Yorkshire Water Biodiversity Fund

Expanding priority habitats in the Lower Ure Valley (Tranche 2)

Update: July to October 2023

LOWER URE CONSERVATION TRUST

A second tranche of funding has been generously provided by Yorkshire Water for the Lower Ure Conservation Trust's work to expand priority habitats, extending from June 2022 to May 2024. This report summarises work undertaken in July to October 2023.

Flasks Fen

Five years in, we're starting to see some rewarding outcomes to our fen creation project despite some frustrating set backs. Thanks to the co-operation of Tarmac's quarry team, better management of water levels since early summer has been of great benefit.

The 'wet' reedfen and sedge-bed plots continue to mature, with the former a well-structured jungle of tall 'reeds' (Common Reed and Great Fen Sedge), sedge tussocks and smaller plants such as Kingcup and Water Mint. This can now be considered a 'self organising' plant community which has developed its own dynamic character. Breeding birds in this habitat in 2023 included Moorhen, Sedge Warbler and Reed Bunting with Shoveler (a nationally uncommon breeding bird) attempting to do so. In late July, a Bittern was a welcome visitor with Bearded Tit calling in October. By early autumn, the staccato song of Cetti's Warbler was a familiar sound in Flasks Fen as a number of these birds established winter territories.

Meanwhile, moth trapping in the summer months produced a remarkable 271 species in the Fen area. These included some characteristic wetland species with Southern, Obscure, Bulrush, Small and Silky Wainscots all recorded. Aquatic invertebrates were monitored in April, August and October; a modest 34 taxa were recorded and abundance was generally low. Water beetle interest appears to be concentrated in the mossy edge habitat rather than in standing water, with the two tiny hydrophilids *Chaetarthria seminulum* and *C. simillima* co-occurring. Both are nationally uncommon.

Management of Common Reed *Phragmites australis* is likely to become a key issue in future years, as the wettest part of our 5-year old transects are becoming increasingly reed-dominated. Selective cutting began in mid-September with the aim of confining dense reed to the outer margin of the fen. Summer cutting is traditionally used to suppress *Phragmites* by reducing the ability of the rhizomes to draw-down oxygen via the hollow stems during winter flooding. However, it's likely that grazing would be a more sustainable method so we're assessing options for next year.

A 2 x 2 metre plot was mown on 6th August 2022 following baseline vegetation recording. This was monitored in July 2023 to examine the effects of mowing (Table 1, page 2 of this report). There had been a small increase in plant diversity, from eight to 11 species. Cover of Common Reed was reduced from 65% to around 40% but cover of Great Fen Sedge had halved, while Tufted Sedge had increased significantly (due to wider spread of tussock crowns rather than increased number of plants). Invasive *Crassula helmsii* had marginally increased.

Species	Cover (%) July 2022	Cover (%) July 2023
Phragmites australis (Common Reed)	65	40
Carex elata (Tufted Sedge)	15	22
Cladium mariscus (Great Fen Sedge)	18	9
Crassula helmsii (Pigmyweed)	5	9
Mentha aquatica (Water Mint)	1	5
Iris pseudacorus (Yellow Flag)	3	3
Typha latifolia (Greater Reedmace)	1	3
Eleocharis palustris (Common Spike-rush)	-	3
Typha angustifolia (Lesser Reedmace)	1	1
Juncus subnodulosus (Blunt-fld Rush)	-	1
Equisetum arvense (Field Horsetail)	-	1

Table 1: Monitoring of mown reedfen plot in Transect 2

At the drier end of the reedfen ecotone, a 20 square metre plot at the edge of the winter flood zone is a particular highlight (cover photo). It now contains at least 44 vascular plant species, including several such as Northern Marsh Orchid which have colonised spontaneously. It has a wonderful mosaic of vegetation architecture, with 'reeds', mid-height understorey species (mainly Blunt-flowered Rush, Purple Moor-grass and Purple Small-reed), tussocks and a low, mossy field layer. Intriguingly, invasive *Crassula helmsii* has dimished in this plot with an expanding ground layer of bryophytes such as Pointed Spear-moss.

Our narrow zone of Blunt-flowered Rush fen-meadow has also matured and is now recognisable as a well-defined plant community. We began mowing this zone in September to prevent mats of rush smothering smaller plants.

Several hundred additional wetland plants were planted in early August. These included sandbags of Lesser Reedmace to reinforce the outer perimeter at the northern end of the Fen, and large plants of Great Fen Sedge to replace some of those lost to siltation last winter, as well as fen-meadow and wet grassland species.

A total of 860 Great Fen Sedge plants were planted between August and October, together with small amounts of Cyperus Sedge and Great Water Dock. Hopefully these will consolidate some of the gaps in last year's planting caused by siltation.

While it was frustrating to lose some of last year's *Cladium* planting to over-winter siltation, the species has put on exceptional growth in the less affected areas, as has Grey Club-rush (photos below).

The dead-hedge outer barrier was bolstered at its northern end with a wall of straw bales to act as a silt trap.

A belt of Lesser Reedmace forms the outer perimeter of the northern part of Flasks Fen, reinforcing the dead hedge as a wave-break and silt trap. Planting in sandbags is safer and easier for our volunteers.

The fen-meadow in early August

Great Fen Sedge planting, August 2022

Great Fen Sedge planting, October 2023

Better exclusion of rabbits and deer has allowed far more plants to flower than previously in the fen-meadow, including Yellow and Purple Loosestrifes, Hemp Agrimony, Sneezewort and Meadowsweet. Carnation Sedge and Purple Small-reed, both important sward components in this habitat, show increasing vegetative spread, the former species now forming an extensive blueish turf. We dug two pools to intercept low-nutrient groundwater flowing into the fen-meadow, and planted these with Bottle Sedge and Common Cotton-grass. Around 50 plugs of Parsley Water-dropwort were planted out in October.

Directly seeded plots

Two small plots were dug-over to create a seedbed and sown by hand using locally-collected fen seed in 2021 and 2022 respectively. In the 2021 plot, seedlings of Meadowsweet and Yellow Flag perished in last year's hot summer with only Purple Moor-grass surviving. This continues to grow well. In the 2022 plot, Yellow Flag is the only fen species to germinate in quantity.

Our site may be particularly challenging for seedlings due to herbivore pressure and the tendency of sandy-silt soils to parch at the surface during dry summers, making planting a more effective option for establishing fen plants than direct seeding. However, grassland plants appear better able to establish from seed sown straight onto a prepared bed.

Purple Moor-grass plot, August 2023

Reedbed Fen

The fen planting at the southern end of the Reedbed, completed in February, had mixed success. About 40% of the berm was planted with tussock-forming sedges, which are thriving. The remainder was planted with Great Fen Sedge and a mixture of other species. This area wasn't securely fenced because of water levels at the time, and was adopted by the local Mute Swans as a loafing area. As a result, many plants were lost. We fenced and replanted this area in October, with mixtures of Tufted Sedge, Cyperus Sedge, Greater Tussock Sedge, Bladder Sedge, Great Fen Sedge, Greater Spearwort, Water Mint and Great Water Dock.

Nursery news

Visitors to the nursery included Harrogate & District Naturalists' Society (twice!) and on 22nd September we were delighted to host a well-attended visit as part of the Richmond Walking and Books Festival. Our ecologist gave a talk to the AGM of High Batts Nature Reserve on 10th October, explaining the historical background to local habitats.

On 27th October, we were able to give Astrid Biddle from Hertfordshire & Middlesex Wildlife Trust a guided tour of wetland creation work at Ripon City Wetlands and Flasks Fen, and show her how we're propagating Scarce Tufted Sedge for HMWT's project to secure the future of this critically-endangered plant, which is known in Great Britain only from a single wet pasture in Hertfordshire.

We've adapted our sandbag-planting method to accommodate large emergent plants such as Great Fen Sedge grown in 1-litre pots. This involves placing single plants in half-sandbags for rooting-in in a wet bed before planting out. The results so far are promising and we've posted a 'how to' guide on the LUCT website (https://www.luct.org.uk/plant-propagation).

A method for planting large emergent plants in shallow water

Our fen creation site, Flasks Fen, is located at Nosterfield Quarry in North Yorkshire. Water levels fluctuate due to quarrying operations, so much of our planting has to take place in shallow water. We quickly discovered all sorts of drawbacks with the usual technique of digging a planting hole, not least that it was a wet and uncomfortable activity for volunteers with the added problem that plants often floated out of their holes afterwards.

We developed a method for planting 3 to 5 plants in compost-filled, biodegradable sandbags, which are then placed in wet beds until they are rooted through (see https://www.luct.org.uk/plant-propagation). The sandbags can then be lowered into place without digging. This technique proved very successful but was less suitable for establishing large plants such as those grown-on in 1 litre pots. Here we describe an adaptation of the sandbag planting method for larger plants.

Step 1: Cut a biodegradable sandbag in half. One half can be used as-is, the other will need stitching, using blanket stitch with biodegradable string or hessian twine or by machine with cotton or biodegradable thread.

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Wetland creation in the wider Lower Ure Valley

Our vision for expanding priority habitats in the Lower Ure Valley extends beyond Nosterfield Nature Reserve. In 2021, we worked with the Yorkshire Wildlife Trust to establish a fen zone around the margins of the Canal Field reedbed at Ripon City Wetlands, a former sand and gravel quarry between the River Ure and Ripon Racecourse. When we re-visited on 10th October, it was heartening to see how well this had established, with a broad fringe of Tufted Sedge reflecting the tussocky vegetation seen in local gypsum dubs and kettle-hole fens. Other plants such as Common Club-rush, Grey Club-rush and Blunt-flowered Rush have also established, creating a structurally-diverse fringe. To this we added 50 'half sandbags' of Great Fen Sedge. As with Flasks Fen, occasional grazing by ponies or cattle will likely be required to prevent Common Reed taking over but initial results are extremely promising.

Comparison of photos shows just how quickly fen plant communities can establish in favourable conditions (page 8). Given similar results with Great Fen Sedge at Flasks Fen (page 3), this shows that nationally-uncommon communities can be established remarkably rapidly using local-provenance planting. Of course this has implications for carbon and nutrient sequestration as well as habitat creation. It would be valuable to understand more about the ecosystem services fen creation can deliver.

Our ecologist sampled aquatic invertebrates from the fen fringe habitat, and found both high species diversity and exceptional abundance of water bugs and beetles. Forty-three species of aquatic Hemiptera and Coleoptera were recorded, including several local species. Potentially, predators such as rails, grebes, small herons and Water Shews could find this attractive habitat. Small fish were also abundant.

We returned to Ripon City Wetlands on 27th October, with another 200 plants of Great Fen Sedge planted at the Canal Field lagoon (photo below).

Also in October, our friends at High Batts Nature Reserve near North Stainley began planting Great Fen Sedge grown at the LUCT nursery in what will become Pennycroft Fen. This wetland of around 1.5 ha which will eventually be part of the restored Hansons Aggregates Ripon Quarry. There is some uncertainty regarding post-extraction water levels, so this is a small-scale initial experiment.

Above: Planting Tufted Sedge at Canal Field Lagoon on 1st October 2021.Below: the same margin on 10th October 2023.

Threatened plant conservation

A visit to the Lower Derwent Valley National Nature Reserve in the Vale of York in mid July was kindly facilitated by the Natural England reserve team. We were able to collect (hopefully) viable seed of **Marsh Stitchwort**, a Priority Species: seed collected from a lower Swaledale site last year was fungus-infected. We also collected seed from a large stand of **Marsh Pea**: seed pods were plentiful, suggesting the population comprises more than a single clone. In due course, we will try to cross-pollinate with our plants of South Yorkshire origin, which are suspected to have limited genetic diversity. We now have a small cohort of Lower Derwent seedlings.

In August, we were delighted to see seedlings of both **Rare Spring Sedge** (*Carex ericetorum*) and **Scarce Tufted Sedge** (*C. cespitosa*) emerging. Given the very small amount of Rare Spring Sedge seed which was gathered from Burton Leonard Lime Quarry, the appearance of several seedlings was encouraging indeed. Scarce Tufted Sedge is even rarer, known from only one location in Britain, in Hertfordshire. Hertfordshire & Middlesex Wildlife Trust asked us if we would try to germinate some seed for them, and results were surprisingly quick; like Tufted Sedge (*Carex elata*), seed seems to be best sown fresh with no cold treatment or scarification required. We are aiming to grow 800 plants of Scarce Tufted Sedge as part of a HMWT project funded by Natural England's Species Recovery Fund.

Rare Spring Sedge seedlings, September 2023

Scarce Tufted Sedge seedlings, September 2023

Water Germander re-introduction

Our partnership with the Yorkshire Wildlife Trust to re-introduce nationally-endangered Water Germander to its historic site at Bolton-on-Swale is another project supported by Natural England's Species Recovery Fund. As with all our work, we are indebted to Yorkshire Water's funding to provide nursery facilities for such endeavours.

Having secured the necessary licences (Water Germander is a protected species), we obtained stolons and seedheads from Kingfishers Bridge Nature Reserve in Cambridgeshire in autumn 2022 and embarked on propagating plants at the LUCT nursery. Initial results were unpromising but we discovered that stolon fragments are best left to float in water overwinter before planting in spring, reflecting the natural dispersal behaviour of this floodplain plant. With this knowledge, we've been able to propagate large numbers of plants. In due course, we will post a 'how to' guide on the LUCT website.

In July, four of us visited Kingfishers Bridge to study the plant in the field. The reserve is the site of an exceptionally successful introduction from a small neighbouring wetland which was one of just two remaining natural sites for Water Germander in Britain. When the introduction began, there were only a dozen or so plants remaining at the donor site, which requires intensive management to maintain suitable conditions. There are now estimated to be several million plants at Kingfishers Bridge! One important lesson is that the places where rare species cling on are not necessarilly their optimal habitat. In this case, Water Germander much prefers the wide fluctuations in water level and disturbance by livestock found at Kingfishers Bridge.

In early September, LUCT volunteers and YWT staff planted out 160 plants at the edge of YWT's Bolton-on-Swale lake. Bolton-on-Swale was a well-recorded location for Water Germander in the first half of the 19th century, with specimens collected by Georgian and Victorian botanists preserved in several herbaria. While the original habitat has long gone, the fluctuating margins of the lake created by 20th century gravel extraction hopefully provide a suitable replacement habitat. A second tranche of planting will take place in 2024 and the results will be monitored.

Below: Water Germander planting at YWT's Bolton-on-Swale reserve, September 2023

Magnesian limestone grassland

As reported in the previous update, the extended enclosure at Kiln Lake has allowed a wide range of calcicole plants to flower and set seed where they would have been munched down by rabbits previously. Some have spread well beyond the enclosure, especially Wild Marjoram, Carline Thistle, Blue Fleabane and Ploughman's Spikenard.

A smaller enclosure established in 2021 has been replaced and enlarged.

Cuttings from Moor Lane (Thornton Watlass) and Farnham Lane have been spread on areas at Kiln where we had previously scarified the rock surface to create better conditions for germination. Together with improved rabbit exclusion, we hope this will allow the area of Lowland Calcareous Grassland priority habitat to expand.

Green hay spread on the limestone at Kiln Lake

With appropriate permissions in place, we helped Yorkshire Wildlife Trust staff and volunteers to cut some of the magnesian limestone grassland at Burton Leonard Lime Quarries Site of Special Scientific Interest (SSSI). Some of the cut material was brought back to dry and sift for seed, to be used to restore Thornborough Middle Henge in 2024.

We've also continued collecting seed from the Henge itself and other local calcareous grasslands, with the aim of growing 10,000 local-provenance plug plants to help re-vegetate recently repaired sections of the Neolithic earthworks. Large numbers of Rockrose, Rough Hawkbit, Small Scabious, Common Bird's-foot Trefoil and Quaking-grass seedlings have already germinated along with smaller amounts of several other species.

Managing magnesian limestone grassland at Burton Leonard Lime Quarries SSSI

Lowland Meadow priority habitat

In the Hay Field at Nosterfield Nature Reserve (see previous Update), an area was chain-harrowed following the hay cut in July and strewn with species-rich hay from St John's Churchyard.

Meanwhile, extensions to the small meadow plot at Flasks were strewn with hay from Moor Lane (Thornton Watlass), the volunteers doing a grand job despite the cool, wet amd windy weather. The meadow plot itself has been cut three times in late summer and autumn to mimic the aftermath grazing which takes place in traditional hay meadows.

The bund between the reedbed and Flasks Lake at Nosterfield Quarry was re-graded when the reedbed was renovated in 2019-20. In 2021-22, the bare gravel was strewn with green hay from St John's Churchyard and local, species-rich road verges. This area hasn't received a lot of attention because of the need to minimise disturbance, and it tends to get heavily browsed by Greylag Geese which loaf on the bund. A brief inspection in October showed that a very herb-rich short sward has developed with abundant Common Bird's-foot Trefoil, Red Clover and Ribwort plus a good scattering of Cat's-ear, Oxeye Daisy, Self-heal, buttercups and other species. This is a great result: around 0.25 ha of new, species-rich grassland created from local seed sources with minimal effort! We are confident that this will develop into a version of Lowland Meadow priority habitat, and we've added plugs of Bulbous Buttercup and Zigzag Clover from the nursery.

The bund between the Reedbed and Flasks Lake: around 0.25 ha of new species-rich grassland created from local seed sources.

Managing County Wildlife Sites

Moor Lane, Thornton Watlass: We visited this important remnant of magnesian limestone grassland on 11th July to see the effects of last winter's initial restoration cut. There was a profusion of flowers such as Wild Marjoram, Clustered Bellflower and Rough Hawkbit but one section remains choked by Dewberry (a type of bramble favouring lime-rich soils). Fifty-five plant species have been recorded this year, including 17 indicators of Lowland Calcareous Grassland priority habitat.

An initial cut was carried out on 25th July, concentrating on the section with most Dewberry growth. Richer areas were left to flower until most of the verge was cut on 31st October.

Moor Lane, Nosterfield: This small verge, newly adopted by LUCT, has Cowslip and Common Spotted Orchid among an interesting flora. We carried out the first 'restoration' cut in mid July to remove blackthorn suckers and dense grass growth. A second cut was completed in October. We're hopeful that in a year or two, the verge will be of County Wildlife Site quality.

Farnham Lane: A partial cut on 12th July aimed at removing coarser vegetation from under-managed areas along the roadside. Cuttings were spread on the magnesian limestone at Kiln Lake.

St John's Churchyard, Sharow: The main hay cut was carried out on 18th July, with the arisings spread on small grassland plots at Flasks Fen.

Theakston Lane, Richmond: The first cut of this species-rich verge was undertaken on 14th July, with ample patches left to flower. A monitoring survey recorded 16 Lowland Meadow indicator plants, up from ten in 2022 and just six in 2020, showing the results of our efforts. Three years ago, Theakston Lane was at risk of being dropped from the register of County Wildlife Sites as it had become overgrown with brambles and coarse grasses. Species include Wood Crane's-bill, Meadow Crane's-bill, Lady's-mantle, Great Burnet and Water Avens.

Much of the green hay was taken for grassland restoration on the Swaledale Estate, the remainder being used to seed extensions to the small meadow at Flasks Fen. We are keen to make best use of arisings from managing species-rich grasslands as a source of propagules for habitat creation and restoration, rather than simply taking material for disposal as green waste.

A second cut was completed on 3rd October, imitating the aftermath grazing which takes place on traditionally managed meadows.

Sharow Mires: Further work was undertaken on three days in September and October to clear invasive Red Osier Dogwood from this ancient wetland, located in a paleo channel of the River Ure. Two sizeable clearings have been created and while high nutrient levels are an issue, we plan to carry out some supplementary planting of key fen plants like Great Fen Sedge and Tufted Sedge when water levels permit. There are remnant populations of both species on-site but these have become small and fragmented: a great advantage of using local

propagules is that we can reinforce dimished populations of wetland plants without compromising local gene pools.

Volunteering

LUCT is committed to delivering at least 7,000 hours volunteering as part of this project. The volunteer hours from 01/07/23 to 31/10/23 total 1,866.25 hrs, broken down approximately as follows:

Nursery: 401.5 hrs
Other practical work (inc. planting): 837.25 hrs
Surveys/monitoring: 117.5 hrs
Trustees: 466.5hrs
Admin: 63.5 hrs

This brings the total number of volunteer hours delivered so far to 8,326.75, greatly exceeding the target.