

# Science

## BRIEFING

January 7, 2014

# BULL TROUT AND CLIMATE CHANGE

## BACKGROUND

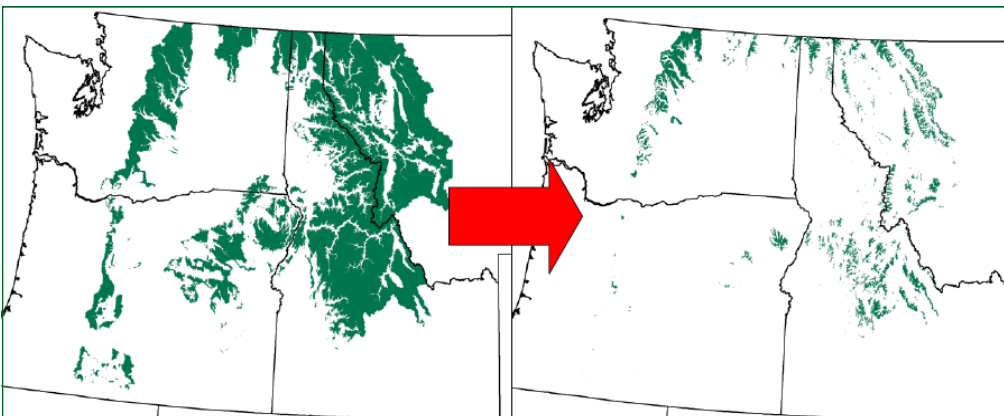
Like many fishes native to the Rocky Mountains and the Pacific Northwest, bull trout (*Salvelinus confluentus*) have declined in response to changes to flow regimes, habitat alteration, and invasion of non-native species. Climate change has only exacerbated these conditions and, as a result, the species is now distributed in highly fragmented populations throughout its range. Bull trout may be especially vulnerable to the effects of a warming climate because they need access to large, interconnected habitats of cold water. As such, they are a useful biological indicator of the effects climate change will have on mountain stream ecosystems.



Adult male bull trout in spawning color.

## RESEARCH

Scientists at RMRS have initiated several studies and have been involved in organizing and contributing to numerous workshops, lecture series, and technical presentations designed to educate resource managers and better understand how bull trout may be affected by a warming climate. This research has focused on three areas: 1) regional scale analyses of current and projected habitat conditions associated with different warming scenarios; 2) precise, landscape scale assessments that model the effects of warming on stream temperatures and thermally suitable habitats in stream networks; and 3) development of climate-sensitive monitoring protocols to detect biological responses. Understanding threats to persistence of bull trout will help to better understand threats to other species and provide information that will be key to prioritization of limited management resources.



Current baseline (left) and future (right) distributions of thermally suitable habitats for bull trout across the interior Columbia River basin, assuming an 800-m increase in their lower elevation as a result of a 5°C rise in mean annual air temperature. Much uncertainty remains about the future security of bull trout and their habitats.

## KEY FINDINGS

- A strong correlation between mean annual air temperatures and bull trout distribution suggests climate plays an important role in determining population boundaries.
- Model projections suggest substantial and spatially heterogeneous losses of habitats could occur in the 21<sup>st</sup> century. Risks of local population extirpations will vary and conservation efforts should be allocated accordingly.
- Recent trends in stream temperatures driven by increasing air temperatures, decreasing flows, and increasing wildfires indicate losses and fragmentation of thermal habitat networks is already occurring.
- Continued monitoring will be needed to detect biological responses that may lag behind environmental trends.

## MORE INFORMATION

Bull trout and climate change website,  
[www.fs.usda.gov/rm/boise/AWAE/projects/bull\\_trout/bt\\_home.html](http://www.fs.usda.gov/rm/boise/AWAE/projects/bull_trout/bt_home.html)  
[www.fs.usda.gov/treearch/pubs/31563](http://www.fs.usda.gov/treearch/pubs/31563)

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