Marsh clubmoss *Lycopodiella inundata*

One of the UK's most prehistoric species

Species Profile

Imagine a time when dragonflies were the size of seagulls and vast lowland swamp forests were dominated by giant club mosses, tree ferns, horsetails and prehistoric creatures.

Today, the New Forest in some ways reminds us of this prehistoric time - clean unpolluted and seasonally fluctuating water table, primitive species, dragonflies, lampreys and ferns. In this New Forest environment an interesting species still exists very similar to its evolutionary ancestors. This plant *Lycopodiella inundata*, or marsh clubmoss as commonly known, is not a true moss but a primitive non-flowering plant, more closely related to ferns. The clubmosses form part of a group of plants that remain virtually unchanged since they first evolved over 400 million years ago.

As you cast your eye over the New Forest wetlands or heathland habitats, on first impressions it can look a fairly bleak landscape, move in a little closer and in fact these ecosystems are on par with a tropical rainforest. The plants and animals of these micro communities offer such interest, vibrancy and wonder to the onlooker. Alongside its plant allies, marsh clubmoss certainly stands out from the crowd in terms of its rarity here in the British Isles, nevertheless its friendly plant companions stand together and tell us an important story of the space they occupy.

Marsh clubmoss has creeping horizontal stems growing to between 5-20cm in length. The strobili which houses and releases reproductive spores form at v junction of two horizontal stems and grows vertically, sometimes to 10cm high. In late summer the strobili develop pale brown spore cases at the tips.

The vast tracts of uncultivated wetland and traditional grazing allow opportunistic colonisation of non-competitive specialist plants thriving in areas of clean unpolluted seasonally saturated ground. This and the intricate mix of grazing and the depressions left by ungulate animals prevent the growth of competitive grasses and rushes creating the perfect home for some of our rarest plant species.

In the New Forest, the Dorset Heaths and Thames Basin Heaths, marsh clubmoss has just about managed to maintain a presence. The rest of its distribution across the UK is a bleak situation. Historically marsh clubmoss has been recorded in 220 10km squares, but since 1987 it has only been found in 53 squares, representing a decline of 76% from its former range. Now officially classified as an endangered species, it is protected by law in the UK, under Schedule 8 of the Wildlife and Countryside Act 1981. For the marsh clubmoss Dossier click here.

The loss of this species is a sign that the whole ecosystem is under pressure and struggling for survival. Each species that is lost, it triggers another, and so on in a domino effect. These habitats and species deserve our highest regard and the highest levels of protection. We know healthy habitats support biodiverse communities, store carbon, form part of the water cycle and contribute to clean air and my offer even more ecosystem services that we have yet to understand.

The Species Recovery Trust in partnership with the Freshwater Habitats Trust and other land management and conservation bodies in the New Forest are committed to long term monitoring of this species. The presence and abundance of this species is important in it own right but is also an indication of the quality of the habitat. Monitoring over a sustained period of time can help us to understand how these rare habitats are changing and can help inform our future land management decisions.

Clubmosses have a fascinating life cycle, like all mosses and bryophytes, they follow alternating generations (both haploid and diploid generations). For marsh clubmoss it happen in association with a symbiotic fungus. Once spores are released from the strobili they grow into gametophytes and these either produce sperm or eggs. Fertilisation occurs when the sperm swims towards the eggs in the wet habitats in which it lives. They can also reproduce asexually, when an extra horizontal stem grows and produces its own strobilus, which eventually breaks off to become its own plant.

Surveys have also led to the discovery of new populations deep within the blanket bogs, away from any disturbance. In these cases the pristine quality of the bogs, combined with permanent waterlogging, has created a unique environment where marsh clubmoss can grow on top of the sphagnum mosses, using them as a hydroponic mat.

We have a superb bunch of volunteers who monitor most of the populations across the forest each year (we're always keen for more people!) and this is also allowing us to track changes in these population over time. One of the most interesting discoveries allowed us to track the impacts of the unusually harsh winter of 2017-2018 (remember all that snow!). At the time we were worried about the clubmoss, as so many populations had sat under the snow and seemed to disappear after the melt, and then just two months later they re-emerged with an average of four times more plants. For a species that grows up into the arctic circle, it had maybe been waiting for a winter like this to trigger a massive regeneration.

Sadly, like financial investments, numbers can go down as well as go up, and over the last four years we have seen many populations vanish. So far, they've been largely replaced by new finds, but as the world grows hotter and summer droughts become more intense, we will continue to keep a close eye on this ancient treasure.

Marsh clubmoss has survived the ravages of a changing world since the early carboniferous period, surviving at least two mass extinction events, and we will continue to work tirelessly to prevent the sixth mass extinction event we are now witnessing, being the end for this, and other rare species. For more information on the species and monitoring click here.

By Gemma Stride Freshwater Habitats Trust and Dominic Price Species Recovery Trust - August 2020