**An Index of Stream Geomorphology for the Assessment of River Health**

# Field manual for channel classification and condition assessment.

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# DEVELOPMENT AND APPLICATION OF THE GEOMORPHOLOGICAL INDEX

## 1. Background and Motivation

River channels are geomorphological features which are formed by the water and sediment that they transport. The geomorphological processes determine the morphology of the channel which in turn provides the physical framework within which the stream biota live. It is not surprising, therefore, that fluvial geomorphology has become an important component of many river management initiatives including the assessment of river health. This report outlines the development of a geomorphological index to describe the condition of a biomonitoring site as is required as an input to the River Health Programme (RHP).

Geomorphology is one of several components used to assess the overall condition of a site. In the RHP seven components have been chosen: invertebrates (SASS); fish (FCII); riparian vegetation; habitat integrity; water quality; hydrology; geomorphology. Invertebrates, fish and vegetation together give a good picture of the ecological integrity of a site and reflect the condition of the bio-physical habitat which are described by the remaining components of habitat integrity, water quality, hydrology and geomorphology. Changes to the stream biota must therefore be assessed against a background of possible changes to channel morphology and channel condition, whether they be due to natural or anthropogenic causes. The potential response of a channel to external change depends on the type of channel, some being inherently stable while others are naturally more prone to change.

Two components of the geomorphological index have been recommended as part of a site rating and monitoring programme: channel classification and channel condition. A geomorphological classification of the site serves three purposes:

- it allows similar sites to be grouped together for comparative purposes;
- it provides archival reference data to which later surveys can be related;
- it provides data from which a geomorphological index of channel stability can be derived.

Channel classification is unlikely to change in the time scale of the monitoring period. The channel condition, however, may change significantly due to both local and upstream impacts. The assessment of channel condition should be carried out on a regular basis as part of the long-term monitoring. This assessment relates for example to the extent of bank erosion or to deposition on the bed of the channel. An index of channel condition, based on bed and bank conditions, is coupled to an habitat index which describes the diversity of hydraulic habitats at a site in terms of both flow hydraulics and substrate conditions as well as the overhead cover.

A successful biomonitoring index must meet a number of criteria: it must provide a meaningful and accurate representation of the river condition; it must be based on field data that is simple to collect; it must be simple to interpret by the non-specialist manager. It is not always easy to marry the first criterion with the second two and most indices will be a compromise. Indices can also be developed at a number of levels. The manager would like a single value which can be used to flag problems, but this single index may be disaggregated into its component parts so that the cause of the problem can be pinpointed. The geomorphological index is at present at the stage of basic data collection. Simplified indices can only be developed once sufficient data has been collected from a wide range of sites so that existing patterns and relationships can be analysed.

The classification system presented in this report also provides the basic data collection system for the IFR component (geomorphology) of Ecological Reserve determinations. The data sheets provided in Appendix A and B are modified versions of those given by Rowntree and Ziervogel (1999).