An Intertidal Survey of the Biotopes of Rocky Scars in the Drigg Coast, European Marine Site

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Further information

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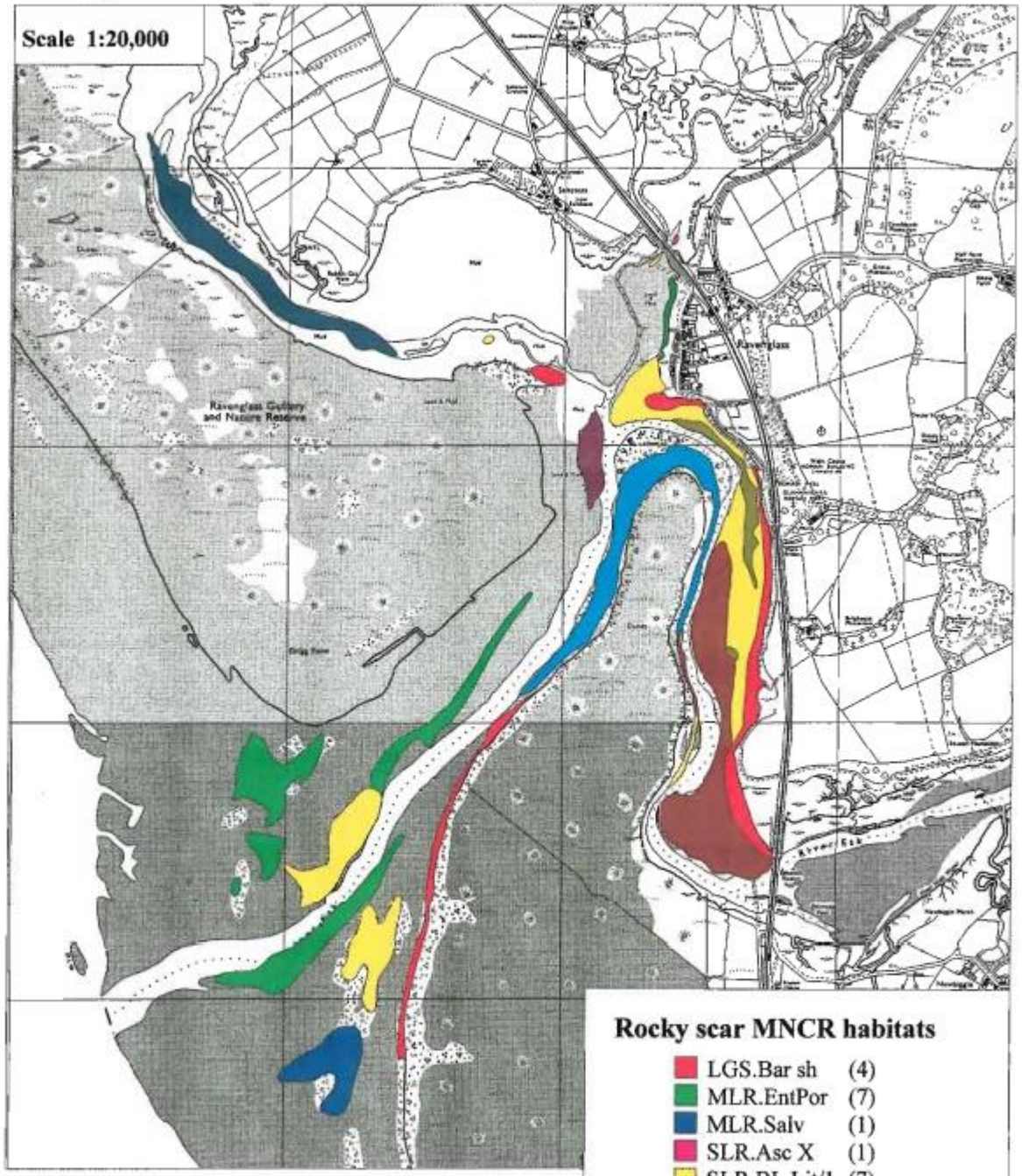
For English Nature
July 1999

WA Marine & Environment

Drigg Coast European marine site: Rocky scar (MNCR) habitats



Rocky scar MNCR habitats

LGS.Bar sh	(4)
MLR.EntPor	(7)
MLR.Salv	(1)
SLR.Asc X	(1)
SLR.BL Lit/1	(7)
SLR.BL Lit/2	(1)
SLR.Eph X	(2)
SLR.Fcer	(1)
SLR.Fcer X	(1)
SLR.Fucs X	(1)
SLR.Myt X	(2)

From 1999 Rocky scar MNCR survey by Mark Woombs, for English Nature

Summary

- The Ravenglass estuary system is a joint estuary of the rivers Esk, Mite and Irt. These converge to the southwest of Ravenglass to join the Cumbrian coast through a single channel between the Drigg Dunes and the Eskmeal Dunes. Within the Channel and estuaries, habitats gradually change from mobile sandy sediments to estuarine muds and saltmarsh. Interrupting these sediments are areas of mixed substrata, with boulders, cobbles, pebbles and consolidated gravels.

- The Drigg Coast, European Marine Site, is of considerable conservation importance; it is a Site of Special Scientific Interest (SSI) and a candidate Special Area of Conservation (SAC).

- While sediments dominate the majority of the area, intertidal boulder and cobble habitats may have important conservation interests. The objectives of this report are to map the extent of the rocky skears in the Esk estuary, Mite Estuary, Irt Estuary and the Channel, and to provide detailed descriptions of the biotopes they support. From this it should be possible to identify and describe any features of particular conservation significance.

- Habitat diversity on rocky skears is generally restricted, leading to a limited range of species being recorded. This is particularly evident on the rocky biotopes of the Drigg Coast. Within the estuaries, species diversity was generally affected by variable and reduced salinities, lack of stability, or less frequently siltation; while in the Esk Channel (from the confluence of the Esk, Mite and Irt), species diversity was reduced by mobile substrata and sand scour. Even in those areas where the substrata had been stabilised by *Mytilus edulis* or *Sabellaria alveolata*, there were relatively impoverished communities.

- All the habitats and communities surveyed (with the exception of Mite Bridge), are believed to be natural and representative of the northwest. The diversity of habitats and communities is very low. Most of the communities are surviving in highly stressed and variable environments and are therefore unlikely to be fragile. The low species richness generally results in a low sensitivity to disturbance and environmental change. The one exception to this may be the *Sabellaria alveolata* reef which may be considered fragile and of limited extent nationally.

- Due to the impoverished nature of these largely mobile sediment shores they lack intrinsic appeal in marine biological terms. However the estuaries as a whole are complex features with a high biological, topographical and geological appeal.

An Intertidal Survey of the Biotopes of Rocky Scars in the Drigg Coast, European Marine Site

Introduction

The exposed coastline of Cumbria is relatively wild and unspoilt. It consists of sandy beaches with areas of cobble and boulder shore known as skears or scars. With the exception of the spectacular sandstone cliffs of St. Bees, these skears are the only real areas of hard substrata on the Cumbrian coast. The geology of the coast from St. Bees to the Duddon estuary is Triassic sandstones with overlain glacial deposits.

The Ravenglass estuary system is a joint estuary of the rivers Esk, Mite and Irt. These converge to the southwest of Ravenglass to join the Cumbrian coast through a single channel between the Drigg Dunes and the Eskmeal Dunes. Within the Channel and estuaries, habitats gradually change from mobile sandy sediments to estuarine muds and saltmarsh. Interrupting these sediments are areas of mixed substrata, with boulders, cobbles, pebbles and consolidated gravels. These areas are often weathered glacial debris. In the estuary channel, many of the boulders, cobbles and pebbles are scoured by medium and coarse grained sand sediments or are mobile during storms, often resulting in an impoverished fauna. Within the estuaries of the Esk, Mite and Irt a gradation occurs from the mobile sediments of the channel to the enclosed estuarine muds at the limit of tidal influence.

According to Covey (1998) the middle and upper sections of the Esk consist of fine, sandy mud with communities of *Hediste diversicolor*. These communities also characterise much of the Mite and Irt estuaries.

Previous work by Covey *et al* (1989) found the sediments of the upper parts of the Esk Estuary to be composed of very fine sand (70%) and silt (30%). There was a black anoxic layer at or near the surface. *Arenicola marina*, *Corophium volutator* and *Eurydice pulchra* dominated the communities. Under extremely sheltered conditions on the upper shore and creek banks the silt fraction increased.

The open end of the Channel is exposed to the prevailing westerly / southwesterly winds. The extensive dunes on either side provide protection for the muddy shores beyond. These vast areas of muddy sediment drain at low tide leaving only the main drainage channels filled with water. A high tidal range and the gently sloping shores generate fast tidal currents (up to 3 knots) both in the Channel and up the estuaries. Although the open coast is fully saline, 31 – 32ppt (Lee and Ramster, 1981), there are large fluctuations within the estuaries, particularly during heavy rainfall, leading to very variable salinities.

The Drigg Coast, European Marine Site, is of considerable conservation importance; it is a Site of Special Scientific Interest (SSI) and a candidate Special Area of Conservation (SAC). The proposed SAC is based upon the coastal dune heathland, the dunes with creeping willow and the estuary complex. As yet little is known about the extent and location of the rocky skears within the Drigg Coast, EMS. While sediments dominate the majority of the area, intertidal boulder and cobble habitats may have important conservation interests. The objectives of this report are to map the extent of the rocky skears in the Esk estuary, Mite Estuary, Irt Estuary and the Channel, and to provide detailed descriptions of the biotopes they support. From this it should be possible to identify and describe any features of particular conservation significance.

Methods

Site selection as specified above was determined by English Nature.

The survey was carried out over low water spring tides from the 28th July to the 30th July 1999 and the 12th August 1999.

Access to sites was by an All Terrain Vehicle (Yamaha Kodiak) or by foot.

All surveys were carefully planned with regard to health and safety; with a minimum of two persons carrying all appropriate safety equipment and following safe working practices.

Yamaha Kodiak ATV equipped with differential GPS

The extent of the sites was mapped using known land and sea marks, and a Garmin 40 GPS linked to a Garmin GBR 21 differential beacon receiver which was tuned to Port Lynas in North Wales. This improved position accuracy to generally better than 10m. This data was then plotted on 1:5,000 Ordnance Survey outline maps in conjunction with the 1:10,000 aerial photographs, all supplied by English Nature.

All biotopes present were identified according to the JNCC Marine Biotope Classification for Britain and Ireland, Volume 1, Version 97.06 (Connor, 1997). Biotope boundaries were mapped and plotted as above.

Field recording forms for site and littoral habitats (detailed) were completed following the guidance of the MNCR publication *Rationale and Methods* (Hiscock, 1996).

Slides were taken of each site and biotope using a Nikon F90X camera, 20, 60 (macro) and 105mm (macro) lenses as appropriate and 35mm Fuji or AGFA, 50 or 100 ASA, slide film.

Features of possible conservation interest were identified.

Results

See the Drigg Coast folder for field recording forms (site locations, site descriptions biotope descriptions and species lists), site and biotope maps and catalogued slides.

- Site 1 – River Esk, south of Ravenglass

A very sheltered estuary of mixed substrata, subject to variations in salinity and siltation. There was no distinct zonation, just large patches of ephemeral algae or barnacles and littorinids. A lower to mid eulittoral zone of dense aggregations of *Mytilus edulis* was present in the northern part of the site. After Eskmeals viaduct the site was entirely muddy sediments with an upper shore of *Salicornia* spp. forming a pioneer saltmarsh community.

SLR.EphX

Three rocky biotopes were recorded, all before Eskmeals viaduct. Just north of the viaduct was a eulittoral mixed substrata of cobbles and pebbles overlying fine sand and mud, that is subject to salinity variations. The main species were frequent patches of *Enteromorpha* and *Ulva* spp. with assorted fucoids, particularly *Fucus ceranoides*. The biotope was almost transitional between SLR.EphX and SLR.FcerX. This biotope may be a summer variation of BLlit.

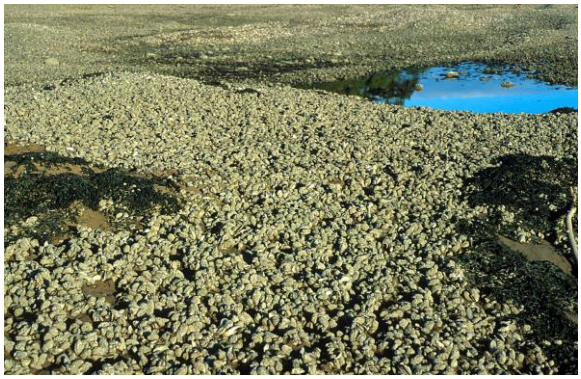
North and east of this biotope and on the west side of the estuary was another eulittoral mixed substrata of cobbles, pebbles and gravel on fine muddy sand, densely covered with barnacles and littorinids (SLR.BLlit). Occasional patches of *Mytilus edulis* occurred between the pebbles, along with occasional fucoids on the larger cobbles. Presumably the

SLR.BLlit

SLR.BLlit

cobbles and pebbles are generally too small or too unstable to support fucoids due to the fairly strong tidal streams.

Within the SLR.BLlit biotope was an extremely dense covering of mussels. An area of fine mud and sand with occasional cobbles and pebbles was stabilised by a very dense covering of *Mytilus edulis* (SLR.MytX). The mussels were encrusted with barnacles (particularly *Elminius modestus*), while littorinids and *Carcinus maenas* were also common. Any bare areas of sediment contained *Arenicola marina*.



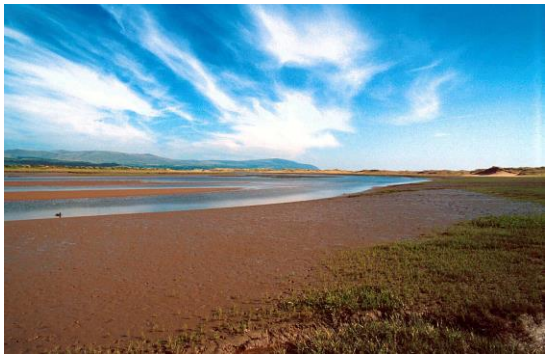
SLR.MytX

To the east of all these biotopes, at the upper eulittoral is an unclassified county road, over which vehicles can drive. Hence this is an area of barren cobbles and pebbles.

All the rocky biotopes of the Esk Estuary had relatively species poor communities and a low habitat diversity.

♦ Site 2 – River Irt

An extremely sheltered, variable salinity estuary consisting principally of muddy sediments with an upper shore of *Salicornia* spp. forming a pioneer saltmarsh community. A bed of pebbles and gravel on a muddy sand, with patches of *Fucus ceranoides* ran down the centre of the lower half of the estuary.



Irt Estuary

SLR.FcerX

Pebbles in the eulittoral zone that are subject to reduced salinities and moderate tidal streams are often covered by *Fucus ceranoides*, giving the biotope SLR.FcerX. The opportunistic green alga *Ulva* sp. was also present. Otherwise species diversity was extremely low.

♦ Site 3 – River Mite

Another very sheltered, variable salinity estuary consisting principally of muddy sediments with an upper shore of *Salicornia* spp. forming a pioneer saltmarsh community. Rocky biotopes were extremely scarce.

Underneath the Mite Railway Bridge there were eulittoral boulders (a largely artificial substratum) and pebbles on mud with *Ascophyllum nodosum* and *Fucus vesiculosus* co-dominant (SLR.AscX). Littorinids and barnacles occurred along with occasional clumps of

Mytilus edulis. The bridge supports were covered with *A. nodosum* and *F. vesiculosus*. Just above these fucoids, there was a very narrow band of *Fucus spiralis* and *Pelvetia canaliculata*.

SLR.AscX

SLR.Fcer

Along the Ravenglass foreshore there was a narrow band of boulders and cobbles on mud with *Fucus ceranoides* and occasional littorinids. Once again species richness was very low. Two small areas of mixed substrata covered with barnacles and littorinids were present; one to the south west of Mite Bridge and the other extending from the Esk Estuary at Ravenglass.

- Site 4 – Esk Channel (seaward to confluence of Esk, Mite and Irt)

A large gently sloping, mainly sandy estuary, resulting from the confluence of the Esk, Mite and Irt estuaries. Where present, areas of largely mobile, mixed substrata (usually cobbles or pebbles on sand) were colonised with barnacles and littorinids or ephemeral algae. This was presumably dependent on the amount of scour and stability. An area of stabilised *Sabellaria alveolata* reef occurred on the edge of the site area.

The south side of the Channel was largely sand with two principal rocky biotopes. In the lower eulittoral were moderately sand scoured cobbles and pebbles with communities of ephemeral green algae, notably *Enteromorpha* spp. (MLR.EntPor). The mid eulittoral comprised mobile cobbles and pebbles on sand, with the barnacles *Elminius modestus and*

MLR.EntPor

Confluence of Esk, Mite and Irt, looking seaward

Semibalanus balanoides, dense aggregations of *Littorina littorea* and *Littorina saxitilis* and occasional sparse patches of *Mytilus edulis* (SLR.BLlit). Both biotopes were extremely species poor. The Esk Estuary biotope (SLR.BLlit) also extends well down the Channel on the Eskmeal dunes side. Behind this and continuing southward is an upper eulittoral and supralittoral bank of barren shingle. Any macrofauna is absent or extremely sparse due to the drainage and very mobile substrate.

To the south of these biotopes and just outside the survey area was an area of moderately sand scoured mid eulittoral cobbles characterised by low (< 25cm) reefs of *Sabellaria alveolata* with *Fucus vesiculosus* (MLR.Salv). The tubes of *S. alveolata* form reef-like hummocks, which help to stabilise the surrounding cobbles and boulders. Although reefs of *S. alveolata* often enhance species diversity, in this case, the biotope was still relatively species poor.

MLR.Salv

MLR.Salv

Similar biotopes were found to the north of the channel (but with no *Sabellaria alveolata*). A lower eulittoral area of cobbles with some boulders, on sand, was colonised by barnacles along with dense aggregations of littorinids (SLR.BLlit). Between the cobbles were patches of sand with *Arenicola marina* or stabilising blankets of *Mytilus edulis*. To the north and north east were mid eulittoral, moderately sand scoured cobbles, with communities of ephemeral algae, notably *Enteromorpha* spp. and *Porphyra purpurea* (MLR.EntPor). Otherwise, again, a very species poor community.

SLR.BLlit

MLR.EntPo

To the extreme north of the site, near the confluence of the three estuaries there was a mid eulittoral area of cobbles and pebbles on fine sand, between which were larger areas of fine sand with occasional *Arenicola marina*. The pebbles and cobbles were covered with patches of *Fucus vesiculosus*, *Fucus ceranoides* and *Enteromorpha* spp., indicating variable salinity and limited stability.

Discussion

Habitat diversity on rocky skears is generally restricted, leading to a limited range of species being recorded. This is particularly evident on the rocky biotopes of the Drigg Coast. Within the estuaries, species diversity was generally affected by variable and reduced salinities, lack of stability, or less frequently siltation; while in the Esk Channel (from the confluence of the Esk, Mite and Irt), species diversity was reduced by mobile substrata and sand scour. Even in those areas where the substrata had been stabilised by *Mytilus edulis* or *Sabellaria alveolata*, there were relatively impoverished communities.

Covey *et al* (1989) in his littoral survey of South Cumbria states that boulder shores were subject to considerable sand scour and were rather barren areas at most locations. He goes on to say exposed shores composed of small stones are typically unstable, the stones are frequently overturned resulting in low species richness. However many Cumbrian shores have become stabilised by extensive mussel beds or reefs of *Sabellaria alveolata*. Within the Drigg Coast, where this stabilisation occurs, it has increased biomass, but not a significantly greater species richness.

Covey *et al* (1989) found the mussel skear in the Esk Estuary differed from those present on exposed pebble and cobble shores. In general the habitat diversity and species richness was low. Covey (1998) reported shingle on the south eastern shore of the Channel to be stabilised by *Mytilus edulis* (MytX), a biotope which extends along the south eastern shore to cover a large area of the lower Esk Estuary around Ravenglass. This survey found occasional patches of *M. edulis* on the southeastern shore, but the biotope was principally SLR.BLlit.

Sabellaria alveolata occurs in relatively exposed conditions where there are high levels of suspended sand and a rocky substrate. The rocky skears of Cumbria often provide an ideal habitat. The reef on the Drigg Coast is just south of the area surveyed and although obviously of conservation interest is not as large or diverse as the reefs of Morecambe Bay or Barn Scar. Despite this, *Sabellaria* reefs are both limited in extent and under increasing pressure in other areas of Britain (Covey *et al*, 1989). *Sabellaria* reefs also tend to undergo cycles of growth and erosion (Gruet, 1986). This cyclical nature can pose problems when assessing their conservation value and intrinsic appeal. In addition these reefs are fragile and could suffer considerably from physical disturbances, both natural and human.

All the habitats and communities surveyed (with the exception of Mite Bridge), are believed to be natural and representative of the northwest. The diversity of habitats and communities is very low. Most of the communities are surviving in highly stressed and variable environments and are therefore unlikely to be fragile. The low species richness generally results in a low sensitivity to disturbance and environmental change. The one exception to this may be the *Sabellaria alveolata* reef which may be considered fragile and of limited extent nationally.

Due to the impoverished nature of these largely mobile sediment shores they lack intrinsic appeal in marine biological terms. However the estuaries as a whole are complex features with a high biological, topographical and geological appeal.

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