

The Marine Habitat Classification for Britain and Ireland. Version 04.05

Littoral Sediment Section

This document is an extract from:

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LOUISE M. LIEBERKNECHT, KATE O. NORTHEN AND JOHNNY B. REKER (2004)
The Marine Habitat Classification for Britain and Ireland Version 04.05 JNCC, Peterborough
ISBN 1 861 07561 8 (internet version)
www.jncc.gov.uk/MarineHabitatClassification

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LS Littoral Sediments

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced/low (0.5-30ppt)
Wave exposure:	Very exposed, Exposed, Moderately exposed, Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Shingle; gravel; sand; mud; mixed sediment
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Littoral sediment includes habitats of shingle (mobile cobbles and pebbles), gravel, sand and mud or any combination of these which occur in the intertidal zone. Littoral sediment is defined further using descriptions of particle sizes - mainly gravel (16-4 mm), coarse sand (4-1 mm), medium sand (1-0.25 mm), fine sand (0.25-0.063 mm) and mud (less than 0.063 mm) and various admixtures of these (and coarser) grades - muddy sand, sandy mud and mixed sediment (cobbles, gravel, sand and mud together). Littoral sediments support communities tolerant to some degree of drainage at low tide and often subject to variation in air temperature and reduced salinity in estuarine situations. Very coarse sediments tend to support few macrofaunal species because these sediments tend to be mobile and subject to a high degree of drying when exposed at low tide. Finer sediments tend to be more stable and retain some water between high tides, and therefore support a greater diversity of species. Medium and fine sand shores usually support a range of oligochaetes, polychaetes, and burrowing crustaceans, and even more stable muddy sand shores also support a range of bivalves. Very fine and cohesive sediment (mud) tends to have a lower species diversity, because oxygen cannot penetrate far below the sediment surface. A black, anoxic layer of sediment develops under these circumstances, which may extend to the sediment surface and in which few species can survive. Some intertidal sediments are dominated by angiosperms, e.g. eelgrass (*Zostera noltii*) beds on the mid and upper shore of muddy sand flats, or saltmarshes which develop on the extreme upper shore of sheltered fine sediment flats.

Situation

Littoral sediments are found across the entire intertidal zone, including the strandline. Sediment biotopes can extend further landwards (dune systems, marshes) and further seawards (sublittoral sediments). Sediment shores are generally found along relatively more sheltered stretches of coast compared to rocky shores. Muddy shores or muddy sand shores occur mainly in very sheltered inlets and along estuaries, where wave exposure is low enough to allow fine sediments to settle. Sandy shores and coarser sediment (gravel, pebbles, cobbles) shores are found in areas subject to higher wave exposures.

Temporal variation

Littoral sediment environments can change markedly over seasonal cycles, with sediment being eroded during winter storms and accreted during calmer summer months. The particle size structure of the sediment may change from finer to coarser during winter months, as finer sediment gets resuspended in seasonal exposed conditions. This may affect the sediment infauna, with some species only present in summer when sediments are more stable. These changes are most likely to affect sandy shores on relatively open shores. Sheltered muddy shores are likely to be more stable throughout the year, but may have a seasonal cover of green seaweeds during the summer period, particularly in nutrient enriched areas or where there is freshwater input.

LS.LCS Littoral coarse sediments

Habitat (physical) description

Salinity:	Full (30-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Shingle; gravel; coarse sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Littoral coarse sediments include shores of mobile pebbles, cobbles and gravel, sometimes with varying amounts of coarse sand. The sediment is highly mobile and subject to high degrees of drying between tides. As a result, few species are able to survive in this environment. Beaches of mobile cobbles and pebbles tend to be devoid of macroinfauna, while gravelly shores may support limited numbers of crustaceans such as *Pectenogammarus planicrurus*.

Situation

Littoral coarse sediments are found along relatively exposed open shores, where wave action prevents finer sediments from settling. Coarse sediments may also be present on the upper parts of shores where there are more stable, sandy biotopes on the lower and mid shore.

Temporal variation

The sediment particle size structure may vary seasonally, with relatively finer sediments able to settle during calmer conditions in summer. Where the sediment grain size is very large (at the interface between sediment and boulder shores), cobbles may be mobile during exposed winter conditions, but stable enough during summer months to support limited juvenile rocky shore epifauna (e.g. juvenile barnacles).

LS.LCS.Sh Shingle (pebble) and gravel shores

Habitat (physical) description

Salinity:	Full (30-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Shingle; gravel; coarse sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Littoral shingle and gravel shores include shores of mobile pebbles and gravel, sometimes with varying amounts of coarse sand. The sediment is highly mobile and subject to high degrees of drying between tides. As a result, few species are able to survive in this environment. Beaches of mobile shingle tend to be devoid of macroinfauna, while gravelly shores may support limited numbers of crustaceans such as *Pectenogammarus planicrurus*.

Situation

Littoral gravels and shingles are found along relatively exposed open shores, where wave action prevents finer sediments from settling. Gravel and shingle may also be present on the upper parts of shores where there are more stable, sandy biotopes on the lower and mid shore.

Temporal variation

The sediment particle size structure may vary seasonally, with relatively finer sediments able to settle during calmer conditions in summer.

LS.LCS.Sh.BarSh Barren littoral shingle

Habitat (physical) description

Salinity:	Full (30-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Pebbles; cobbles; gravel
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Previous code

LGS.Sh.BarSh	97.06
LMXD.BAR	6.95

Biotope description

Shingle or gravel shores, typically with sediment particle size ranging from 4 - 256 mm, sometimes with some coarse sand mixed in. This biotope is normally only found on exposed open coasts in fully marine conditions. Such shores tend to support virtually no macrofauna in their very mobile and freely draining substratum. The few individuals that may be found are those washed into the habitat by the ebbing tide, including the occasional amphipod or small polychaete.

Situation

BarSh often extends over the whole shore, sometimes extending into the subtidal zone. BarSh may occur on the upper shore above BarSa, and in moderately exposed conditions, above AmSco on the lower shore. Tal may occur on the same shore as BarSh, where driftlines of algae and other debris accumulate on the upper shore.

Temporal variation

There may be a temporary cover of the green seaweeds *Enteromorpha* spp. or *Ulva* spp. during periods of stability in the summer.

Similar biotopes

LS.LSa.MoSa.BarSa	A similarly barren sediment habitat, but where the sediment is predominantly sand.
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LS.LCS.Sh.Pec *Pectenogammarus planicrurus* in mid shore well-sorted gravel or coarse sand

Habitat (physical) description

Salinity:	Full (30-35ppt)
Wave exposure:	Moderately exposed
Tidal streams:	
Substratum:	Gravel; very coarse sand (no fine sand or mud)
Zone:	
Height band:	Upper shore, Mid shore
Other features:	The lee of obstacles such as rocky outcrops and groynes

Previous code

LGS.SH.Pec 97.06

Biotope description

Shores of well-sorted gravel with a predominant particle size of 4.0 mm but ranging between 3 and 6 mm support dense populations of the amphipod *Pectenogammarus planicrurus*. Material finer than 2 mm reduces the ability of the amphipod to survive. The amphipod is tolerant of variable salinity, although a preference for a specific salinity regime has not been determined. As this habitat is regularly under-surveyed, its distribution is unclear.

Situation

The biotope is often associated with the lee side of obstacles such as rock outcrops and groynes; this may be due to the deposition of algal debris, shelter from wave action or degree of sorting due to localised tidal flow around the obstacle (most likely a combination of the first and last influence).

Temporal variation

Not known.

Similar biotopes

LS.LSa.MoSa.BarSa	Shores with finer sediments (mobile coarse sands). The infauna is very poor, often the habitat is devoid of macrofauna.
LS.LSa.St.Tal	Occurs on the strandline on shores with a wider range of exposures and sediment types, confined to driftlines of seaweeds and other debris. The sandhopper <i>Talitrus saltator</i> dominates the fauna.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)	
<i>Pectenogammarus planicrurus</i>	●●●●	Frequent	100		7

LS.LSa**Littoral sands and muddy sands****Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered
Tidal streams:	
Substratum:	Sand; muddy sand
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Shores comprising clean sands (coarse, medium or fine-grained) and muddy sands with up to 25% silt and clay fraction. Shells and stones may occasionally be present on the surface. The sand may be duned or rippled as a result of wave action or tidal currents. Littoral sands exhibit varying degrees of drying at low tide depending on the steepness of the shore, the sediment grade and the height on the shore. The more mobile sand shores are relatively impoverished (LS.LSa.MoSa), with more species-rich communities of amphipods, polychaetes and, on the lower shore, bivalves developing with increasing stability in finer sand habitats (LS.LSa.FiSa). Muddy sands (LS.LSa.MuSa), the most stable within this habitat complex, contain the highest proportion of bivalves.

Situation

A strandline of talitrid amphipods (Tal) typically develops at the top of the shore where decaying seaweed accumulates. Fully marine sandy shores occur along stretches of open coast, whilst muddy sands are often present in more sheltered lower estuarine conditions and may be subject to some freshwater influence.

Temporal variation

Littoral sandy shore environments can change markedly over seasonal cycles, with sediment being eroded during winter storms and accreted during calmer summer months. The particle size structure of the sediment may change from finer to coarser during winter months, as finer sediment gets resuspended in seasonal exposed conditions. This may affect the sediment infauna, with some species only present in summer when sediments are more stable. More sheltered muddy sand shores are likely to be more stable throughout the year, but may have a seasonal cover of green seaweeds during the summer period, particularly in nutrient enriched areas or where there is freshwater input.

LS.LSa.St**Strandline****Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered
Tidal streams:	Very strong, Strong, Moderately strong
Substratum:	Shingle; sand
Zone:	
Height band:	Strandline, Upper shore, Mid shore

Biotope description

The strandline is the shifting line of decomposing seaweed and debris which is typically left behind on sediment (and some rocky shores) at the upper extreme of the intertidal at each high tide. These ephemeral bands of seaweed often shelter communities of sandhoppers. A fauna of dense juvenile mussels may be found in sheltered firths, attached to algae on shores of pebbles, gravel, sand, mud and shell debris with a strandline of furoid algae.

Situation

Strandlines may occur in bands along the upper extreme of any sediment shore and some rocky shores.

Temporal variation

Strandlines tend to be mobile, as they consist of driftlines of decomposing seaweed and other debris, which will decompose, and be shifted by the tide. The amount of debris washed up on strandlines, and hence the extent of the strandline, may vary significantly depending on factors such as recent storms or high tides.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
OLIGOCHAETA	•••	Common	11	254
Enchytraeidae	•	Present	2	50
Talitridae	••	Present	26	
<i>Talitrus saltator</i>	•••••	Common	87	1180
<i>Talitrus saltator</i>	••••	Present	27	
<i>Talorchestia deshayesii</i>	•••	Present	26	

LS.LSa.St.Tal Talitrids on the upper shore and strand-line

Habitat (physical) description

Habitat (physical) description		Previous code	
Salinity:	Full (30-35ppt), Variable (18-35ppt)	LGS.S.Tal	97.06
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered	LMXD.TAL	6.95
Tidal streams:			
Substratum:	Shingle; sand		
Zone:			
Height band:	Strandline, Upper shore, Mid shore		

Biotope description

A community of sandhoppers (talitrid amphipods) may occur on any shore where driftlines of decomposing seaweed and other debris accumulate on the strandline. The biotope occurs most frequently on medium and fine sandy shores, but may also occur on a wide variety of sediment shores composed of muddy sediment, shingle and mixed substrata, or on rocky shores. The decaying seaweed provides cover and humidity for the sandhopper *Talitrus saltator*. In places on sand that regularly accumulate larger amounts of weed, *Talorchestia deshayesii* is often present. Oligochaetes, mainly enchytraeids, can occur where the stranded debris remains damp as a result of freshwater seepage across the shore or mass accumulation of weed in shaded situations. On shingle and gravel shores and behind saltmarshes the strandline talitrid species tend to be mainly *Orchestia* species. Abundances of the characterising species tend to be highly patchy. Two characterising species lists are presented below. They are derived from two sets of data, which were analysed separately. The first shows data from infaunal samples, the second shows data from epifaunal samples. The epifaunal lists contains no counts per square metre, as the data were collected on the SACFOR scale.

Situation

Tal may occur on the same shore as a range of sediment (especially sandy) biotopes, where driftlines of algae and other debris accumulate on the upper shore. These biotopes include BarSh, BarSa, Ol, AmSco, and Po. The biotope also occurs at the back of boulder, cobble and pebble shores, above mixed sediment and rocky biotopes.

Temporal variation

This biotope varies in its position between spring and neap tides, and as a result of changing weather. After storms, it may extend into the fore dunes, during spring tides it will occur high on the shore, and during neaps the greatest numbers of talitrids may be found at or just below MHW level. The amount of debris washed up on strandlines, and hence the extent of this biotope, may also vary significantly depending on factors such as recent storms or high tides.

Similar biotopes

LS.LSa.MoSa.BarSa	Occurs in similar physical conditions, in medium to fine mobile sands. Tal may occur on driftlines on the upper shore above (on) BarSa.
LS.LSa.MoSa.AmSco.Eur	Occurs in slightly more sheltered conditions in medium to fine mobile sands. AmSco.Eur occurs lower down on the shore than Tal, and is not confined to driftlines. It has a higher diversity of species, particularly amphipods such as <i>Bathyporeia</i> spp.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
OLIGOCHAETA	●●●	Common	11	254
Enchytraeidae	●	Present	2	50
Talitridae	●●●●●	Present	26	
<i>Talitrus saltator</i>	●●●●	Common	87	1180
<i>Talitrus saltator</i>	●●●●	Present	27	
<i>Talorchestia deshayesii</i>	●●●	Present	26	

LS.LSA.St.MytFab

Mytilus edulis and *Fabricia sabella* in littoral mixed sediment**Habitat (physical) description**

Salinity:	Full (30-35ppt)	LMX.MytFab	97.06
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered		
Tidal streams:			
Substratum:	Mixed sediment, shell debris		
Zone:			

Biotope description

Pebbles, gravel, sand and shell debris with mud in sheltered Firths with a strandline of furoid algae. The fauna is characterised by juvenile mussels *Mytilus edulis*, often in very high numbers. The nemertean worm *Lineus* spp. may be abundant and oligochaetes are common. Polychaetes such as *Pygospio elegans*, *Scoloplos armiger* and *Fabricia sabella* may be present in high densities. *Fabricia sabella* is typically found amongst algal holdfasts and between cobbles on rocky shores. The bivalves *Macoma balthica* and *Cerastoderma edule*, typical of muddy sediments, characterise the community. The validity of this biotope is uncertain, as it has only been recorded from the Dornoch Firth and the Moray Firth. Its position within the classification, as a strandline community, is also very uncertain, but there is not enough information available for a better description or classification at this stage.

Situation

Occurs on sheltered shores of the Dornoch Firth and Moray Firth.

Temporal variation

Not known.

Similar biotopes

LS.LMx.LMus.Myt	Occurs on mixed substrates, often under variable salinity, lower on the shore. Adult <i>M. edulis</i> form beds on the surface of the sediment. Few polychaetes are recorded for Myt, though that may result from a lack of infaunal sampling. A range of rocky shore species occur attached to scattered cobbles and boulders, including <i>Semibalanus balanoides</i> , <i>Elminius modestus</i> , <i>Littorina</i> spp., and <i>Fucus vesiculosus</i> .
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Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Lineus</i>	●●●●	Abundant	2	75
<i>Scoloplos armiger</i>	●●●●	Super-abundant	6	72
<i>Pygospio elegans</i>	●●●●●	Abundant	13	100
<i>Fabricia sabella</i>	●●●●●	Common	6	89
OLIGOCHAETA	●●●●●	Common	12	83
<i>Hydrobia ulvae</i>	●●●●	Abundant	11	67
<i>Mytilus edulis</i>	●●●●●	Abundant	11	100
<i>Cerastoderma edule</i>	●●●	Abundant	2	50
<i>Macoma balthica</i>	●●●●●	Abundant	37	37

LS.LSa.MoS_a Barren or amphipod dominated mobile sand shores

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Shores consisting of clean mobile sands (coarse, medium and some fine-grained), with little very fine sand, and no mud present. Shells and stones may occasionally be present on the surface. The sand may be duned or rippled as a result of wave action or tidal currents. The sands are non-cohesive, with low water retention, and thus subject to drying out between tides, especially on the upper shore and where the shore profile is steep. Most of these shores support a limited range of species, ranging from barren, highly mobile sands to more stable clean sands supporting communities of isopods, amphipods and a limited range of polychaetes. Species which can characterise mobile sand communities include *Scolecipis squamata*, *Pontocrates arenarius*, *Bathyporeia pelagica*, *B. pilosa*, *Haustorius arenarius* and *Eurydice pulchra*.

Situation

Mobile sand shores are typically situated along open stretches of coastline, with a relatively high degree of wave exposure. Bands of gravel and shingle may be present on the upper shore of exposed beaches. Where the wave exposure is less, and the shore profile more shallow, mobile sand communities may also be present on the upper part of the shore, with more stable fine sand communities present lower down. A strandline of talitrid amphipods (Tal) typically develops at the top of the shore where decaying seaweed accumulates.

Temporal variation

Mobile sand shores may show significant seasonal changes, with sediment accretion during calm summer periods and beach erosion during more stormy winter months. There may be a change in sediment particle size structure, with finer sediment grains washed out during winter months, leaving behind coarser sediments.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Scolecipis squamata</i>	••	Common	16	68
<i>Pontocrates arenarius</i>	••	Common	18	55
<i>Bathyporeia pelagica</i>	••	Common	6	54
<i>Bathyporeia pilosa</i>	••	Frequent	8	114
<i>Haustorius arenarius</i>	••	Frequent	6	23
<i>Eurydice pulchra</i>	•••	Frequent	32	67

LS.LSa.MoSa.BarSa Barren littoral coarse sand**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Very exposed, Exposed, Moderately exposed
Tidal streams:	
Substratum:	coarse to fine sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Previous code

LGS.S.BarSnd	97.06
LSND.BAR	6.95

Biotope description

Freely-draining sandy beaches, particularly on the upper and mid shore, which lack a macrofaunal community due to their continual mobility. Trial excavations are unlikely to reveal any macrofauna in these typically steep beaches on exposed coasts. Oligochaetes, probably mainly enchytraeids, and the isopod *Eurydice pulchra* may be found in extremely low abundances, but if present in any quantity should be classed as Ol or AmSco.Eur. Burrowing amphipods (*Bathyporeia* spp.) may be present on very rare occasions. Occasionally, other species may be left behind in low abundance by the ebbing tide.

Situation

BarSa may occur on the mid and/or lower shore below BarSh in exposed conditions. In moderately exposed conditions, and where BarSa occurs on the upper shore, a range of relatively more species-rich clean sand communities may occur on the mid and lower shore. These include AmSco, Ol, and Po, depending on the degree of wave exposure and sediment mobility. Tal may occur on the same shore as BarSa, where driftlines of algae and other debris accumulate on the upper shore.

Temporal variation

Not known.

Similar biotopes

LS.LCS.Sh.BarSh	Similar physical environment, differentiated solely on the basis of larger sediment particle size.
LS.LSa.MoSa.Ol	Occurs in similar sediment types but in slightly more sheltered conditions. Oligochaetes occur in relatively high densities.
LS.LSa.MoSa.AmSco.Sco	Occurs in slightly more sheltered conditions. The fauna is poor, characterised by the polychaetes <i>Scolecopsis squamata</i> and <i>S. foliosa</i> .
LS.LSa.MoSa.AmSco.Pon	Occurs in more sheltered conditions, in sediments with a slightly higher proportion of fine sands. The infauna is more diverse, with the crustaceans <i>Bathyporeia</i> spp. and <i>Pontocrates arenarius</i> common.
LS.LSa.MoSa.AmSco.Eur	Occurs in more sheltered conditions, in sediments with a slightly higher proportion of fine sand. The infauna is more diverse, with the crustaceans <i>Bathyporeia</i> spp. and <i>Eurydice</i> spp. common.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
NEMERTEA	●●●	Present	52	17
OLIGOCHAETA	●●	Present	15	18
<i>Eurydice pulchra</i>	●●	Present	26	6

LS.LSa.MoSa.Ol Oligochaetes in littoral mobile sand

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt)	LGS.Est.Ol	97.06
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LGS.S.BarSnd (part)	97.06
Tidal streams:		LGS.S.AEur (part)	97.06
Substratum:	Gravel; sand		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Previous code

Biotope description

A species-poor community of oligochaetes occurring in estuarine conditions where sands and gravel are associated with the lower shore river channel in estuaries. The sediment is relatively coarse and mobile due to strong river flow and subject to variable salinity. The biotope also occurs in fully marine conditions on open shores with mobile, medium to fine, usually clean, sand. Oligochaetes, including enchytraeid oligochaetes, constitute the infaunal assemblage. This biotope has been split into two sub-biotopes, based on the physical environment (a full salinity and a variable salinity type).

Situation

Ol often occurs in variable salinity conditions, in channels of very fast flowing river mouths at the bottom of otherwise sheltered estuarine shores. In this situation, biotopes under the LS.LMu.MEst and LS.LMu.UEst biotope complexes may be present above the river channel. Ol also occurs on open, fully marine shores. Where it is situated on the mid shore, BarSh and/or BarSa may be present on the upper shore, and lower down on the shore, AmSco.Sco and AmSco.Pon may be found. Ol may also occur on the upper shore, with AmSco.Eur present on the mid shore, and Po.Pful or Po.Aten on the lower shore. Tal may be found on the upper shore where driftlines of wracks and debris accumulate.

Temporal variation

Wave exposure may be higher on some beaches during winter than during the summer months, leading to the disappearance of infaunal species in winter. Where this happens, the biotope may change to BarSa. If conditions become more sheltered, seasonally or permanently, the sediment may become colonised by a greater range of species and the area may change to AmSco.

Similar biotopes

LS.LMu.UEst.Tben	Occurs on upper estuarine muddy shores where there is no strong river flow, and hence the sediment is very soft. While the physical environment is very different, the infaunal community is similarly poor. It consists of oligochaetes, including <i>Tubificoides benedii</i> and <i>Heterochaeta costata</i> , as well as the polychaete <i>Capitella capitata</i> .
LS.LSa.MoSa.BarSa	Occurs in similar sediment types, under more exposed conditions, on open coasts. Infauna is virtually absent as a result of the high mobility of the sediment.
LS.LSa.MoSa.AmSco	Occurs on open fully marine shores with clean mobile sand. The infauna is more diverse, characterised by a range of crustaceans such as <i>Pontocrates arenarius</i> , <i>Bathyporeia</i> spp., <i>Haustorius arenarius</i> , and <i>Eurydice pulchra</i> , as well as the polychaetes <i>Scolecopsis</i> spp.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
OLIGOCHAETA	••••	Abundant	88	2045
Enchytraeidae	••	Common	6	389

LS.LSa.MoSa.Ol.FS Oligochaetes in full salinity littoral mobile sand

Habitat (physical) description

Salinity:	Full (30-35ppt)
Wave exposure:	Exposed, Moderately exposed, Sheltered
Tidal streams:	Moderately strong
Substratum:	Gravel, sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Previous code

LGS.S.BarSnd (part)	97.06
LGS.S.AEur (part)	97.06

Biotope description

A species-poor community of oligochaetes occurring in fully marine conditions on open shores with mobile, medium to fine, usually clean, sand. Oligochaetes, including enchytraeid oligochaetes, constitute the infaunal assemblage. On rare occasions individuals of polychaete or crustacean species may be encountered (e.g. *Nephtys* spp., *Eurydice pulchra*, *Bathyporeia* spp.), though these are not characterising for the biotope and if present in any significant abundance, the area should be classed as AmSco.

Situation

Where Ol.FS is situated on the mid shore, BarSh and/or BarSa may be present on the upper shore, and lower down on the shore, AmSco.Sco and AmSco.Pon may be found. Ol may also occur on the upper shore, with AmSco.Eur present on the mid shore, and Po.Pful or Po.Aten on the lower shore. Tal may be found on the upper shore where driftlines of decomposing seaweed and other debris accumulate.

Temporal variation

Wave exposure may be higher on some beaches during winter than during the summer months, leading to the disappearance of infaunal species in winter. Where this happens, the biotope may change to BarSa. If conditions become more sheltered, seasonally or permanently, the sediment may become colonised by a greater range of species and the area may change to AmSco.

Similar biotopes

LS.LMu.UEst.Tben	Occurs on upper estuarine muddy shores where there is no strong river flow, and hence the sediment is very soft. While the physical environment is very different, the infaunal community is similarly poor. It consists of oligochaetes, including <i>Tubificoides benedii</i> and <i>Heterochaeta costata</i> , as well as the polychaete <i>Capitella capitata</i> .
LS.LSa.MoSa.BarSa	Occurs in similar sediment types, under more exposed conditions, on open coasts. Infauna is virtually absent as a result of the high mobility of the sediment.
LS.LSa.MoSa.AmSco	Occurs on open fully marine shores with clean mobile sand. The infauna is more diverse, characterised by a range of crustaceans such as <i>Pontocrates arenarius</i> , <i>Bathyporeia</i> spp., <i>Haustorius arenarius</i> , and <i>E. pulchra</i> , as well as the polychaetes <i>Scolecipis</i> spp.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
OLIGOCHAETA	●●●●	Abundant	90	1941
Enchytraeidae	●●	Common	7	49

LS.LSa.MoSa.Ol.VS Oligochaetes in variable salinity littoral mobile sand**Habitat (physical) description**

Salinity:	Variable (18-35ppt)
Wave exposure:	Extremely sheltered
Tidal streams:	Weak
Substratum:	Pebble, gravel, sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Previous code

LGS.Est.Ol 97.06

Biotope description

A species-poor community of oligochaetes occurring in estuarine conditions where sands and gravel are associated with the lower shore river channel in estuaries. The sediment is relatively coarse and mobile due to strong river flow and subject to variable salinity. There is usually very little mud in the sediment. Oligochaetes, including enchytraeid oligochaetes, constitute the infaunal assemblage. Nemerteans may be present, and nematodes may be frequent.

Situation

Ol.VS occurs in channels of very fast flowing river mouths at the bottom of otherwise sheltered estuarine shores. In this situation, biotopes under the LS.LMu.MEst and LS.LMu.UEst biotope complexes may be present above the river channel. Tal may be found on the upper shore where driftlines of decomposing seaweed and other debris accumulate.

Temporal variation

Not known.

Similar biotopes

LS.LMu.UEst.Tben

Occurs on upper estuarine muddy shores where there is no strong river flow, and hence the sediment is very soft. While the physical environment is very different, the infaunal community is similarly poor. It consists of oligochaetes, including *Tubificoides benedii* and *Heterochaeta costata*, as well as the polychaete *Capitella capitata*.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
NEMERTEA	••	Present	10	280
NEMATODA	••	Frequent	5	37
OLIGOCHAETA	••••	Abundant	70	2045
Enchytraeidae	••	Common	6	389

LS.LSa.MoSa.AmSco Amphipods and *Scolecipis* spp. in littoral medium-fine sand

Habitat (physical) description

Salinity:	Full (30-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Previous code

LGS.S.AP.Pon (part)	97.06
LGS.S.AP.P (part)	97.06
LGS.S.AEur (part)	97.06

Biotope description

Mobile clean sandy beaches on exposed and moderately exposed shores, with sediment grain sizes ranging from medium to fine, often with a fraction of coarser sediment. The sediment contains little or no organic matter, and usually no anoxic layer is present at all. It tends to be well-drained, retaining little water at low tide, though the sediment of the AmSco.Pon sub-biotope may remain damp throughout the tidal cycle. These beaches usually occur under fully marine conditions, though the AmSco.Eur sub-biotope may occur under moderately exposed lower estuarine conditions. The mobility of the sediment leads to a species-poor community, dominated by polychaetes, isopods and burrowing amphipods. *Scolecipis* spp. can tolerate well-drained conditions, and are often present in well-draining, coarser sand. Burrowing amphipods that often occur in this biotope include *Bathyporeia* spp., *Pontocrates arenarius*, and *Haustorius arenarius*. The isopod *Eurydice pulchra* is also often present. On semi-exposed beaches with a moderate tide range where there is a marked high-shore berm, there can be a marked seepage at the foot of the berm that probably carries the products of the organic matter derived from strand line breakdown. Here in a narrow zone, exceptionally high populations of *Bathyporeia pilosa*, sometimes above 10000 per square metre, may occur. The zone may be narrower than the strandline and could easily be missed on surveys were only a few levels are sampled. Three sub-biotopes are described for this biotope, based principally on differences in infaunal species composition.

Situation

Situated mainly on the mid and lower shore, sometimes upper shore, of exposed to moderately exposed beaches. Under more exposed conditions, it may occur below BarSa, or BarSh. Under more sheltered conditions, it may occur above the Po communities. Tal may be present on the same shores as AmSco, where driftlines of decomposing seaweed and other debris occur on the upper shore.

Temporal variation

Winter storms may reduce the number of or temporarily remove macroinvertebrates from exposed sandy beaches, with the sediment becoming re-colonised during the summer months.

Similar biotopes

LS.LSa.MoSa.BarSa	Occurs in more mobile, coarser sand, often higher on the shore. The mobility and degree of drainage of the sediments enables very few, if any, individuals of hardy species to survive.
LS.LSa.FiSa.Po	Occurs in more stable, finer sediments, sometimes lower on the shore. The increased sediment stability enables a more diverse infaunal community to survive, including a range of polychaetes such as <i>Arenicola marina</i> and <i>Nephtys</i> spp., and the bivalve <i>Angulus tenuis</i> .

Characterising species

% Frequency Abundance (SACFOR) %Contribution Abundance

			<i>to similarity</i>	<i>(nos / m²)</i>
<i>Scolecopsis squamata</i>	•••	Common	24	83
<i>Pontocrates arenarius</i>	•••	Common	22	66
<i>Bathyporeia pelagica</i>	••	Common	7	63
<i>Bathyporeia pilosa</i>	••	Common	7	136
<i>Haustorius arenarius</i>	••	Frequent	5	27
<i>Eurydice pulchra</i>	•••	Frequent	30	78

LS.LSa.MoSa.AmSco.Sco***Scolelepis* spp. in littoral mobile sand****Habitat (physical) description**

Salinity:	Full (30-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Coarse to very fine sand
Zone:	
Height band:	Mid shore, Lower shore

Biotope description

Exposed and moderately exposed shores of fully marine mobile clean sand, with particle sizes ranging from coarse to very fine. The sediment is not always well sorted, and may contain a subsurface layer of gravel or shell debris. Usually no anoxic layer is present. The mobility of the sediment leads to a species-poor community, dominated by the polychaetes *Scolelepis squamata* and *S. foliosa*. The amphipod *Bathyporeia pilosa* may be present. Further species that may be present in this sub-biotope include the amphipods *B. pelagica* and *Haustorius arenarius*, and the isopod *Eurydice pulchra*. The lugworm *Arenicola marina* may also occur.

Situation

Situated mainly on the mid and lower shore, sometimes upper shore, of exposed to moderately exposed beaches. Under more exposed conditions, it may occur below AmSco.Eur, BarSa, or BarSh, and on the same shores as AmSco.Pon. Under more sheltered conditions, it may occur above the Po communities. Tal may be present on the same shores, where driftlines of wrack and other debris occur on the upper shore.

Temporal variation

Winter storms may reduce the number of or temporarily remove macroinvertebrates from exposed sandy beaches, with the sediment becoming re-colonised during the summer months.

Similar biotopes

LS.LSa.MoSa.BarSa	Occurs under more exposed conditions, and/or higher up on the shore. The mobility of the sediment leads to the virtual absence of infauna.
LS.LSa.MoSa.Ol	Occurs under similar conditions, but generally higher up on the shore. The infauna is sparse, dominated by oligochaetes.
LS.LSa.MoSa.AmSco.Eur	Occurs under slightly more sheltered conditions, leading to the presence of burrowing amphipod species as well as <i>Scolelepis</i> spp.
LS.LSa.MoSa.AmSco.Pon	Occurs mainly on the lower shore, in more sheltered conditions. The infauna is significantly more diverse, characterised by a range of polychaete and amphipod species.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Scolelepis foliosa</i>	•••	Abundant	34	101
<i>Scolelepis squamata</i>	•••	Common	51	345
<i>Bathyporeia pilosa</i>	•	Present	2	9

LS.LSa.MoSa.AmSco.Eur

Eurydice pulchra in littoral mobile sand**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	medium to fine sand
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Previous code

LGS.S.AEur	97.06
LSND.AE	6.95

Biotope description

Well-draining beaches of medium- to fine-grained mobile sand, often (but not always) well sorted. Occasionally, a small fraction of coarse sand may be present. The biotope generally occurs on exposed open coasts, but sometimes in estuarine conditions, supporting populations of the isopod *Eurydice pulchra* and burrowing amphipods which frequently include *Bathyporeia pilosa* and *Haustorius arenarius*. The degree of drainage appears to be a critical factor in determining the presence of polychaetes, with only *Scolecipis squamata* capable of tolerating the well-drained sediments of this biotope. This biotope has two facies: drying upper and mid shore sands, and highly mobile lower shore and shallow sublittoral sand bars. Where this biotope occurs in estuarine conditions, *H. arenarius* is often highly abundant.

Situation

AmSco.Eur may occur on the mid and upper shore together with AmSco.Sco, below OI, or above AmSco.Pon and the Po communities. Under more exposed, open conditions, AmSco.Eur may be restricted to the lower part of the shore, with OI, barren sand (BarSa) or barren shingle (BarSh) on the upper shore. Tal may occur where driftlines of wracks or other debris accumulate on the upper shore.

Temporal variation

Winter storms may reduce the number of or temporarily remove macroinvertebrates from exposed sandy beaches, with the sediment becoming re-colonised during the summer months.

Similar biotopes

LS.LSa.MoSa.AmSco.Sco	Occurs under full salinity and more exposed conditions, in highly mobile sediment. The infauna is dominated by <i>S. foliosa</i> and <i>S. squamata</i> , amphipods are only present in a low proportion of samples.
LS.LSa.MoSa.AmSco.Pon	Occurs under fully marine, exposed conditions, tending to be present lower on the shore. The infauna is distinguished by the occasional presence of polychaete species such as <i>Paraonis fulgens</i> , in addition to <i>Scolecipis</i> spp., and most notably by common <i>Pontocrates arenarius</i> .
LS.LSa.MoSa.OI.FS	OI.FS often occurs in similar physical environments. It is distinguished from AmSco.Eur by the presence of oligochaetes and the absence of crustacean species.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Scolecipis squamata</i>	●●●	Common	9	32
<i>Bathyporeia pilosa</i>	●●●	Common	21	345
<i>Haustorius arenarius</i>	●●●	Frequent	5	37
<i>Eurydice pulchra</i>	●●●●	Common	60	155

LS.LSa.MoSa.AmSco.Pon

Pontocrates arenarius in littoral mobile sand**Habitat (physical) description**

		Previous code	
Salinity:	Full (30-35ppt)	LGS.AP.Pon (part)	97.06
Wave exposure:	Extremely exposed, Very exposed, Exposed, Moderately exposed	LGS.S.AP.P (part)	97.06
Tidal streams:		LGS.S.AEur (part)	97.06
Substratum:	Medium sand; fine sand		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Biotope description

Mainly on the mid and lower shore on wave-exposed or moderately wave-exposed coasts of medium and fine sand, sometimes with a fraction of coarse sand, which remains damp throughout the tidal cycle and contains little organic matter. The sediment is often rippled and typically lacks an anoxic sub-surface layer. The infauna is dominated by burrowing amphipods, most notably *Pontocrates arenarius*, as well as *Bathyporeia pelagica*, *Haustorius arenarius* and the isopod *Eurydice pulchra*. The polychaete fauna is poor, dominated by *Scolecopsis squamata*, which tolerates the exposed and mobile sediment conditions. The presence of polychaetes may be seen as coloured burrows running down from the surface of the sediment.

Situation

This biotope may be present on the lower shore, where BarSa, AmSco.Eur, or AmSco.Sco are present higher up. Where AmSco.Pon occurs on the mid shore in relatively sheltered conditions, Po may be present on the lower shore. Tal may be present where driftlines of fucoids and other debris occur on the upper shore.

Temporal variation

This biotope may change to AmSco.Eur, which is very similar in character, if *P. arenarius* decreases in abundance. Winter storms may reduce the number of or temporarily remove macroinvertebrates from exposed sandy beaches, with the sediment becoming re-colonised during the summer months.

Similar biotopes

LS.LSa.MoSa.AmSco.Eur	Occurs in similar physical environments, under slightly more sheltered conditions, and tending to be present higher up on the shore. Infauna is more sparse, dominated by <i>E. pulchra</i> , with <i>P. arenarius</i> absent.
LS.LSa.FiSa.Po.Pful	Occurs in more sheltered, occasionally estuarine, conditions, where sediments are more stable. The infauna is dominated by polychaete species, while burrowing amphipods occur less frequently.
LS.LSa.FiSa.Po.Aten	Occurs in more sheltered conditions. The sediments are even more stable than in the case of Po.Pful and therefore support bivalves, especially <i>Angulus tenuis</i> , in addition to a range of polychaete species similar to the Po.Pful assemblage. Burrowing amphipods occur less frequently than in AmSco.Pon.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Scolecopsis</i>	••	Abundant	3	22
<i>Scolecopsis squamata</i>	••	Common	11	39
<i>Pontocrates arenarius</i>	•••••	Common	62	90
<i>Bathyporeia pelagica</i>	••	Common	6	37
<i>Haustorius arenarius</i>	••	Common	2	27
<i>Eurydice pulchra</i>	•••	Frequent	7	49

LS.LSa.FiSa**Polychaete / amphipod dominated fine sand shores****Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Moderately exposed, Sheltered
Tidal streams:	
Substratum:	Sand
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Shores of clean, medium to fine and very fine sand, with no coarse sand, gravel or mud present. Shells and stones may occasionally be present on the surface. The sand may be duned or rippled as a result of wave action or tidal currents. The degree of drying between tides is limited, and the sediment usually remains damp throughout the tidal cycle. Typically, no anoxic layer is present. Fine sand shores support a range of species including amphipods and polychaetes. On the lower shore, and where sediments are stable, bivalves such as *Angulus tenuis* may be present in large numbers. An exceptionally rich fine sand community has been recorded from very sheltered reduced salinity shores in Poole Harbour. Species recorded include *Anaitides maculata*, *Hediste diversicolor*, *Scoloplos armiger*, *Pygospio elegans*, *Tharyx killariensis*, oligochaetes, *Gammarus locusta*, *Hydrobia ulvae*, *Cerastoderma edule* and *Mya truncata*.

Situation

Fine sand communities may be present throughout the intertidal zone on moderately exposed beaches, or they may be present on the lower parts of the shore with mobile sand communities present along the upper shore. A strandline of talitrid amphipods (Tal) typically develops at the top of the shore where decaying seaweed accumulates.

Temporal variation

Fine sand shores may show seasonal changes, with sediment accretion during calm summer periods and beach erosion during more stormy winter months. There may be a change in sediment particle size structure, with finer sediment grains washed out during winter months, leaving behind coarser sediments.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
NEMERTEA	•••	Present	2	19
<i>Nephtys cirrosa</i>	•••	Common	8	42
<i>Scoloplos armiger</i>	••	Common	1	19
<i>Paraonis fulgens</i>	••	Abundant	5	72
<i>Pygospio elegans</i>	••	Frequent	2	69
<i>Spio filicornis</i>	••	Common	3	60
<i>Spiophanes bombyx</i>	••	Common	1	20
<i>Pontocrates arenarius</i>	••	Frequent	1	30
<i>Bathyporeia pilosa</i>	••	Common	3	260
<i>Angulus tenuis</i>	••••	Abundant	57	313

LS.LSa.FiSa.Po Polychaetes in littoral fine sand**Habitat (physical) description**

Salinity:	Full (30-35ppt)
Wave exposure:	Moderately exposed, Sheltered
Tidal streams:	
Substratum:	Medium and fine sand
Zone:	
Height band:	Mid shore, Lower shore

Previous code

LGS.S.AP.Pon (part)	97.06
LGS.S.AP.P (part)	97.06
LSND.AP (part)	6.95

Biotope description

Moderately exposed or sheltered beaches of medium and fine, usually clean, sand, though the sediment may on rare occasions contain a small silt and clay fraction. The sediment is relatively stable, remains damp throughout the tidal cycle, and contains little organic matter. It is often rippled and typically lacks an anoxic sub-surface layer. Where an anoxic layer is present, it occurs at a depth below 10 cm and tends to be patchy. The biotope occurs mainly on the lower part of the shore, and relatively frequently on the mid shore. It is only rarely present above mid shore level, except where coastal defences cause backwash onto the upper shore. Conditions are usually fully marine, though the biotope can also occur in open lower estuarine conditions. The infaunal community is dominated by a range of polychaete species such as *Nephtys cirrosa*, *Paraonis fulgens*, *Spio* spp., *Pygospio elegans*, *Ophelia rathkei* and *Scoloplos armiger*. The presence of polychaetes may be seen as coloured burrows running down from the surface of the sediment, and *Arenicola marina* casts may be present on the sediment surface. The amphipods *Bathyporeia* spp. and *Pontocrates arenarius* frequently occur, and nemertean are often present. On some North Wales shores, the presence of *Arenicola* species characterises the lowest part of the shore, with a range of species characteristic of the shallow sublittoral. These include sparsely distributed *Echinocardium*, *Amphiura brachiata*, *Ensis siliqua* and *Fabulina fabula*. The Po biotope is split into three sub-biotopes, between which there can be a large degree of overlap. The bivalve *Angulus tenuis* dominates the Po.Atan sub-biotope, which is characterised by slightly more stable and fine sediments than the other two sub-biotopes.

Situation

The Po biotopes may be present below the AmSco communities or OI.FS on moderately exposed shores. BarSa may occur on the upper part of the shore if it is subject to drying in between tides. The strandline biotope Tal may be present on the same shore where driftlines of decomposing seaweed and other debris occur on the upper shore.

Temporal variation

The infauna of this biotope may be affected significantly by seasonal changes in degree of wave exposure. During stormy winters, the sediment may become de-stabilised, leading to the disappearance of some macroinfaunal species. The lugworm *A. marina* may be present occasionally, usually as a temporary recruitment and is likely to be washed out during storms.

Similar biotopes

LS.LSa.MoSa.AmSco

Occurs in more mobile, slightly coarser sands, sometimes higher on the shore or on more wave exposed beaches. The infaunal community is a lot less diverse, as fewer species are able to survive the harsher environmental conditions. The infauna is dominated by burrowing amphipods, and the polychaete *Scolecipis* spp.

LS.LSa.MuSa.Lan

Occurs lower on the shore. It is distinguished from the Po communities by the presence of *Lanice conchilega* as the main polychaete component at densities of common or above.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
NEMERTEA	•••	Present	2	19
<i>Nephtys cirrosa</i>	•••	Common	8	42
<i>Scoloplos armiger</i>	••	Common	1	19
<i>Paraonis fulgens</i>	••	Abundant	5	72
<i>Pygospio elegans</i>	••	Frequent	2	69
<i>Spio filicornis</i>	••	Common	3	60
<i>Spiophanes bombyx</i>	••	Common	1	20
<i>Pontocrates arenarius</i>	••	Frequent	1	30
<i>Bathyporeia pilosa</i>	••	Common	3	260
<i>Angulus tenuis</i>	••••	Abundant	57	313

LS.LSa.FiSa.Po.Pful Polychaetes, including *Paraonis fulgens*, in littoral fine sand

Habitat (physical) description

Habitat (physical) description		Previous code	
Salinity:	Full (30-35ppt), Variable (18-35ppt)	LGS.S.AP.P (part)	97.06
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LGS.S.AP.Pon (part)	97.06
Tidal streams:		LSND.AP	6.95
Substratum:	Medium and fine sand		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Biotope description

This biotope occurs mainly on the mid and lower shore of moderately wave-exposed coasts, with medium and fine clean sand which remains damp throughout the tidal cycle and contains little organic matter. The sediment is often rippled and typically lacks an anoxic sub-surface layer. Polychaetes make up the greater part of the community, and are dominated by *Paraonis fulgens*, *Capitella capitata*, *Pygospio elegans*, *Ophelia rathkei* and *Eteone longa*. The presence of polychaetes may be seen as coloured burrows running down from the surface of the sediment. Nemerteans may also be present. The amphipods *Bathyporeia pilosa* and *B. sarsi* are often present.

Situation

Po.Pful may be present higher up on the shore than Po.Aten, or lower down than the AmSco communities or Ol.FS. The strandline community Tal may be present on the same shore where driftlines of decomposing seaweed and other debris occur on the upper shore.

Temporal variation

The infauna of this biotope may be reduced during winter, as increased storminess and wave action increases sediment mobility and may lead to some species migrating or being washed out of the sediment. The lugworm *Arenicola marina* may be present occasionally, usually as a temporary recruitment and is likely to be washed out during storms.

Similar biotopes

LS.LSa.MoSa.AmSco.Eur	Occurs under more exposed conditions in more mobile sediments, and tending to be present higher up on the shore. Infauna is more sparse, dominated by <i>Eurydice pulchra</i> , with polychaetes virtually absent.
LS.LSa.MoSa.AmSco.Pon	Occurs in more exposed conditions, where sediments are less stable. The infauna is dominated by amphipod species, particularly <i>Pontocrates arenarius</i> , while the polychaete fauna is relatively sparse and dominated by <i>Scolecopsis squamata</i> .
LS.LSa.FiSa.Po.Aten	Occurs in more sheltered conditions. The sediments are more stable than in the case of Po.Pful and therefore support bivalves, especially <i>Angulus tenuis</i> , in addition to a range of polychaete species similar to the Po.Pful assemblage.
LS.LSa.FiSa.Po.Ncir	Occurs lower on the shore. <i>P. fulgens</i> is not always present, the infauna is dominated by <i>Nephtys</i> spp.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
NEMERTEA	••••	Present	6	36
NEMATODA	••	Frequent	2	50
<i>Eteone longa</i>	•••	Abundant	4	50
<i>Streptosyllis websteri</i>	••	Present	2	27
<i>Nephtys cirrosa</i>	••	Present	1	8
<i>Scoloplos armiger</i>	••	Frequent	2	43
<i>Aricidea</i>	••	Present	2	31
<i>Paraonis fulgens</i>	•••••	Abundant	34	240
<i>Pygospio elegans</i>	•••	Common	6	288
<i>Spio martinensis</i>	•••	Present	2	102
<i>Capitella capitata</i>	••	Common	7	410
<i>Arenicola marina</i>	•••	Frequent	1	39
<i>Ophelia rathkei</i>	•••	Common	5	136
OLIGOCHAETA	••	Present	1	37
<i>Bathyporeia pilosa</i>	•••	Common	16	1102
<i>Bathyporeia sarsi</i>	••	Common	4	125
<i>Haustorius arenarius</i>	••	Frequent	1	13

LS.LSa.FiSa.Po.Aten Polychaetes and *Angulus tenuis* in littoral fine sand

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt)	LGS.S.AP.Pon (part)	97.06
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LGS.S.AP.P (part)	97.06
Tidal streams:		LSND.AP (part)	6.95
Substratum:	Fine sand		
Zone:			
Height band:	Mid shore, Lower shore		

Previous code

Biotope description

This biotope occurs on the mid and lower shore on moderately wave-exposed and sheltered coasts, with predominantly fine sand which remains damp throughout the tidal cycle. The sediment is often rippled, and an anoxic layer may occasionally occur below a depth of 10 cm, though it is often patchy. The infaunal community is dominated by the abundant bivalve *Angulus tenuis* together with a range of polychaetes. The presence of polychaetes may be seen as coloured burrows running down from the surface of the sediment. Polychaetes that are characterising for this biotope include *Nephtys cirrosa*, *Paraonis fulgens* and *Spio filicornis*. Burrowing amphipods *Bathyporeia* spp. may occur in some samples of this biotope.

Situation

Where it occurs under moderately exposed conditions, AmSco.Eur, Po.Pful or Ol.FS may be present higher up on the shore than Po.Aten. Where it occurs under more sheltered conditions, Po.Aten may occur below or alongside muddy sand biotopes such as CerPo and BatCare.

Temporal variation

The infauna of this biotope may be reduced during winter, as increased storminess and wave action increases sediment mobility and may lead to some species migrating or being washed out of the sediment.

Similar biotopes

LS.LSa.FiSa.Po.Pful	Occurs higher on the shore. The sediments of Po.Aten are more stable than in the case of Po.Pful and therefore support bivalves, especially <i>A. tenuis</i> .
LS.LSa.FiSa.Po.Ncir	Occurs lower on the shore in slightly coarser sand. <i>A. tenuis</i> is absent or occurs in very low abundance, <i>Nephtys</i> spp. dominate the infauna.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Nephtys cirrosa</i>	●●●	Common	5	44
<i>Paraonis fulgens</i>	●	Abundant	1	40
<i>Spio filicornis</i>	●●●	Common	3	84
<i>Bathyporeia elegans</i>	●●	Common	2	54
<i>Bathyporeia pilosa</i>	●●	Common	1	96
<i>Angulus tenuis</i>	●●●●●	Abundant	74	434

LS.LSa.FiSa.Po.Ncir *Nephtys cirrosa* dominated littoral fine sand

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	medium to fine sand
Zone:	
Height band:	Mid shore, Lower shore

Previous code

LGS.AP.P (part) 97.06

Biotope description

This biotope occurs mainly on the mid and lower shore on moderately wave-exposed and sheltered coasts, with medium to fine clean sand which remains damp throughout the tidal cycle and contains little organic matter. The sediment is not usually well sorted and may contain a fraction of coarse sand. It is often rippled and typically lacks an anoxic sub-surface layer. The polychaete infauna is dominated by *Nephtys cirrosa*, *Magelona mirabilis*, *Spio martinensis*, *Spiophanes bombyx* and *Paraonis fulgens*. The presence of polychaetes may be seen as coloured burrows running down from the surface of the sediment. Nemertean worms may be present. The amphipods *Pontocrates* spp. and *Bathyporeia* spp., as well as *Cumopsis goodsiri* and the shrimp *Crangon crangon* are typically present. The bivalve *Angulus tenuis* is scarce or absent.

Situation

Po.Ncir may be present higher up on the shore than Po.Aten, or lower down than AmSco.Eur or Ol.FS.

Temporal variation

The infaunal community of this biotope may change seasonally, as increased storminess during winter months may reduce sediment stability and the ability of some species to survive. Some species, such as the shrimp *C. crangon* avoid these conditions by seasonal migration to deeper water (Moore, 1991).

Similar biotopes

LS.LSa.FiSa.Po.Aten	Occurs in slightly finer sediments, which are more stable and therefore support bivalves, especially <i>A. tenuis</i> , in addition to a range of polychaete species.
LS.LSa.FiSa.Po.Pful	Occurs higher on the shore. <i>Nephtys</i> spp. are scarce or absent, the infauna is dominated by <i>P. fulgens</i> .

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
NEMERTEA	•••	Present	2	10
<i>Nephtys</i>	•••	Common	6	73
<i>Nephtys cirrosa</i>	•••••	Common	30	79
<i>Paraonis fulgens</i>	••	Common	2	16
<i>Spio martinensis</i>	•••	Common	9	279
<i>Spiophanes bombyx</i>	••••	Frequent	9	55
<i>Magelona mirabilis</i>	••••	Frequent	11	206
<i>Pontocrates altamarinus</i>	••	Present	1	16
<i>Pontocrates arenarius</i>	••••	Present	4	36
<i>Bathyporeia elegans</i>	••	Common	2	31
<i>Bathyporeia pelagica</i>	••	Present	2	48
<i>Bathyporeia sarsi</i>	••	Present	1	13
<i>Cumopsis goodsiri</i>	•••	Frequent	9	76
<i>Crangon crangon</i>	•••	Present	2	17
<i>Angulus tenuis</i>	••	Present	1	6

LS.LSa.MuSa Polychaete / bivalve dominated muddy sand shores**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Fine sand or muddy sand
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Muddy sand or fine sand, often occurring as extensive intertidal flats on open coasts and in marine inlets. The sediment generally remains water-saturated during low water. The habitat may be subject to variable salinity conditions in marine inlets. An anoxic layer may be present below 5 cm of the sediment surface, sometimes seen in the worm casts on the surface. The infauna consists of a diverse range of amphipods, polychaetes, bivalves and gastropods.

Situation

Muddy sand communities are found predominantly on the mid and lower shore, though they may span the entire intertidal. Fine sand or mobile sand communities may be present on the upper shore with muddy sand communities present lower down. In sheltered mid estuarine conditions, muddy sand communities may be present on the upper part of the shore with mid estuarine muddy shore communities (LS.LMu.MEst) lower down.

Temporal variation

Not known.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
NEMATODA	••	Common	2	213
<i>Eteone longa</i>	•••	Abundant	6	114
<i>Hediste diversicolor</i>	•••	Common	5	229
<i>Scoloplos armiger</i>	••	Abundant	3	66
<i>Pygospio elegans</i>	••••	Common	15	670
<i>Capitella capitata</i>	••	Frequent	1	78
OLIGOCHAETA	•••	Abundant	6	1703
<i>Bathyporeia pilosa</i>	••	Common	3	446
<i>Corophium arenarium</i>	••	Common	3	437
<i>Corophium volutator</i>	••	Common	3	1074
<i>Crangon crangon</i>	••	Common	2	25
<i>Hydrobia ulvae</i>	•••	Abundant	11	2829
<i>Cerastoderma edule</i>	••••	Abundant	10	504
<i>Macoma balthica</i>	•••••	Common	22	786

LS.LSa.MuSa.MacAre *Macoma balthica* and *Arenicola marina* in littoral muddy sand

Habitat (physical) description

Habitat (physical) description		Previous code	
Salinity:	Full (30-35ppt)	LMS.MS.MacAre	97.06
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LMS.AreBv	96.7
Tidal streams:			
Substratum:	Fine sand or muddy sand		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Biotope description

Muddy sand or fine sand, often occurring as extensive intertidal flats both on open coasts and in marine inlets. The sediment is often compacted, with a rippled surface, areas of standing water, and generally remains water-saturated during low water. Scattered stones, cobbles and boulders with attached fucoids may be present. An anoxic layer is usually present within 5cm of the sediment surface and is often visible in worm casts. The habitat may be subject to variable salinity conditions in marine inlets. The species assemblage is characterised by the lugworm *Arenicola marina* and the Baltic tellin *Macoma balthica*. The polychaetes *Scoloplos armiger* and *Pygospio elegans* are typically superabundant and common, respectively. Oligochaetes, probably mainly *Tubificoides benedii* and *T. pseudogaster*, may be common, and the cockle *Cerastoderma edule* may be abundant.

Situation

MacAre has broad transition areas with CerPo and HedMac, which tends to occur lower down on the shore.

Temporal variation

Not known.

Similar biotopes

LS.LMu.MEst.HedMac	Occurs in muddier substrata. HedMac is characterised by abundant Ragworms <i>H. diversicolor</i> , as well as <i>M. balthica</i> . The cockle <i>C. edule</i> tends to be less abundant, and the sand gaper <i>Mya arenaria</i> may be abundant.
LS.LSa.MuSa.CerPo	Occurs lower down on the shore, sometimes in variable salinity conditions. The lugworm <i>A. marina</i> tends to be absent, but there is a greater range of crustacean species, and <i>C. edule</i> is more consistently present.
LS.LSa.MuSa.BatCare	Occurs in muddier sediments, in more estuarine conditions. The infauna is characterised by <i>Bathyporeia pilosa</i> and <i>Corophium</i> spp.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Scoloplos armiger</i>	●●●●	Super-abundant	13	75
<i>Pygospio elegans</i>	●●●	Common	4	58
<i>Arenicola marina</i>	●●●●●	Common	6	24
OLIGOCHAETA	●●	Common	4	48
<i>Cerastoderma edule</i>	●●●	Abundant	11	116
<i>Macoma balthica</i>	●●●●●	Common	61	248

LS.LSa.MuSa.CerPo *Cerastoderma edule* and polychaetes in littoral muddy sand

Habitat (physical) description

		Previous code	
Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)	LMS.MS.PCer	97.06
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LMS.MS.MacAre (part)	97.06
Tidal streams:		LMS.AreBv (part)	96.7
Substratum:	Fine sand or muddy sand		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Biotope description

Extensive clean fine sand or muddy sand shores with abundant cockles *Cerastoderma edule*. The community consists of the polychaetes *Eteone longa*, *Scoloplos armiger*, *Pygospio elegans*, *Spio filicornis* and *Capitella capitata*, the crustaceans *Bathyporeia sarsi*, *Bodotria arenosa arenosa* and *Crangon crangon*, the spire shell *Hydrobia ulvae*, as well as the cockle *C. edule* and the baltic tellin *Macoma balthica*. This biotope carries commercially viable stocks of *C. edule*, and it is therefore possible to find areas of this habitat where the infauna may have been changed through recent cockle dredging. Cockle dredging can result in a reduced bivalve abundance and reduced densities of some polychaete species, including *P. elegans* (Moore, 1991). At the outer edges of large flats, there may be a zone between the cockle beds and more exposed sands, where there are fewer cockles and *B. sarsi* is the commoner species.

Situation

The community is found mainly on the mid and lower shore where the sediment is water-saturated most of the time. Where it occurs in muddy sand, CerPo has broad transition areas with MacAre and the LS.LMu.MEst communities, and where it occurs on clean sand shores, it may have broad transition areas with Myt.Sa. Higher on the shore, adjacent to this biotope, BatCare is found, with fewer polychaete and bivalve species due to the drier sediment found on the upper shore.

Temporal variation

A layer of mud with dense spionid polychaetes may build up on cockle beds in sheltered areas, creating a cohesive muddy layer 10-15 cm thick overlying the whole area. This may break up leaving a series of pits and patches with miniature cliffs, giving it an appearance similar to a stony shore when seen from a distance. It should be noted that where it occurs, *Hydrobia ulvae* tends to move a lot and may be highly variable in abundance.

Similar biotopes

LS.LSa.FiSa.Po	These biotopes occur under slightly more exposed, fully marine conditions, in sediments that have a lower silt/clay fraction. The principal infaunal difference is the absence of <i>C. edule</i> and <i>M. balthica</i> .
LS.LSa.MuSa.MacAre	Occurs on more sheltered shores with muddier sediments. The lugworm <i>Arenicola marina</i> is common, and <i>C. edule</i> is not always present.
LS.LSa.MuSa.HedMacEte	Tends to occur more in fully marine conditions, higher up on the shore. The principal differences in the infauna are that <i>Hediste diversicolor</i> is common and <i>E. longa</i> is abundant, whereas <i>C. edule</i> occurs only in about half of the samples.
LS.LMx.LMus.Myt.Sa	Occurs in similar physical conditions, with a similar infaunal community. The difference is that the mussel <i>M. edulis</i> is abundant, forming extensive clumps and beds on the surface of the sediment.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Eteone longa</i>	●●●●	Common	2	67
<i>Scoloplos armiger</i>	●●●	Abundant	4	70
<i>Pygospio elegans</i>	●●●●	Common	8	832
<i>Capitella capitata</i>	●●●	Common	8	160
<i>Bathyporeia sarsi</i>	●●●	Frequent	1	46
<i>Bodotria arenosa arenosa</i>	●●	Common	2	69
<i>Crangon crangon</i>	●●	Common	1	57
<i>Hydrobia ulvae</i>	●●●	Common	1	25
<i>Brachystomia suboblonga</i>	●●●●	Abundant	41	5357
<i>Cerastoderma edule</i>	●●●●●	Abundant	17	715
<i>Macoma balthica</i>	●●●●●	Common	11	574

LS.LSa.MuSa.HedMacEte

Hediste diversicolor, *Macoma balthica* and *Eteone longa* in littoral muddy sand**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	
Tidal streams:	
Substratum:	Muddy sand
Zone:	
Height band:	Upper shore, Mid shore

Previous code

LMU.SMu.HedMac.	97.06
Mare (part)	
LMU.SMu.HedMac.A	97.06
re (part)	
LMS.MS.MacAre	97.06
(part)	

Biotope description

Fine to very fine muddy sand on the mid shore at the lower extreme of estuaries, and in moderately exposed and sheltered bays and marine inlets, sometimes subject to variable salinity. The infauna is characterised by the polychaetes *Eteone longa*, *Hediste diversicolor* (ragworm) and *Pygospio elegans*, oligochaetes (mostly *Tubificoides benedii* and *T. pseudogaster*), the crustaceans *Corophium volutator* and *Crangon crangon*, the spire shell *Hydrobia ulvae* and the baltic tellin *Macoma balthica*. The cockle *Cerastoderma edule* may be abundant, and the sand gaper *Mya arenaria* may be superabundant, though these species are not always present, or may be missed in core samples due to their large size. The polychaetes *Arenicola marina*, *Polydora cornuta* and *Capitella capitata*, the shrimp *Crangon crangon*, and the Mussel *Mytilus edulis* are sometimes present.

Situation

HedMacEte can occur on the mid shore of sheltered, lower estuaries, with the LS.LMu.MEst communities in muddier sediments on the lower shore. Under moderately exposed conditions in lower estuaries and towards open coasts, it may occur alongside other muddy sand biotopes such as CerPo or BatCare.

Temporal variation

Enteromorpha spp. or *Ulva lactuca* may form mats on the surface of the sediment during the summer months, particularly in areas of freshwater influence and/or where there is nutrient enrichment.

Similar biotopes

LS.LSa.FiSa.Po	These biotopes occur in slightly more exposed, marine sediments which lack a silt/clay fraction. The principal infaunal difference is the absence of <i>C. edule</i> and <i>M. balthica</i> .
LS.LMu.MEst.HedMac	Occurs in more sheltered, less saline, mid-shore or lower shore sandy mud and mud. <i>E. longa</i> and <i>P. elegans</i> are less consistently present, but <i>Tubificoides</i> spp. are abundant.
LS.LMu.MEst.HedMacScr	Occurs in less saline, more sheltered muddy conditions on the lower shore, further towards the head of estuaries. There is a greater diversity of polychaetes, <i>M. balthica</i> is not always present, but <i>Scrobicularia plana</i> occurs in high densities.
LS.LMu.MEst.NhomMacScr	Occurs lower down on the shore, in muddier sediments. <i>H. diversicolor</i> occurs only occasionally, but <i>Nephtys hombergii</i> tends to be abundant. <i>Tubificoides</i> spp. are common.
LS.LSa.MuSa.MacAre	Occurs in similar environmental conditions, though on more sheltered coasts and only rarely where there is freshwater influence. <i>H. diversicolor</i> is absent, and fewer mollusc species are present. <i>M. arenaria</i> and <i>H. ulvae</i> do not occur.
LS.LMu.UEst.Hed.Str	Occurs in less saline, more sheltered muddy conditions on the lower shore, further towards the head of estuaries. <i>P. elegans</i> occurs less frequently, <i>Streblospio shrubsolii</i> is abundant. The only molluscs that occur are occasionally common <i>Hydrobia ulvae</i> and <i>S. plana</i> .
LS.LMu.UEst.Hed.Ol	Occurs in more sheltered, less saline, mid-and lower-shore sandy mud. The polychaete fauna is a lot poorer, and bivalves are virtually absent.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
NEMATODA	●●●●	Common	5	536
<i>Eteone longa</i>	●●●●	Abundant	9	275
<i>Hediste diversicolor</i>	●●●●●	Abundant	14	665
<i>Pygospio elegans</i>	●●●●●	Common	17	1043
OLIGOCHAETA	●●●●●	Abundant	13	5060
<i>Corophium volutator</i>	●●●●	Abundant	6	2776
<i>Crangon crangon</i>	●●	Common	1	25
<i>Hydrobia ulvae</i>	●●●	Abundant	6	2514
<i>Cerastoderma edule</i>	●●●	Abundant	4	741
<i>Macoma balthica</i>	●●●●●	Common	16	1722
<i>Mya arenaria</i>	●●●	Super-abundant	3	346

LS.LSa.MuSa.BatCare *Bathyporeia pilosa* and *Corophium arenarium* in littoral muddy sand

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Medium to very fine sand, muddy sand
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Previous code

LMS.MS.BatCor 07.06

Biotope description

Wave-sheltered, mainly upper and mid shore flats of medium to fine sand, often muddy sand. The salinity, although predominantly recorded as variable, probably varies little from fully marine in these broad estuaries. The infauna is characterised by the amphipods *Bathyporeia pilosa*, *Corophium arenarium* and *C. volutator*, and the spire shell *Hydrobia ulvae*. Polychaetes and bivalves are limited in their abundance and variety, though the Baltic tellin *Macoma balthica* may occur. Tidal streams may be strong during spring tides, accounting for the presence of amphipods *B. pilosa* that are more commonly associated with open coast sandflats.

Situation

This biotope is typically found higher up the shore than sandflats with the cockle *Cerastoderma edule* (CerPo) in the large sandy estuaries of the west coast of England and Wales. In moderately exposed conditions, BatCare can occur on the mid shore below Tal and/or BarSa. In more sheltered conditions, BatCare may occur above NhomMacStr.

Temporal variation

Not known.

Similar biotopes

LS.LSa.FiSa.Po	These biotopes are slightly more exposed, with coarser sediments and more marine conditions. The principal infaunal difference is the absence of <i>C. edule</i> and <i>M. balthica</i> .
LS.LSa.MuSa.CerPo	Occurs in a broader range of salinities, in slightly more exposed and less muddy sediment types, sometimes lower on the same shores as BatCare. It has a higher species diversity, most notably a range of polychaetes, as well as the cockle <i>C. edule</i> and denser populations of the Baltic tellin <i>M. balthica</i> .
LS.LSa.MuSa.MacAre	This occurs in full salinity fine sand. The lugworm <i>Arenicola marina</i> and the Baltic tellin <i>M. balthica</i> are consistently present, and <i>Angulus tenuis</i> may occur. There tends to be a greater range of polychaetes, but amphipods are absent.
LS.LMu.UEst.Hed.Cvol	This occurs in muddier, more sheltered estuaries than BatCare. <i>B. pilosa</i> is absent in the muddy sediment, but the ragworm <i>Hediste diversicolor</i> is abundant.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Bathyporeia pilosa</i>	•••••	Abundant	74	2644
<i>Corophium arenarium</i>	••••	Common	5	841
<i>Corophium volutator</i>	••	Common	3	1144
<i>Hydrobia ulvae</i>	••••	Abundant	13	1591

LS.LSa.MuSa.Lan *Lanice conchilega* in littoral sand**Habitat (physical) description**

		Previous code	
Salinity:	Full (30-35ppt), Variable (18-35ppt)	LGS.S.Lan	97.06
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LMSND.LAN	6.95
Tidal streams:	Very strong, Strong, Moderately strong, Weak, Very weak		
Substratum:	Medium to fine muddy sand, mixed sediment		
Zone:			
Height band:	Mid shore, Lower shore		

Biotope description

This biotope usually occurs on flats of medium fine sand and muddy sand, most often on the lower shore but sometimes also on waterlogged mid shores. The sand may contain a proportion of shell fragments or gravel. Lan can also occur on the lower part of predominantly rocky or boulder shores, where patches of sand or muddy sand occur between scattered boulders, cobbles and pebbles. Conditions may be tide-swept, and the sediment may be mobile, but the biotope usually occurs in areas sheltered from strong wave action. The sediment supports dense populations of the sand mason *Lanice conchilega*. Other polychaetes present are tolerant of sand scour or mobility of the sediment surface layers and include the polychaetes *Anaitides mucosa*, *Eumida sanguinea*, *Nephtys hombergii*, *Scoloplos armiger*, *Aricidea minuta*, *Tharyx* spp. and *Pygospio elegans*. The mud shrimp *Corophium arenarium* and the cockle *Cerastoderma edule* may be abundant. The baltic tellin *Macoma balthica* may be present. On boulder shores, and where pebbles and cobbles are mixed in with lower shore tide-swept sand with dense *L. conchilega* between the cobbles, the infaunal component is rarely sampled. The infaunal community under these circumstances, provided that the cobbles are not packed very close together, is likely to be similar to that in areas without the coarse material.

Situation

Lan occurs mainly on the mid and lower shore of moderately exposed sand and muddy sand flats. Higher on the shore, other sand and muddy sand biotopes may be present, such as BarSa and AmSco on the upper shore and the Po communities on the mid shore. Tal may occur where driftlines of wracks and other debris accumulate. Where Lan occurs on areas of scattered boulders and cobbles on the lower shore, there may be broad transition areas with Salv and other boulder shore biotopes.

Temporal variation

Where *Lanice conchilega* becomes very abundant, especially on the low shore, this can lead to the build up of sediment mounds around their tubes, thus leading to a significant alteration in the surface appearance of the biotope.

Similar biotopes

LS.LSa.FiSa.Po

Lan tends to occur lower on the shore than Po. It is distinguished from the Po communities by the presence of *L. conchilega* as the main polychaete component at densities of common and above.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Anaitides mucosa</i>	••••	Common	4	161
<i>Eumida sanguinea</i>	••	Present	1	211
<i>Nephtys hombergii</i>	•••	Present	2	77
<i>Scoloplos armiger</i>	••••	Common	9	329
<i>Aricidea minuta</i>	•••	Common	3	167
<i>Tharyx</i>	•••	Common	7	1484
<i>Pygospio elegans</i>	••••	Common	5	303
<i>Lanice conchilega</i>	•••••	Abundant	34	959
<i>Corophium arenarium</i>	•••	Abundant	23	1921
<i>Cerastoderma edule</i>	••••	Abundant	3	168
<i>Macoma balthica</i>	•••	Present	2	118

LS.LMu**Littoral mud****Habitat (physical) description**

Salinity:	Variable (18-35ppt), Reduced/low (0.5-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Sandy mud, mud
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Shores of fine particulate sediment, mostly in the silt and clay fraction (particle size less than 0.063 mm in diameter), though sandy mud may contain up to 40% sand (mostly very fine and fine sand). Littoral mud typically forms extensive mudflats, though dry compacted mud can form steep and even vertical structures, particularly at the top of the shore adjacent to saltmarshes. Little oxygen penetrates these cohesive sediments, and an anoxic layer is often present within millimetres of the sediment surface. Littoral mud can support communities characterised by polychaetes, bivalves and oligochaetes. Most muddy shores are subject to some freshwater influence, as most of them occur along the shores of estuaries. Mudflats on sheltered lower estuarine shores can support a rich infauna, whereas muddy shores at the extreme upper end of estuaries and which are subject to very low salinity often support very little infauna.

Situation

Muddy shores are principally found along the shores of estuaries where there is enough shelter from wave action to allow fine sediment to settle. Muddy shores may also be present in sheltered inlets, straits and embayments which are not part of major estuarine systems.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the mud during the summer months, particularly in areas of nutrient enrichment or where there is significant freshwater influence.

LS.LMu.MEst Polychaete / bivalve dominated mid estuarine mud shores

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Sandy mud, mud
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Mid estuarine shores of fine particulate sediment, mostly in the silt and clay fraction (particle size less than 0.063 mm in diameter), though sandy mud may contain up to 40% sand (mostly very fine and fine sand). Littoral mud typically forms extensive mudflats, though dry compacted mud can form steep and even vertical structures, particularly at the top of the shore adjacent to saltmarshes. Little oxygen penetrates these cohesive sediments, and an anoxic layer is often present within millimetres of the sediment surface. Most mid estuarine muddy shores are subject to some freshwater influence, though at some locations more or less fully marine conditions may prevail. Mid estuarine muds support rich communities characterised by polychaetes, bivalves and oligochaetes.

Situation

Principally along mid estuarine shores. The mid estuarine communities may also be present in sheltered inlets, straits and embayments which are not part of major estuarine systems, though usually there is some freshwater influence.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the mud during the summer months, particularly in areas of nutrient enrichment or where there is significant freshwater influence.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Eteone longa</i>	●●●	Abundant	3	104
<i>Hediste diversicolor</i>	●●●●●	Abundant	16	899
<i>Nephtys hombergii</i>	●●●	Common	3	75
<i>Pygospio elegans</i>	●●●●	Common	8	719
<i>Streblospio shrubsolii</i>	●●●●	Common	8	731
<i>Tharyx killariensis</i>	●●	Common	2	429
<i>Aphelochaeta marioni</i>	●●	Abundant	2	1794
<i>Manayunkia aestuarina</i>	●●	Common	2	883
<i>Tubificoides benedii</i>	●●●●	Abundant	14	3690
<i>Tubificoides pseudogaster</i>	●●	Common	2	2095
<i>Hydrobia ulvae</i>	●●●●	Common	11	3031
<i>Cerastoderma edule</i>	●●●	Common	2	132
<i>Macoma balthica</i>	●●●●●	Common	15	591
<i>Scrobicularia plana</i>	●●●	Abundant	3	112
<i>Abra tenuis</i>	●●	Common	2	214

LS.LMu.MEst.NhomMacStr *Nephtys hombergii*, *Macoma balthica* and *Streblospio shrubsolii* in littoral sandy mud

Habitat (physical) description

Salinity:	Variable (18-35ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Sandy mud
Zone:	
Height band:	Mid shore, Lower shore

Previous code

LMU.MU.HedStr 97.06
(part)

Biotope description

Soft mud with a fine sand fraction, in variable salinity conditions, typically close to the head of estuaries. The infauna is dominated by the polychaete worm *Streblospio shrubsolii*, the polychaete *Nephtys hombergii*, oligochaetes of the genus *Tubificoides*, and the Baltic tellin *Macoma balthica*. The ragworm *Hediste diversicolor* and the spire shell *Hydrobia ulvae* are often common or abundant.

Situation

NhomMacStr occurs in mid estuary conditions, usually on the low shore. Tben and Hed.Ol may occur higher up the shore, as well as further towards the upper estuary.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the mud during the summer months, particularly in areas of nutrient enrichment.

Similar biotopes

LS.LMu.UEst.Tben	Occurs in lower salinities, in mud with a smaller sand fraction, at the head of estuaries. The infauna is a lot poorer, consisting almost exclusively of oligochaetes and, in some cases, <i>Capitella capitata</i> .
LS.LMu.UEst.Hed.Ol	Tends to occur in more reduced salinities, further towards the head of estuaries. The polychaete assemblage is poorer, and molluscs are virtually absent. It is the presence of <i>M. balthica</i> and <i>H. ulvae</i> that primarily distinguishes NhomMacStr from Hed.Ol.
LS.LMu.MEst.HedMac	These communities occur further down estuaries towards the open coast, in more saline conditions. The infauna is similar, though the ragworm <i>H. diversicolor</i> is always abundant, and both <i>N. hombergii</i> and <i>S. shrubsolii</i> are often absent. The bivalve assemblage tends to be more diverse.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Hediste diversicolor</i>	●●●	Common	1	124
<i>Nephtys hombergii</i>	●●●●	Abundant	6	133
<i>Streblospio shrubsolii</i>	●●●●●	Common	13	593
<i>Tubificoides</i>	●●●	Common	12	662
<i>Tubificoides benedii</i>	●●●●●	Common	10	999
<i>Hydrobia ulvae</i>	●●●●●	Abundant	43	5093
<i>Macoma balthica</i>	●●●●●	Common	12	373

LS.LMu.MEst.HedMac *Hediste diversicolor* and *Macoma balthica* in littoral sandy mud

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)	LMU.SMU.HedMac	97.06
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered	LMU.HedMac.Nhom in part	96.7
Tidal streams:		LMUD.HM	6.95
Substratum:	Sandy mud and mud		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Previous code

Biotope description

Mainly mid and lower shore sandy mud or mud in lower estuaries, sheltered bays and marine inlets, often subject to variable salinity. The main characterising species are the ragworm *Hediste diversicolor*, the baltic tellin *Macoma balthica*, and the oligochaetes *Tubificoides benedii* and *T. pseudogaster*. Further polychaetes that are often common or abundant include *Pygospio elegans*, *Streblospio shrubsolii*, *Tharyx killariensis*, *Aphelochaeta marioni*, *Capitella capitata* and *Manayunkia aestuarina*. The oligochaete *Heterochaeta costata* and the mud shrimp *Corophium volutator* may be abundant. The spire shell *Hydrobia ulvae* is often common. Other species which occur in a significant proportion of samples include the polychaetes *Eteone longa* and *Nephtys hombergii*, and bivalves such as the cockle *Cerastoderma edule* and *Abra tenuis*. The sand gaper *Mya arenaria* is superabundant in about a quarter of the samples for this biotope. *M. arenaria* is probably present in a higher proportion of areas of this biotope, but may be missed in core samples due to its size.

Situation

HedMac may occur on the mid/lower shore of lower estuarine shores, with HedMacEte or MacAre on the upper shore. HedMacScr, Hed.Str, NhomAph, and Hed.Cvol may be present on the same shore.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the mud during the summer months, particularly in areas of nutrient enrichment.

Similar biotopes

LS.LSa.MuSa.MacAre	Occurs in almost fully marine conditions on the upper shore of sheltered coasts. <i>H. diversicolor</i> is absent, but <i>Arenicola marina</i> is abundant. There are fewer mollusc species, and <i>H. ulvae</i> is absent.
LS.LMu.UEst.Hed.Str	Occurs under less saline and slightly more sheltered conditions, further towards inner estuaries. Molluscs are very rare, with the exception of occasionally common <i>Scrobicularia plana</i> and <i>H. ulvae</i> .
LS.LMu.MEst.HedMacScr	Occurs in similar physical conditions. The most notable difference is the presence of superabundant <i>S. plana</i> .
LS.LMu.MEst.NhomMacScr	Tends to occur lower on the shore in slightly more exposed conditions. There is a reduced infaunal diversity, <i>H. diversicolor</i> is not always present, and the bivalves <i>C. edule</i> and <i>M. arenaria</i> are absent.
LS.LMu.UEst.Hed.Ol	Occurs lower on the shore in less saline and more sheltered conditions, i.e. further towards the head of estuaries. The infauna is characterised purely by <i>H. diversicolor</i> and oligochaets. Molluscs are virtually absent.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Eteone longa</i>	••	Common	2	111
<i>Hediste diversicolor</i>	•••••	Abundant	17	1168
<i>Nephtys hombergii</i>	••	Present	1	27
<i>Pygospio elegans</i>	••••	Common	7	679
<i>Streblospio shrubsolii</i>	••••	Common	7	1084
<i>Tharyx killariensis</i>	••	Common	1	422
<i>Aphelochaeta marioni</i>	••	Abundant	3	3457
<i>Capitella capitata</i>	••	Common	1	483
<i>Manayunkia aestuarina</i>	•••	Common	4	1861
<i>Heterochaeta costata</i>	••	Abundant	1	1082
<i>Tubificoides benedii</i>	•••••	Abundant	17	5233
<i>Tubificoides pseudogaster</i>	•••	Common	5	4396
<i>Corophium volutator</i>	••	Abundant	1	3488
<i>Hydrobia ulvae</i>	••••	Common	6	1539
<i>Cerastoderma edule</i>	•••	Common	2	138
<i>Macoma balthica</i>	•••••	Common	17	784
<i>Abra tenuis</i>	•••	Common	2	379
<i>Mya arenaria</i>	••	Super-abundant	1	333

LS.LMu.MEst.HedMacScr

Hediste diversicolor, *Macoma balthica* and *Scrobicularia plana* in littoral sandy mud shores**Habitat (physical) description**

		Previous code	
Salinity:	Variable (18-35ppt), Reduced/low (0.5-30ppt)	LMU.SMU.HedScr	97.06
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LMS.SMu.HedMac (part)	97.06
Tidal streams:		LMUD.HS	6.95
Substratum:	Mud or sandy mud		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Biotope description

Mainly mid shore mud or sandy mud subject to variable salinity on sheltered estuarine shores. Typically, the sediment is wet in appearance and has an anoxic layer below 1 cm depth. The surface of the mud has the distinctive 'crow's foot' pattern formed by the peppery furrow shell *Scrobicularia plana*. The infauna is additionally characterised by a range of polychaete and bivalve species, including the ragworm *Hediste diversicolor*, *Pygospio elegans*, *Streblospio shrubsolii*, *Tharyx killariensis* and the baltic tellin *Macoma balthica*. Oligochaetes, most notably *Tubificoides benedii*, and the spire shell *Hydrobia ulvae* may be abundant. Other species that sometimes occur in this biotope are the cockle *Cerastoderma edule*, the sand gaper *Mya arenaria* and the polychaetes *Eteone longa* and *Nephtys hombergii*.

Situation

HedMacScr may occur on the same shores as NhomMacStr, HedMac, NhomAph, Hed.Str and Hed.Cvol. Higher up on the shore, and/or further towards the head of the estuary, Hed.Ol may occur, changing to Tben at the upper extreme of the estuary.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the mud during the summer months, particularly in areas of nutrient enrichment.

Similar biotopes

LS.LMu.UEst.Hed.Ol	Tends to occur in sandier sediments, in slightly more exposed conditions, on the lower shore. There is a reduced infaunal diversity, <i>H. diversicolor</i> is not always present, and the cockle <i>C. edule</i> does not occur.
LS.LMu.UEst.NhomStr	Tends to occur lower down on slightly more exposed, marine shores, with a reduced infaunal diversity. Bivalves are absent.
LS.LMu.UEst.Hed.Str	Occurs under more sheltered estuarine conditions. The infauna is less diverse, most notably bivalve species are rare.
LS.LMu.UEst.Hed.Cvol	Tends to occur slightly higher on the shore, in more sheltered conditions. The infauna is less diverse, with lower numbers of oligochaete and polychaete species. Bivalves are virtually absent.
LS.LMu.MEst.HedMac	Occurs in similar physical conditions. <i>S. plana</i> is absent.
LS.LMu.MEst.NhomMacScr	Occurs further towards inner estuaries, in less saline conditions. The infauna is similar, though the ragworm <i>H. diversicolor</i> is often absent, and both <i>N. hombergii</i> and <i>S. shrubsolii</i> are almost always abundant. No bivalves except <i>M. balthica</i> occur.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	•••••	Abundant	14	798
<i>Pygospio elegans</i>	••••	Common	8	929
<i>Streblospio shrubsolii</i>	•••	Common	4	392
<i>Tharyx killariensis</i>	••	Common	3	537
OLIGOCHAETA	••	Super-abundant	7	1677
<i>Tubificoides benedii</i>	•••	Abundant	25	2699
<i>Hydrobia ulvae</i>	•••••	Abundant	19	4118
<i>Macoma balthica</i>	••••	Common	5	438
<i>Scrobicularia plana</i>	•••••	Super-abundant	5	250

LS.LMu.UEst Polychaete / oligochaete dominated upper estuarine mud shores

Habitat (physical) description

Salinity:	Variable (18-35ppt), Reduced/low (0.5-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Sandy mud, mud
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Upper estuarine sandy mud and mud shores, in areas with significant freshwater influence. Littoral mud typically forms mudflats, though dry compacted mud can form steep and even vertical structures, particularly at the top of the shore adjacent to saltmarshes. Little oxygen penetrates these cohesive sediments, and an anoxic layer is often present within millimetres of the sediment surface. The upper estuarine mud communities support few infaunal species and are principally characterised by a limited range of polychaetes and oligochaetes.

Situation

There are three oligochaete dominated upper estuarine mud biotopes. Of these three, NhomStr occurs the furthest towards the mid estuary, and possibly lower on the shore than the other two. Tben is the most extreme upper estuarine biotope, occurring at the head of estuaries where there is no strong river flow and hence conditions are very sheltered, and there is a very strong freshwater influence. Further towards the mid estuary, this biotope may occur at the top of the shore, with Hed.Ol and NhomStr further down the shore.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the mud during the summer months, particularly in areas of nutrient enrichment.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
NEMATODA	•	Common	2	558
<i>Hediste diversicolor</i>	•••••	Super-abundant	40	1584
<i>Nephtys hombergii</i>	•••	Common	1	30
<i>Pygospio elegans</i>	••	Common	2	121
<i>Streblospio shrubsolii</i>	•••	Common	9	1289
<i>Manayunkia aestuarina</i>	••	Common	4	1832
OLIGOCHAETA	••	Abundant	9	6871
<i>Heterochaeta costata</i>	••	Abundant	3	1699
<i>Tubificoides benedii</i>	••	Common	8	2031
<i>Corophium volutator</i>	••	Common	8	1811
<i>Cyathura carinata</i>	•	Common	2	121
<i>Hydrobia ulvae</i>	••	Common	2	294
<i>Scrobicularia plana</i>	••	Common	2	36

LS.LMu.UEst.NhomStr *Nephtys hombergii* and *Streblospio shrubsolii* in littoral mud

Habitat (physical) description

Salinity:	Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Mud with fine sand fraction
Zone:	
Height band:	Mid shore, Lower shore

Previous code

LMU.MU.HedStr 97.06
(part)

Biotope description

Soft wet mud with a fine sand fraction, on the mid and lower shore of sheltered estuaries, usually with an anoxic layer present within the first 5 cm of the sediment. The infauna is relatively poor, dominated by the polychaetes *Nephtys hombergii*, *Streblospio shrubsolii*, and *Aphelochaeta marioni*. The oligochaete *Tubificoides benedii* is also characterising for this biotope, and *Hediste diversicolor* may be common.

Situation

NhomStr may occur on the same shores as the LS.LMu.MEst biotopes, Hed.Cvol or Hed.Str. Higher up on the shore, and/or further towards the head of the estuary, Hed.Ol may occur, changing to Tben at the upper extreme of the estuary.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the mud during the summer months, particularly in areas of nutrient enrichment.

Similar biotopes

LS.LMu.UEst.Hed.Ol	Occurs in very similar, but often slightly less saline conditions, further towards the head of estuaries. The species assemblage is poorer, consisting virtually only of oligochaetes and abundant <i>H. diversicolor</i> .
LS.LMu.MEst.NhomMacScr	Tends to occur lower on the shore, in sediments with a greater sand fraction and often subject to more wave exposure, possibly lower down in estuaries. The polychaete assemblage is more diverse, and both <i>Hydrobia ulvae</i> and <i>Macoma balthica</i> are typically present. It is the presence these two species that primarily distinguishes NhomMacStr from similar estuarine mud biotopes.
LS.LMu.UEst.Hed.Str	Tends to occur in slightly less saline, more sheltered conditions, with a higher abundance of <i>H. diversicolor</i> and a greater range of polychaete and oligochaete species. <i>A. marioni</i> is absent.
LS.LMu.MEst.HedMacScr	Occurs over a greater range of shore heights, often on slightly less exposed shores, with an increased infaunal diversity. <i>H. diversicolor</i> is more abundant, and, most notably, the bivalves <i>M. balthica</i> and <i>Scrobicularia plana</i> are abundant.
.	Tends to occur lower on the shore. The infauna is a lot more diverse, dominated by <i>H. diversicolor</i> and <i>M. balthica</i> , with a range of other polychaetes and bivalves occurring frequently.
LS.LMu.UEst.Hed.Cvol	Occurs on slightly more exposed shores, with a reduced infaunal diversity. <i>H. diversicolor</i> and <i>Corophium volutator</i> are the only characterising species.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Nephtys hombergii</i>	●●●●	Common	9	108
<i>Streblospio shrubsolii</i>	●●●●	Common	23	483
<i>Aphelochaeta marioni</i>	●●●●	Abundant	50	2790
<i>Tubificoides benedii</i>	●●●●	Common	10	1259

LS.LMu.UEst.Hed *Hediste diversicolor* in littoral mud

Habitat (physical) description

Salinity:	Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Extremely sheltered
Tidal streams:	
Substratum:	Sandy mud
Zone:	
Height band:	Mid shore, Lower shore

Previous code

LMU.MU.HedOI	97.06
LMU.MU.HedStr (part)	97.06
LMUD.HO (part)	6.95

Biotope description

Mud and sandy mud shores in sheltered marine inlets and estuaries subject to variable or reduced salinity. The biotope is typically found on the mid and lower shores in the upper and mid estuary. If present on the upper shore, the sediment may become firm and compacted as water drains out, though usually the biotope occurs lower on the shore and the sediment remains water saturated during low tide. An anoxic layer occurs within the upper 5 cm of the sediment. The infauna is dominated by abundant or superabundant ragworms *Hediste diversicolor*. Other species that occur in a significant number of samples include oligochaetes such as *Heterochaeta costata* and *Tubificoides* spp., polychaetes such as *Streblospio shrubsolii* and *Manayunkia aestuarina*, the mud shrimp *Corophium volutator*, and the spire shell *Hydrobia ulvae*.

Situation

Hed may occur on the same shores as HedMac, HedMacScr, or NhomAph. Higher up on the shore, and/or further towards the upper extreme of the estuary, Tben may occur.

Temporal variation

Enteromorpha spp. and *Ulva lactuca* may form mats on the surface of the sediment during the summer months, particularly in areas of freshwater influence and/or where there is nutrient enrichment.

Similar biotopes

LS.LMu.UEst.NhomStr	Occurs on slightly more marine shores, in sediments with a smaller sand fraction, with a higher diversity of polychaete and oligochaete species. <i>C. volutator</i> is absent.
LS.LMu.MEst.HedMac	Occurs in similar physical environments. The infauna of this biotope is more diverse, most notably a range of bivalves occur, including the baltic tellin <i>Macoma balthica</i> , in addition to <i>H. diversicolor</i> and the occasionally abundant <i>C. volutator</i> .
LS.LMu.UEst.Tben	Occurs in slightly muddier sediments and lower salinities, further towards the head of estuaries. The species assemblage is much poorer, consisting only of oligochaetes and, in some cases, <i>Capitella capitata</i> . <i>H. diversicolor</i> does not occur.
LS.LMu.MEst.HedMacScr	Occurs in similar physical environments. The infauna of this biotope is more diverse, characterised by a range of polychaetes including the ragworm <i>H. diversicolor</i> and a range of bivalves including the baltic tellin <i>M. balthica</i> and the peppery furrow shell <i>Scrobicularia plana</i> .

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	•••••	Super-abundant	45	1937
<i>Streblospio shrubsolii</i>	•••	Abundant	8	1510
<i>Manayunkia aestuarina</i>	•••	Common	3	2247
OLIGOCHAETA	•••	Common	12	4100
<i>Heterochaeta costata</i>	••	Abundant	5	2065
<i>Tubificoides benedii</i>	••	Abundant	7	2289
<i>Tubificoides pseudogaster</i>	•	Common	1	506
<i>Corophium volutator</i>	•••	Common	9	2220
<i>Hydrobia ulvae</i>	••	Common	1	360

LS.LMu.UEst.Hed.Str *Hediste diversicolor* and *Streblospio shrubsolii* in littoral sandy mud

Habitat (physical) description

Salinity:	Variable (18-35ppt), Reduced/low (0.5-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Mud; sandy mud
Zone:	
Height band:	Mid shore, Lower shore

Previous code

LMU.Mu.HedStr 97.06
(part)

Biotope description

Mud and sandy mud shores in sheltered marine inlets and estuaries subject to variable or reduced salinity. The biotope is typically found on the mid and lower shores and is often associated with shallow layers of cobbles and pebbles in the sediment in the upper and mid estuary. The sediment is anoxic close to the surface and remains water saturated during low tide. The infaunal polychaete community is dominated by dense *Hediste diversicolor*, as well as species with a limited salinity range tolerance such as *Streblospio shrubsolii* and *Manayunkia aestuarina*. Oligochaetes, including *Heterochaeta costata* and *Tubificoides benedii* are often abundant, and the amphipod *Corophium volutator* is often common.

Situation

Hed.Str may occur on the same shores as HedMacScr, HedMac, NhomAph or Hed.Cvol. Higher up on the shore, and/or further towards the head of the estuary, Hed.Ol may occur, changing to Tben at the upper extreme of the estuary.

Temporal variation

Enteromorpha spp. or *Ulva lactuca* may form mats on the surface of the sediment during the summer months, particularly in areas of freshwater influence and/or where there is nutrient enrichment.

Similar biotopes

LS.LMu.UEst.Hed.Ol	Occurs under more reduced salinity conditions. The infauna is a lot less diverse, dominated by <i>H. diversicolor</i> and oligochaetes. <i>S. shrubsolii</i> is absent.
LS.LMu.UEst.NhomStr	Occurs on slightly more marine, exposed shores, with a higher diversity of polychaete species, but hardly any other infauna.
LS.LMu.MEst.HedMacScr	Occurs at a greater range of shore heights on slightly more marine, exposed shores. The infauna is more diverse, most notably a range of bivalve species occur, including <i>Scrobicularia plana</i> .
LS.LMu.UEst.Hed.Cvol	Occurs under similar physical environments, sometimes higher on the shore. The infauna is less diverse, with lower numbers of oligochaete and polychaete species. <i>S. shrubsolii</i> is absent.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	•••••	Super-abundant	20	2020
<i>Streblospio shrubsolii</i>	••••	Abundant	23	3033
<i>Manayunkia aestuarina</i>	••••	Common	7	4526
OLIGOCHAETA	••	Abundant	11	6592
<i>Heterochaeta costata</i>	••	Abundant	5	2386
<i>Tubificoides benedii</i>	•••	Abundant	18	4557
<i>Corophium volutator</i>	•••	Common	6	2897

LS.LMu.UEst.Hed.Cvol *Hediste diversicolor* and *Corophium volutator* in littoral mud

Habitat (physical) description

		Previous code	
Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)	LMU.Mu.HedOl (part)	97.06
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered	LMUD.HO	6.95
Tidal streams:			
Substratum:	Sandy mud		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Biotope description

Sheltered estuarine shores of sandy mud, which may become firm and compacted if present in the upper shore where there is more time for drainage between high tides. An anoxic layer is usually present within the first 5 cm of the sediment. The infauna is very sparse, usually only the ragworm *Hediste diversicolor* and the amphipod *Corophium volutator* are present in any abundance. Occasionally, oligochaetes or the spire shell *Hydrobia ulvae* may be present. *Corophium multisetosum* may also be found. There may be organic pollution of the sediment.

Situation

Hed.Cvol may occur on the same shores as HedMacScr, HedMac, NhomAph, and Hed.Str. Higher up on the shore, and/or further towards the head of the estuary, Hed.Ol may occur, changing to Tben at the upper extreme of the estuary.

Temporal variation

Enteromorpha spp. or *Ulva lactuca* may form mats on the surface of the sediment during the summer months, particularly in areas of freshwater influence and/or where there is nutrient enrichment.

Similar biotopes

LS.LMu.UEst.Hed.Ol	Occurs under more reduced salinity conditions. The principal difference is the absence of <i>C. volutator</i> , and the occasional presence of <i>Scrobicularia plana</i> .
LS.LMu.UEst.NhomStr	Occurs in sediments with a smaller sand fraction, with a higher diversity of polychaete and oligochaete species. <i>C. volutator</i> is absent.
LS.LMu.MEst.HedMac	Occurs in similar physical environments. The infauna of this biotope is a lot more diverse, and dominated by a range of bivalves, including the Baltic tellin <i>Macoma balthica</i> , in addition to <i>H. diversicolor</i> and the occasionally abundant <i>C. volutator</i> .
LS.LMu.MEst.HedMacScr	Occurs under similar, slightly more exposed conditions. The infauna is more diverse, with higher numbers of oligochaete and polychaete species, and the peppery furrow shell <i>S. plana</i> .
LS.LMu.UEst.Hed.Str	Occurs under similar physical environments, slightly lower on the shore. The infauna is more diverse, with higher numbers of oligochaete and polychaete species, most notably <i>Streblospio shrubsolii</i> .

Characterising species

	% Frequency	Abundance (SACFOR)	% Contribution to similarity	Abundance (nos / m ²)
<i>Hediste diversicolor</i>	●●●●	Abundant	48	1783
<i>Corophium volutator</i>	●●●●	Common	43	4257

LS.LMu.UEst.Hed.Ol *Hediste diversicolor* and oligochaetes in littoral mud

Habitat (physical) description

Habitat (physical) description		Previous code	
Salinity:	Variable (18-35ppt), Reduced (18-30ppt)	LMU.MU.HedOl (part)	97.06
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered	LMU.MU.HedStr (part)	97.06
Tidal streams:		LMUD.HO	6.95
Substratum:	Sandy mud		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Biotope description

A species-poor community found in mud or slightly sandy mud in low salinity conditions, typically at the head of estuaries. The infauna is dominated by the ragworm *Hediste diversicolor* which is typically superabundant. Oligochaetes, including tubificids and *Heterochaeta costata*, can be abundant, as well as spionids. The peppery furrow shell *Scrobicularia plana* may be present in low abundances. The mud is often very soft and fluid, with a 'wet' surface appearance, or it may be compacted and form steep banks in the upper parts of macro-tidal estuaries and along saltmarsh creeks.

Situation

There are three oligochaete dominated upper estuarine mud biotopes. Tben is the most extreme upper estuarine biotope, occurring at the head of estuaries where there is a very strong freshwater influence. Further towards the mid estuary, this biotope may occur at the top of the shore, with Hed.Ol further down. NhomStr occurs furthest towards the mid estuary, or on the lower shore with Hed.Ol and Tben higher up.

Temporal variation

Enteromorpha spp. or *Ulva lactuca* may form mats on the surface of the sediment during the summer months, particularly in areas of freshwater influence and/or where there is nutrient enrichment.

Similar biotopes

LS.LMu.UEst.Tben	Occurs in similar physical conditions, but further up towards the head of estuaries. The species assemblage is much poorer, consisting only of oligochaetes and, in some cases, <i>Capitella capitata</i> .
LS.LMu.MEst.NhomMacScr	Occurs in similar physical conditions, but possibly lower down in estuaries (more saline). The polychaete assemblage is more diverse, and both <i>Hydrobia ulvae</i> and <i>Macoma balthica</i> are characterising species. It is the presence of these two species that primarily distinguishes NhomMacStr from upper estuarine mud biotopes.
LS.LMu.UEst.Hed.Str	Occurs in similar physical conditions. The infauna is more diverse, with abundant <i>Streblospio shrubsolii</i> and a range of oligochaetes.
LS.LMu.UEst.Hed.Cvol	Occurs in similar physical conditions. The main difference in the infaunal species composition is the presence of common <i>Corophium voluactor</i> .

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	•••••	Super-abundant	54	1899
Spionidae	••	Abundant	6	468
OLIGOCHAETA	••	Abundant	11	2026
Tubificidae	•••	Abundant	15	1840
<i>Heterochaeta costata</i>	••	Abundant	1	2127

LS.LMu.UEst.Tben *Tubificoides benedii* and other oligochaetes in littoral mud

Habitat (physical) description

Salinity:	Reduced (18-30ppt)	LMU.MU.HedOl (part)	97.06
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered	LMUD.HO (part)	6.95
Tidal streams:			
Substratum:	Fine sandy mud		
Zone:			
Height band:	Upper shore, Mid shore, Lower shore		

Previous code

Biotope description

Extreme upper estuarine fine sandy mud, sometimes with a fine sand fraction, in very sheltered conditions and subject to reduced salinity. An anoxic layer is usually present within the upper 3 cm of the sediment. The infaunal community is extremely poor, consisting almost exclusively of oligochaetes, including *Tubificoides benedii* and, more rarely, *Heterochaeta costata*. The only polychaete species that may occur is *Capitella capitata*, which may be common. The sediment may form steep banks in upper parts of macro-tidal estuaries or along saltmarsh creeks. *Vaucheria* species may form a film on the sediment surface along such creeks, and juvenile shore crabs *Carcinus maenas* may be common. At the very upper end of estuaries, the oligochaetes *Limnodrilus* spp. and *Tubifex tubifex* may be found.

Situation

There are three oligochaete dominated upper estuarine mud biotopes. Tben is the most extreme upper estuarine biotope, occurring at the head of estuaries where there is no strong river flow and hence conditions are very sheltered, and there is a very strong freshwater influence. Further towards the mid estuary, this biotope may occur at the top of the shore, with Hed.Ol further down. NhomStr occurs furthest towards the mid estuary, or on the lower shore with Hed.Ol and Tben higher up.

Temporal variation

Green algae such as *Enteromorpha* spp. may form mats on the surface of the mud during the summer months.

Similar biotopes

LS.LMu.UEst.Hed.Ol	Occurs in similar environmental conditions, possibly slightly lower down in estuaries in slightly more saline conditions. Increased diversity of polychaetes, with superabundant Ragworms <i>Hediste diversicolor</i> .
LS.LSa.MoSa.Ol	Can occur in estuarine coarse sediments on lower shores where strong river flow leads to the absence of a mud fraction. The infauna is similarly poor, dominated by oligochaetes including enchytraeids, and nemerteans.

Characterising species

	% Frequency	Abundance (SACFOR)	% Contribution to similarity	Abundance (nos / m ²)
<i>Capitella capitata</i>	••	Common	1	65
OLIGOCHAETA	•••	Abundant	52	53741
<i>Tubificoides benedii</i>	•••	Common	45	42

LS.LMx

Littoral mixed sediments

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced/low (0.5-30ppt)
Wave exposure:	Moderately exposed, Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Mixed sediment
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Shores of mixed sediments ranging from muds with gravel and sand components to mixed sediments with pebbles, gravels, sands and mud in even proportions. By definition, mixed sediments are poorly sorted. Stable large cobbles or boulders may be present which support epibiota such as fucoids and green seaweeds commonly found on rocky and boulder shores. Mixed sediments which are predominantly muddy tend to support infauna similar to mud and sandy mud shores.

Situation

It is probable that there are broad transition areas between areas of mudflat or sandy mudflat, and mixed sediment biotopes where the sediment consists principally of mud but has significant proportions of gravel and sand mixed in. Gravelly mud may occur in patches on mudflats. Similarly, there is unlikely to be an easily defined boundary between areas of mixed sediment with stable cobbles and boulders, and boulder fields which fall into the rocky shore category.

Temporal variation

Not known.

LS.LMx.GvMu *Hediste diversicolor* dominated gravelly sandy mud shores**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Gravelly sandy mud
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Sheltered gravelly sandy mud, subject to reduced salinity, mainly on the mid and lower shore. The infaunal community is dominated by abundant ragworms *Hediste diversicolor*. Other species of the infauna vary for the sub-biotopes described. They include polychaetes such as *Pygospio elegans*, *Streblospio shrubsolii*, and *Manayunkia aestuarina*, oligochaetes such as *Heterochaeta costata* and *Tubificoides* spp., the mud shrimp *Corophium volutator*, the spire shell *Hydrobia ulvae*, the baltic tellin *Macoma balthica* and the peppery furrow shell *Scrobicularia plana*. Sub-biotopes described in HedMx have equivalent communities in soft muddy sediments, but the sediment here is much firmer due to the gravel component. There are relatively few records in each sub-type, leading to uncertainty over the precise nature of the habitat, particularly regarding sediment type and salinity regime.

Situation

It is probable that there are broad transition areas between the sub-biotopes of HedMx, and the corresponding muddy sediment biotopes. The boundaries may be very indistinct, with the HedMx groups present in patches of gravelly mud on areas of mudflat where the main biotopes are their corresponding mud or sandy mud biotopes. Given the small number of records for each of the sub-biotopes, their spatial distribution is still uncertain.

Temporal variation

Not known.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	●●●●●	Abundant	62	1406
<i>Pygospio elegans</i>	●●	Common	2	207
<i>Streblospio shrubsolii</i>	●●●	Common	4	1099
<i>Manayunkia aestuarina</i>	●●	Common	1	1420
<i>Heterochaeta costata</i>	●●	Common	3	4198
<i>Tubificoides benedii</i>	●●●	Common	3	1759
<i>Tubificoides pseudogaster</i>	●●●	Abundant	6	1796
<i>Corophium volutator</i>	●●●	Common	5	2704
<i>Hydrobia ulvae</i>	●●	Common	2	366
<i>Macoma balthica</i>	●●	Common	2	72
<i>Scrobicularia plana</i>	●●●	Abundant	2	62

LS.LMx.GvMu.HedMx *Hediste diversicolor* in littoral gravelly muddy sand and gravelly sandy mud

Habitat (physical) description

Salinity:	Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Gravelly sandy mud
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Sheltered gravelly sandy mud, subject to reduced salinity, mainly on the mid and lower shore. The infaunal community is dominated by abundant ragworms *Hediste diversicolor*. Other species of the infauna vary for the sub-biotopes described. They include polychaetes such as *Pygospio elegans*, *Streblospio shrubsolii*, and *Manayunkia aestuarina*, oligochaetes such as *Heterochaeta costata* and *Tubificoides* spp., the mud shrimp *Corophium volutator*, the spire shell *Hydrobia ulvae*, the baltic tellin *Macoma balthica* and the peppery furrow shell *Scrobicularia plana*. Sub-biotopes described in HedMx have equivalent communities in soft muddy sediments, but the sediment here is much firmer due to the gravel component. There are relatively few records in each sub-type, leading to uncertainty over the precise nature of the habitat, particularly regarding sediment type and salinity regime.

Situation

It is probable that there are broad transition areas between the sub-biotopes of HedMx, and the corresponding muddy sediment biotopes. The boundaries may be very indistinct, with the HedMx groups present in patches of gravelly mud on areas of mudflat where the main biotopes are their corresponding mud or sandy mud biotopes. Given the small number of records for each of the sub-biotopes, their spatial distribution is still uncertain.

Temporal variation

Not known.

Similar biotopes

LS.LMu.MEst.HedMac	Occurs in lower estuarine muds and sandy muds, without a gravel fraction. The infauna is more diverse, particularly containing a greater number of bivalves (though that may be an artefact of greater number of samples in the HedMac biotope).
LS.LMu.UEst.Hed.Str	Occurs in estuarine muds, without a gravel fraction. The infauna is dominated by similar species.
LS.LMu.UEst.Hed.Cvol	Occurs in estuarine muds, without a gravel fraction. The infauna consists virtually entirely of <i>H. diversicolor</i> and <i>C. volutator</i> .

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	•••••	Abundant	62	1406
<i>Pygospio elegans</i>	••	Common	2	207
<i>Streblospio shrubsolii</i>	•••	Common	4	1099
<i>Manayunkia aestuarina</i>	••	Common	1	1420
<i>Heterochaeta costata</i>	••	Common	3	4198
<i>Tubificoides benedii</i>	•••	Common	3	1759
<i>Tubificoides pseudogaster</i>	•••	Abundant	6	1796
<i>Corophium volutator</i>	•••	Common	5	2704
<i>Hydrobia ulvae</i>	••	Common	2	366
<i>Macoma balthica</i>	••	Common	2	72
<i>Scrobicularia plana</i>	•••	Abundant	2	62

LS.LMx.GvMu.HedMx.Mac *Hediste diversicolor* and *Macoma balthica* in littoral gravelly mud

Habitat (physical) description

Salinity:	Reduced (18-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Gravelly mud
Zone:	
Height band:	Strandline, Upper shore, Mid shore, Lower shore

Biotope description

Sheltered gravelly mud shores, subject to reduced salinity. The infaunal community consists of the ragworm *Hediste diversicolor*, as well as the spire shell *Hydrobia ulvae* and the baltic tellin *Macoma balthica*. The presence of the gravel in the sediment is unlikely to have a large influence on the infaunal composition, which is driven mainly by the estuarine sandy mud conditions. Coarse material on the sediment surface may however enrich the biota with additional epifaunal species such as barnacles and algae. Given the low sample numbers for this biotope, more records are needed to confirm the characterising species list.

Situation

It is probable that there are broad transition areas between this biotope, and the corresponding muddy sediment biotope HedMac. The boundaries may be very indistinct, with HedMx.Mac present in patches of gravelly mud on areas of mudflat, where the main biotope is HedMac. This biotope has been found alongside its mud equivalent in the Stour estuary.

Temporal variation

Not known.

Similar biotopes

LS.LMu.MEst.HedMac	Occurs in lower estuarine muds and sandy muds, without a gravel fraction. The infauna is dominated by the same species, but is more diverse (though that may be an artefact of greater number of samples in the HedMac biotope).
LS.LMx.GvMu.HedMx.Str	Occurs in gravelly sandy mud lower down on the shore, under more sheltered conditions. The polychaete infauna is much more diverse, and a range of oligochaete species are found. <i>M. balthica</i> is rare.
LS.LMx.GvMu.HedMx.Scr	Occurs higher up on the shore under more sheltered conditions. The infaunal assemblage is more diverse, with a greater range of polychaetes and bivalves. <i>Scrobicularia plana</i> is abundant, though <i>M. balthica</i> is only occasionally present.
LS.LMx.Mx.CirCer	Occurs in slightly more sheltered gravelly sandy mud. The principal differences in the infaunal assemblage are the greater diversity of polychaete species, particularly <i>Tharyx killariensis</i> , the abundance of oligochaetes, and the comparative rarity of molluscs.
LS.LMx.GvMu.HedMx.Cvol	Occurs in more sheltered gravelly sandy mud. The principal differences in the infaunal assemblage are the abundance of oligochaetes and <i>Corophium volutator</i> , and the low frequency of occurrence of molluscs.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	●●●●	Super-abundant	61	2388
<i>Hydrobia ulvae</i>	●●●●	Common	25	2296
<i>Macoma balthica</i>	●●●●	Common	11	413

LS.LMx.GvMu.HedMx.Scr *Hediste diversicolor* and *Scrobicularia plana* in littoral gravelly mud

Habitat (physical) description

Salinity:	Full (30-35ppt)
Wave exposure:	Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Gravelly mud
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Extremely sheltered gravelly mud on the mid and lower shore, containing little sand with occasional cobbles. The infaunal community includes the ragworm *Hediste diversicolor* and the peppery furrow shell *Scrobicularia plana*, as well as a range of polychaetes, oligochaetes, and molluscs. Given the low sample numbers for this biotope, more records are needed to confirm the characterising species list.

Situation

It is probable that there are broad transition areas between HedMx.Scr and the corresponding muddy sediment biotope HedMacScr. The boundaries may be very indistinct, with HedMx.Scr present in patches of gravelly mud on areas of mudflat, where the main biotope is HedMacScr.

Temporal variation

Not known.

Similar biotopes

LS.LMu.MEst.HedMacScr	Occurs in lower estuarine muds and sandy muds, without a gravel fraction. The infauna is dominated by the same species, but is more diverse (though that may be an artefact of greater sample numbers in the HedMacScr biotope).
LS.LMx.GvMu.HedMx.Mac	Occurs lower down on the shore under more exposed conditions. The infaunal assemblage is less diverse, with fewer polychaetes and bivalves. <i>S. plana</i> does not occur, though <i>Macoma balthica</i> is abundant.
LS.LMx.GvMu.HedMx.Str	Occurs in gravelly sandy mud lower down on the shore, under more variable salinity conditions. The polychaete infauna is similar, though there may be more crustacean species, including frequent <i>Corophium volutator</i> , and the bivalve infauna is much reduced.
LS.LMx.Mx.CirCer	Occurs in slightly more exposed gravelly sandy mud. The principal differences in the infaunal assemblage are the greater abundance of <i>Tharyx killariensis</i> , the abundance of oligochaetes, and the comparative rarity of molluscs, most notably the absence of <i>S. plana</i> .
LS.LMx.GvMu.HedMx.Cvol	Occurs in more sheltered gravelly sandy mud lower on the shore. The principal differences in the infaunal assemblage are the abundance of oligochaetes and <i>C. volutator</i> , and the low frequency of occurrence of molluscs, most notably the absence of <i>S. plana</i> .

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	•••••	Abundant	35	558
<i>Pygospio elegans</i>	••	Abundant	2	616
<i>Streblospio shrubsolii</i>	••	Abundant	7	594
<i>Aphelochaeta vivipara</i>	••	Common	2	169
<i>Arenicola marina</i>	•••	Common	1	17
<i>Manayunkia aestuarina</i>	••	Common	1	116
<i>Tubificoides benedii</i>	•••	Common	5	797
<i>Tubificoides pseudogaster</i>	••	Abundant	20	1119
<i>Hydrobia ulvae</i>	•••	Frequent	2	84
<i>Macoma balthica</i>	••	Present	3	13
<i>Scrobicularia plana</i>	•••••	Abundant	21	131

LS.LMx.GvMu.HedMx.Str *Hediste diversicolor* and *Streblospio shrubsolii* in littoral gravelly sandy mud

Habitat (physical) description

Salinity:	Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Gravelly sandy mud
Zone:	
Height band:	Mid shore, Lower shore

Biotope description

Extremely sheltered gravelly sandy mud, subject to variable salinity, on the mid and lower shore. The infaunal community consists of the ragworm *Hediste diversicolor*, *Pygospio elegans*, *Streblospio shrubsolii*, and *Ampharete grubei*, as well as oligochaetes and *Corophium volutator*. There are often low densities of *Scrobicularia plana*. Given the low sample numbers for this biotope, more records are needed to confirm the characterising species list.

Situation

It is probable that there are broad transition areas between this biotope and the corresponding muddy sediment biotope Hed.Str. The boundaries may be very indistinct, with HedMx.Str present in patches of gravelly mud on areas of mudflat, where the main biotope is Hed.Str. This biotope has been found along edges of tidal channels in the upper Stour estuary, below its equivalent mud biotope.

Temporal variation

Not known.

Similar biotopes

LS.LMu.UEst.Hed.Str	Occurs in estuarine muds, without a gravel fraction. The infauna is dominated by similar species.
LS.LMx.GvMu.HedMx.Mac	Occurs in gravelly mud under more exposed conditions. The main differences in the infaunal assemblage are the abundance of <i>Macoma balthica</i> , and the absence of oligochaetes and a range of polychaetes including <i>S. shrubsolii</i> .
LS.LMx.GvMu.HedMx.Scr	Occurs in muddy gravel, higher up on the shore and under less variable salinity conditions. The polychaete fauna is similar, but there are fewer oligochaetes. The bivalve infauna is more diverse, with more abundant <i>S. plana</i> .
LS.LMx.Mx.CirCer	Occurs in slightly more exposed gravelly sandy mud. The principal differences in the infaunal assemblage are the greater abundance of <i>Tharyx killariensis</i> , the abundance of oligochaetes, and the absence of <i>S. plana</i> .
LS.LMx.GvMu.HedMx.Cvol	Occurs in more sheltered gravelly sandy mud. The principal differences in the infaunal assemblage are the abundance of oligochaetes and <i>C. volutator</i> , and the absence of <i>S. plana</i> .

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Hediste diversicolor</i>	●●●●	Super-abundant	55	1719
<i>Pygospio elegans</i>	●●	Common	5	279
<i>Streblospio shrubsolii</i>	●●●●	Common	14	219
<i>Ampharete grubei</i>	●●	Abundant	3	193
OLIGOCHAETA	●●●●	Common	20	1332

Corophium volutator

●●●

Frequent

2

39

LS.LMx.GvMu.HedMx.Cir

Hediste diversicolor*, Cirratulids and *Tubificoides* spp. in littoral gravelly sandy mud*Habitat (physical) description**

Salinity:	Variable (18-35ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Gravelly sandy mud
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Sheltered gravelly sandy mud, subject to variable salinity. The infaunal community consists of the ragworm *Hediste diversicolor*, *Pygospio elegans*, *Streblospio shrubsolii*, and Cirratulids such as *Tharyx killariensis*. Nematodes and oligochaetes occur, as well as *Macoma balthica*. Given the low sample numbers for this biotope, more records are needed to confirm the characterising species list.

Situation

It is probable that there are broad transition areas between this biotope and the corresponding muddy sediment biotope HedMac. The boundaries may be very indistinct, with HedMx.Cir present in patches of gravelly mud on areas of mudflat, where the main biotope is HedMac.

Temporal variation

Not known.

Similar biotopes

LS.LMu.MEst.HedMac	Occurs in lower estuarine muds and sandy muds, without a gravel fraction. The infauna is dominated by similar species, though it is more diverse (this may be an artefact of greater sample numbers in the HedMac biotope).
LS.LMx.GvMu.HedMx.Mac	Occurs in gravelly mud under less saline and slightly more sheltered conditions. The main differences in the infaunal assemblage are the abundance of <i>M. balthica</i> , and the absence of oligochaetes and a range of polychaetes including <i>T. killariensis</i> .
LS.LMx.GvMu.HedMx.Scr	Occurs in gravelly mud, higher up on the shore and under more sheltered conditions. The polychaete fauna is similar, but there are fewer oligochaetes. The bivalve infauna is more diverse, with abundant <i>Scrobicularia plana</i> .
LS.LMx.GvMu.HedMx.Str	Occurs in more sheltered gravelly mud. The main differences in the infaunal assemblage are the absence of <i>T. killariensis</i> , fewer oligochaetes, and the presence of occasional <i>S. plana</i> .
LS.LMx.GvMu.HedMx.Cvol	Occurs in more sheltered gravelly sandy mud. The principal differences in the infaunal assemblage are the absence of <i>T. killariensis</i> and the abundance of <i>Corophium volutator</i> .

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
NEMATODA	••••	Frequent	6	166
<i>Hediste diversicolor</i>	•••••	Abundant	47	1040
<i>Pygospio elegans</i>	•••	Present	1	15
<i>Streblospio shrubsolii</i>	••••	Present	3	984
<i>Tharyx killariensis</i>	•••••	Common	25	145
<i>Heterochaeta costata</i>	••••	Present	1	47
<i>Tubificoides benedii</i>	••••	Frequent	4	106
<i>Tubificoides pseudogaster</i>	••••	Present	5	150
Enchytraeidae	••	Common	3	247
<i>Macoma balthica</i>	•••	Present	2	44

LS.LMx.GvMu.HedMx.Cvol *Hediste diversicolor* and *Corophium volutator* in littoral gravelly sandy mud

Habitat (physical) description

Salinity:	Variable (18-35ppt), Reduced/low (0.5-30ppt)
Wave exposure:	Extremely sheltered
Tidal streams:	
Substratum:	Gravelly sandy mud
Zone:	
Height band:	Upper shore, Mid shore, Lower shore

Biotope description

Extremely sheltered gravelly sandy mud, subject to variable or reduced salinity. The infaunal community consists of the ragworm *Hediste diversicolor*, *Streblospio shrubsolii*, *Capitella capitata* and *Manayunkia aestuarina*. Oligochaetes and *Corophium volutator* are abundant. Given the low sample numbers for this biotope, more records are needed to confirm the characterising species list.

Situation

It is probable that there are broad transition areas between this biotope and the corresponding muddy sediment biotope Hed.Cvol. The boundaries may be very indistinct, with HedMx.Cvol present in patches of gravelly mud on areas of mudflat, where the main biotope is Hed.Cvol.

Temporal variation

Not known.

Similar biotopes

LS.LMu.UEst.Hed.Cvol	Occurs in estuarine muds, without a gravel fraction. The infauna is dominated by similar species.
LS.LMx.GvMu.HedMx.Mac	Occurs in gravelly mud under less saline and slightly less sheltered conditions. The main differences in the infaunal assemblage are the abundance of <i>M. balthica</i> , and <i>Hydrobia ulvae</i> , the absence of oligochaetes and a range of polychaetes, and lower abundances of <i>C. volutator</i> .
LS.LMx.GvMu.HedMx.Scr	Occurs in gravelly mud, higher up on the shore. The polychaete fauna is similar, but there are fewer oligochaetes. The bivalve infauna is more diverse, with abundant <i>Scrobicularia plana</i> .
LS.LMx.GvMu.HedMx.Str	Occurs in similar physical conditions. The main differences in the infaunal assemblage are fewer oligochaetes, a higher frequency of occurrence of <i>S. shrubsolii</i> , and the presence of occasional <i>S. plana</i> .
LS.LMx.Mx.CirCer	Occurs in less sheltered gravelly sandy mud. The principal differences in the infaunal assemblage are the abundance of <i>Tharyx killariensis</i> and the absence of <i>C. volutator</i> .

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	•••••	Super-abundant	13	1542
<i>Streblospio shrubsolii</i>	•••	Common	2	2576
<i>Capitella capitata</i>	•••	Abundant	2	1089
<i>Manayunkia aestuarina</i>	•••••	Common	7	4769
<i>Heterochaeta costata</i>	•••••	Abundant	21	14311
<i>Tubificoides benedii</i>	••••	Abundant	8	4791
<i>Tubificoides pseudogaster</i>	••••	Abundant	11	5291
Enchytraeidae	•••	Abundant	8	2469
<i>Corophium volutator</i>	••••	Frequent	27	9057

LS.LMx.Mx Species-rich mixed sediment shores

Habitat (physical) description

Salinity:	Variable (18-35ppt)
Wave exposure:	Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Mixed sediments
Zone:	
Height band:	Mid shore, Lower shore

Biotope description

Sheltered mixed sediments, usually subject to variable salinity conditions. The infauna is very diverse, dominated by a range of polychaetes including *Exogone naidina*, *Sphaerosyllis taylori*, *Pygospio elegans*, *Chaetozone gibber*, *Cirriiformia tentaculata*, *Aphelochaeta marioni*, *Capitella capitata*, *Mediomastus fragilis*, and *Melinna palmata*. The oligochaete worms *Tubificoides benedii* and *T. pseudogaster* are abundant, as is the cockle *Cerastoderma edule*. A large range of amphipods may occur, including *Melita palmata*, *Microprotopus maculatus*, *Aora gracilis* and *Corophium volutator*. The bivalves *Abra alba* and *A. nitida* may occur. The barnacle *Elminius modestus* may be abundant where the sediment has stones on the surface.

Situation

Mid shore, lower shore, as extension of shallow sublittoral biotope.

Temporal variation

Not known.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Exogone naidina</i>	●●●●	Abundant	7	9504
<i>Sphaerosyllis taylori</i>	●●●●	Common	1	1530
<i>Pygospio elegans</i>	●●●●	Frequent	1	608
<i>Chaetozone gibber</i>	●●●●	Common	1	779
<i>Cirriiformia tentaculata</i>	●●●●	Super-abundant	2	939
<i>Aphelochaeta marioni</i>	●●●●●	Abundant	38	18535
<i>Capitella capitata</i>	●●●●	Common	2	787
<i>Mediomastus fragilis</i>	●●●●	Common	1	268
<i>Melinna palmata</i>	●●●●●	Abundant	3	648
<i>Tubificoides benedii</i>	●●●●●	Abundant	20	7945
<i>Tubificoides pseudogaster</i>	●●●●●	Abundant	11	2938
<i>Elminius modestus</i>	●●	Abundant	1	721
<i>Cerastoderma edule</i>	●●●●●	Abundant	2	638

LS.LMx.Mx.CirCer

Cirratulids and *Cerastoderma edule* in littoral mixed sediment**Habitat (physical) description**

Salinity:	Variable (18-35ppt)
Wave exposure:	Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Mixed sediments
Zone:	
Height band:	Mid shore, Lower shore

Biotope description

Sheltered mixed sediments, usually subject to variable salinity conditions. Banks of shell may be present. The infauna is very diverse, dominated by a range of polychaetes including *Exogone naidina*, *Sphaerosyllis taylori*, *Pygospio elegans*, *Chaetozone gibber*, *Cirriiformia tentaculata*, *Aphelochaeta marioni*, *Capitella capitata*, *Mediomastus fragilis*, and *Melinna palmata*. The oligochaetes *Tubificoides benedii* and *T. pseudogaster* are abundant, as is the cockle *Cerastoderma edule*. A large range of amphipods may occur, including *Melita palmata*, *Microprotopus maculatus*, *Aora gracilis* and *Corophium volutator*. The bivalves *Abra alba* and *A. nitida* may occur. The barnacle *Elminius modestus* can be abundant where the sediment has stones on the surface. Epifaunal algae may occur attached to stable cobbles on the sediment surface.

Situation

On the mid and lower shore, sometimes as an extension of a shallow sublittoral biotope.

Temporal variation

Not known.

Similar biotopes

LS.LMx.GvMu.HedMx Similar mixed sediment habitat, but dominated by *Hediste diversicolor* and with less diverse infauna, particularly fewer polychaete species.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Exogone naidina</i>	●●●●	Abundant	7	9504
<i>Sphaerosyllis taylori</i>	●●●●	Common	1	1530
<i>Pygospio elegans</i>	●●●●	Frequent	1	608
<i>Chaetozone gibber</i>	●●●●	Common	1	779
<i>Cirriiformia tentaculata</i>	●●●●	Super-abundant	2	939
<i>Aphelochaeta marioni</i>	●●●●●	Abundant	38	18535
<i>Capitella capitata</i>	●●●●	Common	2	787
<i>Mediomastus fragilis</i>	●●●●	Common	1	268
<i>Melinna palmata</i>	●●●●●	Abundant	3	648
<i>Tubificoides benedii</i>	●●●●●	Abundant	20	7945
<i>Tubificoides pseudogaster</i>	●●●●●	Abundant	11	2938
<i>Elminius modestus</i>	●●	Abundant	1	721
<i>Cerastoderma edule</i>	●●●●●	Abundant	2	638

LS.LBR

Littoral Biogenic Reefs

Habitat (physical) description

Salinity:	Full (30-35ppt); Variable (18-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Boulders; cobbles; pebbles; sand; bedrock
Zone:	Eulittoral - mid, Eulittoral - lower
Height band:	Mid shore, Lower shore

Biotope description

The Littoral Biogenic Reefs habitat complex contains two biotope complexes (littoral *Sabellaria* reefs, and mixed sediment shores with mussels), encompassing the littoral biotope dominated by the honeycomb worm *Sabellaria alveolata*, and littoral *Mytilus edulis*-dominated communities. *S. alveolata* can form honeycomb reefs on mid to lower shore on exposed coasts, where there is a plentiful supply of sediment. The underlying substratum may consist primarily of rock or stable cobbles and boulders, or of cobbles and boulders on sand. Mixed sediment shores characterised by beds of adult mussels *Mytilus edulis* occur principally on mid and lower eulittoral mixed substrata (mainly cobbles and pebbles on muddy sediments) in a wide range of exposure conditions. In high densities the mussels bind the substratum and provide a habitat for many infaunal and epifaunal species.

Situation

Where *S. alveolata* reefs occur on underlying substratum that is primarily rocky, biotopes dominated by ephemeral seaweeds, such as *Enteromorpha* spp. and *Porphyra* spp. or the perennial wrack *Fucus vesiculosus* on mixed substrata (FvesB; Fves.X; EphX; EntPor) may occur higher on the shore. Rockpool biotopes dominated by the red seaweed *Corallina officinalis* (Cor), by wracks such as *Fucus* spp. or by kelp such as *Laminaria* spp. (FK) may also be found above this biotope. Lower down, a community consisting of mixed scour-tolerant species like the kelp *Laminaria digitata* and opportunistic foliose red seaweeds such as *Polyides rotundus* and *Ahnfeltia plicata* (Ldig.Ldig; XKScrR; EphR; PolAhn) can occur. In adjacent sediment areas *Lanice conchilega* may dominate (Lan). Like *S. alveolata* reefs, adult mussel beds can be found below a band of ephemeral green seaweeds (Eph.X) on more exposed, predominantly rocky shores. On sheltered, predominantly rocky shores either a *F. vesiculosus* dominated biotope or a biotope dominated by the wrack *Ascophyllum nodosum* (Fves.X; Asc.X) can be found above, or the barnacle dominated biotope (Sem.LitX).

Temporal variation

S. alveolata reefs may be susceptible to storm damage in the winter, although they can regenerate remarkably quickly in a season as long as some adults are left as they facilitate the larval settlement. *S. alveolata* is tolerant to burial under sand for several weeks. Changes in desiccation over a period of time can cause part of the population to die. One of the mussel-dominated sub-biotopes, Myt.Sa, could change to Myt.Mu over time as pseudofaeces build up forming a layer of mud. This cannot happen where wave action or tidal streams wash away pseudofaeces and prevent a build up. In areas where mussel spat ("mussel crumble") settles on the surface shell layer of cockle beds, the mussel cover may be ephemeral.

LS.LBR.Sab

Littoral *Sabellaria* honeycomb worm reefs**Habitat (physical) description**

Salinity:	Full (30-35ppt)	MLR.Sab	97.06
Wave exposure:	Exposed, Moderately exposed		
Tidal streams:			
Substratum:	Boulders; cobbles; pebbles; sand; bedrock		
Zone:	Eulittoral - mid, Eulittoral - lower		
Height band:	Mid shore, Lower shore		

Biotope description

The sedentary polychaete *Sabellaria alveolata* (honeycomb worm) builds tubes from sand and shell. On exposed shores, where there is a plentiful supply of sediment, *S. alveolata* can form honeycomb reefs on boulders and low-lying bedrock on the mid to lower shore. These *S. alveolata* reefs are quite distinct from the mosaic of seaweeds and barnacles or red seaweeds (FK; MB) generally associated with moderately exposed rocky shores though many of the same species are present. These include the anemone *Actinia equina*, the barnacles *Semibalanus balanoides* and *Elminius modestus*, the limpet *Patella vulgata*, the top shell *Gibbula cineraria* and the wrinkle *Littorina littorea*. The whelk *Nucella lappilus* and the mussel *Mytilus edulis* is also present on the boulders whereas the polychaete *Lanice conchilega* is restricted to the associated sediment areas. Scour resistant red seaweeds including *Palmaria palmata*, *Corallina officinalis*, *Mastocarpus stellatus*, *Chondrus crispus*, *Ceramium nodulosum*, *Osmundea pinnatifida*, *Polysiphonia* spp. and coralline crusts can also be present where suitable substrata exist. Brown and green seaweeds also present include *Fucus serratus*, *Fucus vesiculosus*, *Cladostephus spongiosus*, *Enteromorpha intestinalis* and *Ulva lactuca*.

Situation

Above Salv are biotopes dominated either by ephemeral seaweeds, such as *Enteromorpha* spp. and *Porphyra* spp. or the perennial wrack *Fucus vesiculosus* on mixed substrata (FvesB; Fves.X; EphX; EntPor). Rockpool biotopes dominated by the red seaweed *Corallina officinalis* (Cor), by wracks such as *Fucus* spp. or by kelp such as *Laminaria* spp. (FK) can usually be found above this biotope. Beneath this biotope is a community consisting of mixed scour-tolerant like the kelp *Laminaria digitata* and opportunistic foliose red seaweeds such as *Polyides rotundus* and *Ahnfeltia plicata* (Ldig.Ldig; XKScrR; EphR; PolAhn).

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>
<i>Actinia equina</i>	●●●	Occasional	2
<i>Sabellaria alveolata</i>	●●●●●	Common	24
<i>Lanice conchilega</i>	●●	Occasional	1
<i>Semibalanus balanoides</i>	●●●●	Frequent	8
<i>Elminius modestus</i>	●●	Occasional	2
<i>Carcinus maenas</i>	●●	Occasional	1
<i>Patella vulgata</i>	●●●●	Occasional	5
<i>Gibbula cineraria</i>	●●	Rare	1
<i>Littorina littorea</i>	●●●●	Frequent	6
<i>Nucella lapillus</i>	●●●●	Frequent	7
<i>Mytilus edulis</i>	●●●	Occasional	3
<i>Palmaria palmata</i>	●●●	Occasional	2
Corallinaceae	●●●	Frequent	3
<i>Corallina officinalis</i>	●●●	Occasional	2
<i>Mastocarpus stellatus</i>	●●●	Occasional	2
<i>Chondrus crispus</i>	●●●	Occasional	2
<i>Ceramium nodulosum</i>	●●●	Occasional	2
<i>Osmundea pinnatifida</i>	●●●	Frequent	2
<i>Polysiphonia</i>	●●	Occasional	2
<i>Cladostephus spongiosus</i>	●●●	Occasional	2
<i>Fucus serratus</i>	●●●●	Frequent	5
<i>Fucus vesiculosus</i>	●●	Occasional	2
<i>Enteromorpha intestinalis</i>	●●	Occasional	1
<i>Ulva lactuca</i>	●●●●	Occasional	4

LS.LBR.Sab.Salv Sabellaria alveolata reefs on sand-abraded eulittoral rock**Habitat (physical) description**

Salinity:	Full (30-35ppt)
Wave exposure:	Exposed, Moderately exposed
Tidal streams:	
Substratum:	Cobbles; boulders; pebbles; sand
Zone:	Eulittoral - mid, Eulittoral - lower
Height band:	Mid shore, Lower shore
Other features:	Sand-abraded

Previous code

MLR.Sab.Salv	97.06
MLR.Sab	96.7
LMXD.SAB	6.95

Biotope description

Exposed to moderately exposed bedrock and boulders in the eastern basin of the Irish Sea (and as far south as Cornwall) characterised by reefs of the polychaete *Sabellaria alveolata*. The sand based tubes formed by *S. alveolata* form large reef-like hummocks, which serve to stabilise the boulders and cobbles. Other species in this biotope include the barnacles *Semibalanus balanoides* and *Elminius modestus* and the limpet *Patella vulgata*, the winkle *Littorina littorea*, the mussel *Mytilus edulis* and the whelk *Nucella lapillus*. The anemone *Actinia equina* and the crab *Carcinus maenas* can be present in cracks and crevices on the reef. Low abundance of seaweeds tend to occur in areas of eroded reef. The seaweed diversity can be high and may include the foliose red seaweeds *Palmaria palmata*, *Mastocarpus stellatus*, *Osmundea pinnatifida*, *Chondrus crispus* and some filamentous species e.g. *Polysiphonia* spp. and *Ceramium* spp. Coralline crusts can occur in patches. Wracks such as *Fucus vesiculosus*, *Fucus serratus* and the brown seaweed *Cladostephus spongiosus* may occur along with the ephemeral green seaweeds *Enteromorpha intestinalis* and *Ulva lactuca*. On exposed surf beaches in the south-west *S. alveolata* forms a crust on the rocks, rather than the classic honeycomb reef form, and may be accompanied by the barnacle *Balanus perforatus* (typically common to abundant). On wave-exposed shores in Ireland, the wrack *Himanthalia elongata* can also occur.

Situation

Above Salv are biotopes dominated either by ephemeral seaweeds, such as *Enteromorpha* spp. and *Porphyra* spp. or the perennial wrack *Fucus vesiculosus* on mixed substrata (FvesB; Fves.X; EphX; EntPor). Rockpool biotopes dominated by the red seaweed *Corallina officinalis* (Cor), by wracks such as *Fucus* spp. or by kelp such as *Laminaria* spp. (FK) can usually be found above this biotope. Beneath this biotope is a community consisting of mixed scour-tolerant like the kelp *Laminaria digitata* and opportunistic foliose red seaweeds such as *Polyides rotundus* and *Ahnfeltia plicata* (Ldig.Ldig; XKScrR; EphR; PolAhn). In adjacent sediment areas *Lanice conchilega* may be dominant (Lan).

Temporal variation

These reefs may be susceptible to storm damage in the winter, although they can regenerate remarkably quickly in a season as long as some adults are left as they facilitate the larval settlement. *S. alveolata* is tolerant to burial under sand for several weeks. Changes in desiccation over a period of time can cause part of the population to die.

Similar biotopes

IR.MIR.KR.Lhyp.Sab

Occurs in the upper infralittoral zone. Kelp such as *Laminaria* spp. are present.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>
<i>Actinia equina</i>	●●●	Occasional	2
<i>Sabellaria alveolata</i>	●●●●●	Common	24
<i>Lanice conchilega</i>	●●	Occasional	1
<i>Semibalanus balanoides</i>	●●●●	Frequent	8
<i>Elminius modestus</i>	●●	Occasional	2
<i>Carcinus maenas</i>	●●	Occasional	1
<i>Patella vulgate</i>	●●●●	Occasional	5
<i>Gibbula cineraria</i>	●●	Rare	1
<i>Littorina littorea</i>	●●●●	Frequent	6
<i>Nucella lapillus</i>	●●●●	Frequent	7
<i>Mytilus edulis</i>	●●●	Occasional	3
<i>Palmaria palmata</i>	●●●	Occasional	2
Corallinaceae	●●●	Frequent	3
<i>Corallina officinalis</i>	●●●	Occasional	2
<i>Mastocarpus stellatus</i>	●●●	Occasional	2
<i>Chondrus crispus</i>	●●●	Occasional	2
<i>Ceramium nodulosum</i>	●●●	Occasional	2
<i>Osmundea pinnatifida</i>	●●●	Frequent	2
<i>Polysiphonia</i>	●●	Occasional	2
<i>Cladostephus spongiosus</i>	●●●	Occasional	2
<i>Fucus serratus</i>	●●●●	Frequent	5
<i>Fucus vesiculosus</i>	●●	Occasional	2
<i>Enteromorpha intestinalis</i>	●●	Occasional	1
<i>Ulva lactuca</i>	●●●●	Occasional	4

LS.LBR.LMus Mixed sediment shores with mussels**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)	SLR.Mx	97.06
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered, Extremely sheltered		
Tidal streams:			
Substratum:	Mixed sediment, shell debris, mixed boulders, cobbles and pebbles on muddy sediment		
Zone:			
Height band:	Mid shore, Lower shore		

Biotope description

Mixed sediment shores characterised by beds of adult mussels *Mytilus edulis* occur principally on mid and lower eulittoral mixed substrata (mainly cobbles and pebbles on muddy sediments) in a wide range of exposure conditions. In high densities the mussels bind the substratum and provide a habitat for many infaunal and epifaunal species. This biotope is also found in lower shore tide-swept areas, such as in the tidal narrows of Scottish sealochs.

Situation

Adult mussel beds can be found below a band of ephemeral green seaweeds (Eph.X) on more exposed, predominantly rocky shores. On sheltered, predominantly rocky shores either a *F. vesiculosus* dominated biotope or a biotope dominated by the wrack *Ascophyllum nodosum* (Fves.X; Asc.X) can be found above or the barnacle dominated biotope (Sem.LitX).

Temporal variation

The temporal stability of mussel beds can vary a lot. Some beds are permanent, maintained by recruitment of spat in amongst adults. Other beds are ephemeral, an example of which are beds occurring at South America Skear where large amounts of spat settle intermittently on a cobble basement. The mussels rapidly build up mud, and are unable to remain attached to the stable cobbles. They are then liable to be washed away during gales. A second example of ephemeral mussel dominated biotopes occurs when mussel spat ("mussel crumble") settles on the superficial shell of cockle beds, such as is known to occur in the Burry Inlet.

LS.LMx.LMus.Myt *Mytilus edulis* beds on littoral sediments

Habitat (physical) description

		Previous code	
Salinity:	Full (30-35ppt), Variable (18-35ppt)	SLR.MX.MytX	97.06
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered, Extremely sheltered	LMXD.MYT	6.95
Tidal streams:			
Substratum:	mixed sediment, sand, mud		
Zone:			
Height band:	Mid shore, Lower shore		

Biotope description

Dense aggregations of *Mytilus edulis* on the mid and lower shore, on mixed substrata (mainly cobbles and pebbles on fine sediments), on sand, or on sheltered muddy shores. In high densities the mussels bind the substratum and provide a habitat for many infaunal and epifaunal species. The wrack *Fucus vesiculosus* is often found attached to either the mussels or cobbles and it can be abundant. The mussels are often encrusted with the barnacles *Semibalanus balanoides*, *Elminius modestus* or *Balanus crenatus*. Where boulders are present they can support the limpet *Patella vulgata*. The winkles *Littorina littorea* and *L. saxatilis* and small individuals of the crab *Carcinus maenas* are common amongst the mussels, whilst areas of sediment may contain the lugworm *Arenicola marina*, the sand mason *Lanice conchilega*, the cockle *Cerastoderma edule*, and other infaunal species. The characterising species list shown below is based on data from epifaunal sampling only. Three sub-biotopes are recognised for this biotope, distinguished principally on the basis of the sediment type associated with the mussel beds. The three types of intertidal mussel beds may be part of a continuum on an axis that is most strongly influenced by the amount of pseudofaeces that accumulate amongst the mussels. The differences may not always be directly connected to the underlying substratum on which the mussel bed may have started a long time ago. It should be noted that there are few data available for the muddy (Myt.Mu) and sandy (Myt.Sa) sub-biotopes, therefore there are no characterising species lists or comparative tables for these two sub-biotopes.

Situation

On more exposed, predominantly rocky shores this biotope can be found below a band of ephemeral green seaweeds (Eph.X). On sheltered, predominantly rocky shores either a *F. vesiculosus* dominated biotope or a biotope dominated by the wrack *Ascophyllum nodosum* (Fves.X; Asc.X) can be found above or the barnacle dominated biotope (Sem.LitX). On mudflats and sandflats, this biotope may be found alongside *Cerastoderma edule* beds (CerPo) and other LMU and LSA biotopes. The intertidal Myt biotope can extend seamlessly into the subtidal.

Temporal variation

The temporal stability of mussel beds can vary a lot. Some beds are permanent, maintained by recruitment of spat in amongst adults. Other beds are ephemeral, an example of which are beds occurring at South America Skear where large amounts of spat settle intermittently on a cobble basement. The mussels rapidly build up mud, and are unable to remain attached to the stable cobbles. They are then liable to be washed away during gales. A second example of ephemeral mussel dominated biotopes occurs when mussel spat ("mussel crumble") settles on the superficial shell of cockle beds, such as is known to occur in the Burry Inlet.

Similar biotopes

LR.HLR.MusB.Sem.LitX

Occurs exclusively on rock, sometimes higher on the shore than Myt. It has a similar species composition, but *M. edulis* occurs in low abundance (Occasional) while *L. saxatilis* occurs at an abundance of frequent or above.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Lanice conchilega</i>	••	Frequent		2
<i>Semibalanus balanoides</i>	•••••	Frequent		15
<i>Elminius modestus</i>	•••	Frequent		5
<i>Carcinus maenas</i>	•••	Occasional		3
<i>Patella vulgata</i>	••	Occasional		1
<i>Littorina littorea</i>	•••••	Common		20
<i>Littorina saxatilis</i>	••	Occasional		1
<i>Mytilus edulis</i>	•••••	Abundant		39
<i>Fucus vesiculosus</i>	•••	Occasional		4

LS.LMx.LMus.Myt.Mx *Mytilus edulis* beds on littoral mixed substrata**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Exposed, Moderately exposed, Sheltered, Very sheltered
Tidal streams:	
Substratum:	Mixed boulders, cobbles and pebbles on sand and muddy sand
Zone:	
Height band:	Mid shore, Lower shore

Previous code

SLR.MX.MytX (part)	97.06
LMXD.MYT (part)	6.95

Biotope description

Mid and lower shore mixed substrata (mainly cobbles and pebbles on fine sediments) in a wide range of exposure conditions and with aggregations of the mussel *Mytilus edulis* colonising mainly the sediment between cobbles, though they can extend onto the cobbles themselves. The mussel aggregations can be very dense and support various age classes. In high densities the mussels bind the substratum and provide a habitat for many infaunal and epifaunal species. The wrack *Fucus vesiculosus* is often found attached to either the mussels or the cobbles and it can occur at high abundance. The mussels are also usually encrusted with the barnacles *Semibalanus balanoides*, *Elminius modestus* or *Chtamalus* spp., especially in areas of reduced salinity. The winkles *Littorina littorea* and *L. saxatilis* and small individuals of the crab *Carcinus maenas* are common amongst the mussels, whilst areas of sediment may contain the lugworm *Arenicola marina*, the sand mason *Lanice conchilega* and other infaunal species. Pools are often found within the mussel beds that support algae such as *Chondrus crispus*. Where boulders are present they can support the limpet *Patella vulgata*, the dogwhelk *Nucella lapillus* and the anemone *Actinia equina*. *Ostrea edulis* may occur on the lowest part of the shore. There are few infaunal samples for this biotope, hence the characterising species list below shows only epifauna. Where infaunal samples have been collected for this biotope, they contain a highly diverse range of species including nematodes, *Anaitides mucosa*, *Hediste diversicolor*, *Polydora* spp., *Pygospio elegans*, *Eteone longa*, oligochaetes such as *Tubificoides* spp., *Semibalanus balanoides*, a range of gammarid amphipods, *Corophium volutator*, *Jaera forsmanni*, *Crangon crangon*, *Carcinus maenas*, *Hydrobia ulvae* and *Macoma balthica*.

Situation

On more exposed, predominantly rocky shores this biotope can be found below a band of ephemeral green seaweeds (Eph.X). On sheltered, predominantly rocky shores either a *F. vesiculosus* dominated biotope or a biotope dominated by the wrack *Ascophyllum nodosum* (Fves.X; Asc.X) can be found above or the barnacle dominated biotope (Sem.LitX). This biotope is also found in lower shore tide-swept areas, such as in the tidal narrows of Scottish sealochs.

Temporal variation

Under sheltered conditions, pseudofaeces may build up over time, creating a layer of mud and changing the biotope to Myt.Mu. Where the stability of the mussel bed depends on the mussels being attached to stable cobbles, a build-up of mud from pseudofaeces may prevent this attachment, making the mussel bed unstable and liable to be washed away during storms.

Similar biotopes

LR.HLR.MusB.Sem.LitX	Occurs exclusively on rock, sometimes higher on the shore than Myt. It has a similar species composition, but <i>M. edulis</i> occurs in low abundance (Occasional) while <i>L. saxatilis</i> occurs at an abundance of frequent or above.
LS.LMx.LMus.Myt.Sa	Occurs on sand and muddy sand flats where no cobbles and boulders are present. Rocky shore epifauna does not occur, but the sediment infauna is a lot more diverse, characterised by a range of bivalve and polychaete species.
LS.LMx.LMus..Myt.Mu	Occurs in sheltered conditions on mudflats. Rocky shore epifauna does not occur. The sediment is anoxic and therefore relatively few infaunal species are present.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Lanice conchilega</i>	••	Frequent		2
<i>Semibalanus balanoides</i>	•••••	Frequent		15
<i>Elminius modestus</i>	•••	Frequent		5
<i>Carcinus maenas</i>	•••	Occasional		3
<i>Patella vulgata</i>	••	Occasional		1
<i>Littorina littorea</i>	•••••	Common		20
<i>Littorina saxatilis</i>	••	Occasional		1
<i>Mytilus edulis</i>	•••••	Abundant		39
<i>Fucus vesiculosus</i>	•••	Occasional		4

LS.LMx.LMus.Myt.Sa *Mytilus edulis* beds on littoral sand**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Moderately exposed, Sheltered
Tidal streams:	
Substratum:	Sand and muddy sand
Zone:	
Height band:	Mid shore, Lower shore

Previous code

SLR.MX.MytX (part)	97.06
LMXD.MYT (part)	6.95

Biotope description

This sub-biotope occurs on mid to lower shore sand and muddy sand. Mussels *Mytilus edulis* grow attached to shell debris and live cockles *Cerastoderma edule*, forming patches of mussels on consolidated shell material, and often growing into extensive beds. The mussel valves are usually encrusted with barnacles such as *Elminius modestus* and *Semibalanus balanoides*, and the mussel bed provides a habitat for a range of species including *Littorina littorea*. The sediment infaunal community is usually rich and very similar to that of cockle beds (CerPo), including cockles *Cerastoderma edule*, the baltic tellin *Macoma balthica*, and a range of burrowing crustaceans and polychaetes typical for CerPo. Further species may be present are the sand mason *Lanice conchilega*, the sand gaper *Mya arenaria*, the peppery furrow shell *Scrobicularia plana*, *Nephtys* spp., and the ragworm *Hediste diversicolor*. Scattered fronds of eelgrass *Zostera noltii* may occur.

Situation

This biotope often occurs in large sandy estuaries, or on enclosed shores, alongside other sand and muddy sand biotopes, most notably CerPo. It is possible that *Lanice* beds (Lan) occur lower down on the shore.

Temporal variation

Where this sub-biotope occurs in very sheltered conditions on muddy sand, it could change to Myt.Mu over time as pseudofaeces build up forming a layer of mud. This cannot happen where wave action or tidal streams wash away pseudofaeces and prevent a build up. In areas where mussel spat ("mussel crumble") settles on the surface shell layer of cockle beds, the mussel cover may be ephemeral, as is the case in the Burry Inlet.

Similar biotopes

LS.LSa.MuSa.CerPo	Occurs in very similar physical conditions. <i>M. edulis</i> is not present or only present in low abundances, and does not form beds on the sediment surface. The infaunal community is very similar.
LS.LMx.LMus.Myt.Mx	Occurs on mixed substrata, often in more exposed conditions near predominantly rocky areas. Cobbles and boulders support epifaunal species typical of rocky shores, whereas the sediment infauna is more limited.
LS.LMx.LMus.Myt.Mu	Occurs in more sheltered conditions on mudflats. The sediment is anoxic and the infauna therefore a lot less diverse than that of Myt.Sa. Cockles <i>C. edule</i> do not occur.

LS.LMx.LMus.Myt.Mu *Mytilus edulis* beds on littoral mud**Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Moderately exposed, Sheltered
Tidal streams:	
Substratum:	Sandy mud and mud
Zone:	
Height band:	Mid shore, Lower shore

Previous code

SLR.MX.MytX (part)	97.06
LMXD.MYT (part)	6.95

Biotope description

Dense mussel beds found in sheltered conditions on mud. There is a build up of pseudofaeces that results in a bed that is very soft to walk on, and sediment which is anoxic to the surface. Pools are often present in the mussel bed but they tend to contain few species. The sediment infauna is very poor as a result of anoxic conditions. The mussel valves are usually clean, without epifaunal growth. Where this biotope occurs naturally, all age classes are found within the mussel bed. This biotope also includes commercially laid mussel beds on soft sediments, which tend to be of uniform age structure. The species diversity of this sub-biotope is a lot lower than that of the other Myt sub-biotopes.

Situation

Occurs on sheltered mudflats, or areas that were previously rocky or cobble fields, but where pseudofaeces have accumulated, leading to the presence of a thick layer of mud.

Temporal variation

Mussels may settle on areas of cobble or mixed sediment (Myt.Mx), and lead to the build-up of a thick layer of pseudofaeces, changing the biotope to Myt.Mu over time. The layer of mud can prevent the attachment of mussels to the underlying stable substratum, thus making the mussel bed liable to be washed away during storms. This is known to occur in areas of Morecambe Bay.

Similar biotopes

LS.LMx.LMus.Myt.Mx

Occurs on mixed substrata, often in more exposed conditions near predominantly rocky areas. Species diversity is higher, with cobbles and boulders supporting epifaunal species typical of rocky shores, and limited infauna present in sediment patches.

LS.LMx.LMus.Myt.Sa

Occurs on sand and muddy sand. As well as mussel beds, there is a diverse infaunal community including a range of bivalves such as *Cerastoderma edule* and *Macoma balthica*, and a range of polychaetes.

LS.LMp**Littoral macrophyte-dominated sediment****Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Sandy or muddy sediments
Zone:	Littoral fringe
Height band:	Strandline, Upper shore, Mid shore

Biotope description

Littoral macrophyte-dominated sediment biotopes include saltmarshes on the upper shore and seagrass beds on the mid and upper shore. These higher plant-dominated communities develop on sheltered shores with fine, often muddy, sediments. The character of saltmarsh communities is affected by height up the shore, resulting in a zonation pattern related to the degree or frequency of immersion in seawater. Saltmarsh and seagrass bed vegetation is generally well studied; its classification is fully covered by the UK National Vegetation Classification, where 26 types are defined (Rodwell, 2000). Users are referred to the chapter on saltmarsh communities in Rodwell (2000) for details on the plant communities which characterise the different littoral macrophyte-dominated biotopes.

Situation

Saltmarshes are found on the upper shore above sheltered sand, muddy sand, and mud biotopes, generally confined to estuaries and other sheltered marine inlets. Seagrass beds are most frequently found on lower estuary and sheltered coastal muddy sands.

Temporal variation

There may be seasonal variation in the area covered by intertidal seagrass beds and saltmarshes, as plants die back during cold temperatures in winter. Intertidal seagrass beds may also be subject to heavy grazing by geese, which can reduce the extent of the plant cover significantly.

LS.LMp.Sm**Saltmarsh****Habitat (physical) description**

Salinity:	Full (30-35ppt), Variable (18-35ppt), Reduced (18-30ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Sandy or muddy sediments
Zone:	Littoral fringe
Height band:	Strandline, Upper shore

Previous code

LMU.SM	97.06
LMUD.SAL	6.95

Biotope description

Angiosperm-dominated stands of vegetation, occurring on the extreme upper shore of sheltered coasts and periodically covered by spring high tides. The vegetation develops on a variety of sandy and muddy sediment types and may have admixtures of coarser material. The character of the saltmarsh communities is affected by height up the shore, resulting in a zonation pattern related to the degree or frequency of immersion in seawater. Saltmarsh vegetation is generally well studied; its classification is fully covered by the UK National Vegetation Classification, where 26 types are defined (Rodwell, 2000). The species listed below give a general indication of the infaunal component of saltmarsh communities. Users are referred to the chapter on saltmarsh communities in Rodwell (2000) for details on the plant communities which characterise the different saltmarsh biotopes.

Situation

On the upper shore above sheltered sand, muddy sand, mud, and more marine biotopes. Saltmarshes are generally confined to estuaries and other sheltered marine inlets.

Temporal variation

Saltmarsh vegetation tends to die back during the winter season due to cold temperatures and increased storminess, and saltmarshes may increase in area during the growing period in summer. This is particularly the case for the *Salicornia* spp. - dominated pioneer saltmarsh communities at the lower end of the saltmarsh zone.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Hediste diversicolor</i>	••	Abundant	19	110
<i>Manayunkia aestuarina</i>	••	Frequent	3	333
Enchytraeidae	•••	Common	53	728
<i>Corophium volutator</i>	•••	Abundant	18	165
<i>Hydrobia ulvae</i>	••	Common	4	603

LS.LMp.LSgr Seagrass beds on littoral sediments

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Muddy sand
Zone:	
Height band:	Mid shore

Previous code

LMU.Zos 97.06

Biotope description

Mid and upper shore wave-sheltered muddy fine sand or sandy mud with narrow-leafed eel grass *Zostera noltii* at an abundance of frequent or above. Exactly what determines the distribution of *Z. noltii* is not entirely clear. It is often found in small lagoons and pools, remaining permanently submerged, and on sediment shores where the muddiness of the sediment retains water and stops the roots from drying out. An anoxic layer is usually present below 5 cm sediment depth. The infaunal community is characterised by polychaetes *Scoloplos armiger*, *Pygospio elegans* and *Arenicola marina*, oligochaetes, spire shell *Hydrobia ulvae*, and bivalves *Cerastoderma edule* and *Macoma balthica*. The green algae *Enteromorpha* spp. may be present on the sediment surface. The characterising species lists below give an indication both of the epibiota and of the sediment infauna that may be present in intertidal seagrass beds. The biotope is described in more detail in the National Vegetation Classification (see the chapter on saltmarsh communities in Rodwell, 2000).

Situation

Znol is most frequently found on lower estuary and sheltered coastal muddy sands, together with biotopes such as CerPo.

Temporal variation

There may be seasonal variation in the area covered by intertidal seagrass beds, as plants die back during cold temperatures in winter. Intertidal seagrass beds may also be subject to heavy grazing by geese, which can reduce the extent of the plant cover significantly. The rhizomes of the plants will remain in place within the sediment in both situations.

Characterising species

	% Frequency	Abundance (SACFOR)	%Contribution to similarity	Abundance (nos / m ²)
<i>Scoloplos armiger</i>	●●●●	Super-abundant	23	327
<i>Pygospio elegans</i>	●●●	Common	5	371
<i>Arenicola marina</i>	●●●●●	Abundant	11	39
<i>Arenicola marina</i>	●●	Abundant	7	
OLIGOCHAETA	●●	Common	1	50
<i>Hydrobia ulvae</i>	●●	Common	2	1322
<i>Cerastoderma edule</i>	●●●	Abundant	4	138
<i>Macoma balthica</i>	●●●●●	Common	47	202
<i>Enteromorpha</i>	●●	Present	2	
<i>Zostera</i>	●●●●	Present	82	
<i>Zostera noltii</i>	●●	Common	2	

LS.LMp.LSgr.Znol *Zostera noltii* beds in littoral muddy sand

Habitat (physical) description

Salinity:	Full (30-35ppt), Variable (18-35ppt)
Wave exposure:	Sheltered, Very sheltered, Extremely sheltered
Tidal streams:	
Substratum:	Muddy sand
Zone:	
Height band:	Mid shore

Previous code

LMS.Zos.Znol	97.06
LMS.PCer.Znol	96.7
LMUD.HS.Z	6.95

Biotope description

Mid and upper shore wave-sheltered muddy fine sand or sandy mud with narrow-leafed eel grass *Zostera noltii* at an abundance of frequent or above. It should be noted that the presence of *Z. noltii* as scattered fronds does not change what is otherwise a muddy sand biotope. Exactly what determines the distribution of *Z. noltii* is not entirely clear. It is often found in small lagoons and pools, remaining permanently submerged, and on sediment shores where the muddiness of the sediment retains water and stops the roots from drying out. An anoxic layer is usually present below 5 cm sediment depth. The infaunal community is characterised by the polychaetes *Scoloplos armiger*, *Pygospio elegans* and *Arenicola marina*, oligochaetes, the spire shell *Hydrobia ulvae*, and the bivalves *Cerastoderma edule* and *Macoma balthica*. The green algae *Enteromorpha* spp. may be present on the sediment surface. The characterising species lists below give an indication both of the epibiota and of the sediment infauna that may be present in intertidal seagrass beds. The biotope is described in more detail in the National Vegetation Classification (see Rodwell, 2000).

Situation

Znol is most frequently found on lower estuary and sheltered coastal muddy sands, together with biotopes such as CerPo.

Temporal variation

There may be seasonal variation in the area covered by intertidal seagrass beds, as plants die back during cold temperatures in winter. Intertidal seagrass beds may also be subject to heavy grazing by geese, which can reduce the extent of the plant cover significantly. The rhizomes of the plants will remain in place within the sediment in both situations.

Similar biotopes

LS.LSa.MuSa.CerPo

Occurs under more estuarine but otherwise similar conditions. The infaunal communities are similar, but *Zostera* spp. are absent.

Characterising species

	<i>% Frequency</i>	<i>Abundance (SACFOR)</i>	<i>%Contribution to similarity</i>	<i>Abundance (nos / m²)</i>
<i>Scoloplos armiger</i>	••••	Super-abundant	23	327
<i>Pygospio elegans</i>	•••	Common	5	371
<i>Arenicola marina</i>	•••••	Abundant	11	39
<i>Arenicola marina</i>	••	Abundant	7	
OLIGOCHAETA	••	Common	1	50
<i>Hydrobia ulvae</i>	••	Common	2	1322
<i>Cerastoderma edule</i>	•••	Abundant	4	138
<i>Macoma balthica</i>	•••••	Common	47	202
<i>Enteromorpha</i>	••	Present	2	
<i>Zostera</i>	••••	Present	82	
<i>Zostera noltii</i>	••	Common	2	

Hierarchical Structure Diagram for Littoral Sediment

Littoral sediment LS												
Littoral coarse sediment LCS	Littoral sand LSa				Littoral mud LMu		Littoral mixed sediment LMx		Littoral macrophyte-dominated sediment LMp		Littoral biogenic reefs LBR	
Shingle and gravel shores Sh	Strandline St	Barren or amphipod dominated mobile sand shores MoSa	Polychaete / amphipod dominated fine sand shores FiSa	Polychaete / bivalve dominated muddy sand shores MuSa	Polychaete / bivalve dominated mid estuarine mud shores MEst	Polychaete / oligochaete dominated upper estuarine mud shores UEst	Hediste diversicolor-dominated gravelly-sandy mud shores GvMu	Species-rich mixed sediment shores Mx	Saltmarsh Sm	Littoral seagrass beds LSgr	Littoral <i>Sabellaria alveolata</i> reefs Sab	Mixed sediment shores with mussels LMus
BarSh	Tal	BarSa	Po	MacAre	NhomMacStr	NhomStr	HedMx	CirCer	NVC types	Znol	Salv	Myt
Pec	MytFab	OI	Po.Pful	CerPo	HedMac	Hed	HedMx.Mac					Myt.Mx
		OI.FS	Po.Aten	HedMacEte	HedMacScr	Hed.Str	HedMx.Scr					Myt.Sa
		OI.VS	Po.Ncir	BatCare		Hed.Cvol	HedMx.Str					Myt.Mu
		AmSco		Lan		Hed.OI	HedMx.Cir					
		AmSco.Sco				Tben	HedMx.Cvol					
		AmSco.Eur										
		AmSco.Pon										