AGU abstract

Suggested session:

EP037

Working with Natural Processes to Restore Rivers and Floodplains

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Session ID#: 8877

Session Description:

In rivers throughout the world the natural process drivers that produce complex river and floodplain habitats have been disrupted, resulting in simplified ecosystems. Emerging practices among restoration planners and practitioners involve working with key physical processes (large floods, planform adjustment, wood recruitment) and biota (beaver, fish, vegetation) to restore the form and function of rivers. The effectiveness of such restoration actions will vary depending on the scale of the restoration activity and the capacity of the river system for change in response to new perturbations. This session explores the processes that produce diverse aquatic and riparian ecosystems, and the degree to which these processes can be managed to increase the effectiveness and cost-efficiency of river restoration (i.e., letting the river do the work). We seek presentations highlighting both the mechanics of complex processes and evidence of working with natural processes to restore river functionality across multiple spatial and temporal scales.

Primary Convener:

Lee Harrison, NOAA, Santa Cruz, CA, United States

Conveners:

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Abstract:

Identifying Impacts of Hydropower Regulation on Salmonid Habitats to Guide River Restoration for Existing Schemes and Mitigate Adverse Effects of Future Developments.

A decrease in longitudinal connectivity in riverine ecosystems resulting from the construction of transverse barriers has been identified as a major threat to biodiversity. For example, Atlantic Salmon (*Salmo salar*) have a seasonal variety of hydraulic habitat requirements for their different life stages. However, hydropower impoundments impact the spatial and temporal connectivity of natural habitat along many salmon rivers in ways that are not fully understood. Yet, these changes may affect the sustainability of habitat at local and regional scales and so ultimately the conservation of the species. Research is therefore needed both to aid the restoration and management of rivers impacted by previous hydropower development and guide new schemes to mitigate potentially adverse effects. To this end we assessed the effects of hydropower development on the flow related habitat conditions for different salmon life stages in Scottish rivers at different spatial scales. We used GIS techniques to map the changes in structural connectivity at regional scales, applying a weighting for habitat quality. Next, we used hydrological models to simulate past and present hydrologic conditions that in turn drive reach-scale hydraulic models to assess the impacts of regulation on habitat suitability in both space and time. Preliminary results indicate that: 1) impacts on connectivity depend on the location of the barrier within the river network; 2) multiple smaller barriers may have a potentially lower impact than a single larger barrier; 3) there is a relationship between habitat and connectivity where losing less but more suitable habitat potentially has a disproportionally large impact; 4) the impact of flow regulation can lead to a deterioration of habitat quality, though the effects are spatially variable and the extent of the impact depends on salmon life stage. This work can form a basis for using natural processes to perform targeted and cost-effective restoration of rivers.