

# The Potential Influence of Changing Climate on the Persistence of Native Salmonids "at Risk": A Progress Report

## Background:

DOI, USDA, state fisheries managers, and NGOs are increasingly concerned with the recovery and restoration of native trout and salmon throughout their range. Almost all of the native inland cutthroat species, grayling and bull trout have been proposed for listing under the Endangered Species Act, a number are currently listed as "Threatened", while others are under review. Intact populations of native trout, char, and grayling species in the western United States are largely restricted to small, fragmented headwater habitats, where the long-term sustainability of populations is uncertain at best. Recent extirpations of these small populations caused by wildfires and subsequent floods have highlighted their vulnerability. Global warming and associated climate change are likely to increase air and water temperatures, increase the risk of catastrophic fire, 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 climate change will influence habitat for interior species of native salmonids is critical for effective management and recovery of these species.



We developed a set of research questions that addressed key issues related to climate change and the potential effects on native trout. These included:

1. What is the geographic distribution of target species or populations in relationship to current temperature and flow regimes?
2. How are the 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 salmonid distributions across the western United States?
4. How well do broad scale estimates of the relationship between climate variables (i.e. stream temperature, flow) and native salmonid distribution reflect actual measurements within a basin?

Our expected outcomes from this project included:

- A database including all existing species distribution and habitat information, and air and water temperature data
- Develop maps defining existing and projected future distributions of native salmonids, factoring in anticipated temperature, hydrology, and non-native impacts alone and in combination
- An open file report of this analysis that would include data analysis, maps, and forecasts for each species listed
- Preparation of a scientific journal article that synthesizes this work
- Distribution of this information through a series of workshops and meetings with resource managers

**More information:** [http://www.nrmcs.usgs.gov/research/climate\\_trout](http://www.nrmcs.usgs.gov/research/climate_trout)

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## THE POTENTIAL INFLUENCE OF CHANGING CLIMATE ON THE PERSISTENCE OF NATIVE SALMONIDS "AT RISK" - SUMMARY

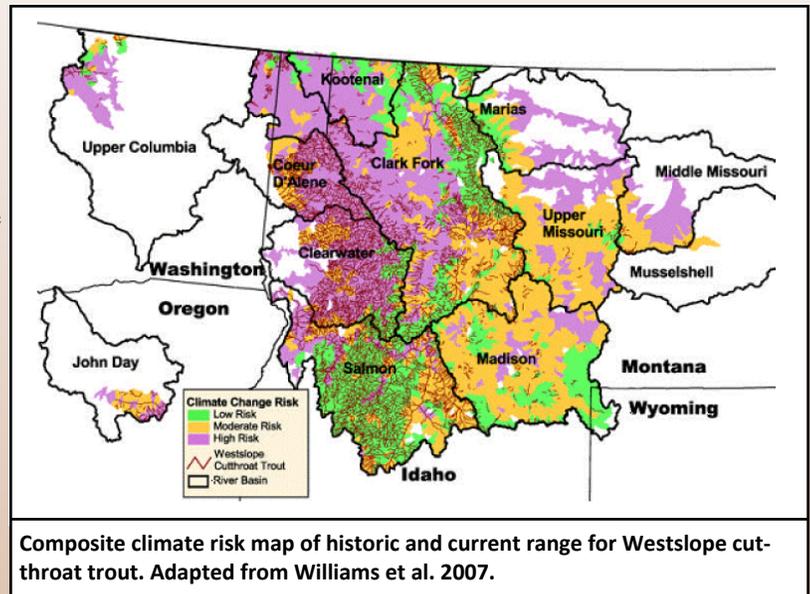
Over the past year we have made significant progress on the objectives outlined in our research proposal. We've developed a website that will eventually provide all of the information from this project ([http://www.nrmcs.usgs.gov/research/climate\\_trout](http://www.nrmcs.usgs.gov/research/climate_trout)) and will house the database, maps and data associated with the project. In addition, publications, research briefs and links to other projects are being developed. Progress on each of our objectives is as follows:

**Develop a database including all existing species distribution and habitat information, and air and water temperature data:** We have completed the database for all of the species identified in the proposal including maps of the distribution of all species, coarse scale habitat information, and the air and water temperature data. In addition, we are working on a series of more fine scaled maps for the area in the upper Snake River for the Greater Yellowstone Coalition (GYC). GYC added additional funding to the proposal to do a more complete analysis of climate risk to Yellowstone cutthroat.

**Develop maps defining existing and projected future distributions of native salmonids factoring in anticipated temperature, hydrology, and non-native impacts alone and in combination:** We have developed maps of low, moderate, and high risk habitats for nearly all western trout and these will be included on the website as well as the Open File report that is in preparation. These maps were also presented in our talks at the symposium we sponsored at the Western Division of the American Fisheries Society meeting in Albuquerque. Drought, winter flooding, wildfire, and increased summer temperature were used as key variables in the modeling effort.

**Develop an open file report of this analysis that would include data analysis, maps and forecasts for each of the species listed:** We are currently preparing the open file report and anticipate the first draft to be complete by August 1. We will be working with the Enterprise Publishing Network at that point to have a document in the queue by fall 2009.

**Preparation of a scientific journal article that synthesizes the work:** We are currently working on a new article that includes all of the species that were included in our proposal. We have an article in the North American Journal of Fish Management that has been accepted for publication that provides some of the foundation for this work on a smaller set of cutthroat sub-species. Additional articles are being prepared by a number of us that are related to this work. We anticipate additional opportunities for publication as we complete the open file report.



**Distribution of information through a series of workshops and meetings with resource managers to update them on the projected change scenarios:** We recently completed a symposium for the Western Division of the American Fisheries Society that included papers from all of the work that was part of our proposal and included additional work from some of our collaborators. The abstracts and talks from this work are being posted to our website. We attracted approximately 100 managers and scientists to this meeting and held an open discussion session at the end of the meeting to gather feedback and comments. Members of our group have presented the initial findings from our work to national BLM management in Washington, DC, and the US Fish and Wildlife Service Strategic Habitat Conservation planning meetings in Denver, CO and San Francisco, CA. We've met with the Greater Yellowstone Coalition to discuss our findings and received additional funding to support additional analysis for the Upper Snake River. We are holding a workshop with the Yellowstone cutthroat trout working group in fall of 2009 to discuss how they can use this information in future planning and recovery efforts.

**Additional Work:** We are currently writing proposals with partners within USGS, the Fish and Wildlife Service, Bureau of Land Management, and the Forest Service to expand work that has resulted from this project. We hope to receive additional funding from the Climate Change and Wildlife Center to downscale some of the work we have started to make more accurate forecasts of the effects of climate change on these species in regional areas that may have more direct utility to managers. Once we have these regional models, we propose to develop decision support tools for managers that will help them understand the consequences of various climate scenarios to native trout management and restoration, and to conduct workshops on using these tools.