A VEGETATIONAL STUDY OF LONG POND SLOUGH, MONTGOMERY COUNTY, TENNESSEE

FRANK EUGENE DODSON

A VEGETATIONAL STUDY OF LONG POND SLOUGH, MONTGOMERY COUNTY, TENNESSEE

An Abstract

Presented to

the Graduate Council of

Austin Peay State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

Frank Eugene Dodson

August 1973

ABSTRACT

A vegetative study of Long Pond Slough, Montgomery County, Tennessee, was conducted throughout the spring, summer and fall months of 1972. The study consisted of two operations: (1) collection, identification and preservation of representative plant specimens, and (2) random pairs sampling of the trees along the shoreline and the observation of the shrub undergrowth.

The results of this study were:

1. The collection and identification of 202 species representing 160 genera and 75 families of plants from the study area.

2. It was found that the vegetation of the study area falls naturally into five major plant communities.

3. Numerous range extensions were reported for the northwestern Highland Rim and Montgomery County. Seven taxa were reported from Middle Tennessee and one taxon from Tennessee for the first time.

Comparisons of the results were made with the work of Eyles and Eyles (1943) on the Reelfoot Lake region. Similarities and differences are discussed.

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August 1973

To the Graduate Council:

I am submitting herewith a Thesis written by Frank Eugene Dodson entitled "A Vegetational Study of Long Pond Slough, Montgomery County, Tennessee." I recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Biology.

Edward N. Costen
Major Professor

We have read this thesis and recommend its acceptance:

Diane S. Findley
Second Committee Member

Floyd L. Brown
Third Committee Member

Accepted for the Council:

Wayne E. Stumpf
Dean of the Graduate School

ACKNOWLEDGEMENTS

The author wishes to express sincere appreciation to Dr. Edward W. Chester for his guidance and assistance in preparation of this thesis. Gratefulness is also extended to Mr. Floyd Brown and Dr. Diane Findley for their suggestions and constructive criticisms of the manuscript.

Appreciation is extended to Joe Schibig and Richard Jensen for their invaluable assistance in carrying out some of the field work.

The author wishes to thank his wife, Linda, for her encouragement and understanding patience during the writing and typing of this manuscript.

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CHAPTER I.

INTRODUCTION

Purposes of the Study

Long Pond Slough is a privately-owned natural swamp located on an alluvial terrace of the Cumberland River. The area is floristically significant because: (1) it is one of the few remaining lowland swamps on the northwestern Highland Rim, and (2) the area is rapidly being encroached upon and filled in for agricultural purposes and will soon lose its unique characteristics. Also, the absence of periodic flooding which occurred before the damming of the Cumberland River in 1966 will undoubtedly lead to changes in the physical characteristics of the area and in the floristic composition of the communities present.

It was the purpose of this study to quantitatively and qualitatively describe and document the plant communities and flora of the area. The floristic affinities of the area were determined and range extensions noted and discussed. In addition, a description of the area is included with data on the soil types and climate taken from published reports.

Description of the Study Area

Long Pond Slough is located in the western section of Montgomery County, Tennessee approximately eight miles west of Clarksville, Tennessee in the Dotsonville community.

Physiographically the area lies within the northwestern Highland Rim which is part of the Interior Low Plateau as defined by Fenneman (1938).

Braun (1950) classifies the area vegetationally as lying within the Western Mesophytic Forest Region of the Eastern Deciduous Forest Formation. According to Braun, forest types of the area vary greatly with local relief and range from mixed mesophytic conditions in the east to oak-hickory segregates, prairie and cedar glade remnants, and extensive swamp forests in the west.

The study area comprises approximately 23.9 acres, 15 of which are permanently inundated. The slough is located on a natural levee approximately 1850 feet from the Cumberland River (Fig. 1). The elevation of the slough is 384 feet above sea level or 25 feet above normal pool elevation of the Cumberland River (U.S.G.S., 1957; U.S. Army, 1971). The slough receives run-off water from adjacent bottomlands and slopes and is apparently fed by underground springs. A run-off area on the south end drains the slough during the wet seasons. Prior to the construction of Barkley Dam on the Cumberland River in 1966, the entire area was flooded periodically by high water from the river.

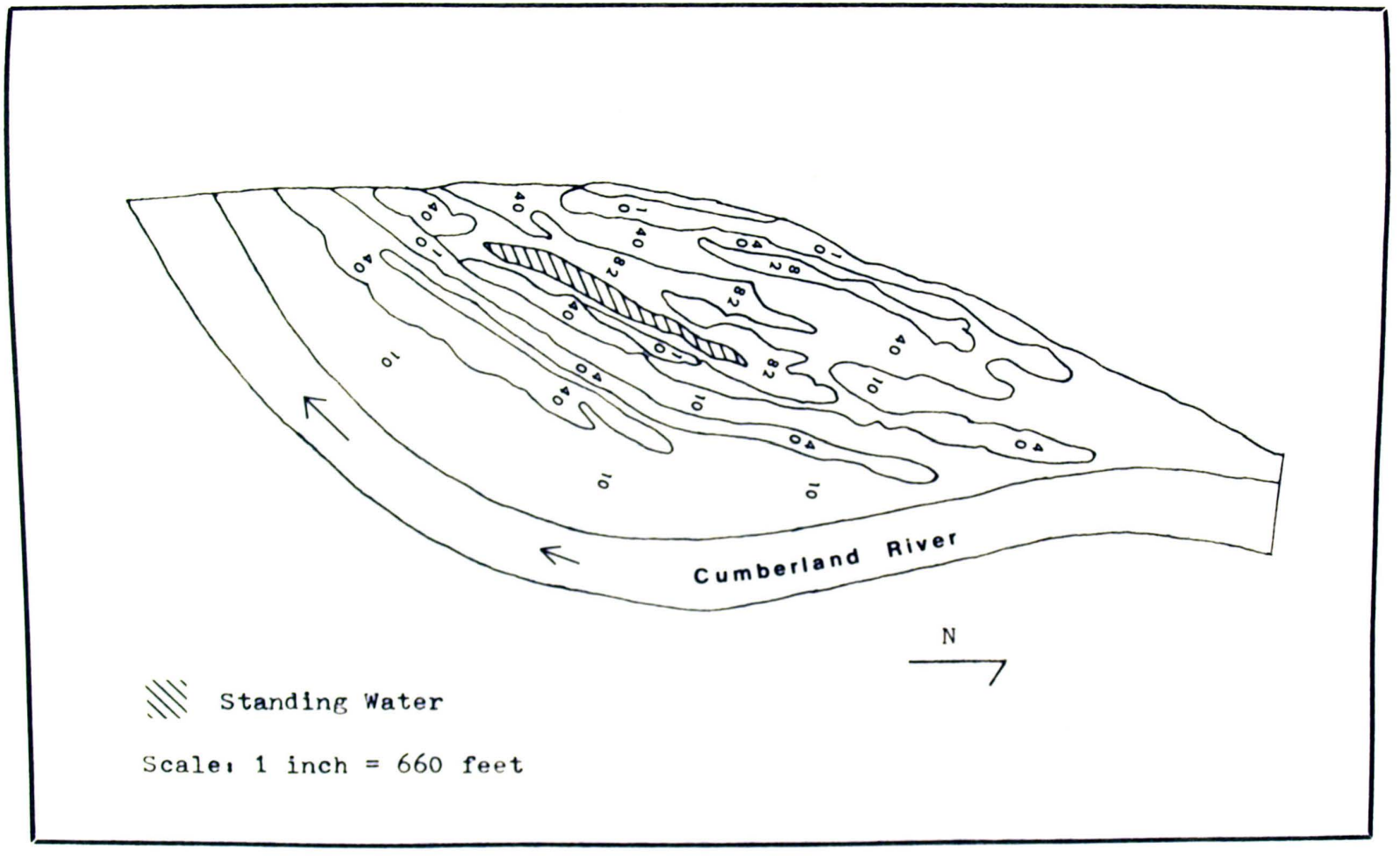

Fig. 1: U.S.D.A. Soil Map of Long Pond Slough and Surrounding Area.

The slough is surrounded by three major soil types (Fig. 1). Newark (82) soil is found at the north end of the slough and in the forest area surrounding the slough on the west side. Newark soils are poorly drained, loamy soils. The soil is permeable and friable to a depth of 30 inches or more. The water table is near the surface in winter and spring and the subsoil is waterlogged and poorly aerated. During the summer months the water table drops and more xeric plants can move into the area vacated by the water; the rooting zone is mostly in the upper 20 inches (U.S.D.A., 1962).

Lindside (40) soil exists on the south end of the slough and extends along the entire east side with one exception; about midway a small strip of Huntington (10) soil exists.

Both the Huntington and Lindside soils are highly productive, nearly level soils on bottomlands and footslopes. They are loamy to a depth of 30 inches or more, have a deep rooting zone and a very high moisture supplying capacity. These soils are easy to work and easy to keep in good tilth. Huntington soils have no important agricultural limitations and have good internal drainage. Lindside soils have slight agricultural limitations due to some waterlogging of the lower subsoil in winter and spring (U.S.D.A., 1966).

The climate of the study area is a warm, temperate one. The growing season of the general area is approximately 208 days with the first killing frost November 3 and the last killing frost April 9. The mean January temperature is 39.3° F and the mean July temperature is 79.7° F with an annual mean temperature of approximately 58.8° F. The average yearly rainfall for the area is 48.92 inches (U.S.D.A., 1941).

Literature Review

Although no data have been published which directly concern lowland swamps of the northwestern Highland Rim, there are numerous references concerning the vegetation of the area. There have also been notes made of the vegetation of swampy areas throughout the state, especially West Tennessee.

The original Tennessee flora was prepared by Gattinger (1901) and revised somewhat by Sharp *et al.* (1956, 1960). This revision included a checklist of the monocots and dicots of Tennessee.

Some families have been studied in detail. These include the Liliaceae (McGilliard, 1955), Juglandaceae and Corylaceae (Hardin, 1952), Violaceae (Russell, 1958), Cyperaceae (Underwood, 1932) and Leguminosae (Mahler, 1970).

Robinson and Shanks (1959) constructed a checklist of the aquatic plants of Tennessee. Jensen, Schibig and

Chester (1973) studied the forest communities of the northwestern Highland Rim of Kentucky and Tennessee and Chester (1973) constructed a preliminary checklist of the trees, shrubs and woody vines of the area. Other local studies of interest include works by Yarbrough (1966), Scott (1967), Duncan and Ellis (1969), Jensen (1972) and Schibig (1972).

Penfound (1952), in a study of southern swamps and marshes, listed the major types of swamps and marshes and Eyles and Eyles (1943) did an extensive study of the Reelfoot Lake region.

CHAPTER II.

METHODS AND MATERIALS

The study consisted of two operations: (1) collection, identification and preservation of representative plant specimens, and (2) random pairs sampling of the trees along the shoreline and observations of the shrub undergrowth.

Specimens were taken randomly on numerous occasions throughout the spring, summer and fall months of 1972. The entire plant specimen was collected whenever feasible; if not, parts of the plant were taken. Field notes were taken as to the location and the habitat along with the assigned plant number and collection date of the specimen collected. The specimens are preserved in the Austin Peay State University Herbarium.

The woody vegetation was sampled by the random pairs method described by Cox (1972). This is a plotless sampling technique developed by Cottam and Curtis (1949). A single line transect was used around the entire shoreline; the species and diameter breast height (dbh) were recorded for each tree sampled. Only trees with a dbh of 10.1 cm. or more were sampled and samples were taken at intervals of 6.2 meters. A total of 214 stations were taken with 428

trees sampled. Voucher specimens were collected from the trees sampled.

For each tree species sampled, the relative density, relative dominance, frequency, relative frequency, average basal area per stem, and an importance value index were obtained using the following formulas as described by Phillips (1959) and Cox (1972).

$$\text{Relative density} = \frac{\text{number of individuals of the species}}{\text{number of individuals of all species}} \times 100$$

$$\text{Relative dominance} = \frac{\text{total basal area of the species}}{\text{total basal area of all species}} \times 100$$

$$\text{Frequency} = \frac{\text{number of points of occurrence of the species}}{\text{total points taken}}$$

$$\text{Relative frequency} = \frac{\text{frequency of a species}}{\text{total of frequency values}} \times 100$$

$$\text{Average basal area per stem} = \frac{\text{total basal area of a species}}{\text{number of individuals of the species}}$$

$$\text{Importance value index (IVI)} = \text{relative density} + \text{relative dominance} + \text{relative frequency}$$

The shrub species, woody species with dbh of less than 10.1 cm., were observed and notes made as to their importance.

Several keys and guides were used in the identification of the plant specimens. They were: Muenscher (1944), Gleason (1952), Fernald (1950), Radford, Ahles and Bell (1968), Shanks and Sharp (1963), Blomquist (1948), Eyles and Robertson (1963) and Rickett (1967). Nomenclature follows Fernald (1950) unless otherwise noted.

CHAPTER III.

RESULTS

This study resulted in a total collection of 202 species representing 160 genera and 75 families. The study revealed that the vegetation falls naturally into five major plant communities. An alphabetical list of plants found in these communities is presented in Table I; also a map showing the location of these communities can be found in Fig. 2. Only six species were found in the open water community; hence this community is not listed in Table I. A vegetative description of these five plant communities follows:

1. Non-marsh forest community - This community surrounds the slough and is rarely inundated. However, most of this community tends to be moist throughout the year. The area is densely populated with herbaceous and woody vine vegetation along with the tree and shrub flora. Lindside is the dominant soil type with Huntington occurring rarely.

The most common herbaceous species encountered were Aster patens, Aster pilosus, Bromus japonicus, Claytonia virginica, Cryptotaenia canadensis, Erigeron philadelphicus, Festuca obtusa, Galium Aparine, Geum canadense, Glechoma

TABLE I: Alphabetical Listing of Taxa Sampled Along with Respective Communities.

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Acer Negundo L.			x	
Acer saccharinum L.		x		
Acer saccharum Marsh.			x	
Alisma subcordatum Raf.	x	x		
Allium canadense L.			x	x
Amaranthus spinosus L.			x	
Ambrosia artemisiifolia L.			x	
Ambrosia trifida L.		x		
Ampelopsis cordata Michx.			x	
Andropogon virginicus L.				x
Anthemis cotula L.				x
Arctium minus (Hill) Bernh.		x		
Armoracia aquatica (Eat.) Wieg.	x			
Artemisia annua L.			x	x
Arundinaria tecta (Walt.) Muhl.			x	
Asimina triloba (L.) Dunal			x	
Aster patens Ait.			x	
Aster pilosus Willd.				x
Bidens aristosa (Michx.) Britt.			x	x
Bignonia capreolata L.			x	
Boehmeria cyclindrica (L.) Su.			x	
Bromus japonicus Thunb.			x	x
Bumelia lycioides (L.) Gaertn.			x	
Campsis radicans (L.) Seem.		x	x	
Capsella Bursa-pastoris (L.) Medic.				x

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Cardamine bulbosa Schreb.			x	
Cardamine hirsuta L.			x	x
Carex alata T. & G.		x		
Carex annectens Bickn.	x	x		
Carex bullata Schkuhr		x		
Carex festucacea Schkuhr	x	x		
Carex Frankii Kunth		x		
Carex Grayii Carey			x	
Carpinus caroliniana Walt.			x	
Carya cordiformis (Wang.) K. Koch			x	
Carya laciniosa (Michx.) Loud.			x	
Carya ovata (Mill.) K. Koch			x	
Celtis laevigata Willd.			x	
Celtis occidentalis L.			x	
Cephalanthus occidentalis L.	x	x		
Cerastium viscosum L.				x
Ceratophyllum demersum L.	x			
Cercis canadensis L.			x	
Chaerophyllum Tainturieri Hook.			x	x
Chrysanthemum Leucanthemum L.				x
Cichorium Intybus L.			x	
Cirsium vulgare (Savi) Tenore		x		
Claytonia virginica L.			x	
Cocculus carolinus (L.) DC.			x	
Commelina communis L.				x

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Cornus Amomum Mill.	x	x		
Crataegus Calpodendron (Ehrh.) Medic.			x	
Cryptotaenia canadensis (L.) DC.			x	x
Cuscuta spp.			x	
Cyperus strigosus L.	x	x		
Dactylis glomerata L.			x	
Daucus Carota L.			x	x
Desmodium canescens (L.) DC.			x	
Desmodium viridiflorum (L.) DC.			x	
Digitaria Ischaemum (Schreb.) Muhl.			x	x
Dioscorea villosa L.			x	
Diospyros virginiana L.			x	
Echinochloa crusgalli (L.) Beauv.		x	x	
Eleocharis obtusa (Willd.) Schultes	x	x		
Eleusine indica (L.) Gaertn.			x	x
Elodea canadensis Michx.	x			
Elymus virginicus L.		x	x	
Erigeron annuus (L.) Pers.			x	x
Erigeron philadelphicus L.			x	x
Erythronium albidum Nutt.			x	
Euonymus atropurpureus Jacq.			x	
Eupatorium coelestinum L.			x	x
Eupatorium serotinum Michx.			x	x
Fagopyrum esculentum Moench.				x
Festuca obtusa Biehler			x	x

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Fraxinus americana L.			x	
Fraxinus pennsylvanica Marsh.			x	
Galium aparine L.			x	
Galium parisiense L.		x		
Geranium carolinianum L.				x
Geum canadense Jacq.		x	x	
Glechoma hederacea L.			x	
Gleditsia triacanthos L.			x	
Glyceria striata (Lam.) Hitchc.	x	x		
Gnaphalium purpureum L.			x	
[1]Helenium amarum (Raf.) Rock				x
Heliotropium indicum L.		x		
Hibiscus moscheutos L.	x	x		
Hordeum pusillum Nutt.			x	x
Hottonia inflata Ell.	x			
Hypericum punctatum Lam.			x	
Impatiens biflora Walt.		x	x	
Iodanthus pinnatifidus (Michx.) Steud.			x	x
Ipomoea hederacea (L.) Jacq.				x
Ipomoea pandurata (L.) G.F.W. Mey.				x
Juglans nigra L.			x	
Juncus effusus L.	x	x		
Juncus tenuis Willd.		x	x	
Juniperus virginiana L.			x	

[1]Nomenclature follows that of Radford, Ahles and Bell (1968)

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Jussiaea decurrens (Walt.) DC.	x	x		
Lactuca Scariola L.			x	
Lamium purpureum L.			x	
Lemna minor L.	x			
Lespedeza striata (Thunb.) H. & A.				x
[2]Lesquerella lescurri (Gray) Wats.				x
Lippia lanceolata Michx.	x			
Liquidambar Styraciflua L.			x	
Lobelia Cardinalis L.		x	x	
Lonicera japonica Thunb.			x	
Ludwigia palustris (L.) Ell.	x			
Lycopus americanus Muhl.	x	x		
Lysimachia Nummularia L.		x		
Menispermum canadense L.		x	x	
Mimulus alatus Ait.		x		
Mollugo verticillata L.				x
Morus rubra L.			x	
Myosurus minimus L.				x
Nuphar advena (Ait.) Ait. f.	x			
Ostrya virginiana (Mill.) K. Koch			x	
Oxalis grandis Small			x	
Oxalis stricta L.			x	
Parthenocissus quinquefolia (L.) Planch.			x	
Penstemon canescens Britt.			x	

[2]Nomenclature follows that of Rickett (1967)

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Penthorum sedoides L.		x		
Phlox paniculata L.			x	
Physalis spp.			x	
Phytolacca americana L.			x	x
Pilea pumila (L.) Gray			x	
Plantago major L.			x	x
Platanus occidentalis L.			x	
Polygonatum biflorum (Walt.) Ell.			x	
Polygonum erectum L.			x	x
Polygonum hydropiperoides Michx.	x	x		
Polygonum pensylvanicum L.		x		
Populus deltoides Marsh.			x	
Potamogeton diversifolius Raf.	x			
Potentilla norvegica L.		x	x	
Prunella vulgaris L.			x	x
Prunus serotina Ehrh.			x	
Ptelea trifoliata (L.) Raf.			x	
Pyrrhopappus carolinianus (Walt.) DC.			x	x
Quercus imbricaria Michx.			x	
Quercus lyrata Walt.			x	
Quercus macrocarpa Michx.			x	
Quercus Michauxii Nutt.			x	
Quercus palustris Muenchh.			x	
Quercus Shumardii Buckl.			x	
Ranunculus abortivus L.			x	x

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Ranunculus carolinianus DC.			x	
Rhus radicans L.		x	x	
Robinia Pseudo-Acacia L.			x	
Rosa setigera Michx.		x		
Rubus argutus Link			x	x
Rudbeckia hirta L.				x
Ruellia strepens L.		x	x	
Rumex crispus L.			x	x
Rumex verticillatus L.	x	x		
Sagittaria latifolia Willd.	x	x		
Salix nigra Marsh.	x	x		
Sanicula canadensis L.			x	
Saururus cernuus L.	x	x		
Scrophularia marilandica L.			x	
Senecio glabellus Poir.			x	x
Setaria viridis (L.) Beauv.			x	x
Sicyos angulatus L.			x	
Sisyrinchium angustifolium Mill.			x	
Smilax Bona-nox L.			x	
Smilax hispida (Muhl.) Fern.			x	
Smilax rotundifolia L.			x	
Solanum carolinense L.				x
Solidago altissima L.				x
Sorgum halepense (L.) Pers.				x
Specularia perfoliata (L.) A. DC.				x

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Spigelia marilandica L.			x	x
Spirodela polyrhiza (L.) Schleid.	x			
Stachys tenuifolia Willd.			x	
Stellaria media (L.) Cyrillo			x	x
Symphoricarpos orbiculatus Moench			x	
Taraxacum officinale Weber			x	x
Teucrium canadense L.			x	
Tovara virginiana (L.) Raf.			x	x
Trifolium procumbens L.				x
Trifolium pratense L.				x
Trifolium repens L.				x
Trillium cuneatum Raf.			x	
Trillium recurvatum Beck			x	
Ulmus rubra Muhl.			x	
Valerianella radiata (L.) Dufr.			x	
Verbascum Blattaria L.			x	
Verbena simplex Lehm.				x
Verbena urticifolia L.			x	
Verbesina helianthoides Michx.			x	x
Verbesina occidentalis (L.) Walt.			x	x
Vernonia altissima Nutt.			x	x
Vicia dasycarpa Ten.				x
Viola papilionacea Pursh			x	x
Viola pensylvanica Michx.			x	x
Vitis palmata Vahl			x	

TABLE I (Continued)

TAXA	Shallow Water Comm.	Swamp Forest Comm.	Non-marsh Forest Comm.	Meadow Comm.
Vitis riparia Michx.			x	
Vitis vulpina L.			x	
Wisteria frutescens (L.) Poir.		x		
Wolffia papulifera C.H. Thompson	x			

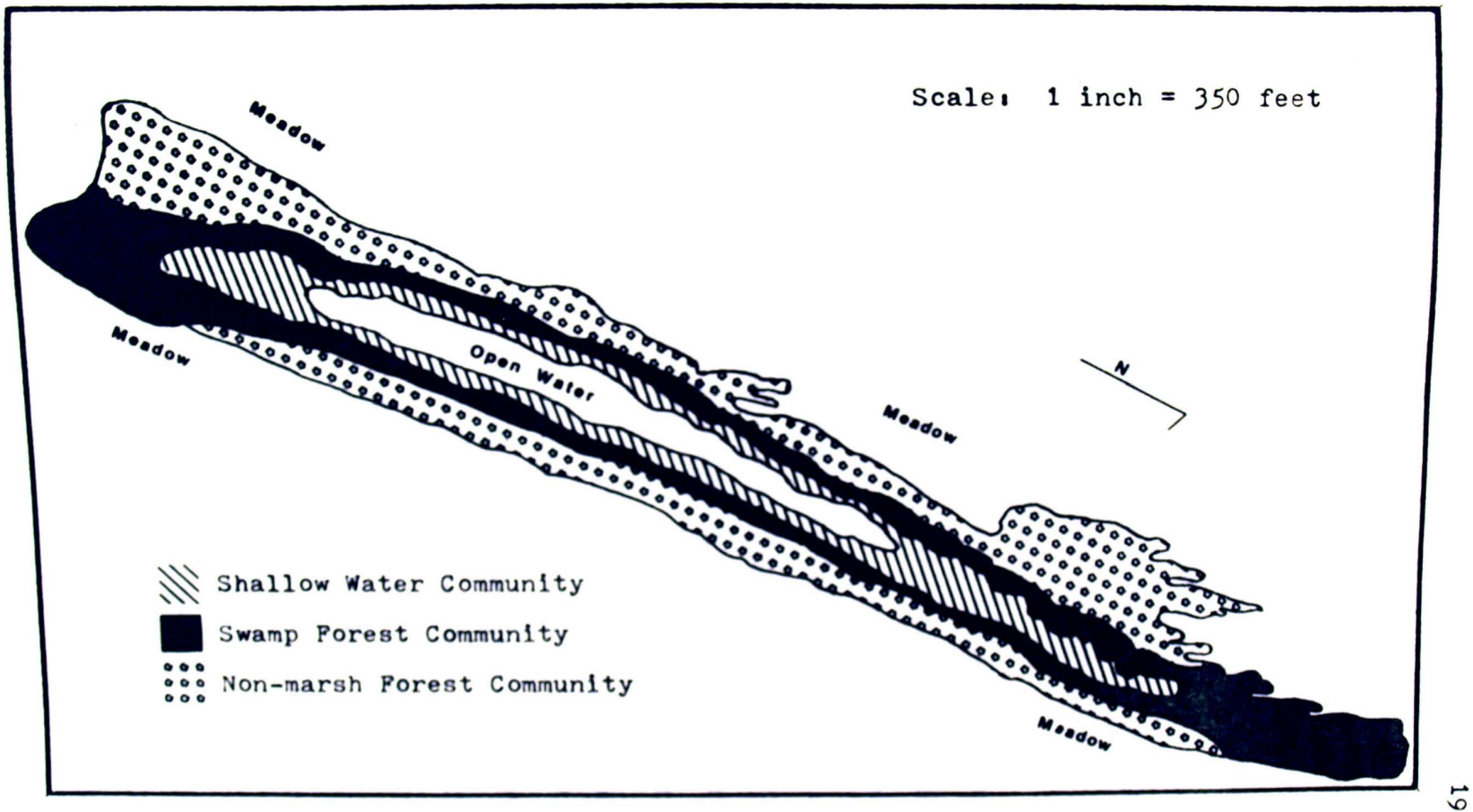

Fig. 2: Map of Long Pond Slough Showing Location of the Plant Communities.

hederacea, Potentilla norvegica, Spigelia marilandica, Stachys tenuifolia, Teucrium canadense, Viola papilionacea and Viola pensylvanica.

The dominant woody vines consisted of Rhus radicans, probably the most encountered of the plant species, Bignonia capreolata, Campsis radicans, Lonicera japonica, Smilax Bona-nox, Smilax hispida, Smilax rotundifolia, Vitis palmata, Vitis riparia and Vitis vulpina.

The ecological survey of the trees, using the random pairs sampling method, resulted in a total of 30 species representing 18 genera sampled in this community. The ecological results are represented in Table II.

It was found that Ulmus rubra, Celtis laevigata and Carya cordiformis were the dominant tree species according to the importance value index. Ulmus rubra had the highest importance value with an IVI of 46.8. Ulmus rubra was sampled 63 times and occurred at 58 out of the 214 plots sampled. This species had a total basal area of 6,356.6 sq. in. with an average basal area per stem of 100.9 sq. in. Celtis laevigata was second with an IVI of 43.6. There were 66 individuals sampled with a total basal area of 5,122.6 sq. in. with an average basal area per stem of 77.6 sq. in. Celtis laevigata occurred in 36 of the 214 plots sampled. Carya cordiformis which ranked third with an IVI of 40.2 was found in 56 of the 214 plots sampled with 61 individuals sampled. This species had a

TABLE II: Summary of Statistical Data Based on the Random Pairs Sampling Method.

SPECIES	No. Indv.	Rel. Dens.	Total B.A.	Rel. Dom.	Avg. B.A. Per Stem	No. Pts. Occur.	Freq.	Rel. Freq.	IVI
Ulmus rubra	63	14.7	6,356.6	17.4	100.9	58	27.1	14.7	46.8
Celtis laevigata	66	15.4	5,122.6	14.0	77.6	56	26.2	14.2	43.6
Carya cordiformis	61	14.3	4,262.2	11.7	69.9	56	26.2	14.2	40.2
Quercus shumardii	25	5.8	4,416.4	12.1	176.6	25	11.7	6.4	24.3
Celtis occidentalis	35	8.2	2,785.9	7.6	79.6	29	13.6	7.4	23.2
Carya laciniosa	38	8.9	1,908.3	5.2	50.2	33	15.4	8.4	22.5
Fraxinus americana	21	4.9	1,607.9	4.4	76.6	21	9.1	5.3	14.6
Quercus macrocarpa	20	4.7	1,811.8	4.9	90.9	19	8.9	4.8	14.4
Acer saccharinum	15	3.5	2,036.0	5.6	135.7	14	6.5	3.5	12.6
Fraxinus pennsylvanica	18	4.2	1,095.6	3.0	60.9	17	7.9	4.3	11.5
Acer Negundo	8	1.9	786.5	2.2	98.3	8	3.7	2.0	6.1
Carya ovata	9	2.1	542.5	1.5	60.2	9	4.2	2.3	5.9
Quercus palustris	7	1.6	419.0	1.4	59.9	7	3.3	1.8	4.8
Platanus occidentalis	5	1.2	660.3	1.8	132.1	5	2.3	1.3	4.3
Carpinus caroliniana	7	1.6	155.6	0.4	22.2	7	3.3	1.8	3.8
Populus deltoides	3	0.7	544.5	1.5	181.5	3	1.4	0.8	2.9

TABLE II (Continued)

SPECIES	No. Indv.	Rel. Dens.	Total B.A.	Rel. Dom.	Avg. B.A. Per Stem	No. Pts. Occur.	Freq.	Rel. Freq.	IVI
Juglans nigra	4	0.9	269.1	0.7	67.3	4	1.9	1.0	2.7
Quercus rubra	3	0.7	448.6	1.2	149.5	3	1.4	0.8	2.7
Robinia pseudoacacia	3	0.7	258.8	0.7	86.3	3	1.4	0.8	2.2
Gleditsia triacanthos	3	0.7	213.4	0.6	71.1	3	1.4	0.8	2.1
Quercus lyrata	2	0.5	165.4	0.5	82.7	2	0.9	0.5	1.5
Acer saccharum	2	0.5	141.5	0.4	70.6	2	0.9	0.5	1.4
Morus rubra	2	0.5	91.5	0.3	45.8	2	0.9	0.5	1.3
Cercis canadensis	2	0.5	49.8	0.1	24.9	2	0.9	0.5	1.1
Quercus imbricaria	1	0.2	158.4	0.4	158.4	1	0.5	0.3	0.9
Quercus michauxii	1	0.2	107.5	0.3	107.5	1	0.5	0.3	0.8
Liquidambar Styraciflua	1	0.2	73.9	0.2	73.9	1	0.5	0.3	0.7
Diospyros virginiana	1	0.2	45.4	0.1	45.4	1	0.5	0.3	0.6
Asimina triloba	1	0.2	14.5	0.1	14.5	1	0.5	0.3	0.5
Ostrya virginiana	1	0.2	13.2	0.1	13.2	1	0.5	0.3	0.5

total basal area of 4,262.2 sq. in. with an average basal area per stem of 69.9 sq. in.

Populus deltoides was found to have the largest basal area per stem with an average of 181.5 sq. in. Ostrya virginiana was found to have the smallest average basal area per stem with that of 13.2 sq. in.

The shrub vegetation consisted of the two dominants, Arundinaria tecta and Symphoricarpos orbiculatus, along with Crataegus Calpodendron, Euonymus atropurpureus, and rarely Ptelea trifoliata.

2. Meadow community - This is an area of pastured meadows surrounding the non-marsh forest community. This bottomland community is rarely inundated but certain parts tend to be moist throughout most of the growing season. The meadow area sampled extended no more than 30.8 meters from the non-marsh forest community. Lindside and Newark soil types make up this area.

This community is continually disturbed by the grazing of livestock and other agricultural practices. The plants occurring in the meadow can best be described as those plants common in pastures, cultivated fields, along ditches and in moist waste places. Some of the dominant species found in this community were Allium canadense, Andropogon virginicus, Artemisia annua, Chaerophyllum Tainturieri, Commelina communis, Daucus Carota, Helenium amarum, Lespedeza striata, Plantago major, Rumex crispus,

Senecio glabellus, Solanum carolinense, Solidago altissima, Sorgum halepense, Specularia perfoliata, Trifolium pratense, Trifolium procumbens, Trifolium repens, Verbesina helianthoides and Vernonia altissima.

3. Swamp forest community - This forest community lies adjacent to the non-marsh forest community, is inundated several months of the year, and is always moist. Newark soils make up this entire area. This community is inhabitated by typical rooted mesic species. The dominant tree making up this area is Salix nigra with Acer saccharinum observed occasionally. No quantitative sampling of woody taxa was done due to the paucity of species; only two tree species were found in this community since only species able to tolerate several months of standing water each year can survive here. There were 43 total species observed in this community as compared to 132 species found in the non-marsh forest community.

Cephalanthus occidentalis dominated the shrub layer. The other shrub species encountered were Cornus Amomum and Rosa setigera.

The herbaceous layer was dominated by numerous mesic species. These were: Alisma subcordatum, Carex alata, Carex annectens, Carex bullata, Carex Frankii, Echinochloa crusgalli, Eleocharis obtusa, Galium parisiense, Glyceria striata, Hibiscus moscheutos, Impatiens biflora, Juncus effusus, Jussiaea decurrens, Lobelia Cardinalis, Mimulus

alatus, Polygonum hydropiperoides, Rumex verticillatus, Sagittaria latifolia and Saururus cernuus.

4. Shallow water community - This community is always inundated but the water is less than three feet deep. The vegetation consists of floating, submerged and emergent taxa with limited woody growth. The woody growth consists of occasional Salix nigra and the shrub species Cephalanthus occidentalis, Cornus Amomum and Rosa setigera.

The floating vegetation consists of Hottonia inflata, Lemna minor, Nuphar advena, Spirodela polyrhiza and Wolffia papulifera.

The submerged taxa consists of Ceratophyllum demersum and Elodea canadensis while the emergent vegetation consists of Alisma subcordatum, Carex annectens, Carex festucacea, Cyperus strigosus, Eleocharis obtusa, Glyceria striata, Hibiscus moscheutos, Juncus effusus, Jussiaea decurrens, Lippia lanceolata, Ludwigia palustris, Polygonum hydropiperoides, Rumex verticillatus, Sagittaria latifolia and Saururus cernuus.

5. Open water community - This community is always inundated and the water is at least five feet deep. This is the smallest of the communities and comprises a narrow strip down the center of the slough. The vegetation consists of six species of floating and submerged aquatics with no woody growth. This area is dominated by Nuphar advena (Ait.) Ait. f. Under the Nuphar advena is a promi-

nent growth of Ceratophyllum demersum L. and Elodea canadensis Michx. and this is overlaid by the free floating species Lemna minor L., Spirodela polyrhiza (L.) Schleid., and Wolffia papulifera C. H. Thompson.

CHAPTER IV.

DISCUSSION OF RESULTS

Numerous range extensions may be reported as a result of this study. These extensions are based upon the comparison of these data with those of Sharp et al. (1956, 1960), Mahler (1970), Robinson and Shanks (1959), Chester (1973) and Jensen, Schibig and Chester (1973). The following taxa are reported as occurring for the first time from the northwestern Highland Rim but have been recorded at other locations from Middle Tennessee: Cardamine hirsuta, Carex bullata, Chrysanthemum Leucanthemum, Cichorium Intybus, Cirsium vulgare, Erigeron annuus, Fagopyrum esculentum, Galium parisiense, Gnaphalium purpureum, Hordeum pussilum, Hypericum punctatum, Iodanthus pinnatifidus, Ipomoea hederacea, Ipomoea pandurata, Jussiaea decurrens, Lactuca Scariola, Lippia lanceolata, Lycopus americanus, Lysimachia Nummularia, Penstemon canescens, Plantago major, Potamogeton diversifolius, Pyrrhopappus carolinianus, Ranunculus carolinianus, Ruellia strepens, Sagittaria latifolia, Sicyos angulatus, Spirodela polyrhiza, Stachys tenuifolia, Tovara virginiana and Viola papilionacea.

The following taxa are reported for the first time from the county but are not new for the Highland Rim: Aster pilosus, Lamium purpureum and Spigelia marilandica.

Seven taxa were reported from Middle Tennessee for the first time. Armoracia aquatica, Ceratophyllum demersum, Hottonia inflata, Lemna minor and Nuphar advena were reported by Robinson and Shanks (1959) as occurring only in the Reelfoot Lake Region. Commelina communis was reported by Sharp et al. (1960) as occurring only in East Tennessee and Rumex verticillatus was previously known only from West Tennessee.

In addition to these range extensions, one taxon is reported from Tennessee for the first time. Wolffia papulifera was previously listed as occurring as far south as Kentucky (Fernald, 1950). This floating species was found in abundance in the shallow and open water communities of the study area.

Jensen and Schibig (1972) in a study of the major forest communities of the northwestern Highland Rim found Acer Negundo, Acer saccharinum and Platanus occidentalis to be the dominant tree species of streambanks and alluvial bottomlands. These taxa had IVI's of 65.2, 53.1 and 38.7 respectively. Other dominants included Ulmus rubra (33.8), Populus deltoides (18.9), Celtis occidentalis (16.9) and Carya cordiformis (13.7).

As a result of this study, it was found that the plant communities of Long Pond Slough and those of Reelfoot Lake have a great similarity.

Penfound (1952), in his research on swamps and marshes of the south, classifies Reelfoot Lake as being a deep, fresh water swamp. He defines a deep, fresh water swamp as fresh water, woody communities, with surface water throughout most or all of the growing season. Long Pond Slough fits perfectly into this classification.

Eyles and Eyles (1943), in a study of Reelfoot Lake, divided the plant communities of that region into two major associations: (1) the aquatic associations which were broken into four communities of the lake proper and (2) the mesophytic associations of the alluvial bottomland and nearby bluffs. The aquatic associations were studied quantitatively and qualitatively while the mesophytic associations were not studied extensively.

Eyles and Eyles (1943) found the community nearest the dry land to be dominated by Salix nigra along with Taxodium distichum. Also important in this community was Cephalanthus occidentalis which formed the shrub layer and Polygonum hydropiperoides dominating the herbaceous layer.

This concurs with my results of the swamp forest community of Long Pond with two exceptions. Polygonum hydropiperoides was an important herbaceous species but the herbaceous layer was dominated more by Saururus cernuus and Carex spp. Taxodium distichum is not found in this area.

Proceeding to deeper water at Reelfoot, they found a Zizaniopsis community dominated by Z. miliacea. This

species was not observed at Long Pond, therefore there is no community corresponding to this one.

The next aquatic community encountered was the water-lily community which corresponds with the shallow water community of Long Pond. The water-lily community of Reelfoot was dominated by Nuphar advena and Nelumbo lutea. Under the lilies was a prominent growth of Ceratophyllum demersum. This was overlaid by a complete cover of small, free floating plants, the duckweeds, called the hydrophyta natantia layer.

Prominent species of the hydrophyta natantia layer were Azolla caroliniana, Lemna spp., Ricciocarpus nutans, Spirodela polyrhiza and Wolffia columbiana. Nuphar advena was also found to be a dominant at Long Pond along with Ceratophyllum demersum and Elodea canadensis as the dominant submergents. The hydrophyta natantia layer consisted of Lemna minor, Spirodela polyrhiza and Wolffia papulifera. Azolla caroliniana, Nelumbo lutea, Ricciocarpus nutans and Wolffia columbiana were not observed at Long Pond.

The last community encountered at Reelfoot was an open water community dominated by Ceratophyllum demersum. This area was completely covered by the hydrophyta natantia layer. This concurs with my results of the open water community of Long Pond with one exception, Nuphar advena along with Ceratophyllum demersum dominated the area.

CHAPTER V.

SUMMARY

A vegetative study of Long Pond Slough, Montgomery County, Tennessee, was conducted throughout the spring, summer and fall months of 1972. The study consisted of two operations: (1) collection, identification and preservation of representative plant specimens, and (2) random pairs sampling of the trees along the shoreline and the observation of the shrub undergrowth.

The results of this study were:

1. The collection and identification of 202 species representing 160 genera and 75 families of plants from the study area.

2. It was found that the vegetation of the study area falls naturally into five major plant communities:

   (1) Non-marsh forest community - Areas rarely inundated but tend to be moist and inhabitated by indicative species.

   (2) Meadow community - Area rarely inundated. Pastured meadows surrounding the non-marsh forest community.

   (3) Swamp forest community - Areas inundated several months of the year and always moist. Inhabitated by typical mesic species.

(4) Shallow water community - Area always inundated, water less than three feet deep. Vegetation of floating, submerged and emergent taxa with some woody growth.

(5) Open water community - Area always inundated, water at least five feet deep. Vegetation mostly floating and submerged aquatics.

3. Numerous range extensions were reported for the northwestern Highland Rim and Montgomery County. Seven taxa were reported from Middle Tennessee and one taxon was represented from Tennessee for the first time.

Comparisons of the results were made with the work of Eyles and Eyles (1943) on the Reelfoot Lake region. Similarities and differences are discussed.

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