Northern Ireland Priority Habitat Guide: Limestone pavement

What is Limestone pavement?

Limestone pavements are a key component of limestone landscapes that display a range of features referred to collectively as karst. They have developed on mainly Carboniferous age limestones first exposed by the passage of ice sheets during the last ice age, over 16,000 years ago. After the ice finally retreated it left behind sediment that soil developed from allowing the growth of woodland and other habitats in many limestone areas. With the coming of agriculture these areas were cleared and much of the soil was lost, leaving the distinctive Limestone pavement exposed once more. Soil remained in the crevices of the pavement and provides micro-habitats featuring a wide range of plant species, many of which are normally found in woodland habitats and some of which are only found in Limestone pavements.

This type of habitat has taken thousands of years to develop and is distinctively formed into clints (relatively flat areas) separated by grikes (crevices). This unique appearance is caused by rain and groundwater dissolving the limestone along lines of weakness in the rock. Other features are runnels, where water is flowing from clints into grikes, and pits and pans that are found on the surface of clints where rainwater pools and dissolves the rock.

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

Northern Ireland Priority Habitat: Limestone Pavement		
Habitat Directive Annex 1 habitats (SAC Features)	**ASSI features**	**NI priority species**
H8240 - Limestone pavements	Limestone pavement, Karst geomorphology	Skylark, Irish Hare, Dingy Skipper, Hoverfly *Cheilosia ahenea*, Irish Eyebright, Juniper, Clint Crisp Moss

Definition

Limestone pavement in Northern Ireland is defined as:

- Areas of open, bare Limestone pavement and some areas of scrubby Limestone pavement.
- Species rich with a range of characteristic flora and fauna, variable dependent on specific site.
- A wide range of vegetation types can be found locally within Limestone pavement associated with clints, grikes, flushes and features of the landscape.

Where are they found?

In Northern Ireland Limestone pavement is restricted to west county Fermanagh within 8 main localities. Of these the largest areas are found in the Marlbank Area of Special Scientific Interest (ASSI) and within the West Fermanagh Scarplands ASSI and Special Area of Conservation (SAC) .

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 asses in Northern Ireland.

Why are they important to wildlife?

Limestone pavements are an important habitat for a range of Northern Ireland priority species as shown in Table 1. The clint surfaces can support calcareous grassland species where there is thin soil cover, or plants of rocky habitats or lack any vegetation cover. Mosses and liverworts are often prominent including Clint Crisp Moss and Silky Wall Feather-moss. Grikes offer shelter from wind and grazing animals and often support higher plants more typical of base rich woodland, including Herb Robert, Wood Sorrel and Hazel.

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

As the vegetation occurring on Limestone pavement is varied, its quality is based on the continued presence of the geological (karst) features and the historic and desired vegetation for the specific site and appropriate levels of management. Factors which lead to the decline of Limestone pavement habitat include but are not limited to:

- Removal - in Northern Ireland Limestone pavement tends to be damaged and removed as part of land improvement or for farm access and development.
- Quarrying - removal of pavement under extant planning permissions e.g. at some quarry sites, means incidental destruction of Limestone pavement by quarrying is a potential threat to the habitat. Where planning permission exists and Limestone pavement is removed it is important that it does not make its way onto the consumer market.
- Gardening - Limestone pavement has suffered greatly from removal for sale commercially as rockery stone under a variety of names, such as water worn limestone. As it takes thousands of years to form it is not replaceable so this represents a permanent loss of habitat.

- Agricultural improvement - the use of fertilisers, herbicides or pesticides on agricultural land that is near to or on Limestone pavements can alter the characteristic assemblage of flora on the Limestone pavement. It may also eventually lead to a build up of organic matter which can reduce the area of exposed rock. In addition, the infilling of grikes to reduce risk of injury to grazing animals can also occur.
- Grazing - overgrazing is a frequent problem on open pavement and can affect scrubby pavement. Conversely low grazing levels can result in increased scrub growth on open pavement and reduced diversity on scrubby pavement.
- Airborne pollution - acidification and nutrient enrichment from atmospheric deposition may impact the species composition and result in a reduction or loss of the lime-loving species associated with this habitat.
- Climate change – this could potentially alter the species composition and biodiversity of Limestone pavements in Northern Ireland.

Favourable management of Limestone pavement

Limestone pavement important habitat should be protected and maintained where it occurs, and should be restored where its condition has declined. Some of our most important Limestone pavement sites are protected through National and International legislation.

Land reclamation techniques such as use of fertilisers, drainage and reseeding, can result in habitat loss or damage and should be prevented.

Maintenance of the extent of bare, scrubby or thin soil covered Limestone pavement and the hydrology of these areas is of primary importance.

Limestone pavements are best managed by light, extensive grazing (cattle grazing is preferred). Undergrazing and/or overgrazing should be avoided. Risk of poaching should be minimised and any livestock removed off site in very wet conditions. Allowing the natural processes to continue will help maintain the important physical and biological characteristics of the habitat.

Organic and inorganic fertilisers should not be applied as this would reduce species-richness and diversity with a loss of nature conservation value.

Encroaching scrub should be controlled by cutting as it can spread at the expense of the priority habitat. Machinery should only be used where ground conditions permit.

Trees should not be planted or felled on this grassland type and nor should it be used for supplementary feeding or storage areas. Other damaging activities including commercial limestone quarrying should be avoided.

How do we determine the "health" or condition of Limestone pavement?

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 and physical habitat that are relatively easy to measure, but which are reliable indicators of the "health" of the habitat.

For open pavement, the cover of bare rock, surface karst features and presence/cover of indicator plants such as Blue-moor- grass, Wild thyme and characteristic mosses should be maintained and the spread of plants such as Ryegrass, Bracken and shrubs is undesirable. For scrubby pavement, the karst features and the height and extent of

the canopy cover and the presence/cover of woodland plants should be maintained. The spread of invasive species such as Sycamore and excessive grazing damage to trees or ground flora should be avoided.

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: Limestone pavement Indicator species and attributes

Positive Indicators:

CLINTS

Extent of Limestone pavement	
Alchemilla sp.	Lady's Mantle
Anthyllis vulneraria	Kidney Vetch
Campanula rotundifolia	Harebell
Carex caryophyllea	Spring-sedge
Carex flacca	Glaucous Sedge
Euphrasia sp.	Eyebright
Galium verum	Lady's Bedstraw
Helictotrichon pubescens	Downy Oat-grass
Koeleria macrantha	Crested Hair-grass
Linum catharticum	Fairy Flax
Lotus corniculatus	Common Bird's-foot-trefoil
Pilosella officinarum	Mouse-ear Hawkweed
Polygala sp.	Milkwort
Potentilla erecta	Tormentil
Primula vulgaris	Primrose
Ranunculus bulbosus	Bulbous Buttercup
Succisa pratensis	Devil's-bit Scabious
Thymus sp.	Thyme

GRIKES

Extent of Limestone pavement	
Asplenium ruta-muraria	Wall Rue
Ceterach officinarum	Rustyback
Corylus avellana	Hazel
Cystopteris fragilis	Brittle Bladder-fern
Dryopteris filix-mas	Male Fern
Geranium robertianum	Herb Robert
Oxalis acetosella	Wood Sorrel
Phyllitis scolopendrium	Hart's-tongue Fern

Negative Indicators :

Bellis perennis	Daisy
Cirsium arvense	Creeping Thistle
Cirsium vulgare	Spear Thistle
Holcus lanatus	Yorkshire-fog
Lolium perenne	Rye-grass
Senecio jacobaea	Common Ragwort
Trifolium repens	White Clover
Urtica dioica	Stinging Nettle

Appendix 2: National Vegetation Classification codes

Limestone pavement – priority habitat

Though there is no specific code for Limestone pavement, in Northern Ireland it can 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 two main NVC communities which make up Limestone pavement are species-rich variants of:

CG9 - *Sesleria albicans – Galium sterneri* grassland.
CG10 – *Festuca ovina – Agrostis capillaris – Thymus spp.* grassland.
W9 – *Fraxinus excelsior* **–** *Acer campestre – Mercurialis perennis* woodland.

The Limestone pavements priority habitat in Northern Ireland occurs in association with the following NVC communities:

MG5 – *Cynosurus cristatus – Centaurea nigra* grassland
MG8 – *Cynosorus cristatus – Caltha palustris* grassland
M23-24 – *Juncus effusus/acutiflorus – Galium palustre* rush pasture – *Molinia caerulea – Cirsium dissectum* fen medow
S27 – *Carex rostrata – Potentilla palustris* tall-herb fen

See Habitat Action Plan for more information.