Integrating Climate Change Considerations into Public Works Project Planning and Design in Snohomish County

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Linking climate science

with real world decision-making

CASCADIA CONSULTING GROUP

Snohomish County

Presentation Outline

Introduction to Snohomish County

- County characteristics
- Exposure to climate impacts
- The role of Public Works

Approaches to building climate resilience

- The role of a decision-support tool

Tool pilot study

- Process
- Findings and lessons learned
- Next steps

What does climate change mean for Snohomish County?

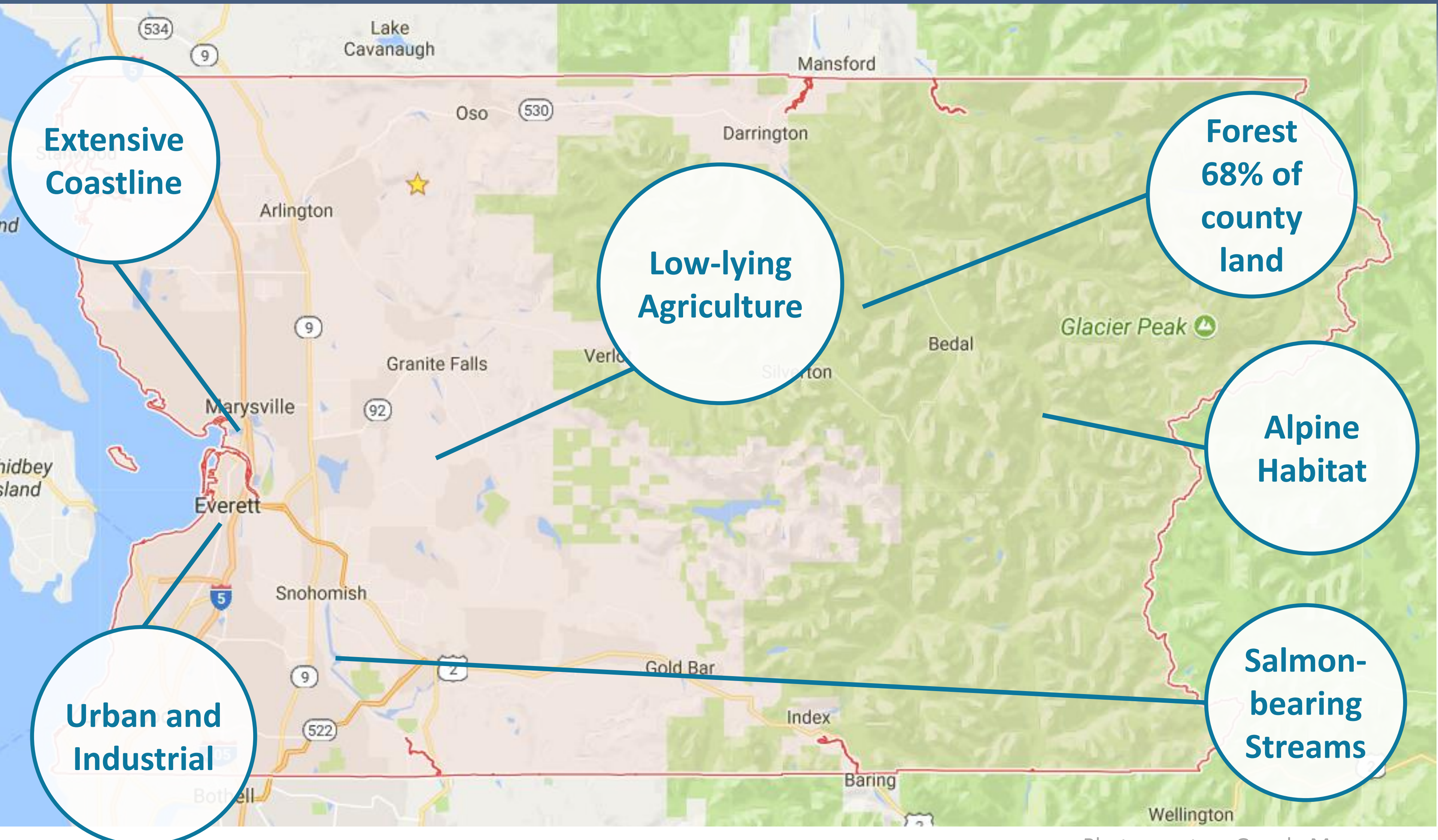
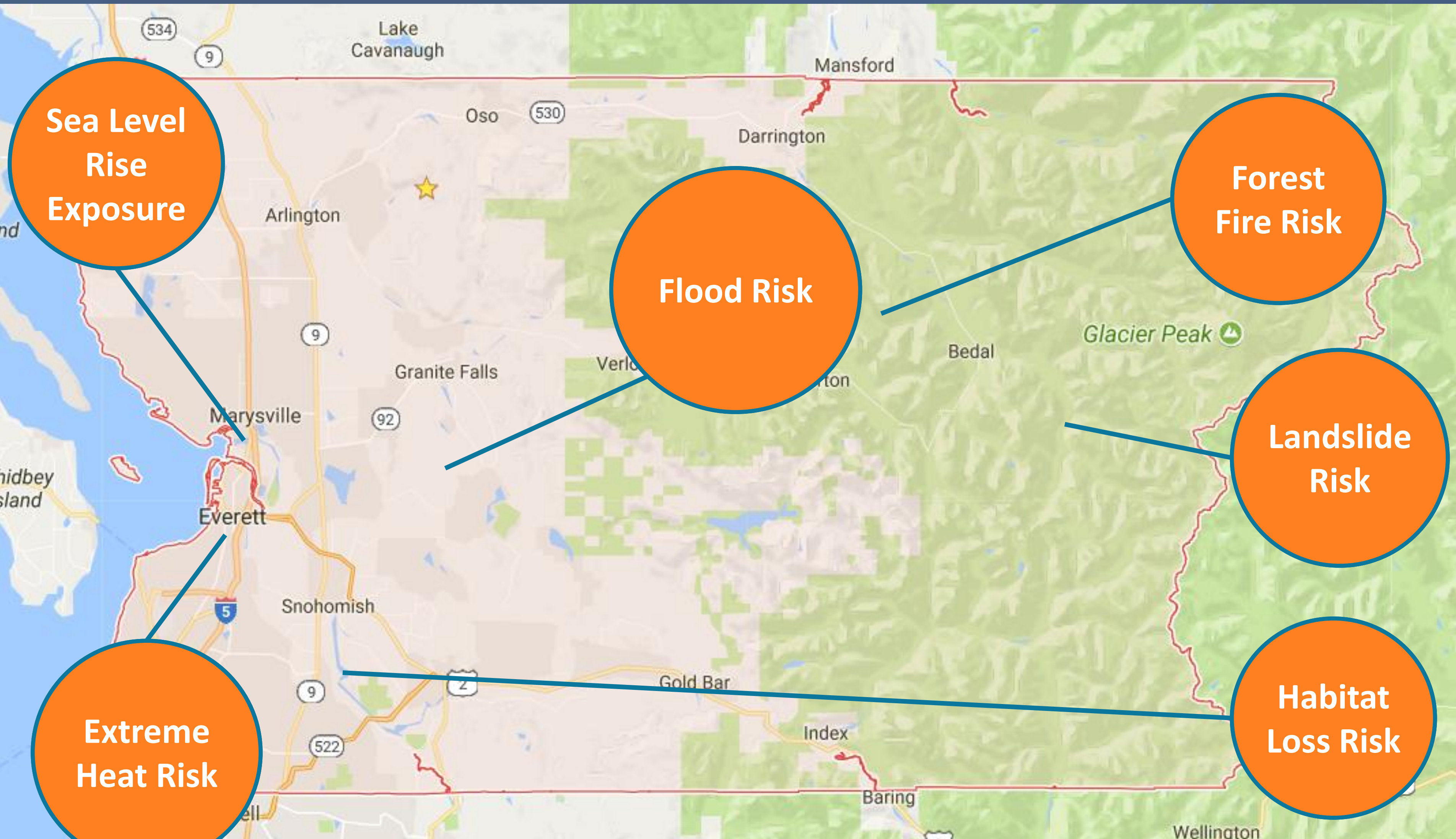


Photo courtesy Google Maps.



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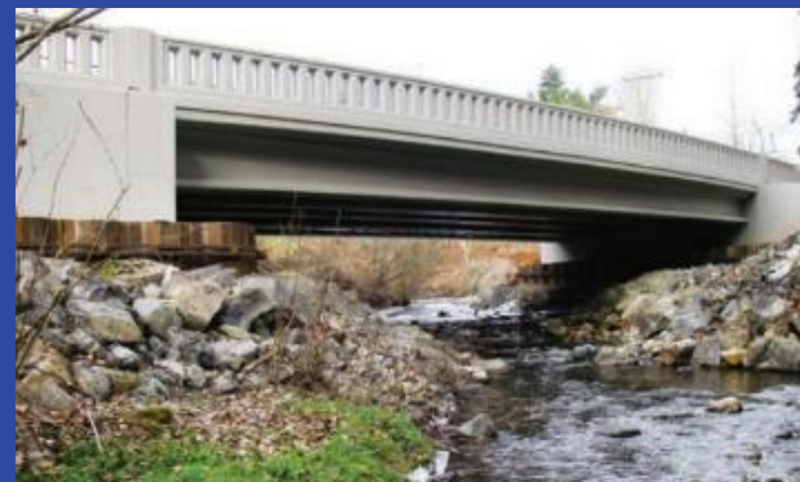


What the County is doing

Snohomish County
Emergency Management

Hazard Mitigation Plan

Puget Sound Initiative

Sustainable Operations Action Plan

Public Works

Snohomish County
Public Works

6 Divisions including:

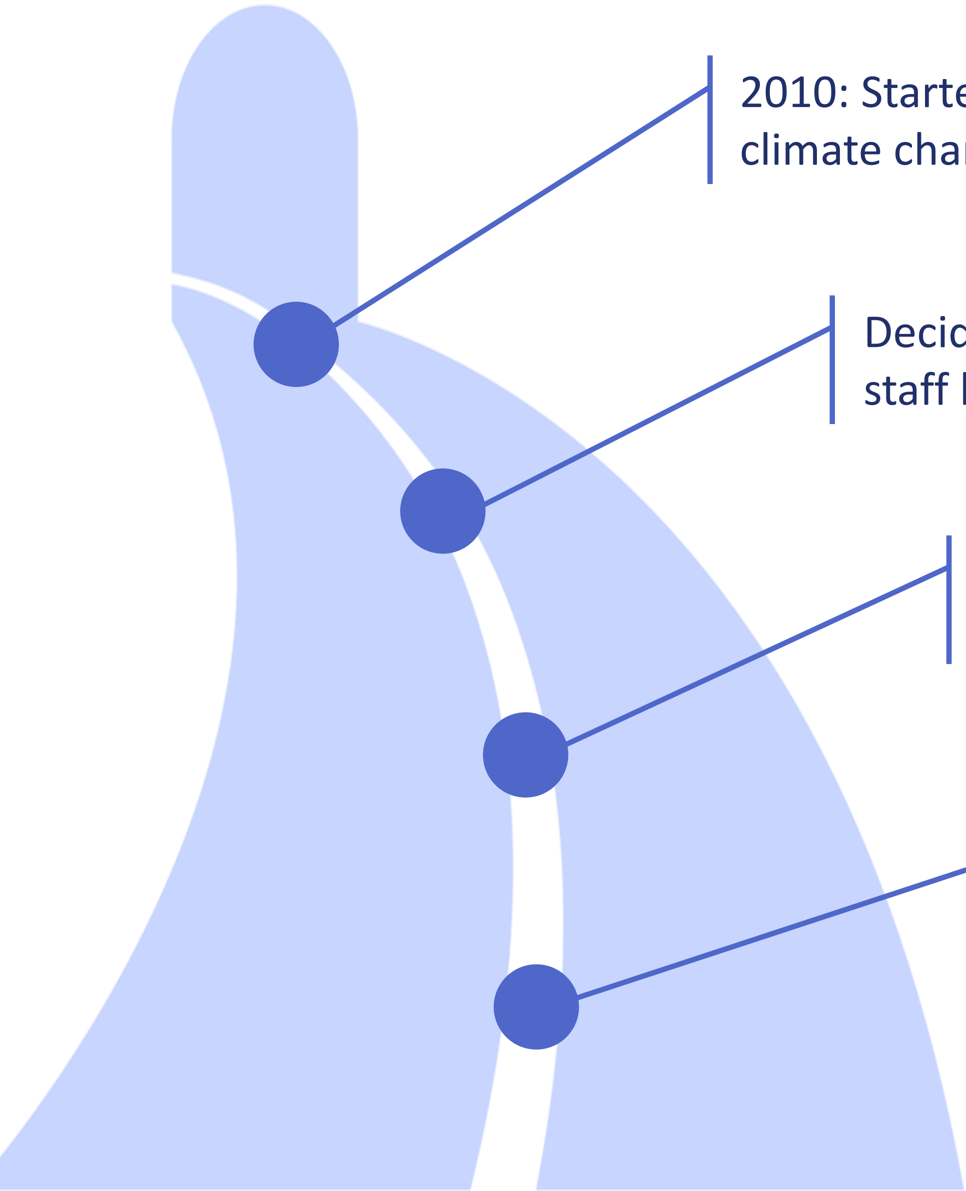
- Engineering Services
- Road Maintenance
- Surface Water Management
- Solid Waste

Climate change matters because…

we plan for, design, build, operate and maintain millions of dollars in public infrastructure to support citizens and businesses in the county and region.

A resilient Snohomish County can better withstand, recover, and adapt to a changing climate.

Our Resilience-building Journey



2010: Started **exploring options** for climate change integration.

Decided that a **tool would help ensure** all staff have **easy access to climate information**.

2015-2017: **Funded, beta-tested, and rolled out** decision-support tool.

Currently applying to several road and bridge projects.

Benefits to Public Works

Educational

- Science-based, objective way to communicate and manage risk

Easy to use and consistent

- Minimizes need for multiple staff in multiple departments to all collect and analyze complex scientific data on climate change, or read long assessment reports
- Filters out extraneous information: focus on timescale of interest

Averts costly damage

- Helps County make cost-effective upfront planning/project decisions
- Reduces harm to people, projects & assets

Benefits to Public Works

Flexible

- Can be regularly updated and expanded

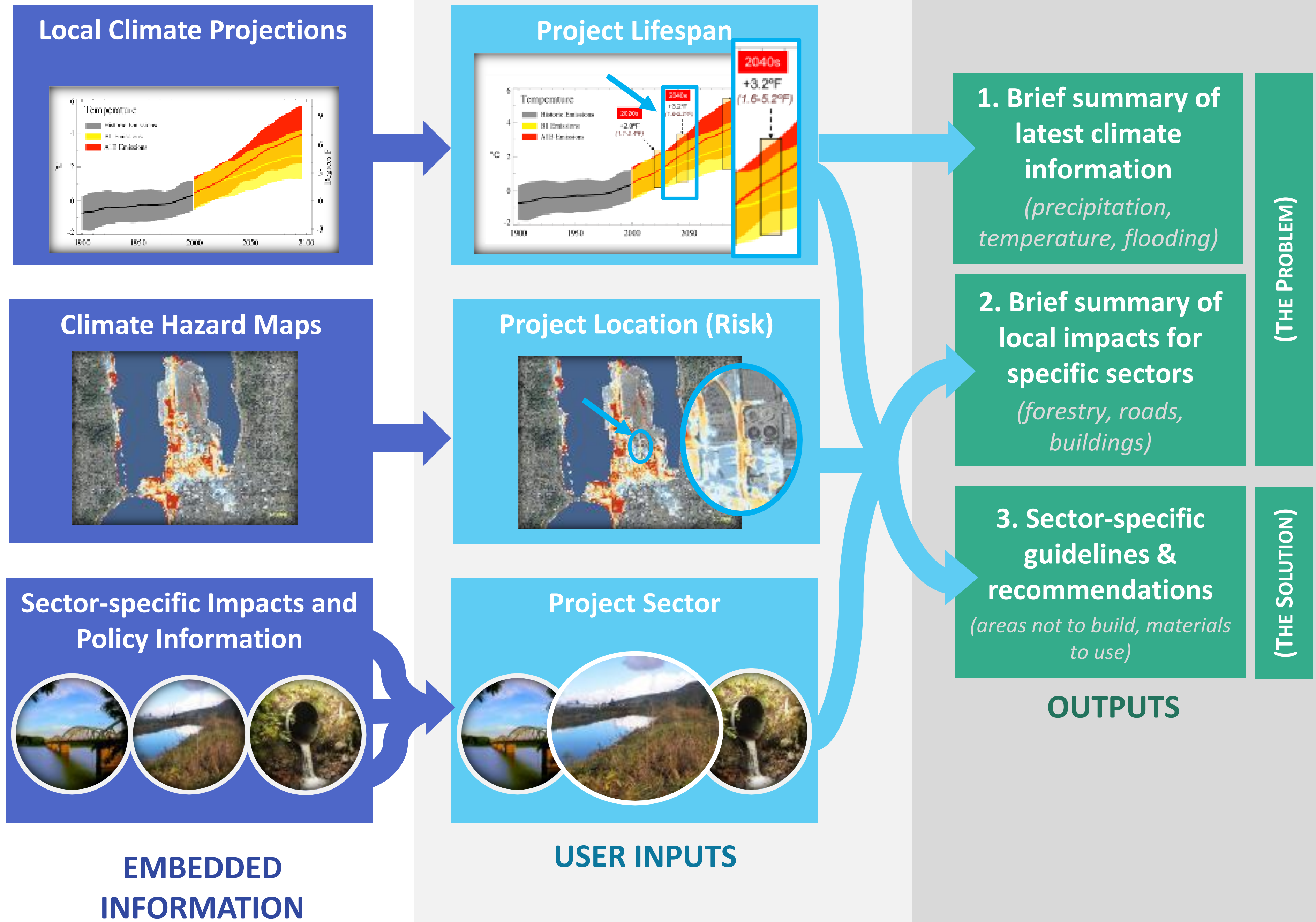
Provides guidance to support decision-making

but…

Does not provide all the answers

- Does not give “investment-grade” analysis or change design standards
- Does not address climate mitigation

The CIMPACT-DST Case Study



Local Climate Projections
Temperature
Climate Hazard Maps
Sector-specific Impacts and Policy Information
EMBEDDED INFORMATION
Project Lifespan
Temperature
2040s
+3.2°F
(1.6-5.2°F)
Project Location (Risk)
Project Sector
USER INPUTS
1. Brief summary of latest climate information
(precipitation, temperature, flooding)
2. Brief summary of local impacts for specific sectors
(forestry, roads, buildings)
(The Problem)
3. Sector-specific guidelines & recommendations
(areas not to build, materials to use)
(The Solution)
OUTPUTS

Tool Snapshot

Project Exposure

Salmon Way Bridge

STEP 2. Select the most appropriate planning horizon for your project.

STEP 3. Click the button to determine the coordinates of your project area.

NOTE: If map values are not available for your area, then enter your best guess based on proxmiate values or other information sources.

When clicking on the icons, maps are provided for the timeframe that most closely matches the project planning horizon.

In cases where a climate impact map is not available for a chosen timeframe, the maps show projected impacts for next available time period. The maps and corresponding do NOT interpolate between time periods.

PLANNING HORIZON

2040-2059

What are the coordinates of your project area?

X (negative value): -13607463.20606

Y (positive value): 6140408.31356

CLICK HERE TO VIEW ALL CLIMATE MAPS FOR CHOSEN TIME PERIOD

STEP 4: Click on the center of your project area in the map to find the coordinates, and enter them here.

STEP 5: Click on the icons to open climate impact maps for your planning area.

STEP 6: Click on your project area in each map to find data to be entered on this page.

TEMPERATURE

Average Ambient Temperature Increase (in degrees F):

	low-end		high-end	
Annual	4.3	to	5.6	degrees F increase compared to historic baseline conditions
Summer	5.1	to	6.9	degrees F increase compared to historic baseline conditions
Winter	3.9	to	4.9	degrees F increase compared to historic baseline conditions
Growing Degree Days	957	to	1322	degree-days compared to historic baseline conditions

Stream Temperature Increase (in degrees C):

Is there a stream associated with your project? (see stream temperature map) Yes

Mean August temperature for measured streams closest to this project is projected to be approximately 17.8 degrees C by the selected time period, which is at the range for increased disease risk in adult salmon .

Wildfire Risk:

Currently, this project is located in a Low Fire Hazard Zone . This risk may increase with projected climate change.

Scroll down to complete this page!

WATER QUALITY/AVAILABILITY

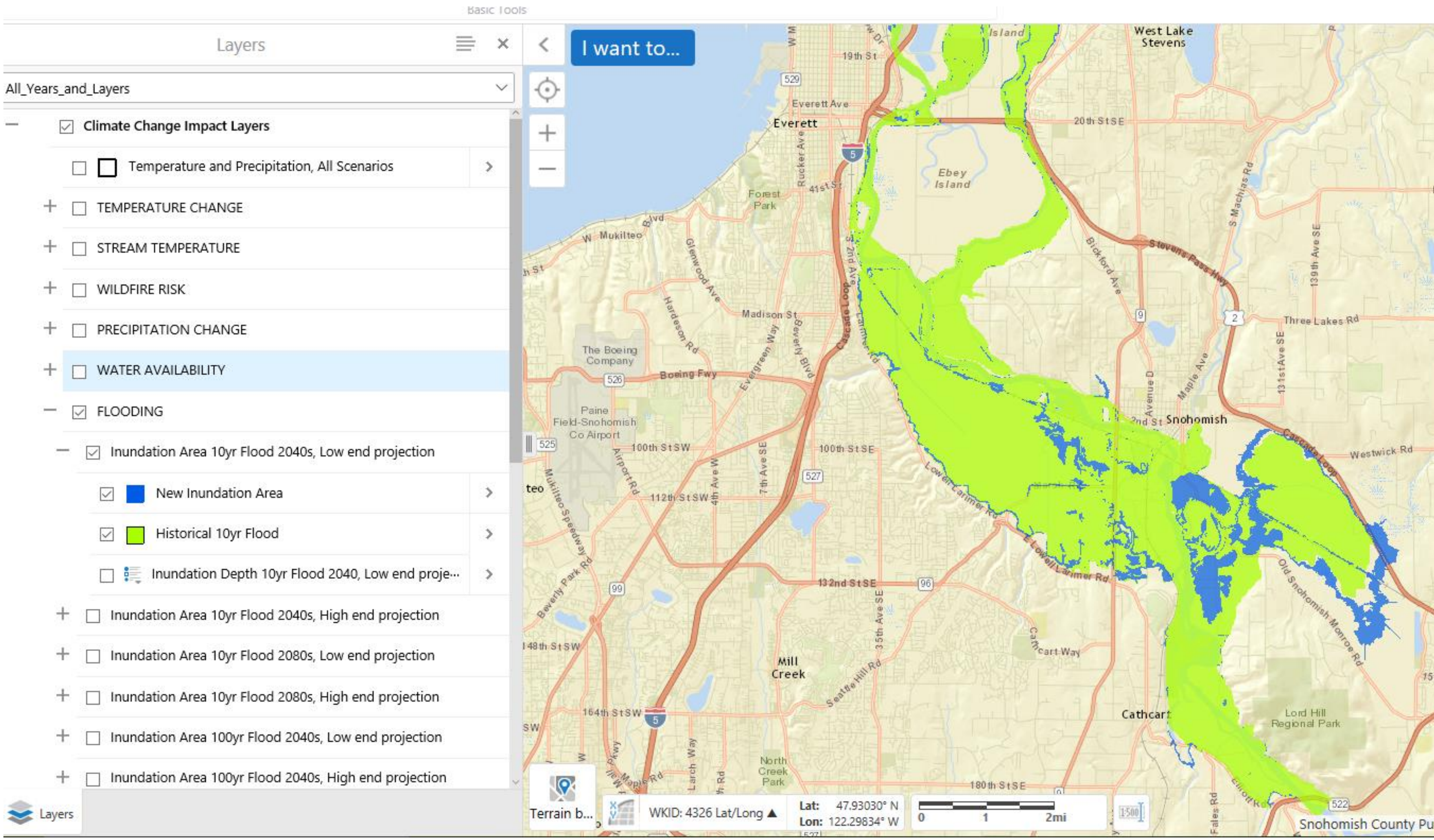
Precipitation Change (percent):

	low-end		high-end	
Annual	2	to	2	percent change in monthly precipitation compared to historic baseline conditions
Dry Season	-8	to	-9	percent change in monthly precipitation compared to historic baseline conditions
Wet Season	7	to	8	percent change in monthly precipitation compared to historic baseline conditions

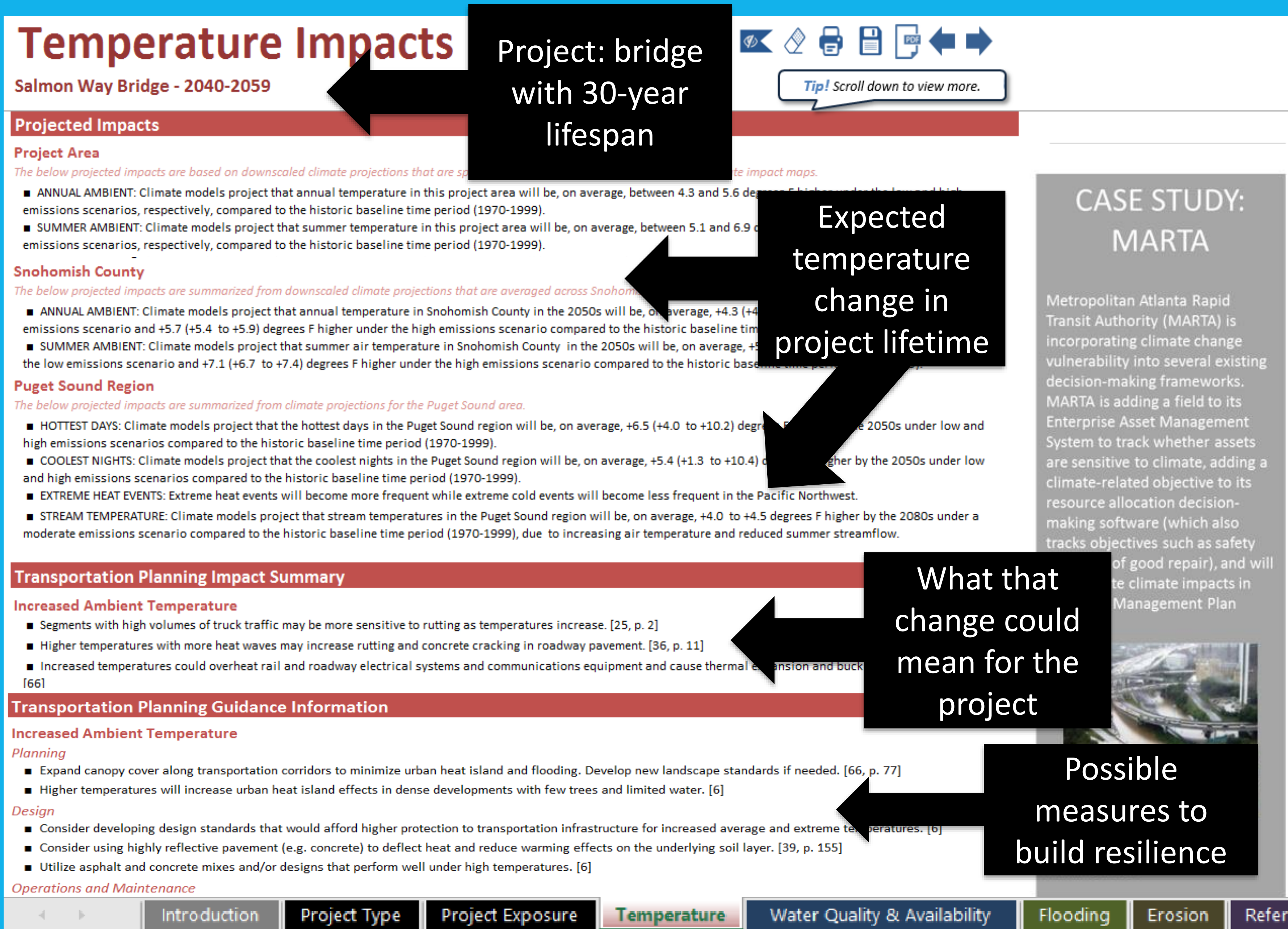
Seasonal Timing of Streamflow:

Historically, this project was located within a mixed rain-snow dominant watershed.

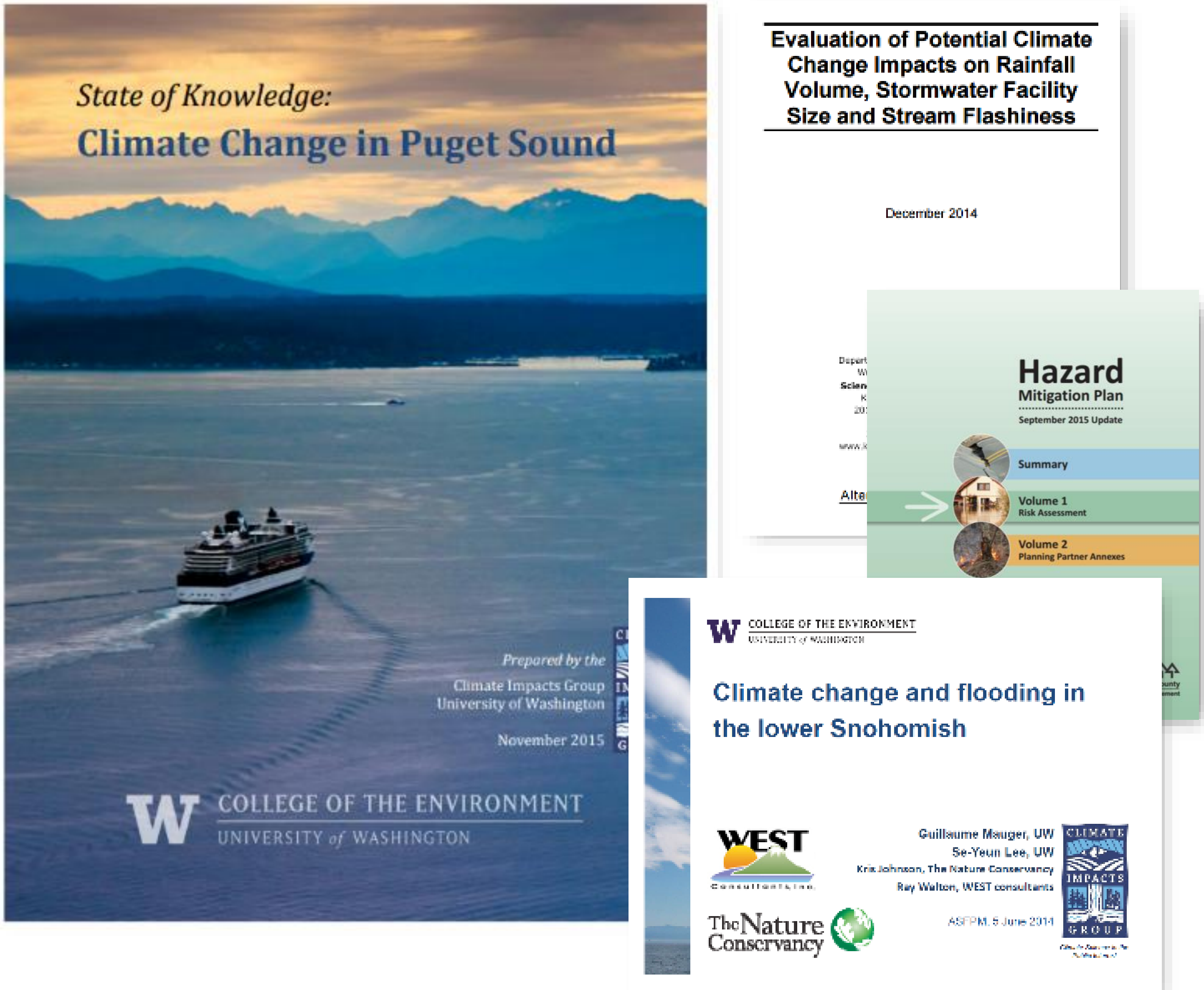
By the selected time period, the project may be be within a mixed rain-snow dominant tershed under the high-end scenario.


Basic Tools
Layers
I want to...
All_Years_and_Layers
Climate Change Impact Layers
Temperature and Precipitation, All Scenarios
TEMPERATURE CHANGE
STREAM TEMPERATURE
WILDFIRE RISK
PRECIPITATION CHANGE
WATER AVAILABILITY
FLOODING
Inundation Area 10yr Flood 2040s, Low end projection
New Inundation Area
Historical 10yr Flood
Inundation Depth 10yr Flood 2040, Low end proje...
Inundation Area 10yr Flood 2040s, High end projection
Inundation Area 10yr Flood 2080s, Low end projection
Inundation Area 10yr Flood 2080s, High end projection
Inundation Area 100yr Flood 2040s, Low end projection
Inundation Area 100yr Flood 2040s, High end projection
Layers
Terrain b...
WKID: 4326 Lat/Long
Lat: 47.93030° N
Lon: 122.29834° W
0
1
2mi
West Lake Stevens
Everett
Ebey Island
Snohomish
Mill Creek
Cathcart
The Boeing Company
Paine Field-Snohomish Co Airport
Lord Hill Regional Park
North Creek Park
Forest Park
Snohomish County Pu

Sample Output



Data Sources



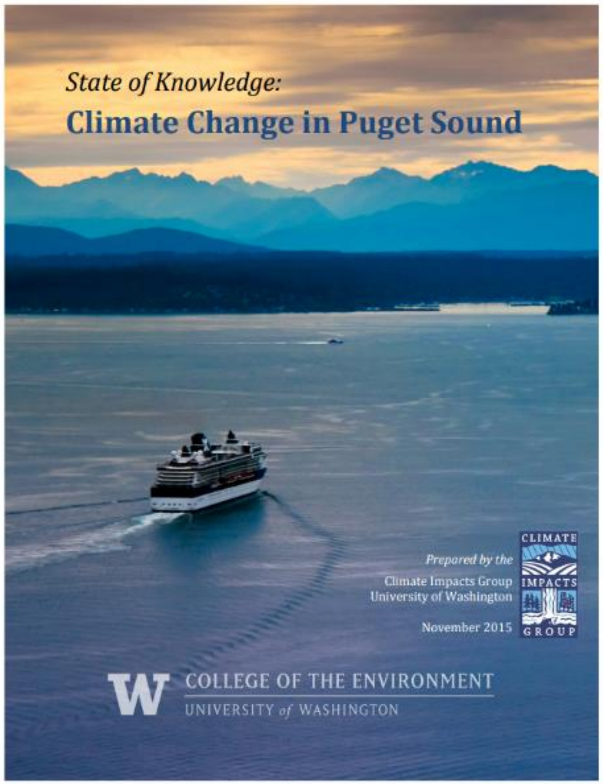
CITY OF VANCOUVER

DEPARTMENT OF ECOLOGY
State of Washington

U.S. Department of Transportation
Federal Transit Administration

WSDOT

Translating available information…



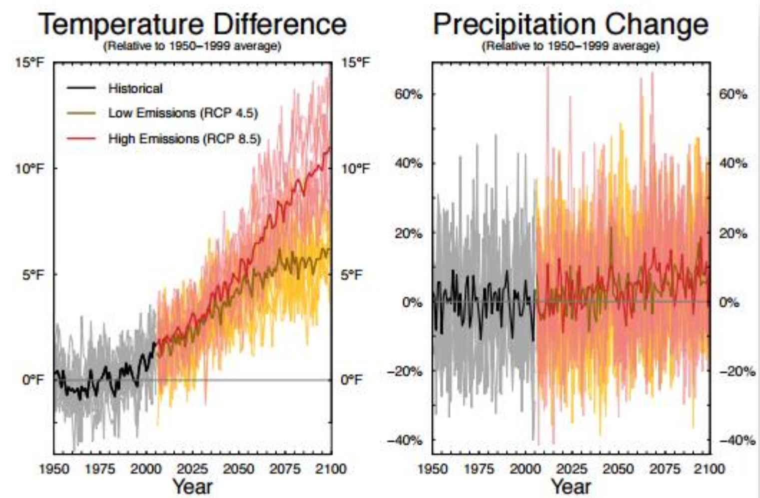


Figure 2-2. All scenarios project warming in the Puget Sound region for the 21st century; projected changes in annual precipitation are small compared to year-to-year variability.

Annual average air temperatures are projected to increase.

Warming is projected for all greenhouse gas scenarios, and the amount of warming depends on the amount of greenhouse gases emitted.

Projected change in Puget Sound average annual air temperature:

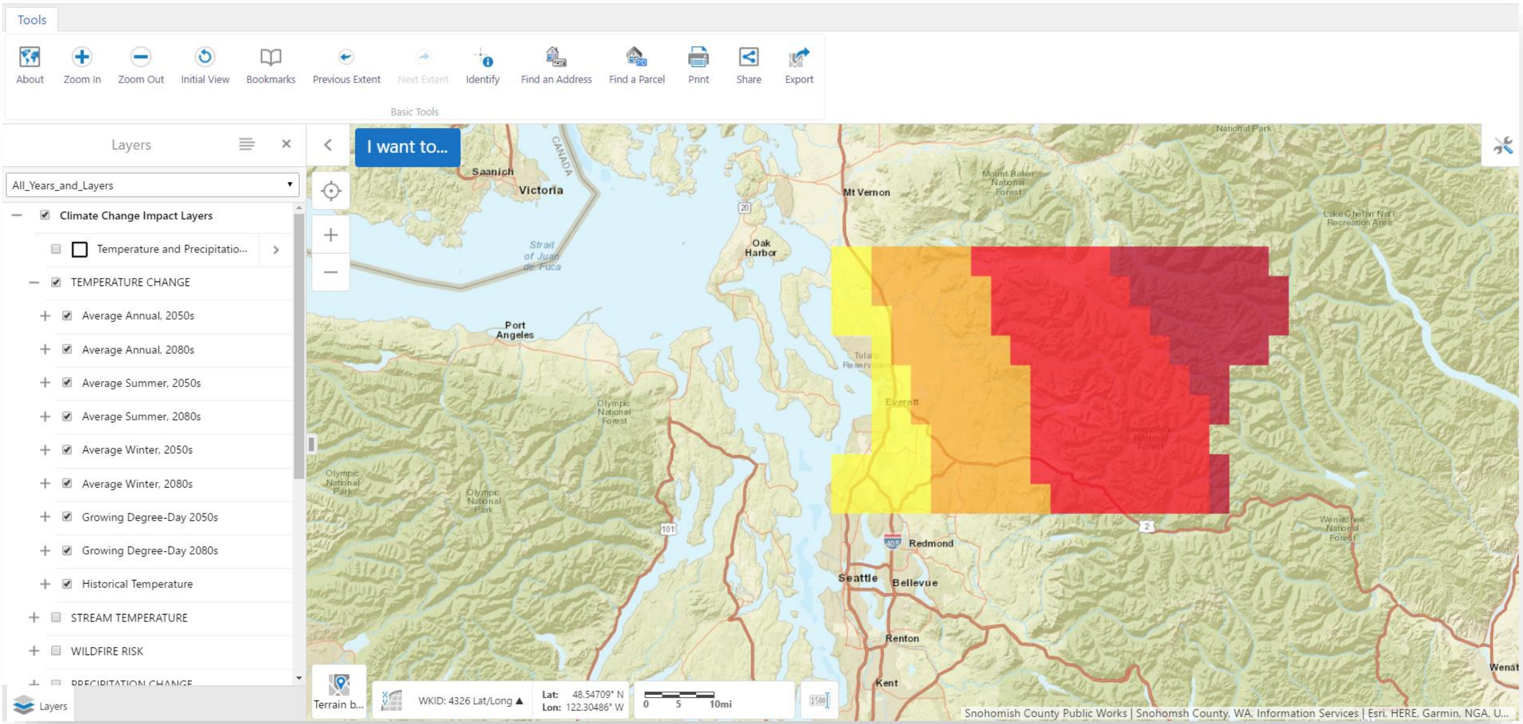
2050s (2040-2069, relative to the average for 1970-1999):[I,23]

Low emissions (RCP 4.5):	+4.2°F (range: +2.9 to +5.4°F)
High emissions (RCP 8.5):	+5.5°F (range +4.3 to +7.1°F)

2080s (2070-2099, relative to the average for 1970-1999):[I,23]

Low emissions (RCP 4.5):	+5.5°F (range: +4.1 to +7.3°F)
High emissions (RCP 8.5):	+9.1°F (range: +7.4 to +12°F)

…into customized, local, and accessible information.



Snohomish County

The below projected impacts are summarized from downscaled climate projections that are averaged across Snohomish County.

- ANNUAL AMBIENT: Climate models project that annual temperature in Snohomish County in the 2050s will be, on average, +4.3 (+4.1 to +4.5) degrees F higher under the low emissions scenario and +5.7 (+5.4 to +5.9) degrees F higher under the high emissions scenario compared to the historic baseline time period (1970-1999).

Project Area

The below projected impacts are based on downscaled climate projections that are specific to the project area, as identified in the climate impact maps.

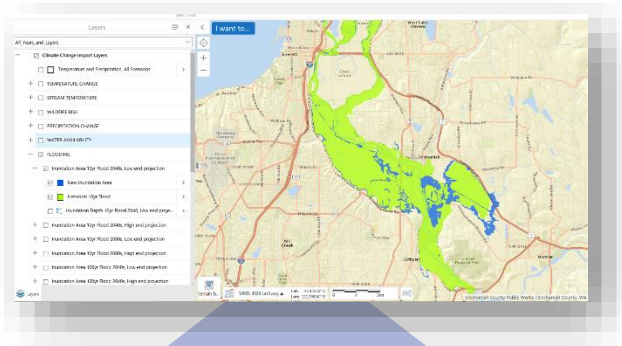
- ANNUAL AMBIENT: Climate models project that annual temperature in this project area will be, on average, between 4.3 and 5.6 degrees F higher under the low and high emissions scenarios, respectively, compared to the historic baseline time period (1970-1999).

Our Process

Surface water management

Transportation planning

Habitat restoration



1 Clarify use scenarios/ sectors

2 Gather and synthesize available information

3 Translate data into customized local platform

4 Beta test and revise using example projects

5 Train Staff

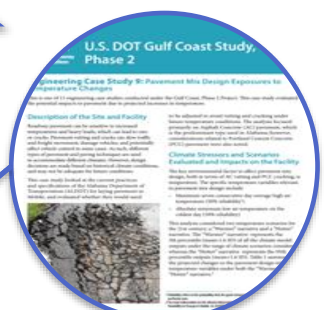
6 Apply to infrastructure projects

Climate projections

Academic literature

Case studies

Guidance documents



Tool Application Example

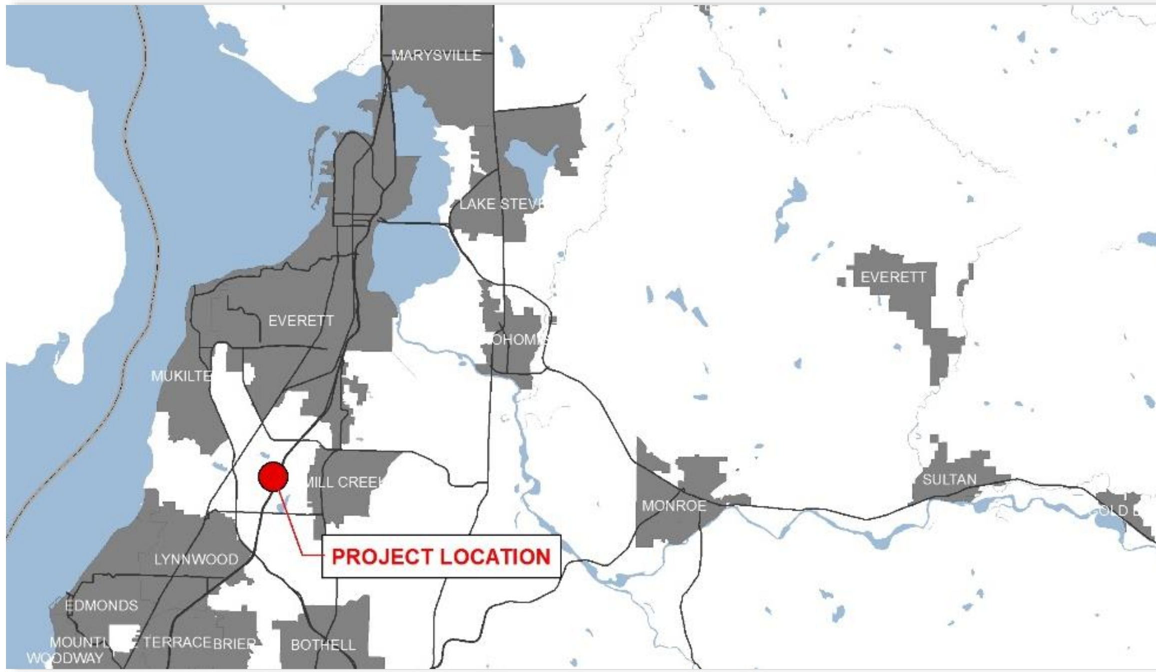
Beta-testing:

4
Public Works projects run through tool

3
Sectors represented

Currently applying to road and bridge projects

Ash Way: 164th St SW to Gibson Road



2.5 Mile Corridor

$50 +/- Million Investment

30-Year Traffic Forecast

40+ Year Lifespan

Key Takeaways

Successes

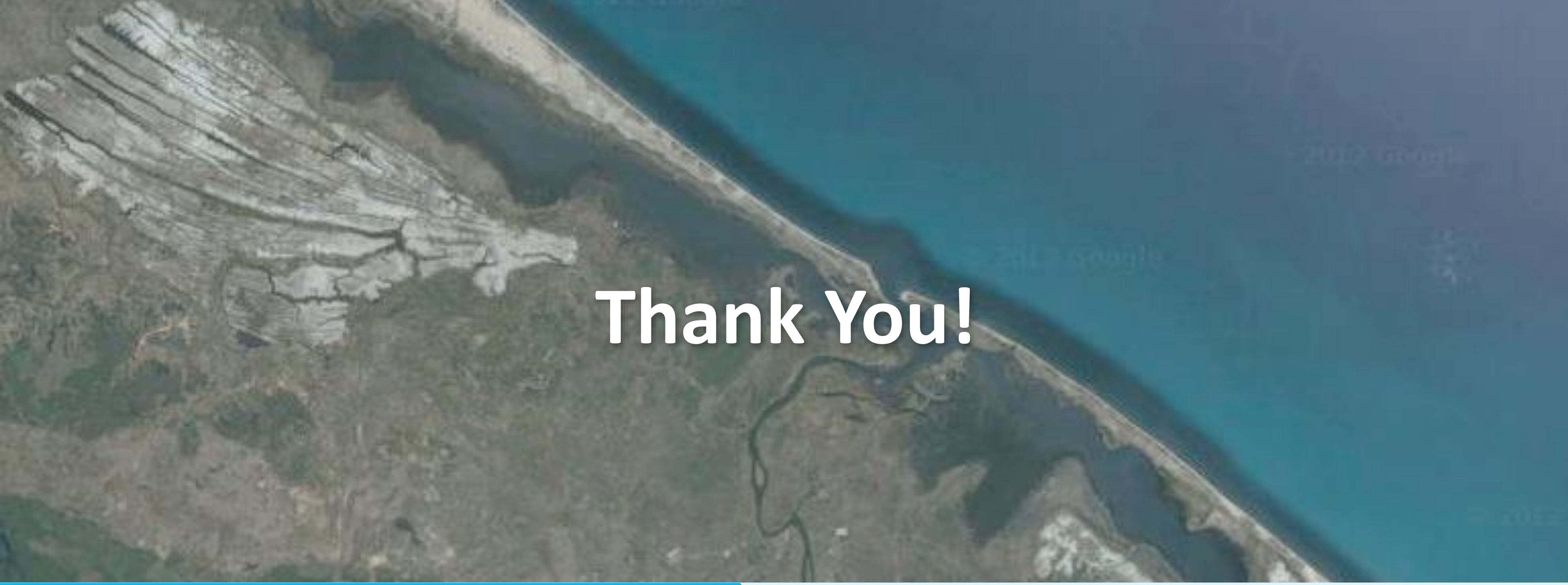
- ✓ Raised **awareness** and **accessibility** of climate information.
- ✓ Started **meaningful dialogues** and creative thinking.
- ✓ Piqued interest in further **trainings**.
- ✓ Triggered more **proactive** risk management.

Challenges

- > Best applied **early** in the project.
- > Hard to change **status quo** or design standards.
- > **Cost-benefit analysis** to support decision making can be challenging.
- > Requires an **internal champion** and time/resources.

Next Steps

- Refine how we conduct risk and cost-benefit analyses.
- Apply tool to additional projects and expand tool use to additional departments.
- Create and update policies relating to climate change.
- Update supplemental guidance and expand training.
- Expand tool: additional topics, new data & information (e.g., guidance, case studies).



Thank You!

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