

# CLIMATE CHANGE AND THE COLVILLE TRIBES

Colville Tribes

## WHY IS CLIMATE CHANGE IMPORTANT TO THE COLVILLE TRIBES?



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Over the past century, temperatures across the Northwest have warmed. This warming is likely to continue over the coming century, leading to many important changes to the lands and waters of the Colville Tribes.

Changes in temperature and precipitation (i.e., rain and snow) are expected to result in warmer, wetter winters and hotter, drier summers. These changes are likely to have many impacts, such as reducing the mountain snowpack that provides summer water for people, fish, and wildlife, and increasing the risks of wildfires, landslides, and floods. All of these changes are likely to affect the many plants and animals of cultural and economic importance to the Colville Tribes.

Understanding what changes may be coming, and why, will help the Colville Tribes take steps to prepare today for a more resilient future.







## TEMPERATURE

Temperatures are expected to warm around the world over the coming century, including the lands and waters of the Colville Tribes. For the Colville Tribes, the biggest changes are likely to be seen in summer high temperatures and winter low temperatures, both of which are expected to warm. Relative to the end of the last century:

- By the middle of this century (2050s), summer high temperatures are expected to be about 6–8°F warmer across the Colville Tribes Traditional Territory. By the end of the century (2080s) temperatures may be 8–13°F warmer.
- The number of heat waves and very hot days are also likely to increase, particularly in southcentral Washington.
- Winter low temperatures are expected to warm by about 5–6°F by the 2050s and 6–10°F by the 2080s.
- Very cold winter days are likely to become less common: the number of days with low temperatures below freezing may be reduced by half.



## PRECIPITATION



The amount of precipitation that falls across the Colville Tribes' Traditional Territory is typically quite variable from year to year. Thus, while total yearly precipitation is expected to increase slightly over the coming century, this change is unlikely to be noticeable compared to year to year changes.

However, changes in precipitation by season are likely to be more noticeable.

- Summers are already dry with little rain, and this small amount of summer rain is expected to decrease. Less rain and higher temperatures are likely to lead to drier summers.
- In contrast, winters are likely to be wetter. Winter precipitation (snow and rain) is expected to increase by about 11–13% by the 2050s and up to 18% by the 2080s. More of this precipitation is expected to fall as rain rather than snow because of warming.





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Our mountain snowpack is an important source of water for people, fish, and wildlife. Snowpack forms as precipitation falling as snow accumulates in the mountains in the winter. It then melts over the spring and summer, filling streams with cold water.

- Warming temperatures will lead to more winter precipitation falling as rain rather than snow, especially at lower elevations, and to earlier and faster snow melt in spring.
- Large decreases in spring snowpack are expected in the low elevations of the Okanogan Highlands, Cascade Range, and Blue Mountains by the 2050s.
- Losses of snowpack will also be seen at higher elevations by later in the century. However, some cold, high-elevation areas are expected to see little change in snowpack through the end of the century.

 **STREAMS AND RIVERS**

Changes in temperature and precipitation are expected to affect streams across the Colville Tribes' Traditional Territory.

Historically, streams and rivers in the region have had highest flows in spring when the snowpack begins to melt. However, more precipitation falling as rain in winter is expected to increase winter streamflows, whereas reduced snowpack and earlier melting is expected to decrease spring and summer streamflows, particularly at mid-elevations.

Warmer temperatures and reduced snowpack are also expected to result in warmer stream temperatures. Streams and rivers at low elevations are likely to warm the most.

- Compared to in the past, the distances over which streams have an average August temperature above 68°F is expected to more than double by the 2050s, and quadruple by the 2080s.

Cool stream temperatures are critical for healthy fish populations, particularly for salmon and bull trout. Warm water temperatures have been linked to higher rates of disease and mortality in fish populations, and can make it hard for salmon to move through streams.



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## WILDFIRE

Warmer, drier summers are expected to increase wildfire risk across the Colville Tribes' Traditional Territory, though how much will also depend on future changes in vegetation and how lands and waters are managed.

- Since 2000, the Colville Tribes' Traditional Territory has experienced five severe fire seasons; 2014 and 2015 were particularly intense. While it is difficult to attribute individual fires and fire seasons to climate change, increasing wildfire risk is consistent with what is expected with climate change.
- Warmer, drier summers and earlier snowmelt are expected to increase the area burned in eastern Washington by two to four times by the 2080s.
- The actual area burned and the effects on vegetation will depend on past fires, future changes in vegetation, and land and water management actions.



## FLOODS & LANDSLIDES

Future changes in temperature and precipitation are expected to increase the risk of floods and landslides over the Colville Tribes Traditional Territory.

Warming temperatures will lead to rising snowlines, which could increase the area of a watershed that receives winter rain instead of snow. If this occurs it would increase the risk of winter flooding during storms because more water would flow into streams and rivers instead of being stored as snow. Increased likelihood of flooding events will also likely have impacts on water crossing structures, such as fish passage culverts.

Climate change may increase future landslide risk through increased seasonal (fall and winter) precipitation, more heavy rain events, and more winter precipitation falling as rain instead of snow. However, these effects will differ by elevation, with greater changes projected at higher elevations. Reduced snowpack and increased soil moisture at high elevation sites may also increase landslide risk at high elevations.





Colville Tribes

## ASSESSING SPECIES' CLIMATE VULNERABILITY

The Colville Tribes have relied on the natural resources of their traditional territory to meet their subsistence and cultural needs for millennia. Projected changes in climate over the next century will present unique challenges to many of the plants and animals important to the Tribes. Preparing for and mitigating these challenges first requires understanding which important species will be most vulnerable to climate change and why.

The Tribes worked with the University of Washington Climate Impacts Group to assess the climate change vulnerability of 72 plant and animal species important to the Tribes.

This assessment used a combination of Western science and indigenous knowledge to estimate which plants and animals might have difficulty responding to climate change, and why.

Species were given a vulnerability ranking that ranged across four levels of severity: less vulnerable, moderately vulnerable, highly vulnerable, and extremely vulnerable. Species were assessed for both a low and high greenhouse gas scenario.

## OVERALL FINDINGS OF SPECIES ASSESSMENT

The vulnerability assessment found that many plant and animals species are expected to have a high level of vulnerability to climate change - that is, they may have difficulty responding to climate change, and their numbers across the Colville Tribes Traditional Territory may decrease by the end of the century.

However, a wide range of vulnerabilities were seen across species. Most birds, for example, are expected to be less vulnerable, while many fish and most amphibians and reptiles are expected to be extremely vulnerable. Plants varied considerably in their vulnerabilities, from less to extremely vulnerable.

Key causes of vulnerability included species dependence on cold temperatures, the presence of natural and man-made barriers on lands and waters that may prevent species movement to new habitats, and the potential for higher risk of disease due to warming.

The results of this assessment will help the Tribes prepare for potential climate impacts on important plant and animal species, enhancing their resilience and that of the communities that depend on them.



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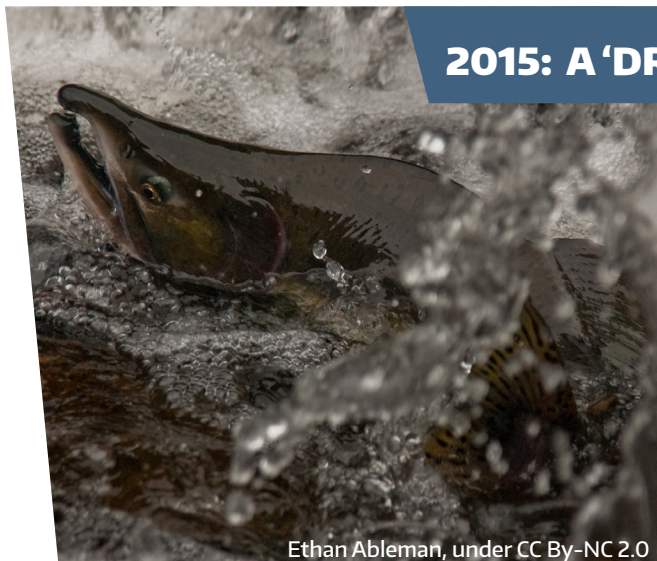




## CHINOOK SALMON

Chinook salmon are of the utmost importance to the Colville Tribes, serving as part of the Tribes' spiritual, cultural, and economic identity. Warming stream temperatures, lower summer streamflows, and higher winter streamflows are projected to negatively affect the survival of Chinook salmon populations. Chinook salmon are estimated to be extremely vulnerable to climate change by mid-century (2050s) and end of the century (2080s). Key sensitivities for the Chinook salmon are discussed below:

- **Dependence on cold stream temperatures.** Warming stream temperatures will likely stress Chinook salmon, increasing their vulnerability to disease and potentially delaying spawning migration.
- **Occurrence of man-made barriers.** Many rivers and streams throughout the Tribes' Traditional Territory have dams that would prevent Chinook salmon from accessing colder streams if current freshwater reaches becomes too warm.
- **Sensitivity to changes in streamflow.** Chinook salmon are sensitive to winter floods and low summer stream levels. Low and high streamflows can destroy embryos and young salmon.
- **Sensitivity to competition from other fish.** Warming stream temperatures may enable the spread of invasive fish species that compete with salmon for food and habitat.



### 2015: A 'DRESS-REHEARSAL' FOR CLIMATE CHANGE



In 2015 the Pacific Northwest experienced weather conditions that are on par with climate change projections for the end of the 21st century. Temperatures in Washington State were almost 4°F above historical temperatures (1950-1999), and precipitation levels were near-normal, only slightly below average. In what has since been named the 'snowpack drought' of 2015, this drought was primarily a result of unprecedented warmth that caused winter precipitation to fall as rain rather than snow on the mountains.

These record-breaking temperatures and low snowpack levels were extremely harmful to fish populations across

the state. Rising water temperatures and low summer streamflow levels throughout the Lower Columbia resulted in conditions that were too warm for salmon populations. Thousands of sockeye salmon perished in the warm waters and many others died from bacterial infections. In response to the high stream temperatures Washington Department of Fish and Wildlife placed wide-spread fishing and hydraulic project closures across the state.

As Washington's climate continues to change, years similar to 2015 will occur more frequently. The 2015 snowpack drought provides a unique opportunity to identify impacts and needs in order to successfully adapt to these changes to ensure salmon populations and other components of our natural environment are able to thrive.



# THINLEAF HUCKLEBERRY



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The thinleaf huckleberry is an important food source for the Colville Tribes. Warming air temperatures and declining snowpack are projected to negatively affect the survival of thinleaf huckleberry. The thinleaf huckleberry is estimated to be extremely vulnerable to climate change under a high greenhouse gas scenario by the 2050s and 2080s. Key sensitivities for the thinleaf huckleberry are discussed below:

- **Dependence on cold habitats.** Thinleaf huckleberry grows at higher-elevation forests within the Colville Tribes' Traditional Territory. Projected warming may negatively affect thinleaf huckleberry habitat within the assessment area.

- **Dependence on snow.** Thinleaf huckleberry is found at higher elevations within the Tribes' Traditional Territory and is often associated with snow cover during the winter months. Therefore, projected declines in winter snowpack may negatively affect thinleaf huckleberry habitat.
- **Sensitivity to disease.** Thinleaf huckleberry has been affected by a rust fungus and an unidentified "spongy" substance. Warming air temperatures and reduced moisture may stress the huckleberry plant, limiting the species' ability to recover after infection.

# ELK



Elk is a priority species for the Colville Tribes. Elk is likely to be somewhat sensitive to climate change. Key sensitivities are discussed below:

- **Sensitivity to man-made barriers.** Roads and active logging sites have been identified as important barriers to elk dispersal. These dispersal barriers may decrease the elk's ability to adjust its range in response to changing climate conditions.
- **Sensitivity to wind farm or solar array development.** Elk inhabit sagebrush-steppe habitat. Sagebrush-steppe habitats are often considered suitable sites for wind farm or solar array development. Renewable energy development in sagebrush-steppe has the potential to negatively affect elk habitat.
- **Limited genetic variation.** Low levels of genetic variation have been observed within North American elk populations. Species with low levels of genetic variation are expected to be less able to adapt to changing climatic conditions.



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## WHAT CAN YOU DO?

There are many things *you* can do to help to prepare for a more resilient future.

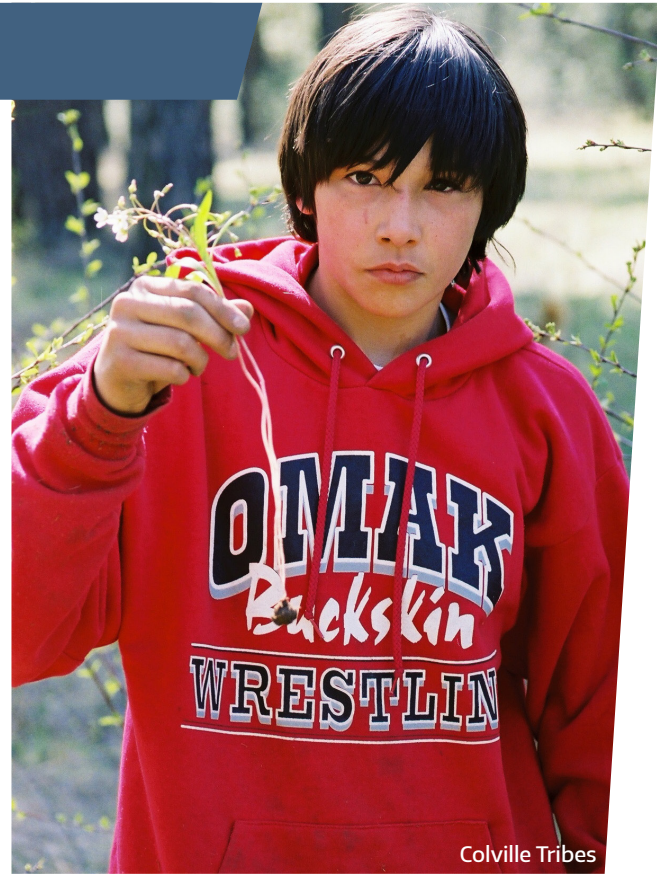
**Become a citizen scientist!** Help understand how species are changing in response to climate change by monitoring plants and animals in the Colville Tribes' Traditional Territory.

- **Join the Community Collaborative Rain, Hail & Snow Network:**  
<https://cocorahs.org/Content.aspx?page=aboutus>
- **Participate in the Audubon Christmas Bird Count:**  
<https://www.audubon.org/conservation/join-christmas-bird-count>

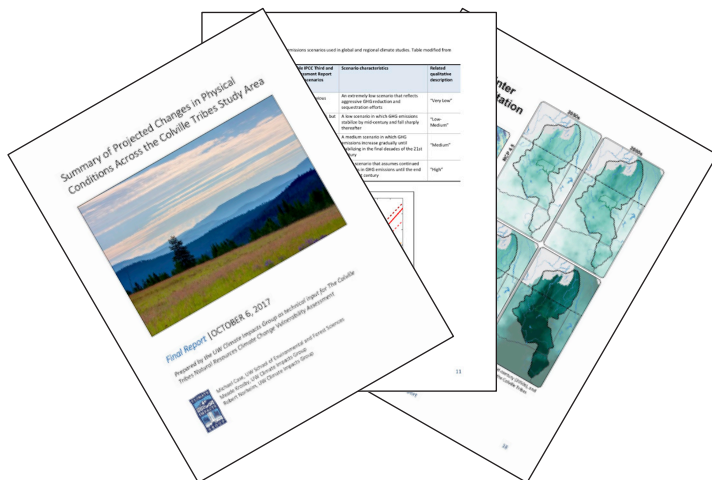
**Volunteer with local habitat restoration efforts!** Look for local opportunities to volunteer to improve wildlife habitats, which will help species respond to climate change.

**Create art!** Make videos, drawings, or find other creative ways to share how climate change is affecting plants, animals, and your community - and what people can do to help!

**Talk to your family!** Share this information with your family - talk about what is most important to you and what you can do together to help.



## ABOUT THIS STUDY



The *Colville Tribes Natural Resources Climate Change Vulnerability Assessment* was completed to understand future changes in climate and the effects of these changes on priority plants and animals within the Colville Tribes Traditional Territory. This area includes the Colville Tribes' reservation, as well as the Okanagan Highlands, Columbia Basin and Blue Mountains.

This assessment looked at 72 species of plants, fish, reptiles and amphibians, birds, mammals, a mollusk, and a mushroom, chosen because of their importance to the Colville Tribes.

The assessment was completed by the Colville Tribes Natural Resources staff in partnership with the University of Washington Climate Impacts Group.

For more information on this study and related studies, contact the Colville Tribes Natural Resource Director, Cody Desautel ([cody.desautel@colvilletribes.com](mailto:cody.desautel@colvilletribes.com)) or Dr. Meade Krosby ([mkrosby@uw.edu](mailto:mkrosby@uw.edu)) at the University of Washington Climate Impacts Group.

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