

## **R&D Technical Summary W5C-021/2b/TS**

# **Performance measures for flood forecasting**

## **Background to R&D project**

The Environment Agency is responsible for flood forecasting and warning in England and Wales. It supports continued development and improvement of flood forecasting services, and consistent implementation across the Agency regions. To this end, development and delivery of a National Flood Forecasting System (NFFS) was commissioned by the Environment Agency.

Prior to that work, the Environment Agency had commissioned a series of projects to assist with the development of flood forecasting. An element missing from these projects is objective performance measures against which to evaluate the success or failure of forecasting services. Currently, the performance of flood forecasting within the context of the Flood Forecasting and Warning service is difficult to measure precisely, and present approaches vary between Environment Agency regions.

## **Results of R&D project**

Part 1 of the technical report describes the wider context of flood forecasting, warning and response, within which performance measures would be applied. It reviews current practice in evaluation of flood forecasting services, and deficiencies, aspirations and ways forward to achieving a consistent system of performance evaluation.

Part 2 gives the recommendations of this project. It defines and discusses the performance measures already planned to be implemented within NFFS, and additional performance measures that would be desirable additions to NFFS. These additional measures include some high level summary statistics, namely the contingency table (and associated skill scores) and a reliability measure. It discusses some of the practical issues associated with operation of these performance measures, especially in situations where measured data are unavailable. It summarises and discusses the alternative options for performance measures, and the relationship of those options to existing methods to be implemented within NFFS. It goes on to recommend one of those options, and to outline a programme for implementation and testing within the Environment Agency Regions. The recommendation is, initially, to accept all the performance measures already being developed within NFFS, plus several additional parameters. These include the  $R^2$  correlation coefficient parameter already used within the Agency, a new timing error parameter incorporating a variable time lag between forecasts and measurements, a new reliability parameter and a contingency table. One of the recommendations is to review this long list of performance measures after initial trials within the Environment Agency to see which really do, in the longer term, contribute to the assessment of flood forecasting performance.

The Environment Agency will formulate a policy for implementation and continued development of the recommendations in this report, after completion of the project.

## **R&D Outputs and their Use**

The main technical information and research findings from this project are contained in one technical report. The report provides recommendations for the definition and implementation of performance measures for the Environment Agency's flood forecasting capability. It is intended mainly for the use of Environment Agency staff involved in operational real-time flood forecast modelling, but would also be of interest to others involved in the assessment of flood forecasting systems.

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This R&D Technical Summary relates to R&D Project W5C-021/2b and the following R&D output:

- **R&D Technical Report W5C-021/2b/TR *Performance measures for flood forecasting: Review and recommendations***. Published December 2004.

Publication Internal Status: Released internally External Status: Released to public domain

Project Manager: Andrew Grime, Weetwood, Elm House Farm, Saughton Lane, Saughton, Chester CH3 6EN. [www.weetwood.net](http://www.weetwood.net)

Research Contractor: Dr Peter Hawkes, HR Wallingford, Howbery Park, Wallingford, Oxon OX10 8BA. [www.hrwallingford.co.uk](http://www.hrwallingford.co.uk)

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© Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury, BRISTOL, BS32 4UD Tel: (+44) 1454 624400 Fax: (+44) 1454 624409.

**Summary Product Code** SCHO0305BIWA-E-P