

Lye Valley Fens (old Hogley Bog) Plants and Fungi

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Introduction

The north and south section of the Lye Valley Fen SSSI are now within the bounds of Oxford City not far from Headington (1). The SSSI comprises the two remaining sections of a once much larger tract of peaty wetland known in previous centuries as Hockley-in-ye-hole, Hogley bog, Ogley Bog, Headington bog, Bogs under Bullingdon Green and most recently Bullingdon Bog. It is a **calcareous (alkaline) valley-head spring-fen** that has retained a botanically diverse short fen flora. There remains only just over a metre of peat, the whole site having been extensively cut-over for fuel in earlier centuries. Botanically, the two small North and South sections (total area 2.5 Ha) contain portions with the nationally rare **M13** Black Bog-rush (*Schoenus nigricans*)-Blunt-flowered Rush (*Juncus subnodulosus*) mire community with some parts closer to **M22** Blunt-flowered Rush-Marsh Thistle community (Rodwell, (2)) and some areas of species-poor Common-reed or Lesser Pond-sedge dominated communities. These communities are the reason for SSSI designation in 1972. Of the 41 plant species listed by Wheeler, Shaw and Money (3) as particularly characteristic of M13, 21 species remain today in the Lye Valley and four more used to be present. Full botanical details of the recent state of the habitats are in my unpublished reports to Oxford City Council (4 & 5) and site records are available on request to Thames Valley Environmental Records Centre (TVERC) (6).

The Oxfordshire group of calcareous species-rich fens is the largest remaining set of such habitats outside East Anglia and North Wales and contains elements of the flora and fauna which are intermediate between those areas. There are 13 fens designated SSSI in Oxon, with the Cothill complex of fens being also designated SAC.

Due to urban development enclosing the Lye Valley site on two sides and lack of management after common land status and its associated grazing disappeared, the area of wetland between these two fragments has scrubbed up to wet woodland and some of the springs have dried up. The site is mentioned for example in Fojt (7) and in a discussion of the Valley-head Fens of the Oxford region by Wheeler (8). Whilst past peat cutting has removed most of its vegetational history, it was probably important in perpetuating the bryophyte-rich, early seral stages that may have been lost in more undisturbed sites. It thus retains some very scarce bryophytes and is the only site for some in VC23.

The Lye Valley fen SSSI units known as North Fen and South Fen are now separated by some 600m of former fen which is now wet woodland forming a corridor to the Boundary Brook and which is designated a Local Wildlife Site. The North Fen is part of a larger section of the brook corridor owned by Oxford City Council and managed as a Local Nature Reserve. The South Fen is in private ownership (a number of separate owners, each of whom owns a thin strip).

Important flowering plant species, losses and recoveries

There have been significant species losses due to scrubbing-up and drying-out as a result of flash-flooding and erosion in the adjacent brooks. Losses include **Black Bog Rush** (was last seen by Francis Rose in 1983 (9)) **Butterwort** (last seen in the mid-1990s) and **Round-leaved Sundew** (last record 1964). These losses may be reversible, because some species thought lost have recurred with better management. However, Grass of Parnassus, Marsh Lousewort, Marsh Valerian, Bog Pimpernel and Marsh Pennywort are all doing well and there are particularly impressive (and increasing) numbers of Marsh Helleborines (over 2000 flower spikes total last year). All these have otherwise been reduced to very few sites in Oxfordshire and the South-east generally. Eighteen types of sedge and two cotton grass species are still to be found, alongside the tiny Bristle Club-rush and the Few-flowered Spike Rush (this last in its lone county station, having been lost from every other Oxon wetland site in either VC22 or VC23). Amongst the sedges, the site has important and thriving

populations of Long-stalked Yellow sedge, Tawny Sedge, Distant Sedge and Bottle Sedge. Flea sedge has recurred in the last few years and Dioicious sedge has recently been re-discovered. There are a total of **22 flowering plants** present that are currently on the draft **Rare Plants Register** for Oxon (currently being compiled by members of the Rare Plants Group of the Ashmolean Natural History Society of Oxfordshire (10) although it has to be noted that some of these are present in very small populations. Grass of Parnassus had been lost from the North area during a rank vegetation and scrub phase, but now that scrub is gone, it has recently been successfully re-introduced by seed transfer from the South area. There are a significant number of very local species present as well, such as: Greater Tussock Sedge, Marsh Arrowgrass, Devil's-bit Scabious, Twayblade, Common Spotted Orchid and Southern Marsh Orchid. Runnels and small marly pools on the fen surface support the stonewort *Chara vulgaris*, here in a very rare habitat type.

See the species list of important Lye Valley plants. This leaves out very common species and those not associated specifically with wetlands. Invasion and dominance by common reed and willow scrub has been the biggest cause of species losses in the past.

Management

The North Fen (previously known as Bullingdon Bog) owned by Oxford City Council, has had remedial scrub removal, willow pollarding and reed vegetation cutting and raking in one part annually for the last 27 years and thus has retained the most diverse flora. A larger part of the spring-fed wetland in this north area on sloping ground was difficult to cut and had progressed to common reed dominance; but has recently (with the help of a Natural England grant) had remedial reed cutting and raking and thus is returning to short, biodiverse fen. With the involvement of the Oxford Conservation Volunteers and a group of local residents, more raking up is possible and a greater area of the site can be returned to favourable short fen condition in the near future. The South Fen has had remedial scrub removal and vegetation cutting and raking only since 2009. This is the unit suffering the greatest degree of peat drying-out due to flash flooding and erosion in the nearby brook. It also has a degree of invasion by Himalayan Balsam, which is tackled annually by a group of local volunteers. The North Fen has a small patch of Japanese Knotweed which is treated with herbicide every year. Grazing would be desirable but is not possible due to proximity to urban development and heavy access to the area for dog-walking on the adjacent footpath. In the southern section, golfers on the adjacent golf course hit balls over the South Fen from one hole to the next fairway. For the last couple of years I have been a voluntary adviser on conservation management to the City Council and Natural England for this site and other fen sites in Oxfordshire.

Comparison with other Oxon Fen sites

According to my survey results, there have been substantial losses of good, short-fen flora in other sites in Oxon. Most fens in private hands have suffered a lack of sufficient management, meaning succession to tall herb fen/reed monoculture and in many of them, progression to wet woodland is common (e.g. Spartum fen, Weston Fen, Barrow Farm fen, Gozzard's Ford fen). Only the VC 22 fens such as: the Cothill Fens SAC, Dry Sandford Pit SSSI and one of the Frilford Heath SSSI fens retain a good diverse short flora due to active management. Even in these, there have been specific rare plant and bryophyte losses. In VC 23, only Sydlings Copse SSSI fen (managed by the Local Wildlife Trust, BBOWT) has had extensive remedial management involving pony grazing. Here some things are returning (lots of Bog Pimpernel and small amounts of the moss *Palustriella commutata*) although the flowering plant and bryophyte flora remains as yet much impoverished compared to the years before rank vegetation and willow scrub dominated. The Cothill fens and Frilford Heath Golf course fens have had extensive remedial cutting or cutting and grazing for the last couple of years, resulting in gain of short fen flora and recurrence of some 'lost' species such as Bog Bean, Flea sedge and Bladderwort in small populations.

Bryophytes

The calcareous wetland bryophytes still present in the Lye Valley form a particularly valuable assemblage in a county context. They form the focus for crunchy tufa (travertine) formation. In the current Flora of Oxfordshire (Killick, Perry & Woodell, (11)) the interesting bryophyte flora of the 'spring-head fens' is mentioned and Bullingdon Bog is mentioned as one of the chief examples. Despite some sad losses (*Philonotis calcarea*, *Aulacomnium palustre*) there is still much of bryological interest even though the rarer species are reduced to small populations. Apart from ubiquitous *Calliergonella cuspidata*, there are good amounts of commoner calcareous wetland species such as *Aneura pinguis*, *Pellia endiviifolia*, *Ctenidium molluscum* and there are substantial quantities of species otherwise much scarcer in the county such as: *Fissidens adianthoides*, *Climacium dendroides* and especially good amounts of *Palustriella falcata*. The scarce leafy liverwort *Chiloscyphus pallescens* is increasing in the Lye Valley but has been seen in only one other Oxon fen. The SSSI citation quotes the moss *Drepanocladus revolvens*, but specimens of this examined by Mark Hill in recent years have confirmed that for both Lye Valley SSSI units it actually is the rarer *Scorpidium cossonii*, a species more typical for such a highly calcareous site where the mosses are tufa-encrusted. A small relict population of *S. cossonii* is still present in each of the North and South Fen SSSI units. This moss is only otherwise found in the SAC site of Cothill Fen in Oxon., VC22 and not at all elsewhere in VC23. The two *Plagiomnium* species (*P. elatum* and *P. ellipticum*) are present as extensive sheets in the N fen and unusually, fruiting has been seen. The site was well-known in a bryological context to E. W. Jones (12) and to Francis Rose (under the name of Bullingdon Bog). Similar low-growing, bryophyte-rich, fen communities are reported to have all but disappeared from the East Anglian Fens and Norfolk Broads (Porley & Hodgetts (13)).

Botanical Recording History

The whole site has a long history of botanical recording since the 1600s by botanists from nearby Oxford University Botany department (only a short walk away, on the site of the current Botanic Garden) and is thus regularly mentioned in the early manuscripts and Floras of the County e.g. by Morison (1699) Sibthorp (1794) and Druce (1886, 1927). Many specimens from the site collected in the 18th and 19th century are held in the current Oxford University Plant Sciences Department Herbarium. As most of these still species survive on the site, it is thus important in a historical botanical context. It is responsible for a good few first County records. For instance, the first county record for butterwort, *Pinguicula vulgaris* was here by Parkinson in 1640 ('in a common about a mile from Oxford neere a village called Herington (Headington)'). Whilst Butterwort has not yet recurred, all the following are still growing on site. First County record for flea sedge, *Carex pulicaris* was by Merrett from this site in 1667 (as 'Hockley of the Hole') for Bottle Sedge, *Carex rostrata*, was by Bobart from this site (as 'Hockley') in 1699 and for Parsley Water-dropwort, *Oenanthe pimpinelloides*, by Dillenius was in 1746 (as 'Hockley in ye Hole'). Even earlier, before the first University botanists, the Belgian botanist Matthias de L'Obel visited Oxford in 1569 and saw grass of Parnassus, *Parnassia palustris* in 'Angliae ad Oxoniam' (England, around Oxford) – The resulting record in his book of 1571 (14) is the first published national British record of this species. Of all the sites 'around Oxford' that he could have observed with grass of Parnassus, the Lye Valley is the best candidate and the **only one where grass of Parnassus still survives today**. As regards bryophytes, the Oxford herbarium has a H. Boswell specimen recorded as '*Hypnum sendtneri/falcatum*' in 1859 from the site (as 'turf bogs under Bullingdon Green'). His specimen is actually *Scorpidium cossonii*. There is a Boswell specimen of what is now called *Palustriella falcata* from the site (Bullingdon Bog) collected in 1861. Remarkably, both scarce mosses still survive at the site today, despite fears drainage would eliminate them more than 100 years ago. The site is well known and visited by more recent botanists such as H. Bowen and the authors of the current Flora of Oxfordshire, J Killick, R Perry and S. Woodell (11). I first started studying and recording at the North Fen in 2003 and at the South Fen in 2007.

Fungi

Two important fungi have been recorded in the area as a result of my investigations – the Alder bolete, *Gyrodon lividus*, (Red list 'Near threatened' and the only Oxon site in which it has been found to date) which is mycorrhizal with roots of alders on stream adjacent to the South Fen unit plus a section of the nearby stream corridor. The second is a porate bracket, *Trametes suaveolens*, (Red list 'Vulnerable') on the dead wood stump of a crack willow along the Lye brook adjacent to the North Fen unit. Neither are directly dependent on the springs, but water quality and quantity may certainly be important for *Gyrodon* in association with live alders. My observations are that the *T. suaveolens* seems to fruit in this area only on dead wood very near to water in the Oxford area (the Thames Valley may be a hotspot for this species – pers. comm. Mycologist Martyn Ainsworth at Kew).

Problems at this Site

1. Arson

Up to 2007 the unmanaged common reed dominance of certain parts led to a dry thatch build up which was the target of regular arson attacks. Since the institution of more far-reaching reed cutting and raking there have been no such burn episodes. Some dense reed areas have been retained for birds and reed-specific insects.

2. Insufficient management

This has been a problem in the past, particularly in the South Fen area due to difficulty in getting an agreement with its multiple private owners. Recent Natural England grants have secured the appropriate management by the City Council for the next few years, helped by the efforts of a small local volunteer group and the Oxford Conservation Volunteers. However, when the grant money runs out, there will be a challenge to achieve funding for the now more extensive tree, scrub and reed control that is necessary. Only the SSSI areas are actively managed annually. The LWS areas could do with much more management but get very little.

3. Springs drying up due to development

Urban infill development around the sites continues since the first housing estates and hospital buildings were built in the catchment from the 1930s. Some of the spring line on the valley sides obviously does not produce as much water as in the past therefore the fens are less wet and not so extensive. Water that should infiltrate to recharge the Corallian limestone aquifer is instead directed by hard surfacing into road run-off drains which empty into the brooks, resulting in erosional damage.

4. Flash flooding and erosion of the brook beds

In 1979 a Thames Water 15 inch dia. road drain was installed to direct road surface run-off water into the Lye Brook above the North Fen area. It collects road surface water from as far away as the Oxford ring road. Within a year flash-flooding was causing major erosion of the brook banks and the stream bed adjacent to the SSSI fen. The bed of the brook was lowered by at least **1.5m in one year**. Thus the water table was lowered in the adjacent peat, starting the drying-out of peat nearest the stream. Remedial raising of the stream bed next to the fen with a large quantity of limestone chippings was attempted in 1985. Continued erosion is now removing these stone chippings. In 2011, Thames Water funded a hydrological study into the effects of their road drain on the SSSI northern section. Their report and new remediation suggestions are awaited. Below the North Fen area, the Lye Brook joins the Boundary Brook and the common watercourse runs past the South Fen area. As the Boundary Brook also has road surface run-off water directed into it (including all the run-off from the large Churchill Hospital site) this augments the flash-flooding from the Lye Brook and the erosion of the banks adjacent to the South Fen is much more severe, continuing down into the Oxford Clay so the brook now runs in a deep channel with a maximal bank depth of **1.78m**. Consequent lowering of the water table has meant that the drying-out of the peat in the South Fen area is much more extensive than in the North Fen, partly because no remedial stream bed raising has ever been attempted.

5. Climate change

Assuming the medium CO2 production scenario, climate predictions for this area of the country by UKCIP are that it will receive up to 50% reduction in total summer rainfall (10% annual overall reduction) thus reducing aquifer re-charge and spring flow. Also it will have up to 30% heavier rainfall in the winter months. During these months the rain may be expected to arrive as much more sudden, intense events, which will therefore have much more potential to cause erosion via extra run-off. See UKCIP, '**changes in wettest days of summer and winter**' (15).

Future Risks

The near future sees several major building developments all happening in a short time within the vicinity of the site. These may affect either aquifer recharge for the springs or increase peat drying by exacerbating flash-flooding erosion.

In 2007 I was employed as an ecological consultant by Oxford City Council to study and report on the potential effect of the building of 1,640 houses on the golf course adjacent to part of the site. A colleague was employed to look at hydrological issues. Both our reports indicated that there would be a very negative impact on the SSSI of such development (mainly due to catchment issues, run-off erosion and public pressure) and it was put to one side. My report is still viewable on the City Council website (4). The hydrologist (C. Lamberth) calculated the surface and ground water catchments for both the North and South sections of the SSSI, so it is clear where development may have a serious impact in terms of lack of water infiltration and consequent aquifer recharge. His hydrological report is still viewable (16).

During 2011, Oxford City Council consulted on possible future development sites within the city. A new 18-unit housing development is planned for immediately adjacent to the North Fen (near Warren Crescent) and also major re-developments are planned for the adjacent large Churchill Hospital site. Both are within the calculated and thus known catchment of the North Fen. Oxford University is re-developing its medical research facilities near the Boundary Brook on the Old Road Campus and included are plans to build on green areas at the previous Park Hospital site. Whilst these sites are outside the catchment of the North Fen it is possible that site-run off will increase to the Boundary Brook, even with full SUDS in all these developments. Increased brook flow may exacerbate problems at the South Fen. On such cramped development sites, infiltration SUDS are said not to be possible, large interception tanks seem to be the solution to slow the run-off to the brook. All SUDS decline in effectiveness with time as the pore spaces block up. Expensive annual maintenance to keep them effective may not be carried out and attenuation tanks have to have sufficient spare capacity (buffer) to cope with the 30% more rainfall as intense events in the climate change predictions. With housing developments, even full SUDS installed and fully and correctly maintained in perpetuity, will not stop householders legally paving/concreting over rear and front gardens if they so wish, preventing water infiltration into the aquifers and causing more rainwater to run-off into surface drains.

'**SUDS will mitigate**' seems to be the mantra of the City Council as if it will solve all problems of development. For the reasons given above, I have strongly objected to this statement at every consultation that has occurred on all future developments. Mitigation means only 'reducing the damage' and this will not in my view be good enough in the case of development which will potentially affect the Lye Valley fens.

Within the calculated, known, fen catchments every drop of water that currently falls needs to fully infiltrate if the Lye Valley fens with their diverse and historic flora are to survive into the future.

Future Positive Indicators

The populations of a good number of rare plants are increasing on the site, Natural England have achieved the correct management and many local people both care for the site and are involved in the groups carrying out voluntary management.

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