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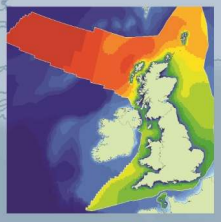
Freiston Managed Realignment Scheme (England)

Case Study

March 2011

Creating sustainable solutions for the marine environment


Basic Statistics

Location	Coordinates (long; lat)	Area (ha)	First Tidal Inundation Date	Years Embanked	Previous Land Use	Tidal Range
The Wash, Lincolnshire.	52.9646594115354; 0.09239484308905	66	August 2002	19	Arable	6.4m (spring)

Plate 1. The managed realignment at Freiston - Google Earth derived aerial view

Design and Management

Prior to the realignment, in 2000, some 1,100m of the remnant landward sea wall were enforced, and a new 500m cross wall built. The material for these works was sourced on site (the borrow pit was later developed into a 15ha saline lagoon). Prior to breaching the sea wall, the vegetation on the 66ha site was cut, baled and removed, field drains were infilled (as far as fill material was available) and some 1,200m of artificial creek system were dug (two channels leading from each breach). Outside the site, some 50m of the external primary creek network were deepened. Finally, three 50m wide breaches were created in the outer sea wall (with channels initially 2m wide and 1m deep).

The site is owned and managed by the Royal Society for the Protection of Birds (RSPB). Its Freiston Shore reserve incorporates the 66ha realignment site, a 15ha saline lagoon and 72ha of wet grassland. Furthermore, Freiston Shore already protects 683ha of saltmarsh and mudflats, which form part of the Wash Special Protection Area (SPA) (RSPB website, 2010).

Promoters and Objectives

In 1983, HM Prison Service (HMP) claimed 66ha of intertidal habitat to gain land for arable production by building a new seaward defence. During the 1990s, the Environment Agency identified this 1,750m stretch of seawall owned by HMP as at high risk of failure, and following a cost benefit analysis decided to strengthen the old, landward, bank in order to form the flood defence. The Royal Society for the Protection of Birds (RSPB) was very keen to take this opportunity to realign the defences and recreate intertidal habitats, and, following discussions with the Environment Agency, English Nature and HMP, acquired the land.

Funding

According to Nottage and Robertson (2005), the capital costs of £1.98 million were raised from the Environment Agency's flood defence budget, as well as contributions from Defra and the Lincolnshire Flood Defence Committee. The RSPB spent £150,000 to purchase the realignment site, and 15ha adjacent to it. Site maintenance is funded through the income from the Defra Countryside Stewardship scheme (£34,500 per annum for 20 years). £400,000 was allocated for monitoring, which was mainly funded by the Environment Agency (Defra contributed some 45% to this).

A project partnership of the Environment Agency, the RSPB, HMP, Boston Borough Council and Lincolnshire County Council obtained almost £800,000 of match funding from the EU 'Objective 5b' initiative, which was used to employ two project officers for three years, profile the adjacent saline lagoon, and create facilities aimed at increasing the site's and area's visitor appeal (including a cycle way through Boston, two new car parks, signs, and a bird watching hide).

Planning Requirements and Consultation

The following consents and consultation steps were obtained/followed (Nottage and Robertson, 2005):

- Defra and Lincolnshire Flood Defence committee approval for the new flood defence scheme,
- Planning consent from the local authority for the Environment Agency works (incl. the new cross bank) (several neighbouring landowners objected to the planning consent; however, all objections were overruled),
- Consent from English Nature due to potential damage to designated sites. Concerns regarding detrimental effects from construction works were addressed in an Environmental Action Plan. Mitigation measures included splitting the work area into two zones, with only one being worked in at any one time, and only between September and May, and

- Extensive public consultation was undertaken. This included letter drops and three workshops. The consultation exercise was described as very useful, as key user groups, and their concerns, could be addressed.

Monitoring

An initial four-year environmental monitoring programme of the site, and adjacent intertidal habitats, has recently concluded (Brown *et al.*, 2007). The majority of the monitoring was undertaken between 2001 and 2006 by the Natural Environment Research Council's Centre for Ecology and Hydrology (CEH), the Cambridge Coastal Research Unit (CCRU), and Birkbeck College (University of London). It investigated accretion/erosion rates, sediment properties, vegetation colonisation, establishment and succession, invertebrate colonisation, and fish utilisation. Accretion and vegetation was surveyed inside the realignment for an additional (5th) year in 2007 (Brown, 2008). Furthermore, the RSPB undertook monthly bird monitoring (for breeding and water birds, as well as wintering passerines), and the National Oceanographic Centre measured wave activity and tide heights for one year after the breach.

Findings and Lessons

(Taken by: C. Scott, ABPmer, April 2010)

Plate 2. Panorama of westerly breach (view east)

Accretion

The recent monitoring reports (Brown *et al.*, 2007; Brown 2008) concluded that in the five years after breaching the sea wall, the Freiston managed realignment site has accreted sediment at similar rates to those of the adjacent salt marsh at the equivalent elevation range. Mean annual accretion rates (after removing a few sites influenced by high deposition of material washed in around the central breach area) ranged between 6 and 10mm per year, and the pattern of natural inter-annual variations inside the realignment matched those outside.

Vegetation

Vegetation establishment and spread have been judged as highly successful, as these have been more rapid than in other (earlier) managed realignment sites. By September 2005, 70% of the area was covered by plants, initially with pioneer species such as glasswort (*Salicornia*) and and

annual sea-blite (*Suaeda maritima*) dominating. By the second and third year, perennial species such as sea purslane (*Halimone portulacoides*) and sea aster (*Aster tripolium*) had become more prevalent (Badley and Allcorn, 2006). It was estimated that the realignment site's species abundance and community types could be equivalent to those outside the site within a further 5 years. This successful vegetation establishment was attributed mainly to the suitable site elevations and the abundant supply of seeds and tiller fragments from the extensive external salt marsh. Overall, no clear evidence was found to suggest that the realignment site has had any adverse effects on the adjacent saltmarsh in general (Brown *et al.*, 2007).

Invertebrates

The realignment site lies at an elevation suitable for salt marsh establishment therefore most of the invertebrates found were species associated with the developing salt marsh. The nature of the fauna (seasonal and weather-dependent activity of mobile organisms and large variation in numbers of small species) made it difficult to make comparisons between years, or between the realignment site and the adjacent marsh, from an annual survey. However, most species found outside were recorded in the site and many species have increased in abundance (Brown *et al.*, 2007).

Fish

The annual fish surveys showed that at least 11 species utilised the realignment site during the first four years of its existence. It was found to act as an important fish nursery area for several commercially important species (such as bass, sprat, and herring), which were shown to be feeding in the realignment site. The site also provides nursery habitat throughout the entire tidal cycle (i.e. fish continue to use the site when it is disconnected from the sea, with the continuous utilisation of permanently flooded channels). In order to improve the site's fish nursery function, the addition of shallow pools or pans was recommended along with research into creek configuration (design and density) (Brown *et al.*, 2007).

Birds

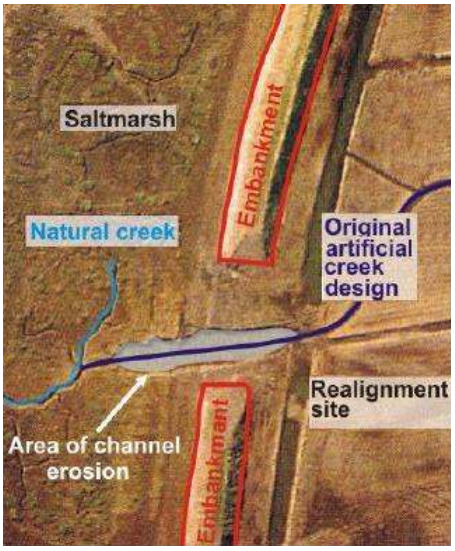
Badley and Allcorn (2006) concluded from four years' of bird monitoring that the realignment supported 'large numbers of wintering waterbirds, several species in nationally important (i.e. > 1% of the UK population) numbers'. These include dark-bellied brent goose and golden and grey plover (for which the following respective peak counts were observed during the 2005/06 period: 1,727, 5,000 and 263). In 2006, the realignment did not contain areas of high enough elevation to support breeding waders, as it was completely inundated during spring tides. The adjacent saline lagoon has developed into a habitat of high ornithological value; it provides a home for breeding, roosting and wintering water birds. Avocets bred for the first time in South Lincolnshire on the newly created lagoon islands. Now, around 40 pairs of avocets choose the lagoon to breed each year. Furthermore large flocks of knot roost on the lagoon and nearby reservoir (RSPB website, 2010).

Morphology

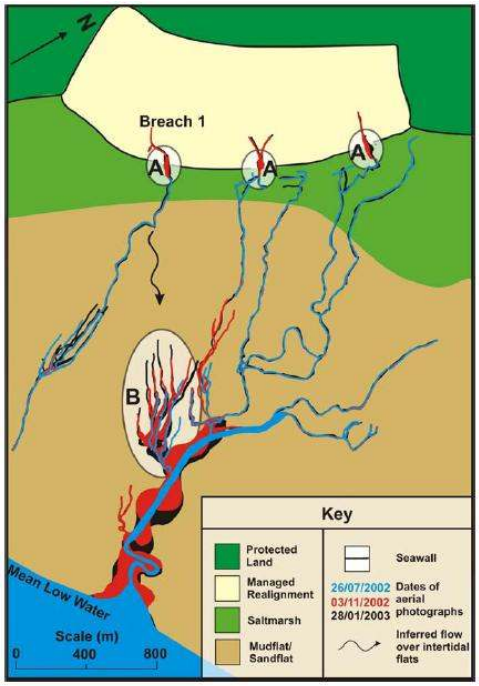
Whilst overall, the site appears to be draining well, in 2006, some 5.6ha were not draining after the tide has receded, with subsequent implications for sediment stability and vegetation development.

In contrast to some other realignment sites (e.g. Tollesbury), creeks in the site were developing through the agricultural soil (Brown *et al.*, 2007).

PhD research (Symonds, 2006; Symonds and Collins, 2007) into the impacts of the realignment on intertidal morphology (undertaken at the University of Southampton) found that in the first one to two months following the breaching, the channels created within the breaches increased substantially from 2m wide by 1m deep to 20m by 4m (see Figure 1a; also visible in Plate 2). However, this initial erosion was restricted to the breaches; it subsequently took almost two years of gradual erosion before the channels within the breaches, and the natural saltmarsh creeks they connect to, had eroded to a sufficient volume to allow the site to drain simultaneously with the fronting saltmarsh (and thus reduce the amount of standing water within the site during low water). In addition to the erosion of the breaches, the managed realignment also directly impacted and creeks over the mid to lower intertidal zones (see Figure 1b). This was caused by the water draining from the managed realignment, following high spring tides, flowing over the intertidal zone as sheetflow and enhancing the natural creek development. This was a temporary effect; once the channels draining the site had reached sufficient dimensions to hold most of the water at most times, the sheetflow diminished considerably and the creeks returned to pre-realignment equilibrium. Unfortunately these changes in intertidal morphology made the area around an oyster farm, located to the south of the site, unstable and ultimately led to the closure of the farm.



a) Rapid erosion of channels in breaches (here: Breach 1 on 03/11/2002 - for scale, the embankment is 20 m wide).



b) Development of a (temporarily) larger mid-intertidal creek network (different erosional zones highlighted by A and B)

(Source: Symonds, 2006)

Figure 1. Channel and creek development in the years following the realignment

Visitors

Nottage and Robertson (2005) noted that following the realignment, visitor numbers to the RSPB's reserve increased significantly, from 11,000 pre-breach to 57,000 in 2003/04. It was estimated that the reserve supports four full time equivalent jobs in local businesses.

Contacts

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Website

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