Morphodynamic and ecohydraulic response of different engineered log jam configurations in response to changes in discharge

Ockelford. A, Curran. J, Parsons. D, Shugar. D.

[1] *School of Environment and Technology, University of Brighton*
[2]*Herrera Environmental Consultants*
[3]*Energy and Environment Institute, University of Hull*
[4]*College of the Environment, University of Washington*

Abstract

Engineered log jams are increasingly being constructed to develop, restore or maintain habitat diversity for key indicator species such as salmon as well as being used to promote and maintain channel stability. However, questions remain as to how differences in the design of engineered log jams affects their efficiency in terms of the inter relationships between the logjams, the channel morphology, the flow characteristics and the habitat diversity. Further there are also questions surrounding how this efficiency changes with flow discharge.

In order to quantify the morphodynamic and ecohydraulic response of engineered log jams to changes in discharge three engineered logjams of different configurations were analyzed over a 3km reach of the South Fork Nooksack River, North Cascades National Park, USA. Data were collected during both the summer low flow period and the subsequent spring snowmelt period. Non-intrusive three-dimensional topographic surveys of the river bed morphology surrounding the logjams were collected using a shallow water multibeam system. This was combined with terrestrial laser scans of the structure of the log jams above the waterline. Co-located high resolution flow velocity data was collected using an Acoustic Doppler Current Profiler.

Discussion concentrates on quantitative comparisons of the effect of logjam configuration on reach scale morphodynamics and ecohydraulics in response to changes in discharge. Multivariate statistical analysis of flow and topographic data in combination with log jam morphology allow the influences of the logjam on habitat suitability for key indicator species to be quantified. Results will be framed in terms of the effectiveness of the different logjam configurations on generating and promoting habitat diversity and channel stability such as to aid future design and implementation.

Keywords— *Channel Stability, Engineered log jams, Discharge response, Morphodynamics*