# How will climate change affect fluvial geomorphology and salmonid habitat in mountain basins?

John M. Buffington[1]
US Forest Service, Rocky Mountain Research Station, Boise, ID

**Abstract.** Riverine habitat for salmonids is intimately linked to channel morphology and fluvial processes (channel hydraulics, sediment transport and scour regime) which are, in turn, controlled by watershed hydrology and erosional processes that input sediment to the fluvial system. Climate change has the potential to alter the timing, magnitude, and style of sediment and water inputs to mountain rivers. Channel response to these changes may range from small-scale adjustments of channel characteristics (e.g., width, depth, grain size) to larger-scale changes in channel type (e.g., metamorphosis from a pool-riffle channel to a plane-bed morphology). Identifying which parts of the river network are relatively stable and which are likely to cross critical thresholds in response to climate change is important for predicting the persistence of salmonid populations. Toward this end, a regime framework is presented for assessing the relative degree of channel stability and scour potential in different physiographic settings (different water and sediment regimes), and digital elevation models are used to explore the spatial distribution of these conditions and potential consequences for salmonid habitat across the landscape. The regime approach provides a useful first-order assessment of channel condition and response potential, but is based on quasi equilibrium (i.e., the stable morphology for a given discharge and bedload transport rate). Consequently, dynamic models are needed to address transient response of river systems and associated salmonid habitat to stochastic, climate-driven disturbances, such as wildfire and subsequent debris flows that deliver sediment pulses to the river network.

[1] US Forest Service, Rocky Mountain Research Station, Boise, ID. jbuffington@fs.fed.us