

How to Use *Climate Mapping for a Resilient Washington*, a Web Tool for Climate Resilience Planning in Washington State.

Climate Mapping for a Resilient Washington (CMRW) enables your jurisdiction to explore local climate impacts that can inform climate vulnerability assessment and resilience planning. The interactive web application displays and summarizes changes in Washington's climate at the state and county level. Users have options to download data, tables, and figures that depict changes for the county in which they are located. This scientific information can inform your local resilience planning, and when combined with current local conditions that affect climate impacts, it can also inform policies and actions to increase climate resilience.

For users who are using *CMRW* along with the climate element planning guidance developed by Washington State Department of Commerce, this user's guide for the web application is linked in Section 3, Step 1 of that guidance document.

This users guide describes steps a local jurisdiction can take to use CMRW to explore local climate impacts for multiple sectors and planning areas. CMRW includes 11 sectors: Agriculture and Food Systems, Built Environment and Energy, Cultural Resources and Practices, Economic Development, Ecosystems, Emergency Management, Health and Well-being, Transportation, Waste Management, Water Resources, and Zoning. Information is provided for seven climate hazards: Drought, Extreme Heat, Extreme Precipitation, Flooding, Reduced Snowpack, Sea Level Rise, Wildfire.

This guide is focused on how to use the web application and the steps to follow to explore local impacts in your area. More information and sources for the climate data contained within the web application are available through the web application by selecting options from the menu bar.

INTRODUCTION

USER GUIDE

ABOUT CLIMATE DATA

DOCUMENTATION

DEFINITIONS

CLIMATE MAPPING FOR A RESILIENT WASHINGTON

Questions about this guide or data and information contained within the web application can be sent to Matt Rogers at rawrgers@uw.edu.

This guide explains how to:

1. Select different visualizations of climate hazards by planning sector;
2. View climate indicators for climate scenarios and time periods in the future;
3. Find information on how to explore local climate impacts and other factors that can affect exposure and sensitivity to changes in the climate at the local level;
4. Download maps, tables, graphs, and data by county.

1. Select Visualization. Climate impacts can be viewed at the state level or for the county in which you are located. Selecting “County Graph” or “County Table” displays a summary of the climate impacts in your county.

Select Visualization

View maps of climate data at the resolution of the data. View county-level climate data on graphs and tables.

STATE
MAP

COUNTY
GRAPH

COUNTY
TABLE

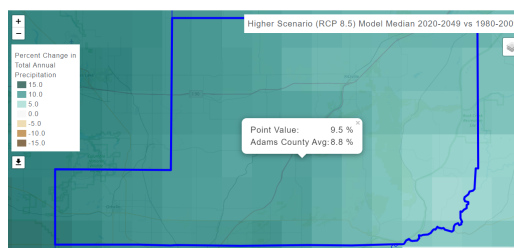
Note: The map is most useful for initial exploration of climate changes in your area. County-specific graphs and tables are most useful for viewing detailed changes expected for your area (see steps 8 and 9).

2. Select County. Selecting your county from the drop-down list will focus the map on that county. You can also select a county by clicking on the county in the state map. Clicking on the county in the map will also produce a pop-up box with the county average value of a climate indicator, as well as the point value for the location of the cursor.

Select County

Select a Washington County here or by clicking on map.

Adams



What about data for my city or town?

Climate Mapping for a Resilient Washington provides climate information summaries at the county level because in many cases the precision of the modeled climate data is not sufficient to provide accurate climate projections at the scale of individual cities or towns. In most cases, the county-level summaries are also applicable to the cities and towns in those counties. For some climate indicators of climate change that vary with elevation, such as changes in snowpack or streamflow, cities and towns can consider the variation within the county as shown on the map. For most climate indicators, within county and local variation in climate impacts will depend on existing local conditions that affect exposure and sensitivity to climate change (**See Step 7**). Data on climate exposure in the web application should be used in combination with local data and expertise on current conditions.

3. Select a Climate Indicator. After selecting your county, you can view indicators of changes in the climate for your area on the map.

3a. Filter by Sector. To view climate indicators that are relevant for your planning sector, use the "Filter by Sector" drop-down menu to see climate indicators for a specific sector. For example, by selecting "Agriculture and Food Systems", the list of climate indicators will be filtered to those that are relevant to agriculture and food systems. CMRW includes 11 sectors: Agriculture and Food Systems, Built Environment and Energy, Cultural Resources and Practices, Economic Development, Ecosystems, Emergency Management, Health and Well-being, Transportation, Waste Management, Water Resources, and Zoning.

3b. Filter by Hazard. To view climate indicators that are relevant for certain climate-related hazards, use the "Filter by Hazard" drop-down menu to see climate indicators for a specific sector. For example, by selecting "Drought", the list of climate indicators will be filtered to those that are relevant to drought. CMRW includes information on seven climate hazards: Drought, Extreme Heat, Extreme Precipitation, Flooding, Reduced Snowpack, Sea Level Rise, Wildfire

3c. Select Climate indicator. For each Sector-Hazard combination, a filtered list of climate indicators will be available that depict changes in the climate relevant for that sector and hazard. For example, a climate indicator for the *sector of agriculture and food Systems* and the *hazard of drought* is "Precipitation Drought." A definition is displayed below the selected indicator. Precipitation drought is defined as the likelihood that summer precipitation in any given year is below 75% of average precipitation. Clicking on "More Info" will provide more information about the source of the climate indicator.

These steps can be repeated for all Sector-Hazard combinations that are relevant to your climate assessment or resilience plan.

Note: *Not all hazards will be relevant to all sectors in your area. Some Sector-Hazard combinations have more indicators than others.*

Select Climate Indicator

Filter the long list of indicators below by selecting a sector or an hazard category for the shown indicators.

Filter by Sector ⓘ
Agriculture and Food Systems ▼

Filter by Hazard
Drought ▼

Climate Indicator

Select an indicator from amongst changes in the climate and climate-related natural hazards.

Precipitation Drought ▼

Likelihood that summer (June-August) precipitation in any given year is below 75% of average precipitation, the historical normal for the period 1980-2009 [More Info](#)

4. Select Future Projections. For each climate indicator, the webtool displays different future climate conditions, or projections, based on different climate scenarios and time periods. The default display in the map view is for a higher climate scenario and changes that are expected for 2020–2049.

More Info'."/>

Select Future Projections
Select greenhouse gas scenarios and future time periods. Note that some scenarios are not available for all variables. [More Info](#)

Select a Future Greenhouse Gas Scenario. ⓘ
Higher Scenario (RCP 8.5) ▼

Select a Future Time Period ⓘ
2030s (2020-2049) ▼

4a. Select a Future Greenhouse Gas Scenario. Compare how the selected climate indicator is expected to change for a higher or lower climate scenario. Scenarios represent a standardized set of assumptions about humanity’s trajectory that lead to different concentrations of greenhouse gasses in the atmosphere. The higher scenario (RCP 8.5) causes more warming by 2100 compared to the moderate (A1B) and lower (RCP 4.5) scenarios, but all scenarios are similar before 2050 and only differ thereafter. For near-future (before 2050) applications, the choice of scenario is less important than for late century applications. For late-century applications (after 2050), we recommend you explore multiple scenarios to determine if the differences matter for your climate assessment or planning.

Note: *Data are not available for all greenhouse gas scenarios for all climate indicators.*

4b. Select a Future Time Period. Compare how the selected climate indicator is expected to change through the 21st century. Changes in the climate are summarized as the average over 30-year periods. The drop-down menu lists the years that are the center decade for each 30-year period; for example, 2030s is the period 2020–2049. For the purpose of climate assessment and planning, we recommend that you use a time period that is consistent with your planning horizon. However, later time periods may also be important to consider because some climate resilience actions will require years to decades of planning before implementation. Also, some assets and infrastructure last for decades to centuries once built, so the assets will be exposed to changes in the climate well beyond the initial planning period. Comparing multiple scenarios and time periods will help your jurisdiction to align your periodic climate impacts analysis with your plan horizon and update cycle.

Note: *Data are not available for all time periods for all climate indicators.*

5. Interpret the Map. Once you have made the selections described in steps 3 and 4, the "Interpreting the Map" box below the map describes the selected climate indicator and provides an example.

Interpreting the Map

The map shows the likelihood, or chance, that any given year in the future 30-year period will have total summer precipitation (June-August) below 75% of the historical normal summer precipitation. The historical normal summer precipitation is the average total summer precipitation for 1980-2009. For example, a value of 0.20 means that there is a 20% chance that a year in the selected 30-year period will have summer precipitation at or below 75% of normal. Summer precipitation below 75% of normal is an indicator of drought because it is a consideration in the legal definition of drought in Washington State, which includes less than 75% of normal water supply.

+ MORE INFO

Lighter browns are lower likelihoods and darker browns are higher likelihoods. Values shown are the median of multiple climate model projections.

6. Understand the Importance. CMRW provides information beyond the climate indicator to help you put the climate indicators in the context of local factors that will affect local exposure and vulnerability to change. *It is important to consider the climate indicator along with your local information.* It is this local information that will produce within jurisdiction granularity in future climate impacts. For example, indicators of changes in extreme heat should be considered in combination with information about local land use (such as paved areas vs. parks and open space) that can affect local heat exposure and density of vulnerable populations (such as low income, elderly or very young) that will be more susceptible to increases in heat extremes.

For each sector-hazard combination, CMRW provides some guiding information to help answer questions about local exposure, sensitivity and impacts. Select a question from the drop-down menu under "Understanding the importance" and a popup box will appear with information on which local conditions to explore for the selected sector-hazard combination.

Understanding the Importance

Based on the sector, hazard, and indicator selected, see more information about this change:

--Select a Topic --

--Select a Topic --
Why does this change matter?
What local factors affect how much change a sector experiences (exposure)?
What local factors affect susceptibility of a sector to change (sensitivity)?
What are the potential impacts of the change?

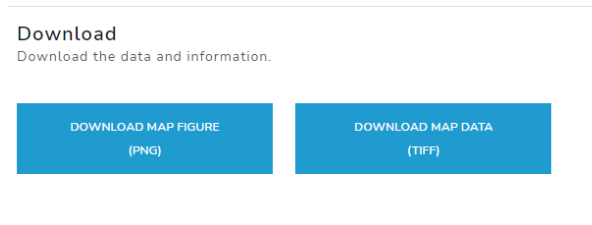
SENSITIVITY

What local factors affect susceptibility of a sector to change?

Health and Well-being sector
Extreme Heat hazard
Summer Maximum Temperature

Health and Well-being Certain populations in your county or community are expected to be more affected by health impacts associated with warmer summers. The elderly, very young, and people with preexisting health conditions are more likely to be affected.

7. Download the map image or data. Once you have explored the indicators of climate change, you can download the map as an image (.png file) or the data displayed in the map (.tiff file) for your local climate assessment or plan.



Climate Mapping for a Resilient Washington is designed to provide state agencies, local governments and communities in the state with data and information on the expected changes in the climate and related natural hazards. The data and information is intended to inform education, awareness, assessment, planning, and prioritization of climate resilience strategies and actions. Because Climate Mapping for a Resilient Washington covers many climate hazards, sectors, and indicators at a high-level, data and information is likely to be insufficient to inform specific project designs or engineering needs. For some changes in the climate, other resources and tools are available that provide more detailed information for climate impacts and sectors, such as these resources also developed by the Climate Impacts Group.

[Projected Changes in Extreme Precipitation](#) is designed to provide data and visualizations of projections of heavy precipitation for use in stormwater planning.

[Interactive Sea Level Rise Data Visualizations](#) provide more detailed site-specific projections of sea level rise for more scenarios and time periods.

8. View County Graph In addition to viewing the climate indicator on a map, you can also view county summaries of the selected climate indicator for all climate scenarios and time periods. This option is most useful if you want to explore in more detail an important climate change indicator for your area. You can repeat this step for all relevant climate indicators.

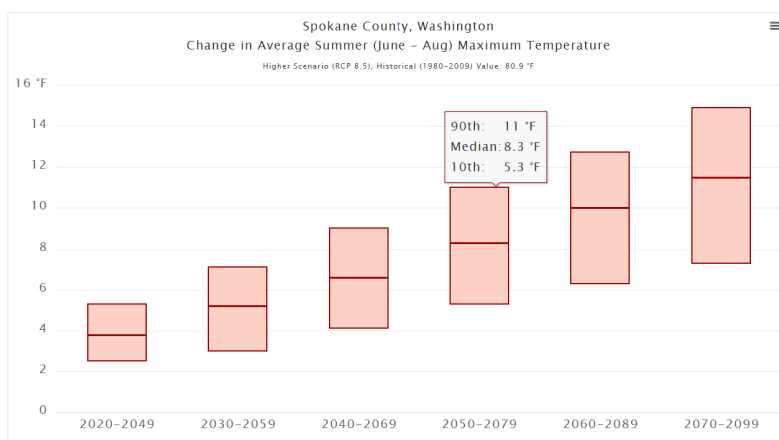
Select Visualization
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8a. View County Graphs. Graphs of the indicator depict the expected changes for your county for all future time periods through 2100, as well as the expected range for each time period. By hovering your cursor over the graph, you can see the high (90th percentile), low (10th percentile), and median values for each time period. We recommend considering a range of possible changes rather than only a single value because the exact future condition cannot be known with certainty. Values can be displayed for all available climate scenarios.



8c. Interpret County Graph. As with the map view, the "Interpreting the Graph" box below the graph describes how to read the graph for the selected climate indicator.

8d. Download County Graph. You can download an image (.png file) of the graph or a file (.csv) containing data shown in the graph.

Download
Download the data and information.

DOWNLOAD
GRAPH FIGURE
(PNG)

DOWNLOAD
GRAPH DATA
(CSV)

9. View County Table. In addition to graphs, county-specific values are provided for the selected climate indicator for all climate scenarios and future time periods through 2100. Values include the historical baseline and median and range of potential future values.

9a. Download County Table. You can download an image of the table (.png file) or the data in the table (.csv file), which can be used to develop your own custom tables.

