

Vision for Essex Lowland Raised Bogs

Safeguarded, improved and extended raised bog habitats appreciated for their wealth of wetland wildlife.

Water levels are managed to benefit wildlife at all seasons.

Populations of key national and Essex species have increased and are spread more widely throughout the county.



Lowland Raised Bog

National Description

Lowland raised bogs are peatland ecosystems which develop primarily, but not exclusively, in lowland areas such as the head of estuaries, along river flood-plains and in topographic depressions. In such locations drainage may be impeded by a high groundwater table, or by low permeability substrata such as estuarine, glacial or lacustrine clays. The resultant waterlogging provides anaerobic conditions which slow down the decomposition of plant material which in turn leads to an accumulation of peat. Continued accrual of peat elevates the bog surface above regional groundwater levels to form a gently-curving dome from which the term 'raised' bog is derived. The thickness of the peat mantle varies considerably but can exceed 12 metres. In the UK lowland raised bogs are a particular feature of cool, rather humid regions such as the northwest lowlands of England, the central and north-east lowlands of Scotland, Wales and Northern Ireland, but remnants also occur in some southern and eastern localities, for example Somerset, South Yorkshire and Fenland.

Lowland raised bogs may develop from a preceding phase of fen via successional processes or, if the climate is sufficiently wet, by peat formation directly onto a bare substrate, a process known as 'paludification'. Accumulation of peat separates the bog surface from the influence of groundwater, so that it becomes irrigated exclusively by precipitation. This type of ecosystem is known as an 'ombrotrophic' (or 'rain-fed') bog. Consequently, the surface of a 'natural' lowland raised bog is typically waterlogged, acidic and deficient in plant nutrients. This gives rise to a distinctive suite of vegetation types, which although low in overall diversity, support specialised plant assemblages dominated by a colourful range of mosses of the genus *Sphagnum*, (Baltic bog-moss *Sphagnum balticum*, Skye bog-moss *Sphagnum skyense*) as well as vascular plants adapted to waterlogged conditions such as the cotton grasses *Eriophorum* spp. Lowland raised bogs also support rarer plants such as the bog mosses *Sphagnum pulchrum* and *Sphagnum imbricatum* as well as a number of higher plants which have become increasingly scarce in the lowlands including bog rosemary *Andromeda polifolia*, great sundew *Drosera anglica* and cranberry *Vaccinium oxycoccos*.

The raised bog surface may support a patterned mosaic of pools, hummocks and lawns, a microtopography created in part by the growth of the plants themselves. This provides a range of water regimes which support different species assemblages. *Sphagnum* mosses are the principal peat forming species on natural UK lowland raised peat bogs, and their dominance in the living vegetation layer gives a bog its characteristically 'spongy' surface. The ability of this layer to store water is thought to be important in keeping the bog surface wet during the summer.

A number of plant communities defined by the National Vegetation Classification can be found on raised bogs. Plant communities that are typical of natural raised bogs include the bog pool communities M1 to M3 and M18 *Erica tetralix* - *Sphagnum papillosum* raised and blanket mire. In addition a number of communities, including M15 *Scirpus cespitosus* - *Erica tetralix* wet heath, M19 *Calluna vulgaris* - *Eriophorum vaginatum* blanket mire, M20 *Eriophorum vaginatum* blanket and raised mire, M25 *Molinia caerulea* - *Potentilla erecta* mire and W4 *Betula pubescens* - *Molinia caerulea* woodland, can be found on raised bogs which have been subject to some disturbance such as drainage or peat-cutting.

Lowland raised bogs also support a distinctive range of animals including a variety of breeding waders and wildfowl and invertebrates. Rare and localised invertebrates such as the large heath butterfly *Coenonympha tullia*, the bog bush cricket *Metrioptera brachyptera*, and mire pill beetle *Curimopsis nigrita* are found on some lowland raised bog sites. Peat accumulation preserves a unique and irreplaceable record of plant and animal remains and some atmospheric deposits from which it is possible to assess historical patterns of vegetation and climate change and human land-use.

As elsewhere across north-west Europe there has been a dramatic decline in the area of lowland raised bog habitat since around the start of the nineteenth century. The area of lowland raised bog in the UK retaining a largely undisturbed surface is estimated to have diminished by around 94% from an original c95,000 ha to c6,000 ha at the present day (England 37,500 ha reduced to 500 ha, Scotland 28,000 ha to 2,500 ha, Wales 4,000 ha to 800 ha, Northern Ireland 25,000 ha to 2,000 ha).

Historically, the greatest decline has occurred through agricultural intensification, afforestation, and commercial peat extraction. Future decline is most likely to be the result of the gradual desiccation of bogs damaged by a range of drainage activities and/or a general lowering of groundwater tables.

STATUS IN ESSEX

Many people might be surprised to learn that bogs actually occur in Essex. However, they were once relatively numerous, and occurred in a number of our forests, heaths and commons. Their spectacular decline to only a handful of sites has passed largely unnoticed by the conservation community, whilst similar downward trends in more familiar habitats such as ancient woodland and grassland have been halted, if not entirely reversed. Bogs are one of the few habitats likely to disappear from the county in our own lifetime.

A flick through the pages of Gibson's flora of Essex published in 1862 gives an indication of the scale of the loss. No less than 11 plant species (see Box 1) associated with this habitat were recorded by Gibson, but not by Jermyn in his flora around 100 years later.

Box 1 Bog plants which had become extinct in Essex in the period between Gibson's (1862) and Jermyn's (1974) floras of the county

Cranberry <i>Vaccinium oxycoccos</i>	Flea sedge <i>Carex pulicaris</i>
Grass of parnassus <i>Parnassia palustris</i>	Few flowered sedge <i>Carex dioica</i>
Alternate water-milfoil <i>Myriophyllum alterniflorum</i>	Yellow sedge <i>Carex viridula ssp oedocarpa</i>
Many-stalked Spike-rush <i>Eleocharis multicaulis</i>	Tawny sedge <i>Carex hostiana</i>
Broad-leaved cotton-grass <i>Eriophorum latifolium</i>	Marsh club-moss <i>Lycopodiella inundata</i>
	Ivy-leaved bellflower <i>Wahlenbergia hederacea</i>

Unfortunately, the decline did not stop there, and since Jermyn's study many relatively common bog plants have come perilously close to extinction. Box 2 lists a further 13 bog plants now confined to two or fewer sites. Without urgent conservation action many of these species are likely to disappear from our county before we reach the 50th anniversary of Jermyn's work in 2024.

Box 2 Bog plants likely to become extinct in the next 25-50 years, figure in parenthesis represents the number of remaining sites

Round leaved sundew <i>Drosera rotundifolia</i> (1)	Marsh fern <i>Thelypteris palustris</i> (1)
Intermediate leaved sundew <i>Drosera intermedia</i> (1)	Flat sedge <i>Blysmus compressus?</i> (1)
Common cotton-grass <i>Eriophorum angustifolium</i> (2)	Star sedge <i>Carex echinata</i> (2)
Bogbean <i>Menyanthes trifoliata</i> (1)	Bog pondweed <i>Potamogeton polygonifolius</i> (2)
Lesser skullcap <i>Scutellaria minor</i> (2)	Marsh violet <i>Viola palustris</i> (1)
Smooth-stalked sedge <i>Carex laevigata</i> (2)	Bilberry <i>Vaccinium myrtillus</i> (1 but appears to have gone extinct)
Yellow sedge <i>Carex viridula ssp oedocarpa</i>	

Despite the fact 'Lowland raised bog' is a UK Biodiversity Action Plan¹ priority habitat, it has failed to attract the level of attention paid to other BAP habitats. As well as the tendency to be viewed as rather unappealing, making it difficult to attract funding for management, bogs have possibly been overlooked by conservationists because they require a more holistic approach to their preservation than the familiar prescriptions of mowing, grazing and felling.

Water is the key factor influencing a bog's wildlife interest, adaptation to waterlogged anaerobic conditions characterising the range of specialist plants found within them. Unlike bogs in the northern and western uplands, direct rainfall is usually not insufficient to keep them wet. As a result, many are situated in hollows and valley bottoms where water collects and is maintained by an impervious substrate or a high water-table.

Understanding what is going on underground is thus critical to ensuring a bog's survival. Once the water level begins to drop or water supply is interrupted previously locked up nutrients are released as the peat dries. This 'flush' tends to precipitate an invasion by plants not typically associated with waterlogged conditions, such as birch, bracken, aspen, creeping soft-grass and rushes. Once established, these species shade out bog specialists and lead to further drying of the habitat, woody species in particular tending to have a higher rate of evapotranspiration (i.e. they lose more water through evaporation from their leaves). Therefore, whilst removing invasive vegetation may help restore the bog, on its own this is unlikely to address the underlying cause of the problem, and it will need to be coupled with measures to retain and improve water supply.

Pinpointing the precise reason behind a bog drying-out is often difficult, but widespread drainage of surrounding countryside as agricultural 'improvement' gathered pace after World War II; together with the fact many sites occur in areas rich in gravels and sands which have been subjected to long periods of extraction, have both contributed to a general lowering of the water table. In addition, there is evidence to suggest that whilst winters have been getting wetter, summer droughts are now more frequent, and a run of very dry summers may be sufficient to trigger the type of invasion described above.

Despite what seem insurmountable difficulties, there is hope for Essex's bogs, as the majority are in sympathetic ownership. In fact the most significant remaining examples are in the care of Essex Wildlife Trust (Pheasant Wood, Woodham Walter, Thrift Wood and Gernon Bushes) and the Corporation of London (Lodge Road and Wake Valley). The Trust has already begun to re-evaluate the management of bogs in its care, and acknowledge that a more ambitious approach is required to restore them to their former glory.

Targets

National Targets		Lowland raised bog	target date
1	No net loss 53,347ha		ongoing

East of England Targets		Lowland raised bog	target date
1	No specific East of England region targets		2015

Essex Targets		Lowland raised bog	target date
1	No net loss c10ha (estimate)		2020
2	Restore 100%		2020