

Technical summary

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Analysis of 1995 Biological Survey Data Phase 2: Post Survey Appraisal R&D Technical Summary E1-036/TS

During the 1990 River Quality Survey and the 1995 General Quality Assessment (GQA) survey, samples of benthic macroinvertebrate communities were collected and analysed from around 8000 sites on rivers across England and Wales. For each year, the basic, national picture of quality was reported at the time but, as usual with ecological data, far more is contained in the data than can be shown by a "high level" analysis of that type. Phase 2 of this R&D project aimed to extract more of this information to assist in the further interpretation of the results of those surveys and of similar data obtained for other purposes (such as the operational investigation of specific quality problems). It also examined the execution of the 1995 survey to see if lessons could be learnt for future surveys. The work was divided into three units as summarised below.

As part of the project, data from the two surveys were filtered to provide a subset of sites common to both surveys for which a complete set of information was available. In addition, two questionnaires were completed by Agency Biologists. One of these covered technical aspects of the 1995 survey, such as sampling methods and site selection. The other elicited their views on the stresses (pollution, habitat degradation etc.) perceived to have been acting on sites during the 1995 survey.

Unit I: Taxon Distribution Studies

This Report should be of day to day use to Agency biologists. It presents the results of a study of the distribution of each BMWP scoring taxon in relation to a number of factors.

BMWP - Biological Monitoring Working Party

The information is presented in the form of a reference manual that gives, for each taxon, a consistent set of maps, graphs and tables, together with a text summary of the main conclusions.

These include:

- the geographical distribution of the taxon;
- its occurrence in relation to the grade of the sites at which it is found and to changes in grade over time;
- the relationship of the taxon to a set of environmental variables;
- its distribution across three major landscape types; and
- the relationship between the taxon and the stresses perceived as affecting sites in the 1995 GQA survey.

The work highlighted the improvement in sorting procedures between the 1990 and 1995 surveys, and the importance of correcting for analytical bias and using common sampling seasons. Unsurprisingly, sewage effluents were a common cause of reduced quality and their impact was well reflected by the BMWP system. Many taxa showed decreased frequency of occurrence where run-off was identified as a stress. The category "bank practices" (e.g. livestock poaching and over-grazing) was associated with increased frequencies of many taxa, whilst decreased frequencies were often linked to non-organic stresses such as mining, leachates and industrial effluents. Interestingly, at the BMWP taxon level, few showed significant frequency changes in response to low flow stress.

It is hoped that this report will increase our understanding of the relationships between benthic invertebrates and their environment and improve our ability to interpret their communities as a monitor of ecological quality.



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Unit II: Changes in Biological Condition

Presents an analysis of the biological condition and changes in condition of sites in the 1990 and 1995 surveys in relation to their environmental variables, region, landscape types and potential environmental stress or pollution. The information in the report will be used to improve the Agency's understanding of:

- changes in biological condition between the 1990 and 1995 surveys;
- the relationship between biological grade and environmental variables such as substrate composition and slope;
- the relationship between biological grade and landscape type; and
- the relationship between biological grade and a wide range of environmental stresses such as pollution and habitat degradation.

The analysis of biological grade in relation to perceived stresses showed again that sewage effluent was still the main factor though in three Agency Regions, "farming" was the most common perceived stress. Industrial discharges and run-off were associated with poor quality sites, especially in urban areas, and roughly half of all sites graded d-f in 1995 were linked to run-off. Almost 8% of sites were thought to be affected by siltation and over 50% of sites in Anglian Region were perceived to be stressed by channelisation. The work carried out for this package will also contribute to the future development of a predictive version of RIVPACS.

Unit III: Post-Survey Appraisal

Presents the results of a Post Survey Appraisal of the 1995 Biology GQA Survey including:

- responses to a post-survey questionnaire to Agency staff;
- results from an investigation of the effects of alternative analytical quality targets for macro-invertebrate samples;
- analysis of the 1995 quality audit to attempt to determine factors associated with poor performance; and
- recommendations for future surveys.

The following items were amongst the recommendations of this report (and were taken into account in planning the 2000 GQA Survey):

- there should be no reduction in site numbers for the 2000 GQA Survey;
- standard procedures should be developed for deep water sampling;
- standard abundance classes must be used;
- internal analytical quality control should be continued;
- alkalinity data should continue to be collected until long term averages are obtained;
- GQA data should be more widely used for Regional and Area purposes; and
- A rolling programme should replace the quinquennial surveys.

This R&D Technical Summary relates to information from R&D Project E1-036 reported in detail in the following outputs:-

R&D Technical Report E103
Unit I: Taxon Distribution Studies
ISBN 1857056574

R&D Technical Report E101
Unit II: Changes in Biological Condition
ISBN 1857056582

R&D Technical Report E102
Unit III: Post-Survey Appraisal
ISBN 1857056590

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External Status: Released to Public Domain

Project Manager
Bob Dines, Southern Region

Research Collaborator:
CEH Dorset (including the former Institute of Freshwater Ecology)

Copies of these documents are available internally from your Regional Libraries or the National Information Centre in Bristol, and externally from the Environment Agency's R&D Dissemination Centre, c/o WRc Information Resources, Frankland Road, Blagrove, Swindon, Wiltshire SN5 8YF
Tel: 01793 865138, Fax: 01793 514562.
Website URL: www.eareports.com

© Environment Agency
Rio House
Waterside Drive
Aztec West
Almondsbury
Bristol
BS32 4UD

Tel: 01454 624400
Fax: 01454 624409

