

MACHAIR (UK BAP PRIORITY HABITAT)



Summary

Machair is a priority habitat defined as much by its landform and management as by its vegetation, which overlaps to a fair degree with that of fixed, stable sand dunes. It consists of level to gently-sloping expanses of coastal ground between the main dune systems and the terrestrial heaths and bogs beyond the influence of the sea. The substrate consists of wind-blown calcareous sand, commonly made up of fragments of shells and other marine creatures. Machairs have been managed for at least a thousand years in a low-intensity, traditional scheme of seasonal grazing and rotational cultivation, without artificial fertilisers or herbicides.

Machair occurs only in Scotland and in the west of Republic of Ireland, with the majority being in Scotland. It is most common on the seaward shores of the inner and Outer Hebrides and in north-west Sutherland, where strong on-shore winds drive sand inland from the beach and dunes, and where the climate has long been suitable only for low-intensity agriculture.

This is important for nature conservation because it is a rare habitat, and it is a culturally important part of crofting management. Uncommon species include several orchids and Machair grasslands are the most important British habitat for corncrake and corn bunting.

The traditional crofting management is best for this habitat.

What is it?

Machair is a distinctively Scottish coastal habitat which develops where calcareous sand is blown inland on exposed low-lying coasts. It is notable for the species-rich swards that are a bright display of flowers in summer.

Most of the vegetation belongs to the SD8 *Festuca rubra-Galium verum* sand dune community, with some representation of the SD17 *Potentilla anserina-Carex nigra* dune slack community and the MG11 *Festuca rubra-Agrostis stolonifera-Potentilla anserina* mesotrophic grassland. Dargie (2000) discovered a range of additional communities that are not yet incorporated into the NVC scheme. The most common species are red fescue *Festuca rubra*, sweet vernal grass *Anthoxanthum odoratum*, red clover *Trifolium pratense*, white clover *T. repens*, lady's bedstraw *Galium verum*, ribwort plantain *Plantago lanceolata*, bird's-foot trefoil *Lotus corniculatus*, yarrow *Achillea millefolium*, eyebrights *Euphrasia officinalis* agg., daisy *Bellis perennis* and meadow buttercup *Ranunculus acris*. Silverweed *Potentilla anserina*, creeping bent *Agrostis stolonifera*, creeping willow *Salix repens*, marsh marigold *Caltha palustris*, ragged robin *Lychnis flos-cuculi*, lesser spearwort *Ranunculus flammula* and common sedge *Carex nigra* are common in seasonally-inundated areas. Species such as yellow rattle *Rhinanthus minor*, lesser meadow-rue *Thalictrum minus*, wild pansy *Viola tricolor*, selfheal *Prunella vulgaris*, black knapweed *Centaurea nigra* and the orchids common twayblade *Listera ovata*, western marsh orchid *Dactylorhiza majalis*, fragrant orchid *Gymnadenia conopsea* and frog orchid *Coeloglossum viride* add to the colourful array.

Bryophytes are common despite the exposed habitat. The calcicoles *Ctenidium molluscum*, *Ditrichum gracile*, *Entodon concinnus*, *Homalothecium lutescens*, *Hypnum lacunosum*, *Tortella tortuosa*, *Leiocolea alpestris*, *Scapania aequiloba* and *S. aspera* are common, as are the less exacting *Rhytidiadelphus squarrosus*, *Brachythecium albicans* and *Syntrichia ruralis* ssp. *ruraliformis*. On damp substrates the characteristic species are *Ditrichum inclinatum*, *Amblyodon dealbatus*, *Catascopium nigratum*, *Meesia uliginosa*, *Moerckia hibernica*, *Preissia quadrata*, *Riccardia incurvata* and *Didymodon ferrugineus*.

Machair has a characteristic lichen flora including *Agonimia tristicula*, *Bacidia muscorum*, *B. sabuletorum*, *Cladonia pocillum*, *C. rangiformis*, *C. firma*, *Collema tenax*, *Peltigera canina*, *P. neckeri*, *P. rufescens*, *Toninia lobulata*, *T. sedifolia*, *Catapyrenium cinereum*, *C. squamulosum*, *Chromatochlamys muscorum*, *Placidopsis cartilaginea*, *Polyblastia gelatinosa*, *P. wheldonii*, *Solorina saccata*, *S. spongiosa* and *Verrucaria muralis* (Gilbert 2000).

How do I recognise it?

Differentiation from other Priority Habitats

Machair is separated from the sand dunes and mesotrophic grasslands by its level or gently-sloping ground on the landward side of the beach and dune system with a substrate of wind-blown shell-based sand. In addition its history of low-intensity agricultural management with seasonal grazing and rotational cropping of potatoes, oats and locally barley and rye, is characteristic.

Definition in relation to other habitat classifications

Classification	Habitat types belonging to this UK BAP priority habitat
NVC	Examples of MG11, SD7-8 and SD17, also OV4, at sites with the following machair characteristics: <i>soil</i> = blown sand with significant % of shell-derived material, so lime-rich with pH >7; <i>topography</i> = flat or gently sloping ground at mature stage of geomorphological evolution; marshy or flooded in winter; <i>climate</i> = cool, moist and oceanic; <i>management</i> = influenced by grazing, cultivation, trampling or drainage within recent historical period; <i>vegetation</i> = SD8a/c/d/e/x*, SD17, MG11 or Arable and fallow,

	with transitional areas characteristically including SD7x*, SD8z*, Mx*, SxTHF*, SHv* or S19x*. (* = provisional NVC types described by Dargie 2000.) All of these communities except those marked * are included in the Scottish Biodiversity List.
Phase 1	This priority habitat includes examples of Phase 1 habitat type H6 at sites with the machair characteristics described above.
UK BAP broad habitat	All examples of Machair priority habitat in Britain belongs in the UK BAP broad habitat - Supralittoral Sediment .

Definition in relation to legislative classifications

Classification	Habitat types belonging to this UK BAP priority habitat
Habitats Directive Annex I	H21A0 (all examples).
SNH SSSI habitat features	Machair (all examples).

Where is it?

Machair habitat forms on exposed coasts where sand from the foreshore and immature dunes is blown onto level ground or gentle slopes inland. Much of the sand is derived from shells and fragments of other marine animals and is highly calcareous.

Although the soils are generally dry in summer they are seasonally waterlogged in winter, and the vegetation of the lower-lying hollows may be swampy.

Machair grasslands occur as part of a wider machair system that includes the beach and foredunes, fixed dunes and dune slacks, lochs, wetlands and saltmarsh. Inland there is a transition zone, known in the Uists as 'blackland', between the machair itself and the terrestrial heaths and bogs.

The habitat itself is complex, depending on small variations in topography, susceptibility to waterlogging, stability of the surface, the acidity of the soil, salinity and the history of cultivation and grazing.

Agricultural use of the Machair habitat probably dates back to the days of the Vikings; a time when easily accessible lands with easily worked soils would have been appreciated much more by the inhabitants than they are today, with our mechanised farming methods and modern fertilisers. Small-scale cropping of oats, barley and rye, and later potatoes; seasonal grazing and haymaking; and fertilising with seaweed and the contents of the cattle byre have resulted in the machair vegetation we see today.

There are about 17,500 ha of Machair in Scotland and another 7,500 ha in western Republic of Ireland. Of this there are about 10,000 ha in the Western Isles (and most is in North and South Uist and Benbecula). There are about 4000 ha in Coll and Tiree, 2300 ha in Orkney, 180 ha in Shetland and 1000 ha on the western mainland. The wider machair systems extend to about 30,000 ha in Scotland, with a further 10,000 ha in western Republic of Ireland.

There is no Machair anywhere else in the world.

What is special about it?

Some species of special conservation status recorded in this priority habitat in Scotland are listed below.

Group	Common name	Latin name	UK BAP priority list	EC Habitats Directive Annex II	Scottish Bio-diversity List	Red Data List	Wildlife and Countryside Act (1981)
bees, wasps and ants	northern colletes	<i>Colletes floralis</i>	y		y		
bees, wasps and ants	great yellow bumblebee	<i>Bombus distinguendus</i>	y		y		
bees, wasps and ants	moss carder-bee	<i>Bombus muscorum</i>	y		y		
bees, wasps and ants	red-shanked carder-bee	<i>Bombus ruderarius</i>	y		y		
birds	skylark	<i>Alauda arvensis</i> subsp. <i>arvensis/scotica</i>	y		y		
birds	common linnet	<i>Carduelis cannabina</i> subsp. <i>autochthona/cannabina</i>	y		y		
birds	corncrake	<i>Crex crex</i>	y		y	y	y
birds	reed bunting	<i>Emberiza schoeniclus</i>	y		y	y	
birds	corn bunting	<i>Emberiza calandra</i> subsp. <i>calandra/clanceyi</i>	y		y		
birds	Greenland white-fronted goose	<i>Anser albifrons</i> subsp. <i>flavirostris</i>	y		y	y	
birds	twite	<i>Carduelis flavirostris</i> subsp. <i>bensonorum/pipilans</i>	y		y		
birds	herring gull	<i>Larus argentatus</i> subsp. <i>argenteus</i>	y		y		
birds	common starling	<i>Sturnus vulgaris</i> subsp. <i>vulgaris</i>	y		y		
birds	northern lapwing	<i>Vanellus vanellus</i>	y		y	y	
butterflies	grayling	<i>Hipparchia semele</i>	y		y		
flowering plants	prickly saltwort	<i>Salsola kali</i> subsp. <i>kali</i>	y		y	y	
flowering plants	dune gentian	<i>Gentianella uliginosa</i>	y		y	y	y
flowering plants	a northern marsh-orchid	<i>Dactylorhiza purpurella</i> subsp. <i>cambrensis</i>	y		y		
flowering plants	frog orchid	<i>Coeloglossum viride</i>	y		y	y	
flowering plants	field gentian	<i>Gentianella campestris</i>	y		y	y	
mosses	elegant feather-moss	<i>Eurhynchium pulchellum</i>	y		y	y	
moths	slender Scotch burnet	<i>Zygaena loti</i> subsp. <i>scotica</i>	y		y		
moths	New Forest burnet	<i>Zygaena viciae</i> subsp. <i>argyllensis</i>	y		y		
moth	grass rivulet	<i>Perizoma albulata</i> subsp. <i>albulata</i>	y		y		

Machair is species-rich, diverse and an excellent example of the advantages of low-intensity agriculture. It is also globally rare, known only from Scotland and Republic of Ireland.

The only rare vascular plant species associated with this habitat is the endemic orchid subspecies *Dactylorhiza majalis* ssp. *scotica*, although the sheer abundance of the more common species is still notable in a country where so many traditional meadows and pastures have been converted to species-poor swards for the sake of agricultural productivity.

Uncommon bryophytes include *Rhodobryum roseum*, *Thuidium philibertii* and the rare *Tortella fragilis*.

Machair is an important habitat for breeding birds. The most notable of these is the declining and endangered corncrake *Crex crex*, which has managed to maintain a foothold here where the grasslands are still managed in a traditional way. There are also important populations of waders such as lapwing *Vanellus vanellus*, oystercatcher *Haematopus ostralegus* and redshank *Tringa totanus*. Machair grasslands are also one of the last remaining strongholds of the corn bunting *Emberiza calandra*.

Uncommon invertebrates recorded in this priority type include the belted beauty moth *Lycia zonaria* and the northern colletes bee *Colletes floralis*.

This habitat is also culturally important as part of the crofting landscape and its agricultural tradition.

How do we manage it?

In the past most Machair was managed by seasonal (winter) cattle grazing together with rotational cultivation for potatoes, oats, barley and rye.

Agricultural improvement, changing patterns of grazing, sand and shingle extraction, and recreational activities including the use of off-road vehicles are all potentially damaging.

The best way to maintain the habitat is to continue the traditional management practices with which it has long been associated, whether or not as a part of a subsistence farming system.

References, links and further reading

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Usher, M.B., Bain, C. and Kerr, A. eds. 2000. Action for Scotland's Biodiversity. Scottish Biodiversity Group. Edinburgh, The Scottish Executive and The Stationery Office.

Common Standards Monitoring guidance <http://www.jncc.gov.uk/page-2199>

Countryside Survey: <http://www.countrysidesurvey.org.uk>

National Biodiversity Network (NBN) Gateway <https://data.nbn.org.uk/>

Scottish Government website – information about agricultural grants, subsidies and services: <http://www.scotland.gov.uk/Topics/farmingrural/Agriculture/grants/A-Z/Intro>

Scottish Natural Heritage website: <http://www.nature.scot>

UKBAP information on JNCC website: <http://jncc.defra.gov.uk/default.aspx?page=5155>