



The Potential Impacts of Climate Change on Native Aquatic Ecosystems of the Northern Rocky Mountains.

Background:

State and federal agencies and non-governmental organizations are increasingly consumed with the recovery and restoration of native trout and salmon throughout the western United States. Almost all of the native inland cutthroat species, grayling and bull trout have been proposed for listing under the Endangered Species Act and a number are currently listed as “Threatened”.

Trout, grayling, and char historically inhabited a variety of freshwater habitats, but have declined due to habitat degradation, fragmentation, and introduction of nonnative species. The remaining intact populations of native fish species are largely restricted to small, fragmented headwater habitats, which are increasingly vulnerable to wildfires and subsequent flooding.

Complicating these issues is global warming and associated climate change, which are likely to increase air and water temperatures, increase the risk of wildfire, change the timing and quantity of water from snowpack, increase winter flooding in some areas, and provide habitat conditions that favor introduced species. Understanding how effects of climate change will influence habitat for native fish is critical for effective management and recovery of these species.



Juvenile bull trout.

Scientists at the U.S. Geological Survey (USGS)—Northern Rocky Mountain Science Center (NOROCK) and their partners from U.S. Forest Service and Trout Unlimited are examining how climate change may be impacting the habitats of native fish species throughout the Rocky Mountains and the interior western United States. The goal is to provide tools that will help managers predict potential climate change induced impacts on native fish. The study is funded by a new USGS initiative on Global Climate Change and Wildlife Science.



Figure 1. Distribution of western native trout throughout North America. Adapted from Western Native Trout Initiative, 2008.

Project:

Researchers are studying how global warming and associated climate change may drive landscape scale impacts that affect the fresh water habitats of key native fish species. Specific research questions the team are exploring include:

1. What is the geographic distribution of target species or populations in relationship to current temperature and stream flow regimes?
2. How are stream flow and temperature regimes likely to change in response to a warming climate, and which habitats and populations will be affected most?
3. How will these large-scale changes in climate affect native fish distributions across the western United States?
4. How well does the relationship between climate and fish distribution reflect actual measurements in a basin?

Deliverables:

Outputs of the project include: 1) database including all existing fish species distribution and habitat information, and air and water temperature data; 2) maps defining existing and projected distributions of native fish factoring in anticipated temperature, hydrology, and non-native impacts; 3) open file report that would include data analysis, maps and forecasts for each species listed; and 4) scientific journal article that synthesizes work.

By developing these types of tools, researchers can assist managers in predicting potential climate change induced impacts on various fish species throughout the Rocky Mountains and the interior western United States.

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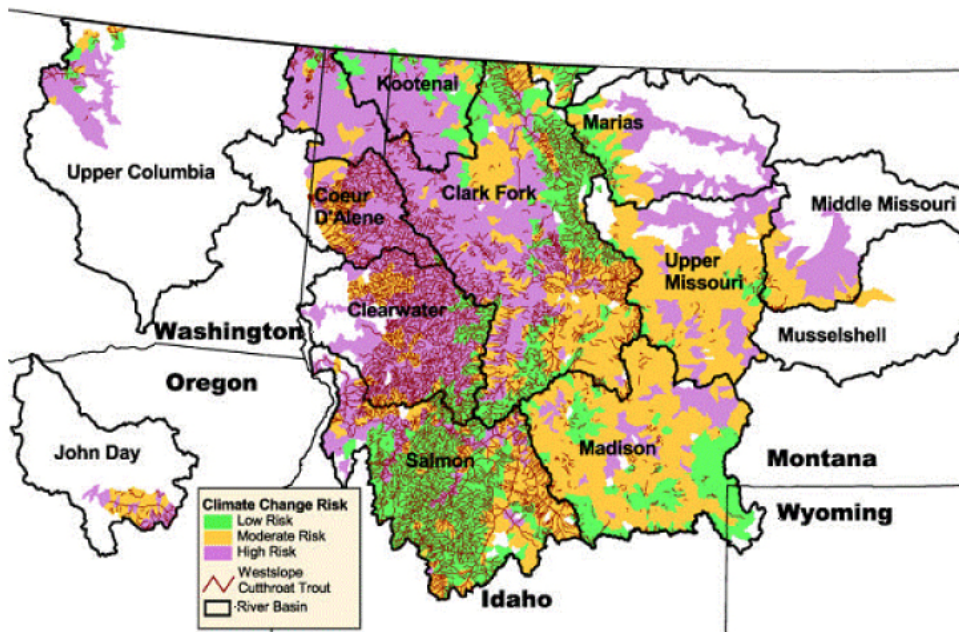


Figure 2. Composite climate risk map of historic and current range for Westslope cutthroat trout. Adapted from William et al. 2007.

The Northern Rocky Mountain Science Center is located in Bozeman, Montana and includes three field stations in Montana and one duty station in Wyoming. For more information on NOROCK’s research, please visit <http://nrmsc.usgs.gov> or contact the Center Director: Jeff Kershner 406-994-5304 or jkershner@usgs.gov
