

# Science

## BRIEFING

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## NORWEST: A REGIONAL STREAM TEMPERATURE DATABASE AND MODELED CLIMATE SCENARIOS

**Keywords:** stream temperature modeling, thermal regime, climate change, aquatic habitat

### BACKGROUND

Climate change is warming aquatic ecosystems and will have profound consequences. Effective conservation of aquatic resources will require unprecedented levels of inter-agency coordination and development of datasets and models for accurate downscaling of climate change effects to important habitat parameters and species distributions at local scales. Many broad-scale bioclimatic assessments have been done for salmon and trout in the Rocky Mountains, but most rely on air temperature or elevation- imprecise surrogates for stream temperature.

### RESEARCH

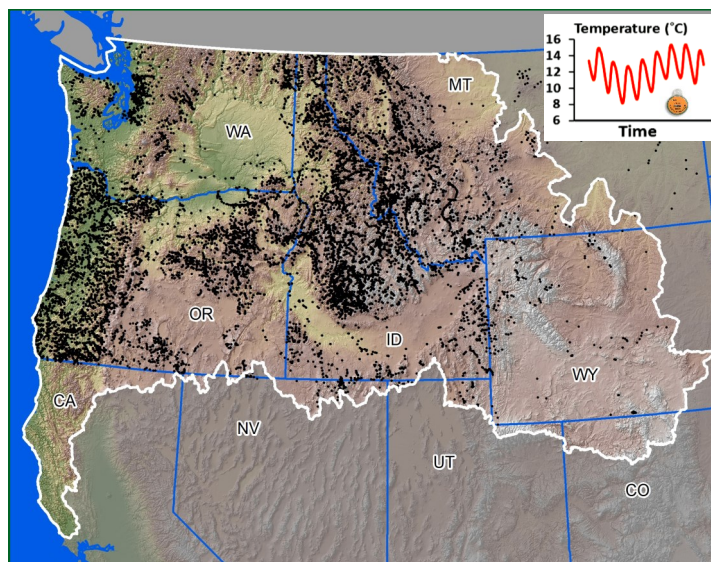
NorWeST is a comprehensive, interagency project funded by the Great Northern and North Pacific Landscape Conservation Cooperatives. A database and model of stream temperatures was developed for all streams across the Northwest U.S. (~500,000 stream kilometers). More than 20,000 summers of data across 234,000 stream kilometers have been modeled with good accuracy ( $R^2 = 90\%$ ;  $RMSE < 1^\circ C$ ). Temperature data and model outputs are posted to the website after QA/QC procedures and development of the final temperature model within a river basin.



### KEY POINTS



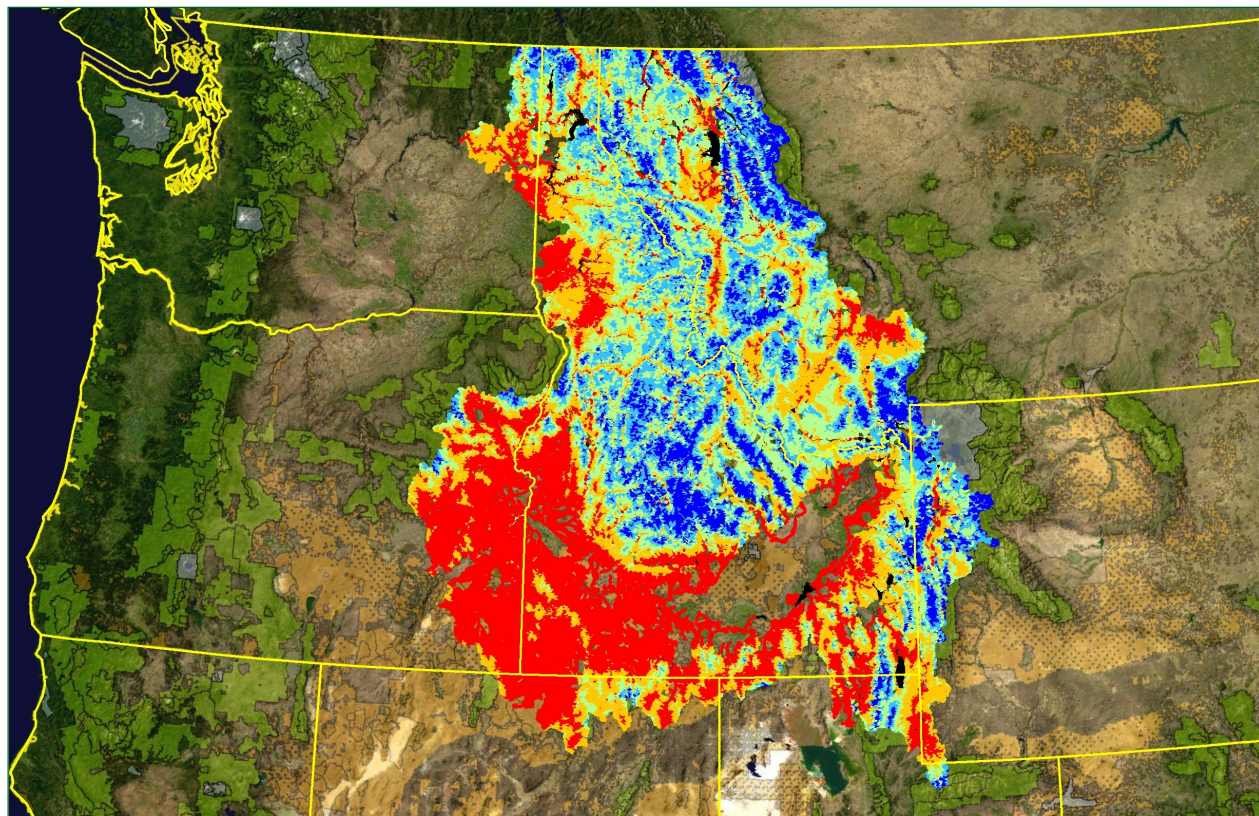
- The NorWeST database may be the largest of its kind, consisting of stream temperature data contributed by over 60 state, federal, tribal, and private resource agencies across Idaho, Washington, Oregon, Montana, and Wyoming.
- The data contained in NorWeST would require \$10,000,000 to replicate, but the information these data yield for decision making and prioritizing future investments has value that is much greater.
- Temperature data, model outputs, and metadata are posted to the [NorWeST](#) website available to download as ArcGIS shapefiles.



*Project boundary and location of observed stream temperature data (black circles) utilized in NorWeST.*



# NORWEST: A REGIONAL STREAM TEMPERATURE DATABASE AND MODELED CLIMATE SCENARIOS



*The NorWeST project has developed a stream temperature database that consists of data from >6,000 unique sites and >17,000 summers of monitoring effort for Idaho alone.*

## RESEARCH IMPLICATIONS

By providing open access to temperature data and scenarios, the NorWeST project is facilitating coordination of monitoring activities among agencies and fostering new research on: 1) stream temperature dynamics, 2) thermal criteria and bioclimatic models for aquatic organisms, and 3) decision support tools for prioritization of habitat restoration. As the NorWeST project progresses, it is developing considerable interest and support across the region, stimulating collaborations among agencies, and serving as a model for initiatives in other parts of the country. For additional information about NorWeST, please see this recent Great Northern LCC newsletter: <http://greatnorthernlcc.org/features/streamtemp-database>

## KEY REFERENCES

### *Original Grant Proposal*

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### *Applications of Spatial Statistical Network Models*

- Isaak, D.J., C.H. Luce, B.E. Rieman, D.E. Nagel, E.E. Peterson, D.L. Horan, S. Parkes, G. Chandler. 2010. Effects of climate change and wildfire on stream temperatures and salmonid thermal habitat in a mountain river network. *Ecological Applications*. 20: 1350-1371.
- Isaak, D.J., E. Peterson, J. V. Hoef, S. Wenger, J. Falke, C. Torgersen, C. Sowder, A. Steel, M.J. Fortin, C. Jordan, A. Reusch, N. Som, P. Monestiez. *In Review*. Applications of spatial statistical stream network models to stream data. *WIREs - Water* 1:xxx.

## MORE INFORMATION

Temperature data and stream climate scenarios are available for free download at the NorWeST website ([www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html](http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html)). For more information, please contact **Dan Isaak**, USFS Research Fishery Biologist, (208) 373-4385 or [disaak@fs.fed.us](mailto:disaak@fs.fed.us).