Saltmarsh Habitat Map using CASI & LIDAR

Data

The Habitat Map classifications were carried out on a site by site basis, with the attribute 'Site' containing the site name. This product is derived from CASI multispectral data gathered on the date provided in the Attribute 'CASI_Date' and LIDAR elevation data gathered on the date provided in the Attribute 'LIDAR_Date'. It also uses ground truth data collected by Natural England / Environment Agency after the CASI capture. The year of analysis and version number of the product are in the attributes 'AnalysisYr' and 'Version' accordingly.

Ground Data

Ground data was collected by Natural England / Environment Agency staff. This involved the habitat classes being collected digitally using ESRI collector software. These samples cover all habitat classes being identified at the site with as great a geographical range as possible. This information was then used for the classification training and ground truthing of the habitat map.

Description

This habitat map is a remotely sensed product, using CASI and LIDAR data and potentially other GIS products. The data is in ESRI Shapefile format and can be loaded in a GIS. Please display these using the optimal display classes contained in the layer file. The analysis extent for each site was defined according to additional data and adjusted according to field notes made during the Ground Truthing Survey.

It classifies the habitats into site relevant classes, visible at the time of CASI image capture. The attribute 'Class' provides the classified habitat. This output layer is a merged product of many years of work, therefore if applicable the class name has been updated to the most suitable recent name to fit the current naming structure.

For habitat class descriptions refer to:

- Saltmarsh mapping 1 classes for sites: Humber (2018), Ribble (2019), Pagham (2020), Steart (2020).

The habitat mapping was carried out for the Environment Agency & Natural England Collaboration: Operational Use of Remote Sensing for Environmental Monitoring.

The habitat map was created using a supervised classification, which means ground truth data were used to train the model.

These techniques used the CASI, LIDAR and Ground data for the classification and to identify the characteristics of the different habitats and to fit them into one of the classes.

The classifications had a quantitative accuracy assessment carried out on them in the form of a confusion matrix using ground data set aside and not used in training the classifier. Alongside this aerial photography was used to check and make final improvements to the habitat map.

For further information contact: david.white@environment-agency.gov.uk

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Example of the Saltmarsh Habitat Map Product:
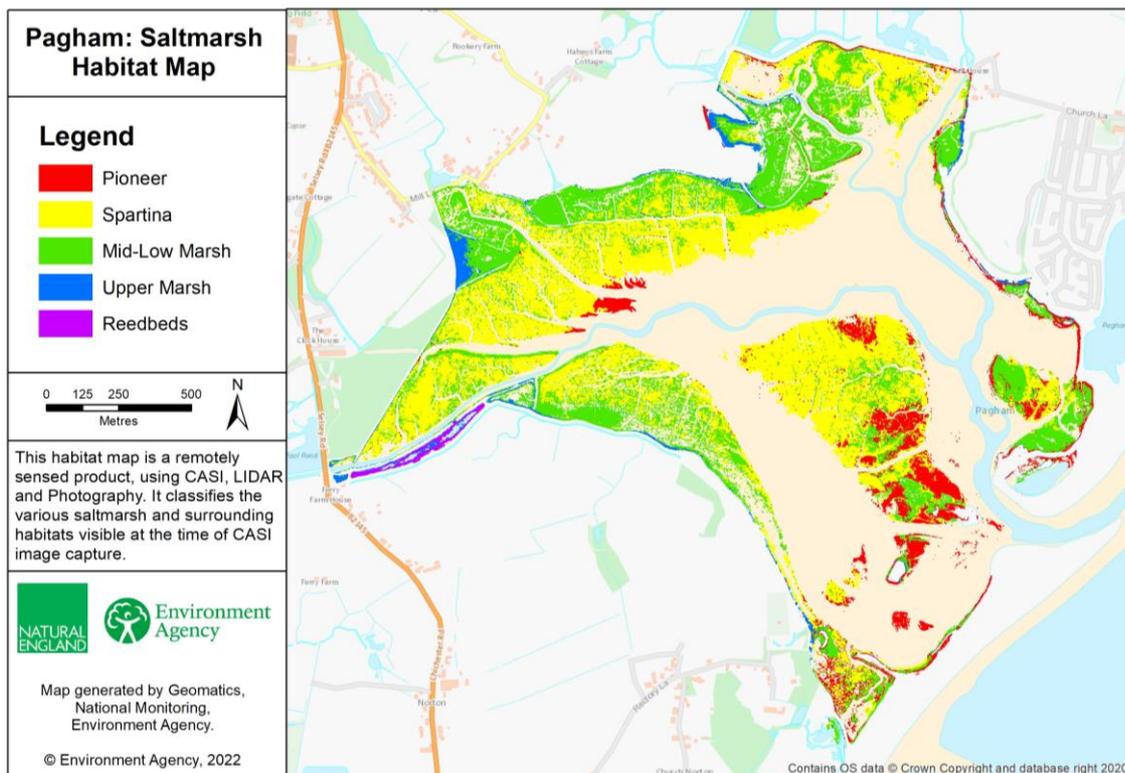
Saltmarsh Mapping 1 - Class descriptions (not all classes are present at each site)

Pioneer – *Salicornia* and pioneer species

The start of the pioneer zone is on the saltmarsh mudflat boundary where pioneer vegetation first colonises Glasswort *Salicornia* spp. or Annual sea-Blite *Suaeda maritima*; can be present on creek-sides and may colonise old pans in the upper saltmarsh where Sea aster *Aster tripolium* is another typical species. The zone is characterised by the presence of open vegetation with bare mud/sand, covered by all high tides, and the following NVC communities SM4, SM5, SM6, SM7, SM8, SM9, SM11 & SM12.

Spartina – *Spartina* **dominant marsh**

Occurs on the seaward fringes of saltmarshes (colonisation can be lower in the tidal frame than other pioneer saltmarsh species) within the pioneer zone, creek-sides and may colonise old pans in the upper saltmarsh.

This is a Water Framework Directive (WFD) class used to identify dominant swards (monoculture) of Common cord-grass *Spartina anglica* stands NVC community SM6, but also includes all other *Spartina* species small cord-grass *S. maritima*, smooth cord-grass *S. alterniflora* and Townsend's cord-grass *S. x townsendii*. SM4 *Spartina maritima* salt-marsh community, SM5 *Spartina alterniflora* salt-marsh community, and SM6 *Spartina anglica* salt-marsh community.

Mid-Low Marsh – *Puccinellia maritima* **and** *Atriplex portulacoides* **dominant marsh**

The lower zone of saltmarsh always flooded by high tides and the upper reaches above Mean High Water rarely inundated.

Comprises a closed vegetation.

The lower reaches typically dominated with continuous cover of Saltmarsh grass *Puccinellia maritima* NVC Communities SM10, SM13a or Sea purslane *Atriplex portulacoides* SM14.

The middle portion can still be dominated by *Puccinellia maritima* SM13b,c,d,f with other common species, Common sea lavender *Limonium vulgare*, Greater sea-spurrey *Spergularia media*, Common scurvy-grass *Cochlearia officinalis* and Sea thrift *Armeria maritima*. Sea plantain *Plantago maritima*, Sea arrow-grass *Triglochin maritima* and Sea milkwort *Glaux maritima* found throughout. Non dominant *Spartina anglica* may be present mixed within the sward.

The upper reaches are dominated by Sea rush *Juncus maritimus* SM15 and/or Red fescue *Festuca rubra* SM16 and other communities present, SM17, SM21, SM22, SM23.

Upper Marsh – *Festuca rubra, Juncus maritimus* **dominated marsh**

Upper reaches of the saltmarsh rarely inundated by high tides and can be influenced by fresh water. SM18, SM19, SM20, SM26, SM27. Includes the drift-line NVC communities Sea couch *Elytrigia atherica* SM24, Scrubby sea-blite *Suaeda vera* SM25 and Common couch-grass *Elytrigia repens* SM28.

Transitional Grasses – **Grass dominated**

A variety of communities, dominated by grasses, may occur at the top of the upper saltmarsh as it transitions to terrestrial habitat. The upper boundary is defined as up to 1m above Highest Astronomical Tide (HAT). While the exact distance above HAT will depend on the topography of the adjacent ground.

Transitional areas include mesotrophic grassland, brackish mire / fen, and swamp communities. Creeping bent-grass *Agrostis stolonifera* (mesotrophic grassland communities e.g. MG11-MG13), fen communities (M28) and swamp communities (S4, S19, S20, S21) including non-dominant Common reed *Phragmites australis*. Includes the drift-line NVC communities Sea couch *Elytrigia atherica* SM24, Scrubby sea-blite *Suaeda vera* SM25 and Common couch-grass *Elytrigia repens* SM28.

MG11 *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland, MG12 *Festuca arundinacea* grassland, MG13 *Agrostis stolonifera-Alopecurus geniculatus* grassland, S4 *Phragmites australis* swamp and reed-beds, S19 *Eleocharis palustris* swamp, S20 *Scirpus lacustris* ssp. *tabernaemontani* swamp, S21 *Scirpus maritimus* swamp, M28 *Iris pseudacorus-Filipendula ulmaria* mire.

Reedbeds – *Phragmites australis*

This is a Water Framework Directive (WFD) class used to identify dominant swards (monoculture) of Common reed *Phragmites australis* of brackish swamp communities. Part of the upper transitional zone (CSM, 2004).

Floodplain and Coastal Grazing Marsh

Pasture and grassland with ditches to maintain the water levels, containing standing brackish or fresh water. These areas are normally grazed and some are cut for hay or silage. Bog, fen or flush vegetation also make up this class, however Reedbeds are recorded separately.