



# Climate Change Vulnerability Assessment in the Upper Snake River Watershed

## Chinook Salmon

MORE WARMING

Low Vulnerability

Medium Vulnerability

High Vulnerability

EXTREME VULNERABILITY

LESS WARMING

Low Vulnerability

Medium Vulnerability

High Vulnerability

EXTREME VULNERABILITY

Results above highlight **Chinook salmon climate change vulnerability in the 2050s** for two different climate change scenarios. The higher climate change scenario (RCP 8.5) is labeled “More Warming” and the lower climate change scenario (RCP 4.5) is labeled “Less Warming”. Generally, more greenhouse gas emissions over a longer time will lead to more severe impacts from climate change.

Relative vulnerability rankings were determined by combining the best available climate change science with the local and traditional knowledge of the Upper Snake River Tribes (USRT) Foundation’s four member tribes. These rankings are based on climate change projections, species-specific sensitivities, and the ability of species to adapt and respond to the projected changes.

### Chinook Salmon and the USRT Member Tribes

Chinook salmon have been central to the culture and diet of the USRT member tribes for thousands of years. They played an especially important part in the tribes’ seasonal migration and subsistence diet.

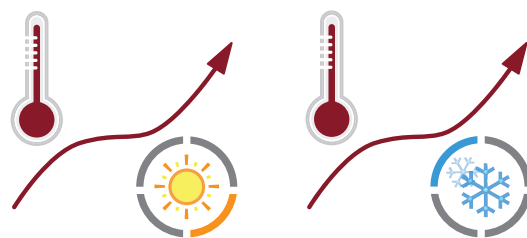
Unfortunately, these connections have been greatly diminished over the last century as eight main dams on the Upper Snake River have prohibited Chinook salmon from reaching the USRT member tribes’ traditional harvest areas. The Burns Paiute Tribe and Shoshone-Paiute Tribes have recently reinitiated ceremonial Chinook salmon fisheries on the upper Malheur River and East Fork Owyhee River by live-transporting fish around the dams. Climate change poses additional complex stressors to this already significantly impacted fishery. Currently, the Fort McDermitt Paiute-Shoshone do not have access to Chinook salmon, while the Shoshone-Bannock Tribes are able to exercise their treaty right to harvest Chinook.



## Key Climate Impacts

Maximum temperatures in the Upper Snake River Watershed are projected to increase 6.5° to 8.5° Fahrenheit in the summer and 8° to 9.5° Fahrenheit in the winter by the 2050s. Projections of lower snowpack in the region will mean less cold-water input to rivers and streams over the summer and fall. Combined with warmer air temperatures, this could increase water temperatures and decrease summer streamflows.

All USRT member tribes are concerned about the existing impact of high water temperatures on fish health and spawning success, conditions which are likely to get worse with climate change.



Maximum summer temperatures are projected to increase 6.5°F to 8.5°F.

Maximum winter temperatures are projected to increase 8°F to 9.5°F.

## Chinook salmon have:

factors that “**greatly increase**” vulnerability

### High water temperatures

Exposure to water temperatures above 69.8°F degrees have been shown to increase adult Chinook mortality. In addition, water temperature above this threshold may cause migration blockages or delays that can contribute to reproductive failure.

### Changing river flows

Chinook adults require large, deep, and cold pools for holding prior to spawning. Adequate river flows are required to meet the needs of developing eggs and fry; both abnormally low or high flows can be destructive.

factors that “**increase**” vulnerability

### Sensitivity to disturbance

With warmer temperatures, winter storms are projected to bring more rain than snow, which could, in turn, increase sediment loads, diminish water quality, and scour streambeds, all of which can affect the survival of eggs and fry.

### Dams

Existing dams on the Upper Snake River, and other rivers in the region, limit the ability of Chinook to access many suitable streams and colder upstream habitats.

### Disease

Warmer water temperatures can stress Chinook, making them more susceptible to disease. Increases in certain diseases, such as *Vibrio* and *Ceratomyxa shasta*, in Chinook have already been seen in the Snake River when summer water temperatures exceeded 69.8°F.



Photo by: Scott Hauser, USRT Foundation

These are select results of a more comprehensive climate change vulnerability assessment developed collaboratively by the Upper Snake River Tribes Foundation, Burns Paiute Tribe, Fort McDermitt Paiute-Shoshone Tribe, Shoshone-Bannock Tribes, Shoshone-Paiute Tribes, Adaptation International, the University of Washington Climate Impacts Group, and Oregon Climate Change Research Institute.

For more information on this assessment or to get involved, visit: [www.upper-snake-river-tribes.org/climate](http://www.upper-snake-river-tribes.org/climate) or contact Scott Hauser, Executive Director, USRT at [scott.hauser@usrtrf.org](mailto:scott.hauser@usrtrf.org).