

Climate Impacts & Resiliency Study

August 3, 2020

Autumn Salamack

Environmental Services Coordinator



Background



2018 Surface Water Master Plan

- Some areas of City already prone to flooding
- Current planning should consider increased rainfall intensity expected in the future
- Climate Impacts and Resiliency Study needed to identify the current and future needs of the surface water system within City limits

SHORELINE CLIMATE IMPACTS AND RESILIENCY STUDY

Christy Shelton, Cascadia
Consulting Group

Matt Fontaine, Herrera

August 3, 2020



PROJECT GOALS



Understand how climate change will impact the Shoreline community



Develop a strategy to prepare the surface water system for climate impacts



Raise awareness among City staff and community about climate change impacts and resiliency measures



Lay a foundation for updating communitywide climate action plan

SCOPE

Climate Change
Projections

Vulnerability
Assessment

Educational
Materials



Climate Impacts
Tool

Resiliency
Strategies



TIMELINE



CLIMATE IMPACTS: KEY FINDINGS

Risk	Trends to Date	Projected Changes
Temperature		
	<ul style="list-style-type: none">📍 The average year in the Puget Sound region is currently 1.3°F warmer than historic averages.	<p>By the 2050s (vs 1970-1999 average)</p> <ul style="list-style-type: none">📍 Average annual temperature in the Puget Sound region will be 4.2°F to 5.5°F warmer.☀️ The hottest summer days will be 4.0°F to 10.2°F warmer.
Precipitation		
	<ul style="list-style-type: none">📍 Extreme rain events in Western Washington have increased moderately.	<p>By the 2080s (vs 1980s)</p> <ul style="list-style-type: none">📍 Annual precipitation in the Puget Sound region will increase at least 6.4 percent.📍 Rainstorms in Shoreline will be more intense.☁️ Winters will be wetter and summers drier.

CLIMATE IMPACTS: KEY FINDINGS

Risk	Trends to Date	Projected Changes
Puget Sound Hydrology		
	<ul style="list-style-type: none">⬇ Puget Sound rivers have lower streamflows during the summer, and streamflow peaks earlier in the year, leaving streams drier in the late summer and fall.	<p>By the 2080s (vs 1970-1999 average)</p> <ul style="list-style-type: none">⬇ Summer streamflows will be even lower.⬆ Flooding risk will increase during the fall, winter, and spring.💧 The Tolt and Cedar River watersheds (which supply Shoreline's drinking water) will have less snowpack to source water from.
Sea Level Rise		
	<ul style="list-style-type: none">⬆ Sea level has risen 0.8 inches per decade in Puget Sound between 1900-2009.	<p>By 2100 (vs 1991-2001 average)</p> <ul style="list-style-type: none">⬆ Relative sea level in Shoreline will rise 2.0 feet or more, resulting in greater risk of coastal erosion and flooding.

DEFINING VULNERABILITY

What is vulnerability?

It is a function of the exposure of a system to impacts from climate change, its sensitivity to those impacts, and its capacity to adapt to prepare for those impacts.



Exposure

The portion of the community in harm's way due to climate impacts.



Sensitivity

The degree to which the community is affected by climate impacts.



Adaptive Capacity

The City's and community's actions to prepare for climate impacts.



**INCREASES
VULNERABILITY**



**INCREASES
VULNERABILITY**



**DECREASES
VULNERABILITY**

VULNERABILITY ASSESSMENT FOCUS AREAS



Natural Systems

- Parks & Open Spaces
- Urban Trees
- Sensitive Ecosystems



Built Environment

- Housing
- Transportation
- Buildings & Development



Public Health, Safety & Emergency Services

- Heat-related Illnesses
- Air Quality
- Mental Health Stress
- Emergency Services
- Vector-borne Diseases



Stormwater

- Low-lying Areas
- Storm Drains
- Stormwater Pipes, Ditches & Culverts

VULNERABILITY ASSESSMENT

HIGH VULNERABILITY

MODERATE VULNERABILITY

LOW VULNERABILITY



Low-Lying Areas



Sensitive Ecosystems



Buildings and Development



Heat-related Illnesses



Air Quality

Storm Drains



Parks and Open Space



Housing



Pipes, Ditches and Culverts



Urban Trees



Mental Health Stress

Transportation

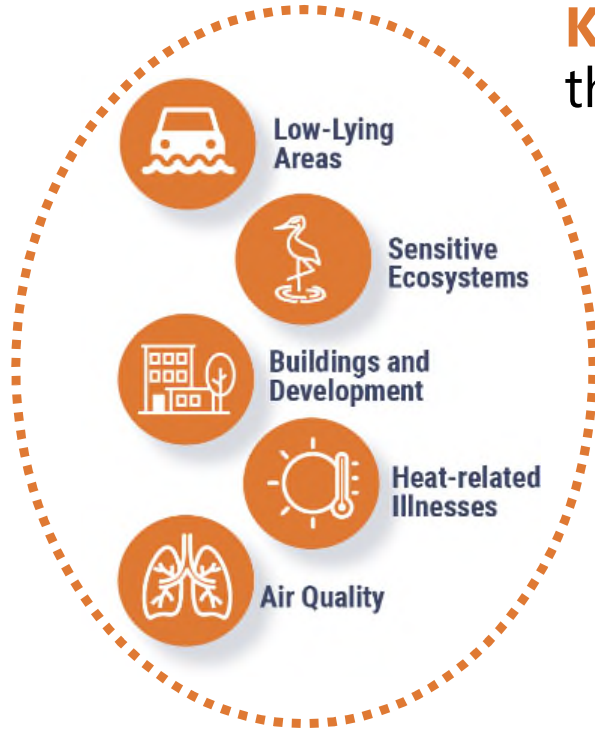


Emergency Services

Vector-borne Diseases



KEY FINDINGS



Key areas of vulnerability are due to these climate impacts and related risks:



More extreme heat & drier summers



More frequent heavy rainstorms



Reduced air quality from heat & wildfire smoke risk



Increased flooding risk

EDUCATIONAL MATERIALS

- Storymap website
- Vulnerability Assessment factsheets

Climate Change and the City of Shoreline



Climate Change and the City of Shoreline

Climate Change and the City of Shoreline



Stormwater

Low-Lying Areas | Larger rainstorms make it more likely that low-lying areas will flood when there is too much rainwater for pipes and pumps to handle.

Storm Drains | More intense rainstorms may overwhelm storm drains or cause more frequent clogging that could increase the risk of flooding in roads.

- **Stormwater Pipes, Ditches, and Culverts** | Some pipes and culverts are
- too small to handle the additional
- rainfall expected in future storms, which
- may cause more flooding of roads and



PUBLIC HEALTH, SAFETY & EMERGENCY SERVICES

VULNERABILITY TO CLIMATE CHANGE

Rising air temperatures, more extreme heat waves, and increased wildfire risk across the state may increase risk of heat-related illnesses and reduce air quality, impacting the physical and mental health of Shoreline residents. Emergency services may be more in demand due to these impacts.

Shoreline communities are likely to face the following impacts of a changing climate:

Heat-related Illnesses HIGH VULNERABILITY More extreme temperatures may increase risk of heat-related illnesses, especially in areas with more paved surfaces that absorb heat.	Air Quality HIGH VULNERABILITY Warmer temperatures and higher risk of wildfire smoke may cause more pollution and reduce air quality.	Mental Health Stress MODERATE VULNERABILITY Climate change impacts may increase anxiety, depression, and other mental health stress for all populations.
Emergency Services LOW VULNERABILITY More demand for emergency services due to public health and safety risks.	Vector-borne Diseases LOW VULNERABILITY More rainfall and warmer temperatures may increase vector populations.	

CLIMATE IMPACTS TOOL

- Interactive map-based tool to easily identify:
 - Areas of vulnerability related to climate change
 - Opportunities to increase resiliency
- Three key focus areas:

**Surface Water
Vulnerabilities**

**Urban Heat Island
Effects**

Equity and Justice

CLIMATE IMPACTS TOOL

City of Shoreline Climate Impacts Tool

No issues detected ✕

Story not shared ✕

Edit ✕



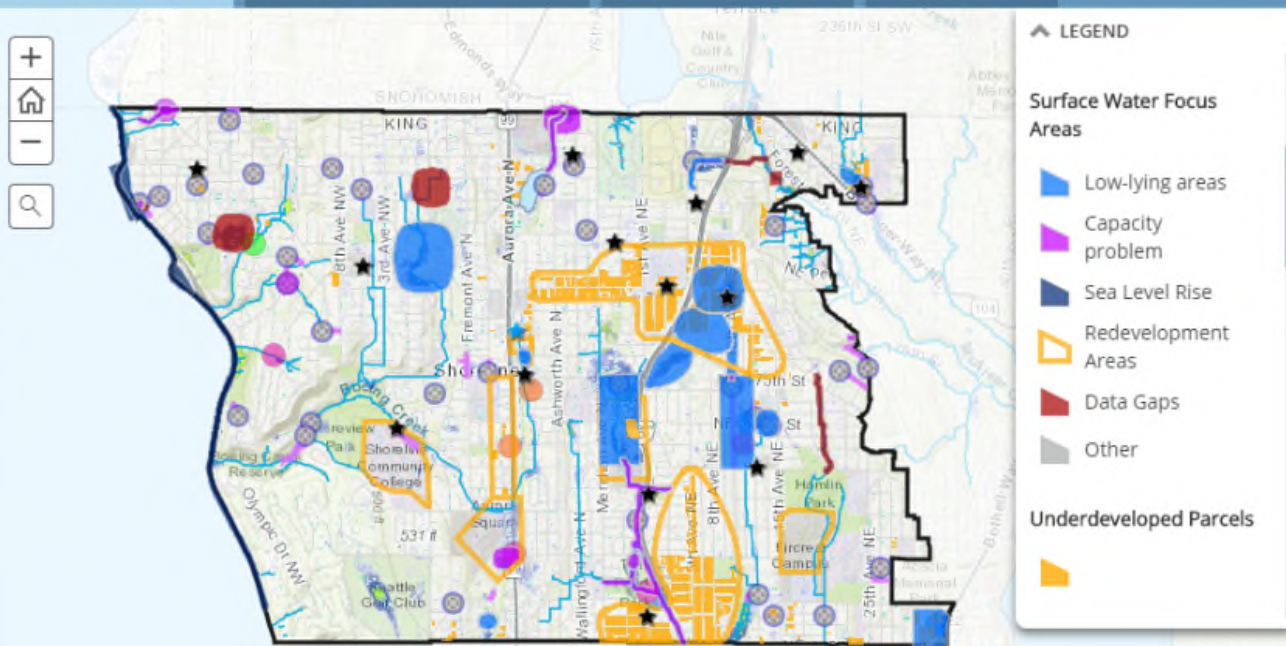
- Introduction
- Step 1 | Map Your Project
- Step 2 | Surface Water Vulnerability
- Step 3 | Urban Heat Island Effects
- Step 4 | Equity & Justice
- Step 5 | Wrap Up

Step 2 | Surface Water Vulnerability

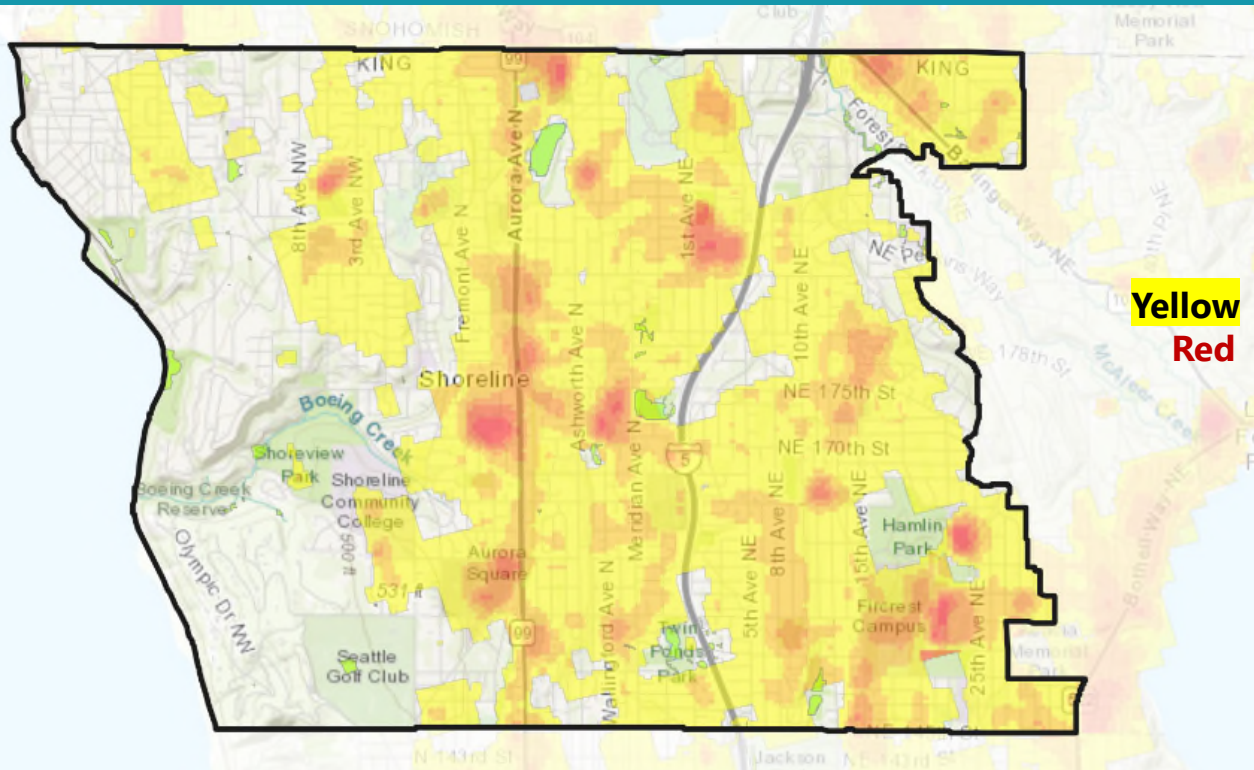


Boeing Creek

Climate change is projected to cause more intense rain storms, worsening existing capacity restrictions and limitations in the stormwater conveyance system (e.g. undersized pipes, pumped drainage, inlet blockage, flat or closed contour areas, and areas with insufficient drainage infrastructure).



URBAN HEAT ISLANDS



Yellow = mild heat area
Red = severe heat area

PRIORITY RESILIENCE STRATEGIES

- Require **capital facilities planning** to consider opportunities to increase resiliency using the Climate Impacts Tool.
- Modify **standards for stormwater facility sizing** to increase capacity and ensure adequacy of flow control and water quality treatment facilities.
- Modify design **standards for drain inlets** to increase capacity.
- Build retrofit-focused **regional stormwater facilities**.
- Revise **tree list and GSI planting** requirements to be more resilient.
- Modify **urban design standards** to ensure development increases city-wide climate resilience.

MASTER PLANNING

Evaluating opportunities to advance resilience strategies in City master planning efforts, including:



Next Steps

- Develop internal policy regarding use of Climate Impacts Tool
- Train additional City staff to use tool
- Review resiliency strategies with staff leading master planning efforts
- Share study results and educational materials with community

Thank You!

City of SHORELINE Washington

SERVICES OUR CITY BUSINESS GOVERNMENT I WANT TO... 🔍

Our City » Environment » Sustainable Shoreline » Climate, Water & Energy »

Adaptation & Resilience

Font Size: + - + Share & Bookmark 🖨️ Print

Extreme Heat

This map shows areas in Shoreline that are hotter than average city temperatures. It uses a scale of yellow (hot) to red (severe heat areas). These hotspots are places where rising temperatures from climate change may pose greater risk to the community. Explore the map by using the navigation buttons in the lower right corner of the map.

Scroll down to continue.

LEARN MORE

- [King County Climate Change Response](#)
- [Climate Impacts Group](#)
- [Washington Climate Change Impacts Assessment](#)
- [WA State Climate Response Strategy](#)
- [EPA Region 10 Climate Change](#)

www.shorelinewa.gov/sustainability

Autumn Salamack, asalamack@shorelinewa.gov

John Featherstone, jfeatherstone@shorelinewa.gov

