**Northern Ireland Priority Habitat Guide: Coastal sand dunes**

**What are Coastal sand dunes?**

Sand dunes are highly diverse coastal habitats, with a range of physical forms and associated plant communities. They develop when there is a suitable supply of sand and prevalent onshore winds. The form of the dune depends on the amount of available sediment supplied by eroding coastlines and the seabed, and the ease with which it can be moved by the wind. A critical factor is the presence of a sufficiently large beach plain, onto which the sands are deposited and whose surface dries out between high tides. The dune habitat is nutrient poor and water deficient and this has led to a high diversity of specialised plants in sand dune communities. The presence of these highly specialised plant species and communities is a key factor in the determination of dune systems of national or European importance.

**Table 1: Linking Habitat types with Annex 1 features, ASSI features and NI Priority Species**

| **Northern Ireland Priority Habitat type: Coastal sand dunes** | | |
|---|---|---|
| **Habitat Directive Annex 1 habitats (SAC feature)** | **ASSI features** | **NI priority species** |
| H2110 Embryonic shifting dunes<br>H2120 Shifting dunes along the shoreline with *Ammophila arenaria* ("white dunes")<br>H2130 Fixed dunes with herbaceous vegetation ("grey dunes")<br>H2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)<br>H2170 Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)<br>H2290 Humid dune slacks | Coastal sand dunes | Smooth Cat's-ear *Hypochaeris glabra*, Bee-orchid *Ophrys apifera*, Marsh Helleborine *Epipactis palustris*, Scots Lovage *Ligusticum scoticum*, Spring Vetch *Lathyrus vernus*, Seaside Centaury *Centaurium littorale*, Grayling, Dark Green Fritillary, Marsh Fritillary, Northern Colletes Bee, Common Lizard, Smooth Newt, Skylark, Meadow Pipit, Irish Hare. |

**Definition**

Coastal sand dunes in Northern Ireland have a range of physical forms which are defined as:

- Embryo dunes are created by the aggregation of wind-blown sand trapped by debris and vegetation along the strandline. These very unstable dunes are colonised by salt tolerant plants like Sand Couch-grass *Elytrigia juncea,* Sea Rocket *Cakile maritima*. As they grow and are less at risk from being washed away by high tides, more plants can colonise and it gradually evolves into a mobile dune. These embryonic dunes are cyclical being washed away during winter and reforming in summer.
- White dunes (also known as fore dunes) are an early stage of succession, where dune mobility is of overriding importance. Such dunes are dominated by Marram-grass *Ammophila arenaria*, and Sea Lyme-grass *Leymus arenaria* as they can withstand burial by sand along with the other stresses, such as poor water availability.
- Grey dunes occur where a more stable or 'fixed' form of dune develops. The decreasing input of sand leads to a reduction in Marram-grass *Ammophila arenaria*, new shoots are less frequent and individual clumps become more sparsely dispersed. Although there may still be some bare patches of sand the majority of these fixed dunes have a continuous vegetation cover. Red Fescue *Festuca rubra* is the dominant species present in the grassland. The formation of such grasslands is accelerated under domestic grazing regimes.
- Dune heath can occur where sands have a low content of calcium carbonate and are more therefore more acidic such as in the Mournes area. They are normally dominated by heathers such as Ling/Common Heather *Calluna vulgaris* or Bell Heather *Erica cinerea.*
- Dune slacks are the low lying flat areas within a dune system. Slacks occur in hollows between dune ridges where the water table is near to the surface of the sand. Plant diversity can be high, particularly on open and low-growing dune slacks communities with calcareous sand. A number of rare or local vascular plants and bryophyte species can occur. The vegetation cover in dune slacks is almost complete and a soil starts to develop. Some slacks may become dominated by low growing species such as Creeping Willow *Salix repens* or with lower grazing, taller wetland plants such as Common Reed *Phragmites australis* can occur.

The National Vegetation Classification (NVC) codes are useful in determining which habitat types fall within Coastal sand dunes priority habitat. NVC codes are provided in the Appendix 2.

**Where are they found?**

In Northern Ireland, the largest dune systems are located along the north and south-east coasts. They are highly concentrated in a few large areas, notably at Magilligan Point, Portstewart and the Bann Estuary and White Park Bay along the north coast and at Dundrum Bay and at Killard Point in County Down. Other dune systems are widely dispersed around the coast, occurring particularly in north County Antrim and South Down. Many of these are either very small or highly modified, both in physiography and vegetation, often because they are managed as golf courses.

DAERA hold priority habitat and species data on the NIEA Natural Environment Map Viewer. See https://appsd.daera-ni.gov.uk/nedmapviewer/ (and link to video tutorial). Note that the Map Viewer indicates areas which hold NIEA records of habitat / species data, but does not infer the complete coverage of these environmental assets in Northern Ireland.

**Why are they important to wildlife?**

Sand dunes support a large proportion of the butterfly, moth, bee, ant and wasp fauna of Northern Ireland. Twenty one butterfly species have been recorded, including the Grayling, the Dark Green Fritillary and the Marsh Fritillary. A range of vertebrate species occur on dunes in Northern Ireland and these include the Common Lizard and the Smooth Newt. Once stabilised by plant growth, dunes provide nesting habitats for breeding birds. When the stabilising vegetation is diverse, the habitat is both more attractive and supports a greater variety of species. Skylark and Meadow Pipit are clearly colonisers of fixed sand dunes in this region.

The variety and abundance of flowering plants within semi-natural habitats provide good sources of pollen and nectar for many of our pollinating insects such as bumblebees, hoverflies, butterflies and moths. For further information on habitat management for pollinators, refer to the All-Ireland Pollinator Plan resources: www.pollinators.ie.

**Pressures & Threats**

- Erosion / accretion / sediment availability – unless artificially constrained, the seaward edges of sand dunes can be a highly mobile feature, though there is a natural trend to greater stability further inland. There is potential for dredging and marine aggregate extraction, through the disruption of coastal processes, to have cumulative and long-term effects on sand dunes.
- Water tables – in some dune systems, a long term fall in the water table can lead to loss of specialist slack flora and invasion by coarse vegetation and scrub. While unusually dry summers may contribute to this problem, the long-term causes are believed to be local extraction of water and / or drainage land used for agriculture or housing.
- Grazing – continued grazing is normally necessary to maintain the typical fixed dune communities, but over-grazing, particularly when combined with the provision of imported feedstuffs, can have damaging effects by affecting the nature of the vegetation and therefore the stability of the dunes. A more widespread problem is under-grazing, leading to invasion by coarse grasses and scrub, though rabbits are locally effective in maintaining short turf. Grazing by rabbits preserves the dune vegetation by preventing the encroachment of trees and bushes.
- General recreation – is a major land use on sand dunes. Many dune systems are used extensively by holiday-makers, mostly on foot but also for parking cars. Moderate pressure by pedestrians may cause little damage and may even help to counteract the effects of abandonment of grazing. However, excessive pedestrian use and vehicular use in particular, have caused unacceptable erosion on many dune sites through 'trampling' pressures. Another problem associated with recreation is the eutrophication of the dune systems due to excessive dog faeces.
- Golf courses – many dune systems also support one or more golf courses. Here much of the original vegetation may be retained in the rough, but the communities of the fairways and particularly the greens and tees, are often severely modified by mowing, fertilising and re-seeding.
  Fragmentation of dune systems by golf courses makes grazing management much more difficult and strict control on rabbit populations had led to rapid successional change and widespread loss of dune grassland to mesotrophic swards. Some sand hill and small dune systems along the Outer Ards Peninsula have been levelled to create recreation areas and prevent sand blowing over the coast road.
- Coastal sea defence – many dune systems are affected by construction of sea defence works or artificial stabilisation measures such as sand and Marram *Ammophila arenaria* planting. Hard sea defences can lead to fossilisation of dunes behind sea walls. While carefully applied dune management measures can help to counteract severe erosion which may threaten the existence of a dune, engineered defence systems usually reduce the biodiversity inherent in the natural dynamism of dune systems and may cause sediment starvation.
- Beach management – on some heavily used beaches the pressure of pedestrian or vehicular traffic, or beach cleaning using mechanical methods, can prevent the establishment of embryo dunes through the removal of drift line vegetation or debris. These factors may remove the minor obstacles which would catch the sand initially, or destroy the embryo dunes at an early stage in their formation.

- Military use – during the Second World War, the majority of dune systems were used for the construction of defensive installations, for military training or both. The resultant widespread erosion had a severe effect on dune vegetation which has since been reversed by protective measures and natural recovery. Military use can be beneficial in restricting other activities or developments.
- Development – dunes have also been affected in the past by housing developments, industrial development, waste disposal and fly tipping.
- Sand removal – small-scale removal of sand from dunes has been recognised as a problem in Northern Ireland. In some areas the traditional rights of farmers to remove sand and shell grit still exist.
- Climate change - some sand dunes are being squeezed between an eroding seaward edge and fixed flood defence walls. This erosional process is being intensified by a reduced supply of sediment in some locations and is likely to increase as result of climate change and rising sea-levels.
- Introduced species – such as Sea-buckthorn *Hippophae rhamnoides*, was widely planted to stabilise dunes and resulted in the considerable loss of dune grassland at Portstewart, Ballykinler and Murlough Dunes. Over time this has led to loss of open dune habitat and important dune grassland communities including rare plants and animals. The encroachment of Gorse *Ulex europaeus*, other scrub and rank grasses at Murlough Dunes has been reversed by the reintroduction of rabbits and winter grazing by sheep, rare breed cattle and ponies.

**Favourable Management of Coastal Sand Dunes**

These important sites should be protected and maintained where they occur, and should be restored where their condition has declined. Some of our most important sites are protected through National and International legislation. In the wider countryside, coastal sand dunes are protected from development and increased agricultural productivity through planning policies and legislation such as the Environmental Impact Assessment Regulations.

Coastal sand dunes are best managed by grazing extensively (with cattle and/or sheep) at a low stocking rate, with a 'no grazing' period from April to mid-August. Undergrazing and/or overgrazing should be avoided.

Application of organic and inorganic fertilisers is not permitted as it reduces species-richness and diversity with a loss of nature conservation value.

Encroaching Bracken *Pteridium aquilinum* or encroaching scrub should be cut annually.

Western Gorse *Ulex gallii* is an important species for sand dunes and should be retained. Bog Myrtle *Myrica gale* and Creeping Willow *Salix repens* should also be retained.

Dune heath habitat condition can be assessed using the Moorland Rapid Condition Assessment and managed as Lowland heathland.

**How do we determine the "health" or condition of Coastal sand dunes?**

The conservation status can be determined by the condition of the habitat. Favourable condition is defined by setting targets or target ranges for a series of different attributes. These are components or characteristics of the vegetation that are relatively easy to measure, but which are reliable indicators of the "health" of the habitat.

Identification and rapid assessment of the Coastal sand dunes can be undertaken using the Coastal Rapid Condition Assessment guide.

NIEA has developed Rapid Condition Assessments for several broad habitat types (grassland, moorland, woodland, coastal and wetlands). These will be made available online in the future. In the interim copies can be requested by contacting NIEA by E-mail: NIEA.EFSHigher@daera-ni.gov.uk.

**Appendix 1: Coastal Sand Dune Indicator species**

Positive Indicators:

| | | |
|---|---|---|
| S | *Anagallis tenella* | Bog Pimpernel |
| | *Anthyllis vulneraria* | Kidney Vetch |
| | *Campanula rotundifolia* | Harebell |
| S | *Campylium stellatum* | Star Campylium Moss |
| D/S | *Carex (small)* | Sedge |
| | *Carex arenaria* | Sand Sedge |
| D/S | *Carex flacca* | Glaucous Sedge |
| | *Centarium erythraea* | Common Centuary |
| D/S | *Dactylorhiza sp* | Orchid sp |
| S | *Equisetum variegatum* | Variegated Horsetail |
| | *Erodium sp.* | Storksbill |
| | *Erophila verna* | Common Whitlowgrass |
| | *Euphrasia agg.* | Eyebright |
| S | *Galium palustre* | Common Marsh-bedstraw |
| | *Galium verum* | Lady's Bedstraw |
| S | *Hydrocotyle vulgaris* | Marsh Pennywort |
| | *Koeleria macrantha* | Crested Hair-grass |
| | *Lotus corniculatus* | Common Bird's-foot-trefoil |
| S | *Mentha aquatica* | Water Mint |
| | *Ononis repens* | Common Restharrow |
| | *Phleum arenarium* | Sand Cat's-tail |
| | *Pimpenella saxifraga* | Burnet Saxifrage |
| | *Polypodium spp.* | Rockcap Fern species |
| S | *Potentilla anserina* | Silverweed |
| | *Potentilla erecta* | Tormentil |
| | *Primula vulgaris* | Primrose |
| | *Ranunculus bulbosus* | Bulbous Buttercup |
| S | *Ranunculus flammula* | Lesser Spearwort |
| S | *Salix repens* | Creeping Willow |
| | *Scilla verna* | Spring Squill |
| | *Succisa pratensis* | Devil's-bit Scabious |
| | *Thymus polytrichus* | Wild Thyme |
| | *Veronica officinalis* | Heath Speedwell |
| | *Viola tricolor* | Wild Pansy |

Negative Indicators:

| | |
|---|---|
| *Arrhenatherum* | False Oat-grass |
| *Cirsium arvense* | Creeping Thistle |
| *Cirsium palustre* | Marsh thistle |
| *Cirsium vulgare* | Spear Thistle |
| *Hippophae* | Sea-buckthorn |
| *Lolium perenne* | Perennial Rye-grass |
| *Prunus spinosa* | Blackthorn |
| *Pteridium aquilinum* | Bracken |
| *Rubus fruticosus* | Bramble |
| *Pteridium aquilinum* | Bracken |
| *Senecio jacobaea* | *Common Ragwort (when in high cover) |
| *Urtica dioica* | Stinging Nettle |

S- Dune Slack species
D/S- Dune Slack or Dune species
Blank- Dune species

**Appendix 2: National Vegetation Classification codes**

Coastal sand dunes in Northern Ireland encompass a range of plant communities that broadly reflect a number of those communities described in the National Vegetation Classification (NVC) of Great Britain (Rodwell, 1991a) where descriptions and codes are given to associations of plants that are characteristic of particular environmental and management conditions.

In Northern Ireland, the main NVC communities which make up Coastal sand dunes are species-rich variants of:

**SD4** - *Elymus juncea ssp. Boreali-atlanticus* community

**SD5** - *Leymus arenarius* mobile dune community

**SD6** - *Ammophila arenariae* Marram-grass community

**SD7**- *Ammophila arenariae – Festuca rubra* comminty

**SD8** - *Festuca rubra – Galium verum*

**SD9** - *Ammophila arenariae – Arrhenatherum elatius*

**SD10** - *Carex arenaria* community

**SD14** - Salix repens – *Campylium stellatum*

**SD16** - *Salix repens – Holcus lanatus*

**SD 17** - *Potentilla anserina – Carex nigra* Common Sedge communities

**SD 18** - *Hippophae rhamnoides* – Sea-buckthorn dune scrub

**H10** - *Calluna vulgaris - Erica cinerea* heath (Lowland heathland)

**H11** - *Calluna vulgaris - Carex arenaria* heath (Lowland heathland)

A wide range of other NVC types associated with other lowland priority habitats e.g. Lowland meadow, Maritime cliff and slope, Calcareous grassland, Purple moor-grass and rush pasture, Lowland acid grassland and Lowland heathland and more species -poor communities often form transitions with Coastal sand dunes. These transitions can be complex.