ECRC

Environmental Change Research Centre

Research Report No.112

Lake SSSI Assessments (17 lakes) – Site Condition Monitoring

Final Report to English Nature (now Natural England) under Contract FST20-29-024.

A. Burgess, E. Shilland

December 2006

Hedgecourt Lake © Ewan Shilland 2006

ISSN: 1366-7300

ENSIS Ltd. / ECRC
Department of Geography
University College London
Pearson Building, Gower Street
London. WC1E 6BT

List of contributors

Amy Burgess ENSIS Ltd. / Environmental Change Research Centre, University College London, Pearson Building, Gower Street, London. WC1E 6BT

Ewan Shilland ENSIS Ltd. / Environmental Change Research Centre, University College London, Pearson Building, Gower Street, London. WC1E 6BT

Acknowledgments

The authors would like to thank the following people for their contributions to this study:

Mr. Frank Speed of Betley Court Farm; Mr. Fradley of Maer Hall; The Sugnall Estate; RMC & Papercourt Sailing Club; Rachel O'Hara of Surrey Wildlife Trust; Hedgecourt Sailing Club; Simon Wightman of the Lee Valley Regional Park Authority and British Waterways, for providing permissions to carry out the macrophyte surveys.

The project officer and regional conservation officers at English Nature (now Natural England), for interesting discussions, provision of data / reports and for helping to arrange site permissions / access.

Jo-Anne Pitt at the Environment Agency, for the analysis of water samples.

Mike Hughes, Genevieve Madgwick and Viv Jones from UCL, for providing valuable assistance with macrophyte field survey work.

Table of contents

List of Tables

1 Introduction

1.1 Background

The UK has a national series of protected sites, Sites of Special Scientific Interest (SSSIs). These sites are designated under the Wildlife and Countryside Act 1981 (as amended). SSSI selection and management is devolved to regional conservation agencies. In England, English Nature (EN) (now Natural England) is responsible for carrying out the monitoring and reporting on SSSI site condition.

The UK Conservation Agencies have devised a common standards monitoring (CSM) protocol (JNCC, March 2005) for the routine monitoring and assessment of protected site condition. This document sets out the standardised field methods for data collection and details the targets to be used for site condition assessments of protected water bodies of different feature types. The CSM lake monitoring method is based on previous survey protocols used by the conservation agencies, and aims to gather the maximum amount of information relating to the ecology of each water body in the most efficient way possible. The protocol makes use of a combination of shoreline walks to identify marginals; waded transects to describe the shallow water vegetation, and boat-based surveys to identify plants in deeper water. In addition, physicochemical data are collected for each lake. The protocol is described in full in JNCC (March 2005).

When assessing site condition, consideration is given to the major characteristics (attributes) that define different habitat feature types. In the CSM protocol there are specified targets for each attribute detailed under the respective feature type. These targets correspond to ‘favourable’ condition. For each lake, the attribute data are assessed against the targets, thus enabling determination of site condition.

The lake assessments detailed in the current report do not employ the full suite of attributes (listed in JNCC, March 2005), although ideally data for all attributes should be used to make the assessments. The current assessments focus primarily on the attributes of macrophyte community composition and structure.

1.2 Aim of the report

The main aim of this report is to determine the current conservation status of 17 individual lakes within 6 English lake SSSI protected habitats (see Table 1.1 for SSSI lake locations and site details). To achieve this aim, field survey data collected using CSM methods is analysed and assessed against habitat feature attribute targets detailed in CSM favourable condition tables (JNCC, March 2005).

1.3 SSSI lakes

The locations and site details of the 17 English SSSI lakes included in this report are provided in Table 1.1, where indicative standing water feature types are also detailed. All lakes surveyed in 2006 have been assessed under the 'Naturally eutrophic lake' indicative feature type.

Table 1.1: Lakes within SSSIs: Lakes surveyed during 2006 showing SSSI name, lake name and the feature for which the sites are notified (for notation, see key at bottom of table). NB: Features here are indicative, since they are not defined by Habitats Directive criteria.

SSSI Name	Lake Name	NGR	# Feature for assessment
Betley Mere [NM]	Betley Mere	SJ748479	NE
Cop Mere [NM]	Cop Mere	SJ802296	NE
Maer Pool [NM]	Maer Pool	SJ789384	NE
Hedgecourt Lake [L]	Hedgecourt	TQ355403	NE
Papercourt [L]	Papercourt (sailing lake)	TQ042565	NE
	Papercourt (small lake)	TQ039559	NE
	Manor Lake	TQ035563	NE
Turnford and Cheshunt Pits [C]	Unit 1	TL370045	NE
	Unit 2a	TL370042	NE
	Unit 2c	TL369039	NE
	Unit 3a: North Metropolitan Pit	TL370034	NE
	Unit 3b: North Metropolitan Pit	TL371038	NE
	Unit 4: Seventy Acres Lake	TL373029	NE
	Unit 5: Hooks Marsh Lake	TL372022	NE
	Unit 6: Police Pit / Cadmore Lane Pit / Turners Marsh Pit	TL370024	NE
	Unit 7: Friday Lake	TL371019	NE
	Unit 9: Bowyers Water	TL367014	NE

[NM] = EN North Mercia region; [C] = EN Colchester region; [L] = EN Lewes region
All lakes were surveyed during 2006 by ENSIS Ltd.
[#] OML = Oligotrophic to mesotrophic lake with *Littorelletea*; HC = Hard lake with *Chara*; NE = Natural eutrophic lake; DY = Dystrophic lake.

1.4 Site condition assessments of SSSI lakes using CSM methods

For assessment of the 17 SSSI lakes, reference is principally made to macrophyte survey data collected using CSM methods during summer 2006 by ENSIS Ltd (under contract to English Nature (EN)). The data from which the assessments have been derived are available on a CD which accompanies this report. The accompanying data CD contains completed field survey forms and transect photographs for each of the 17 SSSI lakes.

At the time of survey, unfiltered spot water samples were also collected, refrigerated and subsequently sent to the Environment Agency (EA) for analysis of total phosphorus (TP). In terms of the availability of chemical data to assess water quality, only these spot sample TP measurements are available. Additional water quality information has to some extent been collected from the field observations of algal blooms and water turbidity.

For many of the lakes, in particular, the Turnford and Cheshunt Pits, no previous survey data / reports are available for the provision of a temporal perspective in respect of site condition. For the Staffordshire Meres, reference has been made to Lockton (2005, 2006a & 2006b) and for Papercourt Manor Lake, Phillips (2000) has been consulted.

The current site condition assessments are baseline surveys within the context of the CSM methods. Where limited previous information is available, it is only possible to state whether a SSSI lake/site is in favourable or unfavourable condition, not whether the conservation interest is being maintained, recovering, declining or destroyed. The condition assessments identify general categories of impact (e.g. eutrophication) and in the case of a lake/site being in unfavourable condition, make recommendations for further investigation and/or management.

2 Site Condition Assessments

2.1 Betley Mere SSSI

2.1.1 Betley Mere

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.1.1: Macrophyte Condition Assessment Summary Table for Betley Mere.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 3 characteristic species: *P. pusillus*, *L. minor* and C. *hermaphroditica*
	No loss of characteristic species	✓	Similar macrophyte assemblage to that recorded in 2005 (Lockton, 2006a)
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	11 out of 63 shore and 2 out of 39 boat vegetated sample spots comply (13% overall)
Negative indicator species	Non-native species absent or present at low frequency	✓	No non-natives present
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	✓	2% of shore and 0% of boat sample spots have scores of 2-3. *Hydrodictyon* sp.present
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	✓	As far as possible for a shallow lake, there is reasonable zonation. Macrophyte beds generally extensive, with moderate to high cover scores across both wader and boat transects.
	Maximum depth distribution should be maintained	✓	Z_{max} = 1.5 m, Z_s = 1.4 m, Plants growing to Z_{max}.
	At least the present structure should be maintained	✓	Similar aquatic macrophyte structure to that recorded in 2005 (Lockton, 2006a)
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 737μgl^{-1} (spot sample on 13.06.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.1.2 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded from four shore and four boat transects across Betley Mere on 13th June 2006.

Table 2.1.2: Macrophyte community composition of Betley Mere.

Submerged and floating-leaved species
Callitriche hermaphroditica
Lemna minor
Nuphar lutea
Potamogeton pectinatus
Potamogeton pusillus
Zannichellia palustris
Emergent species
Acorus calamus
Carex riparia
Iris pseudacorus
Phragmites australis
Phalaris arundinacea
Typha angustifolia

The vegetation of Betley Mere is typical for the lake type, but species poor. In terms of its floating and submerged flora, the lake supports few *Magnopotamion* and *Hydrocharition*-type species. There are no broad-leaved *Potamogeton* species and the characteristic *Magnopotamion* taxa include only *Potamogeton pusillus* and *Callitriche hermaphroditica.* The only characteristic *Hydrocharition* taxon is *L. minor*. The relatively high frequency of occurrence of pollution tolerant *Potamogeton pectinatus* across the boat transects and moderate frequency of *Zannichellia palustris* across the wader transects, suggests that the lake has raised nutrient levels. In terms of macrophyte community composition, the absence of submerged broad-leaved *Potamogeton* species along with the low number of characteristic species indicates unfavourable condition.

Negative indicator species
No non-native species are present in Betley Mere.

There is little filamentous algal growth in Betley Mere. Only 1.5% of wader and 0% of boat sample spots (1% overall) have cover scores of 2-3, suggesting that algal cover is less than 10% overall.

Macrophyte community structure
Betley Mere is surrounded by a band of marginal reedbed vegetation predominantly comprising *Phragmites australis* and *Typha angustifolia*. The main water body supports macrophyte growth to its maximum depth (1.5m). *P. pectinatus* is the dominant macrophyte species growing to the maximum depth of the lake. *P. pusillus, Z. palustris and C. hermaphroditica* grow in shallower water to ~0.8 m and *N. lutea*

grows in patches at depths of 0.5 – 0.8 m. Only a small number of different macrophyte growth forms are represented in the lake – floating-leaved species (*Nuphar lutea*), free-floating species (*L. minor*), submerged fine/strap-leaved species (*P. pectinatus, P. pusillus, Z. palustris*), and emergents (*Acorus calamus, Carex riparia, Iris pseudacorus, P. australis, Phalaris arundinacea, T. angustifolia*).

Water quality

A spot sample taken on 13th June 2006 had a TP concentration of 737µgl^{-1}, suggesting considerable nutrient enrichment and therefore unfavourable condition.

Summary

Betley Mere is in **unfavourable** condition, principally because broad-leaved *Potamogeton* species are absent from the macrophyte assemblage, the range of characteristic macrophyte species is poor and a spot water sample TP concentration is considerably higher than the target/limit for the feature type. Management actions such as reduction of catchment nutrient inputs are recommended and follow-up survey work to assess the success of any such actions would be beneficial.

2.2 Cop Mere SSSI

2.2.1 Cop Mere

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.2.1: Macrophyte Condition Assessment Summary Table for Cop Mere.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 5 characteristic species: *C. demersum, C. globularis, P. crispus*, *P. pusillus, L. minor, L. trisulca*
	No loss of characteristic species	**-**	Similar macrophyte assemblage to that recorded in 2005 (Lockton, 2005) & 1992 (Moss *et al*. 1993)
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	41 out of 75 shore and 52 out of 61 boat vegetated sample spots comply (68% overall)
Negative indicator species	Non-native species absent or present at low frequency	✓	*E. canadensis* present at moderate frequency (57% shore and 8% boat vegetated sample spots – 35% overall)
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	✓	15% of shore and 13% of boat sample spots have a score of 2-3. *Hydrodictyon* sp.present
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	✓	*Salix* sp. / *Alnus glutinosa* fringe. *Phragmites* reedbed in S/SE, *T. angustifolia* in S/W. *P. pectinatus, P. pusillus* & *C. globularis* growing extensively to Z_{max}.
	Maximum depth distribution maintained	**-**	Z_{max} = 2.3 m, Z_s = > site. Plants growing to Z_{max}.
	At least the present structure maintained		Similar structure to that recorded in 2005 & 1992
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 76 μgl^{-1} (spot sample on 15.06.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.2.2 lists that submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Cop Mere from four shore and four boat transects on 15th June 2006.

Table 2.2.2: Macrophyte community composition of Cop Mere.

Submerged and floating-leaved species
Ceratophyllum demersum
Chara globularis
Elodea canadensis
Lemna minor
Lemna trisulca
Potamogeton crispus
Potamogeton pectinatus
Potamogeton pusillus
Zannichellia palustris
Emergent species
Carex acutiformis
Iris pseudacorus
Phalaris arundinacea
Phragmites australis
Sparganium erectum
Typha angustifolia
Typha latifolia

Cop Mere supports a number of *Magnopotamion* and *Hydrocharition*-type species, although the total number of characteristic species falls below target levels. The characteristic *Magnopotamion* taxa include *Chara globularis*, *Potamogeton crispus* and *Potamogeton pusillus.* The only characteristic *Hydrocharition* species are *Lemna* spp (*Lemna minor* and *Lemna trisulca*). The relatively high frequency of occurrence of pollution tolerant *Potamogeton pectinatus* across the boat transects and moderate frequency of *Zannichellia palustris* across the shore transects, suggests that the lake has raised nutrient levels. In terms of macrophyte community composition, the absence of submerged broad-leaved *Potamogeton* species (Lockton (2005) recorded *Potamogeton natans* in 2005, but this species was not seen in 2006), along with the low number of characteristic species indicates unfavourable condition. Moss *et al*. (1993) recorded *Potamogeton berchtoldii* from a summer 1992 survey and Wiggington (1979) also recorded this species. In contrast, all specimens examined in 2006 had closed stipules, identifying them as *P. pusillus* – i.e. no *P. berchtoldii* was found in 2006.

Negative indicator species
The non-native species, *Elodea canadensis* is present in Cop Mere and was recorded in 57% and 8% of the vegetated shore and boat transect sample spots respectively, with an overall frequency of 35%. This is just within the target range, but is still relatively high.

There is limited filamentous algal growth in Cop Mere. Only 15% of wader and 13% of boat sample spots (14% overall) have cover scores of 2-3, suggesting that algal cover is less than 10% overall.

Macrophyte community structure

Cop Mere is largely surrounded by *Alnus-Salix* woodland, which in many areas (particularly in the west), has a rich under storey of sedges and herbs. Beyond the woodland there is a zone of marginal vegetation comprising a substantial fringe of *Phragmites australis* reed swamp to the east/southeast and more localised stands of *Typha angustifolia* to the west and south. The open water supports a high abundance of submerged macrophytes, covering the lake bed to its maximum depth, with plants extending up through the water column, predominantly comprising fine-leaved *Potamogeton* species (*P. pusillus, P. pectinatus*), *E. canadensis* and *C. globularis*. A number of different macrophyte growth forms are represented in the lake – charophytes (*C. globularis*), free-floating species (*L. minor, L. trisulca*), submerged fine/strap-leaved species (*Ceratophyllum demersum*, *E. canadensis*, *P. crispus, P. pectinatus, P. pusillus, Z. palustris*), and emergents (*Carex acutiformis., I. pseudacorus, Phalaris arundinacea, P. australis, Sparganium erectum, T. angustifolia, T. latifolia*).

Water quality

A spot sample taken on 15.06.06 recorded a TP concentration of 76µgl^{-1}. This is above the target concentration of 50µgl^{-1}, indicating nutrient enrichment and therefore unfavourable condition.

Summary

Cop Mere is in **unfavourable** condition. The lake supports a reasonably broad range of macrophyte species and habitats that are typical of the meres and mosses. However, broad-leaved *Potamogeton* species are absent from the macrophyte assemblage (although Lockton recorded *P. natans* from Cop Mere in August 2005 – location unknown) and the range of characteristic macrophyte taxa falls below the target. A spot TP measurement was slightly greater than the target/limit for the feature type, further indicating unfavourable condition.

2.3 Maer Pool SSSI

2.3.1 Maer Pool

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.3.1: Macrophyte Condition Assessment Summary Table for Maer Pool.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 4 characteristic species: *P. pusillus*. *P. crispus*, *L. minor & L. trisulca*
	No loss of characteristic species	✓	Similar species assemblage to notification and 1996 & 2005 surveys. NB: *P. berchtoldii*, not *P. pusillus* recorded in previous surveys.
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	✓	60 out of 78 shore and 47 out of 58 boat vegetated sample spots comply (79% overall)
Negative indicator species	Non-native species absent or present at low frequency	✓	Naturalised non-native, *E. canadensis* present in 15% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	✓	2.5% of shore and 0% of boat sample spots have score of 2-3 (1.4% overall)
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	✓	*Salix* sp./*Alnu*s sp. margins; emergent band dominated by *A. calamus* & *T. latifolia*. *N. alba* 0.5-1.1m (S1). *P. pusillus* dominant 0.5-1.9m.
	Maximum depth distribution should be maintained	✓	Z_{max} = 1.9 m; Z_s = > site; Plants growing to Z_{max}.
	At least the present structure should be maintained	✓	Similar aquatic macrophyte structure to that recorded in 1996 and 2005
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 328 μgl^{-1}. (spot sample on 14.06.06). Cyanophyte bloom throughout water column, but clarity good.

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.3.2 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Maer Pool from four shore and four boat transects on 14th June 2006.

Table 2.3.2: Macrophyte community composition of Maer Pool.

Submerged and floating-leaved species
Elodea canadensis
Lemna minor
Lemna trisulca
Nymphaea alba
Potamogeton crispus
Potamogeton pectinatus
Potamogeton pusillus
Zannichellia palustris
Emergent species
Acorus calamus
Iris pseudacorus
Phragmites australis
Sparganium erectum
Typha latifolia

In terms of its floating and submerged flora, Maer Pool supports no broad-leaved *Potamogeton* species and there are only a moderate number of *Magnopotamion* and *Hydrocharition*-type species. The two characteristic *Magnopotamion* taxa are *Potamogeton crispus* and *Potamogeton pusillus* and the two characteristic *Hydrocharition* species are *Lemna minor* and *Lemna trisulca*.

Negative indicator species
The naturalised, non-native, *Elodea canadensis* is present in Maer Pool, although its frequency of occurrence across vegetated sample spots is only 15%, which does not indicate unfavourable condition.

There is little filamentous algal growth in Maer Pool. Only 2.5% of wader and 0% of boat sample spots (1.4% overall) have cover scores of 2-3, suggesting that algal cover is less than 10% overall.

Macrophyte community structure
Sections 3 and 4 are fringed by a band of *Salix* sp. (and some *Alnus glutinosa*), some of which is overhanging the lake margins. The marginal emergent vegetation is generally dominated by *Acorus calamus,* although *Typha latifolia* and *Phragmites australis* are the dominant emergents at the northwest end of the lake (section 1). In section 1 there is a zone of *Nymphaea alba* beyond the reedbed which is rooted in water depths of 0.5-1.1m. Across most of the open water area (0.5-1.9m water depth)*, P. pusillus* dominates the macrophyte assemblage and is the only species

recorded growing to the maximum depth of the lake. *E. canadensis, L. trisulca* and *Zannichellia palustris* were present across a similar depth range, but were either less abundant or of more localised distribution. A moderate range of different macrophyte growth forms are represented in Maer Pool – floating-leaved species (*N. alba*), free-floating species (*L. minor, L. trisulca*), submerged fine/strap-leaved species (*E. canadensis*, *Potamogeton pectinatus, P. pusillus, Z. palustris*), and emergents (*A. calamus, Iris pseudacorus, P. australis, Sparganium erectum, Typha angustifolia, T. latifolia*).

Water quality

A spot sample taken on 14th June 2006 had a TP concentration of 328µgl^{-1}, suggesting considerable nutrient enrichment and therefore unfavourable condition. At the time of survey, there was a cyanophyte bloom throughout the water column. Although the water clarity was only slightly compromised by this bloom, its presence further implies that Maer Pool is enriched with nutrients.

Summary

Maer Pool is in **unfavourable** condition because broad-leaved *Potamogeton* species are absent from the macrophyte assemblage, the range of characteristic macrophyte taxa is only moderate, the TP concentration of a spot water samples was considerably higher than the target/limit for the feature type and there was a cyanophyte bloom at the time of survey. Although non-native macrophyte species are rare in the main water body, there are a number of non-native terrestrial species which could potentially compromise Maer Pool's conservation status (e.g. *Fallopia japonica* and *Impatiens glandulifera*).

2.4 Hedgecourt SSSI

2.4.1 Hedgecourt

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.4.1: Macrophyte Condition Assessment Summary Table for Hedgecourt.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 5 characteristic species: *Callitriche sp., P. crispus*, *P. obtusifolius, P. pusillus* & *L. minor*
	No loss of characteristic species	**X**	At time of notification *P. natans, N. alba, P. trichoides* and *E. nuttallii* were present in the lake. Only *E. nuttallii* recorded in 2006.
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	19 out of 67 shore and 5 out of 30 boat vegetated sample spots comply (25% overall)
Negative indicator species	Non-native species absent or present at low frequency	✓	*E. nuttallii* present at low frequency (2% of vegetated sample spots only)
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	✓	0% of shore and 28% of boat sample spots have a score of 2-3 (9% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	✓	Some sections with zonation fairly typical for feature type, other sections poorly zoned. Water clarity poor, but extensive growth of plants across lake, growing to Z_{max}.
	Maximum depth distribution should be maintained	✓	Z_{max} = 1.1 m, Z_s = 0.3 m, Plants growing to Z_{max}.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 $\mu g l^{-1}$	**X**	TP = 201 $\mu g l^{-1}$ (spot sample on 15.06.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition

Table 2.4.2 lists that submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Hedgecourt Lake from four shore and four boat transects on 20th June 2006.

Table 2.4.2: Macrophyte community composition of Hedgecourt.

Submerged and floating-leaved species
Callitriche sp.
Ceratophyllum demersum
Elodea nuttallii
Lemna minor
Potamogeton crispus
Potamogeton obtusifolius
Potamogeton pectinatus
Potamogeton pusillus
Zannichellia palustris
Emergent species
Alisma plantago-aquatica
Equisetum fluviatile
Iris pseudacorus
Phalaris arundinacea
Phragmites australis
Sagittaria sagittifolia
Sparganium erectum
Typha latifolia

Hedgecourt supports a number of different *Magnopotamion* and *Hydrocharition*-type species and the total number of characteristic species is only just below the target level. The characteristic *Magnopotamion* taxa include *Callitriche sp, Potamogeton crispus, Potamogeton obtusifolius and Potamogeton pusillus.* The only characteristic *Hydrocharition* species is *L. minor*. The domination of pollution tolerant *Potamogeton pectinatus* across both the shore and boat transects and the moderate frequency of *Zannichellia palustris* across the shore transects suggests that the lake has raised nutrient levels. At the time of SSSI notification, *Potamogeton natans, Nymphaea alba* and *Elodea nuttallii* were present in Hedgecourt. In 2006, *E. nuttallii* was recorded, but broad-leaved *Potamogeton* species were absent from both the survey sections and across the lake as a whole. The same was true of *N. alba*. According to the notification details, Hedgecourt 'was formerly important for other *Potamogeton* species including the rare hair-like pondweed *Potamogeton trichoides* which may still occur.' *P. trichoides* was not recorded during the 2006 survey, although a number of other fine-leaved *Potamogeton* spp. were documented. Further surveys may be required to confirm whether *P. trichoides* remains a component of Hedgecourt's aquatic macrophyte community.

Negative indicator species
The non-native species, *E. nuttallii* is present in Hedgecourt, but was recorded in only 2% of vegetated sample spots.

There is limited filamentous algal growth in Hedgecourt. Only 0% of wader and 28% of boat sample spots (9% overall) have cover scores of 2-3, suggesting that algal cover is less than 10% overall.

Macrophyte community structure
The marginal vegetation structure is rather variable across the survey sections. Section 1 (and to some extent section 4) has a broad zone of tall emergent vegetation between the open water and the wet woodland. Sections 2 and 3 (and to some extent section 4) are largely backed by overhanging trees, scrub and gardens, and there is generally no distinct zone of emergents. Within the main water body, *P. pectinatus* is the dominant aquatic macrophyte, common in both deeper and shallower areas at depths of 0.5-1.1m. *P. obtusifolius, P. crispus, Z. palustris* and *P. pusillus* are less abundant and their distributions more localised, although these species are more frequently found growing in water that is 0.5-0.75m deep.

Water quality
A spot sample taken on 20.06.06 recorded a TP concentration of 201µgl^{-1}. This is above the target concentration of 50µgl^{-1}, indicating nutrient enrichment and therefore unfavourable condition.

Summary
Hedgecourt is in overall **unfavourable** condition. Broad-leaved *Potamogeton* species are absent from the macrophyte assemblage and although the lake supports a fairly high diversity of macrophyte species, the range of characteristic taxa falls just below the target for the feature type. The dominant macrophyte taxon at the time of survey was the pollution tolerant *P. pectinatus*, suggesting that the lake has raised nutrient levels. Some species listed in the original SSSI notification (e.g. *P. natans* and *P. trichoides*) were not recorded during the 2006 survey and a spot water sample had a TP concentration considerably higher than the target/limit for the feature type, further suggesting that the lake is currently in unfavourable condition.

2.5 Papercourt SSSI

2.5.1 Papercourt Sailing Lake

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.5.1: Macrophyte Condition Assessment Summary Table for Papercourt Sailing Lake.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 1 characteristic species: *Chara vulgaris* var. *vulgaris*
	No loss of characteristic species	**-**	No previous survey data
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	✓	13 out of 26 shore and 40 out of 44 boat vegetated sample spots comply (76% overall)
Negative indicator species	Non-native species absent or present at low frequency	**X**	Invasive non-native species, *Crassula helmsii* present
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	58% of shore and 38% of boat sample spots have score of 2-3 (51% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	No clear zonation pattern, although some areas of emergent vegetation to 0.75m, with *C. helmsii* in shallow water (0.5-1m) and *C. vulgaris* and *P. pectinatus* in both shallow and deeper water (to 3.9m and 2.8m respectively). Lake recently treated with herbicide!
	Maximum depth distribution should be maintained	✓	Z_{max} = 3.9m, Z_s = 3.5m Plants growing to Z_{max}.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	✓	TP = 11 μgl^{-1} (spot sample on 19.06.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.5.2 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Papercourt Sailing Lake from four shore and four boat transects on 19th June 2006.

Table 2.5.2: Macrophyte community composition of Papercourt Sailing Lake.

Submerged and floating-leaved species
Chara vulgaris var. *vulgaris*
Crassula helmsii
Potamogeton pectinatus
Emergent species
Cyperus eragrostis
Iris pseudacorus
Typha angustifolia
Typha latifolia

The vegetation of Papercourt Sailing Lake is uncharacteristic of the lake type. Papercourt Sailing Lake is surrounded by limited emergent vegetation. In terms of its floating and submerged flora, the lake supports no broad-leaved *Potamogeton* species and there is only one characteristic *Magnopotamion* taxon – *Chara vulgaris* var. *vulgaris*. This may not be surprising since the lake has recently been treated with herbicide! In terms of macrophyte community composition, the absence of submerged broad-leaved *Potamogeton* species along with the very low number of characteristic species and the underdeveloped emergent flora indicates unfavourable condition. However, the representation of characteristic species (consisting only of *C. vulgaris* var. *vulgaris*) across the boat transects meets the target of 6 out of 10 vegetated sample spots having at least one characteristic species (91% of boat vegetated sample spots comply).

Negative indicator species
The non-native highly invasive species, *Crassula helmsii* is present in Papercourt Sailing Lake. The presence of this species automatically places the lake in unfavourable condition.

Filamentous algal growth is moderate in Papercourt Sailing Lake, with 58% of wader and 38% of boat sample spots (51% overall) having cover scores of 2-3, suggesting that algal cover is greater than 10% overall.

Macrophyte community structure
Limited areas of emergent vegetation surround the lake and although the main water body supports macrophyte growth to its maximum depth (3.9 m), the diversity of the submerged flora is very low. There is no clear zonation pattern, although where emergents do grow (e.g. *Typha* spp. and *Iris pseudacorus*), they are restricted to water depths of <0.75 m. *C. helmsii* only grows in water depths of 0.5–1 m and *Potamogeton pectinatus* and *C. vulgaris* var. *vulgaris* grow in both relatively shallow and deeper areas (from 0.5–3.9 m and 0.7 –2.8 m respectively). Only a small number

of different macrophyte growth forms are represented in the lake – charophytes (*C. vulgaris* var. *vulgaris*), submerged fine/strap-leaved species (*P. pectinatus, C. helmsii*), and emergents (*Cyperus eragrostis, I. pseudacorus, Typha angustifolia, Typha latifolia*).

Water quality

A spot sample taken on 19th June 2006 had a TP concentration of 11µgl^{-1}, suggesting favourable condition.

Summary

Papercourt Sailing Lake is in **unfavourable** condition because a) the non-native invasive species *C. helmsii* is present; b) broad-leaved *Potamogeton* species are absent from the macrophyte assemblage and c) macrophyte community composition and structure are poor. Furthermore, the conservation status of the lake has been compromised by treatment with herbicide.

2.5 Papercourt SSSI

2.5.2 Papercourt Small / Fishing Lake

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.5.3: Macrophyte Condition Assessment Summary Table for Papercourt Small / Fishing Lake.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 3 characteristic species: *C. contraria, C. globularis, N. mucronata* var. *gracillima*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	2 out of 15 shore and 1 out of 1 boat vegetated sample spots comply (13-70% overall)
Negative indicator species	Non-native species absent or present at low frequency	**X**	No non-native invasive species, although *Nymphaea* sp. cultivar present
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	✓	0% of shore and 42% of boat sample spots have score of 2-3 (14% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	No extensive beds of submerged macrophytes. No clear zones of vegetation. Some areas of emergents and some patches of submerged / floating-leaved species.
	Maximum depth distribution should be maintained	**X**	Z_{max} = 1.0 m, Z_s = > site Submerged / floating leaved plants growing to 0.75 m, but very localised distribution.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 124 μgl^{-1} (spot sample on 21.06.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.5.4 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Papercourt Small / Fishing Lake from two shore and two boat transects on 21st June 2006.

Table 2.5.4: Macrophyte community composition of Papercourt Sailing Lake.

Submerged and floating-leaved species
Chara contraria
Chara globularis
Nitella mucronata var. *gracillima*
Nymphaea cultivar (white flowers with pink tinge)
Nymphoides peltata
Zannichellia palustris
Emergent species
Alisma plantago-aquatica
Carex acuta
Carex pseudocyperus
Iris pseudacorus
Sparganium erectum
Typha latifolia

The lake supports no broad-leaved *Potamogeton* species and there are only sparsely populated patches of aquatic macrophytes in shallow areas across an otherwise bare silty lake bottom. The characteristic *Magnopotamion* taxa include *Chara contraria, Chara globularis* and *Nitella mucronata* var. *gracillima*, all of which were growing only in shallow areas of coarser substrate (gravel and silty gravel) at the SE end of the lake. There are no characteristic *Hydrocharition* species. In terms of macrophyte community composition, the absence of submerged broad-leaved *Potamogeton* species along with the relatively low abundance and restricted distribution of characteristic species indicates failure of the target.

Negative indicator species
No non-native invasive aquatic macrophyte taxa are present in the lake. However, there are a few patches of *Nymphaea* sp. cultivar (white flowers with a pinkish tinge to the petals) at the north west end of the lake.

Around the marginal areas of the lake there is minimal filamentous algal growth, however across much of the unvegetated, muddy lake bottom, substantial growths of filamentous algae were recorded.

Macrophyte community structure
Papercourt Small / Fishing Lake is surrounded by *Salix* sp., some of which is overhanging the water. There are a number of patches of marginal emergent vegetation, predominantly comprising *Typha latifolia*, *Sparganium erectum* and *Iris pseudacorus*. At the northern end of the lake the only non-emergent species growing in water depths of 0.5-0.75m is a *Nymphaea* sp. cultivar. Small areas of mostly

coarser substrate (gravel and silty gravel) support submerged macrophyte growth at the SE end of the lake, otherwise the open water is devoid of submerged macrophytes beyond a depth of ~0.75m. The different macrophyte growth forms represented in the lake are: charophytes (*C. contraria, C. globularis* and *N. mucronata* var. *gracillima*), floating-leaved species (*Nymphoides peltata*, *Nymphaea sp. cultivar*), submerged fine/strap-leaved species (*Zannichellia palustris*), and emergents (*Alisma plantago-aquatica, Carex acuta, Carex pseudocyperus, I. pseudacorus, S. erectum, T. latifolia*).

Water quality

A spot sample taken on 21st June 2006 had a TP concentration of 124µgl^{-1}, suggesting unfavourable condition.

Summary

Papercourt Small / Fishing Lake is in **unfavourable** condition because a) broad-leaved *Potamogeton* species are absent from the macrophyte assemblage; b) the range of characteristic macrophyte species is generally poor, except for localised patches of greater diversity in shallow water areas of coarser substrates at the SE end of the lake. In this area, 3 charophyte species (*C. contraria, C. globularis* and *N. mucronata* var. *gracillima*), *N. peltata*, *A. plantago-aquatica* and *Z. palustris* were recorded. The TP concentration is considerably higher than the target/limit for the feature type and although the water clarity at the time of survey was good, the presence of benthivorous fish (Cyprinids) may be reducing macrophyte coverage and hence diversity across much of the silty, filamentous-algal covered lake bottom.

2.5 Papercourt SSSI

2.5.3 Papercourt Manor Lake

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.5.5: Macrophyte Condition Assessment Summary Table for Papercourt Manor Lake.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 4 characteristic species: *P. pusillus, C. globularis, C. contraria* var. *hispidula* and *C. vulgaris*
	No loss of characteristic species	**X?**	Phillips (2000) recorded greater species diversity
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	✓	9 out of 13 shore and 5 out of 5 boat vegetated sample spots comply (78% overall)
Negative indicator species	Non-native species absent or present at low frequency	**X**	Invasive *Crassula helmsii* present and abundant on exposed marginal mud (also recorded by Phillips (2000))
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	60% of shore and 100% of boat sample spots have score of 2-3 (89% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	Extensive beds of submerged macrophytes across lake bottom, but no zonation due to significant lowering of lake levels and very shallow water depth (10 cm).
	Maximum depth distribution should be maintained	**✓?**	Z_{max} = 0.1 m, Z_s = > site. Plants growing to Z_{max}, although lake level considerably lowered.
	At least present structure should be maintained	**-**	Cannot easily compare with Phillips (2000)
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 124 μgl^{-1} (spot sample on 21.06.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.5.6 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Papercourt Manor Lake from one shore and one boat transect on 21st June 2006. Access to the open water was particularly difficult given the exposed wet mud and the very shallow water (>0.1m).

Table 2.5.6: Macrophyte community composition of Papercourt Manor Lake.

Submerged and floating-leaved species
Chara contraria var. *hispidula*
Chara globularis
Chara vulgaris
Crassula helmsii
Potamogeton pectinatus
Potamogeton pusillus
Zannichellia palustris
Emergent species
Alisma plantago-aquatica
Carex cf. acuta
Typha latifolia
Phragmites australis (growing out of the water)

No broad-leaved *Potamogeton* species are present in Papercourt Manor Lake. However, the lake does support 3 species of charophyte – *Chara contraria* var. *hispidula, Chara globularis* and *Chara vulgaris*, which are present in extensive stands across the entire lakebed alongside other non-characteristic submerged macrophyte taxa. The characteristic *Magnopotamion* taxa include *Potamogeton pusillus, C. contraria* var. *hispidula, C. globularis* and *C. vulgaris*. There are no characteristic *Hydrocharition* species. The relatively high frequency of occurrence of pollution tolerant *Potamogeton pectinatus* and *Zannichellia palustris* across the boat and shore transects suggests that the lake has raised nutrient levels.

Negative indicator species
The non-native highly invasive species, *Crassula helmsii* is present in Papercourt Manor Lake. The presence of this species automatically places the lake in unfavourable condition.

Filamentous algal growth is extensive in Manor Lake, with 60% of wader and 100% of boat sample spots (89% overall) having cover scores of 2-3, suggesting that algal cover is greater than 10% overall.

Macrophyte community structure
Lake levels have been lowered considerably so that the maximum water depth is now only 10 cm and the zone of marginal vegetation is separated from the remaining water body in most areas by large expanses of exposed mud. Remnants of poor quality emergent vegetation were recorded growing out of the water on exposed mud around the northern end of the lake. Large areas of the exposed mud were colonised

by the non-native highly invasive species, *C. helmsii*. In the very shallow area of open water, macrophyte growth was extensive and moderately species rich. Fine-leaved *Potamogeton* spp. and *Z. palustris* were dominant, but *Chara* spp. were consistently recorded in the section, intermingled with the more dominant species. Only a small number of different macrophyte growth forms are represented in the lake – charophytes (*C. contraria* var. *hispidula, C. globularis C. vulgaris*), submerged fine/strap-leaved species (*C. helmsii*, *P. pectinatus, P. pusillus, Z. palustris*), and emergents (*Alisma plantago-aquatica, Carex cf. acuta, Phragmites australis, Typha latifolia*).

Water quality
A spot sample taken on 21st June 2006 had a TP concentration of 124µgl^{-1}, failing the target for water quality.

Summary
Papercourt Manor Lake is in **unfavourable** condition. Lake levels have been lowered considerably so that the maximum water depth is now only 10 cm and the zone of marginal vegetation is separated from the remaining water body by large expanses of exposed mud that are colonised by the non-native highly invasive species, *C. helmsii*. However, the lake does support 3 species of charophyte – *C. contraria* var. *hispidula, C. globularis* and *C. vulgaris*, which are present in extensive stands across the entire lakebed alongside other non-characteristic submerged macrophyte taxa. No broad-leaved *Potamogeton* species are present in Papercourt Manor Lake and the TP concentration is considerably higher than the target/limit for the feature type. We recommend that lake water levels are stabilised at higher levels for the benefit of the aquatic macrophyte community.

2.6 Turnford and Cheshunt Pits SSSI

2.6.1 Unit 1

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.1: Macrophyte Condition Assessment Summary Table for Unit 1.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 4 characteristic species: *C. contraria, L. minor, L. trisulca* and *P. pusillus.*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	12 out of 23 shore and 0 out of 5 boat vegetated sample spots comply (43% overall)
Negative indicator species	Non-native species absent or present at low frequency	✓	Naturalised non-native, *E. nuttallii* present, but only in 25% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	59% of shore and 67% of boat sample spots have score of 2-3 (61% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	No zonation. Submerged macrophyte growth very patchy. No submerged higher plants growing at >80cm. Many areas of overhanging trees.
	Maximum depth distribution should be maintained	**X**	Z_{max} = 2.6m, Z_s = 2.4m. Plants only growing to 1.4m (*Fontinalis* sp. = only plant growing at >80cm).
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 52 μgl^{-1} (spot sample on 24.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.2 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 1 from two shore and two boat transects on 24th August 2006.

Table 2.6.2: Macrophyte community composition of Unit 1.

Submerged and floating-leaved species
Chara contraria (not in sections)
Elodea nuttallii
Lemna minor
Lemna trisulca
Potamogeton pectinatus
Potamogeton pusillus
Emergent species
Iris pseudacorus
Phalaris arundinacea
Phragmites australis
Sparganium erectum
Typha latifolia

In terms of its floating and submerged flora, Unit 1 supports no broad-leaved *Potamogeton* species and there are few *Magnopotamion* and *Hydrocharition*-type species. The characteristic *Magnopotamion* taxa are *Chara contraria* (not in the sections) and *Potamogeton pusillus.* Characteristic *Hydrocharition* species are *Lemna minor* and *Lemna trisulca*. *C. contraria* was found growing only on a small area of gravelly substrate to the western side of an island close to the western end of section 1.

Negative indicator species
The naturalised non-native, *Elodea nuttallii* is present in Unit 1; however, its frequency of occurrence across the vegetated sample spots is only 25%, which is within the acceptable range.

Filamentous algal growth is extensive in Unit 1, with 59% of wader and 67% of boat sample spots (61% overall) having cover scores of 2-3, suggesting that algal cover is greater than 10% overall.

Macrophyte community structure
Unit 1 is surrounded by an almost continuous band of overhanging *Salix* sp. and limited marginal emergent vegetation. The emergents, *Phragmites australis, Typha latifolia*, *Phalaris arundinacea, Iris pseudacorus* and *Sparganium erectum* are all present but each only occur in small, localised stands, except *P. australis*, which forms a relatively dense reedbed in subsections 1 and 2 of section 2, where the water depth does not extend beyond 0.75m. Higher plants are only found in shallower areas of the lake at water depths of >0.8m. The aquatic moss; *Fontinalis* sp. is the only plant found in deeper water, growing profusely at water depths of 0.25-1.4m in section 1. The main water body does not support the growth of either higher or lower

plants to the maximum depth of the lake. Only a small number of different macrophyte growth forms are represented in the lake – mosses (*Fontinalis* sp.), free-floating species (*L. minor, L. trisulca*), submerged fine/strap-leaved species (*E. nuttallii*, *Potamogeton pectinatus, P. pusillus*), and emergents (*I. pseudacorus, P. australis, P. arundinacea, S. erectum, T. latifolia*).

Water quality

A spot sample taken on 24th August 2006 had a TP concentration of 52µgl^{-1}, which is only slightly higher than the water quality target of 50µgl^{-1}. At the time of survey, evidence of a former cyanophyte bloom (bright blue/green colour) was noted within the filamentous algae in section 2 at the northern end of the lake, although water clarity was generally good.

Summary

Overall, Unit 1 is in **unfavourable** condition. The lake supports a relatively poor range of submerged and floating-leaved species, no broad-leaved *Potamogeton* species are present and there are no extensive beds of submerged macrophytes across the lake bottom. The lake is almost completely surrounded by a zone of overhanging trees, which shade the marginal areas, restricting the growth of submerged macrophyte species in shallow water areas. In section 2, sediments under the trees were anoxic, composed predominantly of leaf litter and devoid of aquatic macrophytes. *C. contraria* was recorded in Unit 1, but its distribution was restricted to an area of gravel substrate. A spot water sample from the lake had a TP concentration only slightly higher than the target/limit for the feature type. Combined with evidence of a cyanophyte bloom, it is probable that the lake is enriched.

2.6 Turnford and Cheshunt Pits SSSI

2.6.2 Unit 2A: Ashley

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.3: Macrophyte Condition Assessment Summary Table for Unit 2A.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 2 characteristic species: *C. contraria* (sparse) & *L. minor* (strandline only)
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	2 out of 15 shore and 0 out of 0 boat vegetated sample spots comply (13% overall)
Negative indicator species	Non-native species absent or present at low frequency	**X**	Naturalised non-native, *E. nuttallii* present, in 47% of vegetated sample spots. Patches of pale yellow flowered *Nymphaea* sp. cultivar around margins.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	62% of shore and 100% of boat sample spots have score of 2-3 (80% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	Sparse marginal (*P. australis* & *T. angustifolia*) and submerged/floating vegetation to 75cm. No plants at water depths >75cm. Many areas of overhanging trees.
	Maximum depth distribution should be maintained	**X**	Z_{max} = 2.1m, Z_s = 1.5-1.7m. No macrophytes growing at >75 cm.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**✓?**	TP = 49 μgl^{-1} (spot sample on 22.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.4 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 2A from two shore and two boat transects on 22nd August 2006.

Table 2.6.4: Macrophyte community composition of Unit 2A.

Submerged and floating-leaved species
Chara contraria
Elodea nuttallii
Lemna minor (strandline only)
Nymphaea sp. *cultivar* (pale yellow flowers)
Emergent species
Phragmites australis
Typha angustifolia

The aquatic vegetation of Unit 2A is low in diversity. Unit 2A supports no broad-leaved *Potamogeton* species and there are very few *Magnopotamion* and *Hydrocharition*-type species. The sole characteristic *Magnopotamion* taxon is *Chara contraria,* which was only recorded growing in two locations, both shallow and unshaded with sandy substrates. The sole characteristic *Hydrocharition* taxon is *Lemna minor* (strandline only).

Negative indicator species
The naturalised non-native species, *Elodea nuttallii* is present in Unit 2A. Its frequency of occurrence across the vegetated sample spots is 47%, which although just within the acceptable range, is rather high and suggestive of nutrient enrichment and reduced species diversity (NB: there were a total of only 15 vegetated sample spots across both wader and boat transects). The lake also has a number of small wooden fishing jetties, many of which are surrounded by patches of a pale yellow flowered *Nymphaea* sp. cultivar, presumably planted for their aesthetic appeal.

Filamentous algal growth is extensive in Unit 2A, with 62% of wader and 100% of boat sample spots (80% overall) having cover scores of 2-3, suggesting that algal cover is greater than 10% overall.

Macrophyte community structure
Unit 2A is flanked on the eastern side by an almost continuous band of overhanging trees, comprising predominantly *Salix* sp., with an understorey of *Rubus fruticosus* agg. scrub. The western side is generally more open, with banks of scrub sloping down to the lake and fewer trees. The marginal emergent vegetation is very limited, with only small stands of *Phragmites australis* and *Typha angustifolia* present in the survey sections. The main water body does not support the growth of submerged macrophytes beyond a water depth of approximately 80 cm. Few macrophyte growth forms are represented in the lake (some of which are non-native) - floating-leaved species (*Nymphaea* sp. cultivar), free-floating species (*L. minor*), charophytes (*C. contraria*) submerged fine/strap-leaved species (*E. nuttallii*), and emergents (*P. australis, T. angustifolia*).

Water quality
A spot sample taken on 22nd August 2006 had a TP concentration of 49µgl^{-1}, which is just below the water quality target of 50µgl^{-1}. This may suggest favourable water quality conditions, but such an interpretation of the spot sample TP concentration should be treated with caution. Collection of further, seasonal water quality data is recommended.

Summary
Overall, Unit 2A is in **unfavourable** condition. The lake supports few emergent, submerged and floating-leaved species and a few of the species present are non-natives / cultivars (*E. nuttallii* and *Nymphaea* sp. pale yellow flowered cultivar). No broad-leaved *Potamogeton* species were recorded and there were no extensive beds of submerged macrophytes across the lake bottom at the time of survey – in fact, no plants were found growing at water depths greater than 80cm.

Recommendations
Management of the overhanging trees around the eastern side of the lake is recommended and should in time result in improved growth of both the marginal emergent vegetation and the aquatic macrophytes in the shallow water areas (e.g. *C. contraria*, a species favouring unshaded areas).

2.6 Turnford and Cheshunt Pits SSSI

2.6.3 Unit 2C

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.5: Macrophyte Condition Assessment Summary Table for Unit 2C.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 2 characteristic species: *L. minor* & *L. trisulca*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**✓?**	17 out of 17 shore and 17 out of 17 boat vegetated sample spots comply (100% overall) – based on only *Lemna* spp. and on only 1 wader and 1 boat transect.
Negative indicator species	Non-native species absent or present at low frequency	**X?**	*L. minuta* present. *Nymphaea* sp. around island does not appear to be a cultivar.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	65% of shore and 100% of boat sample spots have score of 2-3 (77% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	No zonation. Submerged macrophyte growth very patchy. No submerged higher plants growing at >80cm. Many areas of overhanging trees.
	Maximum depth distribution should be maintained	**X**	Z_{max} = 2.2m, Z_s = 1.3m. No plants growing at >80cm).
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 172 μgl^{-1} (spot sample on 22.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.6 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 2C from one shore and one boat transect on 22nd August 2006.

Table 2.6.6: Macrophyte community composition of Unit 2C.

Submerged and floating-leaved species
Ceratophyllum demersum
Lemna minor
Lemna minuta
Lemna trisulca
Nymphaea alba (strandline and around island)
Persicaria amphibia
Emergent species
Alisma plantago-aquatica
Phragmites australis
Typha latifolia

Unit 2C shows low diversity in its aquatic macrophyte assemblage, supporting no broad-leaved *Potamogeton* species, no characteristic *Magnopotamion* species and the characteristic *Hydrocharition* species are both *Lemna* spp. - *Lemna minor* and *Lemna trisulca.*

Negative indicator species
Growing in association with the native *L. minor*, Unit 2C appears to support the growth of *Lemna minuta*, a species introduced from America. Further investigation of *Lemna* spp. populations is recommended.

Filamentous algal growth is extensive in Unit 2C, with 65% of wader and 100% of boat sample spots (77% overall) having cover scores of 2-3, suggesting that algal cover is greater than 10% overall.

Macrophyte community structure
Unit 2C is surrounded by both overhanging *Salix* sp. and patches of marginal emergent vegetation predominated by *Phragmites australis* and *Typha latifolia*. *Lemna* spp. are dominant between 25-75 cm and *Ceratophyllum demersum* is common between 50-75 cm. The main water body does not support the growth of plants beyond a water depth of approximately 80cm. Few macrophyte growth forms are represented in the lake– floating-leaved species (*Nymphaea alba*), free-floating species (*L. minor, L. trisulca, L. minuta*), submerged fine/strap-leaved species (*C. demersum*), and emergents (*P. australis, T. latifolia*).

Water quality
A spot sample of unfiltered water taken on 22nd August 2006 had a TP concentration of 172µgl^{-1}. This is considerably higher than the water quality target of 50µgl^{-1}, suggesting significant nutrient enrichment.

Summary

Overall, Unit 2C is in **unfavourable** condition. The lake supports a limited range of submerged and floating-leaved species, no broad-leaved *Potamogeton* species are present and there are no extensive beds of submerged macrophytes across the lake bottom. Furthermore, a spot sample of unfiltered water had a TP concentration significantly higher than the target/limit for the feature type.

Recommendations

Management of the overhanging trees around the lake is recommended and should in time result in improved growth of both the marginal emergent vegetation and the growth of aquatic macrophytes in the shallow water areas. Around the lake margins the non-native invasive shrub, *Fallopia japonica* is present and it is recommended that populations be appropriately managed.

2.6 Turnford and Cheshunt Pits SSSI

2.6.4 Unit 3A: North Metropolitan Pit

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.7: Macrophyte Condition Assessment Summary Table for Unit 3A.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. 5 characteristic species: *L. minor, L. trisulca, P. crispus, P. obtusifolius* (strandline only) and *P. pusillus.*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**✓?**	40 out of 43 shore and 8 out of 10 boat vegetated sample spots comply (80% overall) – but predominantly *Lemna* spp.
Negative indicator species	Non-native species absent or present at low frequency	**X**	Naturalised non-native, *E. nuttallii* present in 58% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	43% of shore and 83% of boat sample spots have score of 2-3 (54% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	Some areas of overhanging trees. Reasonable emergent zone. No clear zonation. Fine-leaved *Potamogetons*, *C. demersum, E. nuttallii* in shallow water to 1.2m, only *Lemna* spp.from 1.2-2.1m.
	Maximum depth distribution should be maintained	**X**	Z_{max} = 3.5m, Z_s = 2.4m. Plants only growing to 2.1m.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 368 μgl^{-1} (spot sample on 21.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.8 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 3A from three shore and three boat transects on 21st August 2006.

Table 2.6.8: Macrophyte community composition of Unit 3A.

Submerged and floating-leaved species
Aquatic moss sp. A
Ceratophyllum demersum
Elodea nuttallii
Lemna minor
Lemna trisulca
Myriophyllum spicatum (strandline only)
Nymphaea alba (strandline only)
Potamogeton crispus
Potamogeton obtusifolius (strandline only)
Potamogeton pectinatus
Potamogeton pusillus
Zannichellia palustris
Emergent species
Equisetum fluviatile
Carex sp.
Iris pseudacorus
Phragmites australis
Sparganium erectum
Typha latifolia

In terms of its floating and submerged flora, Unit 3A supports no broad-leaved *Potamogeton* species but there are a number of *Magnopotamion* and *Hydrocharition*-type species. The characteristic *Magnopotamion* species include; *Potamogeton crispus, Potamogeton obtusifolius* (strandline only) and *Potamogeton pusillus.* The only characteristic *Hydrocharition* species are *Lemna* spp. - *Lemna minor* and *Lemna trisulca*.

Negative indicator species
The naturalised non-native, *Elodea nuttallii* is present in Unit 3A, with a frequency of occurrence across the vegetated sample spots of 58%, which is above the target range.

Filamentous algal growth is extensive in Unit 3A, with 43% of wader and 83% of boat sample spots (54% overall) having cover scores of 2-3. This suggests filamentous algal cover of greater than 10% overall.

Macrophyte community structure
Unit 3A is surrounded by both overhanging *Salix* / *Alnus* sp. and reasonably extensive, but narrow stands of marginal emergent vegetation. In some areas

(section 2), the overhanging trees have been managed to increase light availability for the development of marginal emergent vegetation. Fine-leaved *Potamogeton* spp., *Ceratophyllum demersum* and *E. nuttallii* are common in shallow water to a depth of 1.2m. Only *Lemna* spp. are present at water depths of 1.2 to 2.1m. Unit 3A does not support macrophyte growth to its maximum depth (3.5 m). A number of different macrophyte growth forms are represented in the lake – floating-leaved species (*N. alba*), free-floating species (*L. minor, L. trisulca*), submerged fine/strap-leaved species (*C. demersum, P. crispus, P. obtusifolius, Potamogeton pectinatus, P. pusillus, Zannichellia palustris*), and emergents (*Carex* spp., *Equisetum fluviatile, Iris pseudacorus, Phragmites australis, Sparganium erectum, Typha latifolia*, *Typha angustifolia*).

Water quality

A spot sample of unfiltered water taken on 21st August 2006 had a TP concentration of 368µgl^{-1}, which is considerably higher than the water quality target of 50µgl^{-1} for the feature type. At the time of survey an extensive cyanophyte bloom (*Aphanizomenon* sp.?) was present across the lake surface and throughout the water column, further suggesting unfavourable water quality.

Summary

Overall, Unit 3A is in **unfavourable** condition. Although the lake supports a reasonable array of submerged and floating-leaved species, no broad-leaved *Potamogeton* species are present and there are no extensive beds of submerged macrophytes across the lake bottom. The presence of large populations of the naturalised non-native macrophyte species, *E. nuttallii* is indicative of unfavourable condition, as is the high TP concentration, extensive cyanophyte bloom and the high coverage of filamentous algae. Nutrient concentrations should be reduced through management of catchment inputs. Benthivorous fish populations should be controlled. Continued management of the overhanging trees around the lake is recommended and this should eventually result in improved growth of the marginal emergent vegetation. The presence of the non-native invasive species, *Impatiens glandulifera* is noted, although its growth is not extensive around the lake margins.

2.6 Turnford and Cheshunt Pits SSSI

2.6.5 Unit 3B

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.9: Macrophyte Condition Assessment Summary Table for Unit 3B.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 1 characteristic species: *L. minor* (but also *Nitella mucronata* var. *gracillima*)
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**✓?**	18 out of 21 shore and 29 out of 35 boat vegetated sample spots comply (84% overall) – but only one species: *L. minor*
Negative indicator species	Non-native species absent or present at low frequency	**✓**	Naturalised non-natives, *E. canadensis and E. nuttallii* present, but only in 9% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	31% of shore and 36% of boat sample spots have score of 2-3 (33% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**✓?**	*P. australis* & overhanging *Salix/Alnus*. Zone of *N. lutea* 50-150cm. *C. demersum, L. minor, E. nuttallii & N. mucronata* var. *gracillima* beyond, to 2.5m
	Maximum depth distribution should be maintained	**✓**	Z_{max} = 2.5m, Z_s = 1.2m. Plants growing to Z_{max}.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 1036 μgl^{-1} (spot sample on 22.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.10 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 3B from two shore and two boat transects on 22nd August 2006.

Table 2.6.10: Macrophyte community composition of Unit 3B.

Submerged and floating-leaved species
Ceratophyllum demersum
Elodea canadensis
Elodea nuttallii
Lemna minor
Nitella mucronata var*. gracillima*
Nuphar lutea
Potamogeton pectinatus (strandline only)
Emergent species
Phalaris arundinacea
Phragmites australis
Sparganium erectum

In terms of its floating and submerged flora, Unit 3B is reasonably species rich, although the growth of most individual taxa is rather localised. The lake supports no broad-leaved *Potamogeton* species and there are few characteristic *Magnopotamion* and *Hydrocharition*-type species. The only characteristic *Magnopotamion* and *Hydrocharition* species are *Nitella mucronata var. gracillima* (only in section 1) and *Lemna minor* respectively.

Negative indicator species
The naturalised non-natives, *Elodea nuttallii* and *Elodea canadensis* are present in Unit 3B, however, their frequency of occurrence across the vegetated sample spots is only 9%, which is within the target range.

Filamentous algal growth is fairly extensive in Unit 3B, with 31% of wader and 36% of boat sample spots (33% overall) having cover scores of 2-3. This suggests filamentous algal cover of greater than 10% overall.

Macrophyte community structure
Unit 3B is surrounded by an almost continuous band of overhanging trees, comprising *Salix* spp. and *Alnus glutinosa*. There is limited marginal emergent vegetation; *Phragmites australis* is the most common emergent species, particularly in section 1, where it grows to a depth of ~1m. Other emergent species occur only in small, localised stands. There is a zone of *Nuphar lutea*, rooted in water depths of between 0.5 and 1.5m. *L. minor* is most frequent around the lake margins, but also floats on the surface of sheltered areas in water depths of up to 2.5m. *Ceratophyllum demersum, E. nuttallii* and *E. canadensis* are present in both deep and shallower water, whereas *N. mucronata* var. *gracillima* was only found in the boat transect of section 1 at water depths of 1.5-2.5m. At the time of survey, submerged plants were recorded growing to the maximum depth of the lake (Z_{max} = 2.5m), suggesting that

Unit 3B meets the target for maintenance of macrophyte maximum depth distribution. A reasonable number of different macrophyte growth forms are represented in the lake – charophytes (*N. mucronata* var. *gracillima*); mosses (aquatic moss sp. A); floating-leaved species (*N. lutea*), free-floating species (*L. minor*), submerged fine/strap-leaved species (*C. demersum, E. canadensis, E. nuttallii, Potamogeton pectinatus* (strandline only)), and emergents (*P. australis, Phalaris arundinacea, Sparganium erectum*).

Water quality

A spot sample of unfiltered water taken on 22nd August 2006 had a TP concentration of 1036 μgl^{-1}. This is considerably higher than the water quality target of 50 μgl^{-1} TP, suggesting significant nutrient enrichment and unfavourable conditions.

Summary

Overall, Unit 3B is in **unfavourable** condition. The lake supports a reasonable range of submerged and floating-leaved species and at the time of survey there was a reasonable macrophyte structure with submerged plants growing to the maximum depth of the lake. However, no broad-leaved *Potamogeton* species were present and few characteristic species were recorded. A spot water sample had a TP concentration considerably higher than the target/limit for the feature type. Filamentous algal coverage was moderate and the pollution tolerant submerged macrophyte taxon, *C. demersum* was common, further signifying nutrient enrichment and unfavourable conditions.

2.6 Turnford and Cheshunt Pits SSSI

2.6.6 Unit 4: Seventy Acres Lake

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.11: Macrophyte Condition Assessment Summary Table for Unit 4.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 2 characteristic species: *L. minor* and *P. pusillus.*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	31 out of 45 shore and 1 out of 18 boat vegetated sample spots comply (51% overall)
Negative indicator species	Non-native species absent or present at low frequency (<50%)	✓	Naturalised non-native, *E. nuttallii* present, but only in 25% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	71% of shore and 80% of boat sample spots have score of 2-3 (74% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**✓?**	Some areas of overhanging trees. Zone of emergent vegetation. Submerged macrophyte growth dominated by *C. demersum* to 2.3m.
	Maximum depth distribution should be maintained	✓	Z_{max} = 2.4m, Z_s = 2.35m. Plants growing to 2.3m.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 1076 μgl^{-1} (spot sample on 23.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.12 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 4 from three shore and three boat transects on 23rd August 2006.

Table 2.6.12: Macrophyte community composition of Unit 4.

Submerged and floating-leaved species
Ceratophyllum demersum
Elodea nuttallii
Lemna minor
Nymphaea alba
Potamogeton pusillus
Zannichellia palustris (strandline only)
Emergent species
Alisma plantago-aquatica (strandline only)
Acorus calamus
Carex sp.
Phragmites australis
Sparganium erectum

The vegetation of Unit 4 is species poor. In terms of its floating and submerged flora, the lake supports no broad-leaved *Potamogeton* species and there are few *Magnopotamion* and *Hydrocharition*-type species. The only characteristic *Magnopotamion* taxon is *Potamogeton. pusillus* and the only characteristic *Hydrocharition* taxon is *Lemna minor*.

Negative indicator species
The naturalised non-native, *Elodea nuttallii* is present in Unit 4; however, its frequency of occurrence across the vegetated sample spots is only 25%, which is within the acceptable range.

Filamentous algal growth is extensive in Unit 4, with 71% of wader and 80% of boat sample spots (74% overall) having cover scores of 2-3, suggesting filamentous algal cover of greater than 10% overall.

Macrophyte community structure
Unit 4 has a reasonably extensive band of marginal emergent vegetation, although in many areas overhanging *Salix* sp. is frequently encountered and appears to some extent to restrict the growth of emergents. Within the lake, 'islands' of emergent vegetation have been established to improve the lake's ecological structure. The 'islands' are surrounded by netting to encourage plant growth and to reduce the impact of wildfowl grazing. *L. minor* is common across all survey sections at depths of 0-0.8m. The growth of *P. pusillus* and *Nymphaea alba* is more localised (only in sections 1 and 2 respectively and at water depths of ≤0.5m and ≤1m respectively). The main water body supports macrophyte growth more or less to the maximum depth of the lake. *Ceratophyllum demersum* is the dominant macrophyte species in

both the shallow and deep water areas, growing to a depth of 2.3m (almost Z_{max}). *E. nuttallii* also grows to 2.3m, but it is only frequent in survey section 3. A reasonable range of different macrophyte growth forms are represented in the lake – floating-leaved species (*N. alba*), free-floating species (*L. minor*), submerged fine/strap-leaved species (*C. demersum, E. nuttallii, P. pusillus, Zannichellia palustris* (strandline only)), and emergents (*Acorus calamus, Phragmites australis, Sparganium erectum* and *Carex* sp.)

Water quality

A spot sample of unfiltered water taken on 23rd August 2006 had a TP concentration of 1076 μgl^{-1}, which is significantly higher than the water quality target of 50μgl^{-1} TP and suggests considerable nutrient enrichment. Furthermore, at the time of survey the water was greyish green and water clarity was compromised by a small cyanophyte bloom.

Summary

Overall, Unit 4 is in **unfavourable** condition. The lake supports a limited range of submerged and floating-leaved species, few characteristic species are present and there are no broad-leaved *Potamogeton* species. Although the beds of submerged macrophytes are relatively extensive, they are dominated by pollution tolerant and naturalised non-native species, suggesting that the lake's condition is unfavourable. Furthermore, the presence of a cyanophyte bloom and a spot water sample with a TP concentration significantly higher than the target/limit for the feature type both suggest that nutrient pollution is a significant problem in Unit 4.

2.6 Turnford and Cheshunt Pits SSSI

2.6.7 Unit 5: Hooks Marsh Lake

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.13: Macrophyte Condition Assessment Summary Table for Unit 5.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 1 characteristic species: *L. minor*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	25 out of 41 shore and 5 out of 20 boat vegetated sample spots comply (49% overall)
Negative indicator species	Non-native species absent or present at low frequency (<50%)	**✓?**	Naturalised non-native, *E. nuttallii* present, but only in 23% of vegetated sample spots. Patch of pale yellow *Nymphaea* sp. cultivar in boat survey section 3 (1.6m). *L. minuta* present.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	63% of shore and 67% of boat sample spots have score of 2-3 (64% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X?**	Some degree of zonation. Submerged macrophyte growth extensive (to Z_{max}), but more or less monospecific. Many areas of overhanging trees, limiting growth of emergents.
	Maximum depth distribution should be maintained	**✓**	Z_{max} = 3.5m; Z_s = >site. Plants growing to Z_{max}.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 1053 μgl^{-1} (spot sample on 23.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.14 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 5 from three shore and three boat transects on 23rd August 2006.

Table 2.6.14: Macrophyte community composition of Unit 5.

Submerged and floating-leaved species
Ceratophyllum demersum
Elodea nuttallii
Lemna minor
Lemna minuta
Nymphaea sp. (pale yellow flowered cultivar)
Potamogeton pectinatus (strandline only)
Emergent species
Acorus calamus
Carex sp.
Equisetum fluviatile
Glyceria maxima
Iris pseudacorus
Phalaris arundinacea
Phragmites australis
Sparganium erectum
Typha latifolia

The submerged and floating vegetation of Unit 5 is species poor for the feature type, supporting no broad-leaved *Potamogeton* species, no characteristic *Magnopotamion* species and only two characteristic *Hydrocharition* species (*Lemna minor* and *Lemna minuta*).

Negative indicator species
The naturalised non-native, *Elodea nuttallii* is present in Unit 5; however, its frequency of occurrence across the vegetated sample spots is only 23%, which is within the target range. Unit 5 appears to support the growth of *L. minuta*, a species introduced from America. Further investigation of *Lemna* spp. populations is recommended.

Filamentous algal growth is extensive in Unit 5, with 63% of wader and 67% of boat sample spots (64% overall) having cover scores of 2-3. This suggests filamentous algal cover of greater than 10% overall.

Macrophyte community structure
The lake is surrounded by a fairly extensive band of overhanging *Salix* sp. In a number of areas the marginal emergent vegetation appears to be limited by shading and also by the fairly steeply sloping nature of the bank sides. *Sparganium erectum* and *Acorus calamus* are the most frequently encountered emergent species in the survey sections, growing in water depths of ≤0.5m. *L. minor* and *L. minuta* are

commonly found growing on the water surface around the margins being most frequent at water depths of ≤0.75m. *Ceratophyllum demersum* is the dominant submerged macrophyte species, growing both in shallow water areas and in extensive beds to the maximum depth of the lake. *E. nuttallii* is found growing at similar depths to *C. demersum,* but its growth is patchy and far less extensive. A reasonable range of different macrophyte growth forms are represented in the lake – floating-leaved species (*Nymphaea* sp. cultivar, *Persicaria amphibia*), free-floating species (*L. minor, L. minuta*), submerged fine/strap-leaved species (*C. demersum*, *E. nuttallii, Potamogeton pectinatus* (strandline only), and emergents (*S. erectum*, *A. calamus, Iris pseudacorus, Glyceria maxima, Phragmites australis, Phalaris arundinacea, Typha latifolia and Carex* sp.).

Water quality

A spot sample taken on 23rd August 2006 had a TP concentration of 1053 μgl^{-1}, which is considerably higher than the water quality target of 50μgl^{-1}, indicating significant nutrient enrichment.

Summary

Overall, Unit 5 is in **unfavourable** condition. The lake supports a limited range of submerged and floating-leaved species. There are few characteristic species and no broad-leaved *Potamogeton* spp. Although there are extensive beds of submerged macrophytes across the lake bottom, the beds are more or less monospecific (*C. demersum*). Shading by overhanging trees and the relatively steeply sloping banks in many areas appear to limit the growth of emergents and species typical of shallow water areas. A spot water sample from Unit 5 had a TP concentration significantly higher than the target/limit for the feature type and although the water was relatively clear at the time of survey, there was some evidence of an algal bloom, further suggesting that the lake has raised nutrient levels.

2.6 Turnford and Cheshunt Pits SSSI

2.6.8 Unit 6: Police Pit (also known as Turners Marsh Pit or Cadmore Lane Pit)

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.15: Macrophyte Condition Assessment Summary Table for Unit 6.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 5 characteristic species: *C. globularis, P. pusillus*, *R. circinatus, L. minor* and *L. trisulca*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	✓	54 out of 59 shore and 15 out of 29 boat vegetated sample spots comply (78% overall)
Negative indicator species	Non-native species absent or present at low frequency	✓	Naturalised non-native, *E. nuttallii* present, but only in 25% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	**X**	78% of shore and 95% of boat sample spots have score of 2-3 (85% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X?**	Some degree of zonation. Submerged macrophyte growth patchy, but extensive in some areas.
	Maximum depth distribution should be maintained	✓	Z_{max} = 2.2m, Z_s = >site. Plants growing to Z_{max}.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 1038 μgl^{-1} (spot sample on 25.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition
Table 2.6.16 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 6 from three shore and three boat transects on 25th August 2006.

Table 2.6.16: Macrophyte community composition of Unit 6.

Submerged and floating-leaved species
Chara globularis
Ceratophyllum demersum
Elodea nuttallii
Lemna minor
Lemna trisulca
Nuphar lutea
Persicaria amphibia
Potamogeton pectinatus
Potamogeton pusillus
Ranunculus circinatus
Zannichellia palustris
Emergent species
Carex sp.
Equisetum fluviatile
Glyceria maxima
Iris pseudacorus
Sparganium erectum
Typha angustifolia
Typha latifolia

The vegetation of Unit 6 is comparatively species rich in relation to many of the other lakes within the Turnford and Cheshunt Pits SSSI. In terms of its floating and submerged flora, it supports 5 characteristic species - *Chara globularis, Potamogeton pusillus*, *Ranunculus circinatus, Lemna minor* and *Lemna trisulca*, although no broad-leaved *Potamogeton* species were recorded. The growth of *C. globularis* was localised, recorded growing on a patch of gravelly substrate only in subsection 1 of section 1 at a depth of ≥0.75m.

Negative indicator species
The naturalised non-native, *Elodea nuttallii* is present in Unit 6; however, its frequency of occurrence across the vegetated sample spots is only 25%, which is within the acceptable range.

Filamentous algal growth is very extensive in Unit 6, with 78% of wader and 95% of boat sample spots (85% overall) having cover scores of 2-3. This suggests filamentous algal cover of greater than 10% overall.

Macrophyte community structure

Only section 1 (and to some extent section 3) has extensive canopy cover of overhanging *Salix* sp. Marginal emergent vegetation is dominated by *Carex* sp. and *Sparganium erectum*, with *Typha latifolia* and *Typha angustifolia* less common. *L. minor* and *L. trisulca* are frequently encountered in the shallow water marginal areas, with *L. minor* hugging the margins in water depths of ≤0.75m and *L. trisulca* recorded at depths of ≥0.5m and extending its range into deeper water areas (1.9m maximum depth). Alongside *L. trisulca*, *Ceratophyllum demersum* is the most frequently encountered submerged macrophyte species, growing to the maximum depth of the lake (2.2m), with particularly extensive cover in survey section 2. The growth of *Potamogeton pectinatus, E. nuttallii*, *R. circinatus, P. pusillus* and *Zannichellia palustris* is patchier. A relatively broad range of different macrophyte growth forms are represented in the lake – charophytes (*C. globularis*); floating-leaved species (*Nuphar lutea, Persicaria amphibia*), free-floating species (*L. minor, L. trisulca*), submerged fine/strap-leaved species (*R. circinatus, E. nuttallii, C. demersum*, *P. pectinatus, P. pusillus, Z. palustris*), and emergents (*Carex* sp., *Equisetum fluviatile, Glyceria maxima, Iris pseudacorus, S. erectum, T. angustifolia, T. latifolia*).

Water quality

A spot sample of unfiltered water taken on 25th August 2006 had a TP concentration of 1038 µgl^{-1}. This is significantly higher than the water quality target of 50µgl^{-1} and suggests considerable nutrient enrichment of the lake.

Summary

Overall, Unit 6 is in **unfavourable** condition. The lake supports a reasonably broad range of submerged and floating-leaved species and submerged macrophytes were recorded growing to the maximum depth of the lake. However, the absence of broad-leaved *Potamogeton* species; domination of the aquatic macrophyte assemblage by pollution tolerant species (*C. demersum* and *P. pectinatus*) and the extensive cover of filamentous algae all suggest unfavourable condition. Many large carp were seen in the shallow, filamentous algal covered areas of section 3 and they were also present in other areas of the lake. The foraging action of carp can have a negative influence on the ecological functioning of shallow lakes, in particular through the internal resuspension of nutrient-rich sediment into the water column. Furthermore, a spot water sample from Unit 6 had a TP concentration of 1038 µgl^{-1}, which is significantly higher than the target/limit for the feature type, indicating that the lake is eutrophied.

2.6 Turnford and Cheshunt Pits SSSI

2.6.9 Unit 7: Friday Lake

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.17: Macrophyte Condition Assessment Summary Table for Unit 7.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 1 characteristic species: *P. pusillus.*
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	1 out of 33 shore and 1 out of 23 boat vegetated sample spots comply (2% overall)
Negative indicator species	Non-native species absent or present at low frequency	**X**	Naturalised non-native, *E. nuttallii* present in 84% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	✓	10% of shore and 0% of boat sample spots have score of 2-3 (6% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	Areas of overhanging trees and localised stands of marginal vegetation. Submerged macrophyte beds extensive (almost to Z_{max}, but virtually monospecific (*E. nuttallii*).
	Maximum depth distribution should be maintained	✓	Z_{max} = 3.3m, Z_s = 1.4m. Plants growing to 3.0m
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 246 μgl^{-1} (spot sample on 25.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition

Table 2.6.18 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 7 across two shore and two boat transects on 25th August 2006.

Table 2.6.18: Macrophyte community composition of Unit 7.

Submerged and floating-leaved species
Elodea nuttallii
Nymphoides peltata
Persicaria amphibia
Potamogeton pectinatus
Potamogeton pusillus
Emergent species
Acorus calamus
Glyceria maxima
Sparganium erectum
Typha angustifolia
Typha latifolia

The submerged and floating vegetation of Unit 7 is species poor for the feature type, supporting no broad-leaved *Potamogeton* species and no characteristic *Hydrocharition* species. *Potamogeton pusillus* is the only characteristic *Magnopotamion* species. *Nymphoides peltata* was present only in subsection 4 of section 1, growing in a small bay at a water depth of 0.25 -0.50 m.

Negative indicator species

The naturalised non-native, *Elodea nuttallii* is present in Unit 7. Its frequency of occurrence across the vegetated sample spots is 84%, which is considerably higher than the acceptable range. At the time of survey, populations of *E. nuttallii* were senescing.

Filamentous algal growth is not very extensive in Unit 7, with 10% of wader and 0% of boat sample spots (6% overall) having cover scores of 2-3, suggesting that filamentous algal cover is less than 10% overall.

Macrophyte community structure

Unit 7 is surrounded by several areas of overhanging *Salix* sp. Marginal emergent vegetation grows only in localised stands, comprising; *Acorus calamus, Sparganium erectum*, *Typha latifolia* and to a lesser extent, *Glyceria maxima* and *Typha angustifolia*. The naturalised non-native, *E. nuttallii* is the dominant submerged macrophyte species, growing profusely throughout the water column, covering the lake bed extensively and almost exclusively between water depths of 0.75 – 3.0 m. Remnants of *Potamogeton pectinatus* and *P. pusillus* were recorded growing at a depth of 2.2 m in boat survey section 2. These *Potamogeton* spp. may have been more prevalent earlier in the summer before the cover of *E. nuttallii* became so extensive. Only a small number of different macrophyte growth forms are represented in the lake – floating-leaved species (*Nuphar lutea, N. peltata, Persicaria amphibia*); submerged fine/strap-leaved species (*E. nuttallii, P. pectinatus, P. pusillus*), and emergents (*A. calamus, S. erectum*, *T. latifolia, G. maxima* and *T. angustifolia*).

Water quality
At the time of survey on 25th August 2006, Unit 7 had an extensive cyanophyte bloom, reducing the water clarity to 1.4m. A spot water sample taken at the same time had a TP concentration of 246µgl^{-1}, which is higher than the water quality target of 50µgl^{-1}. The cyanophyte bloom and the high TP concentration indicate nutrient enrichment and unfavourable condition.

Summary
Overall, Unit 7 is in **unfavourable** condition. The lake supports a limited range of submerged and floating-leaved species. No broad-leaved *Potamogeton* species are present and although extensive beds of submerged macrophytes are present across the lake bottom, the dominant species is *E. nuttallii*, a naturalised non-native whose dominance is indicative of unfavourable condition. A spot water sample with a TP concentration higher than the target/limit for the feature type and the presence of an extensive cyanophyte bloom at the time of survey, further indicate unfavourable condition.

2.6 Turnford and Cheshunt Pits SSSI

2.6.10 Unit 9: Bowyers Water

Annex 1 type: H3150: Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation. Favourable Condition Table 5.

Table 2.6.19: Macrophyte Condition Assessment Summary Table for Unit 9.

Attribute	Target	Status	Comment
Macrophyte community composition	≥ 6 of the characteristic species listed in Box 4 and 1 broadleaved *Potamogeton* species	**X**	No broadleaved *Potamogeton* spp. Only 1 characteristic species: *L. minor* (strandline only)
	No loss of characteristic species	**-**	No previous surveys
	≥ 6/10 vegetated sample spots (boat or wader survey) should have ≥ 1 characteristic species	**X**	0 out of 28 shore and 0 out of 28 boat vegetated sample spots comply (0% overall)
Negative indicator species	Non-native species absent or present at low frequency	**X**	Naturalised non-native, *E. nuttallii* present in 82% of vegetated sample spots.
	Benthic and epiphytic filamentous algal cover <10% (non-*Chara*)	✓	0% of shore and 0% of boat sample spots have scores of 2-3 (0% overall).
Macrophyte community structure	Characteristic vegetation zones should be present. Extensive beds of submerged macrophytes should be present	**X**	Submerged and emergent macrophyte growth very patchy and poorly zoned. No submerged plants >1.6 m. Many areas of overhanging trees.
	Maximum depth distribution should be maintained	**X**	Z_{max} = 2.2m, Z_s = 0.45m. Plants only growing to 1.6m.
	At least the present structure should be maintained	**-**	Baseline survey
Water quality	Stable nutrient levels: TP target/limit = 50 μgl^{-1}	**X**	TP = 132 μgl^{-1} (spot sample on 25.08.06)

Status: ✓ = favourable; X = unfavourable; - = unable to assess

Macrophyte community composition

Table 2.6.20 lists the submerged / floating-leaved and emergent aquatic macrophyte taxa recorded in Unit 9 across three shore and three boat transects on 25th August 2006.

Table 2.6.20: Macrophyte community composition of Unit 9.

Submerged and floating-leaved species
Elodea nuttallii
Lemna minor (strandline only)
Nuphar lutea
Persicaria amphibia
Emergent species
Equisetum fluviatile
Iris pseudacorus
Phragmites australis
Sparganium erectum
Typha angustifolia

The growth of submerged and floating aquatic vegetation in Unit 9 is localised and species poor. The lake supports no broad-leaved *Potamogeton* species, there are no characteristic *Magnopotamion* species and the only characteristic *Hydrocharition* taxon - *Lemna minor* – was found only in the strandline.

Negative indicator species
The naturalised non-native, *Elodea nuttallii* is present in Unit 9 and its frequency of occurrence across the vegetated survey sample spots is high at 82% - significantly greater than the target frequency of <50%, indicating unfavourable condition.

Filamentous algal growth is limited in Unit 9, with 0% of wader and 0% of boat sample spots having cover scores of 2-3, suggesting that filamentous algal cover is less than 10% overall.

Macrophyte community structure
Unit 9 is surrounded by an almost continuous band of overhanging trees (predominantly *Salix* sp., with some *Alnus* sp.) There is limited marginal emergent vegetation - where present it grows in relatively small stands only. At depths of 0.5 – 1.2 m, *Nuphar lutea* grows in localised patches. In both shallow and deeper water, growing to depths of 1.6 m*, E. nuttallii* is the dominant submerged macrophyte, although its distribution is also patchy. The main water body does not support macrophyte growth to the maximum depth of the lake. Only a small number of different macrophyte growth forms are represented in Unit 9 – floating-leaved species (*N. lutea, Persicaria amphibia*), free-floating species (*L. minor*), submerged fine/strap-leaved species (*E. nuttallii*), and emergents (*Sparganium erectum, Typha angustifolia, Phragmites australis, Iris pseudacorus* and *Equisetum fluviatile*).

Water quality
The water of Unit 9 was green and turbid at the time of survey on 25th August 2006, with the extensive cyanophyte bloom reducing water clarity to only 0.45m. A spot water sample taken at the same time had a TP concentration of 132µgl^{-1}, which is higher than the water quality target/limit of 50µgl^{-1}, suggesting nutrient enrichment.

Summary

Overall, Unit 9 is in **unfavourable** condition. The lake supports a limited range of submerged and floating-leaved macrophyte species, no characteristic macrophyte taxa are present (except *L. minor* in the strandline), macrophytes do not grow to the maximum depth of the lake and the dominant submerged macrophyte taxon is the naturalised non-native, *E. nuttallii*. An extensive cyanophyte bloom was present at the time of survey, reducing water clarity to only 0.45m and a spot water sample taken at the same time recorded a TP concentration higher than the target/limit for the feature type, further indicating unfavourable condition.

2.6.11 Summary condition of the Turnford and Cheshunt Pits SSSI.

All nine of the individual lakes surveyed within the Turnford and Cheshunt Pits SSSI are determined to be in **unfavourable** condition and therefore the SSSI as a whole is in **unfavourable** condition.

Spot sample TP concentrations are above the target level in eight lakes, being particularly high (~ 1000µgl^{-1}) in Pits 3B, 4, 5, and 6. At the time of survey in August 2006, cyanophyte blooms were commonly encountered, providing further evidence that the SSSI as a whole is significantly impacted by nutrient enrichment. Across the SSSI (in Pits 1, 2A, 3B and 6), a total of three different charophyte species were recorded - *Chara contraria, Chara globularis* and *Nitella mucronata* var. *gracillima*. The latter two species are considered more tolerant of nutrient enrichment than many other charophyte species; however they are unable to cope with sustained high nutrient levels (Nick Stewart pers. comm.). This may explain the limited extent of charophyte populations across the Turnford and Cheshunt Pits SSSI and the restriction of *C. contraria* to Pits 1 and 2A, where spot sample TP concentrations were lower (~ 50µgl^{-1}). We recommend that further seasonal (minimum) water quality monitoring data is collected to substantiate the high concentrations recorded in the spot samples. Potential nutrient pollution sources should be identified and where possible reduced through appropriate management interventions (e.g. phosphate stripping of water entering the SSSI or the introduction of buffer strips around the lakes / inflows to minimise the impact of diffuse nutrient pollution). With phosphorus concentrations as high as those recorded in the spot samples, efforts to reduce external nutrient loads may be hampered by persistent resuspension of internally derived sedimentary phosphorus. The resuspension of sediment may be enhanced by the foraging action of benthivorous fish such as carp, which are of widespread occurrence (stocked) in many of the Turnford and Cheshunt Pits.

At the time of SSSI notification in 1995, *Myriophyllum verticillatum*, *Ranunculus trichophyllus*, *Botomus umbellatus*, *Typha angustifolia*, *Hydrocharis morsus-ranae*, *Potamogeton obtusifolius*, *Potamogeton pusillus* and *Carex disticha* were all present. Aside from the fact that not all lakes within the SSSI were surveyed in 2006 and that the surveys were carried out in late August when some aquatic macrophyte species may have been senescing, many of the species listed at the time of notification were absent. Within the survey sections, *P. obtusifolius* was only found in the strandline of Unit 3A, *P. pusillus* was present in five of the lakes and *T. angustifolia* was recorded from a similar number of sites. Species typically considered less tolerant of nutrient enrichment (e.g. *M. verticillatum*, *B. umbellatus* and *H. morsus-ranae*) were absent from the 2006 surveys. This suggests that the lakes have experienced a deterioration of condition since the time of SSSI notification.

The density and extent of overhanging tree cover is potentially problematic at many of the Turnford and Cheshunt Pits. Shade from overhanging trees is considered unfavourable to the development of shallow-water macrophyte populations; in particular to the growth of charophytes (Nick Stewart pers. comm.). Efforts have recently been made to reduce the coverage of overhanging trees around the margins of at least one lake (3A). This effort should be extended to benefit further lakes.

3 References

JNCC. (2005). Common Standards Monitoring Guidance for Standing Waters. Version March 2005. JNCC. 80pp.

Lockton, A. (2006a). A Botanical Survey of Betley Mere. Report to English Nature by Whild Associates Ecological Consultants. 30pp.

Lockton, A. (2006b). A Botanical Survey of Maer Pool. Report to English Nature by Whild Associates Ecological Consultants. 16pp.

Lockton, A. (2005). A Botanical Survey of Cop Mere. Report to English Nature by Whild Associates Ecological Consultants. 21pp.

Phillips, B. (2000). Papercourt Marshes, Ripley. Survey report.