Improvement Programme for England's Natura 2000 Sites (IPENS) – Planning for the Future IPENS012

Alde-Ore Estuary Complex NVC 2013

Alde-Ore & Butley Estuaries Special Area of Conservation (SAC)

Orfordness-Shingle Street SAC

Alde-Ore Estuary Special Protection Area (SPA)

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Foreword

The **Improvement Programme for England's Natura 2000 sites (IPENS)**, supported by European Union LIFE+ funding, is a new strategic approach to managing England's Natura 2000 sites. It is enabling Natural England, the Environment Agency, and other key partners to plan what, how, where and when they will target their efforts on Natura 2000 sites and areas surrounding them.

As part of the IPENS programme, we are identifying gaps in our knowledge and, where possible, addressing these through a range of evidence projects. The project findings are being used to help develop our Theme Plans and Site Improvement Plans. This report is one of the evidence project studies we commissioned.

To provide evidence for assessing changes within the site and to be able to monitor future changes a National Vegetation Classification (NVC) survey was commissioned for the Special Areas of Conservation (SACs):

- Alde-Ore and Butley Estuaries; and
- Orfordness-Shingle Street.

These are both underpinned by Alde-Ore Estuary Site of Special Scientific Interest (SSSI).
The survey was carried out at SSSI unit level and included details about management, habitat quality, and issues currently impacting on, or with the potential to impact on, features.

The report identifies changes within the estuary, such as habitat communities that have increased in extent in comparison with historical aerial photo, as well as those suffering greatest loss within the estuary. In particular, it notes the spread of *Spartina anglica* across the foreshore and the impact this can have on other saltmarsh plants.

It also highlights issues such as the need for appropriate coastal management, for example, in terms of maintaining natural transitional habitats within the estuary. Issues identified within the report have been incorporated into the Alde-Ore Estuaries Site Improvement Plan.

The key audience for this work is the staff within Natural England and land managers and the findings will be used to inform management requirements within the site.

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Alde-Ore Estuary Complex NVC 2013

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Survey Completed by Abrehart Ecology 2013

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Executive summary

Abrehart Ecology was commissioned by Natural England Suffolk Team to carry out an NVC survey of the whole Alde-Ore Estuary complex SSSI. Standard NVC methods were used during the survey and the field work was carried out from August to October.

The results are presented based of general habitat type (saltmarsh, woodland, open vegetation, swamps and grasslands) within these main groups each community or sub-community is discussed with photos attached of each community within the SSSI.

Quadrats were taken from 499 locations across the 20 units of the SSSI in which 65 vegetation types were recorded; 25 saltmarsh, 10 woodland, two sand dune, seven grassland, three sand dune, 11 shingle ridge, one open vegetation, two mire, one heathland, one aquatic and four swamp.

A number of important plant species were recorded during this survey including two endangered species, seven vulnerable species, 26 nationally scarce species, 12 locally scarce/rare species. A total of 343 species of plant were recorded during the survey within the SSSI boundary.

	Scientific name	Common name
Endangered	Spartina maritima	Small cord-grass
	Ranunculus baudotii	
Vulnerable	*Bupleurum tenuissimum*	Slender hare's-ear
	Hordeum marinum	Sea Barley
	Puccinellia fasciculata	Borrer's Saltmarsh-grass
	Geranium robertianum subsp. maritimum	Herb-robert
	Hydrocharis morsus-ranae	Frogbit
	Potamogeton pectinatus	Fennel pondweed
	Carex divisa	Divided Sedge
Locally scarce/rare	*Anagallis tenella*	Bog Pimpernel
	Carex binervis	Green-veined Sedge
	Carex distans	Distant Sedge
	Carex extensa	Extended Sedge
	Crambe maritima	Sea Kale
	Crithmum maritimum	Sea Samphire
	Epilobium palustre	Marsh willowherb
	Scabiosa columbaria	Small scabious
	Sedum anglicum	English stonecrop
	Trifolium glomeratum	Clustered clover
	Trifolium suffocatum	Suffocated clover

	Scientific name	Common name
Nationally scarce	*Inula crithmoides*	Lax-flowered Sea-lavender
	Limonium humile	Golden-Samphire
	Polypogon monspeliensis	Annual beard-grass
	Althea officinalis	Marsh Mallow
	Lepidium latifolium	Dittander
	Suaeda vera	Shrubby Seablite
	Hyoscyamus niger	Henbane
	Hypochaeris glabra	Smooth cat's ear
	Lathyrus japonicus	Sea pea
	Limonium binervosum	Rock Sea Lavender
	Medicago minima	Bur medick
	Parapholis incurva	Curved hard-grass
	Poa bulbosa	Bulbous meadow-grass
	Poa infirma	Early meadow-grass
	Puccinellia rupestris	Stiff saltmarsh-grass
	Ruppia maritima	Beaked Tassel-weed
	Salicornia dolichostachya	Long-spiked glasswort
	Salicornia pusilla	One-flowered glasswort
	Samolus valerandi	Water pimpernel
	Sarcocornia perennis	Perennial glasswort
	Vicia lutea	Yellow vetch
	Frankenia laevis	Sea heath
	Ceratophyllum submersum	Soft hornwort
	Crassula tillaea	Mossy stonecrop
	Verbascum pulverulentum	Hoary mullein
	Sonchus palustris	Marsh sow-thistle

Across this NVC survey area the total vegetated area was 349.16 hectares.

With a total area of saltmarsh and swamp communities covered 278.01 hectares

This included the areas for the S21 and S4b communities which accounted for 0.8 hectares and 60.05 hectares respectively and were integral communities in this estuary system.

Significant community changes were not possible to assess with the SWT 1993 NVC, this was due to lack of constancy in survey areas and lack of maps from that survey.

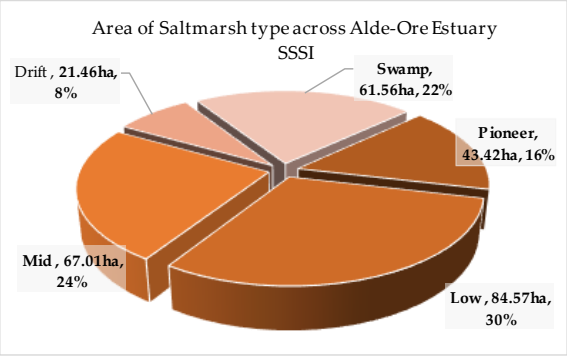
There were some comparisons that could be loosely made though.

Saltmarsh type	SWT - 1993 cover hectares	Percentage of saltmarsh surveyed SWT	AE - 2014 cover hectares	Percentage of saltmarsh surveyed AE
Pioneer	75.34	21.84	43.43	21.71
Low	149.34	43.29	84.23	42
Mid-upper	108.83	31.54	51.75	25.87
Drift	11.98	3.47	21.46	10.73

This table shows the percentage cover of each main vegetation grouping through the estuary. This percentage cover form 1993 to 2014 shows very little difference across the saltmarsh groups. With only the drift community becoming larger, this may be due to more accurate mapping.

Table A: showing percentage change over 20 years within the Alde-Ore Estuary SSSI.

The pie chart below, shows the area and percentages of each main vegetation type of the saltmarshes to include the swamp communities too.



Along with a large number or rare and scarce plant species several other uncommon species were recorded, with Grey Bush-cricket, Great Green Bush-cricket, Yellow-winged Darter, Starlet Sea Anemone, Narrow-mouthed Whorl snail, Desmoulins Whorl Snail and Carthusian Snail amongst the more notable species casually observed.

1. Introduction

Abrehart Ecology was commissioned by Natural England Suffolk Team to carry out a National Vegetation Community (NVC) survey of the Alde-Ore Estuary complex SSSI on the Suffolk coast. This NVC will provide Natural England with an important set of information for assessing changes within the site and to be able to monitor future changes.

This report systematically presents the results of extensive surveys of the SSSI community-by-community in terms of its type (NVC code), the location, extent, management, composition of species, and all additional information deemed of importance when on site.

The location of the Alde-Ore Estuary complex SSSI survey area is shown in figure 1 and SSSI citation issued by Natural England is given in section2.

Photo of saltmarshes near the Martello Tower at Slaughden—Aldeburgh unit 10.

2. Alde-Ore Estuary SSSI Citation

County: Suffolk **Site name:** Alde-Ore Estuary
District: Suffolk Coastal

Status: Site of Special Scientific Interest (SSSI) notified under Section 28 of the Wildlife and Countryside Act 1981 as amended.

National grid reference: from TM 394 757 to TM 358 402 Area: 2,554.3 (ha) 6,311.7 (acres)

Date notified (Under 1949 Act): 1952 Date of last revision: 1980
Date notified (under 1981 Act): 1985 Date of last revision: 1992

Description and reasons for notification

This site stretches along the coast from Bawdsey to Aldeburgh and inland to Snape. It includes Orfordness, Shingle Street, Havergate Island, and the Butley, Ore and Alde Rivers.

The scientific interests of the site are outstanding and diverse. The shingle structures of Orfordness and Shingle Street are of great physiographic importance whilst the cliff at Gedgrave is of geological interest. The site also contains a number of coastal formations and estuarine features including mud-flats, saltmarsh, vegetated shingle and coastal lagoons which are of special botanical and ornithological value.

Geomorphology

Orfordness, together with Shingle Street, is one of three major shingle landforms in the British Isles and is the only one which combines a shingle spit with a cuspate foreland. This large feature comprises a complex sequence of shingle ridges deposited over a long period of time which record stages in the evolution of the landform. The distal end of the spit is still subject to rapid changes and is dynamically related to events at Shingle Street on the mainland shore. This well documented site is of the highest educational and research value.

Botany
The botanical interest of this site is enriched by the variety of habitats present, including mudflats, saltmarsh, brackish lagoons, shingle beach, reedbeds, grassland, freshwater and brackish ditches.

The site contains the second largest and best preserved area of vegetated shingle in Britain. This is a nationally rare and delicate habitat which supports a highly specialised flora. Species typical of exposed, shifting shingle such as sea pea *Lathyrus japonicus* and sea kale *Crambe maritima* are abundant whilst extensive areas of sea campion *Silene uniflora* and stonecrops *Sedum acre* and *S. anglicum* occur on more stable ground. Orfordness contains one of the best examples of zonation in the shingle vegetation. Above the high water mark *Rumex crispus* and *Glaucium flavum* give a highly distinctive character to the mainly bare shingle, with *Lathyrus japonicus* becoming much more abundant within the matrix further inland. This vegetation gives way in turn to grassland dominated by *Arrhenatherum elatius* and *Silene uniflora*. A wide range of rare or local species also occur including yellow vetch *Vicia lutea* and the dwarf clovers *Trifolium suffocatum, T. glomeratum, T. striatum, T. scabrum* and bur medick *Medicago minima*. Lichen communities are also well developed here with extensive areas of Cladonia heath. A unique feature for East Anglia beach formations is the abundance on the ground of normally epiphytic lichens *Parmelia caperata* and *Evernia prunastre*.

Higher saltmarsh blending to neutral grassland, dominated by sea couch grass, Elymus pungens, occurs on former grazing marsh on Havergate Island and Orfordness and on the extensive system of clay embankments throughout the site. There are small areas of reedbed at the head of the Butley River and at Iken.

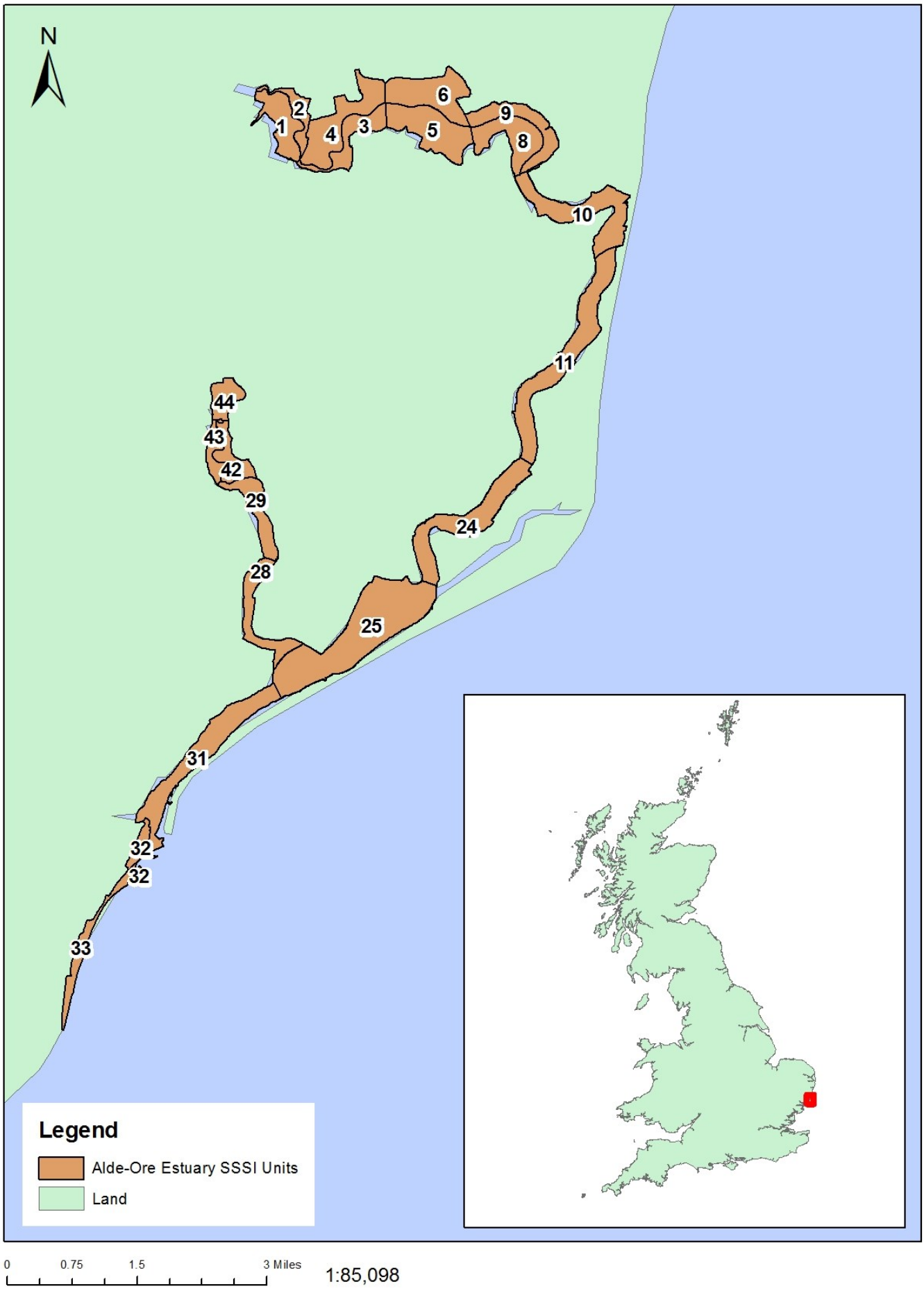


Figure 1. Map of the Alde-Ore Estuary complex SSSI, Suffolk showing SSSI boundaries and units

Common linnet
Carduelis cannabina
Was often seen feeding along the short grasses of unit 32

Rock sea lavender
Limonium binervosum
This species was found widely in unit 31

Lichen rich vegetated shingle

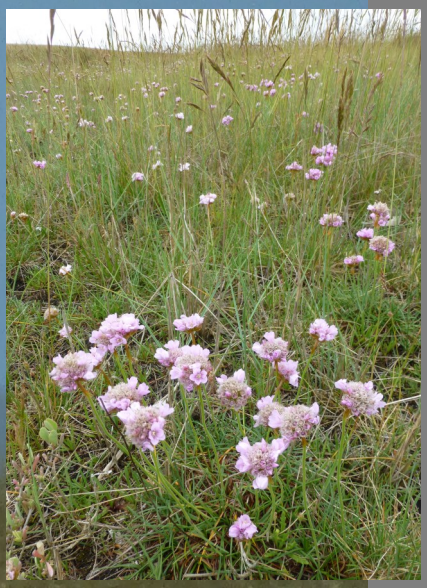
Orfordness lighthouse seen from Shingle Street

Thift
Armeria maritima
This species was often an abundant component of the vegetated shingle and the SM13c community

Small cord-grass
Spartina maritima
This was scattered across the SSSI though always at a low density and mainly at the edges of small saltmarsh pools within the SM13c community

Starlet Sea Anemone
Nematosella vectensis
This was found in two borrow dykes out side the SSSI, though still important

Common Blue
Polyommatus icarus
This species was common across the SSSI and this caterpillar was seen in unit 32



Grayling
Thymallus thymallus
This species was only seen on four occasions with the estuaries

Slender hare's-ear
Bupleurum tenuissimum
This species was found along a large section of the middle Ore Estuary with some within the Butley Creek system too

Suffocated clover
Trifolium suffocatum
Was found along the trampled paths of unit 32 and 33

Extended sedge
Carex extensa
This was previously only known from the one location to the north of Shingle Street
During this survey it was discovered in six new colonies
Some extending to several thousand plants
They were all located at the upper saltmarshes before the SM24 community developed

Yellow vetch
Vicia lutea
This was commonly found all through units 31, 32 and 33.

Often forming large stands several metres across

Desmoulins's whorl-snail
Vertigo moulinsiana
This species was found new to the SSSI during this survey in unit 44.
Here it was present at a low density across the more freshwater marshes.
This is an important find for this RDB3 mollusc

Sea kale
Crambe maritima
This plant was a dominant feature of the newer shingle ridges at the south of the SSSI in units 31, 32 and especially 33

3. Methods

Standard NVC survey methods (Rodwell, 1991a, 1991b, 1992 and 1995) appropriate to each habitat, were used. This comprised the identification of stands of vegetation which were homogenous in terms of their botanical content and structure. This was assessed during a walkover of each site within the individual units. During this walkover a habitat map was prepared using images from Google Earth, these showed the basic nature of each site from which detailed maps were made to current community boundaries. After this initial surveying more detailed assessment of the vegetation was undertaken by carrying out quadrat sampling in appropriate sites. Each quadrat was a 2x2 meters with the exception of the occasional site where the vegetation structure dictated that this was not possible, for example, some small pure stands were recorded in their entirety and the total area of the community was noted (e.g. 1x4m).

The quadrat samples were undertaken in homogenous stands of a community which were visually distinct areas of vegetation. Some random samples were taken in less distinctive communities. The number of quadrats taken was considerably more than quoted for the tender, but it was deemed important to carry out more in order to provide a thorough level of information in a habitat that appeared to be in a state of change.

A large proportion of the saltmarshes were rich mosaics of communities and individual stands are often not possible to distinguish, here mosaics of communities were assessed and allocated a percentage for each community within a given area.

In addition to the quadrat data any additional species noted during the field work were recorded.

As part of the field work notes were made to cover all aspects of the site that were considered important, including comments on management, habitat quality, and any issues arising from these. A photo was taken of each quadrat and is attached to the quadrat data in the appendix of this report.

For the NVC notations on the Shingle sections of the site the 'Seddon' system of communities was chosen over the standard NVC codes, as these were considered to be uninformative and misleading to the actual communities present on the SSSI.

The field survey was taken over 24 days from 27th June to 11th September 2013

4. Data analysis methods

The vegetation data for each quadrat was assessed with reference to Rodwell (2000) to produce an NVC code for the habitat within which the quadrat was situated. In addition, the data was run through the programme MAVIS programme to validate the choice of community. A final assessment was made by the field surveyor once all the information was presented.

Once all the relevant information had been gathered the hand drawn maps were entered onto the ArcGIS 10.2, and areas covered by each community were worked out accordingly. Digitising of polygons were undertaken at 1:800 and overall maps were produced at 1:5000, as per the tender document.

The vegetation maps of the Alde-Ore Estuary SSSI are shown in Figures 1-23—Appendix A

The quadrat location maps of the Alde-Ore complex SSSI survey are shown in Figures 1-23—Appendix B

Direct assessment with the SWT 1993 report has proved very difficult without more data and the associated mapping from that report. However, where possible comparisons have been made and these are detailed in the following sections.

5. Description of the vegetation communities on the Alde-Ore Estuary complex SSSI

66 communities and sub-communities were identified and mapped along the Alde-Ore Estuary complex SSSI .

A wide range of zonation was present with the estuary, though the upper saltmarsh communities were becoming less frequent as they were being 'pushed' into the woodlands and scrub at the rear of the sites in many places and being dominated with low and pioneer communities lower down the saltmarsh.

5.1 Saltmarsh communities

The Alde-Ore Estuary complex SSSI is dominated with saltmarsh running the length of the site, covering 278.34 hectares of the vegetated area of the 20 units surveyed. This excluded any area of saltmarsh in units 11 and 25 that were on Orfordness and Havergate Island. 25 communities and sub-communities of saltmarsh were found during this survey. Saltmarsh was also found outside the SSSI boundary to the west of unit 31 and within unit 38.

SM4 *Spartina maritima* saltmarsh community

There were no large pure stands of *Spartina maritima* found along the length of the SSSI. There were only small stands found within the more extensive and dominant SM13 community. *Spartina maritima* was only found at low density in units 10, 11, 25, 28, 29, 30, 31 and 43. It was never recorded at a high density and, in the main, was recorded as scattered plants across larger areas. The stands were normally on the mid-high saltmarshes as opposed to that occupied by *Spartina anglica* (pioneer and low-mid) and they were often in a matrix with the SM13c community and surrounding small open pools within the saltmarshes.

In some of the lower saltmarsh communities there were small areas of SM4 within the SM10 community as shown in photo 1, seen here in unit 29.

This community was not extensive and dense enough to warrant it being mapped as a stand alone community. Therefore, **1.94** hectares was recorded though the SM13f community. It was always a sparse species within any area of the SSSI.

Photo 1—Unit 29

SM6 *Spartina anglica* saltmarsh community

Pure stands of this community dominated large tracts of the upper Alde estuary. SM6 dominated the pioneer sections of the saltmarshes. In the lower sections of the estuaries SM6 was limited to narrow sections of the edges of the marshes and to the edges of the pools within the saltmarshes themselves. *Spartina anglica* was found in every unit.


Photo 2 of unit 6

This community was spreading throughout its range in these estuaries and was out-competing all other species of the pioneer and lower saltmarshes. It was a dominant component within the SM11 and SM13 communities of units 6, 8, 9, 10, 11, 24, 28, 42, and 43. Within these units the *Aster tripolium* SM11 community appeared to be migrating inland and reducing in density (see photo 3 of unit 10). The SM6 was also spreading into the soft muds along the estuary shores.

Within the areas that were formerly bare mud (units 1—8 (photo 2 of unit 6) *Spartina anglica* formed large species pure stands along the shore (as seen from Google Earth images from 2002 compared to current aerial photos 2011).

Around the saltmarsh pools within the saltmarshes, *Spartina anglica* was often found encroaching onto the bare muds (see photo 4) therefore, reducing the area of SM8 across the SSSI.


Photo 3 of unit 10

At the rear of the saltmarshes, near to the sea wall, there was often a slight lowering in the height of the saltmarshes—units 11, 10 and 8. The increase of water flow at high tide was creating a scouring effect against the steeply sloping sea wall. Along the base of the wall there were many areas where SM6 was increasing in abundance and density.


Photo 4 of unit 31

There also appears to be an increase of *Spartina anglica* throughout the lower and mid saltmarsh communities throughout the SSSI. This community appears to be rapidly spreading across the saltmarshes often to the detriment of mid-level communities in particular SM13a and SM14a (see photo 4 of unit 10).

Across the SSSI there was a total of 29.46 hectare of the SM6 community in 2013. In 1993 there was 3.66 hectares. This is an 8 fold increase.

SM7 *Sarcocornia perennis* stands

There were no large stands of this community anywhere in the estuary though it was found in small areas often less than 1m² in Units 10, 11, 24, 25, 28, 29 and 30 (see photo 5). The SM7 was nearly always within the open bare muds at the margins of pools within the mid saltmarshes.

It was often found with other species of *Salicornia* nearby.

SM7 was found in such small areas often only 1m², within the saltmarshes that a total area possible to prepare, it was a rare community within the estuary.

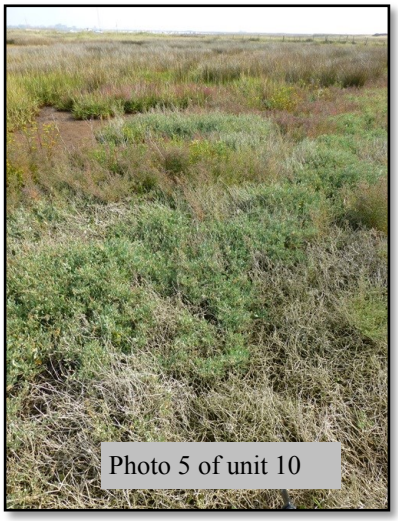


Photo 5 of unit 10

SM8 Annual *Salicornia* saltmarsh community

This community was scattered throughout the SSSI with numerous large stands, though more often it was present in small areas of only a few square metres.

SM8 was also found throughout the SSSI with large mats forming in unit 29 (see photo 6).

There was a range of *Salicornia* species within this community though often they were formed distinct stands of each species according to the substrate they were growing in, with *Salicornia dolichostachya* more frequent in the lower saltmarsh and *Salicornia ramosissima* and *S. europaea* in the mud pans on the saltmarshes.

SM8 covered an area of 4.31 hectares in this survey.

Photo 6 of unit 29

SM9 *Suaeda maritima* saltmarsh community

This community was scattered across the estuary with a few large pure stands, it was mostly at the rear of the saltmarshes near to the sea walls— units 6, 9, 10 (see photo 7) and 25.

In unit 9, it formed a long continuous strip of habitat at the base of the sea wall. Here the SM11 community reached the sea wall too, showing the lower elevation of the saltmarsh in this area. The hard sea wall possibly aggravating increased erosion on this shore.

Suaeda maritima was a common component across the mid to lower saltmarshes but infrequently reached the dominance required for this community.

SM9 covered an area of 0.12 hectares of Alde Ore SSSI area surveyed.

Photo 7 of unit 10

SM10 Transitional low-marsh vegetation with *Puccinellia maritima*, annual *Salicornia* species and *Suaeda maritima*

This community was frequent across the Alde-Ore Estuary complex SSSI, it was found in large stands and always as a transition between other communities.

This community formed especially where there had been considerable trampling and damage caused by cattle and horse grazing of the saltmarshes, especially at the area nearest to the sea walls.

At Blackheath it was present where foot passage across the shore to put boats in the water had created a slightly disturbed habitat, here this community was well represented (see photo 8).

The SM10 community had an area of 7.07 hectares in this survey.

Photo 8 of unit 6

SM11 *Aster tripolium var. discoidea* saltmarsh community

This was a frequent community across the upper Alde, upper Ore and upper Butley Creek sections of the estuary.

This community often formed large nearly pure stands along units 6, 8, 11 and 42 and 43. Although *var. discoidea* was the most frequent form in this community there were always some rayed forms also recorded (see photo 9).

This community was apparently being squeezed out all the sections of the SSSI by SM6.

Across the estuary there was a total of 9.54 hectares. It appeared that the SM6 *Spartina anglica* community was dominating former SM11 zones across the estuary.

Photo 9 of unit 6

SM12 Rayed *Aster tripolium* saltmarsh community

This was a rare community across the upper Alde and upper Ore estuaries.

It was very sporadic in unit 6 and was abundant outside the SSSI boundary of unit 10 near to Hazelwood Marshes SWT reserve. Here there had been some recent works carried out at the fold of the sea wall. This community formed a major component of the flora in this area. It formed a very important nectar source to insects, in this section of this community over ten Clouded Yellow butterflies were noted.

Across the estuary there were no areas large enough to warrant mapping.

Photo 10 of unit 6

SM13a *Puccinellia maritima* saltmarsh community, *Puccinellia maritima* sub-community

SM13a was a species poor sub-community found across many of the units in the estuary. SM13a, along with many of the other saltmarsh communities, creates a transitional matrix for other communities to develop from and to. It is often developed from SM10 where the *Puccinellia maritima* becomes more prevalent as the land is less frequently inundated (see photo 11).

There are large stands within many of the units where it is found, mostly along the lower areas of the saltmarshes often where there has been great disturbance mostly by cattle, horses and sheep.

There was 27.84 hectares of this community across the SSSI

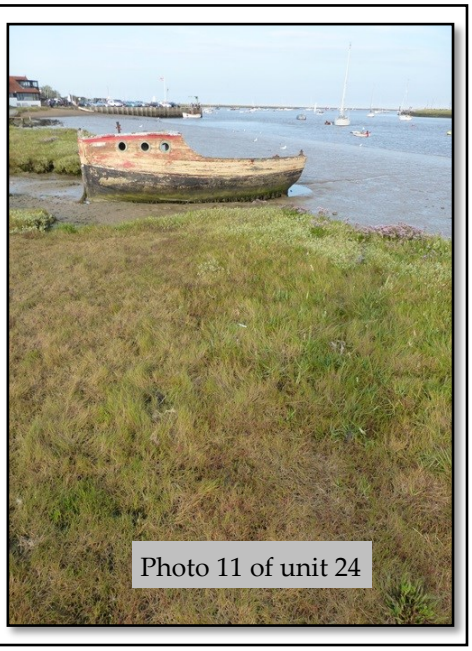


Photo 11 of unit 24

SM13b *Puccinellia maritima* saltmarsh community, *Glaux maritima* sub-community

This community was found sparingly across the upper saltmarsh in units 31 (see photo 12), 43, 42 and 44 and in unit 4.

It often only formed small stands at the rear of the saltmarshes, often at the upper reaches of the saltmarshes.

This community often formed the lower elevation limit for the mollusc *Vertigo angustior* within the upper Alde and in Butley Creek.

There was a small area of this community with 0.45 hectares being found across the SSSI.

Photo 12 of unit 31

SM13c *Puccinellia maritima* saltmarsh community, *Limonium vulgare-Armeria maritima* sub-community

SM13c was frequently found across much of the lower estuary often forming large expanses of habitat from Units 4, 10, 11 (see photo 13 of unit 11), 24, 25, 28, 31, 32 and 43 It was found in the more stable muds with a firmer substrate.

This attractive saltmarsh community often forms large lawns in the mid–upper saltmarshes where there was, most likely, grazing by wildfowl around Sudbourne (White-fronted geese) and Boyton (grent Geese and Eurasian wigeon). Light sheep grazing in unit 28 is also maintaining this lawn. SM13c was most noticeably present in association with the larger more expansive areas of the saltmarsh in the lower estuary. Below unit 10.

Discussion continued over page..

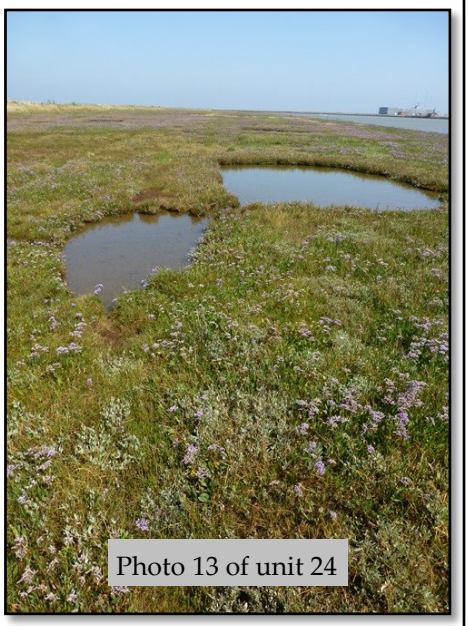


Photo 13 of unit 24

SM13c *Puccinellia maritima* saltmarsh community, *Limonium vulgare-Armeria maritima* sub-community—continued

SM13c formed extensive areas of some of these lower estuary units whereas at the upper reaches of the estuary it was often only in a small narrow strip or small patches of this community. In these upper areas of the estuary this habitat was being squeezed into the SM15 and SM16 communities at the rear of the saltmarsh.

Grazing by livestock in unit 29 may help maintain this tight lawn community, though it also appears that over stocking on some of these marshes of units 25 and 11 creates a greater disturbance of the saltmarsh muds allowing SM10 and SM13a to become more dominant or to take over from the SM13c.

Across the SSSI 29.84 hectares of SM13c were recorded and mapped.

It appeared that the SM13a community was spreading into the SM13c as the site becomes wetter with more frequent inundations.

SM13f *Puccinellia maritima* saltmarsh community, *Puccinellia maritima-Spartina maritima* sub-community

There were several small areas of this sub-community scattered around the lower—mid estuary. This sub-community was often only in small stands with a limited number of *S. maritima* plants across a more dominant *Puccinellia maritima* community.

From Aldeburgh to Boyton (Units 10—30) this community was present though always in very small stands (Photo 14).

Only 1.94 hectares of this community was located during this survey.

The larger area of this community in comparison to the lack of any SM4 may be due to a decrease in density of the *Spartina maritima* across the SSSI. The transition from SM4 to SM13f is subtle. Therefore, these results should not necessarily be taken as evidence for a reduction in *S. maritima* abundance.


Photo 14 of unit 19

SM14a *Halimione portulacoides* saltmarsh community, *Halimione portulacoides* sub-community

SM14a formed almost pure stands of *Atriplex portulacoides* at the edges of many of the larger creeks within the estuary and within lower areas of land behind the shingle ridges of units 30 and 31(Photo 15) .

It formed large stands within the saltmarshes, with narrow strips forming at the base of the sea wall where the saltmarsh was lower due to scouring and the creeks are becoming wider as their edges were being eroded. This created a lower margin enabling the *Atriplex portulacoides* to dominate.

Much of the SM14a was found spreading into the saltmarshes from the margins of the creek edges.

SM14a was found in 16.94 hectares of the saltmarsh surveyed


Photo 15 of unit 17

SM14b *Halimione portulacoides* saltmarsh community, *Juncus maritimus* sub-community

This community occurred in several units across the SSSI, with large patches in units 5, 6, 10, 28, 29 and 43. It was always associated with the higher saltmarshes.

The SM14b sub-community covered an area of 9.67 hectares across the SSSI.

In the 1993 survey there was only 3.46 hectares of this community therefore SM14b has tripled it's area in the past 20 years. This community is spreading into large areas of previously SM13c vegetation throughout the estuary system.

Photo 16 of unit 10

SM14c *Halimione portulacoides* saltmarsh community, *Puccinellia maritima* sub-community

This was a frequent community across the SSSI. With noticeably large areas recorded in units 9 and 10 (photo 17).

SM14c was found in the lower sections of the saltmarshes often surrounding areas of SM13c . In many places there was a considerable amount of *Spartina anglica* entering the community, indicating a change in water levels.

SM14c covered an area of 22.78 hectares of the SSSI in 2013 compared to 3.66 hectares covered in 1993. A six fold increase over 20 years. This mirrors the decrease in SM13a over the same time.

Photo 17 of unit 25

SM15 *Juncus maritimus-Triglochin maritima* saltmarsh community

There were several large areas of SM15 found in several units, 2, 3, 4, 5, 6, 8, 9, 10, 28, 29, 33 and 43 (see photo 18), with the most extensive stands within unit 43.

Where this community occurred it formed large almost pure stands of *Juncus maritimus* with very few other species in association.

It was always in the higher saltmarsh, before the SM24 *Elytrigia atherica* community became more dominant.

This community covered a total of 11.14 hectares, in 1993 there was only 2.40 hectares. This community has increased its distribution five fold in the 20 years.

Photo 18 of unit 43

SM16a *Festuca rubra* saltmarsh community, *Puccinellia maritima* sub-community

This community was mainly found in a narrow strip in unit 10, 11, 24 and 43. It was most frequently found at the outer saltmarsh edge near to the main river channel. Here the wave action at high tide had created a small berm of higher saltmarsh where this community could become established (see photo 19 also showing noticeable cliffing to the mudflats).

This community covered 7.05 hectares of the SSSI, with 13.92 hectares found in 1993. Erosion on the face of the river bank may have contributed directly to the loss of this community.

Photo 19 of unit 10

SM16b *Festuca rubra* saltmarsh community, *Juncus gerardii* sub-community

The *Juncus gerardii* sub-community was found in almost pure stands along the length of the estuary.

Juncus gerardii was often the dominant species through large areas of the saltmarshes as well as the typically small stands at the drift line. The *Juncus gerardii* was often lying flat to the saltmarsh due to recent large tides preceding the survey which had flattened the weakened stems (see photo 20).

There were few other species associated with the community, sometimes *Glaux maritima* was evident once the vegetation had been flattened.

This community covered 12.98 hectares across the saltmarshes.

Photo 20 of unit 44

SM17 *Artemisia maritima* saltmarsh community

Artemisia maritima was found along long lengths of upper saltmarsh along the entire length of the estuary. It was most frequent along the sea walls above the high tide line. It rarely developed into pure stands and was usually incorporated in with SM24 and SM14a communities (see photo 21).

This community was found along much of the lower estuary with an area of 0.06 hectares recorded.

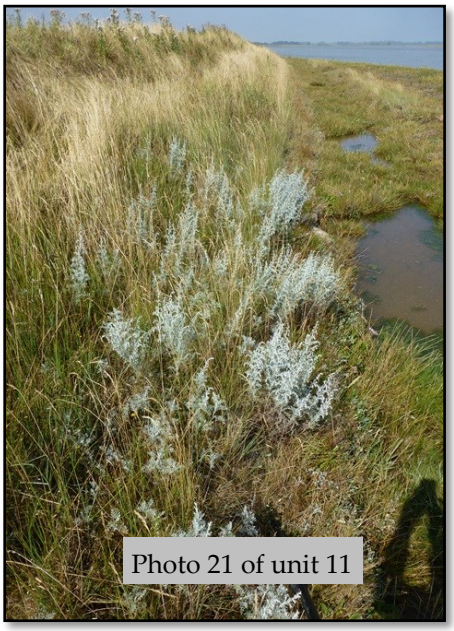


Photo 21 of unit 11

SM16c *Festuca rubra* saltmarsh community, *Festuca rubra—Glaux maritima* sub-community

This community was mainly found in a narrow strip in unit 21, along the edge of the small sandy headland around the concrete tank defences and along the edges of the outer saltmarsh along the edge of the river. Here the land was slightly higher than the surrounding saltmarshes due to the small levee created by wave action raising this edge enough to create ideal conditions for this sub-community (see photo 22).

This community covered 2.07 hectares during this survey, with 0.37 found in 1993.

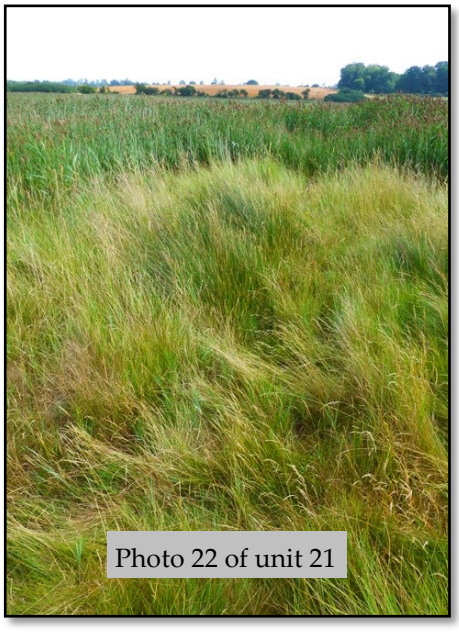


Photo 22 of unit 21

SM16d *Festuca rubra* saltmarsh community, *Festuca rubra* sub-community

This sub-community was found rarely in the estuary with only a narrow margin in unit 28. Here it formed on the outer edge of the saltmarsh along the edge of the river channel.

This community covered 0.02 hectares across the saltmarshes.

Photo 23 of unit 28

SM23 *Spergularia marina—Puccinellia distans* saltmarsh community

This community was limited to a few small stands often behind the sea walls where there had been vehicle movement disturbing the muds at the fold of the sea wall (see photo 24).

There were also areas of this community in the lower estuary of the Alde and around the Shingle Street lagoons of unit 33.

This community covered 0.42 hectares across the lagoons.

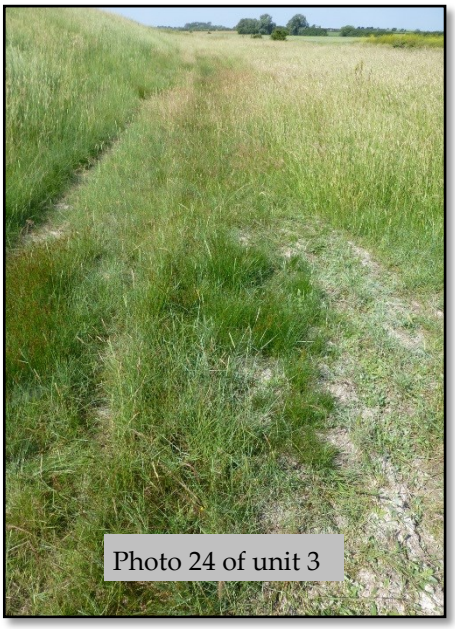


Photo 24 of unit 3

SM24 *Elymus pycnanthus* saltmarsh community


Photo 25 of unit 10

This was a common community all along the estuary and it was particularly dominant along the sea walls, which were mostly outside the SSSI boundary.

Here it formed expansive pure stands along many miles of the wall. Within the saltmarshes themselves there were often smaller stands along any slightly higher ground above the upper saltmarsh communities. This drift line community often formed a gentle transition zone at the top of the saltmarshes. These transitional zones are much less rare in the Alde-Ore Estuary complex SSSI than in the Deben Estuary SSSI. Within units 1, 2, 3, 4, 10, 43 and 44 there are areas of transitional zones with abundant SM24.

This was an important transitional community which holds a wide range of rare invertebrates within the estuary, particularly the mollusc *Vertigo angustior* and the newly discovered population of Grey bush-cricket *Platycleis albopunctata* (Snape and Iken).

Repairs and maintenance of the sea walls have been carried out by the Environment Agency. Post-maintenance or in light of significant damage post heavy grazing (see photo 26) SM24 is an important community to get to re-establish along those sections. This is because of its importance for invertebrates and its role in protecting the sea wall integrity during high tide and potential flood events.

This community was found covering 21.46 hectares of the SSSI during this survey

There was an apparent doubling of this community across the SSSI from the 1993 survey, but, this may be down to an increase in the community or more accurate mapping within the SSSI boundaries.


Photo 26 of unit 24


Photo 27 of unit 44

This community also shows the upper limit of the saline incursion within an estuary system. This is shown below with photo 27 from unit 44. Here the *Sonchus arvensis* is obvious in the foreground. This species indicates this upper limit of saline influence as it does not tolerate heavily saline conditions. Below this all *Vertigo angustior* disappear. Also it was a frequent component in the SM24 in units 43 and 44 , as was *Oenanthe lachenalii* which was often very common here.

SM25b *Suaeda vera* driftline community, *Halimione* portulacoides sub-community

This community was very rare within the SSSI and was found along the transitional saltmarshes in unit 31 and 25, with additional populations outside this survey area in unit 26 on Orfordness. It was growing above the high tide frass line on the stable shingle (see photo 28).

There were also scattered plants in the lower estuary in units 19 and 21.

The SM25b covered such a small area of this survey area that an area was not specifically recorded. Though *Suaeda vera* was found in unit 25 and 31, the number of plants was limited, their position is shown in the maps of Appendix B.

Photo 28 of unit 30

SM26b *Inula crithmoides* stands, *Elymus pycnanthus* sub-community

This community was very rare within the SSSI and was found mostly as the occasional plant of *Inula crithmoides* present. There were never any more than three or four plants within an area and this species was only noted three times in these estuary complexes (see photo 29).

This community was also noted on Orfordness though still limited to the occasional plant along the drift line section of the saltmarsh.

The SM26b covered such a small area of this survey area that an area of vegetation was not specifically recorded. Though *Inula crithmoides* was found in unit 28, 31 and 32, the number of plants was limited, their position is shown in the maps of Appendix B.

Photo 29 of unit 28

SM28 *Elymus repens* saltmarsh community

This community was rare within the SSSI and was only found in scattered patches in unit 32 and 43. It was growing above the SM24 drift line in the areas of gentle transitional zones (see photo 30).

The SM28 covered such a small area of this survey area that an area was not specifically recorded.

Photo 30 of unit 3

5.2 Shingle vegetation communities—the community descriptions follow

SH1 *Arrhenatherum elatius—Silene uniflora—Rumex crispus* subsp. *littoreus*.

This community was found scattered across much of the main beach section at Shingle Street and the shingle of Unit 32 and 33.

This community was abundant in the maturing shingle behind the pioneer community at the front of the beach. There were frequent *Crambe maritima* in this community though they became less frequent towards the rear of the shingle.

This community was found covering 5.25 hectares of the SSSI during this survey.

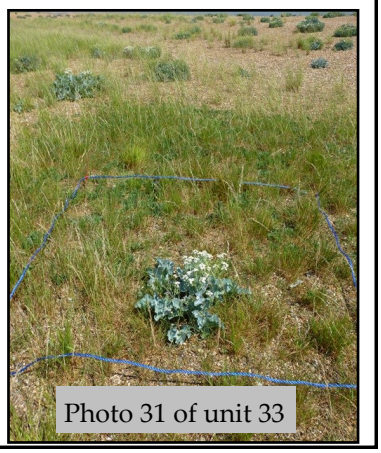


Photo 31 of unit 33

SH2a *Geranium robertianum subsp. maritimus—Arrhenatherum elatius* open grasslands.

This community was recorded at the seaward front of the shingle beach, often only in small stands of a few metres. It was scattered through units 33, 32 and 31.

Immediately inland, this was replaced by SH11 *Lathyrus japonicus* pioneer community. Each quadrat of this community still contained much bare shingle but prominent associates included *Glaucum flavum*, *Rumex crispus*, *Arrhenatherum elatius, Cirsium arvense, Sonchus asper, Crepis vesicaria,* and *Silene uniflora. Vicia lutea.*

This community was found covering 0.48 hectares of the SSSI during this survey.

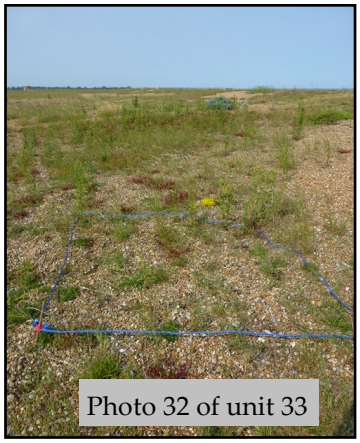


Photo 32 of unit 33

SH6 *Silene uniflora—Crambe maritima* pioneer community.

This community was found scattered across much of the main beach section at Shingle Street and the shingle of units 32 and 33.

It formed the dominant community in this section of the shingle communities and was particularly frequent at the shoreline of the beach.

This community was found covering 7.93 hectares of the SSSI during this survey.


Photo 33 of unit 33

SH11 *Lathyrus japonicus* pioneer community, *Silene uniflora* sub-community

This community developed behind the SH6 pioneer community and was mostly found away from the shoreline in unit 33. It was more frequent in the more stable shingle. In unit 33 it appeared to be at the shore line, this was due to recent erosion of the older shoreline in the winter of 2012/13.

This community was found covering 3.68 hectares of the SSSI during this survey


Photo 34 of unit 33

SH34 *Festuca rubra—Armeria maritima—Plantago maritima* grasslands

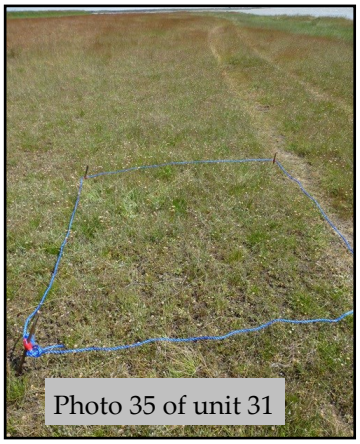


Photo 35 of unit 31

This community was well scattered across units 32 and 31. It was within this community that *Limonium binervosum* was mainly recorded (see photo 35). It formed a distinctive band of vegetation where there was a high silt/clay component within the matrix. A *Festuca rubra* grassland had developed with *Armeria maritima* and *Plantago* spp. as minor constants of SH34. This was a relatively species-poor assemblage as a result of the dominance of *Festuca rubra*, but it may also include halophytes such as *Atriplex portulacoides*, *Seriphidium maritimum*, *Beta maritima* and *Limonium vulgare*. This shingle -salt marsh transitional habitat is rare in Britain but was particularly well illustrated in units 31, 32 and 33.
This community was found covering 3.22 hectares.

SH36 *Elytrigia atherica—Festuca rubra* grassland


Photo 36 of unit 31

This community was recorded above the SH34 community where the land was drier. There was still silt within the soils though less so than in SH34 vegetated areas.

On the slopes of the shingle ridge within the saltmarsh of unit 31 more silt was present in the shingle matrix and an *Elytrigia atherica – Festuca rubra* SH36 community was present. *Armeria maritima* is frequent in this community.

This community merges down-slope into SM16 *Festuca rubra* saltmarsh.
SH36 vegetation community was found covering 6.67 hectares of the SSSI.

SH38 *Silene uniflora—Hypnum cuppressiforme—Arrhenatherum elatius—Rumex acetosella* grasslands

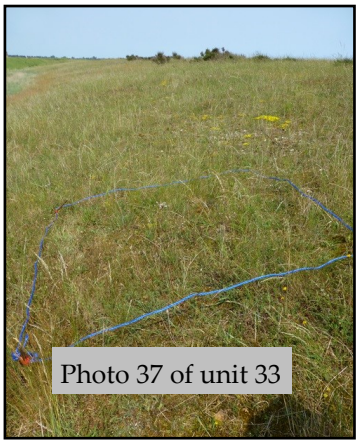


Photo 37 of unit 33

Much of the southern section of unit 33 held a series of vegetated shingle ridges comprising *Silene uniflora – Hypnum cupressiforme* assemblage with *Arrhenatherum elatius* and *Rumex acetosella* as less abundant constants.

This was a diverse community, and supported a large population of *Vicia lutea*. There was a major lichen element among the associates including *Cladonia arbuscula, C. cervicornis, C. coniocraea, C.furcata, C. ciliata* agg. and *C. tenuis.* Other key associates included *Festuca rubra, Hypochoeris radicata*, the moss *Brachythecium albicans, Cerastium* spp. and *Sedum anglicum* was often extensive through this community. **This community was found covering 3.94 hectares.**

SH39 *Silene uniflora—Arrhenatherum elatius* moss and lichen-rich community

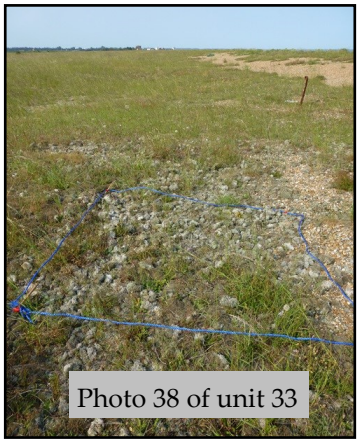


Photo 38 of unit 33

This moss and lichen-rich community with dominated by *Arrhenatherum elatius* and *Silene uniflora,* with *Rumex acetosella, Cladonia impexa, Dicranum scoparium, Hypnum cupressiforme* and *Cladonia furcata* as the most frequent associates. *Festuca rubra* and *Hypogymnia physodes* were the minor associates although the *Festuca rubra* becomes locally important in places within this assemblage which was generally species-poor, having an average of only six species per quadrat.

This mature shingle community was found mainly in the southern sections of unit 33, occasionally in unit 32 and formed a main component of the shingle ridge of the island off unit 31.

This community was found covering 5.29 hectares

SH40 *Arrhenatherum elatius—Festuca rubra—Silene uniflora—Hypochaeris radicata* grasslands


Photo 39 of unit 33

In the most stable areas of unit 33 up to the sea-wall, more mature *Festuca rubra* grassland occurred. Here, the matrix contained some sand and a more diverse grassland results SH40. There was a major bryophyte and lichen component and there were common annual grasses and a wide range of clovers and vetches were also locally important within this community.

Where this community was heavily trampled it supported scarce species including, *Trifolium suffocatum, T.subterraneum* and *Poa bulbosa* (TM3717043561)

This community was found covering 1.71 hectares

SH41 *Arrhenatherum elatius—Festuca rubra—Plantago lanceolata—Silene uniflora* grasslands

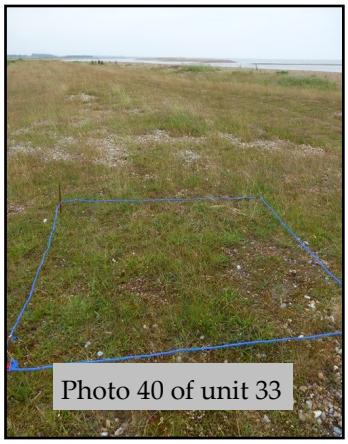


Photo 40 of unit 33

Unit 32 and 33 held extensive *Festuca rubra* grasslands. The most maritime of these SH41, was located immediately behind the storm ridge in the north of the Shingle Street hamlet. It may have resulted from older, inland grassland being re-exposed to marine influences by erosion. It also had some bare shingle but was characterised by the constant presence of *Festuca rubra*, *Arrhenatherum elatius, Silene uniflora*, and *Lathyrus japonicus*. Frequent associates in this assemblage included *Plantago lanceolata, Aira praecox*, *Rumex crispus*, *Cerastium* spp.,and *Vicia* spp., Despite the maritime influences, this was a stable grassland and contained small quantities of bryophytes.

Recent tidal surges had over-washed this area of Shingle Street causing considerable erosion of the light soils of this community in unit 32..

This community was found covering 7.36 hectares

SH109 *Ulex europaeus—Rubus fruticosa—Agrostis capillaris* scrub community

Small linear areas of SH109 *Ulex europaeus – Rubus fruticosus – Agrostis capillaris* scrub occured along the shingle ridge on the island of unit 31.

Few other species are present.

This community was found to cover 0.5 hectares .

SH119 *Rubus fruticosus – Arrhenatherum elatius* scrub

Small patches of SH119 *Rubus fruticosus – Arrhenatherum elatius* scrub occured on the shingle around Shingle Street in unit 33.

This community was found in only very small stands across units 31, 32 and 33 and the areas were not recorded.

5.3 Sand dune communities

These two communities were found in very small areas within the estuary.

SD 2 *Honkenya peploides-Cakile maritima* strandline community

This community was only found in one small section of unit 31. It was within the larger area of SH11 and covered an area of only a few metres of the shingle high tide line.

This community was found in only very small stands of unit 31.

Photo 41 of unit 31

SD10a *Carex arenaria* dune community, *Festuca rubra* sub-community

This community was located in units 6 and 32 and was localised in each case.

In unit 6 it formed behind the SM24 community along the slope of Blackheath, where it formed a important part of the lower slopes of the grass heathland. In unit 32 it formed a narrow strip of vegetation on the mature shingle ridge above the *Carex extensa* communities.

Carex arenaria and *Festuca rubra* were common within this site (see photo 42).

This community covered an area of 0.01 hectares only.

Photo 42 of unit 32

5.4 Swamp communities

These communities were limited to small stands across the SSSI, often they were in a state of being over-run by *Phragmites australis*. The swamp communities covered an area of 61.96 hectares.

S6 *Carex riparia* swamp

This community was limited to areas of the upper estuary where there was some limited fresh water input. It was found in unit 44 (see photo 25); on the north and south sides of Butley Creek and only in very small stands at the edges of the S4d swamp.

It was in this community on the south side of unit 44 (photo 43) that a small population of the mollusc *Vertigo moulinsiana* was found. It was later detected across this western section of unit 44 though always at a very low density.

S6 covered only a few small stands at the edges of unit 44 and specific areas were not mapped. Quadrat data shows all S6 community locations found during the field work.

Photo 43 of unit 44

S4a *Phragmites australis* swamp and reedbeds, *Phragmites australis* sub-community

Areas of *Phragmites australis* were common across unit 1 (see photo 44) where it was the dominant community in the area of marsh running to the south. This sub-community was limited in comparison to S4d which was an abundant community across the upper estuaries.

S4a covered only a few small stands at the edges of unit 1 and specific areas were not mapped. Quadrat data shows all locations found during the field work.

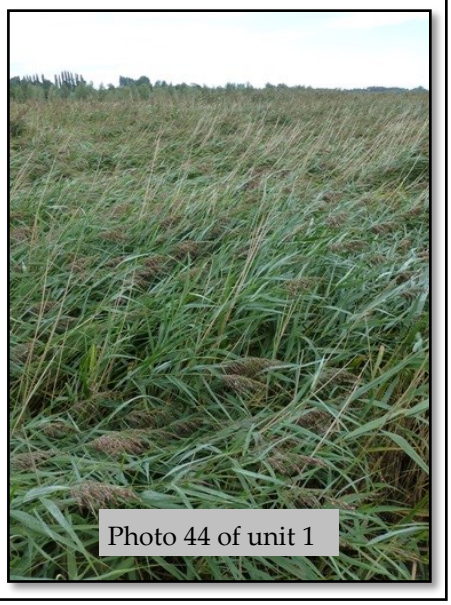


Photo 44 of unit 1

S4b *Phragmites australis* swamp and reedbeds, *Galium palustre* sub-community

This sub-community was limited to a small section of land at the western end of unit 44. Here this community was spreading into the areas of M22. and becoming more dominant than the rarer M22 community.

There was no management in this unit which was allowing this sub-community to invade the more botanically rich M22 community.

S4b covered only a few small stands at the edges of unit 44 and specific areas were not mapped. Quadrat data shows all locations found during the field work.

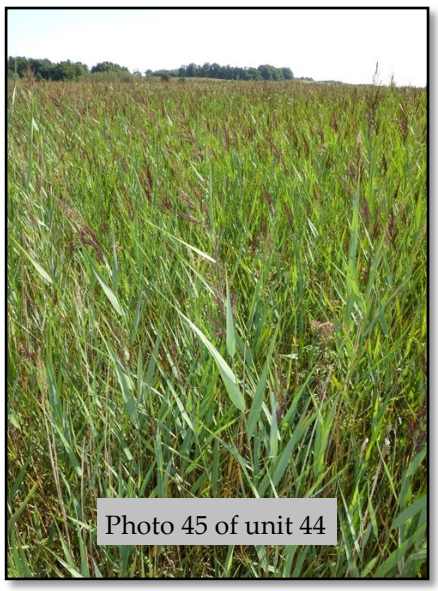


Photo 45 of unit 44

S4d *Phragmites australis* swamp and reed-beds, *Atriplex prostrata* sub-community

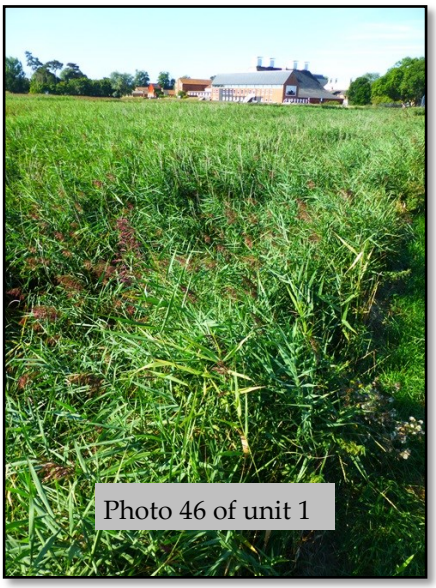


Photo 46 of unit 1

Areas of *Phragmites australis* were common across the upper sections of the estuaries. In particular in units 1, 2, 3, 5, 43 and 44 (see photo 46), where it was often the dominant community. It was obviously spreading into new areas across all these units. In all of these units it was mainly displacing the saltmarsh and mire communities at a rapid rate.

There was a total cover of 60.05 hectares across the SSSI.

In many areas this sub-community was spreading through the SM13 communities which were also being encroached upon by *Spartina anglica* spreading in from the lower saltmarsh.

Therefore, the invasive nature of *P.australis* was having a dramatic effect on the nearby saltmarsh communities . All along the estuary where *Phragmites australis* was recorded, it was always noted to be expanding it's range into the saltmarshes.

S21a *Scirpus maritimus* swamp, *Scirpus maritimus* sub-community

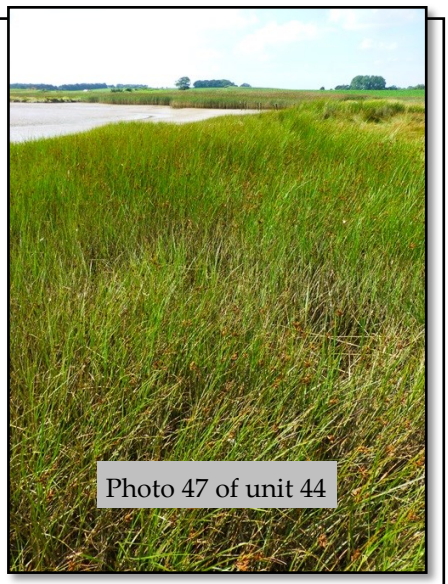


Photo 47 of unit 44

Bolboscheonus maritimus was scattered in numerous large stands all along the mid to upper sections of the SSSI in units 1, 2 and 44.

S21a mostly formed pure stand of *Bolboscheonus maritimus* vegetation where it occurred.

During this survey 0.8 hectares were located.

This community appeared to be expanding in the middle and upper sections of the estuary.

S21b *Scirpus maritimus* swamp, *Atriplex prostrata* sub-community


Photo 48 of unit 2

S21b was found in the looser muds of unit 1, elsewhere it formed stands at the upper saltmarsh edge. Especially in units 1, 6 and 44.

This species appears to be expanding in the upper sections of the estuary.

S21b covered only a very small area in the SSSI and specific areas were not mapped. Quadrat data shows all S21b community locations found during the field work.

S25a *Phragmites australis-Eupatorium cannabinum* tall-herb fen, *Phragmites australis* sub-community

This community was limited to areas of the upper Butley Creek section. Here this community was present within the M22a community and appeared to becoming more frequent. This section of Unit 44 had in the past been grazed or mown maintaining a lower more diverse sward. This is now not the case and the rare species here are becoming overwhelmed.

Lysimachia vulgaris was frequent through the less *Phragmites* dominated habitat.

S25a covered an area of 0.34 hectares across the SSSI.

Photo 49 of unit 44

S26b *Phragmites australis-Urtica dioica* tall-herb fen, *Arrhenatherum elatius* sub-community

Bolboscheonus maritimus was scattered in small stands all along the mid to upper sections of the SSSI.

S21b mostly formed pure stand of *Bolboscheonus maritimus* vegetation where it occurred.

S21b was found in the looser muds of unit 1, elsewhere it formed small stands at the upper saltmarsh edge.

During this survey 0.5 hectares were located; in 1993 0.16 hectares were found.

This species appeared to be expanding in the middle and upper sections of the estuary.

Photo 50 of unit 44

5.5 Grassland communities

MG1a *Arrhenatherum elatius* grassland, *Festuca rubra* sub-community

This community occurred along several sections of the upper grassland communities above the SM24 *Elytrigia atherica* community (see photo 51).

There was a total of 0.43 hectares of this community found across the SSSI during this survey in 2013.

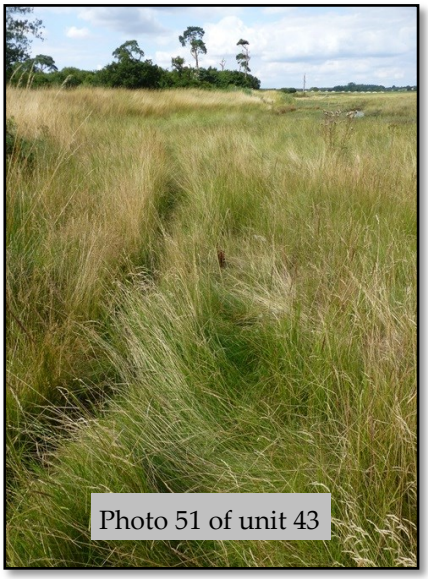


Photo 51 of unit 43

MG11 *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland

There were several areas of this community in the Alde-Ore SSSI, however, they were always small in extent. It forms very small stands in the upper levels of the saltmarsh in unit 3.and 42 . More specifically where rabbits have grazed and where there is a slight fresh water input from nearby.

This community supported the mollusc *Vertigo angustior.*

Associated species within this were *Lotus tenuis* and *Oenanthe lachenalii,* which were often abundant here.

In unit 42 there was a long band of this community only one metre wide running over a kilometre length of the drift line in Butley Creek.

There was 0.59 hectares of MG11 found during this survey in 2013

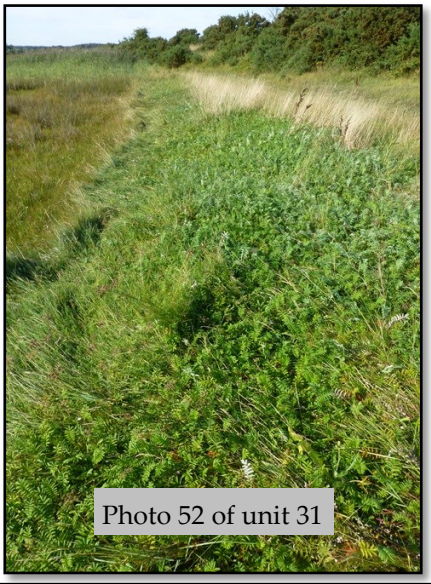


Photo 52 of unit 31

MG6c *Lolium perenne-Cynosurus cristatus* grassland, *Trisetum flavescens* sub-community

A small area of this community was present in a narrow transitional zone above the SM24 on the south side of unit 25 only. This section of heavily grazed, clay grassland held a narrow strip of this community within the SSSI boundary. Though this extended towards the borrow dyke to the rear of the sea wall.

As MG6c covered only a very small area, it was not mapped . However, the quadrat data shows where it was recorded.

Photo 53 of unit 25

5.6 Acid grassland communities

U1 *Festuca ovina-Agrostis capillaris-Rumex acetosella* grassland community

This community was scattered in a few units: 33, 32, 31, 42 and 6. It was only present in the SSSI as a minor component, with this community only edging into the SSSI boundary, with much more of this habitat extending in to the nearby rising land e.g. Butley on both sides of the estuary.

This community covered an area of 5.99 hectares.

Photo 54 of unit

U20 *Pteridium aquilinum-Galium saxatile* community, species-poor sub-community

This was only found in the higher land on the north side of unit 44, this community was behind the W10 woodland and was fenced from the field beyond.

This community covered an area 1.34 of hectares.

5.7 Mire communities

M22a *Juncus subnodulosus-Cirsium palustre* fen-meadow, typical sub-community

A small and rapidly decreasing area of this community occurred within the SSSI, with the only area of any extent in unit 44.

This community formed an extensive area in the gentle transitional zone at the rear of this unit. This section of the site used to be mown or grazed in the past, which has stopped. This was allowing *Phragmites australis* to become a frequent component and start to dominate and reduce the botanical diversity of this site.

Several rare and scarce plant species were found in this habitat including *Carex binervis, Anagallis tenella, Samolus valerandi* and *Molinia caerulea.* All indicating that this is a rich community in need of some management to maintain this rare transitional habitat. Importantly, this was the only natural zone of salt to fresh water marshes in the estuary system.

Photo 55 of unit 44

This community covered an area of 0.4 hectares.

M22a covered an area of 0.27 hectares which was located at the far west of unit 44.

5.8 Open vegetation communities

Very small areas of this community occur within the SSSI, with the only area of any significant extent in unit 1, 44 and 32.

OV10b *Poa annua — Senecio vulgaris* community, *Polygonum aviculare-Matricaria perforata* sub-community

This was only found scattered along the edges of the path in unit 2 and rarely elsewhere in the SSSI in similar habitat, unit 25

The area for this community was not measured as most of this was outside the SSSI boundary. Only a small slither was within the SSSI, at the edge of the footpath seen in photo 56.

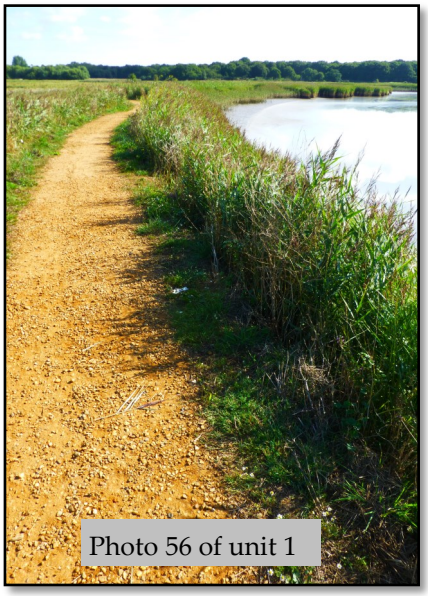


Photo 56 of unit 1

OV14 *Urtica urens-Lamium amplexicaule* community

This community was only located at the edge of the SSSI at Butley at the edge of and arable field.

OV19c *Poa annua-Matricaria perforata* community, *Atriplex prostrata-Chenopodium album* sub-community

This community was only found on a repaired section of sea wall at Butley in unit 44.

The area for this community was not measured as most of this was outside the SSSI boundary. Only a small slither was within the SSSI, at the base of the slope seen in photo 57.

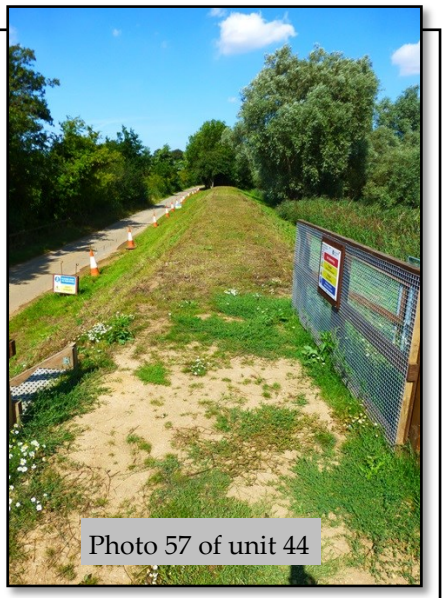


Photo 57 of unit 44

OV21c *Poa annua-Plantago major community, Polygonum aviculare-Ranunculus repens* sub-community

This community was rare within the SSSI, it was only found in unit 32 along the concrete track leading from the sea edge to the road in Shingle Street. Very little vegetation was found in the cracks of this habitat, though it supported several uncommon and rare species. Most noticeably *Poa bulbosa*, which was most commonly seen nearer to the sea on the track.

This community covered an area of 0.26 hectares.

Photo 58 of unit 32

5.9 Aquatic communities

A21 *Ranunculus baudotii* community

This community was dominated with *Ruppia maritima* in many of the saline lagoons of unit 32 and 33. Here it often formed an extensive sward throughout the water body.

In unit 33 there was a small population of *Ranunculus baudotii*, this was apparent once the water level had dropped later in the summer (photo 30).

This community was very important as it held the endangered *Nematosella vectensis* in large numbers within the leaves of *R. maritima.*

This community covered an area of 2.64 hectares.

Photo 59 of unit 33

Photo 59 of unit 33

5.10 Woodland communities

W6d *Alnus glutinosa-Urtica dioica* woodland, *Sambucus nigra* sub-community

This was limited to unit 44 on the northern side of the unit. Here it formed half of the woodland with a good flora typical of this habitat with *Carex remota* (see photo 29), *Caltha palustris, Lysimachia nemorum, Carex riparia* and *Samolus valerandi*.

Photo 29 of unit 44

W10 Quercus robur-Pteridium aquilinum-Rubus fruticosus woodland,

This was the dominant community on the high sandling soils behind the W6 woodlands.

This community covered an area of 5.65 hectares.

6.0 Analysis and discussion

6.1 Overview of main communities in the Alde-Ore Estuary complex SSSI

6.1.1 Pioneer communities

Across the entire SSSI the area covered by pioneer communities was 16% of the saltmarshes (47.34ha). The pioneer communities of SM6, SM7, SM8, SM9 and SM11 were found during this survey within the Alde-Ore Estuary complex SSSI.

SM6 *Spartina anglica* community was the most frequent along the length of the estuary and covered an area of 29.46ha. On the whole, *Spartina anglica* was most abundant on the outer soft muds at the edges of the often cliffed saltmarshes throughout the site.

Within the areas of soft muds that had been left after erosion of the creek edges, where a ledge was formed by erosion, *Salicornia dolichostachya* stands were found developing and creating extensive areas of several square metres. Particularly in sections of the mid estuary.

NVC community	Community name	Area (ha)
SM4	Spartina maritima	0
SM6	Spartina anglica saltmarsh	29.46
SM8	Annual Salicornia saltmarsh	4.30
SM11	Aster tripolium var. discoideus saltmarsh	9.53
SM12	Rayed Aster tripolium on saltmarsh	0
Total area		**43.29**

Table 1—pioneer community areas within the Alde-Ore Estuary SSSI, data collected in 2013.

6.1.2 Low-mid saltmarsh communities

30% of the saltmarsh of the SSSI was made up of low-mid saltmarsh communities (34.9ha).

SM10, SM11, SM13a and SM14 communities made up the low-mid surveyed saltmarsh. This set of communities formed very variable species groupings, this was due to the wide range of saltmarsh sections they were recorded inhabiting. Low-mid communities were recorded around the edges of the creeks, across the wide expanses of some of the saltmarshes and within the rear section of the saltmarshes. The saltmarsh at the base of the sea wall had often been lowered by erosion; therefore, the strip of lower saltmarsh was more frequently inundated than more seaward parts. This created a narrow strip close to the sea wall which was made up of low -mid vegetation types.

Atriplex portulacoides, Puccinellia maritima and *Aster tripolium* were the main species covering the majority this zone. These species were recorded in most quadrats of the four sub-communities associated with this zone and created a wide range of complicated mosaics.

NVC community	Community name	Area (ha)
SM10	Transitional low marsh vegetation with Puccinellia maritima, annual Salicornia sp. and Suaeda maritima	7.07
SM13a	Puccinellia maritima saltmarsh, Puccinellia maritima dominant sub-community	27.84
SM14	Halimione portulacoides saltmarsh	0.28
SM14a	Halimione portulacoides salt-marsh community, Halimione portulacoides sub-community	16.94
SM14b	Halimione portulacoides salt-marsh community, Juncus maritimus sub-community	9.60
SM14c	Halimione portulacoides salt-marsh community, Puccinellia maritima sub-community	22.78
Total area		**84.51**

Table 2—Low-mid community areas within the Alde-Ore Estuary SSSI, data collected in 2013.

6.1.3 Mid-upper saltmarsh communities

Mid-upper communities covered 24% (67.01 ha) of the total saltmarsh of the Alde-Ore SSSI. Within this zone the following communities were recorded: SM13b, SM13c, SM13f, SM15, SM16a, SM16b, SM16c, SM17 and SM26. These mid-upper saltmarsh communities were dominated with a range of grasses. *Puccinellia maritima* was by far the most abundant species throughout these communities and *Juncus maritimus* was frequent in sections of the upper saltmarsh.

Of the mid-upper saltmarsh communities the SM13c lawn was the most distinctive across the estuary. This community was also the one taking the greatest loss within the estuary.

NVC community	Community name	Area (ha)
SM13c	Puccinellia maritima saltmarsh, Limonium vulgare-Armeria maritima sub-community	29.84
SM13f	Puccinellia maritima - Spartina maritima sub-community	1.94
SM15	Juncus maritimus - Triglochin maritima saltmarsh	11.14
SM16a	Festuca rubra saltmarsh, Puccinellia maritima sub-community	7.04
SM16b	Festuca rubra saltmarsh, Juncus gerardii sub-community	12.98
SM16c	Festuca rubra saltmarsh, Festuca rubra - Glaux maritima sub-community	1.56
SM17	Artemisia maritima saltmarsh	0.05
SM26b	Inula crithmoides stands, Elymus pycnanthus sub-community	0.01
Total area		67.01

Table 3—Mid-upper community areas within the Alde-Ore Estuary SSSI, data collected in 2013

6.1.4 Drift-line saltmarsh communities

Across the SSSI the area covered by drift-line communities was 8% (21.19 ha) of the total saltmarsh area.

SM24 was the only drift-line community noted. It was most abundant along the sea wall and upper transition zones where there was no sea wall present.

SM24 is an important community for numerous rare species of invertebrate and some rare plants, most notably the mollusc *Vertigo angustior* and the plants *Bupleurum tenuissimum*. Both were found during this survey and the latter was frequently recorded in the middle sections of the estuary from Aldeburgh to Hollesley.

NVC community	Community name	Area (ha)
SM24	Elytrigia atherica saltmarsh	21.19
Total area		21.19

Table 4—Drift-line community areas within the Alde-Ore Estuary SSSI, data collected in 2013.

6.1.5 Shingle ridge communities

There was a large area of these communities with the SSSI, specifically within units 31, 32 and 33. This diverse, fragile and mobile habitat was well represented in these units. There was a wide range of communities –12– covering recently deposited shingle through to old, well vegetated shingle within each unit. The older shingle ridge communities (SH38, 39, 40 and 41) held the largest number of rare and scarce species across the SSSI.

During this survey there were 46.41 hectares of these communities recorded, which represented 13.18% of the survey area.

6.1.6 Swamp communities

There was a considerable amount of this community across the survey area. It was concentrated in two areas. The upper section of the Alde River and the upper end of Butley Creek.

In the upper Alde the swamp communities were located around Snape and Iken. Here there was a noticeable increase in these communities which was discovered through the use of historical Google Earth images and current aerial photos of the area. These images showed the S4d in particular spreading out into the mudflats and through the remaining saltmarshes. The impact of the increasing reedbeds was noticed all along the estuary edge. Particularly in unit 11, reed often appeared that wherever there was an area of reeds on the sea wall and it was spreading into to adjacent saltmarsh along the whole unit. The S21 *Bolboscheonus maritima* community too was spreading out into the mudflats and often joining up with the *SM6 Spartina anglica* community at the saltmarsh edge. The combination of all three communities will shortly overpower the saltmarshes in units 1 and 2.

Within the upper Butley Creek units (42,43,44) the swamp communities were also found to be encroaching on the saltmarsh communities in the same way. This was most noticeable in unit 44 where all of the small remaining areas of saltmarsh were being squeezed out by reedbed.

During this survey there were 61.96 hectares of swamp communities noted which represented 17.75% of the survey area.

6.2 Changes in saltmarsh communities

In 1993 an NVC survey was carried out by the Suffolk Wildlife Trust (SWT), in the report the areas of each community were calculate. (Unfortunately, Abrehart Ecology was not supplied with maps from the SWT survey). Due to the lack of previous data the areas of the survey could not be determined and thus no comparisons could be assessed between the two surveys.

Community	AE-2013	
SM6	81.34	Pioneer
SM8	3.08	
SM12/11	13.33	
Total area	97.75	
SM10	20.96	Low
SM13a	39.5	
SM14a	10.03	
SM14b	3.28	
SM14c	14.98	
Total area	88.75	
SM13c	15.49	Mid
SM13f	0.29	
SM16b	2.07	
SM17	0.28	
Total area	18.13	
SM24	14.30	Drift
Total area	14.30	

The total vegetation of the survey area was 349.16 hectares in 2013—in 1993 it was 345 hectares, any changes here could be due to differences in survey area and the accuracy of mapping.

Any differences in land area is most likely due to more accurate mapping using ArcGIS and the use of SSSI boundaries provided by Natural England. Though some will also be due to community changes.

Table 5- showing main communities types across the Alde-Ore Estuary SSSI.

Below are two photos that help illustrate the speed of change within the estuary. Both are taken from the jetty at Blackheath (1998—A. Sanei., 2014—T.R.Abrehart). In the first image there are only small stands of *Spartina anglica* noticeable adjacent to the jetty, in the 2013 image there is a complete spread of *Spartina anglica* across the foreshore, extending out into the estuary at least 20 metres in places. This rapid change shows some of the issues with this species in this and the other estuaries in Suffolk.

Another effect of this shoreline development at Blackheath has been the reduced erosion of the cliff face (as seen above). The impact on the fauna of the area has not been studied, but, it is likely that an important aculeate hymenopteran site will have been greatly reduced by this. The vegetation here though did hold Grey Bush-cricket, so the changes may have created ideal habitat for other rare species within the estuary.

7. Rare and unusual species of note

7.1 Plants of note

Endangered

Spartina maritima Small cord-grass—was found across the SSSI though always in small stands

Ranunculus baudotii Brackish Water-crowfoot—was only found in unit 33 in a drying saline lagoon

Vulnerable

Bupleurum tenuissimum Slender hare's-ear—was found in 10, 11, 24, 25 and 29. Always either above the high tide line often where there had been disturbance from trampling. Or at the rear of the sea wall in the disturbed soils where vehicles had driven over the soft muds there.

Hordeum marinum Sea Barley– was only found once near the borrow dyke at Gedgrave this was outside the SSSI boundary.

Puccinellia fasciculata Borrer's Saltmarsh-grass– was found on a few occasions in the lower estuary.

Geranium robertianum subsp. maritimum Sea Herb Robert– was found only on the shingle of units 31, 32 and 33.

Hydrocharis morsus-ranae Frogbit– was found in the borrow dykes of Sudbourne and Orford outside the SSSI boundary

Potamogeton pectinatus Fennel Pondweed—was found in the borrow dyke at Gedgrave.

Carex divisa Divided Sedge—was found in Butley creek at the northern side of unit 44 and in the M22 of unit 44.

Nationally scarce:

Inula crithmoides Golden-Samphire—found on three occasions, in unit 31 and 28 only.

Limonium humile Lax-flowered Sea-lavender—was scattered across the Estuary, mainly just below the high tide line.

Polypogon monspeliensis Annual beard-grass—was found in two locations in unit 44 and just outside the SSSI at Shingle Street

Althea officinalis Marsh Mallow– was found in the upper Alde (units 2 and 4) and in unit 44 of Butley Creek

Lepidium latifolium Dittander– was scattered across the SSSI

Suaeda vera Shrubby Seablite– was found in the lower Ore around unit 25, one small plant in the impounded sea wall at Orford and numerous plants along the northern edge of unit 31.

Hyoscyamus niger Henbane– was found in unit 6 only, along the upper shore and sands of 'Little Japan'

Hypochaeris glabra Smooth Cat's-ear– Along the heavily grazed sea wall in unit 25 and within the more mature vegetated shingle ridges in unit 32 and 33.

Lathyrus japonicus Sea Pea– was widely scattered through the pioneer shingle of unit 31, 32 and 33.

Limonium binervosum Rock Sea-lavender– was noted in unit 31 and 32, see pages below

Medicago minima Bur Medick– was found in unit 25 and 31 within the heavily grazed grasslands or well trampled grass paths.

Parapholis incurva Curved Sea-hard grass– was found in scattered in units 31, 32 and 33, never in large quantities though always in areas of occasional saline inundation.

Poa bulbosa Bulbous Meadow-grass– was found in unit 31 and 32, where it was in the well trodden paths or within the fragmenting concrete tracks.

Poa infirma Early Meadow-grass– was only found in unit 31, here it was found in loose shingle that had been re-exposed in the last year, there was a wide range of casual annuals in this spot.

Puccinellia rupestris Stiff Saltmarsh-grass– was only fond in unit 32 at the edge of an ephemeral saline lagoon.

Ruppia maritima Tassel Pondweed-was found in unit 25, 31, 32 and 33, either in saline lagoons around Shingle Street or within the borrow dykes behind the sea walls.

Salicornia dolichostachya—was found scattered across the lower saltmarshes

Salicornia pusilla– was found scattered in the lower Ore

Samolus valerandi Brook weed– was found only in unit 44, within the mire communities where the halocline was limited.

Sarcocornia perennis Perennial Glasswort-was found occasionally across the SSSI

Vicia lutea Yellow Vetch– was found in abundance in unit 31, 32 and 33. This species was often in great abundance forming pure stands covering several m².

Frankenia laevis Sea Heath– was known to still exist in unit 31, though not seen by the surveyor.

Ceratophyllum submersum Soft Hornwort– was found in the borrow dykes behind unit 25.

Crassula tillaea Mossy stonecrop– was found rarely in unit 31 along the edges of the grass paths.

Verbascum pulverulentum Hoary Verbascum– was found in unit 33

Sonchus palustris Marsh Sow-thistle– was only found in unit 1 and 2

Locally scarce/rare

Anagallis tenella Bog Pimpernel—only found in unit 44
Carex binervis Green-ribbed Sedge—only found in unit 44, there were several plants within the M22 community at the western end of the unit.
Carex distans Distant Sedge– was found occasionally across the SSSI
Carex extensa Extended Sedge– was found in unit 31, 32 and 33. the original population was re-discovered and then a large number of new sites for this species were found. See below.
Crambe maritima Sea Kale– was common in units 31, 32 and 33
Crithmum maritimum Rock Samphire-was only found twice in unit 31 and once in unit 32
Epilobium palustre Marsh Willow-herb– was only found in unit 44
Scabiosa columbaria Small Scabious– was only found in unit 32
Sedum anglicum English Stonecrop– was common on the shingle of units 31, 32 and 33
Trifolium glomeratum Clustered Clover– was found in unit 31, 32 and 33
Trifolium suffocatum Suffocated Clover-was found in unit 31 and 32

7.2 Additional species of interest

Mammals of note

Otter *Lutra lutra* tracks were seen at several locations around the estuaries.

Red Deer *Cervus elaphus* was seen within the reedbeds of unit 44 at Butley.

Birds of note

Osprey *Pandion haliaetus* seen flying overhead at Blackheath, heading south.

Peregrine *Falco peregrinus* seen to mob Harris hawk at Blackheath.

Harris Hawk *Parabuteo unicinctus* was seen being mobbed by hobby and peregrine at Blackheath

Crossbill *Loxia curvirostra* was noted twice on one occasion flying over at Blackheath.

Lapland Bunting *Calcarius lapponicus* were noted on two occasions at Gedgrave, they were seen flying from the sheep grazed field across the river towards Havergate Island.

Raven *Corvus corax* heard first then seen at Gedgrave.

Grasshoppers of note

Grey bush-cricket *Platycleis albopunctata* was heard but not located on the SM24 community at Iken, Snape and Blackheath. This was a new estuary system for this species in Suffolk, it is an important find for a species which is apparently spreading along the coast but not known from any inland sites. These sites were just above the high tide line in rough vegetation. They were heard on several occasions, however unfortunately they were not directly seen. Further searches in 2014 will need to be carried out to determine the extent of this population.

Great green bush cricket *Tettigonia viridissima* was heard in two units, at Sudbourne north and at Aldeburgh, it was heard in the *Phragmites australis* and nearby grasslands often with shorter turf nearby.

Molluscs of note

Narrow-mouthed Whorl snail *Vertigo angustior* was found in only three samples around the estuary. It was not specifically searched for, though noted where time permitted. It was seen in Butley Creek, Aldeburgh and Shingle Street. It was also found outside the SSSI at Butley on the southern side of Mill Lane. This RDB1 species has it's national stronghold in Suffolk and is under great threat from sea level rises and inundation. Much of the population was within the sea walls and nearby transitional land, but these are being squeezed to extinction as there was often no land for the vegetation to migrate into.

Carthusian Snail *Monacha carthusiana* was found at Butley crag pit near to the estuary though outside the SSSI. This is one of only two currently known sites for the rare species RDB3. Nearby, the local and declining *Pupilla muscorum* was also recorded.

8. Limitations of the survey

8.1 Access

Access was possible along the entire length of the estuary and no large areas were missed during this survey.

8.2 Timing

The timing of this survey was planned to coincide with the greatest abundance of saltmarsh plants to ensure that identification of the more difficult species was easier. This did reduce likelihood of recording any vernal species though it is considered that very few species were missed during this survey.

The time taken to carry out the field work will always have an effect on the abundance of species found throughout a survey of this type, some species will be more prevalent at different times of year and create apparent abundance of scarcity depending on when the visit was made.

The field work was started in June and was finished by mid September.

8.3 Land use

As far as was noticed along the estuary there was mostly recreational use being carried out. There were signs of grazing along the saltmarshes and sea walls. Wildfowling was carried out on some of the estuary but was not noted during this survey.

9. Erosion and grazing

During the survey signs of erosion and accretion were recorded. It was difficult to assess the nature of each of these processes as there was no information available to demonstrate changes along the estuary.

Accretion was not specifically noted anywhere in the estuary though it was possible that in the areas of the upper Alde estuary this was occurring around the increasing amounts of *Spartina anglica* in units 1, 2, 3, 4, and 6. Here the *Spartina anglica* was often in soft muds which may well have accumulated, as it is known (William G. Lee & Trevor R. Partridge, 1983) that on mudflats accretion can occur at rates of 12mm p/a. and on sandy substrates this can be 3mm p/a. The growth of this highly invasive species may, in the short term help reduce the erosion on these shores. By reducing wave action and also by stabilizing the muds of the foreshore. The issue is that *Spartina anglica* is a 'Habitat engineer' creating a ideal set of conditions for itself and then outcompeting with all other saltmarsh plants with the pioneer to mid saltmarshes.

Saltmarsh cliff retreat was noted all along the Alde-Ore, with obvious sections of erosion occurring along the river edge. Erosion was also noted in unit 43, here the saltmarsh inside the meander was heavily fragmented and easily collapsed once walked on. Here there was a large amount of *Spartina anglica* spreading across the site. SM6 *Spartina anglica* community is known to be a pioneer community ,as the plants are well adapted to longer periods of partial submersion, therefore the presence of this community here indicated lower elevation of the muds across this section of saltmarsh.

Cattle grazing, was noted upstream of Orford as was a small amount of horse grazing. The affect of these animals was very different of that of sheep. The larger animals created a greater range of communities through the sward, the soft mud was heavily poached and tussocks of vegetation had been created..

Sheep grazing was seen at Butley Creek along the western side, here the number of sheep was low and the affect of the grazing was limited on the saltmarsh and did not appear to have any major impact on the flora.

Spartina anglica controls need to be carefully considered.

10 Notes and comments on additional features and species found during the survey.

10.1. Transitional habitats in the Alde-Ore Estuary complex: their importance and the need for their preservation.

In a natural and un-perturbed estuary system, along an elevation and salinity gradient, saltmarsh communities follow the succession from pioneer to low-mid to mid-upper to driftline communities. These communities within the Alde-Ore estuary complex are outlined in the previous sections of this report. From the driftline communities the vegetation gently grades through vegetation types to reach climax vegetation types. The specific vegetation types in the cycle of succession depend on the angle of the slope and many other factors determining the type of vegetation that will dominate (e.g. soil type, moisture availability, soil pH etc.). However, the modification of the landscape by Man has perturbed natural chains of succession and this has limited the ability of vegetation communities within a landscape to respond to large scale changes in the environment. An example of such as change is sea level rise. Sea level rise is occurring across the globe and in East Anglia the rate is being exacerbated by the sinking of the land due to post-glacial isostatic rebound.

The rate of sea level rise has out-stripped the natural rate of accretion of mud on the saltmarsh, therefore, the vegetation is experiencing more frequent inundation throughout the saltmarsh. The natural response of the vegetation is to retreat to areas of higher ground which suit its ecological requirements. This would be possible if the landscape had not been altered by Man.

Transitional habitats often support a wide variety of species by their very nature. 'Transitional' refers to habitats which are somewhere between a couple of more distinct and defined communities, therefore they often support high biodiversity. However, in the Alde-Ore the construction of sea walls, the steep gradient of the land and agricultural land use have limited the space available for natural succession and for the vegetation to migrate inland. Therefore, transitional communities within the estuaries are being squeezed out and reduced as they come up against the hard barriers at the highest extent, whilst their lower limit is being encroached upon by vegetation lower down in the succession process. The overall product is a reduction in the area of transitional habitat.

In the Alde-Ore the transitional communities, particularly SM24 grasslands at the rear of the saltmarsh, are important havens for rare species of plant and mollusc (*Bupleurum tenuissimum* and *Vertigo angustior*). *Bupleurum tenuissimum* only inhabits this upper saltmarsh/driftline zone. Naturally this would have been present across the transition zone of several metres in width, now within the Suffolk estuaries this zone is often no more than 15cm. The mollusc *Vertigo angustior* has similar restricted habitat requirements. In the Alde-Ore it is found within moist grasslands above the high tide frass line. In several areas where this rare RDB1 mollusc occurred the habitat was being squeezed into scrub and woodland edges (unit 1 and 42 in particular). These higher habitats will not support this species and as such it is vulnerable to any reduction in transitional migratable habitat. The Suffolk Estuaries support the highest densities and widest spread of this mollusc in the UK and hold internationally important populations. These populations are under great pressure and localized extinctions area already being noted in populations that were only discovered ten years ago.

There is one area in particular that will need to be managed to maintain a long transition zone, this in Butley Creek in unit 44. This unit holds a very important transitional zone. Here the saltmarsh leads very gradually into the old grazed fen-mire at the rear of the site. This then leads into an area of willow scrub with an area of marsh behind.

The gentle graduation across this unit shows species disappearing (*Apium graveolens*) and appearing (*Lysimachia vulgaris)* as the saline halocline changes to a more freshwater system further inland. Unit 44 is not only important botanically, it was also a very exciting site for molluscs with the same grading of species appearing and disappearing as the salinity changes. Also there are two very rare species here. One *Vertigo moulinsiana* was a new hectad find for Suffolk and considerable distance from all other known sites (all in the Waveney Valley only), at Butley Creek it was seen to enter the system where the salinity was reduced, much as it is in the tidal sections of the Waveney Valley. Further into the freshwater system there was *Vertigo angustior* which is greatly affected by saline incursion as it inhabits the frass low in the vegetation column, and as such is greatly affected by tidal fluctuations. *Vertigo moulinsiana* however can climb the reed and sedge vegetation as these tidal events occur, enabling it to survive. It was only found in low numbers across the site, however, the site was not exhaustively searched for either *Vertigo* species. The rear of unit 44 also held several important plant species with *Carex binervis*, *Anagallis tenella*, *Carex divisa* and *Molinia caerulea*. These species are uncommon in Suffolk with this being a new site for *Carex binervis* (now only at three sites in Suffolk). The fen-mire here has been neglected recently and is in need of some careful management to enable the transition zone to continue to move with sea level rise.

The lack of areas available for inland habitat migration is of concern in the estuary. The only areas where there was a fully natural area of migratable habitat was in the western end of unit 44 and the northern edge of unit 4. Though some considered management will need to be put into place to ensure this can happen. All the other areas have restrictions with a physical natural barrier or the habitat develops into woodland. The grassland transitions are the habitats under the greatest threat around the estuary.

Within Suffolk there are very few natural transitional zones, even less with grasslands or freshwater marshes at their upper limits. The transitional habitats of the Alde-Ore are the most significant in the county and of great importance for a wide range of species. The areas of most importance are those that transition into grasslands as opposed to woodland. These will allow the floral and faunal communities to maintain their integrity as they migrate as they are put under continued stress through sea level changes.

It is extremely important to look after these habitats and to allow the continued transition across as wide an area as possible, this will need to be monitored to understand the processes.

Unit	Transition habitats	Location	Features restricting migration
1	Driftline grasslands to woodland	Southern side	The driftline community backs on woodland (Iken) or arable fields (Snape Malting's).
2	Driftline grasslands to woodland	Eastern edge	Sea wall, however, the steep rise of the land behind the sea wall renders this section of wall unnecessary.
4	Driftline to acid grasslands and heath	Northern edge	No restrictions
6	Sand cliff	Northern edge	Vertical cliff face
42	Driftline to acid grasslands	the northern side	No restrictions
43	Driftline to acid grassland to arable fields	Southern side	The grasslands lead onto arable fields with some pig units
44	Saltmarsh to reedbed to mire and fen	Western end	Limited though in great need of management

Table 6: The natural transitional habitats that were found in the Alde-Ore

10.2. Saline lagoonal habitat outside the SSSI

Saline lagoons occur in a range of dynamic environmental conditions which give rise to a wide range of salinities and thus a wide range of vegetation and invertebrate communities. The importance of saline lagoons is recognised at international and national levels. The Habitats Directive (EEC, 1992) requires coastal lagoons to be designated as Special Areas of Conservation. On the Suffolk coast, in the absence of expensive coastal defence measures, saline lagoons are threatened by coastal erosion and the relentless encroachment of the sand and shingle into the marshland environments. In addition, inundation events, such as breaches and over-topping of the coastal defence embankments and have caused dramatic, rapid changes in the physical conditions of coastal water bodies.

There were several areas that supported saline lagoonal habitats within this survey area, with 2.61 hectares in unit 33.

Outside of Shingle Street set of lagoons there were no additional saline lagoons known, apart from those on Orfordness and Havergate Island which were not part of this survey project. During the botanical field work additional sites were searched for. Four new sites were discovered through this survey work.

Only one site was found within the SSSI boundary; this was within the Sudbourne section of saltmarsh. *Nematosella vectensis* was also found in an open pool within the estuary in unit 11 at TM452153365, this was a deep pool (40cm) within the saltmarsh near to the river edge. Here several animals were noted around the edge of the pool. There is the potential for many of these deeper pools to hold *N. vectensis* and other saline lagoonal species and should be investigated further.

Outside the SSSI, *Nematosella vectensis* was found in the borrow dyke at Sudbourne from TM4563254074 to TM4549653823. It was found in the flowing water of the borrow dyke. The substrate here had a significant shingle component which was possibly allowing more percolation of saline water through or under the sea wall.

A further two sites outside the SSSI were discovered in the borrow dyke at Boyton from TM3861145918 to TM3884146116, then from TM3885846126 to TM3919846264. It is likely that *N. vectensis* was present in other sections of the borrow dyke but time constraints limited further searches in the area. In both cases, *N. vectensis* was found in good numbers in each of the three sections of dyke briefly searched. There are undoubtedly more lagoonal species in these dykes though no samples were taken. *N. vectensis* being an easy species to identify in the field was the only lagoonal species recorded. It was recorded on the *Ruppia maritima* and *Ruppia cirrhosa* within the water column. There were also several colonies of hydroids growing off the margin of the Boyton dyke. This indicates a richer invertebrate community at this site and should be investigated further.

These brief searches show the potential for more of this habitat to occur in Suffolk than was previously thought. Surveys to uncover more of this habitat should be considered, especially in the light of recent flood events along the coast which has likely greatly reduced known sites in Suffolk.

10.3. Rock Sea Lavender—*Limonium binervosum*

This species was well known from this area of Suffolk, but it was considered important to record as much of this species as possible during this survey.

During this survey work *L. binervosum* was only found in unit 31, here however it was found in a very exacting habitat. This was in the SH34 *Festuca rubra—Armeria maritima—Plantago maritima* grasslands (Sneddon and Randall).

This community was found above the saltmarsh communities and below the vegetated shingle communities of SH38, 40 and 41 within the unit. The habitat where *L. binervosum* was mainly recorded was either at the edges of upper saltmarsh flooded pools (always on the vegetated shingle), or pools that were only flooded at spring tides, high tidal events or are formed by rainwater filling these depressions. In each case it was probable that these sites have a high salinity, due to evaporation. These colonies were all on south or east facing sites, often with a slope to the west and north. This created an even hotter environment for these halophytes. This community has a strong affinity with Mediterranean saltmarsh communities.

The pools and margins had a high silt/clay component within the matrix. This was a relatively species-poor assemblage as a result of the dominance of *Festuca rubra*, but it may also include halophytes such as *Atriplex portulacoides*, *Seriphidium maritimum*, *Beta maritima* and *Limonium vulgare*. This shingle -salt marsh transitional habitat is rare in Britain but was particularly well illustrated in unit 31, this community was found covering 3.22 hectares.

A brief visit to Orfordness showed that the endemic NVC saltmarsh community of SM21 *Suaeda vera–Limonium binervosum* saltmarsh community was developing along the landward side of the shingle ridge. It will be important to determine the extent of this in the future.

Grid reference	Plant numbers	SSSI unit ID
TM3929146230	10	31
TM3961446418	15	31
TM3955746378	40+	31
TM3912946170	40+	31
TM3910646171	40+	31
TM3907746140	40+	31
TM3903446122	40+	31
TM3897246074	40+	31
TM3887446039	40+	31
TM3880745988	40+	31
TM3811245110	40+	31
TM3746444363	40+	31
TM3741544258	40+	31
TM3909446175	40+	31
TM3904746127	40+	31
TM3901546110	40+	31
TM3886246012	40+	31
TM3878245944	40+	31
TM3811245101	40+	31

Table 7: *Limonium binervosum* locations within the Alde/Ore Estuary SSSI and adjacent saltmarsh 2014.

10.4. Extended Sedge—*Carex extensa*

This species was only known from a single small area of upper saltmarsh at the southern end of unit 31 before this survey was carried out. During the NVC fieldwork *Carex extensa* was found in unit 32 and 33.

In unit 32 two plants on the edge of an ephemeral saline lagoon adjacent to the sea wall were recorded. The plants were surrounded by *Juncus gerardii* and other upper saltmarsh species.

In unit 33 there were two distinct populations. One consisted of two plants at the edge of an ephemeral lagoon adjacent to the sea wall within the tank blocks. The other, larger colony was along the northern edge of the permanent lagoon. The entire edge of the lagoon supported this species which numbered in the many hundreds of plants. On the southern side of the lagoon there were a couple of plants at the edge of a drying pool.

In unit 31 two new additional colonies were discovered. The original colony, which was known of prior to this survey, was reduced in size. It is likely to become extinct soon due to roll-back of the shingle ridge which is enveloping the saltmarsh at this location. The first new colony was within an area of *Juncus gerardii* at the edge of a non-permanent pool to the west of the original site. The second colony was spread along the southern side of the small clay mounds adjacent to the creek running inland towards the road. There were three mounds with *Carex extensa* along the base of the drift line margin.

Outside the SSSI a new colony was found to the west of the Shingle Street road within the SM13c community, with over 50 plants found in this area.

All colonies occupied a very specific habitat and no other colonies found anywhere else within the estuary.

These finds are an important expansion to this sedge's range in Suffolk.

Grid reference	Plant Density	SSSI Unit ID
TM3737944042	5	31
TM3736244143	10	31
TM3734144171	30+	31
TM3731944154	30+	31
TM3729844132	30+	31
TM3728444118	30+	31
TM3707843359	5	32
TM3708343356	30+	32
TM3624342023	10	33
TM3622541853	15	33
TM3708343356	1	33
TM3624542018	1	33
TM3625341904	300+	33
TM3621941877	30+	33
TM3622941889	30+	33
TM3626841914	30+	33
TM3629241929	30+	33
TM3673144023	5	
TM3671743983	30+	
TM3672944006	30+	
TM3670944016	30+	
TM3673444021	30+	

Table 8: *Carex extensa* locations within the Alde/Ore Estuary SSSI and adjacent saltmarsh 2014.

11.References

This report is to cited as:
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