The NorWeST Stream Temperature Database & Scenarios for the western U.S.

Thermal regimes affect the distribution and abundance of aquatic organisms and are sensitive to the effects of climate change and anthropogenic habitat degradation. Better stream temperature information is required for understanding thermal regimes and adapting to 21st century challenges, so the NorWeST project was initiated in 2011 to develop a comprehensive interagency database and high-resolution temperature scenarios for all rivers and streams in the 2,500,000 km^2 western U.S. The database has since grown to include >220,000,000 hourly temperature recordings at >22,700 unique stream sites that were contributed by hundreds of professionals working for >100 state, federal, tribal, municipal, county, and private resource organizations. The data are used with spatial-statistical network models (SSN/STARS website:

www.fs.fed.us/rm/boise/AWAE/projects/SpatialStreamNetworks.shtml) to develop accurate stream temperature models (r^2 = 91%; RMSPE = 1.1˚C; MAE = 0.7˚C), which are then used to predict high-resolution (1 kilometer) historical and future climate scenarios. This poster depicts a historical scenario of the mean August temperature for 1993-2011 mapped to the 1:100,000-scale NHDPlus hydrography layer and 343,000 kilometers of perennial streams throughout 12 western states.

The geospatial databases associated with NorWeST scenarios, as well as daily summaries (min/max/mean) of the data used to develop the temperature models are distributed in user-friendly digital formats through the project website (http://www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.shtml). The accuracy, utility, and convenience of NorWeST data products has led to their rapid adoption and use by the management, regulatory, and research communities for conservation planning, inter-agency coordination of temperature monitoring networks, and new research on stream temperatures and thermal ecology.

The analytical infrastructure used to develop NorWeST scenarios is based on a new class of spatial-statistical model for data on stream networks that is also being used with water chemistry attributes (e.g., pH, alkalinity, conductivity, etc.), biological datasets (species occurrence, abundance, genetic attributes), and habitat surveys to provide a wealth of new information about streams and rivers. More details regarding those applications are provided in the references below and at the National Stream Internet project website (www.fs.fed.us/rm/boise/AWAE/projects/NationalStreamInternet.html).

KEY REFERENCES

NorWeST Website: www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html

Spatial Statistical Network Models

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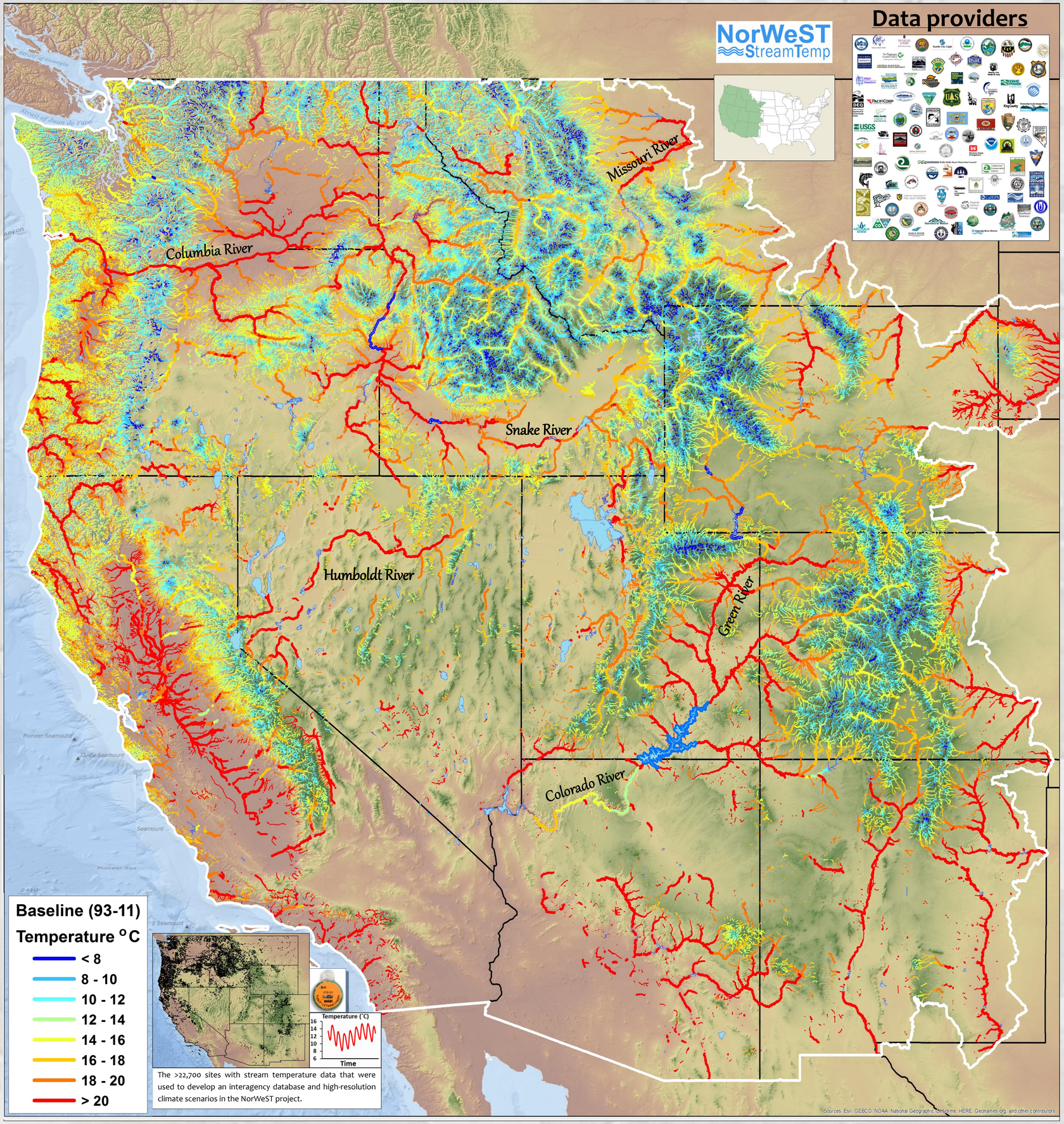
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