

# Holocene, Northern England

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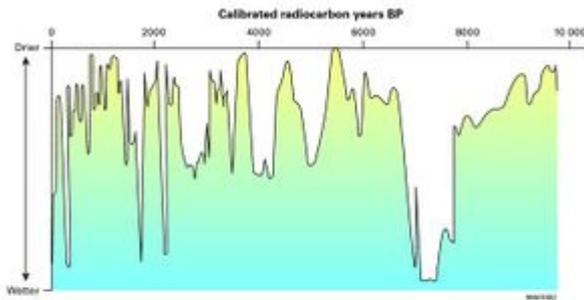
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## Introduction

Approx. age (Ka BP)	Climatogeographical stage		Marine isotope stage	Climate	Environment	Human cultures	Typical large herbivore faunas	Representative deposits	Characteristic features
	A	B							
1	Sub-Atlantic		II	Temperate	Mixed forest (oak, oak ssp, larch, birch)	Historical	Domestic animals	Wedge ground, landscaped ground Peat bog growth	Urbanisation Peat erosion
2	Sub-Atlantic								
3	Sub-Boreal		III	Temperate	Mixed forest (oak, decid)	Bronze Age	Celtic deer	Silt obliteration on floodplains	Spodosol growth
4.2	Sub-Boreal								
5.4	Atlantic		I	Temperate, more relatively cold	Oak, elm, pine, siber forest	Neolithic	Red deer	Tidal flat and coastal deposits	Sea clearance Sea meandering rivers
6.7	Atlantic								
7.8	Boreal		II	Temperate, dry	Fine forest forest	Mesolithic	Red deer	Estuarine silt	Sea levels restored Landscape modification Invasion of glacial deposits Forest expansion Rapid sea level rise
8.7	Boreal								
10	Pre-Boreal		I	Warm continental	Birch-pine forest	Aurochs	Aurochs		
11.55	Pre-Boreal								
11.65	Last Laminar Stadial		Low	Cold local glaciation	Tundra-glacial	Late Upper Palaeolithic	Reindeer, bison, horse	Sandflats, river sands, loam, silt, till	Cirque glaciers, scree Ice wedge polygons Mansions Onset of large herbivores Initiation of modern drainage
11.65	Windermere Interstadial								
14.7	Dunlinian Stadial		Mid	Warm continental	Birch forest	Mesolithic	Elk, goat, deer, reindeer	Kettlehole deposits, organic silt, peat, marl	Initiation of modern drainage
14.7	Dunlinian Stadial								
26	Dunlinian Stadial		3	Glaciation, dry polar desert	Arctic tundra, grasses and sedge-glacial	Non-oharian	Mammoth, woolly rhino, steppe bison, horse	Extensive till and other glacial deposits Mead, stream	Kettleholes, till plains, meltwater channels, drumlins, eskers, and moraines, valley sander
26	Dunlinian Stadial								
40	Mid		3	Variable, generally cold	Open, heath	Early Upper Palaeolithic	Mammoth	Glauconitic Formation	Slow peatification Sea level "high"
40	Mid								
59	Upton Warren		4	Arctic	Tundra	Middle Palaeolithic	Reindeer, woolly rhino, steppe bison, woolly rhino	Woolly Back peat	Ice wedge polygons
59	Upton Warren								
80	Brimpton		4	Continental, temperate to polar desert	Pine, birch, spruce forest	Middle Palaeolithic	Reindeer, woolly rhino, steppe bison, woolly rhino	Woolly Back peat	Ice wedge polygons
80	Brimpton								
90	Chalfont		4	Continental, temperate to polar desert	Pine, birch, spruce forest	Middle Palaeolithic	Reindeer, woolly rhino, steppe bison, woolly rhino	Woolly Back peat	Ice wedge polygons
90	Chalfont								
100	Chalfont		4	Cold	Open, heath	Middle Palaeolithic	Reindeer, woolly rhino, steppe bison, woolly rhino	Woolly Back peat	Ice wedge polygons
100	Chalfont								
11.6	Pre-Boreal		I	Warm temperate	Mixed forest	Non-oharian	Hares, straight tailed sheep, roe deer, red deer, fallow deer	Scrubbed Back peat Troughed peatland Hutton Henry peat	Pre-ice peatification Peat bog growth
11.6	Pre-Boreal								
12.8	Pre-Boreal		I	Warm temperate	Mixed forest	Non-oharian	Hares, straight tailed sheep, roe deer, red deer, fallow deer	Scrubbed Back peat Troughed peatland Hutton Henry peat	Pre-ice peatification Peat bog growth
12.8	Pre-Boreal								
18.6	Woolwichian (late)		II	Arctic	Periglacial tundra-glaciation	Mammoth, woolly rhino, horse	Mammoth, woolly rhino, horse	Worms House Gill Till	Ice wedge polygons
18.6	Woolwichian (late)								

Representative regional deposits and events of the last two glacial-interglacial cycles to affect northern England. P916117.



Changes in mire surface wetness and implied rainfall during the Holocene at Walton Moss, Cumbria. P916106.

The Holocene began abruptly at 11.55 ka BP when the warm Gulf Stream current became re-established, providing an ameliorating influence on the climate of the British Isles. Average summer temperatures rose by about 8°C within 100 years. The widespread occurrence of bare, unstable soils at the beginning of the Holocene led to intense fluvial erosion and deposition, with enhanced debris flow activity on mountainsides and extensive formation of landslips as the ground thawed. The rivers were generally braided with gravelly beds. Soils gradually became more stable following the establishment of vegetation, firstly by pioneering herbs, shrubs and scrub communities similar to the succession of the Windermere Interstadial, and later by woodland.

Trees colonised the district from the south, at first mainly via the coastal lowlands, which were much more extensive than today owing to lower sea level in the early Holocene (see below). Later arrivals came via the Lancashire lowlands and the Vale of York. Most species spread relatively late into the Cumbrian Mountains, Pennines, Cheviots and particularly the Isle of Man. A distinct early phase of juniper dominance was quickly replaced by birch and willow woodland. Hazel became firmly established on the fringes of the Irish Sea and around Teesside by about 10 ka BP, possibly aided by human immigration. An expansion of elm at about 9.6 ka BP generally preceded oak, which arrived between 9.2 and 8.35 ka BP, especially in low-lying fertile areas. Pine spread into southern Cumbria between 9.5 and 8.7 ka BP, and then became established on the Zechstein Group limestone outcrop in County Durham. The arrival of alder at about 7.8 ka BP coincided with the transition from the drier, 'Boreal' climate period to the wetter, 'Atlantic' one in the mid Holocene (P916117). Lime arrived shortly after and all the elements of the mixed mid Holocene deciduous forest were present by 6.7 ka BP when dense tree cover dominated the landscape of all but the highest parts of northern England. Ash, maple, yew and beech all increased later in the Holocene as a result of human intervention.

The Mesolithic hunter-gatherers began to burn forests in the earliest Holocene, perhaps to increase the availability of food resources, but substantial clearance did not begin until about 6.7 ka BP with the arrival of cereal farming in the Neolithic. This preceded the 'Elm Decline' — an important biostratigraphical marker in pollen records that defines the end of maximum forest extension at about 5.6 ka BP. Forest clearance increased between 4.3 and 2.9 ka BP in the Bronze Age, with the most extensive deforestation occurring between 2.4 and 1.8 ka BP in the Iron Age. Despite the spread and retreat of the great Holocene forests, many species of the late glacial tundra flora of the district persist to the present day on the limestone soils of Upper Teesdale, including *Dryas octopetala* (the mountain avens, a small, white-flowered plant of the Rosaceae), after which was named the 'Younger Dryas' stage — the alternative name for the Loch Lomond Stadial used in continental Europe. Many wetland sites have also survived throughout the Holocene and preserve a valuable record of climatic change. For example, analyses of protozoan spores, plant macrofossils

and humification in peat cores from raised bogs such as Walton Moss, Cumbria, have identified cyclical wetter and drier episodes ([P916106](#)).

Although the imprint of glaciation and periglaciation remains dominant, postglacial processes have superimposed subtle, but distinctive modifications on the landscape of northern England, particularly around the coasts. Steep hillsides have been modified by gullying, slope failure, soil-creep and debris flow; valley floors have been sculpted by fluvial erosion and deposition; tidal inlets have become choked with muddy estuarine alluvium and salt marsh deposits. Periglacial processes continue to operate on ground above about 450 m OD, particularly on Cross Fell but also elsewhere, creating a range of similar, but smaller features to those formed during earlier periglacial episodes. Peat growth accelerated at the beginning of the Atlantic climate period with extensive ombrogenous blanket mires forming over the wet uplands and within poorly drained topographical depressions. Diatomaceous deposits accumulated locally in lake basins where there was relatively little sediment influx, such as at Kentmere, near Kendal. The single-thread, submeandering stream patterns of the present day became established early in the Holocene once soils had been stabilised by vegetation, but catchments have been profoundly affected by subsequent deforestation, land drainage, cultivation, overgrazing, mining, gravel extraction and industrial development.

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