

MEMORANDUM

January 31, 2025

To: Robby Eckroth, Senior Planner
Tara Satushek, Senior Planner
Skagit County, Washington

From: Heidi Rous
Climate Director, Kimley-Horn

RE: SUMMARY OF POTENTIAL CLIMATE IMPACTS/RISKS/VULNERABILITIES & POTENTIAL OPPORTUNITIES, CLIMATE ELEMENT AND RESILIENCY SUB-ELEMENT 2025 COMPREHENSIVE PLAN UPDATE, SKAGIT COUNTY

Purpose

As a follow-up to the current policy gaps and opportunities memorandum submitted earlier, this memorandum summarizes potential impacts, risks, and vulnerabilities to key assets in the County. Due to a changing climate, the memorandum identifies potential opportunities for the County to take actions to improve the resiliency of those assets. This memorandum informs new Climate Element and Resiliency Sub-Element, consistent with House Bill 1181 (“HB 1181”) and Washington state’s Growth Management Act (GMA) policies, that is part of the Comprehensive Plan update ([RCW 36.70A.070\(9\)](#)). In correlation with the previous Assets memorandum, this memorandum utilizes identified critical assets to assess potential climate impacts, risks, and vulnerabilities. Under HB 1181 and the GMA for Skagit County, a resiliency sub element must, among other things, equitably enhance resiliency to, and avoid or substantially reduce the adverse impacts of, climate change in human communities and ecological systems through goals, policies, and programs consistent with the best available science and scientifically credible climate projections and impact scenarios ([RCW 36.70A.070\(9\)\(e\)\(i\)](#)).

Scope

Critical infrastructure located within the County are assessed for vulnerability and risk to prioritize climate hazards (see “Analysis” section below). Assets identified are the same as those mentioned in the previous memorandum, *Summary of Climate Hazards and Policy Gaps & Opportunities, Climate Element and Resiliency Sub-Element 2025 Comp Plan Update Skagit County* (“Assets Memorandum”). According to the 2023 Department of Commerce Guidance, assets are defined as community groups, places, natural resources, infrastructure, and services that the community finds valuable and wants to protect against climate-exacerbated hazardous events. This analysis characterizes the exposure of each asset to a climate hazard (sensitivity) along with how frequent the hazard is predicted to occur (probability), how adaptive the asset is to disturbances (adaptive capacity), and how significant functional and physical costs would be (magnitude). This memorandum strives to describe the findings and provide a basis for developing goals and policies that make up the Climate Element and Resiliency Sub-Element.

Methodology

Following guidance from the Washington State Department of Commerce’s Intermediate Planning Guidance [document](#), the Climate Element Workbook was utilized to assess climate impacts, risk, and vulnerabilities, and develop recommended actions. For this assessment, each asset-hazard pair from the Assets Memorandum was assessed in terms of infrastructure sensitivity to climate hazards and adaptive capacity. Both sensitivity and adaptive capacity characterized vulnerability outcomes on a low, medium, and high rating (see definitions in “Analysis” section below). As determined by analysis, outreach, and review of the County’s existing plans mentioned in the “Analysis” section below), the climate hazards most relevant to the County are:

- Drought
- Extreme precipitation,
- Flooding,
- Reduced snowpack,
- Wildfire, and
- Sea level rise.

Based on these specific climate hazards, a total of 93 asset-hazard pairs were analyzed for sensitivity and adaptive capacity using a qualitative rating system (Low, Medium, and High). Ratings were determined based on indicators such as age, asset condition, physical design, social assets, economic costs, etc. Based on the sensitivity and adaptive ratings, an appropriate vulnerability risk rating (Low, Medium, High) was determined. For example, a low sensitivity and a low adaptive capacity would suggest a medium vulnerability for an asset-hazard pair. A total of 63 asset hazard pairs were identified as having medium to high vulnerabilities to climate hazards.

Similarly, the same 63 asset-hazard pairs were analyzed for its probability or frequency of hazard occurrence and the magnitude of potential losses/consequences using a low, medium, and high rating. The ratings were determined based on indicators such as location, social assets, revenue, operations, and safety, etc. Using both the probability and magnitude rating, a composite risk rating was calculated. Based on the composite risk rating, a decision of “Take Action” or “Accept Risk” was identified for each asset-hazard pair. For example, a high probability with a medium magnitude for an asset would indicate a high composite risk rating; thus, a “Take Action” decision was recommended.

Analysis

Vulnerability Characterization

Existing reports, documents, and the County Website were used to gather relevant data pertaining to each hazard. Existing reports and documents include, but are not limited to:

- 2024-2029 Skagit County Capital Facilities Plan
- 2023 Puget Sound Energy Electric Progress Report Chapter 1-9
- 2023 Skagit County Flood Book
- 2023 Skagit County Department of Public Works Annual Bridge Report
- 2023 Skagit River Delta Flood Drainage Project Modeling, Mapping, and Mitigation Analysis
- 2021 Skagit County Comprehensive Emergency Management Plan – Basin Plan
- 2019 Skagit County Community Wildfire Protection Plan Update
- 2019 Oak Ridge National Laboratory - Extreme Weather and Climate Vulnerabilities of the Electric Grid: A Summary of environmental Quantification Methods

- 2016-2036 Skagit County Comprehensive Plan
- 2016 Skagit County Drainage Utility Annual Report
- 2016 Skagit Council of Governments Rail Crossing Study
- 2011 Skagit River Basin Climate Science Report
- 2010 Skagit County Climate Action Plan
- 2003 Skagit County Natural Hazards Mitigation Plan; 2023 Skagit County Natural Hazards Mitigation Plan Update

Through utilization of data found in the above documents, in addition to sources listed in **Appendix B: Sources and References**, the sensitivity and adaptive capacity for each asset-hazard pair were determined based on a low, medium, and high rating according to the appropriate indicators. In accordance with DOE guidance, indicators are identified to qualitatively rank the sensitivity and adaptive capacity of each asset. **Table 1: Sensitivity and Adaptive Capacity Definitions** describes examples of key indicators that exhibit low, medium, and high sensitivity and adaptive capacity.

Table 1: Sensitivity and Adaptive Capacity Definitions			
Example Key Indicators of “Sensitivity”		Example Key Indicators of “Adaptive Capacity”	
Low	<ul style="list-style-type: none"> • Minor repairs and accommodations 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. 	Low	<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. • 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. 	Medium	<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 	High	<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.

Table 1: Sensitivity and Adaptive Capacity Definitions			
	permanent loss of functionality or operations closure. <ul style="list-style-type: none"> • Significant impact to vulnerable populations due to flooding and extreme precipitation-related deaths and illnesses, population displacement, or migration. • Permanent loss of species not able to adapt to weather events exacerbated by climate change. 		<ul style="list-style-type: none"> • Adaptive solutions are highly feasible for most, if not all assets with affordable costs. • Solutions are implemented immediately and face little to no resistance.
Sources: Orange County Transportation Authority, <i>Vulnerability Assessment</i> , Kimley Horn 2023.			

Based on the definitions above and relevant indicators, each asset-hazard pair was evaluated and given an appropriate sensitivity and adaptive capacity rating. Using the sensitivity and adaptive rating, an appropriate vulnerability rating was determined. Each asset-hazard pair describes climate indicators to determine sensitivity, adaptive capacity, and vulnerability ratings (Refer to **Appendix A: Skagit County Climate Element Workbook** for more details).

Risk Characterization

Similar to the Vulnerability Characterization described above, the same resources were used to determine the probability and magnitude ratings for each asset-hazard pair. The definitions for a low, medium, and high probability and magnitude rating are shown in **Table 2: Probability and Magnitude Definitions**.

Table 2: Probability and Magnitude Definitions ¹			
Probability		Magnitude	
<i>Low</i>	Very limited historic events recorded. Frequency of hazardous events to occur is periodic with likelihood of future events to occur episodically. For example, the likelihood of hazardous event(s) to occur once in 20 years.	<i>Low</i>	Minimal destruction to applicable assets with adequate functionality. In addition, minimal injuries and functionality to daily livelihood. Applicable assets may be easily repaired with available resources within a short duration of time without complications.
<i>Medium</i>	Limited, but some available historic events recorded. Frequency of hazardous events to occur is somewhat periodic. For example, likelihood of hazardous event(s) to occur once in 5 to 20 years.	<i>Medium</i>	Moderate destruction to applicable assets with decreased functionality. Injuries and functionality to daily livelihood are moderately heightened. Applicable assets may have increased difficulty for repair and functionality due to increased restoration times and complications. Health concerns are also a higher likelihood with strong suggestions for evacuation plans.
<i>High</i>	Recent, multiple historic events recorded. Hazardous events occur frequently. For example, likelihood of	<i>High</i>	Extreme destruction to applicable assets with little to no functionality. Injuries and functionality to daily livelihood are extremely heightened. Applicable assets will have

Table 2: Probability and Magnitude Definitions ¹			
	hazardous event(s) to occur within 5 years.		significant challenges for repair and elongated periods of construction before functionality can be resumed. Health concerns are at an extreme likelihood with strong coercion for evacuation plans.
1. Definitions for low, medium, and high probability and magnitude were derived from the U.S. Climate Resilience Toolkit, https://toolkit.climate.gov/steps-to-resilience/assess-vulnerability-risk . Accessed November 2024.			

Based on the definitions above and relevant indicators, each asset-hazard pair were evaluated and given an appropriate rating. Each asset-hazard pair describes climate indicators to determine probability, magnitude, and climate risk (Refer to **Appendix A** for more details). It is also important to note that the recommended decisions of “Take Action” or “Accept Risk” should be not understood as a “final” decision for the County. The term “Take Action” can be defined as incorporating changes for the asset-hazard pair within a few years. The term “Accept Risk” can be defined as routine monitoring of the asset-hazard pair before implementing potential action. These decisions are strictly based on the structure of the climate workbook analysis.

Summary of Analysis

Based on the vulnerability and risk analysis, **Table 3: Asset Vulnerability and Climate Hazard Risks** showcase which asset/critical infrastructure are exposed to a priority climate hazard throughout the County. An asset-hazard pair which received a composite risk rating of medium or high are denoted with color scales associated with low (yellow), medium (orange), and high (red) ratings. Composite risk is comprised of an asset’s level of vulnerability to a climate hazard and the probability and magnitude of impact to the asset from a climate hazard. A summary of asset vulnerability and climate hazard risks to critical infrastructure within the County is further provided below.

Table 3: Asset Vulnerability and Climate Hazard Risks

		Priority Climate Hazards ¹						
COMMUNITY ASSETS	Assets	Drought	Extreme Precipitation	Flooding	Reduced Snowpack	Wildfire	Sea Level Rise	
	Neighborhood 1	Yellow	Grey	Grey	Grey	Grey	Orange	Grey
	Neighborhood 2	Grey	Grey	Red	Grey	Grey	Yellow	Yellow
	Neighborhood 3	Yellow	Grey	Grey	Grey	Red	Grey	Grey
	Neighborhood 4	Yellow	Grey	Grey	Grey	Red	Grey	Grey
	Petroleum refineries	Grey	Grey	Grey	Grey	Yellow	Grey	Grey
	Natural gas pipelines	Grey	Grey	Grey	Grey	Orange	Grey	Grey
	Electric utilities	Grey	Grey	Grey	Grey	Orange	Grey	Grey
	Hydroelectric facilities	Grey	Grey	Grey	Grey	Yellow	Grey	Grey
	Farms (Food Systems)	Orange	Red	Grey	Red	Grey	Grey	Grey
	Fisheries (Cultural Resources)	Red	Grey	Red	Grey	Orange	Red	Red
	Farms (Economic Development)	Orange	Orange	Red	Red	Grey	Red	Red
	Commercial Forests	Yellow	Yellow	Orange	Orange	Red	Orange	Orange
	Industrial Businesses	Orange	Yellow	Orange	Yellow	Orange	Orange	Orange
	Rivers	Orange	Grey	Orange	Grey	Yellow	Red	Red
	Fisheries (Ecosystem)	Orange	Grey	Orange	Grey	Yellow	Red	Red
	Nature Preserves	Yellow	Grey	Red	Grey	Red	Red	Red
	Flood Management Infrastructure	Yellow	Red	Red	Grey	Yellow	Red	Red
	Fire Stations	Yellow	Red	Red	Grey	Orange	Red	Red
	Emergency Staging Areas	Yellow	Yellow	Yellow	Grey	Yellow	Yellow	Yellow
	Roadways	Yellow	Orange	Orange	Yellow	Orange	Orange	Orange
	Bridges	Yellow	Orange	Red	Yellow	Grey	Yellow	Yellow
	Railroads	Yellow	Orange	Red	Yellow	Grey	Red	Red
	Public Transit	Yellow	Yellow	Red	Yellow	Grey	Orange	Orange
Solid Waste Facilities	Grey	Yellow	Yellow	Grey	Yellow	Grey	Grey	
Private Septic Tanks	Grey	Yellow	Yellow	Grey	Yellow	Grey	Grey	
Water Treatment Facilities	Yellow	Grey	Grey	Yellow	Orange	Yellow	Yellow	
Reservoirs	Red	Grey	Grey	Red	Yellow	Red	Red	
Schools	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	Yellow	
Radio Towers	Yellow	Red	Orange	Yellow	Red	Orange	Orange	

1. Composite risk ratings are based on a low (yellow), medium (orange), and high (red). Boxes that are grey were not analyzed because of a lack of significant data from the CMRW tool.

Although certain assets may not be exposed to a particular climate hazard, they may be affected by secondary hazards such as landslides from riverine flooding and exposed soil following precipitation events, and flooding from overtopping of levees and unpredictable snowmelt. The section below focuses on asset-hazard pairs with a Medium to High vulnerability rating and Medium to High climate risk rating. Additional details can be found in **Appendix A**.

Findings of Vulnerability and Risk Assessment

- ***Sensitivity***¹: Assets most vulnerable to priority climate hazards are residences, agricultural farms, rivers and tributaries, fisheries, commercial forests used for timber production, industrial/manufacturing businesses, nature preserves, fire stations, flood management infrastructure i.e., dikes/levees, roadways & bridges, railroad infrastructure, public transit infrastructure, wastewater treatment facilities, reservoirs & water supply infrastructure, schools, and telecommunication-fiber optic infrastructure.
- Lower income households in rural areas and with mobility difficulties are vulnerable to climate hazards. A census tract (53057951100) that is in the eastern half of unincorporated County is identified as disadvantaged due to higher-than-average lower income households, cost and time spent on transportation, increased projected flood risk, and increased mortality rates due to natural hazard injuries and fatalities².
- Assets are most likely to be impacted by hazards from seasonal peak (flooding) and low (drought) stream flows, extreme precipitation, and sea level rise. Assets are located in flood zones where increased exposure to flooding is exacerbated by sea level rise, geologic subsidence, storm events, changing precipitation patterns, and high tide events. Assets are also located in upper watershed areas where increased drought conditions can impact profitability of natural resources and subsistence fishing. Examples of climate impacts to assets are further described below:
 - Climate projections anticipate heavier precipitation over winter and early spring, decreased summertime precipitation (drought), and reduced snowpack during early spring. Combined events can lead to intensified surface flooding that delays crop production for agricultural land uses.
 - Local farms produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land with over 90 different crops grown in the County. Crops such as blueberries, raspberries, strawberries, tulips, daffodils, pickling cucumbers, specialty potatoes, Jonogold apples, and vegetable seed are highest revenue generating crops. Around 95% of the red potatoes that are grown in the State of Washington are from Skagit County.
 - Neighborhood 2³ comprises of residential neighborhoods along the Skagit River Delta and the Puget Sound Coast that is located within FEMA’s 100-year floodway. Combined effects of sea level rise and extreme precipitation events during winter and early spring snowmelt and precipitation can expose Neighborhood 2 to increased risk of Phase 2 to 3 flood events that are major to severe.
 - Fish species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions and water quality. Decreased summertime precipitation, changes in peak streamflow due to reduced snowpack, and sea level rise are anticipated to decrease habitat opportunities, especially along tributaries in higher elevations of watersheds.

¹ Information for this section is derived from the County’s updated Multi-Jurisdictional Hazard Mitigation Plan.

² Climate and Economic Justice Screening Tool. [Explore the map - Climate & Economic Justice Screening Tool](#)

³ Exhibit SC-1 Skagit County Hazard Mitigation Neighborhoods – see Assets memorandum for additional details on Neighborhoods within Skagit County.

- Revenue-generating commercial manufacturing and industrial businesses, especially those that rely on raw timber materials, are sensitive to reduced snowpack, drought, wildfire, and flooding. A majority of land used for timber are privately owned: 332,000 acres of private forested timber lands, 282,812 acres of USFS land, and 131,203 acres of State-managed timberlands. Seasonal winter and springtime flooding along with increased summertime drought are anticipated to reduce harvestable trees, potentially impacting revenues for privately owned and operated timber companies. Species composition may shift to hardwoods that can tolerate longer periods of drought.
- Sea level rise (SLR) affects the extent of estuarine habitat (temperature, salinity, tidal height) that affects the abundance, diversity, spatial structure, and productivity of salmon population⁴. Salinity levels, vegetative distribution, and sediment distribution in nearshore environments are also affected that alters the extent of existing pocket estuaries, disrupting juvenile salmon habitats and stressing aquatic species.
- Railroads within the County are owned and operated by BNSF where distribution of gas and petroleum pipelines are exposed to inundation from increased sea levels. March Point refineries produce petroleum and natural gas that is distributed to Canada and southern Washington State. Although March Point and surrounding areas are mostly diked and protected by levees, transportation of petroleum and natural gas by train are subject to flooding from SLR inundation.
- ***Adaptive Capacity:*** The County currently uses land use controls through zoning codes, and memorandums of understanding or agreements, contracts, and programs to engage with private entities and stakeholders on natural resource management and operations. Consortia comprised of elected officials, community members, scientists, and others that provide data enhances collaboration and engagement efforts among stakeholders. For example, the telecommunication consortium (TMC) was created to provide recommendations on best practices for procuring, siting, and managing fiber optic tunnels and telecommunication facilities. Adaptive capacity measures are intended to increase climate resiliency and are further provided in “Recommended Actions” section below.
- ***Probability:*** The frequency of priority climate hazards is anticipated to increase in intensity and become more unpredictable among all assets.
 - ***Frequency of Drought:*** Drought episodes have lasted more than a single season throughout mid-20th century: 1928 to 1932, 1992 to 1994, and 2001⁵. Natural peak summertime flows (June to September) among half of streams Countywide is anticipated to decrease by an average of 40 percent by mid-century under a high emissions scenario⁶.
 - ***Frequency of Extreme Precipitation:*** Precipitation ranges significantly throughout the County. Overall, there is a predicted increase in heavy precipitation magnitude Countywide by eight percent by mid-century⁷.
 - ***Frequency of Flooding:*** Major floods exceeding 80,000 cubic feet per second (“cfs”) has been recorded intermittently since the year 1815 and occurs roughly every one to five years⁸. Annual maximum streamflow is anticipated to be 11 to 20 percent greater than the 30-year baseline by mid-century throughout the County⁹. The Skagit River, Samish River, Sauk River, Suiattle River, and

⁴ Beamer et. al., 2005.

⁵ 2014 Skagit County Natural Hazards Mitigation Plan.

⁶ Climate Mapping for a Resilient Washington, 2023.

⁷ Ibid.

⁸ 2023 Skagit County Flood book, Emergency Response.

⁹ Climate Mapping for a Resilient Washington, 2023.

Cascade River are located in 2% (50-year) and 1% (100-year) annual chance FEMA flood zones and are susceptible to increased hazardous flooding events¹⁰.

- *Frequency of Reduced snowpack/avalanche*: Snowpack is projected to melt quicker during late spring/early summer¹¹, shifting streamflow to shorter but intensified durations. There is an anticipated decrease in April 1st snowpack from a historical average of 22 inches.
- *Frequency of Sea level rise*: Sea level rise is a singular event where sea levels have a 50% likelihood of exceeding 0.7 feet by 2050 and 2.1 feet by 2100¹². Additional studies show that sea levels are projected to rise 0.8 to 1.0 feet by 2050 and 1.1 to 2.0 feet by 2100 under high emissions scenarios¹³. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency that exacerbates sea level rise impacts such as saltwater intrusion of groundwater and surface flooding.
- *Frequency of Wildfire*: Wildfire likelihood – the probability that climate and fuel conditions are conducive to wildfire events (i.e., dry vegetation and soil, prolonged drought, low humidity, strong prevailing winds, fuel loads, etc.) – and high fire danger days are projected to increase by four percent and 11 days Countywide, respectively.
- **Magnitude**: Moderate destruction to certain assets will result in potential losses and consequences. Some assets are anticipated to experience significant destruction resulting in permanent losses. Some examples are included below:
 - Anticipated increase in drought conditions reduces available habitat i.e., flow velocities, water depths, that can impact multiple generations of fish life cycles and risking displacement of native species such as Chinook, Coho, Steelhead, and bull trout. Healthy fish habitat and populations have a direct correlation to cultural practices and traditions that rely on predictable fish runs.
 - Projected sea level rise is anticipated to reduce intertidal marsh areas by approximately 12% (580 acres) in Fir Island under high-emissions mid-century scenarios¹⁴. Potential habitat loss from 1.4 feet to 2.6 feet sea level rise correlates to 211,000 to 530,000 smolt capacity per year, respectively¹⁵. Multiple extreme storm and sea level rise conditions can impact multiple generations, where life cycle of fish are typically 1-4 years.
 - Road, railroad, and pipeline transportation to and from refineries employs a significant amount of workers throughout the County and the region, estimating \$57 million in payroll and more than 800 employees. Projected sea level rise, flooding, and extreme precipitation can reduce revenues and increase operational costs.
 - The I-5 freeway is a Tier 1 roadway carrying more than 10 million tons of freight per year. SR-20 to Anacortes is a Tier 2 roadway carrying 4 to 10 million tons of freight per year. Increased flooding of these roadway reduces opportunities for carrying freight.
 - Reduced snowpack decreases water supply to reservoirs that provide electricity and potable water supply to the County. For example, the Judy Reservoir receives snowmelt from the Cultus

¹⁰ Ibid.

¹¹ 2023 Skagit County Monitoring Program Water Year.

¹² Skagit County 2020 Multi-Jurisdiction Hazard Mitigation Plan Update Volume 1: Planning-Area-Wide Elements. (2020). Retrieved from https://skagitcounty.net/EmergencyManagement/Documents/2020HazMitPlan/Skagit%20County%20HMP_Base_Plan_05132020_Final.pdf

¹³ Beamer et. al., 2005; NOAA Sea Level rise viewer 2023.

¹⁴ Beamer et. al., 2005

¹⁵ Ibid.

Mountains and provides water for agricultural uses, water/wastewater treatment, recreational uses, and ecosystem services. Lake Shannon reservoir supplies a large mix of hydroelectric power to Countywide and regional residents.

- Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains¹⁶. Wildfire regimes are anticipated to increase in severity and frequency throughout the County and State of Washington. Commercial timberlands and rangelands revenue, recreational user experiences, utility infrastructure, and rural communities would be most impacted. For example, the cost of wildfire suppression statewide was \$37 million annually from 2008-2012, and \$153 million from 2013-2018¹⁷. Dollar impacts of wildfire on commercial forests are not available at the County level but are anticipated to increase. Suppression activity costs may outpace revenue generated resulting in a net loss on profitability.

¹⁶ 2019 Update of Skagit County Community Wildfire Protection Plan

¹⁷ Ibid.

Recommended Actions

This section is preliminary for discussion purposes only. Recommended actions are based on cumulative factors in the climate hazard analysis and is subject to change based on further discussions with the County and community members.

- Telecommunication infrastructure i.e., fiber optic cables, radio/cell towers, are a critical facility provided mainly in Anacortes, Mount Vernon, and Burlington. Consider funding opportunities and collaborative pilot programs that provide incentives for private owners or non-profit organizations to establish telecommunication infrastructure in unincorporated areas while considering hazards exacerbated by climate change.
- Riverine flooding is anticipated to increase the most along Sauk Mountain tributaries in southern County area that drain into the Stillaguamish River, and along Sauk River that drain into Skagit River¹⁸. Consider updating the county code to provide development standards for buildings and infrastructure located in 1% chance FEMA flood zones along the Skagit and Sauk Rivers, among other climate scenarios.
- Consider alternative routes and services for rural and disadvantaged communities located in hazardous areas that can be exacerbated by climate change. Promulgate a study or plan through coordination between WSDOT, Skagit Council of Governments, Skagit Transit, road maintenance districts, and other stakeholders.
- Roughly one foot of SLR is projected to inundate the Skagit /Samish delta region by the end of century. Consider a consolidated approach to localized study and mapping of climate hazards, including sea level rise extent, for the County to understand policy implications.
- Dollar impacts of wildfire on commercial forests are not available at the County level. Consider a Countywide assessment of economic impacts of increasing wildfire hazards on timberlands and rangelands, including other relevant sectors.
- Sea level rise (SLR) models show potential inundation extent of Skagit County and does not account for human influences such as improved dikes or levees, altered drainage channels, added floodgates, and other engineering methods. Although the County currently partners with Washington State University on flood management initiatives such as for sea water intrusion of irrigation water sources, a study targeting SLR adaptation strategies and its effects on soil salination and inundation are needed. Further collaboration and consensus building with irrigation and drainage districts, or other stakeholders, to account for sea level rise in future flood management efforts is recommended.

Kimley-Horn looks forward to collaborating with the County to identify potential opportunities to identify priority climate hazard impacts and increase resiliency among all sectors within the community.

Sincerely,

Heidi Rous
Climate Director, Kimley-Horn

On Behalf of County of Skagit, Washington State

¹⁸ Climate Mapping for a Resilient Washington, 2023.

Appendix A: Skagit County Climate Element Workbook

For Tasks 3.1-3.3

Risk Characterization Matrix				
Sensitivity	High	High	High	Medium
	Medium	High	Medium	Low
	Low	Medium	Low	Low
		Low	Medium	High
Adaptive Capacity				

For Tasks 3.4-3.5

Risk Characterization Matrix				
Probability	High	Medium	High	High
	Medium	Low	Medium	High
	Low	Low	Low	Medium
		Low	Medium	High
Magnitude				

Risk Characterization Matrix			
High	Take Action	Take Action	Take Action
Medium	Accept Risk	Take Action	Take Action
Low	Accept Risk	Accept Risk	Take Action
	Low	Medium	High
Composite Risk Rating			

Tasks 3.1-3.3: Assess sensitivity and adaptive capacity to characterize vulnerability

Number	Asset-Hazard Pair <i>(from Column B of Task 1.3 tab)</i>	Sensitivity — Task 3.1 <i>(Low, Medium, or High)</i>	Adaptive Capacity — Task 3.2 <i>(Low, Medium, or High)</i>	Vulnerability — Task 3.3 <i>(Low, Medium, or High)</i>	Notes <i>(The CMRW tool used in Step 1 describes general factors that affect a given sector's sensitivity (susceptibility to change). To qualitatively rate the sensitivity and adaptive capacity of a specific local asset or a broader asset category, start with a core question and then select indicators and available information (e.g., online census data, local plans, and community knowledge) to answer the question. Use the sensitivity and adaptive capacity ratings -- and other information, as desired -- to characterize the asset's vulnerability.)</i>	Indicators Discussion <i>(If desired, use this column to discuss your indicators and how they affected your ratings.)</i>
1	Residential Neighborhood 1 - Drought	High	Medium	High	<p>Neighborhoods 1, 3, and 4 are located outside of the 100-year floodplain and can be more susceptible to summer drought conditions and wildland fires because a high percentage of homes are located in timbered interface areas. Almost 20,000 residents reside in these hazard mitigation neighborhoods, making them more exposed to climate-related risks such as drought, fires, and landslides. Those areas most vulnerable to drought situations are Fidalgo Island and Guemes Island in western Skagit County. According to the Skagit County Population Summary, approximately 49,000 people live in unincorporated areas - this is not split between the four neighborhoods. =High Sensitivity</p> <p>According to the Skagit County Hazard Mitigation Plan Jurisdiction Specific Vulnerability Assessment, Neighborhood 1 has an estimated 4,697 structures with 25% of those structures at risk with a total estimated value of \$354,811,380. This is a lot higher than neighborhoods 2,3, and 4 which have an estimated value of structures at risk at \$187,904,588, \$7,219,131, and \$6,422,988. = High Sensitivity</p> <p>Based on the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, a Drought Contingency Plan should be made alongside the PUD and Skagit County Soil and Water Conservation District spring of 2023 to develop an outreach plan. This plan is anticipated to address public education and water conservation plans/practices (as necessary), particularly when needed for firefighting; however, as of November 12, 2024 and the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023 revised May 2023, there has been no further update. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location
2	Residential Neighborhood 3 - Drought	Low	Medium	Low	<p>Neighborhoods 1, 3, and 4 are located outside of the 100-year floodplain and can be more susceptible to summer drought conditions and wildland fires because a high percentage of homes are located in timbered interface areas. Almost 20,000 residents reside in these hazard mitigation neighborhoods, making them more exposed to climate-related risks such as drought, fires, and landslides. Those areas most vulnerable to drought situations are Fidalgo Island and Guemes Island in western Skagit County. According to the Skagit County Population Summary, approximately 49,000 people live in unincorporated areas - this is not split between the four neighborhoods. =Low Sensitivity</p> <p>According to the Skagit County Hazard Mitigation Plan Jurisdiction Specific Vulnerability Assessment, Neighborhood 3 has an estimated 2,154 structures with 5% of those structures at risk with a total estimated value of \$7,219,131. This is marginal compared to neighborhood 1 which has an estimated 4,697 structures with 25% of those structures at risk with a total estimated value of \$354,811,380. = Low Sensitivity</p> <p>Based on the Skagit County Natural Hazard Mitigation Plan 2023 Update revised may 2023, Initiative #3 can be summarized to develop a drought contingency plan to address public education and water conservation practices (as necessary), particularly when needed for firefighting. The action update of working with the PUD and the Skagit County Soil and Water Conservation District for this initiative has not changed since the revision in may 2023. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location
3	Residential Neighborhood 4 - Drought	Low	Medium	Low	<p>Neighborhoods 1, 3, and 4 are located outside of the 100-year floodplain and can be more susceptible to summer drought conditions and wildland fires because a high percentage of homes are located in timbered interface areas. Almost 20,000 residents reside in these hazard mitigation neighborhoods, making them more exposed to climate-related risks such as drought, fires, and landslides. Those areas most vulnerable to drought situations are Fidalgo Island and Guemes Island in western Skagit County. According to the Skagit County Population Summary, approximately 49,000 people live in unincorporated areas - this is not split between the four neighborhoods. =Low Sensitivity</p> <p>According to the Skagit County Hazard Mitigation Plan Jurisdiction Specific Vulnerability Assessment, Neighborhood 4 has an estimated 1,513 structures with 5% of those structures at risk with a total estimated value of \$6,422,988. This is marginal compared to neighborhood 1 which has an estimated 4,697 structures with 25% of those structures at risk with a total estimated value of \$354,811,380. = Low Sensitivity</p> <p>Based on the Skagit County Natural Hazard Mitigation Plan 2023 Update revised may 2023, Initiative #3 can be summarized to develop a drought contingency plan to address public education and water conservation practices (as necessary), particularly when needed for firefighting. The action update of working with the PUD and the Skagit County Soil and Water Conservation District for this initiative has not changed since the revision in may 2023. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location
4	Residential Neighborhood 1 - Extreme Heat	Low	Medium	Low	<p>Based on the Skagit County Natural Hazards Mitigation Plan, Skagit County experiences nearly every type of weather including wind, rain, drought, snow, fog, extreme heat, etc. These events have a high probability of occurring based on past events; however, there is low to moderate risk associated as the events are relatively short and have localized impacts. Based on the location of neighborhood 1, First Data showcases some hotspots that have major heat risk; however, majority of this neighborhood showcases projected minor-moderate heat risk in the next 30 years. = Low Sensitivity</p> <p>Within the Skagit County Comprehensive Plan 2016-2035, Policy 5A-5.1 has a sub goal to that can be summarized to consider the potential effects of tsunami, high winds with strong winds, sea level rise, and extreme weather events (e.g., extreme heat) for proposed developments or designing infrastructure. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location

5	Residential Neighborhood 2 - Extreme Heat	Low	Medium	Low	<p>Based on the Skagit County Natural Hazards Mitigation Plan, Skagit County experiences nearly every type of weather including wind, rain, drought, snow, fog, extreme heat, etc. These events have a high probability of occurring based on past events; however, there is low to moderate risk associated as the events are relatively short and have localized impacts. Based on the location of neighborhood 2, First Data showcases some hotspots (e.g., near Sedro-Woolley and Mount Vernon that have major heat risk; however, majority of this neighborhood showcases projected moderate heat risk in the next 30 years. = Low Sensitivity</p> <p>Within the Skagit County Comprehensive Plan 2016-2035, Policy 5A-5.1 has a sub goal to that can be summarized to consider the potential effects of tsunami, high winds with strong winds, sea level rise, and extreme weather events (e.g., extreme heat) for proposed developments or designing infrastructure. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location
6	Residential Neighborhood 3 - Extreme Heat	Low	Medium	Low	<p>Based on the Skagit County Natural Hazards Mitigation Plan, Skagit County experiences nearly every type of weather including wind, rain, drought, snow, fog, extreme heat, etc. These events have a high probability of occurring based on past events; however, there is low to moderate risk associated as the events are relatively short and have localized impacts. Also, RN 3 comprises of rural residences that are identified as disadvantaged. Population loss, projected flood risk, lower income households, and transportation barriers are higher than average for the State. Based on the location of neighborhood 3, First Data showcases some hotspots that have severe heat risk; however, majority of this neighborhood showcases projected medium-major with some areas having minor heat risk in the next 30 years. Projected Countywide increase of 5.1 deg. F for summertime max temperatures per CMRW tool. = Low Sensitivity</p> <p>Within the Skagit County Comprehensive Plan 2016-2035, Policy 5A-5.1 has a sub goal to that can be summarized to consider the potential effects of tsunami, high winds with strong winds, sea level rise, and extreme weather events (e.g., extreme heat) for proposed developments or designing infrastructure. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location, disadvantaged communities
7	Residential Neighborhood 4 - Extreme Heat	Low	Medium	Low	<p>Based on the Skagit County Natural Hazards Mitigation Plan, Skagit County experiences nearly every type of weather including wind, rain, drought, snow, fog, extreme heat, etc. These events have a high probability of occurring based on past events; however, there is low to moderate risk associated as the events are relatively short and have localized impacts. Also, RN 4 comprises of rural residences that are identified as disadvantaged. Population loss, projected flood risk, lower income households, and transportation barriers are higher than average for the State. Based on the large area of neighborhood 4, First Data showcases some projected minor heat risk for the next 30 years. Projected Countywide increase of 5.1 deg. F for summertime max temperatures per CMRW tool. = Low Sensitivity</p> <p>Within the Skagit County Comprehensive Plan 2016-2035, Policy 5A-5.1 has a sub goal to that can be summarized to consider the potential effects of tsunami, high winds with strong winds, sea level rise, and extreme weather events (e.g., extreme heat) for proposed developments or designing infrastructure. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location, disadvantaged communities
8	Residential Neighborhood 2 - Flooding	High	High	Medium	<p>According to the Skagit County Hazard Mitigation Plan Jurisdiction Specific Vulnerability Assessment, Neighborhood 2 has an estimated 8,043 structures with 90% considered to be at risk. The average value of each structure is approximately \$155,750 with a total estimated value of structures at risk of \$1,127,427,525. This is significantly higher than Neighborhood 3 with 2,154 estimated structures with 5% considered to be at risk. The average value of each structure in Neighborhood 3 is \$67,030 with a total estimated value of structures at risk to be \$7,219,131. = High Sensitivity</p> <p>Flood risk throughout the County's lowlands is addressed through reservoirs, levees, ditches, pipes, tide gates, and pumps. Further existing policies and goals include targets for increasing the peak flow capacity of the Skagit River downstream of the Sterling bend via construction of one or more flood by-pass channels and setting all existing levees back further from the river. New development plans and site specific permitting will also be aligned with the Skagit County Municipal Code (SCMC 14.16.410 and 14.26.470(4)) include measures to reduce flood hazards. Evacuation plans for the 100-year floodplain have been developed to include signed evacuation routes, evacuation brochures, evacuation walk time maps, siren warning systems, and telephone warning systems to alert residents of imminent danger. = High Adaptive Capacity</p> <p>In addition, Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, initiative #9 states to provide erosion control information and steep slope stability recommendations to citizens and homeowners. Further Initiative #19 states to update the flood profile once the Assessor's data is updated, and the Flood Insurance Study and RiskMAP products are finalized; however, based on Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023 revised May 2023, the action has not been completed.</p> <p>In addition, according to the Skagit County Government Suggested Mitigation Strategies and Projects, there are various mitigation strategies that can be summarized below:</p> <ul style="list-style-type: none"> - Cooperate with various Community Rating System programs that currently exist in Skagit County, continue and expand existing on-going public education programs to inform residents of Skagit County regarding flood risk in Skagit County to provide citizens with information they need in preparation for a catastrophic flood event. - Cooperate with various Community Rating System programs that currently exist in Skagit County, establish and conduct an on-going public education/awareness program to encourage those persons who live and/or own property within the 100-year floodplain to purchase flood insurance. - Enact additional regulations at the local level that will serve to restrict future construction of residential structures and non-agricultural related development within the 100-year floodplain - Develop evacuation plans for the 100-year floodplain that may include signed flood evacuation routes as well as siren warning systems and/or telephone warning systems to alert residents of imminent danger - Continue to conduct buy-out programs, elevation programs, and/or flood-proofing programs for repetitive loss properties within the 100-year floodplain. 	Existing and proposed residential development, location
9	Residential Neighborhood 2 - Sea Level Rise	Medium	Medium	Medium	<p>Neighborhood 2 comprises of the Skagit River delta and Puget Sound coast that follows the boundaries of the river floodplain and can be at greater risk of sea level rise and flood events. Based on the Skagit County Hazard Mitigation Plan Jurisdiction Specific Vulnerability Assessment, Neighborhood 2 has an estimated 8,043 structures with an average value of \$155,750 per structure. Of these structures, 5% is at risk with an estimated total value of structures at risk to be \$62,634,863. This is double that of Neighborhood 1 which has an estimated 4,697 number of structures with an average structure value of \$302,160. Of structures in neighborhood 1, 5% are at risk with a total estimated value of \$70,962,276. = Medium Sensitivity</p> <p>Within the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, initiative #17 states to continue to integrate mitigation planning data into ongoing land-use planning to assist in providing information necessary to enforce existing building codes, floodplain and critical areas ordinances, and shoreline protection.</p> <p>In addition, initiative #28 states to implement cost-effective measures to address the vulnerability of facilities at risk to sea level rise, extreme high tides, and storm surges as they relate to the potential inflow of saltwater. This initiative would lead to working with local private water purveyors and multiple departments such as the Consortium and Dike District Partnership. As of the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, May 2023 update, there has been no progress currently. = Medium Adaptive Capacity</p> <p>In the Skagit County Shoreline Master Program Chapter 4, Goal statement 1 can be summarized to allow for compatible uses of the shorelines in relationship to the limitations of their physical and environmental characteristics. These uses may enhance rather than detract from or adversely impact, the existing shoreline environment. = Medium Adaptive Capacity</p>	Existing and proposed residential development, location

10	Residential Neighborhood 1 -Wildfire	Medium	High	Low	<p>Based on the Skagit County Community Wildfire Protection Plan 2019 Update (CWPP), Skagit County experiences three types of fire threats: structure fires, wildland fires, and wildland-urban interface fires. Based on the CWPP, Neighborhood 1 has varied areas that are identified in the intermix and interface WUI zones. Further, between 2008 and August of 2019, Skagit County has experienced a total of 209 wildland fires with 2009 having the most occurrence of fires. Skagit County typically has numerous fires that occur in forestlands each year; however, all of these fires are extremely small (less than 0.2 acres in size) and remain that way due to the relative high moisture content in fire fuels. From the CWPP wildfire susceptibility assessment, it was concluded that Neighborhood 1 is classified as an area with increased susceptibility to wildfire in Skagit County. = Medium Sensitivity</p> <p>Skagit County has provided educational resources on Firewise USA and Fire Adapted Communities for County homeowners in WUI areas to ensure they can employ fire smart practices. Based on the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, initiative #6 states to continue implementation of coordinated public information program within Skagit County to inform citizens about the hazards faced and the appropriate preparedness such as affixing chimneys, foundations, fire-proof roofing materials, etc. Initiative #11 also states in coordination with the Skagit County Conservation District and local fire agencies, continue to promote a "FireWise" program in the County to increase fire safety zones around businesses and residences. This is especially important for this neighborhood as a high percentage of homes are located in timbered interface areas; thus Initiative #11 also encourages owners to reduce woodland fuel loads on their property. = High Adaptive Capacity</p> <p>Further, based on the CWPP, all aspects of wildland fire are addressed at an inter-agency cooperative level. This includes basic fire prevention and mitigation strategy consisting of pre-suppression. Pre-suppression involves interagency training and communication; wildfire awareness, prevention and preparedness outreach and education; and collaboration among fire agencies. = High Adaptive Capacity</p>	Existing and proposed residential development, location
11	Residential Neighborhood 3 - Wildfire	Medium	High	Low	<p>Based on the Skagit County Community Wildfire Protection Plan 2019 Update (CWPP), Skagit County experiences three types of fire threats: structure fires, wildland fires, and wildland-urban interface fires. Based on the CWPP, Neighborhood 3 has varied areas that are identified in the intermix and interface WUI zones. Further, between 2008 and August of 2019, Skagit County has experienced a total of 209 wildland fires with 2009 having the most occurrence of fires. Skagit County typically has numerous fires that occur in forestlands each year; however, all of these fires are extremely small (less than 0.2 acres in size) and remain that way due to the relative high moisture content in fire fuels. From the CWPP wildfire susceptibility assessment, it was concluded that Neighborhood 3 is classified as an area with increased susceptibility to wildfire in Skagit County. Neighborhood 3 consists primarily of forestlands, river valley floodplains, and rural development. = Medium Sensitivity</p> <p>Skagit County has provided educational resources on Firewise USA and Fire Adapted Communities for County homeowners in WUI areas to ensure they can employ fire smart practices. Based on the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, initiative #6 states to continue implementation of coordinated public information program within Skagit County to inform citizens about the hazards faced and the appropriate preparedness such as affixing chimneys, foundations, fire-proof roofing materials, etc. Initiative #11 also states in coordination with the Skagit County Conservation District and local fire agencies, continue to promote a "FireWise" program in the County to increase fire safety zones around businesses and residences. This is especially important for this neighborhood as a high percentage of homes are located in timbered interface areas; thus Initiative #11 also encourages owners to reduce woodland fuel loads on their property. = High Adaptive Capacity</p>	Existing and proposed residential development, location
12	Residential Neighborhood 4 - Wildfire	Medium	High	Low	<p>Based on the Skagit County Community Wildfire Protection Plan 2019 Update (CWPP), Skagit County experiences three types of fire threats: structure fires, wildland fires, and wildland-urban interface fires. Based on the CWPP, Neighborhood 4 has very limited areas that are identified in the intermix and interface WUI zones. Further, between 2008 and August of 2019, Skagit County has experienced a total of 209 wildland fires with 2009 having the most occurrence of fires. Most occur in Neighborhood 4 where sparse rural residential development exists, and is dominated by timbered forestland and open space. Skagit County typically has numerous fires that occur in forestlands each year; however, all of these fires are extremely small (less than 0.2 acres in size) and remain that way due to the relative high moisture content in fire fuels. From the CWPP wildfire susceptibility assessment, it was concluded that Neighborhood 4 is classified as an area with increased susceptibility to wildfire in Skagit County, affecting rural residents. = Medium Sensitivity</p> <p>Skagit County has provided educational resources on Firewise USA and Fire Adapted Communities for County homeowners in WUI areas to ensure they can employ fire smart practices. Based on the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, initiative #6 states to continue implementation of coordinated public information program within Skagit County to inform citizens about the hazards faced and the appropriate preparedness such as affixing chimneys, foundations, fire-proof roofing materials, etc. Initiative #11 also states in coordination with the Skagit County Conservation District and local fire agencies, continue to promote a "Firewise" program in the County to increase fire safety zones around businesses and residences. This is especially important for this neighborhood as a high percentage of homes are located in timbered interface areas; thus Initiative #11 also encourages owners to reduce woodland fuel loads on their property. = High Adaptive Capacity</p>	Existing and proposed residential development, location
13	Petroleum refineries - Extreme Heat	Medium	High	Low	<p>Petroleum is processed at refineries near Anacortes and delivered via transmission pipelines to Western County. Liquid gas is provided by Northwest Pipeline, BP Olympic Pipeline Company, and Trans Mountain Pipeline, which runs north to south along the Samish and Skagit deltas. The Trans Mountain Puget Sound Pipeline is generally located near West Skagit County and passes through the Skagit river and curves towards the industrial processing areas such as Equilon Enterprises LLC, General Chemical LLC, and Tesora Refining Marketing Company. Similarly, the BP Olympic Company is located similarly to the Trans Mountain Puget Sound Pipeline. Based on First Street data, these areas generally have minor to moderate heat risk = Medium Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities.</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. To build resiliency against climate risks, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards
14	Natural gas pipelines - Extreme Heat	Medium	High	Low	<p>CNG provides natural gas and has a large transmission pipeline that extends from Anacortes in the west to Sedro-Woolley. Based on First Street, heat risk for where the large transmission pipelines are located range from minor to moderate risk. = Medium Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities. CNG also provides rebates and other incentives for energy-efficient building appliances and educational materials for efficient building insulation. = High Adaptive Capacity</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. When technology cannot reduce risks to acceptable levels, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards

15	Electric Utilities - Extreme Heat	Medium	High	Low	<p>Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several days or weeks are defined as extreme heat. As electric utilities are scattered throughout Skagit County, the overall heat risk for the County is minor. Prolonged exposure to extreme heat can reduce output, aka derating, generation capacity, and transmission efficiency and capacity, resulting in systematic energy losses. Turbines and power plants reliant on cool water can become less efficient due to a lower proportional thermal conversion. Extreme heat can also cause overhead lines to sag through thermal expansion, heightening wildfire risk and increasing voluntary power shutoffs and forced blackouts. = Medium Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities.</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. When technology cannot reduce risks to acceptable levels, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards
16	Baker River Hydroelectric Project - Extreme Heat	Low	High	Low	<p>Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several days or weeks are defined as extreme heat. The Baker River Hydroelectric Project covers almost 300 square miles in Washington state. The project creates more than 7,203 acres of water surface that provides public recreation, fisheries, flood risk management, and hydropower benefits for the communities in the Skagit River Valley and the greater northwest. To ensure public safety of the operation of this project, PSE complies with strict regulations and have developed a comprehensive Dam Safety Program. The project also has a early-warning siren system as part of the PSE Dam Safety Program and Emergency Action Plan. = Low Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities.</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. To build resiliency against climate risks, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards
17	Electric Utilities - Wildfire	Medium	High	Low	<p>Based on the CWPP, between 2008 and August of 2019, Skagit County experienced a total of 209 wildland fires. Skagit County typically has numerous fires that occur in forestlands each year, but most fires are extremely small (less than 0.2 acres in size) and remain small due to the relative high moisture content in fire fuels. Electric utilities are scattered throughout Skagit County. Occasional large scale wildfire events have widespread impacts to electricity supply - destruction of asset, lengthy repairs required, loss of service and power. = Medium Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities. PSE also proposes future major construction for existing transmission lines and substations such as the Sedro-Woolley substation, to retrofit and rebuild existing conditions. Rebuilding the transmission and distribution lines would strengthen the current system and reduce the frequency of outages in the area, thus concurrently building resiliency to potential outages due to climate risks. PSE energy security and resiliency investments consider microgrids or infrastructure hardening where specific locations require increased resiliency. These locations may include highly impacted communities, transportation hubs, emergency shelters, and areas at risk for isolation during significant weather events or wildfires. = High Adaptive Capacity</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. To build resiliency against climate risks, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards
18	Natural Gas Pipelines - Wildfire	Low	High	Low	<p>Based on the CWPP, between 2008 and August of 2019, Skagit County experienced a total of 209 wildland fires. Skagit County typically has numerous fires that occur in forestlands each year, but most fires are extremely small (less than 0.2 acres in size) and remain small due to the relative high moisture content in fire fuels. CNG provides natural gas and has a large transmission pipeline that extends from Anacortes in the west to Sedro-Woolley. Based on First Street, wildfire risk for where the large transmission pipelines are located range from moderate to major risk; however, these pipelines are buried underground with differing depths based on their conduit sizing. = Low Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities.</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. To build resiliency against climate risks, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards

19	Petroleum refineries - Wildfire	Low	High	Low	<p>Petroleum is processed at refineries near Anacortes and delivered via transmission pipelines to Western County. Liquid gas is provided by Northwest Pipeline, BP Olympic Pipeline Company, and Trans Mountain Pipeline, which runs north to south along the Samish and Skagit deltas. The Trans Mountain Puget Sound Pipeline is generally located near West Skagit County and passes through the Skagit river and curves towards the industrial processing areas such as Equilon Enterprises LLC, General Chemical LLC, and Tesora Refining Marketing Company. Similarly, the BP Olympic Company is located similarly to the Trans Mountain Puget Sound Pipeline. Based on the CWPP and First Street data, these areas generally have low recorded wildfires and minor risk. = Low Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities.</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. To build resiliency against climate risks, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards
20	Baker River Hydroelectric Project - Wildfire	High	High	Medium	<p>Based on the Seattle Light Wildfire Risk Reduction Strategy, portions of the 230 kW system of the Baker River Hydroelectric Project were deenergized to support evacuation and reduce risk to buildings and infrastructure. Customer accounts lost service for more than 10 minutes; however, no additional service disruption to customers occurred as additional circuits were available for meeting customer load. Further in 2015 and 2023, lightning strikes ignited wildfires in the Skagit River Watershed, which caused the City Light's company towns and a temporary shutoff of transmission lines from the project. = High Sensitivity</p> <p>Skagit County has developed standards for existing and future utility construction and operation conditions. For instance, utility assets must be sited underground whenever feasible. These standards apply to surface utility lines, aerial lines, water outfalls, flowlines, powerhouses for hydropower, and tidal/wave energy facilities.</p> <p>Utility construction, including maintenance and repair, must comply with County regulations, including the Critical Areas Ordinance and vegetation management standards. The Critical Areas Ordinance was adopted to assist in conserving the value of a property, safeguarding the public welfare, and providing protection for the following critical areas: Wetlands, Frequently Flooded Areas, Aquifer Recharge Areas, Geologically Hazardous Areas, and Fish and Wildlife Habitat Conservation Areas. To build resiliency against climate risks, Skagit County ensures that utility facilities are not sited in designated critical areas unless feasible alternatives are unavailable, as some existing gas pipelines and electricity generating and transmission facilities are located in such areas. = High Adaptive Capacity</p>	Physical Design, location, design standards
21	Farms-Drought (Ag & Food Systems)	High	High	Medium	<p>Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. In addition, local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land. Over 90 different crops are grown in the County. Blueberries, raspberries, strawberries, tulips, daffodils, pickling cucumbers, specialty potatoes, Jonagold apples, and vegetable seed are some of the more important crops in this maritime valley. More tulip, iris, and daffodil bulbs are produced here than in any other county in the U.S. Furthermore, 95% of the red potatoes grown in the state of Washington are from Skagit County. Agricultural use of water mainly consists of surface and groundwater for Skagit County. Reduced snowpack would indicate reduced aquifer and groundwater recharge. Based on the Economic Indicators of Agriculture in Skagit County, water use in agriculture from 1990-2005 primarily came from groundwater with approximately 30% each year coming from surface water. This suggests that majority of water consumption for agriculture in Skagit County uses groundwater; thus, reduced snowpack may heavily impact this. = High Sensitivity</p> <p>Asset benefits from initiatives like the WSU Water and Irrigation sustainability education (WISE) program, providing technical support for irrigation efficiency. In addition, farmers in Skagit County have often changed their farming practices and products to sustain their operations. For instance, Skagit County was once known for peas; however, they have shifted to producing other crops in respond to changing demands and resources. = High Adaptive Capacity</p>	Agricultural supply and livelihood
22	Farms-Extreme precipitation (Ag & Food Systems)	Medium	Medium	Medium	<p>Extreme precipitation poses a high risk to the agriculture sector in Skagit County. The secondary hazard of flooding from extreme precipitation leads to the risk of waterlogged soils from heavy rainfall has disrupted farming operations by damaging crops, eroding soil, and impacting irrigation systems. The unpredictability of precipitation patterns exacerbates the challenge, leads to economic losses and reduced agricultural productivity. = Medium Sensitivity</p> <p>Skagit County has partnerships with Washington State University and programs such as the WSU Water and Irrigation sustainability education (WISE) program. These programs and partnerships contribute to improving irrigation efficiency and offer technical assistance to mitigate the effects of climate change. Efforts that focus on the secondary hazard of flooding from extreme precipitation include riparian restoration and adaptive infrastructure. = Medium Adaptive Capacity</p>	Agricultural supply and livelihood
23	Farms - Wildfire	Low	Medium	Low	<p>Farms are mainly located in the delta where agricultural burns are permitted. Asset is predominantly not located in WUI zone (State UI webapp). Impacts to food systems are minimal. = Low Sensitivity</p> <p>Farms utilize controlled burns to reinforce nutrient density in soil. Asset is sited in areas not exposed to wildfire risk and is protected by County legacy programs to protect asset = Medium Adaptive Capacity</p>	Controlled burn practices
24	Farms-Reduced snowpack (Ag & Food Systems)	High	High	Medium	<p>Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. In addition, local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land. Over 90 different crops are grown in the County. Blueberries, raspberries, strawberries, tulips, daffodils, pickling cucumbers, specialty potatoes, Jonagold apples, and vegetable seed are some of the more important crops in this maritime valley. More tulip, iris, and daffodil bulbs are produced here than in any other county in the U.S. Furthermore, 95% of the red potatoes grown in the state of Washington are from Skagit County. Agricultural use of water mainly consists of surface and groundwater for Skagit County. Reduced snowpack would indicate reduced aquifer and groundwater recharge. Based on the Economic Indicators of Agriculture in Skagit County, water use in agriculture from 1990-2005 primarily came from groundwater with approximately 30% each year coming from surface water. This suggests that majority of water consumption for agriculture in Skagit County uses groundwater; thus, reduced snowpack may heavily impact this. = High Sensitivity</p> <p>Farmers in Skagit County have often changed their farming practices and products to sustain their operations. For instance, Skagit County was once known for peas; however, they have shifted to producing other crops in respond to changing demands and resources. = High Adaptive Capacity</p>	Agricultural supply and livelihood

25	Fisheries-Drought (Cultural Resources)	High	Medium	High	<p>Skagit River is the only Puget Sound river system with all five Pacific Salmon species and has largest remaining wild runs of threatened Chinook, with high proportion of salmon spawning streams in rural areas. Reduced water levels from less precipitation causes water temperatures to rise and/or upper tributaries to dry up - changes in water quantity, timing, and quality are projected to disrupt food webs and limit access to critical habitats for aquatic species. Swinomish and upper Skagit delta tribes have traditional hunting grounds and cultural spiritual connection and identity to salmon that are threatened by salmon's declining population. First salmon feast and ceremonial gathering takes place during first annual return of salmon - includes traditional storytelling, customs, connection to nature/Mother Earth and other tribal members. = High Sensitivity</p> <p>Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. County's Salmor Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. = Medium Adaptive Capacity</p>	Inconsistent conditions for spawn cycles
26	Fisheries-Flooding	High	Medium	High	<p>Skagit River is the only Puget Sound river system with all five Pacific Salmon species and has largest remaining wild runs of threatened Chinook, with high proportion of salmon spawning streams in rural areas. In estuarine habitats, extreme precipitation can alter salinity levels, disrupting juvenile salmon habitats and stressing aquatic species. In stream and river habitats, heavy rainfall leads to increased flooding and sedimentation, which negatively affects spawning areas and water quality. Flooding causes secondary hazards such as riverbank erosion - changes in location of traditional hunting grounds and changes in water quantity, timing, and quality are projected to disrupt food webs and limit access to cultural traditions and practices. Swinomish and upper Skagit delta tribes have traditional hunting grounds and cultural spiritual connection and identity to salmon that are threatened by salmon's declining population. First salmon feast and ceremonial gathering takes place during first annual return of salmon - includes traditional storytelling, customs, connection to nature/Mother Earth and other tribal members. = High Sensitivity</p> <p>Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are sensitive to peak streamflow/high velocity conditions. Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. County's Salmor Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Species life cycle, Water flow conditions
27	Fisheries-Sea Level Rise	High	Medium	High	<p>Projections indicate sea levels may rise by 1.0 to 2.0 feet between 2050 and 2100, reducing intertidal marsh areas by approximately 12% and adversely affecting juvenile Chinook salmon that depend on these habitats. In estuarine habitats, SLR can alter salinity levels, disrupting juvenile salmon habitats and stressing aquatic species. Increased inundation and saltwater intrusion during winter and early spring months can lead to the loss of critical habitats for Coldwater species, particularly in estuarine and intertidal zones. Warmer water temperatures due to new shallower shorelines and increased frequency of floods and low flows during summer months threaten aquatic ecosystems that impact flow velocities and habitat access. Changes in location of traditional hunting grounds and changes in water quantity, timing, and quality are projected to disrupt food webs and limit access to cultural traditions and practices. Swinomish and upper Skagit delta tribes have traditional hunting grounds and cultural spiritual connection and identity to salmon that are threatened by salmon's declining population. First salmon feast and ceremonial gathering takes place during first annual return of salmon - includes traditional storytelling, customs, connection to nature/Mother Earth and other tribal members. = High Sensitivity</p> <p>Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Species life cycle, Water flow conditions
28	Fisheries - Wildfire	Medium	Medium	Medium	<p>Fisheries located in upper watershed tributaries are susceptible to wildfire risk. Increased wildfire risk can lead to more wildfire events that cause sedimentation and higher water temperatures - impacting habitat quality for fish. These are singular events that cause temporary impacts to fish habitat. = Medium Sensitivity</p> <p>Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive capacity</p>	Flow conditions
29	Farms-Drought (Economic Development)	Medium	Medium	Medium	<p>Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. In addition, local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land. Over 90 different crops are grown in the County. = Medium Sensitivity</p> <p>Skagit County benefits from initiatives like the WSU Water and Irrigation Sustainability Education (WISE) program, which enhances irrigation efficiency and offers technical support. However, the significant impact of drought on water availability and crop health means that while adaptive measures are in place, they may not fully mitigate the severe effects of extended dry periods on agricultural operations. = Medium Adaptive Capacity</p>	Economic prosperity in agricultural industry, crop production

30	Farms-Extreme precipitation	High	Medium	High	<p>Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. In addition, local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land. Over 90 different crops are grown in the County. Extreme precipitation poses a high risk to the agriculture sector in Skagit County. The secondary hazard of flooding from extreme precipitation leads to the risk of waterlogged soils from heavy rainfall has disrupted farming operations by damaging crops, eroding soil, and impacting irrigation systems. The unpredictability of precipitation patterns exacerbates the challenge, leads to economic losses and reduced agricultural productivity. Reduced agricultural productivity may lead to millions of dollars lost for this sector. =High Sensitivity</p> <p>Skagit County has partnerships with Washington State University and programs such as the WSU Water and Irrigation sustainability education (WISE) program. These programs and partnerships contribute to improving irrigation efficiency and offer technical assistance to mitigate the effects of climate change. Efforts that focus on the secondary hazard of flooding from extreme precipitation include riparian restoration and adaptive infrastructure. =Medium Adaptive Capacity</p>	Economic prosperity in agricultural industry, crop production
31	Farms-Flooding	Medium	Medium	Medium	<p>Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. In addition, local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land. Over 90 different crops are grown in the County. Rising sea levels are projected to impact Skagit County's agricultural lands, particularly in the Skagit River delta, where inundation could damage crops and prevent future planting. Most farming and pastureland in Skagit County are located within the floodplain-delta area, making it highly susceptible to recurrent flooding. Some vulnerable crops include tulips and various vegetable crops (including seed crops), as they may still be in the ground during fall floods or need to be planted in spring before floodwaters have receded. The escalating flood risk is also expected to cause direct damage to farm infrastructure. =Medium Sensitivity</p> <p>The Swinomish Indian Tribal Community is actively enhancing its adaptive capacity in the face of climate change by implementing adaptation recommendations developed in its 2010 Climate Change Adaptation Action Plan. Some key initiatives include revising shoreline codes, creating a detailed coastal protection plan for the vulnerable 1,100 low-lying acres on the north end of the Reservation, establishing a Reservation-wide wildfire risk reduction program, and developing a system of community health indicators to measure awareness and impacts of climate change within the tribal community. Skagit County also continues to partner with the Washington State University (WSU) Agriculture Programs at WSU Skagit Extension. This collaboration helps the agricultural sector with programs such as WSU water irrigation system efficiency and cultivating success. =Medium Adaptive Capacity</p>	Economic prosperity in agricultural industry, crop production
32	Farms-Reduced snowpack	High	High	Medium	<p>Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. In addition, local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land. Over 90 different crops are grown in the County. Blueberries, raspberries, strawberries, tulips, daffodils, pickling cucumbers, specialty potatoes, Jonagold apples, and vegetable seed are some of the more important crops in this maritime valley. More tulip, iris, and daffodil bulbs are produced here than in any other county in the U.S. Furthermore, 95% of the red potatoes grown in the state of Washington are from Skagit County. Agricultural use of water mainly consists of surface and groundwater for Skagit County. Reduced snowpack would indicate reduced aquifer and groundwater recharge. Based on the Economic Indicators of Agriculture in Skagit County, water use in agriculture from 1990-2005 primarily came from groundwater with approximately 30% each year coming from surface water. This suggests that majority of water consumption for agriculture in Skagit County uses groundwater; thus, reduced snowpack may heavily impact revenue heavily =High Sensitivity</p> <p>Farmers in Skagit County have often changed their farming practices and products to sustain their operations. For instance, Skagit County was once known for peas; however, they have shifted to producing other crops in response to changing demands and resources. =High Adaptive Capacity.</p>	Economic prosperity in agricultural industry, crop production
33	Farms-Sea level rise	High	Low	High	<p>Skagit County has a rich agricultural industry and many important ecosystems, historically shaped by the unconfined Skagit River delta. Approximately 90% of the county's farmgate value is produced on around 60,000 acres in the Skagit and Samish Deltas, areas that rely on specialized diking, drainage, and irrigation districts to maintain productivity. In addition, local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land. Over 90 different crops are grown in the County. Sea level rise may lead to inundation and soil salination from saltwater intrusion. Thus, this may lead to reduced arable land which would threaten crop yields and productivity. Rising sea levels may also lead to groundwater intrusion that may disrupt aquifer recharge; consequently, contamination of local water supplies may occur. Farms are mostly located on within western Skagit County near the coastal shorelines. On the Swinomish Indian Tribal Community Reservation on Fidalgo Island in southwestern Skagit County, over 1,100 acres—including all of the reservation's agricultural lands south of SR20 and adjacent to the Swinomish Channel—face a high risk of inundation from sea level rise and storm surge. =High Sensitivity</p> <p>Skagit County has efforts that include partnerships with WSU for irrigation efficiency and flood management initiatives (e.g., for sea water intrusion). However, more targeted adaptation strategies specifically addressing sea level rise and its effects on soil salination and inundation are needed. =Low Adaptive Capacity</p>	Economic prosperity in agricultural industry, crop production
34	Farms - Wildfire	Low	Medium	Low	<p>Farms are mainly located in the delta where agricultural burns are permitted. Asset is predominantly not located in WUI zone (State UI webapp). Impacts to economic development depends on the product - products that are susceptible to slight changes in water quality and availability i.e., grass for livestock, potatoes, berries, etc. would be impacted. Diversity of crops can reduce impacts on economic depression from wildfire events on farms. =Low Sensitivity</p> <p>Skagit County benefits from initiatives like the WSU Water and Irrigation Sustainability Education (WISE) program, which enhances irrigation efficiency and offers technical support. However, the significant impact of drought on water availability and crop health means that while adaptive measures are in place, they may not fully mitigate the severe effects of extended dry periods on agricultural operations. =Medium Adaptive Capacity</p>	Location

35	Commercial forests-Drought & Reduced Snowpack (Economic Dev)	High	Medium	High	<p>The 332,000 acres of private forested timber lands, 282,812 acres of USFS land, and 131,203 acres of state-managed timberlands in the County are exposed to increased drought that increases wildfire risk. Projected decrease in snowpack impacts tree species' ability to store water, making them more susceptible to disease and increasing mortality that ultimately reduces economic returns. Mid-century climate change pressures on plant hardiness zones for Skagit county in degrees Celsius:</p> <p>7: -17.7 to -12.2 8: -12.1 to -6.7 9: -6.6 to -1.1</p> <p>Forestry species below are sensitive to increasing temperatures and drought conditions (source: Tree seed zone web app, 2024):</p> <ul style="list-style-type: none"> - Douglas-Fir (highest demand) - Western Hemlock - Western Redcedar (high average value) - Red Alder - Sitka Spruce (high demand) - Alaskan Yellow Cedar (high average value) - Port Orford Cedar (high average value) - Grand Fir - Ponderosa Pine - Western White Pine - Pacific yew = High Sensitivity <p>Shift to other revenue-generating tree species for drought tolerance: oaks, madrone, eucalyptus, etc. may be costly and difficult to implement. Skagit conservation district and other organizations help forestry businesses by providing resources i.e., forestry mgt planning, funding availability, reforestation, etc. = Medium Adaptive Capacity</p>	Soil moisture, Hardiness zone
36	Commercial forests - Wildfire	Medium	Medium	Medium	<p>The 332,000 acres of private forested timber lands, 282,812 acres of USFS land, and 131,203 acres of state-managed timberlands are located in eastern County with minimal increases in high fire danger days of 5 days, which is close to the county average of 6 days. State-managed timberlands by DNR 2024 revenue = \$3,856,410, lower than the 10-year average. Wildfire events in eastern County are often small scale and unpredictable but is projected to increase in frequency and severity. Impacts to economic development is dependent upon scale and extent of fire on public or private operated timberlands. Large scale wildfire events would significantly impact revenue. = Medium Sensitivity</p> <p>Shift to other revenue-generating tree species for drought tolerance: oaks, madrone, eucalyptus, etc. may be costly and difficult to implement. Skagit conservation district and other organizations help forestry businesses by providing resources i.e., forestry mgt planning, funding availability, reforestation, etc. = Medium Adaptive Capacity</p>	Wildfire scale, extent
37	Commercial forests-Extreme precipitation & Flooding	Medium	Medium	Medium	<p>The 332,000 acres of private forested timber lands, 282,812 acres of USFS land, and 131,203 acres of state-managed timberlands are exposed to extreme precip and flooding. Forestry tree species are more likely to experience damage from secondary impacts i.e., landslides, erosion, due to extreme precip and flooding hazards. Forest lands located in unstable hillside areas or poorly drained soils with shallow root systems are more susceptible. Areas with unstable slopes are located along tributaries in the river valley near Concrete, Van Horn, Rockport, and Marblemount. = Medium Sensitivity</p> <p>Adaptation methods include relocating operations and/or reinforcing hillside areas to mitigate erosion - protective measures are managed by SMP and municipal code to protect ecological functions. = Medium Adaptive Capacity</p>	Landslides
38	Commercial forests-Sea level rise	Low	Medium	Low	<p>The 332,000 acres of private forested timber lands, 282,812 acres of USFS land, and 131,203 acres of state-managed timberlands are exposed to SLR hazards. In particular, commercial forests in southern flank of Chuckanut Mountains can be damaged due to secondary SLR hazards such as bluff toe erosion that causes landslides, and debris avalanches. This area represents a small portion of total commercial forests in the County. = Low Sensitivity</p> <p>Adaptation methods include relocating operations and/or reinforcing coastal bluffs to mitigate erosion - bluff protective measures are superseded by ecological functions per the SMP. = Medium Adaptive Capacity</p>	Revenue
39	Industrial businesses-Drought & Reduced snowpack (Economic Dev)	Medium	Medium	Medium	<p>Large manufacturing industries include food manufacturing, machinery, wood products, petroleum, and coal. Industrial manufacturing facilities such as those located and managed at the Port of Anacortes, March Point, and Fredonia i.e., soil mixing/amendment warehouses, chemical facilities, gas suppliers, etc. can experience disruptions in business continuity due to raw supply limitations. Some businesses provide energy to critical facilities and product to agricultural farms, among others creating a chain reaction of price fluctuations. Timber, biomass, wood products, and food manufacturing products would be most affected by decreased snowpack, requiring alternative sourcing of raw materials. = Medium Sensitivity</p> <p>County receives large portion of general fund and non-general fund revenue from retail sales tax, property tax, and leases - other revenue sources come from state and federal grants, and taxes levied for goods and services (FY2025 adopted revenue budget report, Skagit county). Gross business income (GBI) in 2023 was \$7.81 billion; manufacturing, construction, wholesale, and retail trades are biggest contributor to County's GBI (Source: 2024 Economy Overview report, Economic Development Alliance of Skagit County repository) and comprises 9.13% of the County's economy. Manufacturing is the third largest employer (Ibid). Disruption to business continuity would result in lost profitability that can be recovered by business decisions i.e., wage compensation, supply chain change, grant funding, etc., and siting industrial/manufacturing facilities in other buildable lands able to accommodate industrial uses - 1,767 acres of taxable County land is available for industrial uses (2016 County Comp Plan). County has resources i.e., mental health, job boards, workforce training, etc. County has incentives i.e., business grants, streamlined permitting, tax exemptions, tax credits, etc. for manufacturing/industrial businesses in unincorporated County. Adaptation is restricted by budget and personnel availability. Recommend coordination with stakeholders to plan for potential impacts. = Medium Adaptive Capacity</p>	Raw materials supply restrictions

40	Industrial businesses-Extreme precipitation & Flooding	Medium	Medium	Medium	<p>Large manufacturing industries include food manufacturing, machinery, wood products, petroleum, and coal. Industrial manufacturing facilities in low-lying areas such as those located and managed at the March Point and Fredonia i.e., soil mixing/amendment warehouses, chemical facilities, gas suppliers, etc. can experience disruptions in business continuity due to peak streamflows and riverine and delta flooding. Businesses provide energy to critical facilities and product to agricultural farms, among others creating a chain reaction of price fluctuations. Inundation of chemical plants can create hazardous conditions, requiring businesses to mitigate that can be costly and time-consuming. = Medium Sensitivity</p> <p>County receives large portion of general fund and non-general fund revenue from retail sales tax, property tax, and leases - other revenue sources come from state and federal grants, and taxes levied for goods and services (FY2025 adopted revenue budget report, Skagit county). Gross business income (GBI) in 2023 was \$7.81 billion; manufacturing, construction, wholesale, and retail trades are biggest contributor to County's GBI (Source: 2024 Economy Overview report, Economic Development Alliance of Skagit County repository) and comprises 9.13% of the County's economy. Manufacturing is the third largest employer (Ibid). Disruption to business continuity would result in lost profitability that can be recovered by business decisions i.e., wage compensation, supply chain change, grant funding, etc., and siting industrial/manufacturing facilities in other buildable lands able to accommodate industrial uses - 1,767 acres of taxable County land is available for industrial uses (2016 County Comp Plan). County has resources i.e., mental health, job boards, workforce training, etc. County has incentives i.e., business grants, streamlined permitting, tax exemptions, tax credits, etc. for manufacturing/industrial businesses in unincorporated County. Adaptation is restricted by budget and personnel availability. Recommend coordination with stakeholders to plan for potential impacts. = Medium Adaptive Capacity</p>	Location in low-lying areas
41	Industrial/manufacturing businesses-Sea level rise	Medium	Medium	Medium	<p>Large manufacturing industries include food manufacturing, machinery, wood products, petroleum, and coal. Industrial manufacturing facilities such as those located and managed at the Port of Anacortes, March Point, and Fredonia i.e., soil mixing/amendment warehouses, chemical facilities, gas suppliers, etc. can experience disruptions in business continuity due to SLR inundation. Businesses provide energy to critical facilities and product to agricultural farms, among others creating a chain reaction of price fluctuations. Inundation of chemical plants can create hazardous conditions, requiring businesses to mitigate that can be costly and time-consuming. Marine terminal facilities i.e., Dakota Creek shipyard, Dunlop Towing's log-rafting facility in Swinomish Village, generated \$86.2 million in revenue in 2013 (Source: 2020 HMP). = Medium Sensitivity</p> <p>County receives large portion of general fund and non-general fund revenue from retail sales tax, property tax, and leases - other revenue sources come from state and federal grants, and taxes levied for goods and services (FY2025 adopted revenue budget report, Skagit county). Gross business income (GBI) in 2023 was \$7.81 billion; manufacturing, construction, wholesale, and retail trades are biggest contributor to County's GBI (Source: 2024 Economy Overview report, Economic Development Alliance of Skagit County repository) and comprises 9.13% of the County's economy. Manufacturing is the third largest employer (Ibid). Disruption to business continuity would result in temporary or permanent closure and lost profitability that can be recovered by business decisions i.e., wage compensation, supply chain change, grant funding, etc., and siting industrial/manufacturing facilities in other buildable lands able to accommodate industrial uses - 1,767 acres of taxable County land is available for industrial uses (2016 County Comp Plan). County has resources i.e., mental health, job boards, workforce training, etc. County has incentives i.e., business grants, streamlined permitting, tax exemptions, tax credits, etc. for manufacturing/industrial businesses in unincorporated County. Adaptation is restricted by budget and personnel availability. Recommend coordinating with stakeholders to plan for potential impacts from SLR. = Medium Adaptive Capacity</p>	Impacts to supply chain
42	Industrial/manufacturing businesses-Wildfire	Medium	Medium	Medium	<p>Large manufacturing industries include food manufacturing, machinery, wood products, petroleum, and coal. Industrial manufacturing facilities such as those located and managed at the Port of Anacortes, March Point, and Fredonia i.e., soil mixing/amendment warehouses, chemical facilities, gas suppliers, etc. are located in WUI-interface and WUI-intermix zones and can experience disruptions in business continuity due to increased wildfire risk. High fire danger days are projected to increase significantly (twice the County average of 6 days) in western County where a majority of industrial/manufacturing businesses are located per CMRW tool. = Medium Sensitivity</p> <p>County receives large portion of general fund and non-general fund revenue from retail sales tax, property tax, and leases - other revenue sources come from state and federal grants, and taxes levied for goods and services (FY2025 adopted revenue budget report, Skagit county). Gross business income (GBI) in 2023 was \$7.81 billion; manufacturing, construction, wholesale, and retail trades are biggest contributor to County's GBI (Source: 2024 Economy Overview report, Economic Development Alliance of Skagit County repository) and comprises 9.13% of the County's economy. Manufacturing is the third largest employer (Ibid). Disruption to business continuity would result in lost profitability that can be recovered by business decisions i.e., wage compensation, supply chain change, grant funding, etc., and siting industrial/manufacturing facilities in other buildable lands able to accommodate industrial uses - 1,767 acres of taxable County land is available for industrial uses (2016 County Comp Plan). County has resources i.e., mental health, job boards, workforce training, etc. County has incentives i.e., business grants, streamlined permitting, tax exemptions, tax credits, etc. for manufacturing/industrial businesses in unincorporated County. Adaptation is restricted by budget and personnel availability. Recommend coordination with stakeholders to plan for potential impacts. = Medium Adaptive Capacity</p>	Impacts to supply chain
43	Rivers/Fisheries-Drought (Ecosystems)	High	Medium	High	<p>Reduced water levels from less precipitation causes water temperatures to rise and/or upper tributaries to dry up - changes in water quantity, timing, and quality are projected to disrupt food webs and limit access to critical habitats for aquatic species. Sensitive fish species that are also protected under the Endangered Species Act: Chinook, coho salmon, steelhead, bull trout. During warmer periods, fish must expend more energy to regulate their metabolism, especially when water is scarce and suboptimal. Even though fish in productive areas with abundant food can grow faster in warmer conditions, the increased metabolic costs can limit growth if temperatures rise too high and increase mortality rates. Reduced late summer precip can also impact peak fall time/wintertime streamflows, altering spawning conditions for late summer species. = High Sensitivity</p> <p>Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Reduced optimal flows for spawning and incubation
44	Rivers/Fisheries-Flooding & Reduced snowpack	High	Medium	High	<p>Peak streamflow is anticipated to decrease, altering timing and quantity of streamflows. Flow velocities and water depths accessible to fish for spawning and habitation are indicators of ecosystem health. Near-optimal flows for rearing range from about 7,000 to nearly 45,000 CFS. Near-optimal spawning flows are a narrower range, from about 10,000 to about 18,000 CFS (Duke engineering, 1999). Streamflow is dependent on snowmelt and precipitation. High river discharges/flooding can also occur near coastal areas from SLR inundation, or a mix of high peak streamflow conditions and SLR/coastal storm surges. = High Sensitivity</p> <p>Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. County's Salmor Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Reduced optimal flows for spawning and incubation

45	Rivers/Fisheries - Extreme Heat	Medium	Medium	Medium	<p>Increased summer max temperatures i.e., ambient air temperatures, are anticipated to increase surface water temperatures. Upstream river areas with larger water columns/deeper riverbanks maintain cooler waters and lower depths for fish to migrate. Summer months- where low flows exist in conjunction with higher temperatures- can threaten migratory pathways and habitat access for juvenile fish. = Medium Sensitivity</p> <p>Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. County's Salmon Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Increased surface water temperatures
46	Rivers/Fisheries - Sea level rise	High	Medium	High	<p>SLR affects extent of estuarine habitat (temperature, salinity, tidal height) that affects the abundance, diversity, spatial structure, and productivity of salmon population (Beamer et. al., 2005). SLR can alter salinity levels, vegetative distribution, and sediment distribution in nearshore environments, that alters extent of existing pocket estuaries, disrupting juvenile salmon habitats and stressing aquatic species. Projections indicate sea levels may rise by 1.0 to 2.0 feet between 2050 and 2100, reducing intertidal marsh areas by approximately 12% and adversely affecting juvenile Chinook salmon that depend on these habitats. Potential habitat loss from SLR correlates to 211,000 - 530,000 smolt capacity per year for 1.4 ft. - 2.6 ft., respectively. = High Sensitivity</p> <p>Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Increased salinity levels
47	Rivers/Fisheries - Wildfire	Medium	Medium	Medium	<p>Wildfire events impact habitat availability due to increases in sedimentation, riverbank erosion, and smoke/ash that impacts water quality and chemistry. Wildfire likelihood is expected to increase, impacting freshwater riparian and estuarine habitats. Sediment deposits in downstream estuarine areas potentially increase lagoon habitat with pocket estuaries. = Medium Sensitivity</p> <p>Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. Species that are more tolerant to low flow conditions i.e., warmer water temperatures, low velocities, elevated hypoxia levels, etc. compete with Coldwater species that historically thrive. Tribal fisheries would be significantly affected while commercial and recreational fisheries would shift to other species i.e., crab, yellow perch, etc. or requires more deep water fishing offshore.</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Increased sedimentation
48	Nature preserves-Drought (Ecosystems)	Medium	Medium	Medium	<p>Nature preserves include shoreline & estuarine habitat areas and steep mountainous inland areas. Decreased late summer precip impacts waterfowl, marine birds, and vegetative composition and plant communities, particularly eelgrass, intertidal algae, sand/mudflats, salt marshes, and rocky habitat in estuarine/shoreline areas, that provides less habitat for dependent species. Eelgrass is a protected species under the Endangered Species Act. Decreased late summer precip also impacts tree life cycles that stunt growth and decrease habitat quality for mountain animals. = Medium Sensitivity</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Preserves are also used as stewardship and research opportunities. County's Salmon Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Habitat loss
49	Nature preserves-Flooding & Reduced snowpack	Medium	Medium	Medium	<p>Decreased peak streamflow and reduced snowpack limits fluvial deposits in Skagit delta, resulting in seasonal shifts of habitat. Reduced snowpack results in reduced peak streamflows and provides less habitat area for riparian vegetation to grow such as eelgrass, willow, etc. Invasive species may grow to dominant landscapes once established. Vegetation reduces water velocity during peak streamflow events and provides habitat for fish/other fauna. Reduced quality of nature preserves can impact user experiences such as recreational hikers, birders, and other nature enthusiasts. = Medium Sensitivity</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Preserves are also used as stewardship and research opportunities. County's Salmon Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Establishment of invasive species
50	Nature preserves - Extreme Heat	Medium	Medium	Medium	<p>Increased max summer temperatures reduces soil moisture and alters vegetative communities during seasonal blooms. Dry plant materials and detritus that concentrates in waterlogged areas i.e., marsh, lagoon, estuary, etc. can result in increases of nitrogen that alters water chemistry. Reduced quality of nature preserves can impact user experiences such as recreational hikers, birders, and other nature enthusiasts. = Medium Sensitivity</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Preserves are also used as stewardship and research opportunities. County's Salmon Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. = Medium Adaptive Capacity</p>	Reduced water quality
51	Nature preserves-Sea Level Rise	Medium	Medium	Medium	<p>SLR can alter salinity levels, vegetative distribution, and sediment distribution in nearshore environments, that alters extent of existing pocket estuaries. Projections indicate sea levels may rise by 1.0 to 2.0 feet between 2050 and 2100, reducing intertidal marsh areas by approximately 12%. Inland mountainous preserves are less impacted by SLR. Reduced quality of nature preserves can impact user experiences such as recreational hikers, birders, and other nature enthusiasts. = Medium Sensitivity</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Preserves are also used as stewardship and research opportunities. County's Salmon Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Reduced habitat

52	Nature preserves - Wildfire	Medium	Medium	Medium	<p>Wildfire events impact habitat availability due to increases in sedimentation, riverbank erosion, and smoke/ash that impacts water quality and chemistry. Asset comprises of open space that contains vegetative fuel loads. Wildfire likelihood is expected to increase, impacting riparian and wetland habitat that reduces recreational user experiences. =Medium Sensitivity</p> <p>Many restoration efforts are led by Dept of Ecology, County's Monitoring and Adaptive Management Program, and local organizations and include riparian habitat planting. Preserves area also used as stewardship and research opportunities. County's Salmon Heritage program establishes conservation easements along riparian corridors in rural areas to preserve fish habitat and agricultural industry. Habitat is also protected under the County's critical areas ordinance and the SMP. Technological approaches to adaptation include installing equipment to mitigate low water flow issues like in North Toutle and Puyallup (Source: HMP, 2020). = Medium Adaptive Capacity</p>	Increased fuel loads
53	Flood management infrastructure- Drought (Emergency Management)	Low	Low	Medium	<p>Flood control infrastructure i.e., dikes and levees, generally consisted of earthen materials - silt, sand, and repaired using coarser grained materials ranging from 4 to 27 feet tall (source: 2011 General Investigation Report on Skagit River Basin Levees, Shannon & Wilson, Inc.). Ground material consists of sand and loose materials that compromise structural stability of levees. Decrease in summertime precipitation can weaken earthen dikes/berms and soil moisture making foundation materials contract. Asset would be more susceptible to erosion and failure, requiring more frequent maintenance and replacement. Responsible party is the Dike Districts. = Low Sensitivity</p> <p>Asset is protected and managed under the Critical Areas ordinance for development standards, mitigation requirements, and design. Districts are responsible for managing dikes and levees along the river and delta- must advocate for local, state, and federal funding, including multi-agency coordination and emergency evacuation/response that can be time-consuming and expensive. = Low Adaptive Capacity</p>	Material composition
54	Flood management infrastructure- Extreme precipitation & Flooding	Medium	Low	High	<p>Flood control infrastructure i.e., dikes and levees, generally consisted of earthen materials - silt, sand, and repaired using coarser grained materials ranging from 4 to 27 feet tall. Ground material consists of sand and loose materials that compromise structural stability of levees. Increased extreme precip magnitude can erode and weaken dikes/levees including ground conditions that loosen soil, alters levee geometries, and changes levee composition. Assets may also conflict with habitat restoration projects that require uninterrupted flows for migratory pathways. = Medium Sensitivity</p> <p>Asset is protected and managed under the Critical Areas ordinance for development standards, mitigation requirements, and design. Districts are responsible for managing dikes and levees along the river and delta- must advocate for local, state, and federal funding, including multi-agency coordination and emergency evacuation/response that can be time-consuming and expensive. = Low Adaptive Capacity</p>	Ground condition alteration
55	Flood management infrastructure- Sea level rise	Medium	Low	High	<p>Dike Districts manage dike and drainage infrastructure in the County. Districts 1, 3, 4, 5, 9, 12, 19, and 22 have predominantly low-lying lands that are subject to flooding from SLR inundation. Various flow controls such as flood gates, pump stations, tide gates, and dikes and levees are located throughout the County along delta slough shorelines, river shorelines, coastal shorelines, and adjacent to bridges and roads (source: 2022 Dike district assessment areas map). Older earthen dikes and temporary structures are more sensitive and susceptible to failure, whereas rock revetments, seawalls, bulkheads, and other hard armoring infrastructure are less sensitive to SLR hazards. Asset is managed on a case-by-case basis and regulated by the SMP that prioritizes ecological functions. = Medium Sensitivity</p> <p>Flood gages provide indicators of elevation above a certain level. Asset is protected and managed under the Critical Areas ordinance for development standards, mitigation requirements, and design. Districts are responsible for managing dikes and levees along the river and delta- must advocate for local, state, and federal funding, including multi-agency coordination and emergency evacuation/response that can be time-consuming and expensive. = Low Adaptive Capacity</p>	Dike district management, Infrastructure type
56	Flood management infrastructure- Wildfire	Low	Low	Medium	<p>Asset is predominantly located in western County where high fire danger days are projected to double the County average of 6 days (CMRW tool). Other wildfire conditions i.e., dry vegetation, humidity, etc. would need to be present to cause wildfire events. Although fire days will increase, earthen dikes/levees have minimal sensitivity to wildfire likelihood. Asset is more likely to be sensitive to flooding, extreme precip, and SLR. = Low Sensitivity</p> <p>Asset is protected and managed under the Critical Areas ordinance for development standards, mitigation requirements, and design. Districts are responsible for managing dikes and levees along the river and delta- must advocate for local, state, and federal funding, including multi-agency coordination and emergency evacuation/response that can be time-consuming and expensive. = Low Adaptive Capacity</p>	High fire danger days
57	Fire stations-Drought (Emergency Management)	Medium	Medium	Medium	<p>Fire districts manage agricultural burning throughout the County - drought conditions can increase the need for burning due to excess dry plant material and detritus, remove weeds and prevent disease and pests. Increased precip drought can also reduce water availability for forestland and result in dry soil conditions that increase wildfire likelihood. Responders are mainly volunteers, increased emergency response services causes strain on resources and personnel. = Medium Sensitivity</p> <p>Additional funding levied from property taxes and local, state, or federal funds would be required to rebuild a fire station/critical facility. Less permits may be issued for agricultural burning. Outdoor burn bans for residential yard, and land-clearing fires, may increase in frequency to reduce wildfire risk from drought. = Medium Adaptive Capacity</p>	Increased emergency response services
58	Fire stations-Extreme precipitation & Flooding	Medium	Medium	Medium	<p>Fire districts located in low-lying delta areas and riverine valley floodplains communicate with residents and respond to emergencies related to flooding evacuation. Increased precip magnitude increases intermittent flows of peak streamflow, resulting in single-events of high velocities and high flows. Responders are mainly volunteers, increased emergency response services causes strain on resources and personnel. = Medium Sensitivity</p> <p>Additional funding levied from property taxes and local, state, or federal funds would be required to rebuild a fire station/critical facility, and provide additional services. =Medium Adaptive Capacity</p>	Increased emergency response services
59	Fire stations-Sea level rise	Low	Medium	Low	<p>Fire stations located within fire districts 5, 12, 13, 2, 3, 6, and 1 are located in low-lying coastal areas that may be subject to flooding from SLR inundation by mid-century and would be subject to flooding by end of century, impacting the local fire districts' ability to provide fire prevention and preparedness services, fire suppression services, emergency medical services, and for the protection of life and property. Flooding can result in damage to asset that reduces emergency response services to residents. = Low Sensitivity</p> <p>Additional funding levied from property taxes and local, state, or federal funds would be required to rebuild a fire station/critical facility. =Medium Adaptive Capacity</p>	Emergency services
60	Fire stations-Wildfire	Medium	Medium	Medium	<p>Fire districts are responsible for allocating resources during times of emergency - and soliciting funds and educating residents during non-emergencies. Increased high fire danger days in western County would put more strain on fire districts, and increase fire suppression activities and medical services. Wildfire likelihood is minimal throughout the County. Wildfires are unpredictable and with perfect storm conditions would be more devastating in eastern County due to increased susceptibility i.e., slope, aspect, where population is small, straining resources and reducing emergency responses for fire districts 10, 24, and 16. = Medium Sensitivity</p> <p>The CWPP outlines policies and programs to reduce risk to wildfire: neighborhood-scale CWPPs that identify location specific mitigation strategies- education, outreach, additional training for fire district personnel, fire-resistant landscaping, etc. Prescribed burning is the most popular mitigation strategy, which can be labor intensive and costly. Other opportunities for mitigation strategies would be identified in subsequent CWPP updates. = Medium Adaptive Capacity</p>	Mitigation strategies

61	Emergency staging areas-Extreme precipitation & Flooding	Medium	High	Low	The County has mutual aid agreements, contracts, and memorandums of understandings with property owners throughout the county. Registered volunteers are an important asset to staging areas who provide emergency response services. Extreme precip magnitude can result in localized inundation of asset and loss of site usage as staging area, and create hazardous conditions for volunteers and staff to respond to emergencies. = Medium Sensitivity Volunteers are highly mobile and able, staging areas located outside of flood zones and/or hazardous areas can be utilized in the event other staging areas are affected by flooding. = High Adaptive Capacity	Mobility																								
62	Emergency staging areas-Sea level rise	Low	High	Low	The County has mutual aid agreements, contracts, and memorandums of understandings with property owners throughout the county. Registered volunteers are an important asset to staging areas who provide emergency response services. SLR can result in inundation of asset and loss of site usage as staging area, and create hazardous conditions for volunteers and staff to respond to emergencies. = Medium Sensitivity Volunteers are highly mobile and able, staging areas located more inland can be utilized in the event other staging areas are affected by SLR inundation or SLR effects. = High Adaptive Capacity	Mobility																								
63	Emergency staging areas-Wildfires	Medium	High	Low	The County has mutual aid agreements, contracts, and memorandums of understandings with property owners throughout the county. Registered volunteers are an important asset to staging areas who provide emergency response services. Increased wildfire likelihood can result in more frequent wildfire events and loss of site usage as staging area, and create hazardous conditions for volunteers and staff to respond to emergencies. = Medium Sensitivity Volunteers are highly mobile and able, staging areas located in other areas can be utilized in the event other staging areas are affected by wildfire. = High Adaptive Capacity	Mobility																								
64	Roadways-Drought (Transportation)	Medium	Low	High	Rural roads are classified as "Principal Arterials", "Minor Arterials", "Major Collectors", "Minor Collectors" and "Locals". Interstate 5 and SR 20 west of I-5 are the only Principal Arterials. Other state highways and segments are Minor Arterials. Major and Minor Collectors are the heart of the County system. These roads connect the cities and towns and serve as farm-to-market roads in the rural area. Traffic on the County roads outside of the highways and arterials are fairly moderate. For instance, nearly half of the roads carry fewer than 250 vehicles trips per 24-hour day on average (ADT). About 10% of the roads carry more than 2,000 ADT, and fewer than 2% carry more than 5,000 ADT. Skagit County determines current needs in several categories that include resurfacing, restoration, rehabilitation, and reconstruction. <table border="0"> <tr> <td>Roadway - Segment</td> <td>2014 ADT:</td> <td>2036 ADT:</td> </tr> <tr> <td>Cook Road: I-5 SB Ramps to NB Ramps:</td> <td>12,000</td> <td>14,300</td> </tr> <tr> <td>Cook Road: I-5 NB Ramps to Old Hwy 99:</td> <td>15,600</td> <td>16,800</td> </tr> <tr> <td>Cook Road: Old Hwy 99 to Green Road:</td> <td>12,300</td> <td>13,200</td> </tr> <tr> <td>Cook Road: Green Road to Collins Road:</td> <td>11,100</td> <td>12,000</td> </tr> <tr> <td>Cook Road: Collins Road to Klinger Street:</td> <td>10,900</td> <td>11,600</td> </tr> <tr> <td>Pioneer Hwy: County Line to Miltown Rd:</td> <td>8,000</td> <td>10,500</td> </tr> <tr> <td>Pioneer Hwy: Miltown Road to Fir Island Rd:</td> <td>7,600</td> <td>10,000</td> </tr> </table> <p>Heavily used roadways are more subject to wear and tear. Drought conditions exacerbate heavily used roadways by cracking pavement due to earth movement from depressed groundwater levels. Roadway segments that exceed 7,000 ADT measured on an annual basis may exceed the adopted LOS; thus, would require improvements beyond normal maintenance and repair. These improvements include intersection improvements, widening, traffic controls, and other actions. Projects of regional significance, including Washington State Department of Transportation projects are coordinated for possible joint implementation and funding. = Medium Sensitivity</p> <p>It is noted at this time that work has begun in coordination with special purpose districts on drainage projects, such as culvert installations, roadway elevation in flood-prone areas, and replacing small-diameter flood control devices in known problem areas. Dedicated funding is necessary to ensure these efforts continue and to enhance drainage. = Low Adaptive Capacity</p>	Roadway - Segment	2014 ADT:	2036 ADT:	Cook Road: I-5 SB Ramps to NB Ramps:	12,000	14,300	Cook Road: I-5 NB Ramps to Old Hwy 99:	15,600	16,800	Cook Road: Old Hwy 99 to Green Road:	12,300	13,200	Cook Road: Green Road to Collins Road:	11,100	12,000	Cook Road: Collins Road to Klinger Street:	10,900	11,600	Pioneer Hwy: County Line to Miltown Rd:	8,000	10,500	Pioneer Hwy: Miltown Road to Fir Island Rd:	7,600	10,000	Traffic congestion, roadway type
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65	Roadways-Extreme precipitation	Medium	Medium	Medium	Rural roads are classified as "Principal Arterials", "Minor Arterials", "Major Collectors", "Minor Collectors" and "Locals". Interstate 5 and SR 20 west of I-5 are the only Principal Arterials. Other state highways and segments are Minor Arterials. Major and Minor Collectors are the heart of the County system. These roads connect the cities and towns and serve as farm-to-market roads in the rural area. Traffic on the County roads outside of the highways and arterials are fairly moderate. For instance, nearly half of the roads carry fewer than 250 vehicles trips per 24-hour day on average (ADT). About 10% of the roads carry more than 2,000 ADT, and fewer than 2% carry more than 5,000 ADT. Skagit County determines current needs in several categories that include resurfacing, restoration, rehabilitation, and reconstruction. <table border="0"> <tr> <td>Roadway - Segment</td> <td>2014 ADT:</td> <td>2036 ADT:</td> </tr> <tr> <td>Cook Road: I-5 SB Ramps to NB Ramps:</td> <td>12,000</td> <td>14,300</td> </tr> <tr> <td>Cook Road: I-5 NB Ramps to Old Hwy 99:</td> <td>15,600</td> <td>16,800</td> </tr> <tr> <td>Cook Road: Old Hwy 99 to Green Road:</td> <td>12,300</td> <td>13,200</td> </tr> <tr> <td>Cook Road: Green Road to Collins Road:</td> <td>11,100</td> <td>12,000</td> </tr> <tr> <td>Cook Road: Collins Road to Klinger Street:</td> <td>10,900</td> <td>11,600</td> </tr> <tr> <td>Pioneer Hwy: County Line to Miltown Rd:</td> <td>8,000</td> <td>10,500</td> </tr> <tr> <td>Pioneer Hwy: Miltown Road to Fir Island Rd:</td> <td>7,600</td> <td>10,000</td> </tr> </table> <p>Roadway segments that exceed 7,000 ADT measured on an annual basis may exceed the adopted LOS; thus, would require improvements beyond normal maintenance and repair. These improvements include intersection improvements, widening, traffic controls, and other actions. Projects of regional significance, including Washington State Department of Transportation projects are coordinated for possible joint implementation and funding. = Medium Sensitivity</p> <p>It is noted at this time that work has begun in coordination with special purpose districts on drainage projects, such as culvert installations, roadway elevation in flood-prone areas, and replacing small-diameter flood control devices in known problem areas. Dedicated funding is necessary to ensure these efforts continue and to enhance drainage which can be costly. In the NHMP Update 2023, initiatives such as Initiative #1, #10, #13, #14, #15, and #19 are applicable as well. = Medium Adaptive Capacity</p>	Roadway - Segment	2014 ADT:	2036 ADT:	Cook Road: I-5 SB Ramps to NB Ramps:	12,000	14,300	Cook Road: I-5 NB Ramps to Old Hwy 99:	15,600	16,800	Cook Road: Old Hwy 99 to Green Road:	12,300	13,200	Cook Road: Green Road to Collins Road:	11,100	12,000	Cook Road: Collins Road to Klinger Street:	10,900	11,600	Pioneer Hwy: County Line to Miltown Rd:	8,000	10,500	Pioneer Hwy: Miltown Road to Fir Island Rd:	7,600	10,000	Traffic congestion, roadway type
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66	Roadways-Flooding & Sea level rise	Medium	Medium	Medium	<p>Rural roads are classified as "Principal Arterials", "Minor Arterials", "Major Collectors", "Minor Collectors" and "Locals". Interstate 5 and SR 20 west of I-5 are the only Principal Arterials. Other state highways and segments are Minor Arterials. Major and Minor Collectors are the heart of the County system. These roads connect the cities and towns and serve as farm-to-market roads in the rural area. Traffic on the County roads outside of the highways and arterials are fairly moderate. For instance, nearly half of the roads carry fewer than 250 vehicles trips per 24-hour day on average (ADT). About 10% of the roads carry more than 2,000 ADT, and fewer than 2% carry more than 5,000 ADT. Skagit County determines current needs in several categories that include resurfacing, restoration, rehabilitation, and reconstruction.</p> <table border="0" data-bbox="768 261 1507 394"> <tr> <td>Roadway - Segment</td> <td>2014 ADT:</td> <td>2036 ADT:</td> </tr> <tr> <td>Cook Road: I-5 SB Ramps to NB Ramps:</td> <td>12,000</td> <td>14,300</td> </tr> <tr> <td>Cook Road: I-5 NB Ramps to Old Hwy 99:</td> <td>15,600</td> <td>16,800</td> </tr> <tr> <td>Cook Road: Old Hwy 99 to Green Road:</td> <td>12,300</td> <td>13,200</td> </tr> <tr> <td>Cook Road: Green Road to Collins Road:</td> <td>11,100</td> <td>12,000</td> </tr> <tr> <td>Cook Road: Collins Road to Klinger Street:</td> <td>10,900</td> <td>11,600</td> </tr> <tr> <td>Pioneer Hwy: County Line to Miltown Rd:</td> <td>8,000</td> <td>10,500</td> </tr> <tr> <td>Pioneer Hwy: Miltown Road to Fir Island Rd:</td> <td>7,600</td> <td>10,000</td> </tr> </table> <p>Roadways segments that exceed 7,000 ADT measured on an annual basis may exceed the adopted LOS; thus, would require improvements beyond normal maintenance and repair. These improvements include intersection improvements, widening, traffic controls, and other actions. Projects of regional significant, including Washington State Department of Transportation projects are coordinated for possible joint implementation and funding. = Medium Sensitivity</p> <p>It is noted at this time that work has begun in coordination with special purpose districts on drainage projects, such as culvert installations, roadway elevation in flood-prone areas, and replacing small-diameter flood control devices in known problem areas. Dedicated funding is necessary to ensure these efforts continue and to enhance drainage. In the NHMP Update 2023, initiatives such as Initiative #1, #10, #13, #14, #15, and #19 are applicable as well. = Medium Adaptive Capacity</p>	Roadway - Segment	2014 ADT:	2036 ADT:	Cook Road: I-5 SB Ramps to NB Ramps:	12,000	14,300	Cook Road: I-5 NB Ramps to Old Hwy 99:	15,600	16,800	Cook Road: Old Hwy 99 to Green Road:	12,300	13,200	Cook Road: Green Road to Collins Road:	11,100	12,000	Cook Road: Collins Road to Klinger Street:	10,900	11,600	Pioneer Hwy: County Line to Miltown Rd:	8,000	10,500	Pioneer Hwy: Miltown Road to Fir Island Rd:	7,600	10,000	Traffic congestion, roadway type
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68	Roadways-Wildfire	Medium	Medium	Medium	<p>Roadways provide critical access to personnel to conduct fire suppression activities, and provide evacuation routes for residents and personnel during wildfire events. Wildfire likelihood is projected to increase minimally throughout the County, and high fire danger days are projected to increase twice fold than the County average in western County where a majority of the population lives. = Medium Sensitivity</p> <p>Increased wildfire likelihood increases health risk for sensitive populations, especially those living in rural areas, and may increase usage on roadways for fire response and civilian evacuation. Roads in communities with high susceptibility to wildfire includes Cape Horn, Cascade Ridge, Lake Yee, Pinelli Road area, and more (2022 CWPP). Roadways segments that exceed 7,000 ADT measured on an annual basis may exceed the adopted LOS and can constrain responses to hazard; thus, would require improvements beyond normal maintenance and repair. These improvements include intersection improvements, widening, traffic controls, and other actions. County also requires that a cleared buffer exist along roadways and homes in zoned IF-NFR to be located in existing fire protection districts. Area specific wildfire measures are provided in respective CWPPs. = Medium Adaptive Capacity</p>	Population density																								

69	Bridges-Drought (Transportation)	Low	Medium	Low	<p>There is financial support identified as "The Road Fund" which is stretched thin from funding maintenance of 800 miles of roads and bridges; thus, this option is limited. Skagit County has continued to do partnerships with WSDOT and local municipalities for expanded roadway and bridge assessments; thus, potentially leading to a more resilient transportation sector. Currently there are 110 highway bridges. Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From this report, Skagit County has 6 structurally deficient bridges:</p> <ul style="list-style-type: none"> - BNSF Railroad Overpass; Deck, Superstructure, substructure - Rated Poor - Anacortes Ferry Dock: Superstructure - Rated Poor - Guemes Island Ferry Dock sufficiency rating: Superstructure - Rated Poor - Friday Creek Bridge: Deck - Rated Poor - Thomas Creek Bridge: Deck - Rated Poor - Samish River Bridge: Deck - Rated Serious <p>= Low Sensitivity</p> <p>Three of the six bridges have funding allocated to have them repaired or replaced. In addition, Skagit County has 18 functionally obsolete bridges. Functional obsolescence is based on a comparison of the existing design of each bridge to current standards. These can mean substandard bridge widths, low vertical clearance that can lead to repeated damage from over height trucks, load-carrying capacity, or flood potential. = Medium Adaptive Capacity</p>	Traffic congestion, roadway type
70	Bridges-Extreme precipitation	Medium	Medium	Medium	<p>There is financial support identified as "The Road Fund" which is stretched thin from funding maintenance of 800 miles of roads and bridges; thus, this option is limited. Skagit County has continued to do partnerships with WSDOT and local municipalities for expanded roadway and bridge assessments; thus, potentially leading to a more resilient transportation sector. Currently there are 110 highway bridges. Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From this report, Skagit County has 6 structurally deficient bridges:</p> <ul style="list-style-type: none"> - BNSF Railroad Overpass; Deck, Superstructure, substructure - Rated Poor - Anacortes Ferry Dock: Superstructure - Rated Poor - Guemes Island Ferry Dock sufficiency rating: Superstructure - Rated Poor - Friday Creek Bridge: Deck - Rated Poor - Thomas Creek Bridge: Deck - Rated Poor - Samish River Bridge: Deck - Rated Serious <p>= Medium Sensitivity</p> <p>Three of the six bridges have funding allocated to have them repaired or replaced. In addition, Skagit County has 18 functionally obsolete bridges. Functional obsolescence is based on a comparison of the existing design of each bridge to current standards. These can mean substandard bridge widths, low vertical clearance that can lead to repeated damage from over height trucks, load-carrying capacity, or flood potential. = Medium Adaptive Capacity</p>	Bridge condition, age
71	Bridges-Flooding	Medium	Medium	Medium	<p>There is financial support identified as "The Road Fund" which is stretched thin from funding maintenance of 800 miles of roads and bridges; thus, this option is limited. Skagit County has continued to do partnerships with WSDOT and local municipalities for expanded roadway and bridge assessments; thus, potentially leading to a more resilient transportation sector. Currently there are 110 highway bridges. Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From this report, Skagit County has 6 structurally deficient bridges:</p> <ul style="list-style-type: none"> - BNSF Railroad Overpass; Deck, Superstructure, substructure - Rated Poor - Anacortes Ferry Dock: Superstructure - Rated Poor - Guemes Island Ferry Dock sufficiency rating: Superstructure - Rated Poor - Friday Creek Bridge: Deck - Rated Poor - Thomas Creek Bridge: Deck - Rated Poor - Samish River Bridge: Deck - Rated Serious <p>= Medium Sensitivity</p> <p>Three of the six bridges have funding allocated to have them repaired or replaced. In addition, Skagit County has 18 functionally obsolete bridges. Functional obsolescence is based on a comparison of the existing design of each bridge to current standards. These can mean substandard bridge widths, low vertical clearance that can lead to repeated damage from over height trucks, load-carrying capacity, or flood potential. = Medium Adaptive Capacity</p>	Bridge condition, age
72	Bridges-Reduced snowpack	Low	Medium	Low	<p>There is financial support identified as "The Road Fund" which is stretched thin from funding maintenance of 800 miles of roads and bridges; thus, this option is limited. Skagit County has continued to do partnerships with WSDOT and local municipalities for expanded roadway and bridge assessments; thus, potentially leading to a more resilient transportation sector. Currently there are 110 highway bridges. Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From this report, Skagit County has 6 structurally deficient bridges:</p> <ul style="list-style-type: none"> - BNSF Railroad Overpass; Deck, Superstructure, substructure - Rated Poor - Anacortes Ferry Dock: Superstructure - Rated Poor - Guemes Island Ferry Dock sufficiency rating: Superstructure - Rated Poor - Friday Creek Bridge: Deck - Rated Poor - Thomas Creek Bridge: Deck - Rated Poor - Samish River Bridge: Deck - Rated Serious <p>= Low Sensitivity</p> <p>Three of the six bridges have funding allocated to have them repaired or replaced. In addition, Skagit County has 18 functionally obsolete bridges. Functional obsolescence is based on a comparison of the existing design of each bridge to current standards. These can mean substandard bridge widths, low vertical clearance that can lead to repeated damage from over height trucks, load-carrying capacity, or flood potential. = Medium Adaptive Capacity</p>	Bridge condition, age

73	Bridges-Sea level rise	Low	Medium	Low	<p>There is financial support identified as "The Road Fund" which is stretched thin from funding maintenance of 800 miles of roads and bridges; thus, this option is limited. Skagit County has continued to do partnerships with WSDOT and local municipalities for expanded roadway and bridge assessments; thus, potentially leading to a more resilient transportation sector. Currently there are 110 highway bridges. Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From this report, Skagit County has 6 structurally deficient bridges:</p> <ul style="list-style-type: none"> - BNSF Railroad Overpass: Deck, Superstructure, substructure - Rated Poor - Anacortes Ferry Dock: Superstructure - Rated Poor - Guemes Island Ferry Dock sufficiency rating: Superstructure - Rated Poor - Friday Creek Bridge: Deck - Rated Poor - Thomas Creek Bridge: Deck - Rated Poor - Samish River Bridge: Deck - Rated Serious <p>= Low Sensitivity</p> <p>Three of the six bridges have funding allocated to have them repaired or replaced. In addition, Skagit County has 18 functionally obsolete bridges. Functional obsolescence is based on a comparison of the existing design of each bridge to current standards. These can mean substandard bridge widths, low vertical clearance that can lead to repeated damage from over height trucks, load-carrying capacity, or flood potential. = Medium Adaptive Capacity</p>	Bridge condition, age
74	Bridges-Wildfire	Low	Medium	Low	<p>Bridges provide critical junctions for evacuation and fire suppression activities. Currently there are 110 highway bridges. Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From this report, Skagit County has 6 structurally deficient bridges, most of which are located in coastal delta region. = Low Sensitivity</p> <p>Three of the six bridges have funding allocated to have them repaired or replaced. In addition, Skagit County has 15 functionally obsolete bridges. Functional obsolescence is based on a comparison of the existing design of each bridge to current standards. These can mean substandard bridge widths, low vertical clearance that can lead to repeated damage from over height trucks, load-carrying capacity, or flood potential. There is financial support identified as "The Road Fund" which is stretched thin from funding maintenance of 800 miles of roads and bridges; thus, this option is limited. Skagit County has continued to do partnerships with WSDOT and local municipalities for expanded roadway and bridge assessments; thus, potentially leading to a more resilient transportation sector. = Medium Adaptive Capacity</p>	Structural stability
75	Railroad-Drought (Transportation)	Low	Low	Medium	<p>There are a total of 56 at-grade crossings in Skagit County along BNSF's North-South Mainline, the Burlington-Anacortes Branch line, and the Burlington-Sumas Branch Line.</p> <p>Based on the Skagit County 2016-2036 Comprehensive Plan, a functional road classification system involves facilities that have been identified in the state Freight and Goods Transportation System (FGTS) as trucking routes. This system is based on the estimated gross freight tonnage that is carried on the roads:</p> <ul style="list-style-type: none"> - T-1: more than 10 million tons per year - T-2: 4 million to 10 million tons per year - T-3: 300,000 to 4 million tons per year - T-4: 100,000 to 300,000 tons per year - T-5: at least 20,000 tons in 60 days and less than 100,000 tons per year <p>For rural Skagit County, the highest FGTS designations include the entire length of I-5 (Tier 1) and SR-20 from I-5 to Anacortes (Tier 2 to Anacortes, Tier 3 for the SR20 Spur). SR-20 from Burlington to Anacortes carries an estimated 10,000,000 annual tonnage and is considered Tier 2. Cook Road from I-5 to Sedro-Woolley is designated as Tier 2. Majority of Skagit County's FGTS designations are within the range of 3,000,000 to 34,000,000 tons per year. = Low Sensitivity</p> <p>Skagit County has partnered with the WSDOT, surrounding counties, and local municipalities to expand earthquake assessment of roadways and bridges to reduce hazard impact and transportation-related issues and potential isolation. = Low Adaptive Capacity</p>	Gross freight tonnage, crossing type
76	Railroad-Extreme precipitation	High	Medium	High	<p>Based on the Skagit County 2016-2036 Comprehensive Plan, a functional road classification system involves facilities that have been identified in the state Freight and Goods Transportation System (FGTS) as trucking routes. This system is based on the estimated gross freight tonnage that is carried on the roads:</p> <ul style="list-style-type: none"> - T-1: more than 10 million tons per year - T-2: 4 million to 10 million tons per year - T-3: 300,000 to 4 million tons per year - T-4: 100,000 to 300,000 tons per year - T-5: at least 20,000 tons in 60 days and less than 100,000 tons per year <p>For rural Skagit County, the highest FGTS designations include the entire length of I-5 (Tier 1) and SR-20 from I-5 to Anacortes (Tier 2 to Anacortes, Tier 3 for the SR20 Spur). SR-20 from Burlington to Anacortes carries an estimated 10,000,000 annual tonnage and is considered Tier 2. Cook Road from I-5 to Sedro-Woolley is designated as Tier 2. Majority of Skagit County's FGTS designations are within the range of 3,000,000 to 34,000,000 tons per year. Due to the high traffic volumes for FGTS, railroads may be more highly sensitive to extreme precipitation impacts in terms of operations disruptions or closures. Extreme precipitation may overwhelm drainage systems and flood railways; thus, operation schedules may be disrupted. = High Sensitivity</p> <p>Grade separation of existing at-grade crossings would separate vehicular traffic from train traffic to reduce conflict areas, increase safety, and eliminate delays at crossings. Grade separation would also improve emergency service response by reducing delay to response times and potential railway-roadway crashes. Grade separation projects could cost between approximately \$30 million to \$200 million each. Public funding for grade separation projects are difficult to secure. A variety of traditional funding sources, such as RAISE grants and Freight Mobility Strategic Investment Board (FMSIB) grants are awarded in highly competitive processes and are often insufficient to provide the amount of funds required to complete a grade separation project. The newly enacted FAST Act authorizes \$305 billion from the Highway Trust Fund and the General Fund for transportation projects, including grade separation projects. The Surface Transportation Block Grant Program (STBGP), the Railway Highway Grade Crossings Program, and the Nationally Significant Highway and Freight Projects Program are some of the subcategories of the FAST Act that could provide funding for grade separation projects. State legislative funding packages can also contain funding for grade separation projects. Many grade separation projects take several years to complete once funding is secured. = Medium Adaptive Capacity</p> <p>At-grade crossings that are redundant could be closed to reduce impacts from future train traffic. However, closing an at-grade crossing could result in increased transportation impacts at other nearby crossings by shifting vehicle volumes to other roadways. Grade crossing consolidation requires a petition to be filed with the Utilities and Transportation Commission by the jurisdiction, and would include a public hearing and input from the Railroad Company and WSDOT rail.</p>	Gross freight tonnage, crossing type, traffic congestion, operations

77	Railroad-Flooding	High	Medium	High	<p>Based on the Skagit County 2016-2036 Comprehensive Plan, a functional road classification system involves facilities that have been identified in the state Freight and Goods Transportation System (FGTS) as trucking routes. This system is based on the estimated gross freight tonnage that is carried on the roads:</p> <ul style="list-style-type: none"> - T-1: more than 10 million tons per year - T-2: 4 million to 10 million tons per year - T-3: 300,000 to 4 million tons per year - T-4: 100,000 to 300,000 tons per year - T-5: at least 20,000 tons in 60 days and less than 100,000 tons per year <p>For rural Skagit County, the highest FGTS designations include the entire length of I-5 (Tier 1) and SR-20 from I-5 to Anacortes (Tier 2 to Anacortes, Tier 3 for the SR20 Spur). SR-20 from Burlington to Anacortes carries an estimated 10,000,000 annual tonnage and is considered Tier 2. Cook Road from I-5 to Sedro-Woolley is designated as Tier 2. Majority of Skagit County's FGTS designations are within the range of 3,000,000 to 34,000,000 tons per year. Due to the high traffic volumes for FGTS, railroads may be more highly sensitive to extreme precipitation impacts in terms of operations disruptions or closures. = High Sensitivity</p> <p>Extreme precipitation may lead to secondary impacts such as flooding that may overwhelm drainage systems and flood railways; thus, operation schedules may be disrupted. Grade separation of existing at-grade crossings would separate vehicular traffic from train traffic to reduce conflict areas, increase safety, and eliminate delays at crossings. Grade separation would also improve emergency service response by reducing delay to response times and potential railway-roadway crashes. Identified priority locations for future grade separation projects include Cook Rd in unincorporated County, and SR 538 and SR 20 in incorporated areas (2045 Regional Transportation Plan, SCOG). Grade separation projects could cost between approximately \$30 million to \$200 million each. A variety of traditional funding sources, such as RAISE grants and Freight Mobility Strategic Investment Board (FMSIB) grants are awarded in highly competitive processes and are often insufficient to provide the amount of funds required to complete a grade separation project. The newly enacted Infrastructure Investment and Jobs Act (IIJA) provided grant funding for multimodal transportation and safe routes for citizens within the County- this includes passenger rail- and incorporates planning for climate change resiliency and clean energy transition (2024 Unified Planning Work Program, SCOG). The Surface Transportation Block Grant Program (STBGP), the Railway Highway Grade Crossings Program, and the Nationally Significant Highway and Freight Projects Program are some of the subcategories of the FAST Act that could provide funding for grade separation projects. State legislative funding packages can also contain funding for grade separation projects. Many grade separation projects take several years to complete once funding is secured. = Medium Adaptive Capacity</p> <p>At-grade crossings that are redundant could be closed to reduce impacts from future train traffic. However, closing an at-grade crossing could result in increased transportation impacts at other nearby crossings by shifting vehicle volumes to other roadways. Grade crossing consolidation requires a petition to be filed with the Utilities and Transportation Commission by the jurisdiction, and would include a public hearing and input from the Railroad Company and WSDOT rail.</p>	Gross freight tonnage, crossing type, traffic congestion, operations
78	Railroad-Reduced snowpack	Low	Medium	Low	<p>Based on the Skagit County 2016-2036 Comprehensive Plan, a functional road classification system involves facilities that have been identified in the state Freight and Goods Transportation System (FGTS) as trucking routes. This system is based on the estimated gross freight tonnage that is carried on the roads:</p> <ul style="list-style-type: none"> - T-1: more than 10 million tons per year - T-2: 4 million to 10 million tons per year - T-3: 300,000 to 4 million tons per year - T-4: 100,000 to 300,000 tons per year - T-5: at least 20,000 tons in 60 days and less than 100,000 tons per year <p>For rural Skagit County, the highest FGTS designations include the entire length of I-5 (Tier 1) and SR-20 from I-5 to Anacortes (Tier 2 to Anacortes, Tier 3 for the SR20 Spur). SR-20 from Burlington to Anacortes carries an estimated 10,000,000 annual tonnage and is considered Tier 2. Cook Road from I-5 to Sedro-Woolley is designated as Tier 2. Majority of Skagit County's FGTS designations are within the range of 3,000,000 to 34,000,000 tons per year. Despite the high traffic volumes for FGTS, railroads are not anticipated to be extremely sensitive to reduced snowpack = Low Sensitivity</p> <p>Grade separation of existing at-grade crossings would separate vehicular traffic from train traffic to reduce conflict areas, increase safety, and eliminate delays at crossings. Grade separation would also improve emergency service response by reducing delay to response times and potential railway-roadway crashes. Grade separation projects could cost between approximately \$30 million to \$200 million each. Public funding for grade separation projects are difficult to secure. A variety of traditional funding sources, such as RAISE grants and Freight Mobility Strategic Investment Board (FMSIB) grants are awarded in highly competitive processes and are often insufficient to provide the amount of funds required to complete a grade separation project. The newly enacted FAST Act authorizes \$305 billion from the Highway Trust Fund and the General Fund for transportation projects, including grade separation projects. The Surface Transportation Block Grant Program (STBGP), the Railway Highway Grade Crossings Program, and the Nationally Significant Highway and Freight Projects Program are some of the subcategories of the FAST Act that could provide funding for grade separation projects. State legislative funding packages can also contain funding for grade separation projects. Many grade separation projects take several years to complete once funding is secured. = Medium Adaptive Capacity</p> <p>At-grade crossings that are redundant could be closed to reduce impacts from future train traffic. However, closing an at-grade crossing could result in increased transportation impacts at other nearby crossings by shifting vehicle volumes to other roadways. Grade crossing consolidation requires a petition to be filed with the Utilities and Transportation Commission by the jurisdiction, and would include a public hearing and input from the Railroad Company and WSDOT rail.</p>	Gross freight tonnage, crossing type, traffic congestion, operations

79	Railroad-Sea level rise	Medium	Medium	Medium	<p>Based on the Skagit County 2016-2036 Comprehensive Plan, a functional road classification system involves facilities that have been identified in the state Freight and Goods Transportation System (FGTS) as trucking routes. This system is based on the estimated gross freight tonnage that is carried on the roads:</p> <ul style="list-style-type: none"> - T-1: more than 10 million tons per year - T-2: 4 million to 10 million tons per year - T-3: 300,000 to 4 million tons per year - T-4: 100,000 to 300,000 tons per year - T-5: at least 20,000 tons in 60 days and less than 100,000 tons per year <p>For rural Skagit County, the highest FGTS designations include the entire length of I-5 (Tier 1) and SR-20 from I-5 to Anacortes (Tier 2 to Anacortes, Tier 3 for the SR20 Spur). SR-20 from Burlington to Anacortes carries an estimated 10,000,000 annual tonnage and is considered Tier 2. Cook Road from I-5 to Sedro-Woolley is designated as Tier 2. Majority of Skagit County's FGTS designations are within the range of 3,000,000 to 34,000,000 tons per year. Low lying infrastructure such as railways are vulnerable to sea level rise. = Medium Sensitivity</p> <p>Grade separation of existing at-grade crossings would separate vehicular traffic from train traffic to reduce conflict areas, increase safety, and eliminate delays at crossings. Grade separation would also improve emergency service response by reducing delay to response times and potential railway-roadway crashes. Grade separation projects could cost between approximately \$30 million to \$200 million each. Public funding for grade separation projects are difficult to secure. A variety of traditional funding sources, such as RAISE grants and Freight Mobility Strategic Investment Board (FMSIB) grants are awarded in highly competitive processes and are often insufficient to provide the amount of funds required to complete a grade separation project. The newly enacted FAST Act authorizes \$305 billion from the Highway Trust Fund and the General Fund for transportation projects, including grade separation projects. The Surface Transportation Block Grant Program (STBGP), the Railway Highway Grade Crossings Program, and the Nationally Significant Highway and Freight Projects Program are some of the subcategories of the FAST Act that could provide funding for grade separation projects. State legislative funding packages can also contain funding for grade separation projects. Many grade separation projects take several years to complete once funding is secured. = Medium Adaptive Capacity</p> <p>At-grade crossings that are redundant could be closed to reduce impacts from future train traffic. However, closing an at-grade crossing could result in increased transportation impacts at other nearby crossings by shifting vehicle volumes to other roadways. Grade crossing consolidation requires a petition to be filed with the Utilities and Transportation Commission by the jurisdiction, and would include a public hearing and input from the Railroad Company and WSDOT rail.</p>	Gross freight tonnage, crossing type, traffic congestion, operations
80	Railroad-Wildfire	Low	Medium	Low	<p>For rural Skagit County, the highest FGTS designations include the entire length of I-5 (Tier 1) and SR-20 from I-5 to Anacortes (Tier 2 to Anacortes, Tier 3 for the SR20 Spur). SR-20 from Burlington to Anacortes carries an estimated 10,000,000 annual tonnage and is considered Tier 2. Cook Road from I-5 to Sedro-Woolley is designated as Tier 2. Majority of Skagit County's FGTS designations are within the range of 3,000,000 to 34,000,000 tons per year. Due to the high traffic volumes for FGTS, railroads are not anticipated to experience more risk than under current conditions. Railroads are more likely to experience impacts from wildfire smoke and debris on railroad tracks. = Low Sensitivity</p> <p>Grade separation of existing at-grade crossings would separate vehicular traffic from train traffic to reduce conflict areas, increase safety, and eliminate delays at crossings. At-grade crossings that are redundant could be closed to reduce impacts from future train traffic. However, closing an at-grade crossing could result in increased transportation impacts at other nearby crossings by shifting vehicle volumes to other roadways. Grade crossing consolidation requires a petition to be filed with the Utilities and Transportation Commission by the jurisdiction, and would include a public hearing and input from the Railroad Company and WSDOT rail. = Medium Adaptive Capacity</p>	Gross freight tonnage, crossing type, traffic congestion, operations
81	Public transit-Drought (Transportation)	Low	Low	Medium	<p>Skagit County has partnered with WSDOT to expand earthquake assessment of roadways and bridges to reduce hazard impact and transportation-related issues and potential isolation. = Low Adaptive Capacity</p> <p>Skagit Transit is a public agency funded by Skagit County and several of the cities that provide transit service in some portions of the County. Rail and marine transportation facilities within Skagit County are owned and operated by ports or private companies. Skagit Transit's fixed route service includes local routes, commuter routes, and flex routes. In 2014, the number of fixed route passenger boardings (local, commuter, and flex) increased by 10.7%. Fixed route service is offered along a pattern of streets or routes, operating on a set schedule of pulses from Skagit Station, Chuckanut Park and Ride, March's Point Park and Ride, and other designated transfer locations including Skagit Valley College, 10th Street and Q Avenue in Anacortes, and the Food Pavilion in Sedro-Woolley. In 2014, there were 19 fixed routes, including 11 local routes, two commuter routes, and six flex routes covering 322 miles of streets, roads, and highways. Local fixed routes operated between 5 and 7 days per week. Commuter routes operation hours are better 5 and 6 days per week. Flex routes on the other hand operate between 2 and 5 days per week. Major Transit stations include:</p> <ul style="list-style-type: none"> - Skagit Station, Mount Vernon - Washington State Ferry Terminal and Guemes Island Ferry Terminal, Anacortes - Alger Park and Ride, Alger - Chuckanut Park and Ride, Burlington - March's Point Park and Ride, Mount Vernon - South Mount Vernon Park and Ride, Mount Vernon - Lincoln Creek Park and Ride, Bellingham - Bellingham Station, Bellingham - Everett Station, Everett <p>= Low Sensitivity</p>	Frequency of travel, operation schedule

82	Public transit-Extreme precipitation	Medium	Medium	Medium	<p>Skagit County has partnered with WSDOT to expand earthquake assessment of roadways and bridges to reduce hazard impact and transportation-related issues and potential isolation. Existing measures include elevating and reinforcing roads, enhancing drainage systems and upgrading infrastructure. = Medium Adaptive Capacity</p> <p>Transportation services such as public transit access and ferries in the Skagit River Basin are highly vulnerable to extreme flooding. Bus Routes are particularly at risk during high flood stages of the Samish and Skagit Rivers. Due to their low-lying locations and close proximity to these rivers, these routes are susceptible to rapid inundation and severe disruptions. Skagit Transit is a public agency funded by Skagit County and several of the cities that provide transit service in some portions of the County. Rail and marine transportation facilities within Skagit County are owned and operated by ports or private companies. Skagit Transit's fixed route service includes local routes, commuter routes, and flex routes. In 2014, the number of fixed route passenger boardings (local, commuter, and flex) increased by 10.7%. Fixed route service is offered along a pattern of streets or routes, operating on a set schedule of pulses from Skagit Station, Chuckanut Park and Ride, March's Point Park and Ride, and other designated transfer locations including Skagit Valley College, 10th Street and Q Avenue in Anacortes, and the Food Pavilion in Sedro-Woolley. In 2014, there were 19 fixed routes, including 11 local routes, two commuter routes, and six flex routes covering 322 miles of streets, roads, and highways. Local fixed routes operated between 5 and 7 days per week. Commuter routes operation hours are between 5 and 6 days per week. Flex routes on the other hand operate between 2 and 5 days per week. Major Transit stations include:</p> <ul style="list-style-type: none"> - Skagit Station, Mount Vernon - Washington State Ferry Terminal and Guemes Island Ferry Terminal, Anacortes - Alger Park and Ride, Alger - Chuckanut Park and Ride, Burlington - March's Point Park and Ride, Mount Vernon - South Mount Vernon Park and Ride, Mount Vernon - Lincoln Creek Park and Ride, Bellingham - Bellingham Station, Bellingham - Everett Station, Everett <p>= Medium Sensitivity</p>	Frequency of travel, operation schedule, types of routes
83	Public transit-Flooding	High	Medium	High	<p>Transportation services such as public transit access and ferries in the Skagit River Basin are highly vulnerable to extreme flooding. Bus Routes are particularly at risk during high flood stages of the Samish and Skagit Rivers. Due to their low-lying locations and close proximity to these rivers, these routes are susceptible to rapid inundation and severe disruptions. Skagit Transit is a public agency funded by Skagit County and several of the cities that provide transit service in some portions of the County. Rail and marine transportation facilities within Skagit County are owned and operated by ports or private companies. Skagit Transit's fixed route service includes local routes, commuter routes, and flex routes. In 2014, the number of fixed route passenger boardings (local, commuter, and flex) increased by 10.7%. Fixed route service is offered along a pattern of streets or routes, operating on a set schedule of pulses from Skagit Station, Chuckanut Park and Ride, March's Point Park and Ride, and other designated transfer locations including Skagit Valley College, 10th Street and Q Avenue in Anacortes, and highways. Local fixed routes operated between 5 and 7 days per week. Commuter routes operation hours are between 5 and 6 days per week. Flex routes on the other hand operate between 2 and 5 days per week. Major Transit stations include:</p> <ul style="list-style-type: none"> - Skagit Station, Mount Vernon - Washington State Ferry Terminal and Guemes Island Ferry Terminal, Anacortes - Alger Park and Ride, Alger - Chuckanut Park and Ride, Burlington - March's Point Park and Ride, Mount Vernon - South Mount Vernon Park and Ride, Mount Vernon - Lincoln Creek Park and Ride, Bellingham - Bellingham Station, Bellingham - Everett Station, Everett <p>= High Sensitivity</p> <p>Skagit County has partnered with WSDOT to expand earthquake assessment of roadways and bridges to reduce hazard impact and transportation-related issues and potential isolation. Existing measures include elevating and reinforcing roads, enhancing drainage systems and upgrading infrastructure. = Medium Adaptive Capacity</p>	Frequency of travel, operation schedule, types of routes
84	Public transit-Reduced snowpack	Low	Medium	Low	<p>Skagit Transit is a public agency funded by Skagit County and several of the cities that provide transit service in some portions of the County. Rail and marine transportation facilities within Skagit County are owned and operated by ports or private companies. Skagit Transit's fixed route service includes local routes, commuter routes, and flex routes. In 2014, the number of fixed route passenger boardings (local, commuter, and flex) increased by 10.7%. Fixed route service is offered along a pattern of streets or routes, operating on a set schedule of pulses from Skagit Station, Chuckanut Park and Ride, March's Point Park and Ride, and other designated transfer locations including Skagit Valley College, 10th Street and Q Avenue in Anacortes, and the Food Pavilion in Sedro-Woolley. In 2014, there were 19 fixed routes, including 11 local routes, two commuter routes, and six flex routes covering 322 miles of streets, roads, and highways. Local fixed routes operated between 5 and 7 days per week. Commuter routes operation hours are between 5 and 6 days per week. Flex routes on the other hand operate between 2 and 5 days per week. Major Transit stations include:</p> <ul style="list-style-type: none"> - Skagit Station, Mount Vernon - Washington State Ferry Terminal and Guemes Island Ferry Terminal, Anacortes - Alger Park and Ride, Alger - Chuckanut Park and Ride, Burlington - March's Point Park and Ride, Mount Vernon - South Mount Vernon Park and Ride, Mount Vernon - Lincoln Creek Park and Ride, Bellingham - Bellingham Station, Bellingham - Everett Station, Everett <p>= Low Sensitivity</p> <p>Skagit County has partnered with WSDOT to expand earthquake assessment of roadways and bridges to reduce hazard impact and transportation-related issues and potential isolation. Existing measures include elevating and reinforcing roads, enhancing drainage systems and upgrading infrastructure. = Medium Adaptive Capacity</p>	Frequency of travel, operation schedule

85	Public transit-Sea level rise	Medium	Medium	Medium	<p>Due to their low-lying locations and close proximity to these rivers, these routes are susceptible to rapid inundation and severe disruptions. Skagit Transit is a public agency funded by Skagit County and several of the cities that provide transit service in some portions of the County. Rail and marine transportation facilities within Skagit County are owned and operated by ports or private companies. Skagit Transit's fixed route service includes local routes, commuter routes, and flex routes. In 2014, the number of fixed route passenger boardings (local, commuter, and flex) increased by 10.7%. Fixed route service is offered along a pattern of streets or routes, operating on a set schedule of pulses from Skagit Station, Chuckanut Park and Ride, March's Point Park and Ride, and other designated transfer locations including Skagit Valley College, 10th Street and Q Avenue in Anacortes, and the Food Pavilion in Sedro-Woolley. In 2014, there were 19 fixed routes, including 11 local routes, two commuter routes, and six flex routes covering 322 miles of streets, roads, and highways. Local fixed routes operated between 5 and 7 days per week. Commuter routes operation hours are between 5 and 6 days per week. Flex routes on the other hand operate between 2 and 5 days per week. Major Transit stations include:</p> <ul style="list-style-type: none"> - Skagit Station, Mount Vernon - Washington State Ferry Terminal and Guemes Island Ferry Terminal, Anacortes - Alger Park and Ride, Alger - Chuckanut Park and Ride, Burlington - March's Point Park and Ride - South Mount Vernon Park and Ride, Mount Vernon - Lincoln Creek Park and Ride, Bellingham - Bellingham Station, Bellingham - Everett Station, Everett <p>= Medium Sensitivity</p> <p>Skagit County has partnered with WSDOT to expand earthquake assessment of roadways and bridges to reduce hazard impact and transportation-related issues and potential isolation. Existing measures include elevating and reinforcing roads, enhancing drainage systems and upgrading infrastructure. = Medium Adaptive Capacity</p>	Location, operation schedule
86	Public transit-Wildfire	Low	Medium	Low	<p>Majority of transit services and infrastructure are located in western County where high fire danger days are projected to increase twice the County average of 6 days. Wildfire likelihood is minimal and is located in the WUI-interface and WUI-intermix zones. Wildfire events can lead to disruption of services, some residents would need to rely on neighbors or other resources to evacuate. Portions of western County in WUI zones are identified as disadvantaged, particularly in incorporated areas. = Low Sensitivity</p> <p>Skagit County has an intergovernmental cooperation agreement with Skagit Transit for use of Transit buses during emergency, including wildfire events (2022 CEMP), to reduce hazard impact and transportation-related issues and potential isolation. Transit may not be able to respond in every case. Additional potential measures include identifying critical junctions for evacuation of rural communities and disadvantaged areas, coordinating with Emergency Services Dept., Red Cross and/or other relevant NGOs, local jurisdictions, and other stakeholders to continue providing services per 2022 Skagit County CEMP. = Medium Adaptive Capacity</p>	Disadvantaged community in incorporated areas
87	Solid waste facility-Extreme precipitation (Waste Management)	Low	Medium	Low	<p>The County owns and maintains three solid waste transfer facilities; an interlocal agreement between the County and cities/private companies requires disposal of solid waste at the transfer facilities. Final disposal location is the Roosevelt landfill outside the County. Three of the cities within Skagit County (Anacortes, Mount Vernon, and Sedro-Woolley) provide garbage collection services to their residents and businesses with their own equipment and personnel. These three cities have universal, or mandatory, garbage collection services. Rural residents in unincorporated County use drop boxes at designated collection facilities. Current collection system is sufficient for collecting and removing solid wastes generated by the County's residents and businesses. Waste Management (WM) is the contracted private company that provides collection services, including residential/commercial garbage, recycling, and organics collection and long-haul waste disposal from the TRS. Skagit County no longer has active solid waste landfills. This is because the County has an abundance of surface water and very shallow groundwater; thus, it is difficult for safety reasons. Skagit County Public Works performs routine groundwater monitoring around three closed county landfills. Knowing this historic data, solid waste facilities are unlikely to face high sensitivity. Based on the Skagit County Solid Waste Management Plan, the total waste (recycled and disposed) generated in 2013 was 169,983 tons/year. In 2025 and 2035, the projected total waste is 194,320 tons/year and 218,930 tons/year, respectively. = Low Sensitivity</p> <p>Extreme precipitation does not trigger loss of asset functionality, but may eventually result in contracting elsewhere if landfill were to close. Economic feasibility limits the ability of County to contract with landfills further away. Export of waste via rail continues to be a best practice for the County. Technological solutions i.e., conversion technology, or development of in-County landfill may be costly to implement and requires changes in systemic operations, but is feasible. = Medium Adaptive Capacity</p>	Management, location, operations
88	Solid waste facility-Flooding	Low	Medium	Low	<p>The County owns and maintains three solid waste transfer facilities; an interlocal agreement between the County and cities/private companies requires disposal of solid waste at the transfer facilities, which are subsequently exported to landfills outside the County. Three of the cities within Skagit County (Anacortes, Mount Vernon, and Sedro-Woolley) provide garbage collection services to their residents and businesses with their own equipment and personnel. These three cities have universal, or mandatory, garbage collection services. Current collection system is sufficient for collecting and removing solid wastes generated by the County's and City's residents and businesses. Some service gaps associated with the current collection system have been noted for recycling and organics. Skagit County no longer has active solid waste landfills. This is because the County has an abundance of surface water and very shallow groundwater; thus, it is difficult for safety reasons. Skagit County Public Works performs routine groundwater monitoring around three closed county landfills. Knowing this historic data, solid waste facilities are unlikely to face high sensitivity. Based on the Skagit County Solid Waste Management Plan, the total waste (recycled and disposed) generated in 2013 was 169,983 tons/year. In 2025 and 2035, the projected total waste is 194,320 tons/year and 218,930 tons/year, respectively. = Low Sensitivity</p> <p>Flooding would result in direct loss of asset functionality, but may eventually result in contracting elsewhere if landfill were to close. Economic feasibility limits the ability of County to contract with landfills further away. Export of waste via rail continues to be a best practice for the County. Technological solutions i.e., conversion technology, or development of in-County landfill may be costly to implement and requires changes in systemic operations, but is feasible. = Medium Adaptive Capacity</p>	Management, location, operations

89	Solid waste facility-Reduced snowpack	Low	Medium	Low	<p>Three of the cities within Skagit County (Anacortes, Mount Vernon, and Sedro-Woolley) provide garbage collection services to their residents and businesses with their own equipment and personnel. These three cities have universal, or mandatory, garbage collection services. Current collection system is sufficient for collecting and removing solid wastes generated by the County's and City's residents and businesses. Some service gaps associated with the current collection system have been noted for recycling and organics. Skagit County no longer has active solid waste landfills. This is because the County has an abundance of surface water and very shallow groundwater. Skagit County Public Works performs routine groundwater monitoring around three closed county landfills. Based on the Skagit County Solid Waste Management Plan, the total waste (recycled and disposed) generated in 2013 was 169,983 tons/year. In 2025 and 2035, the projected total waste is 194,320 tons/year and 218,930 tons/year, respectively. Reduced snowpack has minimal impact on solid waste facilities. =Low Sensitivity</p> <p>Reduced snowpack does not trigger loss of asset functionality; limited studies on impacts of reduced snowpack on solid waste facilities and landfills exist. Economic feasibility limits the ability of County to contract with landfills further away. Export of waste via rail continues to be a best practice for the County. Technological solutions i.e., conversion technology, or development of in-County landfill may be costly to implement and requires changes in systemic operations, but is feasible. =Medium Adaptive Capacity</p>	Management, location, operations
90	Solid waste facility-Sea level rise	Low	Medium	Low	<p>The County owns and maintains three solid waste transfer facilities; an interlocal agreement between the County and cities/private companies requires disposal of solid waste at the transfer facilities, which are subsequently exported to landfills outside the County. Three of the cities within Skagit County (Anacortes, Mount Vernon, and Sedro-Woolley) provide garbage collection services to their residents and businesses with their own equipment and personnel. These three cities have universal, or mandatory, garbage collection services. Current collection system is sufficient for collecting and removing solid wastes generated by the County's and City's residents and businesses. Some service gaps associated with the current collection system have been noted for recycling and organics. Skagit County no longer has active solid waste landfills. This is because the County has an abundance of surface water and very shallow groundwater; thus, it is difficult for safety reasons. Skagit County Public Works performs routine groundwater monitoring around three closed county landfills. Based on the Skagit County Solid Waste Management Plan, the total waste (recycled and disposed) generated in 2013 was 169,983 tons/year. In 2025 and 2035, the projected total waste is 194,320 tons/year and 218,930 tons/year, respectively. SLR can cause saltwater intrusion from elevated groundwater levels - causing localized flooding and exacerbates hazardous contamination in flood zones. = Low Sensitivity</p> <p>SLR does not trigger loss of asset functionality, but may eventually result in contracting elsewhere if landfill were to close due to frequent inundation and contamination of groundwater. Economic feasibility limits the ability of County to contract with landfills further away. Export of waste via rail continues to be a best practice for the County. Technological solutions i.e., conversion technology, or development of in-County landfill may be costly to implement and requires changes in systemic operations, but is feasible. =Medium Adaptive Capacity</p>	Management, location, operations
91	Solid waste facility-Wildfire	Low	Medium	Low	<p>The County owns and maintains three solid waste transfer facilities; an interlocal agreement between the County and cities/private companies requires disposal of solid waste at the transfer facilities, which are subsequently exported to landfills outside the County. Three of the cities within Skagit County (Anacortes, Mount Vernon, and Sedro-Woolley) provide garbage collection services to their residents and businesses with their own equipment and personnel. These three cities have universal, or mandatory, garbage collection services. Current collection system is sufficient for collecting and removing solid wastes generated by the County's and City's residents and businesses. Some service gaps associated with the current collection system have been noted for recycling and organics. Skagit County no longer has active solid waste landfills. This is because the County has an abundance of surface water and very shallow groundwater; thus, it is difficult for safety reasons. Skagit County Public Works performs routine groundwater monitoring around three closed county landfills. Based on the Skagit County Solid Waste Management Plan, the total waste (recycled and disposed) generated in 2013 was 169,983 tons/year. In 2025 and 2035, the projected total waste is 194,320 tons/year and 218,930 tons/year, respectively. Asset is more likely to experience secondary hazards such as wildfire smoke, minimal impact on asset. = Low Sensitivity</p> <p>Wildfire likelihood does not directly trigger loss of asset functionality, but may eventually result in contracting elsewhere if landfill were to close due to a wildfire event and contamination of groundwater. Economic feasibility limits the ability of County to contract with landfills further away. Export of waste via rail continues to be a best practice for the County. Technological solutions i.e., conversion technology, or development of in-County landfill may be costly to implement and requires changes in systemic operations, but is feasible. = Medium Adaptive Capacity</p>	Management, location, operations
92	Private septic tanks-Extreme precipitation (Waste Management)	Medium	Medium	Medium	<p>All residents of Skagit County whose homes or businesses are served by a septic system require annual inspections, unless the system is conventional gravity (3-year inspection requirement), per Skagit County Code (SCC) 12.05.160 and Washington Administrative Code (WAC) 246-272A-270. Rebates for qualified residents also exist that range up to \$500 rebates for septic system inspection, pumping, rise installation, lid replacement, or minor repairs. In anticipation of increased extreme precipitation events, septic tank inspections and improvements may become more frequent. = Medium Adaptive Capacity</p> <p>Approximately over 18,000 septic systems in Skagit County clean and recycle sewage contaminated water into clean groundwater every day in Skagit County. =Medium Sensitivity</p>	Maintenance requirements, system reliance
93	Private septic tanks-Flooding	Medium	Medium	Medium	<p>All residents of Skagit County whose homes or businesses are served by a septic system require annual inspections, unless the system is conventional gravity (3-year inspection requirement), per Skagit County Code (SCC) 12.05.160 and Washington Administrative Code (WAC) 246-272A-270. Rebates for qualified residents also exist that range up to \$500 rebates for septic system inspection, pumping, rise installation, lid replacement, or minor repairs. In anticipation of increased extreme precipitation events, septic tank inspections and improvements may become more frequent. = Medium Adaptive Capacity</p> <p>Approximately over 18,000 septic systems in Skagit County clean and recycle sewage contaminated water into clean groundwater every day in Skagit County. Septic tank systems that have been flooded should not be used. After waters have receded, the system should be checked for broken lines or sewage surfacing. Sewage systems may become backed up into the toilet, tub, or drain. There may be foul odors and/or very little water in the toilet bowl. In addition, from the Skagit County Comprehensive Plan 2016-2036, Policy 3A-3.4 can be summarized to ensure adequate wastewater treatment includes the determination of failing on-site septic systems, technical assistance to property owners, and actions to require necessary improvements. = Medium Sensitivity</p>	Maintenance requirements, system reliance, general protocol
94	Private septic tanks-Sea level rise	Medium	Medium	Medium	<p>Approximately 18,000 septic systems in Skagit County clean and recycle sewage contaminated water into clean groundwater every day in Skagit County. In addition, from the Skagit County Comprehensive Plan 2016-2036, Policy 3A-3.4 can be summarized to ensure adequate wastewater treatment includes the determination of failing on-site septic systems, technical assistance to property owners, and actions to require necessary improvements. In anticipation of increased sea levels, saltwater intrusion of groundwater can elevate water levels causing localized flooding and requiring more frequent inspections and maintenance. = Medium Sensitivity</p> <p>All residents of Skagit County whose homes or businesses are served by a septic system require annual inspections, unless the system is conventional gravity (3-year inspection requirement), per Skagit County Code (SCC) 12.05.160 and Washington Administrative Code (WAC) 246-272A-270. Rebates for qualified residents also exist that range up to \$500 rebates for septic system inspection, pumping, rise installation, lid replacement, or minor repairs. = Medium Adaptive Capacity</p>	Maintenance requirements, system reliance, general protocol

95	Private septic tanks-Wildfire	Medium	Medium	Medium	<p>Approximately 18,000 septic systems in Skagit County clean and recycle sewage contaminated water into clean groundwater every day in Skagit County. In addition, from the Skagit County Comprehensive Plan 2016-2036, Policy 3A-3.4 can be summarized to ensure adequate wastewater treatment includes the determination of failing on-site septic systems, technical assistance to property owners, and actions to require necessary improvements. In anticipation of increased wildfire likelihood, assets located in rural residences are directly exposed to destroyed systems and immediate failed operations. Secondary impacts of wildfire on septic tanks include severe water contamination; thus, leading to rehabilitation of septic tanks which may be costly and timely = Medium Sensitivity</p> <p>All residents of Skagit County whose homes or businesses are served by a septic system require annual inspections, unless the system is conventional gravity (3-year inspection requirement), per Skagit County Code (SCC) 12.05.160 and Washington Administrative Code (WAC) 246-272A-270. Rebates for qualified residents also exist that range up to \$500 rebates for septic system inspection, pumping, rise installation, lid replacement, or minor repairs. = Medium Adaptive Capacity</p>	Maintenance requirements, system reliance, general protocol
96	Water treatment facility-Drought (Water Resources)	Low	Medium	Low	<p>Rainwater and melted snow are collected throughout the year from streams surrounding Judy Reservoir and stored in the reservoir for use by the PUD's customers. The stored water is pumped to the water treatment plant, where impurities are removed, ensuring that the water delivered to customers is pure and safe. Chemicals are added to the water to remove particles and provide disinfection. The water is then gently mixed in four open basins, allowing the chemicals to react with the water. The water then passes through one of eight filters. The filter media consists of a layer of sand and coal supported on gravel. Impurities are trapped in the filter and removed periodically by pumping water through the filter in the reverse direction. The filter wash water is temporarily stored in two lagoons before being returned to Judy Reservoir. After filtration, the water is disinfected again and then flows by gravity to three steel storage reservoirs near the treatment plant. A computer system allows operators to control and monitor plant facilities at a central location. The system also provides remote monitoring, alarm indication, and data logging. All municipal wastewater treatment facilities as well as major storm water pumping systems could be inoperable for up to 45 days or perhaps longer. Based on the 2014 Natural Hazard Mitigation Plan, the approximate current value of water treatment in Skagit County is \$25 million; however, critical facilities located within the 100-year floodplain include the water treatment plant. In addition, according to the 2014 Natural Hazard Mitigation Plan, there are 98 stormwater detention ponds (public) that total approximately \$1,561,351 = Low Sensitivity</p> <p>Based on the 2014 Natural Hazard Mitigation Plan, existing prioritized Natural Hazard mitigation Strategies or Projects concerning Water Treatment Facilities include: - Seismic analysis of existing buildings, infrastructure and upgrade - Inter-tie with PUD water system = Medium Adaptive Capacity</p>	Treatment process, structure value
97	Water treatment facility-Reduced snowpack	Low	Medium	Low	<p>Rainwater and melted snow are collected throughout the year from streams surrounding Judy Reservoir and stored in the reservoir for use by the PUD's customers. The stored water is pumped to the water treatment plant, where impurities are removed, ensuring that the water delivered to customers is pure and safe. Chemicals are added to the water to remove particles and provide disinfection. The water is then gently mixed in four open basins, allowing the chemicals to react with the water. The water then passes through one of eight filters. The filter media consists of a layer of sand and coal supported on gravel. Impurities are trapped in the filter and removed periodically by pumping water through the filter in the reverse direction. The filter wash water is temporarily stored in two lagoons before being returned to Judy Reservoir. After filtration, the water is disinfected again and then flows by gravity to three steel storage reservoirs near the treatment plant. A computer system allows operators to control and monitor plant facilities at a central location. The system also provides remote monitoring, alarm indication, and data logging. All municipal wastewater treatment facilities as well as major storm water pumping systems could be inoperable for up to 45 days or perhaps longer. Based on the 2014 Natural Hazard Mitigation Plan, the approximate current value of water treatment in Skagit County is \$25 million; however, critical facilities located within the 100-year floodplain include the water treatment plant. In addition, according to the 2014 Natural Hazard Mitigation Plan, there are 98 stormwater detention ponds (public) that total approximately \$1,561,351 = Low Sensitivity</p> <p>Based on the 2014 Natural Hazard Mitigation Plan, existing prioritized Natural Hazard mitigation Strategies or Projects concerning Water Treatment Facilities include: - Seismic analysis of existing buildings, infrastructure and upgrade - Inter-tie with PUD water system = Medium Adaptive Capacity</p>	Treatment process, structure value
98	Water treatment facility-Sea level rise	Medium	Low	High	<p>Water treatment is managed by the Skagit Public Utility District (PUD) and other local districts. Water treatment is processed in a closed environment and stored in underground steel containers. Water processed and stored in lagoons and open basins can experience saltwater intrusion from the ground and surface runoff, contaminating drinking water from an extensive and complex purification process. Transmission and distribution pipelines are buried underground, coastal assets are subject to SLR inundation/saltwater intrusion. Distribution lines that supply treated water to Samish Farms Water Assn and western portion of Judy System Retail service area are most impacted by mid-century scenarios. Infrastructure i.e., fish passages, drainage pipes, and various road improvements are regularly required. WA Dept of Ecology EIM Groundwater Map Search shows limited data on nearest well used for agricultural irrigation purposes. Groundwater levels vary significantly. = Medium Sensitivity</p> <p>Water System Design Criteria (Appendix C) of the Water Policy manual ensures adequate provisions of water supply via technology i.e., pipe diameter, meters, backflow prevention, pumps, power and backup power supply, pipe corrosion prevention, etc. Some treatment facilities or districts in County are managed by State Dept. of Ecology. =Low Adaptive Capacity</p>	Saltwater intrusion
99	Water treatment facility-Wildfire	Medium	Low	High	<p>Water treatment is managed by the Skagit Public Utility District (PUD) and other local districts. Water treatment is processed in a closed environment and stored in underground steel containers. Water processed and stored in lagoons and open basins can experience saltwater intrusion from the ground and surface runoff, contaminating drinking water from an extensive and complex purification process. Transmission and distribution pipelines are buried underground, VOCs from thermal degradation of plastic pipes/materials, burning structures, and vegetation gets sucked into pipes (EPA, 2021). Distribution lines that supply treated water to in Skagit View Village, Cedar Grove, Rockport, Marblemount, and the CWSP future service area are most impacted by mid-century HE scenarios. = Medium Sensitivity</p> <p>Water System Design Criteria (Appendix C) of the Water Policy manual ensures adequate provisions of water supply via technology i.e., pipe diameter, meters, backflow prevention, pumps, power and backup power supply, pipe corrosion prevention, etc. Some treatment facilities or districts in County are managed by State Dept. of Ecology. =Low Adaptive Capacity</p>	VOC contamination

100	Reservoirs-Drought (Water Resources)	Low	Low	Medium	<p>Based on the 2014 Natural Hazard Mitigation Plan, existing prioritized Natural Hazard mitigation Strategies or Projects concerning Reservoirs include:</p> <p>- New water reservoir = Low Adaptive Capacity</p> <p>Based on the Skagit County PUD Water System Viewer, majority of the county is serviced by the Judy Reservoir. Other areas such as Alger, Cedargrove, Marblemount, Potlatch Beach, Rockport, and Skagit View Village is serviced with remote water systems. Some areas are serviced by the North Fir Island Water Association. Based on the 2014 Natural Hazard Mitigation Plan, drought first impacts the agricultural sector. Those who rely on surface water (reservoirs and lakes) and subsurface water (ground water) are usually the last impacted. Skagit County PUD#1 owns and maintains two earth-fill dams located East of Mount Vernon near Gilligan Creek. These earth-fill dams contain Judy Reservoir with a total water storage capacity of 4,630 acre-feet of 1.5 billion gallons and supplies water to more than 50,000 residents. The reservoir is located in a sparsely populated area but due to storage capacity of the reservoir and topography of the area, sudden failures could severely impact areas located downstream of the reservoir, causing damage to homes and potential loss of life. =Low Sensitivity</p>	Service area and location
101	Reservoirs-Reduced snowpack	Medium	Low	High	<p>Based on the 2014 Natural Hazard Mitigation Plan, existing prioritized Natural Hazard mitigation Strategies or Projects concerning Reservoirs include:</p> <p>- New water reservoir = Low Adaptive Capacity</p> <p>Based on the Skagit County PUD Water System Viewer, majority of the county is serviced by the Judy Reservoir. Other areas such as Alger, Cedargrove, Marblemount, Potlatch Beach, Rockport, and Skagit View Village is serviced with remote water systems. Some areas are serviced by the North Fir Island Water Association. Based on the 2014 Natural Hazard Mitigation Plan, drought first impacts the agricultural sector. Multiple years of reduced snowpack exacerbates drought conditions and reservoir storage capacity. Those who rely on surface water (reservoirs and lakes) and subsurface water (ground water) are usually the last impacted - multiple uses that rely on predictable snowmelt in reservoirs would be impacted i.e., recreational fishing, boating, hydropower, flood management, ecological functions, etc. Skagit County PUD#1 owns and maintains two earth-fill dams located East of Mount Vernon near Gilligan Creek. These earth-fill dams contain Judy Reservoir with a total water storage capacity of 4,630 acre-feet of 1.5 billion gallons and supplies water to more than 50,000 residents. The reservoir is located in a sparsely populated area but due to storage capacity of the reservoir and topography of the area, sudden failures could severely impact areas located downstream of the reservoir, causing damage to homes and potential loss of life. Many reservoirs are located near Western Skagit County with some immediately close to the coastal shoreline and other waterways (e.g., Skagit River). Reduced snowpack would lead to reduced reservoir recharge/aquifer recharge; thus, service areas that heavily rely on reservoirs may be impacted. =Medium Sensitivity</p>	Service area and location
102	Reservoirs-Sea level rise	Medium	Low	High	<p>Based on the 2014 Natural Hazard Mitigation Plan, existing prioritized Natural Hazard mitigation Strategies or Projects concerning Reservoirs include:</p> <p>- New water reservoir = Low Adaptive Capacity</p> <p>Based on the Skagit County PUD Water System Viewer, majority of the county is serviced by the Judy Reservoir. Other areas such as Alger, Cedargrove, Marblemount, Potlatch Beach, Rockport, and Skagit View Village is serviced with remote water systems. Coastal areas that are serviced by the Alger, Samish Farms Water Association Wholesale and Judy Reservoir may be impacted by sea level rise; thus disruptions to service may be come more frequent. Based on the 2014 Natural Hazard Mitigation Plan, drought first impacts the agricultural sector. Those who rely on surface water (reservoirs and lakes) and subsurface water (ground water) are usually the last impacted. Skagit County PUD#1 owns and maintains two earth-fill dams located East of Mount Vernon near Gilligan Creek. These earth-fill dams contain Judy Reservoir with a total water storage capacity of 4,630 acre-feet of 1.5 billion gallons and supplies water to more than 50,000 residents. The reservoir is located in a sparsely populated area but due to storage capacity of the reservoir and topography of the area, sudden failures could severely impact areas located downstream of the reservoir, causing damage to homes and potential loss of life. Many reservoirs are located near Western Skagit County with some immediately close to the coastal shoreline and other waterways (e.g., Skagit River). = Medium Sensitivity</p>	Service area and location
103	Reservoirs - Wildfire	Medium	Low	High	<p>Based on the Skagit County PUD Water System Viewer, majority of the county is serviced by the Judy Reservoir. Other areas such as Alger, Cedargrove, Marblemount, Potlatch Beach, Rockport, and Skagit View Village is serviced with remote water systems. Some areas are serviced by the North Fir Island Water Association. Skagit County PUD#1 owns and maintains two earth-fill dams located East of Mount Vernon near Gilligan Creek. These earth-fill dams contain Judy Reservoir with a total water storage capacity of 4,630 acre-feet of 1.5 billion gallons and supplies water to more than 50,000 residents. The reservoir is located in a sparsely populated area but due to storage capacity of the reservoir and topography of the area, sudden failures could severely impact areas located downstream of the reservoir, causing damage to homes and potential loss of life. Watersheds draining into existing reservoirs are located near Western Skagit County with some immediately close to the coastal shoreline and other waterways (e.g., Skagit River). Increased wildfire likelihood leads to more frequent wildfire events - burnt watersheds are more prone to erosion/landslides that reduce water quality i.e., increased sedimentation. Potential effects of build up in reservoirs area algae blooms and changing hydrology. = Medium Sensitivity</p> <p>Based on the 2014 Natural Hazard Mitigation Plan, existing prioritized Natural Hazard mitigation Strategies or Projects concerning Reservoirs include:</p> <p>- New water reservoir = Low Adaptive Capacity</p>	Storage, Sedimentation
104	Schools-Drought (Zoning & Dev)	Low	Medium	Low	<p>Based on the 2014 Natural Hazard Mitigation Plan, there will be annual maintenance of the Emergency Response Plan to ensure that all Critical facilities which include nursing homes, chemical storage facilities, schools, electric and communication stations have working emergency plan in place and that contacts are up to date. Funding for this is integrated into department budgets. Schools are scattered all throughout Skagit County; thus, some educational facilities may be located on FEMA 100 or 500 year flood plain areas. Though not common, it may still be a concern. Droughts impact school enrollment, participation, grade progression, and learning outcomes. Thus, frequency of drought may deter potential students from enrolling into educational facilities located in drought prone areas. Sectors that are most likely to face severe impacts from drought include the agricultural and forestry industries. In addition, many educational facilities (public) are generally located near coastal and/or water bodies.=Low Sensitivity</p> <p>Based on the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, a Drought Contingency Plan should be made alongside the PUD and Skagit County Soil and Water Conservation District spring of 2023 to develop an outreach plan. This plan is anticipated to address public education and water conservation plans/practices (as necessary), particularly when needed for firefighting; however, as of November 12, 2024 and the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023 revised May 2023, there has been no further update. Mitigation, response, and recovery methods are outlined in the 2014 NHMP i.e., regular drills, redundant communication system, ICS training, emergency supplies, etc. = Medium Adaptive Capacity</p>	Location and operation

105	Schools-Extreme precipitation	Medium	Medium	Medium	<p>Based on the 2020 Hazard Mitigation Plan, there are 58 schools located throughout the County, 9 of which are in unincorporated County. Schools are scattered all throughout Skagit County thus, some educational facilities may be located on FEMA 100 or 500 year flood plain areas, making safe routes to school inaccessible. Continual extreme precipitation days that make road conditions hazardous can impact school enrollment, participation, grade progression, and learning outcomes. For example, La Conner School district noted 5 days of missed school (Mount Vernon school district = 6 missed days) due to severe storms/snow events during the 2008-2013 plan cycle update (2014 NHMP). Thus, frequency of extreme precipitation magnitude may deter potential students from enrolling into educational facilities located in flood prone areas. In addition, many educational facilities (public) are generally located near coastal and/or water bodies. Thus, extreme precipitation may lead to potential flooding and halt operations of these facilities for unknown periods of time. = Medium Sensitivity</p> <p>Based on the 2014 NHMP, there will be annual maintenance of the Emergency Response Plan to ensure that all Critical facilities which include nursing homes, chemical storage facilities, schools, electric and communication stations have working emergency plan in place and that contacts are up to date. Funding for this is integrated into department budgets. The 2020 HMP update identifies an initiative (C-20) to work with local school districts to retrofit facilities to better withstand severe weather and other hazardous events. Mitigation, response, and recovery methods are outlined in the 2014 NHMP i.e., regular drills, redundant communication system, ICS training, emergency supplies, etc. = Medium Adaptive Capacity</p>	Location and operation
106	Schools-Flooding	Medium	Medium	Medium	<p>Based on the 2020 Hazard Mitigation Plan, there are 58 schools located throughout the County, 9 of which are in unincorporated County. Schools are scattered all throughout Skagit County thus, some educational facilities may be located on FEMA 100 or 500 year flood plain areas, making safe routes to school inaccessible. There are no recorded flood events that have made road conditions hazardous that impact school enrollment, participation, grade progression, and learning outcomes. Future flood events doesn't preclude impacts on asset as flooding may halt operations of these facilities and potentially cause undetermined periods of closure. = Medium Sensitivity</p> <p>Based on the 2014 Natural Hazard Mitigation Plan, there will be annual maintenance of the Emergency Response Plan to ensure that all Critical facilities which include nursing homes, chemical storage facilities, schools, electric and communication stations have working emergency plan in place and that contacts are up to date. Funding for this is integrated into department budgets. Schools are required to develop and exercise hazard-specific response plans per RCW 28A.320.125. The 2020 HMP identifies methods to mitigate flood hazards i.e., developing flood hazard awareness week activities, workshops, and information exchange within schools for students, faculty, and staff. Mitigation, response, and recovery methods are outlined in the 2014 NHMP i.e., regular drills, redundant communication system, ICS training, emergency supplies, etc. = Medium Adaptive Capacity</p>	Location and operation
107	Schools-Reduced snowpack	Low	Medium	Low	<p>Based on the 2020 Hazard Mitigation Plan, there are 58 schools located throughout the County, 9 of which are in unincorporated County. Continual seasons of reduced snowpack reduces water availability for school facilities-potentially cause undetermined periods of closure, and may impact school enrollment, participation, grade progression, and learning outcomes. = Low Sensitivity</p> <p>Based on the 2014 Natural Hazard Mitigation Plan, there will be annual maintenance of the Emergency Response Plan to ensure that all Critical facilities which include nursing homes, chemical storage facilities, schools, electric and communication stations have working emergency plan in place and that contacts are up to date. Funding for this is integrated into department budgets. Based on the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023, a Drought Contingency Plan should be made alongside the PUD and Skagit County Soil and Water Conservation District spring of 2023 to develop an outreach plan. This plan is anticipated to address public education and water conservation plans/practices (as necessary), particularly when needed for firefighting; however, as of November 12, 2024 and the Skagit County Multi-Jurisdictional Natural Hazard Mitigation Plan Mid-Cycle update in January 2023 revised May 2023, there has been no further update. In addition, schools are required to develop and exercise hazard-specific response plans per RCW 28A.320.125. The 2020 HMP identifies methods to mitigate hazards from reduced snowpack such as an advanced noticing system. Mitigation, response, and recovery methods are outlined in the 2014 NHMP i.e., regular drills, redundant communication system, ICS training, emergency supplies, etc. = Medium Adaptive Capacity</p>	Location and operation
108	Schools-Sea level rise	Medium	Medium	Medium	<p>Schools are scattered all throughout Skagit County; there are 58 schools located throughout the County, 9 of which are in unincorporated County (2020 Hazard Mitigation Plan). Thus, some educational facilities may be located in potential SLR inundation zones that result in flooding of asset. For example, floods reduce school attendance that impact school enrollment, participation, grade progression, and learning outcomes. Thus, SLR inundation reduces land available for facilities and road accessibility. Hazard may deter potential students from enrolling into educational facilities located in coastal flood prone areas, halting operations of these facilities and potentially cause undetermined periods of closure. = Medium Sensitivity</p> <p>Based on the 2014 Natural Hazard Mitigation Plan, there will be annual maintenance of the Emergency Response Plan to ensure that all Critical facilities which include nursing homes, chemical storage facilities, schools, electric and communication stations have working emergency plan in place and that contacts are up to date. Funding for this is integrated into department budgets. In addition, schools are required to develop and exercise hazard-specific response plans per RCW 28A.320.125. The 2020 HMP identifies methods to mitigate hazards from reduced snowpack such as an advanced noticing system. Mitigation, response, and recovery methods are outlined in the 2014 NHMP i.e., regular drills, redundant communication system, ICS training, emergency supplies, etc. = Medium Adaptive Capacity</p>	Location and operation
109	Schools - Wildfire	Low	Medium	Low	<p>Schools are scattered all throughout Skagit County; there are 58 schools located throughout the County, 9 of which are in unincorporated County (2020 Hazard Mitigation Plan). Some are located in WUI-interface and WUI-intermix zones. Increased wildfire likelihood has minimal impact on schools, however, wildfire events require evacuation and limited outdoor activities, and increased costs to retrofit buildings i.e., air filtration, fire-resistant building materials, landscaping safe space, etc. = Low Sensitivity</p> <p>Based on the 2014 Natural Hazard Mitigation Plan, there will be annual maintenance of the Emergency Response Plan to ensure that all Critical facilities which include nursing homes, chemical storage facilities, schools, electric and communication stations have working emergency plan in place and that contacts are up to date. Funding for this is integrated into department budgets. In addition, schools are required to develop and exercise hazard-specific response plans per RCW 28A.320.125. The 2020 HMP identifies methods to mitigate hazards from reduced snowpack such as an advanced noticing system. Mitigation, response, and recovery methods are outlined in the 2014 NHMP i.e., regular drills, redundant communication system, ICS training, emergency supplies, etc. = Medium Adaptive Capacity</p>	Location and operation
110	Radio towers-Drought (Zoning & Dev)	Low	Medium	Low	<p>Wireless facilities are owned/maintained by private entities, permitting authority is the County. Drought conditions can cause ground to subside and move, compromising structural integrity of asset. Movement depends on groundwater level subsidence. Maintenance of facilities do not require a permit. = Low Sensitivity</p> <p>Siting and design of wireless facilities are regulated by Skagit municipal code sec. 14.16.720 (Towers and small wireless facilities regulations). Environmentally sensitive sites must consider alternative sites and design for height, setback, massing, public right of ways, easements, etc. Engineer determines the operational and structural safety of asset, site specific. Code does not call out provisions specific to drought hazards. = Medium Adaptive Capacity</p>	Site Constraints

111	Radio towers-Extreme precipitation & Flooding	Medium	Medium	Medium	<p>Exposed assets located in delta region are more sensitive to flooding and extreme precip than inland assets that corrodes metal towers and compromises structural integrity. Extreme weather also impacts asset that limits signal transmission and accessibility - communications among private individuals i.e., elderly, mobility-impaired individuals, etc. are most impacted. Access to towers for maintenance can be restricted due to localized flooding. = Medium Sensitivity</p> <p>Siting and design of wireless facilities are regulated by Skagit municipal code sect. 14.16.720 (Towers and small wireless facilities regulations). Environmentally sensitive sites must consider alternative sites and design for height, setback, massing, public right of ways, easements, etc. Engineer determines the operational and structural safety of asset, site specific. Code does not call out provisions specific to extreme precipitation and flood hazards. = Medium Adaptive Capacity</p>	Site Constraints
112	Radio towers-Reduced snowpack	Low	Medium	Low	<p>Exposed assets located in mountainous hillside areas are more sensitive to reduced snowpack. Brangers et. al. (2024) article shows heavy snow layers can increase signal backscatter and interferes with radio wave transmission. "During snowmelt periods, wet snow absorbs the signal, and the soil backscatter becomes negligible". Reduced snowpack is anticipated to lower transmission risks. = Low Sensitivity</p> <p>Siting and design of wireless facilities are regulated by Skagit municipal code sect. 14.16.720 (Towers and small wireless facilities regulations). Environmentally sensitive sites must consider alternative sites and design for height, setback, massing, public right of ways, easements, etc. Engineer determines the operational and structural safety of asset, site specific. Code does not call out provisions specific to reduced snowpack conditions. = Medium Adaptive Capacity</p>	Site Constraints
113	Radio/Cell towers-Sea level rise	Medium	Medium	Medium	<p>Below-grade fiber optic cables located in 1-ft. SLR inundation zone per NOAA SLR viewer can be flooded by brackish or salt water that corrodes foundation of metal towers and compromises structural integrity. Land subsidence or movement from SLR can also impact asset that limits signal transmission and accessibility - communications among private individuals i.e., elderly, mobility-impaired individuals, etc. are most impacted. Access to towers for maintenance can be restricted due to flooding from SLR inundation. = Medium Sensitivity</p> <p>Measures for adaptation: relocate inland, design elevated/higher level, flood protection, reinforced tower and foundation materials to withstand saltwater corrosion, etc. Measures are dependent on funding availability and permits available for privately-managed assets to maintain and upgrade assets. = Medium Adaptive Capacity</p>	Design and functionality
114	Radio/cell towers-Wildfire	Medium	Medium	Medium	<p>Assets located in mountainous hillside areas are more exposed to increased wildfire likelihood, direct impacts include destruction of towers, indirect impacts = reduced radio wave transmission due to increased smoke/particulate matter in air. Wildfire events are unpredictable, and magnitude of destruction varies depending on asset location, material, technological upgrades, etc. = Medium Sensitivity</p> <p>Siting and design of wireless facilities are regulated by Skagit municipal code sect. 14.16.720 (Towers and small wireless facilities regulations). Environmentally sensitive sites must consider alternative sites and design for height, setback, massing, public right of ways, easements, etc. Engineer determines the operational and structural safety of asset, site specific. Code does not call out provisions specific to wildfire hazards. = Medium Adaptive Capacity</p>	Siting constraints

Tasks 3.4-3.5: Characterize risk and decide course of action

In Column B [below], list the assets you identified in Task 3.3 as having *medium* or *high* vulnerability. In Column C, characterize the **Probability** of hazard occurrence for each asset as *low, medium, or high*. In Column E, characterize the **Magnitude** of the potential loss/consequences as *low, medium, or high*. Put each asset's number [from Column A] in the appropriate cell of the Risk Characterization Matrix [right], and note the composite risk rating in Column G. Based on the asset's risk characterization, note your decision [Take Action of Accept Risk] in Column H.

Number	Asset-Hazard Pair (Note applicable sector(s) in parenthesis.)	Probability (Low, Medium, High)	Notes (Note the indicators, data, and ruleset used to characterize probability of loss.)	Magnitude (Low, Medium, High)	Notes (Note the indicators, data, and ruleset used to characterize magnitude of loss.)	Composite Risk Rating (Low = Green; Medium = Gold; Red = High)	Decision (Take Action or Accept Risk)
1	Residential Neighborhood 1 - Drought	Low	<p>Loss of water: Many residents in rural areas of the county rely on private wells or private water systems for their domestic water supply. Part of Neighborhood 1 (Anacortes, Swinomish tribal land) lies within an area identified as disadvantaged. Annual population loss due to natural hazards, homes with a lack of indoor plumbing, and lower income households are higher than average from the State.</p> <p>Probability: According to the Skagit County Multi-Jurisdiction Hazard Mitigation Plan 2020 Update, Skagit County was part of the 2015 drought declaration areas. In May 20, 2019, Skagit County was once again in a drought declaration area. According to USGS Streamflow for day of the year, Skagit has multiple streams that are classified as low, much below normal (<10) and below normal (10-24) percentile classes. According to the U.S. drought monitor (map last updated November 7, 2024), northeast Skagit county is observed to have moderate drought and abnormally dry. Neighborhood 1 is located in west Skagit County and includes all portions of unincorporated Skagit County lying westerly of the Swinomish Channel including Fidalgo Island, Guemes Island, Cypress Island and Sinclair Island = Low Probability</p> <p>Future Likelihood Indicator: Under an RCP8.5 scenario, the likelihood of a year with summer precipitation below 75% of the historical normal is projected to be 20% by mid-century (2040-2069). = Low Probability</p>	Medium	<p>Indicator: Property value and landscaping</p> <p>According to the Skagit County Natural Hazards Mitigation Plan with records obtained from the Skagit county Assessor, there are 4,697 structures with an average market value of \$302,150 in neighborhood 1. The total estimated value of structures at risk in this neighborhood is \$354,811,380. Based on the Skagit County 2020 Base Plan, no structures will be directly affected by drought conditions. Droughts may have significant impact on landscapes, which could cause a financial burden to property owners. In addition, it has been noted Skagit County has experienced some periods of drought in the past; however these events are typically low to moderate in severity and relatively short in duration. Further, the agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. = Medium Magnitude</p> <p>Also based on the Skagit County Natural Hazards Mitigation Plan, a severe drought may severely impact this neighborhood as Guemes Island relies entirely on an island aquifer for domestic water. Further a large number of residents living on rural Fidalgo Island rely on private, stand-alone water systems for their domestic water supply. = Medium magnitude</p>	Low	Accept Risk
2	Residential Neighborhood 1 - Extreme Heat (not priority climate hazard)	Low	<p>Health Impacts: Certain populations are considered more vulnerable or at greater risk during extreme heat events. These populations include, but are not limited to the following: elderly age 65 and older, infants and young children under five years of age, pregnant woman, the displaced or poor, overweight, and people diagnosed with mental illnesses, disabilities, and chronic diseases. Neighborhood 1 is located in an area identified as disadvantaged. Increased annual mortality rates, lack of indoor plumbing, and lower income households are higher than average.</p> <p>Probability: Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several days or weeks are deemed as extreme heat. Severe weather events usually occur during the months of October to April; however, have occurred year round as well. According to First street data, properties at risk from heat in Neighborhood 1 are anticipated to have minimal to minor heat risk.</p> <p>Future Likelihood Indicator: Steady decrease in heating degree days. Historical baseline of 7089 deg F heating days (temperature degree days divided by temperature=109 heating days or number of days to heat home). Mid century and end of century projected to be a decrease in 1199 deg F heating days (18 heating days) and 2467 deg F heating days (38 heating days). = Low Probability</p>	Medium	<p>Indicator: Living conditions</p> <p>Poor living conditions and substandard housing may cause county residents to experience house-related hazard such as lead paint (houses built prior to 1960), asbestos, and poor filtration may amplify public health concerns; thus, leading to increased potential hospitalizations. Vulnerable populations may also face increased poor living conditions and increased medical issues. = Medium magnitude</p>	Low	Accept Risk
3	Residential Neighborhood 2 - Extreme Heat (not priority climate hazard)	Low	<p>Health Impacts: Certain populations are considered more vulnerable or at greater risk during extreme heat events. These populations include, but are not limited to the following: elderly age 65 and older, infants and young children under five years of age, pregnant woman, the displaced or poor, overweight, and people diagnosed with mental illnesses, disabilities, and chronic diseases.</p> <p>Probability: Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several days or weeks are deemed as extreme heat. Severe weather events usually occur during the months of October to April; however, have occurred year round as well. According to First street data, properties at risk from heat in Neighborhood 2 are anticipated to have minimal to minor heat risk.</p> <p>Future Likelihood Indicator: Steady decrease in heating degree days. Historical baseline of 7089 deg F heating days (or 109 heating days). Mid century and end of century projected to be a decrease in 1199 deg F heating days (18 heating days) and 2467 deg F heating days (38 heating days). = Low Probability</p>	Medium	<p>Indicator: Living conditions</p> <p>Poor living conditions and substandard housing may cause county residents to experience house-related hazard such as lead paint (houses built prior to 1960), asbestos, and poor filtration may amplify public health concerns; thus, leading to increased potential hospitalizations. Vulnerable populations may also face increased poor living conditions and increased medical issues. = Medium magnitude</p>	Low	Accept Risk

4	Residential Neighborhood 3 - Extreme Heat (not priority climate hazard)	Low	<p>Health Impacts: Certain populations are considered more vulnerable or at greater risk during extreme heat events. These populations include, but are not limited to the following: elderly age 65 and older, infants and young children under five years of age, pregnant woman, the displaced or poor, overweight, and people diagnosed with mental illnesses, disabilities, and chronic diseases. All of Neighborhood 3 is located in an area identified by the White House Council on Environmental Quality as disadvantaged. Population loss, projected flood risk, lower income households, and transportation barriers are higher than average for the State.</p> <p>Probability: Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several days or weeks are deemed as extreme heat. Severe weather events usually occur during the months of October to April; however, have occurred year round as well. According to First Street, properties at risk in Neighborhood 3 are cited to have more moderate to minor risk. = Low Probability</p> <p>Future Likelihood Indicator: Steady decrease in heating degree days. Historical baseline of 7089 deg F heating days (or 109 heating days). Mid century and end of century projected to be a decrease in 1199 deg F heating days (18 heating days) and 2467 deg F heating days (38 heating days).</p>	Medium	<p>Indicator: Living conditions</p> <p>Poor living conditions and substandard housing may cause county residents to experience house-related hazard such as lead paint (houses built prior to 1960), asbestos, and poor filtration may amplify public health concerns; thus, leading to increased potential hospitalizations. Vulnerable populations may also face increased poor living conditions and increased medical issues. = Medium magnitude</p>	Low	Accept Risk
5	Residential Neighborhood 4 - Extreme Heat (not priority climate hazard)	Low	<p>Health Impacts: Certain populations are considered more vulnerable or at greater risk during extreme heat events. These populations include, but are not limited to the following: elderly age 65 and older, infants and young children under five years of age, pregnant woman, the displaced or poor, overweight, and people diagnosed with mental illnesses, disabilities, and chronic diseases.</p> <p>Probability: Temperatures that hover 10 degrees or more above the average high temperature for the region and last for several days or weeks are deemed as extreme heat. Severe weather events usually occur during the months of October to April; however, have occurred year round as well. As Neighborhood 4 includes areas not within Neighborhoods 1-3, First Street data cites that properties are at minimal heat risk.</p> <p>Future Likelihood Indicator: Steady decrease in heating degree days. Historical baseline of 7089 deg F heating days (or 109 heating days). Mid century and end of century projected to be a decrease in 1199 deg F heating days (18 heating days) and 2467 deg F heating days (38 heating days) . = Low Probability</p>	Medium	<p>Indicator: Living conditions</p> <p>Poor living conditions and substandard housing may cause county residents to experience house-related hazard such as lead paint (houses built prior to 1960), asbestos, and poor filtration may amplify public health concerns; thus, leading to increased potential hospitalizations. Vulnerable populations may also face increased poor living conditions and increased medical issues. = Medium magnitude</p>	Low	Accept Risk
6	Residential Neighborhood 2 - Flooding	High	<p>Structural damage: The combined effects of high tides, peak riverine streamflow, and sea level rise can cause widespread flooding from temporary extreme high-water levels fanning out over the delta's broad and low-lying geography, exposing residential development along shoreline areas. Contains disadvantaged communities in incorporated areas per White House environmental & economic justice mapping tool.</p> <p>Probability: Neighborhood 2 comprises of the Skagit River Delta and the Puget Sound Coast that follows the boundaries of the river floodplain and can be at greater risk of flood events. Based on the Skagit County Multi-Jurisdiction Hazard Mitigation Plan 2020 Update, all coastal areas in Skagit County are at risk to tidal flooding. There are three different types of phase floods: - Phase 1 flooding inundates low areas near the Skagit River and generally does not cause significant damage in the Skagit River Valley. - Phase 2 flooding inundates a broader area and may cause significant damage. - Phase 3 flooding can cause catastrophic damage in the valley</p> <p>Floods in the Skagit basin are greatest in the months of November, December, and January, with events occurring as early as October or as late as February. The Skagit River poses a major flood threat in the lower valley and the Sauk River and Suitable River pose a significant threat in the upper valley. According to First Street data, Neighborhood 2 is anticipated to have areas that may face major to severe flood risk in the next 30 years. Further based on the Skagit County Natural Hazards Mitigation Plan, there is high probability of flooding events in Skagit County because of the Skagit River= High Probability</p> <p>Future Likelihood Indicator: Large areas within Neighborhood 2 are located in Zone A which is deemed as having a 1% chance flood event (100-year flood) with some smaller areas located in Zone X which is deemed as 0.2% annual chance of flood event (500-year event).</p>	Medium	<p>Indicator: Living conditions and structural damage</p> <p>Severity of flood damage is dependent upon ground elevation, the surrounding topography, peak flow volumes, surface flow velocities, and proximity to the river or a levee break. Neighborhood 2 has varying elevations and thus residential areas closer to the Skagit river may face more detrimental damage as compared to residential areas further away. = Medium magnitude</p>	High	Take Action

7	Residential Neighborhood 2 - Sea Level Rise	Low	<p>Structural damage: The combined effects of high tides, peak riverine streamflow, and sea level rise can cause widespread flooding from temporary extreme high-water levels fanning out over the delta's broad and low-lying geography, exposing residential development along shoreline areas.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency, leading to increased likelihood for permanent inundation of low-lying areas, higher tidal and storm surge reach, flooding, erosion, and loss of residential parcels.</p> <p>Future Likelihood Indicator: Sea levels are anticipated to increase by mid-century, causing widespread shallow flooding along the Samish and Skagit Deltas = Low Probability</p>	Medium	<p>Indicator: Living conditions and structural damage</p> <p>Increase of sea level rise would lead to increased community flooding; thus, leading to many residential developments to evacuate and/or leave their homes. Homes would be potentially uninhabitable or increased maintenance would be required. = Medium magnitude</p>	Low	Accept Risk
8	Baker River Hydroelectric Project - Wildfire	Low	<p>Structural damage: Increased likelihood of wildfire may lead to damaged infrastructure of the Baker River Hydroelectric project. This may then cascade into the loss of renewable energy while damaged infrastructure are being renovated.</p> <p>Probability: According to First Street, the areas where the Baker River Hydroelectric Project is located are anticipated to have minor to minimal heat risk in the next 30 years. There have been 5 historical wildfire events in Skagit county between 1984 to 2021. = Low Probability</p> <p>Future Likelihood Indicator: Steady increase in likelihood of climate and fuel conditions for wildfire. Historical baseline recorded to be 0. Mid century and end of century projected to be 0.04 and 0.17, respectively.</p>	Medium	<p>Indicators: Disruption of services</p> <p>The Baker River Hydroelectric Project is one of the largest sources of hydroelectricity for Skagit county. The project includes two concrete damas and their associated powerhouses and facilities. The project reservoirs, Baker Lake and Lake Shannon, are fed by runoff from the flanks of Mount Baker and Mount Shuksan. The power-generating capacity for upstream and downstream of the project is 107 and 111 megawatts, respectively. Loss of this energy due to wildfire would affect the operational capacity of the project. The power production to the grid would be greatly diminished, reducing the amount of energy available for consumers when operations are down. The primary source of electricity in Skagit County comes from hydropower generated by this project. Energy mix will shift to other sources to meet demand or purchase from external sources. = Medium magnitude</p>	Low	Accept Risk
9	Farms-Drought (Ag & Food Systems)	Low	<p>Production: Increased drought may impact this sector because of its heavy dependence on stored water in the soil. Soil water can be rapidly depleted during extended dry periods. Normal production of crops may be heavily impacted; thus, coercing the industry to face potential shortages and supply chain issues.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Under an RCP8.5 scenario, the likelihood of a year with summer precipitation below 75% of the historical normal is projected to be 20% by mid-century (2040-2069). A short-term drought that persists for 3 to 6 months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.</p>	High	<p>Indicators: Crop production</p> <p>As Skagit County is home to the crop production of many vegetables and fruits, increased drought would heavily impact this industry. Over 90 different crops are grown in the County. Blueberries, raspberries, strawberries, tulips, daffodils, pickling cucumbers, specialty potatoes, Jonogold apples, and vegetable seed are some of the more important crops in this maritime valley. More tulip, iris, and daffodil bulbs are produced here than in any other county in the U.S. The implications of drought would heavily impact the crop production listed above and impact the livelihood of the county. = High Magnitude</p>	Medium	Take Action
10	Farms-Extreme precipitation (Ag & Food Systems)	Medium	<p>Production: Increased extreme precipitation may impact this sector because oversaturation of the soil may lead to root rot and failed production of many crops. Normal production of crops may be heavily impacted; thus, coercing the industry to face potential shortages and supply chain issues. Shift to outsourcing crops or to use of alternative crops.</p> <p>Probability: Extreme precipitation, classified as "Severe Storms" in the 2014 Local Hazard Mitigation Plan are common in Skagit County during the fall and winter months in all areas of Skagit County. Some storms are more severe and require assistance from a variety of governmental agencies or emergency responders. Thus, based on past events, the 2014 Local Hazard Mitigation Plan indicates there is a higher probability of extreme precipitation events occurring in the future. According to the 2014 Natural Hazard Mitigation Plan, precipitation in Skagit County varies significantly with some areas having rain intensity of more than 10 inches and other areas with less than 3 inches. Most farms in Skagit County are located in communities including Bow, Burlington, Concrete, Mount Vernon, Rockport, and Sedro-Woolley. These communities have recorded precipitation intensity ranging from 3-4 inches. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded</p>	High	<p>Indicators: Crop production</p> <p>As Skagit County is home to the crop production of many vegetables and fruits, increased extreme precipitation would heavily impact this industry. Over 90 different crops are grown in the County. Blueberries, raspberries, strawberries, tulips, daffodils, pickling cucumbers, specialty potatoes, Jonogold apples, and vegetable seed are some of the more important crops in this maritime valley. More tulip, iris, and daffodil bulbs are produced here than in any other county in the U.S. The impacts of extreme precipitation would heavily impact the crop production listed above and impact the livelihood of the county. Asset is important to community culture and identity - economic return of asset may eventually be outpaced by other uses exacerbated by increased heavy precip magnitude. = High Magnitude</p>	High	Take Action

11	Farms-Reduced snowpack (Ag & Food Systems)	Medium	<p>Production: Reduced snowpack would lead to a decrease in groundwater/aquifer recharge. This impacts production supply of crops as many farms primarily rely on groundwater for crop irrigation instead of surface water. Reduction of snowpack would potentially lead to insufficient water for crop irrigation.</p> <p>Probability: Based on the 2014 Skagit County Natural Hazard Mitigation Plan, snowfall is seldom heavy and varies greatly from year to year. According to the 2023 Skagit County Monitoring Program Water Year, Skagit County had good snowpack at the end of winter; however, the snow melted quickly during a record-breaking warm May. Based on the 2023 Skagit River County Flood Book, snowmelt peak is expected during the spring or early summer due to the seasonable rise in temperatures in resultant melting of the accumulated snow pack. Skagit County's water supply is approximately 50-70% originated from melting snow in the Cascade Mountains. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady increase of percentage of stream lengths in Skagit County winter to spring streamflow timing ratio. Historical baseline ratio for 1.0 to 1.5 is 6.1%. Mid century ratio for 1.0 to 1.5 is 13.6% and end of century 1.0 to 1.5 ratio is 51.3 percent. The ratio of winter to spring streamflow is an indicator of the timing of streamflow during the year, which affects the seasonal availability of water for hydropower and irrigation. An increase in the ratio in the future means an increase in streamflow in winter and a decrease in spring. Middle elevation streams are expected to experience the most change in streamflow timing, with a shift to higher streamflow in winter.</p>	High	<p>Indicators: Crop production</p> <p>As Skagit County is home to the crop production of many vegetables and fruits, reduced snowpack would heavily impact this industry. Over 90 different crops are grown in the County. Blueberries, raspberries, strawberries, tulips, daffodils, pickling cucumbers, specialty potatoes, Jonagold apples, and vegetable seed are some of the more important crops in this maritime valley. More tulip, iris, and daffodil bulbs are produced here than in any other county in the U.S. The impacts of reduced snowpack would lead to reduced irrigation and the inability for crops to be irrigated properly. This could impact the community significantly as their food systems may be impacted greatly. = High Magnitude</p>	High	Take Action
12	Fisheries-Drought (Cultural Resources)	Medium	<p>Livelihood: Drought may lead to reduced water levels where many fisheries thrive in. The livelihood of their habitat and longevity may be threatened with drought. Decreases in fish habitat and populations have a direct correlation to cultural practices and traditions that rely on predictable fish runs.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a 100% change of stream lengths in low stream flow category (-10 to 10). This indicates 100% of the streams in the county will have 10% less streamflow on average during low summer streamflows. Mid century and end of century baseline is 25.4% and 7.7%.</p>	High	<p>Indicators: Livelihood</p> <p>Streamflow plays a critical role in shaping and maintaining habitats for aquatic species, particularly in the Skagit River, where Pacific salmon and trout are both culturally significant and legally protected. The availability of spawning and rearing habitats for these fish is heavily influenced by the river's flow patterns, which determine which areas of the watershed are accessible. Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions and water quality. Anticipated increase in drought conditions reduces available habitat that impacts multiple generations of fish life cycles, risking displacement of species or inability to adapt to changing habitats; thus, not survive. Healthy fish habitat and populations have a direct correlation to cultural practices and traditions that rely on predictable fish runs. Less people would be able to practice traditional cultures and customs and can span generations as well. = High Magnitude</p>	High	Take Action
13	Fisheries-Flooding	High	<p>Fish Livelihood: Flooding may destroy spawn grounds, displace fish populations, and harm eggs and larvae. Further, flooding may also affect the timing of fish migrations that are present in Skagit County. Decreases in fish habitat and populations have a direct correlation to cultural practices and traditions that rely on predictable fish runs.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. = High Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Livelihood</p> <p>Streamflow plays a critical role in shaping and maintaining habitats for aquatic species, particularly in the Skagit River, where Pacific salmon and trout are both culturally significant and legally protected. The availability of spawning and rearing habitats for these fish is heavily influenced by the river's flow patterns, which determine which areas of the watershed are accessible. Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. With the influx of flow from flooding, these species would be at risk of being displaced entirely or be unable to adapt to changing habitats; thus, not survive. Healthy fish habitat and populations have a direct correlation to cultural practices and traditions that rely on predictable fish runs. Less people would be able to practice traditional cultures and customs and can span generations. = High Magnitude</p>	High	Take Action

14	Fisheries-Sea Level Rise	High	<p>Declining habitat: SLR alters salinity levels in estuarine habitats that disrupt juvenile salmon habitats and stressing other aquatic species. Lower tidal columns and low velocities make surface waters more susceptible to increased temperatures, altering water quality and food conditions that impacts fish habitat. Decreases in fish habitat and populations have a direct correlation to less cultural practices and traditions that rely on predictable fish runs.</p> <p>Probability: SSLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency, leading to increased likelihood for permanent inundation of low-lying areas, higher tidal and storm surge reach, flooding, erosion, and fish habitat.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for was not recorded. However, mid century and end of century sea level rise is projected to be 0.7 feet and 2.1 feet, respectively. = High Probability</p>	High	<p>Indicators: Life cycle of fish species</p> <p>Storm events and such combined with SLR will result in areas previously dry that are anticipated to be permanently inundated and can vary along the coast by elevation. Low-lying delta and unstable coastal bluffs areas where pocket estuaries exist can damage habitat for juvenile fish and fry. Potential habitat loss from SLR correlates to 211,000 - 530,000 smolt capacity per year for 1.4 ft. - 2.6 ft., respectively (Beamer et. al., 2005). Multiple extreme storm and SLR conditions impacts multiple generations, where life cycle of fish are typically 1-4 years. Healthy fish habitat and populations have a direct correlation to cultural practices and traditions that rely on predictable fish runs. Less people would be able to practice traditional cultures and customs and can span generations. = High Magnitude</p>	High	Take Action
15	Fisheries-Wildfire	Medium	<p>Habitat degradation: Fisheries in headwater tributaries are more susceptible to increased sedimentation that decreases habitat quality from wildfire events. Increase in wildfire likelihood and fire danger conditions can result in more frequent wildfires.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Medium	<p>Indicators: Existing Conditions</p> <p>Wildfire had an overall positive effect on spring Chinook in their current distribution area, while the effect of fire on salmon in the historical distribution was mixed. Wildfire may have a net positive effect on spring Chinook salmon habitat by increasing habitat diversity (Kirkland et. al., 2017-USDA; Lamborn et. al., 2023), but is highly dependent on fire severity and extent, and ecological condition of stream/watershed. = Medium Magnitude</p>	Medium	Take Action
16	Farms-Drought (Economic Development)	Medium	<p>Revenue: Based on the Economic Indicators of Agriculture in Skagit County, farms make up about 3% of total earnings in 2007. Similarly, employment in the farming industry in Skagit County was found to be 4%. In 2007, there were 1,215 farms, covering about 109,000 acres of land.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County, and will experience 5% in the future. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Medium Probability</p> <p>Future Likelihood Indicator: Under an RCP8.5 scenario, the likelihood of a year with summer precipitation below 75% of the historical normal is projected to be 20% by mid-century (2040-2069). A short-term drought that persists for 3 to 6 months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.</p>	Medium	<p>Indicators: Prosperity</p> <p>Within the Economic Indicators of Agriculture in Skagit County document, the value of sales (e.g., \$100,000) per farm from 1987 to 2007 have met this goal or declined since 2007. With the implications of drought, it is more likely for farms to not reach this goal and contribute to revenue flow for the county. Primary markets for Skagit County farmer's crops and livestock products have been large-scale processing plants, and national purchasers and distributors. However, there has been growing consumer interest in how and where food is produced; thus, demand in this sub market has been growing that may combat the impacts from drought on crop revenue. = Medium Magnitude</p>	Medium	Take Action
17	Farms-Extreme precipitation	Medium	<p>Revenue & working conditions: Extreme precipitation may lead to complete crop damage, waterlogged soil, and damaged farming infrastructure/tools. Employment may also be impacted as well due to extreme precipitation days which would inhibit quality work days.</p> <p>Probability: According to the 2014 Natural Hazard Mitigation Plan, historic average (1950-2019) is 6.5-in. of rain. Precipitation in Skagit County varies significantly with some areas having rain intensity of more than 10 inches and other areas with less than 3 inches. Low-lying delta areas where most farms are located communities are also located in Bow, Burlington, Concrete, Mount Vernon, Rockport, and Sedro-Woolley. These communities have recorded precipitation intensity ranging from 3-4 inches. Greatest increase in heavy precip magnitude (2-year, 24-hour storm) will occur in eastern, northern, and western sections of County. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	Medium	<p>Indicators: Prosperity</p> <p>Based on the Economic Indicators of Agriculture in Skagit County, farms make up about 3% of total earnings in 2007. Similarly, employment in the farming industry in Skagit County was found to be 4%. In 2007, there were 1,215 farms, covering about 109,000 acres of land and has decreased since 2022. Also within this document, the value of sales (e.g., \$100,000) per farm from 1987 to 2007 have met this goal or declined since 2007. Agriculture is adaptable - for example, production of peas shifted to other crops due to processing facility issues. In addition, extreme precipitation would inhibit productive workload for employees of farms as unsafe work conditions may arise. This may lead to increased days of non-working days and/or shift to less demanding crops; thus, reducing employment and crop production, or outsourcing crops. Highest and best use of ag land varies depending on marketability and value-enhancing goods/services of asset. = Medium Magnitude</p>	Medium	Take Action

18	Farms-Flooding	High	<p>Revenue: Flooding may completely destroy crops that have been cultivating during growing seasons; thus, leading to immediate losses of revenue. In addition, extreme precipitation would inhibit productive workload for employees of farms as unsafe work conditions may arise. This may lead to increased days of non-working days; thus, reducing employment and crop production.</p> <p>Probability: In Skagit County, floods are generally the result of either spring snowmelt or winter rain on snow. The greatest threat of flooding is in the months of November through February. Based on anecdotal newspaper reports, Skagit County farms have had to deal with flooding in 2021 which caused water submerged fields and the passing of some farm animals. In 2023, farms and businesses along the Stillaguamish River saw record flooding with water reaching over 21 feet high. Eight other rivers including the Skagit River near concrete to the Snohomish and Tolt rivers close to Carnation, were also above flood stage. = High Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Prosperity Based on the Economic Indicators of Agriculture in Skagit County, farms make up about 3% of total earnings in 2007. Similarly, employment in the farming industry in Skagit County was found to be 4%. In 2007, there were 1,215 farms, covering about 109,000 acres of land and has decreased since 2022. Also within this document, the value of sales (e.g., \$100,000) per farm from 1987 to 2007 have met this goal or declined since 2007. Further, direct crop losses due to water damage, soil erosion, and the destruction of farm infrastructure may occur due to flood damage. = High Magnitude</p>	High	Take Action
19	Farms-Reduced snowpack	Medium	<p>Revenue: Reduced snowpack would lead to decreased groundwater/aquifer recharge. Most of the agricultural sector relies on groundwater for irrigation instead of surface water. Crop production may decrease significantly due to reduced snowpack.</p> <p>Probability: Based on the 2014 Skagit County Natural Hazard Mitigation Plan, snowfall is seldom heavy and varies greatly from year to year. According to the 2023 Skagit County Monitoring Program Water Year, Skagit County had good snowpack at the end of winter; however, the snow melted quickly during a record-breaking warm May. Based on the 2023 Skagit River County Flood Book, snowmelt peak is expected during the spring or early summer due to the seasonable rise in temperatures in resultant melting of the accumulated snow pack. Skagit County's water supply is approximately 50-70% originated from melting snow in the Cascade Mountains. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady increase of percentage of stream lengths in Skagit County winter to spring streamflow timing ratio. Historical baseline ratio for 1.0 to 1.5 is 6.1%. Mid century ratio for 1.0 to 1.5 is 13.6% and end of century 1.0 to 1.5 ratio is 51.3 percent. The ratio of winter to spring streamflow is an indicator of the timing of streamflow during the year, which affects the seasonal availability of water for hydropower and irrigation. An increase in the ratio in the future means an increase in streamflow in winter and a decrease in spring. Middle elevation streams are expected to experience the most change in streamflow timing, with a shift to higher streamflow in winter.</p>	High	<p>Indicators: Prosperity Based on the Economic Indicators of Agriculture in Skagit County, farms make up about 3% of total earnings in 2007. Similarly, employment in the farming industry in Skagit County was found to be 4%. In 2007, there were 1,215 farms, covering about 109,000 acres of land and has decreased since 2022. Also within this document, the value of sales (e.g., \$100,000) per farm from 1987 to 2007 have met this goal or declined since 2007. Reduced snowpack would lead to reduced irrigation; however, it may also lead to soils becoming infertile and unable to produce crops for future growing seasons. = High Magnitude</p>	High	Take Action
20	Farms-Sea level rise	High	<p>Revenue: Sea level rise can inundate laterally or upward from underground saltwater intrusion seeping into groundwater that increases soil salination. Salination changes the soil chemistry that reduces arable land and threatens crop yields and productivity.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for was not recorded. However, mid century and end of century sea level rise is projected to be 0.7 feet and 2.1 feet, respectively. = High Probability</p>	Medium	<p>Indicators: Crop value, Acreage Storm events and such combined with SLR will result in areas previously dry that are anticipated to be permanently inundated and can vary along the coast by elevation. Low-lying delta areas where most farms are located can be damaged by SLR inundation and/or saltwater intrusion. local farmers produce approximately \$350 million worth of crops, livestock, and dairy products on approximately 90,000 acres of land throughout the County. Impacts to local economy can cost millions of dollars and render thousands of acres with reduced arability or infertile. = Medium Magnitude</p>	High	Take Action
21	Commercial forests-Drought (Economic Dev)	Low	<p>Production: Drought may lead to reduced tree growth, increased tree mortality, and heightened susceptibility to pests and diseases; thus, leading to decreased timber yield.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under an RCP8.5 scenario, the likelihood of a year with summer precipitation below 75% of the historical normal is projected to be 20% by mid-century (2040-2069). A short-term drought that persists for 3 to 6 months may have little impact on these sectors, depending on the characteristics of the hydrologic system and water use requirements.</p>	Medium	<p>Indicators: Prosperity With a reduction of commercial forest production, the economy may be impacted significantly. Further, this industry affects many other aspects of the County's economy. For instance, jobs and incomes, property values, energy supply of biomass, manufacturing of raw goods, and the value of the crops and livestock. Similarly, with the increased likelihood of drought, there is anticipation for competition of resources. The supply of land suitable for commercial forest growth may not satisfy the demands for timber; thus, policies or actions may affect this heavily. = Medium Magnitude.</p>	Low	Accept Risk

22	Commercial forests-Extreme precipitation	Low	<p>Production: Commercial forests may become waterlogged and/or non-usable due to extreme precipitation and landslides. Reduced production and profitability of timber may occur due to failed production and cultivation of commercial forests.</p> <p>Probability: The county's commercial forest zoning consists of Secondary Forest, which is a 20-acre minimum lot size; and Industrial Forest with an 80-acre minimum lot size. These areas are zoned SF-NRL and IF-NRL and are found to be primarily located in mountain foothills and some mountain areas throughout the County. Based on the 2014 Natural Hazard Mitigation Plan, areas where precipitation intensity ranged from 3-5 inches.</p> <p>According to the 2023 Skagit County Monitoring Program Water Year, precipitation in Mount Vernon during the water year was only 76% of normal. From October 2022 to September 2023, Mount Vernon experienced about 24.1 inches of precipitation which is about 7.7 inches lower than the historical average of 31.8 inches. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	Medium	<p>Indicators: Prosperity</p> <p>With a reduction of commercial forest production, the economy may be impacted significantly. Further, this industry affects many other aspects of the County's economy. For instance, jobs and incomes, property values, energy supply of biomass, manufacturing of raw goods, and the value of the crops and livestock.</p> <p>Similarly, with the increased likelihood of heavy precipitation magnitude, there is anticipation for competition of resources. The supply of land suitable for commercial forest growth may not satisfy the demands for timber; thus, policies or actions may affect this heavily. = Medium Magnitude.</p>	Low	Accept Risk
23	Commercial forests-Flooding	Medium	<p>Production: Flooding may damage tree root systems through soil erosion, causing oxygen deprivation to roots due to waterlogged soil. Weakened trees from flood may then lead to trees becoming more susceptible to disease and insect infestations; thus, resulting in reduced timber yield and economic losses for forest operations.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. The county's commercial forest zoning consists of Secondary Forest, which is a 20-acre minimum lot size; and Industrial Forest with an 80-acre minimum lot size. These areas are zoned SF-NRL and IF-NRL and are found to be primarily located in mountain foothills and some mountain areas throughout the County. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	Medium	<p>Indicators: Prosperity</p> <p>With a reduction of commercial forest production, the economy may be impacted significantly. Further, this industry affects many other aspects of the County's economy. For instance, jobs and incomes, property values, energy supply of biomass, manufacturing of raw goods, and the value of the crops and livestock.</p> <p>Similarly, with the increased likelihood of flooding frequency, there is anticipation for competition of resources. The supply of land suitable for commercial forest growth may not satisfy the demands for timber; thus, policies or actions may affect this heavily. = Medium Magnitude.</p>	Medium	Take Action
24	Commercial forests-Reduced snowpack	Medium	<p>Production: Similar to drought, reduced snowpack would lead to decrease groundwater and aquifer recharge. Thus irrigation of commercial forests may be lacking irrigation.</p> <p>Probability: Based on the 2014 Skagit County Natural Hazard Mitigation Plan, snowfall is seldom heavy and varies greatly from year to year. According to the 2023 Skagit County Monitoring Program Water Year, Skagit County had good snowpack at the end of winter; however, the snow melted quickly during a record-breaking warm May. Based on the 2023 Skagit River County Flood Book, snowmelt peak is expected during the spring or early summer due to the seasonable rise in temperatures in resultant melting of the accumulated snow pack. Skagit County's water supply is approximately 50-70% originated from melting snow in the Cascade Mountains. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	Medium	<p>Indicators: Prosperity</p> <p>With a reduction of commercial forest production, the economy may be impacted significantly. Further, this industry affects many other aspects of the County's economy. For instance, jobs and incomes, property values, energy supply of biomass, manufacturing of raw goods, and the value of the crops and livestock.</p> <p>Similarly, with anticipated reduced April 1 snowpack, there is anticipation for competition of resources. The supply of land suitable for commercial forest growth may not satisfy the demands for timber; thus, policies or actions may affect this heavily. = Medium Magnitude.</p>	Medium	Take Action
25	Commercial forests-Wildfire	Medium	<p>Variable wildfire conditions: Increased wildfire likelihood and high fire danger days may result in more frequent and potentially larger scale wildfire events. Wildfire events are unpredictable. Impacts on timber economy varies depending on wildfire extent.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	High	<p>Indicators: Suppression costs</p> <p>Cost of wildfire suppression Statewide was \$37 million annually from 2008-2012, and \$153 million from 2013-2018. Dollar impacts of wildfire on commercial forests are not available at the County level but is anticipated to increase. Suppression activity costs may outpace revenue generated resulting in net loss. With a reduction of commercial forest production, the economy may be impacted significantly. Further, this industry affects many other aspects of the County's economy i.e., biomass products, raw goods, jobs and incomes, property values, and the value of the crops and livestock. = High Magnitude</p>	High	Take Action

26	Industrial/manufacturing businesses- Extreme precipitation	Low	<p>Revenue: Extreme precipitation events may lead to reduced productivity from delayed commute, structural damage, unsafe working conditions, etc.</p> <p>Probability: According to the 2014 Skagit County Natural Hazard Mitigation Plan, generally Central Skagit county experience a range of 3 to more than 10 inches of rain. Areas in Central County are seen to experience more than 10 inches of rain and areas radially around Central County decrease to range in 4-7 inches of precipitation intensity. Eastern County generally ranges from 5-7 inches of precipitation intensity to some small areas nearing 8-10 inches of precipitating intensity. Western County generally showcases lower precipitating intensity ranging from less than 3 inches to highs of 5 inches. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	Medium	<p>Indicators: Operations.</p> <p>Industrial businesses may face disruptions to operations due to flooding, damage to infrastructure, supply issues, unsafe work conditions, potential power outages, and increased costs for repair and cleanup. Costs for repairs will be dependent on the type of severe storm and the structural durability of businesses. = Medium Magnitude.</p>	Low	Accept Risk
27	Industrial/manufacturing businesses- Flooding	Medium	<p>Revenue: Flooding would impact operations of industrial businesses preventing workers from working and revenue generation. Further, flooding may inflict direct physical damage to industrial businesses, further preventing operations of facilities.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. Based on the County zoning map, industrial businesses are located generally in Western County with some other areas such as the along the Skagit River. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	Medium	<p>Indicators: Operations.</p> <p>Industrial businesses may face disruptions to operations due to flooding, damage to infrastructure, supply issues, unsafe work conditions, potential power outages, and increased costs for repair and cleanup. Costs for repairs will be dependent on the type of severe storm and the structural durability of businesses. = Medium Magnitude.</p>	Medium	Take Action
28	Industrial/manufacturing businesses- Reduced snowpack	Low	<p>Revenue: Industrial businesses that rely heavily on water or similar resources may face operational difficulties due to the lack of water from snowmelt.</p> <p>Probability: Based on the 2014 Skagit County Natural Hazard Mitigation Plan, snowfall is seldom heavy and varies greatly from year to year. According to the 2023 Skagit County Monitoring Program Water Year, Skagit County had good snowpack at the end of winter; however, the snow melted quickly during a record-breaking warm May. Based on the 2023 Skagit River County Flood Book, snowmelt peak is expected during the spring or early summer due to the seasonable rise in temperatures in resultant melting of the accumulated snow pack. Skagit County's water supply is approximately 50-70% originated from melting snow in the Cascade Mountains. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	Medium	<p>Indicators: Operations.</p> <p>Industrial businesses may face disruptions to operations due to decreased water supply. This may lead to increased water costs and forced closures for industrial businesses that heavily rely on water for their business. = Medium Magnitude.</p>	Low	Accept Risk
29	Industrial/manufacturing businesses- Sea level rise	Low	<p>Flooding: Flooding from SLR inundation would impact operations of industrial businesses preventing workers from working and revenue generation. Further, flooding may inflict direct physical damage to industrial businesses, further preventing operations of facilities.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline was not recorded. However, mid century and end of century is projected to be 0.7 feet and 2.1 feet, respectively. = Low probability</p>	High	<p>Indicators: Operations.</p> <p>Industrial businesses may face disruptions to operations due to flooding, damage to infrastructure, supply issues, unsafe work conditions, potential power outages, and increased costs for repair and cleanup. Costs for repairs will be dependent on the type of severe storm and the structural durability of businesses. In addition, "road, railroad and pipeline transportation to the refineries would be in jeopardy forcing shutdowns for an industry employing more than 800 workers with annual payrolls exceeding \$57 million and thousands of people would possibly be unable to commute from their homes to work". (source: 2020 HMP) = High Magnitude</p>	Medium	Take Action

30	Industrial/manufacturing businesses-Wildfire	Medium	<p>Raw materials: Wildfire can reduce available timber products and byproducts for industrial/manufacturing businesses that rely on raw materials for economic development. Other products such as minerals, fisheries, etc. can also be impacted.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Medium	<p>In 2022, gross business income (GBI) was the highest recorded at \$8.02 billion. This value fell to \$7.81 billion in 2023, and sees continual growth since 2010 similar to the State trend. Main contributors to GBI in Skagit County are manufacturing, construction, wholesale trade, and retail trade (Center for Economic and Business Research, WWU, 2023). More frequent occurrences of large scale wildfire events have cumulative impact on supply chains; business decision to outsource materials causes temporary inflation of consumer pricing impacting County and statewide GBI. = Medium Magnitude</p>	Medium	Take Action
31	Rivers-Drought (Ecosystems)	Low	<p>River Health: Rivers may face reduced water flow; thus, jeopardizing surrounding habitats for organisms. Water temperatures may also increase due to reduced water flows. Further, fish that rely on these rivers may decline in population significantly due to unsuitable habitats and reduced food availability.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the steady decrease in percent change in total precipitation for July 15-September 15. Historical baseline is 3 inches of late summer precipitation. Mid century and end of century negative percentage changes are 10.7% and 11.9 percent, respectively.</p>	High	<p>Indicators: Ecosystem Health</p> <p>A severe drought could result in inadequate river flows that may result in the implementation of strict water conservation measures. Competition for water from river sources may also be sought after while also considering the surrounding habitat and wildlife that heavily depend on rivers. Habitat and wildlife that rely heavily on rivers for food and shelter may become endangered or even extinct. This may alter the river ecosystem drastically and potentially cause irreversible damage. = High Magnitude</p>	Medium	Take Action
32	Rivers-Flooding	Medium	<p>River Health: Flooding impacts rivers in terms of riverbank erosion and sediment deposition in the riverbeds. Therefore, surrounding habitat and wildlife may be severely impacted.</p> <p>Probability: According to the 2014 Natural Hazards Mitigation Plan, major flooding has occurred in the Skagit River Basin throughout the years. Due to its geographic location, the Skagit River Basin is subject to winter rain floods and an increase in discharge during spring due to snowmelt runoff. Rain-type floods occur usually in November or December; however, may occur as early as October or as late as February. Based on RiskMap, rivers in Skagit County are generally classified as Zone AQ (Floodway) with a 1% annual chance of flood event. According to the Natural Hazard Mitigation Plan, the Skagit River, Samish River, Sauk River, Suitable River, and Cascade River are all susceptible to river flooding = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3% and 4.4%, respectively.</p>	Medium	<p>Indicators: Ecosystem Health</p> <p>River flooding occurs on rivers and streams where excessive water discharge causes river or stream channels to overflow. Further, flooding of rivers may completely destroy river banks and temporarily displace local species. Riverbanks and the local ecosystem may take some time to recover before reaching life before the flood. = Medium Magnitude</p>	Medium	Take Action
33	Rivers-Wildfire	Medium	<p>Cascading effects: Wildfires deposit logs and sediment into streams that can increase habitat quality for fisheries and other fauna. Largescale wildfire events deposit large amounts of sediment and detritus that can change hydrology and destroy habitat. Cascading impacts include algae blooms, reservoir impacts, reduced water quality, etc. that impact economy.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Low	<p>Indicators: Human activities impacted</p> <p>Larger extents and more frequent wildfire events have cascading effects on watershed hydrology i.e., increased sedimentation, change in water chemistry and temperatures. Headwater tributaries surrounded by high slope timber lands provide habitat for fish spawning, and for recreational activities. Fishing, water activities, and other activities are most impacted. = Low Magnitude</p>	Low	Accept Risk

34	Fisheries-Drought (Ecosystems)	Low	<p>Water temperatures: Drought may lead to increased water temperatures in rivers where fisheries are located. Unsuitable water temperatures lead to dissatisfactory conditions for fisheries to spawn and thrive in.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the steady decrease in percent change in total precipitation for July 15-September 15. Historical baseline is 3 inches of late summer precipitation. Mid century and end of century negative percentage changes are 10.7% and 11.9 percent, respectively.</p>	High	<p>Indicators: Life cycle of fish species</p> <p>Streamflow plays a critical role in shaping and maintaining habitats for aquatic species, particularly in the Skagit River, where Pacific salmon and trout are both culturally significant and legally protected. The availability of spawning and rearing habitats for these fish is heavily influenced by the river's flow patterns, which determine which areas of the watershed are accessible. Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions and water quality. Anticipated increase in drought conditions reduces available habitat that impacts multiple generations of fish life cycles, risking displacement of species or inability to adapt to changing habitats; thus, not survive. = High Magnitude</p>	Medium	Take Action
35	Fisheries-Flooding	High	<p>Fish Livelihood: Flooding can significantly impact fisheries by directing impacting their habitats and spawning grounds. Further, fish populations may become displaced, water quality may become declined due to influx of sediment and other contaminants from flooding.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. = High Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Survival of fish species</p> <p>Streamflow plays a critical role in shaping and maintaining habitats for aquatic species, particularly in the Skagit River, where Pacific salmon and trout are both culturally significant and legally protected. The availability of spawning and rearing habitats for these fish is heavily influenced by the river's flow patterns, which determine which areas of the watershed are accessible. Species like Chinook and coho salmon, steelhead, and bull trout—especially those that spawn in summer or rear as juveniles for extended periods in freshwater—are highly sensitive to low flow conditions. With the influx of flow from flooding, these species would be at risk of being displaced entirely or be unable to adapt to changing habitats; thus, not survive. = High Magnitude</p>	High	Take Action
36	Fisheries-Wildfire	Medium	<p>Cascading effects: Wildfires deposit logs and sediment into streams that can increase habitat quality for fisheries and other fauna. Largescale wildfire events deposit large amounts of sediment and detritus that can change hydrology and destroy habitat. Cascading impacts include algae blooms, reservoir impacts, reduced water quality, etc. that impact economy.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Low	<p>Indicators: Human activities impacted</p> <p>Larger extents and more frequent wildfire events have cascading effects on watershed hydrology i.e., increased sedimentation, change in water chemistry and temperatures that reduce fish habitat. Headwater tributaries surrounded by high slope timber lands provide habitat for fish spawning, and for recreational activities. Fishing, water activities, and other activities are also impacted. Sedimentation transport to sea level basin that can also change water chemistry/temperatures and impact habitat quality. = Low Magnitude</p>	Low	Accept Risk

37	Nature preserves-Drought (Ecosystems)	Low	<p>Livelihood: Drought impacts on nature preserves include reduced recreation, changes to surrounding habitat and wildfire, and imbalances to the local ecosystem.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the steady decrease in percent change in total precipitation for July 15-September 15. Historical baseline is 3 inches of late summer precipitation. Mid century and end of century negative percentage changes are 10.7% and 11.9 percent, respectively.</p>	Medium	<p>Indicators: Ecosystem Health</p> <p>Nature preserves rely on water heavily for the wildlife and plants located in the area. Thus, wildlife population may become altered which may lead to vegetation overgrowth. Further, communities that often visit nature preserves may become less inclined due to failing ecosystem health. = Medium Magnitude</p>	Low	Accept Risk
38	Nature preserves-Flooding & Reduced snowpack	High	<p>Livelihood: Flooding can destroy nature preserves entirely (i.e., displace wildfire, erode soil, alter plant communities, and contaminate water sources.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. = High probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Legacy</p> <p>Many nature preserves in Skagit County were established well before the 2000s such as the Skagit County Parks and Recreation Department, Skagit River Bald Eagle Natural Area (SRBENA), Farmland Legacy Program, and Skagit Land Trust. These preserves are highly celebrated by communities in Skagit County; thus, flooding of these preserves which may completely destroy them may heavily impact the community's core. = High Magnitude</p>	High	Take Action
39	Nature preserves - SLR	Medium	<p>Decreased user experience: Coastal assets i.e., estuarine reserves, fir island are susceptible to flood risk due to increased sea levels by mid-century, requiring more closures and decreasing user experiences.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline was not recorded. However, mid century and end of century is projected to be 0.7 feet and 2.1 feet, respectively. = Medium probability</p>	High	<p>Indicators: Legacy</p> <p>Many nature preserves in Skagit County were established well before the 2000s such as the Skagit County Parks and Recreation Department, Skagit River Bald Eagle Natural Area (SRBENA), Farmland Legacy Program, and Skagit Land Trust. These preserves are highly celebrated by communities in Skagit County; thus, flooding of these preserves which may completely destroy them may heavily impact the community's core. = High Magnitude</p>	High	Take Action
40	Nature preserves-Wildfire	Medium	<p>User experience: Increased wildfire likelihood increases wildfire events due to fuel loads, impacting recreational user experiences. More frequent restoration activities throughout County. Coastal assets are less affected by increased wildfire likelihood.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	High	<p>Indicators: Legacy</p> <p>Many nature preserves in Skagit County were established well before the 2000s such as the Skagit County Parks and Recreation Department, Skagit River Bald Eagle Natural Area (SRBENA), Farmland Legacy Program, and Skagit Land Trust. These preserves are highly celebrated by communities in Skagit County; thus, flooding of these preserves which may completely destroy them may heavily impact the community's core. = High Magnitude</p>	High	Take Action

41	Flood management infrastructure- Drought (Emergency Management)	Low	<p>Compromised foundations: Increased drought conditions can cause dike/levee soil foundations to contract and crack, compromising foundations that make them more susceptible to failure.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the steady decrease in percent change in total precipitation for July 15-September 15. Historical baseline is 3 inches of late summer precipitation. Mid century and end of century negative percentage changes are 10.7% and 11.9 percent, respectively.</p>	Low	<p>Indicators: Functionality</p> <p>Dikes and levees provide flood protection, where drought is not considered a significant threat that impedes the functionality of the asset. The magnitude of decreasing summer precipitation on the asset is little to none. = Low Magnitude</p>	Low	Accept Risk
42	Flood management infrastructure- Extreme precipitation & Flooding	High	<p>Tidal flooding: Flooding from SLR inundation and peak streamflow is anticipated to increase, and is exacerbated by extreme storm events. Localized flooding from high groundwater levels, poor drainage, and saltwater intrusion can also occur. Dikes and levees are at increased risk of de-stabilization and damage due to erosion</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. = High probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Infrastructure damages and costs</p> <p>1921 - Dike break just north of Great Northern Railway bridge between Mount Vernon and Burlington discharged 60,000 cfs of water in Samish River Delta. Major dike failures caused millions of dollars of damage throughout Fir Island in 1990. (Source: Flood book). Estimated value of buildings located in flood hazard zones per FEMA's 2017 risk map is \$3.2 billion (17,736 buildings). Estimated dollar loss for buildings located in 2% annual-chance flood zones is around \$82.7 million for unincorporated County. Number of infrastructure and dollar losses increase significantly with more extreme flood events i.e., 1% event (100 year), 0.2% event (500 year). = High Magnitude</p>	High	Take Action
43	Flood management infrastructure-Sea level rise	Medium	<p>Tidal flooding: Tidal flooding is anticipated to increase due to SLR, and is exacerbated by storm events and tectonic shifts. Dikes and levees are at increased risk of de-stabilization and damage due to erosion</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline was not recorded. However, mid century and end of century is projected to be 0.7 feet and 2.1 feet, respectively. = Medium probability</p>	High	<p>Indicators: Infrastructure damages and costs</p> <p>1921 - Dike break just north of Great Northern Railway bridge between Mount Vernon and Burlington discharged 60,000 cfs of water in Samish River Delta. Major dike failures caused millions of dollars of damage throughout Fir Island in 1990. (Source: Flood book). Estimated value of buildings located in flood hazard zones per FEMA's 2017 risk map is \$3.2 billion (17,736 buildings). Estimated dollar loss for buildings located in 2% annual-chance flood zones is around \$82.7 million for unincorporated County. Number of infrastructure and dollar losses increase significantly with more extreme flood events i.e., 1% event (100 year), 0.2% event (500 year). = High Magnitude</p>	High	Take Action
44	Flood management infrastructure- Wildfire	Medium	<p>Materials: Levees/dikes that are in WUI-intermix and -interface zones have minimal direct impact from increased wildfire likelihood which is associated with dry vegetation/detritus, dry soil, humidity, slope/aspect, and other conditions.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Low	<p>Indicator: Materials</p> <p>Asset is made of earthen materials located in basin floodplain zone. Asset is more likely to be compromised due to flooding, SLR, and drought events than wildfire. = Low Magnitude</p>	Low	Accept Risk

45	Fire stations-Drought (Emergency Management)	Low	<p>Burn regulations: Decreased summer time precipitation can increase the frequency of agricultural burns due to dry plant material/detritus that are managed by fire department.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the steady decrease in percent change in total precipitation for July 15-September 15. Historical baseline is 3 inches of late summer precipitation. Mid century and end of century negative percentage changes are 10.7% and 11.9 percent, respectively.</p>	Low	<p><u>Indicators: Value - dollar losses</u></p> <p>Fire stations respond to fire emergencies and evacuation support, drought conditions may increase the need for emergency response services due to wildfires, agricultural burns, or unplanned urban burns that strain resources and personnel. = Low Magnitude</p>	Low	Accept Risk
46	Fire stations-Extreme precipitation & Flooding	High	<p>Delay in emergency response services: Assets along river floodplains and delta areas are anticipated to experience increased flooding from peak streamflows. Wintertime where storm events and extreme precipitation coincide will exacerbate flooding, delaying evacuation and emergency responses.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. = High probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p><u>Indicators: Value - dollar losses</u></p> <p>Estimated value of buildings located in flood hazard zones per FEMA's 2017 risk map is \$3.2 billion (17,736 buildings). Estimated dollar loss for buildings located in 2% annual-chance flood zones is around \$82.7 million for unincorporated County. Number of infrastructure and dollar losses increase significantly with more extreme flood events i.e., 1% event (100 year), 0.2% event (500 year). = High Magnitude</p>	High	Take Action
47	Fire stations-Sea level rise	High	<p>Delay in emergency response services: Assets along river floodplains and delta areas are anticipated to experience increased flooding from peak streamflows. Wintertime where storm events and extreme precipitation coincide will exacerbate flooding, delaying evacuation and emergency responses.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. = High probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p><u>Indicators: Value - dollar losses</u></p> <p>Estimated value of buildings located in flood hazard zones per FEMA's 2017 risk map is \$3.2 billion (17,736 buildings). Estimated dollar loss for buildings located in 2% annual-chance flood zones is around \$82.7 million for unincorporated County. Number of infrastructure and dollar losses increase significantly with more extreme flood events i.e., 1% event (100 year), 0.2% event (500 year). = High Magnitude</p>	High	Take Action

48	Fire stations-Wildfire	Medium	<p>Available resources and personnel: Increased wildfire likelihood and high fire danger days increase need for prescribed burns and fire suppression activities, straining resources and personnel that delay emergency response services.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Medium	<p>Indicators: Personnel</p> <p>Direct magnitude impact on asset varies, where wildfire events are unpredictable. Fire stations respond to fire emergencies and evacuation support, increased wildfire likelihood and high fire danger days increase the need for education, prescribed burns that is labor intensive and costly. Increased emergency response services due to wildfires, agricultural burns, or unplanned urban burns that strain resources and personnel. = Medium Magnitude</p>	Medium	Take Action
49	Roadways-Drought (Transportation)	Low	<p>Structural Integrity: Drought may lead to roadways (dependent on their material, design age, and structure) may face cracking, buckling, and warping.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady decrease in percent change in April 1 snowpack. Historical baseline is 22 inches. Mid century and end of century is projected to be a decrease in 53% and 79%, respectively.</p>	Medium	<p>Indicators: Operations</p> <p>Roadways that are structurally unsound would lead to travelers having unsafe routes. Thus, roadways that are impacted by drought leading to structural damage could halt the community's livelihood for undetermined periods of times until damages are repaired. = Medium Magnitude</p>	Low	Accept Risk
50	Roadways-Extreme precipitation	Medium	<p>Operations: Roadways may not be operable in terms of people not being able to safely travel across them due to extreme precipitation. Unusually heavy rainfall may also cause surface flooding in low lying areas where some roadways are located; thus operations may be halted for unknown periods of time.</p> <p>Probability: According to the 2023 Skagit County Monitoring Program Water Year, precipitation in Mount Vernon during the water year was only 76% of normal. From October 2022 to September 2023, Mount Vernon experienced about 24.1 inches of precipitation which is about 7.7 inches lower than the historical average of 31.8 inches. Severe storms generally occur in December and January (wettest months). Roadways are scattered all throughout Skagit County and may face impacts from extreme precipitation. Further, extreme precipitation events that affected Skagit County include November 1990, October 2003, December 2007, and November 2021. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	Medium	<p>Indicators: Operations</p> <p>Roadways that are experience extreme precipitation would lead to unsafe driving conditions. Extreme precipitation would lead to sheet flow in areas of roadways which further decrease safe conditions of driving. For instance, many vehicles may face hydroplaning and car accidents may increase significantly. = Medium Magnitude</p>	Medium	Take Action

51	Roadways-Flooding & Sea level rise	High	<p>Operations: Roadways may not be operable in terms of people not being able to safely travel across them due to flooding. Road closures may become more common as roadway travel would not be operable (safe) to drive on. Portions of Interstate 5, State Route 9, State Route 11, State Route 20, State Route 536 and possibly portions of State Route 530 would be inundated and impassable to traffic (HMP 2020)</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley.</p> <p>Floods from the Skagit River can cause damage and close roads such as the I-5, State route 9, 20, and 536 as they all lie in the flood plain. Further, it is important to note that the Skagit River has reached flood stage over 60 times in the last 100 years. = High Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	Medium	<p>Indicators: Cost</p> <p>Roadways inundated by riverine flooding and/or SLR due to peak streamflows would lead to unsafe driving conditions. Wide range of population are impacted i.e., users livelihood, businesses, emergency response services, etc. Low income rural households are most impacted by road closures. Road improvements are costly; for example, Farm to Market Road intersection improvements cost \$1.8 million in 2022. Road improvements are managed by County Public Works. = Medium Magnitude</p>	High	Take Action
52	Roadways-Wildfire	Medium	<p>Road conditions: Increased wildfire likelihood and high fire danger days require cleared roadways to respond to prescribed burns, wildfire events, and evacuation.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Medium	<p>Roads become impassable due to flooding, downed trees, ice or snow, or a landslide following wildfire events. Power lines and utilities alongside roadways would also impact services to residents and critical facilities. Increase in voluntary power shutoffs and utilization of unblocked roadway to deliver emergency response services and evacuation. Magnitude increases in eastern County where rural residents live, identified as disadvantaged census tract. = Medium Magnitude</p>	Medium	Take Action
53	Bridges-Extreme precipitation	Low	<p>Operations: Bridges may not be operable in terms of people not being able to safely travel across them due to extreme precipitation. Unusually heavy rainfall may also cause surface flooding in low lying areas where some bridges are located; thus operations may be halted for unknown periods of time.</p> <p>Probability: According to the 2023 Skagit County Monitoring Program Water Year, precipitation in Mount Vernon during the water year was only 76% of normal. From October 2022 to September 2023, Mount Vernon experienced about 24.1 inches of precipitation which is about 7.7 inches lower than the historical average of 31.8 inches. As cited in the 2023 Bridge Report, the North Osterman Creek culvert failed due to storms and massive head cutting from the unpredictable migration of the Sauk River. Further, extreme precipitation events that affected Skagit County include November 1990, October 2003, December 2007, and November 2021. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	High	<p>Indicators: Ability to travel</p> <p>Based on the 2022 Annual Bridge Report, Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From the 2023 Annual Bridge Report, Skagit County has 109 bridges in the National Bridge Inventory System plus 3 short span bridges that are routinely inspected. In addition, from the 2023 Annual Bridge Report, Skagit County has 5 structurally deficient bridges:</p> <ul style="list-style-type: none"> - South Skagit Highway at Mill Creek with waterway and adequacy deficiency - Bay View Edison at Joe Leary with deck deficiency - F&S Grade Samish River with deck deficiency - Old Highway 99 at Thomas Creek with deck/substructure deficiency - Skagit River Marblemount with superstructure deficiency <p>Thus, extreme precipitation may further damage these cited bridges and/or damage other ones.</p> <p>= High Magnitude</p>	Medium	Take Action

54	Bridges-Flooding	Medium	<p>Operations: Bridges may not be operable in terms of people not being able to safely travel across them due to flooding. Bridge closures may become more common as travel would not be operable (safe) to drive on.</p> <p>Probability: Based on anecdotal experience, Skagit Talk, three floods occurred in the year 1896. Specifically the flood that occurred on November 16, 1896 where one brick building was destroyed, several wooden structures were pulled from foundations, and several bridges were destroyed. Further in 1917, a large flood occurred in La Conner where a bridge was lost. Besides this damage, there were no other significant structural damages. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Ability to travel</p> <p>Based on the 2022 Annual Bridge Report, Skagit County has 45 bridges that are at least 50 years. Of those 45 bridges, 8 are 70 years or older and 2 are over 80 years old, built in 1930. Annually, the County prepared a bridge report in compliance with WAC 135-20-060. From the 2023 Annual Bridge Report, Skagit County has 109 bridges in the National Bridge Inventory System plus 3 short span bridges that are routinely inspected. In addition, from the 2023 Annual Bridge Report, Skagit County has 5 structurally deficient bridges:</p> <ul style="list-style-type: none"> - South Skagit Highway at Mill Creek with waterway and adequacy deficiency - Bay View Edison at Joe Leary with deck deficiency - F&S Grade Samish River with deck deficiency - Old Highway 99 at Thomas Creek with deck/substructure deficiency - Skagit River Marblemount with superstructure deficiency <p>Thus, flooding may further damage these cited bridges and/or damage other ones. = High Magnitude</p>	High	Take Action
55	Railroad-Drought (Transportation)	Low	<p>Structural Integrity: Drought may cause rail lines to buckle due to heat damage. Thus, potential derailments may occur and stability of surrounding soil would cause further damage.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady decrease in percent change in April 1 snowpack. Historical baseline is 22 inches. Mid century and end of century is projected to be a decrease in 53% and 79%, respectively.</p>	Low	<p>Indicators: Operations</p> <p><u>Based on the 2016 Skagit Council of Governments Rail Crossing Study, there are a total of 56 at-grade crossings in Skagit County along BNSF's North-South mainline, the Burlington-Anacortes Branch Line, and the Burlington-Sumas Branch Line were analyzed in this report. It was found that crossings occur on a variety of roadways, from relatively high traffic volume locations such as Kincaid Street in Downtown Mount Vernon and SR 538 (East College Way, Mount Vernon), to locations with lower traffic volumes such as Bow Hill Road north of Burlington. Concurrent with WSDOT in the 2014 Washington Department of Transportation, economic and demographic growth will likely increase rail demand in the future as rail is used for freight for global sourcing fluctuations, fuel costs, labor availability, and highway congestion. WSDOT estimates that the State's rail system will accommodate more than double the volume of cargo in 2040 when compared to 2010.</u></p> <p><u>Drought may impact the distribution of the gross freight tonnage as rail lines may buckle due to heat damage. However, extreme heat was not identified as a priority hazard for the County; thus, magnitude of drought impacts accompanied with heat damage would not be high. = Low Magnitude.</u></p>	Low	Accept Risk
56	Railroad-Extreme precipitation	Low	<p>Operations: Railroad operations may be impacted due to extreme precipitation. Unusually heavy rainfall may also cause surface flooding in low lying areas where some railways may be located; thus operations may be halted for unknown periods of time.</p> <p>Probability: According to the 2023 Skagit County Monitoring Program Water Year, precipitation in Mount Vernon during the water year was only 76% of normal. From October 2022 to September 2023, Mount Vernon experienced about 24.1 inches of precipitation which is about 7.7 inches lower than historical average of 31.8 inches. Further, extreme precipitation events that affected Skagit County include November 1990, October 2003, and December 2007. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	High	<p>Indicators: Operations</p> <p>Based on the 2016 Skagit Council of Governments Rail Crossing Study, there are a total of 56 at-grade crossings in Skagit County along BNSF's North-South mainline, the Burlington-Anacortes Branch Line, and the Burlington-Sumas Branch Line were analyzed in this report. It was found that crossings occur on a variety of roadways, from relatively high traffic volume locations such as Kincaid Street in Downtown Mount Vernon and SR 538 (East College Way, Mount Vernon), to locations with lower traffic volumes such as Bow Hill Road north of Burlington, to locations with WSDOT in the 2014 Washington Department of Transportation, economic and demographic growth will likely increase rail demand in the future as rail is used for freight for global sourcing fluctuations, fuel costs, labor availability, and highway congestion. WSDOT estimates that the State's rail system will accommodate more than double the volume of cargo in 2040 when compared to 2010.</p> <p>As Skagit County depends greatly on rail operations, extreme precipitation may inhibit safe operation conditions and cause severe accidents. Thus, operations may need to halt and delay of goods may become more common = High Magnitude</p>	Medium	Take Action

57	Railroad-Flooding	Medium	<p>Operations: Railroad operations may be impacted by flooding. Surface flooding in low lying areas where some railways may be located may be more heavily impacted; thus, operations may be halted for unknown periods of time.</p> <p>Probability: According to the 2023 Skagit County flood book, in 1892-1893, disastrous floods occurred washing up railroads in every direction; therefore, no trains ran on the Great Northern for 5 days. Similarly in 1894, railroads once again suffered due to flooding with numerous sections of track being washed out and ceasing operation for days.</p> <p>Based on anecdotal experience, Skagit Talk, three floods occurred in the year 1896. Six hundred feet of the Great Northern railroad track between Burlington and a river-crossing bridge were washed out. Further in 1917, there was a large flood which caused damage to the Interurban Railroad tracks; consequently, service between Mount Vernon and Bellingham was out of service for at least a month while repairs were managed. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Operations</p> <p>Based on the 2016 Skagit Council of Governments Rail Crossing Study, there are a total of 56 at-grade crossings in Skagit County along BNSF's North-South mainline, the Burlington-Anacortes Branch Line, and the Burlington-Sumas Branch Line were analyzed in this report. It was found that crossings occur on a variety of roadways, from relatively high traffic volume locations such as Kincaid Street in Downtown Mount Vernon and SR 538 (East College Way, Mount Vernon), to locations with lower traffic volumes such as Bow Hill Road north of Burlington. Concurrent with WSDOT in the 2014 Washington Department of Transportation, economic and demographic growth will likely increase rail demand in the future as rail is used for freight for global sourcing fluctuations, fuel costs, labor availability, and highway congestion. WSDOT estimates that the State's rail system will accommodate more than double the volume of cargo in 2040 when compared to 2010.</p> <p>As Skagit County relies heavily on rail operations, flooding may inhibit safe operation conditions and cause severe accidents. Flooding may even leave railroad tracks flooding for days and repairs/drainage of water may take long periods of time. Thus, operations may need to halt and delay of goods may become more common = High Magnitude</p>	High	Take Action
58	Railroad-Sea level rise	Medium	<p>Operations: The BNSF railroad runs parallel to the coast, an R1 freight railway from Burlington to Everett carries the highest volume of freight - Rising sea levels can result in soil liquefaction, uplifting, and subsidence in which railroad tracks are highly vulnerable. SLR may also cover railroad tracks entirely; thus, halting operations for days while water is pumped out or repairs take place.</p> <p>Probability: According to the 2023 Skagit County flood book, in 1895, salt water swept over the dikes at the mouth of the Skagit River covering the Swinomish and Samish flats and all fertile lowlands for many miles along the coast. The Great Northern track was swept out in several places by the high tide and no train reached Mount Vernon from the south for many days. The Seattle and Northern track at Whitney station were covered by three feet of salt water. In 1897, the coastline of the Great northern was once again overflowed and resulted in train delays. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is not recorded. Mid century and end of century projected increases are 0.7 feet and 2.1 feet, respectively.</p>	High	<p>Indicators: Cost to livelihood/jobs</p> <p>"Road, railroad and pipeline transportation to the refineries would be in jeopardy forcing shutdowns for an industry employing more than 800 workers with annual payrolls exceeding \$57 million and thousands of people would possibly be unable to commute from their homes to work". (source: 2020 HMP). Freight revenue will also decrease temporarily but can be significant depending on delay time. = High Magnitude</p>	High	Take Action
59	Public transit-Drought (Transportation)	Low	<p>Structural Integrity: Drought impacts to public transit may include warping and deterioration of road surfaces.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady decrease in percent change in April 1 snowpack. Historical baseline is 22 inches. Mid century and end of century is projected to be a decrease in 53% and 79%, respectively.</p>	Medium	<p>Indicators: Operations</p> <p>Public transit that are structurally unsound would lead to travelers having unsafe routes. Thus, public transit areas that are impacted by drought leading to structural damage could halt the community's livelihood for undetermined periods of times until damages are repaired. Communities that heavily rely on public transit may face more significant impacts than other communities have multiple options of travel.= Medium Magnitude</p>	Low	Accept Risk

60	Public transit-Extreme precipitation	Low	<p>Operations: Public transit stations may not be operable in terms of drivers not being able to safely navigate to typical travel routes due to extreme precipitation. Unusually heavy rainfall may also cause surface flooding in low lying areas where some public transit stations may be located; thus operations may be halted for unknown periods of time.</p> <p>Probability: According to the 2023 Skagit County Monitoring Program Water Year, precipitation in Mount Vernon during the water year was only 76% of normal. From October 2022 to September 2023, Mount Vernon experienced about 24.1 inches of precipitation which is about 7.7 inches lower than the historical average of 31.8 inches. Public transit stations are located throughout Skagit County and impacts are dependent on location. Further, extreme precipitation events that affected Skagit County include November 1990, October 2003, December 2007, and November 2021. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the increase in heavy precipitation magnitude is projected to range from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	Medium	<p>Indicators: Operations</p> <p>Public transit that experience extreme precipitation would lead to unsafe driving conditions. Extreme precipitation would lead to sheet flow in areas of roadways which further decrease safe conditions of driving for many public transit modes of travel. For instance, many public transit transportation may face hydroplaning and accidents may increase significantly. = Medium Magnitude</p>	Low	Accept Risk
61	Public transit-Flooding	High	<p>Operations: Public transit stations may not be operable in terms of drivers not being able to safely navigate to typical travel routes due to flooding. Surface flooding in low lying areas where some public transit stations may be located may be more heavily impacted; thus, operations may be halted for unknown periods of time.</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley.</p> <p>Floods from the Skagit River can cause damage and close roads such as a portion of the I-5, State route 9, 20, and 536 as they all lie in the flood plain. Many public transit stations and routes utilize these routes. Further, it is important to note that the Skagit River has reached flood stage over 60 times in the last 100 years. = High Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit county in annual maximum streamflow for -10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	Medium	<p>Indicators: Operations</p> <p>Public transit that experience flooding would lead to unsafe driving conditions. Extreme precipitation would lead to sheet flow in areas of roadways which further decrease safe conditions of driving for many public transit modes of travel. For instance, many public transit transportation may face hydroplaning and accidents may increase significantly. Further, flooding may completely destroy some public transit stations and close roads that public transit transportation typically utilize. = Medium Magnitude</p>	High	Take Action
62	Public transit-Sea level rise	Medium	<p>Operations: Coastal transit routes are at increased risk of inundation from SLR and SLR-related hazards. Households who rely on public transit for work are most impacted.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is not recorded. Mid century and end of century projected increases are 0.7 feet and 2.1 feet, respectively. = Medium Probability</p>	Medium	<p>Indicators: Access</p> <p>Roads and facilities for public transit can be structurally compromised due to SLR hazards, leading to unsafe driving conditions and shutdown of services. SLR inundation can lead to permanent closure of route 615 which serves households in coastal unincorporated County (census tract 53057952100). The CT ranks highest for no access to private vehicles, making mobility and access to resources difficult if reliant on public transit. This census area comprises mainly of farmland, rural housing, and La Conner community. = Medium Magnitude</p>	Medium	Take Action
63	Private septic tanks-Extreme precipitation (Waste Management)	Medium	<p>Maintenance: Septic tanks are typically designed to handle extreme water loads; however, excessive extreme precipitation may overload systems and lead to waste overflow.</p> <p>Probability: Over 18,000 septic tanks are located in Skagit County and serve for water treatment. extreme precipitation events that affected Skagit County include November 1990, October 2003, December 2007, and November 2021. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is not recorded. Mid century and end of century projected increases are 8% and 30%, respectively.</p>	Low	<p>Indicators: Operations</p> <p>There are over 18,000 septic tanks operating all over the county, these tanks are designed to hold up against large water volumes. In addition, the County has strict guidelines and precautions on how to combat septic tank problems in the case overflow or contamination occur = Low Magnitude</p>	Low	Accept Risk

64	Private septic tanks-Flooding	Medium	<p>Operations: Drain fields of septic tanks may become overall saturated; thus, preventing proper wastewater absorption and potentially filling the tank with water from rising groundwater. This would lead to sewage backup and potential contamination.</p> <p>Probability: Septic tanks normally do not flood under typical usage; however, it can become overwhelmed and "flood" due to heavy rainfall or flooding. There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley. Phase 2 floods inundate a wider area and may cause significant damage. In 2015, 2016, and 2018, Phase 2 flooding occurred and Skagit River reached heights above 32 feet on the flood gauge in Concrete. Phase 1 floods can cause catastrophic damage. The most recent Phase 1 flood occurred in November 2021 when the Skagit River reached a height of 38.93 feet on the flood gauge in Concrete, well above the Phase 1 criteria of 37 feet. The Skagit River has reached flood stage over 60 times in the past 100 years. In addition, there are over 18,000 septic systems in Skagit County that clean and recycle sewage contaminated water into clean groundwater every day. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is not recorded. Mid century and end of century projected increases are 28.5% and 14.5%, respectively.</p>	Low	<p>Indicators: Operations</p> <p>There are over 18,000 septic tanks operating all over the county, these tanks are designed to hold up against large water volumes. In addition, the County has strict guidelines and precautions on how to combat septic tank problems in the case overflow or contamination occur = Low Magnitude</p>	Low	Accept Risk
65	Private septic tanks-Sea level Rise	Medium	<p>Water quality: Assets are underground - SLR can raise groundwater levels which vary depending soil and bedrock conditions. Assets located in coastal zones are more exposed to increasing sea levels, contaminating water quality.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is not recorded. Mid century and end of century projected increases are 0.7 feet and 2.1 feet, respectively. = Medium Probability</p>	Low	<p>Indicators: Operations</p> <p>There are over 18,000 septic tanks operating all over the county, these tanks are designed to hold up against large water volumes. In addition, the County has strict guidelines and precautions on how to combat septic tank problems in the case overflow or contamination occur = Low Magnitude</p>	Low	Accept Risk
66	Private septic tanks-Wildfire	Medium	<p>Materials: Increased wildfire likelihood and high fire danger days can result in more frequent wildfire events - increased VOC contamination and destruction to plastic tanks and pipes.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Low	<p>Indicators: Operations</p> <p>There are over 18,000 septic tanks operating all over the county, these tanks are designed to hold up against large water volumes. In addition, the County has strict guidelines and precautions on how to combat septic tank problems in the case overflow or contamination occur = Low Magnitude</p>	Low	Accept Risk
67	Water treatment facility-Sea level rise	Low	<p>Costly repairs: SLR can inundate below-ground pipeline infrastructure and above-ground reservoirs that contaminate water and cost millions in repairs.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady decrease in percent change in April 1 snowpack. Historical baseline is 22 inches. Mid century and end of century is projected to be a decrease in 53% and 79%, respectively. = Low Probability</p>	Medium	<p>Indicators: Capital improvements</p> <p>\$89.7 million in project costs over the 5-year planning horizon and \$154 million during the ten-year period are planned for capital improvement projects. Approximately \$500,000 to \$1,000,000 per year is set aside to address the replacement of these pipelines as well as gridding of the District's system. Funds would be re-routed if inundation from SLR and storms causes infrastructure break. Services to over 50,000 residents, dike districts, Samish farms, tribal governments, and other retail customers would be affected. = Medium Magnitude</p>	Low	Accept Risk

68	Water treatment facility-Wildfire	Medium	<p>Increased Costs: Increased wildfire likelihood and high fire danger days can result in more frequent wildfire events that increase maintenance needs, technological solutions to water treatment of wildfire-contaminated water is labor intensive and costly.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Medium	<p>Indicators: Capital Improvements</p> <p>\$89.7 million in project costs over the 5-year planning horizon and \$154 million during the ten-year period are planned for capital improvement projects. Approximately \$500,000 to \$1,000,000 per year is set aside to address the replacement of these pipelines as well as gridding of the District's system. Funds would be re-routed if wildfire events causes infrastructure break. Services to over 50,000 residents, dike districts, Samish farms, tribal governments, and other retail customers would be affected. = Medium Magnitude</p>	Medium	Take Action
69	Reservoirs-Drought (Water Resources)	Medium	<p>Storage Capacity: Drought would lead to a dramatic decrease in water levels due to reduced rainfall and snowmelt; thus storage capacity would decrease significantly.</p> <p>Probability: Based on the 2014 Natural Hazard Mitigation Plan, there have been a number of drought episodes, including several that have lasted for more than a single season such as the dry periods between 1928-1932 and 1992-1994. Severe drought episodes occurred in 1977 and 2001. The 2001 event was the second-worse drought year in state-recorded history. Though Skagit County has experienced some periods of drought in the past, these events are typically low to moderate in severity and relatively short in duration. The agricultural and forestry industries usually experience the greatest impact from a drought event in Skagit County. In addition, according to the 2023 Skagit County Monitoring Program Water Year, there were abnormally dry to extreme drought conditions throughout most of the water year, with most severe drought levels occurring from August through September 2023. However, prolonged drought events occurring frequently can significantly impact reservoir storage. Drought conditions is anticipated to occur 5% in the future. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady increase in percent change in total annual precipitation. Historical baseline recorded to be 80 inches. Mid century and end of century projected to be 5.3% and 10%, respectively.</p>	High	<p>Indicators: Reservoir Health</p> <p>Drought may completely deplete a reservoir's water storage capacity. As the county relies heavily on the Judy Reservoir for a number of sectors such as agricultural, water/wastewater treatment, recreational, ecosystems, etc. Depletion of the Judy's reservoir water storage capacity could devastate many sectors and communities. = High magnitude</p>	High	Take Action
70	Reservoirs-Reduced snowpack	High	<p>Storage Capacity: Reduced snowpack would lead to reduced groundwater recharge which could drastically impact the storage capacity of reservoirs utilized in the County.</p> <p>Probability: Based on the 2014 Skagit County Natural Hazard Mitigation Plan, snowfall is seldom heavy and varies greatly from year to year. According to the 2023 Skagit County Monitoring Program Water Year, Skagit County had good snowpack at the end of winter; however, the snow melted quickly during a record-breaking warm May. Based on the 2023 Skagit River County Flood Book, snowmelt peak is expected during the spring or early summer due to the seasonable rise in temperatures in resultant melting of the accumulated snow pack. Skagit County's water supply is approximately 50-70% originated from melting snow in the Cascade Mountains. = High Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady decrease in percent change in April 1 snowpack. Historical baseline is 22 inches. Mid century and end of century is projected to be a decrease in 53% and 79%, respectively.</p>	High	<p>Indicators: Reservoir Health</p> <p>Reduced snowpack may completely deplete a reservoir's water storage capacity. As the county relies heavily on the Judy Reservoir for a number of sectors such as agricultural, water/wastewater treatment, recreational, ecosystems, etc. Depletion of the Judy's reservoir water storage capacity could devastate many sectors and communities. = High magnitude</p>	High	Take Action
71	Reservoirs-Sea level rise	High	<p>Seawater intrusion: Groundwater levels vary throughout Skagit county coast; saltwater intrusion levels vary and depends on soil conditions. Guemes Island already experiences seawater intrusion of sole source groundwater. WA Dept of Ecology is authorized to protect aquifers from saltwater intrusion/pollution.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady decrease in percent change in April 1 snowpack. Historical baseline is 22 inches. Mid century and end of century is projected to be a decrease in 53% and 79%, respectively. = High Probability</p>	Medium	<p>Indicators: Urban water supply</p> <p>Groundwater wells and surface water reservoirs are primary sources of potable water for the County. Per aquifer recharge map, potential saltwater intrusion to groundwater sources encompasses roughly 60 miles of coastline and affects dense population centers in La Conner, south Fidalgo island, Anacortes, Bay view, Samish island, and Blanchard ~ 33 well systems that impacts thousands of residents. Failure of groundwater wells in coastal zone would require Skagit PUD water supply mix to reconsider other sources. = Medium Magnitude</p>	High	Take Action

72	Reservoirs-Wildfire	Medium	<p>Decreased Water quality: Increased wildfire likelihood and high fire danger days can result in more frequent wildfire events that increase sedimentation in reservoirs, contaminating water supply due to elevated water temperatures i.e., algae blooms.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Low	<p>Indicators: Urban water supply</p> <p>Groundwater wells and surface water reservoirs are primary sources of potable water for the County. Per aquifer recharge map, closed and low flow streams require a 0.5-mile non-development buffer. Group A wells (water system that serves 15 or more connections or 25 or more people for at least 60 days per year) include a buffer. Potential sedimentation from wildfire events for upper watershed tributaries i.e., Diobsud Creek, Grandy Creek, Jones Creek, Coal Creek, Hill Ditch, require additional maintenance services from water districts, labor intensive. = Low Magnitude</p>	Low	Accept Risk
73	Schools-Extreme precipitation	Medium	<p>Operations: Increased extreme precipitation may lead to school closures due to safety reasons that impacts educational outcomes and economic potential as students cannot access facilities.</p> <p>Probability: Schools are located all throughout Skagit County with some located near coastal areas and/or water bodies. According to the 2014 Skagit County Natural Hazard Mitigation Plan, generally Central Skagit county experience a range of 3 to more than 10 inches of rain. Areas in Central County are seen to experience more than 10 inches of rain and areas radially around Central County decrease to range in 4-7 inches of precipitation intensity. Eastern County generally ranges from 5-7 inches of precipitation intensity to some small areas nearing 8-10 inches of precipitation intensity. Western County generally showcases lower precipitation intensity ranging from less than 3 inches to highs of 5 inches. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a increase in heavy precipitation magnitude from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	Low	<p>Indicators: Location</p> <p>School district records show that schools in incorporated areas have resulted in missed school days due to severe weather- no school days have been missed in unincorporated Skagit County due to extreme precipitation from severe weather (2014 NHMP). = Low Magnitude</p>	Low	Accept Risk
74	Schools-Flooding	Low	<p>Limited flood record: Asset is not located within FEMA floodplain zone as identified in FIRM panel maps. But unique events can occur and risk increases due to increased peak streamflows and precipitation. This impacts educational outcomes and economic potential as students cannot access facilities. = Low Probability</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit County in annual maximum streamflow for 10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	Low	<p>Indicators: Location</p> <p>Historic records show that school districts have resulted in missed school days due to severe weather- no school days have been missed in unincorporated Skagit County due to flooding (2014 NHMP). Although some schools are located in 500-year FEMA flood zones, none are in 100-year FEMA flood zones. Siting of asset in urban centers has little exposure and magnitude of hazard on asset. = Low Magnitude</p>	Low	Accept Risk
75	Schools-Reduced snowpack	Low	<p>No record: Decrease in snowpack can decrease peak streamflow at months otherwise expected. Asset is not located within FEMA flood zone.</p> <p>Probability: Based on the 2014 Skagit County Natural Hazard Mitigation Plan, snowfall is seldom heavy and varies greatly from year to year. According to the 2023 Skagit County Monitoring Program Water Year, Skagit County had good snowpack at the end of winter; however, the snow melted quickly during a record-breaking warm May. Based on the 2023 Skagit River County Flood Book, snowmelt peak is expected during the spring or early summer due to the seasonable rise in temperatures in resultant melting of the accumulated snow pack. Skagit County's water supply is approximately 50-70% originated from melting snow in the Cascade Mountains. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is a steady decrease in percent change in April 1 snowpack. Historical baseline is 22 inches. Mid century and end of century is projected to be a decrease in 53% and 79%, respectively.</p>	Low	<p>Indicators: Limited data</p> <p>Records on impacts of reduced snowpack on schools is limited. Lack of records and siting of asset in urban centers has little exposure and magnitude of hazard on asset. = Low Magnitude</p>	Low	Accept Risk

76	Schools-Sea level rise	Low	<p>Enrollment: SLR inundation impacts student housing in coastal zone that may reduce enrollment and learning experiences. Asset provides staging area, personnel, and resources for emergency staging and response services. Historic records of asset impacts from SLR is none.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline was not recorded. Mid century and end of century projected to be 0.7 feet and 2.1 feet, respectively.</p>	Low	<p>Indicators: Limited data</p> <p>SLR inundation and impacts to schools as emergency response centers is very limited. Lack of records and siting of asset in urban centers has little exposure and magnitude of hazard on asset. = Low Magnitude</p>	Low	Accept Risk
77	Schools-Wildfire	Medium	<p>Community asset: Assets are temporary evacuation shelters for rural communities affected by wildfire events and smoke.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	Low	<p>Indicators: Limited data</p> <p>Wildfire likelihood impacts on schools is limited. Lack of records regarding direct wildfire impacts. Assets provide educational opportunities for wildfire mitigation for local residents and students. = Low Magnitude</p>	Low	Accept Risk
78	Radio towers-Extreme precipitation	Medium	<p>Operations / service delays: Radio towers and fiber optic cables are usually located throughout the County. Towers are typically located in remote hillside areas.</p> <p>Probability: Due to confidential information, radio tower locations are not disclosed. Thus, according to the 2014 Skagit County Natural Hazard Mitigation Plan, generally Central Skagit county experience a range of 3 to more than 10 inches of rain. Areas in Central County are seen to experience more than 10 inches of rain and areas radially around Central County decrease to range in 4-7 inches of precipitation intensity. Eastern County generally ranges from 5-7 inches of precipitation intensity to some small areas nearing 8-10 inches of precipitation intensity. Western County generally showcases lower precipitation intensity ranging from less than 3 inches to highs of 5 inches. = Medium Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), there is an increase in heavy precipitation magnitude from 8% for mid century to 21% for end of century. Historical baseline was not recorded.</p>	High	<p>Indicators: Private ownership responsibilities</p> <p>Current investments \$750,000 in fiber optic improvements throughout the County primarily occurring in urban centers - Anacortes, Mt. Vernon, Burlington, and the airport. Rural areas of more sparse development is not justifiable in regards to profitability. Infrastructure information is privileged, other groups i.e., telecom consortium (TMC), County, Skagit PUD, and Port district would need to contract with private owners using funds, political will, and technical resources to provide a unified approach to public fiber optic broadband network (source: 2004, TMC), including response to impacts from extreme precipitation hazards. Private owners are responsible for repairing assets, depending on economic returns. = High Magnitude</p>	High	Take Action
79	Radio towers-Flooding	Low	<p>Corrosion: Increased peak streamflows and extreme precip can flood fiber optic cables, towers, and other infrastructure that corrode copper and precious metal wirings. Provision of communication and wireless services to residents would be limited. Limited historic records of flood impacts to asset exists. = Low Probability</p> <p>Probability: There are four types of flooding that may occur in Skagit County. 100-year floods are severe and have 1% chance of being equaled or exceeded in any given year. A 100-year flood can occur several times or never within a 100-year period. Phase 3 floods are more common and inundate low areas near the Skagit River which cover sections of roads and occur roughly every few years. Phase 3 floods generally cause minimal damage in the Skagit River Valley.</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline for percentage of stream lengths in Skagit County in annual maximum streamflow for 10 to 10 is 100. Mid century and end of century projections are 19.3 and 4.4, respectively.</p>	High	<p>Indicators: Private ownership responsibilities</p> <p>Current investments \$750,000 in fiber optic improvements throughout the County primarily occurring in urban centers - Anacortes, Mt. Vernon, Burlington, and the airport. Rural areas of more sparse development is not justifiable in regards to profitability. Infrastructure information is privileged, other groups i.e., telecom consortium (TMC), County, Skagit PUD, and Port district would need to contract with private owners using funds, political will, and technical resources to provide a unified approach to public fiber optic broadband network (source: 2004, TMC), including response to impacts from flood hazards. Private owners are responsible for repairing assets, depending on economic returns. = High Magnitude</p>	Medium	Take Action

80	Radio/Cell towers-Sea level rise	Low	<p>Corrosion: SLR inundation of fiber optic cables, towers, and other infrastructure can corrode copper and precious metal wirings that provide communication and wireless services to residents. Limited historic records of SLR impacts to asset exists.</p> <p>Probability: SLR is a singular event where sea levels are projected to rise 0.8-1.0 feet by 2050 and 1.1-2.0 feet by 2100. Storm events, tectonic uplift or shifts, king tides, and extreme precipitation are projected to increase in intensity and frequency. = Low Probability</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline was not recorded. Mid century and end of century projected to be 0.7 feet and 2.1 feet, respectively.</p>	High	<p>Indicators: Private ownership responsibilities</p> <p>Current investments \$750,000 in fiber optic improvements throughout the County primarily occurring in urban centers - Anacortes, Mt. Vernon, Burlington, and the airport. Rural areas of more sparse development is not justifiable in regards to profitability. Infrastructure information is privileged, other groups i.e., telecom consortium (TMC), County, Skagit PUD, and Port district would need to contract with private owners using funds, political will, and technical resources to provide a unified approach to public fiber optic broadband network (source: 2004, TMC), including response to impacts from SLR hazards. Private owners are responsible for repairing assets, depending on economic returns. = High Magnitude</p>	Medium	Take Action
81	Radio/cell towers-Wildfire	Medium	<p>Location: Assets are typically located on high elevation mountainous areas, WUI-interface zones and are exposed to increased wildfire likelihood and high fire danger days.</p> <p>Probability: Major fire events (20+ acres) occur every 5-10 years throughout the County. Specifically, major fire events occur every 40 years in the Chuckanut Mountains (source: 2020 CWPP). Warmer, wetter winters combined with warmer, drier summers and increased moisture stress are likely to cause increases in wintertime vegetation and larger summertime accumulations of woody and leafy debris on the forest floor, suggesting elevated risk of more frequent and large wildfires (URL 1; SITC, 2009; Littell et al., 2010). The average number of acres burned each year in Washington State (WA) has increased from 6,000 in the 1970s to about 30,000 in 2001 (URL 1) and is projected to increase further under climate change (SITC, 2009; Littell et al., 2010) (Lee et. al., 2011).</p> <p>Future Likelihood Indicator: Based on the CMRW tool under a high emissions scenario (RCP8.5), the historical baseline is 48 days of high fire danger (1971-2000), while historical baseline for wildfire likelihood was not recorded. Mid century is projected to be 11 median days of high fire danger, and 4% chance of increased wildfire likelihood. = Medium Probability</p>	High	<p>Indicators: Private ownership responsibilities</p> <p>Current investments \$750,000 in fiber optic improvements throughout the County primarily occurring in urban centers - Anacortes, Mt. Vernon, Burlington, and the airport. Rural areas of more sparse development is not justifiable in regards to profitability. Infrastructure information is privileged, other groups i.e., telecom consortium (TMC), County, Skagit PUD, and Port district would need to contract with private owners using funds, political will, and technical resources to provide a unified approach to public fiber optic broadband network (source: 2004, TMC), including response to impacts from wildfire hazards. Private owners are responsible for repairing assets, depending on economic returns. = High Magnitude</p>	High	Take Action

Appendix B: Sources and References

Topic/Title	Year Published	Publisher/Author	Access Link
Community Characteristics/Environmental Justice			
White House Council on Environmental Quality's Climate & Economic Justice Screening Tool	2022	US Council on Environmental Quality	https://fortress.wa.gov/doh/wtnibl/WTNIBL/
iMap Skagit County Comprehensive Mapping Tool		Skagit County	https://www.skagitcounty.net/Maps/iMap/?mapid=95bc6f46f03248749dfa564d137f2cfb
Skagit County Chart Comparisons		Eastern WA University; Skagit County	https://skagitcountytrends.org/compare.cfm
Skagit County, WA Extreme Heat Map and Heat Wave Forecast First Street		First Street Tech	https://firststreet.org/county/skagit-county-washington/53057_fsid/heat
Economy			
Skagit County Economic Recovery Plan	2022	Economic Development Alliance of Skagit County	https://www.skagit.org/about-edasc/strategic-plan-and-annual-reports/p/item/15596/skagit-county-economic-recovery-plan
Budget 2025	2024	Skagit County	https://www.skagitcounty.net/Departments/BudgetFinance/2025Budget.htm
Unified Planning work program	2024	Skagit Council of Governments	https://www.scog.net/UPWP/2025-UPWP-Amended.pdf
Sea Level Rise			
Sea level rise viewer	2023	NOAA	https://coast.noaa.gov/slr/#/layer/slr/1/-13628327.656239381/6183125.225599197/14/satellite/none/0.8/2050/interHigh/midAccretion
Salt water intrusion of aquifers		Department of Ecology	https://ecology.wa.gov/water-shorelines/water-supply/water-rights/seawater-intrusion
Fisheries			
Beamer, E., McBride, A., Greene, C., Henderson, R., Hood, G., Wolf, K., Skagit River System Cooperative, NOAA Fisheries, & USGS Western Fisheries Research Center. (2005). Delta and nearshore restoration for the recovery of wild Skagit river chinook salmon: linking estuary restoration to wild chinook salmon populations.			https://skagitcoop.org/wp-content/uploads/Appendix-D-Estuary1.pdf
Social and Ecological Impacts of Fire to Coastal Fisheries...	2023	Vol 15, Issue 3	https://afspubs.onlinelibrary.wiley.com/doi/10.1002/mcf2.10240
Adaptation to Wildfire: A fish story		Kirkland et. al., 2017-USDA	https://www.fs.usda.gov/pnw/science/scifi198.pdf
Chapter 7 Ecosystems, Climate Change (Envision skagit)		Skagit County	https://www.skagitcounty.net/EnvisionSkagit/Documents/ClimateChange/ch7_ecosystems.pdf
Wildfire			
WA State's Wildland Urban Interface (WUI)		WA State Building Code Council	https://wadnr.maps.arcgis.com/apps/View/index.html?appid=21683af70ece4bd495c319915f7a9232
Wildland Urban Interface Code Resources	2024	WA State Building Code Council	https://sbcc.wa.gov/state-codes-regulations-guidelines/state-building-code/wildland-urban-interface-code-resources
Water Resources			
Skagit Water Supply and Demand Synthesis	2021	Water Research center	https://wsuniv.maps.arcgis.com/apps/MapSeries/index.html?appid=1ff96129ebf04d728c56d35c0b04efc5
Skagit Water Plan 2021 Limited Update	2022	Skagit PUD	https://www.skagitpud.org/home/showpublisheddocument/2722/638435948696030000
EIM Groundwater Map Search		Dept of Ecology	https://apps.ecology.wa.gov/eim/search/Map/Map.aspx?MapType=Groundwater&MapLocationExtent=-13873343.3370332%2C5711716.75429741%2C-13028904.807647%2C6275212.03415398&HasGroundwaterData=True
Skagit Ground Water Model - Hydrographs: Wells in Skagit River Delta	1993-2007	US Geologic Service	https://wa.water.usgs.gov/projects/skagit/hydrographs.htm

Addressing VOC Contamination of Drinking Water Systems	2021	EPA	https://www.epa.gov/system/files/documents/2021-09/addressing-contamination-of-drinking-water-distribution-systems-from-volatile-organic-compounds-after-wildfires_508.pdf
Roads/Transportation			
Annual Report	2022	Skagit County Public works	https://www.skagitcounty.net/PublicWorks/Documents/2022%20Public%20Works%20Annual%20Report.pdf?utm_medium=email&utm_source=govdelivery
Class 1 Annual Railroad Report	2022	BNSF Railway Company	https://www.bnsf.com/about-bnsf/financial-information/pdf/22R1.pdf
Transit Development Plan 2024-2029	2023	Skagit Transit	https://www.skagittransit.org/assets/1/7/2024-2029_TDP_-_FINAL1.pdf
Regional Transportation Plan		Skagit Council of Governments	https://www.scog.net/transportation-plans/regional-transportation-plan/
Flood Control			
Dike District Assessment Areas Map	2022	Skagit County GIS	https://www.skagitcounty.net/GIS/Documents/Drainage/dike.pdf
FEMA Flood map service center	2025	Homeland Security	https://msc.fema.gov/portal/search
Risk Map - Increasing Resilience Together map	2025	Homeland Security	https://experience.arcgis.com/experience/e8456664263d4cbbb0c6a306c016f437
FEMA Q3 100 year floodplain map exhibit	2017	County	https://skagitcounty.net/GIS/Documents/Flood/FEMA%20Q3%20100%20Year%20Floodplain%20Map.pdf
Flood Hazard Maps	2025	Dept. of Ecology	https://apps.ecology.wa.gov/coastalatlas/tools/Flood.aspx
USGS 12200500 SKAGIT RIVER NEAR MOUNT VERNON, WA Gauge Information	2025	US Geological Service	https://waterdata.usgs.gov/nwis/inventory?site_no=12200500
Discharge Information by Gauge Site, Skagit County	2025	US Geological Service	https://dashboard.waterdata.usgs.gov/app/nwd/en/
Energy/Utilities/Telecommunications			
State Broadband Office 2020 Report- Biennial Report per RCW 43.330.538	2021	Dept. of Commerce	https://www.commerce.wa.gov/wp-content/uploads/2021/04/032921-2020-WA-State-Broadband-Report-FINAL.pdf
Report: Economic Development and County-Wide Broadband Fiber	2004	County	https://www.skagitcounty.net/BudgetFinance/Documents/Fiber/TMC%20Report%20for%20Skagit%20County%20Fiber%202004.pdf
Community Profile for Skagit County	2019	Puget Sound Energy	https://www.pse.com/-/media/PDFs/2019_Skagit_County_Profile.pdf
Electricity Supply	2024	Puget Sound Energy	https://www.pse.com/en/pages/energy-supply/electric-supply
Pipeline Operators by County	2024	WA Utilities and Transportation Commission	https://www.utc.wa.gov/pipeline-operators-county
Extreme Weather and Climate Vulnerabilities of the Electric Grid: A Summary of Environmental Sensitivity Quantification Methods	2019	US Department of Energy	https://www.energy.gov/sites/prod/files/2019/09/f67/Oak%20Ridge%20National%20Laboratory%20EIS%20Response.pdf
Extreme heat, hurricanes, wildfires: How summer's extremes disrupt the power grid	2024	Pacific Northwest National Laboratory	https://www.pnnl.gov/news-media/extreme-heat-hurricanes-wildfires-how-summer-extremes-disrupt-power-grid#:~:text=Heatwaves%3A%20Less%20efficient%20power%20flow%2C%20more%20power%20demand&text=Any%20power%20plants%20that%20rely,so%20does%20the%20water%20temperature.&text=Even%20solar%20panels%20are%20less,an%20electrical%20engineer%20at%20PNNL
Integrated resources plan	2021, 2023	Puget Sound Energy	https://www.pse.com/en/IRP/Past-IRPs/2023-IRP
Biennial Conservation Plan 2024-2025 plan	2023	Cascade Natural Gas Corporation	https://www.cngc.com/wp-content/uploads/PDFs/Conservation/plans_and_reports/2024/230937-CNGC-BCP-2024-2025-Plan-11-15-2023.pdf
2023 Electric Progress Report	2023	Puget Sound Energy	https://www.pse.com/-/media/Media/PERs/IRP/2023/electric/chapters/00_EPR23_ChapterBook_Final.pdf
US Energy Sector Vulnerabilities to Climate Change and Extreme Weather	2013	US Department of Energy	https://www.energy.gov/sites/prod/files/2013/07/f2/20130716-Energy%20Sector%20Vulnerabilities%20Report.pdf
Utility Policy Update	2000	County Public Works	https://skagitcountywa.gov/PublicWorksDevelopmentReview/Documents/Skagit%20County%20Utility%20Policy%20Final.pdf
Reduced snowpack			

Brangers, I., Marshall, H.-P., De Lannoy, G., Dunmire, D., Mätzler, C., and Lievens, H.: Tower-based C-band radar measurements of an alpine snowpack, The Cryosphere, 18, 3177–3193, https://doi.org/10.5194/tc-18-3177-2024 , 2024.			https://doi.org/10.5194/tc-18-3177-2024	
Drought Conditions for Skagit County	2024	NIDIS, NOAA	https://www.drought.gov/states/washington/county/Skagit	
Forestry				
Forest Statistics for Skagit County		WASHINGTON FOREST PROTECTION ASSOCIATION	https://www.wfpa.org/climate-change-solutions/forest-statistics/#/skagit	
Milled Log prices	2024	Department of Natural Resources	https://www.dnr.wa.gov/publications/psl_ts_2410_logprices.pdf	
Tree Seedzones by tree species	2024	WA Association of Conservation Districts	https://wacds.maps.arcgis.com/apps/webappviewer/index.html?id=cff1e4325bf14e2986707f335fd14627	
Skagit County Q3 Income Report - Timber	2024	Dept of Natural Resources	https://www.dnr.wa.gov/publications/fm_skagit_co_0324.pdf	
Table 1 - 10 year revenue history	2024	Dept of Natural Resources	https://www.dnr.wa.gov/publications/fm_county_income_table.pdf	
Skagit County Economic Profile	2024	Western Wa University	https://cbe.wvu.edu/sites/cbe.wvu.edu/files/2024-09/2024%20Skagit%20County%20Profile.pdf	