

# Wetland Plant Survey at Willow Tree Fen Nature Reserve, 2017



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Halls Ecology  
2 West End Avenue  
Brundall  
Norwich  
NR13 5RF  
[jhalsecology@btinternet.com](mailto:jhalsecology@btinternet.com)

*Produced for:*  
Freshwater Habitats Trust  
Bury Knowle House  
North Place  
Headington  
Oxford OX3 9HY



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## **1. Background and scope**

As part of their Flagship Ponds Project, the Freshwater Habitats Trust (FHT) commissioned a wetland plant survey at Willow Tree Fen Nature Reserve in south Lincolnshire. The reserve was purchased by Lincolnshire Wildlife Trust in 2009 and since then the former arable fields have been converted into a mixture of wet grassland, reedbed, ponds and meadows. Some of the waterbodies on the reserve have already developed notable plant and invertebrate communities, hence the inclusion of Willow Tree Fen as a Flagship Pond site.

The results of the survey will be used to inform future management activities to maintain and enhance the value of the site.

The following waterbodies were surveyed (see Figure 1):

1. Education pond (TF17372247)
2. Pond north of education pond (TF17332244)
3. Pond south of the reserve buildings (TF17452237)
4. The wetland area in front of the hide (TF17452159)
5. Fourth District IDB Main Drain (TF17432246)

The Flagship Ponds project is supported by the Heritage Lottery Fund. The survey was commissioned by Anne Heathcote, FHT's Northern Project Officer. John Oliver, the reserve warden, kindly provided access advice and details of current management.

## **2. Methodology**

The field survey involved recording the presence of any emergent and aquatic vascular plants, charophytes and bryophytes. For the three pond sites an estimate of the percentage cover of aquatic plants across the whole area was noted. For the wetland area, IDB drain and all emergent species the relative abundance of plants was recorded.

The perimeter of each of the discreet waterbodies was walked and a hook on a telescopic pole used to retrieve plant samples away from the edge. Binoculars were also used to view any obvious plants that were otherwise not accessible. The wetland area (waterbody 4.) is relatively large and with undefined boundaries, so it was surveyed by ensuring that all of the discreet habitats (shallow water, drying mud and fen) were covered by walking representative parts.

Water samples were collected to measure nitrate and phosphate levels (using the FHT kits) and pH and conductivity readings recorded in the field. A selection of photographs was taken of the waterbodies and any notable plants found.

## **3. Results**

The site was initially visited on the 21<sup>st</sup> June 2017 when all waterbodies apart from the wetland area were surveyed. A second visit was made on the 10<sup>th</sup> August to survey the wetland area and to re-survey the IDB drain. The latter was heavily choked with vegetation in June which made access difficult. However, the drain was subsequently cleared by the IDB as part of the annual maintenance programme.

The results for each waterbody are summarised below with the record tables in Appendix 1.

## 1. Education pond

Conductivity: 969 $\mu\text{S}/\text{cm}$	Nitrate ( $\text{NO}_3$ ppm): <0.2
pH: 7.2	Phosphate ( $\text{PO}_4$ ppm): <0.02

This is a linear pond approximately 50m long by 12m at its widest point and with a maximum measured depth of 0.75m, but generally much shallower than that. The margins are mostly dominated by common reed *Phragmites australis* and locally by reed sweet-grass *Glyceria maxima* and branched bur-reed *Sparganium erectum*. The reed has spread across the full width of the pond in places. Great hairy willowherb *Epilobium hirsutum*, nettle *Urtica dioica* and bramble *Rubus fruticosus* agg. are also frequent along the western margin. Several greater water-parsnip *Sium latifolium* and tubular water-dropwort *Oenanthe fistulosa* plants were noted but otherwise the only other emergent species present were common spike-rush *Eleocharis palustris* and water mint *Mentha aquatica*. Just two aquatic plants were recorded - water violet *Hottonia palustris* and ivy-leaved duckweed *Lemna trisulca*.

Some winter (and ideally summer) clearance of reed would help to reduce the dominance and shading effect as well as promote a more diverse marginal vegetation community. De-silting will also be necessary at some stage to provide deeper areas of open water to benefit aquatic taxa.



Looking north over the pond showing the dominance of *Phragmites australis*

Rosettes of *Hottonia palustris* on the drying mud

## 2. Pond north of Education pond

Conductivity: 890 $\mu\text{S}/\text{cm}$	Nitrate ( $\text{NO}_3$ ppm): <0.2
pH: 8.07	Phosphate ( $\text{PO}_4$ ppm): <0.02

In comparison to the nearby Education pond this waterbody has a much greater proportion of open water but still with some localised encroachment by reed. The width of the reed and reed sweet-grass around the perimeter is variable but typically 3-4m. Other emergent species present include greater reedmace *Typha latifolia*, common club-rush *Schoenoplectus lacustris* and celery-leaved buttercup *Ranunculus sceleratus*. Mare's-tail *Hippuris vulgaris*, ivy-leaved duckweed and the non-native least duckweed *Lemna minuta* were the only aquatic species recorded.

The dense margins provide good nesting habitat for reed warblers and moorhens (both observed) and no doubt other wetland birds. Nevertheless, in the absence of grazing, it may be beneficial to open up at least one length of margin through cutting to reduce the dominance of reed, with the aim of creating a more diverse, fen-type vegetation.



Tall, dense marginal vegetation but plenty of open water.



Mare's-tail is a feature of the western margin

### 3. Pond south of reserve buildings

Conductivity: 753 $\mu\text{S}/\text{cm}$	Nitrate ( $\text{NO}_3$ ppm): <0.2
pH: 8.11	Phosphate ( $\text{PO}_4$ ppm): <0.02

The pond is located within a fenced enclosure of approximately 25m x 25m. It is roughly circular, with a diameter of 15m and circumference of approximately 40m. Water depth shelves steeply from the margins, and in the centre it is greater than 2m (measured using a plummet).

The marginal vegetation is dominated by common reed with occasional to locally frequent fen rush *Juncus subnodulosus*, greater pond sedge *Carex riparia* and branched bur-reed. Other marginal wetland plants recorded, especially on the eastern side where there was some shallow flooding at the time of the survey, included reed sweet-grass, yellow loosestrife *Lysimachia vulgaris*, water mint, water plantain *Alisma plantago-aquatica*, common spike-rush, water figwort *Scrophularia auriculata*, greater reedmace, creeping bent *Agrostis stolonifera* and brooklime *Veronica beccabunga*. There were also several patches of watercress *Rorippa nasturtium-aquaticum* agg. and two tubular water-dropwort plants. Fat duckweed *Lemna gibba* was the only aquatic plant recorded.

As there is currently no access for stock to graze this area there is the risk that reed and other coarse species will eventually dominate the margins at the expense of plants such as tubular water-dropwort and brooklime. Opening the eastern margin to grazing and/or periodic cutting would help to promote a more diverse vegetation.



Looking north-west across Pond 3



Flooded margins and stock-proof fence on the eastern margin

#### 4. Wetland area

Conductivity: 969  $\mu\text{S}/\text{cm}$

Nitrate ( $\text{NO}_3$  ppm): <0.2

pH: 7.2

Phosphate ( $\text{PO}_4$  ppm): <0.02

The only standing water present at the time of the survey was an area immediately in front of the hide which had some mare's-tail, ivy-leaved duckweed and fat duckweed. The narrow strip of vegetation between the hide and stock-proof fence is dominated by common reed but there are also some patches of two notable plants: greater water-parsnip and fine-leaved water-dropwort *Oenanthe aquatica*. Large patches of drying mud marked the extent of areas of shallow winter and spring flooding with the remaining area dominated by a range of wetland emergents, particularly soft rush *Juncus effusus*, common spike-rush, greater pond sedge and grey club-rush *Schoenoplectus tabernaemontani*. Locally, away from the dominance of those species there are more diverse patches with species such as false fox-sedge *Carex otrubae*, pink water speedwell *Veronica catenata*, marsh cudweed *Gnaphalium uliginosum* and gypsywort *Lycopus europaeus*. The area is most notable, however, for the presence of strong populations of greater water-parsnip and fine-leaved water-dropwort. The former is classified as *Endangered* in the England Red List and whilst the latter is *Least Concern* (based on trends since 1930), there has been a marked decline in the species' distribution since 1987 (Stroh *et al* 2014).

The area supports a good range of emergent plants although large parts are dominated by dense stands of soft rush. Aquatic species are limited as it appears that most areas of standing water disappear by mid-summer. The key management aims should be to prevent further encroachment of soft rush (and ideally reducing the current extent) and also maintain water levels that will continue to provide suitable conditions for greater water-parsnip and fine-leaved water dropwort. Rush control will probably involve both cutting and application of herbicide, so it will be important to target the areas where the botanical interest is limited and/or through careful operation of cutting machinery and targeted weed wiping.



Dense *Juncus effusus* and *Eleocharis palustris* dominate large areas of the wetland area



Large area of drying mud with scattered *Alisma plantago-aquatica* and *Juncus articulatus*



*Sium latifolium*



*Oenanthe aquatica*

## 5. IDB drain

Conductivity: 923 $\mu\text{S}/\text{cm}$	Nitrate ( $\text{NO}_3$ ppm): <0.2
pH: 7.9	Phosphate ( $\text{PO}_4$ ppm): <0.02

At the time of the initial survey in June the channel and bank faces were overgrown which made access and recording difficult. Taxa noted included water starwort *Callitriche* spp., Canadian waterweed *Elodea canadensis*, pink water speedwell and false fox-sedge, with dense growth of false oat-grass *Arrhenatherum elatius*, nettle, cleavers *Galium aparine* and bindweed *Calystegia sepium* on the bank itself.

By August the bank and channel had been cut and, although there was generally less than 20cm depth of water along most of its length, a good variety of plants were thriving along much of its length. The most notable was the presence of an estimated 500+ lesser water-plantain *Baldellia ranunculoides* plants together with some opposite-leaved pondweed *Groenlandia densa*. Both taxa are listed as Vulnerable on the England Red List for Vascular Plants (Stroh *et al* 2014). Other aquatics included lesser pondweed *Potamogeton pusillus*, common stonewort *Chara vulgaris*, water starwort species (unidentified) and Canadian waterweed. From TF17712223 the water became ochre stained below two field drains (one on the reserve side and one from the arable field to the north), whilst from TF17822213 there was an increase in reed on both the bank and some in the channel.

The annual clearance of the watercourse benefits some of the wetland plants through controlling the vigour and shading effects of reed and other tall grasses and coarse species.

However, there is also a water quality issue in part of the drain, which is restricting the area that plants can occupy so options to reduce or eliminate the inputs of ochre need investigating.



Choked in June making access for survey difficult



Open channel and regrowth on bank face in August



*Baldellia ranunculoides*



Ochre stained section of dyke with no aquatic plants

## **References**

Stroh, P.A., Leach, S.J., August, T.A., Walker, K.J., Pearman, D.A., Rumsey, F.J., Harrower, C.A., Fay, M.F., Martin, J.P., Pankhurst, T., Preston, C.D. & Taylor, I. (2014). *A Vascular Plant Red List for England*. Botanical Society of Britain and Ireland, Bristol.

## Figures



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**Figure 1. Location of waterbodies surveyed**

## **Appendix 1**

### Waterbody 1 – Education pond

Taxon	Vernacular	Comment
<i>Eleocharis palustris</i>	Common Spike-rush	Frequent
<i>Epilobium hirsutum</i>	Great Willowherb	Occasional
<i>Glyceria maxima</i>	Reed Sweet-grass	Frequent to locally dominant
<i>Hottonia palustris</i>	Water-violet	>1% c.20 rosettes
<i>Lemna trisulca</i>	Ivy-leaved Duckweed	5%
<i>Mentha aquatica</i>	Water Mint	Occasional
<i>Oenanthe fistulosa</i>	Tubular Water-dropwort	Rare - 6 plants on eastern margin
<i>Phragmites australis</i>	Common Reed	Dominant
<i>Sium latifolium</i>	Greater Water-parsnip	Rare - 3 plants on NE margin
<i>Sparganium erectum</i>	Branched Bur-reed	Frequent

#### Incidental records

Odonata: *Aeshna grandis*; *Ischnura elegans*

Orthoptera: *Metroptera roeselii*

Lepidoptera: Cinnabar; Large Skipper; Meadow Brown

### Waterbody 2 - Pond north of Education pond

Taxon	Vernacular	Comment
<i>Carex riparia</i>	Greater Pond-sedge	Occasional
<i>Epilobium hirsutum</i>	Great Willowherb	Rare
<i>Glyceria maxima</i>	Reed Sweet-grass	Frequent to locally abundant
<i>Hippuris vulgaris</i>	Mare's-tail	<1%
<i>Juncus effusus</i>	Soft-rush	Rare
<i>Juncus inflexus</i>	Hard Rush	Occasional
<i>Lemna minuta</i>	Least Duckweed	<1%
<i>Lemna trisulca</i>	Ivy-leaved Duckweed	10%
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	Rare
<i>Phragmites australis</i>	Common Reed	Dominant
<i>Ranunculus sceleratus</i>	Celery-leaved Buttercup	Rare
<i>Schoenoplectus lacustris</i>	Common Club-rush	Rare
<i>Sparganium erectum</i>	Branched Bur-reed	Frequent
<i>Typha latifolia</i>	Bulrush	Occasional

#### Incidental records

Odonata: *Ischnura elegans*; *Enallagma cyathigerum*; *Erythromma najas*; *Aeshna grandis*;

*Anax imperator*; *Libellula quadrimaculata*

Orthoptera: *Chorthippus albomarginatus*; *Chorthippus parallelus*

Lepidoptera: Small Tortoiseshell; Large White

Amphibia: Froglet (2)

### Waterbody 3 - Pond south of reserve buildings

<b>Taxon</b>	<b>Vernacular</b>	<b>Comment</b>
<i>Agrostis stolonifera</i>	Creeping Bent	Occasional
<i>Alisma plantago-aquatica</i>	Water-plantain	Occasional
<i>Carex riparia</i>	Greater Pond-sedge	Frequent
<i>Eleocharis palustris</i>	Common Spike-rush	Occasional
<i>Epilobium parviflorum</i>	Hoary Willowherb	Rare
<i>Glyceria maxima</i>	Reed Sweet-grass	Frequent
<i>Juncus inflexus</i>	Hard Rush	Frequent
<i>Juncus subnodulosus</i>	Blunt-flowered Rush	Frequent
<i>Lemna gibba</i>	Fat Duckweed	<1%
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	Rare
<i>Mentha aquatica</i>	Water Mint	Occasional
<i>Nasturtium officinale</i> agg.	Water-cress	Occasional
<i>Oenanthe fistulosa</i>	Tubular Water-dropwort	Rare - 2 plants
<i>Phragmites australis</i>	Common Reed	Dominant
<i>Schoenoplectus lacustris</i>	Common Club-rush	Occasional
<i>Scrophularia auriculata</i>	Water Figwort	Rare
<i>Sparganium erectum</i>	Branched Bur-reed	Occasional
<i>Typha latifolia</i>	Bulrush	Occasional
<i>Veronica beccabunga</i>	Brooklime	Rare

#### Incidental records

Odonata: *Ischnura elegans*; *Enallagma cyathigerum*; *Libellula quadrimaculata*

Orthoptera: *Chorthippus albomarginatus*

Lepidoptera: Meadow Brown; Ringlet

#### **Waterbody 4 – Wetland area in front of hide**

<b>Taxon</b>	<b>Vernacular</b>	<b>Comment</b>
<i>Alisma plantago-aquatica</i>	Water-plantain	Occasional
<i>Bolboschoenus maritimus</i>	Sea Club-rush	Rare
<i>Carex otrubae</i>	False Fox-sedge	Rare
<i>Carex riparia</i>	Greater Pond-sedge	Occasional to locally abundant
<i>Deschampsia caespitosa</i>	Tufted Hair-grass	Occasional
<i>Eleocharis palustris</i>	Common Spike-rush	Locally dominant
<i>Glyceria maxima</i>	Reed Sweet-grass	Occasional to locally abundant
<i>Gnaphalium uliginosum</i>	Marsh Cudweed	Rare
<i>Hippuris vulgaris</i>	Mare's-tail	<1% Abundant in standing water, rare elsewhere
<i>Juncus articulatus</i>	Jointed Rush	Occasional
<i>Juncus effusus</i>	Soft-rush	Locally dominant
<i>Lemna gibba</i>	Fat Duckweed	<1% in standing water and drying mud
<i>Lemna trisulca</i>	Ivy-leaved Duckweed	<1% Occasional in standing water
<i>Lemna</i> sp.	Unidentified duckweed	<1%
<i>Lycopus europaeus</i>	Gypsywort	Rare
<i>Lythrum salicaria</i>	Purple-loosestrife	Rare
<i>Oenanthe aquatica</i>	Fine-leaved Water-dropwort	Occasional. 200+ plants

<i>Phragmites australis</i>	Common Reed	Occasional to locally abundant
<i>Rorippa palustris</i>	Marsh Yellow-cress	Rare
<i>Schoenoplectus tabernaemontani</i>	Grey Club-rush	Occasional to locally frequent
<i>Sium latifolium</i>	Greater Water-parsnip	Occasional. 100+ plants
<i>Sparganium erectum</i>	Branched Bur-reed	Occasional
<i>Typha latifolia</i>	Bulrush	Occasional
<i>Veronica catenata</i>	Pink Water-speedwell	Occasional

Incidental records

Orthoptera: *Metrioptera roeselii*; *Chorthippus albomarginatus*

**Waterbody 5 – IDB drain**

<b>Taxon</b>	<b>Vernacular</b>	<b>Comment</b>
<i>Alisma plantago-aquatica</i>	Water-plantain	Occasional
<i>Baldellia ranunculoides</i>	Lesser Water-plantain	c500 plants
<i>Callitriche</i> agg.	Water-starwort	10% (80% prior to clearance)
<i>Chara vulgaris</i>	Common Stonewort	<1%
<i>Eloдея canadensis</i>	Canadian Waterweed	10%
<i>Glyceria fluitans</i>	Floating Sweet-grass	Rare
<i>Groenlandia densa</i>	Opposite-leaved Pondweed	<1%
<i>Phragmites australis</i>	Common Reed	Rare in channel, frequent on bank
<i>Potamogeton pusillus</i>	Lesser Pondweed	<1%
<i>Ranunculus sceleratus</i>	Celery-leaved Buttercup	Rare
<i>Samolus valerandi</i>	Brookweed	Rare - 6 plants

Incidental records

Odonata: *Aeshna cyanea*; *Aeshna grandis*; *Sympetrum striolatum*; *Sympetrum sanguineum*;  
*Orthetrum cancellatum*; *Lestes sponsa*

Orthoptera: *Chorthippus albomarginatus*