

Managed Realignment at Tollesbury

Technical Summary: FD 1922

Joint Defra / EA Flood and Coastal Erosion Risk Management R&D programme

Background to R&D project

As part of its Flood and Coastal Defence research programme, Defra, the Department for Environment, Food and Rural Affairs commissioned a study of the managed realignment of sea defences at Tollesbury, Essex. This study was a full-scale experiment in which new sea defences, in the form of low embankments, were constructed behind the existing sea wall and surrounding approximately 21ha of low-lying agricultural land adjacent to Tollesbury Creek. Following the completion of the new sea defences, the existing sea wall was breached on 4 August 1995 and the enclosed area of agricultural land behind it exposed to tidal inundation for the first time in at least 150 years.

This report is the final report detailing research done between 2003 and 2007. It covers changes in sediment accretion rates, the colonisation of the realignment area by saltmarsh plants and inter-tidal invertebrates and changes in soil structure.

Results of R&D project

Seven sites within the realignment area, and one from the existing marsh outside the site, were sampled for intertidal invertebrates. Nine core samples (15cm deep x 10cm diameter) were taken from each giving a total of 72 samples. Between 2004 and 2007 significant increases were observed in the density of four of the most common species (*H. ulvae*, *M. balthica*, *E. longa*, *Diptera* maggots) within the realignment area. During the 12 years between 1995 and 2007 significant increases in the mean number of species per sample were recorded in 5 sites within the re-alignment area.

There was no significant difference between the rates of change of the bed levels of Old Hall and Tollesbury saltmarshes before and after the creation of the managed realignment site. Although initial rates of accretion within the site were linear, and relatively high at 21mm year⁻¹, since 2003, there was evidence of a slow down in the build up of sediment. Approximately thirteen hectares of the 21 ha site were covered in saltmarsh vegetation (21 species) by 2007. All species were typical of the region though the majority of the vegetated area was dominated by *Spartina anglica*.

Measurements of sediment strength (using the fall-cone and cone penetrometer) and stability (critical shear stress measured using the cohesive strength meter) were performed in September



2003 and 2007 over five different vegetation zones within the Tollesbury site. Critical shear stress and shear strength varied significantly between the different zones. Saltmarsh plants were found on sediments with shear strengths ranging from 5 to 70 kPa with the greatest species diversity occurring where the sediment was stronger than 30 kPa. No evidence of significant creek formation was found where *Spartina anglica* dominated.

R&D Outputs and their Use

The following key findings may be useful in formulating the rationale for the creation of future managed realignment sites.

- With minimal pre-treatment and management, allowing tidal ingress through a simple, relatively small breach onto low-lying agricultural land will quickly produce intertidal mudflats which are colonised by intertidal invertebrates and saltmarsh plants.
- Managed realignment sites in low energy environments, located near natural marshes, should be left to regenerate naturally.
- Future projects should consider leaving existing vegetation on the site prior to inundation, either uncut or a high cut, if mown.
- Soils that are compacted during construction of managed realignment sites should be lightly cultivated prior to inundation, as compacted soils restrict plant colonisation.
- The establishment of *Spartina* early in the development of saltmarsh gives regenerate marshes a very different starting point to that of natural marshes, and may affect the eventual outcome of habitat creation efforts. Such marshes may, nevertheless, still perform the required functions of wave energy dissipation and the provision of bird feeding areas.
- The development of a creek network appears fundamental to the establishment of saltmarsh vegetation.

This R&D Technical Summary relates to R&D Project FD1922 and the following R&D output:

R&D Technical Report FD1922/TR – Managed realignment at Tollesbury. Published August 2008.

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The above outputs may be downloaded from the Defra/EA Joint R&D FCERM Programme website (www.defra.gov.uk/environ/fcd/research). Copies are also available via the Environment Agency's science publications catalogue (<http://publications.environment-agency.gov.uk/epages/eapublications.storefront>) on a print-on-demand basis.



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