Wet heaths are damp areas found within both lowland and upland heathlands. Characterised by a dwarf vegetation of heathers and gorses, heathlands occur on impoverished mineral and peaty soils. Wet heath is most commonly found in the wetter north and west of the country, and is dominated by mixtures of cross-leaved heath, deer grass, heather and purple moor-grass, over carpets of *Sphagnum* and other mosses.

Terrestrial wetland habitats are formed by the flow and retention of water in the landscape. Their nature is determined by landform and hydrological pathways, the characteristics of the water supply, and climatological and biological influences which generate a mosaic of wet heaths, fens, bogs, and other habitats of various degrees of wetness and types of hydrochemistry.

The UK Biodiversity Action Plan (published in 1994), described the biological resources of the UK which were identified as being the most threatened and required conservation action – our priority species and habitats. Detailed plans set out actions to protect and restore our threatened wildlife, and work continues today, as a key part of the delivery within Biodiversity 2020 and the Water Framework Directive (WFD). Across catchments, action to enhance or create Priority Habitats can benefit adjacent water bodies, for example via land management changes which reduce pollutant inputs and enhance water quality. The same is the case with the restoration of degraded ecosystems (outcome 1D) through activity such as reconnecting rivers and their floodplains.

**WFD AND B2020 SYNERGIES: SOME CROSSOVER**

As terrestrial wetland habitats, wet heaths fall under the Water Framework Directive primarily as a feature of water-dependent Protected Areas, which must achieve their conservation objectives under the Directive. Delivery under WFD can also benefit a wide range of species that are the focus of B2020 Outcome 3 (protecting species). Under Biodiversity 2020, activity to enhance or create Priority Habitats (Outcome 1a or 1b) can benefit adjacent water bodies, for example via land management changes which reduce pollutant inputs and enhance water quality. The same is the case with the restoration of degraded ecosystems (outcome 1D) through activity such as reconnecting rivers and their floodplains.

**WET HEATHS IN A CATCHMENT CONTEXT**

A typical heathland ecosystem encompasses transitions from dry heathland though humid to wet heath, and finally into valley mire, as part of a heathland mosaic. Wet heaths will form on valley floors over acidic, nutrient-poor substrates (shallow peats or sandy soils with impeded drainage) where rainfall accumulates, as well as in localised depressions and where groundwater emerges as springs and flushes. Distinct vegetation types occur both as permanent features and as seasonally flushed communities within wet
heaths, and the transitions to associated wet woodland or mire can also be particularly species rich. Ponds (including temporary ponds) nested in wet heath can themselves be priority habitats.

In those catchments which contain wet heaths, their protection, restoration and future function will be influenced by the management/restoration of the catchment’s heathland areas as a whole, and by the wider hydrological regime.

**Wet Heaths**

Generally, where water regimes are unimpacted by drainage, wet heaths will be at least seasonally waterlogged, with the depth to water table rarely more than 20 cms throughout most of the year. Rainfall percolates from higher ground through heathland soils, accumulating where land form or geology dictate, and creating conditions which discourage tree and scrub invasion. A natural water level regime is key to the maintenance of wet heaths (further supported by appropriate management, such as grazing).

The habitat is a feature of heathlands across the country, but is more prominent in the wetter north and west. It is characterised by the presence of cross-leaved heath which thrives in permanently moist conditions, as well as heather, sedges, grasses and sphagnum bog mosses. Bog asphodel and black bog rush may be prominent in the wettest areas. In the extensive wet heaths of the north, lichens are common, whilst in the drier south, wet heaths have a more restricted distribution, but a more varied flora, supporting marsh gentian, brown beak-sedge and other species with a southerly distribution. Distinctive communities are also found in Cornwall, where climate and geology favour Cornish heath; along the south coast, where the nationally-rare Dorset heath is found alongside gorses and bristle bent; and at the transitions to other habitats types, such as where the influence of base-rich water or montane conditions causes a shift in species composition. They are a key habitat for a number of vascular plants and bryophytes, some of which have an important part of their EU and world distribution in the UK.

Management by light grazing gives rise to a varied structure of tall grassy tussocks interspersed with shorter grazed stands and locally poached peaty hollows, supporting scarce species including marsh clubmoss and brown beak-sedge. This diversity is of value to invertebrates, providing habitat for a variety of true flies, rove beetles and spiders. Bog bush cricket, southern damsel-flies, silver studded blue butterfly and black bog ant are also found.

Ponds – including peat cuts, shallow pools – some large, formed naturally, and poached hollows may provide breeding habitat for natterjack toad, with taller tussocky vegetation providing nearby cover. Bird species more commonly associated with wet grassland can be found, such as snipe and redshank, as well as those of dry heaths, like nightjar. Wet Heaths may also support extremely rare invertebrates, such as the spangled water beetle, found only in the ponds of Woolmer Forest SAC.

Whilst the broad hydrological processes that lead to formation of wet heaths are understood, the eco-hydrology of individual wet heath sites is often little-known. Many have been affected by significant hydrological modification, particularly historic drainage and ditching, the impact of which often goes unremarked.
PRESSURES ON OUR WET HEATHS

The loss of heathland across the UK and Europe to afforestation, agricultural intensification, development and mismanagement has been widely recognised, (with around 80% of the UK’s lowland heathland lost, for example), but the further loss and degradation of wet heath communities is primarily associated with artificial drainage.

In the past 200 years, and particularly in the post-war agricultural expansion, large areas of heath were lost to farming and forestry and, in the lowlands, to development. In the south, this contraction and fragmentation has contributed to the cessation of management on the remaining resource, where smaller isolated and particularly more urban sites are difficult to graze. Wet heaths then become dominated by rank purple moor grass, and eventually invaded by birch, alder and willow scrub. In the uplands, where grazing management has generally persisted, over-grazing of remaining sites leads to the loss of structural and species diversity. Burning, a traditional management tool across the uplands, can also lead to the loss of key species where too frequent. In the lowlands, arson, and increased risk of fires due to climate change, are a concern.

As in other low-nutrient habitats, enrichment via nitrogen deposition from air pollution and the influx of nutrient-rich water (agricultural runoff, effluent from Sewage Treatment Works) can both impact the structure and function of the habitat, in particular by causing shifts in vegetation communities.

However as a wet habitat it is drainage that has the most significant impact upon the quality of wet heaths. Drainage schemes were extensively implemented to dry out land for agriculture, forestry or grazing, or simply to maintain low water levels on adjacent land. Where drains remain, even where choked with vegetation, water levels remain lower than prior to drainage. Drier conditions see increases in the abundance of dry heath species, facilitate the establishment of invasive rhododendron, and hasten succession to woodland.

These effects may be exacerbated in a changing climate where reduced rainfall is experienced, and climatic shifts may also facilitate the spread of the damaging heather beetle.

KEY PRESSURES ON WET HEATHS

MANAGEMENT: The abandonment of traditional practices, such as grazing and controlled burning, leads to succession in wet heaths and the loss of wildlife

ENRICHMENT: Nutrient enrichment via nitrogen deposition and from effluent and agricultural runoff causes shifts in plant communities on wet heaths

DRAINAGE: Drainage schemes across the whole catchment directly affect sensitive heath habitats and their wildlife as they depend on an intact water regime

CLIMATE CHANGE: Predicted drier, warmer summers will cause increased drying out, leading to peat loss and major changes in plant and animal communities

HABITAT LOSS: In the past, wet heaths have been lost to development, and many remaining sites are small and fragmented, making management difficult

MANAGEMENT: Most heathlands have been degraded – lowland soils are intensively farmed as arable crops or pasture, and upland areas are afforested
• **RESTORATION OF NATURAL PROCESSES**

Measures that seek to restore natural processes – hydrological, geomorphological and water quality regimes – are key to delivering wetland habitat objectives. These range from protection (e.g. tackling pollutant inputs) to direct intervention (e.g. blocking drains). On wet heaths more so than other drained habitats, drainage works tend to have been small-scale, making rectifying them more straightforward – meaning that wet heaths present significant potential for the restoration of hydrological regimes, benefitting declining species like marsh club-moss. Understanding historical modifications and their impacts allows practitioners to consider how the site would function under natural processes, taking this as a foundation for planning restoration, and factoring in implications for existing habitats in and adjacent to the site.

• **LARGE-SCALE PERSPECTIVE**

The condition of wet heaths depend on many factors including what is happening in the catchment and in the atmosphere above. Restoring hydrology and natural water quality and chemistry is crucial – it is not only about addressing direct impacts on the heath itself. Fragmentation is also a key issue affecting wet heaths, but management as a component of a larger mosaic of dry heath and peat bog can help to support, buffer, expand and reconnect small functional patches of the habitat.

• **TAKING ACTION IN THE RIGHT ORDER**

Interventions undertaken within heaths, such as water-level raising and drain blocking, will not deliver the greatest possible biodiversity benefits unless external pressures like nutrient inputs are tackled first.

• **TAKING THE LONG VIEW**

Whilst active intervention such as removing tussocks of purple moor grass or scraping nutrient enriched topsoil can be important in kick-starting restoration, taking a longer term approach enables natural recovery to play the fullest role possible. For instance, long-term plans to tackle water quality issues will support the return to a more natural hydrological regime. A long-term vision encourages management decisions which are more sustainable, particularly if the seemingly ‘immoveable’ socioeconomic constraints of today may be resolved in the longer term.

• **SPECIES MANAGEMENT**

In some circumstances the preferred management regimes for key species and habitats may be incompatible. For example, there could be conflict between the desire to maintain scrub or trees for rare moths, and to remove tree growth to recreate heathland/ bog mosaics. As with all priority habitats, the ideal, of course, is that wet heaths develop within landscape-scale initiatives, where natural hydrological processes will create a full range of self-sustaining habitats and dependent species populations. At a smaller scale, when restoring naturally functioning habitats the implications for priority species and other species of conservation concern need to be considered (see below).

• **RATIONALISING CHANGES IN SPECIES DISTRIBUTION AND ABUNDANCE**

The current distribution of many rare (and more common) heathland species is limited as a result of previous habitat loss or degradation. Plans for species conservation and ecosystem restoration should therefore take into account the (positive and negative) implications for species of the restoration of natural processes, and of climate change. Suitable habitat needs to be maintained or created to prevent local or regional extinctions and to aid species recovery. Direct management, including reintroduction, can also be considered to assist in the transition to restored environmental conditions.
• **SUCCESSION**

Heathland habitats have experienced significant modification over time, so it can be unclear as to which point along this succession is most desirable for conservation; the restoration of intrinsic environmental characteristics and unimpacted water supply mechanisms are principles which form a clear basis for sustainable restoration. An appropriate aim might be a functional mosaic of heath, grassland and bog habitats representing a range of successional stages, maintained by natural hydrological process and appropriate grazing management.

• **BARRIERS TO CONNECTIVITY WITH WIDER ENVIRONMENT**

Reinstating connectivity is a key step in restoring a naturally functioning wetland environment. Non-natural features such as water control structures within and around wetlands should be addressed where possible; modification of structures (or their operation) to minimise their impacts is the next best option. A long view will often need to be taken, where other factors such as poor incoming water quality need to be addressed before physical restoration is effective; and wherever impacts will be felt more widely, for example, if neighbouring land may become wetter.

• **SEASONALITY**

Seasonal habitats like ephemeral pools and seasonally exposed bare ground support an array of characteristic flora and fauna, but can be destroyed by drainage, infilling or deepening. Natural seasonal water-level fluctuations are essential for their continued functioning.

• **UNDERSTANDING THE LOCATION OF EXISTING FRESHWATER BIODIVERSITY**

To maximise the benefits of restoration work, and eliminate damage to priority or endangered species, it is important to obtain a clear picture of the distribution of local freshwater biodiversity, (indeed, this knowledge is legally necessary for some species). Practitioners should take account of standing water, running water and wetland biodiversity. Specialist advice can be valuable; for example, work being undertaken by the Freshwater Habitats Trust to identify ‘Important Freshwater Areas’ could inform local delivery.