National Trust Freshwater Monitoring Survey 2018 results

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National Trust Freshwater Monitoring Survey 2018

1. Report aims

This report provides a brief summary of the survey findings from Year 1 of a five-year rolling programme to assess the status of freshwaters on a representative sample of National Trust properties in England and Wales.

The survey focuses on small waterbodies (ponds and streams) which are critical for freshwater biodiversity and ecosystem services delivery.

The 2018 survey data were collected from 40 small waterbodies (20 streams and 20 ponds) that were identified using a 1 km square stratified random sampling approach (see Tier 2 below).

2. Background

The National Trust's 10 year strategy includes targets for the way in which it manages its land and delivers a healthy, beautiful, natural environment. To measure and track progress against this strategy a range of metrics and monitoring approaches are being developed. In many cases data are already being collected as part of existing national recording schemes (e.g. national butterfly and plant monitoring schemes). However at present there are no targets that are specific to (fresh)water, so this project aims to provide a general assessment of the status of Trust waterbodies and specifically to:

a) Determine the status of freshwater habitats as important wildlife features in their own right;

b) Assess freshwater quality as an indicator of how well the National Trust is managing the land and soils on its properties.

Overall the objective is to evaluate two kinds of changes:

(i) Improvement (or deterioration) within the National Trust estate, assessed by comparing the monitored sites on a 5 year cycle

(ii) Change in the status of National Trust properties compared to the rest of the landscape, assessed by comparing the data collected on National Trust land with the condition of sites in national monitoring programmes using the same methods.

The freshwater monitoring strategy uses a tiered approach (see Biggs, 2018)¹.

Tier 1 uses data from existing national monitoring programmes undertaken by statutory agencies where available, collected mainly for Water Framework Directive (WFD) and other statutory monitoring purposes.

Tier 2 complements this information with new data - the main subject of this report - based on a 1 km square stratified sampling approach covering smaller non-WFD waters, which make a substantial contribution to freshwater biodiversity and freshwater ecosystem services.

Tier 3 comprises monitoring that enables individual properties to assess the condition of their waterbodies

Tier 4 comprises detailed bespoke monitoring of specific projects (e.g. natural flood management projects).

¹ Biggs, J. 2018. Developing a monitoring strategy and protocol for National Trust freshwaters. Freshwater Habitats Trust, Oxford.





4. Summary findings

3.1 Pond survey results

2018 was a very hot, dry year and, of the 20 survey ponds, nine (45%) were dry. Although this appears to be a high proportion, it is not far above the 37% of ponds that were recorded as dry in the 1996 Lowland Pond Survey², which was also a drought year.

Freshwater Habitats Trust unpublished data suggests that although, the richness of most ponds is unaffected by dry years, grazed seasonal ponds are different, and often have lower richness than usual as a result of heavy poaching and grazing by stock seeking water and lush vegetation. In the current survey, the richness of three grazed seasonal ponds (on Kinderscout and at Outseats in the Peak District, and one on the Holnicote estate, Exmoor) may be an underestimate for this reason.

Across the 20 ponds surveyed, the average number of wetland plants recorded was 12 species per pond. However there was considerable variation ranging from zero species in a shaded seasonal quarry pond in the woodlands of Sherringham Park, Norfolk, to 28 species from a large floodplain pond in the grounds of the Trust's Middlethorpe Spar Hotel, York.

The 2007 Pond Survey undertaken as part of UK Countryside Survey³ showed that the average richness of ponds across Britain was a mere eight plant species, and that richness had declined by 20% since the previous survey in the 1990s. On average, the National Trust ponds surveyed in 2018 were 50% richer than these wider countryside ponds. However, they are still only around half the richness of high quality ponds located in semi-natural landscapes where the average is 23 wetland plant species per pond.

Of the plants recorded in 2018, none were Priority Species or red-listed at UK level. However, around a third of ponds (n=7) supported at least one *England* Red Data Book plant. This is not an unexpected result because the England Red List⁴ includes plant species like Lesser Spearwort, and Common Cotton-grass, that are still *widespread* across England, but are red listed because they show a greater than 30% decline since the 1930s. The findings emphasise the importance of the Trust's ponds for maintaining populations of these declining species.

A PSYM analysis⁵ was undertaken for the 11 ponds that contained water in 2018⁶. PSYM assesses pond quality using a range of biological metrics, such as species richness, that are known to vary with human degradation (e.g. pollution, over-stocking). PSYM is ideally calculated using both wetland plant and aquatic macroinvertebrate data. However where invertebrate data are not available, a partial assessment can be made using plant data alone. Plant PSYM uses three metrics, each of which has been shown to vary strongly with pond degradation⁷. These metrics are: (i) number of submerged and emergent plant species (ii) trophic ranking score (a measure of nutrient enrichment) and (iii) the number of uncommon plant species. The PSYM algorithm works by comparing the value of each metric observed at a pond, with the value that would be expected if the pond was unimpaired (i.e. in the "reference state"). Comparing the two scores provides an overall measure of how degraded each pond is relative to its expected unimpaired state.

The results of the PSYM analysis are shown in Figure 1. A comparison between PSYM results from the Countryside Survey 2007 ponds and National Trust ponds showed that the Trust's waterbodies were generally in better condition. However only two of the Trust's ponds (16%) classified as being in Good condition (i.e. suggesting they were close to the unimpaired reference condition), and therefore qualify as Priority habitats on this basis.

² https://www.thenbs.com/PublicationIndex/documents/details?Pub=DETR&DocID=259027

³ http://nora.nerc.ac.uk/id/eprint/9622/1/N009622CR.pdf

⁴ https://bsbi.org/wp-content/uploads/dlm_uploads/England_Red_List_1.pdf

⁵ https://freshwaterhabitats.org.uk/wp-content/uploads/2013/09/NPMN_PSYM_MANUAL_July09.pdf

⁶ Note that PSYM can only be undertaken on ponds that are permanent or semi-permanent, because the reference database, from which the PSYM algorithm draws, does not include seasonal ponds.



Figure 1 Comparison of the mean observed and expected (reference) values for the PSYM plant metrics to assess the ecological quality of *permanent* ponds on National Trust properties in 2018.

Metric	What the metric measures	Results	Results
Number of submerged and emergent plant species (NSEP)	The number of plant species decreases at a pond as overall pollution levels increase. Note that floating-leaved species, like duckweeds, are not counted in the metric because they show the opposite relationship: i.e. ponds tend to have more floating-leaved species as degradation levels increase.	□ Observed values □ Expected values 0 5 10 15 20 Number of submerged & emergent plants	If all Trust permanent ponds were in good condition, they would be expected to have a mean of 18 species of plant per pond. The observed mean NSEP for <i>permanent</i> Trust ponds in 2018 was 14 species per pond, which is significantly lower than that expected for a pond in good condition.
Number of uncommon species (NUS)	As ponds become more degraded and isolated they lose uncommon plant species. For the purposes of PSYM, uncommon means plants that are recorded in less than a quarter of all 10 x 10 km ² in Britain.	Observed values Expected values Expected values 0 1 2 3 4 Number of uncommon wetland plants	A typical unimpaired ponds would be expect to have around three uncommon wetland plant species in each pond. The mean NUS in 2018 was less than one species (0.7) per pond suggesting considerable impairment.
Trophic Ranking Score (TRS)	Trophic Ranking Score is a measure of how enriched ponds are by nutrients. Plants are scored depending on their nutrient preferences. A TRS is calculated as the mean score for the plants at each pond. Higher values indicate a pond is more nutrient-rich.	Observed values Expected values Control Contr	A typical unimpaired pond would be expected to be moderately nutrient rich (mesotrophic) with a TRS of 7.6. The mean TRS for Trust ponds in 2018 was 7.4, indicating that, overall, nutrient levels were similar to predicted.

Figure 2. Percentage of ponds falling into four PSYM quality categories in England and Wales (Countryside Survey 2008) and on National Trust properties in 2018





Overall, the results so far suggest that the majority of ponds on National Trust land are more biodiverse than ponds in the wider countryside, but fall below their potential as wildlife habitats in comparison to high-quality ponds on protected land-use e.g. SSSIs, NNRs.

Stream survey results

The majority of the survey streams were small and shallow: mostly less than 1 m wide and 25 cm deep. Despite the hot summer, only one watercourse was completely dry. A high proportion of the streams (65%), were heavily shaded by trees, which is fairly typical of the wider countryside. However, largely because of the streams' small size and shade, plant richness across the survey as a whole was relatively low.

There are currently no standard assessment methods for evaluating the quality of first order streams. In the current study we used LEAFPACS methods to survey waterbodies, however the data cannot be analysed further using LEAFPACS software because it cannot be applied to streams less than 2 m wide. Therefore, summary analysis of the 2018 stream data can only be qualitative.

Of the 20 streams, the richest were from the Long Mynd in Shrpshire and Maidenhead & Cookham, with 21 plant species recorded at both sites. In addition, the stream in Little Langdale was particularly notable for its rich moss flora with 17 species recorded in the 100 m section.

The majority of plant species recorded were common and widespread at a national level. However, two red listed higher plant species were found: Petty-whin *Genista anglica* was found in the seasonal headwater stream on Hopesay Hill,, Shropshire. Lesser Spearwort *Ranunculus flammula* is a plant that is still widespread across the UK, but it has recently been included on the England Red List as Vulnerable because it has seen a 32% decline in its area of occupancy since the 1930s. This species was recorded from both Hopesay Hill and the Long Mynd.

Amongst the bryophytes, the River Pocket-moss *Fissidens rivulare*, which was present in the Pwll Caerog stream, is only recorded from scattered sites across Wales, note however, that this is a species that is generally under-recorded. Similarly, there are only scattered records for the tamarisk-moss species *Heterocladium wulfsbergii*, which was recorded in Little Langdale, although again, this species is probably under-recorded.



6. Methods

5.1 Pond survey methods

Ponds were selected for survey based on a random sample of 100 waterbodies that will be surveyed over 5 years across the National Trust estate in England and Wales. In 2018, 20 ponds were selected; five from each of 4 sample clusters, with the clustered design providing a cost effective approach to monitoring, whilst still contributing to a national overview for Trust reporting year on year,

The pond survey window is 1st June to 30th September, however in 2018, all pond surveys were completed in August. In future monitoring years (e.g. year 6-10), no site will be surveyed more than 1 month from previous survey date. The methods used to survey ponds followed the National Pond Survey standard methodology http://bit.ly/NPSsurveymethod. Wetland plants were recorded from within the pond area delimited by *upper drawdown zone*: this is the level at which water typically stands when the pond is winter-full. Wetland plants above this line were excluded from the species list, but were noted as extra species if they were present in close proximity.

Water chemistry data were collected in the field using Kyoritsu PackTest kits to measure phosphatephosphorus (minimum detection limit 0.02 mg L-1) and nitrate-nitrogen (minimum detection limit 0.5 mg L-1) <u>http://bit.ly/CWtechrpt</u>. Water pH was measured using a hand-held Hanna HI-98129 field meter.

Pond ecological quality was assessed using the PSYM bioassessment tool. This uses a range of biological measures, such as species richness, that are known to vary with human degradation (e.g. pollution, over-stocking with fish or wildfowl) to assess the extent to which a pond is degraded http://bit.ly/PSYM-manual. PSYM scores are ideally calculated using both wetland plant and aquatic macroinvertebrate data. However where, as here, invertebrate data are not available, a partial assessment can be made using plant data alone.

Grid reference	Site	Region
TL 53057 62495	Anglesey Abbey	East of England
TG 19019 29130	Blickling	East of England
TG 19890 38633	Felbrigg	East of England
TF 74239 00505	Oxburgh Hall	East of England
TG 13060 41561	Sheringham	East of England
SJ 89379 59108	Biddulph Grange Garden	Midlands
SK 07449 88677	Kinder Scout	Midlands
SJ 95858 81720	Lyme	Midlands
SK 14375 66338	Monyash	Midlands
SK 22559 83416	Outseats	Midlands
SS 61213 40391	Arlington Court	South West
ST 74595 75815	Dyrham	South West
SS 8834 044676	Holnicote	South West
ST 91875 67949	Lacock	South West
SS 46030 42891	Morte	South West
SE 51871 59073	Beningbrough Hall	Yorkshire and North East
SE 62827 95609	Bransdale	Yorkshire and North East
SE 59978 48477	Middlethorpe Hall	Yorkshire and North East
NZ 59302 12422	Roseberry Common	Yorkshire and North East
SD 94533 80453	Causeway Moss, Upper Wharfdale	Yorkshire and North East

Table 1 Pond survey locations



5.5 Stream Survey methods

Streams were selected for survey based on a random stratified sample of 100 streams that will be surveyed over 5 years across the National Trust estate. Stratification was undertaken to select first or second order streams that arise from within the estate boundary or close to the boundary in order to reflect management activities occurring within the estate, rather than wider countryside changes.

In 2018, 20 streams were selected; five from each of 4 sample clusters Table 2. The stream survey window is 1st June to 30th September, however in 2018, all streams were surveyed in September.

Stream surveys were undertaken using two approaches:

1. Plant species from the stream channel and margin were recorded using standard LEAFPACS methods⁸, with a survey length of 100m. Plant abundance was ranked on a 9 point scale dependent on the percentage cover the species occupied (1= < 0.1%, 2=0.1% < 1%, 3= 1% < 2.5%, 4=2.5% < 5%, 5= 5% < 10%, 6= 10% < 25%, 7= 25% < 50%, 8= 50% < 75%, 9= $\geq 75\%$).

2. The physical characteristics of the streams were monitored using River Habitat Survey methods⁹, completed over the same the 100m length used for the LEAFPACS plant survey.

Water chemistry data were collected in the field using Kyoritsu PackTest kits.

Grid reference	Site	Region
SU8114064227	Finchampstead Ridges	London and South East
TQ1710846238	Holmwood Common	London and South East
SU8978984006	Maidenhead and Cookham	London and South East
TQ1164713372	Warren Hill	London and South East
SU8656525957	Woolbeding Gardens	London and South East
SO 45069 66379	Croft Castle	Midlands
SP0338476198	Grovely Dingle	Midlands
SO3969383265	Hopesay Hill	Midlands
SO4241796383	Long Mynd	Midlands
SO4655639237	Perry Hill Farm	Midlands
NY3479607565	Grasmere	North West
NY3701400154	Hawkshead	North West
NY3285402623	Little Langdale	North West
NY3370205006	Lower Wood	North West
NY3838403317	Skelghyll Wood	North West
SM9381140039	Cilau Moor	Wales
SN1543808710	Colby Lodge	Wales
SM784693052	Pwll Caerog	Wales
SN7855827893	St. Davids Commons (Tretio)	Wales
SR9785696738	Stackpole	Wales

Table 2 Stream survey locations

⁸ LEAFPACS:

https://www.wfduk.org/sites/default/files/Media/Characterisation%20of%20the%20water%20environment/Biological%20Method%20Statements/River%20Macrophytes%20UKTAG%20Method%20Statement.pdf

⁹ River Habitat Survey: <u>http://www.riverhabitatsurvey.org/manual/rhs-manuals/</u>



2018 Pond survey summary data



1. Anglesey Abbey	Region: East of England	Pond Grid Ref: TL 53057 62495	
Site Address: Quy Rd, Lode, Cambridge CB25 9EJ			
Survey site: Quarry Pond			
Surveyor: Penny Williams (Freshwater Habitats Trust)		Survey Date: 09/08/18	



This is a very deep, steep-sided limestone quarry pool, fed by ground water but topped up by river water from the adjacent Quy Water.

The presence of large carp keeps the pond's water rather cloudy and turbid, however nutrient tests showed no evidence of water pollution: nitrate levels were low (below detection <0.2ppm) and phosphate levels only just detectable (0.02-0.05 ppm). Unsurprisingly for a limestone quarry, the the pond's pH was slightly alkaline (8.0).

The bank tops along the southern and eastern sides of the pond were fringed by a dense belt of Slender Tufted-sedge *Carex acuta*, however, the plants of most other species were very small and recently germinated in the drawdown zone close to the water's edge.

In total 13 wetland plant species were recorded from the pond. This is lower than the 21 species predicted for a high quality pond in a semi-natural landscape (see Table 1.2), but is not an unexpected result given the pond's steep sides and the additional presence of large carp, which reduce the opportunity for native submerged plants to flourish.

The number of uncommon and rare plants was a little below expected (Table 1.2). However, both of the sedges recorded (Slender Tufted-sedge *Carex acuta* and Tufted Sedge *Carex elata*) are species that are generally declining in England. The latter has shown a 29% decline in it's extent of occurance since the 1930s and is classified as Near Threatened in England. Hence it is now very close to inclusion on the England Red List.



Table 1.1 Wetland Plant species recorded

	Percentag (if more th	je cover nan 1%)
Water-plantain	Alisma plantago-aguatica	
Fool's-water-cress	Helosciadium (Apium) nodiflorum	
Cuckooflower	Cardamine pratensis	
Slender Tufted-sedge	Carex acuta 3	
Tufted Sedge	Carex elata	
Great Willowherb	Epilobium hirsutum	
Hemp-agrimony	Eupatorium cannabinum	
Meadowsweet	Filipendula ulmaria	
Square-stalked St Johns-wort	Hypericum tetrapterum	
Gipsywort	Lycopus europaeus	
Water Mint	Mentha aquatica	
Common Fleabane	Pulicaria dysenterica	
Water Figwort	Scrophularia auriculata	
Number of all plant species	13	
Number of marginal plant speci	es 13	
Number of submerged plant sp	ecies 0	
Number of floating plant specie	s 0	
Table 1.2. PSYM results		
Number of submerged + marg	ginal plant species (excludes floating-leaved plants wl	hich are not a
good measure of quality)		
Predicted number for a high qua	ality pond	21.4
Number actually recorded		13
Quality score (very poor =0, good=3)		2
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km grid squares in the UK)		
Predicted number for a high qua	ality pond	4.4
Number actually recorded		2
Quality score (very poor =0, good=3)		1
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if scores are higher than predicted this suggests the pond is polluted by nutrients and that more sensitive plants have been eliminated)		
Predicted score for a high quali	ty pond	8.80
Score actually recorded		9.08
Quality score (very poor =0, go	od=3)	3
Sum of quality scores for all	metrics	6
Overall quality index (actual/	67%	
PSYM quality category (>75% Poor)	=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V	Moderate
Is this a Priority Pond? (Good	I quality category) Note: based on plants only	No



2. Blickling Hall	Region: East of England	Pond Grid Ref: TG 19019 29130	
Site Address: Blickling, Norwich NR11 6NF			
Survey site: Field pond on the estate			

Surveyor: Penny Williams (Freshwater Habitats Trust) Survey Date: 09/08/18



Results

This is a grassland field pond, partly shaded by willows. At the time of the survey, the pond had shallow water (<0.3m), over deep silt. Much of the pond surface was covered in duckweed, but a long muddy drawdown zone supported a good diversity of marginal plant species. Nitrate levels in the pond were low (below the detection limit of 0.2 ppm). Phosphate levels were a little high at 0.05-0.1 ppm, probably as a result of the accumulated silt.

The pond supported a total of 17 plant species, which is close to what would be expected from a high quality pond. All were nationally common and widespread species. The PSYM quality category for the pond was 'Moderate'. It fell below 'Good' because of the absence of uncommon plants.

Management

Some of the trees around the pond had recently been coppiced to provide a balance of light and shade. It would be worth considering desilting the deeper central areas of the pond, whilst retaining the long shallow muddy edges which provide a good plant and animal habitat.



		Percentage cover
		(if more than 1%)
Water-starwort species	Callitriche stagnalis/platycarpa agg. ¹	
Duckweed species	Lemna minor agg²	70
Amphibious Bistort	Persicaria amphibia	
Creeping Bent	Agrostis stolonifera	1
False Fox-sedge	Carex otrubae	
Common Spike-rush	Eleocharis palustris	
Marsh Cudweed	Gnaphalium uliginosum	3
Yellow Iris	Iris pseudacorus	
Toad Rush	Juncus bufonius ss	1
Soft Rush	Juncus effusus	
Gipsywort	Lycopus europaeus	
Water Mint	Mentha aquatica	1
Tufted Forget-me-not	Myosotis laxa	3
Celery-leaved Buttercup	Ranunculus sceleratus	
Marsh Yellow-cress	Rorippa palustris	
Procumbent Pearlwort	Sagina procumbens	
Branched Bur-reed	Sparganium erectum	
Number of all plant species	17	
Number of marginal plant spe	cies 14	
Number of submerged plant s	pecies 1	
Number of floating plant speci	ies 2	

Table 2.1. Wetland Plant species recorded

¹ Single non-fruiting plant. ²Duckweed plants too immature to determine between *L minor* and *L gibba* Other wetland species close to the pond: Water mint complex hybrid (*mentha* sp.), Marsh Woundwort *Stachys palustris*

Table 2.2. PSYM results

Number of submerged + marginal plant species (excludes floating-leaved plants whic good measure of quality)	h are not a
Predicted number for a high quality pond	15.3
Number actually recorded	15
Quality score (very poor =0, good=3)	3
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km grid so UK)	quares in the
Predicted number for a high quality pond	2.8
Number actually recorded	0
Quality score (very poor =0, good=3)	0
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if scores are than predicted this suggests the pond is polluted by nutrients and that more sensitive have been eliminated)	re higher e plants
Predicted score for a high quality pond	8.54
Score actually recorded	8.01
Quality score (very poor =0, good=3)	3
Sum of quality scores for all metrics	6
Overall quality index (actual/predicted), (%)	67%
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)	Moderate
Is this a Priority Pond? (Good quality category) Note: based on plants only	No





Above top: western end of the pond looking east showing a diverse range of marginal plants like tufted forget-me-not and marsh cudweed (inset) growing on exposed mud. Above bottom: northern edge of the pond looking east showing recent management of marginal trees.



3. Felbrigg	Region: East of England	Pond Grid Ref: TG 19890 38633	
Site Address: Felbrigg, Norwich, Norfolk, NR11 8PR			
Survey site: Pond at the edge of Felbrigg Park			
Surveyor: Penny Williams (Freshwater Habitats Trust) Survey Date: 10/08/18		Survey Date: 10/08/18	



This is a partially shaded pond located in a fenced-off area of scrub and woodland at the edge of Felbrigg Park. At the time of survey the pond was dry, and its hard base suggests the pond dries in most years. It is likely that the pond receives polluted runoff draining from higher ground under arable cultivation to the East, although there is some protection from a five meter buffer of nettles.

A total of 11 wetland plant species were recorded. This is richer than usual for ponds in the lowland countryside (average 8 species), but poorer than ponds located in semi-natural landscapes (average 23 species). The latter is not unexpected, given that the pond is very seasonal.

Most of the plants recorded from the pond were nationally common species, however one, Lesser Spearwort *Ranunculus flammula*, has recently been included on the England Red List as Vulnerable due to a 32% decline in its area of occupancy since the 1930s.

Management

Any increase in the width of the buffer zone to the east of the pond would help to protect its water quality for the long term. A greater variety of habitats could be allowed to develop by removing some of the willows growing in the centre and southern areas of the pond, and by deepening the pond at one end. Including a gate in the surrounding fence, would allow periodic grazing by parkland stock which would be likely to further enhance diversity.



		Percentage cover	
		(if more than 1%)	
Amphibious Bistort	Persicaria amphibia	8	
Creeping Bent	Agrostis stolonifera	3	
Marsh Foxtail	Alopecurus geniculatus	2	
Common Spike-rush	Eleocharis palustris	40	
Short-fruited Willowherb	Epilobium obscurum		
Hoary Willowherb	Epilobium parviflorum		
Floating Sweet-grass	Glyceria fluitans	3	
Soft Rush	Juncus effusus	6	
Gipsywort	Lycopus europaeus	1	
Pale Persicaria	Persicaria lapathifolia	4	
Lesser Spearwort	Ranunculus flammula	1	
Number of all plant species 11			
Number of marginal plant species 10			
Number of submerged plant sp	pecies 0		
Number of floating plant specie	es 1		

Table 3.1. Wetland Plant species recorded





Above top: south-eastern end of the pond looking south Left: northern edge of the pond looking north-east.



4. Oxburgh Hall	Region: East of England	Pond Grid Ref: TF 74239 00505	
Site Address: Oxborough, near Swaffham, Norfolk.			
Survey site: Pond in Home Covert			
Surveyor: Penny Williams (Freshwater Habitats Trust) Survey Date: 09/08/18		Survey Date: 09/08/18	



This is a double-basined pond located at the edge of woodland on the Oxborough Hall Estate. The pond is partly shaded and not grazed by stock. At the time of survey, both of the pond basins were dry, and their hard base suggests that the pond dries in most years.

A total of 11 plant species were recorded. This is richer than is typical for the lowland countryside (average 8 species), but lower than ponds in semi-natural areas (average 23 species). However the latter is not unexpected, given that the pond is very seasonal. No nationally uncommon or rare plant species were recorded from the ponds.

Because the pond was dry at the time of survey it was not possible to collect water chemistry data or undertake an ecological quality assessment using the PSYM bioassessment tool.



		Percentage cover
		(if more than 1%)
Creeping Bent	Agrostis stolonifera	9
False Fox-sedge	Carex otrubae	6
Cyperus Sedge	Carex pseudocyperus	5
Tufted Hair-grass	Deschampsia caespitosa	1
Hemp-agrimony	Eupatorium cannabinum	
Floating Sweet-grass	Glyceria fluitans	60
Hard Rush	Juncus inflexus	
Gipsywort	Lycopus europaeus	
Whorled Water-mint	Mentha x verticillata	1
Water-cress	Rorippa nasturtium-aquaticum s.l.	
Bittersweet	Solanum dulcamara	
Number of all plant species	11	
Number of marginal plant spe	cies 11	
Number of submerged plant s	pecies 0	
Number of floating plant speci	ies 0	

Table 4.1. Wetland Plant species recorded







5. Sheringam Park	Region: East of England	Pond Grid Ref: TG 13060 41561
Site Address: Upper Sheringham, Norfolk, NR26 8TL		
Surveyor: Penny Williams (Freshwater Habitats Trust)Survey Date: 10/08/18		



This is an old quarry pond located in woodland. It is heavily shaded, very seasonal and becoming terrestrialised. No wetland plants were recorded from the pond. Because the pond was dry at the time of survey it was not possible to collect water chemistry data or undertake an ecological quality assessment using the PSYM bioassessment tool.

It would be possible to open the pond up by removing some of the large birches from the central and edge areas of the pond. It might also be possible to increase water-holding capacity by digging out some of the accumulated sediment. However, this would need further investigation, and would be best considered as part of Sherringham's overall strategy for its waterbodies.

A quick additional visit was made to the two adjacent ponds to the north west of the survey site. The small pond that is closest (TG 13002 41628) is very similar to the survey pond.

The larger double-basined pond (TG 12900 41734) is a permanent waterbody heavily influenced by fish. It has a large breeding toad population, with many hundreds of toadpoles seen in August. In the northern basin, there was also a stand of the locally uncommon sumbmerged plant Soft Hornwort *Ceratophyllum submersum*, and small plants of the stonewort *Chara virgata.* Toads are a Biodiversity Action Plan species in their own right. In addition, the presence of a strong toad population makes this a BAP Priority Pond http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-42-Ponds.pdf





Left: southern edge of the survey pond looking south-west. Below: Permanent pond southern basin looking southwest. This pond supports a good toad population and stands of Soft Hornwort *Ceratophyllum submersum*.





6. Biddulph Grange	Region: Midlands	Pond Grid Ref: SJ 89379 59108	
Site Address: Grange Road, Biddulph, Staffordshire, ST8 7SD			
Survey site: Arboretum pond			
Surveyor: Penny Williams (Freshwater Habitats Trust) Survey Date: 28/08/18			



This is an ornamental pond created in the arboretum at Biddulph Grange. Information from site staff suggests that the pond was created at a springhead. It also receives runoff from the lawns above. In the last couple of years the pond has been completely restored: combing two pools to return it to its original shapes as a single pond.

Nitrate levels in the pond were low (below the detection limit of 0.2 ppm). Phosphate levels were a little high at 0.05-0.1 ppm, possibly as a result of sediment washing into the pond from bare ground in the newly planted beds above.

The pond supported a total of eight wetland plant species, which is close to what would be expected from a pond in the lowland countryside. All plant species were nationally common and widespread species. The PSYM quality category for the pond was 'very poor', in part because the pond supported fewer plant species, and fewer uncommon species than would be expected from a high quality pond (Table 6.2). However, this is not unexpected given the pond's garden location and recent restoration.

Management

Increasing the density of planting in the sloping beds immediately above the pond would be helpful to minimise the amount of bare ground. This will reduce the amount of sediment washing into the pond: helping to maintain good water quality and reducing the need for sediment removal.



Table 6.1. Wetland Plant species recorded

Percen		Percentage cover	
		(if more than 1%)	
Common Duckweed	Lemna minor ss	2	
Least Duckweed	Lemna minuta	18	
American Willowherb	nerican Willowherb Epilobium ciliatum		
Meadowsweet	Filipendula ulmaria		
Toad Rush	Juncus bufonius ss		
Soft Rush	Juncus effusus	1	
Purple-loosestrife	Lythrum salicaria	1	
Bulrush	Typha latifolia	8	
Number of all plant species	8		
Number of marginal plant speci	ies 6		
Number of submerged plant sp	ecies 0		
Number of floating plant specie	s 2		
Table 6.2 PSYM results			
Number of submerged + marg	ginal plant species (excludes floating-leav	ed plants which are not a	
good measure of quality)			
Predicted number for a high qu	17.2		
Number actually recorded		6	
Quality score (very poor =0, good=3)			
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km grid squares in the UK)			
Predicted number for a high qu	3.4		
Number actually recorded		0	
Quality score (very poor =0, good=3)		0	
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if scores are higher than predicted this suggests the pond is polluted by nutrients and that more sensitive plants have been eliminated)			
Predicted score for a high quali	ty pond	6.79	
Score actually recorded		8.75	
Quality score (very poor =0, go	od=3)	0	
Sum of quality scores for all	metrics	1	
Overall quality index (actual/predicted), (%)		11%	
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V		<25%=V Very Poor	
Poor) Is this a Priority Pond? (Good quality category) Note: based on plants only		only No	





Top::looking across the pond from north-west to south-east. Bottom: looking down the length of the pond from west to east



Materside

Barber



Earm

Results

Horsehill

Sheepfold

This is a shallow, flat-bottomed seasonal pond located on upland moorland. It is unshaded and open to grazing.

agsnaze

Earm

Orchard

A small number of wetland plant species were recorded from the pond (6 species). This is likely to be in part because the pond is very seasonal. Grazed seasonal ponds are also particularly hard-hit in drought years like 2018 (Freshwater Habitats Trust unpublished data), so additional species may be present in wetter years when grazing and poaching pressure is lower.

Most of the plants recorded from the pond were nationally common and widespread species, however one, Common Cotton-grass *Eriophorum angustifolium*, has recently been included on the England Red List as Vulnerable due to a 33% decline in its area of occupancy since the 1930s.

Because the pond was dry at the time of survey it was not possible to collect water chemistry data or undertake an ecological quality assessment using the PSYM bioassessment tool.



Table 7.1. Wetland Plant species recorded

		Percentage cover (if more than 1%)
Bulbous Rush	Juncus bulbosus	
Bog Moss	Sphagnum species	10
Velvet Bent	Agrostis canina	
Common Cottongrass	Eriophorum angustifolium	
Floating Sweet-grass	Glyceria fluitans	
Soft Rush	Juncus effusus	10
Number of all plant species	6	
Number of marginal plant sp	pecies 4	
Number of submerged plant	t species 2	
Number of floating plant spe	ecies 0	



Left: looking north-east along the length of the pond. Below: looking northwards along the northern bank





8. Lyme	Region: Midlands	Pond Grid Ref: SJ 95858 81720	
Site Address: Disley, Stockport, Cheshire. SK12 2NX			
Survey site: Darcy's Pond			
Surveyor: Penny Williams (Freshwa	ter Habitats Trust)	Survey Date: 28/08/18	



Darcy's Pond is a moderately deep, permanent pond located on low moorland. The pond is partly shaded by mature overhanging trees. The banks are open to grazing, however steep sides around much of the pond restrict stock access to some edges. Public access to the pond from adjacent footpaths mean that dogs regularly disturb it, and keep the water rather turbid, particularly in the centre of the pond and along its north western edge. Nutrient tests showed no evidence of nitrate pollution, with levels below the detection limit (<0.2ppm). Phosphate levels were just detectable (0.02-0.05 ppm), perhaps because the pond's sediments are being re-suspended by swimming and playing dogs. The pond's pH was neutral to slightly alkaline (7.7). This is a little surprising for a moorland pool, which would normally be expected to have an acid pH – and may again result from disturbance at the edge of the pond and suspension of bottom sediments.

The pond supported a good diversity of wetland plants with 22 species recorded. This included a number of notable species, particularly a stonewort (*Nitella flexilis* group) which is usually restricted to ponds with better quality water, and Unbranched Bur-reed *Sparganium emersum* which is a relatively uncommon species in the north of Britain. In addition, one plant, Lesser Spearwort *Ranunculus flammula*, has recently been included on the England Red List as Vulnerable. Lesser Spearwort is still a widespread species in England, but has been included on the England Red list because it has seen a 32% decline in its area of occupancy since the 1930s.



PSYM analysis of the pond, based on its wetland flora shows that the pond is in Good condition (Table 2). This means that the pond can be provisionally considered to be a Biodiversity Plan Priority Pond <u>http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-42-Ponds.pdf</u>.

Table 8.1. Wetland Plant species recorde
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		Percentage cover
		(if more than 1%)
Smooth or Dark Stonewort	Nitella flexilis / opaca	6
	(oospores and antheridia	
	absent)	
Small Pondweed	Potamogeton berchtoldii	8
Unbranched Bur-reed	Sparganium emersum	18
Bog Moss	Sphagnum sp.	2
Common Duckweed	Lemna minor ss	1
Broad-leaved Pondweed	Potamogeton natans	14
Velvet Bent	Agrostis canina	
Creeping Bent	Agrostis stolonifera	
Nodding Bur-marigold	Bidens cernua	
Common Sedge	Carex nigra	
Marsh Thistle	Cirsium palustre	
Tufted Hair-grass	Deschampsia caespitosa	
American Willowherb	Epilobium ciliatum	
Short-fruited Willowherb	Epilobium obscurum	
Square-stalked Willowherb	Epilobium tetragonum	2
Marsh Horsetail	Equisetum palustre	
Common Marsh-bedstraw	Galium palustre	
Toad Rush	Juncus bufonius ss	
Soft Rush	Juncus effusus	19
Gipsywort	Lycopus europaeus	
Lesser Spearwort	Ranunculus flammula	
Bog Stitchwort	Stellaria uliginosa	
Number of all plant species	22	
Number of marginal plant species 16		
Number of submerged plant species 4		
Number of floating plant species 2		



Table	8.2.	PSYM	results
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Number of submerged + marginal plant species (excludes floating-leaved plants which			
are not a good measure of quality)			
Predicted number for a high quality pond	20.9		
Number actually recorded	20		
Quality score (very poor =0, good=3)	3		
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km grid squares in the UK)			
Predicted number for a high quality pond	3.5		
Number actually recorded	4		
Quality score (very poor =0, good=3)	3		
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if higher than predicted this suggests the pond is polluted by nutrients and the sensitive plants have been lost)	scores are at more		
Predicted score for a high quality pond	8.17		
Score actually recorded	7.14		
Quality score (very poor =0, good=3)	3		
Sum of quality scores for all metrics	9		
Overall quality index (actual/predicted), (%)	100%		
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)	Good		
Is this a Priority Pond? (Good quality category) Note: based on plants only	Yes		



Darcy's Pond looking westward across the pond from the eastern bank



9. Monyash	Region: Midlands	Pond Grid Ref: SK 14375 66338
Site Address: Tagg Lane,	DE45 1JN.	
Survey site: Field pond		
Surveyor: Penny Williams	(Freshwater Habitats Trust)	Survey Date: 01/09/18
	Creating and the second of the	
	pond	
	YZZ	Paner House
$\langle / / \rangle$	\times	Read Frank

This is a very seasonal, unshaded, grazed field pond that, the flora suggests, now holds water for a very limited period in any year.

Only two wetland plant species were recorded – which is not an unexpected result given that the pond is so dry.

Because the pond was dry at the time of survey it was not possible to collect water chemistry data or undertake an ecological quality assessment using the PSYM bioassessment tool.

From a single visit, it is hard to know why the pond now generally lacks water. Information from NT staff suggest this may be an old dew pond which has had its lining breached.



Table 9.1. Wetland Plant species recorded

		Percentage cover (if more than 1%)
Creeping Bent	Agrostis stolonifera	2
Small Sweet-grass	Glyceria declinata	15
Number of all plant species2Number of marginal plant species2Number of submerged plant0species0		



View of the pond looking south-east from the north-west bank.



Site Address: ear Bamford, Coggers Ln, Hope Valley S32 1BQ

Survey site: Field pond

Surveyor: Penny Williams (Freshwater Habitats Trust)

Survey Date: 01/09/18



Results

This is a shallow, flat-bottomed seasonal pond located in pastoral grassland. The pond is open and unshaded by trees and - always good to see- not fenced against stock.

A moderate diversity of common wetland plants were recorded from the pond (9 species). Additional species may be recorded in other, wetter, years: grazed seasonal ponds are particularly hard-hit in drought years like 2018 (Freshwater Habitats Trust unpublished data). Unfortunately, the most common plant in the pond is currently New Zealand Pigmyweed Crassula helmsii – a highly invasive species that has spread across the UK from garden centres and garden ponds. Crassula is an exceptionally difficult plant to eradicate: methods such as digging it out, covering it with black plastic and spraying with herbicide are rarely completely successful, and the best hope for the future is a new biological control method, using a mite, which has recently been licenced in the UK.

The presence of *Crassula* in the pond makes it difficult to manage. Since the pond is now very seasonal, and UK summers are likely to become hotter and drier in future, it would be worth considering slightly deepening the pond to enable it to hold water for longer. However, deepening the pond in its current state would encourage further growth of Crassula, which should be avoided.

Overall the best course of action is likely to be to leave the pond as it is for now. And to consider the control of *Crassula* using biological control methods, as a future action.



		Percentage cover
		(if more than 1%)
Creeping Bent	Agrostis stolonifera	28
New Zealand Pigmyweed	Crassula helmsii	45
Tufted Hair-grass	Deschampsia caespitosa	
Common Spike-rush	Eleocharis palustris	17
Marsh Willowherb	Epilobium palustre	
Floating Sweet-grass	Glyceria fluitans	3
Yellow Iris	Iris pseudacorus	
Jointed Rush	Juncus articulatus	2
Soft Rush	Juncus effusus	4
Number of all plant species	9	
Number of marginal plant sp	ecies 9	
Number of submerged plant species	0	
Number of floating plant spe	cies 0	

Table 10.1. Wetland Plant species recorded





Top:looking north west from the south-east corner of the pond. Bottom: Looking northwards from the southern end of the pond



11. Arlington Court	Region: South West	Pond Grid Ref: SS 61213 40391	
Site Address: Arlington, near Barnstaple, Devon, EX31 4LP			
Survey site: Large pond in the grounds			
Surveyor: Penny Williams (Freshwater Habitats Trust)		Survey Date: 13/08/2018	



This is a large, permanent, largely unshaded ornamental pond, set in close-cut, but unimproved grassland in the grounds of Arlington Court. The pond has a small inflow and a dam at its outflow end.

Nutrient tests showed no evidence of nitrate pollution, with levels below the detection limit (<0.2ppm). Phosphate levels were just detectable (0.02-0.05 ppm). The pond's had a circumneutral pH (6.8).

The pond supported a good diversity of wetland plants with 22 species recorded. Some plants have clearly been introduced as ornamentals (e.g. Galingale *Cyperus longus* and Giant Rhubarb *Gunnera tinctoria*). However, omitting these, the pond still has a good range of native wetland species.

The most diverse area of the pond for wetland plants was the low soggy grassland edge in the north-east corner of the pond, where the moderately uncommon Water-purslane *Lythrum portula* occurred together with Lesser Spearwort *Ranunculus flammula*. The latter is still a widespread plant in the UK, but has recently been included on the England Red List as Vulnerable because it has seen a 32% decline in its area of occupancy since the 1930s.

PSYM analysis of the pond, based on its wetland flora suggests that the pond is in 'Moderate' condition (Table 2). It fell below the top score (Good) because it had fewer uncommon plants and fewer species indicative of low-nutrient water than would be expected from undegraded ponds in semi-natural landscapes in this part of the world.


Julia Bigham (Head Gardner) noted in conversation, that an eel *Anguilla anguilla* had been caught in the pond the previous year. Eel populations have declined precipitously across Europe over the last decades and this species is now critically Endangered on the IUCN Red List <u>https://www.iucnredlist.org/species/60344/45833138</u>. The presence of this species in the pond makes the pond a priority habitat in its own right.

Management for biodiversity

The current management regime for the pond and its surrounds seems to be maintaining a good diversity of native wetland plant species in the pond. Continuing to avoid application of fertilisers to the grassland/planting beds around the pond is a valuable technique for minimising nutrient pollution, and maintaining the pond's water quality for the long term. Water-cress is currently removed annually from the pond to ensure it remains as a 'reflective' waterbody. For the purposes of biodiversity, it would be valuable to retain a narrow but dense fringe of vegetation at the very edge of the pond when this clearance is undertaken. A fringe of 30-50 cm width around part of the pond would be enough to provide shelter for invertebrates (such as water beetles, water bugs mayflies and caddis flies), and create refuge from fish predation.

		Percentage cover (if more than
		1%)
Curly Waterweed	Lagarosiphon major	1
Common Duckweed	Lemna minor	
Least Duckweed	Lemna minuta	
Bogbean	Menyanthes trifoliata	1
White Water-lily	Nymphaea alba	28
Creeping Bent	Agrostis stolonifera	
Opposite-leaved Golden-	Chrysosplenium	
saxifrage	oppositifolium	
Galingale	Cyperus longus	2
Common Spike-rush	Eleocharis palustris	
American Willowherb	Epilobium ciliatum	
Short-fruited Willowherb	Epilobium obscurum	
Common Marsh-bedstraw	Galium palustre	
Floating Sweet-grass	Glyceria fluitans	
Giant Rhubarb	Gunnera tinctoria	
Yellow Iris	Iris pseudacorus	1
Jointed Rush	Juncus articulatus	
Soft Rush	Juncus effusus	
Greater Bird's-foot-trefoil	Lotus pedunculatus	
Gipsywort	Lycopus europaeus	
Water-purslane	Lythrum portula	
Water Mint	Mentha aquatica	
Creeping Forget-me-not	Myosotis secunda	
Lesser Spearwort	Ranunculus flammula	
Hybrid Water-cress	Rorripa x sterilis	
Branched Bur-reed	Sparganium erectum	
Bog Stitchwort	Stellaria uliginosa	
Number of all plant aported	26	
Number of all plant species	20 21	
invumber of marginal plant specie	es ZT	

Table 11.1. Wetland Plant species recorded

Number of all plant species Number of marginal plant species Number of submerged plant	26 21 1
species	
Number of floating plant species	4



Table 11.2. PSYM results

Number of submerged + marginal plant species (excludes floating-leaved plant are not a good measure of quality)	s which
Predicted number for a high quality pond	23.4
Number actually recorded	22
Quality score (very poor =0, good=3)	3
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km squares in the UK)	grid
Predicted number for a high quality pond	3.9
Number actually recorded	1
Quality score (very poor =0, good=3)	1
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if sc higher than predicted this suggests the pond is polluted by nutrients and that is sensitive plants have been lost)	ores are more
Predicted score for a high quality pond	6.62
Score actually recorded	7.18
Quality score (very poor =0, good=3)	2
Sum of quality scores for all metrics	6
Overall quality index (actual/predicted), (%)	67%
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor,	Moderate
<25%=V Poor)	
Is this a Priority Pond? (Good quality category) Note: based on plants only	NO



Looking north west across the norther half of the pond from the eastern bank



12. Dyrham	Region: South West	Pond Grid Ref: ST 74595 75815		
Site Address: Dyrham, near Bath, Gloucestershire, SN14 8HY				
Site: Old Pond in Pond Wood (plus Frying Pan Pond to the west)				
Surveyor: Penny Williams (Freshwater Habitats Trust) Survey Date: 15/08/18				



Water chemistry

Quick-use water chemistry kits showed that the spring water entering Old Pond is very highly polluted with nitrate (10+ ppm). There was also some indication of phosphate pollution (0.05-0.1 ppm). See Figure 1. This suggests high levels of nutrient pollution in the regional aquifer, particularly of nitrate

Water *leaving* Old Pond at its outflow was still highly polluted with nitrate (2-5 ppm), although levels were slightly lower, presumably through natural biological and biochemical removal processes (e.g. denitrification) in the pond. Phosphate levels were similar to spring water (0.05-0.1 ppm).

A culvert takes outflow water the short distance from Old Pond to Frying Pan Pond.

Water finally leaving Frying Pan pond showed no evidence of nitrate or phosphate pollution N<0.2 ppm, P<P 0.02 ppm). This rather miraculous transformation is likely to have occurred through denitrification by the pond's wet soils and, particularly, through uptake by *Groenlandia densa* (the only submerged macrophyte in the pond) using nitrate and phosphate in the water to build its summer growth.





Figure 12.1 Nutrient test kit results from the inflow stream and pond outflows

Wetland plants

Old Pond was heavily silted-up with little surface water remaining (Photo1). It had a moderately rich flora with a total 14 species of wetland plants recorded from within the pond boundary (Table 1). All were nationally widespread taxa.

PSYM analysis of the pond, based on its wetland flora shows that overall the pond is in Good condition (Table 2). This means that the pond can be provisionally considered to be a Biodiversity Plan Priority Pond http://jncc.defra.gov.uk/pdf/UKBAP_BAPHabitats-42-Ponds.pdf.

Only three plant species were recoded from Frying Pan Pond. However one of these was Opposite-leaved Pondweed *Groenlandia densa,* which continues to grow as a healthy population within the pond. At the time of the survey, *Groenlandia* occupied around 14% of the water area, growing as a semi-continuous belt on shallow mud around the pond's perimeter. *Groenlandia* is a species that has declined considerably in the UK over the llast 50 years and it now Red Listed as Vulnerable. Few extant populations are known to remain in this part of southern England (http://bsbi.org/maps), Making Frying Pan Pond rather a special place.

Management implications

Frying Pan Pond

Grazing: Frying Pan pond had very good stands of *Groenlandia densa* growing in shallow water on soft mud around the edge of the pond. Retaining grazing and poaching by cattle will help to maintain the disturbed bare muddy areas that this poorly-competitive plant needs.

Dredging: Frying Pan Pond currently has a central area of deep mud, which emerges above the surface. Aesthetically this is rather unattractive, and since the area is mainly dominated by a stand of the common Hybrid Watercress (rather than the very uncommon *Groenlandia densa*), this central mud area could be dredged-out with little loss of biodiversity value. This would leave the pond looking more attractive to visitors, would be likely to benefit amphibians,



and would retain the beds of *Groenlandia densa* relatively untouched. Dredging could occur over 1-2 years and, as far as possible, should be undertaken from just one point – to minimise the associated removal of the *Groenlandia*.

Maintaining Groenlandia: Because *Groenlandia* is now such an uncommon and declining plant (the Atlas suggests that there are few other sites in the county) – it would be worth considering ways to protect the population against loss. This might be undertaken by maintaining an ex-situ population (e.g. in garden tubs), or by trial introduction to other pre-existing or new ponds at Dyrham or nearby Estates. Some *Groenlandia* plants will obviously be lost when the central area of the pond is dredged, and these plants could be used for such translocations.

Water quality in other ponds and lakes on the estate. Nutrient pollution is believed to cause unsightly algal blooms in some of the formal lakes and ponds on the estate. Nutrient pollution from the spring that initially feeds Old Pond and Frying Pan Pond is likely to contribute to this pollution. However, there may also be other sources. Quick kits could be used to test nutrient levels in the inflows and outflows of these waterbodies to identify other likely sources pollution. If the spring that feeds Old Pond *is* the major source, then dredging part of Old Pond to create a vegetated silt trap might enhance nutrient reduction. However, it may still be difficult to provide an easy 'fix' if the formal ponds already have deep pollutant-laden sediments.

·		Percentage cover (if more than		
		1%)		
Creeping Bent	Agrostis stolonifera	20		
Various-leaved Water-	Callitriche platvoarpa	1		
starwort	Califinitie platycarpa	l		
Yellow Sedge species	Carex demissa agg ¹			
Tufted Hair-grass	Deschampsia caespitosa			
Great Willowherb	Epilobium hirsutum	1		
Hoary Willowherb	Epilobium parviflorum			
Small Sweet-grass	Glyceria declinata			
Floating Sweet-grass	Glyceria fluitans	18		
Fool's Watercress	Helosciadium (Apium)	2		
	nodiflorum	2		
Jointed Rush	Juncus articulatus	7		
Water Mint	Mentha aquatica	18		
Hybrid Watercress	Rorripa x sterilis	11		
Branched Bur-reed	Sparganium erectum	5		
Brooklime	Veronica beccabunga			
Number of all plant species	14			
Number of marginal plant species 13				
Number of submerged plant	1			
species				
Number of floating plant spec	cies 0			
¹ Single non-fruiting plant Othe	r wetland species close to Old	Pond: Marsh St John's Wort		

Table 12.1. Wetland Plant species recorded from Old Pond

¹ Single non-fruiting plant Other wetland species close to Old Pond: Marsh St John's Wort Hypericum tetrapterum, Common Angelica Angelica sylvestris.



Table 12.2.	Wetland Plant	species I	recorded f	rom Fryi	ing Pan	Pond

		Percentage cover (if more than
		1%)
Small Sweet-grass	Glyceria declinata	
Opposite-leaved Pondweed	Groenlandia densa	14
Hybrid Watercress	Rorripa x sterilis	70
Number of all plant species	3	
Number of marginal plant species	2	
Number of submerged plant species	1	
Number of floating plant species	0	

Table 12.3. PSYM results for Old Pond			
Number of submerged + marginal plant species (excludes floating-leaved plan	ts which		
are not a good measure of quality)			
Predicted number for a high quality pond	17.2		
Number actually recorded	14		
Quality score (very poor =0, good=3)	3		
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km	grid		
squares in the UK)			
Predicted number for a high quality pond	2.8		
Number actually recorded	2		
Quality score (very poor =0, good=3)	2		
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if scores are			
higher than predicted this suggests the pond is polluted by nutrients and that	more		
sensitive plants have been lost)			
Predicted score for a high quality pond	8.72		
Score actually recorded	8.66		
Quality score (very poor =0, good=3)	3		
Sum of quality scores for all metrics	8		
Overall quality index (actual/predicted), (%)	89%		
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor,	Good		
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)	Good		





Photo 1. Old Pond: looking towards the dam



Photo 2. Frying Pan Pond with Groenlandia densa (inset)



13. Holnicote	Region: South West	Pond Grid Ref: SS	8834 044676
Survey site: On open moorland			
Surveyor: Penny Williams (Freshwa	ter Habitats Trust)	Survey Date: 13	/08/18



Results

This is a small, unshaded shallow seasonal pool located on Exmoor heathland. At the time of survey, the pond was dry and heavily poached by stock, with most of the central area bare of vegetation. Because the pond was dry at the time of survey it was not possible to collect water chemistry data or undertake an ecological quality assessment using the PSYM bioassessment tool <u>http://bit.ly/PSYM-manual</u>.

A total of nine plant species were recorded. This is rather lower than most ponds in seminatural areas (average 23 species) – but not unexpectedly so, given that the pond is both small and very seasonal. Grazed seasonal ponds are also particularly hard-hit in drought years like 2018 (Freshwater Habitats Trust unpublished data), so additional species may be present in wetter years when grazing and poaching pressure is lower.

No rare plant species were recorded. However, both Water-purslane *Lythrum portula* and Tormentil *Potentilla erecta* are species that are generally declining in England. The latter has shown a 26% decline in it's area of occupancy since the 1930s and is classified as Near Threatened in England. Hence it is now bordering inclusion on the England Red List.



Table 13.1. Wetland Plant species recorded

			Percentage cover
			(if more than 1%)
Velvet Bent	Agrostis canii	na	
Creeping Bent	Agrostis stolo	onifera	
Small Sweet-grass	Glyceria decl	inata	
Marsh Cudweed	Gnaphalium (uliginosum	
Soft Rush	Juncus effusi	JS	
Water-purslane	Lythrum portu	ıla	
Tormentil	Potentilla ere	cta	
Round-leaved Crowfoot	Ranunculus d	omiophyllus	
Bog Stitchwort	Stellaria uligii	nosa	
Number of all plant species	9		
Number of marginal plant spe	cies 9		
Number of submerged plant	0		
species	0		
Number of floating plant speci	es 0		



North-western end of the pond showing the heavy poaching



14. LacockRegion: South WestPond Grid Ref: ST 91875 67949Site Address: Lacock, near Chippenham, Wiltshire. SN15 2LGSurvey site: Small field pondSurveyor: Penny Williams (Freshvater Habitats Trust)Survey Date: 15/08/2018



Findings

The survey pond is a small field pond located at the edge of a grassland field. It also drains, and probably receives spray drift from, an arable field to the south which, at the time of the survey, was growing maize (see photos). Unsuprisingly, the pond's water was heavily polluted with nitrate (10+ ppm), it was also moderately polluted with phosphate (0.05-0.1 ppm), (see photos). The pond's pH was a neutral 6.8.

The pond supported a rather poor wetland plant community, dominated by a thick surface cover of the widespread, nutrient tollerant Fat Duckweed (*Lemna gibba*). A total of eight plant species were recorded. This is typical of countryside ponds, many of which are degraded. The PSYM assessment (Table 2) suggests the pond has around half of the number of plants that would be expected if the pond was in good condition. The plants are dominated by common species that are tollerant of high nutrient levels.

Management for biodiversity

Unfortunately, the location of the pond, next to a maize field, makes it difficult to manage the pond to significantly improve it's quality: dredging out what must be heavily polluted bottom silt from the pond would be likely to improve its water quality in the short term. But to create long term water quality and biodiverity gains, the pond would also need to be buffered from arable land to the south.



Table 14.1. Wetland Plant species recorded

		Percentage cover
		(if more than 1%)
Fat Duckweed	Lemna gibba	38
Creeping Bent	Agrostis stolonifera	18
American Willowherb	Epilobium ciliatum	
Great Willowherb	Epilobium hirsutum	
Marsh Cudweed	Gnaphalium uliginosum	12
Celery-leaved Buttercup	Ranunculus sceleratus	
Hybrid Water-cress	Rorripa x sterilis	3
Number of all plant species	8	
Number of marginal plant spe	ecies 7	
Number of submerged plant	0	
species	0	
Number of floating plant spec	ies 1	

Table 14.2. PSYM results

Number of submerged + marginal plant species (excludes floating-leaved plan poor measure of quality)	nts which are a
Predicted number for a high quality pond	14.8
Number actually recorded	7
Quality score (very poor =0, good=3)	1
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km in the UK)	grid squares
Predicted number for a high quality pond	2.5
Number actually recorded	1
Quality score (very poor =0, good=3)	1
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if so higher than predicted this suggests the pond is polluted by nutrients and that plants have been lost)	cores are more sensitive
Predicted score for a high quality pond	8.26
Score actually recorded	9.50
Quality score (very poor =0, good=3)	1
Sum of quality scores for all metrics	3
Overall quality index (actual/predicted), (%)	33%
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)	Poor
Is this a Priority Pond? (Good quality category) Note: based on plants only	Νο











Above right and right: Lacock field pond looking west. Above top: looking south across the pond to the maize field which drains directly into the pond. Above bottom: nutrient test kits showing very high nitrate pollution and moderate phosphate pollution



15. Mort	Region: South West	Pond Grid Ref: SS 46030 42891	
Site Address: Woolacombe			
Surveyor: Penny Williams (Freshwater Habitats Trust) Survey Date: 13/08/18			



Results

This is a man-made pond formed behind a dam in a small valley. The pond was dry at the time of survey, and probabaly now dries in most years. It is partly fed by a small seasonal inflow that drains from sheep-grazed unimproved grassland on the hillside above. Part of the pond is heavily shaded by sallows, part remains open and unshaded (see photos).

The pond's wetland flora was moderately rich, supporting 16 plant species. All plants recorded were common and widespread species.

Because the pond was dry at the time of survey it was not possible to collect water chemistry data or undertake an ecological quality assessment using the PSYM bioassessment tool.



Table 15.1. Wetland Plant species recorded

		Percentage cover
		(if more than 1%)
Willow Moss	Fontinalis antipyretica	20
Creeping Bent	Agrostis stolonifera	1
Marsh Foxtail	Alopecurus geniculatus	25
Fool's-water-cress	Helosciadium (Apium) nodiflorum	9
Common Marsh-bedstraw	Galium palustre	1
Floating Sweet-grass	Glyceria fluitans	1
Marsh Cudweed	Gnaphalium uliginosum	
Square-stalked St Johns- wort	Hypericum tetrapterum	
Toad Rush	Juncus bufonius ss	
Soft Rush	Juncus effusus	
Purple-loosestrife	Lythrum salicaria	
Creeping Forget-me-not	Myosotis secunda	1
Water-pepper	Persicaria hydropiper	3
Narrow-fruited Water-cress	Rorippa microphylla	
Bittersweet	Solanum dulcamara	
Bog Stitchwort	Stellaria uliginosa	
Number of all plant species Number of marginal plant spe	16 ecies 15	

Number of all plant species	10
Number of marginal plant species	15
Number of submerged plant	1
species	
Number of floating plant species	0



Southern end of the pond looking towards the inflow



Shaded southern end of the pond with the dam in the background



16. Beningbrough HallRegion: Yorkshire & NEPond Grid Ref: SE 51871 59073Site Address: Beningbrough, York, North Yorkshire, YO30 1DDSurveyor: Penny Williams (Freshwater Habitats Trust)Survey Date: 30/08/18



Results

This is a rather shaded fenced seasonal pool that is largely bordered by arable land.Because the pond was dry at the time of survey it was not possible to collect water chemistry data or undertake an ecological quality assessment using the PSYM bioassessment tool.

A total of five wetland plant species were recorded, all were common and widespread species. This is rather lower than is typical for countryside ponds (average eight wetland plant species) and considerably below the average for high quality ponds in semi-natural areas (average 23 species). The relatively poor flora is likely to partly reflect the fact that the pond is seasonal and rather shaded. However there was a considerable amount of dried-up blanketweed/filamentous algae in the centre of the pond, which may suggest that the pond receives nutrient enriched water draining from improved fields around it.

It is possible that the pond's biodiversity could be enhanced by cutting back some of the overhanging trees. However this should be approached gradually: if the pond *is* receiveing nutrient-polluted water from the surrounds then increasing light levels may just result in greater coverage of blanketweed or duckweed. To protect and enhance the pond's quaity in the longer term, it would be beneficial to create a wider buffer to protect the pond from the intensive land around (and particulalry uphill) of the pond, and to ensure that there are no sub-surface drains bringing in water from the surrounds. If there are long-term plans to graze fields around the pond, it would be beneficial for biodiversity to alow stock access to the pond margins.

Table 16.1. Wetland Plant species recorded



		Percentage cover
		(if more than 0.5%)
Creeping Bent	Agrostis stolonifera	
Short-fruited Willowherb	Epilobium obscurum	
Indian Balsam	Impatiens glandulifera	0.5
Yellow Iris	Iris pseudacorus	2
Soft Rush	Juncus effusus	
Bittersweet	Solanum dulcamara	0.5
Number of all plant species	5	
Number of marginal plant spe	ecies 5	
Number of submerged plant	0	
species	0	
Number of floating plant spec	cies 0	



17. Bransdale	Region: Yorkshire & NE	Pond Grid Ref: SE 62827 95609	
Site Address: Bransdale area			
Survey site: Moorland pond			
Surveyor: Penny Williams (Freshwater Habitats Trust) Survey Date:30/08/18			



Results

This is a steep-sided moorland pond, created by excavating and damming an area of flushes. Geotextiles and bare ground around the dam suggests pond may have been recently restored. New tree planting has been added to the northern margins. The pond is fenced against grazing.

The pond had very turbid water, presumably because of the addition of fish. Water quality showed no evidence of nutrient pollution, with both nitrate and phosphate levels below the detection limit (0.2 and 0.02 ppm respectively).

A moderate number of wetland plant species were recorded from the pond (14 species): a little lower than expected for a pond located in a semi-natural landscapes (Table 2). This is likely to be due to the pond's steep banks which inhibits the growth of marginal species and the presence of fish which increase water turbidity and inhibit submerged plant growth.

Most of the plants recorded from the pond were nationally common and widespread species, however one, Lesser Spearwort *Ranunculus flammula*, has recently been included on the England Red List as Vulnerable due to a 32% decline in its area of occupancy since the 1930s. A second, Star Sedge *Carex echinata*, is bordering on the England Red list: it is now Near Threatened in England due to a 29% decline in its area of occupancy sine the 1930s.



Table 17.1. Wetland Plant species recorded

		Percentage cover
		(if more than 1%)
Common Water-starwort	Callitriche stagnalis	
Bog Moss	Sphagnum sp.	
Velvet Bent	Agrostis canina	
Creeping Bent	Agrostis stolonifera	
Star Sedge	Carex echinata	
Common Sedge	Carex nigra	
Marsh Thistle	Cirsium palustre	
American Willowherb	Epilobium ciliatum	
Short-fruited Willowherb	Epilobium obscurum	
Juncus acutiflorus	Juncus acutiflorus	
Soft Rush	Juncus effusus	12
Lesser Spearwort	Ranunculus flammula	
Bog Stitchwort	Stellaria uliginosa	
Deergrass	Trichophorum cespitosum	
Number of all plant species	14	
Number of marginal plant sp	pecies 12	
Number of submerged plant	2	
species	2	

Number of floating plant species 0

Table 17.2. PSYM results

Number of submerged + marginal plant species (excludes floating-leaved plants which			
are not a good measure of quality)			
Predicted number for a high quality pond	20.7		
Number actually recorded	14		
Quality score (very poor =0, good=3)	2		
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10k	m grid		
squares in the UK)			
Predicted number for a high quality pond	3.6		
Number actually recorded	0		
Quality score (very poor =0, good=3)	0		
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if scores are			
higher than predicted this suggests the pond is polluted by nutrients and that	at more		
sensitive plants have been lost)			
Predicted score for a high quality pond	8.65		
Score actually recorded	5.77		
Quality score (very poor =0, good=3)	3		
Sum of quality scores for all metrics	5		
Overall quality index (actual/predicted), (%)	56%		
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor,	Moderate		
<25%=V Poor)			
Is this a Priority Pond? (Good quality category) Note: based on plants only	Νο		







Above: pond viewed from the north west looking SSE. Left: view from the west of the pond looking east.



18. Roseberry CommonRegion: Yorkshire & NE**Pond Grid Ref:** NZ 59302 12422Survey site: Moorland pondSurveyor: Penny Williams (Freshwater Habitats Trust)Survey Date: 31/08/18



Results

This is a steep-sided, but surprisingly shallow moorland pond, which is unshaded and open to grazing.

The pond has very dark, peaty, turbid water. The pH was acid (5.6), as would be expected from a moorland pool. Water quality showed no evidence of nutrient pollution, with both nitrate and phosphate levels below the detection limit (0.2 and 0.02 ppm respectively).

A small number of wetland plant species were recorded from the pond (6 species): a little lower than expected for a pond located in a semi-natural landscapes (Table 2). This is likely to be due to the pond's steep banks which inhibits the growth of marginal species and the very turbid water which inhibits submerged plant growth.

Most of the plants recorded from the pond were nationally common and widespread species, however one, Common Cotton-grass *Eriophorum angustifolium*, has recently been included on the England Red List as Vulnerable due to a 33% decline in its area of occupancy since the 1930s.



Table 18.1. Wetland Plant species recorded

	Perce	ntage cover	
	(if mo	re than 1%)	
Bog Moss	Sphagnum sp.	15	
Velvet Bent	Agrostis canina		
Creeping Bent	Agrostis stolonifera		
Common Sedge	Carex nigra	1	
Common Cottongrass	Eriophorum angustifolium		
Soft Rush	Juncus effusus	20	
Number of all plant species	6		
Number of marginal plant sp	ecies 5		
Number of submerged plant	1		
species			
Number of floating plant spe	cies 0		
Table 18.2. PSYM results			
Number of submerged + m	arginal plant species (excludes floating-leav	ed plants which	
are not a good measure of	quality)		
Predicted number for a high	quality pond	11.8	
Number actually recorded		6	
Quality score (very poor =0,	good=3)	2	
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km grid			
squares in the UK)		U	
Predicted number for a high	quality pond	2.1	
Number actually recorded		0	
Quality score (very poor =0.	aood=3)	0	
Trophic Ranking Score (a)	measure of how nutrient tolerant the plants a	are: if scores are	
higher than predicted this suggests the pond is polluted by nutrients and that more			
sensitive plants have been	lost)		
Predicted score for a high gu	uality pond	5.44	
Score actually recorded		4.17	
Quality score (very poor =0.	aood=3)	3	
Sum of quality scores for a	all metrics	5	
Overall quality index (actu	al/predicted) (%)	56%	
PSYM quality category (>7	5%-Good 51-75%- Moderate 25-50%-Poor	Moderate	
<25%=V Poor)			
Is this a Priority Pond? (Go	ood quality category) Note: based on plants	oniv No	





Top: looking from the south-west bank towards the eastern end of the pond. Left: looking from the southern to the northern bank



19. Middlethorpe Hall HotelRegion: Yorkshire & NEPond GR: SE 59978 48477Site Address: Middlethorpe, York YO23 2QB

Survey site: Pond in the grounds of the hotel and spa **Surveyor:** Penny Williams (Freshwater Habitats Trust)

Survey Date: 30/08/18



Results

This is a large pond set in the hotel grounds, which is flooded annually by the River Ouse. Nutrient tests showed no evidence of nitrate pollution: nitrate levels were below detection (<0.2ppm). However phosphate levels were rather high (0.1-0.2 ppm), possibly as a result of flooding by polluted river water, and by recirculation from the pond's deep accumulation of silt. The pond's pH was broadly neutral (7.6).

Much of the pond's water surface was covered in the non-native Least Duckweed (*Lemna minuta*). The margins supported extensive stands of tall emergent wetland plants, which extended into the pond as floating rafts around the entire perimeter of the pond.

The pond had a very good diversity of wetland plants with 28 species recorded in total. The PSYM score (see Table 2), shows that this is similar to the number of species that would be expected from a high quality pond. However, the *overall* PSYM category for the pond is 'Moderate'. The pond fell below the optimal score of 'Good' because it supports fewer national rare or uncommon species than would be expected in a 'pristine' pond.



Table 19.1. Wetland Plant species recorded

		Percentage cover (if more than
		0.5%)
Rigid Hornwort	Ceratophyllum demersum	0.5
Least Duckweed	Lemna minuta	70
Ivy-leaved Duckweed	Lemna trisulca	
Amphibious Bistort	Persicaria amphibia	
Creeping Bent	Agrostis stolonifera	1
Water-plantain	Alisma plantago-aquatica	
Marsh-marigold	Caltha palustris	
Greater Pond-sedge	Carex riparia	
Tufted Hair-grass	Deschampsia caespitosa	
American Willowherb	Epilobium ciliatum	
Great Willowherb	Epilobium hirsutum	1
Hoary Willowherb	Epilobium parviflorum	
Marsh Horsetail	Equisetum palustre	
Meadowsweet	Filipendula ulmaria	
Common Marsh-bedstraw	Galium palustre	1
Reed Sweet-grass	Glyceria maxima	10
Indian Balsam	Impatiens glandulifera	1
Yellow Iris	Iris pseudacorus	2
Jointed Rush	Juncus articulatus	
Soft Rush	Juncus effusus	
Creeping-Jenny	Lysimachia nummularia	
Purple-loosestrife	Lythrum salicaria	
Water Forget-me-not	Myosotis scorpioides	
Celery-leaved Buttercup	Ranunculus sceleratus	
Water Figwort	Scrophularia auriculata	
Bittersweet	Solanum dulcamara	
Bulrush	Typha latifolia	18
Brooklime	Veronica beccabunga	
Number of all plant species	28	
Number of marginal plant sp	ecies 24	
Number of submerged plant	1	
species	I	
Number of floating plant spe	cies 3	

Additional species recorded above the drawdown zone: Giant Rhubarb *Gunnera tinctoria* Additional damp ground species recorded that are not on the standard plant list: Hairy Sedge *Carex hirta*



Table 19	9.2. PS	YM res	sults	
	· ·			

Number of submerged + marginal plant species (excludes floating-leaved pla are not a good measure of guality)	ants which
Predicted number for a high quality pond	27.2
Number actually recorded	25
Quality score (very poor =0, good=3)	3
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10k squares in the UK)	m grid
Predicted number for a high quality pond	4.8
Number actually recorded	1
Quality score (very poor =0, good=3)	0
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if higher than predicted this suggests the pond is polluted by nutrients and the sensitive plants have been lost)	scores are at more
Predicted score for a high quality pond	8.82
Score actually recorded	9.22
Quality score (very poor =0, good=3)	3
Sum of quality scores for all metrics	6
Overall quality index (actual/predicted), (%)	67%
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)	Moderate
Is this a Priority Pond? (Good quality category) Note: based on plants only	Νο





Views of the pond looking from the northeast bank towards the south-west bank. Top: extensive band of tall emergent plants extending out into the pond as a floating raft. Middle and bottom: open water covered by a blanket of Least Duckweed *Lemna minuta*.



20. Causeway MossRegion: Yorkshire & NEPond Grid Ref: SD 94533 80453Surveyor: Penny Williams (Freshwater Habitats Trust)



Results

This is a bog pool in an area of grazed moorland grassland. The pH was acid (4.8), as would be expected from a moorland pool, with clear water stained by peat. Water quality showed no evidence of nitrate pollution, with levels below the detection limit (0.2)

ppm). Phosphate levels were slightly elevated 0.05-0.1 ppm.

A small number of wetland plant species were recorded from the pond (6 species): a little lower than expected for a pond located in a semi-natural landscapes (Table 2). This is likelt to be due to the pond's steep banks which inhibits the growth of marginal species and the very turbid water which inhibits submerged plant growth.

Most of the plants recorded from the pond were nationally common and widespread species, however two species, Common Cotton-grass *Eriophorum angustifolium*, and Lesser Spearwort *Ranunculus flammula*, have recently been included on the England Red List as Vulnerable due to a 33% and 32% decline respecitively, in their area of occupancy since the 1930s. A third species, Tormentil *Potentilla erecta*, is bordering on the England Red list: it is now Near Threatened in England due to a 26% decline in its area of occupancy since the 1930s.



		Percentage cover
		(if more than 1%)
Bog Moss	Sphagnum sp.	12
Velvet Bent	Agrostis canina	
Common Sedge	Carex nigra	3
Bottle Sedge	Carex rostrata	
Carex species	Carex sp. (undetermined)	
Marsh Willowherb	Epilobium palustre	
Common Cottongrass	Eriophorum angustifolium	
Common Marsh-bedstraw	Galium palustre	
Soft Rush	Juncus effusus	55
Purple Moor-grass	Molinia caerulea	1
Tormentil	Potentilla erecta	
Lesser Spearwort	Ranunculus flammula	
Bog Stitchwort	Stellaria uliginosa	
Deergrass	Trichophorum cespitosum	1
Number of all plant species	14	
Number of marginal plant sp	ecies 13	
Number of submerged plant	1	
species	I	
Number of floating plant spec	cies 0	

Table 20.1. Wetland Plant species recorded

Table 20.2. PSYM results

Number of submerged + marginal plant species (excludes floating-leaved plants which are not a good measure of quality)				
Predicted number for a high quality pond	20.7			
Number actually recorded	14			
Quality score (very poor =0, good=3)	2			
Number of 'uncommon' plant species (recorded in fewer than 25% of 10x10km grid squares in the UK)				
Predicted number for a high quality pond	3.6			
Number actually recorded	0			
Quality score (very poor =0, good=3)	0			
Trophic Ranking Score (a measure of how nutrient tolerant the plants are: if scores are higher than predicted this suggests the pond is polluted by nutrients and that more sensitive plants have been lost)				
Predicted score for a high quality pond	8.65			
Score actually recorded	5.77			
Quality score (very poor =0, good=3)	3			
Sum of quality scores for all metrics	5			
Overall quality index (actual/predicted), (%)	56%			
PSYM quality category (>75%=Good, 51-75%= Moderate, 25-50%=Poor, <25%=V Poor)	Moderate			
Is this a Priority Pond? (Good quality category). Note: based on plants only	No			







Top: the south-west end of the pond. Left: looking north-eastwards along the pond from the south-west tip.



2018 Stream survey summary data



1. Finchampstead Ridges

Region: London and South East

Stream Length Grid Ref: SU 81140 64227 to SU 81205 64268

Stream Name: n/a

Surveyor: Richard Lansdown

Survey Date: 27/09/18



Results

This is a small shallow stream, less than 1 m wide. The stream had a stable base predominantly comprised of silty-clay but with some peat.

At the time of the survey, the water was clear. Tests showed no evidence of nutrient pollution with nitrate and phosphate levels both below their detection limits (<0.2 ppm and <0.02 ppm respectively).

Both steam banks were heavily shaded by overhanging trees, as a result, the cover of wetland vegetation was low (3%).

Only one plant species was recorded in the stream channel: the bog moss species *Sphagnum fimbriatum*. Seven plant species were recorded from the stream margins (Table 1.1). All species were common and widespread at national level.



Table 1.1 Plant species recorded

pecies	LEAFPACS cover values	
	Channel	Margin
Betula pendula		2
Calluna vulgaris		3
Carex pendula		1
Erica cinerea		1
Glyceria fluitans		1
Juncus effusus		2
Molinea caerulea		5
Sphagnum fimbriatum	3	
Number of plant species	1	7







2. Holmwood Common Region: London and South East Stream Length Grid Ref: TQ 17108 46238 to TQ 17139 46273 Stream Name: Black Brook

Surveyor: Richard Lansdown

Survey Date: 27/09/18



Results

This is a small shallow stream, around 0.5 m in width, with a stable pebble-gravel base.

At the time of the survey, the water was clear. Nutrient tests showed no evidence of pollution with nitrate below the detection limit (<0.2 ppm) and phosphate present at low levels (0.02-0.05 ppm).

Both banks of the stream were heavily shaded by overhanging trees, as a result, the cover of wetland vegetation was low (2%).

Only one plant species was recorded in the stream channel: narrow-leaved pocket-moss *Fissidens gracilifolius.* Seven species were recorded from the stream margins (Table 2.1). All species were common and widespread at national level.



Table 2.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Betula pendula		2
Angelica sylvestris		1
Cardamine flexuosa		3
Carex remota		2
Chrysosplenium oppositifolium		3
Fissidens bryoides		2
Fissidens gracilifolius	3	
Pellia epiphylla		2
Total number of plant species	1	6







3. Maidenhead and CookhamRegion: London and South EastStream Length Grid Ref: SU 89789 84006 to SU 89735 83931Stream Name: White BrookSurveyor: Richard LansdownSurvey Date: 27/09/18



Results

This moderately large stream had a width of 5-7 m and a water depth over 1 m deep. The base was soft silty-clay.

At the time of the survey, the water was turbid. Nutrient tests showed evidence of moderate pollution with nitrate levels between 2-5 ppm and phosphate levels 0.05-0.1 ppm. There was around 5% cover of filamentous algae.

Both banks of the stream were grazed by stock, and were open and unshaded by overhanging trees. Wetland vegetation cover was c 50%.

The channel and marginal areas of the stream were relatively diverse with 10 and 17 plant species recorded respectively (Table 3.1). All plants were nutrient tolerant species that are common and widespread at national level.



Table 3.1 Plant species recorded

Species	LEAFPACS cover values	
-	Channel	Margin
Apium nodiflorum		4
Callitriche sp.	1	
Cladophora glomerata	3	2
Eleocharis palustris		4
Glyceria maxima	5	7
Impatiens capensis		2
Juncus inflexus		1
Lemna gibba	4	3
Lemna minuta	1	
Lycopus europaeus		2
Mentha aquatica	5	6
Myosotis scorpioides		2
Nasturtium officinale agg.	2	
Oenanthe crocata		2
Phragmites australis		1
Ranunculus sceleratus		2
Rumex conglomeratus		1
Rumex hydrolapathum		1
Solanum dulcamara	3	
Sparganium erectum	2	2
Spirodela polyrhiza	3	3
Total number of plant species	10	17

Additional species: Bidens connate, Persicaria hydropiper, Veronica beccabunga, Glyceria declinata Persicaria maculosa



4. Warren Hill

Region: London and South East


Stream Length Grid Ref: TQ 11647 13372 to TQ 11723 13330

Stream Name: n/a

Surveyor: Richard Lansdown

Survey Date: 28/09/18



Results

This small shallow stream, was around 0.5 m in width, and had a stable, pebble-gravel base.

At the time of the survey, the water was clear. Nutrient tests showed no evidence of nitrate pollution with levels below the detection limit (<0.2 ppm). There was some evidence of phosphate pollution (0.05-0.01 ppm).

Both banks of the stream were heavily shaded by overhanging trees. There was no wetland vegetation in the channel. Five plant species were recorded from the stream margins (Table 4.1). All species were common and widespread at national level.



Table 4.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Apium nodiflorum		4
Carex sylvatica		1
Fissidens bryoides		1
Fissidens taxifolius		2
Pellia endiviifolia		3
Total number of plant species	0	5







5. Woolbeding Gardens

Region: London and South East

Stream Length Grid Ref: SU 86565 25957 to SU 86516 25861

Stream Name: n/a

Surveyor: Richard Lansdown

Survey Date: 28/09/18



Results

This small shallow stream was around 0.5 m in width and had a stable, pebble-gravel base.

At the time of the survey, the water was clear. Nutrient tests showed no evidence of pollution; with nitrate and phosphate levels both below the detection limit (<0.2 ppm and <0.02 ppm respectively).

Both banks of the stream were densely shaded by overhanging trees. Two mosses were present at relatively low abundance in the stream channel (1%-2.5%). Eight, shade-tolerant, plant species were recorded from the stream margins (Table 5.1). All were taxa that are common and widespread at national level.



Table 5.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Carex pendula		4
Carex remota		1
Chrysosplenium oppositifolium		5
Fissidens gracilifolius	3	3
Fissidens taxifolius		2
Kindbergia praelonga		3
Lysimachia numularia		1
Pellia epiphylla	3	4
Filamentous green algae	3	
Total number of plant species	3	8







6. Croft Castle

Region: Midlands

Stream Length Grid Ref: SO 45069 66379 to SO 45059 66306

Stream Name: n/a

Surveyor: Richard Lansdown

Survey Date: 17/09/18



Results

This shallow stream was around 1 m in width and had a stable, pebble-cobble base.

At the time of the survey, the water was clear. Nutrient tests showed some evidence of nitrate pollution (1-2 ppm). However there was no evidence of phosphate pollution, with levels below the detection limit (<0.02 ppm)

Both banks of the stream were heavily shaded by overhanging trees. There was no wetland vegetation in the channel. Ten plant species were recorded from the channel margins, with mosses dominating the flora (Table 6.1). All plant species were common and widespread at national level.



Table 6.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Cardamine hirsuta		2
Carex strigosa		3
Chrysosplenium oppositifolium		6
Conocephalum conicum		4
Cratoneuron filicinum		3
Deschampsia cespitosa		2
Filipendula ulmaria		1
Pellia endiviifolia		3
Platyhypnidium riparioides		1
Veronica beccabunga		1
Total number of plant species	0	10









This small shallow stream had little water in at the time of survey. It had a predominantly stable, pebble-gravel base, but there were some areas of soft silty-clay.

At the time of the survey, the water was clear. Nutrient tests showed evidence of moderate nitrate pollution (1-2 ppm), but little phosphate pollution (0.05-0.01 ppm).

Both banks of the stream were heavily shaded by overhanging trees. There was no wetland vegetation in the channel and the stream margins were relatively impoverished, with three plant species recorded (Table 7.1). All plant species were common and widespread at national level.



Table 7.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Carex strigosa		2
Chrysosplenium oppositifolium		2
Fissidens taxifolius		1
Total number of plant species	0	3







8. Hopesay Hill

Region: Midlands

Stream Length Grid Ref: SO 39693 83265 to SO 39649 83190

Stream Name: n/a

Surveyor: Richard Lansdown

Survey Date: 17/09/18



Results

This headwater stream, on open hillside, was dry at the time of survey. The stream channel was unshaded and well vegetated, with a relatively diverse flora dominated by Common Bent *Agrostis capillaris* and Sharp-flowered Rush *Juncus acutiflorus* (Table 8.1).

Two red listed plant species were recorded. Of these, Petty-whin *Genista anglica* is more uncommon. It is Near Threatened across the UK and has Vulnerable status in England, where it has shown a 46% decline since the 1930s. The second red listed species was Lesser Spearwort *Ranunculus flammula*. This is a plant that is still widespread across the UK, but it has recently been included on the England Red List as Vulnerable because it has seen a 32% decline in its area of occupancy since the 1930s.



Table 8.1 Plant species recorded

	LEAFPACS cover
Species	values
Achillea ptarmica	2
Agrostis canina	4
Agrostis capillaris	7
Anagallis tenella	3
Bryum pseudotriquetrum	1
Carex oedocarpa	3
Carex panicea	3
Cirsium palustre	3
Deschampsia cespitosa	3
Galium palustre	1
Genista anglica	1
Hydrocotyle vulgaris	2
Juncus acutiflorus	7
Juncus effusus	2
Lotis pedunculatus	3
Potentilla erecta	2
Ranunculus flammula	1
Sphagnum palustre	4
Total number of plant species	18





9. Long Mynd Region: Midlands Stream Length Grid Ref: SO 42417 96383 to SO 42475 96494 Stream Name: n/a Surveyor: Richard Lansdown Survey Date: 17/09/18

Results

This small, low moorland stream was typically around 0.5 m width, but the section also included online pools. It had a predominantly stable, pebble-gravel base, with some sity-clay.

Nutrient tests showed no evidence of nitrate or phosphate pollution with the levels of both below the detection limit (<0.2 ppm, <0.02 ppm respectively).

Both banks of the stream were open with no shade from overhanging trees. The channel and stream margins were relatively diverse with 18 higher plant species and three sphagnum species recorded (Table 9.1). All plant species were common at national level with the exception of Lesser Spearwort *Ranunculus flammula* which, although still a widespread species, has recently been included on the England Red List as Vulnerable because it has seen a 32% decline in its area of occupancy since the 1930s.



Table 9.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Agrostis stolonifera	1	
Apium nodiflorum	7	
Callitriche stagnalis	1	3
Cardamine pratensis		1
Carex rostrata	3	
Cirsium palustre		1
Epilobium palustre		2
Equisetum palustre	3	
Juncus acutiflorus		3
Juncus conglomeratus		2
Juncus effusus		7
Lotus pedunculatus		3
Myosotis secunda		1
Potamogeton polygonifolius	6	
Potentilla erecta		
Ranunculus flammula		2
Sphagnum sp.		6
Sphagnum palustre		2
Sphagnum subnitens		6
Sparganium erectum	2	2
Spirodela polyrhiza	3	3
Filamentous green algae (Zygnematalean)	1	
Total number of plant species	9	15







10. Perry Hill Farm

Region: Midlands

Stream Length Grid Ref: SO 46556 39237 to SO 46591 39340

Stream Name: n/a

Surveyor: Richard Lansdown

Survey Date: 19/09/18



Results

This small shallow stream had little water in at the time of survey. It had a predominantly stable pebble-gravel base, with some areas of soft silty-clay.

Water clarity was good, however, nutrient tests showed evidence of considerable nitrate pollution (5-10 ppm). Phosphate levels were below the detection limit (<0.02 ppm).

Both banks of the stream were heavily shaded by overhanging trees. Wetland vegetation in the channel was limited to two species: the moss Long-beaked Water-feather *Platyhypnidium riparioides* and Great Scented Liverwort *Conocephalum conicum*. Four plant species were recorded from the stream banks, with Opposite-leaved Golden-saxifrage *Chrysosplenium oppositifolium* the most abundant. All species were common and widespread at national level.



Table 10.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Chrysosplenium oppositifolium		4
Conocephalum conicum	1	
Galium odoratum		1
Geum rivale		1
Kindbergia praelonga		3
Platyhypnidium riparioides	3	
Total number of plant species	2	4





11. Grasmere Region: North West Stream Length Grid Ref: NY 34796 07565 to NY 34745 07519 Stream Name: n/a Surveyor: Richard Lansdown Survey Date: 26/09/18

Results

This small, fast-running stream was typically around 1 m width. The base was stable, with a poorly sorted substrate dominated by boulders, cobbles and pebbles.

Nutrient tests showed no evidence of water pollution; with nitrate and phosphate levels both below the detection limit (<0.2 ppm and <0.02 ppm respectively).

Most of the survey length was open and unshaded. The channel has a moderately diverse flora, dominated by moss species, tar lichens *Verucaria* spp. and crustose lichens. The banks were dominated by Purple Moor-grass *Molinea caerulea* and Sharp-flowered Rush *Juncus acutiflorus*. All higher plants were common and widespread at national level.



Table 11.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Agrostis capillaris		3
Amphidium mougeotii	3	
Anomobryum julaceum	2	
Blindia acuta	1	
Brachythecium plumosum	3	
Cirsium palustre		1
Conocephalum conicum		2
Cratoneuron filicinum	1	
Juncus acutiflorus		6
Lysimachia nemorum		3
Molinea caerulea		7
Narthecium ossifragum		3
Platyhypnidium riparioides	2	
Potentilla erecta		2
Racomitrium aciculare	3	
Schistidium rivulare	2	
Solenostoma atrovirens	3	
Trichostomum tenuirostre	2	
Verucaria spp.**	4	
Crustose lichens*	8	
Total number of plant species	10	8

Total number of plant species

* - includes Rhizocarpum geographicum, Bacidia inundata etc.

** - includes V. nigrescens, V. praetermissa etc.







12. Hawkshead Region: North West Stream Length Grid Ref: NY 37014 00154 to NY 37000 00213 Stream Name: n/a Surveyor: Richard Lansdown Survey Date: 26/09/18

Results

This fast-running and cascading stream was typically 2-3 m wide. The base was stable, with a poorly sorted substrate dominated by boulders, cobbles and pebbles.

At the time of survey the water was clear. Nutrient tests showed no evidence of pollution; with nitrate and phosphate levels both below the detection limit (<0.2 ppm and <0.02 ppm respectively).

Both banks of the stream were heavily shaded by overhanging trees. Vegetation in the channel was dominated by the mosses Long-beaked Water Feather-moss *Platyhypnidium riparioides* and Fox-tail Feather-moss *Thamnobryum alopecurum*. Five species were recorded from the stream margins (Table 12.1). All species were common and widespread at national level.



Table 12.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Cardamine amara	1	
Cardamine hirsuta	1	1
Carex remota		3
Impatien parviflora		1
Platyhypnidium riparioides	6	
Thamnobryum alopecurum	7	7
Urtica dioica		3
Total number of plant species	5	5

Additional species *Trichocolea tomentella*









This fast-running and locally cascading stream was typically 1-2 m wide. The base was stable, with a poorly sorted substrate dominated by boulders, cobbles and pebbles.

At the time of survey the water was clear. Nutrient tests showed no evidence of pollution; with nitrate and phosphate levels both below the detection limit (<0.2 ppm and <0.02 ppm respectively).

Both banks of the stream were heavily shaded by overhanging trees. Although higher plants were absent, the stream supported a rich bryophyte community dominated by Fox-tail Feather-moss *Thamnobryum alopecurum* (Table 13.1).



Table 13.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Brachythecium plumosum	4	
Chiloscyphus polyanthus	4	
Dermatocarpon luridum	3	
Heterocladium wulfsbergii	2	
Hygrohypnum eugyrium	2	
Hygrohypnum luridum	3	
Hyocomium armoricum		6
Lejeunea lamacerina	4	
Pellia epiphylla		4
Plagiochila porelloides		3
Platyhypnidium riparioides	5	
Polytrichum commune		1
Racomitrium aciculare	2	1
Rhizomnium punctatum		1
Scapania undulata	4	
Scrophularia nodosa		1
Thamnobryum alopecurum	7	7
Verrucaria spp.	4	
Total number of plant species	12	8





14. Lower Wood

Region: North West

Stream Length Grid Ref: NY 33702 05006 to NY 33692 04923

Stream Name: Ben Beck Surveyor: Richard Lansdown

Survey Date: 25/09/18



Results

This is a small shallow stream, around 0.3 m in width, with a stable pebble-gravel base.

At the time of the survey the water was clear. However, nutrient tests showed some evidence of moderate nitrate and phosphate pollution (1-2 ppm and 0.1-0.2 ppm respectively).

Both banks of the stream were heavily shaded by overhanging trees. Wetland vegetation in the channel was dominated by lower plants, particularly Great Scented Liverwort *Conocephalum conicum* and Fox-tail Feather-moss *Thamnobryum alopecurum*. Eight plant species, mainly mosses and liverworts, were recorded from the stream margins Table 14.1). All plant species were common and widespread at national level.



Table 14.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Atrichum undulatum		2
Cardamine hirsuta		1
Carex remota		3
Chrysosplenium oppositifolium	2	
Conocephalum conicum	4	4
Deschampsia cespitosa		1
Galium palustre	1	
Hygrohypnum luridum	2	
Plagiochila asplenioides		2
Plagiomnium undulatum		3
Thamnobryum alopecurum	4	8
Total number of plant species	5	8









This small bouldery stream had clear water. Nutrient tests showed no evidence of pollution; with nitrate and phosphate levels both below the detection limit (<0.2 ppm and <0.02 ppm respectively).

Both banks of the stream were heavily shaded by overhanging trees. Higher plants were absent with the exception of Opposite-leaved Golden-saxifrage *Chrysosplenium oppositifolium*, however the stream's margin and banks supported a rich bryophyte community dominated by Fox-tail Feather-moss *Thamnobryum alopecurum* (Table 15.1).



Table 15.1 Plant species recorded

Species	LEAFPACS cover values	
-	Channel	Margin
Chiloscyphus polyanthus	3	
Chrysosplenium oppositifolium		1
Conocephalum salebrosum		1
Dichodontium sp.		3
Fissidens adianthoides		1
Fissidens gracilifolius	2	
Fissidens taxifolius	4	3
Hildenbrandia rivularis	4	
Hygrohypnum luridum	4	3
Lejeunea lamacerina	3	3
Pellia epiphylla		2
Racomitrium aciculare	3	
Rhizomnium punctatum		2
Scapania undulata	5	
Thamnobryum alopecurum	4	8
Thuidium tamariscinum		3
Trichostomum tenuirostre	1	
Total number of plant species	10	11

Additional species

Noellia curvifolia, Riccardia palmate, Trichocolea tomentella, Porella arboris-vitae









This coastal heath stream had a predominantly stable pebble-gravel base.

Water clarity was good, however, nutrient tests showed low levels of nitrate pollution (0.2-0.5 ppm). Phosphate levels were below the detection limit (<0.02 ppm).

Most of the survey length was open and unshaded, but both banks had some areas with denser shade from Grey Willow *Salix cinerea* subsp. *oleifolia*.

The channel was dominated by common macrophytes with Long-beaked Water Feather-moss *Platyhypnidium riparioides* the only bryophyte. Twelve plant species were recorded from the margins (Table 16.1).

Although extensive stands of the priority species Yellow Centaury *Cicendia filiformis* have been recorded on the banks of this stream higher up on the hillside, the survey section supported only common and widespread plant species.



Table 16.1 Plant species recorded

Species	LEAFPACS cover values	
-	Channel	Margin
Angelica sylvestris		1
Apium nodiflorum	3	
Brachythecium rivulare		2
Epilobium hirsutum	1	3
Epilobium palustre		2
Eupatorium cannabinum	1	4
Kindbergia praelonga		3
Lotus pedunculatus		3
Mentha aquatica	2	
Nasturtium officinale agg.	1	
Oenanthe crocata	3	
Plagiomnium undulatum		1
Platyhypnidium riparioides	4	
Rumex acetosa		2
Rumex obtusifolius	1	
Salix cinerea subsp. oleifolia		4
Solanum dulcamara		1
Stellaria uliginosa		1
Total number of plant species	8	12







This shallow fast-running stream was around 1.5-2 m in width and had a stable base of boulders, pebbles and cobbles.

At the time of the survey, the water was clear. Nutrient tests showed some evidence of nitrate pollution (1-2 ppm). However there was no evidence of phosphate pollution, with levels below the detection limit (<0.02 ppm).

Both banks of the stream were heavily shaded by overhanging trees. The channel was dominated by lower plants, with the thalloid red alga *Hildenbrandia rivularis* particularly abundant. Eight plant species were recorded from the margins (Table 17.1). All plant species were common and widespread at national level.



Table 17.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Brachythecium rivulare	4	2
Cardamine hirsuta		1
Carex remota		1
Chrysosplenium oppositifolium		1
Conocephalum conicum	2	
Hildenbrandia rivularis	9	
Hygroamblystegium fluviatile	3	2
Hygroamblystegium varium	1	
Pellia epiphylla	1	2
Platyypnidium riparioides	4	
Scrophularia auriculata		1
Thamnobryum alopecurum	1	4
<i>Verrucaria</i> sp.	5	
Total number of plant species	9	8





18. Pwll Caerog	Region: Wales	
Stream Length Grid Ref: SM 78469 30552 to SM 78436 30551		
Stream Name: n/a		
Surveyor: Richard Lansdown	Survey Date: 18/09/18	



This small, shallow coastal stream had a stable pebble-gravel substrate. Water clarity was good, however, nutrient tests showed evidence of phosphate pollution (0.2-0.5 ppm). Nitrate levels were low (0.2-0.5 ppm).

The survey length was unshaded by trees, but the banks were densely overgrown by tall Rose-bay Willowherb *Chamerion angustifolum*, Meadowsweet *Filipendula ulmaria* and Common Nettle *Urtica dioica*

The stream channel supported a limited range of common mosses and higher plants with Longbeaked Water Feathermoss *Pltyhypnidium riparioides* the most abundant species. Nine plant species were recorded from the stream margins (Table 18.1). All were common and widespread plants at national level.



Table 18.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Apium nodiflorum	4	
Brachythecium rivulare	4	
Chrysosplenium oppositifolium		4
Conocephalum conicum		1
Cratoneuron filicinum	5	
Eupatorium cannabinum		1
Filipendula ulmaria		3
Fissidens riivulare	1	1
Juncus acutiflorus		1
Molinia caerulea		1
Oenanthe crocata	4	
Pellia epiphylla	2	
Pltyhypnidium riparioides	7	2
Solanum dulcamara		1
Total number of plant species	7	9









This shallow stream had a predominantly stable pebble-gravel base, with some silty clay.

Nutrient tests showed low levels of nitrate pollution (0.2-0.5 ppm). Phosphate levels were below the detection limit (<0.02 ppm).

Most of the survey length was open and unshaded, but the left bank had some areas with denser shade from Grey Willow *Salix cinerea* subsp. *oleifolia*.

The stream channel supported a limited range of common mosses and higher plants in relatively low abundance. Eleven plant species were recorded from the margins, excluding trees (Table 19.1). All were common and widespread at national level.



Table 19.1 Plant species recorded

Species	LEAFPACS cover values	
-	Channel	Margin
Angelica sylvestris		3
Apium nodiflorum	4	
Deschampsia cespitosa		4
Eupatorium cannabinum		3
Filipendula ulmaria		6
Iris pseudacorus		1
Lathyrus pratensis		1
Lythrum salicaria		2
Mentha aquatica		1
<i>Myosotis</i> sp.	1	
Oenanthe crocata	3	
Pellia endiviifolia	3	2
Platyhypnidium riparioides	4	
Pulicaria dysenterica		2
Salix cinerea subsp. oleifolia		2
Urtica dioica		3
Total number of plant species	5	12







20. Stackpole

Region: Wales

Stream Length Grid Ref: SR 97856 96738 to SR 97919 96682

Stream Name: n/a

Surveyor: Richard Lansdown

Survey Date: 18/09/18



Results

This shallow stream had a predominantly stable pebble-gravel base. Nutrient tests showed some nitrate pollution (0.5-1 ppm). Phosphate levels were below the detection limit (<0.02 ppm).

Both banks of the stream were heavily shaded by overhanging trees and brambles, together with bundant ferns (*Athyrium felix-femina*, *Dryopteris filix-mas*, *D. dilatata*, *D. carthusiana*, *Phyllitis scolopendrium*, *Blechnum spicant*, *Polystichum setiferum*),

Wetland vegetation in the channel was limited, with the mosses Long-beaked Water-feather *Platyhypnidium riparioides* and Brookside Feather Moss *Hygroamblystegium fluviatile* the most abundant species: Five plant species were recorded from the stream banks (Table 20.1), with Fox-tail Feather-moss *Thamnobryum alopecurum* and Opposite-leaved Golden-saxifrage *Chrysosplenium oppositifolium* the most abundant. All species were common and widespread at national level.



Table 20.1 Plant species recorded

Species	LEAFPACS cover values	
	Channel	Margin
Anium nodiflorum	2	
Carex remota		2
Chrysosplenium oppositifolium		3
Conocephalum conicum		2
Hygroamblystegium fluviatile	3	
Juncus effusus		1
Pellia endiviifolia	1	
Platyhypnidium riparioides	3	
Thamnobryum alopecurum		4
Total number of plant species	4	5

