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# The flora of the pits in the Nature Preservation Area of Ócsa

By

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Abstract: The flora of 5 pits and a canal in the protected area of Ócsa were examined. A total of 140 cenological sample plots in these areas were studied and their floras compared. The previous rarest species are missing from the vegetation of pits but their re-establishment could be expected in the former place.

## INTRODUCTION

The pits examined by me are situated in the Nature Preservation Area of Ócsa, which were turned over to the custody of the NAEPNC in 1975. This area covers 3575 hectares and lies between the villages Ócsa, Dabas and Inárcs, in Pest country. Out of this 1412 hectares the areas known as "Öregturján", "Nagyturján", Rókás erdő strictly protected. The above-mentioned mine lakes are situated in the area of "Öregturján".

### Origin of the area and geological construction

The P.A. of Ócsa lies about 30 km SW from Budapest and east of the Danube valley. The surface (loess, wind-blown sand) formed in the Pleistocene was partly destroyed by the Danube in the pre-Holocene that widened its bed to the east. In this way a characteristic bog area developed in the formed depression. The regulation of waterways partly changed the nature of the bogs but fortunately could not completely change it. The subsoil water of the high, sandy and loess hills and the seepage coming from the shelf of the hills of the Danube-Tisza Mid-region ensured the continuance of the bogs. The late-Pleistocene gravel transporting and containing water added to the rich water supply that is near the surface (IVÁNYOSI 1979).

The remaining parts are "Öregturján" W of the village Ócsa, "Vörös-ér" and "Rokás-mocsár" SE of the village and "Nagyturján" N of village Sári.

At the lakes and periodically flooded areas are found the boggy meadow soils. The character of this soil is the stong hydromorphic effect. The soil profile may be wet, or saturated with water all over the year.

Airless anaerobiosis and the accompanying reductive effects influence in decisive way the determinant processes of soil formation.

A result of these effects is the formation and accumulation of turf. The upper layer consists almost completely of turf, it is alkaline, as shown by dam and snail shells in it. The turf is formed by reed (Phragmites communis) and sedge (Carex spp.). The turf layer is as high as 1 meter near the village Ócsa (SZABOLCS 1979).

The character of the area outlined above was formed by the specific interrelation of soil and water. The agricultural drains of the area were built several decades ago. The subsequently modified drains lead to the already completed section of the Danube-Tisza channel and to the Danube

Valley Main Chanel. These channels should be completed so that the water level could be regulated for the continuance of the valuable bogs (BUZETZKY & ZSUFFA 1979).

## General botanical description

According to the description of Á. BOROS (1936), who was the first notable scientist to study the area, the bogs of Ócsa are inaccessible. Only after the reclamation did it become possible to reach the whole area in 1928. At this time the vegetation of the bog made it possible to investigate the area. This condition rapidly declined because of interference. Now the original vegetation may be found only in small spots. Some of the rare and characteristic species have completely disappeared or are found only in small spots and in few number. The reeds of original lake surfaces, ancient currents can be found only in small areas. In these waters lives Hottonia palustris forming thickets of reed-grass. We could find two glacial relict species in these reeds, i.e. Urtica kioviensis and Sparganium minimum. Now the larger part of water-surfaces are lakes artificially constructed by turf-mining. Reed-grass and coastal vegetation of these lakes are poor in species. The object of this paper is to examine these zones.

Rush-beds (Caricetum elatae) succeed the reeds after accretion of the coast. These are the characteristic elements of the swampy area. These associations are composed of Carex elata, Carex riparia, Carex acutiformis and sometimes mixing with Glyceria maxima. The Carici-Menyanthemum is found in the fen windows in which we only rarely find Menyanthes trifoliata. The rush-beds gradually decrease in the dry areas and Carex species construct stands of thick, closed-formation associations. The characteritic species in these are, e.g.: Symphytum officinale, Valeriana officinale, Galium palustre.

Some typical associations of the boggy meadows could be recognized. E.g.

a) The most characteristic association is the Schoenetum nigricantis which to a large measure has become the victim of turf-mining. The organic matter accumulation is highest in this area. In this association may be found Cladium mariscus.

b) The dominant association in the wet area is Juncetum subnodolosi. In these places some times large numbers of Eriophorum latifolium occur.

c) On the vast meadow the Molinietum coeruleae association is the most frequent. In some places bushes of Salix cinerea add variety to the meadows. The spreading of Salix is hindered by frequent lumbering. These areas are rich in species. Koeleria jávorkeae is a characteristic endemic species of the area. Glacial relicts are e.g.: Adenophora liliifolia, Orchis incarnata, Orchis laxiflora, Anacamptis pyramidalis, Dianthus superbus, Iris sibirica. Also characteristic are Gentiana pneumonanthe, Sanquvisorba officinalis, Lychnis flos-cuculi, Veratrum album.

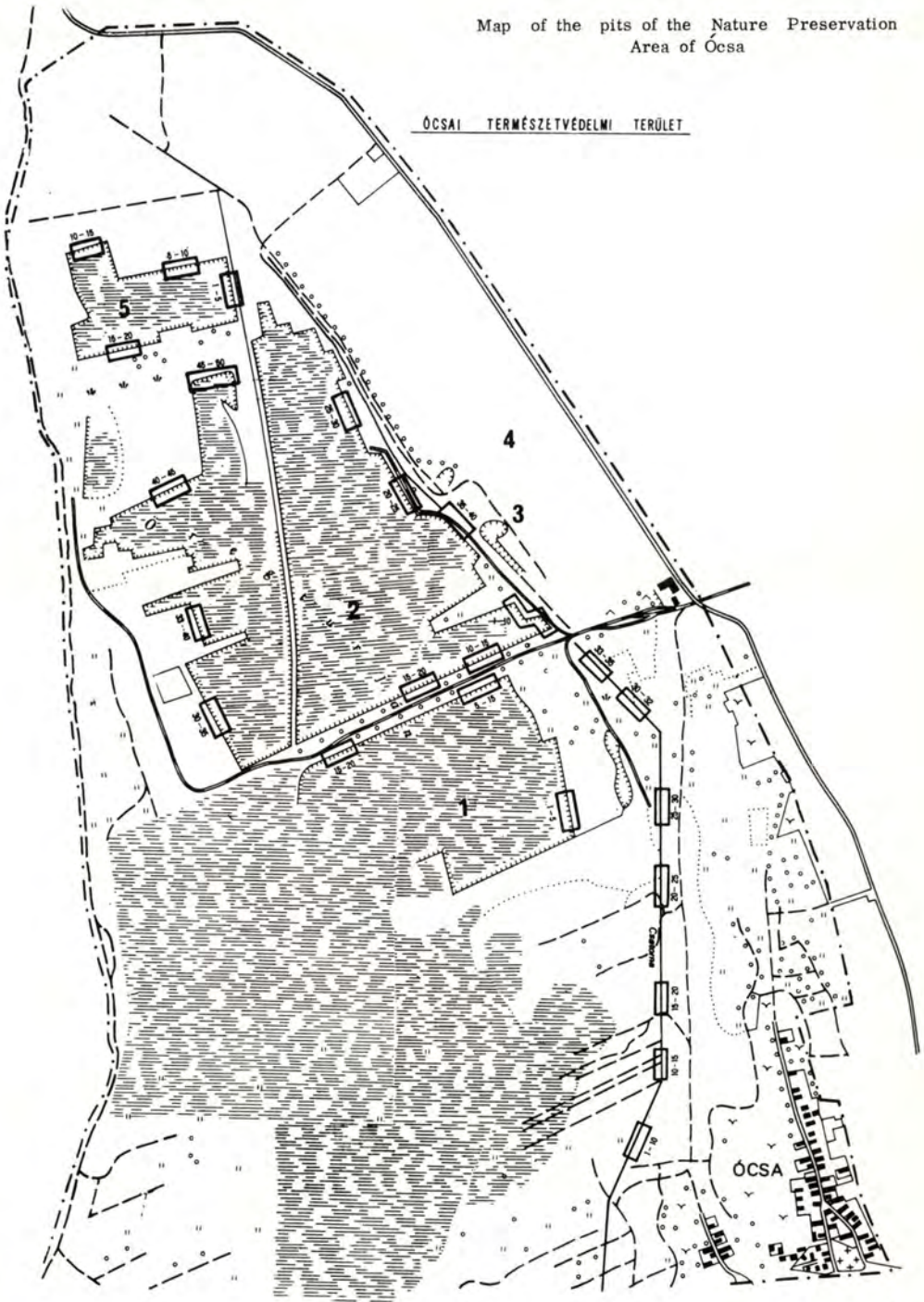
d) In some small areas the appearance of Festuca pseudovina and Plantago maxima mark increasing salinity, which is a consequence of the extensive drainage and the drying of the soil.

The forests are the most complex associations of the area. Fraxino pannonicae - alnetum is the most characteristic association. The trunks have proproots (Alnus glutinose) and Thelypteris palustris flower on them. In some places in large numbers occur Hottonia palustris. Of all remaining isolated forests of Ócsa this alder forest is the most endangered one, it is almost completely dried up. Probably the deepening of a near by gravel pit caused the drop of subsoil water-table.

In higher places gallery forest (Fraxino pannonicae - Ulmetum) occurs. The indigenous species were mainly Quercus, Ulmus, Fraxinus but now as a result of planting there are Populus and Robinia as well (A level). The shrub stratum is rich in species (B level): Sambucus nigra, Frangula alnus, Viburnum opulus. The characteristic species in the herb layer are e.g. Convallaria majalis, Polygonatum latifolium, Orchis militaris. The montane species indicate relationship with mountains of medium altitude.

The mentioned vegetation types that are gradually disappearing were once integral part of the landscape of the Great Hungarian Plain. The original vegetation can now be studied in small patches of the protected area. Survival of these spots and the maintanance of steady conditions are very difficult to ensure because of effects the surrounding agricultural co-operatives. The inconsiderate reclamations, the use of artifical fertilizers and plant protectives of a countless quantity have frequently unfavourable influences over the natural associations living in only small patches, since those are easily affected because of their limited size and their constancy may easy be overbalanced.

Map of the pits of the Nature Preservation Area of Ócsa



## MATERIAL AND METHOD

The objective of the study originated after a pilot survey of the area in 1980. The actual cenological investigations we made from March 1981 to August 1982. We have taken 140 samples from 5 mine lakes and a canal in the "Öregturján" (this is part of the protected area [Map]). These are: Canal 40 samples, lake 1. 20 samples, lake 2. 50 samples, lake 3. 5 samples, lake 4. 5 samples, lake 5. 20 samples.

We took samples throughout the vegetation period. The sample plot first selected were revisited every month and the new species were recorded.

We used 3 x 3 m sample plots suitable for the requirements. In the case of the canal the plot included the 1-1.5 m zone of the coast and the drift. In the case of the lakes the 1-1.5 m zone of coast and the water surface situated next to the sample plot were induded.

We assigned the A-D (abundance, dominance) values with scores of + to 5 according to the scale of BRAUN-BLANQUET (1951). After having tabulated the data, we counted the F (fidelity) values of the species (se Tables 1 to 5). Then we placed the distribution of the A-D values as a function of the number of sample plots. On the basis of the counted values we entered the several plant associations according to SOÓ's system (1964-1973) into the appropriate cenological category. The turf-pit has been carried out in the area since the beginning of this century. This was not notable up to the fifties because it was seasonable and carried out by hand. In the fifties began the large-scale production. These lakes originated as a result of the above-metioned activity. The oldest mine lakes are indicated in the map by numbers 1.2 and 3 (Map) and their ages vary between 25 and 30 years. The turf-pit was finished at the beginning of the seventies in case of lakes 3, 4 and 5, so they are about 7-10 years old. The differences in age are observable in the external appearance of the lakes (high, steep collapsed shore) and in the physiognomy of the vegetation. We give these differences at the detailed description of the lakes.

We could examine only the qualitative characters of the water because of lack of facilities. Alkali ions were found in large quantities ($Na^+$, $K^+$) and considerable was the concentration of $Ca^{2+}$, $Mg^{2+}$ and $Al^{3+}$ ions. The next most concentrated anions in the water were $PO_4^{3-}$, $CO_3^{2-}$, $HCO_3^-$, $SO_4^{2-}$ and $Cl^-$. The $NO_3^-$ anion, not mentioned above, appeared in large quantities. This high nitrate level is characteristic for all the surroundings (at times it appears in sunken wells in the village Ócsa), probably the result of extensive fertilizing of cultivated land.

## DESCRIPTION AND CENOLOGICAL CHARACTERIZATION OF THE AREAS

### Canal

At the edge of the studied area streches the one and only canal containing water even now. The other canals and drainage ditches have become filled up in the course of time. This canal will slowly come to this condition as well. The far end of the canal at the village almost completely dried up in the summer between lakes 2 and 3. The breadth of the canal varies between 1 and 1.5 m and its depth is on the average 15-20 cm. The greatest depth is about 40-45 cm but such places are at the end of the village Ócsa near a bridge. The water current is negligible, it should be more property called ditch water. Its chemical reaction is neutral or possibly slightly alkaline (7-7.8 pH).

The bank increases steeply and above it on both banks there is a road on the dam we could find patches of weed association. Some characteristic species of the dam and the near by arable land could be found on the bank (Potentilla anserina, Lolium perenne, Melilotus albus, Tussilago farfara).

Thick inpenetrable reeds border almost the entire length of the canal, which are mixed with Callistegia sepium. Typha latifolia mingles with the reeds especially in places where the stand of Phragmites communis becomes thin. The reeds disappear here and there, so in those places Alisma plantago-aquatica forms little stands at the edge of the water surface, or in the water. These spots are variegated by single specimens of wonderful Butomus umbellatus. Sium erectum, Sium latifolium, Myosotis palustris and Polygonum lapathifolium comprise the low grass layer in the reeds.

Beside the reeds, on the higher ground dominate Carex elata, Eupatorium cannabinum, Cyperus fuscus, Juncus bufonius and Juncus inflexus.

The plant associations could be allocated to the following cenological units of the literature

(SOÓ, 1964-1973): Reeds: Phragmitetea-Phragmitetalia and Phragmition communis-typhosum latifoliae; Sedge: Magnocaricion elatae-Caricetum elatae.

The rather clearly formed stands of Juncus and Cyperus species are transitional towards the Cypero-Juncetum association.

In the water the floating reed-grass of Lemna minor and Hydrocharis morsus-ranae is characteristic. The two species make up mainly separate stands. Hydrocharis morsus-ranae blooms first of all in the open places, areas covered by few reeds.

We could place them into the following categories: a) Hydrocharietalia-Hydrocharition, b) Lemnetosum minoris and c) Hydrocharetosum. We consider Sium erectum and Sium latifolium as the covering mass of the rooted reed-grass.

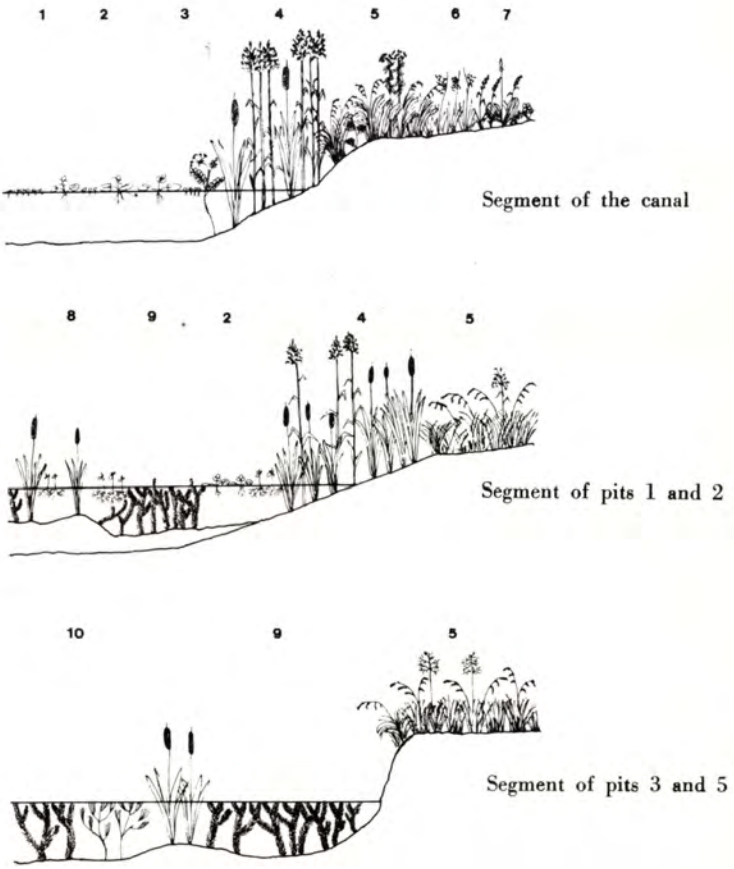



Fig.1.

1. Lemna minor, 2. Hydrocharis morsus-ranae, 3. Sium erectum, 4. Phragmition communis-typhosum latifoliae, 5. Caricetum elatae, 6. Cypero-Juncetum, 7. Lolio-Plantaginetum, 8. Utricularia vulgaris, 9. Ceratophyllum demersum, 10. Potamogeton pectinatus

Lakes 1 and 2.

These are the oldest lakes, in some places they include the original lakes and bogs. Both are of large size. Usually they have shallow water although the depth may reach 1-1.5 m. The average water depth is 40-50 cm. The mud cover is rather thick on the bottom of the lake. Organic matter has accumulated in large quantity, the eutrophication process is at an advanced stage. The pH of water is alkaline, 7.6-8.

There are few open water surfaces. The reed (Phragmites communis) and bulrush species (Typha latifolia, Typha angustifolia) form the coastal vegetation. First of all Typha latifolia is the species in the largest abundance and we could find many Typha angustifolia, too. In some places Typha laxmanni occurs. Large specimens of Rumex palustris are characteristic among the reeds.

Carex elata forms closed stand on higher parts of the beach. It associates with Typha latifolia from the water and Glyceria maxima from the meadow. Polygonum lapathifolium occurs in great number and Alisma plantago-aquatica in the coastal region, too.

The following cenological arrangement seems to be acceptable: Reeds: -Phragmition communis -typhetosum and Sedge: -Magnocaricion elatae-Caricetum elatae.

Here we could find the transition between Caricetosum acutiformis-ripariae and Cypero-Juncetum on high ground. In some parts of the high turfy places appear the characteristic species of Schoenetum nigricantis: Schoenus nigricans, Cladium mariscus.

The vegetation of the lakes surpasses that of the canal in abundance and species richness. Widespread bulrush fields and clumps alternate with open water surfaces.

Utricularia vulgaris is characteristic for the floating reed-grass that in some places forms mixed stand with Hydrocharis morsus-ranae and Utricularia minor. Here and there Utricularia minor form isolated spots. Lemna minor is a characteristic species of this floating reed-grass, too. The association is placed into the following category: a) Hydrocharietalia-Hydrocharition and b) Lemno-Utricularietum.

Myriophyllum verticillatum and Ceratophyllum demersum constitute the rooted reed-grass. Usually they appear together, but Ceratophyllum dominates.

It could be placed into the following category: a) Lemno-Utricularietum and b) Ceratophylletosum demersi.

Lakes 3, 4 and 5

These are the youngest lakes. They are poor in species. Their water surfaces are small, especially those of lakes 3 and 4. The water depth is shallow, it varies between 30 and 50 cm. Their organic matter and mud layers are thinner than in the case of lakes 1 and 2. Their chemical composition corresponds to those of the previous lakes. The vegetation is poor in biomass, too. Here we do not find the transitional reed zone between the beach and the water surface. The reason for it is that the beach drops too steeply because of its artificial origin. An exception is lake 4 which is really a shallow pit with reeds and some square metres of open water surface. The vegetation of the littoral zone can be placed into the Caricetum elatae category in the case of lakes 3 and 5 Phragmition communis-Phragmitetosum in the case of lake 4. The transition towards Schoenetum nigricantis could be found in the case of lake 5, too. The vegetation of the water surface is poor in species as well. Typha latifolia occurs only in few numbers. The few floating reed-grass consist of Lemna minor alone, Ceratophyllum demersum and Potamogeton pectinatum dominate in the rooted reed-grass. Stands of large mass of these species form the bottom vegetation of the lake. Their groups are separated from one another.

## COMPARISON OF THE STUDIED AREAS

It is clear from the detailed descriptions of the areas and the segment of the canal and the lakes that in the appearance of the vegetation there are not great differences. We observed the following characteristic succession in the sample plots: Schoenetum nigricantis, Cypero-Juncetum, Caricetum elatae, Phragmition communis, Lemno - Utricularietum, Ceratophylletosum demersi.

The differences between the lakes appear in the numerical aspects of the species and in the succession of the associations. In lakes 1 and 2 everywhere a wide belt of reeds follow the shoreline. Typha latifolia and Typha angustifolia are more frequent species along the lakes than in the canal. This latter species and Typha laxmannii do not occur in the vegetation of the canal.

Diversity is more noticable in the reed-grass vegetation than in the riparian vegetation. Utricularia, Ceratophyllum, Myriophyllum and Potamogeton species do not occur in the reed-grass of the canal. The reason for these differencies is probably the thick mud layer and the presence of rich nutritive material.

In lakes 3 and 5 the Phragmition communis association is completely absent in contrast with the lakes mentioned above. Furthermore, these lakes are considerably poorer in species than lakes 1 and 2, regarding their coastal and reed-grass vegetation, too. The steep shore and the sudden drop could cause this kind of appearance of the riparian vegetation. Utricularia species are absent, but I found Potamogeton pectinatus and Potamogeton perfoliatus. We can explain this by the dissimilar ages of the lakes. Lakes 3, 4 and 5 are the youngest, so they are only slightly filled up. The beaches show the characteristic features of artificial origin.

It has been found that the previos boggy association will step by step be re-established.

Unfortunately the rarest, most valuable species are absent from these associations. We think that the reintroduction of these species to areas of previous occurrence would solve the problem. So the vegetation completely changed and inpoverished by turf-pit will become similar to the one of the original associations.

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Table 1. Species and their cover values in the sample plots of the canal

| Species | F | Sample plots 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tree layer: | | | | | | | | | | | | | | | | | | | |
| 1. Populus nigra | 13 | | | + | | | | | + | | | | + | | | 1 | | | |
| 2. Populus alba | 12 | + | + | | | | | | | | | | | | | | | | + |
| 3. Salix alba | 20 | + | 1 | | | + | | | | + | + | | | + | + | | + | | + |
| Shrub layer: | | | | | | | | | | | | | | | | | | | |
| 4. Populus nigra | 20 | 2 | + | | | 1 | | | + | + | | + | + | | | + | | | 1 |
| 5. Populus alba | 4 | + | + | | | | | | | + | | | | | | | | | |
| 6. Salix alba | 10 | + | + | | | 1 | | | | 2 | + | | + | | | | | + | |
| 7. Salix cinerea | 13 | | | 1 | + | 1 | | + | | | + | | | | | | + | + | |
| 8. Salix viminalis | 11 | | | + | | + | | + | + | | | + | | + | | | | | |
| 9. Salix purpurea | 5 | | | | | | + | | | | | | | | + | | | + | |
| 10. Sambucus nigra | 16 | + | | + | | | + | | | | + | + | | | | | | | |
| Grass layer: | | | | | | | | | | | | | | | | | | | |
| 11. Phragmites communis | 40 | 5 | 5 | 5 | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | 5 | 5 | 5 | 5 |
| 12. Typha latifolia | 40 | 3 | 2 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| 13. Sium erectum | 40 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 14. Sium latifolium | 40 | 2 | 3 | 1 | 2 | 2 | 1 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 2 |
| 15. Myosotis palustris | 40 | 3 | 3 | 4 | 3 | 5 | 5 | 2 | 3 | 3 | 3 | 2 | 2 | 4 | 3 | 3 | 3 | 2 | 2 |
| 16. Equisetum palustre | 40 | 3 | 2 | 3 | 2 | 2 | 1 | 1 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 1 | 1 | + | 1 |
| 17. Equisetum arvense | 30 | 1 | + | + | + | + | 1 | + | + | + | 1 | 1 | 1 | 1 | + | + | + | + | 1 |
| 18. Dactylis glomerata | 25 | 2 | | + | 3 | | 1 | + | + | 2 | + | 2 | 2 | | | | 1 | 1 | 1 |
| 19. Cirsium canum | 17 | + | | + | + | | | + | + | + | + | | | | | | | | |
| 20. Angelica silvestris | 4 | | | | + | | | + | | | | | | | | | | | |
| 21. Centaurea pannonica | 22 | | + | + | + | + | | | + | + | + | + | + | + | + | + | + | | |
| 22. Symphitum officinale | 29 | 2 | 3 | 3 | 2 | 3 | 2 | | 1 | 1 | + | | | 1 | 1 | 1 | + | + | + |
| 23. Rumex acetosa | 6 | | | + | | | | | | | | | + | | | | | | |
| 24. Callistegia sepium | 40 | 2 | 2 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 4 |
| 25. Lythrum salicaria | 33 | 3 | 3 | 2 | + | 2 | 2 | 2 | 1 | 1 | + | + | | | 1 | 1 | 1 | 1 | 1 |
| 26. Carex elata | 40 | 4 | 4 | 3 | 4 | 3 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 4 | 4 | 5 | 5 | 5 |
| 27. Carex acutiformis | 40 | + | + | + | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | + | + | + | 1 | + | + | + |
| 28. Carex riparia | 13 | | | | + | + | + | + | | | | + | | | + | | + | | |
| 29. Carex serotina | 17 | + | + | | | | | | + | + | + | + | | + | | + | | | + |
| 30. Urtica dioica | 35 | 1 | 1 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 3 | | | 1 | 1 | 2 | 1 | 1 | + |
| 31. Lysimachia vulgaris | 17 | + | | + | + | | | + | + | + | | | | | | + | | + | |
| 32. Hypericum tetrapterum | 20 | | + | + | | + | + | | + | | + | + | + | + | | + | | | |
| 33. Scrophularia nodosa | 12 | | | | + | | + | + | | | | + | | | | | + | | |
| 34. Phleum arv. ssp.nod. | 29 | | + | + | 1 | + | + | 1 | + | + | + | + | | | | | | 1 | 1 |
| 35. Achillea asplenifol. | 40 | + | + | 1 | + | 1 | + | + | 1 | + | + | + | + | 1 | + | + | + | + | + |
| 36. Ranunculus repens | 40 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 1 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 1 | 1 |
| 37. Ranunculus sceleratus | 37 | 1 | 1 | + | 3 | 2 | 3 | 3 | 1 | 2 | 2 | + | + | + | + | | | 1 | + |
| 38. Ranunculus acris | 33 | + | + | | + | + | + | + | | 1 | + | + | + | + | 1 | | + | + | |
| 39. Mentha aquatica | 26 | + | + | 1 | + | | + | + | | 1 | 1 | | | | + | + | + | + | + |
| 40. Mentha longifolia | 14 | | | + | + | | | | + | | | | + | + | | | + | + | |
| 41. Iris pseudacorus | 9 | + | | | | | + | | + | + | | | | | | | | + | |
| 42. Veronica anagall.-aqu. | 8 | | | | + | | | + | | + | | | | | | | | + | |
| 43. Schoenoplectus mucron. | 23 | | | 2 | 1 | 1 | 1 | 1 | | 2 | | 2 | | 1 | 1 | 1 | | 1 | |
| 44. Cyperus fuscus | 40 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 |
| 45. Juncus bufonius | 40 | 2 | 3 | 3 | 3 | 3 | 2 | 1 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 |
| 46. Juncus inflexus | 40 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 |
| 47. Polygonum lapathifol. | 40 | 2 | 2 | 3 | 1 | 2 | 1 | 1 | 2 | 3 | 3 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| 48. Glechoma hederacea | 40 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 3 |
| 49. Alisma plantago-aquat. | 12 | + | | | | + | | | | | | | + | | | | | + | + |
| 50. Tussilago farfara | 32 | 2 | + | + | 1 | 2 | 2 | + | + | + | 1 | + | + | + | | | | + | |
| 51. Vicia cracca | 8 | | 1 | | 1 | + | | + | 1 | | | | | | | | + | | |

Continuation of Table 1.

| | Sample plots | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 1. | + | + | + | | | | | | 1 | 1 | | | | | + | | | + | | + | + | |
| 2. | | | | + | | | + | + | + | | | | + | + | | | | | | | | |
| 3. | | | | | | + | + | + | | | | | + | 1 | 1 | + | | | + | | + | |
| 4. | + | | + | + | | | | | 1 | + | | + | + | | | + | | + | | + | + | |
| 5. | | | | + | | | | | | | | | | | | | | | | | | |
| 6. | | | + | | + | | | | | | | | | | | | | + | | | | |
| 7. | | + | | | | | | + | | | 1 | | | | | | + | | | + | | + |
| 8. | + | | + | | | | | 1 | | | | | | | | | + | | | | + | |
| 9. | | | | | | | | | | + | | + | | | | | | | | | | |
| 10. | | | + | | | | + | | | | + | + | + | | | | | | | | | |
| 11. | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 5 | 3 | 3 | 4 | 4 | 2 | 5 | 5 | 5 | 3 | 5 | 5 | 5 | 5 | 5 |
| 12. | 1 | 1 | 3 | 1 | 1 | 2 | 1 | 1 | + | 1 | 1 | + | 2 | 2 | 1 | + | 1 | 1 | 1 | 1 | 1 | 1 |
| 13. | 5 | 5 | 5 | 5 | 5 | 5 | 2 | 5 | 5 | 5 | 3 | 4 | 3 | 5 | 5 | 5 | 2 | 2 | 5 | 5 | 5 | 5 |
| 14. | 2 | 3 | 3 | 1 | 1 | 1 | + | 1 | 2 | 2 | 1 | 2 | + | 2 | 2 | 2 | 2 | + | 2 | 3 | 3 | 2 |
| 15. | 4 | 4 | 5 | 3 | 3 | 2 | 2 | 4 | 3 | 5 | 5 | 5 | 3 | 4 | 4 | 3 | 4 | 4 | 2 | 2 | 2 | 3 |
| 16. | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | + | + | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 1 | 1 | 1 |
| 17. | 1 | + | 2 | + | + | + | + | | | | + | + | + | + | 1 | | | | | | | |
| 18. | 1 | 1 | + | | | | 1 | 1 | | | | + | + | + | + | + | + | | | | + | |
| 19. | | + | | | + | + | + | + | | + | + | | | | | + | + | | + | | | |
| 20. | | | | | | | | | + | | | | | + | | | | | | | | |
| 21. | | | + | | + | | | | | + | + | + | + | + | | + | + | | | | | |
| 22. | + | | + | + | | 2 | 2 | 3 | 1 | 1 | + | | | | | | + | 1 | 1 | 2 | 2 | 2 |
| 23. | | + | + | | | | | + | | + | | | | | | | | | | | | |
| 24. | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 1 | 2 | 3 | 3 | 4 |
| 25. | 1 | 1 | 2 | 2 | + | | | + | 1 | 1 | 3 | + | + | | | 3 | 3 | 3 | + | | | + |
| 26. | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 5 | 4 |
| 27. | + | + | + | 1 | + | + | 1 | 1 | 1 | + | + | + | 1 | + | 1 | 1 | + | + | + | + | + | + |
| 28. | | | | + | 1 | 1 | 1 | + | | | | | + | | + | + | + | + | + | | + | + |
| 29. | | + | | | + | | | + | | | | | | + | | | | + | + | | | |
| 30. | + | | | | | | + | | + | | | | | + | + | | | | | + | + | + |
| 31. | | | | 1 | 1 | 2 | 2 | 2 | + | + | + | + | + | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 |
| 32. | | + | | | | + | | | | + | | | | + | + | | + | + | + | | | + |
| 33. | + | | | | | | + | | + | + | + | + | | | | | + | | | + | + | + |
| 34. | | | | + | | | | | + | + | | | | + | | + | + | | | | + | |
| 35. | 1 | + | + | | + | + | + | 1 | 1 | | + | + | 1 | + | + | | | | + | 1 | + | 1 |
| 36. | + | + | + | + | 1 | + | + | + | + | 1 | 1 | + | 1 | + | + | + | + | + | + | + | + | + |
| 37. | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 1 | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 1 |
| 38. | + | | 2 | 2 | 1 | 3 | 3 | 2 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 2 | 3 | 1 | 2 | 1 | 2 | 1 |
| 39. | | + | + | + | + | + | 1 | + | | + | + | + | | + | + | + | + | + | + | + | + | + |
| 40. | + | | + | + | + | | | | + | | + | | + | + | + | + | + | | | | + | + |
| 41. | | | | + | + | | | | | | + | | | | | | | | | + | | |
| 42. | | + | | | | + | | | | | | | | | | | + | | + | | | |
| 43. | 2 | 2 | 2 | | | | 1 | 1 | 1 | 1 | | | 2 | 1 | 1 | | 1 | 1 | 1 | | | |
| 44. | 2 | 2 | 2 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 |
| 45. | 3 | 3 | 2 | 2 | 1 | 3 | 3 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 3 | 2 | 3 | 3 | 3 | 3 | 2 | 4 |
| 46. | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 47. | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 1 | 3 | 3 | 2 | 1 | 1 | 1 | 3 | 2 |
| 48. | 1 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 2 |
| 49. | + | | | | | 1 | | 1 | 1 | + | | + | | | | | 2 | | | | | |
| 50. | + | 1 | 1 | 1 | + | | | | + | + | 1 | + | + | + | 1 | 1 | 1 | + | + | + | | + |
| 51. | | | | 1 | | | | | | | | | | | + | | | | | | + | |

Continuation of Table 1.

| Species | F | Sample plots 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 52. Lathyrus pratensis | 13 | | 1 | | | | 1 | | | + | 1 | | | | + | 1 | + | + | |
| 53. Scutellaria galericul. | 5 | | + | | | | + | | | | + | | | | | | | | |
| 54. Galium palustre | 28 | | | + | 1 | 1 | 1 | + | | | 1 | + | + | + | + | + | 1 | 1 | |
| 55. Aiuga reptans | 40 | 1 | + | 1 | 1 | 1 | 1 | + | 1 | 1 | + | + | 1 | 1 | 1 | 1 | + | + | + |
| 56. Rubus caesius | 2 | | | | | | 2 | | | | | | | | | | | | |
| 57. Stachis palustris | 9 | | + | | + | + | | | + | | | | | | | + | | | |
| 58. Eupatorium cannabinum | 40 | 3 | 4 | 4 | 3 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 4 | 3 | 3 | 3 | 2 | 2 | 3 |
| 59. Sonchus arvensis | 21 | + | | | | + | + | + | | | + | + | + | + | + | + | | | |
| 60. Sonchus palustris | 12 | | | + | + | | + | | + | | | | | | | | | + | + |
| 61. Sonchus oleraceus | 15 | + | + | | | + | | | | + | | + | + | + | | | | | |
| 62. Melilotus albus | 3 | | | | | | | | + | | | | | | | | | + | |
| 63. Bryonia dioica | 4 | | | + | | | | | | | + | | | | | | | | |
| 64. Valeriana officinalis | 9 | | | | + | | | | | + | | | + | + | | | | | |
| 65. Epilobium hirsutum | 30 | + | + | | | + | 2 | + | | 1 | 1 | 1 | 1 | + | | + | + | | |
| 66. Epilobium parviflorum | 21 | + | | | + | + | | | 1 | | + | + | | | + | + | 1 | 1 | |
| 67. Epilobium tetragonum | 22 | | | + | | 1 | 1 | + | 2 | 1 | 1 | + | | | | + | 2 | + | + |
| 68. Festuca pratensis | 19 | + | | | 1 | | | | + | + | + | | + | | | | | 1 | 1 |
| 69. Leersia oryzoides | 11 | 1 | | | | + | + | | | | + | | | | | | | + | |
| 70. Poa palustris | 23 | + | + | + | + | 1 | | | + | + | | | | | + | | + | | |
| 71. Lolium perenne | 27 | 1 | 1 | + | + | | | | + | 1 | 1 | 1 | + | + | + | | + | 1 | + |
| 72. Potentilla anserina | 36 | 1 | 1 | 2 | 1 | + | + | + | + | + | 1 | 1 | + | 2 | 2 | 2 | 1 | + | 1 |
| Reed - grass vegetation: | | | | | | | | | | | | | | | | | | | |
| 73. Sium erectum | 40 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 74. Lemna minor | 40 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 3 | 3 | 2 | 4 | 4 |
| 75. Hydrocharis mors.-ra. | 10 | + | | | | | | | | | + | + | | | + | | | | + |
| 76. Butomus umbellatus | 2 | | | | | | | | | | | | | | | | | | |
| 77. Mentha aquatica | 8 | | + | + | | | + | | + | + | | | | | + | | | | |
| 78. Alisma plantago-aqu. | 5 | | | | | | | | | | | | | | | | | | |

Table 2. Species and their cover values in the sample plots of lake 1.

| Species | F | Sample plots 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Phragmites communis | 20 | 4 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 3 | 3 | 2 | 3 | 3 | 3 | 5 | 4 | 4 | 5 | 3 |
| Typha latifolia | 20 | 1 | 5 | 5 | 5 | 4 | 3 | 2 | 2 | 2 | 4 | 5 | 2 | 4 | 4 | 5 | 2 | 4 | 5 | 3 | 3 |
| Typha angustifolia | 20 | 1 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 3 | 1 |
| Typha laxmannii | 10 | | | | + | + | | | | 1 | + | + | + | | + | + | | | | + | + |
| Rumex palustris | 17 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 | + | + | | | | + | 1 | + |
| Callistegia sepium | 20 | 2 | 1 | 1 | + | 1 | 1 | 3 | 2 | 2 | 1 | 1 | + | + | + | + | 2 | 1 | 1 | 2 | + |
| Solanum dulcamara | 5 | + | + | | | | | | | | | + | | | + | | | | | | + |
| Carex elata | 20 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 4 | 5 | 5 | 5 | 4 | 3 |
| Carex acutiformis | 14 | + | + | + | | | 1 | 1 | + | + | + | + | | | | | + | + | 1 | 1 | 1 |
| Carex riparia | 11 | | | + | | + | + | + | | | + | + | | + | | + | | | + | + | + |
| Glyceria maxima | 15 | 1 | 1 | 1 | + | + | + | | | | + | 1 | 1 | 1 | + | | | + | + | + | 1 |
| Polygonum lapathifolium | 20 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 2 |
| Polygonum hidropiper | 20 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 1 |
| Eupatorium cannabinum | 12 | 2 | 2 | 2 | 3 | 1 | 1 | 1 | | | | 1 | 1 | 1 | | | | 2 | 1 | | |
| Urtica dioica | 17 | 2 | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 2 | | | |
| Lythrum salicaria | 9 | | | 1 | + | + | | | | + | + | + | | | | + | + | + | | | |
| Equisetum palustre | 20 | + | + | 1 | + | + | + | 1 | 1 | 1 | 1 | + | + | + | + | + | 1 | + | + | + | + |
| Schoenoplectus lacustris | 7 | | | | | | | | 1 | 1 | | | | | 1 | 1 | | | 1 | 1 | 1 |
| Schoenoplectus mucronatus | 20 | + | 2 | 2 | 2 | 1 | 1 | 2 | 2 | 2 | + | + | + | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 |
| Cyperus fuscus | 20 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 3 | 2 | 2 |
| Juncus bufonius | 20 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 1 | 1 | 1 | 2 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 |
| Juncus inflexus | 20 | 1 | 1 | 2 | 2 | 1 | 1 | 1 | + | + | 2 | 1 | 1 | 1 | 1 | + | + | + | 1 | 1 | 1 |

Continuation of Table 1.

| | Sample plots | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| 52. | | | | | | 1 | | | | | | | | + | | | 1 | | | 1 | | + |
| 53. | | | | | | | | | + | | | | | | | + | | | | | | |
| 54. | | | | + | + | + | + | 1 | | | | + | + | + | + | + | + | | + | + | + | + |
| 55. | + | + | 1 | + | 1 | 1 | 1 | + | + | + | + | 1 | + | 2 | 1 | 1 | 1 | + | + | + | 1 | 1 |
| 56. | | | | | | | | | | | | | 2 | | | | | | | | | |
| 57. | | | | | | | + | | | | | | + | + | | | | + | | | | |
| 58. | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 3 |
| 59. | + | | + | | | | | | | + | | + | + | + | + | + | | | + | | + | |
| 60. | | | + | | | | | | | | + | | | | + | | | + | + | | | + |
| 61. | + | | | | | + | + | + | + | | | | | | | + | | | + | | + | |
| 62. | | | | | | | | | | | + | | | | | | | | | | | |
| 63. | | | | | + | | | | | | | | | | | + | | | | | | |
| 64. | + | | | + | | | | | | | | + | | | | | | | + | | + | |
| 65. | + | + | + | + | + | + | + | 1 | 1 | + | 1 | | | | | 1 | 1 | + | + | + | + | + |
| 66. | | + | + | | | + | | + | | | + | + | 1 | + | | | 1 | + | + | | | |
| 67. | | 1 | 1 | 1 | | | + | 1 | + | | | | | 1 | + | + | + | | | | + | |
| 68. | | | 1 | | | 1 | 1 | 1 | + | + | | | | | | | + | + | + | + | | + |
| 69. | | | | | + | | | | | + | | | | + | + | + | | | + | | + | |
| 70. | + | + | | | + | 1 | | | | | + | + | + | + | + | | 1 | + | + | + | | + |
| 71. | + | | + | 1 | + | | | + | + | + | + | | 1 | | | | | + | + | + | 1 | + |
| 72. | 1 | | + | + | + | + | 2 | 2 | 1 | 2 | 1 | 2 | 1 | + | + | | | 1 | + | + | + | |
| 73. | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 | 1 | + | 5 | 5 | + | 5 | 5 | 5 | + | 5 | 5 | 4 | 5 | 5 |
| 74. | 4 | 4 | 4 | 5 | 5 | 4 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 2 | 3 | 2 |
| 75. | | | | | | | 3 | | 2 | 2 | | | 1 | | | | 2 | | | | | |
| 76. | | | | | + | | | | | | | | | | | | + | | | | | |
| 77. | | | | | + | | | | | | | | + | | | | | | | | | |
| 78. | | | | | | | + | | + | + | | | + | | | | + | | | | | |

Continuation of Table 2.

| Species | | Sample plots | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Alisma plantago-aquatica | 20 | + | 2 | 1 | 1 | + | + | + | 2 | + | 2 | 1 | 1 | 1 | 1 | + | + | + | 1 | 1 | 1 |
| Ranunculus repens | 14 | 1 | + | + | + | 1 | 1 | 1 | 1 | 1 | | | | | | 1 | + | + | | 1 | 1 |
| Ranunculus sceleratus | 11 | + | + | + | | | | | | + | + | + | | | | + | + | | + | + | + |
| Ranunculus acris | 8 | | | | + | + | + | | | | | | + | | + | + | | | | + | |
| Humulus lupulus | 3 | | + | | | | | | | | + | + | | | | | | | | | |
| Epilobium hirsutum | 5 | | | + | + | 1 | | | + | + | | | | | | | | | | | |
| Epilobium parviflorum | 6 | + | + | | | + | + | | | | | | | + | + | | | | | | |
| Epilobium tetragonum | 7 7 | | | | | | | | | | + | + | + | 1 | | | | | + | + | + |
| Festuca pratensis | 10 | 1 | 1 | 1 | + | + | 1 | | + | + | | | | | + | + | | | | | |
| Poa palustris | 15 | + | + | 1 | 1 | 1 | + | | + | + | + | + | + | | + | + | + | + | | | |
| Reed - grass vegetation: | | | | | | | | | | | | | | | | | | | | | |
| Typha latifolia | 15 | + | + | 3 | 3 | 3 | 2 | + | + | + | + | 1 | 1 | 1 | | | | | | 2 | + |
| Typha angustifolia | 15 | + | + | 1 | 1 | 1 | 1 | + | | + | | + | + | + | + | + | | | | 1 | + |
| Utricularia vulgaris | 15 | 4 | 4 | 2 | 1 | 1 | 1 | 4 | 5 | 5 | 5 | 4 | 3 | 3 | 2 | | | 1 | | | |
| Utricularia minor | 9 | | 1 | | | | | | 1 | 1 | | | + | + | 1 | 3 | 2 | | | | 2 |
| Hydrocharis morsus-ranae | 20 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 2 |
| Ceratophyllum demersum | 20 | + | + | + | 5 | 5 | 5 | 1 | 1 | 1 | + | + | 3 | 3 | 4 | 5 | 5 | 5 | 5 | 4 | 3 |
| Sium erectum | 20 | + | + | 1 | 1 | + | + | + | + | + | 1 | + | + | + | + | 1 | + | 1 | + | + | 1 |
| Lemna minor | 20 | 3 | 3 | 3 | 2 | 3 | 4 | 4 | 3 | 3 | 5 | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 3 | 2 | 3 |
| Myriophyllum verticillatum | 6 | | | | | | 3 | 3 | 3 | | | | | | | + | | | 3 | 3 | |
| Zanichellia palustris | 7 | | | | | | | + | | + | + | | | | | | | + | + | + | + |

Table 3. Species and their cover values in the sample plots of lake 2.

| Species | F | Sample plots 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. Phragmites communis | 50 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 5 | 5 | 5 | 4 | 4 | 3 | 3 | 3 | 3 | 4 |
| 2. Typha latifolia | 50 | 2 | 3 | 3 | 3 | 5 | 5 | 5 | 4 | 5 | 5 | 4 | 2 | 2 | 2 | 3 | 4 | 4 | 4 | 4 | 3 |
| 3. Typha angustifolia | 50 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| 4. Typha laxmannii | 16 | + | | | | | + | | | | | | | + | + | + | | | + | + | |
| 5. Rumex palustris | 20 | | | + | + | + | | | | + | + | | + | | | | | + | | | + |
| 6. Callistegia sepium | 43 | + | + | + | 1 | 1 | + | | | | + | 1 | 2 | 2 | 1 | 1 | + | + | + | + | 1 |
| 7. Solanum dulcamara | 4 | | | | | | | | | + | | | | | | | + | | | | |
| 8. Carex elata | 50 | 5 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 4 | 4 | 3 | 3 | 3 | 5 | 5 | 5 | 5 | 5 | 4 | 5 |
| 9. Carex acutiformis | 31 | + | + | + | + | | | | + | + | + | | | + | 1 | + | 1 | 1 | + | + | + |
| 10. Carex riparia | 12 | | | | | | + | | | | | | + | + | + | + | | | | | |
| 11. Glyceria maxima | 50 | 2 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| 12. Polygonum lapathifolium | 50 | 2 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 1 | 2 |
| 13. Polygonum hidropiper | 48 | 1 | 1 | + | + | + | + | + | + | 1 | 2 | 2 | 2 | 1 | + | + | + | + | + | + | 1 |
| 14. Eupatorium cannabinum | 33 | 2 | 2 | 2 | | | 1 | 1 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | | | | 1 | 2 | |
| 15. Urtica dioica | 32 | 1 | 1 | + | + | 2 | 2 | 2 | 2 | | + | + | 1 | 1 | | | | | | + | |
| 16. Lythrum salicaria | 36 | + | + | + | 1 | | 1 | 1 | 1 | | + | + | | | | 1 | 1 | 1 | | 1 | |
| 17. Equisetum palustre | 50 | 1 | 1 | 1 | + | + | + | + | 1 | + | 1 | + | 1 | + | 1 | 1 | + | + | + | 1 | + |
| 18. Schoenoplectus lacustris | 18 | | + | + | + | | | | | | + | + | | | | + | + | | | | |
| 19. Schoenoplectus mucronatus | 50 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | + | 1 | 1 | + | + | + | 2 | 2 | 2 | 2 | 2 |
| 20. Cyperus fuscus | 50 | 2 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 3 |
| 21. Juncus bufonius | 50 | 2 | 2 | 2 | 3 | 3 | 2 | 2 | 3 | 3 | 2 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 3 | 3 |
| 22. Juncus inflexus | 47 | 1 | 1 | 1 | 1 | + | + | + | 1 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | + | + | + | + | 1 |
| 23. Alisma plantago-aquatica | 30 | | | | | + | + | + | 1 | 1 | + | + | | | | 2 | 2 | 2 | 1 | 1 | + |
| 24. Ranunculus repens | 48 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | + | + | 1 | 1 | 1 | 1 | | 1 |
| 25. Ranunculus sceleratus | 47 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | 1 | + | 1 | + | 1 | + | 1 |
| 26. Ranunculus acris | 15 | + | | | | | + | + | + | | | | + | + | + | + | | | | | |
| 27. Humulus lupulus | 13 | | + | | | | | | | | + | + | | | | | | | | | |
| 28. Epilobium hirsutum | 35 | | | + | + | 1 | | | + | + | | | | + | | + | + | + | + | + | + |
| 29. Epilobium parviflorum | 23 | + | + | | | + | + | + | | | + | + | + | | | | | | | | + |
| 30. Epilobium tetragonum | 28 | | | + | + | + | 1 | + | | + | | | | + | + | + | | + | | + | |
| 31. Festuca pratensis | 28 | 1 | 1 | 1 | + | + | 1 | | + | + | | | + | + | | | | | | | |
| 32. Poa palustris | 28 | + | + | 1 | 1 | 1 | | + | + | + | + | + | + | | + | + | + | + | | | 1 |
| 33. Schoenus nigricans | 19 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | + | | | | | + | | + | + | 1 | + | |
| 34. Cladium mariscus | 19 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | + | | | | | + | | + | + | + | + | |
| 35. Iris pseudacorus | 21 | | | | | + | + | + | | | | | | | + | + | | | | + | |
| 36. Leersia oryzoides | 10 | | | 1 | | | | | | + | + | | | | | | + | + | | | |
| Reed- grass vegetation: | | | | | | | | | | | | | | | | | | | | | |
| 37. Typha latifolia | 50 | 1 | 1 | + | + | + | + | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 1 | + | + | + | 2 | 1 | 1 |
| 38. Typha angustifolia | 22 | + | + | | | | | | + | + | + | + | | | | + | | | + | | |
| 39. Utricularia vulgaris | 26 | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 4 | 1 | 1 | | | | | 1 | 4 | 4 | | | |
| 40. Utricularia minor | 20 | 2 | 2 | 2 | | | | | | | | 1 | 1 | 2 | | | + | + | + | | |
| 41. Hydrocharis morsus-ranae | 37 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 1 | 1 | 1 | 3 | 5 | 5 |
| 42. Myriophyllum verticillatum | 14 | | | | | | + | + | + | 5 | 5 | 5 | 5 | | | + | + | | | | |
| 43. Sium erectum | 27 | + | + | + | | | | | | | | | | | | | | | | 4 | 4 |
| 44. Lemna minor | 40 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 3 | 3 | 3 | 4 | 2 | 4 | 2 | 2 | 2 | 2 | 3 | |
| 45. Ceratophyllum demersum | 25 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 4 | | | | 3 | 3 | 4 | 4 | 5 | 5 | | |
| 46. Zanichellia palustris | 13 | + | + | | | | | | | | + | + | + | | | | | | | | |
| 47. Najas minor | 22 | | | | | | | | + | + | | | | | + | + | + | + | + | + | |
| 48. Hippuris vulgaris | 25 | | | + | + | + | + | | | | + | + | + | + | | | | + | | | |

Continuation of Table 3.

| | Sample plots | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| 1. | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 4 | 4 | 4 | 5 | 5 | 5 | 4 | 3 |
| 2. | 3 | 3 | 3 | 2 | 2 | 1 | 2 | 4 | 4 | 4 | 3 | 5 | 3 | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 1 | 1 | 3 | 2 | 2 | 2 | 2 | 3 | 4 |
| 3. | 2 | 1 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 2 | 2 |
| 4. | | | + | + | + | | | | | | | | + | + | | + | | + | | + | + | | | | | | | | | |
| 5. | + | | | | | | | + | + | + | | + | | + | | | | | | | | + | + | | + | + | | | + | + |
| 6. | + | + | 1 | 1 | 1 | 1 | 1 | + | + | + | + | + | | | + | + | + | | | + | + | + | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 7. | | | | | | | + | | | | | | | | | | | + | | | | | | | | | | | | |
| 8. | 5 | 5 | 5 | 4 | 4 | 4 | 4 | 3 | 4 | 3 | 4 | 3 | 3 | 3 | 4 | 3 | 5 | 5 | 5 | 4 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 9. | 1 | 1 | + | + | + | + | 1 | + | 1 | + | + | + | + | + | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | + | 1 | + |
| 10. | + | + | + | | | | | | + | | + | + | | | | + | + | + | | + | | + | | + | + | | | + | + | + |
| 11. | | | | | | | | + | | | + | + | | | | | | | | | + | + | | | | + | + | | | |
| 12. | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 13. | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 2 | 3 | 3 |
| 14. | 1 | + | + | + | + | 1 | + | 1 | 1 | 1 | 1 | + | + | + | | | + | + | 1 | 1 | + | 1 | 1 | 1 | + | 1 | 1 | 1 | + | + |
| 15. | 1 | 1 | | | | 2 | 2 | 2 | 2 | 2 | | | | 1 | 1 | 1 | 2 | 2 | 4 | 3 | 2 | 2 | 2 | | | 2 | 2 | | | |
| 16. | + | + | 1 | | | | | | | | + | + | + | 2 | 1 | 1 | 1 | 2 | 1 | 1 | | + | | 1 | 2 | 1 | 1 | | | 1 |
| 17. | | | + | + | + | + | + | + | | 1 | 1 | 1 | 1 | + | + | + | + | | | + | + | + | + | | | + | 1 | + | 1 | + |
| 18. | | | | | | + | + | + | + | | | | | | | | | | + | + | + | + | | | + | | + | | + | |
| 19. | 1 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 2 | 1 | 1 | 2 | 2 | 2 |
| 20. | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 3 | 2 | 2 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 3 | 2 | 3 | 3 | 2 |
| 21. | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 2 | 2 | 2 | 2 | 3 | 2 | 3 | 3 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 3 | 2 | 2 | 2 |
| 22. | 2 | 2 | 1 | 1 | 1 | 1 | + | + | + | 1 | 1 | + | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 23. | + | + | | | | | | | | | 3 | 2 | 2 | 1 | 2 | 2 | 2 | 3 | 1 | 1 | | | | + | + | | | | + | + | + |
| 24. | 1 | 1 | 1 | 1 | + | + | | + | + | + | 1 | 1 | 1 | + | + | 1 | + | 1 | + | 1 | + | 1 | 1 | 1 | 1 | 1 | 1 | + | + | 1 | 1 |
| 25. | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | + | + | + | + | + | + | + | + | + | + | | + | + | + | + | | | |
| 26. | | | + | + | + | | + | | + | | | | | | | | | + | | | + | | | | | | | | | |
| 27. | | | | | | | | | | + | + | | | | | | | | | | | + | | 1 | 1 | + | + | + | 1 | 1 |
| 28. | + | + | 1 | 1 | 1 | 1 | 1 | 1 | 1 | + | | | | | + | + | + | + | + | + | + | 1 | + | + | + | | | + | | + |
| 29. | + | | | | | | | + | + | | + | + | 1 | 1 | + | | + | | + | | | | | + | + | + | + | | | |
| 30. | | + | + | + | + | | | | | 1 | 1 | 1 | + | + | | | | | + | + | + | + | 1 | | | 1 | 1 | | | 1 |
| 31. | | | | | | | 1 | 1 | 1 | 1 | 1 | 1 | + | | + | + | + | | | | + | | | 1 | + | + | 1 | + | + | + |
| 32. | 1 | 1 | 1 | + | + | | | | | | | + | | | | | | 1 | + | 1 | + | 1 | 1 | | | | | | | |
| 33. | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | |
| 34. | | | | | | | | | | | 1 | 1 | 1 | 1 | 1 | | | | | | | | | | | | | | | |
| 35. | | + | | + | + | | | | + | + | + | + | | | | | + | + | | + | + | | | | | + | + | | + | + |
| 36. | | | | | | | 1 | 1 | | | | + | | + | + | | | | | | | | | | | | | | | |
| 37. | 1 | 1 | 1 | 1 | + | + | + | 3 | + | 3 | 3 | 3 | 1 | 2 | 1 | 2 | 2 | + | 1 | + | + | + | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 1 |
| 38. | + | | | | | + | + | | | | + | + | + | | + | + | | | + | + | | | + | | + | + | | | + | |
| 39. | | | | 5 | 5 | 5 | 5 | 3 | 3 | 1 | 4 | 4 | | | | | | | | | | | | 4 | | 4 | 5 | | | |
| 40. | | | | 1 | | | | + | + | | | | 3 | 3 | 3 | | | | | | | | | 1 | | 2 | 2 | 1 | | 1 |
| 41. | 5 | 5 | 5 | 5 | | | | | | 3 | 3 | 3 | 3 | | | | + | + | | | | | 3 | 3 | | 1 | 1 | 3 | 2 | 2 |
| 42. | | | | | | | | | | | | | | | | | | | | | | | | | | 5 | 5 | 4 | 4 | 4 |
| 43. | 4 | 4 | 4 | 4 | 4 | 4 | 3 | 3 | 3 | 2 | 3 | 3 | 4 | 3 | 2 | 2 | 3 | 4 | 4 | 3 | 2 | 3 | | | | | | | | |
| 44. | | | | 5 | 4 | 5 | 5 | 4 | 4 | | | | | 3 | 4 | 4 | 3 | 3 | 5 | | | | 4 | 4 | | | | 3 | 3 | 4 |
| 45. | + | | | | + | | | + | + | + | | | + | + | | | | | | | | | 5 | 5 | 5 | | | | | |
| 46. | | + | + | | | | | | + | + | | | | | + | | | | | | | | + | | + | | | | | + |
| 47. | | + | + | + | + | + | | | | | | + | | + | + | + | | | | | + | + | | | | + | + | | + | |
| 48. | | | | + | + | | + | + | + | | + | + | | | | | + | + | + | + | | | | + | + | + | | + | + | |

Table 4. Species and cover values in the sample plots of lakes 3 and 4.

| Lake 3. Species | F | Sample plots 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Carex elata | 5 | 5 | 5 | 5 | 5 | 5 |
| Carex acutiformis | 5 | 1 | 1 | 1 | + | + |
| Carex riparia | 3 | | | + | + | + |
| Glyceria maxima | 5 | 5 | 5 | 5 | 5 | 5 |
| Typha latifolia | 5 | 3 | 2 | 3 | 2 | 2 |
| Leersia oryzoides | 3 | + | | | 1 | 1 |
| Reed - grass vegetation: | | | | | | |
| Typha latifolia | 5 | 2 | 2 | 2 | 4 | 5 |
| Myriophyllum verticillatum | 5 | 1 | + | 1 | 3 | 3 |
| Ceratophyllum demersum | 4 | 3 | 3 | 2 | + | |
| Lemna minor | 3 | | | 2 | 3 | 3 |
| Hippuris vulgaris | 2 | | | + | + | |

| Lake 4. Species | F | Sample plots 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|---|
| Phragmites communis | 5 | 5 | 5 | 5 | 5 | 5 |
| Carex riparia | 2 | | | + | + | |
| Carex acutiformis | 5 | + | + | 1 | 1 | + |
| Carex elata | 5 | 5 | 5 | 5 | 5 | 5 |
| Callistegia sepium | 5 | 2 | 2 | 3 | 2 | 3 |
| Lythrum salicaria | 5 | 1 | + | + | + | 1 |
| Polygonum lapathifolium | 5 | 1 | 2 | 2 | 1 | 2 |
| Equisetum palustre | 5 | 2 | 3 | 3 | 2 | 2 |
| Typhy latifolia | 5 | 1 | 1 | 2 | 1 | 1 |
| Eupatorium cannabinum | 5 | 2 | 2 | 3 | 1 | 2 |
| Urtica dioica | 5 | + | + | 1 | 2 | 1 |
| Reed - grass vegetation: | | | | | | |
| Potamogeton pectinatus | 5 | 5 | + | 1 | 1 | 5 |
| Potamogeton perfoliatus | 4 | | 3 | 4 | 2 | 1 |
| Ceratophyllum demersum | 4 | 5 | + | 4 | 4 | |
| Lemna minor | 5 | 3 | 5 | 2 | 2 | 2 |
| Hippuris vulgaris | 3 | 1 | | + | + | |

Table 5. Species and their cover values in the sample plots of lake 5.

| Species | F | Sample plots 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Glyceria maxima | 20 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 4 | 5 | 4 | 4 | 5 | 3 | 3 | 4 | 5 | 5 | 4 | 5 | 3 |
| Carex elata | 20 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 4 | 3 | 3 | 3 | 3 | 3 | 2 | 5 | 5 | 5 | 5 | 5 |
| Carex acutiformis | 18 | 1 | 1 | 1 | + | + | | | + | + | 1 | 1 | 1 | 1 | 1 | + | + | + | 1 | 1 | 1 |
| Phragmites communis | 9 | | | | | | | 1 | 1 | | | 2 | | 2 | 3 | 2 | | | 2 | 1 | 2 |
| Callistegia sepium | 6 | | | | | | | | | | | + | | + | + | + | | | + | | + |
| Typha latifolia | 13 | + | + | | | + | + | | 1 | 1 | | | | + | + | 1 | + | | + | 1 | 1 |
| Schoenus nigricans | 11 | | | | | 3 | 3 | 2 | 3 | 3 | 2 | 2 | 3 | 2 | 3 | 3 | | | | | |
| Cladium mariscus | 11 | | | | | 4 | 4 | 3 | 3 | 4 | 4 | 2 | 2 | 3 | 3 | 2 | | | | | |
| Reed - grass vegetation | | | | | | | | | | | | | | | | | | | | | |
| Typha latifolia | 20 | + | + | + | 1 | 1 | + | + | + | + | + | 1 | 1 | 1 | 1 | 1 | + | + | + | 1 | 1 |
| Potamogeton pectinatus | 13 | | | 5 | 5 | 5 | 2 | 2 | 2 | 4 | 4 | 5 | | | | | | 5 | 5 | 3 | 2 |
| Ceratophyllum demersum | 14 | 5 | 5 | | | | 1 | 1 | 3 | + | + | | 5 | 5 | 4 | 1 | 4 | | | 2 | 2 |
| Hippuris vulgaris | 16 | + | + | 1 | 1 | + | + | + | | | | + | + | + | 1 | 1 | + | | + | + | + |