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Vegetation of Hot Springs National Park, Arkansas

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Final Report

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April 1, 1980

Prepared for the

SOUTHWEST REGION
NATIONAL PARK SERVICE
UNITED STATES DEPARTMENT
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VEGETATION OF HOT SPRINGS NATIONAL PARK, ARKANSAS

Introduction

The results of several investigations have been published on the flora of Hot Springs National Park, but vegetation communities have not been extensively studied. Examples of floristic investigations include studies on the bryophytes (Lowe, 1919; Scully, 1941), ligneous flora (Palmer, 1926; Gregg and Weldon, 1935), wildflowers (Gregg 1934, 1936), ferns (Scully, 1937, 1939; Moore, 1941), and grasses (Scully, 1942).

Although floristic studies can provide indications of vegetation communities present, they generally do not identify vegetation community types or indicate principal species of forest canopies, woody understories, or forest floors. Also, such studies seldom indicate the ecological relationships of the various communities with each other or with different habitats.

Since basic information on vegetation communities is essential for proper planning of future park development and use, the objectives of this study were to: (1) identify the principal natural vegetation communities present in the park, (2) describe the vegetation of these communities, (3) relate the presence of these communities to habitat conditions such as general aerial environmental conditions, soils and topographic features, and (4) prepare a vegetation map of the park on an aerial photographic mosaic.

Methods

Field work was initiated on May 11, 1979 by a flight over the park in a light aircraft at an altitude of about 1,500 feet. One purpose of this flight was to become better acquainted with the general topography and patterns of

vegetation cover of the area. Another was to obtain high oblique normal color and color infrared transparencies of the vegetation. These transparencies make it possible to delineate pine from hardwood canopies and separate many different species of hardwoods when the transpariencies are taken in late April or early May shortly after the leaves have emerged and expanded (Dale, 1978).

Sampling sites were selected tentatively on the basis of contrasting vegetation patterns as they appeared on vertical black and white aerial photographs and the aerial transparencies. Also, care was taken to make sure that some of the communities selected for sampling occurred on soils derived from different underlying rocks as shown by geologic maps of the area accompanying a study of the water of Hot Springs National Park (Bedinger et al, 1974).

Vegetation was sampled at various times in June, July, and August, 1979. Data for trees and other vegetation over 4.5 feet (1.37 M) tall were obtained by the augmented variable radius method (Rice and Penfound, 1955) and ground cover less than 4.5 feet by an ocular point technique similar to that described by Winkworth and Goodall (1962).

Field data for trees were converted to relative frequency, relative density, and relative basal area. These values are measures of distribution within a stand, numbers of individuals, and size, respectively. The relative values for each species were then summed to produce the importance value (Curtis and McIntosh, 1951). The importance value is an overall summation figure useful for determining relative importance of a given tree species within a forest community or for a comparison of species as they occur in different communities. Since the importance value of all tree species is equal to 300 (this figure may vary slightly because of "rounding off"), the percentage vegetation composition of any species can be obtained by dividing the importance value by 3. For

example, a tree species with an importance value of 75 comprises 25 percent of total tree species present.

High understory saplings between 1 in. and 3.5 in. (2.5 and 8.89 cm) in diameter as measured at 4.5 ft. above the ground and low understory between 4.5 ft. tall up to 1 inch diameter at 4.5 feet were compiled separately and reported as density per acre. Data for ground cover (all vegetation less than 4.5 feet tall) were expressed as percent cover.

A total of 34 stands were studied during the course of the investigation. Quantative data from all strata were taken on 22 sites and sampling of some strata only or detailed observations were made in 12 sites.

The data for all stands were arranged in different groups on the basis of importance values of principal species present. The similarities of these groups were then confirmed using community coefficients derived by a modification of methods described by Jaccard (1912), and a vegetation type designation assigned to each stand.

Since U.S.D.A. black and white vertical photographs were not available, a series of aerials taken 1974 for Hot Springs National Park were used to prepare the photographic mosaic. Park boundary lines drawn on air photographs by park service personnel were first transfered to the mosaic and then the vegetation community types and their extent were entered.

Soil samples were collected from representive sites and sent for analysis to the Soils Laboratory, Department of Agronomy, University of Arkansas. Also, observations were made concerning habitat conditions, photographs were taken, and all sites were marked on topographic maps.

Duplicate voucher specimens of all plant species noted in the sampling data were collected periodically during the study. One set was sent to Hot

Springs National Park and the other deposited in the herbarium of the University of Arkansas.

Designation of Dominants

A dominant is generally defined as a species which exerts community control (Clements, 1916; Oosting, 1956).

Trees with importance values of 75 or more are considered as dominant species while those with importance values between 25 and 74 are regarded as important secondary species.

Although overstory trees are generally recognized as the dominants of a community, some species of the high and low overstory and ground cover vegetation may be regarded as dominants within their own stratum. Both high and low understory species are considered here as dominants if their density per acre values are greater than 100. Those species with values between 60 and 99 are considered to be important secondary species.

Vegetation of the forest floor with 10 percent or more ground cover are considered as dominants while species with cover percentages between 5 and 9 are important secondary species.

These designations are in general agreement with those used by Hite (1959), Bullington (1962), Fullerton (1964), Sullins (1970) and Bailey (1976) in hardwood or pine-hardwood forests in the Ozark region of Arkansas.

Results and Discussion

There are four principal types of forest that occur in the park. These types have been designated primarily on the basis of the dominant and important secondary species present. The types, in order of usual occurrence from mountain tops to lower elevations, are: (1) Upland Hardwood Type, (2) Pine-Oak Hickory Type, (3) Oak Hickory-Pine Type with xeric and mesic subtypes, and (4) Mixed Forest Type.

In the descriptions that follow, one site typical of others of the same type present will be described with accompaning tables in the text. Compiled data for other sites of the various types have been placed in the appendix to reduce the tabular material in the text.

The Upland Hardwood Type

The Upland Hardwood Type occurs principally along ridge tops and gently sloping or flat areas throughout the park. The type supports mostly mesic overstory species in some areas but more xeric oaks predominate on the dry tops of ridges.

Site number 12 located on the ridge of West Mountain is representative of other forests of this type (Figure 1).

No single species occurs as a dominant at this site, but white oak (*Quercus alba*), blackjack oak (*Quercus marilandica*), black oak (*Q. velutina*), mockernut hickory (*Carya tomentosa*) and northern red oak (*Q. rubra*) are present as important secondary species. White oak is a dominant at only one other site of this type and short-leaf pine (*Pinus echinata*) and bitternut hickory (*Carya cordiformis*) are important secondary species at other sites.

The only dominants in the high understory are mockernut hickory and blackjack oak. Important secondary species include black oak, northern red oak, short-leaf pine and service berry (*Amelanchier arborea*).

No species occurred as dominants or important secondary species in the low understudy (Table I).

The forest floor supports stiff sunflower (*Helianthus divaricatus*) as the only dominant in site 12 or any other sites of this type. Important secondary species include deerberry (*Vaccinium stamineum*), dittany (*Cunila origanoides*), and New Jersey tea (*Ceanothus americanus*) at this site (Table II).

Important secondary species found in other sites supporting the Upland Hardwood Type include lowbush huckleberry (*Vaccinium pallidum*), horsemint (*Monarda russeliana*), summer grape (*Vitis aestivalis*) and tree huckleberry (*Vaccinium arboreum*).

The Pine-Oak Hickory Type

The Pine-Oak Hickory Type usually occurs on dry south-facing slopes near tops of ridges. This type is the most xeric of all types present and generally supports the fewest number and variety of species. It is distinguished from other types that support oak and pine by an importance value of 160 or more for pine and relatively large numbers of xeric oaks such as post oak (*Quercus stellata* var. *stellata*) and blackjack oak (*Q. marilandica*). Site number 17, located on Sugarloaf Mountain, is typical of this type (Figure 1).

The only dominant overstory species present is short-leaf pine (*Pinus echinata*) and the principal important secondary species are blackjack oak and post oak. Black hickory (*Carya texana*) commonly occurs as an important secondary species in other sites of this type.

Short-leaf pine is the principal dominant of the high understory. The only other dominant is blackjack oak. Important secondary species are post oak and black hickory.

The low understory supports few species or may be entirely absent in most sites of this type. Short-leaf pine is the only species present in site 17 (Table III).

Ground cover is relatively sparce and highly variable as to species present in different sites. Dominants are goat rue (*Tephrosia virginiana*) and brachyelytrum (*Brachyelytrum erectum*) at site 17. Common important secondary species include rabbit tobacco (*Antennaria plantaginifolia*), tick trefoil

(*Desmodium nudiflorum*), stiff sunflower (*Helianthus divaricatus*), and tree huckleberry (*Vaccinium arboreum*) (Table IV).

Black hickory is the only dominant ground cover species and muscadine grape (*Vitis rotundifolia*), shield fern (*Dryopteris marginalis*), and tick trefoil (*Desmodium nudiflorum*) are the most important secondary species at other sites.

The Oak Hickory-Pine Type

This is by far the most extensive type of forest in the park. The most important species is short-leaf pine (*Pinus echinata*) which occurs as a dominant in most stands of this type. However, the importance value is less than 160 in all sites examined, and the aggregate importance value of the oaks and hickories is usually greater than that of pine. Furthermore, mesic species of oaks, hickories and other hard woods are more common than in the Pine-Oak Hickory Type.

This type is arbitrarily divided into two subtypes on the basis of whether the oaks and other hardwoods present are primarily xeric species such as post oak (*Quercus stellata* var. *stellata*) and blackjack oak (*Q. marilandica*), southern red oak (*Q. falcata*) or hickory. This separation was made because it does not seem justifiable to designate different types on the basis of secondary species only, and also as a matter of convenience for mapping purposes since the two subtypes cannot be distinguished on aerial photographs.

A. Subtype Xeric

This subtype occurs primarily on south or southeast facing slopes below the Pine-Oak Hickory Type or on steeper northern exposures.

Site number 13, located on a south facing slope of West Mountain, is representative (Figure 1).

The only dominant in the overstory is short-leaf pine. Important secondary species are blackjack oak, black hickory (*Carya texana*), and post oak at site 13. White oak (*Quercus alba*), black oak (*Q. velutina*) and bitternut hickory (*C. cordiformis*) are important secondary species at other sites of this subtype.

The only dominant in the high understory at any site is short-leaf pine, and no species is dominant in the low understory. Important secondary species of the high understory include post oak, blackjack oak, black hickory, and mockernut hickory (*Carya tomentosa*) at site 13. No species occurs as an important secondary species in the low understory at this site (Table V).

The only dominant ground cover species at site 13 is broomsedge (*Andropogon virginicus*). Important secondary species are stiff sunflower (*Helianthus divaricatus*), Bosc panic grass (*Panicum boscii*), rabbit tobacco (*Antennaria plantaginifolia*) and short-leaf pine (Table VI). Other sites of this same type support a similar ground cover.

B. Subtype Mesic

This subtype usually occurs on lower north-facing slopes or flat areas. Site number 18, located on a northwest-facing slope near the base of Sugarloaf Mountain, is typical (Figure 1).

Short-leaf pine and white oak share dominance in most sites supporting this subtype. Black hickory is the only important secondary species at site 18, but black oak, mockernut hickory, black gum (*Nyssa sylvatica* var. *syvatica*), and southern red oak are important secondary species at other sites of this same subtype.

Neither high nor low understories support dominants at Site 18, but white oak occurs as an important secondary species in the high understory (Table VII). However, at other sites, white oak is an important secondary species in both

high and low understories, and red maple (*Acer rubrum* var. *rubrum*), mockernut hickory and southern red oak are important secondary species of high understories.

Deerberry (*Vaccinium stamineum*) and prairie spurge (*Euphorbia corollata*) are the only dominant ground cover species at site 18. Important secondary species include daisy fleabane (*Erigeron strigosus*), New Jersey tea (*Ceanothus americanus*), wild yam (*Dioscorea villosa*) and old field goldenrod (*Solidago nemoralis*) as shown in Table VIII.

Ground cover dominants and important secondary species at other sites include muscadine grape (*Vitis rotundifolia*), tree huckleberry (*Vaccinium vacillans*), bitternut hickory (*Carya cordiformis*), bracken fern (*Pteridium aquilinum*), white oak, short-leaf pine, panic grass (*Panicum dichotomum*), flowering dogwood (*Cornus florida*), deerberry, old field goldenrod and greenbrier (*Smilax bona-nox*).

The Mixed Forest Type

The Mixed Forest Type is restricted to areas along Gulpha Creek and to the middle and lower sections of upland ravines. It is the most mesic forest type present in the park.

This type is characterized by large numbers of different overstory trees, none of which are dominant, and a highly variable ground cover. Extensive disturbance of some of these areas in the past is indicated by high cover percentage of Japanese honeysuckle (*Lonicera japonica*) or poison ivy (*Toxicodendron radicans*).

Site number 24 located east of the campground on the floodplain of Gulpha Creek is representative (Figure 1).

Sweetgum (*Liquidambar styraciflua*) and short-leaf pine (*Pinus echinata*) are the most important secondary species at site 24. These and blue beech

(*Carpinus caroliniana*), sycamore (*Platanus occidentalis*), beech (*Fagus grandifolia*), white oak (*Quercus alba*) and black gum (*Nyssa sylvatica* var. *sylvatica*) are principal species at other sites.

White oak and blue beech are dominants of the high understory and blue beech only dominates in the low understory (Table IX).

Japanese honeysuckle is the only dominant ground cover species in site 24 and most of the other sites. Also, important secondary species are absent, but numerous, different kinds of plants are present at this and other sites examined (Table X).

Relation of Environmental Factors to Vegetation Types

Soils

Comparisons of pH, organic matter, and mineral content of soils show that the same soil factors in the five different vegetation types are unusually similar. Where differences in soil factor values are present, most of them are within usual variations known for soils in forests of the same general types elsewhere in Arkansas as described by Fullerton (1964), Youree (1969), Sullins (1970), Foti (1971), Bailey (1976) and others.

Several well-known correlations between soil factors and vegetation exist in the park. One example is the low pH range (4.1-4.3) and high organic matter (4+%) in the Pine-Oak Hickory Type at site 17, with these same general trends occurring in forests with high pine populations throughout the park. Another is the relatively high soil fertility found in the Subtype Mesic of the Oak Hickery-Pine Type at site 18, which is typical of forests of this type (Table XI). Other examples can be cited, but because differences in soil factors are generally small between the different vegetation types, it seems doubtful that these different soil conditions greatly

influence present distribution of the various vegetation types in the park. However, it is likely that initial establishment of some community types of earlier successional stages may have been greatly influenced.

Geology

The present occurrence of vegetation types does not appear to be related to the kinds of underlying rocks. For example, the Upland Hardwoods Type occurs on four different kinds of underlying rocks; the Oak Hickory-Pine Subtype Xeric on three and Subtype Mesic on four; and the Pine-Oak Hickory on three. The Mixed Forest Type occurs on one only, but it is not directly influenced by underlying rocks since it is present mostly on transported alluvium along streams (Table XII).

Slope and Exposure

The occurrence of the different vegetation types correlates best with exposure and slope (Table XII). These two factors in turn determine moisture conditions, which probably have the greatest effect.

The vegetation communities present and their habitats, in order of increasing moisture availability are: (1) post oak-blackjack oak communities of the Upland Hardwoods Type and the Pine-Oak Hickory Type, both of which occur on upper parts of mountains on southwest and south exposures, (2) Subtype Xeric of the Oak Hickory-Pine Type; lower south and southeast exposures, (3) Upland Hardwood Type; lower south exposures and relatively flat areas (except post oak-blackjack oak communities), (4) Subtype Mesic of the Oak Hickory-Pine Type; north exposures and flat areas, and (5) Mixed Forest Type; floodplains and lower parts of upland ravines.

Description of Vegetation Map

The vegetation map has been placed on a mosaic made from copies of scale uncorrected aerial photographs taken in 1974 since U.S.D.A. photographs were not available. The map is presented in three closely arranged separate strip to minimize lateral distortion that occurs along the edges of the strips.

Symbols used to designate each plant community type are listed below:

UH - Upland Hardwood Type

PO - Pine-Oak Hickory Type

OP - Oak Hickory-Pine Type

MF - Mixed Forest Type

C - Recently cut-over areas

F - Presently cultivated fields or areas that obviously have been cultivated within the last few years and have been abandoned. Meadows or pastures are included, also.

D - Disturbed areas that do not appear to fit any of the previously listed categories. This could include dwellings, lawns, parks, campground, etc.

It should be mentioned that some plant communities support species that occur as dominants in several types. Examples include pine, which occurs as a dominant in three of the four principal vegetation types present, and mockernut hickory, post oak, blackjack oak and white oak, one or more of which occur as dominants in at least two types. Thus, lines drawn on the map indicating separate communities where these species dominate may indicate in actuality the center of transition zones between communities. However, the separation of some communities may be fairly distinct such as between the Pine-Oak Hickory Type and the Upland Hardwood Type.

As noted previously, the mesic and xeric subtypes of the Oak Hickory-Pine Type are not separated on the map because they are indistinguishible on air photographs. However, the north-facing slopes that support the Oak-Hickory-Pine Type almost always (unless the slope is very steep or has unusually thin soils) has the Subtype Mesic present and the south and west exposures, the Subtype Xeric. Thus, the exposure gives excellent indications of which subtype is present at any given location.

Finally, very small areas of a vegetation type adjacent to or surrounded by a different type are not indicated on the map.

FIGURES AND TABLES

FIGURE 1. Aerial photographic mosaic showing location of sampling sites.

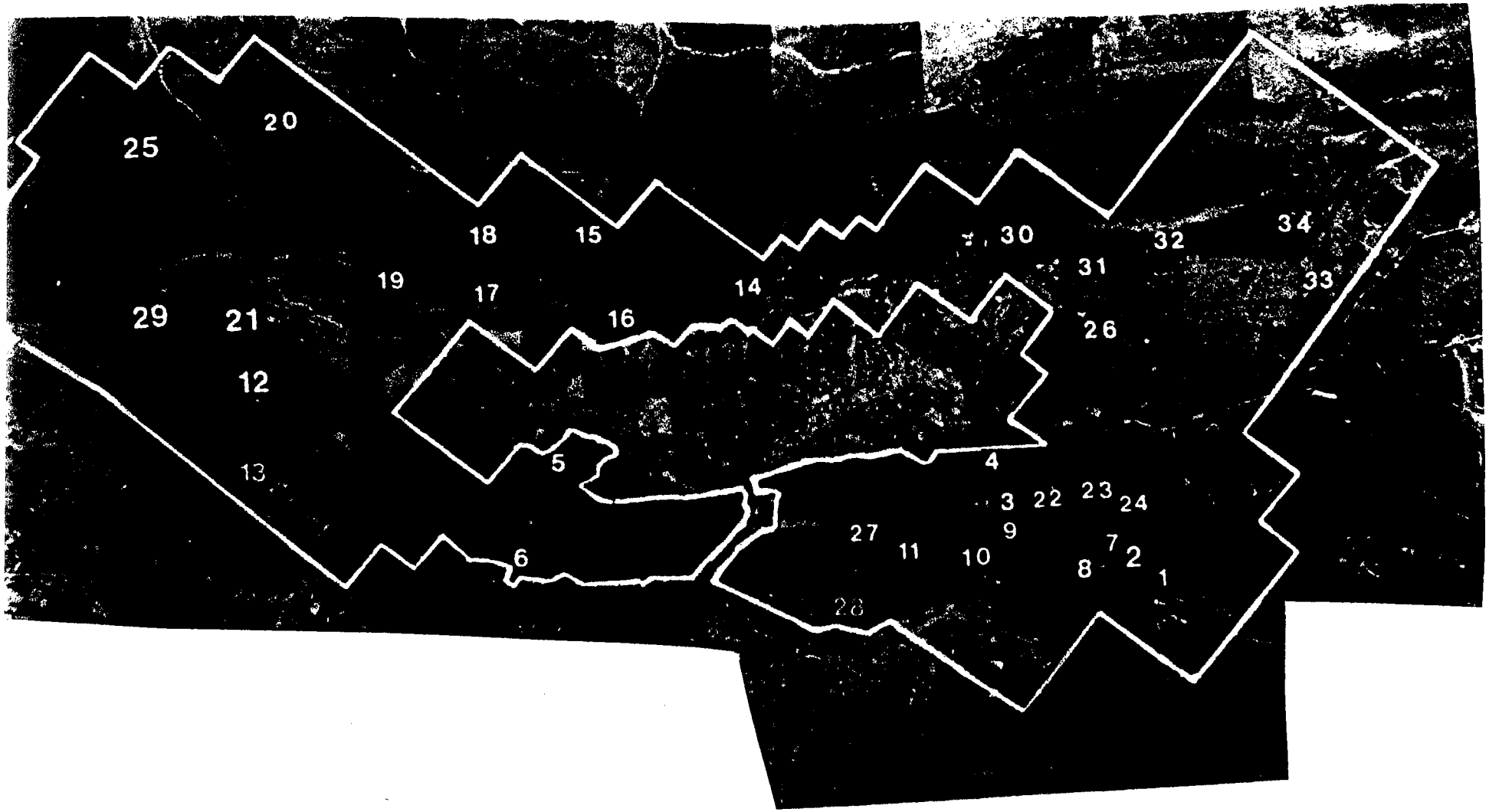
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Table I. Species present, density and basal area per acre and importance value of trees and density per acre of saplings in the high and low understories of the Upland Hardwood Type at site 12.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Quercus alba L.	116.9	8.34	60.69	33	16
Q. marilandica Muench.	50.1	10.00	47.45	100	33
Carya tomentosa (Poir.) Nutt.	16.7	6.67	32.23	116	33
Quercus rubra L.	16.7	6.67	32.23	66	16
Pinus echinata Mill.	16.7	5.00	24.03	66	16
Carya texana Buckl.	50.1	1.67	20.71	33	--
Quercus prinoides Willd. var. *acuminata* (Michx.) Gl.	50.1	--	12.50	16	--
Nyssa sylvatica Marsh. var. *sylvatica*	16.7	1.67	12.37	--	--
Quercus stellata Wang. var. *stellata*	16.7	1.67	12.37	16	--
Prunus serotina Ehrh.	16.7	--	4.16	--	--
Amelanchier arborea (Michx f.) Fern.	--	--	--	66	16
Acer rubrum L. var. *rubrum*	--	--	--	--	--
Cornus florida L.	--	--	--	33	33
Viburnum rufidulum Raf.	--	--	--	--	16
TOTALS	400.8	48.36	299.91	611	195

Table II. Species present and percent cover of forest floor in the Upland Hardwood Type at site 12.

SPECIES	PERCENT COVER
Helianthus divaricatus L.	11.9
Vaccinium stamineum L.	7.5
Cunila origanoides (L.) Britt.	6.7
Ceanothus americanus L.	5.0
Antennaria plantaginifolia (L.) Hook	3.3
Cornus florida L.	3.3
Desmodium ciliare (Muhl.) D.C.	3.3
Euphorbia corollata L.	3.3
Prunus serotina Ehrh.	3.3
Pinus echinata Mill.	2.5
Quercus alba L.	2.5
Rhus copallina L.	2.5
Sassafras albidum (Nutt.) Nees	2.5
Echinacea pallida (Nutt.)	1.7
Hieracium gronovii L.	1.7
Lonicera sp.	1.7
Quercus marilandica Muench.	1.7
Solidago caesia L.	1.7
Toxicodendron radicans (L.) Kuntze	1.7
Vitis aestivalis Michx.	1.7
Acer negundo L.	.8
Baptisia leacophaea Nutt. var. *leucophaea*	.8

Table II. (continued)

SPECIES	PERCENT COVER
Carya texana Buckl.	.8
Diospyros virginiana L.	.8
Lespedeza hirta (L.) Hornem.	.8
Monarda stipitatoglandulosa Waterfall	.8
Sedge sp.	.8
Viburnum rufidulum Raf.	.8
Vicia sativa L.	.8
Vitis rotundifolia Michx.	.8
Bare Ground	22.5

Table III. Species present, density, and basal area per acre and importance value of trees and density per acre of saplings in the high and low understories of the Pine-Oak Hickory Type at Site 17.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	233.8	36.67	164.04	167	17
Quercus marilandica Muench.	33.4	11.67	56.94	134	--
Q. stellata Wang. var. *stellata*	83.5	8.34	56.54	83	--
Carya cordiformis (Wang.) K. Koch.	16.7	1.67	14.17	16	--
Carya texana Buckl.	33.4	--	8.34	83	--
Carya tomentosa (Poir.) Nutt.	--	--	--	33	--
Quercus velutina Lam.	--	--	--	17	--
TOTALS	400.8	58.35	300.03	533	17

Table IV. Species present and percent cover of forest floor in the Pine-Oak Hickory Type at Site 12.17

SPECIES	PERCENT COVER
Bracheyelytrum erectum (Schreb.) Beauv.	11.4
Tephrosia virginiana (L.) Pers.	11.4
Antennaria plantaginifolia (L.) Hook.	5.8
Desmodivm nudiflorum (L.) D.C.	5.8
Helianthus divaricatus L.	5.8
Vaccinivm arboreum Marsh.	5.8
Coreopsis grandiflora Hogg	4.3
Euphorbia corollata L.	4.3
Vitis aestivalis Michx.	4.3
Carya texana Buckl.	2.8
Hieracivm gronovii L.	1.4
Lespedeza hirta (L.) Hornem.	1.4
Panicum lanuginosum Ell.	1.4
Pinus echinata Mill.	1.4
Pteridirm aquilinum (L.) Kuhn.	1.4
Polygala verticillata L.	1.4
Quercus marilandica Muench.	1.4
Quercus stellata Wang. var. *stellata*	1.4
Rhamnus caroliniana Walt.	1.4
Bare Ground	25.7

Table V: Species present, density, and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type, Subtype Xeric, at Site 13.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	233.8	26.67	130.9	33	17
Quercus marilandica Muench.	66.8	10.00	58.02	67	17
Carya texana Buckl.	66.8	10.00	53.01	67	50
Quercus stellata Wang. var. *stellata*	33.4	5.00	26.51	83	17
Carya tomentosa (Poir.) Nutt.	33.4	3.34	23.58	67	17
Ulmus alata Michx.	--	1.67	7.95	--	--
Liquidambar styraciflua L.	--	--	--	17	--
Quercus velutina Lam.	--	--	--	17	--
TOTALS	434.2	56.68	299.97	351	118

Table VI. Species present and percent cover of forest floor in the Oak Hickory-Pine Type, Subtype Xeric, at Site 13.

SPECIES	PERCENT COVER
Andropogon virginicus L.	17.5
Helianthus divaricatus L.	8.2
Antennaria plantaginifolia (L.) Hook	5.1
Panicum boscii Poir.	5.1
Pinus echinata Mill.	5.1
Ceanothus americanus L.	3.4
Desmodium nudiflorum (L.) D.C.	3.4
Quercus marilandica Muench.	3.4
Tephrosia virginiana (L.) Pers.	2.5
Carya texana Buckl.	1.7
Baptisia leucophaea Nutt. var. *leucophaea*	.8
Carya tomentosa (Poir.) Nutt.	.8
Cunila origanoides (L.) Britt.	.8
Lespedeza intermedia (S. Wats.) Britt.	.8
Rhus copallina L.	.8
Sanicula canadensis L.	.8
Bare Ground	48.5

Table VII. Species present, density, and basal area per acre and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type, Subtype Mesic, at Site 18.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	183.7	21.67	94.75	17	--
Quercus alba L.	16.7	16.67	79.10	67	17
Carya texana Buckl.	33.4	6.67	30.29	50	33
Quercus rubra L.	66.8	3.34	26.27	17	--
Q. velutina Lam.	33.4	3.34	20.39	67	--
Nyssa sylvatica Marsh. var. *sylvatica*	16.7	3.34	12.90	17	--
Quercus falcata Michx. var. *falcata*	16.7	3.34	12.90	--	--
Q. stellata Wang. var. *stellata*	16.7	1.67	10.20	17	--
Rhamnus caroliniana Walt.	16.7	1.67	10.20	17	--
Carya tomentosa (Poir.) Nutt.	16.7	--	2.94	--	33
TOTALS	567.8	61.71	299.90	269	83

Table VIII. Species present and percent cover of forest floor in the Oak Hickory-Pine Type, Subtype Mesic, at Site 18.

SPECIES	PERCENT COVER
Vaccinium stamineum L.	24.8
Euphorbia corollata L.	17.1
Erigeron strigosus Muhl.	8.5
Ceanothus americanus L.	5.7
Dioscorea villosa L.	5.7
Solidago nemoralis Ait.	5.7
Baptisia leucophaea Nutt. var. *leucophaea*	4.2
Quercus alba L.	4.2
Aster patens Ait.	2.8
Quercus falcata Michx. var. *falcata*	2.8
Antennaria plantaginifolia (L.) Hook.	1.5
Carya texana Buckl.	1.5
Carya tomentosa (Poir.) Nutt.	1.5
Helianthus divaricatus L.	1.5
Passiflora lutea L.	1.5
Pinus echinata Mill.	1.5
Quercus velutina Lam.	1.5
Bare Ground	8.5

Table IX. Species present, density, and basal area per acre and importance value of trees and density per acre of saplings in the high and low understories of the Mixed Forest Type at Site 24.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Liquidambar styraciflua L.	100.2	25.00	71.66	33	--
Pinus echinata Mill.	50.1	46.67	70.62	--	--
Quercus rubra L.	66.8	5.00	35.91	33	--
Carpinus caroliniana Walt.	--	16.67	24.22	200	100
Carya tomentosa (Poir.) Nutt.	16.7	5.00	18.31	--	--
Quercus alba L.	--	8.34	14.98	133	--
Platanus occidentalis L.	16.7	3.34	14.16	--	--
Ulmus americana L.	16.7	1.67	10.04	--	--
Prunus serotina Ehrh.	16.7	3.34	8.46	--	--
Carya cordiformis (Wang.) K. Koch	--	3.34	8.26	--	17
Cornus florida L.	--	5.00	6.67	33	33
Acer rubrum L. var. *rubrum*	--	1.67	4.14	17	17
Magnolia acuminata L.	--	1.67	4.14	--	--
Quercus falcata Michx. var. *falcata*	--	--	4.14	--	17
Quercus velutina Lam.	--	1.67	4.14	--	--
Alnus serrulata (Ait.) Willd.	--	--	--	--	17
Assimina triloba (L.)Dunal	--	--	--	--	50
Erechtites hieraciifolia (L.) Raf. ex D.C. var. *hieraciifolia*	--	--	--	--	33

Table IX. (continued)

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Bumelia lanuginosa (Michx.) Pers.	--	--	--	--	17
Nyssa sylvatica Marsh var. *sylvatica*	--	--	--	33	--
Ulmus crassifolia Nutt.	--	--	--	--	33
TOTALS	283.9	130.05	299.88	482	334

Table X. Species present and percent cover of forest floor in the Mixed Forest Type at Site 24.

SPECIES	PERCENT COVER
Lonicera japonica Thunb.	25.0
Toxicodendron radicans (L.) Kuntze	4.2
Berchemia scandens (Hill) K. Koch	3.4
Boehmeria cylindrica (L.) Sw.	2.5
Ostrya virginiana (Mill.) K. Koch	2.5
Parthenocissus quinquefolia (L.) Planchon	2.5
Smilax bona-nox L.	2.5
Solidago hispida Muhl.	2.5
Aster cordifolius L.	1.7
Asimia triloba (L.) Dunal	1.7
Nyssa sylvatica Marsh var. *sylvatica*	1.7
Ligustrum sinense Lour.	1.7
Carex sp.	1.7
Brachyelytrum erectum (Schreb.) Beauv.	.8
Chasmanthium latifolium (Michx.) Yates	.8
Cocculus carolinus (L.) D.C.	.8
Cornus florida L.	.8
Dioscorea villosa L.	.8
Erechtites hieraciifolia (L.) Raf.	.8
Euonymus americanus L.	.8
Impatiens capensis Meerb.	.8

Table X. (continued)

SPECIES	PERCENT COVER
Mitchella repens L.	.8
Podophyllum peltatum L.	.8
Polygonum virginianum L.	.8
Silene sp.	.8
Vaccinium stamineum L.	.8
Miscellaneous forbs	3.4
Bare Ground	32.5

Table VI. Summary of results of soil analysis for all vegetation types at representative sites. Figures presented are averages of 4 replicate samples at each site except pH where highest and lowest values are presented. Organic matter is expressed as percent and all other figures as pounds per acre, except conductivity.

Type	Site No.	pH	O.M.	P	K	Ca	Na	Mg	Cond.
Upland Hardwood	12	4.3-5.3	3.0	17	123	1100	73	148	49
Pine-Oak Hickory	17	4.1-4.3	4.0+	13	60	475	88	73	52
Oak Hickory-Pine (Xeric Subtype)	13	4.4-4.7	4.0	15	90	925	73	83	54
Oak Hickory-Pine (Mesic Subtype)	18	4.9-6.8	3.0	89	205	2375	88	195	85
Mixed Hardwood	24	3.9-5.4	4.0	21	152	1125	88	168	85

Table XII. Underlying rocks and exposure at sampling sites of the different vegetation types. Observational sites are indicated by asterisk (*). Geology abbreviations are: Ms - Stanley Shale; Mhs - Hot Springs Sandstone; Mda - Arkansas Novoculite; SOmp - Missouri Mountain Shale, Blaylock Sandstone, Polk Creek Shale; OW - Womble Shale and Obf - Bigfork Chert. Exposures shown as flat and with a direction indicate a site that includes both level or nearly level and sloping areas.

Site No.	Vegetation Type	Geology	Exposure
1*	Pine-Oak Hickory	Mda	South
2*	Pine-Oak Hickory	Mda	West
3*	Oak Hickory-Pine, Xeric	Mda	Northwest
4*	Oak Hickory-Pine, Mesic	Mda	North
5*	Oak Hickory-Pine, Mesic	SOmp, Obf	North
6	Oak Hickory-Pine, Xeric	Mhs	South
7	Oak Hickory-Pine, Mesic	Mda	North
8*	Pine-Oak Hickory	Mda	South
9	Mixed Forest	Mda	Protected Ravine
10	Oak Hickory-Pine, Mesic	Mhs	Northeast
11	Oak Hickory-Pine, Xeric	Mda	Southeast
12	Upland Hardwood	Mda	South
13	Oak Hickory-Pine, Xeric	Mhs	South
14	Oak Hickory-Pine, Xeric	Mda	Southeast
15	Upland Hardwood	Mhs	South, Flat
16	Oak Hickory-Pine, Xeric	Mda, SOmp	Southeast
17	Pine-Oak Hickory	Mda	South
18	Oak Hickory-Pine, Mesic	Mhs	North
19	Oak Hickory-Pine, Mesic	Obf	North, Flat
20*	Upland Hardwood	Ms	Flat
21*	Oak Hickory-Pine, Mesic	Mda	South
22	Mixed Forest	Mda	Protected Ravine
23	Mixed Forest	Mda	Protected Ravine
24	Mixed Forest	Mda	Protected Ravine
25*	Upland Hardwood	Mda	Northwest, Flat
26	Upland Hardwood	Obf	Flat
27*	Pine-Oak Hickory	Mhs	South

Table XII. (continued)

Site No.	Vegetation Type	Geology	Exposure
28*	Oak Hickory-Pine, Mesic	Mda	South
29*	Upland Hardwood	Mda	Southeast
30	Pine-Oak Hickory	Obf	South
31	Oak Hickory-Pine, Mesic	Obf	North, Flat
32	Pine-Oak Hickory	Obf	South
33	Oak Hickory-Pine, Mesic	Obf	North, Flat
34	Oak Hickory-Pine, Mesic	Obf	North, Flat

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APPENDIX I

Results of Soil Analysis

APPENDIX TABLES I-V

Appendix
Table I. Results of soil analysis for sites in the Upland Hardwoods Type. Four replicate samples were taken at each site and indicated as A, B, C, and D. Organic matter is presented as percent and all other factors except pH and conductivity are shown as pounds per acre. Asterisk (*) indicates observational site.

Site No. 12 --

Replicates	pH	OM	P	K	Ca	Na	Mg	Cond
A	5.3	4.0+	17	150	1600	70	200	52
B	5.1	3.3	11	110	1400	70	160	55
C	4.3	2.1	16	130	400	70	90	42
D	4.8	3.8	22	100	1000	80	140	48

Site No. 15 --

A	3.8	2.8	3	90	200	70	50	73
B	4.6	2.3	19	60	100	70	30	48
C	4.3	3.1	15	90	200	80	30	47
D	4.5	3.9	23	130	600	100	70	63

Site No. 20*--

A	4.7	3.3	19	100	700	70	90	52
B	5.6	4.0+	18	160	1900	80	200	69
C	4.7	4.0+	13	130	800	70	100	88
D	4.4	3.2	11	70	400	60	60	44

Site No. 26 --

A	4.7	1.9	13	150	500	90	160	52
B	4.5	2.3	14	120	300	100	90	58
C	5.5	4.0+	32	220	2900	90	480	106
D	4.0	2.8	51	80	200	80	30	53

Appendix
Table II. Results of soil analysis for sites in the Pine-Oak Hickory Type. Four replicate samples were taken at each site and indicated as A, B, C, and D. Organic matter is presented as percent and all other factors except pH and conductivity are shown as pounds per acre. Asterisk (*) indicates observational site.

Site No. 2*--

Replicates	pH	OM	P	K	Ca	Na	Mg	Cond
A	4.8	4.0+	10	100	900	70	120	90
B	5.9	3.3	8	70	1600	90	140	80
C	4.8	3.9	15	120	1000	70	140	80
D	4.7	3.6	10	90	800	70	100	88

Site No. 8 --

A	4.8	4.0+	29	140	1000	70	140	68
B	4.9	3.9	32	110	700	80	120	63
C	5.0	3.9	11	90	1100	70	110	54
D	5.0	4.0+	9	120	1700	80	160	100

Site No. 17 --

A	4.1	4.0+	9	50	500	90	90	50
B	4.3	4.0+	14	70	700	90	90	61
C	4.1	4.0+	17	50	200	80	40	50
D	4.2	4.0+	13	70	500	90	70	48

Site No. 27*--

A	4.1	3.3	12	100	300	90	50	53
B	4.3	2.4	12	80	250	90	40	45
C	4.2	3.1	11	100	300	80	50	52
D	5.5	4.0+	21	140	2400	80	180	84

Appendix
Table III. Results of soil analysis for sites in the Oak Hickory-Pine Type, Xeric Subtype. Four replicate samples were taken at each site and indicated as A, B, C, and D. Organic matter is presented as percent and all other factors except pH and conductivity are shown as pounds per acre. Asterisk (*) indicates observational site.

	Replicates	pH	OM	P	K	Ca	Na	Mg	Cond
Site No. 3*--	A	4.4	3.3	25	120	400	50	50	58
	B	4.6	3.3	29	90	300	70	30	45
	C	4.5	2.8	33	100	300	60	30	52
	D	4.9	3.9	30	80	1400	80	90	78
Site No. 11 --	A	4.7	4.0+	10	120	1000	70	110	60
	B	4.8	3.3	13	80	600	80	70	56
	C	5.1	3.9	17	120	1600	70	140	72
	D	4.4	3.8	12	110	600	60	60	56
Site No. 13 --	A	4.7	4.0+	13	100	1400	70	130	73
	B	4.7	4.0+	17	110	1300	80	100	60
	C	4.4	3.9	12	70	500	70	50	48
	D	4.5	2.5	17	80	500	70	50	36
Site No. 14 --	A	5.1	3.3	28	60	1400	50	120	73
	B	4.7	4.0+	15	110	700	60	110	90
	C	4.9	4.0+	40	130	1400	80	120	90
	D	4.4	4.0+	17	110	600	80	80	66
Site No. 16 --	A	3.9	4.0+	10	130	500	70	70	64
	B	4.0	3.7	12	80	200	90	30	48
	C	4.4	4.0+	13	100	800	70	70	82
	D	4.1	4.0+	15	80	700	80	70	61

Appendix
Table IV. Results of soil analysis for sites in the Oak Hickory-Pine Type, Mesic Subtype. Four replicate samples were taken at each site and indicated as A, B, C, and D. Organic matter is presented as percent and all other factors except pH and conductivity are shown as pounds per acre. Asterisk (*) indicates observational site.

Site No. 4*--

Replicates	pH	OM	P	K	Ca	Na	Mg	Cond
A	4.4	2.6	13	90	400	70	70	68
B	4.5	2.7	15	90	300	70	60	70
C	4.4	2.7	14	70	300	60	40	52
D	5.9	2.8	16	70	1600	70	60	150

Site No. 7 --

A	4.3	2.1	10	100	300	60	40	49
B	4.6	2.8	9	50	300	60	30	46
C	4.7	3.3	12	100	500	60	50	55
D	4.5	2.2	14	130	400	70	50	50

Site No. 10 --

A	4.4	3.6	20	100	300	60	50	64
B	4.9	3.8	9	100	800	80	100	66
C	4.8	4.0+	11	110	1000	80	130	68
D	4.3	4.0+	15	130	500	60	70	46

Site No. 18 --

A	5.3	2.4	76	180	1500	100	150	74
B	6.8	4.0+	88	230	3700	90	230	106
C	5.9	4.0+	81	240	3100	90	260	102
D	4.9	3.5	109	170	1200	70	140	56

Site No. 19 --

A	4.3	4.0+	18	100	400	90	70	56
B	4.4	3.9	14	130	500	100	80	64
C	4.0	3.8	16	80	300	70	50	69
D	4.0	4.0+	17	80	200	60	50	55

Site No. 28*--

A	4.9	4.0+	17	150	900	90	160	68
B	5.1	4.0+	16	150	1500	90	220	74
C	4.8	1.4	9	110	600	70	160	48
D	4.8	3.4	14	180	700	120	180	50

Appendix Table V. Results of soil analysis for sites in the Mixed Forest Type. Four replicate samples were taken at each site and indicated as A, B, C, and D. Organic matter is presented as percent and all other factors except pH and conductivity are shown as pounds per acre.

	Replicates	pH	OM	P	K	Ca	Na	Mg	Cond
Site No. 9 --	A	4.2	0.7	15	50	100	60	30	41
	B	4.8	3.7	10	90	1000	100	100	78
	C	4.2	2.5	22	90	200	70	40	56
	D	5.5	4.0+	16	130	2300	120	190	51
Site No. 22 --	A	5.4	4.0+	90	150	2500	110	220	208
	B	5.0	2.6	22	90	1000	90	130	80
	C	5.1	3.8	51	150	1300	90	180	83
	D	4.8	3.3	13	120	1000	80	150	62
Site No. 23 --	A	4.8	2.3	48	100	9000	90	120	66
	B	4.7	2.4	18	120	800	100	120	60
	C	4.6	3.3	36	130	800	90	160	66
	D	5.0	3.3	16	120	1000	80	150	61
Site No. 24 --	A	3.9	3.3	17	110	300	80	50	85
	B	3.7	4.0+	18	90	300	100	50	82
	C	5.6	4.0+	33	250	2700	90	390	106
	D	5.0	3.9	16	160	1200	80	180	68

APPENDIX II

Results of Vegetation Analysis

Section A - Upland Hardwoods Type

Section B - Pine-Oak-Hickory Type

Section C - Oak Hickory-Pine Type
Subtype Xeric

Section D - Oak Hickory Pine Type
Subtype Mesic

Section E - Mixed Forest Type

APPENDIX II

Results of Vegetation Analysis
Section A - Upland Hardwoods Type

APPENDIX TABLES VI - IX

Table VI. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Upland Hardwood Type at Site 15.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Quercus alba L.	66.8	15.00	65.89	66	16
Quercus falcata Michx. var. *falcata*	116.9	13.34	64.27	-	-
Carya cordiformis (Wang.) K. Koch	116.9	10.00	54.08	10	16
Quercus velutina Lam.	100.2	5.00	41.92	83	-
Pinus echinata Mill.	50.1	3.34	24.59	16	16
Quercus rubra L.	33.4	5.00	24.19	10	33
Q. Stellata Wang. var. *stellata*	16.7	1.67	10.64	-	-
Amelanchier arborea (Michx.f.) Fern	-	1.67	7.30	16	33
Castanea pumila (L.) Mill. var. *ozarkensis* (Ashe) Tucker	-	1.67	7.30	-	-
Cornus florida L.	-	-	-	-	16
Prunus serotina Ehrh.	-	-	-	16	-
Rhamnus caroliniana Walt.	-	-	-	16	-
Sassafras albidum (Nutt.) Nees	-	-	-	16	16
TOTALS	501.0	56.69	300.58	249	146

Table VII. Species present and percent cover of forest floor in the Upland Hardwood Type at Site 15.

SPECIES	PERCENT COVER
Monarda russeliana Nutt.	8.1
vaccinium pallidum Ait.	8.1
Vitis aestivalis Michx.	8.1
Vaccinium arboreum Marsh.	6.4
Ceanothus americanus L.	5.5
Helianthus divaricatus L.	5.4
Dioscorea villosa L.	4.6
Carya texana Buckl.	3.6
Cornus florida L.	3.6
Euphorbia corollata L.	3.6
Panicum commutatum Schult.	3.6
Sassafras albidum (Nutt.) Nees	3.6
Baptisia leucophaea Nutt. var. *leucophaea*	2.7
Desmodium nudiflorum (L.) D.C.	2.7
Quercus alba L.	2.7
Solidago petiolaris Ait.	2.7
Vitis rotundifolia Michx.	1.8
Aster patens Ait.	1
Amelanchier arborea (Michx. f.) Fern	1
Galium arkansanum Gray	1
Quercus velutina Lam.	1
Solidago hispida Muhl.	1
Toxicodendron radicans (L.) Kuntze	1
Bare Ground	16.3

Table VIII. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Upland Hardwoods Type at Site 26.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Quercus alba L.	167.0	58.34	159.21	-	-16
Quercus falcata Michx. var. *falcata*	16.7	10.00	33.70	-	-
Pinus echinata Mill.	-	11.67	27.67	66	10
Liquidambar styrceiflua L.	16.7	3.34	19.04	16	16
Carya tomentosa (Poir.) Nutt.	-	6.67	18.67	-	33
Nyssa sylvatica Marsh. var. *sylvatica*	16.7	1.67	13.37	-	33
Quercus velutina Lam.	-	3.34	11.34	16	16
Acer rubrum L. var. *rubrum*	-	1.67	5.67	33	50
Prunus serotina Ehrh.	-	1.67	5.67	16	-
Quercus rubra L.	1	1.67	5.67	-	-
Cornus florida L.	-	-	-	33	-
Hamamelis virginiana L.	-	-	-	-	33
Rhododendron prinophyllum (Small) Millais	-	-	-	-	+ 6
Vaccinium staminum L.	-	-	-	-	+ 6
TOTALS	217.1	100.04	300.01	180	239

Table IX. Species present and percent cover of forest floor in the Upland Hardwoods Type at Site 26.

SPECIES	PERCENT COVER
Rhododendron prinophyllum (Small) Millais	8.3
Vaccinum pallidum Ait	5.8
Vaccinium stamineum L.	4.2
Quercus alba L.	4.1
Acer rubrum L.	3.3
Nyssa sylvatica Marsh. var. *sylvatica*	3.3
Smilax bona-nox L.	3.3
Quercus falcata Michx var. *falcata*	2.5
Quercus velutina Lam.	2.5
Toxicodendron radicans (L.) Kuntze	2.5
Alnus serrulata (Ait.) Willd.	1.7
Hamamelis virginiana L.	1.7
Lonicera japonica Thunb.	1.7
Andrachne phyllanthoides (Nutt.) Muel.	.8
Carya tomentosa (Poir.) Nutt.	.8
Ilex opaca Ait.	.8
Liquidambar styraciflua L.	.8
Parthenocissus quinquefolia (L.) Planchon	.8
Pteridium aquilinum (L.) Kuhn.	.8
Sassafras albidum (Nutt.) Nees	.8
Vitis aestivalis Michx.	.8
Bare Ground	58.3

APPENDIX II

Results of Vegetation Analysis

Section B - Pine-Oak Hickory Type

APPENDIX TABLES X - XIII

Appendix
Table X. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Pine-Oak Hickory Type at Site 30.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	350.7	76.7	198.9	134	-
Quercus Stellata Wang. var. *Stellata*	33.4	6.7	39.7	-	-
Q. marilandica Muench.	16.7	6.7	35.9	-	-
Carya texana Buckl	33.4	5.0	25.4	17	-
Liquidambar styraciflua L.	-	-	-	17	-
Prunus serotina Ehrh.	-	-	-	17	-
TOTALS	434.2	95.1	299.9	185	

Appendix
Table XI. Species present and percent cover of forest floor in the Pine-Oak Hickory Type at Site 30.

SPECIES	PERCENT COVER
Carya texana Buckl.	11.7
Desmodium nudiflorum (L.) D.C.	6.7
Dryopteris marginalis (L.) Gray	6.7
Vitis rotundifolia Michx.	6.7
Quercus stellata Wang. van *stellata*	3.3
Vitis aestivalis Michx.	3.3
Euphorbia corollata L.	1.7
Quercus marilandica Muench.	1.7
Bare Ground	58.2

Appendix
Table XII. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Pine-Oak Hickory Type at Site 32.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	434.2	56.7	198.0	150	-
Carya texana Buckl.	33.4	8.3	37.3	17	-
Quercus stellata Wang. var. *Stellata*	33.4	5.0	26.3	-	-
Carya tomentosa (Poir.) Nutt.	-	3.3	17.6	50	-
Quercus velutina Lam.	16.7	1.67	12.0	-	-
Quercus marilandica Muench.	-	1.67	8.8	-	-
Cornus florida L.	-	-	-	50	-
TOTALS	517.7	76.6	300.0	267	-

Appendix
Table XIII. Species present and percent cover of forest floor in the Pine-Oak Hickory Type at Site 32.

SPECIES	PERCENT COVER
Carya texana Buckl.	6.6
Antennaria plantaginifolia (L.) Hook	5.0
Carya tomentosa (Poir) Nutt.	5.0
Cassia nictitans L var. *nictitans*	5.0
Desmodium laevigatum (Nutt.) D.C.	5.0
Pteridium aquilinum (L.) Kuhn.	5.0
Vitis rotundifolia Michx.	5.0
Aster patens Ait.	3.3
Quercus stellata Wang. var. *stellata*	3.3
Aster paludosus Ait.	1.7
Ceanothus americanus L.	1.7
Crataegus spathulata Michx	1.7
Lespedeza repens (L.) Bart.	1.7
Quercus marilandica Muench.	1.7
Bare Ground	41.6

APPENDIX II

Results of Vegetation Analysis

Section C - Oak Hickory-Pine Type
Subtype Xeric

APPENDIX TABLES XIV - XXII

Appendix
Table XIV. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Xeric at Site 6.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	125.0	28.75	109.40	88	25
Carya tomentosa (Poir.) Nutt	112.5	12.50	71.42	75	88
C. texana Buckl.	25.0	10.00	36.33	75	63
Quercus alba L.	25.0	6.25	30.88	13	13
Q. marilandica Muench.	-	6.25	22.88	88	75
Q. stellata Wang. var. *stellata*	25.0	2.50	18.52	13	-
Cornus florida L.	-	1.25	5.24	25	-
Ulmus alata Michx.	-	1.25	5.24	13	13
Amelanchier arborea (Michx. f.) Fern	-	-	-	-	25
Crataegus spathulata Michx.	-	-	-	-	25
Prunus serotina Ehrh.	-	-	-	-	13
Viburnum prunifolium L.	-	-	-	-	25
TOTALS	312.5	68.75	299.90	390	365

Appendix
Table XV. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Xeric at Site 6.

SPECIES	PERCENT COVER
Andropogon virginicus L.	8.0
Antennaria plantaginifolia (L.) Hook	6.5
Helianthus divaricatus L.	6.5
Vaccinium stamineum L.	6.0
Amelanchier arborea (Michx. f.) Fern	4.0
Cornus florida L.	3.3
Quercus marilandica Muench.	3.3
Carya glabra (Mill) Sweet	2.6
Cunila origanoides (L.) Britt.	2.6
Pinus echinata Mill.	2.6
Vaccinium pallidum Ait.	2.6
Aster pilosus Willd.	2.0
Panicum lanuginosum Ell.	2.0
Parthenocissus quinquefolia (L.) Planchon	2.0
Polystichum acrostichoides (Michx.) Schott.	2.0
Quercus velutina Lam.	2.0
Tephrosia virginiana (L.) Pers.	2.0
Toxicodendron radicans (L.) Kuntze	2.0
Carya tomentosa (Poir.) Nutt.	1.3
Dioscorea villosa L.	1.3
Lespedeza repens (L.) Bart.	1.3
Quercus alba L.	1.3
Tradescantia ohiensis Raf.	1.3

Appendix
Table XV. (Continued)

SPECIES	PERCENT COVER
Aster lateriflorus (L.) Britt.	.7
Aster paludosus Ait	.7
Baptisia leucophaea Nutt. var. *leucophaea*	.7
Carya cordiformis (Wang.) K. Koch.	.7
Carya texana Buckl.	.7
Ceanothus americanus L.	.7
Cratagus sp.	.7
Coreopsis grandiflora Hogg.	.7
Euphorbia corollata L.	.7
Galium obtusum Bigel.	.7
Erigeron Strigosus Muhl.	.7
Panicum sphaerocarpon Ell.	.7
Quercus falcata Michx. var. *falcata*	.7
Quercus rubra L.	.7
Rudbeckia hirta L.	.7
Ruellia pedunculata Torr.	.7
Solidago hispida Muhl.	.7
Solidago petiolaris Ait.	.7
Vitis aestivalis Michx.	.7
Vitis rotundifolia Michx.	.7
Bare Ground	17.5

Appendix
Table XVII. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Xeric at Site 11.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	240	56	144.33	40	-
Carya tomentosa (Poir.) Nutt.	60	10	40.93	80	60
C. texana Buckl.	20	6	27.07	40	20
Quercus velutina Lam.	20	6	27.07	-	20
Q. marilandica Muench.	20	4	14.93	20	20
Q. alba L.	40	6	26.56	-	40
Nyssa sylvatica Marsh. var. *sylvatica*	20	2	12.19	-	-
Quercus stellata Wang. var. *stellata*	0	2	7.43	-	-
Cornus florida L.	-	-	-	60	-
Cratageus sp.	-	-	-	-	20
Ulmus alata Michx.	-	-	-	20	-
TOTALS	420	92	299.94	260	180

Appendix
Table XVIII. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Xeric at Site 11.

SPECIES	PERCENT COVER
Helianthus divaricatus L.	13
Vaccinium pallidum Ait.	6
Desmodium marilandicum (L.) D.C.	4
Solidago hispida Muhl.	4
Euphorbia corollata L.	3
Monarda russeliana Nutt.	3
Vitis aestivalis Michx.	3
Vitis rotundifolia Michx.	3
Carya texana Backl.	2
Quercus marilandica Muench	2
Acer rubrum L.	1
Aster patens Ait.	1
Amelanchier arborea (Michx. f.) Fern.	1
Cunila origanoides (L.) Britt	1
Panicum commutatum Schult.	1
Parthenocissus quinquefolia (L.) Planchon	1
Passiflora lutea L.	1
Pteridium aquilinum (L.) Kuhn.	1
Quercus alba L.	1
Sedge sp.	1
Bare Ground	44

Appendix Table XIX. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Xeric at Site 14.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	66.8	18.34	64.20	-	-
Quercus Stellata Wang. var. *Stellata*	83.5	10	51.20	33	-
Quercus alba L.	50.1	10	39.34	33	-
Q. falcata Michx. var. *falcata*	16.7	10	35.20	33	-
Q. Velutina Lam.	33.4	6.67	33.92	50	16
Carya cordiformis (Wang K. Koch	83.5	1.67	26.49	83	66
Quercus rubra L.	50.1	1.67	18.49	16	-
Q. marilandica Muench.	-	3.34	16.81	16	-
Carya texana Buckl	33.4	1.67	14.49	16	-
Diospyros virginiana L.	-	-	-	-	16
Rhamnus caroliniana Walt.	-	-	-	16	-
TOTALS	417.5	63.36	300.14	296	98

Appendix
Table XX. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Xeric at Site 14.

SPECIES	PERCENT COVER
Helianthus divaricatus L.	11.6
Dioscorea villosa L.	6.6
Monarda russeliana Nutt.	5.0
Antennaria plantaginifolia (L.) Hook	4.2
Prunus serotina Ehrh.	4.2
Sassafras albidum (Nutt.) Nees	4.2
Solidago hispida Muhl.	4.2
Duchesnea indica (Andr.) Focke	3.3
Tephrosia virginiana (L.) Pers.	3.3
Vitis aestivalis Michx.	3.3
Lespedeza procumbens Michx.	2.5
Quercus velutina Lam	2.5
Solidago caesia L.	2.5
Vitis rotundifolia Michx.	2.5
Galium arkansanum Gray	1.8
Aster patens Ait.	1.7
Carya cordiformis (Wang) K. Koch	1.7
Desmodium nudifloram (L.) D.C.	1.7
Quercus Stellata Wang var. *stellata*	1.7
Smilax bona-nox L.	1.7
Vaccinium stamineum L.	1.7
Baptisia leucophaea Nutt. var. *leucophaea*	.8
Carya texana Buckl.	.8

Appendix
Table XX. (Continued)

SPECIES	PERCENT COVER
Cornus florida L.	.8
Magnolia tripetala L.	.8
Panicum dichotomum L.	.8
Parthenocissus quinquefolia (L.) Planchon	.8
Scutellaria elliptica Muhl.	.8
Vicia sativa L.	.8
Bare Ground	17.5

Appendix
Table XXI. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Xeric at Site 16.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	217.1	25.00	106.70	200	67
Quercus marilandica Muench.	83.5	15.00	65.90	217	17
Q. Stellata Wang. var. *stellata*	83.5	16.67	63.86	50	-
Carya cordiformis (Wang.) K. Koch	83.5	8.34	46.82	50	17
Quercus velutina Lam	16.7	1.670	10.28	17	-
Nyssa sylvatica Marsh. var. *sylvatica*	16.7	-	3.23	17	-
Ulmus alata Michx.	16.7	-	3.23	17	-
Carya tomentosa (Poir.) Nutt.	-	-	-	17	17
Prunus serotina Ehrh.	-	-	-	17	33
TOTALS	517.7	66.68	300.02	585	151

Appendix
Table XXII. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Xeric at Site 16.

SPECIES	PERCENT COVER
Quercus marilandica Muench	5.7
Tephrosia virginiana (L.) Pers.	5.7
Vitis aestivalis Michx.	5.7
Euphorbia corollata L.	4.3
Quercus Stellata Wang. var. *stellata*	4.3
Antennaria plantaginifolia (L.) Hook	2.9
Carya texana Buckl.	2.9
Ceanothus americanus L.	2.9
Panicum boscii Poir.	2.9
Vaccinium stamineum L.	2.9
Hieracium gronovii L.	1.4
Lespedeza repens (L.) Bart.	1.4
Liastris squarrosa (L.) Michx.	1.4
Pinus echinata Mill	1.4
Scutellaria elliptica Muhl.	1.4
Bare Ground	47.2

APPENDIX II

Results of Vegetation Analysis

Section D - Oak Hickory-Pine Type
Subtype Mesic

APPENDIX TABLES XXIII - XXXIV

Appendix
Table XXIII. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Mesic at Site 7.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	275	35.0	128.31	125	-
Quercus alba L.	100	25.0	78.97	125	100
Q. velutina Lam.	50	5.0	30.11	25	50
Q. rubra L.	-	5.0	19.59	50	-
Carya texana Buckl.	25	2.5	15.06	25	25
Magnolia tripetala L.	-	5.0	12.92	25	-
Quercus marilandica Muench.	-	2.5	9.80	50	-
Carya tomentosa (Poir.) Nutt.	25	-	5.26	25	-
Amelanchier arborea (Michx. f.) Fern.	-	-	-	50	25
Cornus florida L.	-	-	-	50	50
Carya cordiformis (Wang.) K. Koch	-	-	-	-	25
Crataegus sp.	-	-	-	-	-
Prunus serotina Ehrh.	-	-	-	25	-
Quercus Stellata Wang. var. *Stellata*	-	-	-	25	50
Ulmus alata Michx.	-	-	-	-	25
Viburnum prunifolium L.	-	-	-	-	25
TOTALS	475	80.0	300.02	600	375

Appendix
Table XXIV. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Mesic at Site 7.

SPECIES	PERCENT COVER
Vaccinium stamineum L.	15.0
Vaccinium pallidum Ait.	8.7
Euphorbia corollata L.	7.5
Dioscorea villosa L.	6.2
Pteridium aquilinum (L.) Kuhn.	6.2
Aster patens Ait.	3.7
Cornus florida L.	3.7
Helianthus divaricatus L.	3.7
Parthenocissus quinquefolia (L.) Planchon	3.7
Vitis rotundifolia Michx.	3.7
Amelanchier arborea (Michx. f.) Fern.	2.5
Monarda russeliana Nutt.	2.5
Panicum sphaerocarpoa Ell.	2.5
Quercus alba L.	2.5
Antennaria plantaginifolia (L.) Hook	1.3
Crataegus spathulata Michx.	1.3
Pinus echinata Mill.	1.3
Solidago hispida Muhl.	1.3
Toxicodendron radicans (L.) Kuntze	1.3
Amianthium muscaetoxicum (Walt.) Gray	1.2
Desmodium nudiflorum (L.) D.C.	1.2
Prunus serotina Ehrh.	1.2
Vitis aestivalis Michx.	1.2
Bare Ground	16.2

Appendix
Table XXV. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Mesic at Site 10.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	367.4	60.00	154.6	50	33
Quercus alba L.	66.8	13.34	49.2	50	17
Carya tomentosa (Poir.) Nutt.	33.4	5.00	25.2	33	50
Quercus falcata Michx. var. *falcata*	33.4	5.00	15.7	33	-
Carya texana Buckl.	16.7	1.67	9.4	17	-
Nyssa sylvatica Marsh. var. *sylvatica*	33.4	6.67	27.1	17	17
Cornus florida L.	-	1.67	6.5	33	83
Quercus velutina Lam.	-	1.67	6.5	17	-
Acer rubrum L. var. *rubrum*	16.7	-	2.9	117	17
Quercus Stellata Wang. var. *stellata*	16.7	-	2.9	-	-
Ulmus alata Michx.	-	-	-	-	17
TOTALS	584.5	95.02	300.00	367	234

Appendix
Table XXVI. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Mesic at Site 10.

SPECIES	PERCENT COVER
Vitis rotundifolia Michx.	10.8
Vaccinium stamineum L.	6.7
Euphorbia corollata L.	4.2
Cornus florida L.	3.3
Quercus alba L.	3.3
Viburnum rufidulum Raf.	3.3
Nyssa sylvatica Marsh var. *sylvatica*	2.5
Panicum dichotomum L.	2.5
Pteridium aquilinum (L.) Kuhn	2.5
Smilax bona-nox L.	2.5
Desmodium laevigatum (Nutt.) D.C.	1.7
Helianthus divaricatus L.	1.7
Monarda stipitatoglandulosa Waterfall	1.7
Quercus velutina Lam.	1.7
Cunila origanoides (L.) Britt.	1.6
Acer negundo L.	.8
Carya cordiformis (Wang.) K. Koch	.8
Carya tomentosa (Poir.) Nutt.	.8
Oxalis violacea L. var. *violacea*	.8
Panicum boseii Poir.	.8
Juniperus virginiana L.	.8
Quercus falcata Michx. var. *falcata*	.8
Sanicula canadensis L.	.8
Bare Ground	42.5

Appendix
Table XXVII. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Mesic at Site 19.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	217.1	51.67	126.6	167	17
Quercus alba L.	100.2	18.34	58.79	17	-
Nyssa sylvatica Marsh var. *sylvatica*	16.2	11.67	27.65	17	67
Acer rubrum L. var. *rubrum*	16.7	10.00	21.82	33	17
Quercus stellata Wang. var. *stellata*	16.7	5.00	17.35	-	-
Carya tomentosa (Poir.) Nutt.	-	8.34	16.17	83	17
Quercus marilandica Muench.	33.4	1.67	14.19	-	-
Liquidambar styraciflua L.	-	1.67	5.85	-	33
Cornus florida L.	1	1.67	5.85	33	17
Quercus velutina Lam.	1	1.67	5.85	17	33
Carya cordiformis (Wang.) K. Koch	-	-	-	17	-
Prunus serotina Ehrh.	-	-	-	17	-
TOTALS	400.8	111.70	300.12	401	218

Appendix
Table XXVIII. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Mesic at Site 19.

SPECIES	PERCENT COVER
Vaccinium arboreum Marsh.	27.3
Carya cordiformis (Wang.) K. Koch	14.4
Pteridium aquilinum (L.) Kuhn	10.0
Solidago nemoralis Ait.	5.7
Quercus alba L.	4.2
Cunila origanoides (L.) Britt.	3.6
Nyssa sylvatica Marsh. var. *sylvatica*	3.6
Helianthus divaricatus L.	2.8
Quercus falcata Michx. var. *falcata*	2.8
Acer rubrum L.	1.8
Antennaria plantaginifolia (L.) Hook	1.8
Lespedeza repens (L.) Bart.	1.8
Vitis rotundifolia Michx.	1.8
Quercus velutina Lam.	1.5
Cornus florida L.	.9
Liquidambar styraciflua L.	.9
Prunus serotina Ehrh.	.9
Bare Ground	29.1

Appendix
Table XXIX. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Mesic at Site 31.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	317.3	43.34	146.33	83	-
Quercus alba L.	100.2	13.34	62.15	-	-
Q. velutina Lam.	50.1	6.67	38.92	-	-
Carya tomentosa (Poir.) Nutt.	50.1	1.67	16.17	-	-
Quercus falcata Michx. var. *falcata*	16.7	3.34	12.79	-	-
Nyssa sylvatica Marsh. var. *sylvatica*	-	1.67	7.6	-	-
Quercus Stellata Wang. var. *stellata*	-	1.67	7.6	-	-
Acer rubrum L. var. *rubrum*	33.4	-	5.72	-	-
Cornus florida L.	16.7	-	2.86	33	-
TOTALS	584.5	71.7	300.14	116	-

Appendix
Table XXX. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Mesic at Site 31.

SPECIES	PERCENT COVER
Vitis rotundifolia Michx.	13.3
Quercus alba L.	10.0
Smilax bona-nox L.	6.7
Carya tomentosa (Poir.) Nutt.	5.0
Cornus florida L.	5.0
Pinus echinata Mill.	5.0
Toxicodendron radicans (L.) Kuntze	5.0
Acer rubrum L.	3.3
Panicum dichotomum L.	3.3
Polystichum acrostichoides (Michx.) Schott.	3.3
Cunila origanoides (L.) Britt.	1.7
Quercus velutina Lam.	1.7
Vernonia gigantea (Walt.) Trel.	1.7
Bare Ground	35.

Appendix
Table XXXI. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak-Hickory-Pine Type Subtype Mesic at Site 33.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	133.6	21.66	111.63	150	-
Carya tomentosa (Poir.) Nutt.	66.8	13.30	65.86	83	-
Quercus alba L.	50.1	5.00	39.76	67	-
Q. falcata Michx var. *falcata*	50.1	5.00	39.76	-	-
Q. Stellata Wang. var. *stellata*	-	9.68	20.19	-	-
Q. velutina Lam.	16.7	3.24	13.26	-	-
Corya texana Buckl.	16.7	-	4.76	-	-
Liquidambar styraciflua L.	16.7	-	4.76	33	-
TOTALS	617.9	88.35	300.4	333	-

Appendix
Table XXXII. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Mesic at Site 33.

SPECIES	PERCENT COVER
Panicum dichotomum L.	15.0
Pinus echinata Mill.	15.0
Quercus alba L.	8.3
Solidago nemoralis Ait.	6.6
Monarda russeliana Nutt.	5.0
Vitis rotundifolia Michx.	5.0
Carya glabra (Mill) Sweet	3.3
Cunila origanoides (L.) Britt.	3.3
Desmodium laevigatum (Nutt.) D.C.	3.3
Lespedeza repens (L.) Bart.	3.3
Nyssa sylvatica Marsh. var. *sylvatica*	3.3
Diodia teres Walt.	1.7
Helianthus divaricatus L.	1.7
Passiflora incarnata L.	1.7
Rubus flagellaris Willd.	1.7
Veronia gigantea (Walt.) Trel.	1.7
Bare Ground	26.7

Appendix
Table XXXIII. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Oak Hickory-Pine Type Subtype Mesic at Site 34.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Quercus alba L.	233.8	28.34	92.98	50	-
Pinus echinata Mill.	167	21.67	74.62	50	-
Quercus falcata Michx. var. *falcata*	133.6	21.67	65.44	17	-
Carya tomentosa (Poir.) Nutt.	33.4	11.67	41.69	33	-
Quercus stellata Wang. var. *stellata*	-	5.00	17.20	33	-
Nyssa sylvatica Marsh. var. *sylvatica*	50.1	-	8.11	17	-
Cornus florida L.	-	-	-	17	-
Liquidambar styraciflua L.	-	-	-	33	-
TOTALS	617.9	88.35	300.40	250	-

Appendix
Table XXXIV. Species present and percent cover of forest floor in the Oak Hickory-Pine Type Subtype Mesic at Site 34.

SPECIES	PERCENT COVER
Panicum dichotomum L.	13.3
Cornus florida L.	10.0
Desmodium laevigatum (Nutt.) D.C.	6.7
Callicarpa americana L.	5.0
Monarda stipitatoglandulosa Waterfall	5.0
Panicum commutatum Schult.	5.0
Quercus alba L.	5.0
Solidago nemoralis Ait.	5.0
Vitis rotundifolia Michx.	5.0
Cassia nictitans L. var. *nictitans*	3.3
Lespedeza repens (L.) Bart.	3.3
Nyssa sylvatica Marsh var. *sylvatica*	3.3
Pinus echinata Mill.	3.3
Carya tomentosa (Poir.) Nutt.	1.7
Vernonia gigantea (Walt.) Trel.	1.7
Bare Ground	23.4

APPENDIX II

Results of Vegetation Analysis
Section E - Mixed Forest Type

APPENDIX TABLES XXXV - XL

Appendix
Table XXXV. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Mixed Forest Type at Site 9.

SPECIES	PERCENT COVER
Smilax bona-nox L.	6.6
Toxicodendron radicans (L.) Kuntze	6.6
Vaccinium arboreum Marsh.	6.6
Athyrium filix-femina (L) Roth. var. *asplenoides* (Michx.) Farn.	5.0
Liquidambar styraciflua L.	5.0
Quercus alba L.	5.0
Cornus florida L.	3.3
Hedyotis purpurea (L.) T. & G.	3.3
Panicum Boscii Poir.	3.3
Panicum commutatum Schult.	3.3
Acer rubrum L.	1.7
Alnus serrulata (Ait.) Willd.	1.7
Amphicarpa bracteata (L.) Fern. var. *bracteata*	1.7
Baptisia leucophaea Nutt. var. *leucophaea*	1.7
Betula nigra L.	1.7
Cassia nictitans L. var. *nictitans*	1.7
Dioscorea villosa L.	1.7
Elymus virginicus L.	1.7
Mitchella repens L.	1.7
Ostrya virginiana (Mill.) K. Koch	1.7
Panicum lanuginosum Ell.	1.7
Pinus echinata Mill.	1.7
Rubus flagellaris Willd.	1.7
Solidago petiolaris Ait.	1.7
Urtica chamaedryoides Pursh.	1.7
Viburnum rufidulum Raf.	1.7
Bare Ground	24.8

Appendix
Table XXXVI. Species present and percent cover of forest floor in the Mixed Forest Type at Site 9.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Liquidambar styraciflua L.	200	10.0	73.13	75	-
Carpinus caroliniana Walt.	75	20.0	58.26	25	-
Quercus alba L.	100	5.0	39.21	-	-
Pinus echinata Mill	25	12.5	32.22	-	25
Nyssa sylvatica Marsh. var. *sylvatica*	50	5.0	28.10	-	-
Acer rubrum L. var. *rubrum*	-	10.0	18.18	-	-
Fagus grandifolia Ehrh.	-	5.0	16.98	-	-
Fraxinus americana L.	-	5.0	15.98	-	-
Alnus serrulata (Ait.) Willd.	-	2.5	8.50	50	175
Prunus serotina Ehrh.	-	2.5	8.50	-	-
Berechemia scandens (Hill) K. Koch	-	-	-	-	50
Salix caroliniana Michx.	-	-	-	-	100
Tilia americana L.	-	-	-	50	25
TOTALS	450	77.5	300.06	200	375

Appendix
Table XXXVII. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Mixed Forest Type at Site 22.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Pinus echinata Mill.	33.4	36.67	70.03	-	-
Liquidambar styraciflua L.	33.4	28.30	63.02	67	17
Carpinus caroliniana Walt.	16.7	11.67	32.26	150	17
Fagus grandifolia Ehrh.	33.4	5.00	29.33	-	-
Plantanus occidentalis L.	16.7	6.67	28.09	-	-
Acer rubrum L. var. *rubrum*	16.7	6.67	22.37	67	50
Quercus rubra L.	-	5.00	12.74	-	-
Carya tomentosa (Poir.) *Nutt.*	-	3.34	8.49	-	-
Cornus florida L.	-	3.34	8.49	17	-
Quercus alba L.	-	5.00	7.03	17	-
Q. falcata Michx. var. *falcata*	-	3.34	5.64	17	-
Ulmus americana L.	-	1.67	4.25	17	-
Prunus serotina Ehrh.	-	1.67	42.0	-	-
Alnus serralata (Ait.) *Willd.*	-	-	-	17	-
Asimina triloba (L.) Dunal	-	-	-	-	50
Erechtites hieraciifolia (L.) Raf. ex D.C. var. *Hieraciifolia*	-	-	-	-	17
Nyssa sylvatica Marsh. var. *sylvatica*	-	-	-	67	17
Ulmus alata Michx.	-	-	-	17	-
Magnolia acuminata L.	-	-	-	17	-
TOTALS	150.3	120.01	300.19	453	168

Appendix
Table XXXVIII. Species present and percent cover of forest floor in the Mixed Forest Type at Site 22.

SPECIES	PERCENT COVER
Lonicera japonica Thunb.	19.1
Tephrosia virginiana (L.) Pers	6.6
Brachyelytrum erectum (Schreb) Beauv.	5.0
Asimina triloba (L.) Dunal	3.3
Cornus florida L.	2.5
Ostrya virginiana (Mill) K. Koch	2.5
Berchemia scandens (Hill) K. Koch	1.7
Carex sp.	1.7
Hamamelis virginiana L.	1.7
Quercus rubra L.	1.7
Acer rubrum L.	1.7
Amphicorpa bracteata (L.) Fern. var. *bracteata*	.8
Carya tomentosa (Poir.) Nutt.	.8
Cocculus carolinus (L.) D.C.	.8
Crataegus pruinosa (Wendl.) K. Koch	.8
Passiflora lutea L.	.8
Polystichum acrostichoides (Michx.) Schott	.8
Potentilla recta L.	.8
Smilax glauca Walt.	.8
Solidago nemoralis Ait.	.8
Bare Ground	47.0

Appendix
Table XXXIX. Species present, density and basal area per acre, and importance value of trees and density per acre of saplings in the high and low understories of the Mixed Forest Type at Site 23.

SPECIES	Density	Basal Area	Importance Value	Understory	
				High	Low
Carpinus caroliniana Walt	83.5	21.7	70.51	267	67
Liquidambar styraciflua L.	66.8	16.7	59.25	50	-
Pinus echinata Mill.	50.1	15.0	55.99	-	-
Quercus alba L.	33.4	5.0	19.72	17	-
Fagus grandifolia Ehrh.	16.7	3.4	16.58	33	-
Plantanus occidentalis L.	16.7	3.4	16.58	-	-
Ulmus americana L.	-	5.0	13.9	-	-
Prunus serotina Ehrh.	16.7	1.7	10.67	-	-
Cornus florida L.	33.4	-	9.56	50	17
Carya cordiformis (Wang.) K. Koch	-	1.7	5.91	33	33
Fraxinus americana L.	-	1.7	5.91	-	-
Quercus falcata Michx. var. *falcata*	-	1.7	5.91	-	-
Ulmus carassifolia Nutt.	16.7	-	4.76	-	17
Acer rubrum L. var. *rubrum*	-	-	-	17	17
Carya ovata (Mill.) K. Koch	-	-	-	33	-
Carya tomentosa (Poir.) Nutt.	-	-	-	-	17
Erechtites hieraciifolia (L.) Raf. ex D.C. var. *hieraciifolia*	-	-	-	17	-
Quercus Stellata Wang. var. *Stellata*	-	-	-	17	-
Ligustrum sinense Lour.	-	-	-	-	17
Catalpa speciosa Warder	16.7	-	4.76	-	-
TOTALS	350.7	77.0	200.97	534	185

Table XL. (Continued)

SPECIES	PERCENT COVER
Parthenocissus quinquefolia (L.) Planchon	.8
Phryma leptostachya L.	.8
Podophyllum peltatum L.	.8
Polystichum acrostichoides (Michx) Schott	.8
Simlax bona-nox L.	.8
Toxicodendron radicans (L.) Kuntze	.8
Ulmus americana L.	.8
Bare Ground	39.2

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