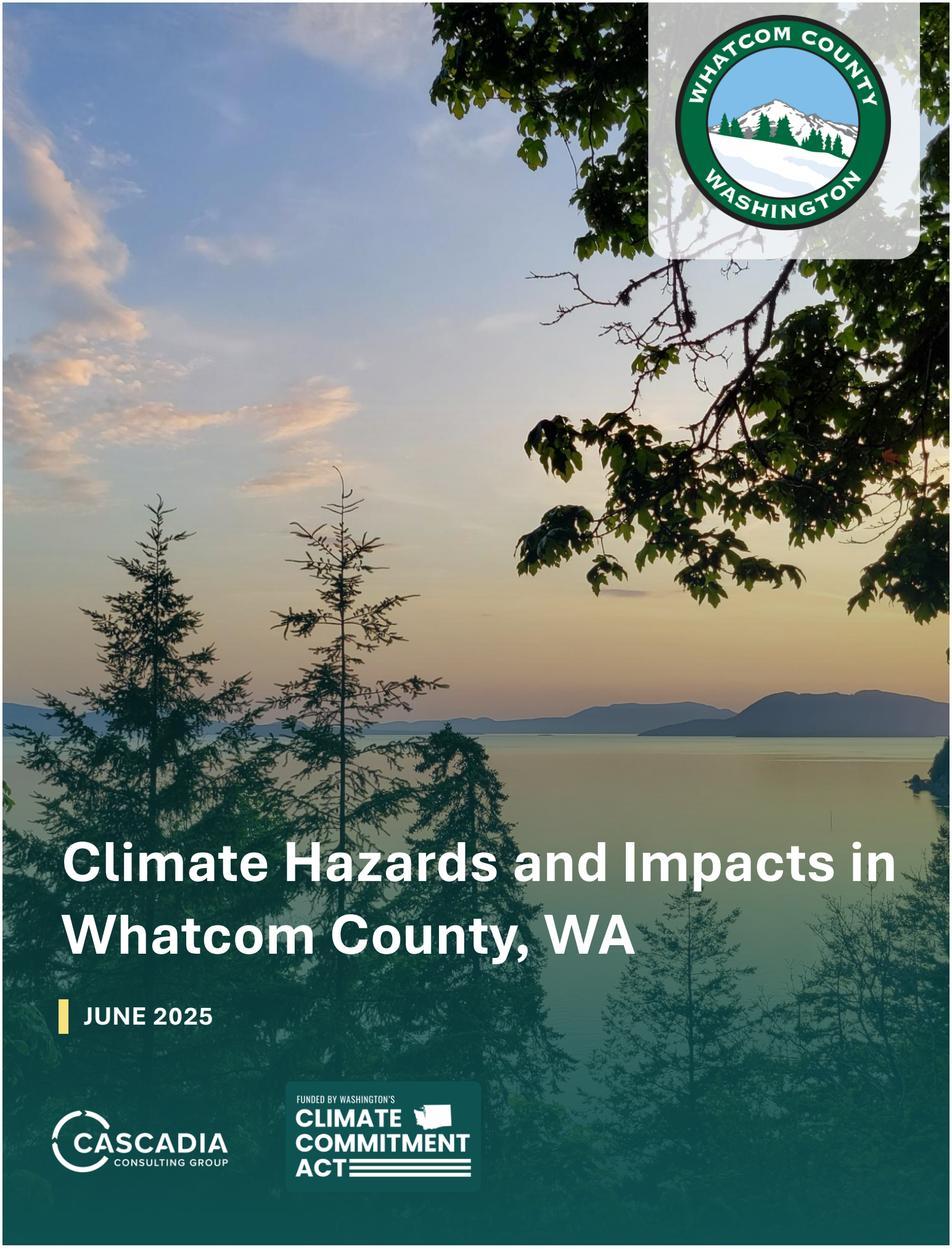

Climate Hazards and Impacts in Whatcom County, WA

JUNE 2025

CASCADIA CONSULTING GROUP

FUNDED BY WASHINGTON'S CLIMATE COMMITMENT ACT

Funding Acknowledgment

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Section 1: Executive Summary

Report Scope and Structure

Climate change and extreme weather events are already affecting Whatcom County with increased frequency and severity. Coastal communities and urban growth areas within Whatcom County— such as Blaine, Birch Bay, and Bellingham—are experiencing more frequent and intense flooding events due to increased prevalence of coastal storms. Communities along the Nooksack River—such as Everson, Ferndale, Nooksack, and Sumas—are experiencing more severe riverine flooding. Wildfire and smoke impacts are becoming more common throughout the County. These climate hazards are affecting Whatcom County in multiple ways: damaging public and private infrastructure, affecting the health, wellbeing, and safety of residents, and altering ecosystem health and function.

Figure 1. Climate Hazard Events in Whatcom County. Photos (left to right): Birch Bay flooding during a high tide coastal storm event in January 2022 (photo credit: Bellingham Herald); Wildfire along east side of Lake Whatcom in August 2023 (photo credit: Nate Bo

This report—Climate Hazards and Impacts in Whatcom County, WA—is a technical input to Whatcom County's Comprehensive Plan update and will also be used as background information for the update of the Whatcom County Natural Hazard Mitigation Plan. The goal of this report is to help Whatcom County meet climate planning requirements under RCW 36.70A.070(9)(e)(i) by providing a science-based assessment of climate impacts and environmental justice considerations. The report provides technical documentation for Whatcom County and partner jurisdictions by 1) identifying overburdened communities or sensitive population groups and their spatial distribution across the County; 2) identifying hotspots, which are the presence of both climate hazard exposure and sensitive populations; and 3) identifying specific tax parcels that experience exposure to multiple climate hazards.

This report is organized in the following four (4) sections:

Section	Description
Section 1: Executive Summary	Executive summary of the report.
Section 2: Sensitive Populations in Whatcom County	This section provides an overview of sensitive populations (e.g., older adults, low-income households, communities of color) in Whatcom County and a summary of environmental health outcomes.
Section 3: Whatcom County Climate Hazards and Hotspot Analysis	This section provides an overview of priority climate hazards—such as extreme heat, flooding, landslides, and wildfires—across Whatcom County and key hotspots where there is both hazard exposure and higher prevalence of sensitive populations.
Section 4: Parcel Analysis	This section summarizes results from a parcel-level analysis of sea level rise, flooding, erosion and landslide risks to inform the County's resilience planning requirements.

Sensitive Populations in Whatcom County

Population groups can experience adverse impacts from climate change and extreme events based on socioeconomic, demographic, and locational characteristics. In the event of a heatwave, older adults are more physiologically sensitive to extreme heat, which can lead to a higher prevalence of acute injuries and sometimes death. Lower-income families are more likely to live in an older house or a house in poor condition with a porous and permeable envelope or no air conditioning. Urban heat islands in areas with low canopy coverage and impervious surface are often home to a higher portion of low-income households and communities of color. Systemic disinvestment, which is partially due to a legacy of discriminatory housing practices, such as redlining and restrictive housing covenants, has been linked to more heat island impacts. Other characteristics, such as people with limited English proficiency, can affect the ability for residents to access or understand public emergency communications. Furthermore, individuals with multiple socioeconomic or demographic characteristics—such as a low-income older adult—can experience additional vulnerability and compounding health risks from climate exacerbated hazards.

Section 2: Sensitive Populations in Whatcom County evaluates sensitivity associated with several population groups in Whatcom County, including Tribal and Indigenous communities, communities of color, youth, older adults, low-income households, people with disabilities, and people with limited English proficiency. These population groups were assessed to provide analysis specific to Whatcom County around "vulnerable populations" defined in HB 1181 as population groups that are more likely to be at higher risk for poor health outcomes in response to environmental harms, due to (1) adverse socioeconomic factors, such as unemployment, high housing and transportation costs relative to income, limited access to nutritious food and adequate health care, linguistic isolation, and other factors that negatively affect health outcomes and increase vulnerability to the effects of environmental harms; and (2) sensitivity factors, such as low birth weight and higher rates of hospitalization.

Table 1. Census block groups in Whatcom County in the 90th percentile for one or more sensitive population category.

Number of 90th Percentile Sensitive Population Categories	Number of Census Block Groups in Whatcom County
1	35
2	16
3	7
4	7
5	3
6	1

Only a few areas in the County contain high proportions of multiple climate-sensitive populations (Table 1). Of Whatcom's 129 total census block groups, there are 69 census block groups that belong in the 90th percentile for at least one sensitive population group, and 18 block groups being in the 90th percentile for three or more sensitive population categories.

Climate Hazards and Hotspots

Building on the analysis of sensitive populations, **Section 3: Whatcom County Climate Hazards and Hotspot Analysis** identifies co-occurrence of sensitive populations with climate hazard areas across Whatcom County. Sensitive population hotspots were census block groups that were 1) in the top 50th percentile for people who lived below the poverty line, and 2) in the top 10th percentile for containing a community of color (any non-White races and ethnicities).

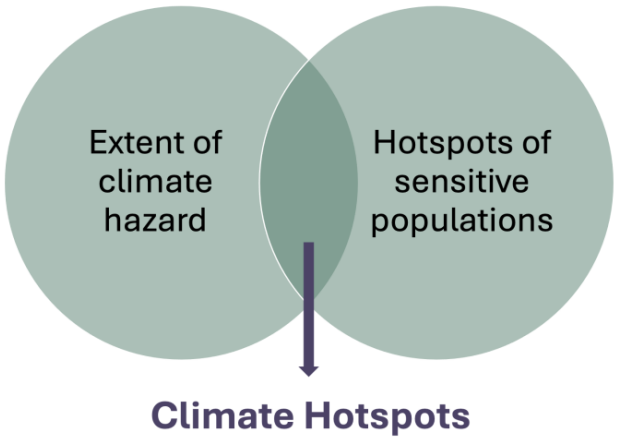

Figure 2. Climate Hotspot Conceptual Diagram. Conceptual diagram of the climate hotspot analysis.

Section 3 includes "climate hotspots" (see Figure 2) for the following climate hazards: extreme heat, riverine flooding, coastal flooding and sea level rise, landslides and alluvial fans, and wildfires and wildfire smoke. These "climate hotspots" provide a basis for identifying the geographic areas in Whatcom County where vulnerable populations face combined, multiple environmental harms and health impacts, meaning they meet the definition of "overburdened communities" in HB 1181. Figure 3 provides an example of the results produced by hotspot analysis for riverine flooding.

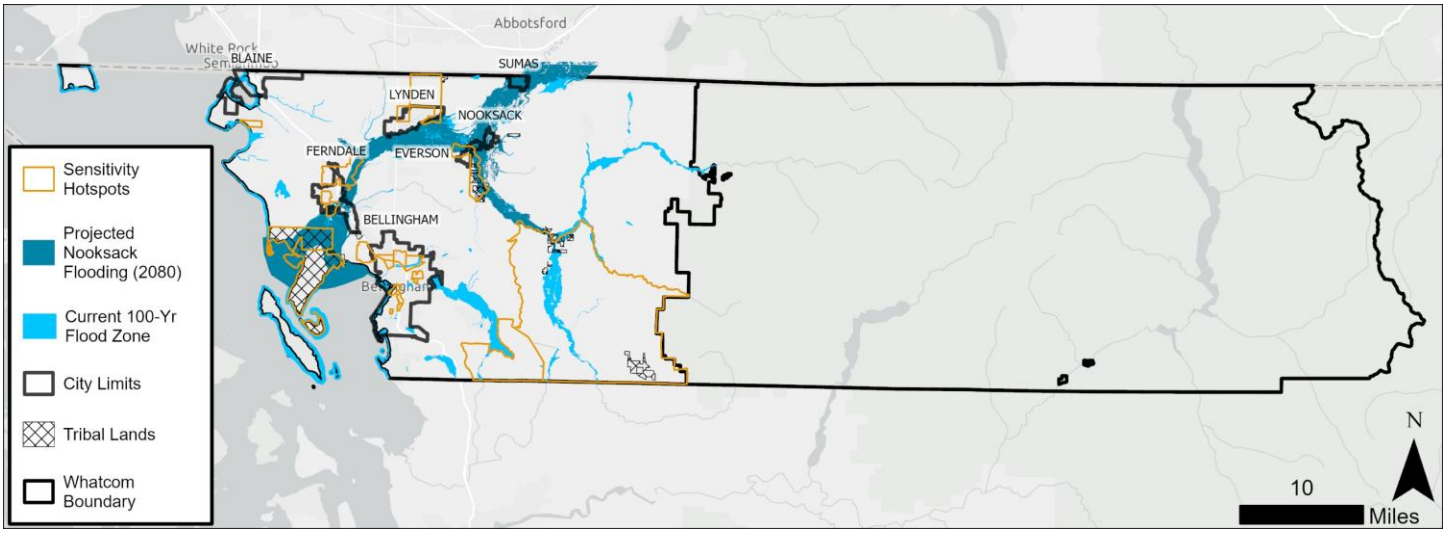

Figure 3. Example Climate Hotspot: Riverine Flooding in Whatcom County. Effective 100-year floodplain and projected future flooding (1.75x 100-year flood) along the Nooksack River overlaid with sensitive population hotspots.

Parcel Analysis

In addition to the hotspot analysis, the parcel analysis identifies parcels that are likely to be affected by multiple climate hazards, based on the best available science (Figure 4). The parcel analysis includes the subset of hazards with spatial datasets available at a fine-scale resolution for evaluation at a parcel level: erosion, sea level rise, landslides, flooding, and alluvial fans. Out of 110,373 total tax parcels in Whatcom County, there are 28,553 parcels (approximately 25.9% of all parcels) that intersect at least one evaluated hazard, and some of these parcels are exposed to multiple hazards. Flooding hazards compose approximately 82.4% of all hazard-exposed parcels. Of the 28,553 hazard-exposed parcels, 18,987 are only exposed to a single hazard, 6,460 are exposed to two hazards, 3,081 are exposed to three hazards, and 25 parcels are exposed to all four hazards. No parcel intersects with all five mapped hazards.

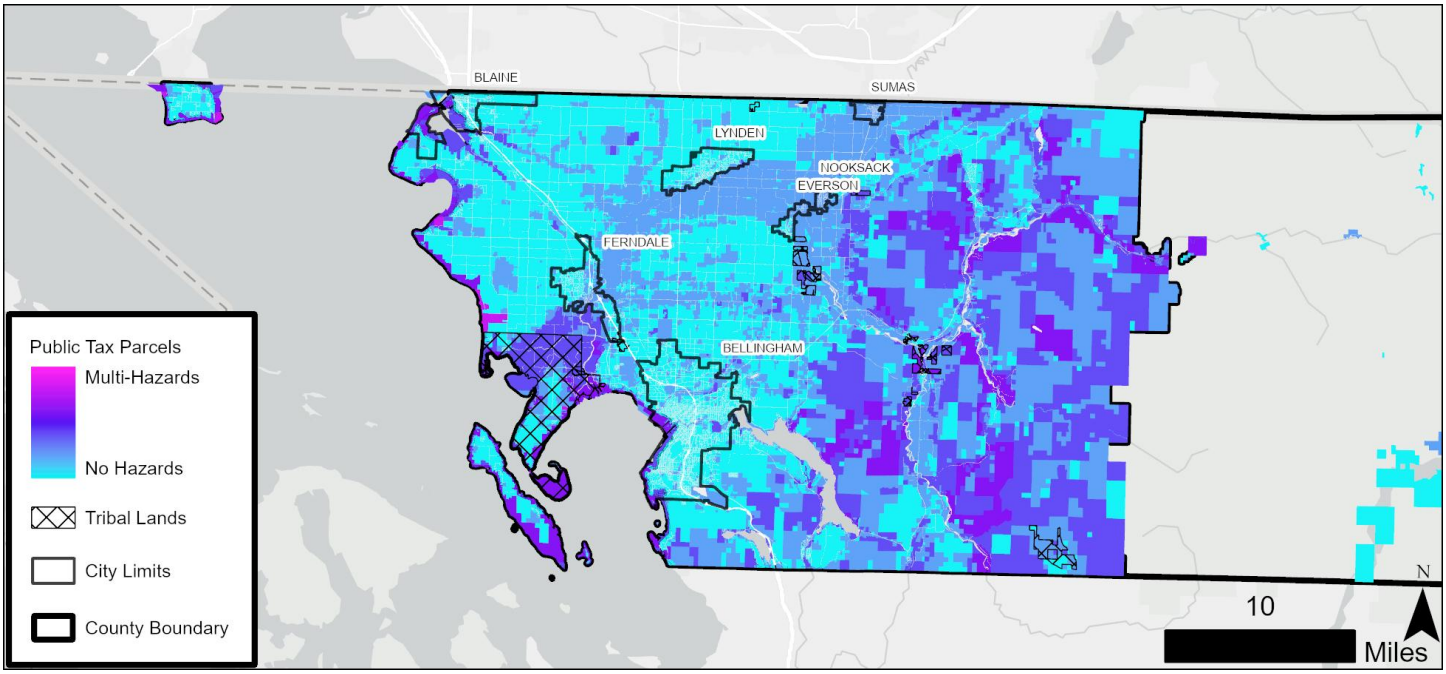

Figure 4. Tax Parcels in Whatcom County Exposed to Multiple Hazards. Parcels highlighted in pink intersect multiple hazard layers, such as flooding, erosion, landslides, alluvial fans, or sea level rise, and are considered exposed to multiple areas, a consideration for future development. Parcels shown in blue have little to no hazard overlap and represent lower exposure.

Planning Implications

This report is intended to provide guidance on identifying natural hazards created or aggravated by climate change—including sea level rise, landslides, flooding, and wildfires—based on the intermediate climate planning guidance from the Washington Department of Commerce and the best available science. This technical evaluation of hazards exposure provides information to support the development of a Climate Element of the Comprehensive Plan as required by RCW 18 36.70A.070(9). This report, as well as data assembled and analyzed for its production, can subsequently be used by Whatcom County and its cities to develop resilience plans and policies.

As a technical evaluation of hazard incidence and exposure, the Climate Hazard and Impacts report does not prescribe specific zoning or development regulations to address the hazard exposure impacts or recommend specific comprehensive plan policies or implementation actions. Additional regional coordination to finalize countywide planning policies for resilience and local prioritization of resilience policies within each jurisdiction's comprehensive plans is ongoing throughout the 2025 Comprehensive Plan update. Final guidance from the Department of Commerce through the rulemaking process of HB 1181 and future technical guidance will also provide additional policy directions to local jurisdictions to evaluate of whether resilience policy implementation is likely to reduce the severity of the hazard's projected climate impacts to specific parcels in a given jurisdiction.

Section 2: Sensitive Populations in Whatcom County

Introduction

Whatcom County is already experiencing a variety of climate impacts and extreme events at increased rates—including wildfires, smoke events, extreme floods, coastal hazards, and drought—with many climate impacts projected to worsen and intensify.

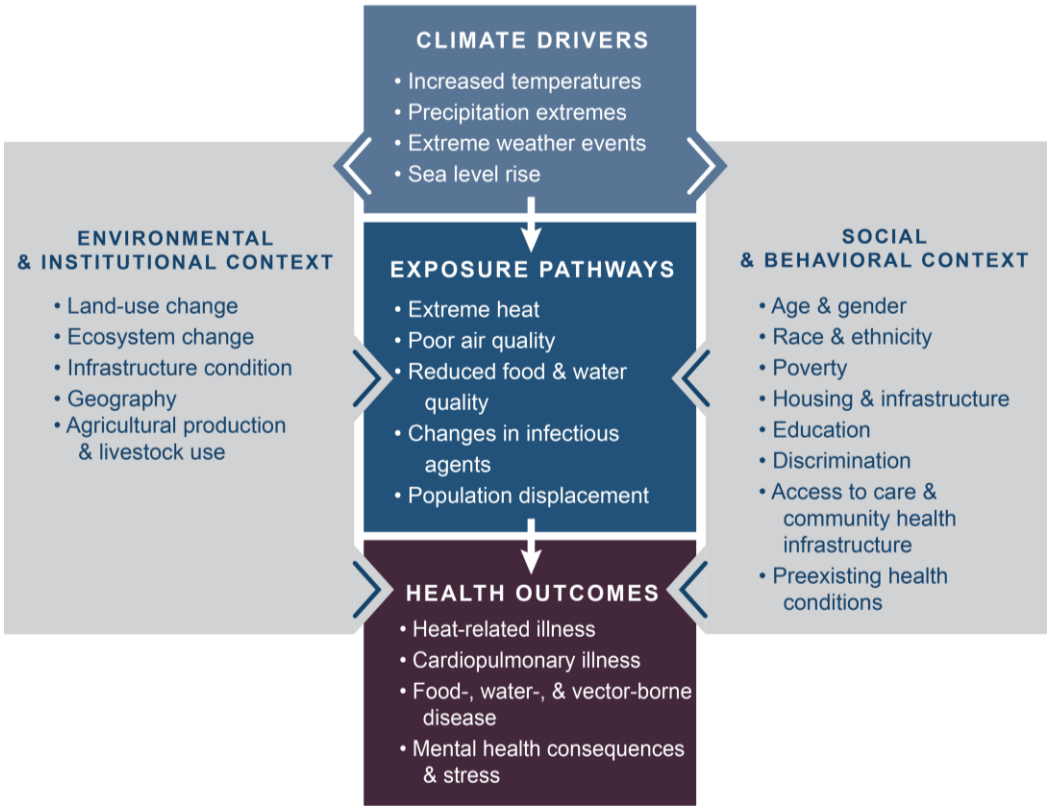

Figure 5. Determinants of health outcomes from climate change. Conceptual diagram illustrates the exposure pathways by which climate change could affect human health. Figure sourced from the National Climate Assessment (2018), Ch. 14: Health.

Climate change is expected to affect everyone regardless of race, income, or socioeconomic status. However, different population groups across Whatcom County—such as older adults and low-income residents—may experience disproportionate risks and impacts from climate change and extreme events. This is because health outcomes from climate impacts are distributed unevenly across a community or population based on the social and environmental context of each individual or household (Figure 5).

This section summarizes key sensitive populations across Whatcom County and describes the various drivers and considerations that increase sensitivity to climate hazards within given population groups. Key groups included in this analysis include Indigenous people, communities of color, youth, older adults, low-income households, outdoor workers, people with disabilities, people with Limited English Proficiency, people with chronic conditions, and pregnant people. The analysis broadly evaluates factors that may increase vulnerability to the impacts of climate change but does not include every population group that is likely to be disproportionally impacted by climate change. The results of the analysis are presented after a description of the methods.

Methods

Data Screening and Literature Review

An initial screen of a variety of data sources and data tools was conducted to identify a list of overburdened or sensitive populations and relevant datasets. Criteria for data screening and review included relevance to planning/local context, spatial resolution available, and year of data collection. These criteria provided the foundation for the analysis and were used to select quantitative and qualitative data sources to inform Whatcom County's comprehensive planning effort. This process allowed the assessment to focus on population groups that are 1) sensitive to multiple types of climate hazards, and 2) for which data are available that can be accurately and confidently mapped.

Key data sources reviewed include:

- U.S. Census 5-year American Community Survey
- Washington State Environmental Health Disparities Map
- EPA Climate Change and Social Vulnerability in the United States
- EPA Environmental Justice Screening Tool
- Council on Environmental Quality Climate & Economic Justice Screening Tool
- University of Washington's Climate Health and Risk Tool (CHaRT)
- Whatcom County Building Resilience Against Smoke & Heat
- Whatcom County Community Health Insights

The following list of questions was developed by the planning team to evaluate each piece of data:

- *How relevant is the data to the County for evaluating the particular climate hazard?*
- *Is the data from a reputable source? When was it published?*
- *Does the data fit the spatial resolution needs for local planning purposes (meaning census block or tract level)? If not, can the data be manipulated in a defensible way to meet spatial resolution needs?*
- *Does the data show heterogeneity across the County to meaningfully help us address health disparities and environmental justice considerations?*

After the initial data review, the planning team identified key indicators (population groups, potentially relevant climate hazards, and known impacts of hazards on those populations such as health outcomes). Then, the team validated this list of indicators using a literature review and local feedback. Based on the data screening approach, the analysis primarily included the 2020 U.S. Census Bureau's Census Data API and the 2020 American Community Survey (5-year data) to spatially represent key sensitive populations across the region, as these two data sources had data outputs recorded at the census block group, the finest resolution available. Additionally, for each sensitive population category, we cross-referenced our analysis outputs with Washington Environmental Health Disparities Map and Whatcom County Community Health Insights data platform to document the relationship between sensitive population group and health outcomes.

Mapping Climate Sensitive Populations

Through an iterative process, the data screening and review process identified priority populations with higher overall sensitivity to climate change impacts. For each population group, available data sources were evaluated to assess relevance for local planning, data limitations, and feasibility for mapping the spatial distribution of that sensitive population. For some groups—such as outdoor and natural resource workers or people with chronic

health conditions—the available spatial datasets on where these populations lived had significant data limitations. Table 2 provides a summary of key sensitive population groups, whether those populations were mapped, and additional comments with population-specific considerations. All geospatial analysis is included as part of Whatcom County's ArcGIS web map.[1]

Table 2. Climate sensitive populations in Whatcom County, WA.

Sensitive Population Group(s)	Mapped	Census Data Limitations
Indigenous peoples	Yes	Census data is aggregated by "American Indian or Alaska Native" category with self-identification of Tribal affiliation.
Communities of color • Asian • Hispanic or Latino • Native Hawaiian or Pacific Islander • Other race or ethnicity • Two or more races	Yes	Census data associated with different racial and ethnic groups was disaggregated for the analysis because each racial or ethnic group has different social, cultural, economic, and health dimensions.
Youth	Yes	None.
Older adults	Yes	None.
Low-income households	Yes	None.
Outdoor and/ or natural resource workers	No	Outdoor and natural resource workers are often sensitive to climate change due to additional occupational risk (e.g., occupational exposure for outdoor workers, impacts to natural resource industries). However, there is a mismatch in datasets, where available data maps only where outdoor workers live, not location of work. Vulnerability of outdoor workers was included as part of the narrative discussion.
People with disabilities	Yes	Not available at block group level.
People with Limited English Proficiency	Yes	Not available at the block group.
People with chronic health considerations	No	Data availability was limited at a block group scale for specific chronic health conditions. Additionally, there was uncertainty associated with attribution between chronic health conditions and climate impacts. Additional data limitations included small sample sizes and possible identifiable health information.
Pregnant people	No	There are very limited high-quality available datasets at the census block group level associated with pregnancy. This vulnerability is discussed as part of the narrative discussion.
Area in the wildland-urban interface	Yes	This layer is not described in this report but is included in the County's web map. Additional mapping to update the wildland urban interface map is underway by Washington Department of Natural Resources

[1] Link to project web map: Climate Planning Grant- Climate Hazard and Impact Assessment

The data used to create every demographic map is from the U.S. Census Bureau's Census Data API and the 2020 American Community Survey (ACS) 5-year data. The Census Data API allows most of this data to be represented at Whatcom County's block group level, the highest resolution it is recorded in. Data for every sensitive demographic group is organized in the Census Data API by total count, so it required data cleaning to derive the percentage for each demographic from the total population count within the specified block group.

All data layers are included as part of the web map associated with the final report. The final static images of every map representing each sensitive population, as well as tables with approximately the top 10% of all census block groups with the highest percentages for each sensitive population, are included in the results section.

Geospatial Data Limitations

A geospatial analytical approach to vulnerability should be complemented with other information to inform policy decisions, as various approaches have strengths and limitations. For this assessment, using a mapping approach provides a broad assessment of the spatial distribution of sensitive population groups across the County's geography; however, there are some limitations to this approach that are important to keep in mind.

Firstly, quantitative data may not be able to reflect the nuances of lived experiences across a diversity of community groups. Lived experiences may be able to broaden the understanding, such as how intersectional identities may lead to higher sensitivity considerations. Secondly, relying on demographic data may inadvertently also exclude other important but untracked information that is also considered part of social determinants of health, including sex, gender, and immigration status. This means that demographic data available from the U.S. Census almost certainly undercounts sensitive communities, which also include migrant farmworkers, who are disproportionately exposed to environmental hazards and climate impacts such as extreme heat and smoke.

Additionally, the spatial resolution of demographic data, even at the finest scale available, may not allow for fine-grain identification of where particular populations live or where some environmental disparities are present. For example, visualizing maps using data at the scale of census block groups may not be able to capture air quality impacts from highways or major roadways on households. Particulate matter emissions from vehicles are typically highly concentrated within a 2-3 block or 0.25-mile radius of these transit routes lly, some variables may be unavailable by census block group. For example, disability and limited English-language speaking proficiency population data were two sensitive demographic groups that were not available at the block group level. As a result, the maps visualizing this data used in this report represent these demographics at the next highest resolution: census tracts.

Climate Sensitive Populations in Whatcom County

This section provides an overview of the results of the spatial analysis and desktop research, outlining key sensitive populations and to which specific climate hazards these populations may be most sensitive. Section 3 contains further hotspot analysis to identify geographic overlap between dense concentrations of sensitive populations and areas that are exposed to mapped climate hazards. This hotspot analysis provides both maps and accompanying narrative descriptions about how those populations may be impacted and their spatial distribution. The rest of this section is organized based on environmental justice considerations and sensitive populations grouped based on (1) social and economic characteristics and (2) populations with health considerations and access needs. Table 3 relates each of these sensitive populations to each climate impact and hazard.

Table 3. Climate sensitivities for select populations.

This table crosswalks the specific hazards that each sensitive population may be sensitive to. Note: members of each population group may face differential risks depending on individual risk profiles.

Priority Climate Hazards								
Sensitive Populations		**Drought**	**Flooding & SLR**	**Heat**	**Landslides**	**Wildfire**	**Smoke**	**Ocean warming & acidification**
Social and Economic Characteristics	Indigenous people	✓	✓	✓		✓	✓	✓
	Communities of Color		✓	✓		✓	✓	
	Youth			✓			✓	
	Older adults		✓	✓	✓	✓	✓	
	Low-income households		✓	✓	✓	✓	✓	
	Outdoor & natural resource workers	✓	✓	✓	✓	✓	✓	✓
Populations with Health Considerations and Access Needs	People with disabilities		✓		✓	✓		
	People with Limited English Proficiency		✓	✓	✓	✓	✓	
	People with chronic health conditions	✓		✓		✓	✓	
	People who are pregnant			✓			✓	

Comparing the 129 census block groups in Whatcom County, 69 are within the 90th percentile for at least one, discrete sensitive population category included in this analysis. Notably, four block groups rank in the 90th percentile for five or more sensitive population categories. These high-sensitivity areas are located in Lynden, Nooksack, and in or near the City of Bellingham.

Table 4. Number of census block groups in the 90th percentile for one or more sensitive population categories.

Number of 90th Percentile Sensitive Population Categories	Number of Census Block Groups
1	35
2	16
3	7
4	7
5	3
6	1

Social and Economic Characteristics

INDIGENOUS PEOPLES

Climate change is negatively impacting species and ecosystems that constitute First Foods (Tribal traditional and culturally relevant foods) and are vital to Tribal cultures, economies, and traditional ways of life. Climate impacts like changing precipitation patterns, sea level rise, and flooding are negatively impacting access and availability to First Foods, which can lead to adverse health outcomes for Indigenous peoples. For example, warming sea surface temperatures have been linked with increases in diseases and mercury levels in shellfish with potential adverse health outcomes.

The northwest corner of Washington is the ancestral homeland of the Coastal Salish people, including Lummi Nation and Nooksack Indian Tribe. There are also Urban Native and Indigenous communities dispersed throughout Whatcom County. While the highest proportions of individuals that self-identified as "Native American or Alaska Native" in the Census live within or near the reservation boundaries of Lummi Nation and Nooksack Indian Tribe (see Figure 6), many Tribal or Indigenous individuals live in other areas, particularly in neighborhoods with the city limits of Bellingham and Ferndale as well as along the Highway 9 corridor. The Census indicates that there are also members of the Native Hawaiian diaspora living in neighborhoods around Bellingham International Airport, Happy Valley in Bellingham, and the north end of Birch Bay.

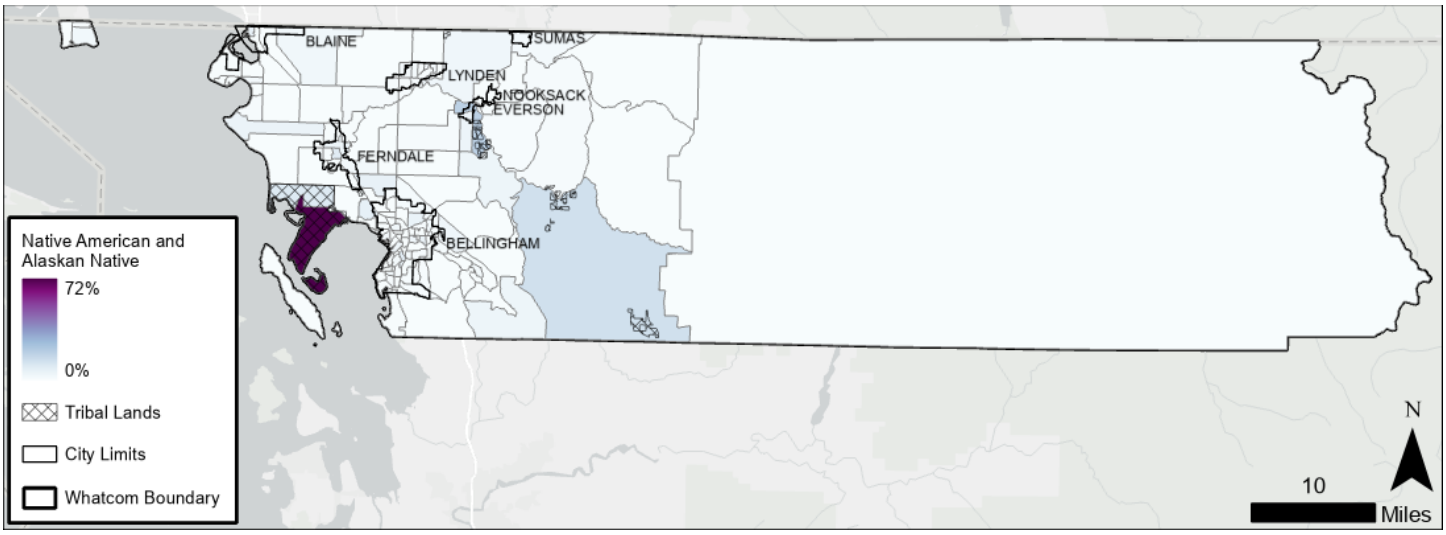

Figure 6. Map of Native American and Alaskan Native populations in Whatcom County.

Climate-Related Health Outcomes for Indigenous Populations

Tribes in the Pacific Northwest have lived near coasts and rivers since time immemorial due to the abundant natural resources and the cultural significance of these environments. While these coastal and riparian environments offer easy access to First Foods like salmon or shellfish, these environments are more exposed to sea level rise and other flooding. For example, in November 2021, significant precipitation caused the Nooksack River to spill over the levees containing it, leading to an increase in water levels between four and six feet for some parts of Lummi Nation and restricting road access for several days. These types of flooding risks can lead to a variety of health outcomes—including disconnection from ancestral or cultural sites, increased susceptibility to flooding-related health risks (e.g., mold, water-borne illnesses), and disrupted access to critical services during extreme events (Chang et al., 2023).

According to data from Washington State Department of Health, Lummi Tribal members face significant health disparities. Lummi Tribal members have some of the highest rates in Washington for two commonly used markers

of population health: low birth weights and deaths due to cardiovascular disease (University of Washington Department of Environmental & Occupational Health Sciences and Washington State Department of Health, 2022). High rates of cardiovascular mortality increase vulnerability to climate impacts because individuals with pre-existing heart disease are at higher risk of mortality when exposed to various environmental stressors, such as extreme heat and wildfire smoke. Studies have found that short-term exposure to particulate matter, such as during wildfire smoke days, is linked to acute coronary events (Jiao et al., 2024). Furthermore, individuals who survived an acute coronary event were found to have an even higher mortality rate when exposed to particulate matter (Jiao et al., 2024). Cardiovascular mortality rates are also higher than the statewide average in several other areas with higher proportions of Native American and Native Hawaiian residents, including around the Bellingham International Airport, Sehome and Happy Valley neighborhoods in Bellingham, and eastern Whatcom County (WSDOH, 2022).

Table 5. Census block groups in the 90th percentile for Native American (American Indian/Alaska Native) populations in Whatcom County.

Block Group	Geographic Description	% American Indian / Alaska Native	WA EHD Score
9400021	S. Lummi Nation, Peninsula	71.6%	5
0107023	Nooksack Reservation and Everson	18.9%	3
0101031	Corridor around State Route 9 (Van Zandt to Wickersham)	13.3%	4
9400011	N. Lummi Nation, Neptune Beach	9.9%	5
0105061	N. Ferndale	8.7%	5
0010001	Central Bellingham – Sehome neighborhood near N. Samish Way	8.1%	7
0002013	Neighborhood SW of Bellingham Int. Airport	6.6%	5

COMMUNITIES OF COLOR

People of color and ethnic minorities in Whatcom County in both rural and urban areas face disproportionate health risks from environmental hazards, including several that are expected to be worsened by climate change (Min et al., 2021). While the specific risks each community faces may differ, ranging from heat exposure in densely populated neighborhoods to flood threats on Tribal lands to wildfire smoke on agricultural worksites, the increased sensitivity of communities of color to climate change stems from a set of common, deeply rooted causes. Historical marginalization and systemic disinvestment have shaped where people live and what resources they can access. Many people of color, including Indigenous peoples and immigrant farmworkers faced (and may continue to face) racially discriminatory housing and employment practices, as well as education inequalities. A socioeconomic divide compounds these risks: communities of color are more likely to experience poverty, insecure housing, limited access to health care, lack of health insurance, and occupational hazard (Ahmadi & Murdock, 2022; Seabury et al., 2017; Washington State Department of Children, 2023; Washington State Department of Health, 2018; Washington State Homeownership Disparities Work Group & Department of Commerce, 2022). Any and all of these factors can increase sensitivity to climate-related health threats and result in adverse health outcomes.

Based on 2020 U.S. Census data, Whatcom County had a total population of approximately 226,847. People who identify as Hispanic/Latinos (of any race) make up the largest community of color with ~22,825 individuals (10.1% of total county population). This is followed by people who reported being Two or More Races (Non-Hispanic) with ~13,555 individuals (6.0%), Asian/Asian American with ~9,952 individuals (4.4%), American Indian/ Alaska Native with ~7,469 individuals (3.3%), Black/African American with ~2,516 individuals (1.1%). Less than one percent reported being of Some Other Race or Native Hawaiian and Other Pacific Islander. Whatcom County's various racial and ethnic populations (Figure 7 through Figure 10) were disaggregated because there are different

characteristics of each of these communities that may make them more sensitive to the impacts of climate change. For example, inadequate language access in emergency preparedness can cause disproportionate property damage and loss of life during climate-related disasters for communities of color with Limited English Proficiency (Xiang et al., 2021): emergency alerts and health guidance may be less accessible to Hispanic and Asian immigrant communities that have limited English proficiency. (see the subsection ***People with Limited English Proficiency***).

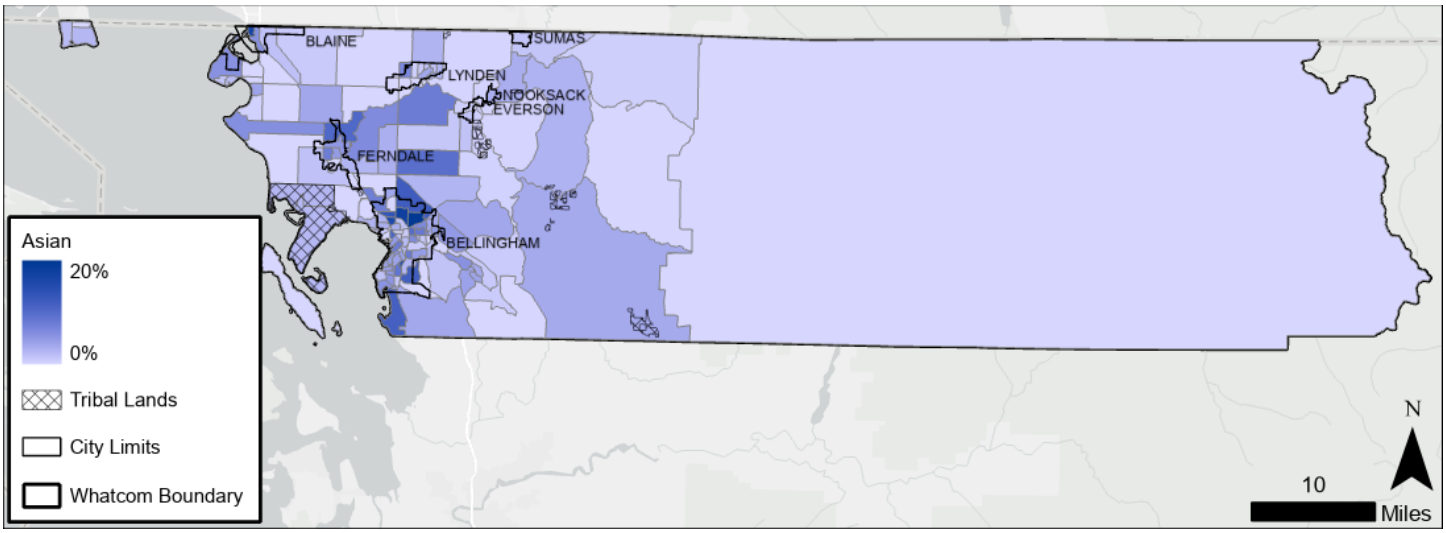

Figure 7. Map of Asian populations in Whatcom County.

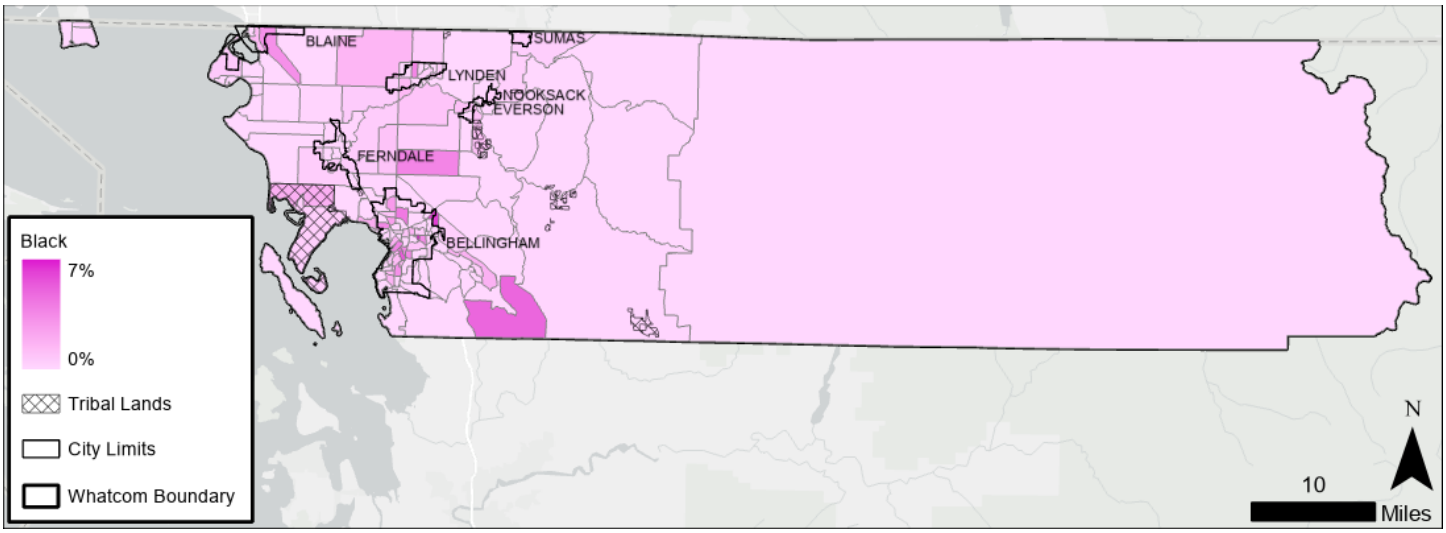

Figure 8. Map of Black populations in Whatcom County.

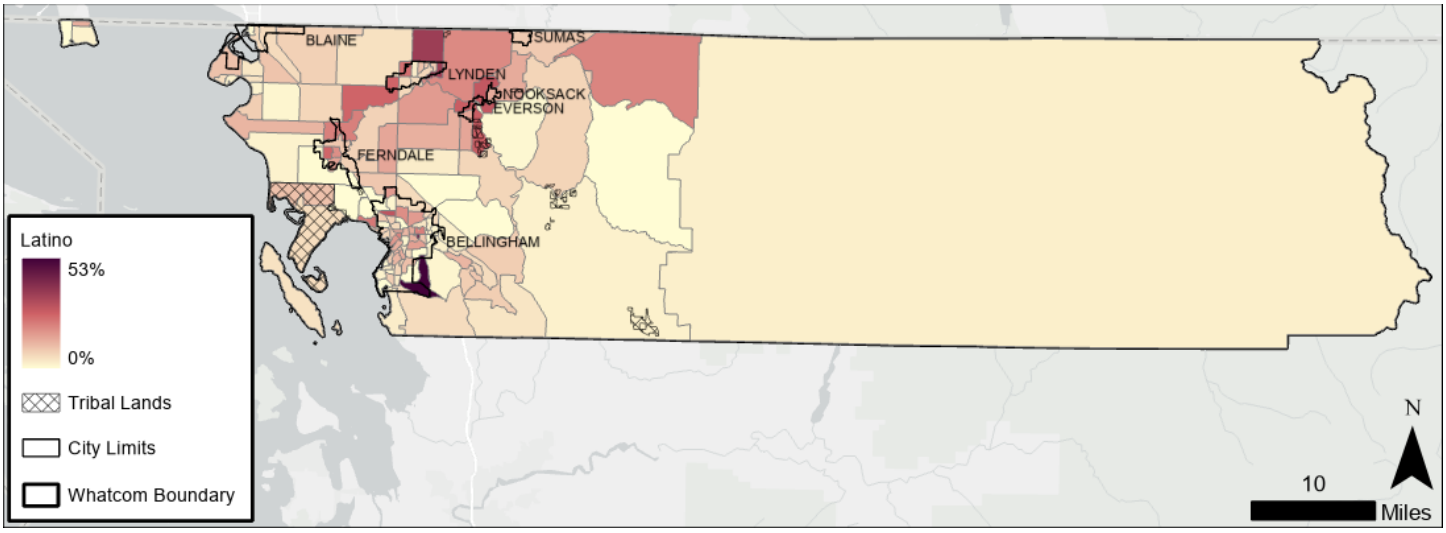

Figure 9. Map of Hispanic/Latino populations in Whatcom County.

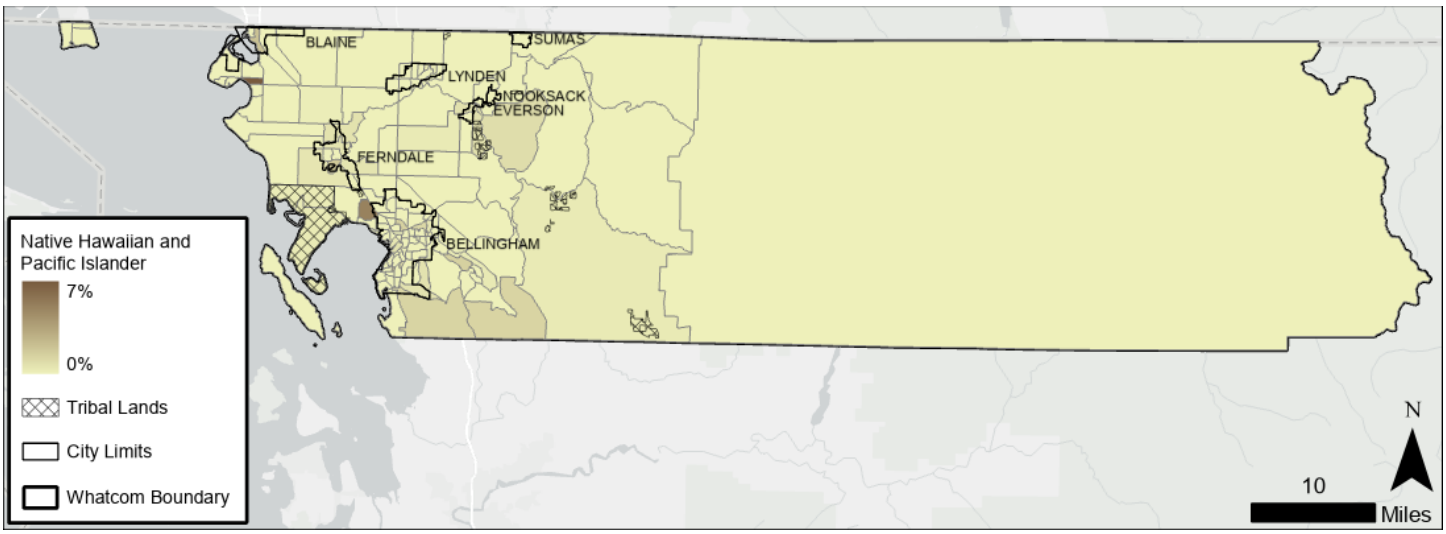

Figure 10. Map of Native Hawaiian and Pacific Islander populations in Whatcom County.

Climate-Related Health Outcomes for Communities of Color

There are more individuals that self-identify as being from a community of color in Whatcom County that live in urban areas than in rural census tracts. In urban areas like Bellingham and its surrounding neighborhoods, Bellingham residents of color—including Asian, Black, Latino, and multiracial communities—face climate-related health risks intensified by existing socioeconomic and housing inequities (Berberian et al., 2022a). For example, renters and lower-income families of color are more likely to live in older, less energy-efficient housing that lacks air conditioning. As extreme heat events become more frequent, these populations face higher risks of heat-related illnesses.

Communities of color in Washington are more likely to live near major roadways or industrial zones, exposing them to higher baseline levels of air pollution and associated respiratory issues (Min et al., 2021; UW Department of Environmental & Occupational Health Sciences & Washington State Department of Health, 2022). When wildfire smoke blankets the region, these communities—especially those with pre-existing respiratory conditions—are at elevated risk, often without access to high-quality indoor air filtration. Across the country, communities of color are more likely to reside in high flood-risk areas, often in lower-quality housing (e.g., aging mobile homes) and with fewer financial resources to prepare for or recover from disasters (Ratcliffe et al., 2019;

Tate et al., 2021). As a result, those individuals are more likely to face long-term consequences such as damaged credit, mortgage defaults, and increased debt burdens (Ratcliffe et al., 2019).

Hispanic/Latino and American Indian/Alaska Native populations face environmental health vulnerabilities specific to rural communities. Rural Whatcom County has areas with more Latino farmworker communities, that face unique vulnerabilities tied to both climate exposure and structural inequities. Hispanic/Latino farmworkers are at particular risk from extreme heat, wildfire smoke, pesticide exposure, and other occupational hazards exacerbated by climate change (Berberian et al., 2022b). These workers often lack access to protective equipment, paid sick leave, or adequate healthcare, which increases their vulnerability to acute and chronic illnesses. Some rural households, including those living in farmworker housing, rely on aging or unregulated water systems that are more vulnerable to contamination from flooding, agricultural runoff, and drought-related supply disruptions (U.S. EPA, 2025b; Wilson-Black, 2025).

Table 6. Census block groups in the 90th percentile for various communities of color[2] in Whatcom County.

Asian population in Whatcom County

Block Group	Geographic Description	% Asian	WA EHD Score
0001022	NE Bellingham – S. Irongate around Sunset Pond Park	20.1%	6
0001023	N. Bellingham, Bakerview	17.8%	6
0104091	Blaine	17.1%	3
0003022	Bellingham – Birchwood	15.8%	8
0012042	Bellingham – N. Happy Valley	15.4%	6
0003021	Bellingham – Between BIA and Meridian St	13.4%	8
0001021	N. Bellingham, N. King Mountain	12.2%	6
0009022	Bellingham – Samish	11.9%	2
0012022	Chuckanut	11.6%	5
0004022	Bellingham – Columbia	10.8%	3
0105052	N. Ferndale	10.5%	5

Black population in Whatcom County

Block Group	Geographic Description	% Black	WA EHD Score
0007004	Bellingham – Roosevelt	7.1%	8
0008042	NW Bellingham near Barkley Village	6.3%	1
0010001	Central Bellingham – Sehome neighborhood near N. Samish Way	5.5%	7
0008071	S. of Lake Whatcom and west of Acme	5.0%	2
0010002	Bellingham – Sehome	4.7%	7
0001023	Bellingham – Bakerview	4.2%	6
0006001	Bellingham City Center	3.8%	4

[2] American Indian/Alaska Native communities were profiled in the previous section.

Hispanic or Latino population in Whatcom County

Block Group	Geographic Description	% Hispanic/ Latino	WA EHD Score
0009023	Lake Padden Areas	53.4%	2
0007004	Bellingham - Roosevelt	46.8%	8
0103031	N. of Lynden/ Hwy 546	36.3%	2
0003021	Bellingham – Between BIA and Meridian St	29.9%	8
0102022	Hampton, W. of Nooksack	28.9%	3
0107023	Nooksack Indian Tribe and Everson	27.6%	3
0103012	Wiley Lake area	25.9%	1
0105031	W. Central Ferndale	25.8%	3
0103013	Lynden, N.of Main Street	24.2%	1
0002012	Marietta-Alderwood (W of Bellingham)	22.7%	5
0007001	Bellingham – Roosevelt	21.5%	8
0105052	N. Ferndale	21.1%	5

Native Hawaiian and Pacific Islander population in Whatcom County

Block Group	Geographic Description	% Black	WA EHD Score
0104061	Birch Bay	7.2%	1
0002013	Bellingham – BIA	5.2%	5
0012031	Bellingham – W. of Happy Valley	2.4%	6
0104092	Blaine	2.1%	3

CHILDREN AND YOUTHS

Children are sensitive to climate impacts for multiple reasons, including being more physiologically sensitive to specific hazards such as smoke and heat and experiencing higher rates of mental health challenges from more frequent extreme weather events (Whatcom County Health & Community Services, 2022). Multiple census block groups in the greater Bellingham area and areas in northern parts of the County (e.g., Sumas, Lynden, Nooksack, Everson) have higher proportions of youth residents. Some of the highest densities of children under 5 are in the Marietta-Alderwood census-designated place outside of Bellingham, Birch Bay, and areas outside of Lynden.

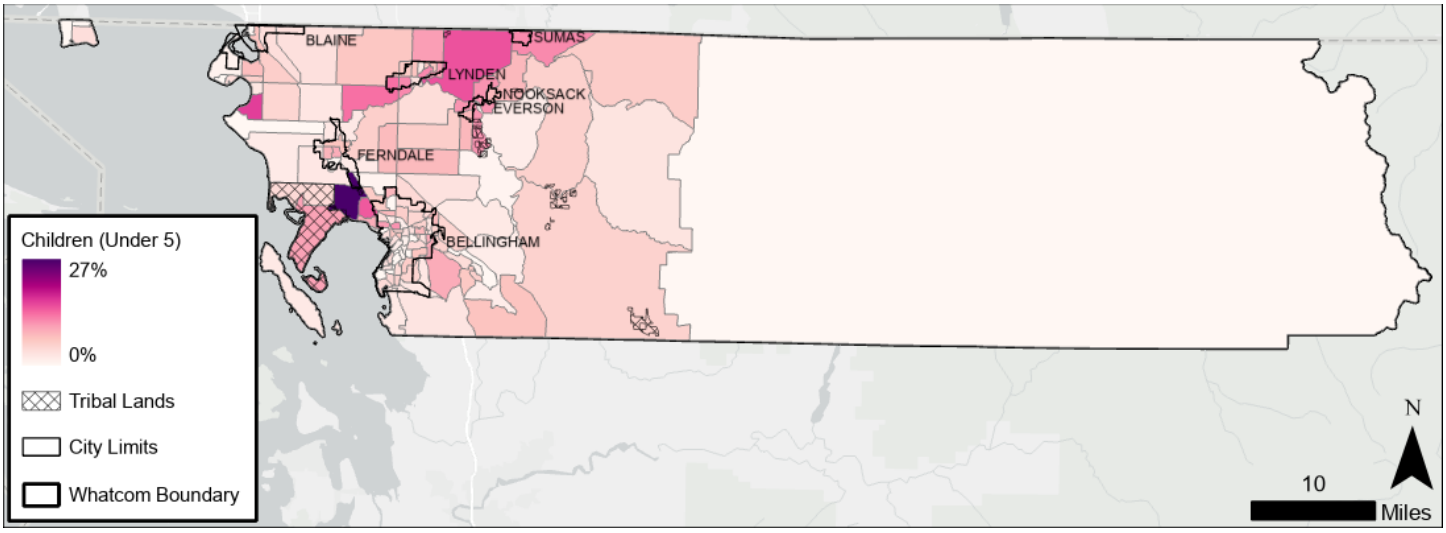

Figure 11. Map of children under 5 in Whatcom County.

Climate-Related Health Outcomes for Children and Youth

Children and youth are more susceptible to adverse health impacts due to climate change. Children—especially younger children—are still developing biologically and may have additional challenges regulating body temperatures during extreme events such as heat waves (Sanson et al., 2019). Additionally, children are particularly sensitive because exposure to climate hazards can have adverse physical health impacts (e.g., smoke inhalation can affect developmental progress and is associated with increased risk of youth developing chronic respiratory conditions) or mental health impacts (e.g., exposure to extreme events can increase risk of poor mental health conditions) (Hayden et al., 2023).

Children are also more susceptible to mental health challenges following extreme events. Many of the census block groups that have higher proportion of children are already at higher risk of coastal and riverine flooding. For example, extreme flooding in the Nooksack River in 2022 damaged homes and displaced families (Gluzman, 2022). Evidence indicates that people affected by extreme floods—and particularly children—can experience distress and anxiety from uncertainty and financial instability, a declining sense of trust in public institutions, and in some cases post-traumatic stress disorders (Mort et al., 2018).

Table 7. Census block groups in the 90th percentile for youth in Whatcom County.

Census Block Group Number	Geographic Description	% Youth (<18 years old)	% Youth (<5 years old)	WA EHD Score
0002011	Brennan and Marietta-Alderwood	26.7%	26.7%	5
0104111	S. Birch Bay	31.4%	16.0%	5
0102023	Clearbrook area	27.8%	14.8%	3
0002013	Neighborhood SW of Bellingham Int. Airport	32.0%	14.3%	5
0103012	Wiley Lake area	25.8%	12.9%	1
0103032	Lynden	37.9%	11.4%	2
0103014	W. of Lynden	27.6%	11.4%	1
0102021	Sumas	32.6%	11.3%	3
0004012	Bellingham – Cornwall Park	24.0%	10.8%	3
0102022	Hampton, W. of Nooksack	33.5%	10.7%	3

Census Block Group Number	Geographic Description	% Youth (<18 years old)	% Youth (<5 years old)	WA EHD Score
0107023	Nooksack Reservation and Everson	33.1%	10.7%	3
0103031	N. of Lynden/ Hwy 546	37.3%	10.1%	2

OLDER ADULTS

During emergencies, older adults often have significant transportation and medical assistance needs (NIH National Institute on Aging, 2022). According to the UW Climate Impacts Group, the population of older adults (aged 65 and older) is expected to grow by 21.7% by 2040—surpassing two million adults in Washington (Vogel et al., 2023). In the case of severe storms and flooding, older adults may be more medically dependent on electricity and experience disproportionate risk of harm during power outages (NIH National Institute on Aging, 2022).

Some older adults can lack social support networks vital to successfully evacuate wildfires, floods, severe storms, or extreme heat events (Modaresi Rad et al., 2023; Thompson et al., 2023). If communication networks are damaged, it can impair the ability for isolated older adults to access critical information and for emergency response teams to know where older adults are located in order to evacuate them (Hansson et al., 2020; Thompson et al., 2023).

In Whatcom County, there are higher concentrations of older adults in several locations, including parts of Bellingham, Birch Bay, Lummi Island, Blaine, and Point Roberts. While some areas have more high-income households—such as Lummi Island—those areas are also more remote, which can make access to emergency response or other emergency services an additional vulnerability.

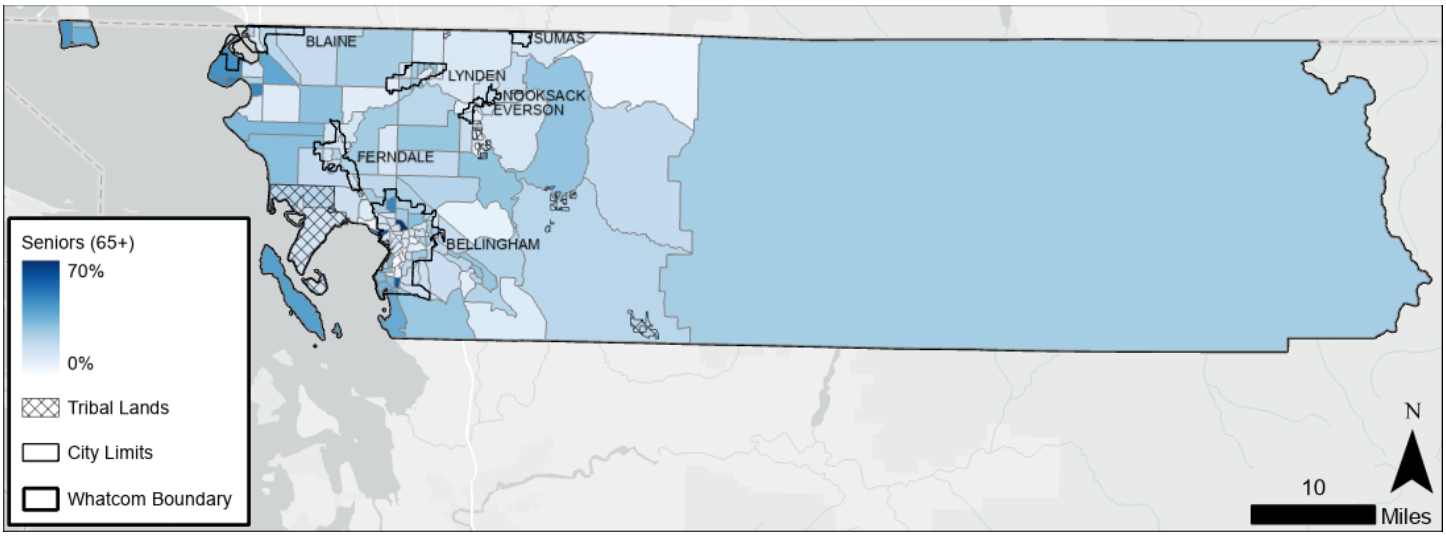

Figure 12. Percentage of older adults by census block groups.

Climate-Related Health Outcomes for Older Adults

Older adults are more physiologically sensitive to climate impacts, such as extreme heat and wildfire smoke, and thus make up a large majority of deaths related to heat and air pollution. During the 2021 heat dome event, older adults made up 67% of excess deaths[3] recorded in Washington (Vogel et al., 2023). Exposure to extreme heat and

[3] Excess mortality is how many more people are dying than would be expected based on previous years (the increase in the number of deaths during a specific time period or in a certain group).

humidity is projected to result in a 370% increase in heat-related mortality among those 65 years and older by midcentury (Romanello et al., 2023). Additionally, almost 1.7 million excess deaths among older adult populations result from exposure to air pollution, due to its association with increasing pressure on existing cardiovascular diseases (Figueiredo, 2024).

Wildfires present risk to older adults in the form of evacuation challenges and exposure to air pollution (airborne particulate matter) from wildfire smoke. Short-term exposures to wildfire smoke place older adults at increased risk of health effects because of their higher prevalence of pre-existing lung and heart diseases and the way physiological systems decline with age. Epidemiologic studies report greater risks of emergency department visits, hospital admissions, and mortality associated with short-term exposures to fine particle pollution in older adults (U.S. EPA, 2025a).

Table 8. Older adults in Whatcom County, WA.

Census Block Group Number	Geographic Description	% Seniors (65+)	WA EHD Score
0004013	Bellingham – E. Cornwall Park	69.6%	3
0003012	Neighborhood around Bellingham Technical College	60.8%	8
0012023	Bellingham – South	59.8%	5
0104052	Birch Bay – Birch Bay Village	48.6%	1
0002031	Bellingham – Cordata	46.7%	5
0104112	Central Birch Bay	46.4%	5
0104053	N. Birch Bay	44.1%	1
0104051	N.of Birch Bay, Semiahmoo Peninsula	43.2%	1
0110003	W. Point Roberts	42.2%	1
0109001	Lummi Island	39.4%	1
0104102	S. of Blaine, Loomis Trail area	36.7%	3
0012022	Chuckanut	35.8%	5
0110001	E. Point Roberts	33.5%	1

LOW-INCOME HOUSEHOLDS

Individuals and families living below the poverty line are sensitive to climate impacts, such as flooding, wildfire, and extreme heat. Limited financial resources can make it difficult to prepare for disasters, recover from damage, or voluntarily or involuntarily relocate away from high-risk areas. Low-income households are also more likely to live in older, less resilient housing and may lack access to adequate healthcare and insurance. Poor-quality housing—such as older homes or homes with old or deteriorating envelopes—are typically more permeable, which allows smoke to infiltrate indoors and affect indoor air quality. Older homes may also have worse air filtration installed in heating, ventilation, and air conditioning (HVAC) systems and have no indoor cooling system at all.

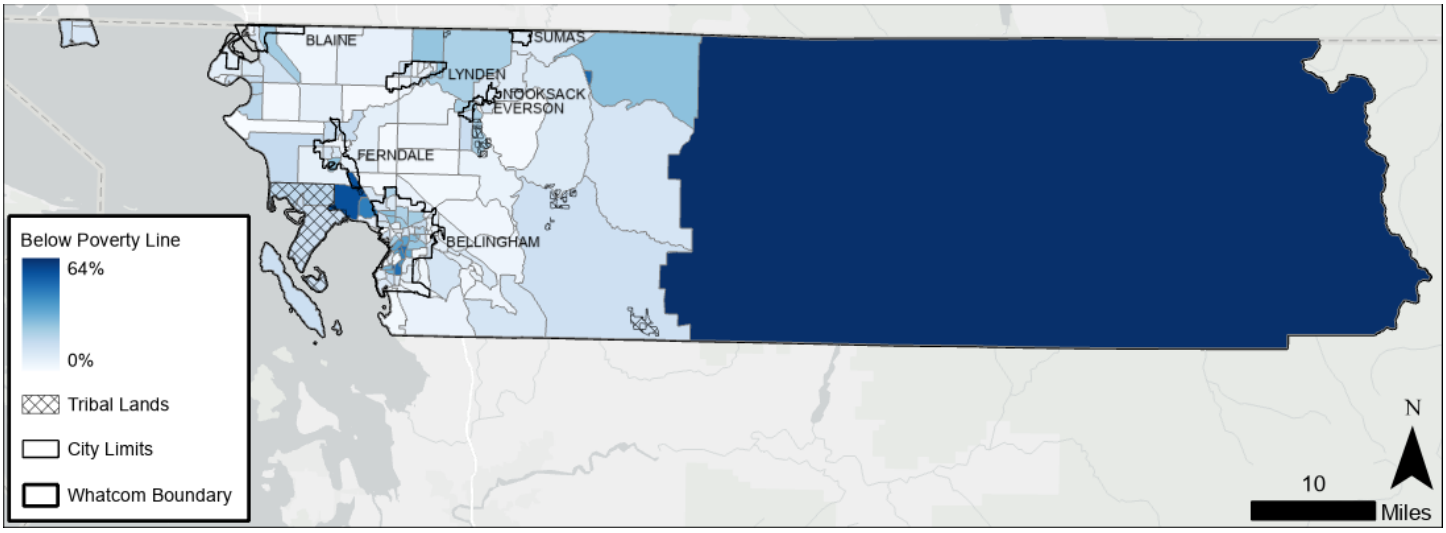

Figure 13. Populations below poverty line, by census tract.

Climate-Related Health Outcomes for Low-Income Households

Low-income households in Whatcom County face heightened health risks from climate change due to compounding social and economic vulnerabilities. According to the Centers for Disease Control and Prevention (CDC), poverty significantly increases climate vulnerability by limiting access to healthcare, nutritious food, and stability, all of which become even more critical during climate-related disasters (CDC, 2021). Households with fewer financial resources are less able to prepare for or recover from flooding events, especially when these events occur repeatedly (Ogie et al., 2018). For example, while wealthier residents may afford to evacuate with a personal vehicle, stay in a hotel, or take time off work, lower-income families often cannot. Research shows that low-income populations are more likely to experience disproportionate physical and mental health impacts following disasters (Lambrou et al., 2023).

In Whatcom County, poverty rates are particularly high in parts of Bellingham, south of Ferndale, and the county's eastern region. From 2022 to 2023, poverty in Bellingham increased by 54%, with 22% of residents now living below the poverty line (Wilkinson, 2024). These residents are more susceptible to heart and lung conditions as air pollution worsens with climate change (EPA, 2025). Additionally, limited financial means often delay critical repairs to homes and infrastructure after floods, wildfires, or storms, prolonging exposure to health hazards and increasing the risk of injury or death (Ohio University, 2024). People living in poverty also tend to experience a higher "disease burden," which further reduces their ability to adapt to a changing climate (Witting, 2023). As these risks converge, climate change exacerbates existing health disparities for low-income communities in the region.

Table 9. Census block groups with high proportions of residents below the poverty line.

Census Block Group Number	Geographic Description	% Below Poverty Line	WA EHD Score
0101032	E. Whatcom County	63.9%	4
0002011	Brennan and Marietta-Alderwood	56.1%	5
0012031	Bellingham - Happy Valley	55.2%	6
0010002	Bellingham – Sehome	50.6%	7
0101021	N. Peaceful Valley	50.3%	2
0005013	Bellingham – York	48.8%	7
0012041	Bellingham – Happy Valley	48.6%	6

Census Block Group Number	Geographic Description	% Below Poverty Line	WA EHD Score
0002013	Neighborhood SW of Bellingham Int. Airport	44.8%	5
0010001	Central Bellingham – Sehome neighborhood near N. Samish Way	44%	7
0012042	Bellingham – N. Happy Valley	39.2%	6
0006001	Bellingham City Center	35.5%	4
0010003	Bellingham – Sehome, N. of Western WA University	35.3%	7
0005012	Bellingham – S. Sunnyland	34.8%	7

Outdoor & Natural Resource Workers

Outdoor workers—such as agricultural and construction workers—can experience higher exposer to climate hazards, such as extreme heat and smoke (Whatcom County Health & Community Services, 2022). With 3 and 5 degrees Fahrenheit of temperature increase, an average worker in Whatcom County may lose an additional 1.1 to 7.0 days of work a year due to extreme heat, respectively. In comparison, outdoor workers may experience an additional 4.1 to 15.9 lost days of work due to extreme heat, respectively (EPA 2021). Expected labor losses can have implications on an individual's wage and financial stability.

Additionally, workers dependent on natural resource industries—such as fisheries, agriculture, forestry, and outdoor recreation are expected to see financial losses in the future as climate change affects resource quality, productivity, and seasons (Chang et al. 2023).

Populations with Health Considerations and Access Needs

PEOPLE WITH DISABILITIES

People with disabilities—which can include limited mobility, impaired vision or hearing, other physical disabilities, or cognitive disabilities—can be more susceptible to some climate hazards. People with hearing or vision impairments may have greater limitations on access to emergency communications from public agencies. People with disabilities may also have a harder time evacuating or responding to extreme events, such as flood events, due to functional and access needs.

People with disabilities often have other intersecting social and economic factors—such as being an older adult or dependent on electric medical equipment—that may compound their risk.

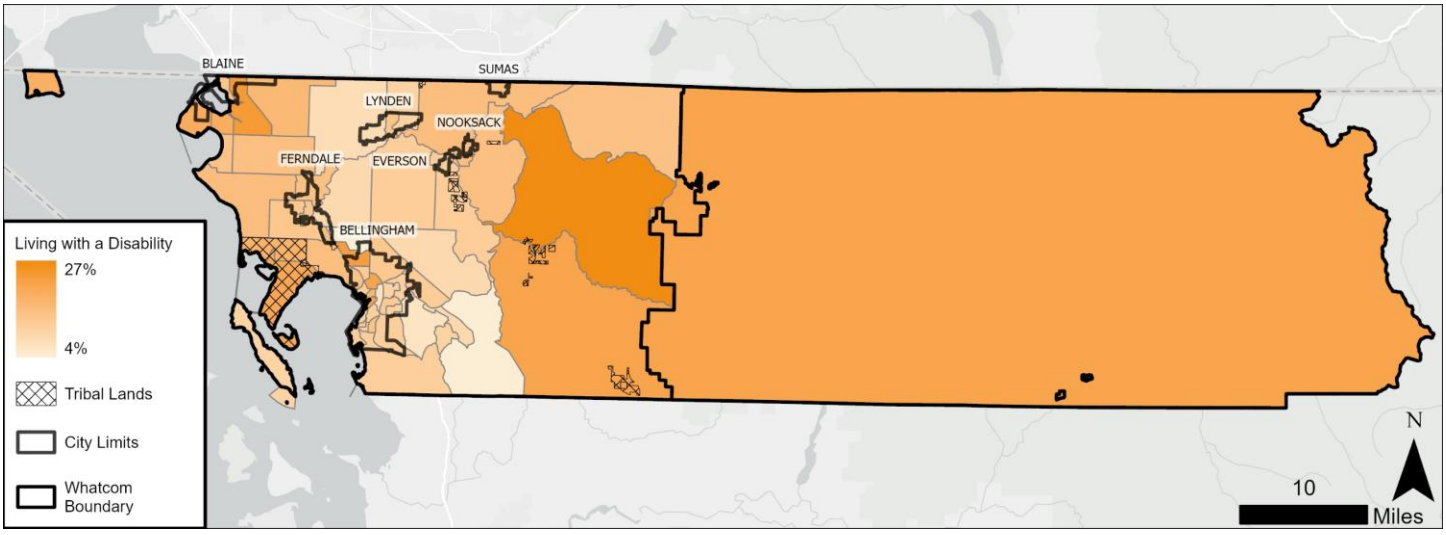

Figure 14. Population of Individuals with One or More Disability

Note: Census data for this variable is available only at the census tract level.

Climate-Related Health Outcomes for People with Disabilities

Some areas in central and eastern Whatcom County have higher proportions of people with a disability in Census data, such as the Kendall-Maple Falls area and Van Zandt. These areas are a greater distance from emergency management services, so there can be longer response times and reduced access to emergency services during extreme events. Additionally, some areas with a higher proportion of disabilities also have low incomes (e.g., block group 0101032 in eastern Whatcom County or block group 000601 in Bellingham's city center) or have higher proportions of other sensitive populations (e.g., block group 9400021 has a high percentage of Native Americans because it is part of the Lummi Nation).

Table 10. People with Disabilities in Whatcom County.

Census Block Group Number	Geographic Description	% with Disability	WA EHD Score
0101011	Kendall, Maple Falls, and Kulshan area	27.4%	4
0101012	Deming, Welcome, and W. Peaceful Valley area	27.4%	4
0104101	E. of Blaine and I-5, Dakota Creek area	24.1%	3
0104102	S. of Blaine, Loomis Trail area	24.1%	3
0002031	Bellingham – E. Cordata/ Meridian	23.5%	5
0002032	Bellingham – W. Cordata	23.5%	5
0006001	Bellingham City Center	21.7%	4
0101031	Corridor around State Route 9 (Van Zandt to Wickersham)	21.7%	4
0101032	Eastern Whatcom County	21.7%	4
0004011	Bellingham – S. Cornwall Park	21.7%	3
0004012	Bellingham – Cornwall Park	21.7%	3
0004013	Bellingham – E. Cornwall Park	21.7%	3
9400021	S. Lummi Reservation, Peninsula	20.9%	5

PEOPLE WITH LIMITED ENGLISH PROFICIENCY

People with limited or no English proficiency in Whatcom County are at greater risk during extreme events when critical warnings, evacuation notices, and recovery resources may not be effectively communicated in multiple languages. Language barriers can delay emergency response and limit access to crucial services, making these communities particularly vulnerable during and after disasters (Ogie et al., 2018).

Figure 15. Map of populations with limited to no English proficiency.

Climate-Related Health Outcomes for Populations with Limited English Proficiency

In Whatcom County, approximately 12.7% of the County speaks a language other than English at home (U.S. Census Bureau, 2023). Approximately half of those households are foreign-born residents, and approximately 15.7% are below the poverty level. Other than English, Spanish is the most common language spoken at home (WA Office of Financial Management, 2024). Additionally, Indo-European (e.g., Russian, Hindi), Asian (e.g., Mandarin Chinese, Korean, Vietnamese), and Pacific languages (e.g., Samoan, Tongan) are also spoken in Whatcom County homes (WA Office of Financial Management, 2024).

Table 11. People with Limited English Proficiency in Whatcom County.

Census Block Group Number	Geographic Description	% Limited English Speaking	WA EHD Score
0002011	Brennan and Marietta	9.9%	5
0002012	Marietta-Alderwood, neighborhood S. of Bellingham Int. Airport	9.9%	5
0002013	Alderwood, neighborhood SE of Bellingham Int. Airport	9.9%	5
0003021	Bellingham – W. Meridian	5.8%	8
0003022	Bellingham – NE Birchwood	5.8%	8
0104061	Birch Bay	5.4%	1
0104062	Birch Bay	5.4%	1
0001021	Northeast Bellingham	4.7%	6
0001022	Bellingham - Irongate	4.7%	6
0001023	Bellingham – King Mountain	4.7%	6

Census Block Group Number	Geographic Description	% Limited English Speaking	WA EHD Score
0004021	Bellingham – City Center	4.0%	3
0004022	Bellingham – Columbia	4.0%	3

Additional Climate and Health Vulnerabilities

Not all types of climate and health associations could be included in the analysis of health vulnerabilities discussed above. Rates of chronic illnesses are sometimes associated with environmental conditions and hazards, such as proximity to industrial sites or poor water quality. Some of these environmental conditions can be worsened due to climate change. For example, prolonged drought is associated with increases in particulate matter, which is correlated with chronic respiratory conditions. Additionally, individuals with other types of chronic health conditions, such as diabetes or COPD, are often more susceptible to acute injuries or death from extreme heat events (Hayden et al. 2023).

There is some emerging empirical evidence on the impacts of climate hazards on pregnant people. Pregnant people can be more susceptible to heat-related injuries, and exposure to wildfire smoke can lead to a variety of adverse health outcomes for babies, including premature births and birth defects (Chang et al. 2023).

Section 3: Whatcom County Climate Hazards and Hotspot Analysis

Introduction

Climate hazard exposure and sensitive populations groups are not evenly distributed across the County. Hotspot analysis is one analytical tool to determine areas that are particularly vulnerable to the impacts of climate change, illustrating where there are clusters of hazard exposure and sensitive populations (Fan et al., 2021; Patz & Kovats, 2002). These types of analyses can help prioritize adaptation efforts in hotspot areas, improve disaster preparedness, and support land use strategies to mitigate risks.

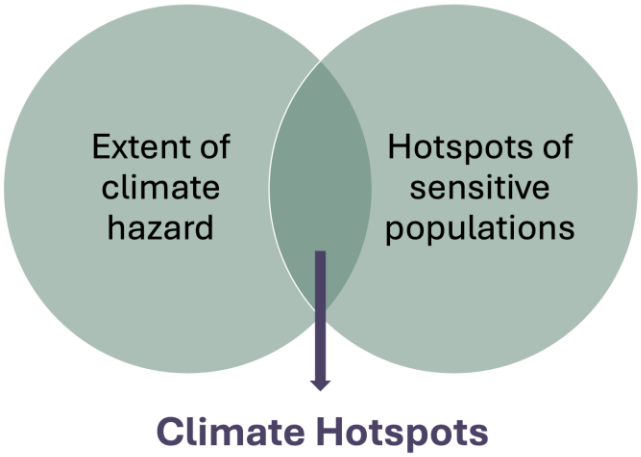

Figure 16. Conceptual diagram of the hotspot analysis.

The goal of this hotspot analysis is to understand the spatial distribution of populations at risk to climate hazards by identifying the overlap of exposure extent of specific hazards with concentrations of sensitive populations.

Methodology

To conduct this hotspot analysis, the methodology required the following: 1) map the extent of specific climate hazards, and 2) identify hotspots of sensitive population groups.

Climate Hazard Identification and Mapping

HAZARD SELECTION

Hazard selection was iteratively assessed based on data availability and the best available science. Some key considerations included spatial resolution of a specific hazard, relevance for resilience planning required by the Washington Department of Commerce Intermediate Climate Planning Guidance, and synergy with other available datasets. In some cases, hazard datasets were sourced from ongoing County efforts to model sea level rise and flooding (described in detail below) or from University of Washington's Climate Impacts Group. This analysis focuses on the following hazards:

- Extreme heat
- Coastal and inland flooding, including sea level rise
- Landslides and alluvial fans
- Wildfires

HAZARD MAPPING

This analysis used different approaches to mapping specific climate hazards. All spatial layers for the different climate hazards are uploaded to Whatcom County's GIS web map. Approaches are summarized in the sections below.

Extreme Heat

Table 12. Dates of land surface temperatures data from USGS.

Date	Maximum Air Temperature
07/27/2022	81 °F
07/28/2022	86 °F
08/15/2023	83 °F
07/08/2024	85 °F
07/09/2024	88 °F
08/16/2024	83 °F

Extreme heat impacts are spatially variable due to a variety of factors, including land use, extent of tree canopy and vegetation, and extent of impervious surfaces. To understand which areas of Whatcom County are most affected by extreme heat, we extracted a Land Surface Temperature (LST) composite from multiple dates representing periods of high temperatures and minimal cloud cover. To model LST, we downloaded U.S. Geological Survey (USGS) Landsat Collection 2 Level 1 data for six different dates (USGS, 2024). These dates were selected to represent a variety of periods across multiple years to ensure data reliability (NOAA, 2024) (Table 12). LST values from these six dates were composited and averaged to create a single layer, which was then aggregated by block group to identify areas most affected by the heat island effect (Figure 17).

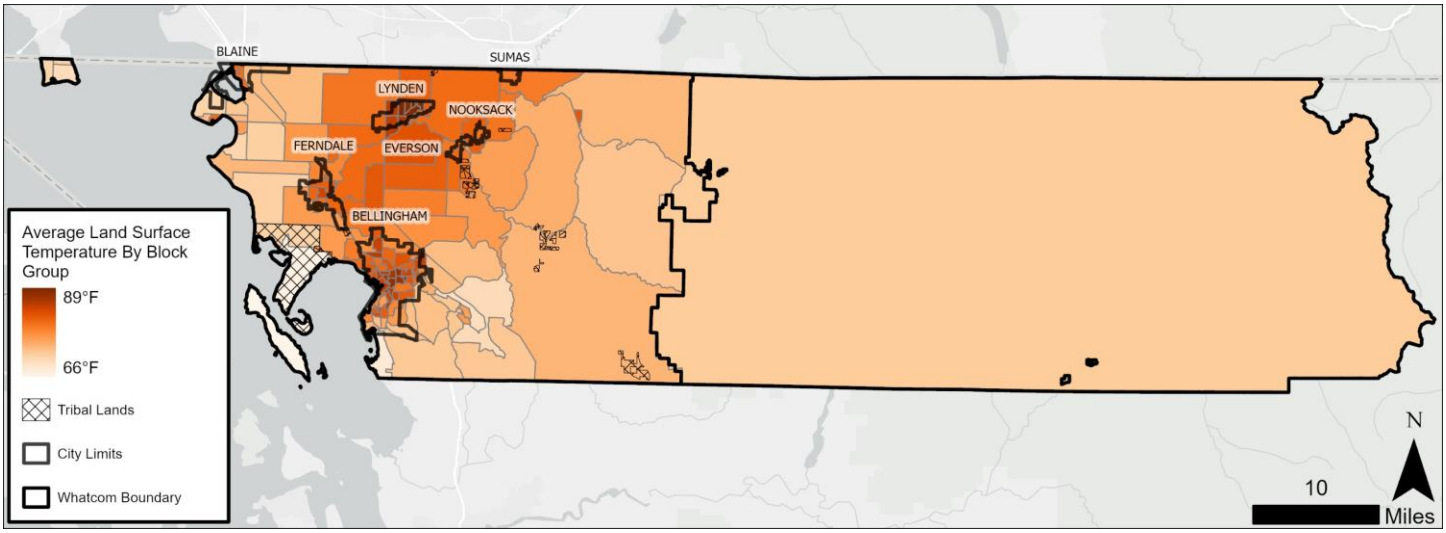

Figure 17. Average land surface temperature from selected summer dates from 2022-2024.

Flooding

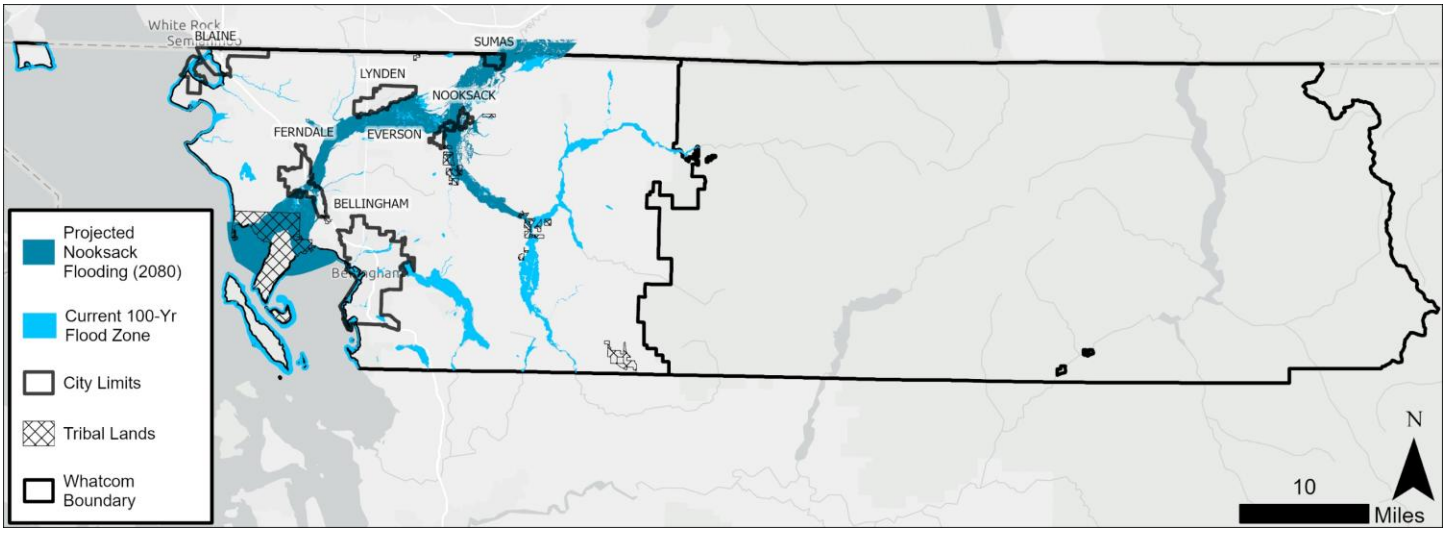

Figure 18. Areas of flood risk across Whatcom County, highlighting the current 100-year floodplain (light blue) and projected future flooding along the Nooksack River by 2080s (dark blue), based on an increase in flood volumes.

To assess future coastal flooding, coastal erosion, and riverine flooding in Whatcom County, this **analysis** drew on multiple sources:

- **Sea Level Rise.** The USGS's Coastal Storm Modeling System (CoSMoS), which incorporated a 3.3-foot increase in sea level by 2070–2120, representing a 10% likelihood scenario under RCP 8.5., which simulates coastal storm surge impacts.
- **Future Flooding of Nooksack.** Using 2022 LiDAR and river bathymetry, a hydraulic model of the Nooksack River by Northwest Hydraulic Consultants represents a 2080s 100-year flood event by modeling a present-day 100-year flood that is 175% larger. This model includes the Everson-Sumas overflow corridor and was produced for the County's Nooksack River Floodplain Integrated Planning

project. [4] The model estimates a 26% chance of major flooding in a 30-year period by the 2080s and up to a 75% increase in flood volume, indicating expanded flood-prone areas under future climate conditions.

- **FEMA Flood Modeling.** The 100-year effective floodplain data was obtained by downloading the latest FEMA layers and importing them into ArcGIS Pro. This provided flood risk info for non-Nooksack inland flooding.
- **Coastal Bluff Erosion.** Bluff erosion by 2100 was modeled by USGS using updated wave and water level data, refined landform characteristics, and a combination of statistical and process-based models to estimate future bluff retreat. The modeling incorporated uncertainty and produced a range of potential future bluff positions under projected sea level rise and erosion conditions.

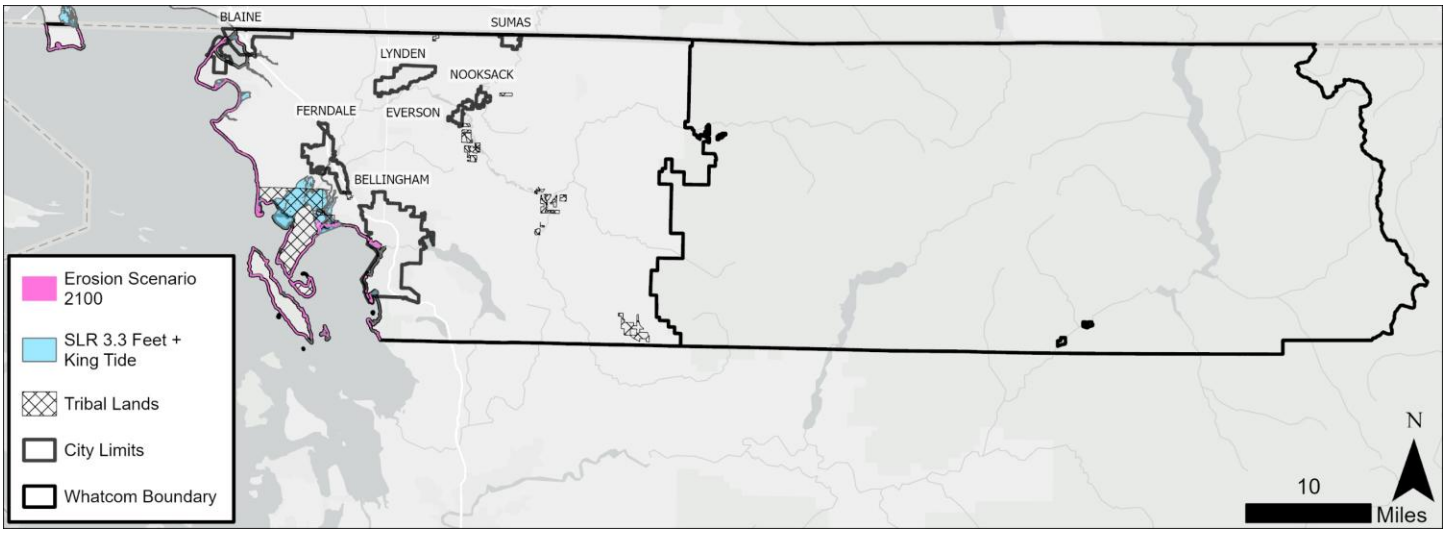

Figure 19. Projected 3.3 feet of SLR + King Tide event (blue) and erosion by 2100 (pink).

Landslides and Alluvial Fans

To represent geological risks driven by climate change, landslide hazard zones were downloaded into ArcGIS Pro from the Washington State Department of Natural Resources' Landslide Hazard Zonation Project (Washington State Department of Natural Resources, 2021). Alluvial fans—fan-shaped deposits of sediment that form where steep mountain streams lose energy and spread out onto flatter valley floors—were also obtained from the Washington State Department of Natural Resources' Landslide Inventory Database (Washington State Department of Natural Resources, 2023). As climate change is projected to increase the intensity of precipitation and the frequency of wildfires, hazards associated with both landslide risk areas and alluvial fans are projected to be more active (Washington State Department of Natural Resources, 2015). Layers were overlaid onto the Whatcom County boundary for spatial analysis (Figure 20).

[4] Link to project web map: Nooksack River Floodplain Integrated Planning

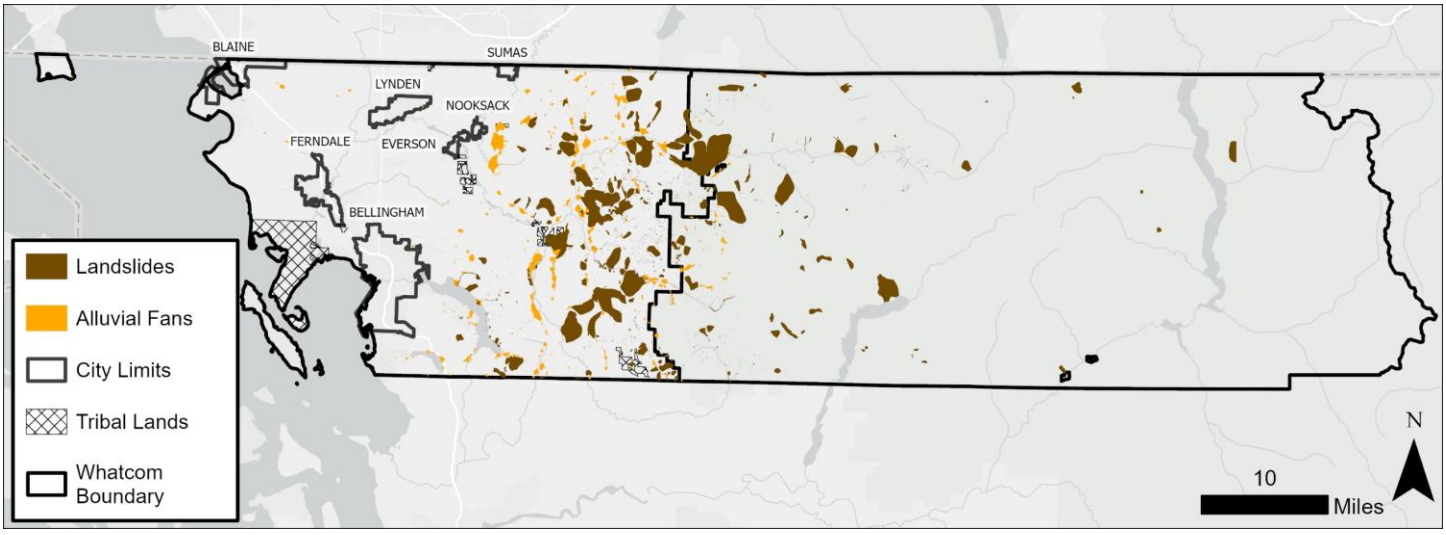

Figure 20. Alluvial fans (orange) and landslide hazard zones (brown) in Whatcom County.

Wildfires and Wildfire Smoke

Wildfire exposure was assessed using Risk Reduction Zones from the U.S. Forest Service's Wildfire Risk to Communities Tool, which categorize areas based on potential impact and mitigation effectiveness. Homes with direct or indirect exposure may be exposed to embers by adjacent vegetation or home to home ignition. These layers were downloaded into ArcGIS Pro and clipped to Whatcom County (Figure 21).

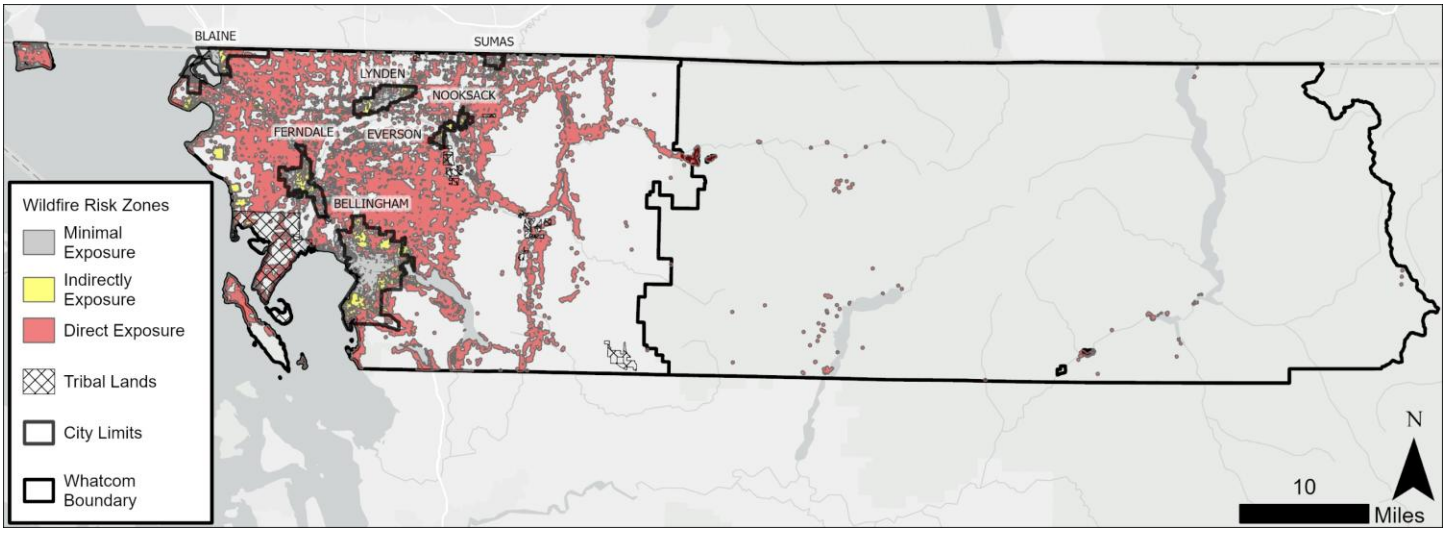

Figure 21. Wildfire risk zones in Whatcom County. Direct exposure is symbolized in red, indirect exposure is yellow, and areas of minimal exposure are depicted in grey.

To analyze wildfire smoke exposure, we used daily PM2.5 concentration data (2006–2023) from Stanford's Environmental Change and Human Outcomes Lab. We filtered the data to include only wildfire smoke days exceeding the EPA threshold (9.0 μg/m^3), for each 10x10km grid and was downloaded into ArcGIS pro. This allowed us to identify which areas of Whatcom County have historically been more prone to experiencing wildfire smoke days (Figure 22).

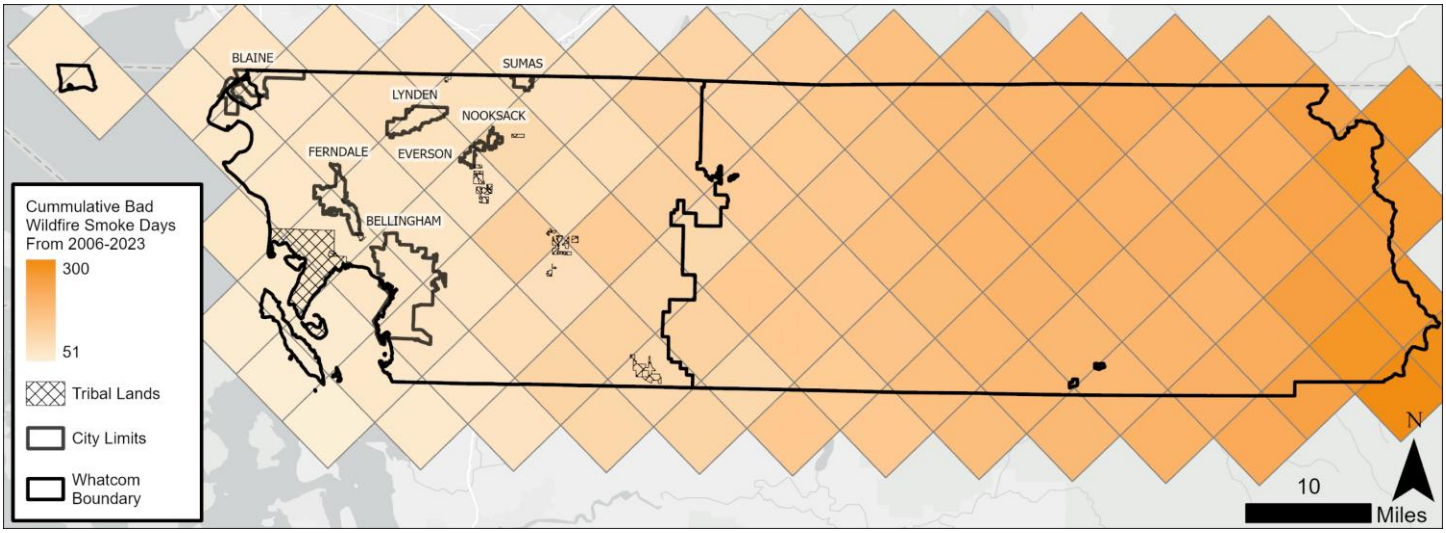

Figure 22. Days from 2006-2023 in which PM2.5 concentration were above the EPA threshold of 9.0 µg/m^3 and were attributable to wildfire smoke.

Hotspots of Sensitive Populations

To better understand where areas of heightened sensitivity occur, a hotspot analysis was conducted to identify communities that may be particularly vulnerable to climate hazards. For this analysis, a sensitivity hotspot was defined as a block group that met both of the following criteria: (1) the block group ranked within the top 10th percentile for any community of color identified in Section 2, and (2) the block group fell within the top 50th percentile for the proportion of residents living below the poverty line. There were 34 block groups that met the thresholds for these criteria and were designated as sensitivity hotspots (Figure 23). The resulting layer would be used to identify where sensitive populations would be most impacted by selected climate change impacts.

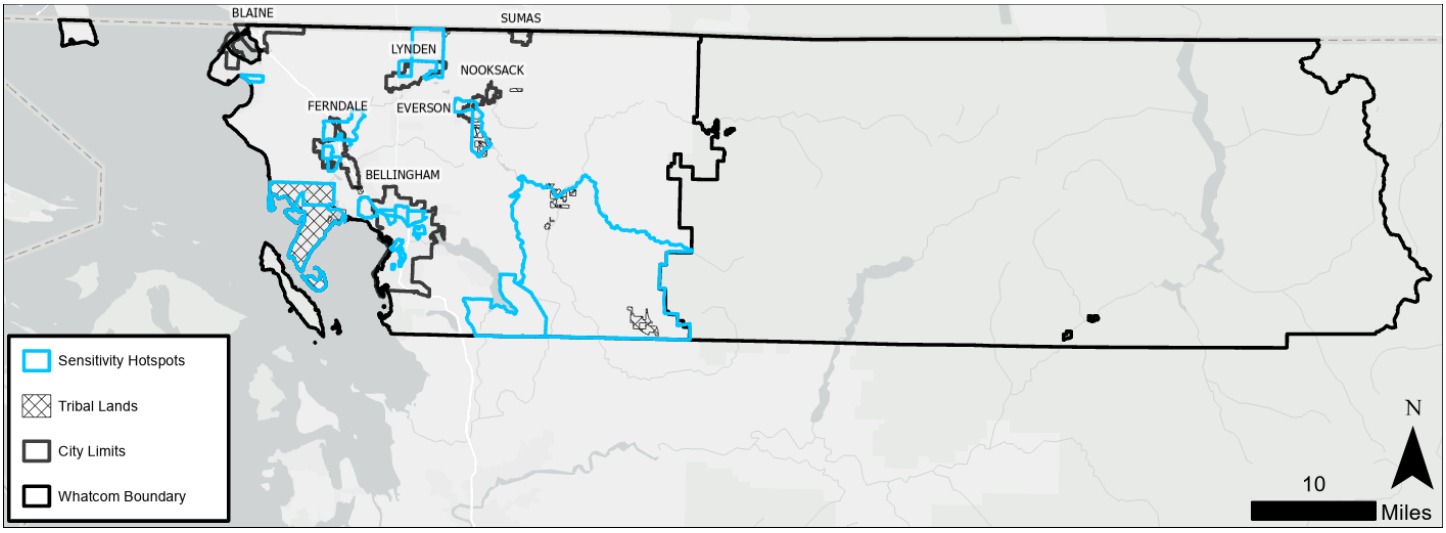

Figure 23. Hotspots of sensitive populations in Whatcom County. Block groups shown in blue meet both of the following criteria: (1) the block groups fall within the top 10th percentile for any population group identified in Section 2, and (2) the block groups are within the top 50th percentile for the proportion of residents living below the poverty line.

Climate Hazard Maps and Hotspot Analysis

Hotspot Analysis: Extreme Heat

The average temperature in Whatcom County has increased by 1.9°F over the last century and is expected to warm at a faster rate into the future (NOAA, 2024). As the climate continues to warm, areas of Whatcom County with pronounced heat island effects will experience greater exposure to extreme heat. The heat island effect is largely driven by the extent of impervious surfaces, such as roads, parking lots, and rooftops, which can absorb and retain heat. These surfaces not only intensify local temperatures but also limit nighttime cooling, increasing overall heat stress for residents.

Block groups with higher average land surface temperatures are concentrated in developed areas such as portions of Bellingham, Ferndale, and Lynden (Figure 24). These areas typically feature limited tree canopy and a high proportion of impervious surfaces.

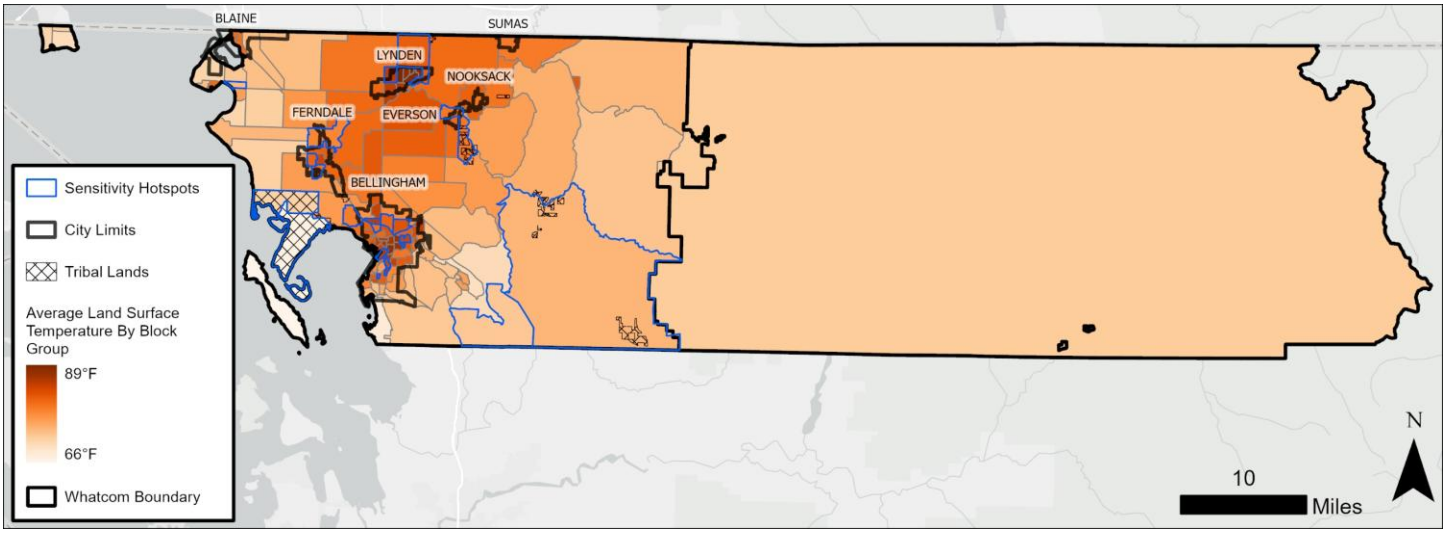

Figure 24. Climate hotspots for extreme heat.

As extreme heat events become more frequent and intense, residents in urbanized zones, especially those from vulnerable populations, face elevated health risks. Research shows that low-income communities and communities of color in urban areas are disproportionately affected by the heat island effect, with formerly redlined neighborhoods experiencing significantly higher summer surface temperatures than non-redlined areas (Hoffman et al., 2020) . In particular, low-income households have a more limited ability to adapt to extreme heat, such as purchasing air conditioning or improving home insulation (Walker, 2024).

The link between heat island areas and sensitive populations is evident in Whatcom County, as several sensitive block groups also exhibit higher average land surface temperatures. This overlap is especially notable in and around Bellingham, where many of the most heat-affected areas coincide with neighborhoods that are home to sensitive populations (Figure 25). Local reporting describes how residents of low-income housing in central Bellingham have experienced and coped with extreme heat events (Showalter, 2024). In the aftermath of a resident's death from apparent heat stroke during the record-breaking heat wave in 2021, portable air conditioning units were distributed to residents in affordable housing complexes (Mittendorf, 2021). But with limited ventilation and without central air conditioning, seniors living in affordable housing have expressed concerns about being left vulnerable to heat-related illnesses in buildings that were not designed for increasingly extreme summer temperatures (Downs et al., 2023; Showalter, 2023).

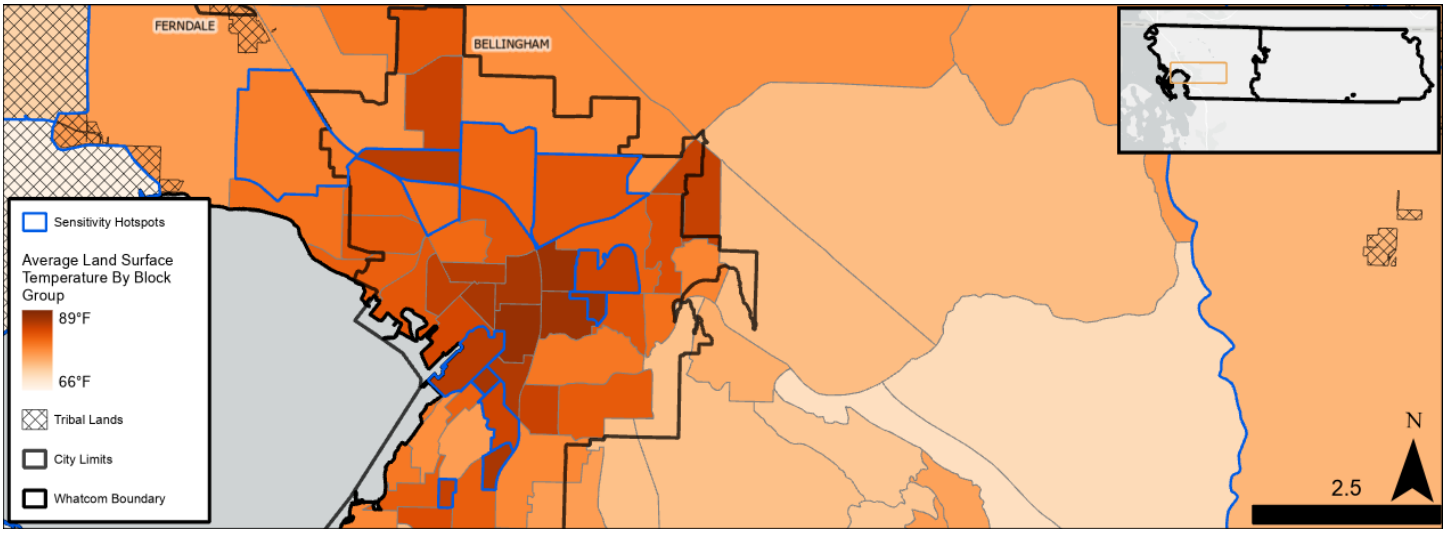

Figure 25. Heat islands and sensitivity hotspots in Bellingham.

Hotspot Analysis: Riverine Flooding

While total precipitation has varied from year to year, within Whatcom County there has been a slight upward trend in annual precipitation since 1895 (NOAA, 2025). This trend is expected to continue, particularly for areas west of the Cascades, where the greatest increases are projected during the winter months (Rogers & Mauger, 2021). In the Puget Sound region, shifting precipitation patterns and more frequent and intense storm events are anticipated to increase the extent and frequency of flooding.

In Whatcom County, areas within the current 100-year floodplain are at heightened risk due to increased precipitation and changes in upland snow retention and melt off, as these locations are already more susceptible to flooding. With heavy rainfall events becoming more common, exposure within these floodplain areas is expected to increase. By 2080, the extent of land area associated with a 100-year flood event in the Nooksack River watershed is projected to increase by 75%, significantly raising flood risk and expanding the extent of inundation throughout the watershed (Rogers & Mauger, 2021).

Riverine flooding in western parts of Whatcom County has been a persistent issue, and the severity of flooding in this region has increased in recent years. Riverine flood risk is projected to intensify in the future (Figure 26). Currently, about 82 square miles of the County lie within the 100-year floodplain, and by 2080 the floodplain will extend to about 102 square miles due to projected increases in flooding along the Nooksack River and coastal areas. These future flood risk areas are particularly concentrated around Ferndale, Lynden, Everson, Sumas, Nooksack, as well as other unincorporated communities such as Deming and Acme. Flood risk areas also include portions of Nooksack Indian Tribal reservation lands and the Lummi Nation.

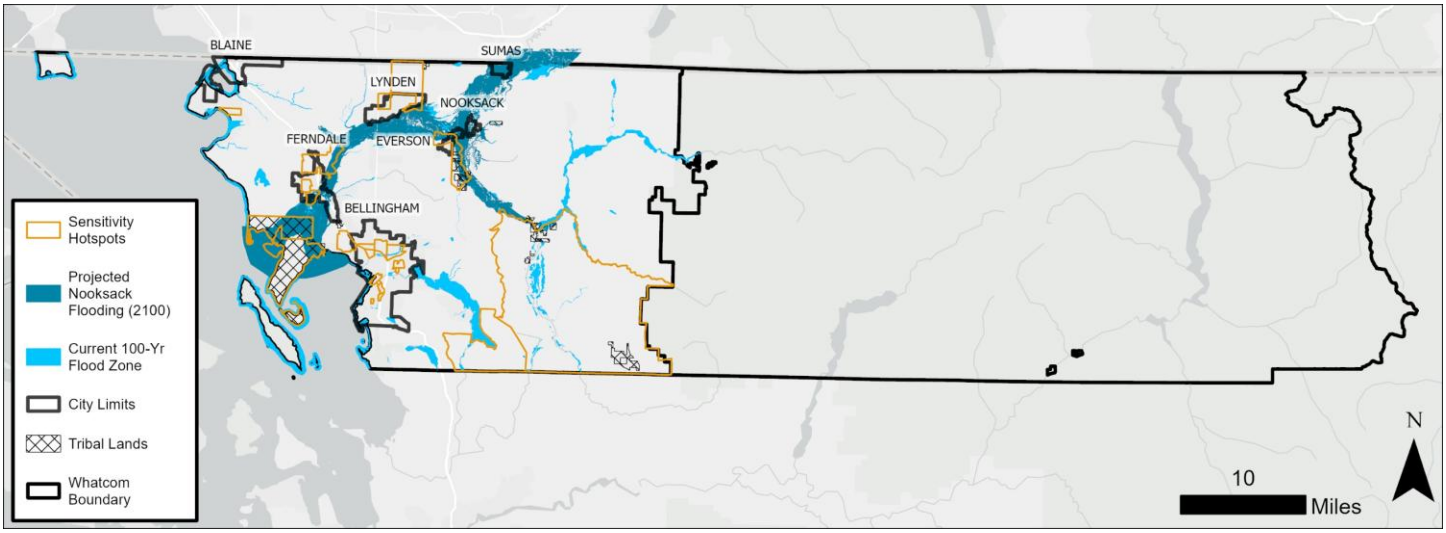

Figure 26. Riverine flooding hotspots in Whatcom County.

Projected flooding risks overlap with many hotspots flagged for their higher proportions of sensitive populations. Current and future flood risk along the Nooksack River floodplain threatens human health and property, especially for communities of color and low-income populations. Specifically, areas around Bellingham, Ferndale, Nooksack, Everson, Sumas, and Lummi Nation have higher rates of sensitive population groups and are exposed

to current and forecasted future flooding risks (

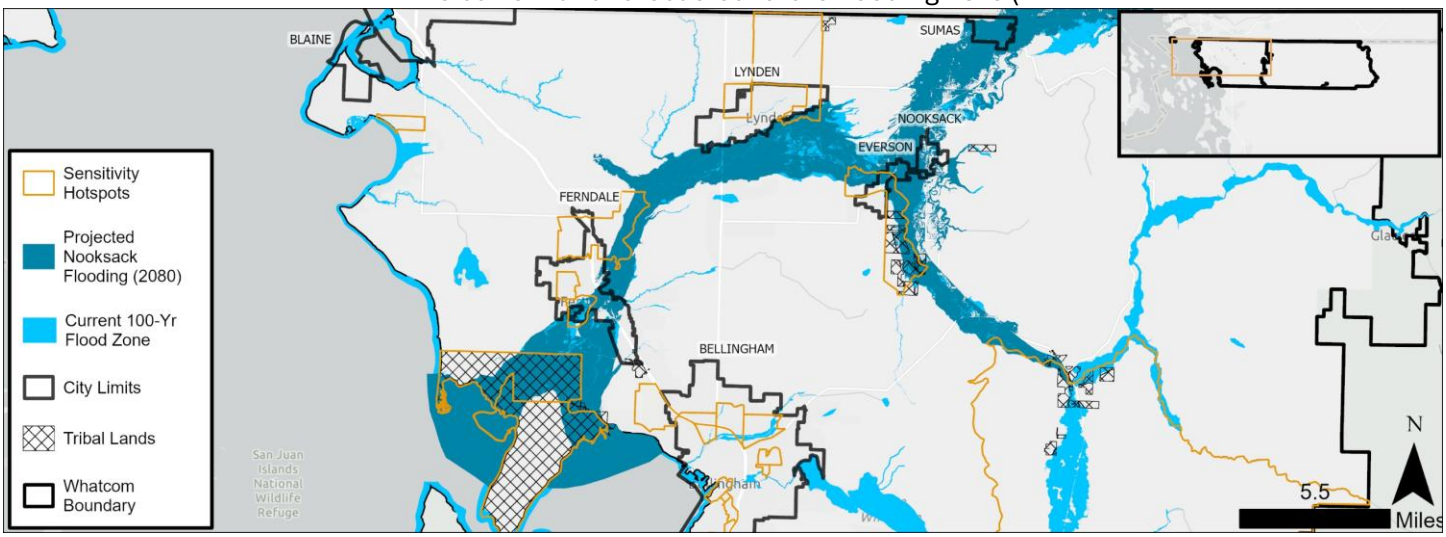

Figure 27).

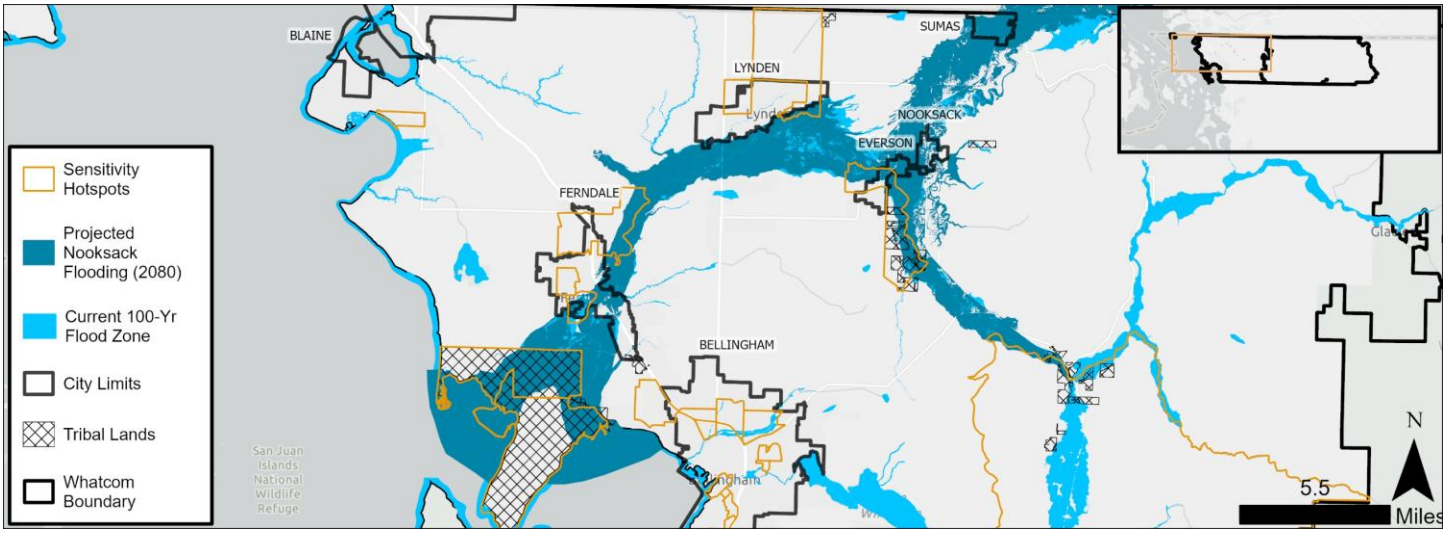

Figure 27. Flooding hotspots in northwestern Whatcom County in/nearby Lummi Nation, Lynden, Everson, Nooksack, Ferndale, and Nooksack Tribal Lands.

For example, around Lummi Nation, when critical transportation infrastructure leading to and from the reservation (i.e., Marine Drive, Slater Road, Kwina Road, Ferndale Road, and Haxton Way [State Route 548]) has been blocked and/or damaged by riverine flooding, it has severed access to vital medical services, medications, and emergency responders, including any Lummi Tribal Health Center staff who commute to work on the reservation (Washington State Department of Health, n.d.; Lummi Indian Business Council, 2021; King 5 Staff, 2021). When the roads leading to Lummi Tribal Health Center are inundated, any of the 5,000 predominantly Native American patients of Lummi Tribal Health Center across Whatcom County who do not live in Lummi Nation lose access to the clinic's free or significantly reduced-cost health care services. This transportation infrastructure is projected to increasingly be severely impacted in the future by climate-exacerbated flooding from both coastal events and increasingly intense rainstorms (Fletcher, 2025).

Riverine flooding also impacts low-income households and communities of color across the Nooksack floodplain because these communities may struggle to access flood recovery resources. This was the case with several Hispanic families impacted by severe flooding in Ferndale in 2021 (Caldwell, 2022).

Hotspot Analysis: Sea Level Rise, Coastal Flooding, and Erosion

While average sea levels have remained relatively constant in Whatcom County, increasing concentrations of greenhouse gas emissions are expected to drive significant sea level rise, leading to increased inundation and accelerated bluff erosion along Whatcom County's coastline. Under the 10% likelihood scenario (RCP 8.5), sea levels are projected to rise by 3.3 feet by the end of the century (Lavin, et al., 2020). The gravitational pull of the moon combined with low pressure storm systems can lead to extremely high tides, known as King Tides, which contribute to extreme water levels and inundation. King Tide events have led to extreme flooding and increased rates of erosion along Whatcom County's shorelines (Whatcom County, 2024). Areas in Whatcom County where projected sea level rise and coastal erosion scenarios intersect with socially sensitive populations, exist throughout the coastline (Figure 28).

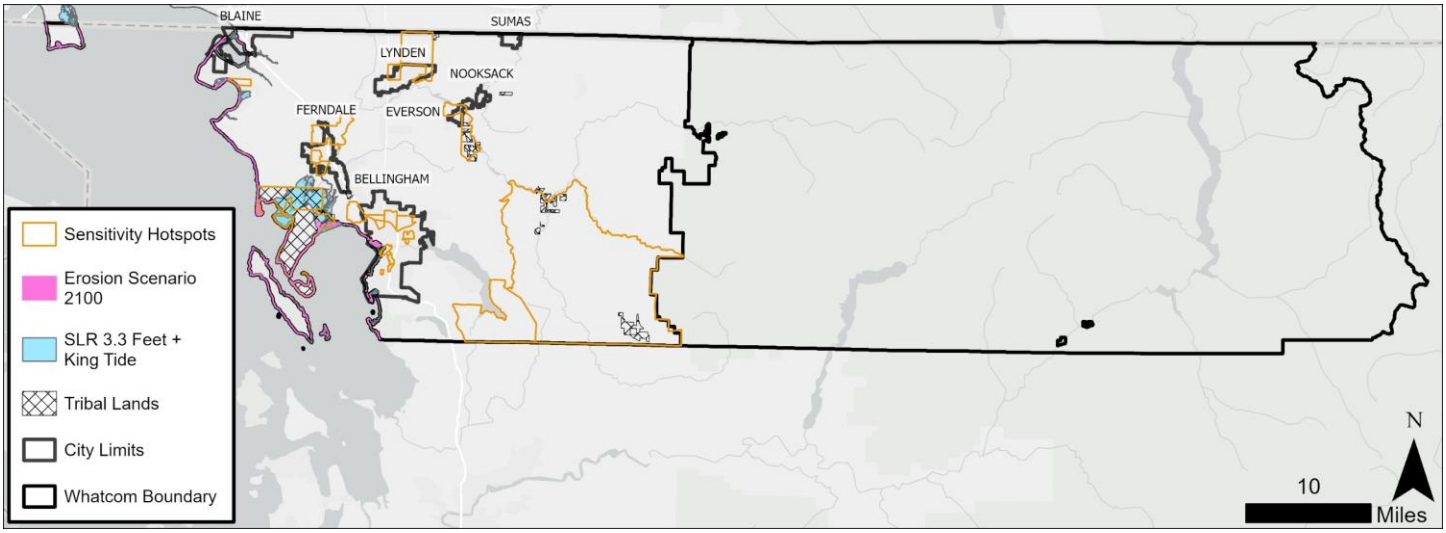

Figure 28. Coastal flooding, sea level rise, and erosion hotspots in Whatcom County.

Sensitive population areas overlapping with erosion and sea level rise hazard zones include parts of Bellingham and Birch Bay. The highest concentration of severe coastal flood risk occurs in a sensitive population block group located within the Lummi Nation. Communities with higher social vulnerability not only face greater exposure to sea level rise but are also significantly more likely to be deserted rather than protected as coastal risks increases (Martinich et al., 2013). Additionally, studies indicate that under a 50 centimeter global sea level rise scenario, American Indian and Alaska Native populations are up to 48% more likely to live in areas projected to be inundated, underscoring the compounding effects of climate and social inequities (EPA, 2021).

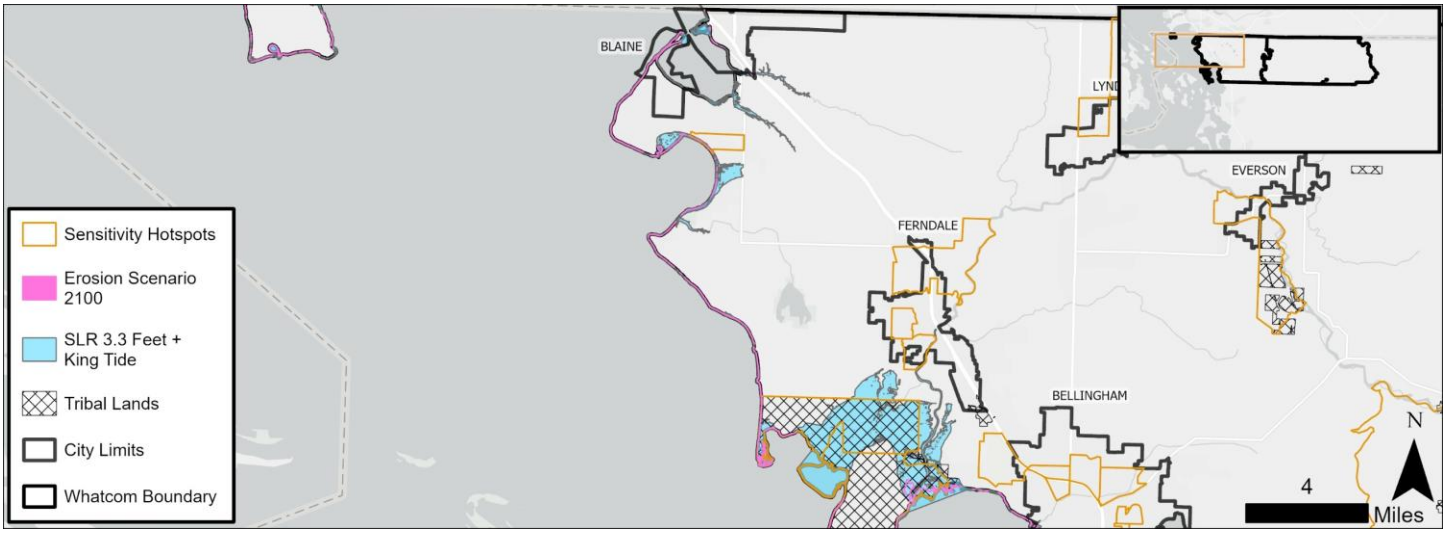

Figure 29. Coastal flooding, sea level rise, and erosion hotspots in northwestern Whatcom County.

Hotspot Analysis: Landslides and Alluvial Fans

Washington State experiences hundreds to thousands of landslides each year, making it one of the most landslide-prone states in the country (Washington State Department of Natural Resources, 2015). Whatcom County ranks in the 96th percentile for landslide risk compared to counties nationwide, highlighting the region's heightened vulnerability to this hazard. Across the Puget Sound region, incidences of landslides and sediment transport rates are expected to increase due to more frequent and intense heavy rain events, a higher frequency of wildfires, and decreasing snowpack. Additionally, these changes are likely to impact alluvial fans, as these systems may experience accelerated sediment delivery, and an increased likelihood of debris flows and flooding. As a result, these dynamic landforms may become more unstable and hazardous to nearby infrastructure and communities (Department of Ecology State of Washington, 2019).

Geological hazards, such as landslide-prone zones and alluvial fans, are primarily concentrated in the rural areas of Whatcom County. As population growth continues and climate change intensifies the frequency and severity of these hazards, due to more frequent and intense precipitation events, more areas may become vulnerable, extending hazard exposure beyond what is currently mapped. This could cause more frequent road closures, property damage, and loss of life (Figure 30).

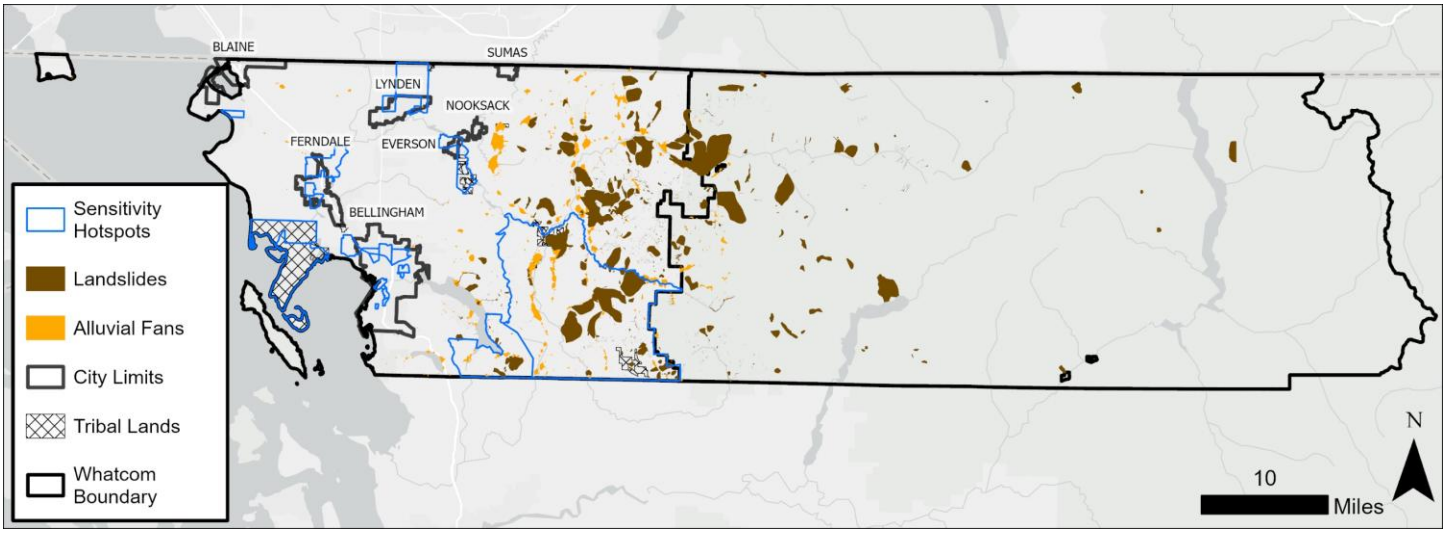

Figure 30. Climate hotspots for landslides and alluvial fans in Whatcom County.

Notably, there is a convergence of sensitive populations and geologic hazard zones in the large block groups east and south of Lake Whatcom and especially along the steep western slopes of the South Fork Valley. People living in poverty are more likely to live in housing that is of lower quality construction and is more susceptible to damage from hazards such as landslides and debris flows (SAMHSA, 2017).

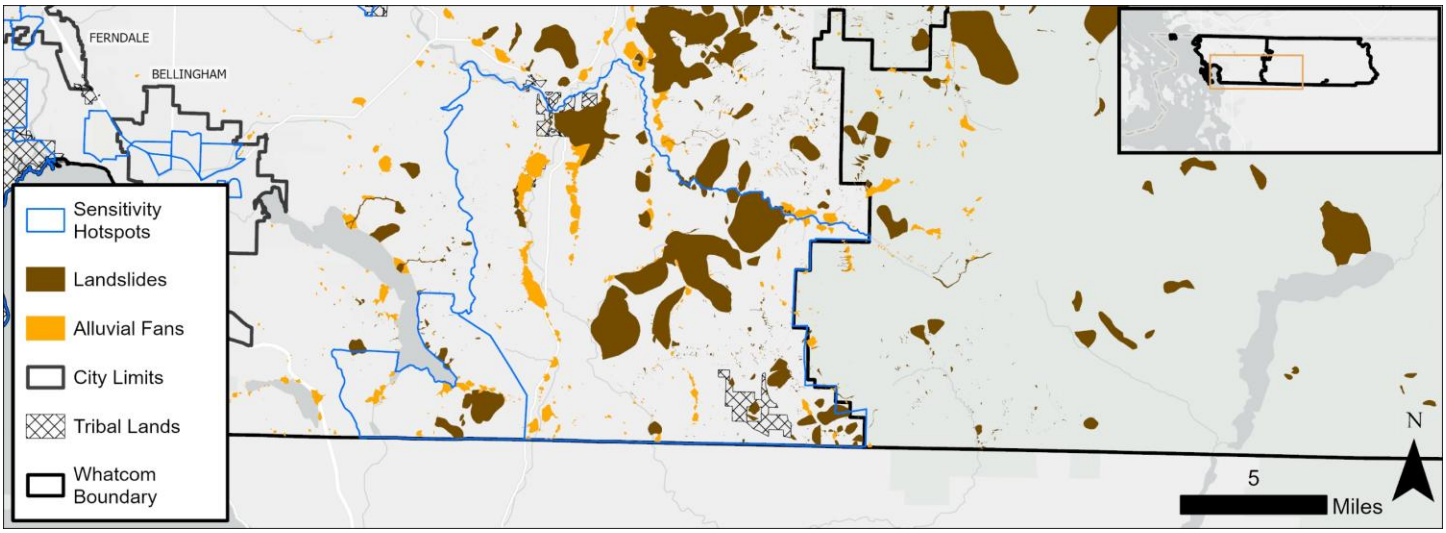

Figure 31. Climate hotspots for landslides and alluvial fans in south-central Whatcom County.

Hotspot Analysis: Wildfire and Wildfire Smoke

Historically, the wildfire regime west of the Cascades has been characterized by less frequent but more intense wildfire activity (Fales & Donato, 2024). However, in recent decades, hotter and drier conditions have increased the likelihood of wildfires, with the number of large wildfires in the region doubling between 1984 and 2015 (Washington State Department of Ecology, 2019). Climate change is expected to further intensify wildfire risk by altering natural conditions such as temperature, humidity, soil moisture, and vegetation (Wuebbles, et al., 2017). As residential development continues to expand into the WUI, wildfire risk to people and property grows (Chang et al. 2023).

In addition to physical fire risk, wildfire smoke exposure is expected to increase. Recent years have increased smoke exposure from wildfires in Eastern Washington, Idaho, Montana, and British Columbia into Whatcom County, impacting local air quality and public health (Whatcom County Health and Community Service, 2024).

The areas surrounding Bellingham, Ferndale, Lynden, Everson, as well as Lummi Nation, contain sensitive population areas that overlap with the direct wildfire exposure zones.

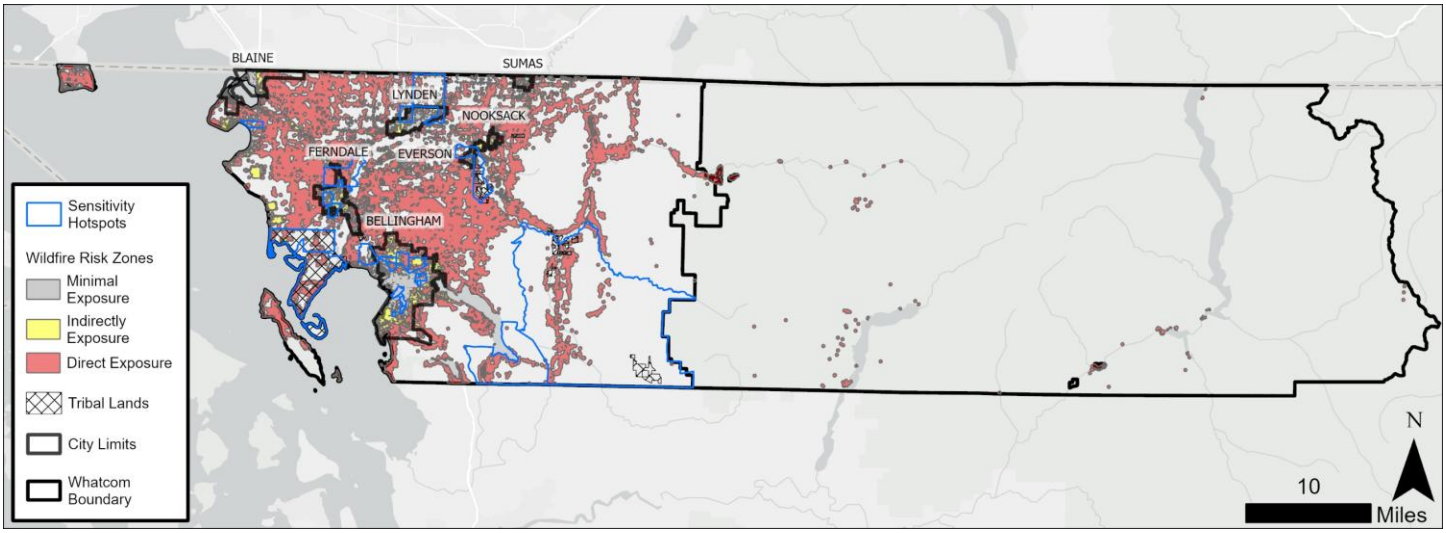

Figure 32. Wildfire risk hotspots in Whatcom County. Areas are categorized by wildfire risk (minimal, indirect, or direct exposure) and overlaid with sensitivity hotspots.

Studies have indicated that both people of color and individuals experiencing poverty are more likely to be negatively impacted by living in the WUI, as they often have less capacity to influence development patterns compared to wealthier residents (Jenerette et al., 2022). While white residents make up the majority of people living in wildfire risk areas, Black, Hispanic, and Indigenous populations may experience 50% greater vulnerability to wildfires as they face limited access to resources needed for fire safety investments, insurance coverage, and rebuilding after disasters (Davies et al., 2018).

Although the eastern part of Whatcom County tends to experience more days with hazardous wildfire smoke, sensitive populations in western parts of the County are still susceptible to the health effects of wildfire smoke exposure (Figure 33).

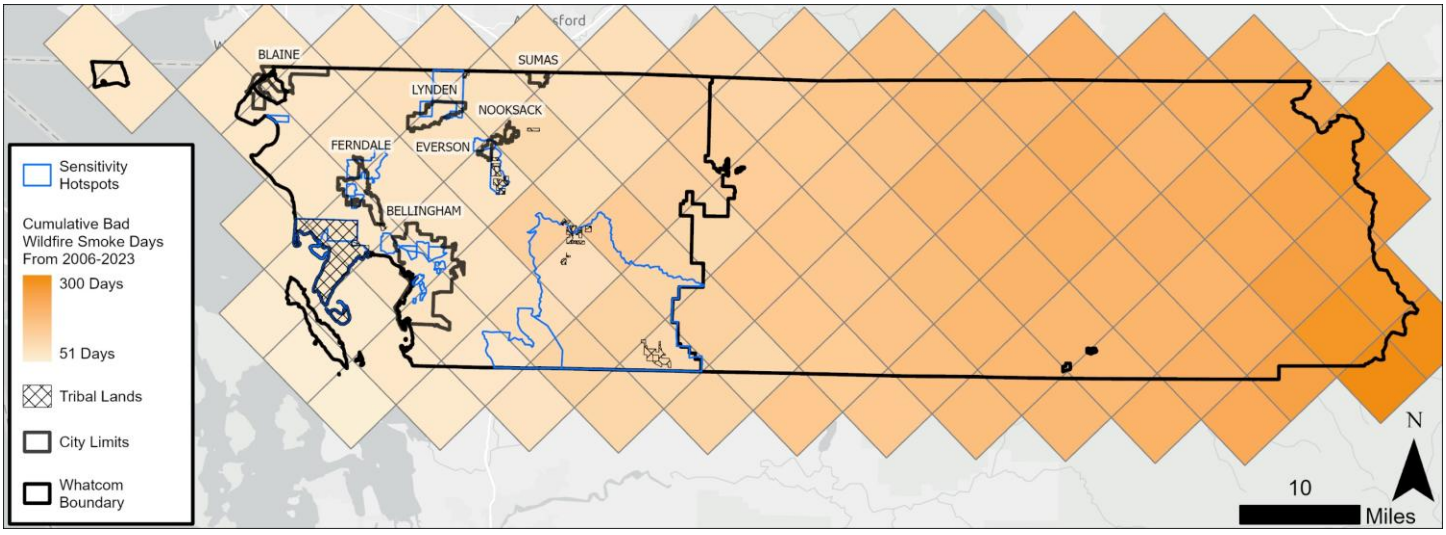

Figure 33. Number of bad wildfire smoke days, where PM2.5 concentrations are attributable to wildfire smoke and above 9.0 µg/m^3 from 2006 to 2023, shown alongside areas with more sensitive populations.

Research shows that people of color and those living below the poverty line are strongly associated with heightened vulnerability to poor air quality, as these populations are more likely to have pre-existing health conditions exacerbated by wildfire smoke, have limited access to transportation, or face language barriers that complicate emergency response and communication (Headwaters Economics, 2021).

Hotspots of sensitive populations that intersect with areas of both direct and indirect wildfire exposure are concentrated in the outskirts of Bellingham, Ferndale, and Everson, as well as within Lummi Nation boundaries (Figure 34).

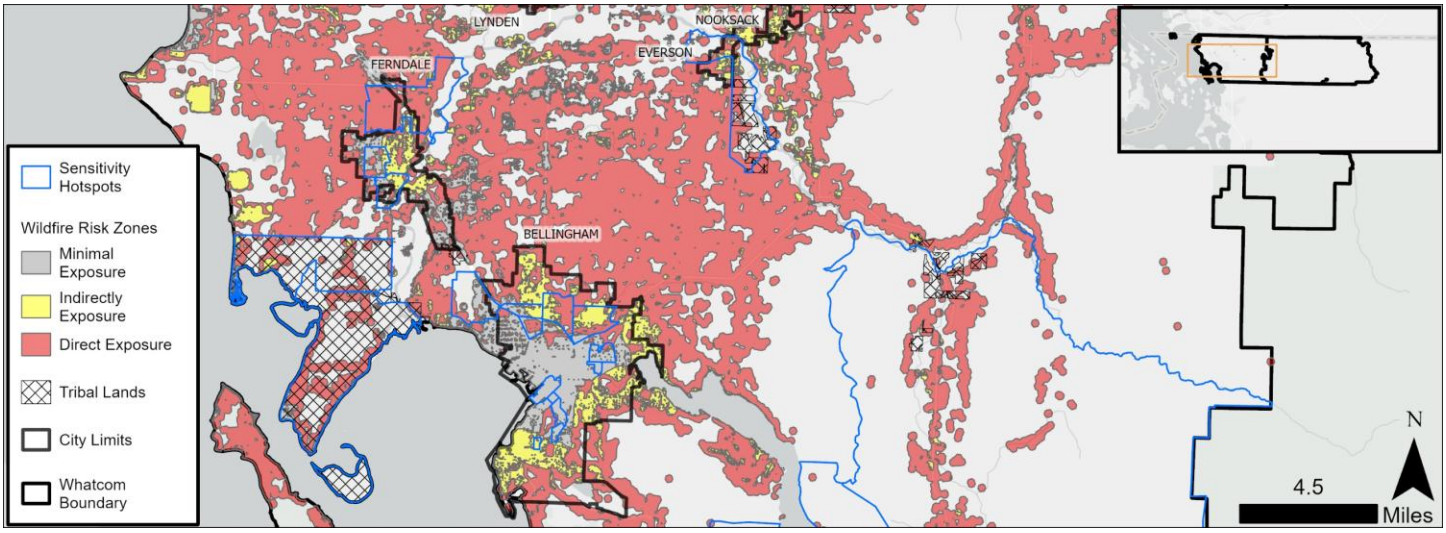

Figure 34. Wildfire risk hotspots around Bellingham, Ferndale, Everson, and Lummi Nation.

While wildfire smoke days are historically more common in eastern Whatcom County, areas around Acme, Blue Canyon, and Doran are particularly vulnerable to both elevated smoke exposure and higher concentrations of sensitive populations (Figure 35).

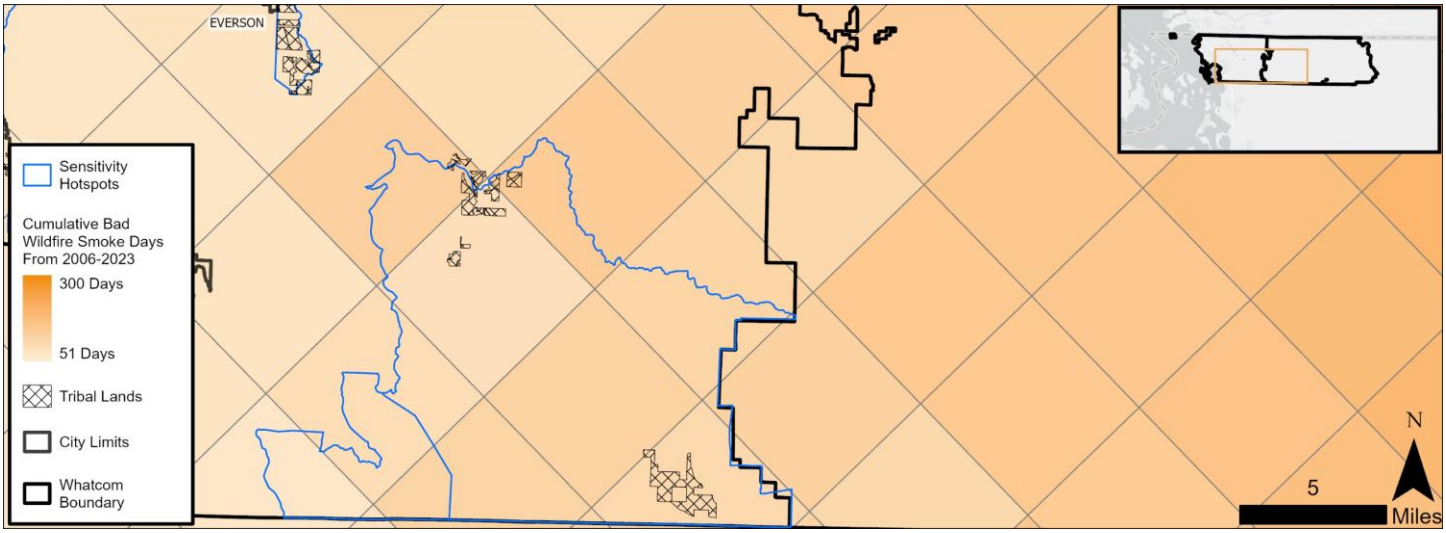

Figure 35. Historic wildfire smoke days and hotspots of sensitive populations in and around Acme, Blue Canyon, and Doran.

Section 4: Parcel Analysis

A parcel analysis is included as part of the climate hazards and impacts analysis to evaluate the spatial distribution of climate hazards in Whatcom County. The purpose of this analysis is to overlay tax parcels with climate hazards to inform current and future local and regional planning efforts. This analysis provides a framework to assess risk exposure due to climate change which could be used to identify vulnerable and areas at risk to focus specific planning and zoning actions to ensure resilient communities.

Methodology

Tax assessor parcels were used as the base unit of analysis, serving as a fine-scale approximation for identifying potentially suitable or unsuitable urban growth areas. These parcels were sourced from the Whatcom County Assessor Tax Parcel Maps, imported into ArcGIS Pro, and overlaid with hazard layers representing physical risks.

The following hazard categories were included in the analysis:

- Bluff erosion
- Landslides
- Sea level rise
- Flooding
- Alluvial fans

A parcel was designated as high risk if it intersected any of the hazard layers described in Section 3 of this report. For example, parcels that intersected the 3.3 feet sea level rise plus King tide scenario were selected and then classified as being exposed to coastal flooding (Figure 36).

All parcel analysis maps are included as part of the County's ArcGIS web portal.

Wildfires and Parcel Analysis

Whatcom County initially wanted to conduct a parcel analysis for wildfire risks. However, the technical team ultimately decided not to include wildfire risk as part of this parcel analysis for several reasons. First and foremost, many wildfire risk maps were not at a fine enough scale to present analytical outputs. Existing wildfire risk maps also presented challenges to delineate existing risk versus projected future risk due to climate change. The project team connected with several research groups that produced wildfire risk maps, and these groups affirmed that while wildfire risk maps can generally be used to inform planning efforts, existing maps are not designed to be used at the parcel-level scale.

Secondly, examples of other parcel-level risk analysis for wildfires (see Meldrum et al. 2022) note that parcel-level risk varies from parcel to parcel based on a variety of factors, including soil and vegetation factors, susceptibility of structures (e.g., use of defensible space), and firefighting capacity and access.

While the County did not conduct a parcel-level risk analysis for wildfire hazards in this project, the County may pursue this in future planning efforts.

Figure 36. Coastal flood risk parcel identification process. This figure illustrates the process of identifying and selecting parcels at risk under the 3.3 feet sea level rise plus king tide scenario. Step 1 (left): Projected coastal flood extent (blue) are overlaid with tax parcels. Step 2 (middle): Parcels intersecting the flood extent are highlighted. Step 3 (right): The highlighted parcels are selected and classified as being at risk of coastal flooding.

Parcels that intersected designated landslide risk areas were identified and categorized accordingly, using the same methodology (Figure 37). All other hazards followed this process as well.

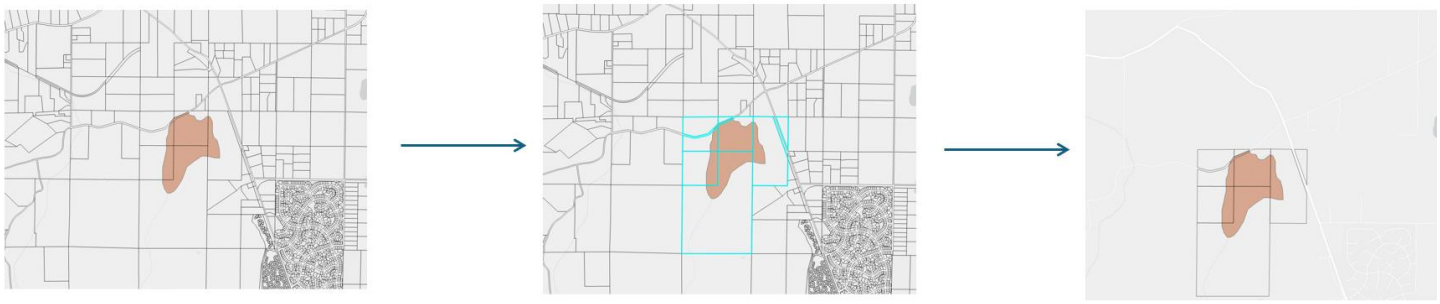

Figure 37. Landslide hazard parcel identification process. This figure depicts the process of identifying parcels at risk of landslides. Step 1 (left): Mapped landslide hazard zones (brown) are overlaid on to parcels. Step 2 (middle): Parcels that intersect hazard zones are highlighted. Step 3 (right): The highlighted parcels are classified as being at-risk of landslides.

Parcel Analysis Results

Out of 110,373 total tax parcels in Whatcom County, 28,553 parcels (approximately 25.9% of all parcels) intersect at least one hazard, and some of these parcels intersect multiple hazards (Table 13 and Table 14) Of the 28,553 hazard-exposed parcels, 18,987 are only exposed to a single hazard, 6,460 are exposed to two hazards, 3,081 are exposed to three hazards, and 25 parcels are exposed to four hazards. No parcel intersects with all five mapped hazards. Parcels located in unincorporated Whatcom County have a higher tendency to intersect with multiple hazards. Flooding hazards intersect approximately 82.4% of all hazard-exposed parcels.

Table 13. Number of parcels that intersect each hazard layers.

Hazard	Total tax parcels intersected	# of tax parcels in Unincorporated Whatcom County	# of tax parcels by UGA cities
Alluvial Fans	4,290	4,248	42
Erosion	2,883	2,747	136
Flooding	23,521	16,656	6,865
Landslide	3,029	3,029	0
Sea Level Rise	7,347	6,634	713

Table 14. Count of parcels categorized by how many hazards they intersect with.

Number of Hazards	Total Number of tax parcels intersected	# of tax parcels in unincorporated Whatcom County	# of tax parcels by UGA cities
5 hazards	0	0	0
4 hazards	25	25	0
3 hazards	3,081	2,972	109
2 hazards	6,460	5,872	588
1 hazard	18,987	12,734	6,253
No hazards	81,820	38,364	43,456

The spatial distribution of the parcel risk analysis results indicate that parcels located in certain areas are exposed to multiple hazards (Parcels located along the coastline of the County are more likely to face elevated risks from both sea level rise and coastal erosion, while those in the eastern region are more commonly exposed to both landslide-prone areas and alluvial fans. Furthermore, flooding and sea level rise are more often co-located in flat, low-lying areas, whereas landslide and alluvial fan hazards typically occur in steeper terrain, resulting in limited geographic overlap between these pairs of hazards.

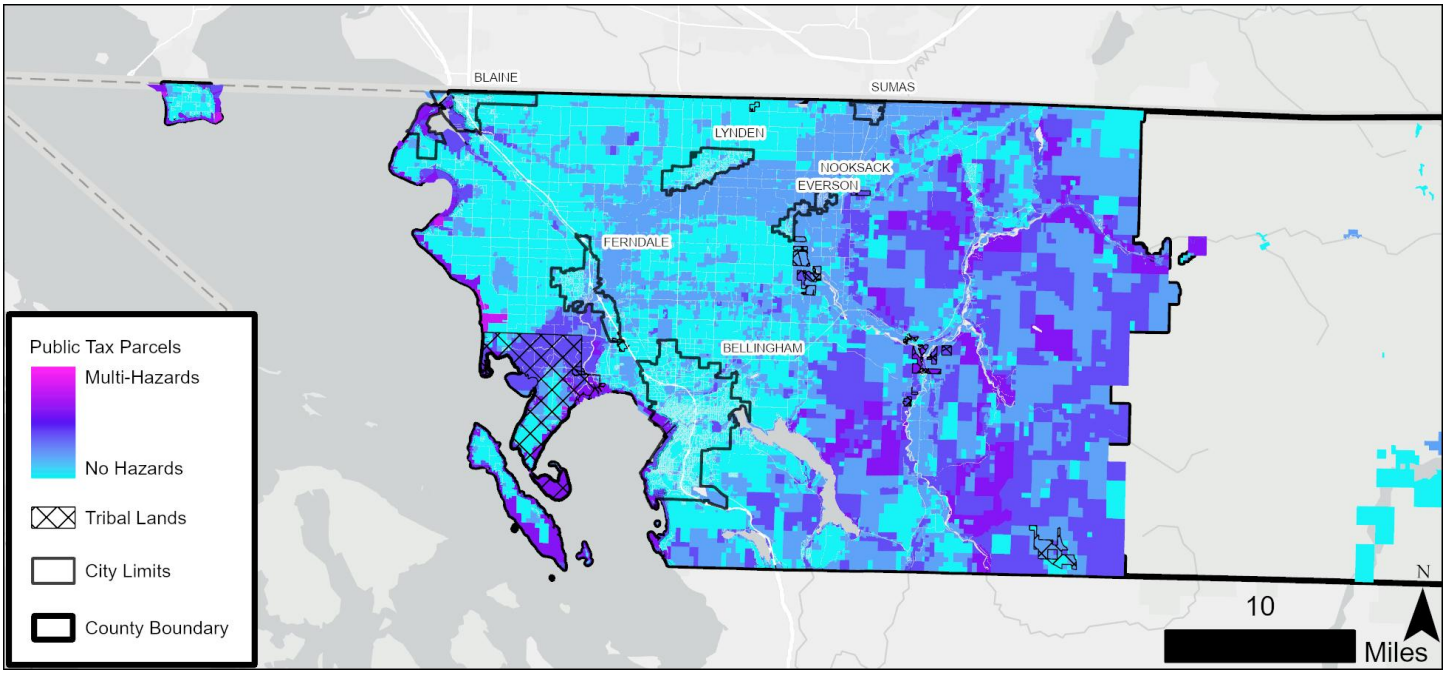

Figure 38. Multi-hazard to no-hazard tax parcels in Whatcom. Parcels highlighted in pink and purple intersect multiple hazard layers, such as flooding, erosion, landslides, alluvial fans, or sea level rise, and are considered multi-hazard risk areas for future development. Parcels shown in blue have little to no hazard overlap and represent areas with lower hazard exposure.

There are several areas around the County where there is a concentration of parcels that intersect two (Figure 39) or three hazards (Figure 40).

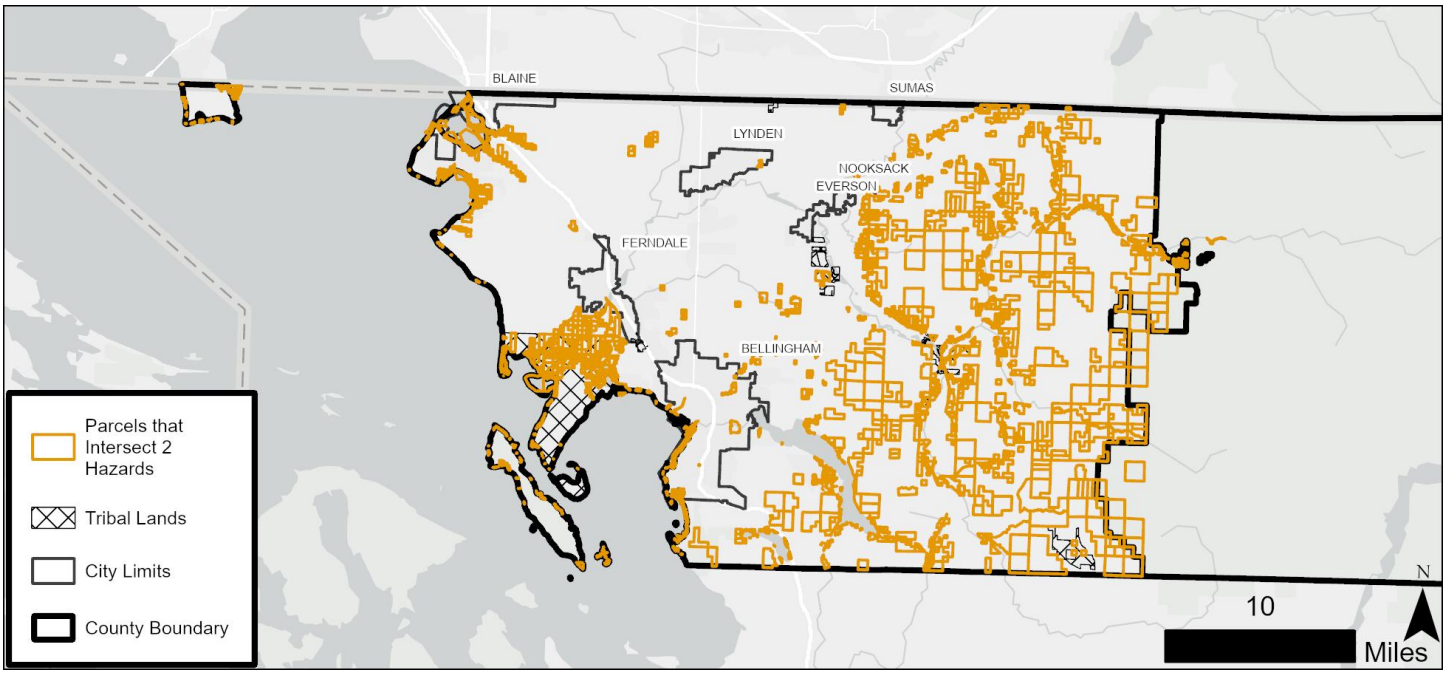

Figure 39: Parcels that intersect two different climate hazards.

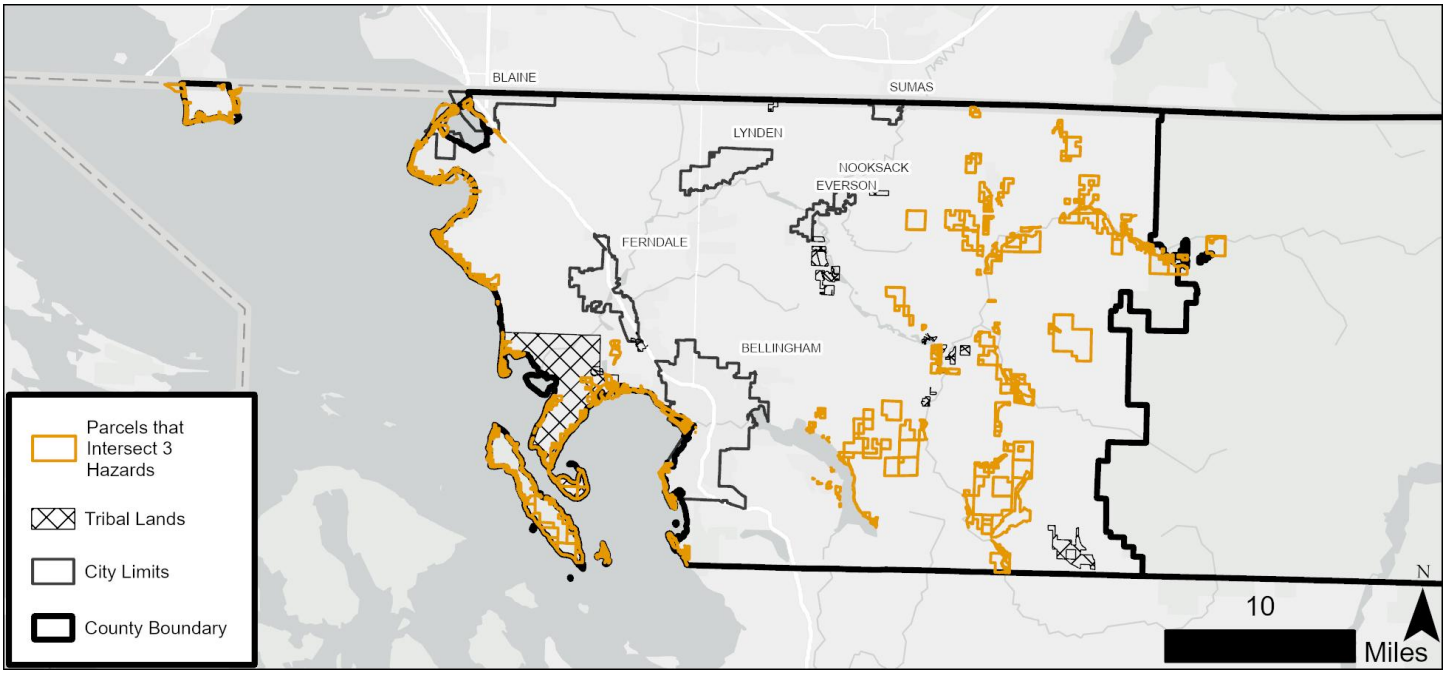

Figure 40: Parcels that intersect three different climate hazards.

Additionally, there are several coastal locations where parcels are simultaneously exposed to four hazards, including coastal and inland flooding, erosion, and small landslide or alluvial fan risk zones (Figure 41). The 25 parcels that intersect at least four different hazards are located along the coast, with clusters near Birch Bay, the Lummi Peninsula, and Point Roberts.

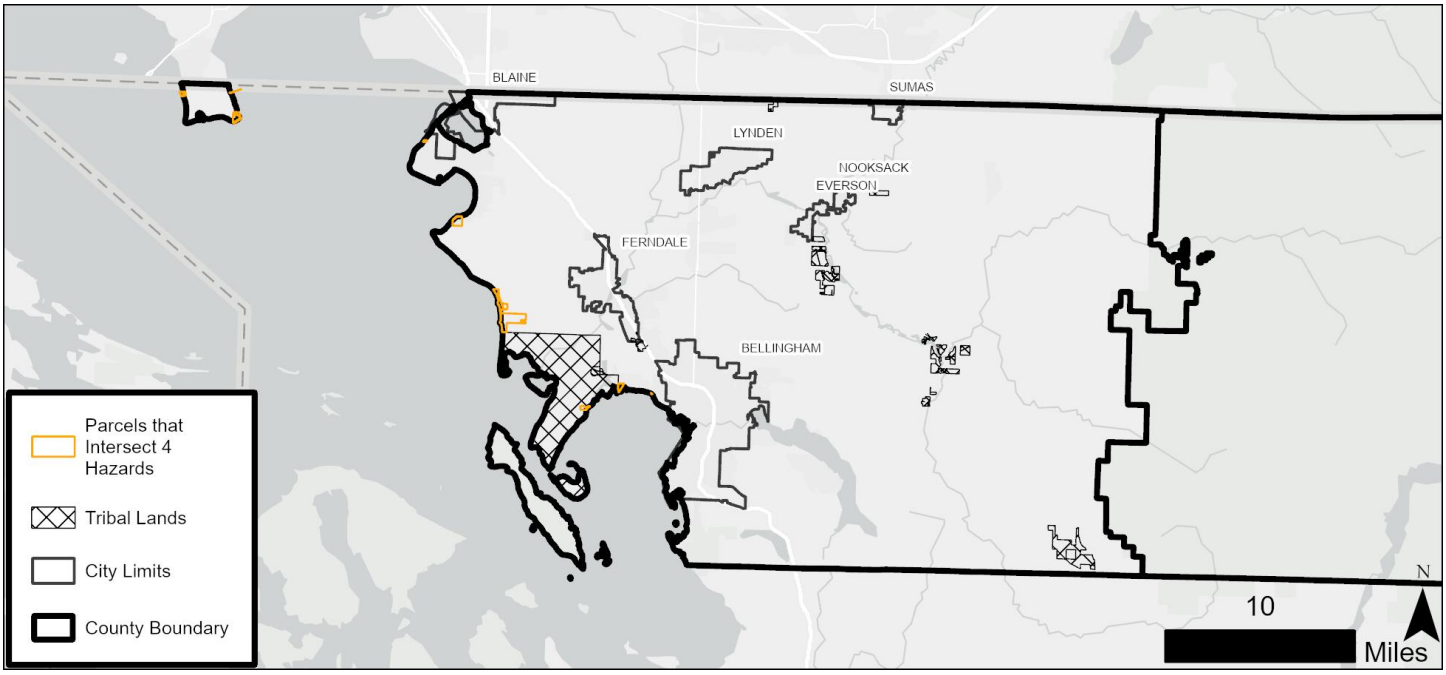

Figure 41. Parcels that intersect at least four different climate hazards.

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Appendix A: Table of Sensitive Populations

This section provides a table of all sensitive populations in Whatcom County.

GEOID20	Area in WUI	Under 17	Under 5	Seniors (65+)	Disabled	Non-English Speaking	Below Poverty Level	Asian	Black	Latino	American Indian	NH Pacific Islander	Other Race	Two or more races
530730001011	49%	17%	2%	5%	9%	0%	2%	4%	0%	0%	0%	0%	0%	5%
530730001012	94%	13%	3%	21%	9%	0%	2%	3%	0%	0%	0%	0%	0%	4%
530730001021	92%	16%	4%	22%	13%	5%	4%	12%	0%	6%	1%	0%	0%	14%
530730001022	93%	14%	5%	30%	13%	5%	23%	20%	0%	17%	5%	0%	3%	15%
530730001023	96%	14%	6%	25%	13%	5%	21%	18%	4%	19%	0%	0%	11%	4%
530730002011	56%	27%	27%	15%	16%	10%	56%	0%	0%	0%	0%	0%	0%	0%
530730002012	48%	24%	9%	1%	16%	10%	5%	3%	2%	23%	0%	0%	19%	13%
530730002013	22%	32%	14%	9%	16%	10%	45%	0%	0%	0%	7%	5%	0%	25%
530730002021	93%	18%	8%	28%	4%	1%	21%	4%	1%	17%	0%	0%	1%	5%
530730002022	71%	15%	1%	19%	4%	1%	1%	0%	0%	9%	6%	0%	0%	0%
530730002031	100%	0%	0%	47%	23%	1%	9%	0%	3%	1%	0%	0%	0%	1%
530730002032	64%	12%	6%	24%	23%	1%	10%	8%	0%	0%	0%	0%	0%	5%
530730003011	0%	17%	10%	13%	15%	4%	10%	3%	4%	1%	0%	0%	0%	9%
530730003012	2%	3%	0%	61%	15%	4%	0%	1%	0%	8%	0%	0%	0%	0%
530730003013	6%	15%	3%	13%	15%	4%	13%	3%	0%	9%	0%	0%	3%	5%
530730003021	69%	18%	8%	12%	13%	6%	27%	13%	1%	30%	0%	0%	30%	0%
530730003022	59%	2%	2%	15%	13%	6%	26%	16%	3%	8%	0%	0%	0%	9%
530730004011	0%	23%	5%	3%	22%	0%	3%	0%	0%	15%	0%	0%	1%	4%
530730004012	19%	24%	11%	16%	22%	0%	4%	3%	0%	6%	3%	0%	0%	7%
530730004013	33%	5%	1%	70%	22%	0%	23%	2%	0%	0%	1%	1%	0%	1%
530730004021	0%	24%	3%	12%	12%	4%	12%	0%	0%	6%	2%	0%	0%	3%
530730004022	0%	20%	6%	13%	12%	4%	3%	11%	0%	10%	0%	0%	10%	1%

GEOID20	Area in WUI	Under 17	Under 5	Seniors (65+)	Disabled	Non-English Speaking	Below Poverty Level	Asian	Black	Latino	American Indian	NH Pacific Islander	Other Race	Two or more races
530730005011	0%	21%	3%	9%	7%	1%	9%	1%	1%	12%	0%	0%	4%	0%
530730005012	1%	3%	1%	10%	7%	1%	35%	2%	0%	1%	0%	0%	0%	2%
530730005013	0%	2%	1%	5%	7%	1%	49%	2%	4%	4%	0%	0%	0%	4%
530730005021	0%	22%	6%	8%	17%	3%	9%	2%	0%	21%	0%	0%	0%	8%
530730005022	2%	9%	3%	15%	17%	3%	21%	5%	2%	17%	0%	0%	15%	5%
530730006001	0%	9%	1%	9%	22%	2%	36%	8%	4%	13%	3%	1%	0%	11%
530730007001	8%	25%	8%	13%	11%	2%	19%	8%	0%	22%	0%	0%	6%	4%
530730007002	0%	19%	3%	10%	11%	2%	7%	10%	2%	14%	0%	0%	4%	8%
530730007003	8%	0%	0%	2%	11%	2%	28%	6%	0%	13%	3%	0%	0%	6%
530730007004	9%	25%	5%	4%	11%	2%	25%	2%	7%	47%	0%	0%	33%	7%
530730008031	57%	22%	3%	23%	12%	0%	12%	1%	3%	9%	5%	0%	3%	7%
530730008032	64%	27%	9%	23%	12%	0%	1%	0%	0%	0%	0%	0%	0%	6%
530730008033	83%	11%	3%	25%	12%	0%	4%	4%	0%	2%	1%	1%	0%	3%
530730008034	42%	12%	5%	12%	12%	0%	14%	6%	0%	4%	1%	1%	1%	6%
530730008041	88%	20%	5%	17%	12%	1%	4%	5%	0%	2%	3%	0%	0%	8%
530730008042	100%	23%	8%	11%	12%	1%	6%	3%	6%	6%	0%	0%	0%	12%
530730008043	100%	24%	5%	25%	12%	1%	3%	5%	0%	1%	0%	0%	0%	3%
530730008051	32%	19%	9%	16%	7%	1%	11%	1%	0%	1%	0%	0%	0%	19%
530730008052	95%	11%	5%	19%	7%	1%	6%	0%	0%	2%	1%	0%	0%	2%
530730008053	67%	33%	4%	20%	7%	1%	6%	6%	0%	12%	0%	1%	0%	15%
530730008071	25%	21%	7%	9%	4%	1%	11%	0%	5%	4%	4%	1%	1%	4%
530730008072	15%	11%	2%	21%	4%	1%	3%	1%	0%	8%	0%	0%	0%	5%
530730008081	95%	23%	1%	28%	9%	0%	2%	4%	0%	7%	2%	0%	2%	4%
530730008082	81%	22%	0%	27%	9%	0%	9%	1%	2%	6%	0%	0%	2%	5%
530730008091	100%	19%	5%	21%	11%	0%	5%	4%	0%	9%	0%	0%	8%	9%
530730008092	36%	21%	6%	8%	11%	0%	2%	4%	0%	8%	0%	0%	0%	8%
530730009021	70%	14%	6%	19%	12%	2%	7%	2%	0%	11%	0%	0%	1%	2%
530730009022	90%	31%	5%	15%	12%	2%	6%	12%	0%	0%	0%	0%	0%	8%

GEOID20	Area in WUI	Under 17	Under 5	Seniors (65+)	Disabled	Non-English Speaking	Below Poverty Level	Asian	Black	Latino	American Indian	NH Pacific Islander	Other Race	Two or more races
530730009023	57%	38%	2%	15%	12%	2%	2%	0%	0%	53%	0%	1%	53%	6%
530730009031	67%	6%	0%	13%	13%	0%	34%	8%	4%	6%	1%	0%	1%	6%
530730009032	88%	16%	4%	8%	13%	0%	25%	1%	1%	16%	0%	0%	0%	6%
530730009041	100%	25%	7%	26%	11%	1%	2%	5%	0%	0%	1%	0%	0%	5%
530730010001	5%	3%	0%	6%	12%	0%	44%	4%	5%	14%	8%	0%	13%	0%
530730010002	0%	0%	0%	3%	12%	0%	51%	2%	5%	10%	1%	0%	0%	13%
530730010003	0%	4%	0%	2%	12%	0%	35%	5%	2%	12%	0%	0%	3%	15%
530730010004	47%	1%	0%	0%	12%	0%	1%	4%	1%	12%	2%	0%	3%	5%
530730011011	95%	17%	4%	33%	12%	1%	8%	5%	0%	0%	0%	0%	0%	5%
530730011012	93%	15%	2%	29%	12%	1%	30%	4%	0%	3%	0%	0%	2%	3%
530730011013	98%	15%	0%	30%	12%	1%	7%	2%	0%	2%	0%	0%	0%	0%
530730011021	36%	9%	3%	22%	11%	1%	1%	4%	0%	1%	0%	0%	0%	0%
530730011022	3%	12%	4%	31%	11%	1%	6%	4%	1%	8%	0%	0%	1%	7%
530730012021	29%	16%	3%	27%	12%	1%	4%	4%	0%	5%	0%	1%	0%	0%
530730012022	49%	9%	2%	36%	12%	1%	1%	12%	0%	3%	1%	0%	0%	9%
530730012023	100%	5%	5%	60%	12%	1%	8%	1%	0%	3%	0%	0%	3%	13%
530730012024	93%	14%	4%	31%	12%	1%	12%	5%	2%	8%	1%	0%	0%	9%
530730012031	100%	1%	0%	1%	11%	1%	55%	6%	2%	5%	0%	2%	1%	7%
530730012032	100%	7%	0%	5%	11%	1%	32%	5%	1%	2%	2%	0%	0%	2%
530730012041	94%	18%	4%	4%	15%	3%	49%	9%	3%	6%	1%	0%	1%	4%
530730012042	29%	3%	1%	7%	15%	3%	39%	15%	1%	7%	6%	1%	3%	10%
530730101011	10%	13%	3%	18%	27%	0%	11%	0%	0%	0%	0%	0%	0%	4%
530730101012	29%	10%	5%	28%	27%	0%	8%	3%	0%	7%	1%	0%	0%	0%
530730101021	100%	25%	5%	14%	15%	2%	50%	1%	0%	7%	1%	0%	1%	4%
530730101022	20%	30%	6%	2%	15%	2%	27%	0%	0%	20%	0%	0%	9%	5%
530730101031	14%	17%	5%	20%	22%	0%	13%	3%	0%	2%	13%	0%	1%	9%
530730101032	0%	0%	0%	25%	22%	0%	64%	0%	0%	2%	0%	0%	2%	18%
530730102011	43%	23%	2%	12%	15%	3%	1%	0%	0%	1%	0%	1%	0%	7%

GEOID20	Area in WUI	Under 17	Under 5	Seniors (65+)	Disabled	Non-English Speaking	Below Poverty Level	Asian	Black	Latino	American Indian	NH Pacific Islander	Other Race	Two or more races
530730102012	73%	25%	8%	16%	15%	3%	8%	3%	0%	14%	0%	0%	2%	15%
530730102021	45%	33%	11%	11%	16%	1%	8%	1%	0%	9%	2%	0%	5%	4%
530730102022	48%	33%	11%	13%	16%	1%	9%	0%	0%	29%	0%	0%	14%	1%
530730102023	49%	28%	15%	10%	16%	1%	21%	0%	0%	20%	3%	0%	14%	2%
530730103011	49%	12%	6%	24%	8%	0%	5%	0%	2%	5%	0%	0%	0%	3%
530730103012	33%	26%	13%	7%	8%	0%	1%	0%	1%	26%	1%	0%	30%	3%
530730103013	22%	8%	6%	10%	8%	0%	11%	7%	0%	24%	2%	0%	2%	17%
530730103014	6%	28%	11%	21%	8%	0%	3%	0%	1%	6%	1%	0%	0%	9%
530730103021	19%	16%	3%	26%	14%	1%	9%	0%	0%	6%	0%	0%	0%	3%
530730103022	5%	18%	2%	27%	14%	1%	4%	1%	0%	10%	0%	0%	9%	3%
530730103023	6%	29%	7%	24%	14%	1%	3%	0%	4%	3%	2%	0%	1%	0%
530730103031	31%	37%	10%	10%	11%	2%	25%	3%	1%	36%	0%	0%	18%	26%
530730103032	9%	38%	11%	9%	11%	2%	5%	4%	0%	6%	0%	0%	1%	4%
530730103033	64%	17%	6%	28%	11%	2%	7%	2%	0%	9%	1%	0%	5%	11%
530730104051	66%	12%	1%	43%	20%	1%	6%	6%	1%	10%	1%	0%	5%	5%
530730104052	90%	10%	4%	49%	20%	1%	11%	2%	0%	2%	0%	0%	0%	16%
530730104053	96%	3%	0%	44%	20%	1%	4%	1%	0%	5%	0%	0%	0%	0%
530730104061	91%	22%	5%	22%	20%	5%	15%	0%	0%	4%	2%	7%	4%	19%
530730104062	86%	24%	7%	14%	20%	5%	8%	0%	0%	4%	0%	0%	1%	23%
530730104071	77%	19%	5%	9%	15%	0%	2%	0%	0%	1%	0%	0%	0%	2%
530730104072	82%	17%	2%	29%	15%	0%	6%	4%	0%	6%	0%	0%	2%	3%
530730104081	81%	27%	3%	18%	17%	1%	3%	1%	0%	7%	3%	0%	0%	5%
530730104091	7%	9%	0%	18%	14%	3%	2%	17%	0%	1%	6%	0%	0%	1%
530730104092	74%	31%	7%	9%	14%	3%	8%	6%	1%	6%	0%	2%	1%	5%
530730104101	89%	32%	4%	20%	24%	0%	23%	2%	3%	6%	0%	0%	0%	2%
530730104102	86%	10%	6%	37%	24%	0%	13%	0%	0%	10%	0%	0%	10%	0%
530730104111	65%	31%	16%	11%	15%	3%	18%	0%	0%	8%	1%	0%	3%	11%
530730104112	95%	6%	3%	46%	15%	3%	20%	4%	0%	2%	0%	0%	0%	0%

GEOID20	Area in WUI	Under 17	Under 5	Seniors (65+)	Disabled	Non-English Speaking	Below Poverty Level	Asian	Black	Latino	American Indian	NH Pacific Islander	Other Race	Two or more races
530730105031	100%	32%	8%	13%	14%	2%	10%	8%	0%	26%	0%	0%	3%	1%
530730105032	76%	28%	2%	18%	14%	2%	5%	2%	0%	0%	0%	0%	0%	1%
530730105041	53%	14%	2%	30%	16%	1%	16%	0%	0%	2%	0%	0%	1%	0%
530730105042	71%	10%	0%	31%	16%	1%	0%	6%	0%	12%	5%	0%	8%	9%
530730105051	70%	30%	7%	12%	15%	2%	2%	5%	0%	9%	4%	1%	7%	3%
530730105052	63%	22%	2%	13%	15%	2%	15%	11%	0%	21%	1%	1%	19%	0%
530730105061	75%	25%	9%	21%	14%	2%	9%	5%	0%	19%	9%	0%	3%	9%
530730105062	44%	25%	0%	16%	14%	2%	26%	0%	1%	15%	0%	2%	16%	1%
530730106001	36%	24%	2%	21%	9%	3%	5%	3%	1%	8%	2%	1%	2%	13%
530730106002	54%	19%	8%	11%	9%	3%	1%	3%	1%	15%	0%	0%	11%	7%
530730106003	29%	22%	5%	25%	9%	3%	6%	6%	0%	7%	0%	0%	0%	2%
530730107011	28%	19%	4%	20%	12%	0%	4%	8%	1%	17%	0%	0%	9%	0%
530730107012	93%	28%	8%	18%	12%	0%	1%	10%	4%	3%	0%	0%	0%	3%
530730107013	63%	21%	6%	27%	12%	0%	3%	1%	0%	13%	1%	0%	9%	2%
530730107021	65%	17%	1%	28%	12%	0%	4%	0%	0%	6%	4%	0%	2%	3%
530730107022	80%	24%	8%	16%	12%	0%	14%	1%	0%	15%	4%	0%	8%	4%
530730107023	37%	33%	11%	6%	12%	0%	22%	0%	1%	28%	19%	1%	11%	15%
530730109001	47%	8%	2%	39%	11%	0%	14%	0%	0%	4%	0%	0%	2%	3%
530730110001	74%	8%	4%	34%	19%	3%	10%	2%	0%	2%	2%	0%	0%	2%
530730110002	16%	15%	0%	27%	19%	3%	9%	0%	0%	13%	1%	0%	3%	3%
530730110003	62%	4%	0%	42%	19%	3%	14%	2%	0%	0%	0%	0%	0%	6%
530739400011	39%	16%	4%	21%	18%	1%	17%	2%	2%	10%	10%	0%	2%	5%
530739400021	41%	26%	10%	13%	21%	2%	14%	2%	0%	5%	72%	0%	0%	4%