Enhancing the biodiversity of Nafferton Mere: a report for the Parish Ponds Project

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1. Introduction

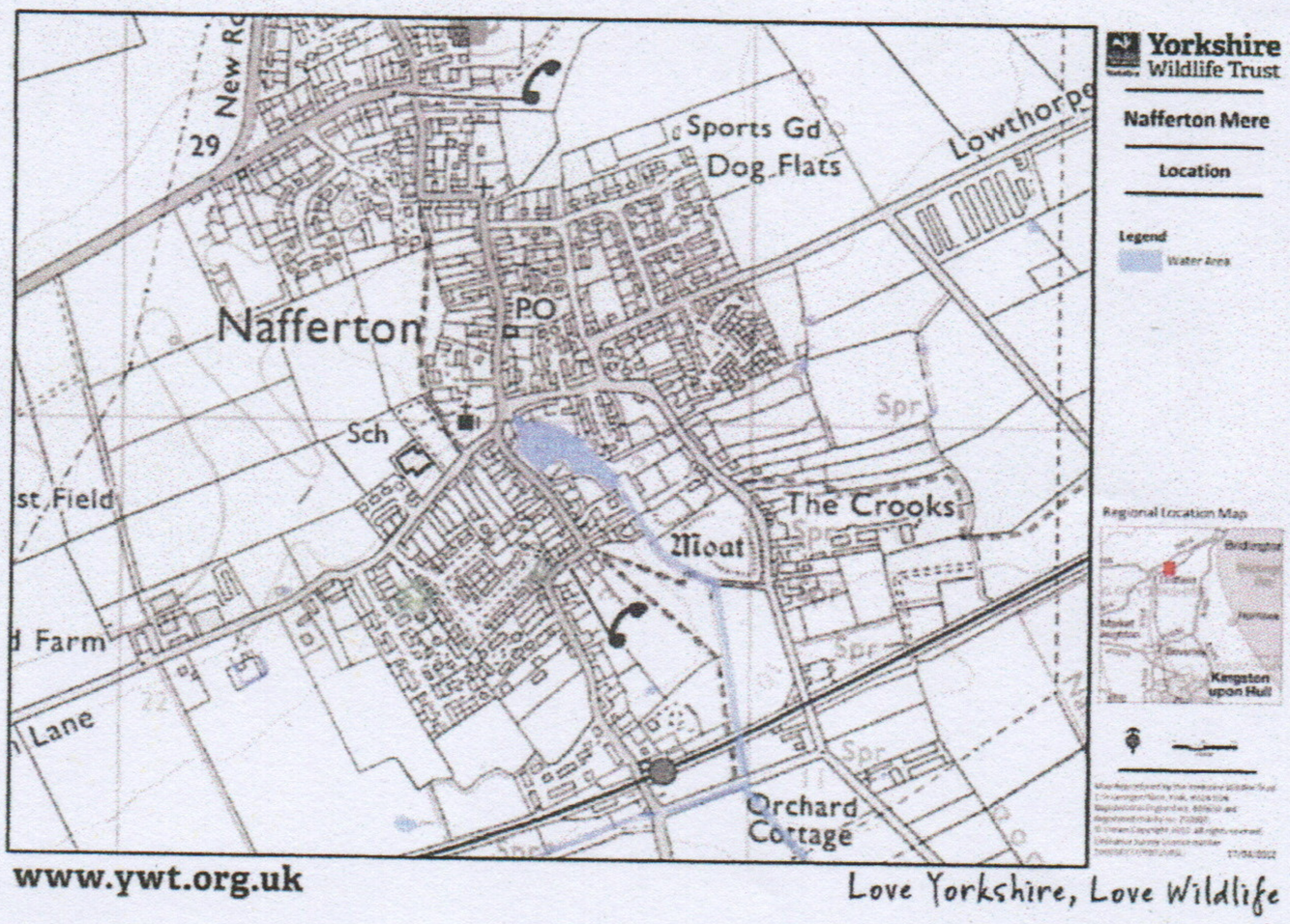
This report has been commissioned by the Yorkshire WildlifeTrust's Parish Ponds Project to suggest options for ecological enhancement Nafferton Mere. The site has been visited twice during summer 2012.

Nafferton Mere is a small, spring-fed water body of around 0.7 hectares, located within the village of Nafferton (national grid reference TA 056 589). It is situated on the spring line at the base of the Yorkshire Wolds dip slope, adjoining the Hull Valley, so its water is derived from the chalk aquifer. Although the water body itself is owned by Nafferton Parish Council, most of the shoreline lies within the curtilage of private houses and the banks are almost entirely walled. The Mere discharges via a sluice at its southern end into Nafferton Beck. It originated as a mill pond, and is not one of the natural post-glacial meres of the Hull Valley/Holderness[1].

The Mere apparently contains no floating or submerged vegetation other than extensive carpets of filamentous algae. As far as could be seen, emergent vegetation is limited to a very small patch of yellow flag iris (*Iris pseduacorus*) near the outflow, though it understood that a small amount of marginal vegetation also exists within private gardens bordering the lake.

Waterfowl present on the Mere include Mute Swan, Greylag Goose, Mallard (and domesticated hybrids), Tufted Duck and Coot. It is likely that these birds are maintained at least in part by artificial feeding, as natural food resources (aquatic or marginal plants and aquatic invertebrates) are limited.

An attempt was made to sample aquatic invertebrates from the edge of the Mere at Coppergate on 26th April 2012. This was not pursued for health and safety reasons because faecal material and ragging (strands of toilet paper) were encountered. However, Chironomids (non-biting midge larvae) appeared to be the dominant invertebrates on the sediment surface: this family of insects is characteristic of waters with high levels of organic pollution.



[1] See Map in J.R. Flenley (1990). Vegetational history. Pp 43-54 in S. Ellis & D.R. Crowther (eds) (1990). *Humber perspectives: a region through the ages*. Hull University Press.

2. Nature conservation significance of Nafferton Mere

Nafferton Mere is an important landscape feature of the village but its potential wildlife value is limited.

Poor water quality is likely to be an important limiting factor, resulting from a combination of storm drain inputs (which appear to include some untreated sewage), road run-off and a relatively large waterfowl population maintained by artificial feeding. As the lake is spring-fed, groundwater quality may also be an issue, although this has not been investigated.

Wildlife potential is limited further by the lack of submerged, floating or marginal vegetation. This is a result of (a) poor water quality, (b) the density of waterfowl and (c) the lack of natural bankside habitat at the margins of the Mere. The soft mineral sediment of the pond bed may also be unfavourable for plant growth. Indeed most ponds fed by chalk springs are dominated by filamentous algae and support few if any submerged waterweeds, even where they are less obviously impacted by waterfowl and urban run-off.

Waterfowl are a feature of the Mere and whilst some species such as Moorhen and Tufted Duck probably have little impact on the ecology of the water body, it is likely that the waterfowl population as a whole relies on artificial feeding and exceeds the natural 'carrying capacity' of the pond.

3. Potential for ecological enhancement

It is unlikely to be feasible to deliver significant improvements in water quality at Nafferton Mere, although it would be worth investigating whether surface water drains venting into the pond meet legal requirements and best practice standards in terms of intercepting pollutants.

The most obvious 'deliverable' enhancement would be to create water-margin vegetation, which seems to be almost entirely lacking. Even a small area of well-designed water-margin habitat could significantly enhance the wildlife value of the Mere by:

- Improving water quality by taking up excess nutrients and breaking down pollutants.
- Providing habitat for water-margin plants and invertebrates.
- Increasing the diversity and abundance of food (invertebrates and seeds) for fauna using surrounding buildings and gardens, especially bats and birds such as wagtails, thrushes, Swifts, House Martins and House Sparrows. For example, water margin vegetation can be a valuable source of invertebrate food for ground-foraging songbirds whilst bats, Swifts and House Martins are likely to benefit from an increase in flying insects which develop or shelter amongst marginal vegetation.

There is obvious potential to construct a berm or ledge supporting water margin vegetation along the base of the vertical wall on Priestgate, since this is presumably not within a private curtilage. A range of possible techniques are available, depending on budget and logistics. These could include a 'hard' retaining wall comprising perforated bricks or breeze blocks allowing contact with the water; a 'soft' retaining structure such as wattle hurdles; prefabricated vegetated rafts; or coir (coconut fibre) rolls or mats anchored to the toe of the wall.

The purpose of any retaining structure would be to provide stability and protection to allow vegetation to develop. Depending on the technique used, a medium may be required to provide anchorage for plants but it is likely that the water would provide ample nutrients so inert material such as gravel would be more appropriate than compost or soil. There would need to be a barrier to exclude waterfowl. Advice from an appropriately qualified engineer would be required to ensure that any such structure did not compromise the structural integrity of the retaining wall.

A wide variety of water margin plants could be used, depending on the design of the structure. Locally-native species which root below the water line and can tolerate nutrient-rich water include branched bur-reed (*Sparganium erectum*), common club-rush (*Schoenoplectus lacustris*) and lesser reedmace (*Typha angustifolia*). Reed sweet-grass (*Glyceria maxima*), greater reedmace (*Typha latifolia*), lesser pond sedge (*Carex acutiformis*), greater pond sedge (*Carex riparia*) and common reed (*Phragmites australis*) are also suitable but once established these can be very domineering and exclude other flora.

Suitable species which root on or just above the water line include yellow flag iris, water mint (*Mentha aquatica*), purple loosestrife (*Lythrum salicaria*), water forget-me-not (*Myosotis scorpioides*), common water-plantain (*Alisma plantago-aquatica*), greater spearwort (*Ranunculus lingua*) and common spike-rush (*Eleocharis palustris*). Combinations of these plants would provide shelter for insects emerging from the water, habitat for water-margin invertebrates, nectar and pollen sources for a wide range of insects, as well as seed- and insect- rich foraging habitat for bats and songbirds. The recommended species would also provide considerable aesthetic appeal with a long flowering season extending from late spring to late summer and varied foliage architecture.

A further option to consider would be to install floating rafts of wetland vegetation at the northern end of the Mere, close to the inflow on Coppergate. As feeding the ducks and swans appears to be a popular activity with parents and young children here, rafts would need to be located carefully, and also protected by mesh cages to prevent grazing and trampling damage. Floating rafts of vegetation are used in many countries to improve water quality as well as to provide wildlife habitat and enhance the appearance of man-made water bodies. Rafts of vegetation in contact with the water surface absorb excess nutrients, which are taken up by the growing plants and stored in their root systems and associated biofilm. Some wetland plants also have the ability to break down pollutants through the action of microbial communities associated with their root zones: this is why artificial reed-bed systems are widely used to filter sewage and industrial effluent.

Floating vegetation rafts or islands could not be guaranteed to provide visible improvements in water or habitat quality at Nafferton Mere, but could provide a practical means of filtering out some of the pollutants entering the water body. It is possible that damage by waterfowl would be too difficult to control, even on mesh-caged rafts, so it is recommended that this option is trialled initially on an experimental basis to avoid wasted expenditure.

Various designs of floating vegetation rafts are available, ranging from DIY constructions to commercially-available, pre-fabricated and pre-planted units. In the case of floating rafts, it is advisable to use robust, vigorous plants such as common reed or reed sweet-grass rather than attempting to establish more diverse mixtures of wetland flora.

More modest wildlife enhancements could include installing bat boxes on trees on the island. Even ponds and lakes with poor water quality generate a huge biomass of small flies which develop from aquatic larvae: these provide the staple food for the smaller bats found around towns and villages. If the Parish Council is interested in investigating this option further, East Yorkshire Bat Group could be approached for advice since they have a detailed knowledge of local bat species and the best options for providing artificial roost habitats.

It is possible that some locally-native aquatic plant species could establish successfully in Nafferton Mere if introduced. For example, marestail (*Hippuris vulgaris*), fennel pondweed (*Potamogeton pectinatus*) and horned pondweed (*Zannichellia palustris*) can thrive in nutrient-rich, alkaline water bodies with fine mineral substrates. It is possible that the lack of submerged vegetation results from the isolated location of the Mere, preventing natural colonization. However, grazing and disturbance by waterfowl may well be too intense to allow establishment of submerged plants. Equally, there is a chance that introduced species – even carefully selected, indigenous ones – could become invasive. In practice, this is impossible to predict.

4. Sources of further information

Further information on floating vegetation rafts can be found in Section 14 of this report: http://www.sustainableaggregates.com/library/docs/mist/l0087_ma_6_2_013.pdf

One UK supplier of floating reedbeds/vegetation rafts is A.G.A. Group:

http://www.agagroup.co.uk/special-projects/reed-beds-wetlands

Another is Aquatic Engineering Ltd:

http://www.aquaticengineering.co.uk/?content=pages&id=floating-reedrafts

Mires Beck Nursery at North Cave (http://www.miresbeck.co.uk/) specialises in growing wildflowers of Yorkshire provenance and can provide a wide variety of water-margin species. Planting requirements should be discussed with any supplier well in advance.

Further information on bat boxes is available on the Bat Conservation Trust website (http://www.bats.org.uk/pages/bat_boxes.html). Many different designs are available, which can be home-made or purchased.