TACOMA TIDEFLATS

SUBAREA PLAN

Steering Committee

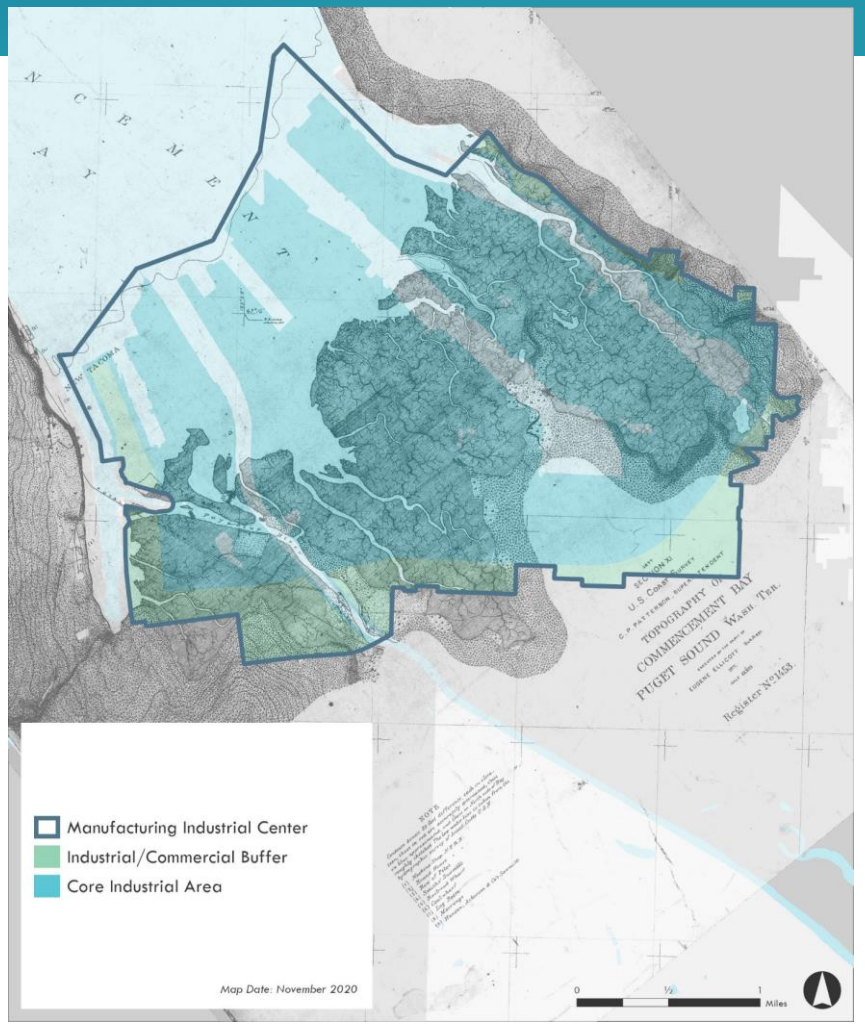
January 14, 2021

TACOMA TIDEFLATS

Climate Vulnerability – Progress Update

Presentation Outline

- Introduction
- Climate Hazards
- Resources & Assets
- Hazard Analysis (Coastal & Riverine Flooding)
- Vulnerability Assessment (Work-in-Progress)
  - Seeking Input from Stakeholders
- Next Steps



Climate Vulnerability Assessment

What are the hazards associated with climate for the Tacoma Tideflats?

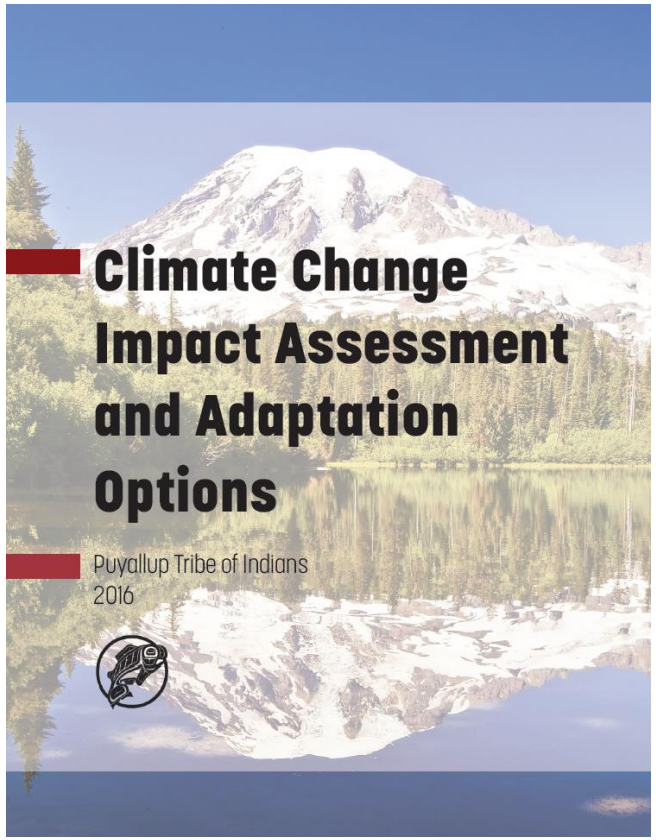
What magnitudes of climate hazards matter for the Tacoma Tideflats?

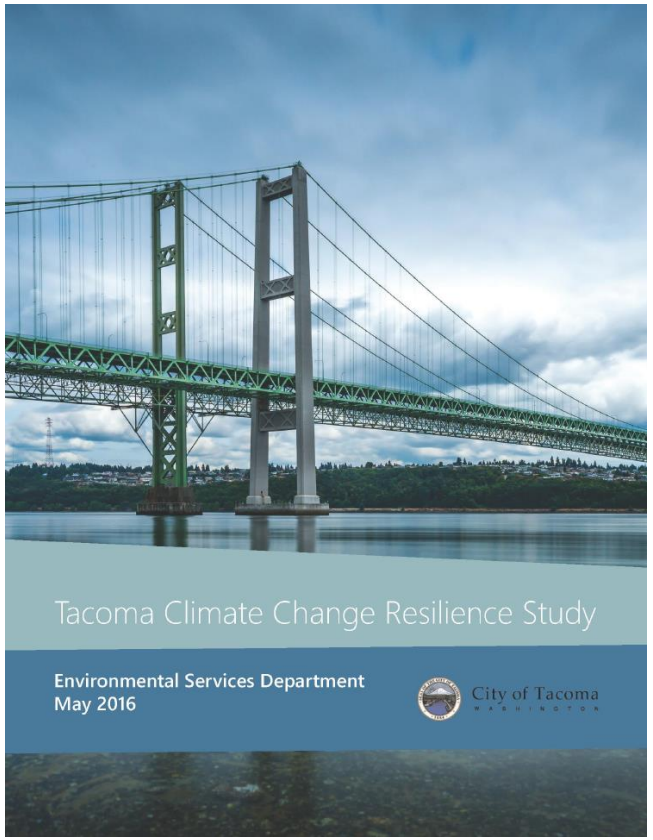
What resources and infrastructure are at risk under different hazard scenarios?

When could these scenarios happen and how do we plan for and adapt to them?

Previous & Ongoing Studies

Previous Studies

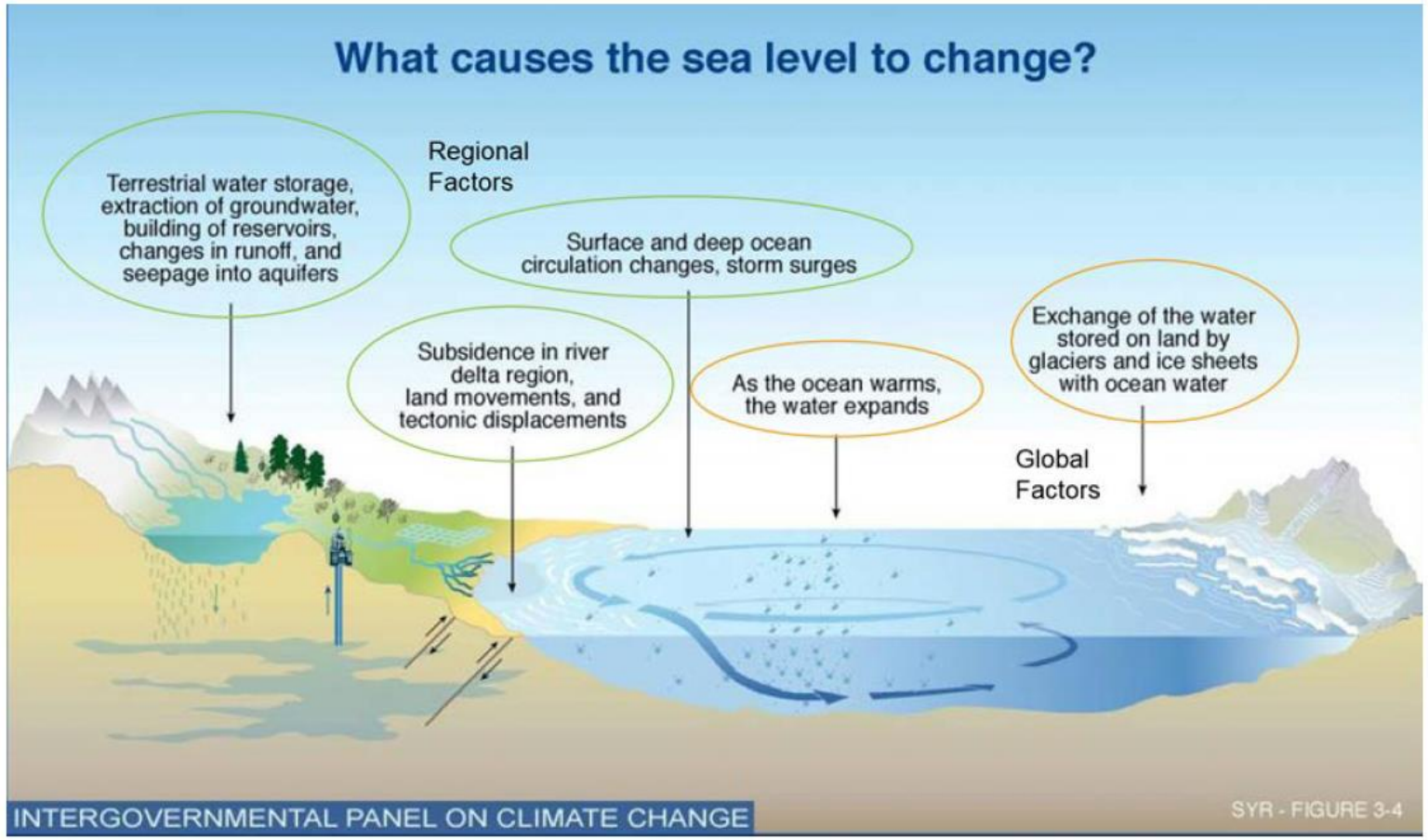




Ongoing Studies

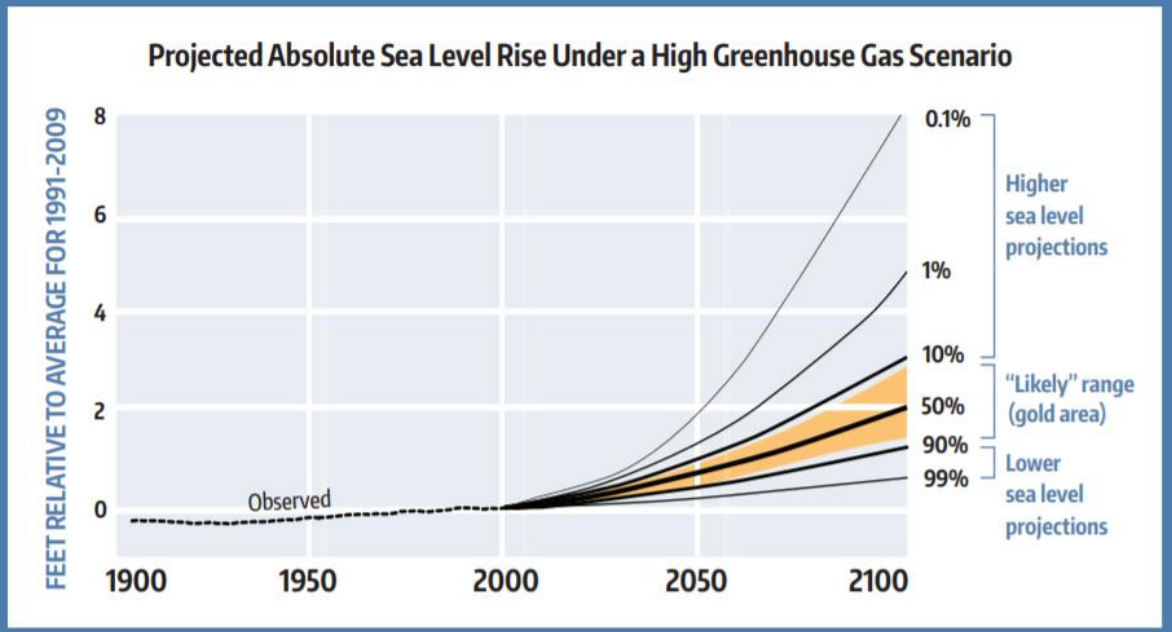
- City of Tacoma's Climate Adaptation Strategy

Climate Hazards – Sea Level Change



Best Available Science on SLR Projections

FIGURE 2: Absolute sea level rise projections, through 2100, for a high greenhouse gas scenario (RCP 8.5), for Washington State. Projections are based on Kopp et al. (2014) and observed variations in absolute sea level are shown for 1907-2007.[4] All results are shown relative to the average for 1991-2009. The probability values are "probabilities of exceedance", i.e., the current best assessment of the likelihood that absolute sea level will rise by at least a given change in elevation.



Best Available Science on SLR Projections

TABLE 2: Relative sea level projections, in feet, for three of the 171 locations along Washington's coastline. Example locations in Washington include the Taholah, Neah Bay, and Long Beach. Projections are expressed in terms of the "probability of exceedance" for 2100 (2090-2109) under two different greenhouse gas scenarios (RCP 4.5 ["Low"] and RCP 8.5 ["High"]; van Vuuren et al., 2011). Projected changes are assessed relative to contemporary sea level, which we define as the average sea level over the 19-year period 1991-2009. Data for all 171 locations are available at www.wacoastalnetwork.com/wcrp-documents.html.

PROJECTED RELATIVE SEA LEVEL CHANGE FOR 2100
(feet, averaged over a 19-year time period)

Location	Vertical Land Movement Estimate	Greenhouse Gas Scenario	Central Estimate (50%)	Likely Range (83-17%)	Higher magnitude, but lower likelihood possibilities		
					10% probability of exceedance	1% probability of exceedance	0.1% probability of exceedance
Tacoma (47.3N, 122.4W)	-0.5 ± 0.2	Low	2.1	1.5-2.7	3	4.6	7.9
		High	2.5	1.9-3.3	3.6	5.3	8.8
Neah Bay (48.4N, 124.6W)	1.1 ± 0.3	Low	0.5	-0.1 - 1.2	1.5	3.1	6.3
		High	1	0.3 - 1.7	2	3.8	7.4
Taholah (47.4N, 124.3W)	0.3 ± 0.5	Low	1.3	0.6-2.1	2.4	3.9	7.1
		High	1.7	1.0-2.6	2.9	4.6	8.1

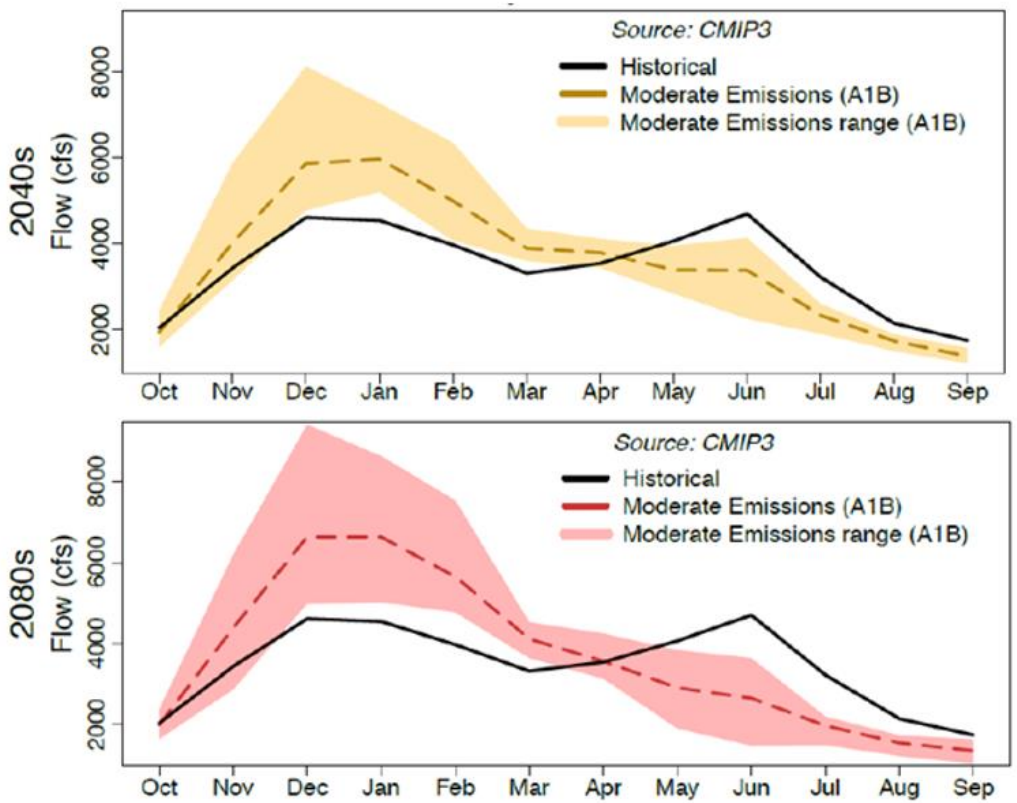
Projected RSLR (ft) and Associated Probabilities For Each Time Horizon for Tacoma

Time Period	83% - 17%	50%	10%	5%	1%	0.1%
2030	0.3 – 0.6	0.5	0.6	0.7	0.7	0.9
2040	0.5 – 0.8	0.7	0.9	1.0	1.1	1.5
2050	0.7 – 1.2	0.9	1.2	1.4	1.6	2.2
2060	0.9 – 1.5	1.2	1.6	1.7	2.1	3.2
2070	1.1 – 1.9	1.5	2.0	2.2	2.8	4.4
2080	1.4 – 2.3	1.8	2.5	2.8	3.5	5.7
2090	1.6 – 2.8	2.1	3.0	3.3	4.3	7.1
2100	1.9 – 3.3	2.5	3.6	4.0	5.3	8.8

Source: (Miller, et al., 2018)

Climate Hazards – Fluvial (Riverine) Flooding

Projected Shifts in Monthly Streamflow for the Puyallup River



Source: (Pierce County Emergency Management, 2019a)

Projected Changes in Streamflow for the Puyallup River by 2080 Under a Moderate Greenhouse Gas Emissions Scenario

Watershed Impact	Projected Change for Puyallup River
Peak Streamflow Timing	-18 Days (-30 Days to -9 Days)
100-Year Event Streamflow	+37% (+10% to +88%)
Summer Minimum Streamflow	-27% (-39% to -16%)

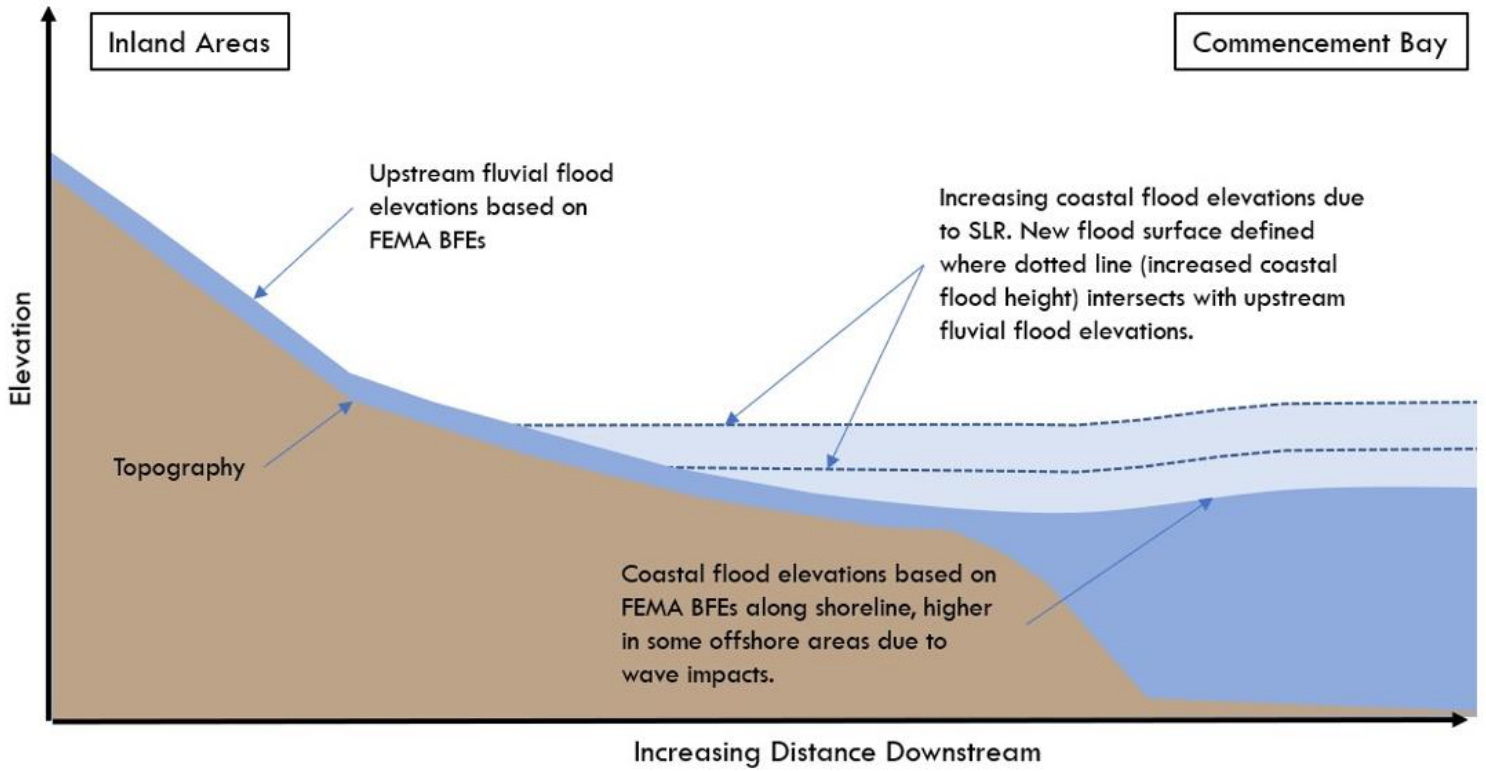
Source: (Mauger, et al., 2015; Hamlet, et al., 2013)

Resources & Assets

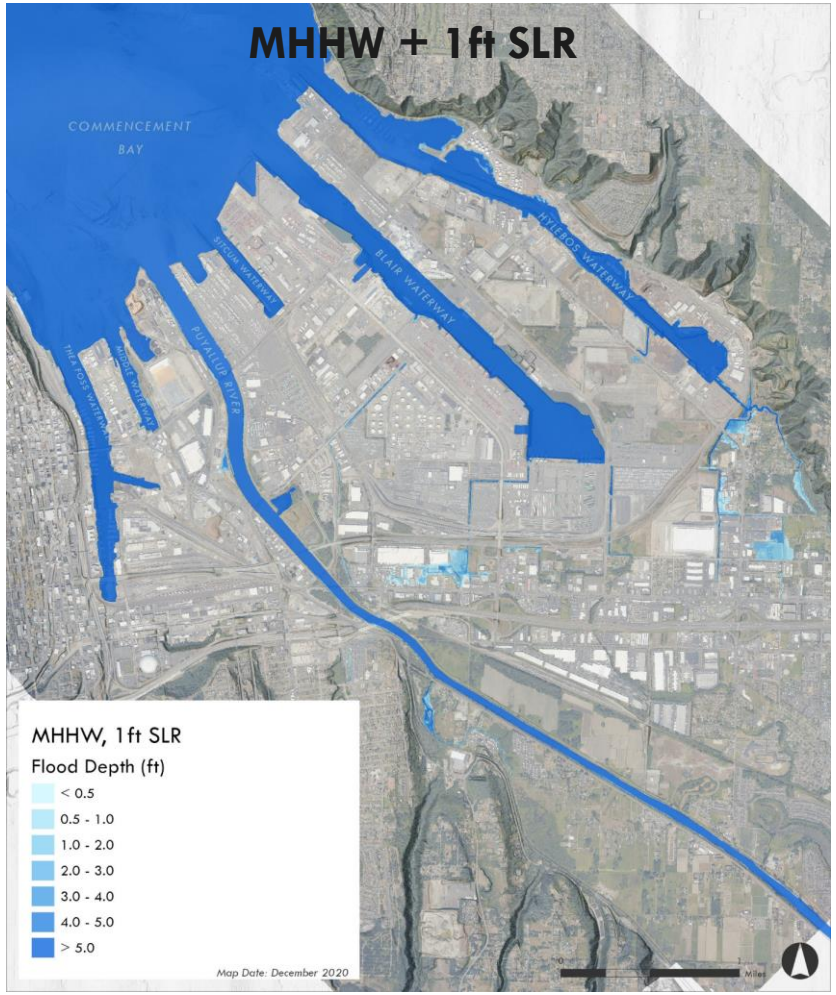
Resource/Asset Types

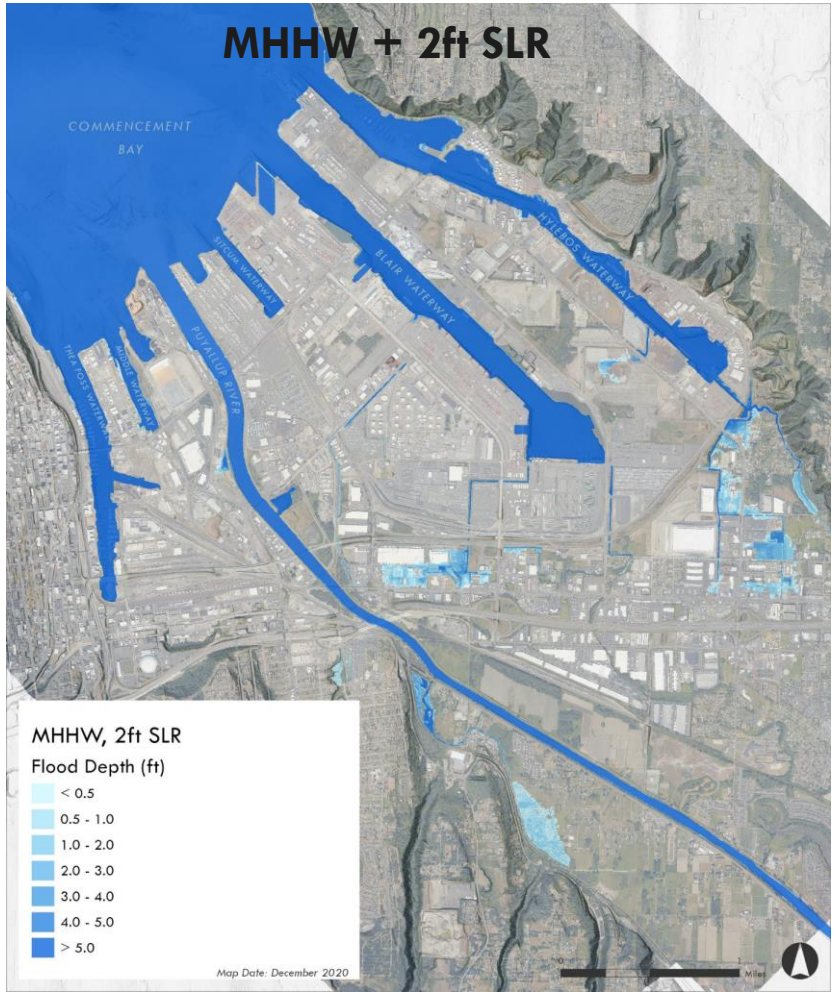
- Transportation
- Natural Environment
- Built Environment/Infrastructure
- Utilities
- Cultural Resources
- Land Use/Ownership

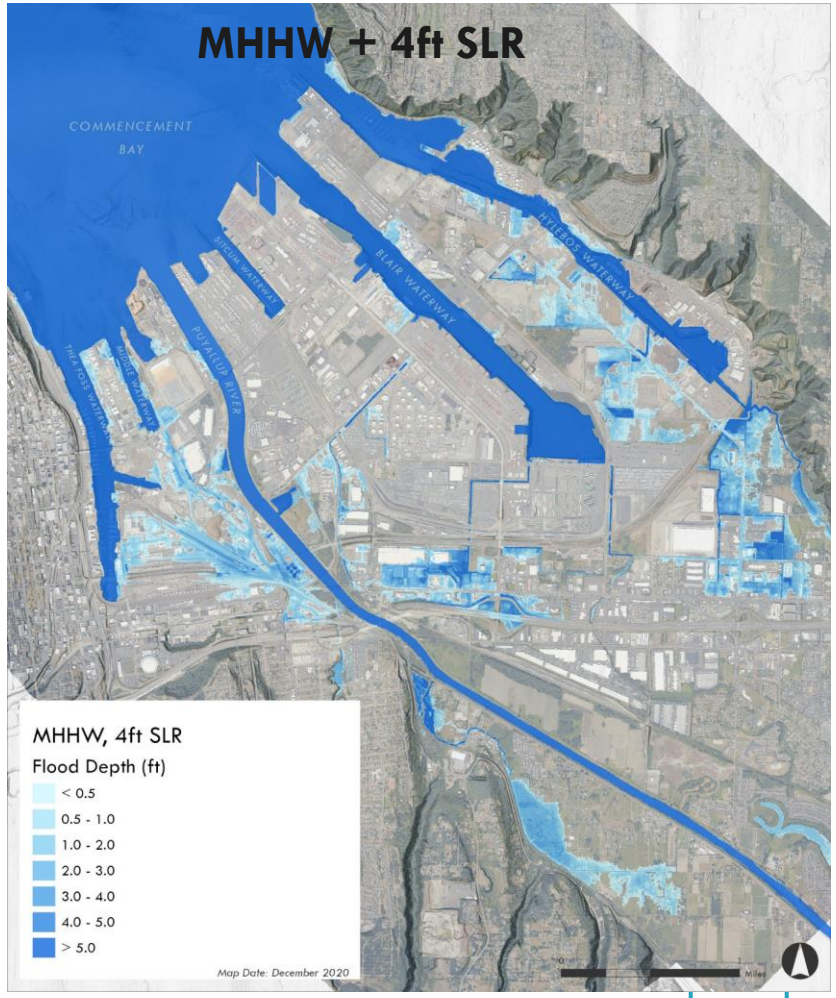
Hazard Analysis – Coastal & Fluvial Flooding



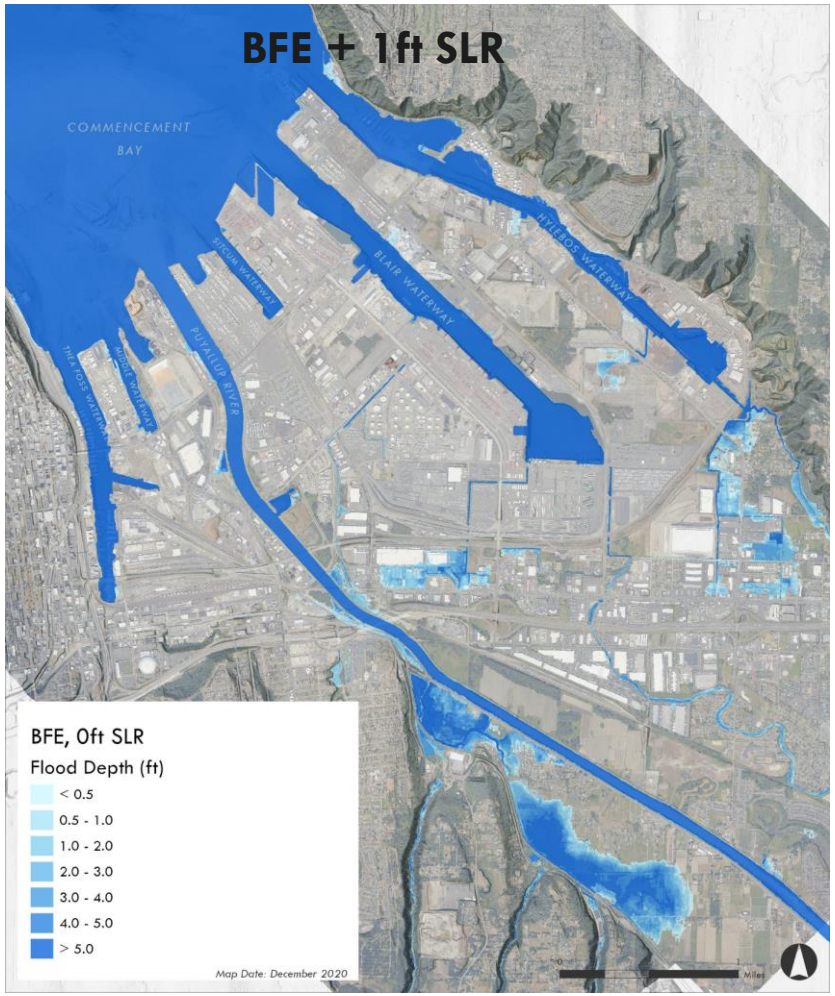
Coastal (Bathtub) Flooding

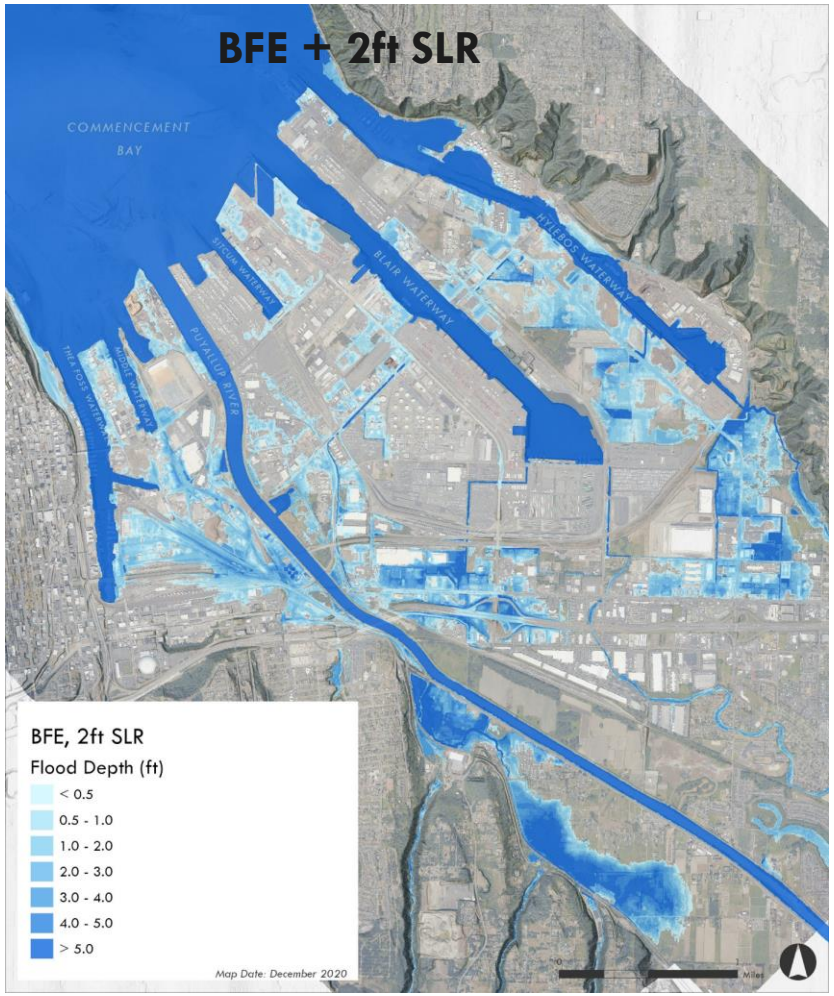


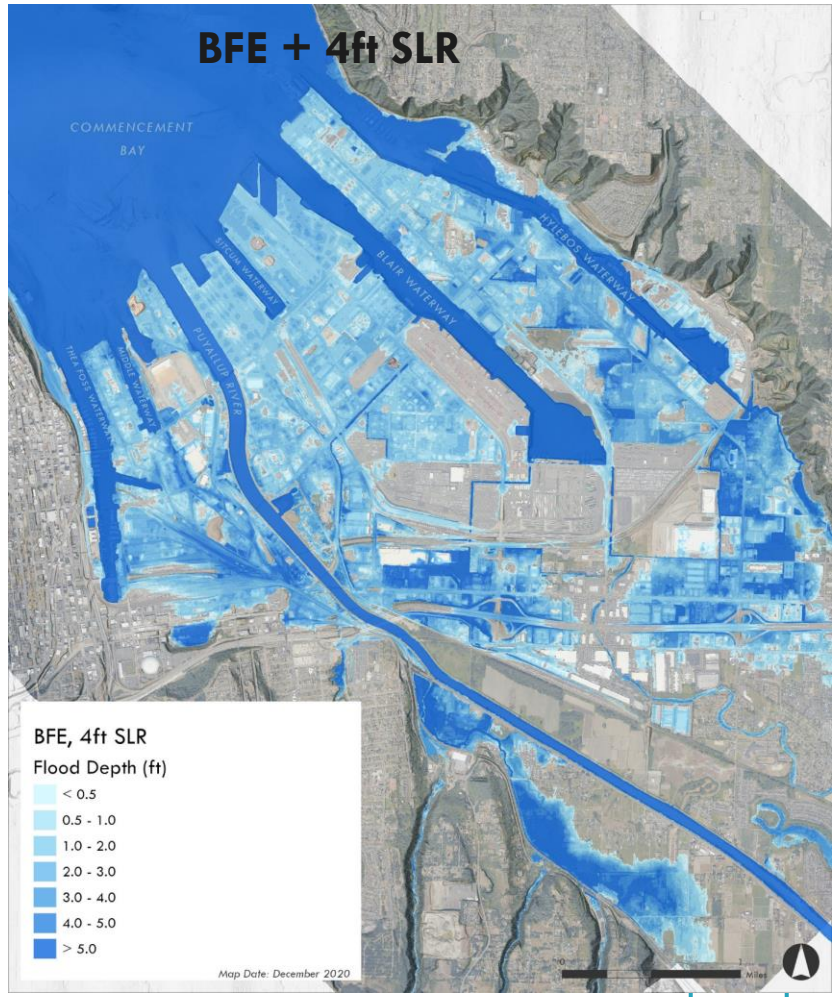




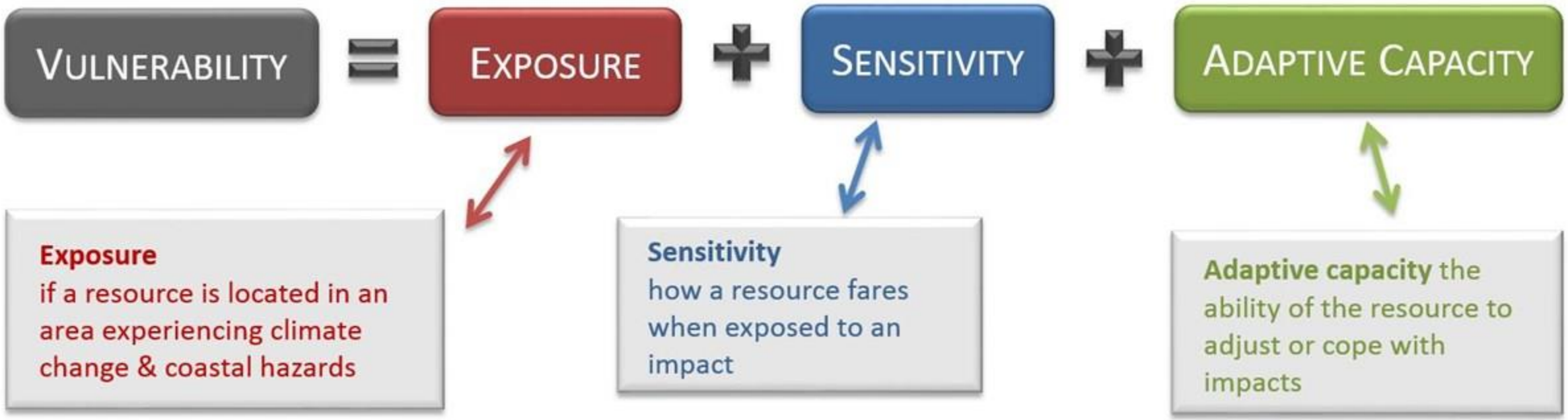
Fluvial + Coastal Flooding





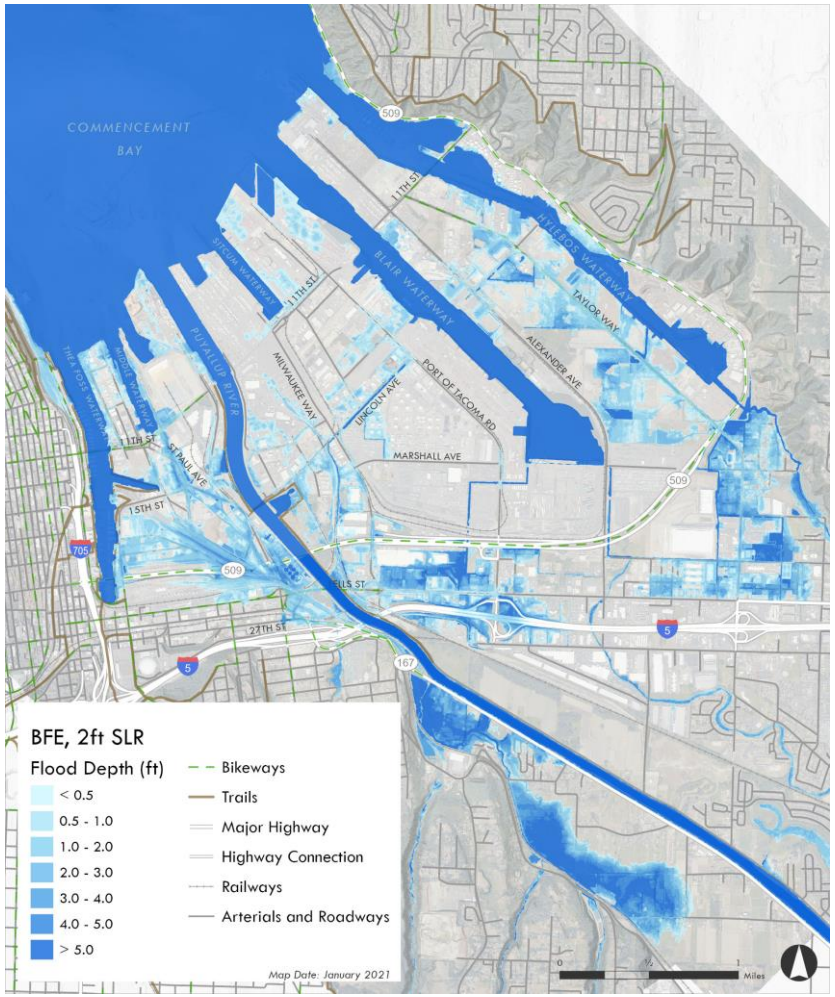


Vulnerability Assessment

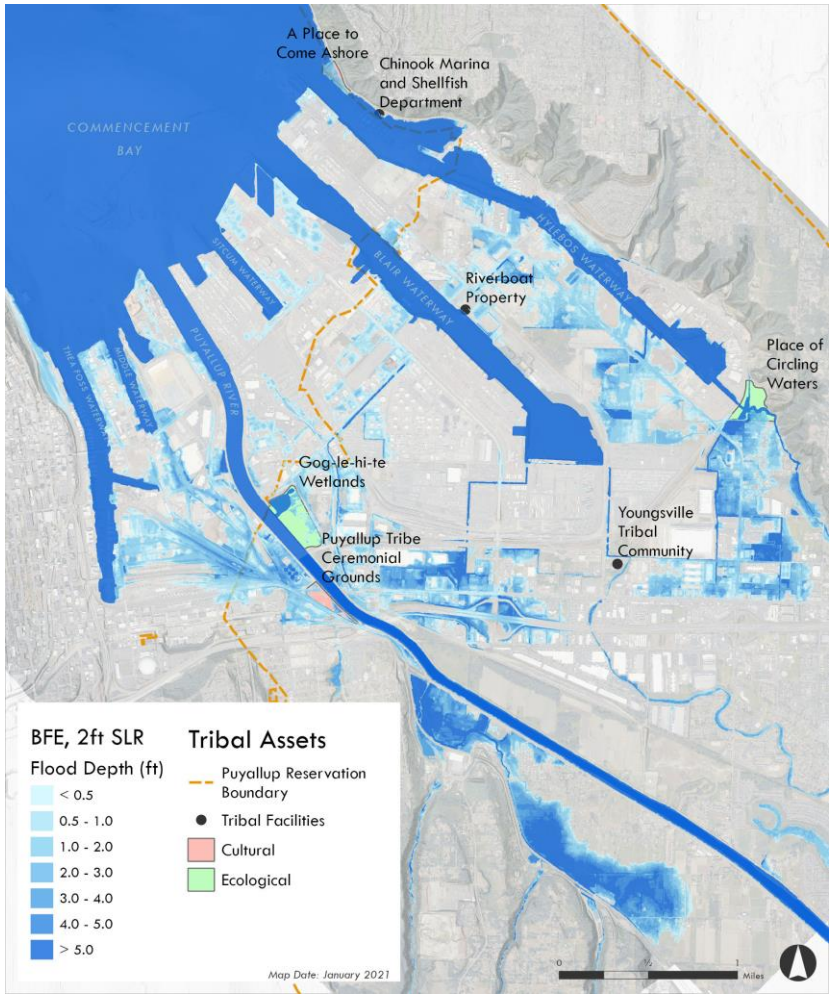


Exposure to Coastal/Fluvial Flooding

Transportation



Cultural Resources/Tribal Assets



Vulnerability Assessment Summary

Resource	RSLR-Related Hazards	RSLR Scenario 1ft	2ft	3ft	4ft	5 ft
Coastal Development						
Industrial Areas within MIC	Coastal/fluvial flooding	L	M	H	S	S
Development Bordering MIC	Coastal/fluvial flooding	M	M	H	S	S
Utilities Infrastructure						
Stormwater	Loss of function due to higher tidal elevations	M			H	S
Wastewater	Coastal/fluvial flood				S	S
Water	Coastal				M	H
Power			M	M	H	S
Transportation Infrastructure						
Highways	ial flooding	L	M	M	H	H
Roadways	Coastal/fluvial flooding	M	M	H	H	S
Bikeways	Coastal/fluvial flooding	L	L	M	H	H
Trails	Coastal/fluvial flooding	L	L	M	H	H
Environmental Resources						
Wetlands	Habitat loss due to inundation	M	M	M	H	S

Work in Progress, Needs to be Vetted by Stakeholders as a Next Step

Risk Assessment

Risk Assessment Scoring System

Consequence	Risk Score	
	Short-term RSLR Threshold SLR ≤ 2 ft	Long-term RSLR Threshold SLR ≥ 3 ft
High: Permanently damaged, large impact on system, large loss of value or life	R4	R3
Medium: Temporarily damaged but moderate impact on system, medium loss of value	R3	R2
Low: Temporarily damaged, low impact to system, small loss of value	R2	R1

Tideflats Resource Risk Assessment Matrix

Resource	RSLR Threshold	Consequence	Justification	Risk Score
Coastal Development				
Industrial Areas within MIC	Long-term (SLR ≥ 3 ft)	High	Highly valuable industrial development critical to region	R3
Development Bordering MIC	Long-term (SLR ≥ 3 ft)	Medium	Variety of uses, less dense than within MIC	R2
Utilities Infrastructure				
Stormwater	Short-term (SLR ≤ 2 ft)	Medium	Tempora… inf…	R3
Wastewater	Short-term (SLR ≤ 2 ft)	High		R4
Water	Long-term (SLR ≥ 3 ft)			R2
Power			…pacts to …ons and generators	R3
Transportation In…				
Highways		High	Large impacts possible from temporary disruptions	R3
Roadways	Short-term (SLR ≤ 2 ft)	Medium	Temporary disruptions may have impacts locally	R3
Bikeways	Long-term (SLR ≥ 3 ft)	Low	Relatively minor impacts from temporary loss of service	R1
Trails	Long-term (SLR ≥ 3 ft)	Low	Relatively minor impacts from temporary loss of service	R1
Environmental Resources				
Wetlands	Short-term (SLR ≤ 2 ft)	Medium	Gradual loss of habitat areas	R3

Work in Progress, Needs to be Vetted by Stakeholders as a Next Step

Next Steps

- Vulnerability Assessment (Work in Progress)
  - Seek Input from Stakeholders on Assessment
- Develop Mitigation Measures & Recommendations for Next Steps
  - Seek Input from Stakeholders