THURSTON CLIMATE ADAPTATION PLAN

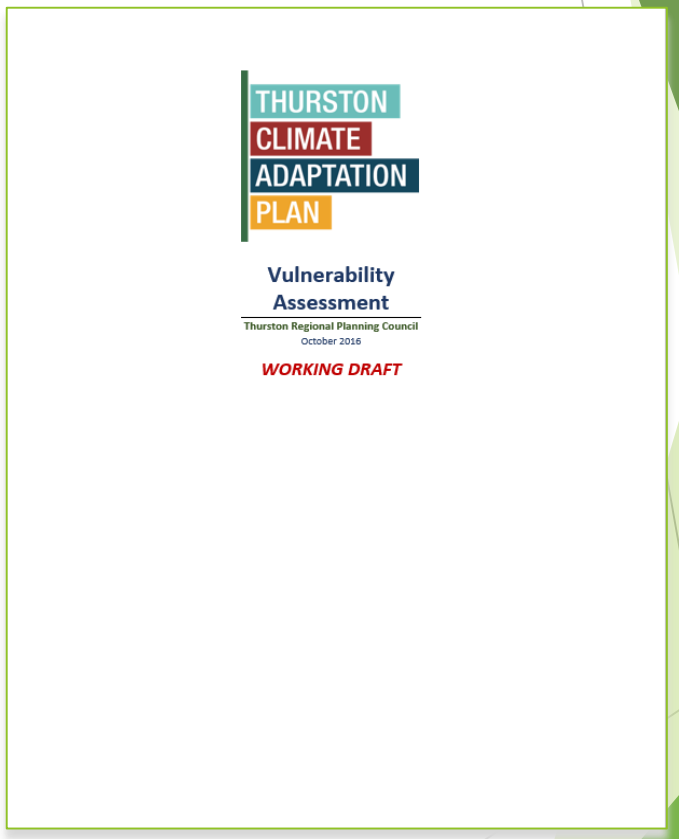
Presentation: Identifying & Assessing Climate Risks

Oct. 27, 2016

thurston regional planning council

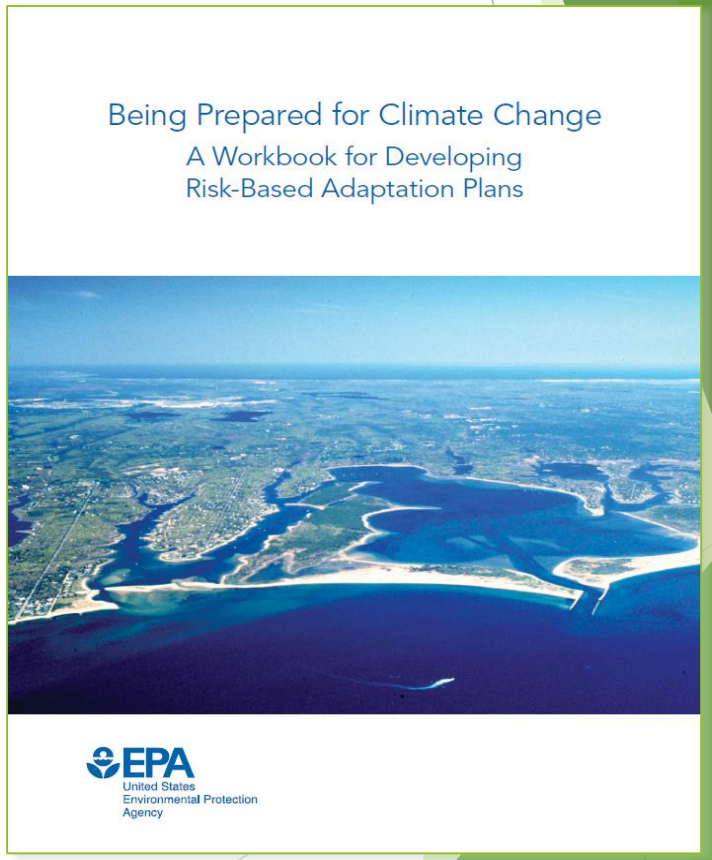
Vulnerability Assessment

- **Drafted Vulnerability Assessment:**
  - 100-page document printed for binders and saved on project website: www.trpc.org/climate
  - Uses empirical data to show historical changes in South Puget Sound region's climate
  - Uses emissions scenarios and climate models to show projected changes over the 21st century
  - Uses research (*academic*, *government*) to assess impacts on region's human and natural systems and assets (*roads*, *estuaries*, *streams*, *etc.*)
  - Serves as foundation for Risk Assessment



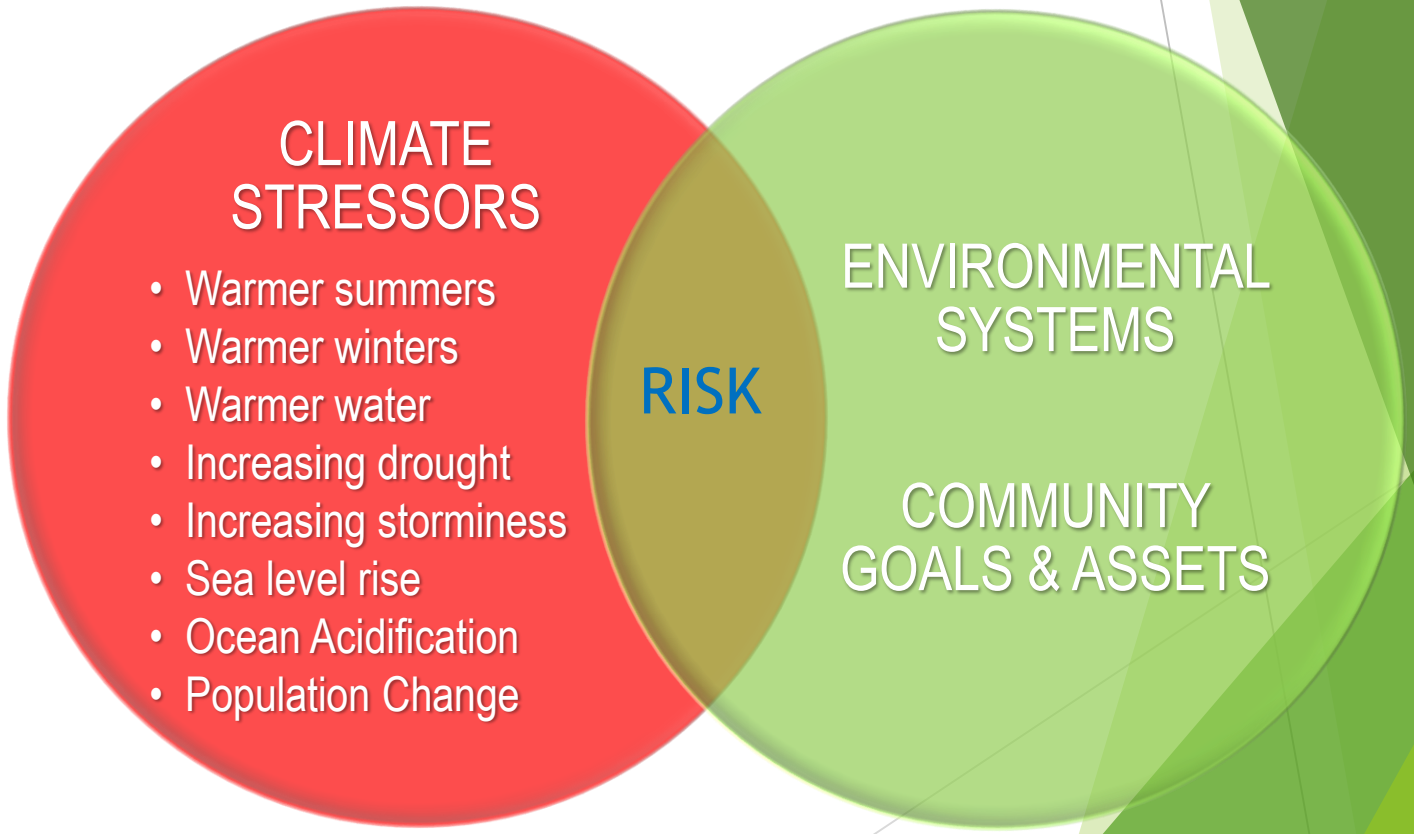
Risk Assessment

- **Overview:** Use EPA tool for watershed-scale adaptation planning
- **Steps 1-2:** Define project area, gather stakeholders and establish goals *[July-September 2016]*
- **Step 3:** Identify how climate opportunities and risks affect goals *[October 2016]*
- **Step 4:** Assess risks (*probability, consequence, extent, time horizon, etc.*) *[November-December 2016]*
- **Step 5:** Compare risks (*put in probability/consequence table*) *[December 2016-January 2017]*
- **Steps 6-7:** Decide course of action (*e.g., mitigate, transfer or accept risk*) *[January-February 2017]*
- **Step 8:** Draft, revise and prioritize adaptation strategies *[March-June 2017]*



Defining Risk

- **Risk:** The potential for loss, damage, disruption, or other impacts created by the interaction of climate change stressors with environmental systems and community goals and assets



Identifying Risk

- **Method:** Assess how risks and opportunities identified in the vulnerability assessment and categorized by climate stressor affect our community's ability to achieve its goals.

- **12** Sustainable Thurston priority goals

- **8** stressor categories identified by EPA and project team

Goal & Stressor Table (Goals 1-4) Includes Risks (-) and Opportunities (+)

	STRESSORS							
	Warmer Summer	Warmer Winter	Warmer Water	Increasing Drought	Increasing Storminess	Sea-Level Rise	Ocean Acidification	Population Change
Goal 1: Create vibrant centers, corridors and neighborhoods while accommodating growth	(-) Causes urban heat islands, which affect livability/health in heavily developed centers and corridors [Sec. 2.1, pg. 17]			(-) Limits water available to support new development [Sec. 3.4, pg. 53]	(-) Increases volume of urban runoff and flooding and renders inadequate some stormwater/flood-control facilities [Sec. 2.3, pg. 27]	(-) Increases frequency, depth and duration of inundation of low coastal areas (e.g., downtown Olympia), which may damage or disrupt use infrastructure (e.g., homes, roads, etc.) [Sec. 4.1, pg. 54]		(+) Presents opportunity to focus growth in existing urban areas [Sec. 6.5, pg. 89]
Goal 2: Preserve environmentally sensitive lands, farmlands, forest lands, prairies, and rural lands, and develop compact urban areas	(-) Decreases climatic suitability of areas that currently support Garry oak and Douglas fir but may increase the range of western hemlock, western red cedar and other species that can withstand warmer temperatures [Sec. 5.2, pgs. 70-71] (-) Decreases freshwater wetland habitat [Sec. 3.3, pg. 49] (-) Stresses sensitive species, leaving them more vulnerable	(-) Supports survival of invasive species that could outcompete native flora and fauna throughout the region's forests, prairies and grazing lands [Secs. 5.1 and 5.2, pgs. 67-71] (-) Shifts the timing of flowering and abundance	(-) Increases periods of low dissolved oxygen and hypoxic conditions in both freshwater and marine areas [Sec. 3.2, pg. 45]	(-) Raises the risk of wildfires, which could damage forests and other sensitive habitat [Sec. 5.2, pg. 73] (-)Stresses sensitive plants and habitat, reducing long-term viability of preserved and restored areas [Sec. 5.2, pg. 71]	(-) Increases frequency and intensity of heaviest 24-hour rain events and overall volume of winter streamflow, which could scour streambeds and degrade sensitive riparian areas [Sec. 3.1, pg. 32]	(-) Increases frequency, depth and duration of inundation of low-lying coastal areas, which could turn marshes and other upland areas into mudflats [Sec. 4.1, pg. 54] (+) Increases the rate of erosion of unprotected		(-) Increases pressure on rural land to develop [Sec. 6.5, pg. 89] (-) Increases pressure on existing parks and open space [Sec. 6.5, pg. 89]

Group Exercises

- Split into 4 groups at tables, discuss 3 goals on posters
- Consider whether changes needed (*adding*, *rewording*, *reorganizing*)
- Make comments on posters (*write on sticky notes or margins*)
- Report back to full Stakeholder Advisory Committee
- Discuss as full group

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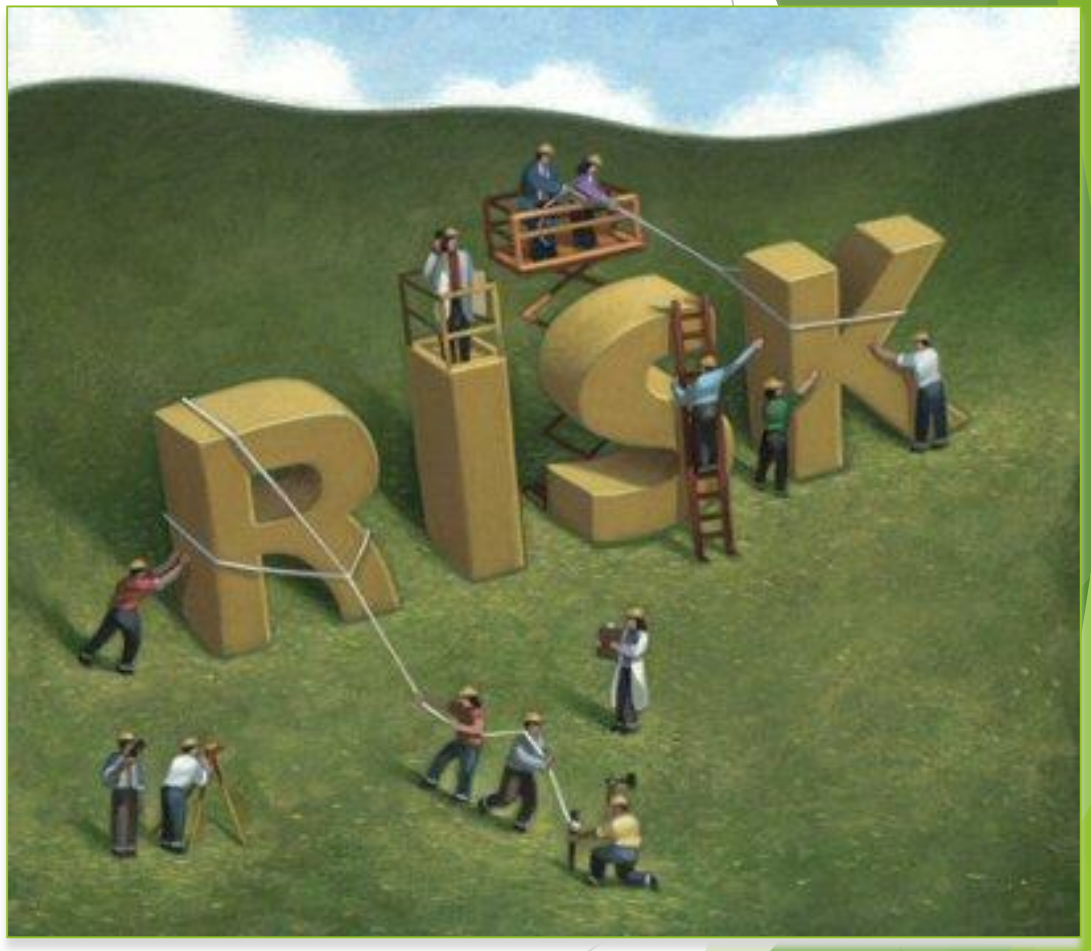
Goal 3: Create a robust economy	(-) Raises risk of low crop yields or failure due to warmer temperature, reduced summer precipitation and increased pest prevalence [Sec. 5.1, pg. 69]	(-) Reduces snowpack and alters streamflow volume and temperature, impacting long-term productivity of anadromous fish populations and fisheries [Sec. 3.1, pgs. 32-36]	(-) Increases the risk of marine water stratification and hypoxia and could alter the timing of spring plankton blooms that support the marine food web, including salmon and other economically important fish [Sec. 4.2, pg. 66]	(-) Decreases summer streamflow, which could reduce the habitat, health, and survival of salmonids [Sec. 3.1, pg. 34]	(-) Raises the risk of floods and landslides, which could damage utility infrastructure and close roads, cutting off access to goods, natural resources, and services vital to region's economy [Sec. 6.2, pg. 78]	(-) Threatens to flood local highways, railways, bridges, port marine terminal and other transportation infrastructure that are critical to moving people and goods throughout the region [Sec. 4.1, pg. 35]	(-) Threatens Puget Sound fisheries (e.g., shellfish, crabs and salmon) -- both commercial and recreational harvests [Sec. 4.2, pg. 65]	(+) Increases local demand for goods and services and supports local job creation and demand [Sec. 6.5, pg. 89]
	(-) Increases demand/cost for emergency medical services and hospitalizations [Sec. 2.1, pg. 17]	(+) Supports longer growing season, new range of crops [Sec. 5.1, pg. 68]	(-) Thermally stresses salmonids, which support economically important fisheries [Sec. 3.1, pg. 38]	(-) Increases wildfire risk -- especially amid the urban-wildland interface -- which can damage forests and infrastructure critical to the region's economy [Sec. 5.2, pg. 73]	(-) Raises the risk of flooding, which could damage agricultural crops, buildings and equipment [Sec. 5.1, pg. 67]	(-) Threatens to flood low-lying industrial, commercial, agricultural, and residential properties, disrupt commerce and damage infrastructure [Sec. 4.1, pg. 67]		(-) Increases demand for and cost to provide services (social, emergency, etc.) [Sec. 6.5, pg. 89]
	(-) Impacts outdoor occupations, especially in the construction industry, and could result in project delays and increased costs [Sec. 2.1, pg. 17]			(-) Reduces summer hydropower production, a comparatively clean and inexpensive electricity source for commercial and residential customers [Sec. 3.1, pgs. 36-37]	(-) Raises the risk of flooding that could disrupt transportation, business, school, emergency service, and public works and private utility operations [Sec. 6.2, pg. 78]	(+) Inundates coastal marshes, which could turn them into mudflats that support shellfish and estuarine fish [Sec. 4.1, pg. 63]		(-) Puts more strain on transportation (roads, transit, etc.) [Sec. 6.5, pg. 89]
				(-) Reduces water supply, which is critical for agriculture and industry [Sec. 5.1, pg. 67]	(-) Increases risk of flooding that could damage private property and result in economic losses [Sec. 6.2, pg. 78]	(-) Increases the rate of erosion of unprotected coastal bluffs, which may threaten the property and safety of nearby residents [Sec. 4.1, pg. 63]		
Goal 11: Provide opportunities for everyone in the Thurston Region to learn about and practice sustainability	(+) Creating a Thurston Climate Adaptation Plan presents another opportunity for the region to learn about and practice sustainability. Cumulative stressors necessitate climate adaptation, which IPCC says is now "unavoidable" because accumulation of past GHG emissions [Sec. 7, pg. 90].							

Words of Advice

- Apply your subject expertise and local system knowledge.
- Write down *plausible* risks and opportunities — even if they seem insignificant — for the 21st century (*emissions scenarios/models extent*).
- If adding a *new* climate risk, consider whether research suggests it is applicable to South Puget Sound (*e.g., extreme desertification not likely here*).
- The same risk might affect several goals — and that's okay …
  - … different strategies may be needed to mitigate the risk and achieve the goals.



Next Steps

- **10/28/16:** Project team sends stakeholders revised table that reflects edits from 10/27 meeting
- **11/2/16:** Stakeholders send project team any final suggested changes to table
- ***11/17/16:** Stakeholders review/revise project team's initial analysis of each risk (*probability and consequence*)
- ***12/22/16:** If necessary, continue discussion of risk analyses
- ***1/26/17:** Project team presents stakeholders 3x3 grid of risks' probability and consequence (*low, medium, high*)

**** Stakeholder meeting***

Likelihood (probability) of occurrence	Low	Medium	High
High	1. Warmer water may stress immobile biota 2. Warmer water may lead to changes in drinking water treatment processes n. _____	1. Warmer water may hold less dissolved oxygen 2. Sea level rise may cause bulkheads, sea walls and revetments to become more widely adopted n. _____	1. Shoreline erosion from sea level rise may lead to loss of beaches, wetlands and salt marshes 2. Combined sewer overflows may increase from more intense precipitation n. _____
Medium	1. Increased wildfires from warmer summers may lead to soil erosion 2. Warmer winters may lead species that once migrated through to stop and stay n. _____	1. Parasites and bacteria may have greater abundance, survival or transmission due to warmer water 2. Warmer summers may drive greater water demand n. _____	1. More frequent drought may diminish freshwater flow in streams 2. More intense precipitation may cause more flooding n. _____
Low	1. Warmer water may lead open seasons and fish to be misaligned 2. Warmer winters may lead to more freeze/thaw cycles that impact water infrastructure n. _____	1. Warmer water may lead jellyfish to be more common 2. Ocean acidification may cause the recreational shellfish harvest to be lost n. _____	1. Contaminated sites may flood from sea level rise 2. Warmer water may promote invasive species n. _____
	Low	Medium	High
	Consequence of impact		