Pennine Dales Upland Hay Meadows, England

Richard G. Jefferson
Natural England, Northminster House, Peterborough PE1 1UA, UK, richard.jefferson@naturalengland.org.uk

John S. Rodwell
Consultant Ecologist, 7 Derwent Road, Lancaster, LA1 3ES, UK, johnrodwell@tiscali.co.uk

Physical background
The English Pennine Dales are situated in the counties of North Yorkshire, Durham, Cumbria and Northumberland between the town of Grassington in the south and Allendale Town in the north within the central part of the chain of hills known as the Pennines. The Pennines run from the Trent valley in the English Midlands to the Tyne valley in northern England and are often referred to as the “backbone of England”. They rise to about 900m and are cut by a series of glaciated river valleys or dales which predominantly drain to the east and south. The dale bottoms lie at altitudes between 200 to 400m. The Pennines of central and northern England are largely composed of rocks of Carboniferous age, mainly limestones, sandstones and shales (Taylor et al., 1971), though the Dales themselves are largely underlain by limestone. Along the valley bottoms, there are accumulations of glacial drift, fluvial gravels and alluvium. The soils of the Dale bottoms are typically loamy brown earths or calcareous brown earths which may be free-draining or partially gleyed and prone to winter water logging. They have usually been modified by farming practices, particularly the addition of liming materials and fertilisers and in some cases, the installation of sub-surface drainage. The soil reaction is normally within the range pH 5.1 to 6.6 and the soils of the agriculturally unimproved meadows have low levels of extractable phosphorus and potassium (Jefferson, 2005).

The climate of the Pennine Dales is sub-montane. The winters are cold and stormy with up to 50 days observed snow or sleet. Between 1971 and 2000, there was an average of 75 days of air frost between November and April recorded at 400 m aod at Malham, near Grassington. The growing season normally begins in late April to early May which is later than in any other part of England and Wales but late frosts may occur after this time. Summers are short, cool and cloudy and the windy, wet weather of autumn sets in early (Rodwell, 1992). There is an average of 1200 sunshine hours/year. Annual rainfall ranges from 900 to 1800 mm with 180-200 rain hours/year. There is a tendency to surface leaching in the free-draining soils, even where the parent material is derived from limestone, while more clayey soils tend to be impeded for much of the year.

Cultural history
The present cultural landscape of the Dales has evolved under human influence since Mesolithic hunters first established themselves over 7,000 years ago by burning woodland to create temporary clearings (Raistrick, 1968; Roberts, 1978). Settled pastoral agriculture probably dates from the Neolithic period which saw the commencement of woodland clearance. There is archaeological evidence for the presence of farmsteads and villages on the drier hill slopes in the Iron Age/Romano-British period (Raistrick, 1968). By the Roman period, woodland was mostly confined to the heads of the valleys and the encircling slopes. The Viking settlers who arrived in the 9th and 10th centuries were forced to establish their farms on the higher ground at the valley heads/valley sides as the valley bottoms were already well-populated with farming communities of Celtic and Anglo-Saxon origin (Whyte, 1990). At the valley heads one can still find Scandinavian place-names, among which –thwaite (from –tveit) is one of the most revealing: it means ‘clearing’ or ‘place from where hay is cut’, evidence that hay meadow management began a long time ago (Cooper et al., 1997). By 1100, the basic foundations of today’s settlement pattern, consisting of farms, villages and common-field agriculture had been largely established (Raistrick, 1968).

Nature value of the landscape*
The traditionally-managed upland hay meadows occur in the valley bottoms and lower slopes between 200 and 400m. They conform to the Triseto-Polygonion grasslands found in sub-montane meadows elsewhere in Western Europe (Rodwell et al., 2007). They have been described in Britain as the Anthoxanthum odoratum-Geranium sylvaticum grassland (MG3 in the National Vegetation Classification, Rodwell, 1992) and consist of an intimate mixture of grasses and herbaceous dicotyledons. No single plant is obviously dominant, though some of the dicotyledons are bulky clonal species which form prominent clumps.

Of the grasses, Anthoxanthum odoratum, Festuca rubra, Holcus lanatus, Agrostis capillaris and Poa trivialis are the most frequent with