

Moor Green Lakes Nature Reserve

An Aquatic and Wetlands Plant Survey



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Introduction

Background

Surrey Wildlife Trust has been commissioned to carry out an aquatic plant survey at Moor Green Lakes, a 36 hectare nature reserve occupying former gravel workings. The reserve is situated immediately north of the River Blackwater, between Yately and Sandhurst in Berkshire (grid reference SU810 624). The site was created as a nature reserve by Hall Aggregates (South East) Ltd. and opened in 1993.

Management of the reserve is overseen by a steering group made up of representatives from a number of interested bodies and the work programme carried out by volunteers belonging to Moor Green Lakes Group and by Blackwater Valley Countryside Partnership. Members of Moor Green Lakes Group have access to two viewing hides but otherwise access on to the reserve is restricted. A public footpath and bridleway pass by the western and southern boundaries of the site.

Survey Brief

The principal aim was to carry out an aquatic plant survey to update a survey carried out by Chris Hall in 2002. The objective therefore was to re-find those species previously recorded with an estimate of their present abundances, whilst at the same time noting any new species not previously found.

The survey site consists of three lakes known as Colebrook Lake North, Colebrook Lake South and Grove Lake. Colebrook North and South lakes are separated by Long Island and each lake also has between one and three small artificial islands. Principal habitat surrounding the lakes is either managed grassland with a few trees or thorn thickets.

Methodology

Surveys of the margins of Colebrook Lakes North and South and of Grove Lake were conducted on 31st July and 1st August 2006 by walking in the shallow waters around the margins, provided it was safe to do so bearing in mind that the surveyor was working alone. Occasional overhanging trees made this hazardous and access was difficult at the margin of Colebrook Lake South due to thick scrub and also on the south side of Grove Lake. Grapnel throws were made for submerged species at

regular intervals to sample the water up to ten metres from the bank. Species lists with abundances were compiled for each lake.

The open water of Colebrook Lake North and South was surveyed by boat on 14th August with the assistance of Blackwater Valley Ranger Tim Mockridge operating the boat. The objective was to sample each lake as widely as possible including deep and shallow water areas by throwing a grapnel from the boat, allowing it to sink to the bed before pulling it in slowly. This was done at seventeen points in Colebrook Lake North and thirteen in the smaller South Lake. Material from the grapnel was sorted in the field and returned to the lake except where closer inspection was necessary. Long Island and the five small islands in Colebrook Lake were surveyed on the same day. A boat survey of Grove Lake and Grove Island was carried out on 18th August also assisted by Tim. Seventeen points were sampled in Grove Lake

The islands were surveyed by a walk around the water's edge, recording species in the water, at the margin and visible on the bank. Long Island was also surveyed by walking the margin in the shallow waters where accessible. The cut through the middle was not surveyed due to time constraints.

Results

A separate species list (Appendix 1) with abundances using the DAFOR system was compiled for the margins of each lake and for each island. Results of the open water sampling are shown in Table 1 and the sampling points on Figure 1 (Appendix 2). The DAFOR system is a subjective way of describing the abundance of a plant and uses the following key:-

(Locally) Dominant Abundant Frequent Occasional Rare

Please note that plants ranked as "*rare*" means that they were not found often over this site and does not necessarily indicate a county or national rarity.

Plants that could not be identified with certainty (generally because only vegetative or depauperate parts were present) are omitted from the results. Scientific nomenclature follows Stace (1997).

Species lists show the plants grouped according to the zone in which they normally occur. Submerged and floating species are those in which the entire plant may be submerged or may float on the surface of the water, or the plant may be rooted in the substrate and send up aerial leaves. Emergent plants are those whose roots and lower parts stand in water, while their leaves and flowers rise above the surface. Riparian species are those occupying the zone higher up the bank but where the soil is moist; they are usually adapted to fluctuating water conditions and able to withstand occasional flooding.

In all 78 vascular plant and charophyte taxa were recorded for the site. These are listed in Appendix 2. In summary, sixty-one species were recorded for Colebrook Lake North and islands, forty-one for Colebrook Lake South and fifty-three for Grove Lake.

Colebrook Lake North

The northern and western edges of North Lake are managed grassland with sparse Willows overhanging the banks. Frequent stands of *Sparganium erectum* line the margins of the lake with occasional stands of *Typha latifolia*. Beneath the canopy of the taller emergent species are locally frequent *Hydrocotyle vulgaris*, *Mentha aquatica*, *Myosotis scorpioides*. Constant and often locally abundant riparian species include *Juncus effuses*, *Lotus pedunculatus*, *Oenanthe crocata* and *Lysimachia nummularia* with scattered and often frequent *Juncus acutiflorus*, *Lycopus europaeus*, *Scutellaria galericulata*, *Lythrum salicaria*, *Eupatorium cannabinum* and *Epilobium hirsutum*.

Juncus articulatus, *Angelica sylvestris*, *Filipendula ulmaria*, *Glyceria fluitans* and *Equisetum fluviatile* occur in a few scattered localities. Along the eastern edge of the lake Willows are locally abundant and marginal vegetation is dominated by *Sparganium* but also occurring on the edge are *Ranunculus flammula*, *Bidens cernua*, *B. Tripartita*, *Impatiens capensis* and *Myosotis laxa*.

Where tall emergent vegetation is absent, as on beaches and scrapes, *Eleocharis acicularis* and *E. palustris* are locally frequent but are often competing with the

dominance of *Crassula helmsii*; *Persicaria maculosa* and *P. hydropiper* also occur on the bare ground of the scrapes.

Of the submerged and floating species *Elodea nuttallii* is dominant and Blanketweed abundant. *Potamogeton pusillus* is locally frequent, with *P. obtusifolius* and *P. berchtoldii* rare. *Elatine hexandra* is fairly frequent in the gravel of the shallow waters. *Ceraophyllum demersum* occurred near the hide and at five open water sample points. Other occurrences included *Callitriche stagnalis* and a *Chara* species.

The small islands in Colebrook Lake North have their own particular vegetation communities, though abundant *Crassula* is common to all three. On Tern Island *Chenopodiaceae* are dominant with abundant *Persicaria hydropiper*, occasional *P. maculosa*, *P. lapthifolium* and both *Bidens* species. *Chamerion angustifolium* is prominent and the dominant species on the higher ground. No submerged or floating species were recorded here.

The most frequent species among marginal vegetation on Goose Island are *Mentha aquatica*, *Juncus effusus*, *Lycopus europaeus*, *Hydrocotyle vulgaris* and *Agrostis stolonifera*; other aquatic species include *Eleocharis acicularis*, *Iris pseudacorus* and *Alisma plantago-aquatica*. Both *Potamogeton obtusifolius* and *P. berchtoldii* were found, together with abundant *Elodea nuttallii*.

Persicaria hydropiper is abundant on Plover Island with other occasional *Chenopodium*, *Lysimachia vulgaris* and *Conyza canadensis*. Only Blanket weed was recorded submerged or floating.

Colebrook Lake South

Much of the marginal vegetation along the banks of the lake is under tree cover with the dense thorn thicket reaching the water's edge, resulting in less light here and therefore fewer emergent and riparian species than Colebrook Lake North. The eastern end is rather more open and there are some good stands of *Sparganium* but frequently Alders and Willows are overhanging the water's edge. Riparian species include fairly frequent *Juncus effusus*, *Lycopus europaeus*, *Lysimachia vulgaris* and *Oenanthe crocata* while others such as *Lythrum salicaria*, *Epilobium hirsutum*,

Impatiens capensis and *Stachys palustris* are rather more occasional. Where clearings occur *Mentha aquatica*, *Myosotis scorpioides* and *Persicaria hydropiper* are among those species flourishing together with those mentioned above. Among the more sparse occurrences are *Carex remota*, *Angelica sylvestris*, *Iris pseudacorus* and *Scrophularia auriculata*.

Crassula helmsii is locally frequent, with occasional patches of *Lemna minor* and *L. minuta* mixed with it. Blanket weed and *Elodea* are often abundant at the margins and in the open water. No other submerged or floating species were noted at the margins but *Ceratophyllum demersum* and three *Potamogeton* were recorded from the boat survey.

Swan Island *Salix cinerea* is dominant at the water's edge with bare ground beneath. There are occasional-frequent *Lycopus europaeus*, *Lysimachia vulgaris* and *Lythrum salicaria*. *Hydrocotyle vulgaris* is the most frequent emergent with local occurrences of *Eleocharis palustris* and *Crassula*. *Elodea nuttallii* is again abundant beneath the water and a small amount of *Ceratophyllum* was noted in the margins.

Snipe Island is dominated by *Persicaria hydropiper* with most other species only occasional, including *P. maculosa*, *Stachys palustris*, *Conyza canadensis*, *Bidens cernua* and *B. tripartita*. *Myosotis scorpioides* is rare here and *Rorippa amphibia* also occurred. *Crassula* was abundant along the margins but no submerged species were found around the island except *Elodea nuttallii*.

Long Island

The island supports a good variety of species broadly similar to those found at the margins of Colebrook Lakes North and South Lake. Stands of *Sparganium* are again frequent but there are also occurrences of *Typha latifolia* and *Phalaris arundinacea*. Several scrapes on the island support mats of *Eleocharis acicularis*, *E. palustris* and *Crassula*. There are several good populations of *Elatine hexandra*. Among the most frequent herbs are *Hydrocotyle vulgaris* – often abundant beneath the canopy of taller species – *Myosotis scorpioides*, *Scutellaria galericulata*, *Persicaria hydropiper* and *Mentha aquatica*. A small amount of *Apium nodiflorum* was noted on the north side of the island. Taller riparian species are similar to those around the margins of

North Lake, such as *Lycopus europaeus*, *Lythrum salicaria* and *Lysimachia vulgaris* but with the addition of *Chamerion angustifolium*. Willows are fairly frequent around the edges so that a small part of the island was not accessible and the channel through the middle was not surveyed due to time constraints.

Grove Lake

With the exception of the south side the margins of Grove Lake are largely open grassland with occasional clumps of Alder and Willow over-reaching the bankside; dense stands of Bracken and Bramble reach the water's edge to the north-east and there is an area of Birch scrub in the far north-east. Stands of *Sparganium erectum* are frequent and often dominate the northern and western margins, with *Juncus effuses* broadly constant and occasional stands of *Typha latifolia*. Associated species include *Stachys palustris*, *Solanum dulcamara*, *Lycopus europaeus*, *Mentha aquatica* and *Myosotis scorpioides*, but *Angelica sylvestris* and *Eupatorium cannabinum* occur less frequently. *Lotus pedunculatus* is less prominent here than around Colebrook Lake North; there are occasional stands of *Epilobium hirsutum* and good numbers of both *Bidens cernua* and *B. tripartita* along the east side.

There are good populations of *Eleocharis* generally on the northern and eastern edges of Grove Lake, notably where there are scrapes and beeches. *Crassula helmsii* has also colonised these scrapes and is particularly abundant along the eastern side of the lake. *Elatine hexandra* is also frequent in the shallow waters along these margins of the lake, particularly where *Sparganium* is absent. A large scrape by the bird-hide supports a good variety of aquatic species, notably *Lythrum portula*, *Ranunculus hederaceus*, *Eleocharis acicularis*, *Alisma plantago-aquatica* and a good stand of *Phalaris arundinacea* nearby. The fine-leaved pondweeds *Potamogeton berchtoldii* and *P. obtusifolius* are frequent-occasional at the margins of the lake and blanket weed is locally frequent. Rare occurrences include *Ranunculus flammula*, *R. sceleratus* and possibly *Glyceria declinata*.

The open water and lake margins are dominated by *Elodea nuttallii* both vertically and horizontally; it is noticeably more abundant than in the Colebrook Lakes. *Ceratophyllum demersum* was recorded from one grapnel throw.

The south side of Grove Lake is quite wooded with frequent thickets of Hawthorn, Birch, Willows and Bramble reaching the water's edge and restricting available light for aquatic species so that this side is less species rich. Where clearings occur *Epilobium hirsutum*, *Oenanthe crocata*, *Lycopus europaeus* are frequent with occasional *Deschampsia cespitosa*, *Impatiens capensis*, *Typha latifolia* and *Lythrum salicaria*. *Galium palustre* occurred on this side of the Lake amongst the scrub.

Around Grove Island the margins at the water line are dominated by *Crassula helmsii* with *Eleocharis acicularis*, *E. palustris*, *Mentha aquatica*, *Elatine hexandra* and *Myosotis scorpioides* also present. Locally frequent in the shallow water are *Elodea nuttallii* and *Callitriche stagnalis* with *Potamogeton berchtoldii* rare. Several Chenopodiaceae are present above the water line of which *Persicaria hydropiper* is the most prominent.

Discussion

The previous survey (Hall 2002) had recorded a number of notable species and so an important aspect of this survey was to ascertain whether these were still present and whether there had been changes in distribution or abundance. Chris Hall has discussed the identification, distribution and rarity of some of these species in detail and so it is only intended to refer to their ecology here as far as it is relevant to this discussion.

The four fine-leaved *Potamogeton* found in 2002 were refound though, as in 2001, material was too poor to be certain of *P. trichoides*. All occurred in Colebrook Lake North with *P. pusillus*, which is the commonest pondweed of disused gravel pits, the most frequent. *P. obtusifolius* can be abundant in shallow water up to 1.5 metres but was only found at three locations in Colebrook Lake North during this survey which suggests it is now less plentiful than in 2002. *P. berchtoldii* and *P. obtusifolius* were recorded around Goose Island and in Grove Lake; both are locally frequent in east Berkshire (Crawley, 2005). *P. trichoides* is a local speciality in Berkshire. At Moor Green Lakes it is thought to have been found during this survey in Colebrook Lake North at one location but not confirmed; for this stipules need to be examined but material was in a poor condition.

Ceratophyllum demersum (Rigid Hornwort) had been recorded only at Colebrook Lake South in 2002 but in 2006 it was found in the north lake near the hide and at five sample points in open water, at Long Island, and at four sample points in open water of the south lake. It would appear, therefore, that this species has increased in recent years. It is suggested in the new Atlas of the British Isles (Preston et al 2002) that this species may be rather more common than was previously thought due to better recording of aquatic plants. In Berkshire it is not common and is scattered through the county.

Myriophyllum spicatum (Spiked Water Milfoil) on the other hand, which had been recorded as rare at Goose Island, was not refound during this survey and nor was *Callitriche hamulata*, previously recorded in North Lake.

Charophytes (Stoneworts) are strictly speaking an advanced group of green algae. They frequently inhabit abandoned gravel pits, benefiting from a flush of minerals, but tend to be replaced by vascular plants as mineral levels decline pushing the stoneworts out to more open habitat (Stewart 2001). A stonewort was recorded in open water at two sample points in the vicinity of Grove Island and one location in Colebrook Lake North. It is thought by the surveyor to be *Chara globularis* but identification requires specialist confirmation and material found at Moor Green Lakes was too poor to send to Nick Stewart (BSBI Charophyte referee) for determination.

With regard to the more interesting emergent species there are still good populations of *Elatine hexandra*, *Eleocharis acicularis*, and *Lythrum portula* with distributions broadly similar to those mapped in 2002.

Elatine hexandra (Waterwort) - this small plant, which is said by Preston (1997) to have a tendency to vary in number from year to year, appears to be doing well at Moor Green Lakes. Good populations were found; it was frequently rooted in the gravel in shallow water and occasionally in exposed, seasonally inundated mud at the water's edge, often in association with *Eleocharis acicularis*.

Good populations of *Eleocharis acicularis* were found, often forming extensive mats. It usually occurred exposed at the water margin where it was likely to be seasonally flooded at locations where there was bare ground and lack of taller competitive species. *Crassula* was frequently present and this may have an impact in time. Again this is a species that can vary in abundance from year to year (Preston 1997). *Eleocharis palustris* was occasionally seen at the margin of stands of the much taller *Sparganium erectum* and in such situations may be outcompeted. However, it also occurred as stands were it was the locally dominant emergent.

Pilularia globulifera (Pillwort) was well recorded and mapped at a total of five locations on all three lakes by Hall (2002). In spite of careful searching this could not be found. Reports suggest that it has not been seen for a couple of years (personal communications). It is described in the literature as being an opportunist and rapid coloniser of exposed, nearly level muddy flats substrates. It usually thrives in habitats which are permanently damp in summer and are periodically flooded but are largely competition free. Growth apparently varies widely from year to year and it is suggested by Page (1982) that although colonies die back during years of drought, sporocarps may persist and remain dormant for many years. Its apparent absence during this survey may be due to several years of low rainfall and subsequent drop in the water level or due to competition. If the former, then there is every hope that it will re-appear.

Lythrum portula (Water purslane) was occasionally found as scattered populations at the water's edge but as previously the best sites were by both hides, particularly abundant in the scrape on Grove Lake.

Ranunculus hederaceus (Ivy-leaved Crowfoot) appears to have increased on Grove Lake since 2002. It is abundant near the hide and was also found at Grove Island. whilst emergent species such as *Mentha aquatica*, *Myosotis scorpioides* and *Hydrocotyle vulgaris* were present in good numbers some others, notably *Alisma plantago-aquatica*, *Ranunculus sceleratus* and *Iris pseudacorus* currently occur rarely at Moor Green Lakes.

Among the riparian species both *Bidens cernua* and *B. tripartita* have quite good populations scattered around the lakes and islands. *Scutellaria galericulata*, *Stachys palustris* and *Lycopus europaeus* are also generally frequent among the vegetation but it is the more ruderal herbs which are most abundant and prominent. *Chamerion angustifolium* appears to be a recent addition to the site. This is abundant on Tern Island and was also recorded on Long Island and near the hide on Colebrook Lake North. It occurs just outside the reserve to the east and has presumably spread from there.

Several alien species occur at Moor Green Lakes of which *Crassula helmsii* and *Elodea nuttallii* are particularly invasive. *Crassula* is abundant at Colebrook Lake and comparison with 2002 survey suggests that it is increasing on Grove Lake. *Elodea nuttallii*, which is native of North America, is generally abundant in all three lakes but particularly so in Grove Lake where it often forms a dense canopy in the open water. *Impatiens capensis* (Orange Balsam) appears to have increased slightly in occurrence but the more invasive *I. glandulifera* (Indian Balsam) which is abundant on the River Blackwater has not yet appeared within the reserve.

A number of species recorded as very local on Colebrook Lake South in 2002 were not found in 2006. A constraint on the survey was the fact that the margin of South Lake was very hard to access due to dense thickets except at the east and west ends. This may have resulted in these species 2002 being missed; these include *Filipendula ulmaria*, *Scirpus sylvaticus*, *Equisetum palustre*, *Cardamine pratensis* and *Lychnis flos-cuculi*. It is also possible, however, that some of these have been lost due to their intolerance of taller species. Similar difficulties in access through scrub occurred on the south side of Grove Lake but it was possible to access several clearings here by boat on the 18th August so that the survey here is thought to be representative.

Aquatic communities may change from year to year, even in a relatively stable system such as Moor Green Lakes. Several factors may be going on – low rainfall over the last two years resulting in a lower water level, change in nutrient levels, strong competition from species such as *Sparganium* which has probably colonised more of the water margin to the detriment of those less competitive species which exploit the

boundary between the mire and water. Where disturbance has occurred such as at scrapes, this has restricted the growth of potentially dominant vegetation. Species diversity is low on the southern sides of the lakes and this could be improved by creating more openings in the scrub along the margins, without compromising the benefits of this habitat for birds.

With a total of thirteen submerged or floating species recorded, twenty nine emergent and thirty three riparian species the reserve boasts a significant aquatic community.

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APPENDIX 1

Species lists for individual lakes and islands

Colebrook Lake North submerged and floating

<i>Callitriche stagnalis</i>	Common Water-starwort	rare
<i>Ceratophyllum demersum</i>	Rigid Hornwort	occasional
<i>Chara</i> sp.	Stonewort	rare
<i>Elodea nuttallii</i>	Nuttall's Waterweed	dominant
<i>Lemna minor</i>	Common Duckweed	locally frequent
<i>Potamogeton berchtoldii</i>	Small Pondweed	rare
<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed	rare
<i>Potamogeton pusillus</i>	Lesser Pondweed	occasional/locally frequent
<i>Potamogeton trichoides</i>	Hairlike Pondweed	rare
<i>Ranunculus</i> sp.	Water-crowfoot	rare
<i>Algae</i>	Blanket Weed	abundant

emergent

<i>Agrostis stolonifera</i>	Creeping Bent	occasional
<i>Crassula helmsii</i>	New Zealand Pygmyweed	frequent/locally abundant
<i>Elatine hexandra</i>	Waterwort	frequent
<i>Eleocharis acicularis</i>	Needle Spike-rush	locally abundant
<i>Eleocharis palustris</i>	Common Spike-rush	locally frequent
<i>Equisetum fluviatile</i>	Water Horsetail	rare
<i>Glyceria fluitans</i>	Floating Sweet-grass	occasional
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	frequent
<i>Juncus effusus</i>	Soft Rush	dominant
<i>Lythrum portula</i>	Water Purslane	locally frequent
<i>Mentha aquatica</i>	Water Mint	frequent
<i>Myosotis laxa</i>	Tufted Forget-me-not	rare
<i>Myosotis scorpioides</i>	Water Forget-me-not	frequent
<i>Oenanthe crocata</i>	Hemlock Water Dropwort	frequent
<i>Persicaria hydropiper</i>	Water Pepper	rare
<i>Phalaris arundinacea</i>	Reed Canary-grass	occasional
<i>Phragmites australis</i>	Common Reed	rare
<i>Ranunculus flammula</i>	Lesser Spearwort	rare
<i>Sparganium erectum</i>	Branched Bur-reed	dominant
<i>Typha latifolia</i>	Bulrush (Common Reedmace)	occasional

Riparian

<i>Agrostis canina</i>	Velvet Bent	rare
<i>Angelica sylvestris</i>	Wild Angelica	occasional
<i>Bidens cernua</i>	Nodding Bur-marigold	rare
<i>Bidens tripartita</i>	Trifid Bur-marigold	occasional
<i>Carex ovalis</i>	Oval Sedge	rare
<i>Chamerion angustifolium</i>	Rosebay Willowherb	rare
<i>Chenopodium ficifolium</i>	Fig-leaved Goosefoot	rare
<i>Cirsium palustre</i>	Marsh Thistle	locally frequent
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	occasional
<i>Epilobium hirsutum</i>	Great Willowherb	locally frequent
<i>Epilobium palustre</i>	Marsh Willowherb	rare
<i>Epilobium parviflorum</i>	Hoary Willowherb	rare
<i>Eupatorium cannabinum</i>	Hemp Agrimony	occasional
<i>Filipendula ulmaria</i>	Meadowseet	rare

<i>Impatiens capensis</i>	Orange Balsam	rare
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	locally abundant
<i>Juncus articulatus</i>	Jointed Rush	rare
<i>Lotus pedunculatus</i>	Greater Bird'sfoot-trefoil	locally abundant
<i>Lycopus europaeus</i>	Gipsywort	occasional
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	locally abundant
<i>Lythrum salicaria</i>	Purple Loosestrife	occasional
<i>Persicaria maculosa</i>	Redshank	rare
<i>Pulicaria dysenterica</i>	Common Fleabane	locally abundant
<i>Scutellaria galericulata</i>	Skullcap	occasional
<i>Stachys palustris</i>	Marsh Woundwort	rare

Goose Island

submerged and floating

<i>Callitriche sp.</i>	Water-starwort	rare
<i>Elodea nuttallii</i>	Nuttall's Waterweed	abundant
<i>Potamogeton berchtoldii</i>	Small Pondweed	locally frequent
<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed	rare
Algae	Blanket Weed	frequent

emergent

<i>Agrostis stolonifera</i>	Creeping Bent	frequent
<i>Alisma plantago-aquatica</i>	Water-plantain	rare
<i>Crassula helmsii</i>	New Zealand Pygmyweed	abundant/dominant
<i>Eleocharis acicularis</i>	Needle Spike-rush	occasional
<i>Eleocharis palustris</i>	Common Spike-rush	occasional
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	frequent
<i>Iris pseudacorus</i>	Yellow Iris	rare
<i>Juncus effusus</i>	Soft Rush	locally abundant
<i>Mentha aquatica</i>	Water Mint	frequent
<i>Myosotis scorpioides</i>	Water Forget-me-not	frequent
<i>Persicaria hydropiper</i>	Water Pepper	occasional
<i>Sparganium erectum</i>	Branched Bur-reed	occasional

Riparian

<i>Agrostis canina</i>	Velvet Bent	rare
<i>Bidens cernua</i>	Nodding Bur-marigold	occasional
<i>Lotus pedunculatus</i>	Greater Bird'sfoot-trefoil	rare
<i>Lycopus europaeus</i>	Gipsywort	occasional
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	occasional
<i>Lythrum salicaria</i>	Purple Loosestrife	occasional

Plover Island

submerged and floating

Algae	Blanket Weed	occasional
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emergent

<i>Crassula helmsii</i>	New Zealand Pygmyweed	abundant
<i>Elatine hexandra</i>	Waterwort	occasional
<i>Lythrum portula</i>	Water Purslane	rare
<i>Mentha aquatica</i>	Water Mint	frequent
<i>Myosotis scorpioides</i>	Water Forget-me-not	rare

<i>Persicaria hydropiper</i>	Water Pepper	dominant
<i>Ranunculus flammula</i>	Lesser Spearwort	rare
Riparian		
<i>Bidens tripartita</i>	Trifid Bur-marigold	occasional
<i>Chenopodium ficifolium</i>	Fig-leaved Goosefoot	occasional
<i>Conyza canadensis</i>	Canadian Fleabane	occasional
<i>Epilobium ciliatum</i>	American Willowherb	locally occasional
<i>Epilobium palustre</i>	Marsh Willowherb	rare
<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil	rare
<i>Lycopus europaeus</i>	Gipsywort	frequent
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	occasional
<i>Lythrum salicaria</i>	Purple Loosestrife	occasional
<i>Persicaria lapathifolium</i>	Pale Persicaria	rare
<i>Persicaria maculosa</i>	Redshank	occasional
<i>Pulicaria dysenterica</i>	Common Fleabane	rare
<i>Scutellaria galericulata</i>	Skullcap	occasional

Tern Island

submerged and floating

<i>Algae</i>	Blanket Weed	frequent
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emergent

<i>Crassula helmsii</i>	New Zealand Pygmyweed	frequent
<i>Mentha aquatica</i>	Water Mint	occasional
<i>Myosotis scorpioides</i>	Water Forget-me-not	occasional
<i>Persicaria hydropiper</i>	Water Pepper	abundant

Riparian

<i>Bidens cernua</i>	Nodding Bur-marigold	rare
<i>Bidens tripartita</i>	Trifid Bur-marigold	frequent
<i>Chamerion angustifolium</i>	Rosebay Willowherb	abundant
<i>Chenopodium ficifolium</i>	Fig-leaved Goosefoot	occasional
<i>Epilobium palustre</i>	Marsh Willowherb	occasional
<i>Lycopus europaeus</i>	Gipsywort	frequent
<i>Lythrum salicaria</i>	Purple Loosestrife	occasional
<i>Persicaria lapathifolium</i>	Pale Persicaria	occasional
<i>Persicaria maculosa</i>	Redshank	occasional

Colebrook Lake South

submerged and floating

<i>Ceratophyllum demersum</i>	Rigid Hornwort	rare
<i>Elodea nuttallii</i>	Nuttall's Waterweed	frequent
<i>Lemna minor</i>	Common Duckweed	locally abundant
<i>Lemna minuta</i>	Least duckweed	rare
<i>Filamentous Algae</i>	Blanket Weed	locally abundant

emergent

<i>Agrostis stolonifera</i>	Creeping Bent	frequent
<i>Crassula helmsii</i>	New Zealand Pygmyweed	frequent
<i>Elatine hexandra</i>	Waterwort	rare
<i>Eleocharis palustris</i>	Common Spike-rush	locally frequent
<i>Glyceria fluitans</i>	Floating Sweet-grass	rare

<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	rare
<i>Iris pseudacorus</i>	Yellow Iris	rare
<i>Juncus effusus</i>	Soft Rush	locally abundant
<i>Mentha aquatica</i>	Water Mint	frequent
<i>Myosotis scorpioides</i>	Water Forget-me-not	frequent
<i>Myosoton aquaticum</i>	Water Chickweed	rare
<i>Oenanthe crocata</i>	Hemlock Water Dropwort	frequent
<i>Persicaria hydropiper</i>	Water Pepper	occasional
<i>Phalaris arundinacea</i>	Reed Canary-grass	occasional
<i>Phragmites australis</i>	Common Reed	locally abundant
<i>Sparganium erectum</i>	Branched Bur-reed	frequent/locally dominant
<i>Typha latifolia</i>	Bulrush (Common Reedmace)	occasional
Riparian		
<i>Agrostis canina</i>	Velvet Bent	rare
<i>Angelica sylvestris</i>	Wild Angelica	occasional
<i>Carex ovalis</i>	Oval Sedge	rare
<i>Carex remota</i>	Remote Sedge	rare
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	occasional/locally frequent
<i>Epilobium hirsutum</i>	Great Willowherb	occasional
<i>Impatiens capensis</i>	Orange Balsam	occasional
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	occasional
<i>Lotus pedunculatus</i>	Greater Bird'sfoot-trefoil	rare
<i>Lycopus europaeus</i>	Gipsywort	frequent/locally abundant
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	occasional/locally frequent
<i>Lythrum salicaria</i>	Purple Loosestrife	occasional
<i>Persicaria maculosa</i>	Redshank	rare
<i>Scrophularia auriculata</i>	Water Figwort	rare
<i>Solanum dulcamara</i>	Bittersweet	rare
<i>Stachys palustris</i>	Marsh Woundwort	occasional

Long Island

submerged and floating

<i>Callitriche stagnalis</i>	Common Water-starwort	rare
<i>Ceratophyllum demersum</i>	Rigid Hornwort	rare
<i>Chara sp.</i>	Stonewort	rare
<i>Elodea nuttallii</i>	Nuttall's Waterweed	abundant
<i>Lemna minor</i>	Common Duckweed	occasional
<i>Potamogeton pusillus</i>	Lesser Pondweed	occasional
<i>Filamentous Algae</i>	Blanket weed	locally abundant

emergent

<i>Agrostis stolonifera</i>	Creeping Bent	occasional
<i>Apium nodiflorum</i>	Fool's Watercress	rare
<i>Crassula helmsii</i>	New Zealand Pygmyweed	frequent/locally dominant
<i>Elatine hexandra</i>	Waterwort	occasional/locally frequent
<i>Eleocharis acicularis</i>	Needle Spike-rush	occasional
<i>Eleocharis palustris</i>	Common Spike-rush	occasional
<i>Galium palustre</i>	Marsh Bedstraw	rare
<i>Glyceria fluitans</i>	Floating Sweet-grass	occasional
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort	abundant

<i>Juncus effusus</i>	Soft Rush	abundant
<i>Mentha aquatica</i>	Water Mint	occasional
<i>Myosotis scorpioides</i>	Water Forget-me-not	locally frequent
<i>Oenanthe crocata</i>	Hemlock Water Dropwort	occasional
<i>Persicaria hydropiper</i>	Water Pepper	locally frequent
<i>Phalaris arundinacea</i>	Reed Canary-grass	locally frequent
<i>Rorripa amphibia</i>	Great Yellow-cress	rare
<i>Sparganium erectum</i>	Branched Bur-reed	locally abundant
<i>Typha latifolia</i>	Bulrush (Common Reedmace)	occasional/locally dominant

Riparian

<i>Agrostis canina</i>	Velvet Bent	rare
<i>Angelica sylvestris</i>	Wild Angelica	rare
<i>Bidens cernua</i>	Nodding Bur-marigold	occasional
<i>Bidens tripartita</i>	Trifid Bur-marigold	rare
<i>Chamerion angustifolium</i>	Rosebay Willowherb	rare
<i>Cirsium palustre</i>	Marsh Thistle	occasional
<i>Conyza canadensis</i>	Canadian Fleabane	occasional
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	occasional
<i>Epilobium ciliatum</i>	American Willowherb	rare
<i>Epilobium hirsutum</i>	Great Willowherb	occasional
<i>Epilobium palustre</i>	Marsh Willowherb	occasional
<i>Eupatorium cannabinum</i>	Hemp Agrimony	rare
<i>Impatiens capensis</i>	Orange Balsam	occasional
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	frequent
<i>Juncus articulatus</i>	Jointed Rush	rare
<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil	locally frequent
<i>Lycopus europaeus</i>	Gipsywort	occasional/locally frequent
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	occasional/frequent
<i>Lythrum salicaria</i>	Purple Loosestrife	occasional
<i>Persicaria maculosa</i>	Redshank	rare
<i>Pulicaria dysenterica</i>	Common Fleabane	occasional
<i>Rorippa palustris</i>	Marsh Yellow-cress	rare
<i>Stachys palustris</i>	Marsh Woundwort	rare
Bryophyte		
<i>Callergonella cuspidata</i>	moss	rare

Grove Lake

submerged and floating

<i>Callitriche stagnalis</i>	Common Water-starwort	locally frequent
<i>Callitriche</i> sp.	Water-starwort	rare
<i>Elodea nuttallii</i>	Nuttall's Waterweed	dominant
<i>Lemna minor</i>	Common Duckweed	locally abundant
<i>Potamogeton berchtoldii</i>	Small Pondweed	frequent
<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed	occasional
Filamentous Algae	Blanket Weed	occasional

emergent

<i>Agrostis stolonifera</i>	Creeping Bent	locally frequent
<i>Alisma plantago-aquatica</i>	Water-plantain	rare
<i>Crassula helmsii</i>	New Zealand Pygmyweed	locally frequent
<i>Elatine hexandra</i>	Waterwort	frequent

<i>Eleocharis acicularis</i>	Needle Spike-rush	locally frequent
<i>Eleocharis palustris</i>	Common Spike-rush	locally frequent
<i>Galium palustre</i>	Marsh Bedstraw	rare
<i>Glyceria declinata</i>	Small Sweet-grass	rare
<i>Glyceria fluitans</i>	Floating Sweet-grass	occasional
<i>Juncus effusus</i>	Soft Rush	abundant/locally dominant
<i>Lythrum portula</i>	Water Purslane	occasional/locally abundant
<i>Mentha aquatica</i>	Water Mint	frequent
<i>Myosotis scorpioides</i>	Water Forget-me-not	frequent
<i>Oenanthe crocata</i>	Hemlock Water Dropwort	frequent
<i>Persicaria hydropiper</i>	Water Pepper	locally frequent
<i>Phalaris arundinacea</i>	Reed Canary-grass	locally frequent
<i>Phragmites australis</i>	Common Reed	locally frequent
<i>Ranunculus flammula</i>	Lesser Spearwort	rare
<i>Ranunculus hederaceus</i>	Ivy-leaved Crowfoot	occasional/locally abundant
<i>Ranunculus sceleratus</i>	Celery-leaved Buttercup	rare
<i>Sparganium erectum</i>	Branched Bur-reed	abundant/locally dominant
<i>Typha latifolia</i>	Bulrush (Common Reedmace)	occasional/locally frequent
Riparian		
<i>Agrostis canina</i>	Velvet Bent	occasional
<i>Angelica sylvestris</i>	Wild Angelica	occasional
<i>Bidens cernua</i>	Nodding Bur-marigold	locally frequent
<i>Bidens tripartita</i>	Trifid Bur-marigold	occasional
<i>Cirsium palustre</i>	Marsh Thistle	occasional
<i>Deschampsia cespitosa</i>	Tufted Hair-grass	occasional
<i>Epilobium hirsutum</i>	Great Willowherb	occasional
<i>Epilobium palustre</i>	Marsh Willowherb	occasional
<i>Eupatorium cannabinum</i>	Hemp Agrimony	rare
<i>Gnaphalium uliginosum</i>	Marsh Cudweed	rare
<i>Impatiens capensis</i>	Orange Balsam	occasional
<i>Juncus acutiflorus</i>	Sharp-flowered Rush	occasional
<i>Juncus articulatus</i>	Jointed Rush	rare
<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil	locally frequent
<i>Lycopus europaeus</i>	Gipsywort	occasional/locally frequent
<i>Lysimachia vulgaris</i>	Yellow Loosestrife	occasional
<i>Lythrum salicaria</i>	Purple Loosestrife	occasional
<i>Persicaria maculosa</i>	Redshank	occasional
<i>Pulicaria dysenterica</i>	Common Fleabane	occasional
<i>Rorippa palustris</i>	Marsh Yellow-cress	rare
<i>Scrophularia auriculata</i>	Water Figwort	rare
<i>Solanum dulcamara</i>	Bittersweet	occasional
<i>Stachys palustris</i>	Marsh Woundwort	frequent

**Grove Island
submerged and floating**

<i>Callitriche stagnalis</i>	Common Water-starwort	locally frequent
<i>Elodea nuttallii</i>	Nuttall's Waterweed	frequent
<i>Potamogeton berchtoldii</i>	Small Pondweed	rare
<i>Filamentous Algae</i>	Blanket Weed	occasional

emergent

<i>Crassula helmsii</i>	New Zealand Pygmyweed	dominant
<i>Elatine hexandra</i>	Waterwort	locally frequent
<i>Eleocharis acicularis</i>	Needle Spike-rush	locally frequent
<i>Eleocharis palustris</i>	Common Spike-rush	locally occasional
<i>Lythrum portula</i>	Water Purslane	rare
<i>Mentha aquatica</i>	Water Mint	occasional
<i>Myosotis scorpioides</i>	Water Forget-me-not	occasional
<i>Persicaria hydropiper</i>	Water Pepper	dominant
<i>Ranunculus hederaceus</i>	Ivy-leaved Crowfoot	rare
Riparian		
<i>Bidens cernua</i>	Nodding Bur-marigold	rare
<i>Bidens tripartita</i>	Trifid Bur-marigold	rare
<i>Chenopodium ficifolium</i>	Fig-leaved Goosefoot	occasional
<i>Cirsium palustre</i>	Marsh Thistle	occasional
<i>Epilobium hirsutum</i>	Great Willowherb	rare
<i>Epilobium palustre</i>	Marsh Willowherb	rare
<i>Lycopus europaeus</i>	Gipsywort	occasional
<i>Persicaria maculosa</i>	Redshank	rare

APPENDIX 2

Species list for Moor Green Lakes

Scientific name	Common name
submerged and floating	
<i>Callitriche stagnalis</i>	Common Water-starwort
<i>Callitriche sp.</i>	Water-starwort
<i>Ceratophyllum demersum</i>	Rigid Hornwort
<i>Chara sp.</i>	Stonewort
<i>Elodea nuttallii</i>	Nuttall's Waterweed
<i>Lemna minor</i>	Common Duckweed
<i>Lemna minuta</i>	Least duckweed
<i>Potamogeton berchtoldii</i>	Small Pondweed
<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed
<i>Potamogeton pusillus</i>	Lesser Pondweed
<i>Potamogeton trichoides</i>	Hairlike Pondweed
<i>Ranunculus peltatus</i>	Pond Water-crowfoot
<i>Ranunculus sp.</i>	Water-crowfoot
<i>Algae</i>	Blanket Weed
emergent	
<i>Agrostis stolonifera</i>	Creeping Bent
<i>Alisma plantago-aquatica</i>	Water-plantain
<i>Apium nodiflorum</i>	Fool's Watercress
<i>Crassula helmsii</i>	New Zealand Pygmyweed
<i>Elatine hexandra</i>	Waterwort
<i>Eleocharis acicularis</i>	Needle Spike-rush
<i>Eleocharis palustris</i>	Common Spike-rush
<i>Equisetum fluviatile</i>	Water Horsetail
<i>Galium palustre</i>	Marsh Bedstraw
<i>Glyceria declinata</i>	Small Sweet-grass
<i>Glyceria fluitans</i>	Floating Sweet-grass
<i>Hydrocotyle vulgaris</i>	Marsh Pennywort
<i>Iris pseudacorus</i>	Yellow Iris
<i>Juncus effusus</i>	Soft Rush
<i>Lythrum portula</i>	Water Purslane
<i>Mentha aquatica</i>	Water Mint
<i>Myosotis laxa</i>	Tufted Forget-me-not
<i>Myosotis scorpioides</i>	Water Forget-me-not
<i>Myosoton aquaticum</i>	Water Chickweed
<i>Oenanthe crocata</i>	Hemlock Water Dropwort
<i>Persicaria hydropiper</i>	Water Pepper
<i>Phalaris arundinacea</i>	Reed Canary-grass
<i>Phragmites australis</i>	Common Reed
<i>Ranunculus flammula</i>	Lesser Spearwort
<i>Ranunculus hederaceus</i>	Ivy-leaved Crowfoot
<i>Ranunculus sceleratus</i>	Celery-leaved Buttercup
<i>Rorripa amphibia</i>	Great Yellow-cress
<i>Sparganum erectum</i>	Branched Bur-reed
<i>Typha latifolia</i>	Bulrush (Common Reedmace)
Riparian	
<i>Agrostis canina</i>	Velvet Bent

<i>Angelica sylvestris</i>	Wild Angelica
<i>Bidens cernua</i>	Nodding Bur-marigold
<i>Bidens tripartita</i>	Trifid Bur-marigold
<i>Carex ovalis</i>	Oval Sedge
<i>Carex remota</i>	Remote Sedge
<i>Chamerion angustifolium</i>	Rosebay Willowherb
<i>Chenopodium ficifolium</i>	Fig-leaved Goosefoot
<i>Cirsium palustre</i>	Marsh Thistle
<i>Conyza canadensis</i>	Canadian Fleabane
<i>Deschampsia cespitosa</i>	Tufted Hair-grass
<i>Epilobium ciliatum</i>	American Willowherb
<i>Epilobium hirsutum</i>	Great Willowherb
<i>Epilobium palustre</i>	Marsh Willowherb
<i>Epilobium parviflorum</i>	Hoary Willowherb
<i>Eupatorium cannabinum</i>	Hemp Agrimony
<i>Filipendula ulmaria</i>	Meadowseet
<i>Gnaphalium uliginosum</i>	Marsh Cudweed
<i>Impatiens capensis</i>	Orange Balsam
<i>Juncus acutiflorus</i>	Sharp-flowered Rush
<i>Juncus articulatus</i>	Jointed Rush
<i>Lotus pedunculatus</i>	Greater Bird's-foot-trefoil
<i>Lycopus europaeus</i>	Gipsywort
<i>Lysimachia vulgaris</i>	Yellow Loosestrife
<i>Lythrum salicaria</i>	Purple Loosestrife
<i>Persicaria laphifolium</i>	Pale Persicaria
<i>Persicaria maculosa</i>	Redshank
<i>Pulicaria dysenterica</i>	Common Fleabane
<i>Rorippa palustris</i>	Marsh Yellow-cress
<i>Scrophularia auriculata</i>	Water Figwort
<i>Scutellaria galericulata</i>	Skullcap
<i>Solanum dulcamara</i>	Bittersweet
<i>Stachys palustris</i>	Marsh Woundwort
<i>Callergonella cuspidata</i>	moss