Incorporating Climate Change Information in River Restoration Design

River restoration is an increasingly common resource management activity. Objectives include improving habitat quality and access for resident and migratory species, enhancing recreation opportunities, and addressing safety hazards posed by aging infrastructure. Managers and restoration practitioners are recognizing that in addition to restoring biogeophysical processes that sustained the pre-disturbance ecosystem, restoration designs must also consider anticipated climate changes. Dams, bridges, culverts, and other floodplain infrastructure are frequent components of river restoration projects and appropriately sizing them to safely convey future flows increases structural resilience and enhances the resilience of restored aquatic and riparian environments by minimizing interference with channel and floodplain processes. Thus, restoration practitioners and structural engineers have a shared interest in climate-informed design and a stake in the active discussion in the research community about what methods are most appropriate for designing infrastructure for a changing climate. Traditional methods for estimating design flows assume that the past is a good guide to the future. This is more formally known as a “stationarity” assumption, and presently there are no well accepted non-stationary design flow estimation techniques. In this presentation I will briefly review observed and predicted hydroclimatic changes in the Northeast U.S. that have implications for restoration design and discuss a number of recently proposed stationary and non-stationary approaches for estimating design floods. I will conclude by presenting special considerations and guidance for designing naturalized river channels, a major component of many river restoration design projects.