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Responding to evolving stakeholder needs for 21st century climate and hydrologic scenarios: methods for the Columbia Basin Climate Change Scenarios Project

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In collaboration with the WA State Dept. of Ecology and a group of regional stakeholders in OR, WA, ID, MT, and BC, the Climate Impacts Group conducted an analysis of climate change and its impacts on hydrology in the Columbia River basin and coastal drainages in WA and OR. The study provides detailed hydrologic data for 297 river locations in the PNW as well as a regional database of gridded hydrological data over the entire study domain (http://www.hydro.washington.edu/2860/). Using temperature and precipitation changes projected by 10 IPCC AR4 global climate models with the best performance in the Pacific Northwest and three different statistical downscaling approaches, the study provides 77 climate change scenarios. Global climate models were statistically downscaled using (1) traditional "delta" methods, (2) the BCSD / BCDC method, and (3) a more sophisticated "hybrid delta" method with the best features of both, particularly that the "hybrid delta" is capable of projecting changes in variance and extremes and takes its spatial variability partially from GCMs, but retains the delta method's desirable approach to climate variability and its capability to preserve spatial correlation. Each future scenario was used to drive the Variable Infiltration Capacity hydrologic model The results are designed to support water resources planning as well as terrestrial and aquatic ecosystems research. Gridded (about 6km) climatologies as well as historical and future (2010-2039, 2030-2059, and 2070-2099) daily time series are available for over 20 variables including temperature, precipitation, streamflow, snowpack, soil moisture, water balance deficit, evapotranspiration, etc. The study results are already being used by a wide range of regional stakeholders including the USGS, Bonneville Power Administration, U.S. Bureau of Reclamation, U.S. Army Corps of Engineers, U.S. Forest Service, U.S. Fish and Wildlife Service, Boise Aquatic Research Laboratory, and the National Marine Fisheries Science Center.