Stream Temperature Modeling in a Complex River System - An Evaluation of River Temperature Response to Probable Influential Factors in the Middle Snake River, Idaho

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Water temperature is an important characteristic of aquatic ecosystems due to its influential effects on biological and chemical processes, and the biota therein. Climate change, stream flow alterations, ground to surface water flux, and land use changes can alter temperature regimes in aquatic systems. Understanding how these and other factors affect stream temperature is important for the preservation of ecological integrity in aquatic systems. Development of publicly available and user-friendly stream temperature models provides resource managers with a tool to assess how changes in influential factors may affect stream temperature. In many cases, the application of an appropriate temperature model to a system of interest provides valuable information for managers to make well-informed decisions concerning water resources. This study sought to: 1) calibrate a temperature model for the middle Snake River, 2) evaluate the sensitivity of river temperature to river headwater flow, spring tributary flow, surface tributary temperature, and surface tributary flow, and 3) identify information gaps that may affect model performance. The one-day synoptic study event focused on the date of historic peak temperatures in the middle Snake River. The QUAL2Kw model calibration results showed good agreement between observed and predicted temperatures, indicating that the model has application potential in the middle Snake River. Results indicate that temperature in the middle Snake River is largely dominated by river headwater flow conditions, although all other evaluated factors were found to influence river temperature.