Geophysical Research Abstracts, Vol. 8, 06709, 2006
SRef-ID: 1607-7962/gra/EGU06-A-06709

Classifying the hydraulic performance of channel bedforms for habitat assessment and river restoration design

A. Ockelford (1), D.A. Sear, J.C. Emery

School of Geography, University of Southampton, Highfield, Southampton, S017 1BJ, UK

(1) Now at Catchment Science Centre, University of Sheffield, UK

(cip05ao@shef.ac.uk / fax: +44 (0) 114 222 5701 / phone: +44 (0) 114 222 5734)

Restoration is becoming a popular method of river management which fits well into the current paradigm of environmental sustainability. Restoration may also be an important tool for achieving the goals of environmental legislation such as the Water Framework Directive. Modification of in-stream habitat is a principle method of river restoration which must be underpinned by an understanding of both form and function. Despite the fact that the mesoscale physical habitat environment is recognized as a primary determinant of in-channel flow patterns, reproducible associations between hydraulic patterns, bedform morphology and sediments are still lacking. To provide these associations monitoring procedures must be implemented to evaluate the success of restoration projects. By modeling the relationships between morphological and sedimentological units via a coupling of bed morphology with flow characteristics an assessment of the ecohydraulic performance of the channel can be made. Our work aims to address the need for a quantitative means of classifying flow behavior that can be applied in functional ecohydraulic river restoration designs. Information from two reaches, one restored and one channelised from the same river in the New Forest, UK, are used to illustrate the approach. The reaches are mapped to obtain a detailed channel morphology. Surveys describing the streamwise depth-averaged velocities, substrate and depth at two flow stages are then grouped using cluster analysis. The validity of each cluster as a distinct hydraulic patch class is assessed statistically using analysis of variance. The procedure groups locations along the channel which display similar suites of velocity values at different flow stages. This allows differ-

entiation between areas in the channel within which the hydraulic habitat is largely homogenous from those where abrupt spatial changes occur. It also allows the quantitative description of different hydraulic patch classes. We show that river restoration increases physical habitat diversity. Compared with the channelised reach, the restored reach has consistently higher physical habitat diversity, although the channelised reach has higher physical habitat heterogeneity than previously suggested in the literature. Such an integrated assessment of the hydraulic performance of bedforms is relevant to less mobile biota such as invertebrates and plants, and is also a significant control on the stability of bed substrate, in turn an important component of physical habitat.