



River Rehabilitation Guidance for Eastern England Rivers

**For
The Environment Agency
Anglian Region**

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1 Introduction

Eastern England's rivers are characterised by the generally flat landscape of the area. This flat landscape, good soils and sheltered climate has been intensively cultivated for centuries. As with many such areas of food production, land drainage has been paramount, to enable working of the soils. Where river systems have been modified to allow/maintain agricultural production, we often see a long history of changes.

In Eastern England, some areas, such as the Fens and Levels, have been modified to such a degree that it is often difficult to fathom the natural/original drainage pattern. For further information see the many texts relating to fenland agriculture and land drainage (e.g. Hawkins 2000, Clayton 2004).

River restoration/rehabilitation is a concept that involves understanding the natural system, looking at the changes that have occurred and working with natural processes to achieve some form of recovery to a fully (restoration) or partly (rehabilitation) working fluvial system. In the Eastern counties, the natural system is difficult to find or even predict, the changes are many and complex and the natural functions that would aid self recovery are limited (low slope and poor gradient, interrupted sediment transport, interference by man).

The majority of work that will be planned and undertaken in the Anglian Region of the Environment Agency for England and Wales will be rehabilitation and enhancement rather than restoration. However, given the generally poor state of the river systems, opportunities for improvement are plentiful and the benefits they bring are significant. Put within a strategy for the river catchments (such as Catchment Flood Management Plans (CFMP's) or the Water Framework Directive (WFD) River Basin Plans), catchment scale river restoration planning can help to maximise the benefits from limited funding in a well structured approach and incorporate opportunistic works as they emerge.

Many of the techniques available for river rehabilitation in the UK are applicable to Eastern England rivers. One set of techniques may have been used on an upland stream, but the concept be equally applicable to a low energy environment, albeit using different materials. For example, the generic technique of narrowing has many variations; from blockstone in bedrock rivers to low groynes in chalk streams.

Appendix A illustrates the range of techniques available and those applicable to lowland England.

Of course, some Anglian Region watercourses will exhibit special characteristics (chalk streams, ephemeral streams, artificial controlled drains, pumped systems, etc). It must be stressed that each should be considered carefully before rehabilitation/enhancement works are planned. The techniques should reflect the objectives of the project and must be tailored to the specific site. Poorly planned schemes tend to fail their objectives, reflect badly on the instigators, but also present the river restoration concept in a bad light (one of little thought and less scientific justification).

River restoration is not an exact science given the variables involved and the paucity of credible scientific appraisal. Planning is best done on the basis of broad assessment backed up with scientific proof where appropriate and necessary. Unnecessary expenditure on modelling and design, is wasteful of resources and may stifle the recognition of opportunities to make a

significant enhancement to the environment. A happy middle ground should be sought where considered, risk-based assessment of possible options provides a basis for discussion of the need for further information.

River rehabilitation and enhancement of Eastern England rivers is already well established. Agency Fisheries, Recreation and Biodiversity (FRB) staff have delivered and are delivering significant habitat biodiversity gains through this work. As schemes become more numerous and complex, assessing their contribution to river basin management and restoration becomes more important.

Project managers will need to access greater resources of information and build internal expertise to aid understanding and justify the proposed works within the regulatory framework of the organisation.

1.1 This Guidance

This document provides stand-alone descriptions of the main generic techniques used in the rehabilitation of Eastern England rivers, their background and intention, effect on the river and surrounding land and possible issues that may arise. These descriptions are then supported by an assessment of the hydraulic implication of such structural works, the options currently available to model them and their appropriateness.

It is often the case that projects could be, or are, constrained by the hydraulic regime of the watercourse/site (channel capacity, flood levels, storage, flood risk management standard of service, etc). For this reason this guidance document integrates an appreciation of flows and modelling into all of the techniques and examples.

Where applicable, case studies are used to demonstrate the above techniques, their modelling and their usefulness. The guidance also examines the use of the new Conveyance Estimation System (CES) and how this can help to determine likely changes to river and flood flows for different techniques.

Though the guidance will necessarily be generic, the document will refer to many different publications, listed in table 1a, highlighting their use, availability and applicability.

Manual/Guide
MOT - Manual of River Restoration Techniques
NR&WH - New Rivers & Wildlife Handbook
ARM2 - Australian Rehabilitation Manual - Volume 2
WTT - WTT guide to improving trout streams
SCUS - Stream Corridor Restoration USA
WBPG - Waterway bank protection guide
SEPAF - Managing river habitats for fisheries
GRMF - Guidelines for rehabilitation and management of floodplain
FWMH - Farming and Watercourse management Handbook
RRTH - Restoration of Riverine Trout Habitats
HAHP - Handbook for assessment of hydraulic performance of environmental channels
RRSH - Restoration of Riverine Salmon Habitats

Table 1a. List of useful manuals and guides