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Identifying open mosaic habitat

Open mosaic habitat on brownfield sites can be extremely diverse, supporting a wide range of terrestrial and aquatic habitats. This diversity has made them increasingly important within ecological networks for rare and scarce invertebrates as well as lichens, plants, birds, reptiles and amphibians of conservation concern. However, this same diversity can make them challenging to define, identify and assess appropriately. Without being properly identified, wildlife-rich brownfields supporting open mosaic habitat are vulnerable to being poorly assessed, increasing the likelihood of loss to development or inappropriate restoration.

An introduction to open mosaic habitat on previously developed land

Open mosaic habitats can be extremely diverse, including such wide ranging sites as railway sidings, quarries, former industrial works, slag heap, bings and brick pits. Brownfields with open mosaic habitats show evidence of previous disturbance, either through soil being removed or severely modified by previous use, or the addition of materials such as industrial spoil, with spatial variation developing across the site. The resultant variation allows for a mosaic of different habitats to be supported in close proximity. This habitat diversity can support rich assemblages of invertebrates, which has led to 'open mosaic habitats on previously developed land' being added to the UK Biodiversity Action Plan (UK BAP) as a Priority habitat listed on Section 41 of the Natural Environment and Rural Communities Act 2006 (NERC Act). Its

inclusion in Section 41 is to guide decision makers in implementing their duty under Section 40 of the NERC Act to have regard for conservation of biodiversity, including making it a material consideration in planning decisions.

The value of open mosaic habitats for invertebrates

Brownfields supporting open mosaic habitats have become refuges for rare and scarce invertebrates due to the decline of more natural habitats such as wildflower-rich meadows, heathland, and chalk and acid grasslands. The altered nature of open mosaic habitats leads to fine-scale changes in hydrology, pH and topography, allowing a range of habitats to develop alongside each other. The diversity of habitats is ideal for species which require two or more habitats near to each other to complete their life cycle, while also attracting specialists for each habitat type alongside more generalist species. Many brownfield sites are low nutrient, preventing



Disused sand pit © Jamie Robins



Flower-rich brownfield © Jamie Robins

Criteria for identification of open mosaic habitat on previously developed land priority habitat (Rising *et al.* 2010)

Criterion 1	The site is at least 0.25 ha in size This minimum size may be part of a much larger site containing other habitats or developed land.
Criterion 2	Known history of disturbance at the site or evidence that soil has been removed or severely modified by previous use(s) of the site. Extraneous materials/substrates such as industrial spoil may have been added.
Criterion 3	The site contains some vegetation. This will comprise early successional communities consisting mainly of stress tolerant species (e.g. indicative of low nutrient status or drought). Early successional communities are composed of 1) annuals <i>or</i> b) mosses/liverworts <i>or</i> c) lichens <i>or</i> d) ruderals <i>or</i> e) inundation species <i>or</i> f) open grassland <i>or</i> g) flower-rich grassland <i>or</i> h) heathland
Criterion 4	The site contains unvegetated, loose bare substrate and pools may be present
Criterion 5	The site shows spatial variation, forming a mosaic of one or more of the early successional communities plus bare substrate, within 0.25ha

rapid succession and allowing open vegetation mosaics to develop. Of particular importance is the presence of bare ground, which creates warm microclimates for thermophilic invertebrates to bask, including those at the northerly limit of their range. Bare areas also provide nesting opportunities for ground nesting species and areas for active predators to hunt. Low nutrient sites tend also to have a strong assemblage of nectar-rich, stress tolerant annuals, which provide an abundance of forage. An absence of management provides yet further opportunities by allowing invertebrates to overwinter in seeds, flower heads, leaves and stems, which is increasingly difficult in the modern day highly managed landscape. A number of UK Priority species are strongly associated with brownfields, making their conservation highly dependent on the presence of a network of high quality brownfields to allow their movement throughout the landscape.

However, every brownfield site is different, dependent on its individual character, land use history and location, making definition and identification difficult. During Phase 1 habitat assessments, open mosaic habitats frequently demonstrate a poor fit to traditionally described Natural Vegetation Classification (NVC) communities. This has led to poor site

assessments and a tendency for sites to be extremely undervalued in terms of their biodiversity potential, and the loss of swathes of wildlife-rich brownfields.

Criteria for open mosaic habitat qualification

To help identify which brownfield sites support open mosaic habitat, a set of criteria have been produced which must be met for a site to qualify as supporting UK BAP habitat (see text box above). These criteria will help in identifying high quality habitat, ensuring that sites are appropriately assessed for their value for rare and scarce invertebrates.

Identifying open mosaic habitat on brownfields

A wide range of habitats feature in open mosaic habitat, often appearing in unusual combinations. A selection of images showing open mosaic habitats follow, with key features identified. It is important to note that not all potential habitat types are shown, but the selection of images is intended to be a guide to recognising the presence of open mosaic habitat and particular features of value for invertebrates.

Not all brownfields will support open mosaic habitats, particularly where hardstanding areas dominate, providing only limited opportunities for vegetation or exposed friable material. Brownfield sites which have not undergone significant disturbance or have been disturbed in a similar nature site-wide will often support homogenous habitats such as rough species poor grassland. In addition, where disturbance has been sufficiently historic, sites may have been subject to succession for many years, developing into solid blocks of scrub or woodland. Although such sites may be of some raised wildlife value, they do not present the habitat diversity of open mosaic habitats or have the potential to support as valuable invertebrate assemblages.

Examples of UK BAP invertebrates strongly associated with brownfields

Dingy skipper (*Erynnis tages*), Grayling (*Hipparchia semele*), Shrill carder bee (*Bombus sylvarum*), Brown-banded carder bee (*Bombus humilis*), Distinguished jumping spider (*Sitticus distinguendus*), Five-banded weevil wasp (*Cerceris quinquefasciata*), Four-banded weevil wasp (*Cerceris quadricincta*), Saltmarsh shortspur beetle (*Anisodactylus poeciloides*), Streaked bombardier beetle (*Brachinus sclopeta*), Phoenix fly (*Dorycera graminum*), Black-headed mason wasp (*Odynerus melanocephalus*), Horehound longhorn moth (*Nemophora fasciella*)



- ① Rough grassland
- ② Scrub
- ③ Reedbed
- ④ Bare Pulverised Fuel Ash (PFA)
- ⑤ Sparsely vegetated ground
- ⑥ Topographical variation



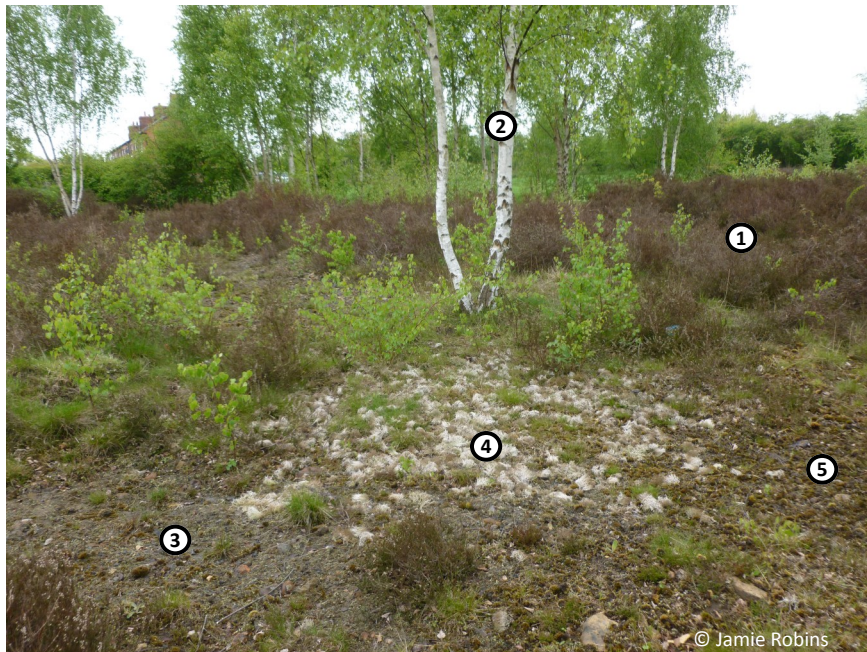
- ① Bare ground
- ② Herb-rich, short sward grassland
- ③ Open water
- ④ Emergent aquatic vegetation
- ⑤ Scrub
- ⑥ Tall ruderal vegetation



- ① Stepped vertical sand faces
- ② Acidic scrub species
- ③ Scrub
- ④ Drought-stressed bramble
- ⑤ Sparsely vegetated bare ground



- ① Early successional vegetation
- ② Hardstanding
- ③ Tall ruderals
- ④ Bramble
- ⑤ Scrub
- ⑥ Moss cover



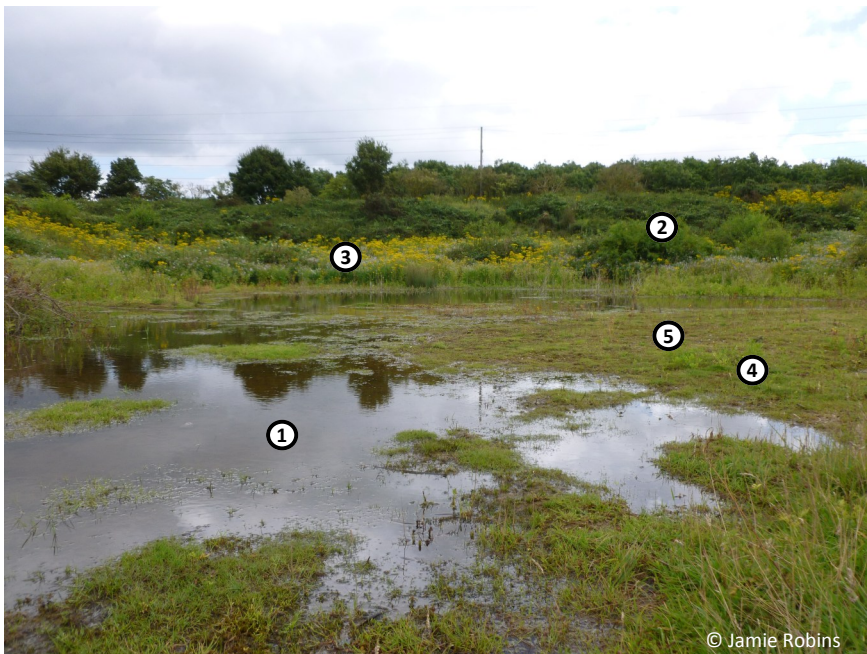
- ① Dwarf shrub heath
- ② Scrub
- ③ Bare ground
- ④ Lichen heath
- ⑤ Moss cover



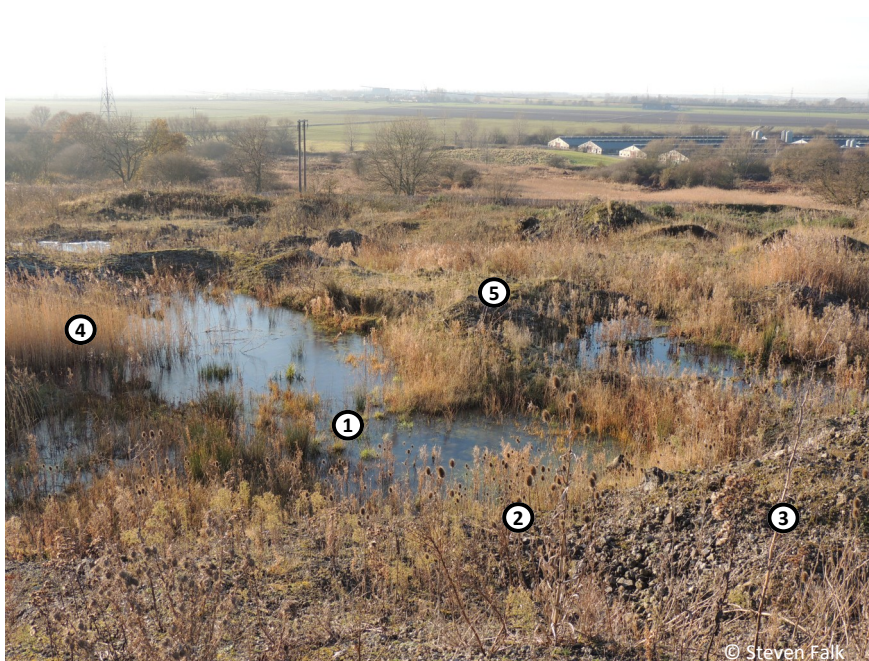
- ① Rubble piles
- ② Tall ruderals
- ③ Sparsely vegetated gravels
- ④ Moss cover



- ① Sparsely vegetated sands
- ② Tall ruderals
- ③ Acidic scrub species
- ④ Bare sandy ground
- ⑤ Scrub



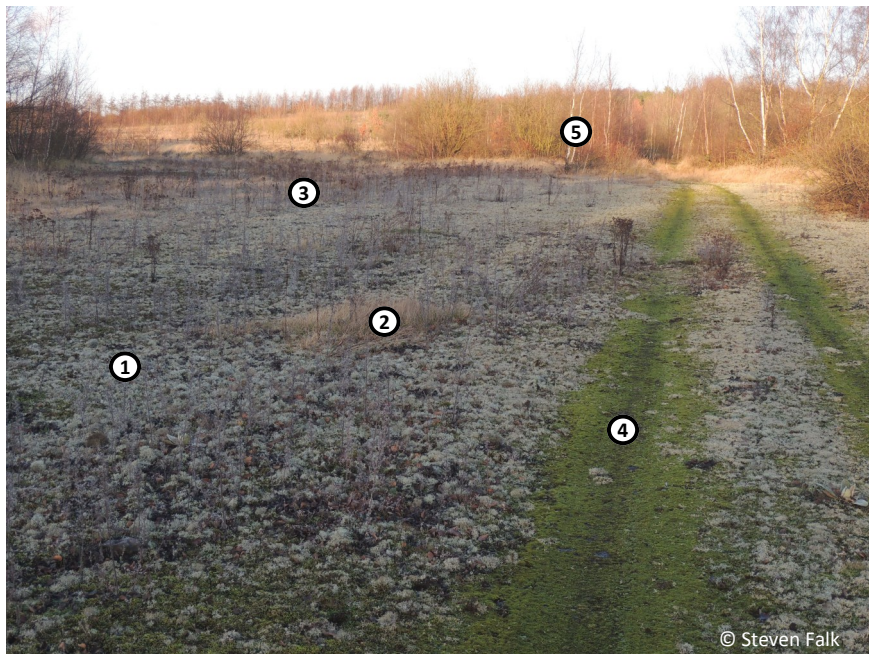
- ① Seasonal pool
- ② Scrub
- ③ Tall ruderals
- ④ Herb-rich short sward grassland
- ⑤ Moss cover



- ① Seasonal pools
- ② Tall ruderals
- ③ Sparsely vegetated gravels
- ④ Reedbed
- ⑤ Topographic variation



- ① Sparsely vegetated ground
- ② Bare Pulverised Fuel Ash (PFA)
- ③ Tall ruderals
- ④ Scrub
- ⑤ Topographical variation



- ① Lichen heath
- ② Herb-rich, short sward grassland
- ③ Tall ruderals
- ④ Moss cover
- ⑤ Scrub

Further information

- Open mosaic habitat field assessment form
- Maddock, A. (ed.), 2008. UK Biodiversity Action Plan Priority Habitat Descriptions: Open Mosaic Habitat on Previously Developed Land. Biodiversity Information and Recording Group (Updated July 2010). Joint Nature Conservancy Committee, Peterborough ([link](#))
- Lush, M.J., Kirby, P., Shepherd, P., 2013. Open Mosaic Habitat Survey Handbook. ExeGesIS Spatial Data Management Ltd, Powys ([link](#))

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