

Vascular Flora of Five Reservoirs in the Berea College Forest, Madison and Jackson Counties, Kentucky

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ABSTRACT

A descriptive survey of the vascular plants from wetland and aquatic habitats of the five Berea College reservoirs, Madison and Jackson counties, in south-central Kentucky was conducted during the growing seasons of 1995, 1996, 1998, and 2003. Six plant habitats described are Vegetated Open Water, Emergent Marsh, Shrub Swamp, Seasonally Dewatered Mud and Sandflat, Sedge-grass Meadow, and Shallow Stream with Gravel Bar. Relative abundance values were determined for every taxon at each reservoir. The species list comprises 292 species, 175 genera, and 65 families. Thirty-eight taxa (13%) are exotics. Species are classified as Lycopodiophyta (1), Equisetophyta (2), Polypodiophyta (7), Pinophyta (1), and Magnoliophyta (281). In the National Wetland Classification, 205 species (70.0%) are obligate, facultative wetland, and facultative species.

INTRODUCTION

The Berea College Forest (BCF) consists of 3318 ha (8200 acres) in several tracts in parts of Madison, Jackson, and Rockcastle counties of south-central Kentucky. BCF is maintained for watershed/wilderness resources, timber management, wildlife management, recreation, and educational purposes by Berea College, Berea, Kentucky. In addition, the BCF has four reservoirs in Madison and Jackson counties that provide the water supply for the city of Berea and surrounding Madison County communities and one reservoir for flood-prevention purposes.

Prior to 1904, people from Berea obtained their water from wells or cisterns. In 1904, Berea College began collecting water from springs in the Berea College Forest and started the Berea College Waterworks. In 1919, Upper Silver Creek Reservoir was built to collect and store water for the city. A second reservoir, Lower Silver Creek Lake, was created in 1939 to provide more water. Cowbell Lake was built in 1954 because of increased water demand by Berea and south Madison County. As more water continued to be needed for Berea, its industrial areas, and south Madison County, Owsley Fork Reservoir was constructed in 1976. In 1986, Berea College was re-

quired to build an earthen dam to serve as a flood-retarding structure for the overflow or breach of the Cowbell Reservoir dam. This accumulated body of water is known as Red Lick Reservoir No. 2. These five reservoir lakes are managed and regulated by Berea College Utilities.

Ferren and Tonsor (1996) defined a reservoir as a pond or lake, natural or artificial, from which water may be withdrawn for irrigation and/or water supply. Our floristic study is a baseline inventory with emphasis on the wetland and aquatic flora from collections and observations at five man-made bodies of water, or lakes, which we have termed “reservoirs” for descriptive purposes. These bodies of water are classified under the Lacustrine System of Cowardin et al. (1979), which are characteristically bounded by uplands or by wetlands dominated by shrubs, persistent emergents, and emergent mosses and lichens.

Published botanical works for the Berea College Forest are Grossman and Pittillo (1962), Wade and Thompson (1990), and Thompson and Fleming (2004). Among these three studies, over 600 plant species have been collected from the forest. Recent wetland floristic studies in south-central and east-central Kentucky include Hoagland and Jones

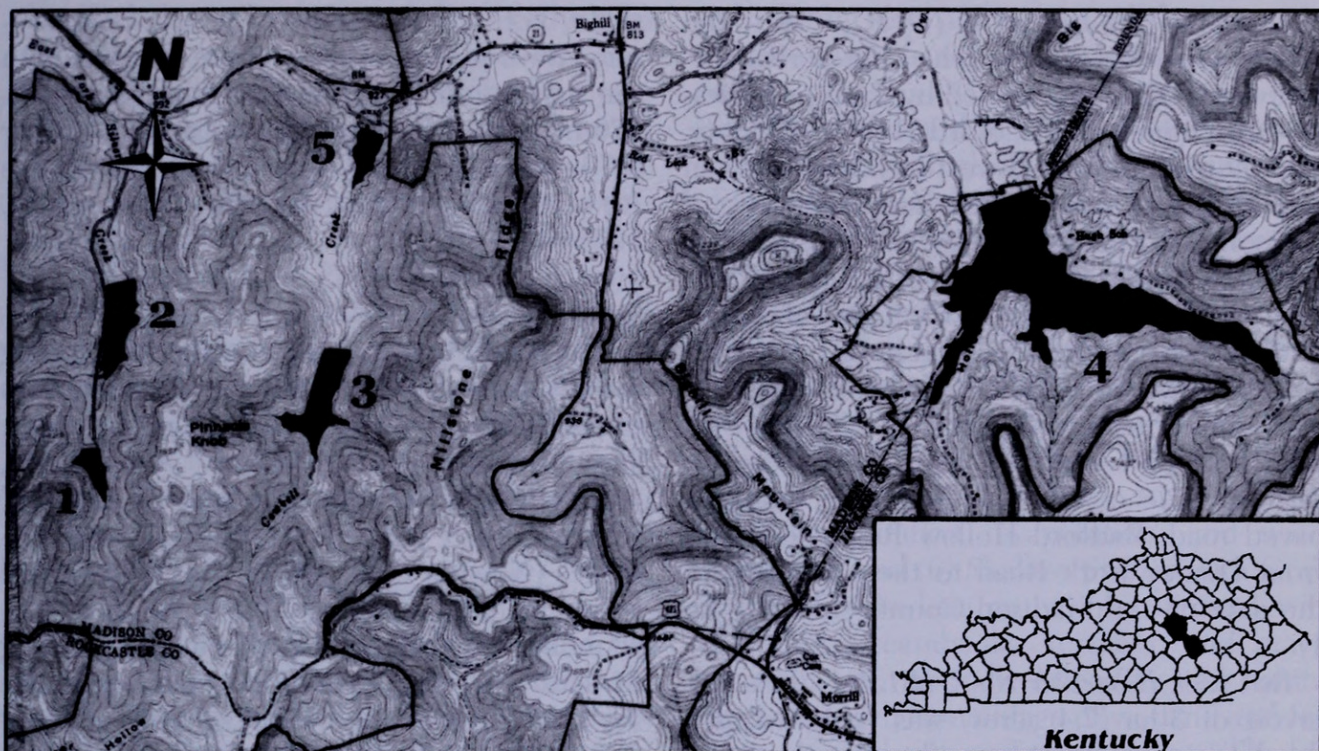


Figure 1. The five reservoirs within the Berea College Forest, Bighill Quadrangle, Kentucky, Photorevised 1979: (1) Upper Silver Creek Reservoir, (2) Lower Silver Creek Reservoir, (3) Cowbell Reservoir, (4) Owsley Fork Reservoir, and (5) Red Lick Reservoir No. 2. Kentucky inset with Madison (upper left) and Jackson (lower right) counties darkened.

(1992), Luken and Bezold (2000), and Thompson and FitzGerald (2003).

Baseline inventories of the vascular flora from reservoirs are important for preserving wetland areas, moderating the effects of floods, improving water quality, and enhancing aesthetic and heritage value (Mitsch and Gosselink 1993). Wetland studies have provided valuable information on soils, hydrological patterns, plant communities, hydrosere succession, and environmental controlling factors (Meagher and Tonsor 1992).

The objectives of our descriptive floristic survey were (1) to document the vascular flora with representative voucher specimens, (2) to ascertain plant origin (i.e., native or exotic), (3) to indicate National Wetland Classification Status for each taxon, (4) to determine relative abundance, and (5) to describe habitats for each species.

THE ENVIRONMENTAL COMPLEX

Reservoir Descriptions

Upper Silver Creek Reservoir (USC). Also known as Kale Lake or A-Lake, USC is the smallest reservoir, 2.1-ha surface area (5.3

acres), and was formed by damming the East Fork of Silver Creek. The concrete dam lies at 341 m elevation. USC is 10 m deep at its deepest point with visibility of 3.5 m. Upper Silver Creek reservoir is located in Madison County at the end of a gravel road 2 km south of KY 21 and 5 km west of the US 421 junction with KY 21 at Bighill (Figure 1).

Lower Silver Creek Reservoir (LSC). LSC (B-Lake or North Lake) has 7.8-ha surface area (19.3 acres). The north-trending concrete dam spillway lies at 298 m elevation. LSC is 10.5 m deep with visibility at 3 m. Lower Silver Creek Reservoir lies 0.3 km north of USC on the East Fork Silver Creek and 1.7 km south of KY 21 (Figure 1).

Cowbell Reservoir (CBR). CBR has 6.8-ha (16.8 acres) surface area and was formed by damming of the Cowbell Creek watershed. A north-trending earthen and concrete dam lies at 301 m elevation. CBR is 12 m deep with visibility of 3 m. Cowbell Reservoir is located in Madison County at the end of a gravel road 1.8 km south of KY 21 and 2.4 km west of junction US 421 and KY 21 at Bighill (Figure 1).

Owsley Fork Reservoir (OFR). This, the largest reservoir, has 61.1-ha (151 acres) surface area. OFR was formed by damming Owsley Fork Creek and Radford Hollow tributary. The north- and northwest-trending earthen and concrete dam lies on the Madison and Jackson county boundary at 250 m elevation. OFR has a maximum depth of 12 m with visibility of 3.5 m. Owsley Fork Reservoir is the only lake open to the general public, but with certain restrictions. OFR is located 4 km east of Bighill from the junction of US 421 with KY 21 which becomes Owsley Fork Road on the east side of OFR in Jackson County. A paved road, Radford Hollow Road, separates from Owsley Fork Road to the southwest of the dam on the Madison County side (Figure 1).

Red Lick Reservoir No. 2 (RLR). This reservoir of 3-ha (7.4 acres) was designed as a flood-retarding structure with an earthen dam formed from landfill from the adjacent mixed hardwood forest. The elevation of the dam top is 262 m. RLR is 5 m deep with limited visibility of 1 m. It is located 1.2 km north of Cowbell Reservoir on Cowbell Creek, and 0.7 km south of KY 21 (Figure 1).

Physiography and Geology

The Berea College Forest of Madison and Jackson counties lies within the Knobs Lower Scioto Dissected Plateau Region of the Western Allegheny Plateau and the Knobs Normal Upland Region of the Interior Plateau (Wood et al. 2002). The geological substrate within the area of the Berea College reservoirs is very complex. Drainage below the reservoirs has some Holocene Alluvium (210–230 m) of the Quaternary System, and the valleys have some New Albany Shale (230–275 m) of the Upper Devonian and Lower Mississippian System. Bedrock surrounding the reservoirs on lower slopes consists of shale, siltstone, and limestone of the Nancy Member (275–335 m), Cowbell Member (335–365 m), Nada Member (365–385 m), and Renfro Member (385–396 m). All these members belong to the Borden Formation of the Mississippian System (Weir et al. 1971). The middle and upper slopes and ridgetops of the Knobs consist of limestone and shale of Newman Limestone Member (396–450 m) and Pennington Formation (450–457 m) sandstone, siltstone and

shale, both of the Upper Mississippian System. Several higher Knobs are capped with the Livingston Conglomerate Member (457–470 m) and/or the Corbin Sandstone Member (470–488 m) in the Lee Formation of the Lower Pennsylvanian System (Weir et al. 1971).

Soils

The majority of the forest soils surrounding the reservoirs belong to the the Weikert series or the Bledsoe-Gilpin-Shelock-Grigsby series. The Weikert series are shallow, well-drained, moderately permeable soils with an acid pH from 4.5 to 5 derived mainly from acid siltstones (Newton et al. 1973). The Weikert soil series includes the majority of the soils surrounding Cowbell, Red Lick Flood Retarding Structure, Upper Silver Creek, and Lower Silver Creek reservoirs located entirely in Madison County. The soils of the Bledsoe-Gilpin-Shelock-Grigsby series are typically deep, well-drained, and moderately permeable soils with a pH from 4.6 to 7. They are formed mainly in mixed alluvium from acid siltstones and shales (Hayes 1989). This soil association is found only at the Owsley Fork Reservoir study site in Jackson and Madison counties.

Climate

The climate of Kentucky is warm temperate, humid mesothermal, with little or no water deficiency, and is characterized by long warm summers and short mild winters (Trewartha and Horn 1980). The mean annual temperature of Berea is 13.7°C. July and August are usually the warmest months, with a mean temperature of 24.6°C, and January is the coldest month, with a mean temperature of 1.5°C. The mean annual precipitation is 119.3 cm with July having the highest precipitation at 12.2 cm and October the lowest with 5.8 cm. The mean frost-free growing season is 189 days with the mean date of the last spring freeze on 15 April and the first fall freeze on 22 October (Conner 1980).

Vegetation

Western Mesophytic Forest, a mosaic region of Mixed Mesophytic Forest and Oak-Hickory Forest, is the predominant vegetation in The Knobs Border Area as described by Braun (1950). Muller and McComb (1986)

classified the upland forests from eight sites within the Kentucky Knobs Region into mesophytic hardwoods, white oak, chestnut oak, and scarlet oak forest types. The upland forest bordering the Berea College reservoirs on the north- and northwest-trending aspects is primarily a mosaic of mesophytic hardwoods (*Liriodendron-Acer-Fagus-Quercus-Carya-Fraxinus*). The forest stands on the east-trending aspect and valley bottoms in the vicinity of the reservoirs are intermixed with mixed oak hardwoods-pine (*Quercus-Pinus*). All five reservoirs are surrounded by forests and open lands in various seral stages of secondary succession.

METHODS

The vascular flora was collected from the wetland habitats of the five reservoirs throughout the growing seasons of 1995, 1996, 1998, and 2003. Plants not in wetland habitats (i.e., contiguous secondary successional ecotones, upland forests, and reservoir dams) were not included in the species list. Manuals used for plant identification were Gleason and Cronquist (1991), Strausbaugh and Core (1978), and Beal and Thieret (1986). Plant classification and nomenclature are mostly from Gleason and Cronquist (1991). Representative voucher specimens were processed according to standard herbarium procedures and deposited in the Berea College Herbarium (BEREA). Previous plant collections from the BCF were also examined at BERE.

Six wetland habitats modified from Thompson and FitzGerald (2003) were delineated from field reconnaissance of wetland habitats and species composition in these wetland areas from each reservoir. These wetland habitats are enclosed in brackets after the National Wetland Category in the Appendix. The six wetland habitats are (1) Vegetated Open Water (VOW)—an area of permanent water with a depth of up to 2 m with vegetation restricted to obligate free-floating species, floating-leaved submergents, and submergents; (2) Shrub Swamp (SS)—seasonally flooded area with saturated soils present when no standing water exists and dominated by riparian trees and shrubs with wetland herbaceous species; (3) Emergent Marsh (EM)—an area that is characterized by permanent or seasonal flooding or by water letdown, resulting in saturated

soils during dry summers, and that supports obligate and facultative amphibious herbaceous plants; (4) Sedge-grass Meadow (SGM)—an area that has typically saturated soils covered with shallow water during times of increased rainfall and that supports obligate and facultative wetland herbs; (5) Seasonally Dewatered Mud-Sand Flat (SDF)—an area that is inundated for most of the year but with water receding early enough in summer, supporting annual species along exposed mudflats or sandy shoreline. The boundary between the seasonally dewatered flats and emergent marshes may vary from year to year based upon precipitation, evaporation, and water drawdown; and (6) Shallow Stream with Gravel Bar (SSG)—headwater inlet streams with vegetated streambanks, terraces, and gravel bar areas from periodical flooding; this habitat supports a rich assemblage of wetland and forest perennial herbs and woody plants. The forests and open lands in various seral stages of secondary succession surrounding the reservoirs were not inventoried for plants or included in the species list.

The Appendix includes the species name, plant origin (native or exotic), National Wetland Classification status, a representative wetland habitat for each taxon, and the relative abundance value of each species found at each reservoir.

An asterisk (*) preceding a species name denotes an exotic or non-indigenous plant species. After the species name is the National Wetland Category (Reed 1988). These National Wetland Categories are OBL = Obligate Wetland, FACW = Facultative Wetland, FAC = Facultative, FACU = Facultative Upland, and UPL = Upland, and may contain minus (−) or plus (+) designations for the drier or wetter limits of the facultative categories. A Not Categorized (NC) has been created for those species not listed or classified in the 1997 National Wetland Indicator Plant List, Northeastern Region 1 by the USFWS (1997) (Appendix).

In the Appendix, abbreviations horizontally from the earliest to most recently established are reservoirs are: USC = Upper Silver Creek, LSC = Lower Silver Creek, CBR = Cowbell, OFR = Owsley Fork, and RLR = Red Lick Reservoir No. 2. Relative abundance values are listed under the columns for each reser-

Table 1. Classification of vascular plants at Five Reservoirs in the Berea College Forest, Kentucky.

Division	Families	Genera	Species	Native	Exotic	Species composition (%)
Equisetophyta	1	1	2	2	0	0.69
Lycopodiophyta	1	1	1	1	0	0.34
Polypodiophyta	3	5	7	7	0	2.40
Pinophyta	1	1	1	1	0	0.34
Magnoliophyta	59	167	281	243	38	96.23
Magnoliopsida	44	125	190	167	23	65.07
Liliopsida	15	42	91	76	15	31.16
Totals	65	175	292	254	38	100.00

voir. Relative abundance values adapted from Thompson and Jones (2001) are R = Rare—1 to 5 individuals or colonies; I = Infrequent—6 to 30 individuals or colonies; O = Occasional—31 to 100 individuals or colonies; F = Frequent—hundreds of individuals or colonies; and A = Abundant—thousands of individuals or colonies (Appendix).

RESULTS

Taxonomic Summary

The documented vascular flora of the five Berea College Reservoirs comprises 292 species within 175 genera from 65 families. The annotated catalogue of plant species is composed of Lycopodiophyta (1), Equisetophyta (2), Polypodiophyta (7), Pinophyta (1), and Magnoliophyta (281). Thirty-eight species (13%) are exotics (Table 1). Two hundred five (70.0%) are OBL, FACW, and FAC wetland species (Appendix). The number of species in the wetland categories are OBL (61), FACW (73), FAC (70), FACU (61), UPL (11), and NC (16). Total species for each reservoir are USC (114), LSC (177), CBR (150), OFR (214), and RLR (135) (Appendix). The largest families in species are Asteraceae (48), Poaceae (35), Cyperaceae (24), Lamiaceae (13), Fabaceae (12), Polygonaceae (12), and Juncaceae (9). The largest genera are *Polygonum* (11), *Juncus* (9), *Panicum* (9), *Aster* (8), and *Carex* (8) (Appendix). *Polygonum densiflorum* is documented as a new Kentucky record.

Reservoir Flora and Habitats

The five reservoirs have developed various wetland habitats through hydrarch or hydrosere succession. Characteristic species and lo-

cally rare taxa are listed for each reservoir habitat. There is some zone intergradation in the species from the six habitats, some more conspicuous than others; e.g., a gradient or continuum exists between species among the EM, SS, and SDF habitats at Owsley Fork Reservoir.

The flora and habitats of the five reservoirs in the Berea College Forest—Upper Silver Creek, Lower Silver Creek, Cowbell, Owsley Fork, and Red Lick Reservoir No. 2—are described from the oldest to the earliest created body of water.

Upper Silver Creek Reservoir. The four habitats of USC are VOW, EM, SDF, and SGM. Important submerged vegetation in the VOW are *Najas guadalupensis*, *N. minor*, and *Potamogeton nodosus*. The EM lies in steep areas surrounding the reservoir and at a small area by the dam spillway. Generally, the EM and SDF habitats are heavily shaded by the encroaching upland vegetation. Characteristic species of the EM include *Alisma subcordatum*, *Cyperus strigosus*, *Juncus acuminatus*, *J. effusus* var. *solutus*, *Leersia oryzoides*, *Ludwigia alternifolia*, *Scirpus cyperinus*, and *Scutellaria lateriflora*.

The SDF occurs as small slough delta areas at the northwest shore and east shore, which are created from side ravine stream siltation and water drawdown. Typical taxa of this habitat include *Bidens* spp., *Boehmeria cylindrica*, *Impatiens capensis*, *Ludwigia alternifolia*, *Lycopus virginicus*, *Mimulus alatus*, and *Penthorum sedoides*. At the north end on the lower part of the dam, a small wet-meadow seepage exists. Some SGM species include *Apocynum cannabinum*, *Carex frankii*, *C. lurida*, *C. vulpinoidea*, *Eupatorium perfoliatum*, *E. serotinum*, *Linum striatum*, *Polygala sanguinea*, *Scirpus atrovirens*, and *S. pendulus*. *Scirpus polyphyllus* is restricted to USC.

The USC flora is represented by 27 OBL, 27 FACW, 26 FAC, 25 FACU, 4 UPL, and 5 NC species.

Lower Silver Creek Reservoir. The five wetland habitats of LSC are VOW, EM, SDF, SS, and SGM. The VOW habitat contains *Najas guadalupensis*, *N. minor*, and *Potamogeton nodosus*. The EM zone occurs at the northwestern end by the concrete spillway, extensively at the southern end, and in small areas along the west-and-east trending banks. Char-

acteristic emergents are *Eleocharis quadrangulata*, *Juncus acuminatus*, *Juncus effusus* var. *solutus*, *Leersia oryzoides*, *Scirpus cyperinus*, *S. validus*, and *Typha latifolia*. Other EM taxa include *Acorus calamus*, *Asclepias incarnata*, *Carex* spp., *Hypericum mutilum*, *Ludwigia alternifolia*, *L. palustris*, *Lycopus virginicus*, *Onoclea sensibilis*, and *Panicum rigidulum*.

The SDF habitat nearly encompasses the entire reservoir during times of water draw-down except at the concrete dam. Characteristic species are *Bidens* spp., *Boehmeria cylindrica*, *Fimbristylis autumnalis*, *Impatiens capensis*, *Lycopus virginicus*, *Microstegium vimineum*, *Mimulus alatus*, *M. ringens*, *Polygonum* spp., *Scirpus atrovirens*, and *Xanthium strumarium*. A small zone of SS behind the EM at the south end includes scattered *Platanus occidentalis*, *Salix exigua*, *S. nigra*, *S. sericea*, and *Sambucus canadensis*. The herbaceous layer of SS mainly comprises species present in the seasonally dewatered flats and emergent marsh. The SGM habitats in the southern terminus and the northern end comprise the most floristically rich habitat. Characteristic SGM species include *Agrimonia parviflora*, *Asclepias incarnata*, *Aster dumosus*, *Carex frankii*, *C. lurida*, *C. tribuloides*, *C. vulpinoidea*, *Eupatorium coelestinum*, *E. fistulosum*, *E. perfoliatum*, *Euthamia graminifolia*, *Helianthus angustifolius*, *Lobelia cardinalis*, *L. siphilitica*, *Panicum clandestinum*, *Polygala sanguinea*, *Rhexia virginica*, and *Spiranthes cernua*.

Wetland species found only at LSC are *Acorus calamus*, *Aster puniceus*, *Carex squarrosa*, *C. stipata*, *Cyperus brevifolioides*, *Habenaria flava*, *H. lacera*, *H. peramoena*, *Lilium canadense*, *Pluchea camphorata*, and *Solidago rugosa* (Appendix).

The LSC flora is represented by 36 OBL, 50 FACW, 40 FAC, 36 FACU, 5 UPL, and 10 NC species.

Cowbell Reservoir. Four wetland habitats at CBR are classified as VOW, EM, SDF, and SS. The perimeter is entirely forested with steep terrain on both the east and west-trending banks. *Najas guadalupensis*, *Potamogeton diversifolius*, *P. nodosus*, and *P. pusillus*, are found in the VOW zone. The EM at the south and southwest watershed area supports typical hydrosere successional plants. Characteristic emergent species are *Eleocharis quadrangu-*

lata, *Juncus effusus* var. *solutus*, *Leersia oryzoides*, *Panicum rigidulum*, *Scirpus cyperinus*, *S. pendulus*, and *Typha latifolia*. The SDF zone is located around shoreline especially on the west and south sides. Characteristic species along the SDF shoreline are *Boehmeria cylindrica*, *Carex vulpinoidea*, *Impatiens capensis*, *I. pallida*, *Juncus tenuis*, *Lycopus virginicus*, *Polygonum cespitosum* var. *longisetum*, *Polygonum punctatum*, and *Rotala ramosior*.

Shrub swamp habitats are located on the east and west banks at CBR. Indicator woody trees are *Acer negundo*, *A. saccharinum*, *Betula nigra*, *Platanus occidentalis*, *Populus deltoides*, and *Salix nigra*. Characteristic shrubs are *Hydrangea arborescens*, *Lindera benzoin*, and *Sambucus canadensis*. *Toxicodendron radicans* is the most prevalent woody vine. Herbaceous plants in the SS differ little in species composition from those found in the surrounding EM and SDF habitats.

Wetland species, *Betula nigra*, *Gratiola neglecta*, *Populus deltoides*, *Potamogeton diversifolius*, *P. pusillus*, and *Thelypteris hexagonoptera*, are recorded only from CBR (Appendix).

The CBR flora consists of 34 OBL, 35 FACW, 34 FAC, 35 FACU, 4 UPL, and 8 NC species.

Owsley Fork Reservoir. All six wetland habitats—VOW, EM, SDF, SS, SGM, and SSG—are present at OFR. Characteristic species in the VOW are *Najas guadalupensis*, *N. minor*, *Potamogeton illinoensis*, and *P. nodosus*. Two large areas of EM are present at OFR; one located at the western shore of Madison County and the other at the southeastern shore of Jackson County. Characteristic emergents are *Alisma subcordatum*, *Eleocharis palustris*, *E. quadrangulata*, *Equisetum arvense*, *E. hyemale*, *Galium tinctorium*, *Juncus effusus* var. *solutus*, *Ludwigia alternifolia*, *Sagittaria australis*, *Scirpus purshianus*, *S. validus*, *Typha angustifolia*, and *T. latifolia* (Appendix).

The Seasonally Dewatered Mud-Sand Flats encircle the entire lake in the southwest and southeast coves of the reservoir where the shoreline is much more level, exposed, and drier during water letdown than the shaded north-trending aspect. Characteristic species of the SDF are *Bidens* spp., *Cyperus strigosus*, *Diodia virginiana*, *Eclipta prostrata*, *Eleo-*

charis ovata, *Lindernia dubia*, *Ludwigia palustris*, *Lysimachia nummularia*, *Penthorum sedoides*, *Polygonum* spp., *Rotala ramosior*, *Scirpus purshianus*, *Scutellaria lateriflora*, and *Xanthium strumarium*.

Shrub swamp habitats serve as an intergrading boundary between the SDF and EM zones in the largest coves of Owsley Fork Reservoir. Woody species of the Jackson county SS in the eastern corner of the lake are *Acer negundo*, *A. saccharinum*, *Cornus drummondii*, *Platanus occidentalis*, *Salix exigua*, *S. nigra*, and *S. sericea*. Herbaceous wetland species principally include those of the SGM and SDF zones. The SS in the northwest corner of the reservoir in Jackson County has nearly the same floristic composition in the Madison County side.

Owsley Fork Reservoir has a large SGM on the north side in Jackson County and also on the east side in Madison County. The SGM species include *Agalinis purpurea*, *Agrimonia parviflora*, *Apocynum cannabinum*, *Asclepias incarnata*, *Eupatorium coelestinum*, *E. fistulosum*, *E. perfoliatum*, *Impatiens capensis*, *Juncus* spp., *Mentha* × *piperita*, and *Scirpus atrovirens*. The SSG zones were present at the watershed of the SS of both Madison and Jackson counties where intermittent streams are located. Characteristic woody taxa include *Campsis radicans*, *Clematis virginiana*, *Hydrangea arborescens*, *Lindera benzoin*, *Sambucus canadensis*, and *Toxicodendron radicans*. On the streambanks and gravel bars are found *Bidens* spp., *Boehmeria cylindrica*, *Equisetum arvense*, *Impatiens capensis*, *I. pallida*, *Lobelia siphilitica*, and *Microstegium vimineum*.

Wetland species restricted to OFR are *Cicuta maculata*, *Cornus drummondii*, *Eleocharis tenuis*, *Epilobium coloratum*, *Equisetum hyemale*, *Galium tinctorium*, *Juncus brachycarpus*, *J. diffusissimus*, *J. torreyi*, *Leucospora multifida*, *Lycopus americanus*, *Lysimachia nummularia*, *Potamogeton illinoensis*, *Sagittaria calycina*, and *Typha angustifolia*.

The OFR flora is made up of 47 OBL, 55 FACW, 51 FAC, 42 FACU, 10 UPL, and 9 NC species (Appendix).

Red Lick Reservoir No. 2. RLR has all six wetland habitats—VOW, EM, SDF, SS, SGM, and SSG. Characteristic plants of the VOW habitat are *Brasenia schreberi*, *Lemna minor*,

Najas guadalupensis, and *Potamogeton nodosus*. The EM at this reservoir lies along the east-facing bank and the southern end of the lake. Smaller areas of this habitat can also be found in the northwest corner near the dam and along the steep, west-trending bank of undisturbed mesophytic hardwood forest. The EM zone is dominated by *Eleocharis quadrangulata*, *Juncus effusus* var. *solutus*, *Leersia oryzoides*, *Panicum rigidulum*, *Polygonum densiflorum*, *Scirpus cyperinus*, *Sparganium americanum*, and *Typha latifolia*.

The SDF habitats are located in the south end between the SS and the EM and in a few other small sites depending on the seasonally evaporated water levels. Characteristic species include *Cyperus strigosus*, *Eleocharis ovata*, *Fimbristylis autumnalis*, *Impatiens capensis*, *Lindernia dubia* var. *anagallidea*, *Ludwigia alternifolia*, *Penthorum sedoides*, *Rotala ramosior*, and *Xanthium strumarium*.

A small SS zone at the south end near the SSG entrance and on the disturbed west shore has *Alnus glutinosa*, *Cornus amomum*, *Liquidambar styraciflua*, *Platanus occidentalis*, and *Salix nigra*. Herbaceous plants are primarily those of the SDF and SGM. The SGM along the west side includes *Boehmeria cylindrica*, *Carex lurida*, *C. tribuloides*, *Equisetum arvense*, *Helianthus angustifolius*, *Lobelia siphilitica*, *Lythrum salicaria*, *Mimulus alatus*, *Pilea pumila*, and several other species found mainly on the SDF. The SSG habitat, located at the southern terminus of the reservoir, is floristically different from any of the other habitats. The SSG streambanks include *Carpinus caroliniana*, *Hydrangea arborescens*, *Liquidambar styraciflua*, and *Sambucus canadensis*; gravel bars support *Boehmeria cylindrica*, *Carex torta*, *Equisetum arvense*, *Glyceria striata*, and *Impatiens capensis*.

Alnus glutinosa, *Brasenia schreberi*, *Carex torta*, *Cornus amomum*, *Lemna minor*, *Ludwigia decurrens*, *Liquidambar styraciflua*, *Lythrum salicaria*, *Panicum verrucosum*, *Polygonum densiflorum*, and *Sparganium americanum* are wetland species found only at RLR.

The RLR flora is composed of 35 OBL, 34 FACW, 32 FAC, 26 FACU, 3 UPL, and 5 NC species (Appendix).

DISCUSSION

The five Berea College reservoirs exhibit similar stages of hydrosere succession composed of characteristic wetland species in specific wetland habitats. Each reservoir varies in development of plant habitats and species composition based in part on factors of reservoir age, size and depth, existing vegetation contiguous to the lakes, hydrarch succession, and copper sulfate algicide treatments. The four reservoirs used for utilities water are currently mesoligotrophic. Although Red Lick Reservoir No. 2 is the most recently formed reservoir, it has advanced to a more eutrophic stage than the older reservoirs. Some contributing factors include sedimentation from adjacent reclaimed land, shallow depth, and a lack of direct copper sulfate treatments.

The species richness of wetland and aquatic vascular plants appears to be high with 70% belonging to the OBL, FACW, and FAC categories. This is a significant percentage considering that the upland forested and open terrain is predominately composed of FACU and UPL species. Each reservoir has transitional zones of upland forest and grassy areas bordering the wetland habitats. Many facultative species have taken advantage of the moisture regimens of these reservoirs. Red Lick Reservoir No. 2 has a species richness comparable to the other four reservoirs in total plant species including its number of wetland and aquatic plants.

Hydrarch succession, a type of progressive secondary succession, has been induced by a number of factors at the reservoirs. The first of these factors may have been the presence of viable seed banks prior to reservoir construction. Once these diaspores were given the appropriate environmental conditions for germination and subsequent growth, they became established as various habitats developed. Water and wind are important dispersal mechanisms for propagules. The flora and fauna have shaped the floristic composition in a number of ways. Animals have aided in the distribution of viable seeds to account for a greater species richness. Waterfowl, for example, could be responsible for certain wetland species that clearly were not present prior to lake formation, e.g., *Acorus calamus*, *Brasenia schreberi*, *Lemna minor*, *Sagittaria calycina*, and *Spar-*

ganium americanum. The flora allows for the formation of better-suited habitats for wetland species, through decaying of plant material, resulting in the addition of organic material to the soil, and through increased evapotranspiration, allowing for areas with drier soils (Mitsch and Gosselink 1993). These factors have increased the ability of these areas to support various degrees of high species richness.

Several wetland and aquatic species are locally rare in the wetland habitats of the five reservoirs. These taxa often are restricted to a single reservoir site, i.e., *Habenaria flava*, *H. lacera*, and *H. peramoena* at Lower Silver Creek Reservoir. We encountered no threatened, endangered, or special concern taxa for Kentucky (KSNPC 2000). We did document the presence of *Polygonum densiflorum*, a new Kentucky distribution record. Overall, 292 species have become established in the reservoirs within 10 to 77 years.

ACKNOWLEDGMENTS

Gratitude is extended to the Appalachian College Association, Inc., Berea, Kentucky, for financial support during summer 1998 through a Mellon Faculty/Student Research Grant awarded to Berea College. Special thanks are given to Rudy A. Gelis, a Berea College biology graduate, for field assistance and field collections from the Berea College Reservoirs.

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Appendix. Vascular plants of the five Berea College Reservoirs, Madison and Jackson counties, Kentucky.

Taxon. National Wetland Category. [wetland habitat]	Relative abundances				
	USC	LSC	CBR	OFR	RLR
Equisetophyta					
Equisetaceae					
<i>Equisetum arvense</i> L. FAC. [SSG]	—	O	O	F	O
<i>E. hyemale</i> L. FACW. [SS]	—	—	—	F	—
Lycopodiophyta					
Selaginellaceae					
<i>Selaginella apoda</i> (L.) Fern. FACW. [SSG]	—	I	—	I	—
Polypodiophyta					
Aspleniaceae					
<i>Athyrium filix-femina</i> (L.) Roth. FAC. [SSG]	R	—	—	—	R
<i>A. pycnocarpon</i> (Spreng.) Tidest. FAC. [SSG]	R	—	—	—	—
<i>A. thelypteroides</i> (Michx.) Desv. FAC. [SSG]	I	—	—	—	—
<i>Polystichum acrostichoides</i> (Michx.) Schott. FACU—, [SSG]	I	I	O	R	—
<i>Thelypteris hexagonoptera</i> (Michx.) Weatherby. FAC. [SSG]	—	—	I	—	—
Onocleaceae					
<i>Onoclea sensibilis</i> L. FACW. [SGM]	—	O	I	—	—
Ophioglossaceae					
<i>Botrychium dissectum</i> Spreng. FAC. [SDF]	—	R	R	—	—
Pinophyta					
Taxodiaceae					
<i>Taxodium distichum</i> (L.) Rich. OBL. [SDF]	—	—	—	I	—
Magnoliophyta					
Aceraceae					
<i>Acer negundo</i> L. FAC+. [SDF]	—	—	I	I	—
<i>A. rubrum</i> L. FAC. [SSG]	I	I	I	O	—
<i>A. saccharinum</i> L. FACW [SS]	—	—	I	I	—
Acoraceae					
<i>Acorus calamus</i> L. OBL. [EM]	—	I	—	—	—
Alismataceae					
<i>Alisma subcordatum</i> Raf. OBL. [EM]	I	I	O	F	I
<i>Sagittaria australis</i> (J.G. Smith) Small. OBL. [EM]	R	O	I	R	O
<i>S. calycina</i> Engelm. OBL. [EM]	—	—	—	O	—
Anacardiaceae					
<i>Rhus copallina</i> L. FACU—, [SSG]	—	I	—	—	I
<i>R. glabra</i> L. NC. [SGM]	—	I	—	—	—
<i>Toxicodendron radicans</i> (L.) Kuntze. FAC. [SDF]	O	F	F	O	O
Apiaceae					
<i>Cicuta maculata</i> L. OBL. [SGM]	—	—	—	R	—
<i>Cryptotaenia canadensis</i> (L.) DC. FAC. [SGM]	I	—	I	I	—
* <i>Daucus carota</i> L. NC. [SGM]	I	O	I	O	I
<i>Osmorhiza claytonii</i> (Michx.) Clarke. FACU—, [SGM]	R	—	I	R	—
<i>Sanicula canadensis</i> L. UPL. [SGM]	R	O	I	I	—
Apocynaceae					
<i>Apocynum cannabinum</i> L. FACU. [SGM]	O	O	O	F	I
Asclepiadaceae					
<i>Ampelamus albidus</i> (Nutt.) Britt. FAC. [SDF]	—	—	—	I	—
<i>Asclepias incarnata</i> L. OBL. [SDF]	I	O	I	F	I
<i>A. syriaca</i> L. FACU—, [SGM]	I	I	I	I	R
<i>A. tuberosa</i> L. NC. [SGM]	—	R	—	R	—
<i>A. viridis</i> Walt. NC. [SGM]	R	R	—	—	—
Asteraceae					
* <i>Achillea millefolium</i> L. FACU. [SGM]	I	O	I	—	—
<i>Ambrosia artemisiifolia</i> L. FACU. [SGM]	O	O	I	O	O
<i>A. trifida</i> L. FAC. [SGM]	—	O	—	O	O
<i>Aster cordifolius</i> L. NC. [SSG]	O	O	I	I	I
<i>A. dumosus</i> L. FAC. [SGM]	—	O	I	I	—
<i>A. divaricatus</i> L. NC. [SSG]	—	I	I	I	—
<i>A. lateriflorus</i> (L.) Britt. FACW—, [SDF]	I	I	I	I	—
<i>A. ontarionis</i> Wieg. FAC. [SDF]	—	—	—	I	I

Appendix. Continued.

Taxon. National Wetland Category. [wetland habitat]	Relative abundances				
	USC	LSC	CBR	OFR	RLR
<i>A. pilosus</i> Willd. UPL. [SGM]	—	I	—	I	I
<i>A. prenanthoides</i> Muhl. FAC. [SDF]	—	—	—	I	I
<i>A. puniceus</i> L. OBL. [SDF]	—	R	—	—	—
<i>Bidens cernua</i> L. OBL. [SDF]	—	O	I	I	—
<i>B. frondosa</i> L. FACW. [SGM]	I	I	O	O	O
<i>B. polylepis</i> S. F. Blake. FACW. [SGM]	I	O	I	O	O
* <i>Chrysanthemum leucanthemum</i> L. UPL. [SGM]	—	—	—	I	I
<i>Conyza canadensis</i> (L.) Cronq. UPL. [SGM]	—	—	I	—	—
* <i>Eclipta prostrata</i> (L.) L. FAC. [SDF]	R	—	—	I	—
<i>Elephantopus carolinianus</i> Willd. FACU. [SGM]	—	—	O	—	—
<i>Erechtites hieracifolia</i> (L.) Raf. FACU. [SGM]	—	—	R	R	R
<i>Eupatorium coelestinum</i> L. FAC. [SGM]	—	O	I	O	I
<i>E. fistulosum</i> Barratt. FACW. [SDF]	I	F	—	O	O
<i>E. purpureum</i> L. FAC. [SGM]	—	R	—	—	—
<i>E. perfoliatum</i> L. FACW+. [SGM]	I	O	I	F	O
<i>E. rotundifolium</i> L. FAC-. [SGM]	—	I	—	—	—
<i>E. serotinum</i> Michx. FAC-. [SGM]	I	O	O	O	O
<i>Euthamia graminifolia</i> (L.) Nutt. FAC. [SGM]	—	O	O	O	—
<i>Helenium flexuosum</i> Raf. FAC-. [SDF]	—	I	—	I	—
<i>Helianthus angustifolius</i> L. FACW. [SDF]	—	O	—	—	O
<i>Helianthus microcephalus</i> T. & G. NC. [SGM]	—	—	R	—	—
<i>Iva annua</i> L. FAC. [SGM]	—	—	—	—	I
<i>Lactuca canadensis</i> L. FACU-. [SGM]	I	O	O	I	R
<i>Pluchea camphorata</i> (L.) DC. FACW. [SDF]	—	—	R	—	—
<i>Polymnia uvedalia</i> L. FAC. [SGM]	—	—	R	I	—
<i>Prenanthes altissima</i> L. FACU-. [SGM]	—	—	I	—	—
<i>Pyrrophappus carolinianus</i> (Walt.) DC. NC. [SGM]	—	I	R	R	—
<i>Rudbeckia fulgida</i> Ait. FAC. [SDF]	—	—	R	—	—
<i>R. hirta</i> L. FACU. [SGM]	—	—	I	—	—
<i>R. triloba</i> L. FACU. [SGM]	—	R	—	R	—
<i>Silphium trifoliatum</i> L. FAC. [SGM]	—	I	—	I	—
<i>Solidago caesia</i> L. FACU. [SDF]	O	I	I	O	I
<i>S. canadensis</i> L. FACU. [SGM]	—	F	—	O	I
<i>S. flexicaulis</i> L. FACU. [SDF]	O	O	O	I	—
<i>S. gigantea</i> Ait. FACW. [SDF]	—	—	R	O	—
<i>S. rugosa</i> P. Mill. FAC. [SGM]	—	O	—	—	—
* <i>Sonchus asper</i> (L.) Hill. FAC. [SGM]	—	—	—	—	R
<i>Verbesina alternifolia</i> (L.) Britt. FAC. [SGM]	—	O	—	O	—
<i>Vernonia gigantea</i> (Walt.) Trel. FAC. [SGM]	—	I	—	I	—
<i>Xanthium strumarium</i> L. FAC. [SDF]	I	O	O	F	I
Balsaminaceae					
<i>Impatiens capensis</i> Meerb. FACW. [SGM]	F	F	F	A	F
<i>I. pallida</i> Nutt. FACW. [SSG]	—	—	I	I	I
Betulaceae					
* <i>Alnus glutinosa</i> (L.) Gaertn. FACW-. [SS]	—	—	—	—	I
<i>Betula nigra</i> L. FACW. [SS]	—	—	R	—	—
<i>Carpinus caroliniana</i> Walt. FAC. [SS]	—	—	—	I	I
<i>Corylus americana</i> Walt. FACU-. [SWG]	—	—	—	I	I
Bignoniaceae					
<i>Campsis radicans</i> (L.) Seem. FAC. [SSG]	—	R	I	O	I
Brassicaceae					
* <i>Cardamine hirsuta</i> L. FACU. [SGM]	R	—	R	—	—
<i>Lepidium virginicum</i> L. FACU-. [SGM]	—	—	—	I	—
<i>Rorippa palustris</i> (L.) Bess. OBL. [EM]	—	—	I	O	—
Cabombaceae					
<i>Brasenia schreberi</i> J. F. Gmel. OBL. [VOW]	—	—	—	—	F
Campanulaceae					
<i>Campanula americana</i> L. FACU. [SGM]	—	—	—	I	—
<i>Lobelia cardinalis</i> L. FACW+. [SGM]	—	R	—	I	—
<i>L. inflata</i> L. FACU. [SDF]	I	I	I	O	I

Appendix. Continued.

Taxon. National Wetland Category. [wetland habitat]	Relative abundances				
	USC	LSC	CBR	OFR	RLR
<i>L. puberula</i> Michx. FACW-. [SDF]	—	I	—	I	—
<i>L. siphilitica</i> L. FACW+. [SGM]	I	O	I	O	I
<i>L. spicata</i> Lam. FAC-. [SGM]	—	R	—	—	—
<i>Triodanis perfoliata</i> (L.) Nieuwl. FAC. [SGM]	I	—	—	—	—
Caprifoliaceae					
* <i>Lonicera japonica</i> Thunb. FAC-. [SGM]	O	O	F	F	O
<i>Sambucus canadensis</i> L. FACW. [SWG]	I	O	I	O	I
<i>Viburnum rufidulum</i> Raf. UPL. [SDF]	—	—	R	—	—
Clusiaceae					
<i>Hypericum mutilum</i> L. FACW. [SDF]	I	O	O	O	O
<i>H. punctatum</i> Lam. FAC-. [SDF]	I	I	—	I	I
Commelinaceae					
* <i>Commelina communis</i> L. FAC-. [SGM]	—	—	I	I	I
Convolvulaceae					
<i>Calystegia sepium</i> (L.) R. Br. FAC-. [SGM]	—	—	I	I	—
* <i>Ipomoea lacunosa</i> L. FACW. [SDF]	I	O	—	O	I
<i>I. pandurata</i> (L.) G.Mey. FACU. [SGM]	—	I	I	—	—
Cornaceae					
<i>Cornus amomum</i> P. Mill. FACW. [SS]	—	—	—	—	R
<i>C. drummondii</i> C. A. Mey. FAC. [SS]	—	—	—	R	—
Cuscutaceae					
<i>Cuscuta gronovii</i> Willd. NC. [EM]	—	—	—	I	I
<i>C. indecora</i> Choisy. NC. [SDF]	—	I	I	—	—
<i>C. pentagona</i> Engelm. NC. [SGM]	—	O	—	O	R
Cyperaceae					
<i>Carex frankii</i> Kunth. OBL. [EM]	I	I	I	O	I
<i>C. hirsutella</i> Mack. FACU. [SDF]	—	I	—	—	—
<i>C. lurida</i> Wahl. OBL. [EM]	R	F	I	F	O
<i>C. squarrosa</i> L. FACW. [EM]	—	I	—	—	—
<i>C. stipata</i> Willd. OBL. [EM]	—	R	—	—	—
<i>C. torta</i> F. Booth. FACW. [SSG]	—	—	—	—	O
<i>C. tribuloides</i> Wahl. FACW+. [EM]	R	I	—	O	I
<i>C. vulpinoidea</i> Michx. OBL. [EM]	I	F	O	O	O
<i>Cyperus brevifolioides</i> Thieret & Delahoussaye FACW. [SGM]	—	I	—	—	—
<i>C. flavescens</i> L. OBL. [SDF]	—	I	—	R	—
<i>C. strigosus</i> L. FACW. [EM]	I	O	O	O	O
<i>Eleocharis ovata</i> (Roth) R. & S. OBL. [SDF]	I	F	F	F	O
<i>E. palustris</i> (L.) R. & S. OBL. [EM]	—	—	I	F	—
<i>E. quadrangulata</i> (Michx.) R. & S. OBL. [EM]	—	F	F	O	F
<i>E. tenuis</i> (Willd.) Schult. FACW+. [SDF]	—	—	—	O	—
<i>Fimbristylis autumnalis</i> (L.) R. & S. FACW+. [SDF]	—	O	—	O	O
<i>Rhynchospora capitellata</i> (Michx.) Vahl. OBL. [EM]	—	—	—	—	I
<i>Scirpus atrovirens</i> Muhl. OBL. [SDF]	I	I	I	F	R
<i>S. cyperinus</i> (L.) Kunth. FACW+. [SDF]	O	F	F	F	O
<i>S. pendulus</i> Muhl. OBL. [EM]	I	—	I	O	R
<i>S. polyphyllus</i> Vahl. OBL. [EM]	R	—	—	—	—
<i>S. purshianus</i> Fern. OBL. [EM]	—	—	I	F	—
<i>S. validus</i> Vahl. OBL. [EM]	—	F	—	F	F
<i>Scleria triglomerata</i> Michx. FAC. [SGM]	—	—	—	—	I
Dioscoreaceae					
* <i>Dioscorea batatas</i> Dcne. NC. [SSG]	I	O	—	O	I
Euphorbiaceae					
<i>Acalypha rhomboidea</i> Raf. FACU-. [SDF]	—	—	—	O	I
<i>A. virginica</i> L. FACU-. [SDF]	—	—	—	R	—
<i>Euphorbia maculata</i> L. FACU-. [SDF]	—	R	R	O	—
<i>E. nutans</i> Lagasca. FACU-. [SDF]	—	I	I	O	I
<i>Phyllanthus carolinensis</i> Walt. FAC+. [SDF]	—	—	R	R	—
Fabaceae					
<i>Amphicarpaea bracteata</i> (L.) Fern. FAC. [SGM]	O	F	O	F	O
<i>Apios americana</i> Medik. FACW. [EM]	—	—	—	I	O

Appendix. Continued.

Taxon. National Wetland Category. [wetland habitat]	Relative abundances				
	USC	LSC	CBR	OFR	RLR
<i>Chamaecrista fasciculata</i> (Michx.) Greene. FACU. [SGM]	—	O	—	F	I
<i>Desmanthus illinoensis</i> (Michx.) MacMill. FAC. [SGM]	I	O	—	—	—
<i>Desmodium paniculatum</i> (L.) DC. UPL. [SGM]	O	F	—	O	—
* <i>Lespedeza cuneata</i> (Dum Cours.) Don. FACU-. [SDF]	I	O	I	O	O
<i>L. intermedia</i> (S. Wats.) Britt. NC. [SGM]	—	—	O	—	—
* <i>L. stipulacea</i> Maxim. FACU. [SDF]	—	F	O	—	—
* <i>L. striata</i> (Thunb.) H. & A. FACU. [SDF]	—	—	I	I	—
* <i>Melilotus alba</i> Desr. FACU-. [SGM]	—	—	I	—	R
<i>Strophostyles umbellata</i> (Muhl.) Britt. FACU-. [SGM]	—	I	—	I	—
* <i>Trifolium pratense</i> L. FACU-. [SGM]	—	F	—	—	—
Gentianaceae					
<i>Sabatia angularis</i> (L.) Pursh. FAC+. [SDF]	I	O	R	I	—
Hamamelidaceae					
<i>Liquidambar styraciflua</i> L. FAC. [SS]	—	—	—	—	I
Hydrangeaceae					
<i>Hydrangea arborescens</i> L. FACU. [SSGF]	I	O	O	O	I
Juncaceae					
<i>Juncus acuminatus</i> Michx. OBL. [EM]	I	O	O	O	O
<i>J. biflorus</i> Ell. FACW. [SGM]	—	—	R	O	—
<i>J. brachycarpus</i> Engelm. FACW. [SGM]	—	—	—	I	—
<i>J. diffusissimus</i> Buckl. FACW. [SGM]	—	—	—	O	—
<i>J. dudleyi</i> Wieg. FAC-. [SGM]	—	—	—	—	R
<i>J. effusus</i> L. var. <i>solutus</i> Fern. & Wieg. OBL. [EM]	O	F	O	F	F
<i>J. marginatus</i> Rostk. FACW. [SDF]	—	I	I	O	I
<i>J. tenuis</i> Willd. FAC-. [SGM]	I	O	I	F	O
<i>J. torreyi</i> Cov. FACW. [SGM]	—	—	—	I	—
Lamiaceae					
<i>Collinsonia canadensis</i> L. FAC+. [SGM]	I	I	R	I	—
<i>Lycopus americanus</i> Muhl. OBL. [EM]	—	—	—	O	—
<i>L. virginicus</i> L. OBL. [SDF]	O	O	I	F	I
* <i>Mentha</i> × <i>piperita</i> L. FACW+. [SGM]	—	I	—	O	—
<i>Physostegia virginiana</i> (L.) Benth. FAC+. [SSG]	—	—	—	R	—
* <i>Prunella vulgaris</i> L. FACU. [SGM]	I	O	R	O	I
<i>Pycnanthemum tenuifolium</i> Schrad. FACW. [SDF]	O	F	—	O	R
<i>Scutellaria elliptica</i> Muhl. NC. [SDF]	I	—	—	—	—
<i>Scutellaria lateriflora</i> L. FACW+. [SDF]	I	O	O	F	—
<i>Stachys nuttallii</i> Schuttw. FAC. [SGM]	—	—	—	I	—
<i>S. tenuifolia</i> Willd. FACW+. [SDF]	R	O	I	R	—
<i>Teucrium canadense</i> L. FACW-. [SDF]	—	I	—	—	—
<i>Trichostema dichotomum</i> L. NC. [SGM]	—	—	—	R	—
Lauraceae					
<i>Lindera benzoin</i> (L.) Blume. FACW-. [WM]	—	—	I	I	—
Lemnaceae					
* <i>Lemna minor</i> L. OBL. [VOW]	—	—	—	—	F
Liliaceae					
* <i>Allium vineale</i> L. FACU-. [SGM]	I	I	—	—	—
<i>Lilium canadense</i> L. FAC+. [SGM]	—	R	—	—	—
Linaceae					
<i>Linum medium</i> (Planch.) Britt. FACU. [SDF]	I	I	—	—	—
<i>L. striatum</i> Walt. FACW. [SDF]	O	F	F	O	—
Lythraceae					
<i>Ammannia coccinea</i> Rottb. OBL. [SDF]	—	—	R	—	R
* <i>Lythrum salicaria</i> L. FACW+. [SGM]	—	—	—	—	R
<i>Rotala ramosior</i> (L.) Koehne. OBL. [SDF]	I	—	O	F	I
Magnoliaceae					
<i>Liriodendron tulipifera</i> L. FACU. [SS]	I	O	I	O	O
Melastomataceae					
<i>Rhexia virginica</i> L. OBL. [SDF]	—	O	—	O	—
Molluginaceae					
* <i>Mollugo verticillata</i> L. FAC. [SDF]	—	—	—	O	—

Appendix. Continued.

Taxon. National Wetland Category. [wetland habitat]	Relative abundances				
	USC	LSC	CBR	OFR	RLR
Najadaceae					
* <i>Najas minor</i> All. OBL. [VOW]	O	O	F	F	—
<i>N. guadelupensis</i> (Spreng.) Magnus. OBL. [VOW]	F	F	A	A	F
<i>Fraxinus pennsylvanica</i> Marsh. FACW. [SS]	—	I	I	I	—
Onagraceae					
<i>Circaea lutetiana</i> L. FACU. [SGM]	—	—	—	R	—
<i>Epilobium coloratum</i> Biehler. FACW+. [SDF]	—	—	—	O	—
<i>Ludwigia alternifolia</i> L. FACW+. [SDF]	O	F	I	O	I
<i>L. decurrens</i> Walt. OBL. [EM]	—	—	—	—	R
<i>L. palustris</i> (L.) Ell. OBL. [SDF]	O	F	F	F	F
Orchidaceae					
<i>Habenaria flava</i> (L.) R. Br. FACW. [SGM]	—	R	—	—	—
<i>H. lacera</i> (Michx.) Loud. FACW. [SGM]	—	R	—	—	—
<i>H. peramoena</i> A. Gray. FACW. [SGM]	—	R	—	—	—
<i>Spiranthes cernua</i> (L.) Rich. FACW. [SDF]	—	O	R	R	—
<i>S. lacera</i> (Raf.) Raf. FACU-. [SGM]	I	—	—	—	—
Plantaginaceae					
<i>Plantago rugelii</i> Dcne. FACU. [SGM]	O	—	—	O	—
Platanaceae					
<i>Platanus occidentalis</i> L. FACW-. [SS]	I	O	I	O	I
Poaceae					
* <i>Agrostis gigantea</i> Roth. FACW. [SDF]	I	O	O	O	—
<i>A. perennans</i> (Walt.) Tuckerm. FACU. [SGM]	—	—	I	—	I
<i>Andropogon virginicus</i> L. FACU. [SGM]	—	O	I	O	R
<i>Brachyelytrum erectum</i> (Schreb.) Beauv. NC. [SGM]	—	—	O	—	—
<i>Cinna arundinacea</i> L. FACW+. [SDF]	—	R	O	—	—
* <i>Digitaria ischaemum</i> (Schreb.) Muhl. UPL. [SDF]	—	I	—	O	—
* <i>D. sanguinalis</i> (L.) Scop. FACU-. [SDF]	—	—	—	O	—
* <i>Echinochloa crus-galli</i> (L.) Beauv. FACU. [SDF]	—	—	—	R	—
<i>E. muricata</i> (Beauv.) Fern. FACW+. [SDF]	I	I	I	I	O
* <i>Eleusine indica</i> (L.) Gaertn. FACU-. [SDF]	—	—	—	O	—
<i>Elymus hystrix</i> L. UPL. [SSG]	—	—	I	I	—
<i>E. virginicus</i> L. FACW-. [SDF]	—	I	—	I	—
* <i>Eragrostis pectinacea</i> (Michx.) Nees. FAC. [SDF]	—	—	—	O	—
* <i>E. spectabilis</i> (Pursh) Steudel. UPL. [SGM]	—	—	—	I	—
* <i>Festuca elatior</i> L. FACU-. [SGM]	I	I	R	I	I
<i>Glyceria striata</i> (Lam.) Hitchc. OBL. [EM]	I	O	O	O	O
* <i>Holcus lanatus</i> L. FACU. [SGM]	—	O	—	—	—
<i>Leersia oryzoides</i> (L.) Swartz. OBL. [EM]	O	F	F	F	O
<i>L. virginica</i> Willd. FACW. [SDF]	O	F	O	—	O
* <i>Microstegium vimineum</i> (Trin.) Camus. FAC. [SSG]	F	A	F	A	F
<i>Muhlenbergia frondosa</i> (Poir.) Fern. FAC. [SSG]	—	—	—	O	—
<i>Panicum anceps</i> Michx. FAC. [SGM]	I	F	—	F	O
<i>P. clandestinum</i> L. FAC+. [SDF]	I	F	F	F	O
<i>P. dichotomiflorum</i> Michx. FACW-. [SDF]	—	O	I	I	—
<i>P. dichotomum</i> L. FAC. [SDF]	F	F	F	F	F
<i>P. flexile</i> (Gattinger) Scribn. FACU. [SDF]	—	—	—	I	I
<i>P. lanuginosum</i> Ell. FAC. [SDF]	—	F	—	F	O
<i>P. polyanthes</i> Schult. FAC. [SDF]	O	F	O	F	I
<i>P. rigidulum</i> Nees. FACW+. [EM]	—	I	O	F	I
<i>P. verrucosum</i> Muhl. FACW. [SGM]	—	—	—	—	I
<i>Paspalum laeve</i> Michx. FAC+. [SGM]	—	O	O	F	O
* <i>Setaria faberi</i> Herrm. UPL. [SGM]	R	O	—	I	I
<i>S. geniculata</i> (Lam.) P. Beauv. FAC. [SGM]	—	I	R	O	—
* <i>Sorghum halepense</i> (L.) Pers. FACU. [SDF]	—	—	—	I	—
<i>Tridens flavus</i> (L.) A. Hitchc. FACU. [SDF]	—	O	—	O	—
Polygalaceae					
<i>Polygala ambigua</i> Nutt. UPL. [SGM]	R	—	—	I	—
<i>P. sanguinea</i> L. FACU. [SGM]	I	O	—	—	—

Appendix. Continued.

Taxon. National Wetland Category. [wetland habitat]	Relative abundances				
	USC	LSC	CBR	OFR	RLR
Polygonaceae					
<i>Polygonum amphibium</i> L. OBL. [EM]	—	F	—	F	O
* <i>P. cespitosum</i> Blume. var. <i>longisetum</i> (De Bruyn) Stewart FACU-. [SDF]	I	O	O	F	I
<i>P. densiflorum</i> Meissn. OBL. [EM]	—	—	—	—	I
<i>P. hydropiperoides</i> Michx. OBL. [EM]	—	—	—	O	—
<i>P. lapathifolium</i> L. FACW+. [SDF]	—	R	—	I	—
<i>P. pensylvanicum</i> L. FACW. [SDF]	I	—	O	O	—
* <i>P. persicaria</i> L. FACW. [EM]	—	—	O	I	I
<i>P. punctatum</i> Ell. OBL. [SDF]	I	O	O	O	I
<i>P. sagittatum</i> L. OBL. [SDF]	O	O	—	O	—
<i>P. scandens</i> L. FAC. [SDF]	—	—	—	O	—
<i>P. virginianum</i> L. FAC. [SDF]	—	—	I	I	R
* <i>Rumex crispus</i> L. FACW. [SDF]	—	I	—	O	I
Potamogetonaceae					
<i>Potamogeton. diversifolius</i> Raf. OBL. [VOW]	—	—	R	—	—
<i>P. illinoensis</i> Morong. OBL. [VOW]	—	—	—	F	—
<i>P. nodosus</i> Poir. OBL. [VOW]	F	A	F	A	A
<i>P. pusillus</i> L. OBL [VOW]	—	—	I	—	—
Primulaceae					
* <i>Lysimachia nummularia</i> L. FACW+. [SGM]	—	—	—	F	—
<i>Samolus floribundus</i> HBK. OBL. [SDF]	I	I	O	O	R
Ranunculaceae					
<i>Clematis virginiana</i> L. FAC. [SDF]	R	O	I	F	O
<i>Thalictrum pubescens</i> Pursh. FACW+. [SGM]	—	I	—	—	—
Rosaceae					
<i>Agrimonia parviflora</i> Ait. FACW. [SGM]	I	F	—	A	F
<i>A. rostellata</i> Wallr. FACU. [SGM]	—	I	—	I	—
<i>Geum canadense</i> Jacq. FACU+. [SGM]	I	I	—	O	R
<i>Potentilla norvegica</i> L. FACU. [SGM]	—	—	O	—	—
<i>Rubus pensilvanicus</i> Poir. FACU. [SGM]	—	O	O	F	I
Rubiaceae					
<i>Diodia virginiana</i> L. FACW. [SDF]	—	O	—	F	—
<i>Galium tinctorium</i> (L.) Scop. OBL. [EM]	—	—	—	F	—
<i>G. triflorum</i> Michx. FACU. [SGM]	I	O	I	O	R
Salicaceae					
<i>Populus deltoides</i> Marsh. FAC. [SS]	—	—	R	—	—
<i>Salix exigua</i> Nutt. OBL. [SDF]	—	I	—	F	—
<i>S. nigra</i> Marsh. FACW+. [SS]	I	F	I	F	O
<i>S. sericea</i> Marsh. OBL. [SS]	—	O	—	O	—
Saxifragaceae					
<i>Penthorum sedoides</i> L. OBL. [SDF]	O	O	O	F	I
Scrophulariaceae					
<i>Agalinis purpurea</i> (L.) Pennell. FACW-. [SGM]	—	O	—	I	—
<i>Gratiola neglecta</i> Torr. OBL. [SDF]	—	—	R	—	—
<i>Leucospora multifida</i> (Michx.) Nutt. OBL. [SDF]	—	—	—	R	—
<i>Lindernia dubia</i> (L.) Pennell. var. <i>anagallidea</i> (Michx.) Cooperri- der. OBL. [SDF]	I	O	O	F	I
<i>Mimulus alatus</i> Ait. OBL. [SGM]	O	O	O	O	I
<i>M. ringens</i> L. OBL. [SGM]	R	I	—	F	I
Sparganiaceae					
<i>Sparganium americanum</i> Nutt. OBL. [EM]	—	—	—	—	A
Typhaceae					
<i>Typha angustifolia</i> L. OBL. [EM]	—	—	—	F	—
<i>T. latifolia</i> L. OBL. [EM]	—	A	F	A	F
Urticaceae					
<i>Boehmeria cylindrica</i> (L.) Sw. FACW+. [SDF]	O	F	O	F	I
<i>Laportea canadensis</i> (L.) Wedd. FAC. [SDF]	I	—	I	O	—
<i>Pilea pumila</i> (L.) A. Gray. FACW. [SDF]	O	O	I	F	I

Appendix. Continued.

Taxon. National Wetland Category. [wetland habitat]	Relative abundances				
	USC	LSC	CBR	OFR	RLR
Verbenaceae					
<i>Verbena urticifolia</i> L. FACU. [SGM]	R	O	I	R	—
Vitaceae					
<i>Ampelopsis cordata</i> Michx. FAC+. [SDF]	—	—	—	O	—
<i>Parthenocissus quinquefolia</i> (L.) Planch. FACU. [SDF]	O	I	O	O	O
<i>Vitis vulpina</i> L. FAC. [SDF]	I	O	I	O	I
Totals	114	177	150	214	135

Abbreviations and acronyms used:
Berea College Reservoirs: CBR = Cowbell; LSC = Lower Silver Creek; OFR = Owsley Fork; RLR = Red Lick No. 2; USC = Upper Silver Creek.
National Wetland Categories: FAC = Facultative; FACU = Facultative Upland; FACW = Facultative Wetland; OBL = Obligate; NC = Not Categorized;
UPL = Upland; + = Wetter limit of facultative categories; - = Drier limit of facultative categories.
Reservoir Wetland Habitats: EM = Emergent Marsh; SDF = Seasonally Dewatered Mud-sand Flats; SGM = Sedge-grass Meadow; SS = Shrub Swamp;
SSG = Shallow Stream with Gravel Bar; VOW = Vegetated Open Water.
Relative abundance: R = Rare; I = Infrequent; O = Occasional; F = Frequent; A = Abundant.



Thompson, Ralph L. and Fleming, Chris A. 2004. "Vascular Flora of Five Reservoirs in the Berea College Forest, Madison and Jackson Counties, Kentucky." *Journal of the Kentucky Academy of Science* 65(2), 116–131.

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