Seal sands © Carl Watts

Tees Valley Biodiversity Partnership

Intertidal mudflats and saltmarsh Habitat Action Plan 2010-2014

Plan Lead Organisation	Natural England
Plan Coordinator	Mike Leakey
Action Group	Wetland and coastal
Associated Plans	Sand dunes
Latest version	Jan 2010

Description

Coastal mudflats and saltmarsh are interrelated transitional habitats between marine and terrestrial habitats.

Coastal mudflats are sedimentary intertidal habitats created by deposition in low energy coastal environments, particularly estuaries and other sheltered areas. Their sediment consists mostly of silts and clays with a high organic content. Mudflats are intimately linked by physical processes to, and may be dependent on, other coastal habitats such as soft cliffs, fluvial processes and saltmarshes. They commonly appear in the natural sequence of habitats between subtidal channels and vegetated saltmarshes.
Mudflats, like other intertidal areas, dissipate wave energy, thus reducing the risk of eroding saltmarshes, damaging coastal defences and flooding low-lying land. The mud surface is often apparently devoid of vegetation, although mats of benthic microalgae are common. These produce mucilage that binds the sediment. Under nutrient-rich conditions, there may be mats of the macroalgae *Enteromorpha spp* or *Ulva spp*. which can have a negative impact on the integrity of the infaunal mudflat community.Mudflats are highly productive areas which, together with other intertidal habitats, support large numbers of birds and fish. They provide feeding and resting areas for internationally important populations of migrant and wintering waterfowl, and are also important nursery areas for fish (demersal, gobidae and flatfish).

Coastal saltmarshes form the vegetated upper portion of intertidal mudflats between the mean high water neap tides and mean high water spring tides. Saltmarshes develop along coasts with soft shallow shores which provide protection from strong wave action. Saltmarshes have specialized vegetation dominated by a small number of halophyte (salt tolerant) species adapted to regular tidal immersion. The habitat shows vegetation zonation in accordance with the frequency of immersion in salt water. From the marine environment to landward these can be divided into pioneer marsh, low marsh, upper marsh and transitional marsh. Characteristic species include glassworts *Salicornia spp*, sea aster *Aster tripolium* and common saltmarsh grass *Puccinella maritima.* Saltmarsh communities are additionally affected by differences in climate, the particle size of the sediment and, within estuaries, by decreasing salinity in the upper reaches. Saltmarshes on fine sediments, which are predominant on the east coasts of Britain, tend to differ in species and community composition from those on the more sandy sediments typical of the west. The northern limits of some saltmarsh species also influence plant community variation between the north and south of Britain.

Saltmarsh is a highly specialised and productive habitat which supports a flora which is adapted to cope with seawater. Many invertebrates, including GB red data book and nationally scarce species, are confined to saltmarshes. Areas with a high structural and plant diversity, particularly where freshwater seepages provide a transition from fresh to brackish conditions, are particularly important for invertebrates.

Saltmarshes are important habitats for wading birds and waterfowl. They act as a high tide refuge for birds feeding on adjacent mudflats and breeding sites for waders, gulls and terns. In winter they are important for wigeon, teal, redshank, curlew and lapwing,

The total UK estuarine resource has been estimated as around 588,000ha of which 55% is intertidal area, mostly mud and sandflats with a lesser amount of saltmarsh. Intertidal flats cover about 270,000ha. Mudflats are widespread estuarine habitats in the UK with significant examples in the Wash, the Solway Firth, Mersey Estuary, Bridgwater Bay and Strangford Lough. Land claim, for urban and transport infrastructure and for industry, has removed about 25% of the UK's estuarine intertidal mudflats and up to 80% in some estuaries. Loss of mudflats reduces estuary productivity and may influence other estuary habitats such as saltmarsh.

95% of saltmarshes in the UK are found in estuaries. In Britain there is estimated to be 45,820ha of saltmarsh which is widely distributed around the coast. This resource is concentrated in the major estuaries of low-lying land in eastern and north-west England. Historically, large areas of saltmarsh have been lost as a result of land claim for agriculture and industry. As a result, the upper and transitional zones of saltmarsh have become comparatively scarce in England.

Current factors causing loss and decline

- Within estuaries, mudflats deposited in the past may erode due to changed estuarine dynamics and remobilised sediment may be redeposited elsewhere in the same littoral sediment cell. Higher sea levels and increased storm frequency, resulting from climate change, may further affect the sedimentation patterns of mudflats and estuaries.

- Erosion of the seaward edge of mudflats and saltmarshes may occur because of rising sea levels and an increase in wave energy. Sediments are usually deposited further up the shore but this is not possible where coastal defences are in place. This can lead to saltmarsh being lost because of the 'squeeze' which takes place between the rising sea and the fixed sea defenses.

- Barrage schemes for water storage, amenity, tidal power and flood defence continue to pose a threat to the integrity and ecological value of mudflats and saltmarsh in estuaries and enclosed bays.

- Diffuse and point source discharges from agriculture, industry and urban areas, including polluted storm-water run-off, can create abiotic areas or produce algal mats which may affect invertebrate communities. They can also remove embedded fauna and destabilize sediments thus making the habitat liable to erosion.

- Fishing and bait digging can have an adverse impact on community structure and substratum. For example, suction dredging for shellfish or juvenile flatfish by-catch from shrimp fisheries may have a significant effect on important predator populations. While bait collection is prohibited by Natural England Byelaws within most areas of Teesmouth NNR, it remains unregulated at Bran Sands, where 20 or more bait-diggers are regularly present in the winter months.

- The introduction of new or non-native species, for example the spread of cord-grass *Spartina anglica* (which has vegetated some upper-shore mudflat areas) reduces the diversity of saltmarsh vegetation and the value of the habitat as a feeding ground for birds.

- Dredging to maintain shipping channels can affect movement of sediment and formation of mudflats and saltmarshes. Conversely, in the case of North Tees Mudflat, a training wall acts to prevent the erosion of an important linear area of mudflat adjacent the River Tees.

- Pollution from oil, sewage, fertilizers and run-off from old waste disposal sites can all constitute a threat. For example oil pollution can damage saltmarsh vegetation and whilst it usually recovers, sediment may be lost during the period of die-back. Water pollution from sewage and fertilizers can lead to eutrophication. This is manifested by the excessive growth of green algae, which may cause local problems of smothering on mudflats and saltmarshes.

- Coastal defences and other engineering works can disrupt the natural coastal processes of erosion and deposition needed for the maintenance of intertidal habitats.

- Overgrazing may cause damage on some sites, affecting both breeding birds and saltmarsh vegetation.

Conservation Status

Intertidal mudflats and Atlantic salt meadows are listed as a habitat type on Annex 1 of the EC Habitats Directive. Inter-tidal mudflats and Saltmarsh are UK Biodiversity Action Plan Habitats

In the UK approximately 80% of the area of saltmarsh has been notified as SSSI.

The Habitat in the Tees Valley

The Tees estuary has been considerably modified by human activities. Land reclamation has dramatically changed the estuary's shape and reduced the extent and range of estuarine habitats. Despite the enormous impact of industry on the estuary it retains an international importance for wildlife. Teesmouth National Nature Reserve (NNR) covers 355 hectares comprising a range of habitats including intertidal mud and sand flats, sand dune systems, saltmarsh and grazing marsh. Seal Sands occupies the southern half of Teesmouth NNR and contains the largest area of intertidal mud flats between the Humber and Holy Island. . The reserve boundaries encompass parts of two Sites of Special Scientific Interest (SSSIs); together with parts of a further four SSSI, these make up Teesmouth and Cleveland Coast Special Protection Area (SPA) and Ramsar site, which is of international importance for wildlife. The SPA estuarine habitats provide feeding and roosting opportunities for important numbers of waterbirds in winter and during passage periods. In summer Little Tern *Sterna albifrons* breed on beaches within the site, while Sandwich Tern *Sterna sandvicensis* are abundant on passage. Throughout the year, it provides a sanctuary for migrating waterbirds. Seal Sands supports the only regular breeding colony of common seals on the north east coast of England.

Growth of mats of the green algae*, Enteromorpha* was recorded on mud flats at Seal Sands in the Tees Estuary in the mid 1990s. Its growth is associated with eutrophication (nutrient enrichment) which causes rapid growth of phytoplankton and opportunistic green algae. The mats themselves can impede the foraging efficiency of waterbirds, while the bacterial breakdown of large amounts of algal growth can lead to anaerobic conditions that reduce the quantity and diversity of benthic invertebrates, which are turn the food source of wading birds. Detailed studies on the growth and affects of *Enteromorpha* mats at Seal Sands have revealed a complex set of interrelationships between factors controlling algal growth. Despite some significant correlations between bird usage of the mudflats and *Enteromorpha* growth, it may not the main factor behind a decline in waterbird numbers or their redistribution during the 1990s and early 2000s.

Saltmarsh is a rare habitat type in the Tees Valley, occupying just 26.5ha (15ha in Hartlepool Borough and 11.5ha in Stockton-on-Tees). At Teesmouth the extent of land reclamation has reduced this transitional habitat to little more than narrow belts of halophytic (salt-loving) plants in some areas. While saltmarsh formerly occupied extensive tracts of the Tees estuary, with the reclamation of around 90% of the inter-tidal zone during the last 250 years saltmarsh is now restricted to narrow strips either side of Greatham Creek (the northern margin being within Hartlepool Borough, the southern lying within Stockton Borough). A further small area of saltmarsh exists within Stockton at Seal Sands peninsula (within the boundary of Teesmouth National Nature Reserve). All significant sites have been designated as Sites of Special Scientific Interest and form part of the Teesmouth and Cleveland Special Protection Area. 7% of the area within the boundary of the Teesmouth and Cleveland Coast Ramsar site (site number 741) is described as saltmarsh.

While in historical times much saltmarsh has been lost due to land reclamation and the subsequent development of industry, the recent trend has been for saltmarsh species to spread; the enclosed marsh within the Seal Sands peninsula and emerging area of *Salicornia* to the west of this peninsula and at Seaton Snook provide evidence of this. The Environment Agency's managed realignment scheme at Greatham Creek should aid the further expansion of this rare habitat type, enabling the Tees Valley to buck the national trend of decline for this particular habitat type. Unfortunately, opportunities to compensate for national losses are restricted and it should be borne in mind that natural expansion of saltmarsh (particularly at Seal Sands) is likely to be at the expense of mudflats.

Current Activity in the Tees Valley

A key area of monitoring comprises assessing bird usage through the British Trust for Ornithology's Wetland Bird Survey core counts. Low tide bird counts are currently undertaken on behalf of Northumbrian Water Ltd and by the Teesmouth NNR Senior Reserve Manager. Data are supplemented through cannon netting that takes place at the Seal Sands peninsula through the Tees Ringing Group. Condition assessments are conducted by Natural England staff on SSSI units.

Botanical monitoring has been carried out for several years in the Seal Sands and Greatham Creek areas by John Jenkins (Wildflower Ark) with recent help from INCA.

.In recent years considerable investment has been made by Northumbrian Water Ltd under the AMP process to investigate and mitigate eutrophication in the Seal Sands area. This project has resulted in the diversion of treated sewage effluent from the Billingham STW to long sea outfall. Monitoring of *Enteromorpha* coverage on Seal Sands will shortly cease following the completion of the project.

The Environment Agency has ambitious plans for a large-scale managed realignment project on the north-west cell of Greatham Creek, as part of compensation for its Tees Tidal Flood Risk Management Strategy.

A much smaller area of potential managed realignment has recently been identified by INCA close to the confluence of Billingham Beck with the River Tees. It is hoped that up to 2ha (predominantly saltmarsh) could possibly be created at this location.

PD Ports has proposals to repair a section of eroding training wall adjacent to North Tees Mudflat, which will have the effect of both retaining an important mudflat bird habitat and restricting the remobilization of previously buried contaminated sediments.

Finally, considerable efforts are being made by Natural England to eliminate bird disturbance on Seal Sands, the estuary's core intertidal feeding area. Illegal bait collection is the primary target here. The encroachment of development (for example the mothballing of large offshore rigs in Seaton Channel, adjacent to Seal Sands) is also being resisted.

Further Information

Adam, P. 1990. *Saltmarsh Ecology*. Cambridge University Press Cambridge.
Allen, J.R.L. & Pye, K. 1992. *Saltmarshes: Morphodynamics, conservation and engineering*. Cambridge University Press, Cambridge.
Burd, F. 1989. *The saltmarsh survey of Great Britain. An inventory of British saltmarshes*. Research and Survey in Nature Conservation No. 17, Nature Conservancy Council, Peterborough.
Davidson, N.C., D.A. Laffoley, D., Doody, J.P., Way, L.S., Gordon, J., Key, R., Drake, C.M., Pienkowski, M.W., Mitchell, R. & Duff, K.L. 1991. *Nature conservation and estuaries in Great Britain.* Nature Conservancy Council, Peterborough.
Mann, J.A., Short, P.M., Smith, J.K and Woods, R. (2009).The state of the natural environment of the Tees Valley - A summary of environmental changes from 1995. Industry and Nature Conservation Association.

Raffaelli, D.G., Raven, J. & Pool, L. 1998. Ecological impact of green macro-algal blooms. In: *Oceanography and Marine Biology: an Annual Review* 36 , 97-126.
Sherwood, B.R., Gardiner, B.G. & Harris, T. (eds) (2000). British Saltmarshes . Forrest Text, Cardigan.

Websites
Defra and the Environment Agency have an online saltmarsh management site
www.saltmarshmanagementmanual.co.uk

Vision Statement

To allow space for natural coastal processes to ensure a dynamic system of natural mudflat and saltmarsh habitats of high nature conservation value in the Tees Valley.

Targets

MS.T1 Maintain the current net extent of coastal saltmarsh at Teesmouth of 26.5 hectares

MS.T2 Create intertidal habitat which will compensate for losses due to coastal squeeze

No numerical target goals have been set for extent and creation of mudflats and saltmarshes, given that this is essentially a dynamic habitat; we are instead focusing on allowing the system space to work and re-work sediments into mudflats/saltmarsh according to natural coastal processes.

Actions

Code	Action	Organisational lead	Action contact	Partners	End date
MS.A1	Create at least 20 ha of intertidal habitat at Greatham creek through coastal realignment.	Environment Agency	Katy Dickson	RSPB Natural England	2015
MS.A2	Continue to monitor and survey the extent, plant communities and habitat condition of the existing saltmarsh resource to inform improved management schemes.	INCA	Robert Woods		?
MS.03	Monitor areas of saltmarsh (particularly newly created areas) for changes in flora, fauna and extent of saltmarsh habitat.	Environment Agency	Katy Dickson		Ongoing
MS.04	Raise awareness amongst decision makers, industry, schools and the wider community, about the importance and management of Teesmouth's intertidal habitats and their associated species through publicity material, events and training.	Natural England	Jonnah Collins	Teesmouth Field Centre, RSPB INCA	Ongoing
MS.05	Restrict human disturbance on Seal Sands, especially from bait and shellfish collection.	Natural England	Mike Leakey	PD Ports Police	Ongoing
MS.06	Maintain the integrity of North Tees Mudflat through reinstatement of the training wall	PD Ports	Andrew Ridley	Natural England	2011
MS.07	Monitor bird usage of intertidal areas	Wetland Bird Survey	Mike Leakey	RSPB, Natural England, Teesmouth Bird Club	Ongoing