1-DX006-1

MARBLE HILL NUCLEAR GENERATING STATION

UNITS 1 AND 2

REMOTE SENSING AND GROUND TRUTH PROGRAM

FINAL REPORT FOR 1980 - 1981 SEASON

AND

5-YEAR SUMMARY REPORT

Prepared for

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FOREWORD

Normandeau Associates, Incorporated (NAI) is pleased to submit this draft report of methodology applied and results obtained during the first five years (1976-1981) of a continuing remote sensing and ground truth program conducted on and near Public Service Company of Indiana, Inc. (PSI) proposed Marble Hill Generating Station Units 1 and 2. The Marble Hill Generating Station and prescribed area of study are near New Washington, Jefferson County, Indiana.

During the course of the 1980-1981 study year, NAI acquired Texas Instruments (TI) Ecological Services group, which began the remote sensing and ground truth monitoring program for PSI's Marble Hill Generating Station. Complete transition of TI Ecological Services to NAI allowed continuation of the 1980-1981 Marble Hill program with the same personnel and facilities. For reference purposes, citations of past reports on the Marble Hill monitoring program will remain Texas Instruments, and reference to NAI will begin with this report.

EXECUTIVE SUMMARY

The Marble Hill remote sensing and ground truth program was initiated in 1976 to ascertain and document the existing vegetation cover types, vegetation stress, and soil chemistry in the vicinity of the Marble Hill Nuclear Generating Station and to provide cumulative reference information necessary to monitor the potential effects of cooling tower operation and coincident salt deposition on local vegetation and soil. Since the total monitoring period coincides with the construction phase of the project, the annual color infrared aerial photography and updated vegetation cover type maps assist Public Service Company of Indiana, Inc. in their evaluation of construction impacts on the local environment.

Species composition and seasonal variation in the major vegetation cover types in the vicinity of the Marble Hill station have been documented through sampling representative plots. This documentation provides a basis for evaluating future cover type changes and determining the presence of vegetation species potentially sensitive to salt drift deposition. The vegetation cover types of the Marble Hill study area are typical of the region, which is transitional in regards to vegetation and geology. The forests of this region, which is at the southern edge of glacial activity, contain several plant species at the northern limits of their natural range as well as some at their southern limits. Vegetation types are further influenced by localized variations in topography, substrate, and previous disturbance. Consequently, cover type composition is diverse with numerous component species. Hardwoods dominate the forests, with scattered pine stands present in the upland flats.

Vegetation cover types sampled include maple-basswood, oak-maple, chinkapin oak, red pine, sycamore-boxelder, oak-hickory, walnut-hickory-buckeye, orchard and Virginia pine forests. Sampling during the first five years of the remote sensing and ground truth program generally showed no major changes in species composition, frequency, cover, or other parameters. Most of the variations in measurements were due to naturally occurring successional changes, with greatest change in the pine stands.

Soil parameter data collected throughout the monitoring period provide documentation of naturally occurring fluctuations in soil salinity and other soil parameters as a basis for comparison with any fluctuations occurring during cooling tower operation. However, drift modeling based on published deposition rates and average monthly precipitation near the site (PSI 1976) indicates that no significant salt accumulations are expected. Soils of the study area are predominately silt loams and have generally low salt concentrations. Conductivity measurements from the sample plots are well below those potentially detrimental to plants. Other measured soil parameters are basically consistent with site conditions.

Documentation of vegetation stress occurring in the study area prior to station operation provides a reference for identifying and evaluating the impact of potential stress due to cooling tower operation. Determination of typical stress agents, patterns of outbreaks, extent of stress, and commonly affected vegetation species indicates the degree of stress occurring in the study area under pre-operational conditions not influenced by the Marble Hill Generating Station. Stress observed after station start-up can be compared with the baseline as an indication of whether changes are due to fluctuations of natural causal agents or are related to station operation.

Vegetation stress in the study area is detected by using color infrared photographs taken annually during aerial overflights. Apparent stress areas are identified and delineated through photointerpretation, then verified and causal agents determined through ground truthing. Most of the vegetation stress identified during the monitoring period has been attributable to natural causal agents, particularly insects and disease. An outbreak of locust leaf miner during 1978, 1979, and 1980 has been the primary stress factor in the study area during the past five years. Less predominate insects contributing to vegetation stress include borers and leaf feeders, especially lace bugs and bagworms. Fungal and bacterial diseases have also contributed to stress, especially during the period of extended heavy rainfall in 1981. Predominant indentifiable diseases were anthracnose on sycamore, leaf blotch on buckeyes, and leaf spots on oaks. Winter damage from frost and

ice, fluctuations in Ohio River water level, and successional changes have also caused stress due to general decline. Man-induced stress observed outside the Marble Hill site boundaries has been due to a variety of causal factors including fire, herbicide spraying, and pipeline effluent.

Stress attributable to construction of the Marble Hill Generating Station has been confined to the site, with mechanical injury, soil compaction, and filling around trees the major stress causes. Construction activities have also led to increased stress from general decline in areas where clearing has caused increased exposure to wind and contributed to windthrow in perimeter trees. However, affected areas are small (less than five acres), and such vegetation stress is expected during construction. None of the construction activities appear to have affected stress outside the site boundaries.

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SECTION 1.0

INTRODUCTION

1.1 PROGRAM OBJECTIVES

Specific objectives of the Marble Hill remote sensing and ground truth program are to ascertain and document the existing vegetation cover types, vegetation stress, and soil chemistry in the vicinity of the Marble Hill Nuclear Generating Station and to provide cumulative reference information necessary to monitor the potential effects of cooling tower operation and coincident salt deposition on local vegetation and soil. In addition, the annual aerial color infrared (CIR) photography and the updated vegetation cover type maps will assist Public Service Company of Indiana, Inc. (PSI) in their evaluation of construction impacts on the local environment.

1.2 PROGRAM SCHEDULE

The completion dates for each task are listed in Table 1-1.

Table 1-1

Schedule for the 1980-1981 Marble Hill Remote Sensing and Ground-Truth Program by Task and Date

Task	Completion Date
Aerial CIR Photography	21 May 1981
Photointerpretation	5 June 1981
Vegetation, Data Collection	12 September 1980 23 October 1980 4 May 1981 11 June 1981
Soil, Data Collection	12 September 1980 23 October 1980 4 May 1981 11 June 1981
Reports	
Draft	15 August 1981
Final	15 September 1981

Methods of data collection, reduction, and analysis are documented in Section 2.0 - Methodology; summarized data are presented in Section 3.0 - Results and Discussion, which includes both 1980-1981 information and 5-year summary analysis.

SECTION 2.0

METHODOLOGY

The objectives of this study have been addressed through application of appropriate methods of data acquisition, handling, analysis, and interpretation. The five major tasks proposed to fulfill the program objectives included:

- o Aerial color infrared photography
- o Vegetation cover type mapping
- o Vegetation stress delineation
- o Vegetation sampling and analysis
- o Soil sampling and chemical analysis

Methods applied toward completion of each task are discussed in the text that follows.

2.1 AERIAL COLOR INFRARED PHOTOGRAPHY

Aerial color infrared (CIR) photographs were obtained in May 1981. Five flight lines were required to obtain the coverage of the designated area shown in Figure 2-1 and maintain a 30-percent side lap. Color infrared photographs were obtained with a 6-inch focal length camera from an altitude of 5000 feet to assure a working scale of 1:10,000 (1 inch = 833 feet). The forward overlap attained was 60 percent and provided the specified stereoscopic viewing conditions.

Film was processed to positive transparencies; these were encased in plastic sleeves for protection during the mapping and ground truth phases of the study.

2.2 MAPPING VEGETATION COVER TYPES

Vegetation cover type boundaries that were presented in "Vegetation Cover Types in the Vicinity of the Marble Hill Nuclear Generating Station"

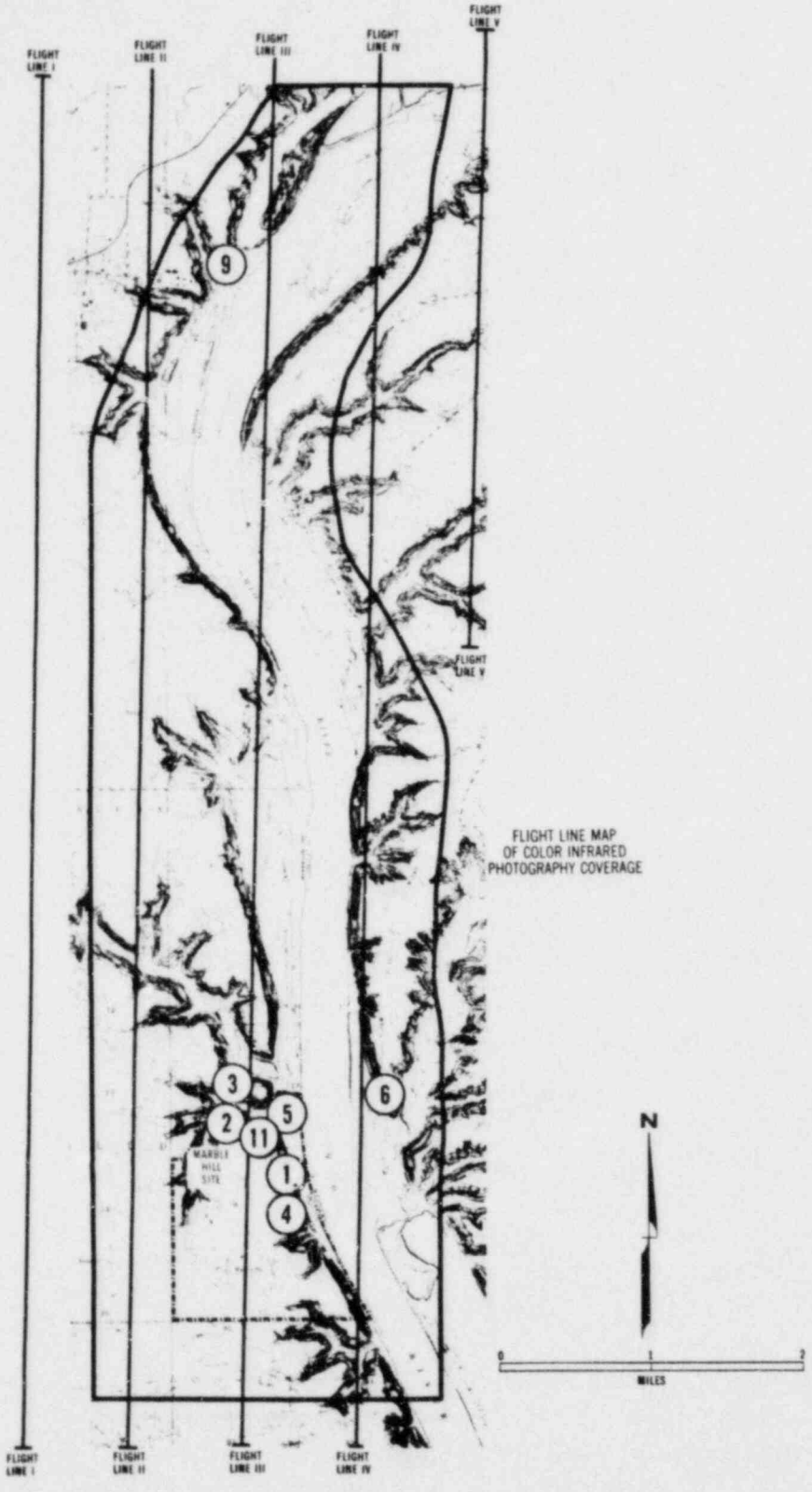

Figure 2-1. Flight Line Map of Color Infrared Photography Coverage, June 1981

(Texas Instruments 1980) were refined and redelineated where necessary. This was accomplished through photointerpretation of the May 1981 CIR photographs, cross-referencing these with the August 1976, May 1977, May 1978, June 1979, and June 1980 CIR photographs, and through ground truthing during June 1981.

Cover type nomenclature follows the designation and types of the Society of American Foresters (1954) with some modification to allow adequate description of locally important vegetation units. The type name was generally determined on the basis of the dominant and codominant canopy species. Where no single species comprised 50 percent or more of a given stand, the stand was typed on the basis of numerical plurality of canopy species (e.g., maple-basswood).

Ground-truth examinations were conducted for initial boundary verification and for refinement of vegetation cover type delineations. Map revisions were incorporated, nomenclature applied, and the vegetation cover type map drafted at a scale of 1:24,000. Sixteen map units were employed to document all important existing features and cover types. The acreage of each refined map unit was determined from the 1:24,000 scale map by polar planimeter measurement.

2.3 Mapping Vegetation Stress

Areas of apparently stressed vegetation were separately delineated within each cover type. Vegetation under stress from disease, insects or weather was detected on the color infrared photography due to loss of infrared reflectance from affected foliage. The reddish photographic rendition of healthy vegetation grades to magenta, purple, green, then yellow as the loss of infrared reflectance progresses due to increased stress. Vegetation stress areas were delineated on the photographs and evaluated by an experienced photointerpreter and independently by an experienced field botanist.

Areas of apparent vegetation stress were noted on photo overlays and each was assigned a reference number. During ground truth reconnaissance, stress areas greater than or equal to 5 acres were field-checked for stress

verification and documentation of the causal agent(s). Previously defined stress areas greater than or equal to 5 acres (TI 1980) were examined from CIR photographs and revisited during 1981 ground-truthing to monitor the status of each area.

Approximately 81% of stressed areas less than 5 acres and 87% of stressed areas greater than 5 acres were field-checked, and locations of all stress areas were plotted on the photo overlays, assigned a reference number for monitoring purposes, and transferred to the vegetation cover type map.

2.4 Vegetation Sampling And Analysis

Vegetation cover and condition were sampled by establishing two permanent 100-square meter plots in one representative unit of each of eight specific cover types delineated from the CIR aerial photographs. Sampling locations for each cover type are shown in Figure 2-2. Direction from the cooling towers, proximity to the area of maximum salt deposition, and accessibility were considered in locating the permanent vegetation plots.

Two sets of circular nested plots were used to estimate vegetation cover by species in each representative unit. Figure 2-3 shows the plot radii and the nesting arrangement of the four plot types used to sample the various vegetation strata. Vegetation stratum sampled in each plot, the size inclusion criteria, and the plot area are presented in Table 2-1.

Nested circular plots were easy to establish and relocate since only a single stake was required to permanently mark a center point from which all radii were measured. Plot sizes and nesting arrangement were modified from those of Cox (1972) and Ohman (1973). The center of each sub-plot within each 100-square meter plot also was permanently marked.

Herbs, grasses, seedlings, shrubs, and vines (plot types 1 and 2) were sampled during September and October 1980 and during April and June 1981

Figure 2-2. General Locations of Permanent Vegetation and Soil Sampling Plots

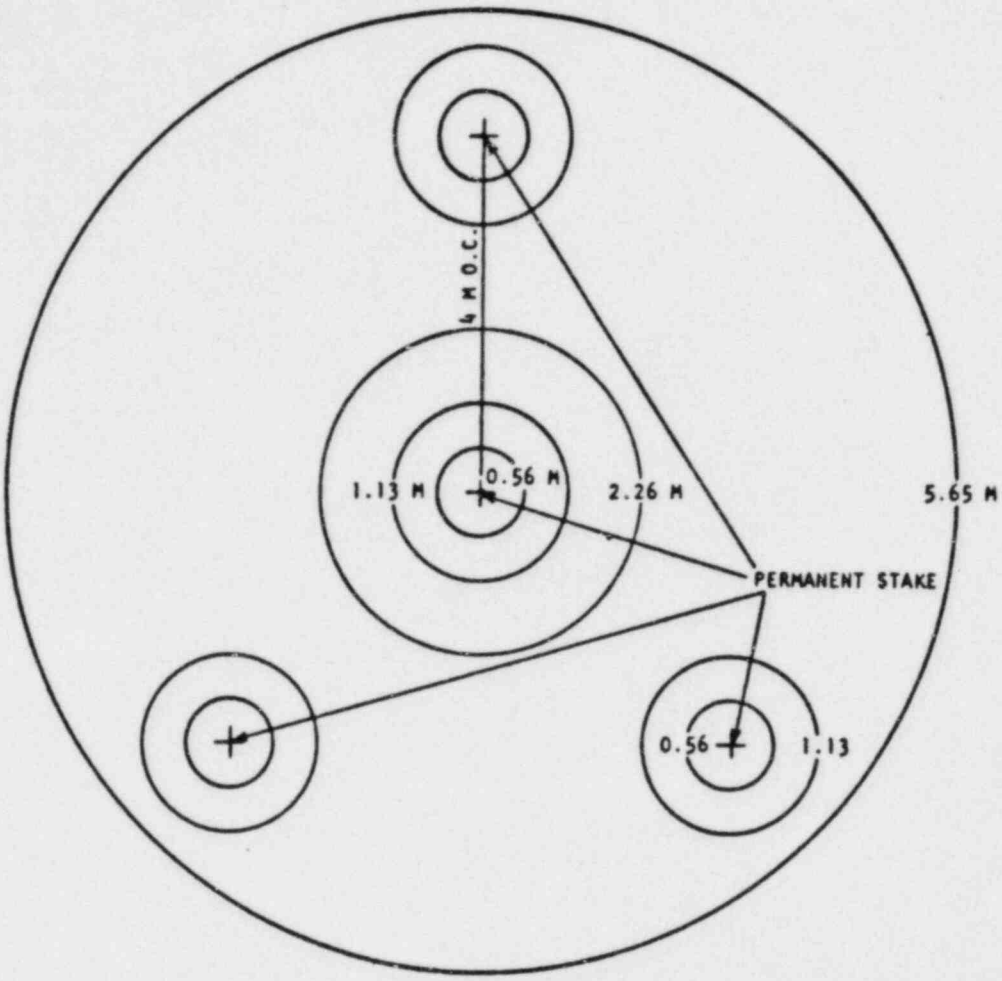

Figure 2-3. Nested Circular Plots for Vegetation Sampling

Table 2-1

Vegetation Plot Types

Plot Type (Stratum)	Vegetation Included	Stem dbh* (m)		Stem Height (m)	Plot Radius (m)	Plot Area (m^2)
1	Herbs, grasses, low shrubs, and seedlings	<0.025		<1.0	0.56	1.0
2	Shrubs, vines, and seedlings	<0.025		≥1.0	1.13	4.0
3	Saplings	≥0.025	<0.089	≥1.0	2.26	16.0
4	Trees	≥0.089		≥1.0	5.65	100.0

*Diameter at breast height (1.35 meters above the ground surface)

in vegetation cover types 1, 2, 3, 4, 5, 6, 9, and 11. Data recorded within each of eight subplots per cover type included: taxa present, percent cover (percentage of plot area covered by a given taxon), mode condition (most common state of physical or evident physiological condition of a given taxon), and percentage ground cover (percentage of total plot area covered by vegetation and litter).

Diameters of saplings and trees (plot types 3 and 4) were individually measured in each of two plots per cover type during September 1980 and April 1981 to determine both species composition and basal area (square meters/hectare). Data recorded for each individual included: taxon, dbh (diameter at breast height) to the nearest 0.1 inch, and condition code (Table 2-2). Each individual was numbered with paint to facilitate recognition and identification of temporal change in apparent health or vigor (condition).

Table 2-2

Codes Used to Record Apparent Vegetation Condition

Condition Code	Condition Category
1	Healthy
2	Diseased
3	Insect injury
4	Mechanical injury
5	Browsed
6	Dead
7	Dying
8	Dormant

During October 1980 and June 1981 each tree and sapling was inspected for condition; diameter was not remeasured in these months since it was unlikely that this parameter would have changed significantly since the September 1980 and April 1981 measurements, respectively.

Plot data were summarized within cover types, and the following standard ecological analyses (Cox 1972) were performed for each taxon according to stratum:

$$\text{Cover (\%)} = \frac{\Sigma \text{percentage areal cover from plots}}{\text{number of plots}}$$

$$\text{Relative cover (\%)} = \frac{\text{cover for a species}}{\text{cover for all species}} \times 100$$

$$\text{Basal area } (m^2/ha) = \frac{\sum_{i}^{n} [(0.5 \text{ dbh in in.})^2 \pi] \, 0.00064516}{\text{area sampled (ha)}}$$

$$\text{Relative basal area (\%)} = \frac{\text{basal area for a species}}{\text{basal area for all species}} \times 100$$

$$\text{Frequency} = \frac{\text{number of plots in which species occurred}}{\text{number of plots sampled}}$$

$$\text{Relative frequency (\%)} = \frac{\text{frequency for a species}}{\text{frequency of all species}} \times 100$$

$$\text{Importance value} = \text{relative cover or relative basal area} + \text{relative frequency}$$

2.5 SOIL SAMPLING AND ANALYSIS

Two paired sets of soil samples (0 to 15 centimeter depth) were collected from each permanent 100-meter square vegetation plot during September and October 1980 and April and June 1981. Half of each pair of soil samples was collected by excavation with a small hand trowel, with the other half of the sample collected using a cylindrical metal core sampler (Black et al. 1965). Each half of the sample pair was placed in separate labeled plastic bags, sealed, tied together in pairs and returned to the Dallas laboratory for analysis. With two permanent vegetation plots per cover type,

a total of four paired soil samples were collected from each cover type each sampling period.

The standard volume core samples were used to determine bulk density and percent moisture in the soil. Percent moisture in the oven dry soil was measured in association with bulk density determinations by drying samples at 105°C to constant weight. Results were expressed in appropriate units as determined from the following:

$$\text{Bulk density } (g/cm^3) = \frac{\text{oven dry weight (g) of soil sample}}{\text{core volume } (cm^3)}$$

$$\text{Moisture } (\%) = \frac{\text{soil wet weight (g) - soil dry weight (g)}}{\text{soil wet weight (g)}} \times 100$$

The trowel portion of the sample was used for analysis of pH, conductivity, cation exchange capacity, and percent base saturation. Soil pH in water was determined by mixing equal portions, by weight, of soil and distilled water in an appropriate container. The mixture was stirred periodically and the solids allowed to settle out. The soil-water suspension was then allowed to settle for a short time, after which the pH was measured using an internal reference glass electrode (Black et al. 1965). Results were recorded as soil pH measured in water.

Soil conductivity was determined by mixing each soil sample with distilled water and stirring to form a saturated extract. Either soil or water was added to the extract to form the desired soil-water paste. The paste was allowed to stand for one hour, checked for consistency, allowed to stand for four additional hours, and vacuum-filtered. Conductivity of the filtrate was measured with a cathode-ray conductivity bridge of the Wheatstone type at 85 Hz using a 1.0 constant cell (Black et al. 1965). Results were recorded as micromhos/centimeter at 25°C.

Cation exchange capacity of soils was determined using the ammonium saturation method (Black et al. 1965). Samples were air-dried and ground to pass through a 2-millimeter mesh sieve. The sized soil sample was mixed with 1N ammonium acetate, shaken thoroughly, and allowed to stand overnight. The wet sample was filtered, the residue washed with ammonium acetate, and the filtrate set aside for determination of total exchangeable bases (required to calculate percentage base saturation). The residue was then washed several times; once with 99 percent isopropyl alcohol, followed by several washings with 5 percent sodium chloride to a measured volume. Ammonium ion concentration was determined from the washings using an autoanalyzer. Results were recorded in milliequivalents per 100 grams of soil.

$$\text{Percent base saturation} = \frac{\text{Total exchangeable bases}}{\text{Cation exchange capacity}} \times 100$$

Total exchangeable bases were determined by forced evaporation of the filtrate (set aside during cation exchange processing) to dryness, ignition of the residue in a furnace, and treatment of the cooled residue with 0.1N hydrochloric acid. The acid-treated residue was heated, stirred, and titrated with 0.1N sodium hydroxide to a bromocresol green end-point (Black et al. 1965). Results were recorded as milliequivalents per 100 grams of soil based on milliequivalents of standard acid consumed in the titration.

Replicate data from each of the soil chemical analyses were summarized as mean ($\bar{X}$) and standard error (SE) by cover type and date.

SECTION 3.0

RESULTS AND DISCUSSION

The general botanical history of the Marble Hill study area was described, vegetation and land use categories mapped, and distinguishing characteristics of map units discussed in the first annual report to PSI (TI 1977). During the 1977-1978, 1978-1979, 1979-1980, and 1980-1981 sampling periods, additional quantitative and qualitative data were obtained and analyzed.

The data collected in the 1980-1981 sampling period are presented in this report, along with a summary of the information obtained over the 5-year sampling period. This comprehensive information is used to characterize the present floristic and soil conditions in the Marble Hill study area. An analysis of the 1980-1981 data is presented in Section 3.1. The 5-year summary in Section 3.2 includes description of the regional setting (Section 3.2.1), characterization of the cover types (vegetation and soils) sampled (Section 3.2.2), and discussion of major vegetation stress factors in the study area (Section 3.2.3).

3.1 COVER TYPE ANALYSIS AND VEGETATION STRESS SURVEY, 1980-1981

The land use/land cover types comprising the Marble Hill study area are listed along with acreage comparisons in Table 3.1-1. Slight acreage changes in comparison with previous reports are due to use of the more precise polar planimeter in calculating acreages. The distribution of the cover types over the survey area is depicted in Figure 3-1 (1:24,000 scale map located in the plastic pocket at the back of the report).

Cover type distribution has essentially remained unchanged over the 5-year survey period. Most of the Ohio River floodplain remained in cropland, pasture, or forest. Level uplands were generally cultivated, with small areas of pasture and forest. Ridges, slopes, and small drainageways were forested. The most notable land use change was the clearing of agricultural land for

Table 3.1-1

Estimated Horizontal Acreage for Each Vegetation Cover Type for the Survey Area and Marble Hill Site, June 1981

Map Unit	Land Use/Land Cover Type	Survey Area		Marble Hill Site		
		Acreage	Percent of Total	Acreage	Percent of Total	Change in Acres from 1980
1	Maple-Basswood	611	3.5	94	9.8	0.0
2	Oak-Maple	2,106	12.2	220	22.9	0.0
3	Chinkapin Oak	528	3.1	86	9.0	0.0
4	Red pine	16	0.1	3	0.3	0.0
5	Sycamore-Boxelder	596	3.4	12	1.3	0.0
6	Oak-Hickory	686	4.0	0	0.0	0.0
7	Unimproved pasture/old fields	2,376	13.8	96	10.0	-0.4
8	Cropland	5,474	31.7	6	0.6	0.0
9	Walnut-Hickory-Buckeye	660	3.8	0	0.0	0.0
10	Orchards	24	0.1	0	0.0	0.0
11	Virginia pine	185	1.1	8	0.8	0.0
12	Residential/farmsteads	345	2.0	0	0.0	0.0
13	Industrial	769	4.5	434	45.2	+0.4
14	Water	2,883	16.7	0	0.0	0.0
15	Cemetery	5	0.0	1	0.1	0.0
	Total	17,264		960		

construction of the Trimble County Generating Station southeast of the Marble Hill site on the Kentucky side of the Ohio River. Changes due to conversion of old fields and pastures to cropland, while notable, are not uncommon in agricultural areas due to crop rotations, weather conditions, and fluctuations in market value of cultivated crops.

As shown in Table 3.1-1, there was little change in cover type acreages due to onsite construction of the Marble Hill Generating Station. The 0.4-acre clearing of unimproved pasture land was the only change due to construction observed from color infrared aerial photographs (Figure 3-2). Approximately 44 percent of the site has been cleared for Marble Hill plant construction.

3.1.1 Vegetation Analysis, 1980-1981 Sampling Period

o Ground Cover

The graphs in Figure 3-3 depict the total ground cover, vegetation cover, and litter cover for the four seasonal sampling periods for each cover type. The shaded portion of each bar in the graph is the mean vegetation cover, while the non-shaded portion of the bar represents mean litter cover. The total height of the bar indicates total ground cover. The bars are paired at each seasonal sampling date to facilitate comparison of the 1980-1981 values with the mean of the previous four years.

Examination of the values for total ground cover, vegetation cover, and litter cover for the four sampling periods shows that the April sampling period generally had the highest percentage of vegetation cover and lowest litter cover (Figure 3-3, Appendix Table A-1). This differs from previous years results, in which the highest vegetation cover generally occurred in June, correlating with the peak of the summer growing season. It probably is due to a later than usual April sampling and may reflect typical conditions in late April/early May, depending on weather factors. Although the emergence of early spring ephemerals had peaked prior to the late April sampling, some spring species still were present, as well as some summer species that usually emerge later, making total cover high.

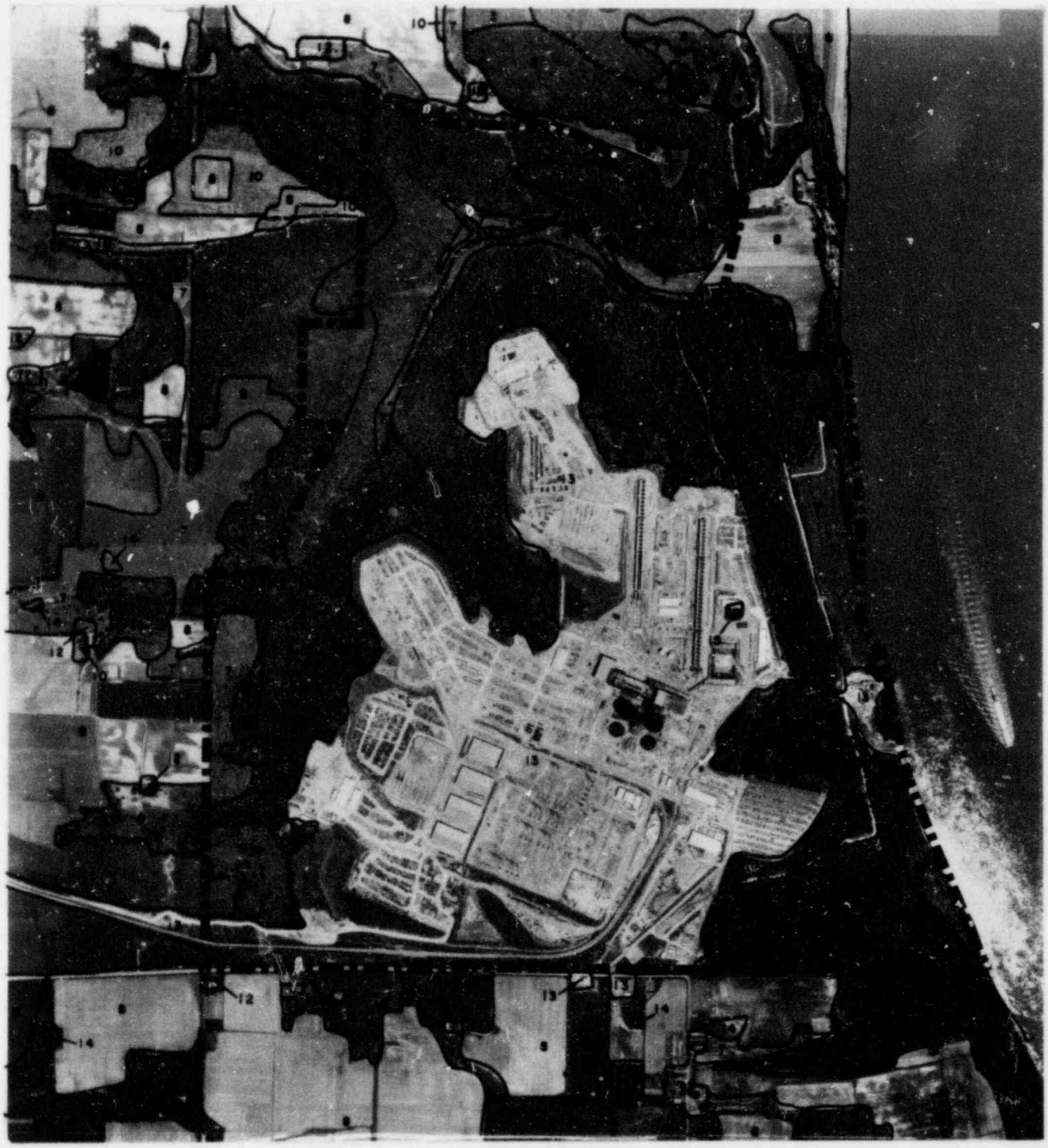

Figure 3-2. Color Infrared Aerial Photography, Marble Hill Site Area, June 1981, Depicting Relationship of Construction Disturbance to June 1980 Vegetation Cover Types

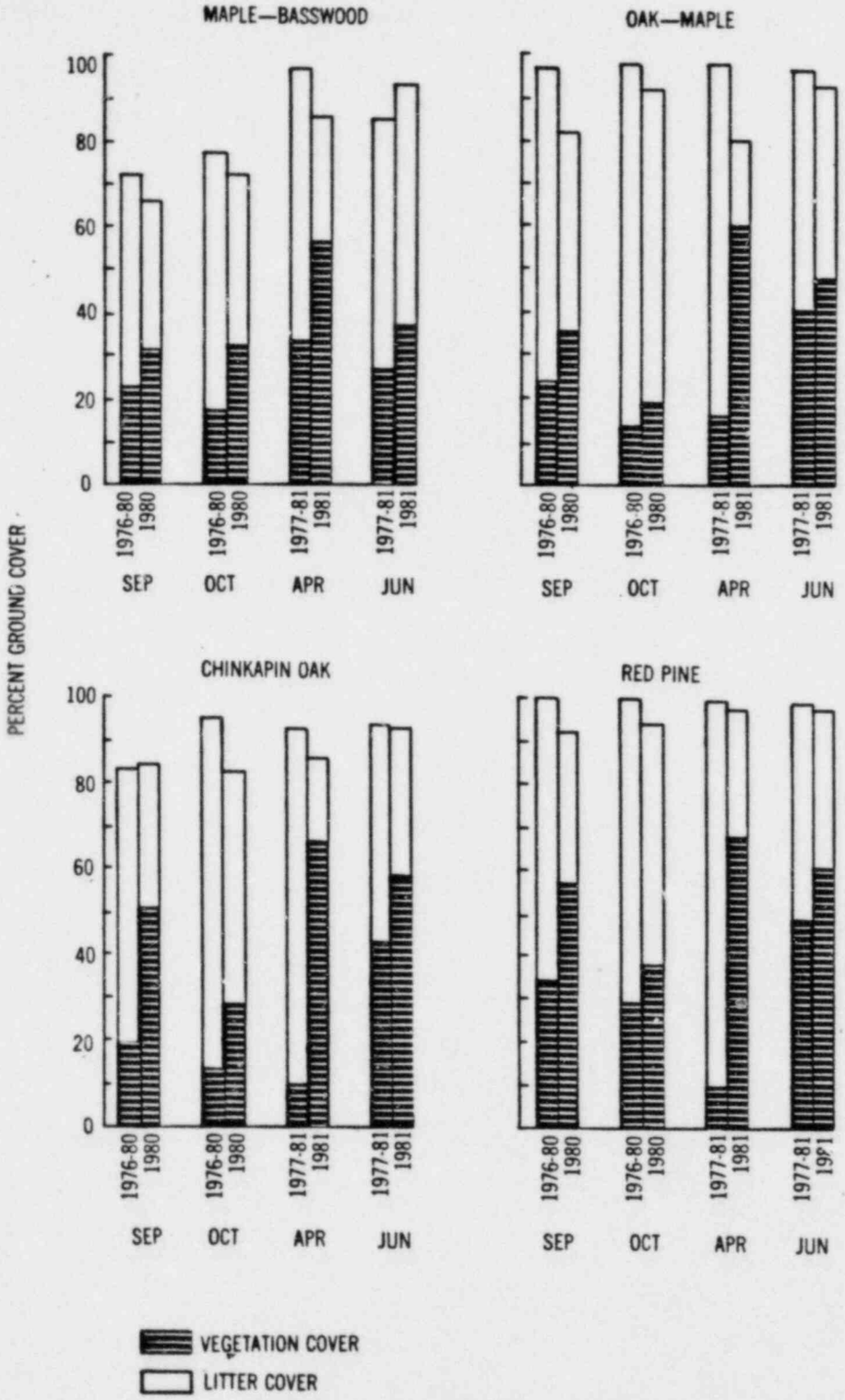

Figure 3-3. Mean Percent Ground Cover for Vegetation, Litter, and Total Ground Cover for Each Vegetation Cover Type During 1980-1981 Sampling Period and Comparison with 1976-1980 Mean Values (Sheet 1 of 2)

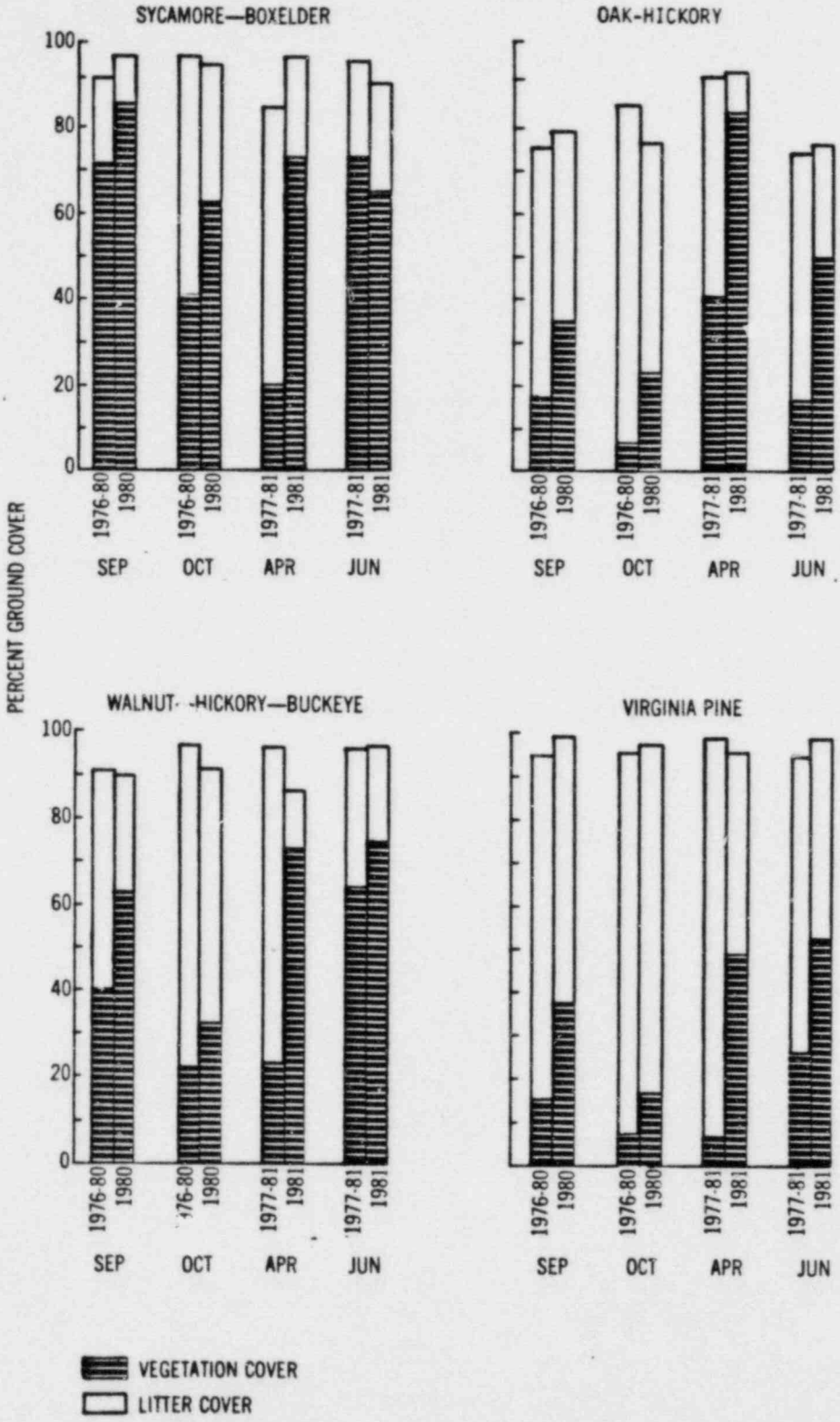

Figure 3-3. Mean Percent Ground Cover for Vegetation, Litter, and Total Ground Cover for Each Vegetation Cover Type During 1980-1981 Sampling Period and Comparison with 1976-1980 Mean Values (Sheet 2 of 2)

In the walnut-hickory-buckeye and Virginia pine cover types, where peak vegetation cover occurred in June, April values were similar, but fewer spring ephemerals were present and April vegetation cover essentially represented an earlier stage of the same vegetation present in June. The sycamore-boxelder cover type had the highest vegetation cover in September. This is due to the late summer maturation of extensive colonies of wingstem, false nettle, clearweed, and jewelweed that are common on the periodically flooded, silty flats along Saluda Creek.

Litter cover was generally highest in October in all cover types due to increased cover from leaf fall. Total ground cover was highest in the red pine and Virginia pine cover types, which are on fairly level terrain where the needle-covered ground is subject to minimal washing or erosion.

A comparison of 1980-1981 values with mean values of the previous four years shows that the total ground cover has remained fairly consistent, although there was a general increase in vegetation cover in 1980-1981. This is due to a number of factors, including the timing of spring sampling, successional changes in some cover types, and relocation of the Virginia pine plots in 1980 (TI 1980).

- Maple-Basswood (01)

Sugar maple (Acer saccharum) is the dominant tree in the maple-basswood cover type, with basswood (Tilia americana) second in importance (Table 3.1-2). The presence of white ash (Fraxinus americana) and black walnut (Juglans nigra) as minor components in the sample plots is typical of their distribution in the cover type as a whole. There is little understory vegetation in this heavily shaded forest, and no saplings occurred in the sample plots. All trees in the plots appeared healthy, although a fungal leaf blotch infested many of the yellow buckeyes (Aesculus octandra) that are scattered throughout the cover type.

Sugar maple, pawpaw (Asimina triloba), and spicebush (Lindera benzoin) were the most important shrub species in the 1980-1981 sampling

Table 3.1-2

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Maple-Basswood Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	No. in Sample Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Acer saccharum	Sugar maple	5	0	1.0	14.8	40.0	42.7	83	1
Fraxinus americana	White ash	1	0	0.5	1.2	20.0	3.5	24	4
Juglans nigra	Black walnut	1	0	0.5	4.3	20.0	12.4	32	3
Tilia americana	Basswood	3	0	0.5	14.4	20.0	41.4	61	2
Sapling Stratum									
No saplings occurred in plots.									

period (Table 3.1-3). These species normally grow in fertile, moist soils and are indicators of a rich site.

Herbaceous cover is also sparse under the dense canopy of the steep east-facing slopes of this cover type. As in previous years, the highest vegetation cover values were in April, with springephemerals, especially spring beauty (Claytonia virginica), larkspur (Delphinium tricorne), cut-leaved toothwort (Dentaria laciniata), Dutchman's breeches (Dicentra cucullaria), cleavers (Galium aparine), and trillium (Trillium sessile), contributing most of the vegetative cover (Table 3.1-4). Wild ginger (Asarum canadense) is the most important herbaceous species, based on relative frequency and relative cover values. It consistently contributes the most cover throughout the sampling seasons, although peaking in fall. Other important herbaceous stratum species reaching their peak in summer and fall include sugar maple, white snakeroot (Eupatorium rugosum), Virginia creeper (Parthenocissus quinquefolia), clearweed (Piliea pumila), and jewelweed (Impatiens biflora/pallida).

A steep slope and sparse ground cover make this cover type particularly sensitive to surface erosion and washing. Although not apparent in the plots, increased surface water runoff from construction areas upslope has enlarged and deepened a rocky drainage gully just south of one of the plots. At this time, increased erosion appears to be limited to existing drainageways and is not widespread across the face of the slope.

- Oak-Maple (02)

Sugar maple also is a major component of the tree stratum of the oak-maple cover type (Table 3.1-5). Although numerous, the sugar maples are mainly smaller trees, while northern red oak (Quercus rubra), the codominant canopy species is larger in size and less frequent in distribution. The importance values in Table 3.1-5 reflect comparative basal area and frequency of tree species in the cover type. Sugar maple and northern red oak have the highest values, white ash and black cherry (Prunus serotina) have similar middle values, and dogwood (Cornus florida) has the lowest value, reflecting its primary position as a understory tree.

Table 3.1-3

Species Composition, Relative Frequency, Relative Cover, and Importance Value for Shrub Stratum by Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Maple-Basswood													
Acer saccharum	Sugar maple	75.0	20.0	33.3	-	64.4	20.2	31.3	-	139	40	65	-
Asimina triloba	Pawpaw	25.0	60.0	22.2	66.7	35.6	59.6	31.3	79.8	61	120	53	147
Fraxinus americana	White ash	-	-	11.1	-	-	-	6.1	-	-	-	17	-
Lindera benzoin	Spicebush	-	20.0	22.2	33.7	-	20.2	25.3	20.2	-	40	48	54
Vitis aestivalis	Summer grape	-	-	11.1	-	-	-	6.1	-	-	-	17	-
Oak-Maple													
Acer saccharum	Sugar maple	18.2	16.7	12.5	18.2	20.4	6.1	12.6	15.9	39	23	25	34
Aesculus octandra	Yellow buckeye	-	-	6.3	-	-	-	1.7	-	-	-	8	-
Celtis occidentalis	Hackberry	9.4	8.3	12.5	-	2.2	4.0	1.7	-	11	12	14	-
Cercis canadensis	Eastern redbud	-	-	6.3	-	-	-	1.7	-	-	-	8	-
Cornus florida	Flowering dogwood	18.2	25.0	12.5	27.3	38.5	49.8	28.7	47.5	57	75	41	75
Fraxinus americana	White ash	-	8.3	6.3	-	-	1.8	1.7	-	-	10	8	-
Ostrya virginiana	Hophornbeam	18.2	16.7	18.8	27.3	13.8	17.1	21.5	22.8	32	34	40	50
Prunus serotina	Black cherry	9.4	-	6.3	-	2.2	-	1.7	-	11	-	8	-
Ulmus rubra	Slippery elm	18.2	25.0	25.0	27.3	22.9	21.1	28.7	13.8	41	46	54	41
Chinkapin Oak													
Celtis occidentalis	Hackberry	25.0	5.9	12.5	15.2	32.7	14.2	61.1	24.9	58	20	74	40
Cercis canadensis	Eastern redbud	-	5.9	6.3	15.2	-	3.7	3.8	19.6	-	10	10	35
Fraxinus quadrangulata	Blue ash	12.5	11.8	6.3	7.6	8.5	3.7	0.7	2.7	21	16	7	10
Juniperus virginiana	Eastern redcedar	6.3	17.6	18.8	-	5.2	33.7	8.4	-	12	51	27	-
Ostrya virginiana	Hophornbeam	12.5	5.9	12.5	-	6.9	7.1	3.8	-	19	13	16	-
Quercus muehlenbergii	Chinkapin oak	6.3	5.9	-	9.1	3.6	3.7	-	8.4	10	10	-	18
Rhus aromatica	Fragrant sumac	6.3	-	12.5	15.2	10.4	-	9.9	11.1	17	-	22	26
Symphoricarpos orbiculatus	Coralberry	-	5.9	-	7.6	-	7.1	-	2.7	-	13	-	10
Ulmus rubra	Slippery elm	18.8	17.6	18.8	15.2	24.2	17.8	18.4	16.9	43	35	37	32
Viburnum prunifolium	Black-haw	-	11.8	-	-	-	5.4	-	-	-	17	-	-
Xanthoxylem americanum	Prickly-ash	12.5	11.8	12.5	15.2	8.5	3.7	3.8	13.8	21	16	16	29
Red Pine													
Acer saccharum	Sugar maple	6.5	6.7	9.1	11.1	11.8	45.7	14.7	9.8	18	62	24	21
Carya cordiformis	Bitternut hickory	-	4.2	-	3.7	-	1.4	-	1.0	-	6	-	5
Celtis occidentalis	Hackberry	3.2	-	3.0	-	1.0	-	0.8	-	4	-	4	-
Cercis canadensis	Eastern redbud	9.7	12.5	6.1	11.1	9.6	7.1	6.9	8.7	19	20	13	20
Cornus florida	Flowering dogwood	19.4	12.5	15.2	18.5	37.5	12.8	23.5	38.3	57	25	39	57
Fraxinus americana	White ash	12.9	8.3	18.2	25.9	12.8	4.3	8.8	16.4	26	13	27	42

Table 3.1-3 (Contd)

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	Relative Frequency (%) 1980 Oct	Relative Frequency (%) 1981 Apr	Relative Frequency (%) 1981 Jun	Relative Cover (%) 1980 Sep	Relative Cover (%) 1980 Oct	Relative Cover (%) 1981 Apr	Relative Cover (%) 1981 Jun	Importance Value 1980 Sep	Importance Value 1980 Oct	Importance Value 1981 Apr	Importance Value 1981 Jun
Red Pine (Continued)													
Fraxinus quadrangulata	Blue ash	-	4.2	-	-	-	3.0	-	-	-	7	-	-
Liriodendron tulipifera	Yellow poplar	-	4.2	12.1	3.7	-	1.4	10.4	0.2	-	6	23	4
Lonicera japonica	Japanese honeysuckle	3.2	-	-	-	2.2	-	-	-	5	-	-	-
Prunus serotina	Black cherry	12.9	4.2	12.1	7.4	4.3	4.3	10.4	4.4	17	8	23	12
Quercus muehlenbergii	Chinkapin oak	6.5	4.2	9.1	3.7	3.3	1.4	3.5	3.3	10	6	13	7
Quercus rubra	Northern red oak	6.5	8.3	3.0	3.7	3.3	7.1	2.6	2.3	10	15	6	6
Rubus phoenicolasius	Wineberry	3.2	4.2	3.0	3.7	3.3	4.3	7.8	6.6	7	9	11	10
Rubus sp.	Blackberry	3.2	8.3	-	-	2.2	3.0	-	-	5	11	-	-
Sassafras albidum	Sassafras	6.5	4.2	3.0	3.7	4.3	3.0	3.5	2.3	11	7	7	6
Ulmus rubra	Slippery elm	3.2	-	3.0	3.7	2.2	-	1.8	6.6	5	-	5	10
Vitis aestivalis	Summer grape	3.2	4.2	3.0	-	2.2	1.4	5.3	-	5	6	8	-
Sycamore-Boxelder													
Acer negundo	Boxelder	-	50.0	25.0	37.5	-	23.2	5.4	6.0	-	73	30	44
Aesculus octandra	Yellow buckeye	-	-	25.0	-	-	-	5.4	-	-	-	30	-
Cornus florida	Flowering dogwood	33.3	-	-	-	26.4	-	-	-	60	-	-	-
Lindera benzoin	Spicebush	33.3	-	25.0	37.5	38.9	-	44.6	44.0	72	-	70	81
Ulmus americana	American elm	33.3	50.0	25.0	37.5	34.7	76.8	44.6	50.0	68	127	70	88
Oak-Hickory													
Celtis occidentalis	Hackberry	-	11.1	8.3	-	-	1.8	3.4	-	-	13	12	-
Cercis canadensis	Eastern redbud	35.1	11.1	25.0	30.0	25.0	68.1	33.9	39.5	60	79	59	70
Cornus priceae	Miss Price's dogwood	-	11.1	8.3	20.0	-	1.8	6.5	6.6	-	13	15	27
Fraxinus americana	White ash	11.7	11.1	8.3	-	1.1	0.8	1.6	-	13	12	10	-
Quercus rubra	Northern red oak	-	11.1	-	-	-	5.3	-	-	-	16	-	-
Rosa sp.	Wild rose	-	-	-	20.0	-	-	-	6.6	-	-	-	27
Staphylea trifoliata	Bladdernut	-	-	8.3	-	-	-	1.6	-	-	-	10	-
Symphoricarpos orbiculatus	Coralberry	23.4	11.1	8.3	10.0	3.4	1.8	8.0	1.7	27	13	16	12
Ulmus americana	American elm	18.1	22.2	25.0	10.0	68.1	20.4	43.7	0.3	86	43	69	10
Xanthoxylem americanum	Prickly-ash	11.7	-	8.3	-	2.4	-	1.6	-	14	-	10	-
Walnut-Hickory-Buckeye													
Acer negundo	Boxelder	6.7	9.1	16.7	3.3	3.7	9.3	15.2	1.7	10	18	32	5
Acer saccharum	Sugar maple	13.3	4.5	5.6	6.7	10.8	3.2	6.6	2.3	24	8	12	9
Aesculus octandra	Yellow buckeye	-	-	-	3.3	-	-	-	12.5	-	-	-	16
Asimina triloba	Pawpaw	20.0	13.6	11.1	13.3	44.4	27.6	10.7	26.6	64	41	22	40

Table 3.1-3 (Contd)

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Walnut-Hickory-Buckeye (Continued)													
Carya cordiformis	Bitternut hickory	6.7	-	-	-	5.4	-	-	-	12	-	-	-
Carya ovata	Shagbark hickory	6.7	4.5	5.6	-	5.4	6.1	4.5	-	12	11	10	-
Fraxinus americana	White ash	13.3	22.7	11.1	10.0	12.5	16.9	8.7	14.2	26	40	20	24
Fraxinus quadrangulata	Blue ash	6.7	9.1	22.2	10.0	1.7	13.7	21.8	10.8	8	23	44	21
Lindera benzoin	Spicebush	26.7	9.1	16.7	26.7	16.0	4.9	23.9	15.9	43	14	41	13
Prunus serotina	Black cherry	-	4.5	-	3.3	-	1.5	-	1.7	-	6	-	5
Quercus muehlengergii	Chinkapin oak	-	-	5.6	3.3	-	-	6.6	5.4	-	-	12	9
Rubus sp.	Blackberry	-	4.5	-	3.3	-	1.5	-	3.7	-	6	-	7
Symphoricarpos orbiculatus	Coralberry	-	13.6	5.6	6.7	-	4.6	2.1	5.4	-	18	8	12
Ulmus rubra	Slippery elm	-	4.5	-	-	-	10.8	-	-	-	15	-	-
Virginia Pine													
Cornus florida	Flowering dogwood	-	75.0	75.0	80.0	-	83.8	72.5	95.2	-	159	148	175
Fagus grandifolia	American beech	40.0	-	-	-	48.7	-	-	-	89	-	-	-
Liquidambar styraciflua	Sweetgum	40.0	25.0	-	20.0	48.7	16.2	-	4.8	89	41	-	25
Prunus serotina	Black cherry	-	-	25.0	-	-	-	27.5	-	-	-	53	-
Quercus muehlenbergii	Chinkapin oak	20.0	-	-	-	2.6	-	-	-	23	-	-	-

Table 3.1-4

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Stratum, Maple-Basswood Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer rubrum	Red maple	-	-	-	2.8	-	-	-	0.2	-	-	-	3
Acer saccharum	Sugar maple	4.3	13.6	1.9	13.9	1.6	14.6	0.8	9.2	6	28*	3	23*
Aesculus sp.	Buckeye	-	-	-	2.8	-	-	-	0.2	-	-	-	3
Arisaema atrorubens	Jack-in-the-pulpit	4.3	-	3.7	-	0.3	-	4.2	-	5	-	8	-
Asarum canadense	Wild ginger	21.7	22.7	9.3	13.9	56.2	58.5	24.3	35.5	78*	81*	34*	49*
Asimina triloba	Pawpaw	4.3	4.5	1.9	2.8	1.6	3.8	0.8	3.1	6	8	3	6
Claytonia virginica	Spring beauty	-	-	7.4	-	-	-	3.9	-	-	-	11	-
Delphinium tricorne	Larkspur	-	-	13.0	-	-	-	10.8	-	-	-	24*	-
Dentaria laciniata	Cut-leaved toothwort	-	-	11.1	-	-	-	5.4	-	-	-	17*	-
Dicentra cucullaria	Dutchman's breeches	-	-	11.1	-	-	-	8.1	-	-	-	19*	-
Eupatorium rugosum	White snakeroot	8.7	18.2	1.9	11.1	11.9	11.1	3.4	17.8	21*	29*	5	29*
Fraxinus americana	White ash	4.3	4.5	1.9	5.6	1.6	1.8	0.8	5.9	6	6	3	12
Galium aparine	Cleavers	-	-	14.8	-	-	-	24.3	-	-	-	39*	-
Glechoma hederacea	Ground-ivy	-	-	-	2.8	-	-	-	0.2	-	-	-	3
Impatiens biflora/pallida	Jewelweed	4.3	13.6	3.7	5.6	3.5	4.1	4.2	10.4	8	18*	8	16*
Lindera benzoin	Spicebush	-	-	-	2.8	-	-	-	0.2	-	-	-	3
Parthenocissus quinquefolia	Virginia creeper	8.7	-	3.7	8.3	3.5	-	2.6	9.2	12	-	6	18*
Pilea pumila	Clearweed	17.4	-	3.7	5.6	15.1	-	1.7	1.9	33*	-	5	8
Ranunculus arbortivus	Small-flowered buttercup	-	4.5	-	2.8	-	1.8	-	0.2	-	6	-	3
Rhus radicans	Poison ivy	-	4.5	-	-	1.6	-	-	-	-	6	-	-
Rosa sp.	Wild rose	-	-	-	2.8	-	-	-	0.2	-	-	-	3
Sanicula trifoliata	Black snakeroot	4.3	-	-	-	1.6	-	-	-	6	-	-	-
Sassafras albidum	Sassafras	-	-	-	2.8	-	-	-	0.2	-	-	-	3
Tovara virginiana	Jumpseed	-	-	-	2.8	-	-	-	0.2	-	-	-	3
Trillium sessile	Toadshade	-	-	1.9	-	-	-	1.7	-	-	-	4	-
Ulmus americana/rubra	American/Slippery elm	8.7	13.6	3.7	2.8	0.8	2.6	0.4	0.2	10	16*	4	3
Viola sororia	Woolly blue violet	8.7	-	5.6	8.3	2.2	-	2.7	4.7	11	-	8	13

* Major species (importance value ≥15).

Table 3.1-5

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Oak-Maple Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	No. in Sample Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Acer saccharum	Sugar maple	7	0	1.0	5.5	33.3	23.1	56	1
Cornus florida	Flowering Dogwood	2	0	0.5	0.8	16.7	3.4	20	5
Fraxinus americana	White ash	3	0	0.5	5.3	16.7	22.3	39	3
Juniperus virginiana	Eastern redcedar	0	-1	-	-	-	-	-	-
Prunus serotina	Black cherry	1	-1	0.5	5.1	16.7	21.4	38	4
Quercus muehlenbergii	Chinkapin oak	1	-1	-	-	-	-	-	-
Quercus rubra	Northern red oak	1	0	0.5	7.1	16.7	29.8	47	2
Sapling Stratum									
Acer saccharum	Sugar maple	4	0	1.0	1.6	100.0	100.0	200	1

The plot data show that sugar maple is also the most important species in the sapling stratum, although buckeye, dogwood, and hophornbeam (Ostrya virginiana) are scattered thorughout the cover type. Three trees in sample plots died during the 1980-1981 sampling period: a black cherry and chinkapin oak (Quercus muehlenbergii) that had been diseased and dying for several years, and an eastern redcedar (Juniperus virginiana), which is a shade intolerant tree that has been gradually suppressed under the hardwood canopy.

The major components of the shrub stratum reflect the make-up of the sapling stratum, with dogwood the most important shrub species followed by hophornbeam, slippery elm (Ulmus rubra), and sugar maple (Table 3.1-3).

Many of the important species in the herbaceous stratum are seedlings of taxa in the tree and sapling strata. These include sugar maple, dogwood, white ash, hophornbeam, black cherry, and slippery elm (Table 3.1-6). Other important species are black snakeroot (Sanicula trifoliata), wood anemone (Anemone quinquefolia), wild ginger, Virginia creeper, and poison ivy (Rhus radicans).

The litter disturbance and increased erosion noted in the 1980 final report (TI 1980) appears to have been reduced due to seeding by PSI of upslope construction sites, although washing is still evident along the drainageways of this slope.

- Chinkapin Oak (03)

Chinkapin oak was the dominant species in the tree stratum on these plots, with white ash second in importance (Table 3.1-7). The presence of eastern redcedar in the tree class indicates previous disturbance, although the death of one redcedar sapling and the suppressed condition of the others make the eventual loss of these intolerant species likely, barring future disturbance. With the exception of the redcedars, the trees in the sample plots appeared healthy. Minor insect damage was evident on oaks, and leaf blotch infested buckeyes in the area.

Table 3.1-6

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Oak-Maple Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer saccharum	Sugar maple	15.2	12.5	1.3	7.7	19.1	25.9	1.7	7.2	34*	38*	3	15*
Agrimonia microcarpa	Agrimony	-	-	-	3.8	-	-	-	1.5	-	-	-	5
Allium canadense	Wild garlic	-	-	5.3	1.9	-	-	4.9	1.1	-	-	10	3
Anemone quinquefolia	Wood anemone	-	18.8	10.5	-	-	19.6	20.1	-	-	38*	31*	-
Anemonella thalictroides	Rue anemone	-	-	2.6	-	-	-	1.0	-	-	-	4	-
Asarum canadense	Wild ginger	3.0	-	2.6	-	1.8	-	12.9	-	5	-	16*	-
Botrychium virginianum	Virginia grapefern	-	-	-	3.8	-	-	-	1.5	-	-	-	6
Commelina virginica	Dayflower	-	6.3	-	-	-	6.3	-	-	-	13	-	-
Cornus florida	Flowering dogwood	9.1	6.3	2.6	3.8	9.4	3.6	4.0	3.5	19*	10	7	7
Dentaria laciniata	Cut-leaved toothwort	-	-	6.6	-	-	-	1.4	-	-	-	8	-
Desmodium glutinosum	Point-leaved tick-trefoil	3.0	-	-	-	1.8	-	-	-	5	-	-	-
Dicentra cucullaria	Dutchman's breeches	-	-	3.9	-	-	-	2.7	-	-	-	7	-
Dicotyledoneae	Dicot	-	-	3.9	9.6	-	-	8.2	9.3	-	-	12	19*
Dioscorea quaternata	Wild yam	6.1	3.1	3.9	7.7	3.9	0.4	1.2	5.2	10	4	5	13
Fraxinus americana	White ash	6.1	6.3	3.9	1.9	9.4	8.5	1.8	1.1	16*	15*	6	3
Fraxinus quadrangulata	Blue ash	3.0	-	-	-	1.8	-	-	-	5	-	-	-
Galium aparine	Cleavers	-	-	9.2	1.9	-	-	5.0	1.1	-	-	14	3
Galium circaezans	White wild licorice	6.1	3.1	1.3	3.8	2.4	2.7	0.8	1.5	9	6	2	5
Geum canadense	Canadian avens	-	3.1	-	-	-	2.7	-	-	-	6	-	-
Jeffersonia diphylla	Twinleaf	-	-	3.9	5.8	-	-	3.2	4.6	-	-	7	11
Lonicera japonica	Japanese honeysuckle	-	3.1	-	-	-	0.4	-	-	-	4	-	-
Ostrya virginiana	Hophornbeam	6.1	3.1	2.6	5.8	6.1	2.7	1.7	10.4	12	6	4	16*
Parthenocissus quinquefolia	Virginia creeper	9.1	3.1	9.2	1.9	5.8	2.7	9.6	1.1	15	6	19*	3
Poaceae	Grass	-	3.1	1.3	1.9	-	2.7	1.7	2.4	-	6	3	4
Prunus serotina	Black cherry	3.0	12.5	2.6	1.9	0.3	4.5	1.0	1.1	3	17*	4	3
Quercus rubra	Northern red oak	-	3.1	1.3	1.9	-	2.7	0.1	1.1	-	6	1	3
Rhus radicans	Poison ivy	9.1	3.1	2.6	1.9	11.8	0.4	3.2	4.6	21*	4	6	7
Sanguinaria canadensis	Bloodroot	-	-	1.3	1.9	-	-	0.8	1.1	-	-	2	3
Sanicula trifoliata	Black snakeroot	18.2	3.1	-	9.6	24.5	5.8	-	22.3	45*	9	-	32*
Smilax sp.	Smilax	-	-	-	1.9	-	-	-	2.4	-	-	-	4
Stellaria pubera	Star chickweed	-	-	3.9	-	-	-	3.6	-	-	-	8	-
Ulmus rubra	Slippery elm	3.0	6.3	3.9	9.6	1.8	8.5	6.4	9.3	5	15*	10	19*
Viola eriocarpa	Smooth yellow violet	-	-	1.3	1.9	-	-	0.8	2.4	-	-	2	4
Viola sororia	Woolly blue violet	-	-	7.9	7.7	-	-	2.3	2.8	-	-	10	11

* Major species (importance value ≥15).

Table 3.1-7

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Chinkapin Oak Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Acer saccharum	Sugar Maple	1	0	0.5	0.4	11.1	1.7	13	6
Fraxinus americana	White ash	9	0	1.0	6.5	22.2	27.4	50	2
Juniperus virginiana	Eastern redcedar	5	0	1.0	3.1	22.2	13.1	35	3
Quercus muehlenbergii	Chinkapin oak	11	0	1.0	12.5	22.2	52.7	75	1
Quercus rubra	Northern red oak	1	0	0.5	0.7	11.1	3.0	14	4
Ulmus rubra	Slippery elm	1	0	0.5	0.5	11.1	2.1	13	5
Sapling Stratum									
Juniperus virginiana	Eastern redcedar	1	-1	0.5	0.3	100.0	100.0	200	1

No one species clearly dominated the numerous taxa in the shrub stratum (Table 3.1-3). Some of these shrub class components are hackberry (Celtis occidentalis), slippery elm, prickly-ash (Xanthoxylem americanum), blue ash (Fraxinus quadrangulata), eastern redcedar, fragrant sumac (Rhus aromatica), and redbud (Cercis canadensis).

As in previous years, Japanese honeysuckle (Lonicera japonica) was the most important herbaceous species (Table 3.1-8). This cover type contains a large number of different taxa, but few are of major importance in the plots. In addition to the consistent presence of Japanese honeysuckle, major species included Solomon's seal (Polygonatum biflorum) in the spring; columbo (Swertia caroliniensis) in the spring and summer; and wild yam (Dioscorea villosa), white wild licorice (Galium circaezans), and elm-leaved goldenrod (Solidago ulmifolia) in summer and fall. Many of these species are characteristic of disturbed sites and are not found in other cover types sampled in the study area.

- Red Pine (04)

Red pine (Pinus resinosa) remained the predominant tree species in this cover type, although two more red pines died in the 1980-1981 sampling period (Table 3.1-9). The continual decline of red pine is a successional trend that has been ongoing for many years. As noted in previous reports, red pine cannot tolerate competition from natural successors such as white pine, especially in the southern portion of its range (Fowells 1965). The suppression by white pine and hardwoods scattered in the overstory, as well as the invasion of hardwoods into the understory, indicates the existing red pine will eventually die out, and pine regeneration in the hardwood understory is unlikely.

Although no saplings were recorded on the plots, numerous species in the shrub stratum indicate that in a few years hardwoods will enter the sapling stratum in this cover type.

Table 3.1-8

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Stratum, Chinkapin Oak Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Agrimonia microcarpa	Agrimony	-	-	-	1.4	-	-	-	0	-	-	-	2
Allium canadense	Wild garlic	3.6	-	4.8	-	1.1	-	1.1	-	5	-	6	-
Carex sp.	Sedge	3.6	6.5	-	-	3.4	2.7	-	-	7	9	-	-
Celtis occidentalis	Hackberry	-	-	2.4	2.7	-	-	0.3	1.2	-	-	3	4
Cercis canadensis	Eastern redbud	1.8	-	1.2	1.4	0.8	-	0.1	0.1	3	-	1	2
Clematis viorna	Leatherflower	-	-	-	1.3	-	-	-	2.8	-	-	-	4
Commelina virginica	Dayflower	1.8	3.2	1.2	-	2.6	6.4	0.7	-	4	10	2	-
Delphinium tricorne	Larkspur	-	-	3.6	-	-	-	1.6	-	-	-	5	-
Dicotyledoneae	Dicot	7.3	-	7.1	5.4	2.2	-	5.2	4.2	10	-	12	10
Dioscorea villosa	Wild yam	9.1	-	6.0	8.1	20.4	-	6.4	16.9	30*	-	12	25*
Fraxinus americana	White ash	-	-	-	1.4	-	-	-	0.1	-	-	-	2
Fraxinus quadrangulata	Blue ash	3.6	-	-	-	1.8	-	-	-	5	-	-	-
Galium circaezans	White wild licorice	7.3	12.9	-	5.4	3.8	5.4	-	3.9	11	18*	-	9
Geum canadense	Canadian avens	-	3.2	-	-	-	0.3	-	-	-	4	-	-
Hystrix patula	Bottlebrush	-	6.5	-	-	-	6.4	-	-	-	13	-	-
Jeffersonia diphylla	Twinleaf	-	-	4.8	4.1	-	-	5.1	3.0	-	-	10	7
Lonicera japonica	Japanese honeysuckle	5.5	16.1	4.8	5.4	20.4	40.1	17.0	15.0	26*	56*	22*	20*
Monocotyledoneae	Monocot	-	-	-	1.4	-	-	-	0.9	-	-	-	2
Ostrya virginiana	Hophornbeam	5.5	6.5	2.4	-	5.2	6.4	3.5	-	11	13	6	-
Parthenocissus quinquefolia	Virginia creeper	7.3	-	2.4	4.1	2.8	-	2.8	5.8	10	-	5	10
Poaceae	Grass	-	-	1.2	1.4	-	-	1.5	0.9	-	-	3	2
Polygonatum biflorum	Solomon's seal	5.5	-	8.3	5.4	3.4	-	10.0	2.2	9	-	18*	8
Prunus serotina	Black cherry	5.5	6.5	3.6	2.7	3.4	4.3	2.2	1.2	9	11	6	4
Quercus rubra	Northern red oak	1.8	3.2	-	-	0.8	2.0	-		3	5	-	-
Rhus aromatica	Fragrant sumac	1.8	-	1.2	2.7	7.6	-	1.5	3.7	9	-	3	6
Rhus radicans	Poison ivy	1.8	-	1.2	1.4	0.8	-	1.5	0.1	3	-	3	2
Rosa sp.	Wild rose	-	-	1.2	-	-	-	0.7	-	-	-	2	-
Rubus sp.	Blackberry	-	-	-	1.4	-	-	-	1.0	-	-	-	2
Sanicula trifoliata	Black snakeroot	3.6	-	-	8.1	0.4	-	-	2.7	4	-	-	11
Silphium trifoliatum	Whorled rosinweed	1.8	-	-	-	4.2	-	-	-	6	-	-	-
Smilax herbacea	Carrion-flower	5.5	3.2	4.8	6.8	1.9	2.0	2.4	3.9	7	5	7	11
Solidago ulmifolia	Elm-leaved goldenrod	9.1	19.4	3.6	4.1	4.5	14.7	2.2	2.8	14	34*	6	7
Swertia caroliniensis	Columbo	-	-	6.0	6.8	-	-	12.8	15.9	-	-	19*	23*
Symphoricarpos orbiculatus	Coralberry	1.8	3.2	1.2	-	0.1	0.3	1.5	-	2	4	3	-
Taraxacum officinale	Dandelion	-	-	1.2	-	-	-	0.1	-	-	-	1	-
Thalictrum revolutum	Wax-leaved meadow rue	-	3.2	6.0	6.8	-	0.3	9.4	0.7	-	4	15	14
Triosteum aurantiacum	Horse-gentian	-	-	3.6	5.4	-	-	2.8	1.5	-	-	6	7
Viburnum prunifolium	Black-haw	-	3.2	-	1.4	-	0.3	-	0.9	-	4	-	2
Viola sororia	Woolly blue violet	-	-	1.2	-	-	-	0.7	-	-	-	2	-
Vitis aestivalis	Summer grape	1.8	-	1.2	1.4	1.8	-	0.1	0.9	4	-	1	2
Xanthoxylum americanum	Prickly-ash	1.8	3.2	1.2	2.7	6.8	8.4	3.5	1.2	9	12	5	4

* Major species (importance value ≥15).

Table 3.1-9

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Red Pine Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	No. in Sample Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Fraxinus americana	White ash	2	0	0.5	2.9	16.7	10.1	27	4
Liriodendron tulipifera	Yellow poplar	2	0	0.5	5.1	16.7	17.7	34	3
Pinus resinosa	Red pine	10	-2	1.0	15.0	33.3	52.1	85	1
Pinus strobus	White pine	4	0	1.0	5.8	33.3	20.1	53	2
Sapling Stratum									
No saplings occurred in plots.									

With 17 taxa in the shrub stratum, the red pine cover type had the largest variety of shrubs in the 1980-1981 sampling (Table 3.1-3). Hardwood regeneration accounted for most of the vegetative cover, with dogwood, sugar maple, and white ash the major species. Other hardwoods contributing to areal cover included eastern redbud, black cherry, chinkapin oak, northern red oak, and sassafras. Openings in the canopy from the death of red pines have aided establishment of many of these hardwood species, as well as less shade tolerant shrubs such as wineberry (Rubus phoenicolasius).

In the herbaceous stratum, Japenese honeysuckle continued to be the most important taxon (Table 3.1-10). Other major cover contributors were tree seedlings such as dogwood, redbud, and black cherry; vines of poison ivy and Virginia creeper; and black snakeroot, which reached vegetative importance in June. The extensive cover from Japanese honeysuckle and the dense shrub layer limited the importance of other herbaceous species.

- Sycamore-Boxelder (05)

Sycamore (Platanus occidentalis) is the dominant member of this cover type according to 1980-1981 importance values for trees on the sample plots (Table 3.1-11). Boxelder (Acer negundo) is a common, widely distributed member of the cover type, although only one tree is present in the plots. The other species in the plots are minor components in the cover type. Little change occurred in the tree and sapling strata from 1979-1980 sampling, and trees appeared healthy except a disease- and insect-damaged black cherry.

Characteristically, flooding of much of the sycamore-boxelder cover type occurred in 1981. Extensive flooding occurred in June over the floodplain and lowlands along Saluda Creek, a tributary of the Ohio River. Although June data were collected at the sample plot located on an upper terrace in this cover type, the plot located in the floodplain was under water and could not be sampled. Thus, herbaceous data for June reflect only one plot location. However, loss of these data is unimportant because of

Table 3.1-10

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Stratum, Red Pine Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	Oct	1981 Apr	Jun	Relative Cover (%) 1980 Sep	Oct	1981 Apr	Jun	Importance Value 1980 Sep	Oct	1981 Apr	Jun
Acer rubrum	Red maple	3.2	-	1.6	-	0.2	-	0.7	-	3	-	2	-
Acer saccharum	Sugar maple	-	-	1.6	-	-	-	3.1	-	-	-	5	-
Carex sp.	Sedge	3.2	2.4	1.6	1.6	1.4	0.9	0.1	0.1	5	3	2	2
Cercis canadensis	Eastern redbud	12.9	9.5	4.9	1.6	5.9	5.6	3.9	5.5	19*	15*	9	7
Circaea quadrisulcata	Enchanter's nightshade	-	-	-	1.6	-	-	-	0.1	-	-	-	2
Cornus florida	Flowering dogwood	9.7	9.5	6.6	6.5	26.6	29.6	8.6	11.7	36*	39	15*	3
Dentaria laciniata	Cut-leaved toothwort	-	-	4.9	-	-	-	3.1	-	-	-	8	-
Desmodium glutinosum	Point-leaved ticktrefoil	-	2.4	-	1.6	-	9.3	-	0.9	-	12	-	3
Dicotyledoneae	Dicot	-	-	-	1.6	-	-	-	2.7	-	-	-	4
Diospyros virginiana	Persimmon	3.2	-	-	-	3.1	-	-	-	6	-	-	-
Eupatorium rugosum	White snakeroot	3.2	2.4	1.6	1.6	3.1	0.9	0.7	0.9	6	3	2	3
Fragaria virginiana	Wild strawberry	3.2	2.4	1.6	-	0.2	1.9	1.2	-	3	4	3	-
Fraxinus americana	White ash	3.2	2.4	3.3	6.5	1.4	2.8	2.4	5.6	5	5	6	12
Fraxinus quadrangulata	Blue ash	3.2	-	-	-	3.1	-	-	-	6	-	-	-
Fraxinus sp.	Ash	-	-	-	3.2	-	-	-	0.4	-	-	-	4
Galium circaezans	White wild licorice	-	4.8	4.9	6.5	-	0.4	0.5	1.4	-	5	5	8
Galium triflorum	Fragrant bedstraw	3.2	-	4.9	4.8	0.1	-	1.7	0.6	3	-	7	5
Liriodendron tulipifera	Yellow poplar	-	2.4	1.6	-	-	0.1	0.1	-	-	3	2	-
Lonicera japonica	Japanese honeysuckle	19.4	14.3	9.8	8.1	36.7	16.9	31.8	19.9	56*	31*	42*	28*
Parthenocissus quinquefolia	Virginia creeper	-	4.8	11.5	11.3	-	3.7	14.0	18.9	-	9	26*	30*
Phryma leptostachya	Lopseed	-	4.8	3.3	-	-	1.9	2.4	-	-	7	6	-
Pinus strobus	White pine	3.2	2.4	1.6	1.6	1.4	0.1	0.1	0.1	5	3	2	2
Prunus serotina	Black cherry	9.7	4.8	6.6	3.2	7.3	3.7	8.6	3.6	17*	9	15*	7
Quercus muehlenbergii	Chinkapin oak	3.2	-	1.6	-	1.4	-	0.7	-	5	-	2	-
Rhus radicans	Poison ivy	-	11.9	9.8	8.1	-	7.4	7.5	9.1	-	19*	17*	17*
Rosa sp.	Wild rose	-	2.4	1.6	-	-	1.9	0.7	-	-	4	2	-
Rubus phoenicolasius	Wineberry	3.2	2.4	-	3.2	3.1	3.7	-	1.9	6	6	-	5
Rubus sp.	Blackberry	3.2	4.8	3.3	8.1	3.1	3.7	2.4	3.8	6	9	6	12
Sanicula trifoliata	Black snakeroot	3.2	4.8	8.2	9.7	0.2	2.8	4.1	5.8	3	8	12	16*
Sassafras albidum	Sassafras	-	-	-	3.2	-	-	-	1.2	-	-	-	4
Taraxacum officinale	Dandelion	3.2	-	1.6	-	0.2	-	0.7	-	3	-	2	-
Ulmus americana/rubra	American/slippery elm	3.2	2.4	1.6	1.6	1.4	1.5	0.7	0.1	5	4	2	2
Vitis aestivalis	Summer grape	-	2.9	-	1.6	-	0.9	-	0.1	-	3	-	2

*Major species (importance value ≥15).

Table 3.1-11

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Sycamore-Boxelder Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	No. in Sample Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Acer negundo	Boxelder	1	0	0.5	0.6	14.3	1.2	16	6
Cornus florida	Flowering dogwood	2	0	0.5	1.2	14.3	2.4	17	4
Juglans nigra	Black walnut	2	0	0.5	4.5	14.3	9.0	23	2
Platanus occidentalis	Sycamore	4	0	0.5	37.8	14.3	75.6	90	1
Prunus serotina	Black cherry	1	0	0.5	0.4	14.3	0.8	15	7
Tilia americana	Basswood	1	0	0.5	1.1	14.3	2.2	17	5
Ulmus rubra	Slippery elm	1	0	0.5	4.4	14.3	8.8	23	3
Sapling Stratum									
Celtis occidentalis	Hackberry	1	0	0.5	0.5	100.0	100.0	200	1

similarity of species composition. Further since no shrubs occurred in the flooded plot and since tree and sapling measurements were taken during April sampling, data for these strata were not affected.

Few shrubs occur in the sycamore-boxelder cover type (Table 3.1-3). American elm (Ulmus americana) is the most important shrub component in the sample plots, followed by spicebush and boxelder.

Herbaceous coverage is high in this cover type, and much of it is due to dense colonies of jewelweed, false nettle (Boehmeria cylindrica), wild hydrangea (Hydrangea arborescens), clearweed, and wingstem (Actinomeris alternifolia), especially in the floodplain plot (Table 3.1-12). In the upper terrace plot, sedge (Carex sp.), cleavers, Canadian avens (Geum canadense) early buttercup (Ranunculus fasicularis), black snakeroot, and woolly blue violet (Viola sororia) contribute to vegetation cover.

- Oak-Hickory (06)

Canopy composition varies throughout the oak-hickory cover type due to site differences, previous disturbance, and the diverse nature of forests in this region (see Section 3.2.2.1 for further discussion). The important overstory species in the sample plots include oaks, ashes, and buckeyes. Hickories, although present in the cover type, are not as widely distributed or as predominant as the oaks and ashes. Sugar maple, which like hickory is not present in the sample plots, is common throughout the lower slopes of this cover type reflecting the variability in species dominance due to localized site differences. The forest in the vicinity of the plots also has been logged in the past, reducing the number of oaks, hickories, and other merchantable timber and subsequently releasing ashes, sugar maples, and buckeyes that formed the understory.

Table 3.1-12

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Stratum, Sycamore-Boxelder Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun**	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun**	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer negundo	Boxelder	4.4	2.2	5.7	3.6	2.4	0.9	4.0	3.3	7	3	10	7
Actinomeris alternifolia	Wingstem	8.9	4.4	-	7.1	13.1	2.8	-	12.7	22*	7	-	20*
Aesculus sp.	Buckeye	-	-	-	3.6	-	-	-	1.5		-	-	5
Asarum canadense	Wild ginger	-	4.4	1.9	-	-	1.2	0.7	-	-	6	3	-
Aster azureus	Azure aster	-	2.2	-	-	-	0.9	-	-	-	3	-	-
Boehmeria cylindrica	False nettle	11.1	17.8	9.4	7.1	14.2	24.1	6.2	4.8	25*	42*	16*	12
Carex sp.	Sedge	8.9	8.9	7.5	14.3	16.0	24.1	7.8	22.3	25*	33*	15*	36*
Commelina virginica	Dayflower	2.2	2.2	-	-	0.1	0.9	-	-	2	3	-	-
Cornus florida	Flowering dogwood	2.2	-	1.9	-	1.2	-	0.7	-	3	-	3	-
Dicotyledoneae	Dicot	2.2	-	-	-	1.2	-	-	-	3	-	-	-
Dioscorea quaternata	Wild yam	-	2.2	1.9	3.6	-	2.8	2.4	3.3	-	5	4	7
Fragaria virginiana	Wild strawberry	-	4.4	-	-	-	0.4	-	-	-	5	-	-
Galium aparine	Cleavers	-	-	9.4	3.6	-	-	10.0	0.3	-	-	19*	4
Galium triflorum	Fragrant bedstraw	-	-	1.9	-	-	-	0.7	-	-	-	3	-
Geum canadense	Canadian avens	8.9	-	5.7	-	6.0	-	7.8	-	15*	-	14	-
Hydrangea arborescens	Wild hydrangea	6.6	4.4	7.5	-	6.5	7.4	12.4	-	13	12	20*	-
Impatiens biflora/pallida	Jewelweed	7.0	6.7	-	14.3	7.5	9.3	-	22.3	15*	16*	-	36*
Lindera benzoin	Spicebush	-	-	1.9	-	-	-	2.4	-	-	-	4	-
Parthenocissus quinquefolia	Virginia creeper	4.4	-	1.9	7.1	1.3	-	0.7	3.3	-	-	3	10
Phryma leptostachya	Lopseed	-	4.4	15.1	-	-	2.8	24.3	-	-	7	39*	-
Pilea pumila	Clearweed	15.5	-	1.9	-	24.4	-	0.7	-	40*	-	3	-
Poaceae	Grass	-	-	7.5	3.6	-	-	3.8	1.5	-	-	11	5
Polygonum cespitosum	Long-bristled smartweed	-	6.7	-	-	-	1.3	-	-	-	8	-	-
Ranunculus fasicularis	Early buttercup	-	8.9	1.9	-	-	13.0	1.6	-	-	22*	4	-
Rhus radicans	Poison ivy	2.2	-	1.9	-	1.8	-	1.6	-	4	-	4	-
Sanicula trifoliata	Black snakeroot	-	-	3.8	14.3	-	-	0.4	19.0	-	-	4	33*
Stellaria media	Common chickweed	-	-	3.8	-	-	-	6.9	-	-	-	11	-
Tovara virginiana	Jumpseed	6.6	6.7	1.9	7.1	2.4	2.8	0.7	3.3	9	10	3	10
Viola papilionaceae	Common blue violet	-	-	5.7	10.7	-	-	3.8	2.3	-	-	10	13
Viola sororia	Woolly blue violet	8.9	11.1	-	-	2.0	4.9	-	-	11	16*	-	-

*Major species (importance value >15).
**Due to flooding, June data available from only one sample plot location.

As in previous years, blue ash has continued to be the most important member of the tree stratum on the plots (Table 3.1-13). The limestone outcrops along the middle and upper slope provide an ideal site for this calciphyte. Northern red oak ranks second in importance value on the plots and, along with sugar maple and white ash, becomes more abundant farther downslope. Yellow buckeye is scattered throughout the cover type, while the other species in the plots, American elm and northern catalpa, are minor components, along with basswood and hackberry. Moderate to severe infestations of leaf blotch were apparent on the buckeyes this year.

Both permanent sample plots are on a steep midslope site having rocky soil and numerous limestone outcrops. Understory vegetation cover is sparse, with no saplings in the plots and few shrubs. Eastern redbud and American elm were the most important shrub species (Table 3.1-3).

Spring ephemerals were responsible for much of the herbaceous cover in this type (Table 3.1-14). In addition to Virginia bluebells (Mertensia virginica) in large colonies, larkspur and trout-lily (Erythronium albidum) were important spring species. Vines, such as Japanese honeysuckle and Virginia creeper, continued to increase in importance. White snakeroot and sedge also contributed to the summer and fall vegetation cover.

- Walnut-Hickory-Buckeye (09)

Shagbark hickory (Carya ovata), white ash, black walnut, and yellow buckeye are the important members of the tree stratum in this cover type (Table 3.1-15).

Two of the four saplings present in the 1979-1980 sampling died (Table 3.1-15), apparently choked out by Japanese honeysuckle, which continues to increase. The remaining white ash and blue ash saplings are typical components of the fairly dense understory.

Table 3.1-13

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Oak-Hickory Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	No. in Sample Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Aesculus octandra	Yellow buckeye	5	0	1.0	3.3	25.0	8.5	34	3
Catalpa speciosa	Northern catalpa	1	0	0.5	3.7	12.5	9.6	22	5
Fraxinus americana	White ash	3	0	0.5	5.9	12.5	15.2	28	4
Fraxinus quadrangulata	Blue ash	5	0	1.0	11.9	25.0	30.7	56	1
Quercus rubra	Northern red oak	2	0	0.5	13.0	12.5	33.6	46	2
Ulmus americana	American elm	1	0	0.5	0.9	12.5	2.3	15	6
Sapling Stratum									
No saplings occurred in plots									

Table 3.1-14

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Stratum, Oak-Hickory Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Aesculus octandra	Yellow buckeye	-	-	1.5	5.0	-	-	0.5	1.5	-	-	2	7
Arisaema atrorubens	Jack-in-the-pulpit	-	-	4.4	3.3	-	-	2.1	3.3	-	-	7	7
Aster azureus	Azure aster	-	7.1	-	-	-	1.4	-	-	-	9	-	-
Carex sp.	Sedge	8.8	14.3	-	5.0	4.7	12.0	-	1.5	14	26*	-	7
Celtis occidentalis	Hackberry	2.9	-	1.5	1.7	1.6	-	0.5	2.1	5	-	2	4
Cercis canadensis	Eastern redbud	5.9	3.6	-	5.0	6.5	2.9	-	2.3	12	7	-	7
Delphinium tricorne	Larkspur	-	-	10.3	-	-	-	7.2	-	-	-	18*	-
Dentaria laciniata	Cut-leaved toothwort	-	-	1.5	-	-	-	0.5	-	-	-	2	-
Dicotyledoneae	Dicot	-	-	-	5.0	-	-	-	4.1	-	-	-	9
Erythronium albidum	Trout-lily	-	-	4.4	-	-	-	10.7	-	-	-	15*	-
Eupatorium rugosum	White snakeroot	17.6	25.0	8.8	10.0	29.5	35.9	2.4	11.3	47*	61*	11	21*
Fraxinus americana	White ash	2.9	-	1.5	3.3	1.6	-	0.5	1.3	5	-	2	5
Fraxinus sp.	Ash	-	-	-	1.7	-	-	-	0.2	-	-	-	2
Galium aparine	Cleavers	-	-	8.8	-	-	-	2.0	-	-	-	11	-
Geum canadense	Canadian avens	2.9	7.1	-	1.7	1.6	3.8	-	1.0	5	11	-	3
Hystrix patula	Bottlebrush	5.9	10.7	7.4	6.7	5.0	9.6	1.4	3.4	11	20*	9	10
Lonicera japonica	Japanese honeysuckle	11.8	14.3	5.9	6.7	16.4	26.8	16.1	19.7	28*	41*	22*	26*
Mertensia virginica	Virginia bluebells	-	-	11.8	-	-	-	27.8	-	-	-	40*	-
Parthenocissus quinquefolia	Virginia creeper	14.7	-	11.8	13.3	10.2	-	18.7	31.0	25*	-	31*	44*
Poaceae	Grass	5.9	-	-	-	8.1	-	-	-	14	-	-	-
Prunus serotina	Black cherry	5.9	7.1	1.5	3.3	3.4	1.4	0.5	0.5	9	9	2	4
Quercus sp.	Oak	-	-	-	1.7	-	-	-	0.2	-	-	-	2
Rhus aromatica	Fragrant sumac	-	-	1.5	1.7	-	-	0.1	0.2	-	-	2	2
Ribes sp.	Current	2.9	-	-	-	1.6	-	-	-	5	-	-	-
Rubus sp.	Blackberry	-	3.6	-	1.7	-	2.9	-	2.1	-	7	-	4
Sanguinaria canadense	Bloodroot	-	-	2.9	6.7	-	-	0.7	2.5	-	7	3	7
Sanicula trifoliata	Black snakeroot	-	3.6	2.9	5.0	-	2.9	0.3	2.3	-	-	4	9
Smilacina racemosa	False Solomon's seal	-	-	1.5	1.7	-	-	2.6	2.1	-	-	4	4
Symphoricarpos orbiculatus	Coralberry	-	3.6	-	-	-	0.5	-	-	-	4	-	-
Trillium sessile	Toadshade	-	-	4.4	3.3	-	-	2.8	2.1	-	-	7	5
Ulmus americana	American elm	8.8	-	4.4	5.0	5.0	-	2.1	3.1	14	-	7	8
Vitis aestivalis	Summer grape	2.9	-	1.5	1.7	5.0	-	0.5	2.1	8	-	2	4

*Major species (importance value $\geq$15).

Table 3.1-15

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Walnut-Hickory-Buckeye Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	No. in Sample Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Aesculus octandra	Yellow buckeye	9	0	0.5	8.9	14.3	25.7	40	4
Carya ovata	Shagbark hickory	2	0	0.5	10.2	14.3	29.5	44	1
Cercis canadensis	Eastern redbud	2	0	0.5	0.9	14.3	2.6	17	5
Fraxinus americana	White ash	3	0	1.0	5.0	28.6	14.5	43	2
Juglans nigra	Black walnut	1	0	0.5	9.1	14.3	26.3	41	3
Ulmus americana	American elm	1	0	0.5	0.5	14.3	1.4	16	6
Sapling Stratum									
Aesculus octandra	Yellow buckeye	0	-1	-	-	-	-	-	-
Fraxinus americana	White ash	1	0	0.5	0.8	50.0	72.7	123	1
Fraxinus quadrangulata	Blue ash	1	0	0.5	0.3	50.0	27.3	77	2
Quercus muehlenbergii	Chinkapin oak	0	-1	-	-	-	-	-	-

Numerous shrubs are present in the walnut-hickory-buckeye cover type, with paw-paw the most important species (Table 3.1-3). Additional cover is provided by spicebush, white ash, blue ash, boxelder, and sugar maple.

Canopy openings from the death of several trees in the past have encouraged the growth of Japanese honeysuckle, which is the most important herbaceous species (Table 3.1-16) and is influencing the shrub and sapling strata by choking-out other plants. Japanese honeysuckle is expected to continue to increase until the canopy becomes dense enough to begin shading it out.

Other vines important in this cover type are Virginia creeper and poison ivy. Cut-leaved toothwort contributes to cover in the spring, while false nettle, black snakeroot, white ash, and paw-paw are important in summer and fall.

- Virginia Pine (11)

Virginia pine (Pinus virginiana) predominates the tree stratum of this cover type (Table 3.1-17). However, hardwoods have invaded the understory and are preventing pine regeneration, indicating a successional trend toward a hardwood stand. Scattered yellow poplar (Liriodendron tulipifera), which, like Virginia pine, is intolerant to shading, already shares the upper canopy. Sugar maple and dogwood dominate the sapling layer, as indicated in the plot data. Shrub and ground cover are sparse in areas dominated by pines, but become more abundant in areas where hardwoods are encroaching. The pines in the plots appear healthy at this time, although the trees along the edge of the stand have broken-up somewhat due to wind exposure where construction clearing has occurred.

Dogwood was the most important shrub taxa, followed by sweetgum (Liquidambar styraciflua) (Table 3.1-3).

Table 3.1-16

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Stratum, Walnut-Hickory-Buckeye Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer negundo	Boxelder	3.8	4.0	1.5	-	1.9	1.8	1.1	-	6	6	3	-
Actinomeris alternifolia	Wingstem	1.9	-	4.4	-	3.1	-	3.6	-	5	-	8	-
Asarum canadense	Wild ginger	-	-	1.5	1.6	-	-	1.1	0.1	-	-	3	2
Asimina triloba	Pawpaw	3.8	-	2.9	3.2	15.0	-	2.4	4.9	19*	-	5	8
Carex sp.	Sedge	1.9	8.0	-	1.6	0.2	3.8	-	0.1	2	12	-	2
Carya cordiformis	Bitternut hickory	3.8	4.0	4.4	1.6	3.1	1.8	3.4	0.8	7	6	8	2
Carya ovata	Shagbark hickory	-	4.0	-	1.6	-	3.8	-	0.8	-	8	-	2
Cercis canadensis	Redbud	1.9	-	-	3.2	1.4	-	-	0.4	3	-	-	4
Circaea quadrisulcata	Enchanter's Nightshade	-	-	-	1.6	-	-	-	0.1	-	-	-	2
Dentaria laciniata	Cut-leaved toothwort	-	-	11.8	-	-	-	8.9	-	-	-	21*	-
Dicentra cucullinaria	Dutchman's breeches	-	-	4.4	-	-	-	0.7	-	-	-	5	-
Dicotyledoneae	Dicot	-	-	-	1.6	-	-	-	0.1	-	-	-	2
Eupatorium rugosum	False nettle	11.3	20.0	1.5	7.9	10.9	9.6	0.2	4.0	22*	30*	2	12
Fraxinus americana	White ash	7.5	4.0	1.5	6.3	16.4	7.3	2.4	4.9	24*	11	4	11
Fraxinus quadrangulata	Blue ash	-	-	1.5	1.6	-	-	2.4	0.8	-	-	4	2
Fraxinus sp.	Ash	-	-	-	1.6	-	-	-	0.8	-	-	-	2
Galium aparine	Cleavers	-	-	10.3	1.6	-	-	3.4	0.8	-	-	14	2
Glechoma hederacea	Ground-ivy	1.9	-	-	-	0.2	-	-	-	2	-	-	-
Juglans nigra	Black walnut	-	4.0	-	-	-	1.8	-	-	-	6	-	-
Lindera benzoin	Spicebush	9.4	-	-	3.2	5.0	-	-	1.0	14	-	-	4
Lonicera japonica	Japanese honeysuckle	15.1	32.0	11.8	12.7	5.0	64.0	8.9	44.1	20*	96*	21*	57*
Parthenocissus quinquefolia	Virginia creeper	9.4	-	11.8	12.7	5.0	-	21.5	16.0	14	-	33*	29*
Prenanthes sp.	Lion's paw	-	-	-	1.6	-	-	-	0.8	-	-	-	2
Rhus radicans	Poison ivy	9.4	-	7.3	9.5	19.7	-	17.0	12.2	29*	-	24*	22*
Rosa sp.	Wild rose	1.9	-	1.5	1.6	0.2	-	2.4	0.1	2	-	4	2
Rubus sp.	Blackberry	1.9	-	1.5	1.6	3.1	-	2.4	2.4	5	-	4	4
Sanicula trifoliata	Black snakeroot	9.4	12.0	7.3	6.3	6.7	4.1	8.1	1.3	16*	16*	15*	8
Smilax sp.	Smilax	-	-	-	1.6	-	-	-	0.1	-	-	-	2
Symphoricarpos orbiculatus	Coralberry	1.9	-	5.9	6.3	1.4	-	4.5	1.9	3	-	10	8
Trillium sessile	Toadshade	-	-	1.5	-	-	-	1.1	-	-	-	3	-
Ulmus rubra	Slippery elm	1.9	4.0	2.9	1.6	1.4	1.8	2.4	0.8	3	6	5	2
Viola sororia	Woolly blue violet	1.9	4.0	2.9	3.2	0.2	0.3	2.4	0.4	2	4	5	4
Vitis aestivalis	Summer grape	-	-	-	3.2	-	-	-	0.4	-	-	-	4

*Major species (importance value ≥15).

Table 3.1-17

Species Composition, Frequency, Basal Area, Importance Value, and Ranking of Tree and Sapling Strata, Virginia Pine Cover Type, 1980-1981

Scientific Name	Common Name	No. in Sample 1980-1981	No. in Sample Change	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Importance Value	Rank
Tree Stratum									
Fraxinus americana	White ash	1	0	0.5	0.7	50.0	1.6	52	2
Juniperus virginiana	Eastern redcedar	0	-1	-	-	-	-	-	-
Pinus virginiana	Virginia pine	12	0	0.5	43.7	50.0	98.4	148	1
Sapling Stratum									
Acer saccharum	Sugar maple	2	2	1.0	0.5	33.3	17.2	51	2
Cornus florida	Flowering dogwood	4	0	1.0	2.4	66.7	82.8	150	1
Liquidambar styraciflua	Sweetgum	0	-1	-	-	-	-	-	-

In the herbaceous class, dogwood was also abundant, along with other hardwoods including oaks, American beech (Fagus grandifolia), and sweetgum (Table 3.1-18). Additional cover was provided by Japanese honeysuckle, Virginia creeper, poison ivy, white wild licorice, and blackberry (Rubus sp.).

3.1.2 Soils Analysis, 1980-1981 Sampling Period

The summarization in section 3.2.2.2 correlates soil sample values and expected ranges with site and vegetation characteristics to further describe the 8 sampled cover types. To avoid duplication, data discussion in the following section is limited to presenting and highlighting the 1980-1981 values.

- Moisture

Seasonal soil moisture fluctations in the 1980-1981 sampling period differed somewhat from previous years by having the highest moisture levels in June (Table 3.1-19). This may be attributed to higher rainfall in June 1981. Cover types with the greatest soil moisture values were maple-basswood, oak-maple, and walnut-hickory-buckeye. Lowest values were in the Virginia pine cover type.

- Bulk Density

As in previous years, highest bulk density soils are associated with the sycamore-boxelder, red pine, oak-hickory, and Virginia pine cover types (Table 3.1-20). Lowest values were recorded in the chinkapin oak cover type.

- pH

Soil pH was highest in cover types located along the limestone bluffs and slopes (Table 3.1-21). Virginia pine had the most acidic soil, with red pine and sycamore-boxelder also having low pH values.

Table 3.1-18

Species Composition, Relative Frequency, Relative Cover, and Importance Values for Herbaceous Stratum, Virginia Pine Cover Type, 1980-1981

Scientific Name	Common Name	Relative Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Relative Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Importance Value 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer rubrum	Red maple	4.3	-	3.8	4.6	2.0	-	1.4	0.5	6	-	5	5
Acer saccharum	Sugar maple	-	5.7	1.9	1.5	-	0.5	0.2	0.1	-	6	2	2
Carex sp.	Sedge	-	2.9	1.9	4.6	-	0.5	0.2	1.1	-	3	2	6
Cercis canadensis	Eastern redbud	4.3	2.9	1.9	4.6	2.0	0.5	0.2	0.5	6	3	2	5
Cornus florida	Flowering dogwood	14.9	17.1	9.4	12.3	13.0	14.3	10.1	8.6	28*	31*	2	21*
Dioscorea quaternata	Wild yam	-	-	3.8	1.5	-	-	3.3	0.1	-	-	7	2
Fagus grandifolia	American beech	6.4	8.6	3.8	4.6	7.8	15.3	4.4	6.0	14	24*	8	11
Fragaria virginiana	Wild strawberry	2.1	-	-	-	1.5	-	-	-	4	-	-	-
Fraxinus americana	White ash	2.1	-	1.9	-	1.5	-	1.0	-	4	-	3	-
Galium circaezans	White wild licorice	10.6	11.4	7.5	9.2	7.3	6.9	2.8	2.2	18*	18*	1	11
Galium triflorum	Fragrant bedstraw	2.1	2.9	1.9	4.6	1.5	3.0	0.2	4.0	4	6	2	9
Liquidambar styraciflua	Sweetgum	6.4	5.7	7.5	4.6	11.0	6.9	4.5	2.4	17*	13	1	7
Lonicera japonica	Japanese honeysuckle	6.4	8.6	5.7	4.6	7.8	21.7	24.0	11.4	14	30*	3	16*
Osmorhiza claytoni	Sweet cicely	-	-	1.9	3.1	-	-	3.3	4.7	-	-	5	8
Oxalis stricta	Yellow wood-sorrel	-	-	1.9	-	-	-	3.3	-	-	-	5	-
Parthenocissus quinquefolia	Virginia creeper	6.4	-	9.4	4.6	7.8	-	11.0	14.4	14	-	2	19*
Poaceae	Grass	-	-	3.8	-	-	-	1.4	-	-	-	5	-
Prunus serotina	Black cherry	2.1	8.6	7.5	7.7	0.8	4.4	2.6	0.4	3	13	1	8
Quercus sp.	Oak	10.6	14.3	5.7	1.5	7.8	12.8	2.4	2.3	18*	27*	8	4
Ranunculus recurvatus	Hooked crowfoot	-	-	3.8	-	-	-	3.3	-	-	-	7	-
Rhus radicans	Poison ivy	6.4	-	5.7	7.7	14.0	-	16.4	15.6	20*	-	2	23*
Rosa sp.	Wild rose	-	-	1.9	1.5	-	-	0.2	0.1	-	-	2	2
Rubus sp.	Blackberry	2.1	5.7	3.8	1.5	4.8	6.9	2.4	19.7	7	13	6	21*
Sanicula trifoliata	Black snakeroot	4.3	5.7	3.8	7.7	4.8	6.4	-	4.8	9	12	-	13
Sassafras albidum	Sassafras	2.1	-	-	-	1.5	-	-	-	4	-	-	-
Smilax sp.	Smilax	-	-	-	7.7	-	-	-	4.8	-	-	-	13
Ulmus americana/rubra	American/slippery elm	2.1	-	-	-	0.3	-	-	-	2	-	-	-
Vitis aestivalis	Summer grape	2.1	-	-	-	1.5	-	-	-	4	-	-	-

*Major species (importance value ≥15).

Table 3.1-19

Mean Values* for Soil Moisture (%) for Each Vegetation Cover Type, 1980-1981

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	28.3	27.2	34.4	37.4
Oak-Maple	02	21.2	23.2	29.8	34.3
Chinkapin Oak	03	19.3	19.0	32.3	32.6
Red Pine	04	18.4	20.6	26.1	31.0
Sycamore-Boxelder	05	23.0	23.6	23.4	26.7**
Oak-Hickory	06	16.3	19.2	24.2	28.1
Walnut-Hickory-Buckeye	09	25.4	27.1	31.0	37.5
Virginia Pine	11	12.1	14.1	22.5	26.1

* Based on 4 replicates per cover type per date sampled, except June, 1981.

** Due to flooding, June data based on 2 replicates in the Sycamore-Boxelder cover type.

Table 3.1-20

Mean Values* for Soil Bulk Density (g/cm^3) for Each Vegetation Cover Type, 1980-1981

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	1.06	1.01	1.11	1.09
Oak-Maple	02	1.00	1.15	1.16	1.12
Chinkapin Oak	03	0.98	0.92	1.07	1.14
Red Pine	04	1.31	1.13	1.35	1.28
Sycamore-Boxelder	05	1.31	1.31	1.44	1.35**
Oak-Hickory	06	1.12	1.20	1.29	1.32
Walnut-Hickory-Buckeye	09	1.01	1.02	1.13	1.08
Virginia Pine	11	1.13	1.17	1.32	1.21

* Based on 4 replicates per cover type per date sampled, except June, 1981.

** Due to flooding, June data based on 2 replicates in the Sycamore-Boxelder cover type.

Table 3.1-21

Mean Values* for Soil pH (Measured in Water) for Each Vegetation Cover Type, 1980-1981

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	7.4	7.4	7.6	8.1
Oak-Maple	02	7.2	7.1	7.3	7.4
Chinkapin Oak	03	7.6	7.3	7.7	6.8
Red Pine	04	6.8	6.5	7.2	7.3
Sycamore-Boxelder	05	6.9	7.0	7.2	6.6**
Oak-Hickory	06	7.7	7.5	7.9	7.7
Walnut-Hickory-Buckeye	09	7.2	7.0	7.6	7.3
Virginia Pine	11	5.3	5.3	5.8	6.0

* Based on 4 replicates per cover type per date sampled, except June, 1981.

** Due to flooding, June data based on 2 replicates in the Sycamore-Boxelder cover type.

- Conductivity

Soil conductivity values, indicative of soil salinity, were generally lowest in April and June and highest in September (Table 3.1-22). Recorded conductivity values were within the range of negligible effects on vegetation. The effects of salts on vegetation often are evaluated on the basis of electrical conductivity of an aqueous solution of soil. Salt solutions with conductivity values of 0 to 2,000 micromhos per centimeter (µmhos/cm) usually have little or no effects on plants (Figure 3-4); values from 2,000 to 4,000 may restrict the yield of salt-sensitive crops; values from 4,000 to 8,000 restrict the yield of many plant species; and at values over 8,000 micromhos/cm, only salt-tolerant species yield satisfactorily (Richards 1954). As shown in Table 3.1-22, the highest mean electrical conductivity value for cover types sampled through the sampling year was 1,453 micromhos/cm in the oak-maple type. This is still below values that might be harmful to crop or native plant species. Data collected to date indicate that baseline salinity levels are in the range reported as having a neglible effect on vegetation production.

- Cation Exchange Capacity and Base Saturation

Soils associated with the maple-basswood, oak-maple, chinkapin oak, and walnut-hickory-buckeye cover types again exhibited the highest cation exchange values (Table 3.1-23). Base saturation values were lowest in April and June (Table 3.1-24).

3.1.3 Vegetation Stress Survey, 1980-1981 Sampling Period

June 1981 CIR photography revealed 210 discrete areas of vegetation stress (Figure 3-1). The 102 areas that were less than 5 acres in extent are listed by cover type and location in Table 3.1-25. These small areas consisted of several individuals or small stands that were moderately to

Table 3.1-22

Mean Values* for Soil Conductivity (μmhos/cm) for Each Vegetation Cover Type, 1980-1981

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	903	653	380	366
Oak-Maple	02	1,453	594	293	320
Chinkapin Oak	03	830	530	308	206
Red Pine	04	731	406	158	176
Sycamore-Boxelder	05	1,045	806	216	209**
Oak-Hickory	06	935	769	334	280
Walnut-Hickory-Buckeye	09	1,103	693	162	215
Virginia Pine	11	233	195	133	167

* Based on 4 replicates per cover type per date sampled, except June, 1981.

** Due to flooding, June data based on 2 replicates in the Sycamore-Boxelder cover type.

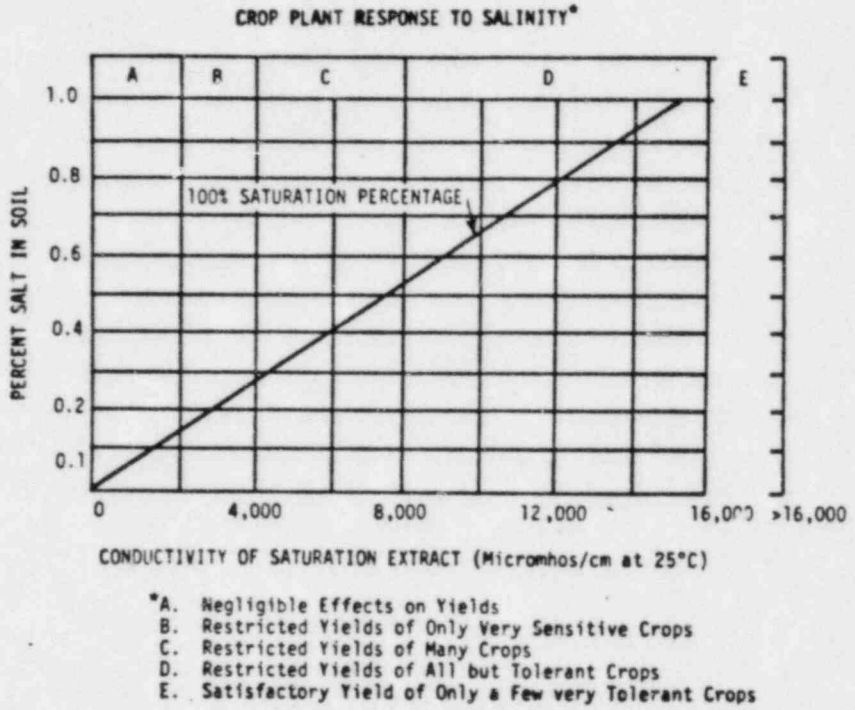

Figure 3-4. Relation of the Percent Salt in Soil to Electrical Conductivity of the Saturation Extract to Crop Response in the Conductivity Ranges

Table 3.1-23

Mean Values* for Soil Cation Exchange Capacity (meq/100g)
for Each Vegetation Cover Type, 1980-1981

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	54.6	49.0	63.6	64.2
Oak-Maple	02	47.4	41.0	46.4	48.2
Chinkapin Oak	03	57.2	48.7	55.3	56.9
Red Pine	04	25.6	27.9	28.8	28.2
Sycamore-Boxelder	05	29.4	26.9	23.9	44.1**
Oak-Hickory	06	33.9	41.5	49.6	37.9
Walnut-Hickory-Buckeye	09	39.8	46.9	50.6	53.9
Virginia Pine	11	22.0	27.3	28.8	27.0

* Based on 4 replicates per cover type per date sampled, except June, 1981.

** Due to flooding, June data based on 2 replicates in the Sycamore-Boxelder cover type.

Table 3.1-24

Mean Values* for Base Saturation (%) for Each Vegetation Cover Type, 1980-1981

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	92.0	102.3	62.9	75.4
Oak-Maple	02	91.5	92.1	67.8	70.1
Chinkapin Oak	03	85.2	101.8	75.7	74.0
Red Pine	04	95.7	107.8	62.3	56.4
Sycamore-Boxelder	05	131.5	174.5	89.7	35.9**
Oak-Hickory	06	185.2	120.2	75.2	121.8
Walnut-Hickory-Buckeye	09	119.2	100.5	79.4	69.8
Virginia Pine	11	84.9	77.7	54.8	29.4

* Based on 4 replicates per cover type per date sampled, except June, 1981.

** Due to flooding, June data based on 2 replicates in the Sycamore-Boxelder cover type.

Table 3.1-25

Cover Type, Location, and Causal Agent of Vegetation Stress Areas Covering Less than 5 Acres, Marble Hill Survey Area, June 1981

Cover Type Code	Location*	No. of Stress Areas	Species Affected	Causal Agent(s)	Extent
9	1B	2	Yellow buckeye; sycamore	Leaf blotch, anthracnose	Moderate
9	1C	3	Redbud, boxelder, ash; yellow buckeye; black locust	Leaf feeders, especially Fascista cercerisella on redbud; leaf blotch; locust leaf miner	Moderate
5	2B	1	Sycamore	Anthracnose	Moderate
5	3B	1	Sycamore	Anthracnose	Moderate
6	3B	2	Hardwoods	**	
6	4B	1	Hardwoods	**	
2	4B	1	Hardwoods	**	
5	5A	9	Sycamore	Anthracnose	Severe
1	5B	2	Hardwoods	**	
7	5C	2	Hardwoods	**	
9	5C	1	Hardwoods	**	
6	5C	2	Yellow buckeye	Leaf blotch	Moderate
2	6A	3	American beech, southern red oak, red maple, white ash, hophornbeam	Leaf spots	Moderate
11	6B	1	Virginia pine	**	
6	6C	3	Yellow buckeye	Leaf blotch	Moderate
7	6C	2	Hardwoods	**	
2	6C	2	Hardwoods	**	
2	6D	1	Hardwoods	**	
2	7A	4	Southern red oak, beech, red maple, sweetgum, white ash, white oak	Leaf spots	Moderate
2	7B	2	Southern red oak, white oak, red maple	Leaf spots	Moderate
1	7B	1	Hardwoods	**	
3	8A	1	Oaks	Leaf feeders	Moderate
11	8B	1	Pines	**	
2	8B	1	Oaks, ash, sweetgum	Leaf spots	Moderate
5	8C	1	Sycamore	Anthracnose	Moderate
6	8C	1	Hardwoods	**	
2	8D	1	Hardwoods	**	
2	9A	1	Southern red oak,	Leaf spots	Moderate
3	9B	3	Oaks, ash; yellow buckeye	Leaf feeders; leaf blotch	Moderate
2	9B	2	Yellow buckeye	Leaf blotch	Moderate
5	9B	5	Sycamore	Anthracnose	Severe

* Keyed to location grid on vegetation cover type map (Figure 3-1).
** Vegetation appeared stressed in CIR photos but causal agents not determined due to inaccessibility of locations.

Table 3.1-25 (Continued)

Cover Type, Location, and Causal Agent of Vegetation Stress Areas Covering Less than 5 Acres, Marble Hill Survey Area, June 1981

Cover Type Code	Location*	No. of Stress Areas	Species Affected	Causal Agent(s)	Extent
6	9C	1	Yellow buckeye	Leaf blotch	Severe
2	9D	2	Oaks; yellow buckeye	Leaf feeders; leaf blotch	Moderate
11	10A	1	Hardwoods	**	
2	10B	7	Oaks, maples; yellow buckeye	Leaf feeders, leaf spots; leaf blotch	Moderate
3	10B	1	Oaks	Leaf feeders	Moderate
11	10B	1	Virginia pine	Windthrow	Moderate
13	10B	1	Southern red oak, white oak	Leaf spots	Moderate
4	10C	1	Red pine	General decline	Severe
2	11A	3	Oaks, sweetgum, red maple	Leaf spots	Moderate
2	11B	8	Oaks, sweetgum, red maple, white ash, elms	Leaf spots	Moderate
7	11B	1	Sycamore	Anthracnose	Moderate
16	11C	2	Oaks; black locust	Leaf spots; locust leaf miner	Moderate
2	11C	7	Oaks; black locust	Leaf spots; locust leaf miner	Moderate
5	11C	1	Sycamore	Anthracnose	Moderate
2	12A	1	Oaks, beech, maple	Leaf spots	Moderate
2	12B	1	Oaks, hophornbeam, sweetgum	Leaf spots	Moderate

* Keyed to location grid on vegetation cover type map (Figure 3-1).
** Vegetation appeared stressed in CIR photos but causal agents not determined due to inaccessibility of locations.

severely affected by the various stress agents. Extensive rainfall in the spring and early summer of 1981 led to widespread occurrence of fungal and bacterial diseases during the survey period. The extent of these infestations made it infeasible to record less than moderate infestations or scattered individuals.

The majority of the stress areas less than 5 acres in size were produced by natural causal agents especially leaf blotch (Guignardia aesculi) on buckeyes, anthracnose (Gnomonia platani) on sycamore, and various leaf spot diseases on oak, beech, maple, and ash. Some leaf feeders were present, with Fascista cercerisella infestations noted on redbud. Locust leaf miner (Chalepus dorsalis), which has caused widespread infestations on black locust in previous years, was observed only in scattered areas and most occurrences caused only minor stress. The severe stress of previous years, while not killing the black locust trees, has apparently left them susceptible to other stress agents, and locust borers (Megacyllene robiniae) are becoming a problem on some trees.

Stress areas greater than or equal to 5 acres are summarized in Table 3.1-26. Causal agents and affected species were similar to those in the smaller stress areas. Fungal diseases again were the primary stress agents. Sycamores are widely distributed throughout the lowlands and stream banks of the study area, and most appeared to be infested to some extent with anthracnose. This disease, caused by the fungus Gnomonia platani, causes young sycamore leaves to turn brown and die, looking as if hit by late frost (Westcott 1971). Later in the season, infected leaves have irregular brown patches along the veins. In severe infestations, sycamores may be nearly defoliated and small twigs killed. Severe defoliation of sycamores in the study area was limited to scattered individuals.

Leaf blotch infestations on buckeye also were widespread. This fungal disease produces irregular reddish-brown blotches with narrow, yellowish margins on the leaves (Carter 1964). Most of the study area had slight infestations characterized by small blotches confined to interveinal or

Table 3.1-26

Cover Type, Location, and Causal Agent of Vegetation Stress Areas Greater Than or Equal to 5 Acres, Marble Hill Survey Area, June 1981

Cover Type Code	Location*	No. of Stress Areas	Species Affected	Causal Agent(s)	Extent
2	1B	2	Oaks	Leaf spots	Moderate
9	1B	3	Redbud, boxelder, ash; yellow buckeye; black locust	Leaf feeders, especially Fascista cercerisella on redbud; leaf blotch; locust leaf miner, locust borer	Moderate
9	1C	3	Redbud, boxelder; yellow buckeye; black locust; sycamore	Leaf feeders; leaf blotch; locust leaf miner, locust borer; anthracnose	Moderate
5	1C	1	Sycamore	Anthracnose	Moderate
9	2B	3	Sycamore; black locust; redbud, boxelder, ash	Anthracnose; locust leaf miner; leaf feeders	Moderate
5,6	2C,2D	7	Black locust, American elm, black cherry	Stress from previous flooding, Dutch elm disease, borers	Moderate
5	3A	2	Sycamore	Anthracnose	Moderate
6	3B	1	Hardwoods	**	
2	3B	1	Hardwoods	**	
16	4A	2	American beech	Leaf spots	Moderate
9	4A	2	Sycamore	Anthracnose	Moderate
6	4B	1	Black locust; yellow buckeye	Locust leaf miner; leaf blotch	Moderate
5,2,9	4C	6	Sycamore	Anthracnose	Severe
5	5A	1	Sycamore	Anthracnose	Moderate
1	5B	1	Sycamore	Anthracnose	Moderate
5,9	5C	3	Sycamore	Anthracnose	Severe
6	5C	1	Hardwoods	**	
5	6A	1	Sycamore	Anthracnose	Moderate
16	6A	1	Sassafras	Fire	Moderate
16	6A	3	Southern red oak, red maple, white ash	Leaf spots	Moderate
3	6B	1	Hardwoods	**	
2	6B	2	Hardwoods	**	
1	6B	3	Hardwoods	**	
5	6B	1	Sycamore	Anthracnose	Moderate
5,6	6C	1	Sycamore	Anthracnose	Moderate
2	6C	2	Yellow buckeye	Leaf blotch	Moderate
2	6D	2	Sycamore	Anthracnose	Moderate
16	7A	1	Oaks; sycamore	Leaf spots; anthracnose	Moderate
16	7B	2	Oaks, maple, white ash	Leaf spots	Moderate
1	7B	1	Yellow buckeye	Leaf blotch	Moderate
6	7C	2	Hardwoods	**	

* Keyed to location grid on vegetation cover type map (Figure 3-1).

**Vegetation appeared stressed on CIR photos but causal agents not determined due to inaccessibility of locations.

Table 3.1-26 (Continued)

Cover Type, Location, and Causal Agent of Vegetation Stress Areas Greater Than or Equal to 5 Acres, Marble Hill Survey Area, June 1981

Cover Type Code	Location*	No. of Stress Areas	Species Affected	Causal Agent(s)	Extent
5,6	7C	1	Sycamore	Anthracnose	Moderate
2,3	8A	1	Yellow buckeye	Leaf blotch	Severe
2,3,11	8B	1	Yellow buckeye; sycamore	Leaf blotch; anthracnose	Severe
9	8B	1	Hardwoods	**	
6	8C	5	Yellow buckeye	Leaf blotch	Moderate
9	8D	3	Oaks; yellow buckeye	Leaf spots; leaf blotch	Moderate
2	9B	3	Oaks; yellow buckeye	Leaf feeders and leaf spots; leaf blotch	Moderate
7	9B	1	Sycamore	Anthracnose	Moderate
3	9B	1	Oaks, white ash; yellow buckeye	Leaf feeders; leaf blotch	Moderate
2	9B	1	Sycamore; yellow buckeye	Anthracnose; leaf blotch	Severe
5	9C	1	Sycamore	Anthracnose	Moderate
2	9C	3	Oaks; yellow buckeye	Leaf spots; leaf blotch	Moderate
5,6	9D	3	Sycamore	Anthracnose	Moderate
9	9D	3	Eastern redcedar	Fire	Moderate
2	10B	1	Black locust; oaks; American elm	Locust leaf miner; leaf spots; Dutch elm disease	Moderate
5	10C	1	Sycamore	Anthracnose	Moderate
16	11A	1	Oaks, sweetgum, red maple, sassafras	Leaf spots	Moderate
7	11A	1	Sycamore	Anthracnose	Moderate
16	11B	4	Southern red oak, white oak, elm, sassafras	Leaf spots	Moderate
1	11C	3	Hardwoods	**	
2	11C	1	Sycamore	Anthracnose	Moderate
3	11C	1	Sycamore	Anthracnose	Moderate
5	11C	1	Sycamore	Anthracnose	Moderate
16	12A	1	Oaks	Leaf spots	Moderate
16	12B	1	Oaks	Leaf spots	Moderate
2	12C	1	Sycamore	Anthracnose	Moderate

* Keyed to location grid on vegetation cover type map (Figure 3-1).
**Vegetation appeared stressed on CIR photos but causal agents not determined due to inaccessibility of locations.

marginal tissue of the leaves. Some areas had severe infestations in which the dark blotches covered the leaf surface. Subsequent yellowing and early senescence is expected in these areas. Generally, fungus infestations appear more severe and widespread than those observed in 1980.

Vegetation stress in the immediate vicinity of the Marble Hill construction area was mainly due to leaf blotch, anthracnose, and other leaf spots. Minor damage to oaks, ash, and maples from leaf feeders was also observed. The general decline of red pines is continuing, and damage to Virginia pines, apparently from windthrow, was noted. Locust leaf miner caused little stress during the 1981 survey.

3.2 Five-Year Summary (1976-1981)

The Marble Hill remote sensing and ground truth program was initiated to provide a baseline for assessing potential vegetation stress due to operation of cooling towers at the Marble Hill Nuclear Generating Station. The extent of the study area was based on predicted directions of cooling tower drift. Estimates of drift transport, concentration, and deposition were derived through a combination of published mathematical models described in the Marble Hill Environmental Report (PSI 1976). Maximum drift deposition is expected to occur to the north and northeast of the cooling towers as a result of predominant wind flow toward these directions, with peak deposition expected 200 meters north-northeast of the towers. Based on these estimates, the greatest portion of the study area is north of the site and includes both the Indiana and Kentucky sides of the Ohio River.

In fulfilling the objective of ascertaining and documenting existing vegetation cover types and soil chemistry in the vicinity of the Marble Hill Nuclear Generating Station, permanent sample plots were established in the major cover types. Although 15 land use/land cover types are delineated in the study area (see Figure 3-1 in pocket), four of the categories are land use rather than vegetation types (e.g. residential, industrial, water, cemetery). Two of the types, cropland and unimproved pasture (old fields), are compositionally variable, with cropland essentially representing cultivated monocultures and unimproved pasture including various successional stages from grassland and weeds to pioneer tree and shrub species. The remaining nine cover types represent the major vegetation cover of the area or were considered sensitive to impacts from cooling tower drift. Selection of representative sample plot locations within these nine types was based on species composition (particularly overstory composition), topography (including slope, aspect, and position), and location within the area potentially affected by cooling tower drift.

To ascertain and document existing vegetation stress in the vicinity of the Marble Hill Nuclear Generating Station, color infrared aerial photographs are taken of the study area annually, apparent vegetation stress

areas identified, and causal agents determined through ground truthing. This documentation of common stress agents, patterns of infestation, and vegetation species affected provides background information on types and extent of stress occurring in the study area prior to station operation.

The remote sensing and ground truth program at Marble Hill Nuclear Generating Station has provided yearly documentation of vegetation and soil conditions in the study area since its inception in 1976. Following the 1980-1981 sampling program, this information was examined for trends and expected results. These determinations and pertinent information from literature are presented as an integrated 5-year summary of the program and study area. Emphasis is placed on describing the eight cover types currently sampled, plus generalization of the orchard cover type which is no longer sampled. Cover type descriptions are not limited to data from the permanent plots, but depict characteristics of each cover type as a whole.

3.2.1 Regional Setting

The location of the Marble Hill site on the Ohio River in southeastern Indiana places it in a transition area, in terms of both vegetation and geology. The area is at the southern boundary of glacial activity. Although covered by Illinoian drift, it was not reached by later glaciers, so glacial deposit layers are thin (Braun 1950). Most areas of Illinoian drift are flat uplands that contrast with the steep slopes and river bluffs along the larger streams that dissect the region. Both the upland flats and the dissected areas are characterized by vegetation cover types that are more closely related to southern forests typical of geologically older areas than to the beech-maple forests of the younger, more glaciated land to the north.

Vegetationally, the Marble Hill study area is part of the Western Mesophytic Forest region of the Deciduous Forest Formation of Eastern North America (Braun 1950). Forest communities in this region are not characterized by a single climax type, and as many as 10 to 20 species may share the crown cover (Lindsey 1966). Many plant species found in the study area are at the limits of their current range. Two of them, Virginia pine and yellow buckeye,

which are at the northwestern limits of their natural range, are listed as special concern, rare and/or restricted by the Indiana Department of Natural Resources (1979). Not only has glaciation affected species dispersal, but the Ohio River has altered vegetation ranges by providing a natural plant migration corridor for dispersing both southern lowland and mixed mesophytic upland species to this area.

The predominately calcareous bedrock of the area (PSI 1976) provides an ideal habitat for many calciphytes, including blue ash, chinkapin oak, and bladdernut (Staphylea trifolia). The three distinct physiographic areas on the Marble Hill site - upland, river bluff, and valley bottom (PSI 1976) - are typical of the region and provide varied habitats that increase species diversity. Further, agricultural clearing and selective logging have altered successional stages, introduced new species, and reduced the extent of previously dominant species and cover types. Thus, the vegetation of the region is a mosaic of cover types reflecting underlying rock formations and topography, as well as present and historical land uses.

3.2.2 Cover Type Descriptions

Vegetation cover types of the Marble Hill study area generally can be grouped according to the physiographic positions they occupy - uplands, river bluffs and slopes, or valley bottomlands. The two cover types notably not restricted by physiographic position are cropland and pasture, which occupy all but the steepest slopes and river bluffs. Although they are the most extensive vegetation cover types and commercially important land uses, cultivated fields and pastures are primarily monocultures and may change yearly through crop rotation. These variable and intensively managed cover types are not sampled by permanent plots.

Upland Flats. Forest cover types of the upland flats are predominately hardwoods, although scattered planted and naturally occurring pine stands and pine-hardwood mixtures occur throughout. Two pine cover types are sampled on the Marble Hill site, red pine and Virginia pine. Both pine types are small stands that are being invaded by hardwood species.

The hardwoods that occupy the upland flats are mixed forest communities that can withstand poor drainage conditions accentuated by impervious soils and little relief. Depending on the developmental stage, these forests are dominated by sweetgum, beech, pin oak (Quercus palustris), white oak (Q. alba), southern red oak (Q. falcata), red maple (Acer rubrum), and elms (Ulmus spp.) (Braun 1950). Sugar maple commonly is not part of this community except in transitional bands between the flats and the steeper slopes (Braun 1950). This upland hardwoods cover type is more common farther from the slopes and valleys of the Ohio River. During the extensive information search and ground truthing conducted for this summary report, stands of upland hardwoods were delineated within the study area. Permanent plots will be established at a representative site during the 1981-1982 sampling period to sample this cover type.

River bluffs and slopes. Slope position, aspect, rock outcrops, and previous logging practices affect forest development along the slopes and bluffs of the study area major streams, especially the Ohio River. As is characteristic of the Western Mesophytic forests, no single vegetation type or species dominates. Five cover types sampled by permanent plots are components of this physiographic area: maple-basswood, oak-maple, walnut-hickory-buckeye, oak-ash-maple, and chinkapin oak. Along the rocky upper slopes, where man-caused disturbance often is evident, chinkapin oak forests are common. On rich, moist sites of the middle and lower slopes, maple-basswood forests similar to the mixed mesophytic woodlands of eastern Kentucky develop. Mixed mesophytic communities in this part of southeastern Indiana are limited in extent and closely dependent on favorable habitat conditions (Braun 1950). White basswood (Tilia heterophylla) and yellow buckeye (Aesculus octandra), which are the most characteristic trees of the eastern mixed mesophytic forests, are less common in this transitional region, and oaks become increasingly dominant. Cover types like maple-basswood, oak-maple, and walnut-hickory-buckeye, have some of the component species of the mixed mesophytic communities, yet are also similar to the oak-ash-maple forests on the drier slopes and bluffs of this region and the oak-hickory cover types that dominate farther west.

Valley bottomlands. Valley bottom sites, which include floodplains and upper and lower terraces, contain trees subject to frequent flooding as well as less water tolerant lowland species. Because of agriculture, woodlands are not extensive, and often are limited to a streamside band of trees. Typical species include sycamore, silver maple (Acer saccharinum), cottonwood (Populus deltoides), boxelder, hackberry (Celtis occidentalis), yellow poplar, black willow (Salix nigra), white ash, and elms. The sycamore-boxelder cover type, sampled by permanent plots, contains several of these bottomland species.

Both vegetation and soils characteristics are important in cover type descriptions. Data for the eight cover types sampled over the past five years are summarized and discussed in the following vegetation and soils sections.

3.2.2.1 Vegetation

- Maple-Basswood

The maple-basswood cover type is the most typical mixed mesophytic forest sampled in the study area. The steep, ravine slopes with fertile, moist, well-drained soils provide an ideal habitat for sugar maple, which is the predominant canopy species (Table 3.2-1). This species and basswood, which ranks second in importance in this cover type, are typical mixed mesophytic trees. Basswood is fairly sensitive to differences in microclimate as influenced by topography, aspect, and soil moisture (Fowells 1965). The large size of many of the basswoods and the presence of other indicator species in the understory (e.g., spicebush and pawpaw) are further evidence of the rich, fertile site occupied by this cover type. The easterly exposure and dense canopy cover help retain soil moisture even during dry periods, and the steep slope eliminates drainage problems. Besides black walnut and white ash, elms and blue ash are also minor canopy components.

The maple-basswood cover type is a stable forest, typical of a climax situation. There has been little change in species composition over

Table 3.2-1

Importance Values and Ranking of Tree Stratum for Each Cover Type

Common Name	1977 Impt. Value	1977 Rank	1978 Impt. Value	1978 Rank	1979 Impt. Value	1979 Rank	1980 Impt. Value	1980 Rank	1981 Impt. Value	1981 Rank
Maple-Basswood										
Sugar maple	75	1	82	1	74	1	83	1	83	1
White ash	22	4	14	4	20	4	24	4	24	4
Black walnut	29	3	32	3	29	3	32	3	32	3
Basswood	56	2	61	2	58	2	61	2	61	2
Oak-Maple										
Sugar maple	50	1	50	1	58	1	71	1	56	1
Flowering dogwood	13	4	11	4	13	5	17	5	20	5
White ash	28	3	28	3	28	4	36	3	39	3
Eastern redcedar	11	5	11	4	12	6	16	6	-	-
Black cherry	28	3	29	2	31	3	24	4	38	4
Chinkapin oak	29	2	28	3	-	-	-	-	-	-
Northern red oak	28	3	28	3	29	2	37	2	47	2
Chinkapin Oak										
Sugar maple	10	5	12	6	11	6	12	6	13	5
White ash	39	2	39	2	38	2	43	2	50	2
Blue ash	10	5	15	4	14	4	14	4	-	-
Eastern redcedar	30	3	34	3	32	3	33	3	35	3
Chinkapin oak	66	1	72	1	71	1	73	1	75	1
Northern red oak	11	4	13	5	12	5	13	5	14	4
Slippery elm	10	5	12	6	12	5	12	6	13	5

Table 3.2-1 (cont'd.)

Importance Values and Ranking of Tree Strata for Each Cover Type

Common Name	1977 Impt. Value	1977 Rank	1978 Impt. Value	1978 Rank	1979 Impt. Value	1979 Rank	1980 Impt. Value	1980 Rank	1981 Impt. Value	1981 Rank
Red Pine										
White ash	14	4	20	4	19	4	26	4	27	4
Yellow poplar	17	3	24	3	24	3	33	3	34	3
Red pine	95	1	78	1	67	1	87	1	85	1
White pine	36	2	41	2	41	2	55	2	53	2
Sycamore-Boxelder										
Boxelder	16	4	15	5	15	6	16	4	16	4
Flowering	17	3	17	3	17	4	25	2	17	3
Black walnut	24	2	23	2	24	2	23	3	23	2
Wycamore	88	1	91	1	90	1	83	1	90	1
Black cherry	15	5	15	5	15	6	15	5	15	5
Basswood	16	4	16	4	16	5	16	4	17	3
American elm	24	2	23	2	23	3	23	3	23	2
Oak-Hickory										
Yellow buckeye	28	3	25	3	31	3	37	3	34	3
Catalpa	20	4	19	4	21	4	24	5	22	5
White ash	13	5	12	5	14	5	25	4	28	4
Blue ash	62	1	59	1	61	1	50	1	56	1
Northern red oak	42	2	41	2	44	2	48	2	46	2
American elm	12	6	12	5	13	6	17	6	15	6

Table 3.2-1 (cont'd.)

Importance Values and Ranking of Tree Strata for Each Cover Type

Common Name	1977 Impt. Value	1977 Rank	1978 Impt. Value	1978 Rank	1979 Impt. Value	1979 Rank	1980 Impt. Value	1980 Rank	1981 Impt. Value	1981 Rank
Walnut-Hickory Buckeye										
Yellow buckeye	37	3	33	2	31	3	40	4	40	4
Shagbark hickory	41	1	37	1	38	1	45	1	44	1
Eastern redbud	15	5	12	4	11	6	17	5	17	5
White ash	24	4	20	3	20	4	41	3	43	2
Blue ash	14	6	12	4	10	7	-	-	-	-
Black walnut	40	2	37	1	35	2	42	2	41	3
American elm	15	5	12	4	12	5	16	6	16	6
Virginia Pine										
Eastern redbud	23	4	42	2	16	4	-	-	-	-
Flowering dogwood	27	2	17	4	43	2	-	-	-	-
Persimmon	12	5	-	-	-	-	-	-	-	-
White ash	-	-	-	-	-	-	27	2	52	2
Eastern redcedar	27	2	19	3	19	3	26	3	-	-
Yellow poplar	26	3	15	5	15	5	-	-	-	-
Virginia pine	73	1	106	1	106	1	148	1	148	1

the past five years. Although not in a stage of rapid growth, this forest stand essentially is healthy with a net increase in basal area of 1.3 m^2/ha in the tree strata on the sample plots (Table 3.2-2).

As is typical of a mature forest, understory vegetation is sparse. No saplings have been recorded on the plots (Table 3.2-3), although buckeye and sugar maple saplings are scattered throughout the cover type. Pawpaw is the most important shrub species, followed by spicebush and sugar maple (Table 3.2-4).

Spring ephemerals make up an important portion of the ground cover on this site. During spring, the sparse and immature foliage in the tree canopy allows growth of large populations of spring ephemerals. Over the five years of sampling, highest herbaceous cover has consistently been in April (see Figure 3-3). Seven species listed in Table 3.2-5 were present only in April. As shown in the list of important species in Table 3.2-6, all but two of the taxa are separated into those species important in April and those important in the June through October periods. Wild ginger and sugar maple are the only species consistently important across all seasons. In addition to wild ginger and sugar maple, species that have been recorded as important taxa for more than one year include spring beauty, cut-leaved toothwort, dutchman's breeches, harbinger-of-spring, white snakeroot, white ash, lopseed, clearweed, and elm.

The maple-basswood cover type is sensitive to disturbance. The steep slopes and sparse ground cover increase the potential for erosion and washing of litter and topsoil. Removal of trees from the canopy would alter the species composition and density of this climax-stage woodland. Except for those areas cleared for construction, the Marble Hill project has had little effect on the onsite portion of this cover type. Increased runoff noted in 1981 is restricted to existing drainageways at this time, but the sensitivity of this cover type warrants continued monitoring of any further increases.

Table 3.2-2

Comparison of Total Basal Areas for the Tree Stratum of Each Vegetation Cover Type

Cover Type	Total Basal Area (m^2/ha) 1977	1978	1979	1980	1981	Net Change 1977-1981
Maple-Basswood	33.4	33.3	33.9	34.3	34.7	+ 1.3
Oak-Maple	30.9	31.6	28.6	35.5	23.8	- 7.1
Chinkapin Oak	20.2	20.5	21.4	23.2	23.7	+ 3.5
Red Pine	31.1	34.3	30.5	31.0	28.8	- 2.3
Sycamore-Boxelder	43.1	50.3	48.5	52.8	50.0	+ 6.9
Oak-Hickory	35.6	36.2	36.3	38.9	38.7	+ 3.1
Walnut-Hickory-Buckeye	29.6	31.1	31.3	33.9	34.6	+ 5.0
Virginia Pine	20.5	28.3	28.0	44.3*	44.4	+23.9

* Major increase in basal area in 1980 due to relocation of plots.

Table 3.2-3

Comparison of Total Basal Areas for the Sapling Stratum of Each Vegetation Cover Type

Cover Type	Total Basal Area (m^2/ha) 1977	1978	1979	1980	1981	Net Change 1977-1981
Maple-Basswood	-	-	-	-	-	-
Oak-Maple	1.8	2.4	1.3	1.5	1.6	- 0.2
Chinkapin Oak	0.8	0.5	0.5	0.1	0.3	- 0.5
Red Pine	-	-	-	-	-	-
Sycamore-Boxelder	1.7	1.3	1.3	0.1	0.5	- 1.2
Oak-Hickory	-	-	-	-	-	-
Walnut-Hickory-Buckeye	0.6	-	-	1.4	1.1	+ 0.5
Virginia Pine	5.4	0.4	0.6	3.4*	2.9	- 2.5

* Change in basal area in 1980 due to relocation of plots.

Table 3.2-4

Major Shrub Species for Each Vegetation Cover Type

Cover Type	Scientific Name	Common Name
Maple-Basswood	Acer saccharum	Sugar maple
	Asimina triloba	Pawpaw
	Lindera benzoin	Spicebush
Oak-Maple	Acer saccharum	Sugar maple
	Cornus florida	Flowering dogwood
	Ostrya virginiana	Hophornbeam
	Ulmus rubra	Slippery elm
Chinkapin Oak	Celtis occidentalis	Hackberry
	Fraxinus quadrangulata	Blue ash
	Juniperus virginiana	Eastern redcedar
	Rhus aromatica	Fragrant sumac
	Ulmus rubra	Slippery elm
	Xanthoxylem americanum	Prickly-ash
Red Pine	Acer saccharum	Sugar maple
	Cercis canadensis	Eastern redbud
	Cornus florida	Flowering dogwood
	Fraxinus americana	White ash
	Prunus serotina	Black cherry
	Quercus muehlenbergii	Chinkapin oak
	Quercus rubra	Northern red oak
	Rubus phoenicolasius	Wineberry
	Sassafras albidum	Sassafras
Sycamore-Boxelder	Acer negundo	Boxelder
	Lindera benzoin	Spicebush
	Ulmus americana	American elm
Oak-Hickory	Cercis canadensis	Eastern redbud
	Cornus priceae	Miss Price's dogwood
	Symphoricarpos orbiculatus	Coralberry
	Ulmus americana	American elm
Walnut-Hickory-Buckeye	Acer negundo	Boxelder
	Acer saccharum	Sugar maple
	Asimina triloba	Pawpaw
	Fraxinus americana	White ash
	Fraxinus quadrangulata	Blue ash
	Lindera benzoin	Spicebush
Virginia Pine	Cornus florida	Flowering dogwood
	Prunus serotina	Black cherry

Table 3.2-5

Importance Values for Herbaceous Stratum, Maple-Basswood Cover Type, 1976-1981

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer rubrum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Acer saccharum	20*	27*	10	28*	34*	57*	16*	28*	24*	26*	11	20*	33*	25*	6	31*	6	28*	3	23*
Aesculus octandra	4	4	7	12	-	-	3	5	-	-	3	3	-	-	2	-	-	-	-	-
Aesculus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Anemonella thalictroides	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arisaema atrorubens	-	-	3	10	-	-	-	-	-	-	3	5	6	-	5	3	5	-	8	-
Asarum canadense	38*	46*	9	47*	46*	80*	23*	36*	49*	53*	32*	41*	53*	72*	18*	50*	78*	81*	34*	49*
Asimina triloba	4	4	-	-	3	-	7	-	5	-	-	-	-	5	-	-	6	8	3	6
Boehmeria cylindrica	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-
Carya cordiformis	-	-	-	4	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-
Circaea quadrisulcata	-	-	-	-	-	-	-	-	6	-	-	-	-	-	2	19	-	-	-	-
Claytonia virginica	-	-	28*	-	-	-	26*	-	-	-	31*	-	-	-	54*	-	-	-	11	-
Delphinium tricorne	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	24*	-
Dentaria laciniata	-	-	92*	-	4	7	70*	-	-	-	61*	-	-	-	34*	-	-	-	17*	-
Dicentria cucullaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	24*	-	-	-	19*	-
Erigenia bulbosa	-	-	29*	-	-	-	21*	-	-	-	21*	-	-	-	-	-	-	-	-	-
Eupatorium rugosum	43*	53*	-	42*	46*	43*	9	48*	47*	50*	5	48*	42*	38*	-	-	21*	29*	5	29*
Fraxinus americana	16*	16*	3	18*	26*	13	3	13	9	15*	-	9	6	-	5	11	6	6	3	12
Fraxinus quadrangulata	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-
Galium aparine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	-	-	39*	-
Galium boreale	-	-	3	-	-	-	8	-	-	-	11	3	-	-	-	-	-	-	-	-
Geum canadense	-	-	-	-	-	-	-	10	-	-	-	-	-	-	-	-	-	-	-	-
Glechoma hederacea	-	-	-	-	-	-	-	-	3	7	-	-	-	-	-	-	-	-	-	3
Impatiens biflora/ pallida	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	16*
Lindera benzoin	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	3
Maianthemum canadense	-	-	-	-	-	-	-	11	14	15*	-	-	4	25*	-	-	-	-	-	-
Monocotyledoneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33*	-	-	-	-
Parthenocissus quinquefolia	5	4	-	6	-	-	-	5	8	4	-	5	9	-	2	13	12	-	6	18*
Phryma leptostachya	29*	8	-	-	-	-	-	-	-	-	-	-	10	7	-	-	8	18*	8	-
Pilea pumila	-	-	-	-	10	-	-	12	13	14	2	15*	22*	23*	8	27*	33*	-	5	8

Table 3.2-5 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Pinus strobus	4	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Ranunculus abortivus	-	-	-	-	-	-	-	-	-	-	6	-	-	-	2	-	-	6	-	3
Rhus radicans	9	8	-	8	15*	-	-	6	3	-	2	3	-	-	2	-	-	6	-	-
Rosa sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Sanicula trifoliata	5	5	-	-	-	-	-	-	-	-	-	5	-	-	-	-	6	-	-	-
Sassafras albidum	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	3
Tilia americana	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tovara virginiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3
Trillium sessile	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	4	-
Ulmus americana/rubra	22*	12	4	25*	-	-	4	11	12	10	2	-	4	-	7	8	10	16*	4	3
Viola sororia	-	-	-	-	16*	-	10	9	4	3	4	-	4	5	9	-	11	-	8	13
Viola sp.	-	-	7	-	-	-	-	3	-	-	6	-	4	-	-	-	-	-	-	-
Vitis aestivalis	4	8	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-

* Major species (importance value ≥15).

Table 3.2-6

Seasonal Distribution of Important* Herbaceous Species,
Maple-Basswood Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Sugar maple	3	2,3,4,5,6	1,2,3,4	1,2,3,4,5
Wild ginger	3,4,5,6	2,3,4,5,6	1,2,3,4,5	1,2,3,4,5
Spring beauty	2,3,4,5			
Cut-leaved toothwort	2,3,4,5,6			
Larkspur	6			
Dutchman's breeches	5,6			
Harbinger-of-spring	2,3,4			
White snakeroot		2,3,4, 6	1,2,3,4,5	1,2,3,4,5
White ash		2	1,2	1, 3
Cleavers	6			
Jewelweed		6		
Canada mayflower				3,4
Monocot		5		
Virginia creeper		6		
Lopseed			1	5
Clearweed		4,5	4,5	4
Poison ivy			2	
Slippery elm		2	1	5
Woolly blue violet			2	

* Based on importance values ≥15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

- Oak-Maple

The oak-maple cover type generally is located upslope from the maple-basswood cover type. The oak-maple cover type is typical of this transition region, having some of the component species of the mesophytic forests and a stronger influence of oaks typical of the oak-hickory forests. The part of this cover type in which the sample plots are located has been disturbed in the past, probably from selective timber removal. This is evidenced by the small number of large trees, especially oaks, and the widespread presence of small sugar maples and understory trees (e.g., dogwood), which are usually released following disturbance. The presence of several large eastern redcedars is additional evidence that the canopy was once more open.

Slopes, although steep in localized areas, do not show the severe relief of the maple-basswood site. Topography and aspect varies, with the oak-maple cover type encompassing some flatter uplands as well as the slopes approaching valley bottoms. Sugar maple, again, is one of the codominants of the tree stratum (Table 3.2-1). Northern red oak is the major oak species; white ash, black cherry, and hickory are minor canopy components. A few beech also are scattered thoughout the woodland. Common subcanopy species include sugar maple, dogwood, slippery elm, buckeye, and hophornbeam. The net loss in basal area shown in Table 3.2-2 reflects the death of three trees within the plots, but is not indicative of the stand as a whole, which is healthy and viable. Likewise, the loss of one out of five saplings over the past five years has an undue effect on basal area within the plots (Table 3.2-3) compared with a negligible impact on the cover type.

Understory vegetation, while not dense, is greater than in the maple-basswood cover type. Important species in the shrub stratum are many of the same taxa that are important saplings. Major shrubs include sugar maple, flowering dogwood, hophornbeam, and slippery elm (Table 3.2-4).

Greatest herbaceous cover is generally in June (Figure 3-3). Many

of the species are present throughout the growing season (Table 3.2-7). Important herbaceous taxa present for more than one year include sugar maple, wood anemone, flowering dogwood, cut-leaved toothwort, Virginia creeper, black snakeroot, slippery elm, and woolly blue violet (Table 3.2-8). Large patches of spring ephemerals, including phlox, larkspur, trout lily, Soloman's seal, and mayapple, are scattered throughout the site.

The oak-maple cover type occupies a varied site and tends to be composed of a greater number of species, many having less exacting site requirements than those in the maple-basswood cover type. It is, in most locations, a good fertile site with a rich diversity of species. Construction effects appear to be minimal, with the exception of increased surface water runoff as in the maple-basswood area. Loss of surface litter, as well as erosion in some areas, was first noticed in the summer of 1980; subsequent seeding by PSI of upslope construction areas has somewhat abated the effects.

- Chinkapin Oak

The chinkapin oak cover type generally occupies upper slopes and ridgetops in the study area. These sites are typically drier with shallow soils and numerous limestone outcrops. The sample plots are located in a previously disturbed area that probably was a pasture or an old field. Numerous redcedars are distributed along the ridgetop, and canopy openings encourage growth of shade intolerant vegetation. Few large trees exist, and understory vegetation is dense in many areas. Species diversity is high and continually changing as succession progresses. The south-facing slopes of this cover type tend to lose soil moisture quickly, and many of the species present are typical dry-site vegetation.

Chinkapin oak predominates the tree stratum of this cover type, followed in importance by white ash and eastern redcedar (Table 3.2-1). Sugar maple and northern red oak are minor components of the chinkapin oak cover type, which typically grades into the oak-maple type farther downslope.

Table 3.2-7

Importance Values for Herbaceous Stratum, Oak-Maple Cover Type, 1976-1981

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer saccharum	23*	25*	22*	18*	21*	12	19*	17*	23*	30*	7	12	23*	34*	6	16*	34*	38*	3	15*
Agrimonia microcarpa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Allium canadense	-	9	28*	-	-	31*	12	-	-	6	10	-	-	11	7	-	-	-	10	3
Anemone quinquefolia	-	-	18*	-	-	-	26*	-	-	-	6	-	-	-	-	-	-	38*	31*	-
Anemonella thalictroides	-	-	4	-	-	-	2	-	-	-	1	-	-	-	8	2	-	-	4	-
Arabis sp.	-	-	-	-	-	-	-	2	-	-	3	2	-	-	-	-	-	-	-	-
Ariseama atrorubens	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
Asarum canadense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	16*	-
Aster azureus	-	2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Aster divaricatus	-	-	-	-	2	7	-	-	5	4	-	13	11	9	-	-	-	-	-	-
Aster sp.	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmeria cylindrica	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-
Botrychium virginianum	-	-	-	2	-	-	-	-	-	-	-	-	-	-	3	2	-	-	-	6
Carex sp.	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-
Carya cordiformis	-	-	2	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-	-	-
Caryophyllaceae	-	-	-	-	-	-	-	-	-	-	16*	-	-	-	-	-	-	-	-	-
Cercis canadensis	2	4	-	-	2	5	-	4	7	4	-	2	-	-	-	-	-	-	-	-
Cimicifuga racemosa	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Circaea quadrisulcata	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Clematis viorna	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-
Commelina virginica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	13	-	-
Cornus florida	15*	12	14	16*	21*	5	-	2	13	16*	1	8	13	5	1	8	19*	10	7	7
Delphinium tricorne	-	-	-	-	-	-	12	-	-	-	25*	-	-	-	14	-	-	-	-	-
Dentaria laciniata	-	-	33*	-	-	-	26*	-	2	-	28*	-	-	-	23*	-	-	-	8	-
Desmodium glutinosum	-	-	-	-	-	-	-	-	-	4	-	-	4	6	-	-	5	-	-	-
Dicentra cucullaria	-	-	6	-	-	-	2	-	-	-	-	-	-	-	13	-	-	-	7	-
Dicotyledoneae	2	2	-	11	3	10	11	11	6	-	-	2	-	-	-	-	-	-	12	19*
Dioscorea quaternata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	10	4	5	13
Dioscorea villosa	-	-	-	-	-	-	-	-	14	15*	-	-	-	-	-	-	-	-	-	-
Elymus virginicus	2	2	4	3	2	5	2	3	2	-	6	5	-	3	-	-	-	-	-	-
Erigenia bulbosa	-	-	8	-	-	-	3	-	-	-	4	-	-	-	-	-	-	-	-	-
Eupatorium sp.	-	-	-	-	-	-	-	-	3	2	-	2	3	-	-	-	-	-	-	-
Fagus grandifolia	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Fragaria virginiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Fraxinus americana	8	7	2	8	-	-	-	13	-	-	-	9	5	6	9	7	16*	15*	6	3

Table 3.2-7 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Fraxinus quadrangulata	3	2	6	3	12	-	6	-	15*	7	2	4	8	2	-	2	5	-	-	-
Galium aparine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	36*	-	-	-	14	3
Galium boreale	13	13	11	-	11	14	-	3	14	12	3	3	2	4	-	-	-	-	-	-
Galium circaezans	2	-	-	-	-	-	13	13	-	-	14	5	9	8	-	12	9	6	2	5
Galium triflorum	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-
Geum canadense	6	5	4	5	5	50*	10	8	9	-	7	4	5	9	-	-	-	6	-	-
Hydrophyllum appendiculatum	35*	47*	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hystrix patula	-	-	-	-	-	-	-	-	2	4	-	-	5	3	-	-	-	-	-	-
Jeffersonia diphylla	5	4	2	7	-	-	10	-	-	-	8	7	-	-	8	13	-	-	7	11
Lilliaceae	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Lindera benzoin	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lonicera japonica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
Monocotyledoneae	4	7	6	4	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
Osmorhiza claytoni	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-
Ostrya virginiana	-	-	-	-	-	-	5	-	-	-	-	4	4	6	-	-	12	6	4	16*
Parthenocissus quinquefolia	7	-	-	13	16*	10	4	28*	3	-	6	16*	22*	-	7	15*	15*	6	19*	3
Phryma leptostachya	-	-	-	-	4	-	-	-	2	-	-	2	-	-	-	11	-	-	-	-
Pilea pumila	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Poaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	6	3	4
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
Prunus serotina	8	6	6	7	5	21*	4	5	2	4	8	-	2	5	4	2	3	17*	4	3
Quercus rubra	2	2	-	4	40*	-	-	-	-	2	-	-	-	-	2	2	-	6	1	3
Rhus radicans	4	4	-	6	8	5	-	8	17*	7	4	5	7	5	6	8	21*	4	6	7
Sanguinaria canadensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	3	-	-	2	3
Sanicula trifoliata	15*	15*	-	42*	40*	18*	-	31*	26*	9	23*	48*	46*	53*	-	45*	43*	9	-	32*
Smilax herbacea	15*	15*	-	12	3	-	-	16*	-	-	-	8	10	15*	-	-	-	-	-	-
Smilax sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Solidago sp.	-	-	-	-	-	-	-	-	-	-	-	-	3	2	-	-	-	-	-	-
Stellaria pubera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	8	-
Symphoricarpos orbiculatus	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.2-7 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Ulmus rubra	21*	14	11	18*	31*	10	5	23*	17*	22*	5	15*	13	8	13	11	5	15*	10	19
Viburnum prunifolium	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Viola eriocarpa	-	-	9	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11
Viola pensylvanica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Viola sororia	-	-	-	-	-	-	8	15*	3	5	11	13	-	-	19*	12	-	-	10	5

*Major species (importance value ≥15).

Table 3.2-8

Seasonal Distribution of Important* Herbaceous Species,
Oak-Maple Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Sugar maple	2,3	2,3, 5,6	1,2,3,4,5	1, 3,4,5
Wild garlic	2			2
Wood anemone	2,3, 5			4
Wild ginger	5			
Chickweeds	4			
Flowering dogwood		2	1,2, 5	3
Larkspur	4			
Cut-leaved toothwort	2,3,4,5			
Dicot		6		
Wild yam				3
White ash			5	5
Blue ash			3	
Cleavers	5			
Canadian avens				2
Appendaged water leaf			1	1
Hophornbeam		6		
Virginia creeper	5	3,4,5	2, 4,5	
Black cherry				2, 5
Northern red oak			2	
Poison ivy			3, 5	
Black snakeroot	4	2,3,4,5,6	1,2,3,4,5	1,2, 4
Carrion-flower		3	1	1, 4
Slippery elm		2,3,4, 6	1,2,3	3, 5
Woolly blue violet	5	3		

* Based on importance values $\geq$15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

Basal area in the tree class, although low due to the small-sized trees, is steadily increasing (Table 3.2-2). The suppression of eastern redcedar from the closing hardwood canopy has already led to the death of one redcedar in the sapling class, causing a reduction in basal area within the plots (Table 3.2-3). Redcedars in the tree stratum also are being overtopped by hardwoods, and their continued decline is expected.

Limestone outcrops are abundant on this site, and many of the vegetative species present are typical of high calcium soils. These include the dominant canopy member, chinkapin oak, as well as blue ash, eastern redcedar, hackberry, and redbud.

Shrub cover is variable - dense in open areas and sparse in heavily wooded sections. Many of the species are typical of disturbed sites. Major shrubs include hackberry, blue ash, eastern redcedar, fragrant sumac, slippery elm, and prickly-ash (Table 3.2-4).

Numerous herbaceous species comprise the chinkapin oak cover type (Table 3.2-9). The most important is Japanese honeysuckle, which thrives in areas of high insolation. Highest vegetation cover is generally in June (Figure 3-2), although major species are distributed throughout the sampling seasons. Major species recorded for more than one year include wild garlic, leather flower, wild yam, white wild licorice, Solomon's seal, black cherry, elm-leaved goldenrod, columbo, and wax-leaved meadow rue (Table 3.2-10).

The chinkapin oak cover type is a diverse woodland undergoing successional change. The vegetation is composed of species that are adaptable to unfavorable site conditions and have less exacting habitat requirements than those in the maple-basswood and oak-maple cover types. Construction of the Marble Hill Generating Station does not appear to have affected the chinkapin oak cover type at this time.

Table 3.2-9

Importance Values for Herbaceous Stratum, Chinkapin Oak Cover Type, 1976-1981

Scientific Name	1976 Sep	1976 Oct	1976 Apr	1977 Jun	1977 Sep	1977 Oct	1977 Apr	1978 Jun	1978 Sep	1978 Oct	1978 Apr	1979 Jun	1979 Sep	1979 Oct	1980 Apr	1980 Jun	1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer saccharum	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Actea rubra	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Actinomeris alternifolia	-	-	-	-	-	-	-	2	-	-	-	-	-	3	-	-	-	-	-	-
Agrimonia microcarpa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Allium canadense	-	-	24*	-	-	-	7	-	-	-	9	-	-	-	16*	-	-	-	6	-
Anemone quinquefolia	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anemone virginiana	-	-	7	2	3	6	-	2	10	5	-	2	-	-	-	-	-	-	-	-
Anemonella thalictroides	-	-	-	11	-	-	-	9	-	-	-	-	-	-	18*	3	-	-	-	-
Arabis laevigata	-	-	-	2	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Aster azureus	-	-	-	2	-	-	-	5	-	-	6	-	-	-	-	-	-	-	-	-
Carex sp.	-	-	-	-	-	-	-	2	2	-	-	2	3	5	9	4	5	9	-	-
Celtis occidentalis	16*	3	5	6	3	5	-	-	-	-	-	7	4	-	-	5	7	-	3	4
Cercis canadensis	3	6	-	2	-	-	-	2	1	-	-	1	4	-	-	-	3	-	1	2
Circaea quadrisulcata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
Clematis viorna	2	2	-	29*	7	-	15*	29*	5	-	-	9	-	3	-	-	-	-	-	4
Commelina virginica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	10	2	-
Cornus florida	-	-	-	-	3	-	-	-	-	2	2	-	-	-	-	-	-	-	-	-
Cynanchum laeve	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Delphinim tricorne	-	-	-	-	-	-	14	-	-	-	6	-	-	-	-	-	-	-	5	-
Dentaria laciniata	-	-	3	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Dicotyledoneae	5	-	-	-	3	-	-	2	9	-	-	-	-	-	-	-	10	-	12	10
Dioscorea villosa	4	-	-	29*	15*	5	-	28*	28*	4	-	10	15*	5	-	28*	30*	-	12	25*
Diospyros virginiana	3	6	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Elymus virginicus	-	-	-	-	5	-	-	-	-	4	-	4	5	10	-	-	-	-	-	-
Eupatorium rugosum	-	-	-	3	-	23*	-	7	-	3	6	4	6	2	-	-	-	-	-	-
Fraxinus americana	7	6	-	2	3	-	3	4	3	5	-	3	3	-	-	3	-	-	-	2
Fraxinus quadrangulata	4	3	5	3	-	-	1	-	-	-	-	-	-	-	-	-	5	-	-	-
Galium circaezans	6	14	-	11	15*	5	-	9	11	13	5	9	9	12	-	5	11	18*	-	9
Galim pilosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-
Geum canadense	15*	11	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-
Helianthus sp.	3	-	-	-	-	-	-	-	3	-	4	8	5	-	-	-	-	-	-	-
Hieracium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-	-	-	-
Hystrix patula	7	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	13	-	-
Jeffersonia diphylla	4	-	5	4	-	-	10	6	1	-	6	5	-	-	8	9	-	-	10	7
Juniperus virginiana	2	2	5	-	2	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.2-9 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Krigia sp.	-	-	-	-	-	-	-	-	5	3	2	-	-	-	-	-	-	-	-	-
Labiatea	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Lactuca sp.	-	-	-	-	-	5	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptostachys sp.	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Lonicera japonica	21*	30*	31*	13	39*	72*	19*	23*	37*	71*	39*	19*	38*	64*	33*	25*	26*	56*	22*	20*
Maianthemum canadense	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monocotyledoneae	-	-	-	-	-	-	24*	-	-	-	6	-	-	-	-	-	-	-	-	2
Muhlenbergia sobolifera	5	3	-	2	3	6	-	5	-	-	5	-	-	-	-	-	-	-	-	-
Oenothero sp.	3	6	10	6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ostrya virginiana	10	9	9	5	-	-	-	-	4	-	-	-	3	-	-	-	11	13	6	-
Panicum boscii	6	9	-	4	5	10	1	-	4	7	2	4	6	9	-	-	-	-	-	-
Panicum clandestinum	-	-	-	-	-	-	-	-	5	3	-	-	-	-	-	-	-	-	-	-
Parthenocissus quinquefolia	3	-	3	6	4	5	1	5	9	-	-	6	10	-	-	9	10	-	5	10
Pinus virginiana	3	3	5	2	-	5	-	2	2	3	3	1	2	3	-	-	-	-	-	-
Poaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	3	2
Polygonatum biflorum	-	-	-	11	-	-	-	9	-	-	-	-	-	-	30*	18*	9	-	18*	8
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	11	-	-	-	-
Prunus serotina	6	7	5	3	7	10	15*	6	10	17*	16*	5	11	15*	2	-	9	11	6	4
Quercus muehlenbergii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	5	-	-
Quercus rubra	8	3	3	7	2	5	-	7	-	9	-	8	-	-	-	2	-	-	-	-
Quercus velutina	3	14	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ranunculus arbortivus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8	-	-	-	-	-
Rhus aromatica	-	-	-	2	-	-	-	-	5	-	2	1	7	5	-	9	9	-	3	6
Rhus radicans	-	-	-	-	3	-	1	2	3	-	3	2	-	-	-	3	3	-	3	2
Robinia pseudoacacia	17*	21*	7	4	11	-	-	3	9	4	-	5	4	7	-	-	-	-	-	-
Rosa sp.	4	5	3	2	3	5	1	2	2	-	-	1	-	-	-	-	-	-	2	-
Ruellia caroliniensis	-	-	-	2	-	-	-	3	-	-	-	8	13	6	-	-	-	-	-	-
Sanguinaria canadensis	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sanicula trifoliata	-	-	3	5	7	-	9	7	-	-	8	10	14	10	-	8	4	-	11	11
Silphium trifoliatum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-
Smilacina racemosa	-	-	-	-	-	-	21*	-	-	-	10	9	-	-	-	-	-	-	-	-
Smilax herbacea	-	-	-	-	5	-	-	-	-	-	-	-	2	3	-	2	7	5	7	11
Solidago ulmifolia	21*	27*	17*	9	13	6	23*	8	12	21*	6	6	11	16*	-	-	14	34*	6	7
Solidago sp.	-	-	-	-	7	-	-	-	-	2	-	-	2	3	-	12	-	-	-	-
Swertia caroliniensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	29*	19*	-	-	19*	23*

Table 3.2-9 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Symphoricarpos orbiculatus	4	4	6	3	-	6	6	3	-	-	3	2	-	-	-	-	2	4	3	-
Taraxacum officinale	-	-	-	-	-	-	6	3	3	-	6	-	-	-	-	1	-	-	1	-
Thalictrum dioicum/ revolutum	-	-	20*	-	9	10	15*	-	2	3	16*	14	6	10	-	7	-	4	15*	14
Triosteum aurantiacum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	7
Ulmus rubra	8	5	13	2	12	5	-	7	9	19*	2	2	6	4	5	5	-	-	-	-
Veratrum sp.	-	-	-	-	-	-	-	3	-	-	24*	14	-	-	-	-	-	-	-	-
Viola sororia	-	-	-	-	2	-	1	-	-	-	-	-	1	-	2	1	-	-	2	-
Vitis aestivalis	3	-	-	-	3	-	-	-	5	-	-	2	3	3	-	-	4	-	1	2
Viburnum prunifolium	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	2
Xanthoxylum americana	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	5	9	12	5	4

*Major species (importance value ≥15).

Table 3.2-10

Seasonal Distribution of Important* Herbaceous Species,
Chinkapin Oak Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Wild garlic	2 5			
Rue anemone	5			
Hackberry			1	
Leather flower	3	2,3		
Wild yam		2,3, 5,6	2,3,4,5	
White snakeroot				2
White wild licorice			2	5
Canadian avens			1	
Japanese honeysuckle	2,3,4,5,6	3,4,5,6	1,2,3,4,5	1,2,3,4,5
Monocot	3			
Solomon's seal	5,6	5		
Black cherry	3,4			3,4
Black locust			1	1
False Solomon's seal	3			
Elm-leaved goldenrod	2,3		1	1, 3,4,5
Columbo	5,6	5,6		
Wax-leaved meadow rue	2,3,4, 6			
Slippery elm			3	
Veratrum	4			

* Based on importance values ≥15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

- Red Pine

The red pine cover type is an abandoned pine plantation located on the flat uplands. The red pine that predominates this stand is slowly being replaced by the subdominant white pine and invading hardwoods. Both red and white pine are northern conifers, and southern Indiana is outside their native range (Fowells 1965). Red pine, which is especially intolerant of competition in marginal locations, has shown the greatest decline. Clearing of approximately 0.5 acres of the cover type during construction of the site parking lot (TI 1978) exposed the remaining stand to increased stress from high winds, further weakening the red pine. Many of the stressed pines also have been invaded by bark beetles, and some crowns are being shaded out by grape vines. Moreover, neither red nor white pine has optimum growth on the high limestone soils of the study area.

In its northern range, red pine's natural successor is white pine, followed by hardwoods. White pine in the canopy of this stand appear to be healthy and there are scattered white pine seedlings in the understory, but the heavy invasion of hardwoods in the shrub and herbaceous stratum will likely prevent white pine regeneration. No red pine seedlings have been noted in the understory. The rapid decline of red pine noticed in the past five years indicates that this stand will progress to a mixed white pine-hardwood stand as the more aggressive hardwoods thrive in the canopy openings left by dying red pine. Eventually the hardwoods will overtop the less shade tolerant white pines, resulting in a hardwood stand similar to the forests of the surrounding upland flats.

The occurrence of yellow poplar and white ash in the tree strata of the plots is typical of the scattered hardwoods present in the canopy (Table 3.2-1). Although importance values change due to loss of individual trees, the ranking remains constant. The basal area loss in Table 3.2-2 is due to the deaths of red pines. Although no saplings are presently recorded in the plots (Table 3.2-3), the growing shrub cover is increasing the understory density. One of the most noticeable trends over the past five years is the increase in shrub taxa, with 6 species recorded in 1977 and 17 present in 1981

(see Table 3.1-3 in text and Table E-3 in Appendix). The current shrub cover is indicative of hardwood invasion as the canopy has become more open. Major species include dogwood, white ash, sugar maple, redbud, black cherry, chinkapin oak, northern red oak, sassafras, and wineberry (Table 3.2-4).

As in the chinkapin oak cover type, Japanese honeysuckle also is the most consistently important herbaceous species in this cover type. However, in this type, it is closely followed by dogwood, redbud, black snakeroot, and black cherry (Table 3.2-11). Other species important for more than one year are cut-leaved toothwort, Virginia creeper, and poison ivy (Table 3.2-12). Because much of the herbaceous cover is tree seedlings, highest cover is June (Figure 3-3) and spring ephemerals have little importance in this cover type.

Decline of the red pine cover type, although probably accelerated by nearby construction, was inevitable on this marginal red pine site. Continued loss of red pines and increased presence of hardwoods is expected as natural succession continues.

- Sycamore-Boxelder

The sycamore-boxelder cover type is typical of lowland vegetation along the Ohio River valley. Lower elevations frequently are flooded, and the alluvial soils vary from gravelly sands and silts along the bottomlands to deep and fertile loams on upper terraces. Many of the common species are fast-growing trees, especially sycamore, which predominates the cover type. American sycamore is a large tree, having perhaps the greatest diameter of any of the eastern hardwoods. Diameter measurements of 3 to 8 feet and a height of over 100 feet are common in some regions (Harlow and Harrar 1969).

Species composition is highly variable, especially between floodplain and upper terrace vegetation. Although the topography is characteristically flat, considerable variations in soils, drainage, and vegetation are associated with slight variations in elevation (Barrett 1962).

Table 3.2-11

Importance Values for Herbaceous Stratum, Red Pine Cover Type, 1976-1981

Scientific Name	1976 Sep	1976 Oct	1977 Apr	1977 Jun	1977 Sep	1977 Oct	1978 Apr	1978 Jun	1978 Sep	1978 Oct	1979 Apr	1979 Jun	1979 Sep	1979 Oct	1980 Apr	1980 Jun	1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer rubrum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	12	-	3	2	-
Acer saccharum	-	-	-	-	-	-	-	-	3	5	-	2	2	-	-	-	-	-	5	-
Actea rubra	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Ambrosia artemisiifolia	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Aster sp.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Boehmeria cylindrica	-	-	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-
Carex sp.	-	-	-	-	-	-	-	-	3	-	2	3	3	3	3	5	3	5	2	2
Caryophyllaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-
Cercis canadensis	16*	17*	-	16*	17*	14	-	15*	15*	12	-	12	14	11	2	15*	15*	19*	9	7
Circaea quadrisulcata	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	3	-	-	-	2
Cornus florida	26*	26*	15*	22*	26*	27*	9	16*	22*	27*	9	30*	37*	47*	7	23*	39*	36*	15*	3
Cruciferae	-	-	-	-	-	-	-	-	-	3	7	-	-	2	-	-	-	-	-	-
Dentaria laciniata	-	-	15*	-	-	-	28*	-	-	-	9	-	-	-	12	-	-	-	8	-
Desmodium glutinosum	-	-	-	-	-	-	-	-	-	-	-	-	4	6	-	-	12	-	-	3
Dicotyledoneae	2	-	-	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Dioscorea quaternata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-
Diospyros virginiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-
Erigeron sp.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Eupatorium rugosum	4	5	-	3	4	7	4	-	6	6	-	4	3	5	-	-	3	6	3	3
Fagus grandifolia	3	3	5	2	2	5	10	4	3	2	-	3	2	5	-	-	-	-	-	-
Fragaria virginiana	3	3	5	3	2	-	3	2	-	4	-	3	3	3	18*	3	4	3	3	-
Fraxinus americana	11	9	5	11	12	-	5	14	10	15*	2	11	18*	3	8	3	5	5	6	12
Fraxinus quadrangulata	3	4	3	-	-	9	4	-	-	-	-	7	-	-	-	-	-	6	-	-
Fraxinus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
Galium aparine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	10	-	-	-	-
Galium asprellum	-	-	-	2	2	9	-	3	8	6	-	-	6	3	-	-	-	-	-	-
Galium circaezans	9	7	-	6	8	5	-	8	4	3	5	7	7	17*	13	2	5	-	5	8
Galium triflorum	2	3	3	3	-	-	12	2	-	-	18*	1	-	-	-	-	-	3	7	5
Geum canadense	3	-	3	-	-	-	9	9	11	3	-	-	3	3	-	-	-	-	-	-
Hieracium sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
Liriodendron tulipifera	-	-	-	-	-	-	-	3	3	3	-	1	2	-	2	8	3	-	2	-
Lonicera japonica	40*	56*	69*	26*	45*	75*	-	38*	41*	55*	35*	18*	27*	56*	52*	36*	31*	56*	42*	28*
Monocotyledoneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Muhlenbergia sobolifera	-	-	-	2	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	-
Panicum boscii	-	-	-	-	-	-	-	-	1	2	5	-	-	-	-	-	-	-	-	-

Table 3.2-11 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Parthenocissus quinquefolia	9	-	3	14	9	-	9	13	12	-	5	17*	12	-	-	23*	9	-	26*	30*
Phryma leptostachya	5	3	-	7	11	-	-	6	5	3	-	2	9	6	-	1	7	-	6	-
Pilea pumila	-	-	-	-	-	-	-	2	3	2	9	1	-	-	-	-	-	-	-	-
Pinus strobus	5	10	17*	11	4	9	4	-	3	2	9	1	2	4	6	2	3	5	2	2
Poaceae	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-	2	-	-	-	-
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	13	-	-	-	-
Prunus serotina	4	10	28*	15*	9	6	30*	10	13	17*	24*	5	9	14	11	10	9	17*	15*	7
Quercus muehlenbergii	5	5	-	-	2	13	-	-	6	7	-	6	5	6	-	-	-	5	2	-
Ranunculus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-
Rhus radicans	13	-	-	9	5	-	3	7	6	3	5	10	6	-	15*	14	19*	-	17*	17*
Rubus phoenicolasius	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	6	-	5
Rubus sp.	-	3	-	2	2	-	-	5	3	5	9	7	7	14	5	5	9	6	6	12
Sanicula trifoliata	19*	18*	22*	21*	15*	18*	-	24*	10	7	38*	19*	8	6	-	12	8	3	12	16*
Sassafras albidum	3	6	-	4	5	-	-	-	3	5	-	5	2	12	-	-	-	-	-	4
Smilax herbacea	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solidago sp.	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Symphoricarpos orbiculatus	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Taraxacum officinale	-	-	-	-	-	-	-	-	-	-	-	1	2	2	8	2	-	3	2	-
Ulmus americana/rubra	3	3	-	5	2	-	-	3	2	-	7	3	5	4	-	4	4	5	2	2
Viola sororia	-	-	-	-	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Viola sp.	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitis aestivalis	2	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	3	-	-	2

*Major species (importance value ≥15).

Table 3.2-12

Seasonal Distribution of Important* Herbaceous Species,
Red Pine Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Eastern redbud		2,3, 5	1,2,3	1, 5
Flowering dogwood	2, 6	2,3,4,5	1,2,3,4,5	1,2,3,4,5
Cut-leaved toothwort	2,3			
Wild strawberry	5			
White ash			4	3
White wild licorice				4
Fragrant bedstraw	4			
Japanese honeysuckle	2, 4,5,6	2,3,4,5,6	1,2,3,4,5	1,2,3,4,5
Virginia creeper	6	4,5,6		
White pine	2			
Black cherry	2,3,4, 6	2		3, 5
Poison ivy	5,6	6	5	
Black snakeroot	2, 4	2,3,4, 6	1,2	1,2

* Based on importance values $\geq$15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

Localized areas rarely represent all components of the cover type, and the sample plots are typical of this situation. In addition to sycamore, common trees present in the plots include boxelder, American elm, and hackberry (Table 3.2-1). Other principal cover type components not present in the plots are silver maple, cottonwood, yellow poplar, and black willow. The occurrence of dogwood, black walnut, black cherry, and basswood on the upper terrace location of one plot is typical of minor canopy components on the fertile sites with better drainage.

The 6.9 m^2/ha net increase in basal area of the tree stratum of the plots (Table 3.2-2) is indicative of the fast-growing trees on this site, since there was no change in tree composition over the five years. Total basal area is higher than any other cover type, primarily due to the large size of the sycamores (one of which had a dbh of 25.3 inches in March 1981).

Subcanopy density is low, with few major sapling and shrub components. Important shrubs over the 5-year period include boxelder, spicebush, and American elm (Table 3.2-4). Shrub density is greatest on the upper terraces.

Herbaceous cover is high, especially in the floodplains. Although spring flooding periodically tends to remove herbaceous vegetation or bury it under sediment, subsequent vegetation often appears as dense clumps or widespread colonies of vegetation. Large patches of jewelweed, clearweed, and wingstem are common. Highest vegetation cover is in late summer, with species composition fairly consistent throughout the sampling seasons (Table 3.2-13). Other important species recorded for more than one year are sedge, enchanter's nightshade, spring beauty, cut-leaved toothwort, Virginia wild-rye, and white snakeroot (Table 3.2-14).

The sycamore-boxelder cover type, like the maple-basswood, is a fairly stable forest association. Unlike those of the maple-basswood type, the sycamore-boxelder stands are a heterogeneous mixture of several species, with stand composition tending to vary from site to site. Water is an

Table 3.2-13

Importance Values for Herbaceous Stratum, Sycamore-Boxelder Cover Type, 1976-1981

Scientific Name	1976		1977				1978					1979				1980			1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer neaundo	3	-	-	6	-	-	4	-	-	4	7	-	-	2	-	6	7	3	10	7
Acer saccharum	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-	-	-	-	-	-
Actinomeris alternifolia	11	10	-	18*	8	10	8	13	12	11	-	13	11	16*	-	24*	22*	7	-	20*
Aesculus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Amaranthus sp.	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ariseama atrorubens	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Asarum canadense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	6	3	-
Aster divaricatus	-	-	-	-	-	-	-	-	-	4	3	-	-	-	-	-	-	-	-	-
Aster azureus	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
Bidens sp.	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Boehmeria cylindrica	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	12
Cardamine pratensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Carex sp.	-	-	-	-	14	37*	39*	15*	7	16*	29*	13	15*	19*	32*	25*	25*	33*	15*	36*
Circaea quadrisulcata	80*	71*	-	42*	-	-	-	3	-	9	-	-	4	-	14	49*	-	-	-	-
Claytonia virginica	-	-	32*	-	-	-	14	-	-	-	13	-	-	-	30*	-	-	-	-	-
Commelina virginica	3	3	-	3	2	7	-	3	-	2	-	3	2	4	-	2	2	3	-	-
Cornus florida	4	6	6	7	9	7	-	4	4	-	6	3	5	3	-	-	3	-	3	-
Corydalis flavula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-
Cryptotaenia canadensis	-	-	-	7	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Cyperaceae	27*	27*	33*	19*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentaria laciniata	-	-	23*	-	3	3	28*	-	-	-	24*	-	-	-	12	-	-	-	-	-
Dicentra cucullaria	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-
Dicotyledoneae	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	3	-	-	-
Dioscorea quaternata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	5	4	7
Elymus virginicus	11	12	27*	8	5	10	3	8	5	3	31*	4	2	3	14	-	-	-	11	-
Erigenia bulbosa	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Erigeron sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-
Eupatorium rugosum	7	14	-	30*	7	40*	-	15*	35*	43*	7	-	26*	41*	-	-	25*	42*	16*	-
Fragaria virginiana	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	5	-	-
Galium aparine	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	2	-	-	19*	4
Galium circaezans	3	3	3	3	2	3	5	2	-	-	4	2	-	2	-	-	-	-	-	-
Galium triflorum	-	-	17*	-	-	-	3	-	-	-	5	-	-	-	4	-	-	-	3	-
Geum canadense	16*	17*	12	7	11	13	3	14	7	9	-	2	13	12	-	-	15*	-	14	-
Glechoma hederacea	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-
Hydrangea arborescens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	13*	12	20*	-

Table 3.2-13 (Contd)

Scientific Name	1976 Sep	1976 Oct	1977 Apr	1977 Jun	1977 Sep	1977 Oct	1978 Apr	1978 Jun	1978 Sep	1978 Oct	1979 Apr	1979 Jun	1979 Sep	1979 Oct	1980 Apr	1980 Jun	1980 Sep	1980 Oct	1981 Apr	1981 Jun
Hydrophyllum appendiculatum	-	-	-	-	-	-	-	-	-	-	12	-	-	-	-	-	-	-	-	-
Hypericum sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-
Impatiens biflora/ pallida	-	-	-	-	18*	9	26*	40*	26*	6	17*	53*	37*	17*	-	-	15*	16*	-	36*
Jeffersonia diphylla	-	-	22*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Laportea canadensis	-	-	-	-	-	-	-	-	8	8	-	32*	16*	6	-	-	-	-	-	-
Lindera benzoin	-	-	-	-	3	-	-	-	-	-	-	3	5	3	-	-	-	-	4	-
Osmorhiza claytoni	-	-	-	-	-	-	12	-	-	-	-	3	2	-	2	-	-	-	-	-
Parthenocissus quinquefolia	3	3	3	4	6	-	3	6	7	2	2	4	2	-	1	7	6	-	3	10
Phryma leptostachya	-	-	-	-	-	-	-	-	-	-	-	-	6	3	-	43*	-	7	39*	-
Pilea pumila	-	-	-	33*	75*	32*	8	40*	55*	43*	4	26*	35*	38*	25*	1	40*	2	3	-
Poaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5
Polygonum caespitosum	8	10	-	-	-	3	-	-	5	6	-	5	4	8	-	-	-	8	-	-
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-	-	-	-	-
Prunus serotina	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
Quercus prinus	-	-	-	-	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-
Ranunculus fascicularis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22*	4	-
Rhus radicans	3	2	-	4	3	3	6	3	3	2	2	5	4	-	10	-	4	-	4	-
Rosa sp.	-	-	-	-	-	-	-	-	-	-	3	-	2	2	-	-	-	-	-	-
Ruellia caroliniensis	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Sanicula trifoliata	3	3	13	3	3	5	15*	12	2	3	9	15*	-	6	-	23*	-	-	4	33*
Smilax herbacea	3	-	-	-	3	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Solidago sp.	9	8	-	-	5	-	3	5	-	-	-	-	-	-	-	-	-	-	-	-
Stellaria media	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	-
Tovara virginiana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	10	3	10
Ulmus rubra	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Umbelliferae	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Urtica dioca	-	-	-	-	14	-	-	9	6	-	-	-	-	-	-	-	-	-	-	-
Viola eriocarpa	9	9	9	7	3	4	3	-	3	-	6	3	-	-	-	-	-	-	-	-
Viola papilionacea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-
Viola sororia	-	-	-	-	7	6	13	8	7	8	7	7	10	7	22*	12	11	16*	-	13

*Major species (importance values ≥15).

Table 3.2-14

Seasonal Distribution of Important* Herbaceous Species,
Sycamore-Boxelder Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Wingstem		2, 5,6	5	4
Sedge	3,4,5,6	3, 5,6	4,5	2,3,4,5
Enchanter's nightshade		2, 5	1	1
Spring beauty	2, 5			
Sedges	2	2	1	1
Cut-leaved toothwort	2,3,4			
Virginia wild-rye	2, 4			
White snakeroot	6	2,3	3,4,5	2,3,4,5
Cleavers	6			
Fragrant bedstraw	2			
Canadian avens			1 5	1
Wild hydrangea	6			
Jewelweed	3,4	3,4, 6	2,3,4,5	4,5
Twinleaf	2			
Wood nettle		4	4	
Lopseed	6	5		
Clearweed	5	2,3,4, 6	2,3,4,5	2,3,4
Small-flowered buttercup				5
Black snakeroot	3	4,5		
Woolly blue violet	5			5

* Based on importance values ≥15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

integral part of this cover type, although, again, species vary in their tolerance of extremes in moisture levels.

- Oak-Hickory

Oak-hickory communities, while present in the Western Mesophytic Forest region, are somewhat transitional in composition with a predominance of oaks, few hickories, and mixture of mesophytic slope forest species (Braun 1974). Oaks become more dominant and hickories more common in the oak-hickory forests farther west. The oak-hickory cover type within the study area generally occupies west-facing slopes on the Kentucky side of the Ohio River. Species composition is similar to the oak-maple cover type, differing primarily by more extensive ash, especially blue ash, which is abundant on the limestone outcrops and high calcium soils of this cover type. Both cover types have been affected by past logging, generally leaving an abundance of typically low-value and/or cull timber. Regeneration of shade tolerant sugar maple is widespread. The oak-hickory cover type differs from the oak-maple and maple-basswood sites across the Ohio River by having drier, generally less fertile soils. The west-facing slopes of the oak-hickory forests and a lighter canopy cover increase moisture loss. The typically sparse ground cover, steep slopes, and rocky soils are subject to washing and subsequent nutrient loss.

Northern red oak is the most abundant oak in this cover type. Other common canopy members include white and blue ash and sugar maple. Scattered basswood, black cherry, yellow buckeye, shagbark hickory, American elm, and black walnut also are present in the overstory. The influence of limestone outcrops is apparent in the importance of high-calcium species on this site. Blue ash consistently has been the most important tree in the sample plots (Table 3.2-1). Redbud, hackberry, and bladdernut are also high-calcium taxa common on this site.

Stand composition varies somewhat with localized site differences. Ashes are more common on the rocky upper slopes, while oak and maple are more common on the more favorable lower slope positions. The moderate growth of

the tree stratum of these plots is similar to that of the chinkapin oak cover type, which resembles this cover type in extensive limestone outcropping (Table 3.2-2).

Understory density varies. Although no saplings are recorded on the plots (Table 3.2-3), sugar maple and buckeye saplings, especially, are scattered throughout the forest. Major shrub species recorded on the plots include eastern redbud, Miss Price's dogwood (Cornus priceae), coralberry (Symphoricarpos orbiculatus), and American elm (Tables 3.2-4)

Herbaceous cover is typically sparse on these steep slopes. Few species consistently are important (Table 3.2-15), and spring ephemerals make a major contribution to cover. As in the maple-basswood cover type, vegetation cover is highest in April (Figure 3-3). The most important spring ephemeral probably is Virginia bluebell, which occurs in large patches. Other species recorded as important only in April include larkspur, cut-leaved toothwort, trout-lily, Canada anemone, and trillium (Table 3.2-16). Species having greatest importance in the June through October periods include Virginia creeper, Japanese honeysuckle, white snakeroot, redbud, American elm, bottlebrush, summer grape, and Canadian avens.

Cover types like the oak-hickory forest, which have been selectively disturbed in the past, tend to vary in composition and stability within the cover type. In some areas hardwood regeneration is rapidly filling canopy openings, and stand growth is vigorous. In other areas, particularly less accessible locations, old, diseased, or short-lived trees contribute to a stagnant growth situation. This cover type is not located onsite, and there have been no apparent impacts from Marble Hill construction.

- Walnut-Hickory-Buckeye

In many forests of this region, long-time settlement and numerous man-caused and natural disturbances have altered stand composition to the extent that cover type classification is often difficult. Adding to the difficulty of defining a cover type is the mixture of species in this region, with both mixed mesophytic and oak-hickory species present in the same forest

Table 3.2-15

Importance Values for Herbaceous Stratum, Oak-Hickory Cover Type, 1976-1981

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer saccharum	-	-	-	-	-	-	-	3		-	-	-	-	-	-	-	-	-	-	-
Actea rubra	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Actinomeris alternifolia	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-
Aesculus octandra	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	4	-	-	2	7
Allium canadense	-	-	6	-	-	-	4	-	-	-	5	-	-	-	-	-	-	-	-	-
Amaranthus sp.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anemone quinquefolia	-	-	25*	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
Anemonella thalictroides	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arisaema atrorubens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-	-	7	7
Asarum canadense	-	-	-	-	-	-	-	3	4	-	9	2	-	-	-	-	-	-	-	-
Aster azureus	3	4	-	4	-	-	-	-	-	5	2	3	-	-	-	-	-	9	-	-
Cardamine douglassii	-	-	7	3	4	-	4	-	-	-	3	-	-	-	7	-	-	-	-	-
Carex sp.	-	-	-	-	8	-	-	-	6	9	2	5	8	9	-	7	14	26*	-	7
Carya cordiformis	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Celtis occidentalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	2	4
Cercis canadensis	25*	25*	2	25*	6	-	8	16*	16*	12	2	8	13	5	-	4	12	7	-	7
Circaea quadrisulcata	-	4	-	-	4	31*	-	-	3	5	-	-	2	-	-	-	-	-	-	-
Commelina virginica	4	-	-	-	-	-	-	-	-	-	4	3	-	-	-	-	-	-	-	-
Compositae	-	-	-	-	4	-	-	4	-	4	2	-	-	-	-	-	-	-	-	-
Cornus priceae	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyperaceae	21*	25*	2	12	-	-	-	-	-	-	26*	-	-	-	-	-	-	-	-	-
Delphinium tricorne	-	-	-	-	-	-	26*	-	-	-	-	-	-	-	21*	-	-	-	18*	-
Dentaria laciniata	-	-	25*	-	-	-	18*	-	3	-	26*	-	-	-	10	-	-	-	2	-
Dicentra cucullaria	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-
Dicotyledoneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9
Erythronium albidum	-	-	24*	-	-	-	28*	-	-	-	13	-	-	-	31*	-	-	-	15*	-
Eupatorium rugosum	19*	18*	-	14	22*	16*	-	22*	32*	68*	2	37*	41*	57*	-	-	47*	61*	11	21*
Fraxinus americana	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	10	5	-	2	5
Fraxinus quadranguiata	7	9	-	5	3	21*	-	-	8	5	2	6	9	-	-	-	-	-	-	-
Fraxinus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Galium aparine	-	-	-	-	-	-	-	-	-	-	6	-	-	-	11	-	-	-	11	-
Gallium circaezans	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	3	-	-	-	-
Geum canadense	6	6	4	4	6	16*	5	8	-	14	-	-	8	16*	-	-	5	11	-	3
Glechoma hederacea	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.2-15 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Huechera americana	-	-	-	-	-	-	-	-	8	-	-	-	-	-	-	-	-	-	-	-
Hydrophyllum appendiculatum	2	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hystrix patula	29*	30*	2	10	-	-	-	8	-	7	4	8	4	9	-	-	11	20*	9	10
Lonicera japanica	3	4	-	4	5	-	-	8	17*	25*	6	17*	26*	61*	17*	26*	28*	41*	22*	26*
Mertensia virginica	-	-	55*	-	-	-	59*	-	-	-	54*	-	-	-	33*	-	-	-	40*	-
Monocotyledoneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Muhlenbergia sobolifera	4	9	4	4	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-
Neptea cataria	-	-	-	-	3	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-
Panicum clandestinum	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
Parthenocissus quinquefolia	36*	16*	4	52*	77*	16*	11	65*	75*	10	6	53*	51*	-	12	56*	25*	-	31*	44*
Phryma leptostachya	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32*	-	-	-	-
Pilea pumila	-	-	-	-	-	-	-	-	-	-	-	2	-	-	8	-	-	-	-	-
Poaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	11	14	-	-	-
Polygonatum biflorum	3	3	7	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-	-	-
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	10	-	-	-	-
Prunus serotina	-	-	-	-	-	-	-	-	-	-	-	3	-	4	-	-	9	9	2	4
Quercus muehlenbergii	-	-	-	-	-	-	-	-	4	5	-	3	-	-	-	-	-	-	-	-
Quercus sp.	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	2
Rhus aromatica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Rhus radicans	2	-	-	-	9	-	-	3	-	-	-	-	-	-	1	8	-	-	-	-
Ribes sp.	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	5	-	-	-
Robinia pseudoacacia	4	6	2	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubus sp.	-	-	-	-	6	-	-	-	-	-	-	3	-	9	2	2	-	7	-	4
Sanguinaria canadensis	-	-	3	8	-	-	6	9	-	-	-	3	-	-	1	2	-	-	4	9
Sanicula trifoliata	-	-	-	8	4	-	-	4	-	-	2	9	-	5	-	-	-	7	3	7
Smilacina racemosa	4	-	-	8	-	-	-	5	-	-	6	9	3	-	4	7	-	-	4	4
Solidago sp.	-	-	-	-	6	16*	-	-	-	-	-	-	3	-	-	-	-	-	-	-
Symphoricarpos orbiculatus	3	4	3	4	-	-	3	-	-	-	2	2	-	-	-	-	-	4	-	-
Trillium sessile	-	-	19*	-	-	-	12	4	-	-	9	7	-	-	8	10	-	-	7	5
Ulmus americana	15*	13	4	17*	13	85*	8	19*	9	5	3	5	11	5	6	-	14	-	7	8
Viola sororia	-	-	-	-	4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-
Vitis aestivalis	3	4	-	5	6	-	-	65*	9	17*	-	5	11	17*	-	9	8	-	2	4

*Major species (importance values $\geq$ 15).

Table 3.2-16

Seasonal Distribution of Important* Herbaceous Species,
Oak-Hickory Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Canada anemone	2			
Sedge				5
Eastern redbud		2,3	1, 3	1
Enchanter's nightshade				2
Sedges	4		1	1
Larkspur	3, 5,6			
Cut-leaved toothwort	2,3,4			
Trout-lily	2,3, 5,6			
White snakeroot		3,4, 6	1,2,3,4,5	1,2,3,4,5
Blue ash				2
Canadian avens				2, 4
Bottlebrush			1	1, 5
Japanese honeysuckle	5,6	4,5,6	3,4,5	3,4,5
Virginia bluebell	2,3,4,5,6			
Virginia creeper	6	2,3,4,5,6	1,2,3,4,5	1,2
Lopseed		5		
Goldenrod				2
Toadshade	2			
American elm		2,3	1	2
Summer grape		3		3,4

* Based on importance values $\geq$15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

stand. This variable type of forest is typified by the walnut-hickory-buckeye cover type. Although more closely related to a mixed mesophytic forest, some species, especially the hickories, are more typically oak-hickory components. Relatively intolerant trees like black walnut are overstory associates with very tolerant hickories and buckeyes.

Walnut-hickory-buckeye is one of the five cover types in the study area located along slopes. The moist fertile soil encourages growth of site-sensitive species like black walnut and buckeye. Pawpaw and spicebush in the understory are further indicators of a fertile site. The limestone bedrock provides suitable substrate for blue ash, chinkapin oak, and redbud.

Shagbark hickory is one of the dominant trees in the sample plots (Table 3.2-1), although bitternut hickory (Carya cordiformis) is also present in the cover type. By occupying a dominant portion of the canopy, black walnut is able to maintain its presence in the forest. Yellow buckeye and white ash are also common overstory components. Sugar maple is not as important as in the maple-basswood, oak-maple, and oak-ash-maple cover types. Openings in the canopy, either from man-induced or natural causes, have encouraged both overstory and understory growth. A 5.0 m^2/ha increase in basal area in the tree stratum (Table 3.2-2) and a 0.5 m^2/ha increase in the sapling stratum (Table 3.2-3) of the plots have occurred over the past five years. Major saplings in the cover type are blue ash, white ash, and buckeye.

Shrub cover ranks second only to that of red pine. Major shrub taxa include pawpaw, spicebush, blue ash, white ash, sugar maple, and boxelder (Table 3.2-4).

As is typical of a site with numerous canopy openings, Japanese honeysuckle is the dominant herbaceous species (Table 3.2-17). In some areas, Japanese honeysuckle not only is choking out other herbaceous plants, but also is overcoming shrubs and saplings. The importance of vines in this cover type is further indicated by major coverage from Virginia creeper and poison ivy. Greatest herbaceous ground cover is usually in June (Figure 3-2). Cut-leaved toothwort, dutchman's breeches, and harbinger-of-spring are important spring

Table 3.2-17

Importance Values for Herbaceous Stratum, Walnut-Hickory-Buckeye Cover Type, 1976-1981

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer negundo	-	-	3	2	2	4	3	-	3	4	3	5	3	-	-	-	6	6	3	-
Acer saccharum	-	-	-	-	1	2	-	3	4	-	-	-	2	-	-	-	-	-	-	-
Actinomeris alternifolia	-	-	-	3	6	-	-	6	6	4	-	8	9	4	-	-	5	-	8	-
Allium canadense	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Anemone quinquefolia	-	-	-	-	-	-	-	2	2	3	-	-	2	-	-	-	-	-	-	-
Arabis laevigata	2	-	-	-	2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Asarum canadense	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	2
Asimina triloba	9	6	5	6	6	-	-	7	5	17*	-	8	14	11	-	9	19*	-	5	8
Aster divaricatus	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Boehmeria cylindrica	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Cardamine douglassii	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carex sp.	-	-	-	-	6	3	2	3	2	3	2	3	4	2	-	2	2	12	-	2
Carya cordiformis	5	6	-	4	2	-	-	-	5	-	-	-	7	2	-	-	7	6	8	2
Carya ovata	-	8	-	-	-	-	-	-	-	-	-	4	-	-	10	6	-	8	-	2
Cercis canadensis	9	8	-	2	6	-	-	8	3	3	-	3	2	2	-	2	3	-	-	4
Circaea quadrisulcata	-	-	-	2	5	-	-	2	2	-	-	5	2	-	-	-	-	-	-	2
Compositae	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-
Convolvulus sp.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyperaceae	4	5	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dentaria laciniata	-	-	58*	-	-	-	42*	-	2	-	47*	-	-	-	54*	-	-	-	21*	-
Dicentra cucullaria	-	-	-	-	-	-	-	-	-	-	-	-	-	-	26*	-	-	-	5	-
Dicotyledoneae	-	-	-	-	6	-	-	-	-	-	2	2	-	-	-	-	-	-	-	2
Erigenia bulbosa	-	-	22*	-	-	-	17*	-	-	-	21*	-	-	-	-	-	-	-	-	-
Eupatorium rugosum	20*	29*	-	10	11	30*	-	14	18*	30*	-	11	18*	15*	-	-	22*	30*	2	12
Fraxinus americana	8	12	7	8	8	-	2	11	3	4	2	8	3	6	-	14	24*	11	4	11
Fraxinus quadrangulata	6	4	-	6	7	-	-	-	3	4	2	8	7	5	-	-	-	-	4	2
Fraxinus sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Galium aparine	-	-	-	-	-	-	7	-	11	7	-	-	-	-	-	-	-	-	14	2
Galium triflorum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9	-	-	-	-	-
Geum canadense	6	-	12	4	2	8	9	4	-	-	6	1	2	-	-	-	-	-	-	-

Table 3.2-17 (Contd)

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Glechoma hederacea	2	5	3	-	2	4	-	-	-	-	-	1	2	2	-	-	2	-	-	-
Helianthus sp.	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Huechera sp.	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
Hydrophyllum appendiculatum	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Juglans nigra	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-	-
Lindera benzoin	5	12	-	4	3	4	-	3	4	-	-	-	4	5	-	6	14	-	-	4
Lonicera japonica	43*	61*	53*	43*	48*	88*	55*	61*	48*	95*	61*	46*	69*	90*	50*	68*	20*	96*	21*	57*
Monocotyledoneae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	14	-	-	-	-
Parietaria pennsylvanica	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-
Parthenocissus quinquefolia	19*	2	-	46*	20*	-	4	20*	16*	-	8	27*	-	-	-	24*	14	-	33*	29*
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	11	11	-	-	-	-
Prenanthes sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Prunus serotina	-	-	-	-	-	-	-	-	2	-	-	3	4	3	-	-	-	-	-	-
Ranunculus arbortivus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-	-	-
Ranunculus sp.	-	-	-	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-
Rhus radicans	26*	15*	-	23*	23*	12	9	25*	36*	9	4	24*	16*	2	10	22*	29*	-	24*	22*
Rosa sp.	-	-	-	-	4	8	-	4	4	-	3	3	-	2	-	2	2	-	4	2
Rubus sp.	3	4	5	3	-	8	-	3	2	3	3	3	-	7	-	3	5	-	4	4
Sanicula trifoliata	3	10	5	13	11	20*	13	11	-	-	13	11	11	12	-	7	16*	16*	15*	8
Saxifragaceae	-	-	-	-	2	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Smilax sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
Symphoricarpos orbiculatus	12	9	21*	15*	9	4	13	4	4	-	17*	10	5	7	5	-	3	-	10	8
Taraxacum officinale	-	-	-	-	-	-	-	2	-	-	3	2	-	-	4	-	-	-	-	-
Trillium sessile	-	-	5	-	5	-	3	4	-	-	3	-	-	-	2	-	-	-	3	-
Ulmus rubra	6	3	-	4	5	-	3	4	3	3	-	2	2	5	-	-	3	6	5	2
Umbelliferae	-	-	-	-	-	-	13	-	-	-	-	-	-	-	-	-	-	-	-	-
Viola sororia	-	-	-	-	3	-	2	1	2	3	5	2	2	4	5	6	2	4	5	4
Vitis aestivalis	3	3	-	-	2	-	-	2	2	-	-	1	-	-	-	7	-	-	-	4
Vitis rotundifolia	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-

*Major species (importance values ≥15).

ephemerals, but most of the herbaceous coverage comes from the vines plus white snakeroot, pawpaw, black snakeroot, and coralberry (Table 3.2-18)

The walnut-hickory-buckeye cover type is a varied forest stand with ongoing changes in species composition and dominance due to scattered disturbance. Growth of intolerant species, particularly Japanese honeysuckle, in the canopy openings is expected to continue. Barring further disturbance, more tolerant species will eventually dominate. Since this cover type is not within the Marble Hill site boundaries, construction has not affected it.

- Virginia Pine

The Virginia pine cover type typically is located at the edge of the upland flats and the river bluff slopes in the study area. Virginia pine stands often occur on eroded areas or worn-out fields (Fowells 1965). At the northwestern edge of its native range in the study area, Virginia pine is not common, and most stands are small and widely scattered.

Virginia pine, the dominant species in this cover type, is a shade intolerant tree. It generally comprises a transitional forest that eventually is replaced by hardwoods. Although often occurring as pure stands, Virginia pine stands in the study area generally have scattered hardwoods, such as yellow poplar and white ash, in the overstory. Further indication that the pines are occupying old fields is the presence of eastern redcedar in some stands. Dogwood is a common associate of Virginia pine, although it usually is more important in the subcanopy.

Expanded construction has reduced the size of the Virginia pine stand containing the sample plots and has necessitated establishment of new plots. Although still indicative of general characteristics of the cover type, new plots have produced data that cannot be directly compared with that previously collected. Differences in species composition and coverage are especially evident in the tree stratum (Table 3.2-1). The large increase in basal area values in Table 3.2-2 is indicative of an increase in the number

Table 3.2-18

Seasonal Distribution of Important* Herbaceous Species,
Walnut-Hickory-Buckeye Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Timbleweed				5
Paw paw			3, 5	
Cut-leaved toothwort	2,3,4,5,6			
Dutchman's breeches	5			
Harbinger-of-spring	2,3,4			
White snakeroot			1, 3,4,5	1,2,3,4,5
Japanese honeysuckle	2,3,4,5,6	2,3,4,5,6	1,2,3,4,5	1,2,3,4,5
Virginia creeper	6	2,3,4,5,6	1,2,3	
Buttercup	6			
Poison ivy	6	2,3,4,5,6	1,2,3,4,5	1
Black snakeroot			5	2
Coralberry	2, 4	2		

* Based on importance values ≥15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

and size of trees measured in the new plots rather than a substantial increase in growth in the cover type. Plot relocation also is responsible for the loss of basal area in the sapling stratum (Table 3.2-3).

Understory cover that is dense in the surrounding hardwoods becomes sparse under the pine canopy. Dogwood is the major species in the shrub class followed by black cherry (Table 3.2-4). Dogwood also is the most consistently important member of the herbaceous stratum, with Japanese honeysuckle of increasing importance in the new plots (Table 3.2-19). Other important herbaceous species include Virginia creeper, black cherry, poison ivy, and black snakeroot (Table 3.2-20). Spring ephemerals are not a major part of the vegetation cover, which is typically highest in June (Figure 3-3). Although vegetation cover is generally sparse, total ground cover is high due to the needle cover content of the litter.

Over 90% of the approximately 16 acres of the Virginia pine cover type on the Marble Hill site has been cleared for construction. The remaining portion of the Virginia pine stand in which the plots are located is small, and invasion by surrounding hardwoods is likely. An increase in hardwoods in the herbaceous and shrub classes, similar to that currently happening in the red pine cover type, is expected. Although most pines are healthy, trees along the edge of the cleared area are more exposed to wind, ice, and sleet. Virginia pine is not a windfirm species (Fowells 1965), and windthrow and breakage in these vulnerable residual trees is likely. The limited natural occurrence of Virginia pine in this region makes them of special concern to the Indiana Department of Natural Resources. Of the eight cover types sampled, Virginia pine appears to have been most affected by construction activities.

- Orchard

Peach and apple orchards are common on the gently rolling uplands of this region. The largest orchard within the survey area, Reed Orchard Company, is located adjacent to the northwest corner of the Marble Hill site.

Table 3.2-19

Importance Values for Herbaceous Stratum, Virginia Pine Cover Type, 1976-1981

Scientific Name	1976		1977				1978				1979				1980				1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer rubrum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	13	6	-	5	5
Acer saccharum	-	-	-	-	4	8	-	2	3	3	-	2	-	3	4	-	-	6	2	2
Actinomeris alternifolia	-	-	-	-	-	-	-	-	6	-	-	-	-	-	-	-	-	-	-	-
Allium canadense	-	7	28*	-	-	19*	14	-	-	-	17*	-	-	-	-	-	-	-	-	-
Anemone quinquefolia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-
Asplenium platyneuron	8	9	9	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Botrychium virginianum	3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bryophyta	-	-	25*	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campsis radicans	12	3	-	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carex leersii	11	13	10	9	6	22*	11	3	-	10	-	-	-	-	-	-	-	-	-	-
Carex swanii	-	-	-	-	-	-	-	-	-	-	18*	4	-	-	-	-	-	-	-	-
Carex sp.	-	-	-	-	-	-	-	7	-	-	-	-	33*	49*	-	-	-	3	2	6
Carya cordiformis	6	3	-	6	-	-	-	-	-	3	-	-	3	-	-	-	-	-	-	-
Cercis canadensis	-	-	-	-	3	-	-	9	10	5	-	8	9	16*	-	-	6	3	2	5
Compositae	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-	-	-	-	-	-
Cornus florida	38*	41*	28*	46*	46*	22*	53*	45*	51*	75*	35*	47*	50*	45*	15*	12	28*	25*	20*	21*
Desmodium paniculatum	9	3	-	6	-	-	-	3	-	-	-	-	11	13	-	-	-	-	-	-
Dioscorea quaternata	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	4	4	-	7	2
Elymus virginicus	-	-	-	-	-	-	-	-	8	3	2	-	-	-	-	-	-	-	-	-
Eupatorium rugosium	7	7	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fagus grandifolia	-	-	-	-	-	-	-	-	3	-	-	9	8	4	5	12	14	17*	8	11
Fragaria virginiana	9	3	12	3	4	-	-	-	3	6	8	3	3	4	-	-	4	-	-	-
Fraxinus americana	5	3	-	-	4	-	17*	-	-	-	-	10	15*	4	-	-	4	-	3	-
Fraxinus quadrangulata	6	6	-	9	8	-	-	17*	11	-	-	3	-	-	2	4	-	-	-	-
Galium circaezans	3	3	8	6	4	8	14	11	10	10	7	8	9	6	-	13	18*	15*	10	11
Galium pilosum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-
Galium triflorum	-	-	-	-	-	-	-	-	-	-	-	2	-	-	10	4	4	5	2	9
Geum canadense	8	13	-	12	-	-	-	7	-	-	-	2	-	-	-	-	-	-	-	-
Hammamelis virginiana	-	-	-	-	-	11	9	-	-	-	-	-	-	-	-	-	-	-	-	-
Jeffersonia diphyla	-	-	-	-	-	-	-	3	-	-	8	3	-	-	-	-	-	-	-	-
Juniperus virginiana	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-	-	-	-	-
Liriodendron tulipifera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-	-
Liquidambar styraciflua	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17*	9	12	7
Lonicera japonica	12	33*	50*	15*	38*	18*	9	4	4	5	8	3	5	4	41*	26*	14	20*	30*	16*
Luzula multiflora	-	-	-	-	-	-	-	-	-	-	8	9	-	-	-	-	-	-	-	-

Table 3.2-19 (Contd)

Scientific Name	1976 Sep	1976 Oct	1977 Apr	1977 Jun	1977 Sep	1977 Oct	1978 Apr	1978 Jun	1978 Sep	1978 Oct	1979 Apr	1979 Jun	1979 Sep	1979 Oct	1980 Apr**	1980 Jun	1980 Sep	1980 Oct	1981 Apr	1981 Jun
Osmorhiza claytoni	-	-	-	-	3	-	-	-	-	-	-	-	-	-	12	17*	-	-	5	8
Oxalis stricta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16*	-	-	-	5	-
Panicum boscii	-	-	-	-	-	-	-	-	5	3	-	-	-	-	-	-	-	-	-	-
Parthenocissus quinquefolia	13	3	5	11	15*	8	16*	42*	46*	5	2	33*	15*	-	15*	23*	14	-	20*	19*
Phryma leptostachya	-	-	-	-	-	5	-	-	-	13	-	2	-	-	-	-	3	-	-	-
Pinus virginiana	-	-	-	-	-	8	-	-	-	3	-	-	-	-	-	-	-	-	-	-
Poaceae	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	3	-	-	5	-
Podophyllum peltatum	-	-	-	-	-	-	3	3	-	-	2	3	-	-	-	-	-	-	-	-
Potentilla sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	21*	-	-	-	-	-
Prunus serotina	3	3	5	11	4	51*	31*	10	13	19*	41*	17*	5	10	10	10	-	11	10	8
Quercus muehlenbergii	-	-	-	-	-	-	-	-	-	-	-	-	5	13	7	14	18*	69*	8	4
Quercus rubra	4	4	3	-	-	-	3	8	9	12	-	-	-	-	-	-	-	-	-	-
Ranunculus recurvatus	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	-
Rhus radicans	11	-	-	14	21*	-	-	5	4	-	7	4	3	3	17*	11	20*	-	22*	23*
Robinia pseudoacacia	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rosa sp.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	2
Rosaceae	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rubus sp.	12	12	-	3	-	-	-	-	-	-	-	-	-	-	-	3	7	9	6	21*
Sanicula trifoliata	5	13	17*	12	12	19*	18*	16*	14	19*	25*	18*	17*	22*	-	18*	9	9	-	13
Sassafras albidum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	4	-	-	-
Scirpus sp.	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-
Smilax herbacea	3	3	-	4	-	9	-	-	-	4	-	-	3	4	-	-	-	-	-	13
Smilax sp.	9	10	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-
Solidago sp.	2	3	-	3	-	-	-	-	-	4	8	-	-	-	-	-	-	-	-	-
Taraxacum officinale	-	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-	-	-	-	-
Ulmus rubra	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	2	-	-	-
Viola sororia	-	-	-	-	3	-	-	2	-	-	2	2	2	-	-	-	-	-	-	-
Vitis rotundifolia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-

* Major species (importance values ≥15).
**Data beginning April 1980 reflect all new sampling plots.

Table 3.2-20

Seasonal Distribution of Important* Herbaceous Species,
Virginia Pine Cover Type

Common Name	Sampling Period**			
	Apr	Jun	Sep	Oct
Wild garlic	2, 4			2
Mosses	2			
Little prickly sedge				2
Swan's sedge	4			
Sedge			4	4
Eastern redbud				4
Flowering dogwood	2,3,4,5,6	2,3,4, 6	1,2,3,4,5	1,2,3,4,5
American beech				5
White ash	3		4	
Blue ash		3		
White wild licorice			5	5
Sweetgum			5	
Japanese honeysuckle	2, 5,6	2, 5,6	2	1,2, 5
Sweet cicely		5		
Yellow wood-sorrel	5			
Virginia creeper	3, 5,6	3,4,5,6	2,3,4	
Cinquefoil	5			
Black cherry	3,4	4		2,3
Chinkapin oak			5	5
Poison ivy	5,6	6	2, 5	
Blackberry		6		
Black snakeroot	2,3,4	3,4,5	4	2,3,4

* Based on importance values $\geq$15.

** For purposes of identifying seasonal trends, data have been arranged to show yearly progression across report years.

1 = 1976
2 = 1977
3 = 1978
4 = 1979
5 = 1980
6 = 1981

Maintenance of the peach and apple trees in this orchard is typical of other local operations and normally consists of pruning individual trees, removal of diseased trees, between-row cultivation, weed control using paraquat within rows, pesticide applications at about 10-day intervals between flowering and harvest, and fungicide and trace metal applications as needed to control disease or nutrient deficiencies (TI 1977).

Sampling of this cover type was initiated in June 1977 and discontinued in April 1980 after denial of access. No permanent plots were established in this type, and investigations consisted of soil sampling and general survey of vegetation cover and stress. Observations during the sampling period showed the orchard to be generally healthy and regularly maintained. Although many individual peach sets (plantings) received cold injury during the 1976-1977 and 1977-1978 winters and subsequently were infested by peach tree borers, pruning and replanting had re-established healthy peach sets by 1979 (TI 1978, 1979). Apple trees were generally healthy throughout the survey period. Discussion of soil analysis results is included in Section 3.2.2.2 which follows.

3.2.2.2 Soils

Soils are characteristically heterogeneous. Distinct boundaries between soil classification units are rare, as is uniformity within soil units (Black et al. 1965). Local variations may be caused by natural factors such as vegetative or topographic transitions, or by human activity such as agriculture. Soils characteristics may vary not only from one location to another, but also from one horizon to another within the same soil profile.

Among other diverse human and natural influences, soils of the Marble Hill study area occupy a variety of topographic sites. Extreme variation exists within soil types, with areas of rocky slopes, shallow soil, and eroded upper horizons located next to areas of gentle slopes, deep soils, and well-developed horizons. Because localized variations are common, precise characterization of soils in a cover type is difficult to derive from sampling that occurs in the same area each year. Thus, discussion of data and trends

is generalized in an attempt to characterize whole cover types and not just the sample sites. Summarizations in this section include expected values, when available, to support or clarify measured values.

Although a soil survey report for Jefferson County has not been published, Soil Conservation Service field surveys indicate that the soils of the Marble Hill study area generally are silt loams (USDA Soil Conservation Service, personal communication 1981). The maple-basswood, oak-maple, chinkapin oak, and walnut-hickory-buckeye cover types have soils in the Eden-Caneyville Complex. These moderately deep, well drained soils occupy 25 to 60 percent slopes and have a silty clay loam surface layer. The Virginia pine cover type appears to have soils classified as Caneyville series, stony. Although similar to the Eden-Caneyville Complex, these soils are rockier and have a lower pH. Soils in the sycamore-boxelder cover type are Huntington silt loams formed in alluvial material. These deep floodplain soils are flooded occasionally and have a silt loam surface layer and sandy clay loam substratum. Soils in the vicinity of the red pine cover type are Ryker silt loams. These typically upland soils are formed in loess, till, and residuum weathered from underlying limestone bedrock; typical slopes range from 6 to 12 percent and may be eroded.

o Moisture

Soil moisture content is variable, changing continually throughout the year (Armson 1977). Moisture changes in forest soils are caused by many factors, including precipitation, soil texture, vegetation, and drainage. Seasonal fluctuations within soil types sampled in the Marble Hill study area are usually due to a combination of these factors.

The range of mean values for soil moisture over the 5-year monitoring period is presented by cover type in Table 3.2-21. Soil moisture values show no strong changes in topographic position, aspect, and vegetation cover. Highest soil moisture values are in the maple-basswood cover type, which is located on a densely shaded east-facing slope. Lowest moisture content occurs in soils of the Virginia pine, orchard, oak-hickory, and red

Table 3.2-21

Mean Value Ranges* of Soil Parameters for Each Vegetation Cover Type

Cover Type	Moisture (%)	Bulk Density (g/cm^3)	pH	Conductivity (μmho/cm)	Cation Exchange Capacity (meg/100g)	Base Saturation (%)
Maple-Basswood	32-38	.80- .92	7.0-7.2	248-560	33-53	55-79
Oak-Maple	26-33	.91- .97	6.9-7.1	230-593	28-38	61-75
Chinkapin Oak	23-32	.87- .92	6.9-7.3	178-455	30-54	52-82
Red Pine	20-28	1.02-1.13	6.2-6.3	205-418	18-21	42-52
Sycamore-Boxelder	22-27	1.01-1.16	6.5-6.8	244-560	20-22	62-95
Oak-Ash-Maple	20-24	.92-1.05	7.2-7.4	280-650	25-36	82-98
Walnut-Hickory-Buckeye	30-35	.82- .96	7.0-7.2	226-665	32-44	69-78
Virginia Pine	18-27	.94-1.01	5.8-6.0	120-310	16-21	30-45
Orchard	17-25	.97-1.06	6.0-6.3	302-733	14-16	40-48

* Ranges are derived from lowest and highest seasonal mean values for each cover type over the 5-year sampling period.

pine cover types. Soils of the two pine sites generally reflect the poorly drained, eroded condition of old fields now occupied by pine stands on the flat uplands. The orchard is also located on the flat upland soils, with low moisture values possibly accentuated by cultivation and weed control maintenance between and within tree rows. The low moisture values in the oak-hickory cover type reflect the west-facing slopes, canopy openings, rocky outcrops, and thin soils typical of this cover type.

o Bulk Density

Bulk density is the weight of soil solids per unit volume of total soil (Thompson and Troeh 1978). Soils that are loose and porous have a lesser amount of solids per unit volume, resulting in lower bulk density values (Buckman and Brady 1969). Among such soils are those having high organic matter content and those loosened and fluffed by root penetration. Since organic content and root penetration primarily affect the soil surface, upper horizon layers generally have lower bulk densities than deeper layers. Bulk densities of the upper horizon of mineral soils usually range from 1.0 to 1.6 g/cm^3 (Thompson and Troeh 1978), with sandy soils in the upper portion of the range and loams and clays at the lower end (Hillel 1980). Very compact subsoils may have bulk densities as high as 2.0 g/cm^3 (Buckman and Brady 1969), while highly organic soils in sphagnum peat bogs can have bulk densities as low as 0.1 g/cm^3 (Thompson and Troeh 1978).

The similarity of soils sampled in the study area is indicated by the narrow range of bulk density values in Table 3.2-21. Although all of the cover types occupy silt loam soils that should have low bulk densities, the sample values generally are lower than those expected. This may be due to high organic matter in the surface layer where these samples are collected or to localized variations in the soils sampled. Generally, those cover types with highest moisture content, maple-basswood and walnut-hickory-buckeye, have lowest bulk density, reflecting the greater water holding capacity of soils that have a large volume of pore spaces. The comparatively high bulk density values for the sycamore-boxelder soils may be due to the greater proportion of sand particles in soils of the floodplain sample plot.

- pH

Soil pH is a highly variable measure of acidity and alkalinity. Among the many factors affecting pH are parent materials, climate, living organisms, topography, and age (Thompson and Troeh 1978). Soil pH is also influenced by season of the year, cropping practices, soil horizon, ambient water content, and pH measurement techniques. Most humid region mineral soils have a pH range of 5 to 7, while a range of 7 to 9 is more common in arid regions (Buckman and Brady 1969).

The mean pH values in Table 3.2-21 represent the annual range for soils in sampling areas of each of the cover types. One of the major influences on soils in the study area is the prevailing limestone bedrock, which has an alkaline effect on pH. This effect is greater where limestone outcrops are numerous and depth to subsurface bedrock is shallow, as is common in the cover types located along the slopes and river bluffs. The pH values are highest in the oak-hickory, maple-basswood, walnut-hickory-buckeye, chinkapin oak, and oak-maple cover types of these areas, and they fall within SCS estimates of 5.1 to 6.4 for these soils (USDA Soil Conservation Service, personal communication 1981). Lowest pH ranges are associated with the upland pine and orchard sites, where sample values generally are consistent with the 4.5 to 6.0 estimates from SCS.

- Conductivity

Electrical conductivity is a measure of soluble salt concentrations in the soil matrix. Salt deposition from cooling towers could potentially stress vegetation through long-term accumulations in the soil medium or by short-term impingement on leaf surfaces.

Where salt accumulations in the soil are substantial, depression of plant growth may occur. This depression of growth may be due to the direct effect of salt in reducing water uptake by plants, the direct effect of salt in disturbing the plant's nutrition and metabolism, and the indirect effects of salt in changing soil structure, permeability, and aeration. The salt content at which plant growth is impaired is dependent upon the moisture

characteristics of the soil, the distribution of the salt in the profile, the chemical composition of the salt, and the type of plant.

Soils in the Marble Hill study area have generally low salt concentrations, although, unlike most soils in humid regions, they are high-lime soils rather than acidic. Most high-lime soils are young soils formed from parent material high in calcium (Thompson and Troeh 1978). Although containing large amounts of $CaCO_3$, these soils are not saline due to the relatively low solubility and buffering action of $CaCO_3$.

Because naturally occurring soluble salts tend to move with water, precipitation and drainage characteristics influence salinity patterns for any given area. During dry periods, evaporation of soil moisture draws salts to the surface where they accumulate. After periods of considerable precipitation, salts may be leached from the site or deposited deeper in the soil profile, making surface concentrations lower. Greater leaching of salts often occurs on ridges or hilltops, while moist areas or lowland basins receive runoff waters high in soluble salts from these areas.

Due to the proximity of sample plots in the study area, topographic influences appear to have more effect than precipitation on conductivity variations among cover types (Table 3.2-21). Lowest conductivity values are found in soils of the Virginia pine, red pine, and chinkapin oak cover types, which are located on ridgetops or upland sites. The influence of the prevailing limestone bedrock is evident in the high conductivity levels on sites with numerous outcrops and shallow depth to bedrock, such as the oak-hickory cover type. In this cover type, the solubility of calcium carbonate in the soil water solution increases conductivity values.

Comparison of the values in Table 3.2-21 and Figure 3-4 shows that the mean conductivity values are within the negligible effects range of plant response to salinity. Fluctuations in conductivity are common, especially because of continually changing moisture regimes. However, even the highest readings are below the 2,000 micromhos/cm threshold for possible effects on

salt-sensitive vegetation. Cultural influences, including fertilizer application, irrigation, and cooling tower salt drift, can increase naturally low conductivity levels. The highest reading during the 5-year sampling period was 1,625 µmho/cm in the orchard cover type. Although no longer sampled, this and other agricultural sites probably have higher salt concentrations than the eight woodland cover types and would likely be the first to show stress should excessive salt levels be reached. Comparison of salt tolerance of various agricultural and forest vegetation is presented in Table 3.2-22. Two of the salt-sensitive species, apple and dogwood, are common in the study area, and may serve as indicators of salt build-up.

- Cation Exchange Capacity and Base Saturation

The total exchangeable cations that can adsorb onto a soil is expressed as cation exchange capacity (Buckman and Brady 1969). The exchangeable cations may be grouped into exchangeable bases (commonly calcium, magnesium, sodium, and potassium) or exchangeable acid-generating particles (hydrogen and aluminum) (Buol et al. 1973). Cation exchange capacity (CEC) is important in determining agronomic and forest nutrition. High CEC of mineral soils indicate a high nutrient storage capacity. Also, high CEC are associated with less weathered soils that have weatherable minerals available as a plant nutrient reserve.

The kinds of cations adsorbed onto soils are influenced by parent material, weathering, organic matter, and agricultural soil ammendments. Calcium, which is readily dissolved and adsorbed, is the most abundant exchangeable cation in the majority of approximately neutral soils (Kelly 1948). Magnesium commonly is next in occurrence, with potassium and sodium present in relately small amounts. Younger soils tend to have higher calcium levels, higher pH, and greater CEC (Thompson and Troeh 1978). Continued weathering and increased decomposition of organic matter tend to replace the easily removed calcium ions with more strongly adsorbed hydrogen and aluminum. Older soils consequently have lower pH and CEC. Cation-exchange reactions, however, are reversible. Addition of lime reverses the replacement process of acid soils, increasing exchangeable calcium and decreasing adsorbed

Table 3.2-22

Comparative Salt Tolerance of Agricultural and Forest Plant Species

High Salt Tolerance (10,000-18,000 µmho/cm)	Medium Salt Tolerance (4,000-12,000 µmho/cm)	Low Salt Tolerance (2,000-4,000 µmho/cm)
Asparagus	Alfalfa	Almond
Barley	Bell pepper	Alsike clover
Bermudagrass	Broccoli	Apple
Birdsfoot trefoil	Cabbage	Apricot
Garden beets	Cantaloupe	Celery
Kale	Carrot	Dogwood
Spinach	Castor beans	Field beans
Spruce	Cauliflower	Green beans
Sugar beet	Corn	Meadow foxtail
Virginia pine	Cucumber	Peach
	Flax	Pear
	Grape	Plum
	Lettuce	Radish
	Oats	Red clover
	Onion	Strawberry
	Orchardgrass	White Dutch clover
	Peas	
	Perrenial ryegrass	
	Potatoes	
	Rice	
	Rye	
	Sorghum	
	Squash	
	Sudangrass	
	Sunflower	
	Tomato	
	Wheat	
	White sweet clover	
	Yellow poplar	

Source: Black, C.A. (1968).
Curtis et. al. (1977)
Richards, L.A. (1954)

hydrogen and aluminum. Application of fertilizer similarly reverses the chemical makeup of alkaline soils.

Changes in CEC can indicate degree of weathering, soil development, and presence of cations that affect plant growth. Exchange capacity of mineral soils rarely is more than 75 milliequivalents/100 grams, and in most is substantially less than 50 meq/100g (Kelly 1948). Highest CEC values are found in peaty soils, while sandy soils usually have lowest CEC.

As noted previously, hydrogen and aluminum cations tend to dominate acid soils, while most of the other cations, called exchangeable bases, enhance soil alkalinity. The proportion of CEC occupied by these bases is the base saturation percentage (Buckman and Brady 1969). As percent base saturation is reduced, CEC decreases, and pH is lowered. Percent base saturation of a soil indicates how much of the CEC is being utilized to store plant nutrients (Thompson and Troeh 1978). Calcium in particular is important to plant growth.

The correlation of CEC, base saturation, and pH is evident in the sample values in Table 3.2-21 and Figure 3-5. Base saturation and CEC are generally highest in cover types with high pH. In examining CEC values, the only exception to this trend is the oak-hickory cover type, which has the highest pH but medium-range CEC. This apparently is due to calcium carbonate interference. As shown in the base saturation formula in Section 2.5, determination of total exchangeable bases (TEB) and CEC is necessary to derive percent base saturation. Since limestone, when extracted, has positive influence on TEB and a negative influence on CEC, the resultant base saturation values are artificially high. This explains the unrealistic base saturation values (those greater than 100%) in previous years and accounts for the high base saturation and low CEC in the oak-hickory cover types.

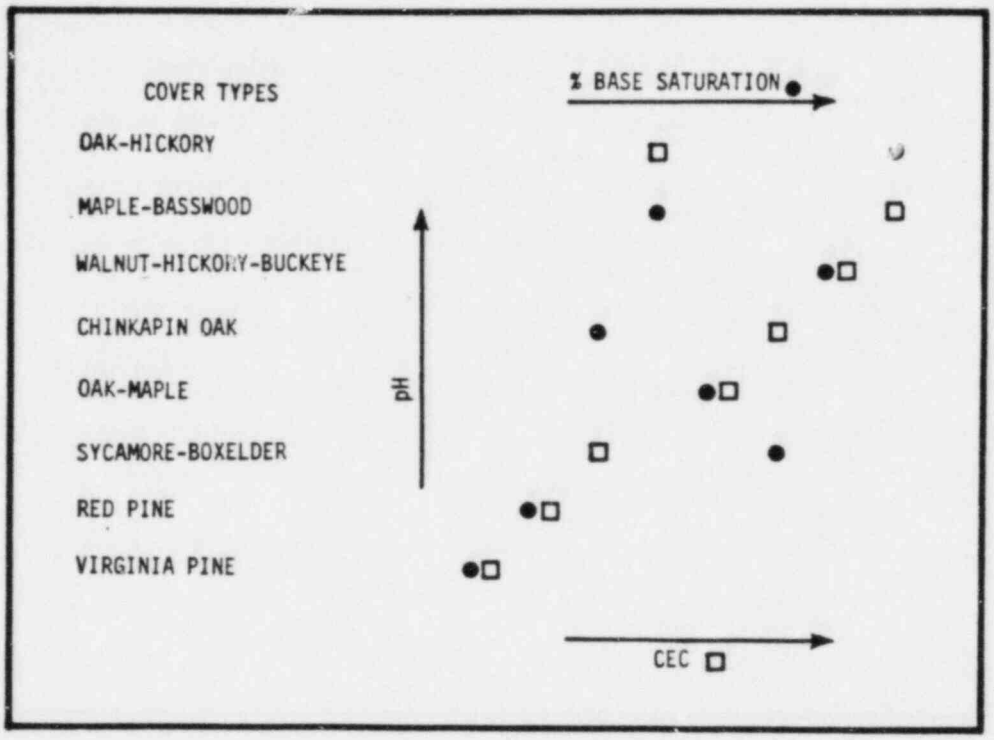

Figure 3-5. Relationship of pH, Cation Exchange Capacity, and Percent Base Saturation of Soil Samples for Each of the Vegetation Cover Types

3.2.3 Major Vegetation Stress Factors

Vegetation stress over the 5-year monitoring period has been primarily due to natural causal agents. Figure 3-6 is a general representation of the major stress factors and illustrates the comparative importance of natural causal agents. Values for the graph were based on the percent of identified stress areas attributable to the major causal agents. Causal factors generally have been grouped to show comparative contributions

of the differing stress factors and to emphasize changes in extent of infestations over the five years. Due to the widespread impact of locust leaf miner, it was separated from the other insects to show its specific contribution to stress.

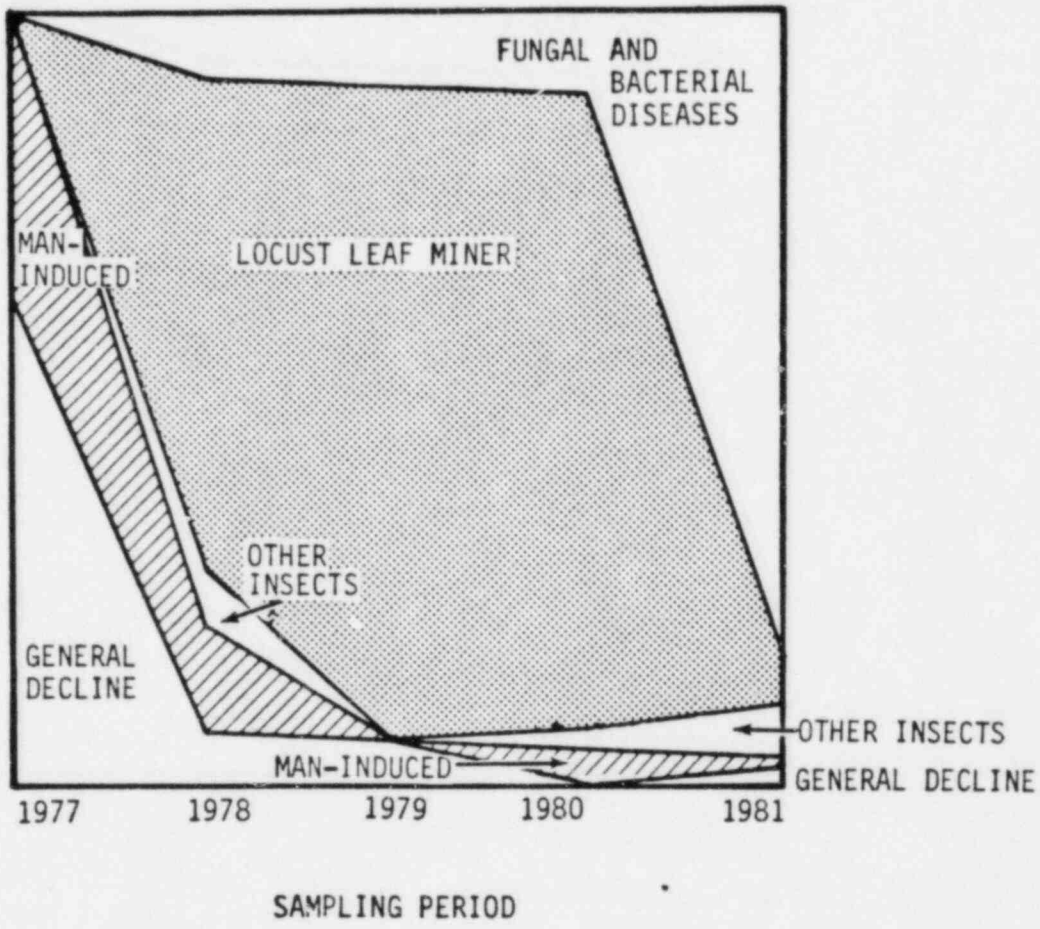

Figure 3-6. Major identified Vegetation Stress Factors Over the 5-Year Monitoring Period

Insects, primarily locust leaf miner, have contributed most to vegetation stress in the study area. The magnitude of impact of locust leaf miner is evident in Figure 3-6. Outbreaks of this insect are common throughout its range, and black locust, its favored host, is abundant and widely distributed throughout the study area. Extent of infestation is cyclic, as shown in the low level of 1977, a marked increase and extensive presence in 1978, 1979, and 1980, and then a marked decrease in 1981. While causing extensive leaf-browning, and in some cases defoliation during severe outbreaks, trees are seldom killed, making infestation from locust leaf miner expected to increase again in the future. Less predominate insects contributing to stress over the five years include borers and leaf feeders, especially lace bugs and bagworms.

Fungal and bacterial diseases also have contributed to stress, especially in 1981. Although many types of diseases occur affecting various vegetation species, the predominant identifiable stress was due to anthracnose on sycamore, leaf blotch on buckeyes, and leaf spots on oaks. These diseases tend to be more widespread during extended periods of heavy rainfall, such as occurred in the spring and early summer of 1981.

Stress attributed to general decline includes several different causal agents. Winter damage from frost and ice in 1977 and 1978 contributed to the general decline of sensitive species, particularly pines and fruit trees. Fluctuations in water level of the Ohio River and subsequent erosion produced stress in tree stands along the river. Successional changes, particularly in the pine stands in the study area, involve suppression of intolerant species and contribute to general decline. Additionally, successional changes are often accelerated by weather conditions, so that stress such as windthrow damage occurs. All of these factors have contributed to stress from general decline during the 5-year survey.

Man-induced stress observed in the study area also is due to a variety of factors. Stress from pipeline effluent and herbicide spraying along a right-of-way was noted in 1978, but had recovered by the next year. Fire is another factor that has produced stress in scattered areas.

Stress attributable to construction of the Marble Hill Generating Station was apparent in the 1980 survey. Expansion of laydown areas and road construction caused stress to trees along the perimeters of these construction areas. Mechanical injury, soil compaction, and filling around trees were the major stress causes. This stress was restricted to locations within the Marble Hill site boundaries and did not involve extensive areas (less than 5 acres). Construction activities also have contributed to increased stress from general decline, such as the increased exposure to wind in the Virginia pine stand contributing to windthrow. However, none of the construction activities appear to have affected vegetation stress outside the Marble Hill site boundaries.

SECTION 4.0

CONCLUSIONS

Results of the 1980-1981 remote sensing and ground truth program and an indepth review of previous years' results were used to describe existing vegetation cover types and vegetation stress of the Marble Hill study area. The cover type descriptions included correlations among vegetation, topography, and certain soils parameters. The vegetation stress review included an estimate of the relative importance of various stress causes that have been identified in the study area during the past five years.

The Marble Hill study area cover types are typical of the region, which is a transition area in terms of vegetation and geology. Characteristic of transition areas, many of the plant species comprising the cover types are at the limits of their current ranges. Overall, the cover types are more closely related to southern forests than to the beech-maple forests to the north. The regional forest communities are generally not characterized by a single climax type, so that as many as 10 to 20 species may share the crown cover.

The study area forest cover types can be grouped according to the topographic positions they occupy: hardwoods, natural and planted pine stands, and pine-hardwood mixtures occur on upland flats; chinkapin oak, maple-basswood, oak-maple, walnut-hickory-buckeye, and oak-hickory occur at various positions and aspects of Ohio River bluffs and slopes; and the sycamore-boxelder cover type occurs in valley bottomlands. Evaluation of these topographic/vegetation relationships and extensive ground truthing for species composition resulted in the recognition of an upland mixed hardwoods cover type on the Marble Hill site that is distinct from the ash-maple type with which it previously was identified.

The influence of substrate on study area vegetation is apparent in species distribution within and among forest cover types. The predominantly calcareous bedrock of the study area accounts for the widespread presence of calciphytes and their concentration on slopes where soils often are shallow

and limestone outcrops abundant. Where substrates generally have remained stable or undisturbed, successional maturity is evident. Where human activity and/or physiography have induced erosion or other disturbance, species composition is changing noticeably.

The maple-basswood and sycamore-boxelder cover types are typical of mature woodlands in the region. The maple-basswood is characterized by sparse undergrowth that is densest during spring prior to canopy leafout. Undergrowth in the sycamore-boxelder type is denser, with seasonal distribution based on periodic flooding. The other cover types are undergoing successional change and comprise, to various degrees, species adaptable to unfavorable site conditions. Understory cover varies depending on site conditions but is generally denser in the changing cover types.

Soils of the study area generally are silt loams. Those associated with the maple-basswood, oak-maple, chinkapin oak, and walnut-hickory-buckeye cover types are moderately deep well drained soils that occupy relatively steep slopes and have a silty clay loam surface. Soils of the Virginia pine cover type are similar but stony. Those associated with the sycamore-boxelder cover type are flooded occasionally and have a silt loam surface layer and sandy clay loam substratum. Measured soil parameters generally are consistent with site conditions:

1. pH values are highest in those cover types where soils are shallow and limestone's alkaline influence is greater.

2. Lowest moisture content occurs in the two pine cover types and the oak-hickory cover type, with the pines reflecting poorly drained, eroded sites and the latter reflecting west-facing slopes, rocky outcrops, and thin soils.

3. Cover types with highest moisture content have lowest bulk density.

The major causes of vegetation stress observed during the monitoring period have been insects and diseases. The primary insect pest has been the locust leaf miner, which was present in outbreak proportions during 1978, 1979, and 1980. Predominate diseases have been anthracnose on sycamores, leaf blotch

on buckeyes, and leaf spots on oaks. The predominate cause of general vegetation decline has been weather, although Marble Hill construction activities have caused or induced some onsite decline.

SECTION 5.0

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APPENDIX A

PSI MARBLE HILL VEGETATION AND SOILS DATA

1980-1981 ANNUAL REPORT

Table A-1

Mean ($\bar{x}$) and Standard Error (SE) of Percent Cover for Vegetation, Litter, and Total Cover in Marble Hill Plots, 1980-1981

Map Unit	Cover Type	1980 Sep* $\bar{x}$	1980 Sep* SE	1980 Oct* $\bar{x}$	1980 Oct* SE	1981 Apr* $\bar{x}$	1981 Apr* SE	1981 Jun* $\bar{x}$	1981 Jun* SE
01	Maple-Basswood								
	Vegetation	31.7	13.1	32.6	12.2	56.9	8.6	37.6	10.6
	Litter	31.9	15.3	39.9	6.5	29.4	7.4	58.6	9.6
	Total Cover	66.4	6.2	72.5	6.9	86.3	3.8	93.5	1.8
02	Oak-Maple								
	Vegetation	36.3	11.6	18.8	5.8	60.0	16.3	47.5	5.3
	Litter	45.6	8.3	73.1	6.3	31.3	8.4	45.0	6.7
	Total Cover	81.9	8.5	91.9	2.7	80.0	15.4	92.5	4.6
03	Chinkapin Oak								
	Vegetation	50.6	11.7	28.1	9.6	66.3	8.5	58.1	7.8
	Litter	33.8	15.8	54.4	15.5	19.4	9.7	35.0	5.2
	Total Cover	84.4	14.7	82.5	7.3	85.6	6.2	92.5	5.7
04	Red Pine								
	Vegetation	56.9	11.8	38.1	7.1	68.1	6.1	61.3	8.4
	Litter	35.6	8.7	56.3	5.3	30.0	5.7	37.5	8.4
	Total Cover	92.5	8.7	94.4	5.3	98.1	1.9	98.8	1.2
05	Sycamore-Boxelder								
	Vegetation	86.3	4.6	62.5	8.6	73.1	18.9	65.0	4.1
	Litter	10.0	4.7	31.9	9.9	23.1	9.3	25.0	3.5
	Total Cover	96.3	2.9	94.4	3.6	96.3	1.8	90.0	2.1
06	Oak-Hickory								
	Vegetation	35.0	8.0	23.1	7.3	83.8	3.5	50.0	11.5
	Litter	43.8	9.2	56.9	6.1	9.4	2.5	25.6	6.1
	Total Cover	78.8	3.7	76.3	4.8	93.1	1.3	75.6	6.3
09	Walnut-Hickory-Buckeye								
	Vegetation	63.1	7.9	32.5	10.1	73.8	8.0	75.6	6.0
	Litter	27.5	7.8	59.4	8.1	13.1	3.5	21.9	6.4
	Total Cover	90.6	3.9	91.9	4.8	86.9	5.3	97.5	1.3
11	Virginia Pine								
	Vegetation	37.5	6.9	16.9	4.0	49.4	10.0	53.1	7.7
	Litter	61.9	6.9	81.3	4.0	46.9	9.8	46.9	7.7
	Total Cover	100.0	0.0	98.1	1.9	96.3	2.2	100.0	0.0

*Based on mean of eight plots per cover type per sample date, except June 1981 sampling of Sycamore-Boxelder cover type which was based on mean of four plots.

Table A-2

Species Composition, Frequency, Cover, and Mode Condition Values for Shrub Stratum by Cover Type, 1980-1981

Scientific Name	Frequency (%)				Cover (%)				Mode Condition			
	1980		1981		1980		1981		1980		1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Maple-Basswood												
Acer saccharum	37.5	12.5	37.5	-	5.6	1.9	3.1	-	1	1	1	-
Asimina triloba	12.5	37.5	25.0	25.0	3.1	5.6	3.1	7.5	1	1	1	1
Fraxinus americana	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Lindera benzoin	-	12.5	25.0	12.5	-	1.9	2.0	1.9	-	1	1	1
Vitis aestivalis	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Oak-Maple												
Acer saccharum	25.0	25.0	25.0	25.0	5.6	2.0	4.4	4.4	1	1	1	1
Aesculus octandra	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Celtis occidentalis	12.5	12.5	12.5	-	0.6	1.3	0.6	-	1	1	1	-
Cercis canadensis	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Cornus florida	25.0	37.5	25.0	37.5	10.6	16.3	10.0	13.1	1	1	1	1
Fraxinus americana	-	12.5	12.5	-	-	0.6	0.6	-	-	1	1	-
Ostrya virginiana	25.0	25.0	37.5	37.5	3.8	5.6	7.5	6.3	1	-	1	1
Prunus serotina	12.5	-	12.5	-	0.6	-	0.6		1	1	1	-
Ulmus rubra	37.5	37.5	50.0	37.5	6.3	6.9	10.0	3.8	1	1	1	1
Chinkapin Oak												
Celtis occidentalis	50.0	12.5	25.0	25.0	11.9	5.0	50.0	5.6	1	8	1	1
Cercis canadensis	-	12.5	12.5	25.0	-	1.3	3.1	4.4	-	1	1	1
Fraxinus quadrangulata	25.0	25.0	12.5	12.5	3.1	1.3	0.6	0.6	1	1	1	1
Juniperus virginiana	12.5	37.5	37.5	-	1.9	11.9	6.9	-	1	7	7	-
Ostrya virginiana	25.0	12.5	25.0	-	2.5	2.5	3.1	-	1	1	1	-
Quercus muehlenbergii	12.5	12.5	-	15.0	1.3	1.3	-	1.9	1	1	-	1
Rhus aromatica	12.5	-	25.0	25.0	3.8	-	8.1	2.5	1	-	1	1
Symphoricarpos orbiculatus	-	12.5	-	12.5	-	2.5	-	0.6	-	1	-	1
Ulmus rubra	37.5	37.5	37.5	25.0	8.8	6.3	6.9	3.8	1	8	1	1
Viburnum prunifolium	-	25.0	-	-	-	1.9	-	-	-	1	-	-
Xanthoxylem americanum	25.0	25.0	25.0	25.0	3.1	1.3	3.1	3.1	1	1	1	1

Table A-2 (Continued)

Scientific Name	Frequency (%) 1980 Sep	Frequency (%) 1980 Oct	Frequency (%) 1981 Apr	Frequency (%) 1981 Jun	Cover (%) 1980 Sep	Cover (%) 1980 Oct	Cover (%) 1981 Apr	Cover (%) 1981 Jun	Mode Condition 1980 Sep	Mode Condition 1980 Oct	Mode Condition 1981 Apr	Mode Condition 1981 Jun
Red Pine												
Acer saccharum	25.0	50.0	37.5	37.5	6.9	20.0	10.6	5.6	1	1	1	1
Carya cordiformis	-	12.5	-	12.5	-	0.6	-	0.6	-	1	-	1
Celtis occidentalis	12.5	-	12.5	-	0.6	-	0.6	-	1	-	1	-
Cercis canadensis	37.5	37.5	25.0	37.5	5.6	3.1	5.0	5.0	1	1	1	1
Cornus florida	75.0	37.5	62.5	62.5	21.9	5.6	16.9	21.9	1	1	1	1
Fraxinus americana	50.0	25.0	75.0	87.5	7.5	1.9	6.3	9.4	1	1	1	1
Fraxinus quadrangulata	-	12.5	-	-	-	1.3	-	-	-	1	-	-
Liriodendron tulipifera	-	12.5	50.0	12.5	-	0.6	7.5	0.1	-	1	1	1
Lonicera japonica	12.5	-	-	-	1.3	-	-	-	1	-	-	-
Prunus serotina	50.0	12.5	50.0	25.0	2.5	1.9	7.5	2.5	1	1	1	1
Quercus muehlenbergii	25.0	12.5	37.5	12.5	1.9	0.6	2.5	1.9	1	1	1	1
Quercus rubra	25.0	25.0	12.5	12.5	1.9	3.1	1.9	3.1	1	1	1	1
Rubus phoenicolasius	12.5	12.5	12.5	12.5	1.9	1.9	5.6	3.8	1	1	1	1
Rubus sp.	12.5	25.0	-	-	1.3	1.3	-	-	1	1	-	-
Sassafras albidum	25.0	12.5	12.5	12.5	2.5	1.3	2.5	1.3	1	1	1	1
Ulmus rubra	12.5	-	12.5	12.5	1.3	-	1.3	3.8	1	-	1	1
Vitis aestivalis	12.5	12.5	12.5	-	1.3	0.6	3.8	-	1	1	1	-
Sycamore-Boxelder												
Acer negundo	-	12.5	12.5	12.5	-	1.9	0.6	0.6	-	1	1	1
Aesculus octandra	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Cornus florida	12.5	-	-	-	3.8	-	-	-	1	-	-	-
Lindera benzoin	12.5	-	12.5	12.5	5.6	-	5.0	4.4	1	-	1	1
Ulmus americana	12.5	12.5	12.5	12.5	5.0	6.3	5.0	5.0	1	1	1	1

Table A-2 (Continued)

Scientific Name	Frequency (%) 1980 Sep	Frequency (%) 1980 Oct	Frequency (%) 1981 Apr	Frequency (%) 1981 Jun	Cover (%) 1980 Sep	Cover (%) 1980 Oct	Cover (%) 1981 Apr	Cover (%) 1981 Jun	Mode Condition 1980 Sep	Mode Condition 1980 Oct	Mode Condition 1981 Apr	Mode Condition 1981 Jun
Oak-Hickory												
Celtis occidentalis	-	12.5	12.5	-	-	1.3	1.3	-	-	1	1	-
Cercis canadensis	37.5	12.5	37.5	37.5	13.8	50.0	13.1	13.8	1	1	1	1
Cornus priceae	-	12.5	12.5	25.0	-	1.3	2.5	2.3	-	1	1	1
Fraxinus americana	12.5	12.5	12.5	-	0.6	0.6	0.6	-	1	1	1	-
Quercus rubra	-	25.0	-	-	-	3.9	-	-	-	1	-	-
Rosa sp.	-	-	-	12.5	-	-	-	0.6	-	-	-	1
Staphylea trifoliata	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Symphoricarpos orbiculatus	25.0	12.5	12.5	12.5	1.9	1.3	3.1	0.1	1	1	1	1
Ulmus americana	19.4	25.0	37.5	37.5	37.5	15.0	16.9	18.1	1	1	1	1
Xanthoxylem americanum	12.5	-	12.5	-	1.3	-	0.6	-	1	-	1	-
Walnut-Hickory-Buckeye												
Acer negundo	12.5	25.0	37.5	12.5	1.3	3.8	4.4	0.6	1	1	1	1
Acer saccharum	25.0	12.5	12.5	25.0	3.8	1.3	1.9	0.8	1	1	1	1
Aesculus octandra	-	-	-	12.5	-	-	-	1.4	-	-	-	1
Asimina triloba	37.5	37.5	25.0	50.0	15.6	11.3	3.1	9.4	1	1	1	1
Carya cordiformis	12.5	-	-	-	1.9	-	-	-	1	-	-	-
Carya ovata	12.5	12.5	12.5	-	1.9	2.5	1.3	-	1	1	1	-
Fraxinus americana	25.0	62.5	25.0	37.5	4.4	6.9	2.5	5.0	1	1	1	1
Fraxinus quadrangulata	12.5	25.0	50.0	37.5	0.6	5.6	6.3	3.8	7	1	1	3
Lindera benzoin	50.0	25.0	37.5	100.0	5.6	2.0	6.9	5.6	1	1	1	1
Prunus serotina	-	12.5	-	12.5	-	0.6	-	0.6	-	1	-	1
Quercus muehlenbergii	-	-	12.5	12.5	-	-	1.9	1.9	-	-	1	1
Rubus sp.	-	12.5	-	12.5	-	0.6	-	1.3	-	1	-	1
Symphoricarpus orbiculatus	-	37.5	12.5	25.0	-	1.9	0.6	1.9	-	1	1	1
Ulmus rubra	-	12.5	-	-	-	4.4	-	-	-	1	-	-

Table A-2 (Continued)

Scientific Name	Frequency (%) 1980 Sep	Frequency (%) 1980 Oct	Frequency (%) 1981 Apr	Frequency (%) 1981 Jun	Cover (%) 1980 Sep	Cover (%) 1980 Oct	Cover (%) 1981 Apr	Cover (%) 1981 Jun	Mode Condition 1980 Sep	Mode Condition 1980 Oct	Mode Condition 1981 Apr	Mode Condition 1981 Jun
Virginia Pine												
Cornus florida	-	37.5	37.5	50.0	-	3.1	5.0	1.9	-	7	1	1
Fagus grandifolia	25.0	-	-	-	1.9	-	-	-	1	-	-	-
Liquidambar styraciflua	25.0	12.5	-	12.5	-	0.6	-	0.6	1	1	-	1
Prunus serotina	-	-	12.5	-	-	-	1.9	-	-	-	1	-
Quercus muehlenbergii	12.5	-	-	-	0.1	-	-	-	1	-	-	-

Mode condition: 1 = healthy, 3 = insect injury, 7 = dying, 8 = dormant.

Table A-3

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Maple-Basswood Cover Type, 1980-1981

Scientific Name	Frequency (%)				Cover (%)				Mode Condition			
	1980		1981		1980		1981		1980		1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer rubrum	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Acer saccharum	12.5	37.5	12.5	62.5	0.6	5.0	0.6	3.9	1	1	1	3
Aesculus sp.	-	-	-	12.5	-	-	-	0.1	-	-	-	3
Arisaema atrorubens	12.5	-	25.0	-	0.1	-	3.1	-	1	-	1	-
Asarum canadense	62.5	62.5	62.5	62.5	20.8	20.0	18.1	15.0	1	1	1	1
Asimina triloba	12.5	12.5	12.5	12.5	0.6	1.3	0.6	1.3	1	1	1	1
Claytonia virginica	-	-	50.0	-	-	-	2.9	-	-	-	7	-
Delphinium tricorne	-	-	87.5	-	-	-	8.0	-	-	-	7	-
Dentaria laciniata	-	-	75.0	-	-	-	4.0	-	-	-	7	-
Dicentra cucullaria	-	-	75.0	-	-	-	6.0	-	-	-	7	-
Eupatorium rugosum	25.0	50.0	12.5	50.0	4.4	3.8	2.5	7.5	1	1	1	3
Fraxinus americana	12.5	12.5	12.5	25.0	0.6	0.6	0.6	2.5	1	1	1	1
Galium aparine	-	-	100.0	-	-	-	18.1	-	-	-	1	1
Glechoma hederacea	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Impatiens biflora/pallida	12.5	37.5	25.0	25.0	1.3	1.4	3.1	4.4	7	1	1	1
Lindera benzoin	-	-	-	12.5	-	-	-	0.1	-	-	-	-
Parthenocissus quinquefolia	25.0	-	25.0	37.5	1.3	-	1.9	3.9	3	-	1	1
Pilea pumila	50.0	-	25.0	25.0	5.6	-	1.3	0.8	1	-	1	1
Ranunculus arbortivus	-	12.5	-	12.5	-	0.6	-	0.1	-	1	-	3
Rhus radicans	-	12.5	-	-	-	0.6	-	-	-	1	-	1
Rosa sp.	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Sanicula trifoliata	12.5	-	-	-	0.6	-	-	-	3	-	-	1
Sassafras albidum	-	-	-	12.5	-	-	-	0.1	-	-	-	-
Tovara virginiana	-	-	-	12.5	-	-	-	0.1	-	-	-	-
Trillium sessile	-	-	12.5	-	-	-	1.3	-	-	-	1	1
Ulmus americana/rubra	25.0	37.5	25.0	12.5	0.3	0.9	0.3	0.1	1	1	1	1
Viola sororia	25.0	-	37.5	37.5	0.8	-	2.0	2.0	1	-	1	1

Mode condition: 1 = healthy, 3 = insect injury, 7 = dying.

Table A-4

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Oak-Maple Cover Type, 1980-1981

Scientific Name	Frequency (%)				Cover (%)				Mode Condition			
	1980		1981		1980		1981		1980		1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer saccharum	62.5	50.0	12.5	50.0	6.3	5.8	1.3	3.9	1	1	1	1
Agrimonia microcarpa	-	-	-	25.0	-	-	-	0.8	-	-	-	1
Allium canadense	-	75.0	50.0	12.5	-	4.4	3.8	0.6	-	1	1	1
Anemone quinquefolia	-	-	100.0	-	-	-	15.6	-	-	-	1	-
Anemonella thalictroides	-	-	25.0	-	-	-	0.8	-	-	-	1	-
Asarum canadense	12.5	-	25.0	-	0.6	-	10.0	-	1	-	1	-
Botrychium virginianum	-	-	-	25.0	-	-	-	1.4	-	-	-	1
Commelina virginica	-	25.0	-		-	1.4	-	-	-	1	-	-
Cornus florida	37.5	25.0	25.0	25.0	3.1	0.8	3.1	1.9	1	1	1	-
Dentaria laciniata	-	-	62.5	-	-	-	1.1	-	-	-	1	-
Desmodium glutinosum	12.5	-	-	-	0.6	-	-	-	1	-	-	-
Dicentra cucullaria	-	-	37.5	-	-	-	2.1	-	-	-	7	-
Dicotyledoneae	-	-	37.5	62.5	-	-	6.4	5.0	-	-	1	1
Dioscorea quaternata	25.0	12.5	37.5	50.0	1.3	0.1	0.9	2.8	1	1	1	1
Fraxinus americana	25.0	25.0	37.5	12.5	3.1	1.9	1.4	0.6	1	1	1	-
Fraxinus quadrangulata	12.5	-	-	-	0.6	-	-	-	1	-	-	-
Galium aparine	-	-	87.5	12.5	-	-	3.9	0.6	-	-	1	1
Galium circaezans	25.0	12.5	12.5	25.0	0.8	0.6	0.6	0.8	1	1	1	1
Geum canadense	-	12.5	-	-	-	0.6	-	-	-	1	-	-
Jeffersonia diphylla	-	-	37.5	37.5	-	-	2.5	2.5	-	-	1	1
Lonicera japonica	-	12.5	-	-	-	0.1	-	-	-	1	-	-
Ostrya virginiana	25.0	12.5	25.0	37.5	2.0	0.6	1.3	5.6	1	1	1	1
Parthenocissus quinquefolia	37.5	12.5	87.5	12.5	1.9	9.6	7.5	0.6	1	1	1	1
Poaceae	-	12.5	12.5	12.5	-	0.6	1.3	1.3	-	1	1	1
Prunus serotina	12.5	50.0	25.0	12.5	0.1	1.0	0.8	0.6	1	1	1	1
Quercus rubra	-	12.5	12.5	12.5	-	0.6	0.1	0.6	-	8	1	1
Rhus radicans	37.5	12.5	25.0	12.5	3.9	0.1	2.5	2.5	1	1	1	1
Sanguinaria canadensis	-	-	12.5	12.5	-	-	0.6	0.6	-	-	1	1
Sanicula trifoliata	75.0	12.5	-	62.5	8.1	1.3	-	12.0	1	1	-	1
Smilax sp.	-	-	-	12.5	-	-	-	1.3	-	-	-	1
Stellaria pubera	-	-	37.5	-	-	-	2.8	-	-	-	1	-
Ulmus rubra	12.5	25.0	37.5	62.5	0.6	1.9	5.0	5.0	1	1	1	1
Viola eriocarpa	-	-	12.5	12.5	-	-	0.6	1.3	-	-	1	1
Viola sororia	-	-	75.0	50.0	-	-	1.8	1.5	-	-	1	1

Mode condition: 1 = healthy, 7 = dying, 8 = dormant.

Table A-5

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Chinkapin Oak Cover Type, 1980-1981

Scientific Name	Frequency (%) 1980 Sep	Frequency (%) 1980 Oct	Frequency (%) 1981 Apr	Frequency (%) 1981 Jun	Cover (%) 1980 Sep	Cover (%) 1980 Oct	Cover (%) 1981 Apr	Cover (%) 1981 Jun	Mode Condition 1980 Sep	Mode Condition 1980 Oct	Mode Condition 1981 Apr	Mode Condition 1981 Jun
Agrimonia microcarpa	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Allium canadense	-	-	50.0	-	-	-	1.0	-	-	-	1	-
Carex sp.	25.0	25.0	-	-	0.8	0.8	-	-	1	1	-	-
Celtis occidentalis	25.0	-	25.0	25.0	2.5	-	0.3	0.8	1	-	1	1
Cercis canadensis	12.5	-	12.5	12.5	0.6	-	0.1	0.1	1	-	1	1
Clematis viorna	-	-	-	12.5	-	-	-	1.9	-	-	-	1
Commelina virginica	12.5	12.5	12.5	-	1.9	1.9	0.6	-	1	1	1	-
Delphinium tricorne	-	-	37.5	-	-	-	1.4	-	-	-	1	-
Dicotyledoneae	50.0	-	75.0	50.0	1.6	-	4.6	2.8	1	-	1	1
Dioscorea villosa	62.5	-	62.5	75.0	15.0	-	5.6	11.3	7	-	1	1
Fraxinus americana	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Fraxinus quadrangulata	25.0	-	-	-	1.3	-	-	-	1	-	-	-
Galium circaezans	50.0	50.0	50.0	50.0	2.8	1.6	1.5	2.6	1	1	1	1
Geum canadense	-	12.5	-	-	-	0.1	-	-	-	1	-	-
Hystrix patula	-	25.0	-	-	-	1.9	-	-	-	1	-	-
Jeffersonia diphylla	-	-	50.0	37.5	-	-	4.5	2.0	-	-	1	1
Lonicera japonica	62.5	62.5	50.0	50.0	15.0	12.0	15.0	10.0	1	1	1	1
Monocotyledoneae	-	-	-	12.5	-	-	-	0.6	-	-	-	1
Ostrya virginiana	25.0	25.0	25.0	-	3.8	1.9	3.1	-	1	1	1	-
Parthenocissus quinquefolia	50.0	-	25.0	37.5	2.1	-	2.5	3.9	1	-	1	1
Poaceae	-	-	12.5	12.5	-	-	1.3	0.6	-	-	1	1
Polygonatum biflorum	37.5	-	87.5	50.0	2.5	-	8.8	1.5	1	-	1	1
Prunus serotina	37.5	25.0	37.5	25.0	2.5	1.3	1.9	0.8	1	1	1	1
Quercus rubra	12.5	12.5	-	-	0.6	0.6	-	-	1	1	-	-
Rhus aromatica	12.5	-	12.5	25.0	5.6	-	1.3	2.5	1	-	1	1
Rhus radicans	12.5	-	12.5	12.5	0.6	-	1.3	0.1	1	-	1	1
Rosa sp.	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Rubus sp.	-	-	-	12.5	-	-	-	0.7	-	-	-	-
Sanicula trifoliata	25.0	-	-	75.0	0.3	-	-	1.8	1	-	-	1
Silphium trifoliatum	12.5	-	-	-	3.1	-	-	-	1	-	-	-
Smilax herbacea	37.5	12.5	50.0	62.5	1.4	0.6	2.1	2.6	1	1	1	1
Solidago ulmifolia	62.5	75.0	37.5	37.5	3.3	4.4	1.9	1.9	1	1	1	1
Swertia caroliniensis	-	-	62.5	62.5	-	-	11.3	10.6	-	-	1	1
Symphoricarpos orbiculatus	12.5	12.5	12.5	-	0.1	0.1	1.3	-	1	1	1	-
Taraxacum officinale	-	-	12.5	-	-	-	0.1	-	-	-	1	-
Thalictrum revolutum	-	12.5	62.5	62.5	-	0.1	8.3	4.5	-	1	1	-
Triosteum aurantiacum	-	-	37.5	50.0	-	-	2.5	1.0	-	-	1	1
Viburnum prunifolium	-	12.5	-	12.5	-	0.1	-	0.6	-	1	-	1
Viola sororia	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Vitis aestivalis	12.5	-	12.5	12.5	1.3	-	0.1	0.6	1	-	1	1
Xanthoxylum americanum	12.5	12.5	12.5	25.0	5.0	2.5	3.1	0.8	1	1	1	1

Mode condition: 1 = healthy, 7 = dying.

Table A-6

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Red Pine Cover Type, 1980-1981

Scientific Name	Frequency (%)				Cover (%)				Mode Condition			
	1980		1981		1980		1981		1980		1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer rubrum	-	12.5	12.5	-	-	0.1	0.6	-	-	1	1	-
Acer saccharum	-	-	12.5	-	-	-	2.5	-	-	-	1	-
Carex sp.	12.5	12.5	12.5	12.5	0.6	0.6	0.1	0.1	1	1	1	1
Cercis canadensis	50.0	50.0	37.5	12.5	3.8	2.5	3.1	3.8	1	1	1	1
Circaea quadrisulcata	-	-	-	37.5	-	-	-	3.8	-	-	-	-
Cornus florida	50.0	37.5	50.0	50.0	20.0	11.3	6.9	8.1	1	1	1	1
Dentaria laciniata	-	-	37.5	-	-	-	2.5	-	-	-	1	-
Desmodium glutinosum	12.5	-	-	12.5	6.3	-	-	0.6	1	-	-	-
Dicotyledoneae	-	-	-	12.5	-	-	-	1.9	-	-	-	2
Diospyros virginiana	-	12.5	-	-	-	1.3	-	-	-	1	-	-
Eupatorium rugosum	12.5	12.5	12.5	12.5	0.6	1.3	0.6	0.6	1	1	1	3
Fragaria virginiana	12.5	12.5	12.5	-	1.3	0.1	1.0	-	1	1	1	-
Fraxinus americana	12.5	12.5	25.0	50.0	1.9	0.6	1.9	3.0	1	1	1	1
Fraxinus quadrangulata	-	12.5	-	-	-	1.3	-	-	-	1	-	-
Fraxinus sp.	-	-	-	25.0	-	-	-	0.3	-	-	-	1
Galium circaezans	25.0	-	37.5	50.0	0.3	-	0.4	1.0	1	-	1	1
Galium triflorum	-	12.5	37.5	37.5	-	0.1	1.4	0.4	-	1	1	1
Liriodendron tulipifera	12.5	-	12.5	-	0.1	-	0.1	-	1	-	1	-
Lonicera japonica	75.0	75.0	75.0	62.5	11.4	15.6	25.6	13.8	1	1	1	1
Parthenocissus quinquefolia	25.0	-	87.5	87.5	2.5	-	11.3	13.1	1	-	1	1
Phyrma leptostachya	25.0	-	25.0	-	1.3	-	1.9	-	1	-	1	-
Pinus strobus	12.5	12.5	12.5	12.5	0.1	0.6	0.1	0.1	1	1	1	1
Prunus serotina	25.0	37.5	50.0	25.0	2.5	3.1	6.9	2.5	1	1	1	1
Quercus muehlenbergii	-	12.5	12.5	-	-	0.6	0.6	-	-	1	1	-
Rhus radicans	62.5	-	75.0	62.5	5.0	-	6.0	6.3	1	-	1	1
Rosa sp.	12.5	-	12.5	-	1.3	-	0.6	-	1	-	1	-
Rubus phoenicolasius	12.5	12.5	-	25.0	2.5	1.3	-	1.3	1	1	-	1
Rubus sp.	25.0	12.5	25.0	62.5	2.5	1.3	1.9	2.6	1	1	1	1
Sanicula trifoliata	25.0	12.5	62.5	75.0	1.9	0.1	3.3	4.0	1	1	1	1
Sassafras albidum	-	-	-	25.0	-	-	-	0.8	-	-	-	1
Taraxacum officinale	-	12.5	12.5	-	-	0.1	0.6	-	-	1	1	-
Ulmus americana/rubra	12.5	12.5	12.5	12.5	1.0	0.6	0.6	0.1	1	1	1	1
Vitis aestivalis	12.5	-	-	12.5	0.6	-	-	0.1	1	-	-	1

Mode condition: 1 = healthy, 2 = diseased, 3 = insect injury.

Table A-7

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Sycamore-Boxelder Cover Type, 1980-1981

Scientific Name	Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun*	Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun*	Mode Condition 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer negundo	25.0	12.5	37.5	12.5	2.5	0.6	3.2	1.3	1	1	1	1
Actinomeris alternifolia	50.0	25.0	-	25.0	13.8	1.9	-	5.0	1	1	-	1
Aesculus sp.	-	-	-	12.5	-	-	-	0.6	-	-	-	1
Asarum canadense	-	25.0	12.5	-	-	0.8	0.6	-	-	1	1	-
Aster azureus	-	12.5	-	-	-	0.6	-	-	-	1	-	-
Boehmeria cylindrica	62.5	100.0	62.5	25.0	15.0	16.3	5.0	1.9	1	1	1	1
Carex sp.	50.0	50.0	50.0	50.0	16.9	16.3	6.3	8.8	1	1	1	1
Commelina virginica	12.5	12.5	-	-	0.1	0.6	-	-	1	1	-	-
Cornus florida	12.5	-	12.5	-	1.3	-	0.6	-	1	-	1	-
Dicotyledoneae	12.5	-	-	-	1.3	-	-	-	1	-	-	-
Dioscorea quaternata	-	12.5	12.5	12.5	-	1.9	1.9	1.3	-	1	1	1
Fragaria virginiana	-	25.0	-	-	-	0.3	-	-	-	1	-	-
Galium aparine	-	-	62.5	12.5	-	-	8.1	0.1	-	-	1	1
Galium triflorum	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Geum canadense	50.0	-	37.5	-	6.3	-	6.3	-	1	-	1	-
Hydrangea arborescens	37.5	25.0	50.0	-	6.9	5.0	10.0	-	1	1	1	-
Impatiens biflora/pallida	39.4	37.5	-	50.0	7.9	6.3	-	8.8	1	1	-	1
Lindera benzoin	-	-	12.5	-	-	-	1.9	-	-	-	1	-
Parthenocissus quinquefolia	25.0	-	12.5	-	1.4	-	0.6	-	1	-	1	-
Phryma leptostachya	-	25.0	100.0	-	-	1.9	19.6	-	-	1	1	-
Pilea pumila	87.5	12.5	12.5	-	25.8	0.1	0.6	-	1	1	1	-
Poaceae	-	-	50.0	12.5	-	-	3.1	0.6	-	-	1	1
Polygonum cespitosum	-	37.5	-	-	-	0.9	-	-	-	1	-	-
Ranunculus fascicularis	-	50.0	12.5	-	-	8.8	1.3	-	-	1	1	-
Rhus radicans	12.5	-	12.5	-	1.9	-	1.3	-	1	-	1	-
Sanicula trifoliata	-	-	25.0	50.0	-	-	0.3	7.5	-	-	1	1
Stellaria media	-	-	25.0	-	-	-	5.6		-	-	1	-
Tovara virginiana	37.5	37.5	12.5	25.0	2.5	1.9	0.6	1.3	1	1	1	1
Viola papilionacea	-	-	37.5	37.5	-	-	3.1	0.9	-	-	1	1
Viola sororia	50.0	62.5	-	-	2.1	3.3	-	-	1	1	-	-

*Due to flooding, June data available from only one sample plot location.

Mode conditions: 1 = healthy

Table A-8

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Oak-Hickory Cover Type, 1980-1981

Scientific Name	Frequency (%)				Cover (%)				Mode Condition			
	1980		1981		1980		1981		1980		1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Aesculus octandra	-	-	12.5	5.0	-	-	0.6	1.5	-	-	1	1
Arisaema atrorubens	-	-	37.5	25.0	-	-	2.5	2.0	-	-	1	1
Aster azureus	-	25.0	-	-	-	0.3	-	-	-	1	-	-
Carex sp.	37.5	50.0	-	37.5	1.8	2.5	-	0.9	1	1	-	1
Celtis occidentalis	12.5	-	12.5	12.5	0.6	-	0.6	1.3	1	-	7	1
Cercis canadensis	25.0	12.5	-	37.5	2.5	0.6	-	1.4	1	1	-	1
Delphinium tricorne	-	-	87.5	-	-	-	8.4	-	-	-	1	-
Dentaria laciniata	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Dicotyledoneae	-	-	-	37.5	-	-	-	2.5	-	-	-	1
Erythronium albidum	-	-	37.5	-	-	-	12.5	-	-	-	7	-
Eupatorium rugosum	75.0	87.5	75.0	75.0	11.3	7.5	2.8	6.9	3	1	1	1
Fraxinus americana	12.5	-	12.5	25.0	0.6	-	0.6	0.8	1	-	1	1
Fraxinus sp.	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Galium aparine	-	-	75.0	-	-	-	2.3	-	-	-	1	-
Geum canadense	12.5	25.0	-	12.5	0.6	0.8	-	0.6	1	1	-	-
Hystrix patula	25.0	37.5	62.5	50.0	1.9	2.0	1.6	2.1	7	1	1	1
Lonicera japonica	50.0	50.0	50.0	50.0	6.3	5.6	18.8	12.0	1	1	1	1
Mertensia virginica	-	-	100.0	-	-	-	32.5	-	-	-	1	-
Parthenocissus quinquefolia	62.5	-	100.0	100.0	3.9	-	21.9	19.0	7	-	1	2
Poaceae	25.0	-	-	-	3.1	-	-	-	7	-	-	-
Prunus serotina	25.0	25.0	12.5	25.0	1.3	0.3	0.6	0.3	1	1	1	1
Quercus sp.	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Rhus aromatica	-	-	12.5	12.5	-	-	0.1	0.1	-	-	1	1
Ribes sp.	12.5	-	-	-	0.6	-	-	-	1	-	-	-
Rubus sp.	-	12.5	-	12.5	-	0.6	-	1.3	-	1	-	1
Sanguinaria canadense	-	-	25.0	50.0	-	-	0.8	1.5	-	-	1	1
Sanicula trifoliata	-	12.5	25.0	37.5	-	0.6	0.3	1.4	-	1	1	1
Smilacina racemosa	-	-	12.5	12.5	-	-	3.1	1.3	-	-	1	1
Symphoricarpos orbiculatus	-	12.5	-	-	-	0.1	-	-	-	1	-	-
Trillium sessile	-	-	37.5	25.0	-	-	3.3	1.3	-	-	1	7
Ulmus americana	37.5	-	-	37.5	1.9	-	-	1.9	1	-	-	1
Vitis aestivalis	12.5	-	-	12.5	1.9	-	-	1.3	1	-	-	1

Mode condition: 1 = healthy, 2 = diseased, 3 = insect injury, 7 = dying.

Table A-9

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Walnut-Hickory-Buckeye Cover Type, 1980-1981

Scientific Name	Frequency (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Cover (%) 1980 Sep	1980 Oct	1981 Apr	1981 Jun	Mode Condition 1980 Sep	1980 Oct	1981 Apr	1981 Jun
Acer negundo	25.0	12.5	12.5	-	0.8	0.6	0.6	-	1	1	1	-
Actinomeris alternifolia	12.5	-	37.5	-	1.3	-	2.0	-	1	-	1	-
Asarum canadense	-	-	12.5	12.5	-	-	0.6	0.1	-	-	1	1
Asimina triloba	25.0	-	25.0	25.0	6.3	-	1.3	3.8	1	-	1	1
Carex sp.	12.5	25.0	-	12.5	0.1	1.3	-	0.1	1	1	-	1
Carya cordiformis	25.0	12.5	37.5	12.5	1.3	0.6	1.9	0.6	1	1	1	1
Carya ovata	-	12.5	-	12.5	-	1.3	-	0.6	-	1	-	1
Cercis canadensis	12.5	-	-	25.0	0.6	-	-	0.3	1	-	-	1
Circaea quadrisulcata	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Dentaria laciniata	-	-	100.0	-	-	-	4.9	-	-	-	7	-
Dicentra cucullinaria	-	-	37.5	-	-	-	0.4	-	-	-	7	-
Dicotyledoneae	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Eupatorium rugosum	75.0	62.5	12.5	62.5	4.6	3.3	0.1	3.1	1	1	1	1
Fraxinus sp.	-	-	-	12.5	-	-	-	0.6	-	-	-	1
Fraxinus americana	50.0	12.5	12.5	50.0	6.9	2.5	1.3	3.8	1	1	1	1
Fraxinus quadrangulata	-	-	12.5	12.5	-	-	1.3	0.6	-	-	1	1
Galium aparine	-	-	87.5	12.5	-	-	1.9	0.6	-	-	1	1
Glechoma hederacea	12.5	-	-	-	0.1	-	-	-	1	-	-	-
Juglans nigra	-	12.5	-	-	-	0.6	-	-	-	1	-	-
Lindera benzoin	62.5	-	-	25.0	2.1	-	-	0.8	1	-	-	1
Lonicera japonica	100.0	100.0	100.0	100.0	2.1	21.9	4.9	34.4	1	1	1	1
Parthenocissus quinquefolia	62.5	-	100.0	100.0	2.1	-	11.9	12.5	1	-	1	1
Prenanthes sp.	-	-	-	12.5	-	-	-	0.6	-	-	-	1
Rhus radicans	62.5	-	62.5	75.0	8.3	-	9.4	9.5	1	-	1	1
Rosa sp.	12.5	-	12.5	12.5	0.1	-	1.3	0.1	1	-	1	1
Rubus sp.	12.5	-	12.5	12.5	1.3	-	1.3	1.9	1	-	1	1
Sanicula trifoliata	62.5	37.5	62.5	50.0	2.8	1.4	4.5	1.0	1	1	1	1
Smilax sp.	-	-	-	12.5	-	-	-	0.1	-	-	-	1
Symphoricarpos orbiculatus	12.5	-	50.0	50.0	0.6	-	2.5	1.5	1	-	1	1
Trillium sessile	-	-	12.5	-	-	-	0.6	-	-	-	1	-
Ulmus rubra	12.5	12.5	25.0	12.5	0.6	0.6	1.3	0.6	1	1	1	1
Viola sororia	12.5	12.5	25.0	25.0	0.1	0.1	1.3	0.3	1	1	1	1
Vitis aestivalis	-	-	-	25.0	-	-	-	0.3	-	-	-	1

Mode condition: 1 - healthy, 7 = dying.

Table A-10

Species Composition, Frequency, Cover, and Mode Condition for Herbaceous Stratum, Virginia Pine Cover Type, 1980-1981

Scientific Name	Frequency (%)				Cover (%)				Mode Condition			
	1980		1981		1980		1981		1980		1981	
	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
Acer rubrum	25.0	-	25.0	37.5	0.8	-	0.8	0.4	1	-	1	1
Acer saccharum	-	25.0	12.5	12.5	-	0.1	0.1	0.1	-	1	1	1
Carex sp.	-	12.5	12.5	37.5	-	0.1	0.1	0.9	-	1	1	1
Cercis canadensis	25.0	12.5	12.5	37.5	0.8	0.1	0.1	0.4	1	1	1	1
Cornus florida	87.5	75.0	62.5	100.0	5.2	2.9	5.8	7.1	1	1	1	1
Dioscorea quaternata	12.5	-	25.0	12.5	0.6	-	1.9	0.1	1	-	1	1
Fagus grandifolia	37.5	37.5	25.0	37.5	3.1	3.1	2.5	5.0	1	1	1	1
Fragaria virginiana	12.5	-	-	-	0.6	-	-	-	1	-	-	-
Fraxinus americana	12.5	-	12.5	-	0.6	-	0.6	-	1	-	1	-
Galium circaezans	62.5	50.0	50.0	75.0	2.9	1.4	1.6	1.8	1	1	1	1
Galium triflorum	12.5	12.5	12.5	37.5	0.6	0.6	0.1	3.3	1	1	1	1
Liquidambar styraciflua	37.5	25.0	50.0	37.5	4.4	1.4	2.6	2.0	1	1	1	1
Lonicera japonica	37.5	37.5	37.5	37.4	3.1	4.4	13.8	9.4	1	1	1	1
Osmorhiza claytoni	-	-	12.5	25.0	-	-	1.9	3.9	-	-	1	1
Oxalis stricta	-	-	12.5	-	-	-	1.9	-	-	-	1	-
Parthenocissus quinquefolia	37.5	-	62.5	75.0	3.1	-	6.3	11.9	1	-	1	1
Poaceae	-	-	25.0	-	-	-	0.8	-	-	-	1	-
Prunus serotina	12.5	37.5	50.0	25.0	0.3	0.9	1.5	0.3	1	1	1	1
Quercus sp.	62.5	62.5	37.5	37.5	3.1	2.6	1.4	1.9	1	1	1	1
Ranunculus recurvatus	-	-	25.0	-	-	-	1.9	-	-	-	1	-
Rhus radicans	37.5	-	37.5	62.5	5.6	-	9.4	12.8	1	-	1	1
Rosa sp.	-	-	12.5	12.5	-	-	0.1	0.1	-	-	1	1
Rubus sp.	12.5	25.0	25.0	12.5	1.9	1.4	1.4	16.3	1	1	1	1
Sanicula trifoliata	25.0	25.0	25.0	62.5	1.9	1.3	0.8	4.0	1	1	-	1
Sassafras albidum	12.5	-	-	-	0.6	-	-	-	1	-	-	-
Smilax sp.	-	-	-	37.5	-	-	-	0.9	-	-	-	1
Ulmus americana/rubra	12.5	-	-	-	0.1	-	-	-	1	-	-	-
Vitis aestivalis	12.5	-	-	-	0.6	-	-	-	1	-	-	-

Mode condition: 1 = healthy.

Table A-11

Standard Error Values of Soils Parameters for Each Vegetation Cover Type, 1980-1981

Soil Moisture

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	0.9	1.3	1.3	0.4
Oak-Maple	02	7.6	1.6	1.2	2.7
Chinkapin oak	03	2.2	1.7	0.7	2.5
Red pine	04	0.6	0.8	1.1	2.1
Sycamore-Boxelder	05	1.2	1.8	0.5	2.9
Oak-Hickory	06	1.3	1.4	1.7	1.8
Walnut-Hickory-Buckeye	09	1.2	1.6	0.6	0.4
Virginia pine	11	0.9	1.4	0.4	1.2

Soil Bulk Density

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	0.04	0.11	0.03	0.01
Oak-Maple	02	0.05	0.04	0.03	0.07
Chinkapin oak	03	0.10	0.04	0.03	0.02
Red pine	04	0.07	0.09	0.07	0.06
Sycamore-Boxelder	05	0.03	0.04	0.04	0.01
Oak-Hickory	06	0.12	0.05	0.10	0.10
Walnut-Hickory-Buckeye	09	0.12	0.03	0.02	0.03
Virginia Pine	11	0.58	0.03	0.05	0.04

Table A-11 (Continued)

Soil pH

Cover Type	Code	1980 Sep	1980 Oct	1981 Apr	1981 Jun
Maple-Basswood	01	0.1	0.1	0.1	0.1
Oak-Maple	02	0.2	0.3	0.3	0.5
Chinkapin oak	03	0.2	0.1	0.1	0.6
Red pine	04	0.2	0.1	0.1	0.4
Sycamore-Boxelder	05	0.4	0.3	0.4	0.6
Oak-Hickory	06	0.1	0.1	0.1	0.4
Walnut-Hickory-Buckeye	09	0.2	0.3	0.1	0.5
Virginia pine	11	0.1	0.2	0.2	0.3

Soil Conductivity

Cover Type	Code	1980 Sep	1980 Oct	1981 Apr	1981 Jun
Maple-Basswood	01	234	37	60	39
Oak-Maple	02	418	90	64	63
Chinkapin oak	03	77	35	82	12
Red pine	04	240	79	31	21
Sycamore-Boxelder	05	65	50	23	15
Oak-Hickory	06	162	122	48	29
Walnut-Hickory-Buckeye	09	120	123	11	23
Virginia pine	11	24	14	7	25

Table A-11 (Continued)

Soil Cation Exchange Capacity

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	1.5	3.0	4.1	1.9
Oak-Maple	02	3.9	2.5	2.7	1.6
Chinkapin oak	03	3.8	2.3	2.5	4.5
Red pine	04	1.9	2.7	1.7	5.5
Sycamore-Boxelder	05	1.7	2.6	1.3	0.3
Oak-Hickory	06	4.4	2.6	4.2	3.3
Walnut-Hickory-Buckeye	09	4.4	3.2	1.5	3.8
Virginia pine	11	2.7	2.5	2.0	3.2

Soil Base Saturation

Cover Type	Code	1980		1981	
		Sep	Oct	Apr	Jun
Maple-Basswood	01	4.7	5.6	2.5	1.8
Oak-Maple	02	9.9	3.1	4.2	2.7
Chinkapin oak	03	15.3	1.4	3.6	5.3
Red pine	04	5.1	10.7	4.6	11.1
Sycamore-Boxelder	05	22.4	48.4	18.1	3.0
Oak-Hickory	06	16.9	17.2	4.5	14.9
Walnut-Hickory-Buckeye	09	9.5	8.3	2.7	3.0
Virginia pine	11	19.2	18.1	10.5	2.5

Table A-12

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Acer negundo	Boxelder					x		x	
Acer rubrum	Red maple	o			x				x
Acer saccharum	Sugar maple	x	x	x	x	-	-	x	x
Actea rubra	Red baneberry		-	-	-		-		
Actinomeris alternifolia	Wingstem			-		x	-	x	-
Aesculus sp.	Buckeye	o				o	o		
Aesculus glabra	Ohio buckeye					-	-	-	
Aesculus octandra	Yellow buckeye	x	x	-		o	o	o	
Agrimonia microcarpa	Agrimony		o	o					
Allium canadense	Wild garlic		x	x			-	-	-
Amaranthus sp.	Pigweed					-	-		
Ambrosia artemisiifolia	Common ragweed				-				
Anemone canadensis	Canada anemone						-	x	
Anemone quinquefolia	Wood anemone		x	-			-	o	
Anemone virginica	Thimbleweed			-					
Anemonella thalictroides	Rue anemone	-	x	-			-		
Arabis laevigata	Smooth rockcress		-	-				-	
Aralia spinose	Hercules-club		-						
Arisaema atrorubens	Jack-in-the-pulpit	o	-			o			
Arisaema triphyllum	Small jack-in-the-pulpit	-					-		
Asarum canadense	Wild ginger	x	o			x	-	o	
Asimina triloba	Pawpaw	x						x	
Asplenium platyneuron	Ebony spleenwort								-
Aster sp.	Aster		-		-	-			
Aster azureus	Azure aster		-	-		o	o	-	
Aster divaricatus	White wood aster		-			-			
Bidens sp.	Beggar's ticks					-			
Boehmeria cylindrica	False nettle	-	-		-	o		-	
Botrychium virginianum	Virginia grape-fern		x						-
Bryophyta	Mosses								-
Bumellia lanuginosa	Chittamwood						-		

Table A-12 (Continued)

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Campsis radicans	Trumpet vine								-
Cardamine douglassii	Purple cress					-	-	-	
Carex leersii	Little prickly sedge								-
Carex swanii	Swan's sedge								-
Carex sp.	Sedge		-	x	x	x	x	x	
Carpinus caroliniana	Ironwood	-	x						
Carya sp.	Hickory				-			-	
Carya cordiformis	Bitternut hickory	-	-		o		-	x	-
Carya ovata	Shagbark hickory							x	
Caryophyllaceae	Chickweed family				o				
Catalpa speciosa	Northern catalpa						x		
Celtis occidentalis	Hackberry		x	x	x	x	o	-	
Cercis canadensis	Eastern redbud		x	x	x		x	x	-
Circaea quadrisulcata	Enchanter's nightshade	x	-	o	x	x	x	x	
Claytonia virginica	Spring-beauty	x	-			-			
Clematis viorna	Leather flower		-	x					
Commelina virginica	Dayflower		o	o		x	-		
Compositae	Composite family							-	-
Convolvulus sp.	Bindweed							-	
Cornus florida	Flowering dogwood		x	-	x	x	-		x
Cornus priceae	Miss Price's dogwood						x		
Corydalis flavula	Yellow fumewort					-			
Cruciferae	Mustard family				x				
Cryptotaenia canadensis	Honewort					-			
Cynanchum laeve	Milk vine			-					

Table A-12 (Continued)

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Delphinium tricorne	Dwarf larkspur	x	x	-			x		
Dentaria laciniata	Cut-leaved toothwort	x	x	-	x	-	x	x	
Desmodium glutinosum	Pointed-leaved tick-trefoil		x		x				
Desmodium paniculatum	Panicled tick-trefoil		o		o				-
Dicentra sp.	Bleeding heart	o	o					o	-
Dicentra cucullaria	Dutchman's breeches	o	x				-	o	
Dioscorea quaternata	Wild Yam		x		o	x			o
Dioscorea villosa	Wild Yam	-	-	x					-
Diospyros virginiana	Persimmon		-	o	o				-
Elymus virginicus	Virginia wild-rye		-	-		-			
Erigenia bulbosa	Harbinger-of-spring	-	-			-		-	
Erigeron sp.	Daisy fleabane				-	-			
Erythronium albidum	White trout-lily						x		
Erythronium americanum	Adder's-tongue		-						
Euonymous americanus	American strawberry-bush						-		
Eupatorium maculatum	Spotted joe-pye-weed			-					
Eupatorium rugosum	White snakeroot	o			o		o	o	
Eupatorium serotinum	Late-flowering thoroughwort	-			-	-	-	-	-
Eupatorium sp.	Thoroughwort		x						
Fagus grandifolia	American beech	-	-		-				x
Fragaria virginiana	Wild strawberry		-		x	x			x
Fraxinus americana	White ash	x	x	x	x	-	x	x	x
Fraxinus sp.	Ash				o		o	o	
Fraxinus quadrangulata	Blue ash		x	x	x		-	x	x

Table A-12 (Continued)

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Galium aparine	Cleavers	x	x		-	x	x	-	
Galium asprellum	Rough bedstraw			-					
Galium boreale	Northern bedstraw	-	-						
Galium circaezans	White wild licorice		x	x	x	-	-		x
Galium pilosum	Hairy bedstraw			-					-
Galium triflorum	Fragrant bedstraw	-	-		-	x		x	x
Geum canadense	Canadian avens		x	x	-	x	x	-	-
Glechoma hederacea	Gill-over-the-ground	x					-	x	
Gleditsia triacanthos	Honey locust						-	-	
Goodyera sp.	Rattlesnake plantain				-				
Gymnocladus dioica	Kentucky coffee-tree						-	-	
Hamamelis virginiana	Witch-hazel								-
Helianthus sp.	Sunflower			-				-	
Hemerocallis fulva	Day-lily	-							
Heuchera americana	Heuchera							-	
Hieracium sp.	Hawkweed		-	-					
Hydrangea arborescens	Wild hydrangea					o			
Hydrophyllum appendiculatum	Appendaged water leaf		-				-	-	
Hypericum sp.	St. John's-wort					-			
Hystrix patula	Bottlebrush		x	x		-	x		
Impatiens biflora/pallida	Jewelwood	x				x			
Iris cristata	Wild iris		-						
Jeffersonia diphylla	Twinleaf		x	x		-			-
Juglans nigra	Black walnut	x				x		x	
Juniperus virginiana	Eastern red-cedar	-	x	x	-		-	-	x
Krigia sp.	Dwarf dandelion			-					

Table A-12 (Continued)

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Lactua sp.	Lettuce			-					
Laportea canadensis	Wood nettle					-			
Leptostaycha sp.	mint			-					
Liliaceae	Lily		-						
Lindera benzoin	Spicebush	x	-	-		x		x	
Liriodendron tulipifera	Yellow poplar		-	x	-				-
Liquidambar styraciflua	Sweetgum								x
Lonicera japonica	Japanese honeysuckle			x	x		x	x	x
Lonicera tatarica	Tartarian honeysuckle								-
Luzula multiflora	Woodrush								-
Maianthemum canadense	Canada mayflower	-		-					
Mertensia virginica	Virginia bluebell						x		
Muhlenbergia sobolifera	Muhly grass			-	-	-			
Monocotyledoneae	Monocot	-		o	-		-	-	
Neptea catarica	Catnip						-		
Oenothera sp.	Evening primrose			-					
Osmorhiza claytonii	White snakeroot		-			-			x
Ostrya virginiana	Hop-hornbeam		x	x					
Oxalis stricta	Yellow wood-sorrel								x

Table A-12 (Continued)

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Panicum boscii	Bosc's panicum		-	-	-				-
Panicum clandestinum	Corn grass			-		-			-
Parietaria pensylvanica	Pellitory							-	
Parthenocissus quinquefolia	Virginia creeper	x	x	x	x	x	x	x	x
Passiflora lutea	Yellow passion-flower			-					
Phryma leptostachya	Lopseed	x	-		x	o			-
Pilea pumila	Clearweed	x	-		-	x	-		
Pinus resinosa	Red pine				x				
Pinus strobus	White pine	-			x				
Pinus virginiana	Virginia pine			x				o	x
Platanus occidentalis	Sycamore		-			x		-	-
Poaceae	Grass family		x	x	-	x	-		x
Podophyllum peltatum	Mayapple					-			-
Polygonatum biflorum	Solomon's seal			x			-		
Polygonum cespitosum	Long-bristled smartweed					x			
Potentilla sp.	Cinquefoil	-	-	-	-	-	-	-	-
Prenanthes sp.	Lion's paw							o	
Prunus serotina	Black cherry		x	-	x	x	-	-	x
Prunus virginiana	Choke cherry							-	
Quercus coccinea	Scarlet oak		-				-		
Quercus falcata	Southern red oak		-						
Quercus muhlenbergii	Chinkapin oak		x	x	x	-	-	x	x
Quercus palustris	Pin oak		-						
Quercus prinus	Chestnut oak		-	-	-	-	-	-	-
Quercus rubra	Northern red oak		o	x			x		-
Quercus sp.	Oak						o		
Quercus velutina	Black oak		x	-	x		-		

Table A-12 (Continued)

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Ranunculus abortivus	Small-flowered buttercup	x		o				o	
Ranunculus fascicularis	Early buttercup					o			
Ranunculus sp.	Buttercup							o	
Rhus aromatica	Fragrant sumac			x			o		
Rhus radicans	Poison ivy	x	x	x	x	x	-	x	x
Ribes sp.	Currant						x		
Robinia pseudoacacia	Black locust			-			-	-	-
Rosa sp.	Rose			x	x	x	-	x	o
Rubus sp.	Blackberry			o	x		x	x	x
Rubus phoenicolasius	Wineberry				x				
Ruellia caroliniensis	Hairy ruellia			-		-			
Sanguinaria canadensis	Bloodroot		x	-			x		
Sanicula trifoliata	Black snakeroot	-	x	x	x	x	x	x	-
Sassafras albidum	Sassafras	x	-	-	x				x
Silphium trifoliatum	Whorled rosinweed			o					
Smilacina racemosa	False Solomon's seal			-			x		
Smilax sp.	Greenbriar		x						-
Smilax herbacea	Carrion-flower		-	x	-	-		-	-
Solidago sp.	Goldenrod		-	-	-	-	-		-
Solidago ulmifolia	Elmleaf goldenrod			x					
Stellaria media	Common chickweed					o			
Stellaria pubera	Star chickweed		x						
Swertia caroliniensis	Columbo			x					
Symphoricarpos orbiculatus	Coralberry		-	-	x		x	x	-

Table A-12 (Continued)

Plant Taxa Present in Sampled Cover Types,
September 1976 through June 1981

Scientific Name	Common Name	Cover Type							
		01	02	03	04	05	06	09	11*
Taraxacum officinale	Common dandelion			-	x			x	-
Thalictrum dioicum	Early meadow-rue			-					
Thalictrum revolutum	Wax-leaved meadow-rue			x					
Tovara virginianum	Jumpseed	o				o			
Tilia americana	Basswood	x				x			
Tradescantia virginiana	Spiderwort						-		
Trillium sessile	Toadshade	x	-				x	x	
Triosteum aurantiacum	Horse-gentian			o					
Umbelliferae	Carrot family							-	
Ulmus americana	American elm						o	o	
Ulmus rubra	Slippery elm	x	x	x	x	x	x	x	
Ulmus thomassi	Rock elm								-
Urtica dioca	Stinging nettle					-			
Veratrum sp.	Veratrum			-					
Viburnum prunifolium	Blackhaw		-	o					
Viola eriocarpa	Smooth yellow violet		-	o		-			
Viola papilionacea	Common blue violet					o			
Viola sororia	Woolly blue violet	x	x	x	-	x	-	x	-
Viola sp.	Violet	-							
Vitis aestivalis	Summer grape	x		x	o		x	x	o
Vitis rotundifolia	Muscadine grape			o	x			-	
Xanthoxylum americanum	Prickly ash			x			x		

x - Observed during 1980-1981 sampling.
o - Newly recorded during 1980-1981 sampling.
- - Observed during monitoring period, but not during 1980-1981 sampling.
* - New plots established in April 1980.

APPENDIX B

PSI MARBLE HILL VEGETATION AND SOILS DATA

1979-1980 ANNUAL REPORT

Table B-1

Mean ($\bar{x}$) and Standard Error (SE) of Cover Percentage for Vegetation, Litter, and Total Cover in Marble Hill Plots

Map Unit	Cover Type	September*						October*						April*						June*					
		1976 $\bar{x}$	1977 $\bar{x}$	1978 $\bar{x}$	1979 $\bar{x}$	1976-1979 $\bar{x}$	SE	1976 $\bar{x}$	1977 $\bar{x}$	1978 $\bar{x}$	1979 $\bar{x}$	1976-1979 $\bar{x}$	SE	1977 $\bar{x}$	1978 $\bar{x}$	1979 $\bar{x}$	1980 $\bar{x}$	1977-1980 $\bar{x}$	SE	1977 $\bar{x}$	1978 $\bar{x}$	1979 $\bar{x}$	1980 $\bar{x}$	1977-1980 $\bar{x}$	SE
01	Maple-Basswood																								
	Vegetation	20.6	13.9	22.9	34.6**	23.0	4.3	17.5	13.5	18.3	20.5	17.5	1.5	31.6	36.0	25.7	43.5**	34.2	3.8	17.8	20.0	32.9	38.6	27.3	5.0
	Litter	53.8	60.5	54.0	29.5**	49.5	6.9	58.8	83.3	61.3	36.6**	43.7	11.3	65.3	63.5	71.6	53.1**	63.4	3.9	72.0	70.0	45.1	43.1	57.6	7.8
	Total cover	74.4	74.4	76.9	64.1**	72.5	2.9	76.3	96.9	79.6	57.5**	77.6	8.1	96.9	99.5	97.3	96.6	97.6	0.7	89.8	90.0	78.0	85.1	85.7	2.8
02	Oak-Maple																								
	Vegetation	25.1	23.4	18.1	29.1**	23.9	2.3	19.4	7.6	15.1	11.0	13.3	2.6	6.5	17.6	16.1	21.8	15.5	3.3	30.6	29.5	48.1	55.0	40.8	6.4
	Litter	67.4	73.5	80.4	71.3	73.2	2.8	76.9	92.5	80.9	87.9	84.6	3.5	89.1	81.1	83.5	75.6	82.3	2.8	65.3	69.1	50.9	36.9**	55.6	7.4
	Total cover	92.5	96.9	98.5	99.1	96.8	1.5	96.3	100.0	96.0	98.9	97.8	1.0	95.6	98.7	99.6	96.1	97.5	1.0	95.9	98.6	99.0	91.9	96.4	7.7
03	Chinkapin oak																								
	Vegetation	15.9	16.0	21.9	25.0	19.7	2.3	12.9	11.1	14.1	12.1	12.6	0.7	6.3	8.8	10.1	11.4	9.2	1.1	33.1	36.8	40.3	58.8**	42.3	5.7
	Litter	71.6	79.8	72.3	69.9	73.4	2.2	77.1	88.9	82.7	82.5	82.8	2.4	81.2	85.4	85.9	78.6	82.8	1.8	58.8	59.5	53.0	33.1**	51.1	6.2
	Total cover	87.5	95.8	94.2	94.9	83.3	5.6	90.0	100.0	96.8	94.6	95.4	2.1	87.5	94.2	96.0	92.5	92.6	1.9	91.9	96.3	93.3	91.9	93.4	1.1
04	Red pine																								
	Vegetation	29.8	37.5	35.1	57.6**	34.1	2.0	25.8	14.4	42.9	32.8**	29.0	6.0	7.0	10.6	5.8	16.1**	9.9	2.3	41.6	36.8	59.7	60.0	49.5	6.1
	Litter	70.2	62.5	64.9	42.4**	60.0	6.1	74.2	85.6	57.1	67.3	71.1	6.0	93.0	89.4	94.2	83.9**	90.1	2.3	58.4	63.2	40.3	38.1	50.0	6.4
	Total cover	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	98.1	99.5	0.5
05	Sycamore-Boxelder																								
	Vegetation	70.0	66.4	82.5	67.3**	71.6	3.8	57.5	19.6	57.4	29.1**	40.9	9.8	15.5	20.6	20.4	23.5	20.0	1.7	51.3	90.0	74.6	76.9	73.2	8.1
	Litter	21.9	22.5	14.4	21.9	20.2	2.0	38.8	80.4	40.4	64.4**	56.0	10.0	81.4	79.1	47.0	51.0	64.6	9.1	45.0	10.0	16.2	17.5	22.2	7.8
	Total cover	91.9	88.9	96.9	89.1	91.7	1.9	96.3	100.0	97.8	93.5	96.9	1.4	96.9	99.7	67.4	74.5	84.6	8.1	96.3	100.0	90.8	94.4	95.4	1.9
06	Oak-Hickory																								
	Vegetation	12.1	11.4	20.1	27.9	17.9	3.9	8.1	2.3	7.6	8.4	6.6	1.5	38.6	47.0	40.2	39.1	41.2	2.0	15.6	19.4	29.4	45.0**	27.4	6.6
	Litter	52.9	55.5	65.8	52.4**	56.7	3.1	60.6	95.8	72.3	83.9**	78.2	7.6	48.3	47.9	53.1	52.8	50.5	1.4	60.7	53.3	41.9	33.8	47.4	6.0
	Total cover	65.0	66.9	85.9	83.9	75.4	5.5	68.7	98.1	79.9	92.3**	84.8	6.6	86.9	94.9	93.3	93.1	92.1	1.8	76.3	72.7	71.3	78.8	74.8	1.7
09	Walnut-Hickory-Buckeye																								
	Vegetation	29.1	33.8	50.6	48.0	40.4	5.3	16.5	13.1	27.6	32.3	22.4	4.6	8.0	30.6	16.4	34.4**	22.4	6.2	46.3	72.6	67.2	75.0	65.3	6.6
	Litter	61.9	59.3	46.0	36.9	51.0	5.9	81.4	86.6	71.5	54.0**	73.4	7.2	86.4	67.9	82.1	61.5**	74.5	5.9	48.1	26.0	31.7	21.9	31.9	5.8
	Total cover	91.0	93.1	96.6	84.9**	91.4	2.5	97.9	99.7	99.1	94.5	97.8	1.2	94.4	98.5	98.5	97.1	97.1	1.0	94.4	98.6	98.9	96.9	97.2	1.1
11	Virginia pine																								
	Vegetation	13.8	19.8	17.0	10.4	15.3	2.1	12.9	3.4	9.0	4.3	7.4	2.2	9.5	2.3	2.3	12.8**	6.7	2.7	23.0	12.6	19.4	47.5**	25.6	7.6
	Litter	73.7	76.8	82.4	85.6	79.6	2.7	74.6	96.5	90.0	94.5	88.9	5.0	89.4	96.6	97.7	87.3**	92.8	2.6	76.1	72.4	80.0	51.9**	70.1	6.3
	Total cover	87.5	96.6	99.4	96.0	94.9	2.6	87.5	99.9	99.0	98.8	96.3	3.0	98.9	98.9	100.0	100.0	99.5	0.3	99.1	85.0	99.4	99.4	95.7	2.6

*Based on mean of eight plots per cover type per sample date.

**Greater than 10 percent change in cover in sampling periods from 1978-1979 to 1979-1980.

Table B-2

Species Composition, Basal Area, and Condition of Tree and Sapling Strata by Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1980	No. in Sample Change**
Tree stratum											
Acer saccharum	Sugar maple	1.0	14.7	40.0	42.9	1	1	1	1	5	0
Fraxinus americana	White ash	0.5	1.2	20.0	3.5	3/1	8	1	1	1	0
Juglans nigra	Black walnut	0.5	4.2	20.0	12.2	1	8	1	1	1	0
Tilia americana	Basswood	0.5	14.2	20.0	41.4	1	8	1	1	3	0
Total		2.5	34.3	100.0	100.0					10	0
Sapling stratum											
No saplings occurred in plots.											

*1 = healthy, 3 = insect injury, 8 = dormant.

**Change in number of individuals from 1978-1979 to 1979-1980.

Oak-Maple Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1980	No. in Sample Change**
Tree stratum											
Acer saccharum	Sugar maple	1.0	12.6	25.0	35.5	1	8	1	1	7	0
Cornus florida	Flowering dogwood	0.5	0.8	12.5	2.3	1	8	1	1	2	0
Fraxinus americana	White ash	0.5	6.3	12.5	17.7	1	8	1	1	3	0
Juniperus virginiana	Eastern redcedar	0.5	0.4	12.5	1.1	1	1	1	1/7	1	0
Prunus serotina	Black cherry	0.5	3.0	12.5	8.5	2	2	2	7	2	0
Quercus prinus	Chestnut oak	0.5	5.8	12.5	16.3	1	8	1	1	1	+1
Quercus velutina	Black oak	0.5	6.6	12.5	18.6	1	8	1	1	1	0
Total		4.0	35.5	100.0	100.0					17	+1
Sapling stratum											
Acer saccharum	Sugar maple	1.0	1.5	100.0	100.0	1		1	1	4	0

*1 = healthy, 2 = diseased, 7 = dying, 8 = dormant.

**Change in number of individuals from 1978-1979 to 1979-1980.

Chinkapin Oak Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1980	No. in Sample Change**
Tree stratum											
Acer saccharum	Sugar maple	0.5	0.4	10.0	1.7	2	8	2	1	1	0
Fraxinus americana	White ash	1.0	5.3	20.0	22.8	1	8	1	1	7	+2
Fraxinus quadrangulata	Blue ash	0.5	1.0	10.0	4.3	1	8	1	1	2	0
Juniperus virginiana	Eastern redcedar	1.0	3.1	20.0	13.4	1	1	1	1	5	0
Quercus muehlenbergii	Chinkapin oak	1.0	12.2	20.0	52.6	3	8	3	3	11	0
Quercus rubra	Red oak	0.5	0.7	10.0	3.0	1	8	1	1	1	0
Ulmus rubra	Slippery elm	0.5	0.5	10.0	2.2	1	8	1	1	1	0
Total		5.0	23.2	100.0	100.0					28	+2
Sapling stratum											
Juniperus virginiana	Eastern redcedar	0.5	0.1	100.0	100.0	1	1	1/7	1/7	2	0

*1 = healthy, 2 = diseased, 3 = insect injury, 8 = dormant.

**Change in number of individuals from 1978-1979 to 1979-1980.

Table B-2 (Contd.)

Red Pine Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1980	No. in Sample Change**
Tree stratum											
Fraxinus americana	White ash	0.5	2.8	16.7	9.0	1	8	1	1	2	0
Liriodendron tulipifera	Yellow poplar	0.5	4.9	16.7	15.8	1	8	1	1	2	0
Pinus resinosa	Red pine	1.0	16.7	33.3	53.9	1	1	1	1	12	-1
Pinus strobus	White pine	1.0	6.6	33.3	21.3	1	1	1	1	4	0
Total		3.0	31.0	100.0	100.0					20	-1
Sapling stratum											
No saplings occurred in plots.											

*1 = healthy, 8 = dormant.

**Change in number of individuals from 1978-1979 to 1979-1980.

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1980	No. in Sample Change**
Tree stratum											
Acer negundo	Boxelder	0.5	0.6	14.3	1.2	1	8	1	1	1	0
Cornus florida	Flowering dogwood	0.5	5.5	14.3	10.4	1	8	1	1	2	0
Juglans nigra	Black walnut	0.5	4.5	14.3	8.5	1	8	1	1	2	0
Platanus occidentalis	Sycamore	0.5	36.4	14.3	68.9	1	8	1	1	4	0
Prunus serotina	Black cherry	0.5	0.4	14.3	0.8	2	8	2	2	1	0
Tilia americana	Basswood	0.5	1.0	14.3	1.9	1	8	1	1	1	0
Ulmus rubra	Slippery elm	0.5	4.4	14.3	8.3	3	8	1	1	1	0
Total		3.5	52.8	100.1	100.0					12	0
Sapling stratum											
Celtis occidentalis	Hackberry	0.5	0.1	100.0	100.0	3	8	3	3	1	-1

*1 = healthy, 2 = diseased, 3 = insect injury, 8 = dormant.

**Change in number of individuals from 1978-1979 to 1979-1980.

Oak-Hickory Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1980	No. in Sample Change**
Tree stratum											
Aesculus glabra	Ohio buckeye	1.0	3.3	28.6	8.5	2/7	8	1	2	5	0
Catalpa speciosa	Northern catalpa	0.5	3.6	14.3	9.3	1	8	1	1	1	0
Fraxinus americana	White ash	0.5	4.2	14.3	10.7	1	8	1	1	1	0
Fraxinus quadrangulata	Blue ash	0.5	14.0	14.3	36.0	1	8	1	1	8	0
Quercus rubra	Red oak	0.5	12.9	14.3	33.2	1	8	1	1	2	0
Ulmus rubra	Slippery elm	0.5	0.9	14.3	2.3	3	8	1	1	1	0
Total		3.5	38.9	100.1	100.0					18	0
Sapling stratum											
No saplings occurred in plots.											

*1 = healthy, 2 = diseased, 3 = insect injury, 7 = dying, 8 = dormant.

**Change in number of individuals from 1978-1979 to 1979-1980.

Note: Identification of ash species in this cover type has been corrected from that previously reported.

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1980	No. in Sample Change**
Tree stratum											
Aesculus glabra	Ohio buckeye	0.5	8.6	14.3	25.4	2	8	2	1	9	+1
Carya ovata	Shagbark hickory	0.5	10.3	14.3	30.4	2/3	8	1	1	2	0
Cercis canadensis	Eastern redbud	0.5	0.9	14.3	2.6	2	8	1/2	1	2	0
Fraxinus americana	White ash	1.0	4.2	28.6	12.4	1	8	1	1	3	+2
Juglans nigra	Black walnut	0.5	9.4	14.3	27.7	7	8	7	7	1	0
Ulmus rubra	Slippery elm	0.5	0.5	14.3	1.5	3	8	1	1	1	-1
Total		3.5	33.9	100.0	100.0					18	+1
Sapling stratum											
Aesculus glabra	Ohio buckeye	0.5	0.2	25.0	14.3	1	8	1	1	1	+1
Fraxinus americana	White ash	0.5	0.8	25.0	57.1	1	8	1	1	1	+1
Fraxinus quadrangulata	Blue ash	0.5	0.2	25.0	14.3	3	8	3	4	1	+1
Quercus prinus	Chestnut oak	0.5	0.2	25.0	14.3	1	8	1	1	1	+1
Total		2.0	1.4	100.0	100.0					4	+4

*1 = healthy, 2 = diseased, 3 = insect injury, 7 = dying, 8 = dormant.

**Change in number of individuals from 1978-1979 to 1979-1980.

Note: Identification of ash species in this cover type has been corrected from that previously reported.

Virginia Pine Cover Type

Scientific Name	Common Name	Frequency	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition** 1979 Sep	1979 Oct	1980 Apr	1980 Jun	No. in Sample 1979-1970	No. in Sample Change***
Tree stratum											
Fraxinus americana	White ash	0.5	0.7	25.0	1.6	NA	NA	1	1	1	NA
Juniperus virginiana	Eastern red-cedar	0.5	0.4	25.0	0.9	NA	NA	7	6	1	NA
Pinus virginiana	Virginia pine	1.0	43.2	50.0	97.5	NA	NA	1	1	12	NA
Total		2.0	44.3	100.0	100.0						
Sapling stratum											
Cornus florida	Flowering dogwood	1.0	3.0	66.7	88.3	NA	NA	1	1	4	NA
Liquidambar styraciflua	Sweetgum	0.5	0.4	33.3	11.7	NA	NA	1	1	1	NA
Total		1.5	3.4	100.0	100.0					5	

*Due to removal of 5 acres of Virginia pine cover type, plots were relocated in April 1980.

**1 = healthy, 6 = dead, 7 = dying.

***Change in individuals is not applicable (NA) since new plots were established in April 1980.

Table B-3

Species Composition, Frequency, Areal Cover, and Condition of the Shrub Stratum by Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%)/Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Maple-Basswood (01)													
Acer saccharum	Sugar maple	–	–	0.4/ 0.5	0.1/ 0.1	–	–	50.0/50.0	20.0/ 1.9	–	–	1	1
Aesculus octandra	Yellow buckeye	–	–	0.1/ 0.1	0.1/ 0.1	–	–	16.7/12.5	20.0/ 1.9	–	–	1	1
Asimina triloba	Pawpaw	0.4/ 4.0	0.4/1.6	0.3/ 0.4	0.4/ 0.6	100.0/100.0	100.0/100.0	33.3/37.5	60.0/96.2	1	1	8	1
Oak-Maple (02)													
Acer saccharum	Sugar maple	0.3/ 1.3	0.3/1.1	0.4/ 2.3	0.5/ 0.1	25.0/ 11.3	23.1/ 14.9	23.1/31.0	21.1/14.2	1	1	1	3
Aesculus octandra	Yellow buckeye	–	–	0.1/ 0.1	0.1/ 0.6	–	–	7.7/ 1.7	5.3/ 2.3	–	–	1	1
Carpinus caroliniana	Ironwood	0.1/ 0.3	0.1/0.1	–	–	8.3/ 2.6	7.7/ 1.4	–	–	1	8	–	–
Celtis occidentalis	Hackberry	0.1/ 0.5	0.1/0.4	–	0.3/ 0.8	8.3/ 4.3	7.7/ 5.4	–	10.5/ 2.8	1	1	–	3
Cornus florida	Flowering dogwood	0.3/ 7.8	0.3/5.1	0.3/ 1.5	0.4/ 0.1	25.0/ 67.8	23.1/ 68.9	15.4/20.7	15.8/39.0	1	1/8	1	1
Fraxinus americana	White ash	–	–	0.3/ 0.5	0.1/ 0.6	–	–	15.4/ 6.9	5.3/ 2.3	–	–	1	1
Prunus serotina	Black cherry	–	–	0.3/ 0.9	0.3/ 0.9	–	–	15.4/12.1	10.5/ 3.2	–	–	1	1
Smilax sp.	Greenbriar	–	0.1/0.1	–	–	–	7.7/ 1.4	–	–	–	8	–	–
Ulmus rubra	Slippery elm	0.4/ 1.6	0.4/0.6	0.4/ 2.0	0.8/ 9.9	33.3/ 13.9	30.8/ 8.1	23.1/27.6	31.6/36.2	1	8	1	3
Chinkapin Oak (03)													
Celtis occidentalis	Hackberry	0.3/ 1.4	0.1/1.4	–	0.4/ 5.6	10.7/ 12.1	7.1/ 28.0	–	20.0/21.6	3	8	–	1
Cercis canadensis	Eastern redbud	0.4/ 4.0	–	–	0.4/ 5.4	14.3/ 34.5	–	–	15.0/17.8	3	–	–	3
Fraxinus quadrangulata	Blue ash	–	–	–	0.1/ 1.5	–	–	–	5.0/ 5.0	–	–	–	1
Juniperus virginiana	Eastern redcedar	0.3/ 1.4	0.1/1.4	0.3/ 0.6	0.5/ 6.5	10.7/ 12.1	7.1/ 28.0	15.4/18.8	20.0/21.6	1/7	1	7	7
Lonicera japonica	Japanese honeysuckle	0.4/ 0.1	0.3/0.6	0.3/ 0.9	0.1/ 0.6	14.3/ 0.9	21.4/ 12.0	15.4/28.1	5.0/ 2.1	1	1	1	1
Pinus virginiana	Virginia pine	–	–	0.1/ 0.1	–	–	–	12.5/ 3.1	–	–	–	7	–
Prunus serotina	Black cherry	–	–	0.3/ 0.4	–	–	–	15.4/12.5	–	–	–	1	–
Quercus muehlenbergii	Chinkapin oak	0.1/ 0.5	0.3/0.6	–	0.1/ 0.1	3.6/ 4.3	21.4/ 12.0	–	5.0/ 6.2	1	8	–	1
Rhus aromatica	Fragrant sumac	0.3/ 0.6	0.1/0.1	–	0.1/ 1.9	10.7/ 5.2	7.1/ 2.0	–	20.0/21.2	1	8	–	1
Ulmus rubra	Slippery elm	0.5/ 1.8	0.4/0.4	0.4/ 0.6	0.5/ 6.4	17.9/ 15.5	28.6/ 8.0	25.1/18.8	5.0/ 1.2	1/3	1	1	1
Vitus rotundifolia	Muscadine grape	–	–	–	0.1/ 0.4	–	–	–	5.0/ 1.9	–	–	–	1
Zanthoxylum americanum	Prickly ash	0.5/ 1.8	0.1/0.5	0.4/ 0.6	0.1/ 0.6	17.9/ 15.5	7.1/ 10.0	23.1/18.8	5.0/ 2.1	1	8	1	1

*1 = healthy, 3 = insect injury, 6 = dead, 7 = dying, 8 = dormant.

– Taxa not present.

NA = Not applicable due to establishment of new plots in April, 1980.

Tr = Trace.

Table B-3 (Contd)

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%)/Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Red Pine (04)													
Acer saccharum	Sugar maple	0.3/ 2.4	0.3/6.0	0.4/ 7.3	0.4/ 8.8	13.0/ 21.2	17.6/ 58.8	1.2/10.0	8.6/17.9	1	1	1	1
Carya sp.	Hickory	–	–	–	0.1/ 0.3	–	–	–	2.9/ 0.5	–	–	–	1
Celtis occidentalis	Hackberry	–	–	–	0.1/ 0.3	–	–	–	2.9/ 0.5	–	–	–	1
Cercis canadensis	Eastern redbud	–	–	0.4/ 7.3	0.3/ 1.4	–	–	1.1/ 9.0	5.7/ 2.8	–	–	1	1
Cornus florida	Flowering dogwood	0.4/ 2.1	0.3/2.1	0.8/14.6	0.6/17.5	17.4/ 18.6	17.6/ 20.6	3.8/30.0	14.3/35.8	1	1/8	1	1
Fraxinus americana	White ash	0.5/ 3.6	0.3/0.3	0.4/ 2.0	0.6/ 9.8	21.7/ 31.9	17.6/ 2.9	13.6/18.6	9.8/19.9	1	6/8	1	1
Liriodendron tulipifera	Yellow poplar	–	–	0.3/ 4.9	0.1/ 0.6	–	–	0.3/ 2.0	2.9/ 2.3	–	–	1	1
Lonicera japonica	Japanese honeysuckle	0.5/ 1.6	0.4/1.1	–	–	21.7/ 14.2	23.5/ 10.8	–	–	1	1	–	–
Parthenocissus quinquefolia	Virginia creeper	0.3/ 0.8	–	–	–	13.0/ 7.1	–	–	–	1	–	–	–
Pinus strobus	White pine	–	–	12.5/ 2.4	0.1/ 0.1	–	–	0.1/ 1.0	2.9/ 0.3	–	–	1	1
Prunus serotina	Black cherry	–	0.1/0.4	0.8/14.6	0.6/ 3.1	–	5.9/ 3.9	2.0/16.0	14.3/ 6.4	–	1	1	1
Quercus muehlenbergii	Chinkapin oak	–	–	0.3/ 4.9	0.1/ 0.5	–	–	0.4/ 3.0	2.9/ 1.0	–	–	1	1
Quercus velutina	Black oak	–	–	0.4/ 7.3	0.1/ 0.3	–	–	0.4/ 3.0	2.9/ 0.5	–	–	1	1
Rosa sp.	Wild rose	–	–	0.1/ 2.4	0.1/ 0.3	–	–	0.4/ 3.0	2.9/ 0.5	–	–	1	1
Rubus phoenicolasius	Wineberry	–	–	–	0.1/ 0.1	–	–	–	2.9/ 2.0	–	–	–	1
Rubus sp.	Raspberry	–	–	0.4/ 7.3	0.3/ 0.8	–	–	0.4/ 3.0	5.7/ 1.5	–	–	1	1
Sassafras albidum	Sassafras	–	–	0.1/ 2.4	0.1/ 0.1	–	–	0.1/ 1.0	2.9/ 2.6	–	–	1	1
Ulmus rubra	Slippery elm	–	–	0.3/ 4.9	0.1/ 0.1	–	–	0.3/ 2.0	2.9/ 2.6	–	–	1	1
Vitis rotundifolia	Muscadine grape	0.3/ 0.8	0.3/0.3	0.3/ 4.9	0.4/ 1.9	13.0/ 7.1	17.6/ 2.9	0.5/ 4.0	8.6/ 3.8	1	8	1	1
Sycamore-Boxelder (05)													
Acer negundo	Boxelder	–	–	–	–	–	–	–	–	–	–	–	1
Aesculus octandra	Yellow buckeye	–	–	0.1/16.7	0.1/ 0.6	–	–	0.1/12.5	16.7/ 4.8	–	–	1	1
Cornus florida	Flowering dogwood	–	–	0.1/16.7	0.1/ 1.9	–	–	0.4/37.5	16.7/ 4.4	–	–	1	1
Fraxinus americana	White ash	–	–	0.1/16.7	–	–	–	0.1/12.5	–	–	–	1	–
Lindera benzoin	Spice bush	0.1/ 0.9	0.1/1.5	0.3/33.3	0.1/ 5.0	50.0/ 37.5	100.0/100.0	0.3/25.0	16.7/38.5	1	1	8	1
Rhus radicans	Poison ivy	–	–	0.1/16.7	–	–	–	0.1/12.5	–	–	–	1	–
Rosa sp.	Wild rose	–	–	–	0.1/ 0.1	–	–	–	16.7/ 2.9	–	–	–	1
Ulmus rubra	Slippery elm	0.1/ 1.5	–	–	0.1/ 5.0	50.0/ 62.5	–	–	16.7/38.5	1	–	–	1
Old Hickory (06)													
Catalpa speciosa	Northern catalpa	–	–	–	0.1/ 0.3	–	–	–	10.0/ 0.7	–	–	–	1
Cercis canadensis	Eastern redbud	0.4/ 4.0	0.4/2.4	0.3/ 1.0	0.4/12.5	37.3/ 24.8	37.6/ 65.4	20.0/25.0	30.0/37.5	1	8	1	1
Cornus priceae	Miss Price's dogwood	0.1/ 0.8	0.1/0.4	–	0.1/ 0.6	12.7/ 4.6	12.9/ 10.4	–	10.0/ 1.9	1	8	–	1
Fraxinus americana	White ash	–	–	0.3/ 0.5	–	–	–	20.0/12.5	–	–	–	1	–
Lonicera japonica	Japanese honeysuckle	–	–	–	0.1/ 0.6	–	–	–	10.0/ 1.9	–	–	–	1
Symphoricarpos orbiculatus	Coralberry	0.1/ 0.3	0.3/Tr	0.5/ 0.8	–	12.7/ 1.5	24.8/Tr	40.0/18.8	–	1	8	1	–
Ulmus rubra	Slippery elm	0.4/11.1	0.3/0.9	0.3/ 1.8	0.4/18.8	37.3/ 69.0	24.8/ 24.2	20.0/43.8	30.0/56.2	1	8	1	1
Zanthoxylem americanum	Prickly ash	–	–	–	0.1/ 0.6	–	–	–	10.0/ 1.9	–	–	–	1

Table B-3 (Contd)

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%)/Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Walnut-Hickory-Buckeye (09)													
Acer negundo	Boxelder	0.1/ 0.4	0.1/0.3	0.1/ 0.1	0.1/ 1.3	4.0/ 1.8	3.8/ 3.2	3.4/ 0.9	3.8/ 2.5	1	8	1	1
Acer saccharum	Sugar maple	0.4/ 5.1	0.3/2.5	0.1/ 0.4	0.4/12.3	11.6/ 24.1	11.5/ 26.3	3.4/ 3.7	11.5/24.7	1	8	1/7	1
Aesculus glabra	Ohio buckeye	–	0.1/0.1	–	–	–	3.8/ 1.1	–	–	–	8	–	-
Asimina triloba	Pawpaw	0.5/ 6.1	0.1/0.5	0.1/ 0.5	0.9/18.0	15.2/ 28.8	3.8/ 5.3	3.4/ 4.6	26.9/36.3	1	8	8	3
Carya ovata	Shagbark hickory	0.1/ 1.4	–	0.1/ 0.5	0.3/ 2.3	4.0/ 6.5	–	3.4/ 4.6	7.7/ 4.4	1	–	1	3
Cercis canadensis	Eastern redbud	–	–	–	0.1/ 2.5	–	–	–	3.8/ 0.5	–	–	–	1
Fraxinus americana	White ash	0.4/ 1.5	0.4/0.1	0.4/ 2.0	0.5/ 3.1	11.6/ 7.0	15.4/ 1.1	13.8/18.5	15.4/ 6.3	1	8	1	1
Fraxinus quadrangulata	Blue ash	0.4/ 1.8	0.1/0.3	0.3/ 0.4	0.4/ 8.8	11.6/ 8.2	3.8/ 3.2	10.3/ 3.7	11.5/17.6	1	8	1	1
Lindera benzoin	Spice bush	0.5/ 3.0	0.4/1.4	–	0.6/ 3.8	15.2/ 14.1	15.4/ 14.7	–	19.2/ 7.6	1	8	–	1
Lonicera japonica	Japanese honeysuckle	0.5/ 1.1	1.0/4.3	0.8/ 4.3	–	15.2/ 5.3	38.5/ 45.2	27.6/39.8	–	1	1	1	–
Parthenocissus quinquefolia	Virginia creeper	0.1/ 0.1	–	–	–	4.0/ 0.6	–	–	–	1	–	–	–
Prunus virginiana	Choke cherry	0.1/ 0.5	–	–	–	4.0/ 2.3	–	–	–	1	–	–	–
Rhus radicans	Poison ivy	0.1/ 0.3	0.1/Tr	0.3/ 0.3	–	4.0/ 1.2	3.8/ 0.1	10.3/ 2.8	–	1	8	1	–
Rubus sp.	Raspberry	–	–	0.3/ 0.3	–	–	–	10.3/ 2.8	–	–	–	1	–
Symphoricarpos orbiculatus	Coralberry	–	–	0.4/ 2.0	–	–	–	13.8/18.5	–	–	–	1	–
Virginia Pine (11)													
Acer saccharum	Sugar maple	NA	NA	0.1/ 5.9	0.1/ 1.0	NA	NA	0.3/ 5.4	8.3/11.1	NA	NA	1	1
Cornus florida	Flowering dogwood	NA	NA	0.1/ 5.9	0.3/ 3.1	NA	NA	0.3/ 5.4	16.7/34.7	NA	NA	1	1
Fagus grandifolia	American beech	NA	NA	0.5/23.5	–	NA	NA	0.8/16.2	–	NA	NA	1	–
Liquidambar styraciflua	Sweetgum	NA	NA	0.6/29.4	0.5/ 3.5	NA	NA	1.6/35.1	33.3/38.9	NA	NA	1	1
Prunus serotina	Black cherry	NA	NA	0.6/29.4	0.4/ 1.2	NA	NA	1.5/32.4	25.0/12.5	NA	NA	1	3
Quercus prinus	Chestnut oak	NA	NA	0.1/ 5.9	0.1/ 0.1	NA	NA	0.3/ 5.4	8.3/ 1.4	NA	NA	1	1
Sassafras albidum	Sassafras	NA	NA	–	0.1/ 0.1	NA	NA	–	8.3/ 1.4	NA	NA	–	1

Table B-4

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum by Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%)/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Acer saccharum	Sugar maple	0.6/ 5.5	0.4/ 2.9	0.3/ 0.6	0.6/ 6.9	17.2/15.9	12.0/13.8	4.4/ 1.4	15.4/15.1	1	1	1	1
Aesculus octandra	Yellow buckeye	–	–	0.1/ 0.1	–	–	–	1.5/ 0.2	–	–	–	1	–
Ariseama triphyllum	Jack-in-the-pulpit	0.1/ 0.8	–	0.3/ 0.3	0.1/ 0.3	3.5/ 2.2	–	4.4/ 0.7	2.6/ 0.7	1	–	1	1
Asarum canadense	Wild ginger	0.5/13.6	0.6/10.9	0.6/ 4.0	0.6/15.6	13.6/39.5	19.9/52.1	8.8/ 9.2	15.4/34.2	1	1	1	1
Asimina triloba	Pawpaw	–	0.1/ 0.13	–	–	–	4.1/ 0.6	–	–	–	1	–	–
Circacea alpina	Northern enchanter's nightshade	–	–	0.1/ Tr	0.3/ 5.0	–	–	1.5/ Tr	7.7/11.0	–	–	1	1
Claytonia virginica	Spring beauty	–	–	1.0/17.1	–	–	–	14.7/39.4	–	–	–	1	–
Delphinium tricorne	Larkspur	–	–	0.4/ 0.6	–	–	–	5.9/ 1.4	–	–	–	1	–
Dentaria laciniata	Cut-leaved toothwort	–	–	1.0/ 8.5	–	–	–	14.7/19.6	–	–	–	1	–
Dicentra cucullaria	Dutchman's breeches	–	–	0.6/ 6.5	–	–	–	8.8/15.0	–	–	–	1	–
Eupatorium serotinum	Late-flowering thoroughwort	0.6/ 8.4	0.6/ 3.8	–	–	17.2/24.3	19.9/17.9	–	–	1	1	–	–
Fraxinus americana	White ash	0.1/ 1.0	–	0.3/ 0.4	0.3/ 1.5	3.5/ 2.9	–	4.4/ 0.9	7.7/ 3.3	1	–	1	1
Fraxinus quadrangulata	Blue ash	0.1/ 0.13	–	–	–	3.5/ 0.4	–	–	–	1	–	–	–
Galium aparine	Cleavers	–	–	0.5/ 2.0	–	–	–	7.4/ 4.6	–	–	–	1	–
Malanthemum canadense	Canada mayflower	0.1/ 0.13	0.8/ 0.3	–	–	3.5/ 0.4	23.7/ 1.2	–	–	1	1	–	–
Monocotyledonae	Monocotyledon	–	–	–	0.8/ 5.5	–	–	–	20.5/12.1	–	–	–	1
Parthenocissus quinquefolia	Virginia creeper	0.3/ 0.6	–	0.1/ 0.4	0.3/ 2.4	6.8/ 1.8	–	1.5/ 0.9	7.7/ 5.3	3	–	1	1
Phryma leptostachya	Lopseed	0.3/ 1.3	0.1/ 0.6	–	–	6.8/ 3.6	4.1/ 3.0	–	–	1	7	–	–
Pilea pumila	Clearweed	0.5/ 2.8	0.4/ 2.3	0.4/ 1.1	0.4/ 7.5	13.6/ 8.0	12.0/10.8	5.9/ 2.5	10.3/16.4	1	1	1	1
Potentilla sp.	Cinquefoil	–	–	–	0.1/ 0.3	–	–	–	2.6/ 0.7	–	–	–	1
Ranunculus abortivus	Small-flowered buttercup	–	–	0.1/ Tr	–	–	–	1.5/ Tr	–	–	–	1	–
Rhus radicans	Poison ivy	–	–	0.1/ 0.1	–	–	–	1.5/ 0.2	–	–	–	1	–
Trillium sessile	Toadshade	–	–	0.1/ 0.1	–	–	–	1.5/ 0.2	–	–	–	1	–
Ulmus rubra	Slippery elm	0.1/ 0.1	–	0.4/ 0.4	0.3/ 0.3	3.5/ 0.4	–	5.9/ 0.9	7.7/ 0.7	1	–	1	1
Viola sororia	Woolly blue violet	0.1/ 0.1	0.1/ 0.1	0.4/ 1.2	–	3.4/ 0.4	4.1/ 0.6	5.9/ 2.8	–	1	1	1	–
Viola sp.	Violet	0.1/ 0.1	–	–	–	3.5/ 0.4	–	–	–	1	–	–	–
Vitis aestivalis	Summer grape	–	–	–	0.1/ 0.3	–	–	–	2.6/ 0.7	–	–	–	1

* 1 = healthy, 3 = insect injury, 7 = dying.

– Taxa not present.

Tr = trace.

Oak-Maple Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%)/Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Acer saccharum	Sugar maple	0.6/4.3	0.8/2.4	0.3/0.4	0.6/ 3.8	8.8/13.9	12.9/20.8	3.7/ 2.5	7.9/ 8.0	1	8	1	1
Allium canadense	Wild garlic	–	0.4/0.5	0.4/0.4	–	–	6.5/ 4.4	4.9/ 2.5	–	–	1	1	–
Anemonella thalictroides	Rue anemone	–	–	0.4/0.5	0.1/0.1	–	–	4.9/ 3.2	1.3/ 0.2	–	–	1	1
Aster divaricatus	White wood aster	0.3/2.1	0.3/0.5	–	–	3.5/ 7.0	4.3/ 4.4	–	–	1	1	–	–
Botrychium virginianum	Rattlesnake-fern	–	–	0.1/0.3	0.1/ 0.1	–	–	1.2/ 1.9	1.3/ 0.2	–	–	1	1
Carex sp.	Sedge	0.1/0.1	–	–	–	1.8/ 0.4	–	–	–	1	–	–	–
Cercis canadensis	Eastern redbud	0.1/0.1	0.1/Tr	–	–	1.8/ 0.4	2.2/Tr	–	–	1	8	–	–
Cornus florida	Flowering dogwood	0.6/1.3	0.3/0.1	0.1/Tr	0.4/ 1.4	8.8/ 4.1	4.3/ 1.1	1.2/ 0.1	5.3/ 2.9	1	1/8	1	1
Delphinium tricorne	Larkspur	–	–	0.4/1.4	–	–	–	4.9/ 8.8	–	–	–	1	–
Dentaria laciniata	Cut-leaved toothwort	–	–	0.7/2.3	–	–	–	8.5/14.5	–	–	–	1	–
Desmodium glutinosum	Point-leaved tick-trefoil	0.1/0.8	0.1/0.4	–	–	1.8/ 2.5	2.2/ 3.3	–	–	1	1	–	–
Dicentra cucullaria	Dutchman's breeches	–	–	0.5/1.1	–	–	–	6.1/ 6.9	–	–	–	1	–
Dioscorea quaternata	Wild yam	–	–	–	0.6/ 2.3	–	–	–	7.9/ 4.8	–	–	–	1
Elymus virginicus	Virginia wild rye	–	0.1/0.1	–	–	–	2.2/ 1.1	–	–	–	1	–	–
Eupatorium sp.	Thoroughwort	0.1/0.4	–	–	–	1.8/ 1.2	–	–	–	1	–	–	–
Fagus grandifolia	American beech	0.1/0.1	0.1/0.1	–	–	1.8/ 0.4	2.2/ 1.1	–	–	1	1	–	–
Fragraria virginiana	Wild strawberry	–	–	0.1/0.1	–	–	–	1.2/ 0.6	–	–	–	1	–
Fraxinus americana	White ash	0.3/0.5	0.1/0.4	0.4/0.6	0.3/ 1.6	3.5/ 1.6	2.2/ 3.3	4.9/ 3.8	3.9/ 3.4	1	1	1	1
Fraxinus quadrangulata	Blue ash	0.4/0.9	0.1/Tr	–	0.1/ 0.3	5.3/ 2.9	2.2/Tr	–	1.3/ 0.6	1	8	–	1
Galium aparine	Cleavers	–	–	0.9/3.9	–	–	–	11.0/24.6	–	–	–	1	–
Galium boreale	Northern bedstraw	0.1/0.1	0.1/0.3	–	–	1.8/ 0.4	2.2/ 2.2	–	–	1	1	–	–
Galium circaezans	White wild licorice	0.5/0.5	0.4/0.1	–	0.8/ 0.9	7.0/ 1.6	6.5/ 1.1	–	10.5/ 1.9	1	1	–	1
Geum canadense	Canadian avens	0.3/0.4	0.3/0.5	–	–	3.5/ 1.2	4.3/ 4.4	–	–	1	1/8	–	–
Hystrix patula	Bottlebrush grass	0.3/0.5	0.1/0.1	–	–	3.5/ 1.6	2.2/ 1.1	–	–	1	1	–	–
Iris cristata	Wild iris	–	–	0.1/Tr	–	–	–	1.2/ 0.1	–	–	–	1	–
Jeffersonia diphylla	Twin leaf	–	–	0.5/0.3	0.6/ 2.3	–	–	6.1/ 1.9	7.9/ 4.8	–	–	1	1
Ostrya virginiana	Ironwood	0.1/0.6	0.1/0.4	–	–	1.8/ 2.1	2.2/ 3.3	–	–	3	1	–	–
Parthenocissus quinquefolia	Virginia creeper	0.8/3.5	–	0.4/0.4	0.6/ 3.4	10.4/11.5	–	4.9/ 2.5	7.9/ 7.2	1	–	–	1
Phryma leptostachya	Lopseed	–	–	–	0.3/ 3.6	–	–	–	3.9/ 7.6	–	–	–	1
Poaceae	Grass	–	–	–	0.3/ 2.5	–	–	–	3.9/ 5.3	–	–	–	1
Potentilla sp.	Cinquefoil	–	–	0.1/Tr	–	–	–	1.2/ 0.1	–	–	–	1	–
Prunus serotina	Black cherry	0.1/0.1	0.3/0.1	0.3/0.1	0.1/ 0.1	1.8/ 0.4	4.3/ 1.1	3.7/ 0.6	1.3/ 0.2	1	1	1	1
Quercus prinus	Chestnut oak	–	–	0.1/0.1	0.1/ 0.3	–	–	1.2/ 0.6	1.3/ 0.6	–	–	1	1
Rhus radicans	Poison ivy	0.3/1.0	0.3/0.1	0.3/0.4	0.3/ 1.9	3.5/ 3.3	4.3/ 1.1	3.7/ 2.5	3.9/ 4.0	1	8	1	1
Sahguinaria canadensis	Bloodroot	–	–	0.3/0.3	0.1/ 0.6	–	–	3.7/ 1.9	1.3/ 1.3	–	–	1	1
Sanicula trifoliata	Black snakeroot	1.0/9.9	1.0/4.1	–	1.0/15.3	13.9/32.3	17.2/36.1	–	13.2/32.2	1	1	–	1/3
Smilax herbacea	Carrion-flower	0.5/0.8	0.5/0.8	–	–	7.0/ 2.5	8.6/ 6.6	–	–	1	8	–	–
Solidago sp.	Goldenrod	0.1/0.3	0.1/Tr	–	–	1.8/ 0.8	2.2/Tr	–	–	1	8	–	–
Stellaria pubera	Star chickweed	–	–	0.3/1.1	–	–	–	3.7/ 6.9	–	–	–	1	–
Ulmus rubra	Slippery elm	0.4/2.4	0.3/0.4	0.6/0.9	0.4/ 6.1	5.3/ 7.8	4.3/ 3.3	7.3/ 5.7	5.3/ 6.1	1	1/8	1	1
Viola sororia	Wooly blue violet	–	–	0.9/1.2	0.8/ 0.9	–	–	11.0/ 7.6	10.5/ 1.9	–	–	1	1

* 1 = healthy, 3 = insect injury, 8 = dormant.

– Taxa not present.

Tr = trace.

Table B-4 (Contd)

Chinkapin Oak Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%) / Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Actinomeris alternifolia	Wing stem	–	0.1/0.1	–	–	–	2.3/ 1.0	–	–	–	1	–	–
Allium canadense	Wild garlic	–	–	0.5/1.0	–	–	–	7.1/ 9.1	–	–	–	1	–
Anemonella thalictroides	Rue anemone	–	–	0.6/1.0	0.1/ 1.9	–	–	8.6/ 9.1	1.3/ 2.1	–	–	1	1
Carex sp.	Sedge	0.3/Tr	0.3/Tr	0.4/0.3	0.3/ 0.5	2.8/Tr	4.5/Tr	5.7/ 2.7	3.8/ 0.5	1	1	1	1
Celtis occidentalis	Hackberry	0.3/0.3	–	–	0.1/ 3.1	2.9/ 1.1	–	–	1.3/ 3.3	1	–	–	1
Cercis canadensis	Eastern redbud	0.4/Tr	–	–	–	4.2/Tr	–	–	–	1	–	–	–
Circaea alpina	Northern enchanter's nightshade	–	–	0.1/0.4	–	–	–	1.4/ 3.5	–	–	–	1	–
Clematis viorna	Leatherflower	–	0.1/0.1	–	–	–	2.3/ 1.0	–	–	–	1	–	–
Cynanchum laeve	Milk vine	0.1/0.3	–	–	–	1.4/ 1.1	–	–	–	1	–	–	–
Dioscorea villosa	Wild yam	0.6/1.9	0.1/0.4	–	0.8/15.9	7.0/ 8.1	2.3/ 3.1	–	10.3/17.2	1	8	–	1
Diospyros virginiana	Persimmon	0.1/0.1	–	–	–	1.4/ 0.6	–	–	–	1	–	–	–
Elymus virginicus	Virginia wild rye	0.4/0.1	0.4/0.4	–	–	4.2/ 0.6	6.8/ 3.1	–	–	1	1	–	–
Eupatorium maculatum	Spotted joe-pye-weed	0.3/0.6	0.1/Tr	–	–	2.8/ 2.7	2.3/Tr	–	–	1	1	–	–
Fraxinus americana	White ash	0.1/0.4	–	–	0.1/ 1.3	1.4/ 1.6	–	–	1.3/ 1.4	3	–	–	1
Galium circaezans	White wild licorice	0.6/0.4	0.6/0.1	–	0.3/ 1.5	7.0/ 1.6	11.3/ 1.0	–	3.8/ 1.6	1	1	–	1
Galium pilosum	Hairy bedstraw	–	–	0.6/0.5	–	–	–	8.6/ 4.5	–	–	–	1	–
Helianthus sp.	Sunflower	0.1/0.9	–	–	–	1.4/ 3.8	–	–	–	1	–	–	–
Hieracium sp.	Hawkweed	–	–	0.6/0.5	–	–	–	8.6/ 4.5	–	–	–	–	–
Jeffersonia diphylla	Twinleaf	–	–	0.4/0.3	0.4/ 3.4	–	–	5.7/ 2.7	5.1/ 3.7	–	–	1	1
Lonicera japonica	Japanese honeysuckle	0.8/7.0	0.6/6.5	0.8/2.4	0.5/17.5	8.3/30.0	11.3/52.2	11.4/21.8	6.4/18.9	1	1	1	1
Ostrya virginiana	Ironwood	0.1/0.3	–	–	–	1.4/ 1.1	–	–	–	1	–	–	–
Panicum boscii	Bosc's panicum	0.1/1.1	0.1/0.9	–	–	1.4/ 4.8	2.3/ 7.1	–	–	1	8	–	–
Parthenocissus quinquefolia	Virginia creeper	0.4/1.3	–	–	0.4/ 3.8	4.2/ 5.4	–	–	5.1/ 4.1	1	–	–	1
Pinus virginiana	Virginia pine	0.1/0.1	0.1/0.1	–	–	1.4/ 0.6	2.3/ 1.0	–	–	1	1	–	–
Poaceae	Grass	–	–	–	0.1/ 3.1	–	–	–	1.3/ 3.3	–	–	–	1
Polygonatum biflorum	Solomon's seal	–	–	0.8/2.0	0.8/ 6.9	–	–	11.4/18.2	10.3/7.5	–	–	1	1/7
Potentilla sp.	Cinquefoil	–	–	0.5/0.2	0.6/ 3.0	–	–	7.1/ 1.8	7.7/ 3.2	–	–	1	1
Prunus serotina	Black cherry	0.6/1.0	0.5/0.8	0.1/0.1	–	7.0/ 4.3	9.0/ 6.0	1.4/ 0.9	–	1	1/8	1	–
Quercus prinus	Chestnut oak	–	–	–	0.1/ 0.3	–	–	–	1.3/ 0.3	–	–	–	1
Ranunculus arbortivus	Smallflower buttercup	–	–	0.4/0.2	–	–	–	5.7/ 1.8	–	–	–	1	–
Rhus aromatica	Fragrant sumac	0.1/1.4	0.1/0.4	–	0.3/ 5.1	1.4/ 5.9	2.3/ 3.1	–	3.8/ 5.5	1	8	–	1
Rhus radicans	Poison ivy	–	–	–	0.1/ 1.3	–	–	–	1.3/ 1.4	–	–	–	1
Robinia pseudoacacia	Black locust	0.1/0.5	0.3/0.3	–	–	1.4/ 2.1	4.5/ 2.0	–	–	1	8	–	–
Ruellia caroliniensis	Hairy ruellia	0.8/1.0	0.3/0.1	–	–	8.3/ 4.3	4.5/ 1.0	–	–	1	1	–	–
Sanicula trifoliata	Black snakeroot	0.9/0.9	0.4/0.4	–	0.5/ 1.3	9.8/ 3.8	6.8/ 3.1	–	6.4/ 1.4	1	1	–	1
Smilax herbacea	Carrion-flower	0.1/0.1	0.1/0.1	–	0.1/ 0.5	1.4/ 0.6	2.3/ 1.0	–	1.3/ 0.5	1	1	–	1
Solidago ulmifolia	Goldenrod	0.4/1.6	0.5/0.9	–	–	4.2/ 7.0	9.0/ 7.1	–	–	1	1	–	–
Solidago sp.	Goldenrod	0.1/0.1	0.1/0.1	–	0.6/ 4.3	1.4/ 0.6	2.3/ 1.0	–	7.7/ 4.6	1	8	–	1
Swertia caroliniensis	Columbo	–	–	0.8/1.9	0.6/10.5	–	–	11.4/17.3	7.7/11.3	–	–	1	1
Taraxicum officinale	Dandelion	–	–	–	0.1/ 0.1	–	–	–	1.3/ 0.1	–	–	–	1
Thalictrum revolutum	Waxy meadow-rue	0.4/0.5	0.4/0.4	–	0.3/ 3.3	4.2/ 2.1	6.8/ 3.1	–	3.8/ 3.6	1	1	–	1
Ulmus rubra	Slippery elm	0.3/0.6	0.1/0.3	0.3/0.1	0.3/ 1.4	2.8/ 2.7	2.3/ 2.0	4.3/ 0.9	3.8/ 1.5	1	8	1	1
Viola sororia	Woolly blue violet	0.1/Tr	–	0.1/0.1	0.1/ 0.1	1.4/Tr	–	1.4/ 0.9	1.3/ 0.1	1	–	1	1
Vitis aestivalis	Summer grape	0.1/0.3	0.1/0.1	–	–	1.4/ 1.1	2.3/ 1.0	–	–	1	8	–	–
Zanthoxylum americanum	Prickly ash	0.1/0.6	–	–	0.2/ 2.5	1.4/ 2.7	–	–	2.6/ 2.7	1	–	–	1

* 1 = healthy, 3 = insect injury, 7 = dying, 8 = dormant.

– Taxa not present.

Tr = trace.

Table B-4 (Contd)

Red Pine Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%) / Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Acer rubrum	Red maple	–	–	–	0.1/ 0.3	–	–	–	1.3/ 0.4	–	–	–	1
Acer saccharum	Sugar maple	0.1/ 0.5	–	–	–	1.5/ 0.9	–	–	–	1	–	–	–
Carex sp.	Sedge	0.3/ 0.3	0.1/ 0.1	0.1/0.3	0.3/ 0.5	2.9/ 0.5	1.9/ 0.6	1.6/ 1.8	3.9/ 0.6	1	1	1	1
Caryophyllaceae	Chickweed	–	0.1/Tr	–	–	–	1.9/Tr	–	–	–	1	–	–
Cercis canadensis	Eastern redbud	0.8/ 3.0	0.5/ 1.0	0.1/0.1	0.6/ 5.6	8.7/ 5.4	7.3/ 4.4	1.6/ 0.6	7.8/ 7.3	1	1	1	1
Circaea alpina	Northern enchanger's nightshade	–	–	–	0.1/ 1.3	–	–	–	1.3/ 1.7	–	–	–	1
Cornus florida	Flowering dogwood	0.6/16.5	0.6/ 8.5	0.3/0.4	0.6/11.8	7.3/29.9	9.2/37.4	4.8/ 2.5	7.8/15.3	1	1	1	1
Cruciferae	Mustard	–	0.1/Tr	–	–	–	1.9/Tr	–	–	–	1	–	–
Dentaria lacinata	Cut-leaved toothwort	–	–	0.4/0.9	–	–	–	6.3/ 5.5	–	–	–	1	–
Desmodium glutinosum	Point-leaved tick-trefoil	0.1/ 1.3	0.1/ 1.0	–	–	1.5/ 2.3	1.9/ 4.4	–	–	1	1	–	–
Dioscorea quaternata	Wild yam	–	–	–	0.1/ 1.0	–	–	–	1.3/ 1.3	–	–	–	1
Eupatorium serotinum	Late-flowering thoroughwort	0.1/ 0.6	0.3/ 0.4	–	–	1.5/ 1.1	3.6/ 1.7	–	–	1	1	–	–
Fagus grandifolia	American beech	0.1/ 0.1	0.3/ 0.3	–	–	1.5/ 0.2	3.6/ 1.1	–	–	1	1/8	–	–
Fragaria virginiana	Wild strawberry	0.3/ 0.3	0.1/ 0.1	0.5/1.6	0.1/ 1.0	2.9/ 0.5	1.9/ 0.6	7.9/ 9.8	1.3/ 1.3	1	1	1	1
Fraxinus americana	White ash	0.6/ 5.9	0.1/ 0.1	0.4/0.3	0.1/ 1.3	7.3/10.7	1.9/ 0.6	6.3/ 1.8	1.3/ 1.7	1	1	1	1
Galium aparine	Cleavers	–	–	0.3/0.3	0.5/ 2.5	–	–	4.8/ 1.8	6.5/ 3.2	–	–	1	1
Galium asprellum	Northern bedstraw	0.3/ 1.8	0.1/ 0.1	–	–	2.9/ 3.2	1.9/ 0.6	–	–	1	1	–	–
Galium circaezans	White wild licorice	0.4/ 1.3	0.6/ 1.8	0.4/1.1	0.1/ 0.3	4.4/ 2.3	9.2/ 7.7	6.3/ 6.7	1.3/ 0.4	1	1	1	1
Geum canadense	Canadian avens	0.1/ 0.9	0.1/ 0.1	–	–	1.5/ 1.6	1.9/ 0.6	–	–	1	1	–	–
Hieracium sp.	Hawkweed	–	0.1/ 0.1	–	–	–	1.9/ 0.6	–	–	–	1	–	–
Liriodendron tulipifera	Yellow poplar	0.1/ 0.1	–	0.1/Tr	0.1/ 0.3	1.5/ 0.2	–	1.6/Tr	1.3/ 0.4	1	–	1	1
Lonicera japonica	Japanese honeysuckle	0.6/10.6	0.6/10.5	0.8/8.1	0.8/20.0	7.3/19.3	9.2/47.0	2.7/49.6	10.4/25.9	1	1	1	1
Monocotyledoneae	Monocotyledon	–	–	0.1/0.1	–	–	–	1.6/ 0.6	–	–	–	1	–
Parthenocissus quinquefolia	Virginia creeper	0.6/ 2.8	–	0.3/0.3	0.6/11.4	7.3/ 5.0	–	4.8/ 1.8	7.8/14.8	1	–	1	1
Phryma leptostachya	Lopseed	0.4/ 2.3	0.1/ 0.9	–	0.1/ 0.6	4.4/ 4.1	1.9/ 3.9	–	1.3/ 0.8	1	7	–	1
Pinus strobus	White pine	0.1/Tr	0.3/ 0.1	0.4/Tr	0.1/ 0.3	1.5/Tr	3.6/ 0.6	6.3/Tr	1.3/ 0.4	1	1	1	1
Poaceae	Grass	–	0.1/ 0.3	–	0.1/ 0.3	–	1.9/ 1.1	–	1.3/ 0.4	–	1	–	1
Potentilla sp.	Cinquefoil	–	–	0.3/0.4	0.8/ 1.8	–	–	4.8/ 2.5	10.4/ 2.3	–	–	1	1
Prunus serotina	Black cherry	0.6/ 1.0	0.6/ 1.1	0.4/0.8	0.5/ 3.0	7.3/ 1.8	9.2/ 5.0	6.3/ 4.9	6.5/ 3.9	1	1	1	1
Quercus prinus	Chestnut oak	0.3/ 1.0	0.3/ 0.6	–	–	2.9/ 1.8	3.6/ 2.8	–	–	1	1	–	–
Quercus velutina	Black oak	0.3/ 1.4	0.3/ 1.1	–	0.1/ 0.6	2.9/ 2.5	3.6/ 5.0	–	1.3/ 0.8	1	1/8	–	1
Rhus radicans	Poison ivy	0.4/ 0.8	–	0.5/1.1	0.5/ 6.0	4.4/ 1.4	–	7.9/ 6.7	6.5/ 7.8	1	–	1	1
Rosa sp.	Wild rose	0.1/ 0.4	0.1/ 0.1	0.1/0.1	0.1/ 0.6	1.5/ 0.7	1.9/ 0.6	1.6/ 0.6	1.3/ 0.8	1	8	1	1
Rosaceae	Rose family	–	–	0.1/0.1	0.1/ 0.3	–	–	1.6/ 0.6	1.3/ 0.4	–	–	–	1
Rubus sp.	Blackberry	0.4/ 1.4	0.5/ 1.5	0.3/0.1	0.3/ 1.1	4.4/ 2.5	7.3/ 6.6	4.8/ 0.6	3.9/ 1.4	1	1	1	1
Sanicula trifoliata	Black snakeroot	0.5/ 1.1	0.3/ 0.5	–	0.5/ 4.5	5.8/ 2.0	3.6/ 2.2	–	6.5/ 5.8	7	1	–	1
Sassafras albidum	Sassafras	0.1/ 0.1	0.4/ 1.5	–	–	1.5/ 0.2	5.5/ 6.6	–	–	1	8	–	–
Taraxicum officinale	Dandelion	0.1/Tr	0.1/Tr	0.4/0.2	0.1/ 0.4	1.5/Tr	1.9/Tr	6.3/ 1.2	1.3/ 0.5	1	1	1	1
Ulmus rubra	Slippery elm	0.3/ 0.9	0.1/ 0.4	–	0.3/ 0.4	2.9/ 1.6	1.9/ 1.7	–	3.9/ 0.5	1/3	1	–	1

* 1 = healthy, 3 = insect injury, 7 = dying, 8 = dormant.

– Taxa not present.

Tr = trace.

Table B-4 (Contd)

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%) / Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Acer negundo	Boxelder	–	0.1/Tr	–	0.3/ 3.4	–	2.0/Tr	–	5.5/ 2.6	–	8	–	1
Actinomeris alternifolia	Wing-stem	0.4/ 4.5	0.4/2.9	–	0.6/17.1	5.1/ 6.1	5.9/10.0	–	10.9/12.9	1	1	–	1
Asarum canadense	Wild ginger	–	–	–	0.1/ 0.1	–	–	–	1.8/ 0.1	–	–	–	1
Boehmeria cylindrica	False nettle	–	0.1/0.5	–	–	–	2.0/ 1.7	–	–	–	1	–	–
Cardamine pratensis	Meadow bittercress	–	–	0.1/0.1	–	–	–	2.1/ 0.8	–	–	–	1	–
Carex sp.	Sedge	0.6/ 4.8	0.5/3.1	0.4/3.1	0.5/21.0	8.5/ 6.5	7.8/10.9	8.3/23.7	9.1/15.8	1	1	1	1
Circaea alpina	Northern enchanter's nightshade	0.3/ 0.5	–	0.1/1.5	1.0/40.6	3.4/ 0.7	–	2.1/11.5	18.2/30.6	1	–	1	1
Claytonia virginica	Spring beauty	–	–	0.5/2.5	–	–	–	10.4/19.1	–	–	–	1	–
Commelina sp.	Dayflower	0.1/ 0.4	0.1/0.5	–	0.1/ 0.4	1.7/ 0.5	2.0/ 1.7	–	1.8/ 0.3	1	1	–	1
Corydalis flavula	Yellow fumewort	–	–	0.1/0.1	–	–	–	2.1/ 0.8	–	–	–	1	–
Cornus florida	Flowering dogwood	0.1/ 2.4	0.1/0.4	–	–	1.7/ 3.2	2.0/ 1.3	–	–	1	8	–	–
Dentaria lacinata	Cut-leaved toothwort	–	–	0.3/0.8	–	–	–	6.3/ 6.1	–	–	–	1	–
Dioscorea quaternata	Wild yam	–	–	–	0.1/ 1.3	–	–	–	1.8/ 1.0	–	–	–	1
Elymus virginicus	Virginia wild rye	0.1/ 0.3	0.1/0.4	–	–	1.7/ 0.3	2.0/ 1.3	–	–	1	1	–	–
Erigeron sp.	Fleabane	–	0.3/0.4	–	–	–	3.9/ 1.3	–	–	–	1	–	–
Eupatorium serotinum	Late-flowering thoroughwort	0.8/11.0	1.0/7.3	–	–	10.5/15.0	15.5/25.3	–	–	1	1	–	–
Galium aparine	Cleavers	–	–	0.1/0.3	0.1/ 0.4	–	–	2.1/ 2.3	1.8/ 0.3	–	–	1	1
Galium circaezans	White wild licorice	–	0.1/Tr	–	–	–	2.0/Tr	–	–	–	1	–	–
Galium triflorum	Fragrant bedstraw	–	–	0.1/0.3	–	–	–	2.1/ 2.3	–	–	–	1	–
Geum canadense	Canadian avens	0.5/ 4.9	0.4/1.5	–	–	6.7/ 6.6	6.9/ 5.2	–	–	1	1	–	–
Hypericum sp.	St. John's-wort	–	–	0.3/0.4	–	–	–	6.3/ 3.1	–	–	–	1	–
Impatiens biflora	Jewelweed	0.1/ 1.0	–	–	–	1.7/ 1.4	–	–	–	1	–	–	–
Impatiens pallida	Yellow jewelweed	0.9/16.0	0.6/2.1	–	–	11.8/21.8	9.8/ 7.4	–	–	1	8	–	–
Laportea canadensis	Wood nettle	0.5/ 6.9	0.3/0.6	–	–	6.7/ 9.4	3.9/ 2.2	–	–	1	1/8	–	–
Lindera benzoin	Spice bush	0.3/ 0.9	0.1/0.3	–	–	3.4/ 1.2	2.0/ 0.9	–	–	1	1	–	–
Osmorhiza claytonii	White snakeroot	0.1/ 0.4	–	0.1/0.3	–	1.7/ 0.5	–	0.1/ 2.3	–	1	–	1	–
Parthenocissus quinquefolia	Virginia creeper	0.1/Tr	–	0.1/0.1	0.3/ 2.1	1.7/Tr	–	0.1/ 0.8	5.5/ 1.6	1	–	1	1
Phryma leptostachya	Lopseed	0.4/ 0.8	0.1/0.4	–	1.0/33.0	5.1/ 1.0	2.0/ 1.3	–	18.2/24.9	1	1	–	1
Pilea pumila	Clearweed	0.9/16.6	0.9/6.9	0.8/1.1	–	11.8/22.7	13.6/24.0	16.7/ 8.4	–	1	1	1	–
Poaceae	Grass	–	–	0.5/0.4	–	–	–	10.4/ 3.1	–	–	–	1	–
Polygonum cespitosum	Long-bristled smartweed	0.3/ 0.5	0.4/0.5	–	–	3.4/ 0.7	5.9/ 1.7	–	–	1	1	–	–
Potentilla sp.	Cinquefoil	–	–	0.4/0.4	–	–	–	8.3/ 3.1	–	–	–	1	–
Rhus radicans	Poison ivy	0.3/ 0.6	–	0.4/0.2	–	3.4/ 0.9	–	8.3/ 1.5	–	1	–	1	–
Rosa sp.	Wild rose	0.1/Tr	0.1/Tr	–	–	1.7/Tr	2.0/Tr	–	–	1	1	–	–
Sanicula trifoliata	Black snakeroot	–	0.3/0.6	–	0.9/ 9.1	–	3.9/ 2.2	–	16.4/ 6.9	–	1	–	1
Viola sororia	Woolly blue violet	0.6/ 1.1	0.4/0.4	0.5/1.5	0.5/ 4.1	8.5/ 1.5	5.9/ 1.3	10.4/11.5	9.1/ 3.1	1	1	1	1

* 1 = healthy, 8 = dormant.

– Taxa not present.

Tr = trace.

Table B-4 (Contd)

Oak-Hickory Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%) / Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Aesculus glabra	Ohio buckeye	–	–	–	0.1/ 1.0	–	–	–	1.8/ 1.8	–	–	–	1
Arisaema triphyllum	Jack-in-the-pulpit	–	–	0.4/ 0.4	–	–	–	4.5/ 1.0	–	–	–	1	–
Cardamine douglassii	Purple cress	–	–	0.5/ 0.5	–	–	–	5.7/ 1.3	–	–	–	1	–
Carex sp.	Sedge	0.4/Tr	0.3/0.1	–	0.3/ 1.1	7.9/Tr	7.9/ 1.3	–	5.4/ 1.9	1	1	–	1
Cercis canadensis	Eastern redbud	0.5/0.8	0.1/0.1	–	0.1/ 1.3	10.4/ 2.8	4.1/ 1.3	–	1.8/ 2.3	1	1	–	1
Circaea alpina	Northern enchanter's nightshade	0.1/0.1	–	–	–	2.7/ 0.5	–	–	–	1	–	–	–
Delphinium tricorne	Larkspur	–	–	1.0/ 3.6	–	–	–	11.4/ 9.2	–	–	–	1	–
Dentaria laciniata	Cut-leaved toothwort	–	–	0.6/ 1.3	–	–	–	6.8/ 3.3	–	–	–	1	–
Erythronium albidum	Trout-lily	–	–	0.5/10.0	–	–	–	5.7/25.4	–	–	–	1	–
Eupatorium serotinum	Late-flowering thoroughwort	0.9/6.1	0.9/2.9	–	–	18.3/22.6	27.8/29.4	–	–	1	1	–	–
Fraxinus americana	White ash	–	–	–	0.4/ 1.6	–	–	–	7.1/ 2.8	–	–	–	1
Fraxinus quadrangulata	Blue ash	0.3/1.1	–	–	–	5.2/ 4.2	–	–	–	1	–	–	–
Galium aparine	Cleavers	–	–	0.8/ 0.7	–	–	–	9.1/ 1.8	–	–	–	1	–
Galium circaezans	White wild licorice	–	–	–	0.1/ 0.6	–	–	–	1.8/ 1.1	–	–	–	1
Geum canadense	Canadian avens	0.3/0.9	0.4/0.4	–	–	5.2/ 3.2	12.0/ 3.9	–	–	1	1	–	–
Hystrix patula	Bottlebrush	0.1/0.3	0.3/0.1	–	–	2.7/ 0.9	7.9/ 1.3	–	–	1	1	–	–
Lonicera japonica	Japanese honeysuckle	0.4/5.0	0.5/4.5	0.4/ 5.0	0.4/10.6	7.9/18.4	14.8/46.0	4.5/12.7	7.1/18.6	1	1	1	1
Mertensia virginica	Virginia bluebells	–	–	1.0/12.5	–	–	–	1.4/31.8	–	–	–	1	–
Monocotyledoneae	Monocotyledon	–	–	0.1/ 0.3	–	–	–	1.1/ 0.8	–	–	–	1	–
Muhlenbergia sobolifera	Muhly grass	0.1/0.5	–	–	–	2.7/ 1.8	–	–	–	1	–	–	–
Parthenocissus quinquefolia	Virginia creeper	1.0/8.1	–	0.8/ 1.1	1.0/21.5	20.8/29.9	–	9.1/ 2.8	17.9/37.7	1	–	1	1
Phryma leptostachya	Lopseed	–	–	–	0.9/ 8.9	–	–	–	16.1/15.6	–	–	–	1
Pilea pumila	Clearweed	–	–	0.6/ 0.6	–	–	–	6.8/ 1.5	–	–	–	1	–
Poaceae	Grass	–	–	0.6/ 1.1	0.4/ 2.3	–	–	6.8/ 2.8	7.1/ 4.0	–	–	1	1
Potentilla sp.	Cinquefoil	–	–	–	0.4/ 1.6	–	–	–	7.1/ 2.8	–	–	–	1
Prunus serotina	Black cherry	–	0.1/Tr	–	–	–	4.1/Tr	–	–	–	1	–	–
Rhus radicans	Poison ivy	–	–	0.1/Tr	0.4/ 0.6	–	–	1.1/Tr	7.1/ 1.1	–	–	1	1
Ribes sp.	Current	0.1/0.1	–	–	–	2.7/ 0.5	–	–	–	1	–	–	–
Rubus sp.	Blackberry	–	0.3/0.1	0.1/ 0.3	0.1/ 0.3	–	7.9/ 1.3	1.1/ 0.8	1.8/ 0.5	–	1	1	1
Sanguinaria canadensis	Bloodroot	–	–	0.1/Tr	0.1/ 0.3	–	–	1.1/Tr	1.8/ 0.5	–	–	1	1
Sanicula trifoliata	Black snakeroot	–	0.1/0.1	–	–	–	4.1/ 1.3	–	–	–	1	–	–
Smilacina racemosa	False Solomon's seal	0.1/0.1	–	0.3/ 0.3	0.3/ 0.8	2.7/ 0.5	–	3.4/ 0.8	5.4/ 1.4	1	–	1	1
Solidago sp.	Goldenrod	0.1/0.1	–	–	–	2.7/ 0.5	–	–	–	1	–	–	–
Trillium sessile	Toadshade	–	–	0.5/ 1.0	0.5/ 0.8	–	–	5.7/ 2.5	8.9/ 1.4	–	–	1	1
Ulmus rubra	Slippery elm	0.3/1.6	0.1/0.1	0.4/ 0.6	–	5.2/ 6.0	4.1/ 1.3	4.5/ 1.5	–	1	8	1	–
Vitis aestivalis	Summer grape	0.1/2.3	0.1/1.3	–	0.1/ 3.8	2.7/ 8.3	4.1/12.8	–	1.8/ 6.7	1	8	–	1

* 1 = healthy, 8 = dormant.

– Taxa not present.

Tr = trace.

Table B-4 (Contd)

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1979 Apr	1980 Jun	Relative Frequency (%) / Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Acer negundo	Boxelder	0.1/ 0.4	0.3/ 0.5	–	–	1.8/ 0.8	–	–	–	3	1/3	–	–
Acer saccharum	Sugar maple	0.1/Tr	–	–	–	1.8/Tr	–	–	–	1	–	–	–
Actinomeris alternifolia	Wingstem	0.4/ 1.8	0.1/ 0.5	–	–	5.3/ 3.5	2.1/ 1.6	–	–	1	3	–	–
Anemone canadense	Canadian anemone	0.1/ 0.1	–	–	–	1.8/ 0.3	–	–	–	1	–	–	–
Asimina triloba	Pawpaw	0.4/ 4.5	0.4/ 1.5	–	0.3/ 4.6	5.3/ 9.0	6.0/ 4.7	–	4.5/ 4.6	1	8	–	1
Carex sp.	Sedge	0.3/ 0.1	0.1/Tr	–	0.1/ 0.1	3.5/ 0.3	2.1/Tr	–	1.5/ 0.1	1	1	–	1
Carya cordiformis	Bitternut hickory	0.4/ 0.8	0.1/Tr	–	–	5.3/ 1.5	2.1/Tr	–	–	1	8	–	–
Carya ovata	Shagbark hickory	–	–	0.6/ 0.6	0.3/ 1.5	–	–	8.2/ 1.7	4.5/ 1.5	–	–	1	1
Cercis canadensis	Eastern redbud	0.1/Tr	0.1/Tr	–	0.1/ 0.1	1.8/Tr	2.1/Tr	–	1.5/ 0.1	1	1	–	1
Circaea alpina	Northern enchanter's nightshade	0.1/ 0.1	–	–	–	1.8/ 0.3	–	–	–	1	–	–	–
Dentaria laciniata	Cut-leaved toothwort	–	–	1.0/13.9	–	–	–	13.7/39.8	–	–	–	1	–
Dicentra cucullaria	Dutchman's breeches	–	–	1.0/ 4.4	–	–	–	13.7/12.6	–	–	–	1	–
Eupatorium serotinum	Late-flowering thoroughwort	0.8/ 3.9	0.6/ 1.6	–	–	10.4/ 7.8	10.0/ 5.1	–	–	1	1	–	–
Fraxinus americana	White ash	0.1/ 0.4	0.3/ 0.6	–	0.6/ 4.8	1.8/ 0.8	4.0/ 2.0	–	9.0/ 4.8	1	8	–	1
Fraxinus quadrangulata	Blue ash	0.4/ 1.0	0.3/ 0.4	–	–	5.3/ 2.0	4.0/ 1.2	–	–	1	8	–	–
Galium triflorum	Fragrant bedstraw	–	–	0.6/ 0.4	–	–	–	8.2/ 1.1	–	–	–	1	–
Geum canadense	Canadian avens	0.1/ 0.1	–	–	–	1.8/ 0.3	–	–	–	1	–	–	–
Glechoma hederacea	Gill-over-the-ground	0.1/Tr	0.1/Tr	–	–	1.8/Tr	2.1/Tr	–	–	1	1	–	–
Lindera benzoin	Spice bush	0.3/ 0.4	0.6/ 1.1	–	0.3/ 1.6	3.5/ 0.8	1.0/ 3.5	–	4.5/ 1.6	1	1	–	1
Lonicera japonica	Japanese honeysuckle	1.0/27.6	1.0/23.6	1.0/12.5	1.0/53.1	13.9/55.5	15.8/73.8	13.7/35.8	14.9/53.3	1	1	1	1
Monocotyledoneae	Monocotyledon	–	–	0.5/ 0.2	0.6/ 4.5	–	–	6.8/ 0.6	9.0/ 4.5	–	–	1	1
Parietaria pennsylvanica	Pellitory	0.1/ 1.0	–	–	–	1.8/ 2.0	–	–	–	1	–	–	–
Parthenocissus quinquefolia	Virginia creeper	–	–	–	0.9/10.4	–	–	–	13.4/10.4	–	–	–	1
Potentilla sp.	Cinquefoil	–	–	0.6/ 1.1	0.5/ 3.1	–	–	8.2/ 3.2	7.5/ 3.1	–	–	1	1
Prunus serotina	Black cherry	0.3/ 0.4	0.1/ 0.3	–	–	3.5/ 0.8	2.1/ 0.8	–	–	1	1	–	–
Ranunculus arbortivus	Smallflower buttercup	–	–	0.3/ 0.3	–	–	–	4.1/ 0.9	–	–	–	1	–
Ranunculus sp.	Buttercup	–	–	0.1/Tr	–	–	–	1.4/Tr	–	–	–	1	–
Rhus radicans	Poison ivy	0.5/ 4.8	0.1/Tr	0.6/ 0.6	0.8/ 9.9	6.9/ 9.5	2.1/Tr	8.2/ 1.7	11.9/ 9.9	3	1	1	1
Rosa sp.	Wild rose	–	0.1/Tr	–	0.1/ 0.5	–	2.1/Tr	–	1.5/ 0.5	–	1	–	1
Rubus sp.	Blackberry	–	0.3/ 0.9	–	0.1/ 1.3	–	4.0/ 2.7	–	1.5/ 1.3	–	1	–	1
Sanicula trifoliata	Black snakeroot	0.6/ 1.3	0.6/ 0.5	–	0.4/ 1.0	8.7/ 2.5	10.0/ 1.6	–	6.0/ 1.0	1	1	–	1
Smilax herbacea	Carrion flower	–	0.1/Tr	–	–	–	2.1/Tr	–	–	–	1	–	–
Symphoricarpos orbiculatus	Coral berry	0.3/ 0.9	0.4/ 0.3	0.3/ 0.3	–	3.5/ 1.8	6.0/ 0.8	4.1/ 0.9	–	1	8	1	–
Taraxacum officinale	Dandelion	–	–	0.3/Tr	–	–	–	4.1/Tr	–	–	–	1	–
Trillium sessile	Toadshade	–	–	0.1/ 0.3	–	–	–	1.4/ 0.9	–	–	–	1	–
Ulmus rubra	Slippery elm	0.1/ 0.1	0.3/ 0.3	–	–	1.8/ 0.3	4.0/ 0.8	–	–	1	1	–	–
Viola sororia	Woolly blue violet	0.1/Tr	0.3/Tr	0.3/ 0.3	0.3/ 1.0	1.8/Tr	4.0/Tr	4.1/ 0.9	4.5/ 1.0	3	1/3	1	1
Vitis aestivalis	Summer grape	–	–	–	0.3/ 2.1	–	–	–	4.5/ 2.1	–	–	–	1

* 1 = healthy, 3 = insect injury, 8 = dormant.

– Taxa not present.

Tr = trace.

Table B-4 (Contd)

Virginia Pine Cover Type

Scientific Name	Common Name	Frequency/Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Relative Frequency (%) / Relative Areal Cover (%) 1979 Sep	1979 Oct	1980 Apr	1980 Jun	Mode Condition* 1979 Sep	1979 Oct	1980 Apr	1980 Jun
Acer rubrum	Red maple	NA	NA	0.3/0.1	0.4/ 3.5	NA	NA	5.1/ 0.8	6.3/ 6.7	NA	NA	1	1
Acer saccharum	Sugar maple	NA	NA	0.1/0.3	–	NA	NA	1.7/ 2.3	–	NA	NA	1	–
Cornus florida	Flowering dogwood	NA	NA	0.6/0.6	0.6/ 1.4	NA	NA	10.2/ 4.6	9.5/ 2.7	NA	NA	1	1
Dioscorea quaternata	Wild yam	NA	NA	–	0.1/ 1.3	NA	NA	–	1.6/ 2.5	NA	NA	–	1
Fagus grandifolia	American beech	NA	NA	0.3/Tr	0.4/ 3.1	NA	NA	5.1/ 0.1	6.3/ 5.9	NA	NA	1	1
Fragraria virginiana	Wild strawberry	NA	NA	0.1/Tr	0.1/ 1.0	NA	NA	1.7/ 0.1	1.6/ 1.9	NA	NA	1	1
Galium circaezans	White wild licorice	NA	NA	–	0.6/ 1.8	NA	NA	–	9.5/ 3.4	NA	NA	–	1
Galium pilosum	Hairy bedstraw	NA	NA	0.6/0.5	–	NA	NA	10.2/ 3.8	–	NA	NA	1	–
Galium triflorum	Fragrant bedstraw	NA	NA	0.4/0.4	0.1/ 1.0	NA	NA	6.8/ 3.1	1.6/ 1.9	NA	NA	1	1
Liriodendron tulipifera	Yellow poplar	NA	NA	0.1/Tr	0.1/Tr	NA	NA	1.7/ 0.1	1.6/Tr	NA	NA	1	1
Lonicera japonica	Japanese honeysuckle	NA	NA	0.4/4.5	0.4/10.4	NA	NA	6.8/34.5	6.3/19.6	NA	NA	1	1
Osmorhiza claytoni	Sweet cicely	NA	NA	0.3/0.9	0.3/ 6.5	NA	NA	5.1/ 6.9	4.8/12.4	NA	NA	1	1
Oxalis stricta	Yellow wood-sorrel	NA	NA	0.1/1.9	–	NA	NA	1.7/14.6	–	NA	NA	1	–
Parthenocissus quinquefolia	Virginia creeper	NA	NA	0.5/0.8	0.8/ 5.3	NA	NA	8.5/ 6.1	12.7/10.1	NA	NA	1	1
Poaceae	Grass	NA	NA	0.1/0.3	0.1/ 0.6	NA	NA	1.7/ 2.3	1.6/ 1.1	NA	NA	1	1
Potentilla sp.	Cinquefoil	NA	NA	0.8/1.0	–	NA	NA	13.6/ 7.7	–	NA	NA	1	–
Prunus serotina	Black cherry	NA	NA	0.4/0.4	0.5/ 1.3	NA	NA	6.8/ 3.1	7.9/ 2.5	NA	NA	1	1
Quercus prinus	Chestnut oak	NA	NA	0.4/Tr	0.6/ 2.4	NA	NA	6.8/ 0.1	9.5/ 4.6	NA	NA	1	1
Rhus radicans	Poison ivy	NA	NA	0.4/1.3	0.4/ 7.5	NA	NA	6.8/10.0	6.3/ 4.3	NA	NA	1	1
Rubus sp.	Blackberry	NA	NA	–	0.1/ 0.6	NA	NA	–	1.6/ 1.1	NA	NA	–	1
Sanicula trifoliata	Black snakeroot	NA	NA	–	0.6/ 4.3	NA	NA	–	9.5/ 8.2	NA	NA	–	1
Sassafras albidum	Sassafras	NA	NA	–	0.1/ 0.6	NA	NA	–	1.6/ 1.1	NA	NA	–	1

* 1 = healthy.

NA = Not applicable due to establishment of new plots in April, 1980.

– Taxa not present.

Tr = trace.

Table B-5

Mean ($\bar{x}$) and Standard Error (SE)* Values for
Soils Parameters for Each Vegetation Cover Type

Soil Moisture (%)

Cover Type	Code	Sep 1979		Oct 1979		Apr 1980		Jun 1980	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Maple-Basswood	01	35.4	0.9	35.7	1.0	39.5	2.3	31.6	2.9
Oak-Maple	02	30.2	1.5	34.8	0.9	33.9	2.9	25.6	2.4
Chinkapin Oak	03	30.1	0.6	33.8	1.8	33.1	3.4	22.4	1.6
Red pine	04	23.7	1.5	26.0	1.2	27.0	1.5	18.2	1.7
Sycamore-Boxelder	05	26.8	1.3	28.0	2.1	27.4	2.3	23.4	2.1
Oak-Hickory	06	29.1	3.0	27.5	2.4	17.9	1.3	20.2	0.9
Walnut-Hickory-Buckeye	09	31.6	1.9	41.8	1.6	32.7	1.3	34.6	0.9
Orchard**	10	22.5	1.5	19.6	2.3	–	–	–	–
Virginia pine	11	20.1	2.4	25.9	1.5	32.3	3.9	21.0	0.7

*Based on four replicates per cover type per date sampled.

**Data collection terminated after October 1979.

Soil Bulk Density (g/cm^3)

Cover Type	Code	Sep 1979		Oct 1979		Apr 1980		Jun 1980	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Maple-Basswood	01	0.96	0.04	1.01	0.03	0.83	0.06	0.94	0.01
Oak-Maple	02	0.99	0.05	0.96	0.03	0.92	0.06	0.92	0.01
Chinkapin Oak	03	0.94	0.04	0.92	0.06	0.95	0.13	0.88	0.03
Red pine	04	1.18	0.03	1.21	0.29	1.12	0.07	0.91	0.09
Sycamore-Boxelder	05	1.14	0.02	1.19	0.04	1.09	0.05	1.20	0.09
Oak-Hickory	06	1.00	0.09	1.14	0.09	1.06	0.03	1.07	0.09
Walnut-Hickory-Buckeye	09	0.94	0.02	0.97	0.10	0.89	0.03	0.95	0.03
Orchard**	10	1.22	0.03	1.26	0.06	–	–	–	–
Virginia pine	11	1.13	0.02	1.06	0.32	0.79	0.06	1.03	0.05

*Based on four replicates per cover type per date sampled.

**Data collection terminated after October 1979.

Table B-5 (Contd)

Soil pH

Cover Type	Code	Sep 1979		Oct 1979		Apr 1980		Jun 1980	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Maple-Basswood	01	6.0	0.1	5.9	0.1	5.9	0.1	6.9	0.1
Oak-Maple	02	6.2	0.1	5.5	0.1	6.5	0.1	6.8	0.2
Chinkapin Oak	03	6.3	0.1	5.7	0.1	6.4	0.1	6.3	0.7
Red pine	04	5.6	0.3	5.6	0.1	6.6	0.1	6.4	0.1
Sycamore-Boxelder	05	5.5	0.3	5.5	0.1	6.4	0.1	6.8	0.4
Oak-Hickory	06	6.0	0.1	5.9	0.2	6.5	0.1	7.4	0.1
Walnut-Hickory-Buckeye	09	6.0	0.1	6.1	0.1	6.5	0.1	6.9	0.1
Orchard***	10	5.7	0.3	5.2	0.3	—	—	—	—
Virginia pine	11	5.2	0.1	5.5	0.2	6.1	0.2	5.3	0.2

*Based on four replicates per cover type per date sampled.

**Soil pH measured in water.

***Data collection terminated after October 1979.

Soil Conductivity (μmho/cm)

Cover Type	Code	Sep 1979		Oct 1979		Apr 1980		Jun 1980	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Maple-Basswood	01	990	290	532	67	321	74	179	18
Oak-Maple	02	756	50	698	81	345	102	183	28
Chinkapin Oak	03	672	104	590	103	673	118	186	32
Red pine	04	752	143	483	136	404	134	259	111
Sycamore-Boxelder	05	890	211	785	77	603	44	216	22
Oak-Hickory	06	927	110	663	127	438	95	243	25
Walnut-Hickory-Buckeye	09	1458	208	785	162	385	121	158	17
Orchard**	10	1625	121	1163	267	—	—	—	—
Virginia pine	11	895	71	742	373	234	59	112	12

*Based on four replicates per cover type per date sampled.

**Data collection terminated after October 1979.

Table B-5 (Contd)

Soil Cation Exchange Capacity (meq/100g)

Cover Type	Code	Sep 1979		Oct 1979		Apr 1980		Jun 1980	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Maple-Basswood	01	50.3	1.8	41.5	3.6	38.1	3.6	28.0	1.2
Oak-Maple	02	41.8	4.0	33.2	4.2	23.1	2.5	22.3	2.0
Chinkapin oak	03	52.3	2.2	53.4	4.2	32.3	2.6	28.2	1.9
Red pine	04	19.7	2.5	18.7	1.3	12.5	0.7	19.6	2.4
Sycamore-Boxelder	05	18.7	2.2	17.9	1.0	13.5	1.2	18.4	1.7
Oak-Hickory	06	38.0	2.4	38.6	3.7	23.5	1.5	20.9	2.2
Walnut-Hickory-Buckeye	09	31.1	2.4	39.6	1.4	30.3	3.6	30.4	2.7
Orchard**	10	9.8	1.7	14.4	0.8	–	–	–	–
Virginia pine	11	6.7	0.4	15.2	0.6	20.2	2.9	14.1	1.2

*Based on four replicates per cover type per date sampled.

**Data collection terminated after October 1979.

Soil Base Saturation (%)

Cover Type	Code	Sep 1979		Oct 1979		Apr 1980		Jun 1980	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
Maple-Basswood	01	66.0	1.5	90.5	11.9	72.0	7.1	103.4	1.5
Oak-Maple	02	70.4	8.4	85.9	10.7	59.0	7.4	104.3	6.7
Chinkapin Oak	03	64.1	5.2	71.3	2.3	63.4	18.6	109.1	6.5
Red pine	04	45.7	7.6	47.4	7.9	47.4	16.5	42.3	9.7
Sycamore-Boxelder	05	117.2	25.6	111.4	28.4	87.4	22.7	75.6	24.0
Oak-Hickory	06	92.3	3.8	107.1	6.9	122.1	27.8	137.2	15.0
Walnut-Hickory-Buckeye	09	75.1	4.2	77.7	6.7	123.4	24.4	94.2	2.8
Orchard **	10	63.5	9.9	52.1	9.2	–	–	–	–
Virginia pine	11	36.5	2.6	49.4	5.5	14.9	14.2	39.5	10.2

*Based on four replicates per cover type per date sampled.

**Data collection terminated after October 1979.

APPENDIX C

PSI MARBLE HILL VEGETATION AND SOILS DATA

1978-1979 ANNUAL REPORT

Table C-1

Mean and Standard Error of Percent Cover for Vegetation, Litter, and Total Cover in PSI Plots

Code	Cover Type	September Mean*					October Mean*					March-April Mean*					June Mean*				
		1976	1977	1978	3-Yr Mean	SE	1976	1977	1978	3-Yr Mean	SE	1977	1978	1979	3-Yr Mean	SE	1977	1978	1979	3-Yr Mean	SE
01	Maple Basswood																				
	(A) Vegetation	20.6	13.9	22.9	19.1	2.7	17.5	13.5	18.3	16.4	1.5	31.5	36.0	25.7	31.1	3.0	17.8	20.0	32.9**	23.6	4.7
	(B) Litter	53.8	60.5	54.0	56.1	2.2	58.8	83.3	61.3**	67.8	7.8	65.3	63.5	71.6	66.8	2.5	72.0	70.0	45.1**	62.4	8.7
	(C) Total Cover	74.4	74.4	76.9	75.2	0.8	76.3	96.9	79.6	84.3	6.4	96.9	99.5	97.3	97.9	0.8	89.8	90.0	78.0	85.9	4.0
02	Oak-Maple																				
	(A)	25.1	23.4	18.1	22.2	2.1	19.4	7.6	15.1	14.0	3.5	6.5	17.6	16.1	13.4	3.5	30.6	29.5	48.1**	36.1	6.0
	(B)	67.4	73.5	80.4	73.8	3.8	76.9	92.5	80.9**	83.4	4.7	89.1	81.1	83.5	84.6	2.4	65.3	69.1	50.9**	61.8	5.5
	(C)	92.5	96.9	98.5	96.0	1.8	96.3	100.0	96.0	97.4	1.3	95.6	98.7	99.6	98.0	1.2	95.9	98.6	99.0	97.8	1.0
03	Chinkapin Oak																				
	(A)	15.9	16.0	21.9	17.9	2.0	12.9	11.1	14.1	12.7	0.9	6.3	8.8	10.1	8.4	1.1	33.1	36.8	40.3	36.7	2.1
	(B)	71.6	79.8	72.3	74.6	2.6	77.1	88.9	82.7	82.9	3.4	81.2	85.4	85.9	84.2	1.5	58.8	59.5	53.0	57.1	2.1
	(C)	87.5	95.8	94.2	92.5	2.5	90.0	100.0	96.8	95.6	2.9	87.5	94.2	96.0	92.6	2.6	91.9	96.3	93.3	93.8	1.3
04	Red Pine																				
	(A)	29.8	37.5	35.1	34.1	2.3	25.8	14.4	42.9**	27.7	8.3	7.0	10.6	5.8	7.8	1.4	41.6	36.8	59.7**	46.0	7.0
	(B)	70.2	62.5	64.9	65.9	2.3	74.2	85.6	57.1**	72.3	8.3	93.0	89.4	94.2	92.2	1.4	58.4	63.2	40.3**	54.0	7.0
	(C)	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0	100.0	100.0	100.0	100.0	0.0
05	Sycamore-Boxelder																				
	(A)	70.0	66.4	82.5**	73.0	4.9	57.5	19.6	57.4**	44.8	12.6	15.5	20.6	20.4	18.8	1.7	51.3	90.0	74.6**	72.0	11.3
	(B)	21.9	22.5	14.4	19.6	2.6	38.8	80.4	40.4**	53.2	13.6	81.4	79.1	47.0**	69.2	11.1	45.0	10.0	16.2**	23.7	10.8
	(C)	91.9	88.9	96.9	92.6	2.3	96.3	100.0	97.8	98.0	1.1	96.9	99.7	67.4	88.0	10.3	96.3	100.0	90.8	95.7	2.7
06	Oak-Hickory																				
	(A)	12.1	11.4	20.1	14.5	2.8	8.1	2.3	7.6	6.0	1.8	38.6	47.0	40.2	41.9	2.6	15.6	19.4	29.4**	21.5	4.1
	(B)	52.9	55.5	65.8**	58.1	3.9	60.6	95.8	72.3**	76.2	10.3	48.3	47.9	53.1	49.8	1.7	60.7	53.3	41.9**	52.0	5.5
	(C)	65.0	66.9	85.9**	72.6	6.7	68.7	98.1	79.9**	82.2	8.5	86.9	94.9	93.3	91.7	2.4	76.3	72.7	71.3	73.4	1.5
09	Walnut-Hickory-Buckeye																				
	(A)	29.1	33.8	50.6**	37.8	6.5	16.5	13.1	27.6**	19.1	4.4	8.0	30.6	16.4**	18.3	6.6	46.3	72.6	67.2	62.0	8.0
	(B)	61.9	59.3	46.0	55.7	4.9	81.4	86.6	71.5**	79.8	4.4	86.4	67.9	82.1**	78.8	5.6	48.1	26.0	31.7	35.3	6.6
	(C)	91.0	93.1	96.6	93.6	1.6	97.9	99.7	99.1	98.9	0.5	94.4	98.5	98.5	97.1	1.4	94.4	98.6	98.9	97.3	1.4
11	Virginia Pine																				
	(A)	13.8	19.8	17.0	16.9	1.7	12.9	3.4	9.0	8.4	2.8	9.5	2.3	2.3	4.7	2.4	23.0	12.6	19.4	18.3	3.1
	(B)	73.7	76.8	82.4	77.6	2.5	74.6	96.5	90.0	87.0	6.5	89.4	96.6	97.7	94.6	2.6	76.1	72.4	80.0	76.2	2.2
	(C)	87.5	96.6	99.4	94.5	3.6	87.5	99.9	99.0	95.5	4.0	98.9	98.9	100.0	99.3	0.3	99.1	85.0	99.4**	94.5	4.7

*Based on mean of 8 plots per cover type per sample date.
**Significant changes from 1977-1978 sampling period (>10.0).
SE = Standard Error of the Mean.

Table C-2

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata for Each Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-1977	1977-1978	1978-1979	Change**
Tree stratum													
Live condition													
Acer saccharum	Sugar maple	100	14.2	33.3	41.0	1	1	8	1	5	5	5	-
Fraxinus americana	White ash	50	1.2	16.7	3.5	1/2	8	8	1	2	1	1	-
Juglans nigra	Black walnut	50	4.1	16.7	11.8	1	8	8	1	1	1	1	-
Tilia americana	Basswood	50	14.4	16.7	41.6	1	2/8	8	2	3	3	3	-
Total Live		250	33.9	83.4	97.9					11	10	10	-
Dead condition													
Fraxinus americana	White ash	50	0.7	16.7	2.0					1	1	1	-
Total Dead		50	0.7	16.7	2.0					1	1	1	-
TOTAL		300	34.6	100.1	99.9					12	11	11	-
Sapling stratum													
No saplings occurred in plots													

*1 - Healthy, 2 - Disease, 8 - Dormant.

**Change in the number of individuals between the sample in 1977-1978 and the sample in 1978-1979.

- Indicates no change.

Table C-2 (Contd)

Oak-Maple Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-1977	1977-1978	1978-1979	Change**
Tree stratum													
Live condition													
Acer saccharum	Sugar maple	100	12.2	22.2	35.4	1	1	8	1	6	7	7	-
Cornus florida	Flowering dogwood	50	0.8	11.1	2.3	1	1/8	8	1	2	1	2	1
Fraxinus americana	White ash	50	5.9	11.1	17.1	1	8	8	1	3	3	3	-
Juniperus virginiana	Eastern red cedar	50	0.4	11.1	1.1	7	1	1	1	1	1	1	-
Prunus serotina	Black cherry	100	3.0	22.2	8.7	1/8	8	8	1/7	2	2	2	-
Quercus prinus	Chestnut oak					1	1	6	6	1	1	0	(1)
Quercus velutina	Black oak	50	6.3	11.1	18.3	1	1	1	1	1	1	1	-
Total Live		400	28.6	88.8	82.9					16	16	16	-
Dead condition													
Acer saccharum	Sugar maple		0.0							1	1	0	(1)
Quercus prinus	Chestnut oak	50	5.9	11.1	17.1					0	0	1	1
Total Dead		50	5.9	11.1	17.1					1	1	1	-
TOTAL		450	34.5	99.9	100.0					17	17	17	-
Sapling stratum													
Live condition													
Acer saccharum	Sugar maple	100	1.3	100.0	100.0	8	8	8	1	5	4	4	-
Total Live		100	1.3	100.0	100.0					5	4	4	-
Dead condition													
None													
Total Dead		0	0	0	0					0	0	0	-
TOTAL		100	1.3	100.0	100.0					5	4	4	-

*1 - Healthy, 2 - Diseased, 6 - Dead, 7 - Dying, 8 - Dormant.

**Change in the number of individuals between the sample in 1977-1978 and the sample in 1978-1979.

- Indicates no change.

(n) Indicates loss of "n" individuals.

Table C-2 (Contd)

Chinkapin Oak Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-1977	1977-1978	1978-1979	Change**
Tree stratum													
Live condition													
Acer saccharum	Sugar maple	50	0.4	9.1	1.8	1	2/8	8	1	1	1	1	
Fraxinus americana	White ash	100	4.3	18.2	19.6	1	2/8	1	1	7	7	5	(2)
Fraxinus quadrangulata	Blue ash	50	1.0	9.1	4.6	8	8	8	1	1	2	2	
Juniperus virginiana	Eastern red cedar	100	3.0	18.2	13.7	1	1	1	1	5	5	5	
Quercus muehlenbergii	Chinkapin oak	100	11.6	18.2	53.0	1	1	8	1	11	11	11	
Quercus rubra	Red oak	50	0.6	9.1	2.7	1	1	8	1	1	1	1	
Ulmus rubra	Slippery elm	50	0.5	9.1	2.3	1	8	8	1	1	1	1	
Total Live		500	21.4	91.0	97.7					27	28	26	(2)
Dead condition													
Fraxinus americana	White ash	50	0.5	9.1	2.3					0	0	1	1
Fraxinus quadrangulata	Blue ash	0	0.0							1	0	0	-
Quercus muehlenbergii	Chinkapin oak	0	0.0							2	2	0	(2)
Total Dead		50	0.5	9.1	2.3					3	2	1	(1)
TOTAL		550	21.9	100.1	100.0					30	30	28	(2)
Sapling stratum													
Live condition													
Juniperus virginiana	Eastern red cedar	50	0.5	100.0	100.0	1	1	1	1	1	2	2	-
Total Live		50	0.5	100.0	100.0					1	2	2	-
Dead condition													
None													
Total Dead		0	0	0	0					0	0	0	
TOTAL		50	0.5	100.0	100.0					1	2	2	-

*1 - Healthy, 2 - Disease, 8 - Dormant.

**Change in the number of individuals between the sample in 1977-1978 and the sample in 1978-1979.

- Indicates no change.

(n) Indicates loss of "n" individuals.

Table C-2 (Contd)

Red Pine Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-1977	1977-1978	1978-1979	Change**
Tree stratum													
Live condition													
Fraxinus americana	White ash	50	2.7	12.5	6.8	1	8	1/8	1	2	2	2	-
Liriodendron tulipifera	Yellow poplar	50	4.6	12.5	11.6	1	8	8	1	1	2	2	-
Pinus resinosa	Red pine	100	16.7	25.0	42.0	1	1	1	1/2	14	15	13	(2)
Pinus strobus	White pine	100	6.5	25.0	16.3	1	1	1	1	5	4	4	-
Total Live		300	30.5	75.0	76.7					22	23	21	(2)
Dead condition													
Pinus resinosa	Red pine	100	9.3	25.0	23.4					8	6	7	1
Total Dead		100	9.3	25.0	23.4					8	6	7	1
TOTAL		400	39.8	100.0	100.1					30	29	28	(1)
Sapling stratum													
No saplings occurred in plots													

*1 - Healthy, 2 - Diseased, 8 - Dormant.

**Change in the number of individuals between the sample in 1977-1978 and the sample in 1978-1979.

- Indicates no change.

(n) Indicates loss of "n" individuals.

Table C-2 (Contd)

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-1977	1977-1978	1978-1979	Change**
Tree stratum													
Live condition													
Acer negundo	Boxelder	50	0.5	14.3	1.0	1	1	8	1	1	1	1	-
Cornus florida	Flowering dogwood	50	1.2	14.3	2.5	1	1	8	1	2	2	2	-
Juglans nigra	Black walnut	50	4.5	14.3	9.3	1	1/8	8	1	2	2	2	-
Platnus occidentalis	Sycamore	50	36.6	14.3	75.5	1	2	8	1	4	4	4	-
Prunus serotina	Black cherry	50	0.4	14.3	0.8	1	8	8	1	1	1	1	-
Tilia americana	Basswood	50	1.0	14.3	2.1	1	1	8	1	1	1	1	-
Ulmus rubra	Slippery elm	50	4.3	14.3	8.9	1	1	8	3	1	1	1	-
Total Live		350	48.5	100.2	100.1					12	12	12	-
Dead condition													
None		0	0	0	0					0	0	0	-
Total Dead		0	0	0	0					0	0	0	-
TOTAL		350	48.5	100.2	100.1					12	12	12	-
Sapling stratum													
Live condition													
Acer negundo	Boxelder	50	1.3	50.0	72.2	1	8	2	1	2	2	2	-
Celtis occidentalis	Hackberry	0	0	0	0					1	0	0	-
Total Live		50	1.3	50.0	72.2					3	2	2	-
Dead condition													
Celtis occidentalis	Hackberry	50	0.5	50.0	27.8					0	1	1	-
Ulmus rubra	Slippery elm	0	0							1	0	0	-
Total Dead		50	0.5	50.0	27.8					1	1	1	-
TOTAL		100	1.8	100.0	110.0					4	3	3	-

*1 - Healthy, 2 - Diseased, 3 - Insect, 8 - Dormant

**Change in the number of individuals between the sample in 1977-1978 and the sample in 1978-1979.

- Indicates no change.

(n) Indicates loss of "n" individuals.

Table C-2 (Contd)

Oak-Hickory Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-77	1977-78	1978-79	Change**
Tree stratum													
Live condition													
Aesculus glabra	Ohio buckeye	100	3.2	22.2	8.3	2	8	1	2	5	4	5	1
Catalpa speciosa	Northern catalpa	50	3.6	11.1	9.4	1	8	8	1	1	1	1	-
Fraxinus americana	White ash	50	1.0	11.1	2.6	1	8	8	1	1	1	1	-
Fraxinus quadrangulata	Blue ash	100	15.0	22.2	39.1	1	8	8	1	7	7	8	1
Quercus rubra	Red oak	50	12.6	11.1	32.8	1	8	8	1	2	2	2	-
Ulmus rubra	Slippery elm	50	0.9	11.1	2.3	1	8	8	3	1	1	1	-
Total Live		400	36.3	88.8	94.5					17	16	18	2
Dead condition													
Aesculus glabra	Ohio buckeye	0	0	0	0					0	1	0	(1)
Fraxinus quadrangulata	Blue ash	50	2.1	11.1	5.5					3	3	2	(1)
Total Dead		50	2.1	11.1	5.5					3	4	2	(2)
TOTAL		450	38.4	99.9	100.0					20	20	20	-
Sapling stratum													
No saplings occurred in plots													

*1 - Healthy, 2 - Disease, 3 - Insect, 8 - Dormant.

**Change in the number of individuals between the sample in 1977-78 and the sample in 1978-79.

- Indicates no change.

(n) Indicates loss of "n" individuals.

Table C-2 (Contd)

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Frequency (%)	Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-1977	1977-1978	1978-1979	Change**
Tree stratum													
Live condition													
Aesculus glabra	Ohio buckeye	50	7.3	9.1	21.7	1/4	8	1/8	1	8	7	8	1
Carya ovata	Shagbark hickory	50	9.5	9.1	28.5	2	8	8	1	2	2	2	-
Cercis canadensis	Eastern redbud	50	0.9	9.1	2.3	2/1	8	8	1	2	2	2	-
Fraxinus americana	White ash	50	3.5	9.1	10.4	1	1/8	8	1	2	1	1	-
Fraxinus quadrangulata	Blue ash	50	0.4	9.1	1.2	1	8	8	1	1	2	1	(1)
Juglans nigra	Black walnut	50	8.8	9.1	26.1	7	8	7	1	1	1	1	-
Ulmus rubra	Slippery elm	50	0.8	9.1	2.4	8/1	8	8	1	2	2	2	-
Total Live		350	31.3	63.7	92.6					18	17	17	-
Dead condition													
Aesculus glabra	Ohio buckeye	50	1.0	9.1	3.0					0	1	1	-
Fraxinus americana	White ash	50	0.5	9.1	1.5					0	1	1	-
Fraxinus quadrangulata	Blue ash	50	0.3	9.1	0.9					0	0	1	1
Ulmus rubra	Slippery elm	50	0.6	9.1	1.8					1	1	1	-
Total Dead		200	2.4	36.4	7.2					3	4	1	1
TOTAL		550	33.7	100.1	99.8					19	20	21	1
Sapling stratum													
No saplings occurred in plots													

*1 - Healthy, 2 - Diseased, 4 - Mechanical injury, 7 - Dying, 8 - Dormant.

**Change in the number of individuals between the sample in 1977-1978 and the sample in 1978-1979.

- Indicates no change.

(n) Indicates loss of "n" individuals.

Table C-2 (Contd)

Virginia Pine Cover Type

Scientific Name	Common Name	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition* 1978 Sep	1978 Oct	1979 Apr	1979 Jun	No. Individuals in Sample 1976-1977	1977-1978	1978-1979	Change**
Tree stratum													
Live condition													
Cercis canadensis	Eastern redbud†	50	0.6	14.3	2.1	1	8	1	1	2	1	1	-
Cornus florida	Flowering dogwood†	100	4.0	28.6	14.3	1	1	8	1	3	8	8	-
Diospyros virginiana	Persimmon	0	0.0	0.0	0.0					1	0	0	-
Juniperus virginiana	Eastern red cedar	50	1.4	14.3	5.0	1	1	1	1	2	1	1	-
Lirodendron tulipifera	Yellow poplar	50	0.3	14.3	1.1	1	8	1	1	1	1	1	-
Pinus virginiana	Virginia pine	100	21.7	28.6	77.5	1	1	1	1	12	11	11	-
Total Live		350	28.0	100.1	100.0					21	22	22	-
Dead condition													
Juniperus virginiana	Eastern red cedar	0	0.0	0.0	0.0					0	0	0	-
Total Dead		0	0.0	0.0	0.0					1	0	0	-
TOTAL		350	28.0	100.1	100.0					22	22	22	-
Sapling stratum													
Live condition													
Cercis canadensis	Eastern redbud	50	0.6	50.0	66.6	1	8	8	1	1	1	1	-
Cornus florida	Flowering dogwood	0	0.0	0.0	0.0					2	1	0	(1)
Juniperus virginiana	Eastern red cedar	0	0.0	0.0	0.0					1	0	0	-
Liriodendron tulipifera	Yellow poplar	0	0.0	0.0	0.0					0	0	0	-
Pinus virginiana	Black cherry	0	0.0	0.0	0.0					1	0	0	-
Total Live		50	0.6	50.0	66.6					5	2	1	(1)
Dead condition													
Cercis canadensis	Eastern redbud	0	0.0	0.0	0.0					1	0	0	-
Cornus florida	Flowering dogwood	50	0.3	50.0	33.3					0	1	1	-
Total Dead		50	0.3	50.0	33.3					1	1	1	-
TOTAL		100	0.9	100.0	99.9					6	3	2	(1)

*1 - Healthy, 8 - Dormant.

**Change in the number of individuals between the sample in 1977-1978 and the sample in 1978-1979.

†Values for these taxa transposed in 1977-1978 annual report.

- Indicates no change.

(n) Indicates loss of "n" individuals.

Table C-3

Species Composition, Frequency, Areal Cover, and Condition of the Shrub Stratum (Plot Type 2) by Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Node Condition*** 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Maple-Basswood (01)													
Asimina triloba	Pawpaw	38/1.00	25/3.88	25/0.38	13/0.38	100.0/100.0	100.0/100.0	100.0/100.0	100.0/100.0	1	1	8	1
Oak-Maple (02)													
Acer saccharum	Sugar maple	25/3.50	*	25/0.25	25/2.88	24.8/23.7	*	28.4/10.5	18.0/17.8	1	*	8	1
Aesculus octandra**	Yellow buckeye	-	-	-	13/0.38	-	-	-	9.4/2.4	-	-	-	1
Celtis occidentalis**	Hackberry	-	-	-	13/0.50	-	-	-	9.4/3.1	-	-	-	1
Cornus florida	Flowering dogwood	25/9.38	*	25/1.38	25/8.00	24.8/63.6	*	28.4/58.0	18.0/49.6	1	*	8	1
Ostrya virginiana**	Ironwood	-	-	-	25/0.63	-	-	-	18.0/3.9	-	-	-	1
Prunus serotina	Black cherry	-	-	*	-	-	-	*	-	-	-	*	-
Rhus radicans**	Poison ivy	13/0.25	-	-	-	12.9/1.7	-	-	-	1	-	-	-
Smilax sp.	Greenbriar	-	-	*	-	-	-	*	-	-	-	-	*
Ulmus rubra	Slippery elm	38/1.63	*	38/0.75	38/3.75	37.7/11.1	*	43.2/31.5	27.2/23.2	1	*	8	1
Chinkapin Oak (03)													
Aesculus octandra	Yellow buckeye	-	-	*	-	-	-	*	-	-	-	*	-
Celtis occidentalis	Hackberry	*	*	-	13/0.25	*	*	-	8.4/5.5	*	*	-	1
Cercis canadensis**	Eastern redbud	13/0.75	-	-	13/0.25	7.8/12.5	-	-	8.4/5.5	1	-	-	1
Clematis viorna	Leather flower	*	*	-	13/0.25	*	*	-	8.4/5.5	*	*	-	1
Dioscorea villosa**	Wild yam	13/0.38	-	-	13/0.38	7.8/6.3	-	-	8.4/8.4	1	-	-	1
Diospyros virginiana	Persimmon	-	-	-	-	-	-	-	-	-	-	-	-
Juniperus virginiana	Eastern red cedar	13/2.00	13/3.88	13/1.75	13/0.50	7.8/33.3	17.1/68.8	20.0/55.7	8.4/11.1	1	1	1	1
Lonicera japonica	Japanese honeysuckle	25/0.25	*	-	*	15.1/4.2	*	-	*	2	*	-	*
Passiflora lutea	Yellow passion-flower	*	*	-	-	*	*	-	*	*	*	-	-
Prunus serotina	Black cherry	13/0.13	-	13/0.13	25/Tr	7.8/2.2	-	20.0/4.1	16.2/Tr	1	-	8	2/6
Quercus muehlenbergii	Chinkapin oak	13/0.50	*	*	-	7.8/8.3	*	*	-	1	*	*	-
Rhus aromatica	Fragrant sumac	13/0.50	13/0.38	13/0.38	13/1.00	7.8/8.3	17.1/6.7	20.0/12.1	8.4/22.2	1	8	8	1
Robinia pseudoacacia	Black locust	13/0.25	*	13/0.25	13/0.38	7.8/4.2	*	20.0/8.0	8.4/8.4	1	*	8	1
Symphoricarpos orbiculatus	Coralberry	-	-	*	-	-	-	*	*	-	-	*	-
Ulmus rubra	Slippery elm	50/1.25	50/1.38	13/0.63	38/1.50	30.1/20.8	65.8/24.5	20.0/20.1	24.7/33.3	4	8	8	1
Viburnum prunifolium	Black haw	-	-	-	*	-	-	-	*	-	-	-	*
Red Pine (04)													
Acer saccharum	Sugar maple	25/3.38	25/3.13	13/Tr	25/2.60	11.0/36.0	22.1/54.3	10.2/Tr	14.0/27.1	1	1	8	1
Cornus florida	Flowering dogwood	13/0.25	*	-	25/0.63	5.7/2.7	*	-	14.0/8.5	1	*	-	1
Fagus grandifolia**	Beech	13/0.50	-	13/0.25	-	5.7/5.3	-	10.2/14.2	-	8	-	8	-
Fraxinus americana	White ash	63/3.25	38/1.00	25/0.38	38/1.88	27.6/34.6	33.6/17.4	19.7/21.6	21.3/25.4	1	8	8	1
Lonicera japonica	Japanese honeysuckle	50/0.75	50/1.63	38/0.50	38/1.25	21.9/8.0	44.2/28.3	29.9/28.4	21.3/16.9	1	1	1	1
Parthenocissus quinquefolia	Virginia creeper	*	-	-	13/1.00	*	-	-	7.3/13.5	*	-	-	1
Prunus serotina**	Black cherry	13/0.13	-	13/0.13	-	5.7/1.4	-	10.2/7.4	-	1	-	1	-
Quercus prinus**	Chestnut oak	13/0.38	-	-	13/0.25	5.7/4.0	-	-	7.3/3.4	1	-	-	1
Quercus velutina**	Black oak	13/0.25	-	-	-	5.7/2.7	-	-	-	1	-	-	-
Rhus radicans**	Poison ivy	-	-	-	13/Tr	-	-	-	7.3/Tr	-	-	-	1
Vitis rotundifolia	Muscadine grape	25/0.50	*	25/0.50	13/0.38	11.0/5.3	*	19.7/28.4	7.3/5.1	1	*	8	1
Sycamore-Boxelder (05)													
Aesculus octandra	Yellow buckeye	-	-	*	*	-	-	*	*	-	-	*	*
Cornus florida	Flowering dogwood	-	-	*	*	-	-	*	*	-	-	*	*
Lindera benzoin	Spicebush	13/1.00	13/0.75	25/1.63	*	100.0/100.0	100.0/100.0	100.0/100.0	*	1	8	8	*
Ulmus rubra	Slippery elm	*	*	-	-	*	*	-	-	*	*	-	-
Oak-Hickory (06)													
Cercis canadensis	Eastern redbud	38/5.88	38/3.13	25/0.38	25/1.38	37.3/36.5	50.0/48.1	50.0/14.4	28.1/17.5	1	8	8	2/1
Cornus florida**	Flowering dogwood	13/1.50	-	-	13/0.50	12.7/9.3	-	-	14.6/5.3	1	-	-	2
Cornus pricear	Miss Price's cornel	13/1.50	*	*	-	12.7/9.3	*	*	*	1	*	*	*
Fraxinus quadrangulata	Blue ash	*	-	-	-	*	-	-	-	*	-	-	-
Gymnocladus dioica	Kentucky coffee-tree	*	-	*	13/0.63	*	-	*	14.6/8.0	*	-	*	1
Juniperus virginiana	Eastern red cedar	*	*	-	-	*	*	-	-	*	*	-	-
Symphoricarpos orbiculatus	Coralberry	-	-	-	25/0.63	-	-	-	28.1/8.0	-	-	-	1
Ulmus rubra	Slippery elm	38/7.25	38/3.38	25/2.25	13/4.75	37.3/44.9	50.0/51.9	50.0/85.6	14.6/60.2	1	8	8	2
Walnut-Hickory-Buckeye (09)													
Acer negundo	Boxelder	13/0.88	13/0.63	13/0.38	*	4.3/5.0	5.4/4.6	6.4/7.6	*	1	8	8	*
Acer saccharum	Sugar maple	38/5.75	38/3.13	*	13/1.63	12.5/32.4	15.8/22.7	*	4.5/10.9	1	8	*	1
Aesculus glabra	Ohio buckeye	*	*	-	-	*	*	-	-	*	*	-	-
Asimina triloba	Pawpaw	38/3.25	75/5.63	25/1.38	25/1.25	12.5/18.3	31.3/40.9	12.3/27.5	8.6/8.4	1	8	8	1
Carya ovata	Shagbark hickory	*	-	-	-	*	-	-	-	*	-	-	-
Cercis canadensis	Eastern redbud	*	*	-	13/0.13	*	*	-	4.5/0.9	*	*	-	1
Fraxinus americana	White ash	13/0.25	*	38/0.75	38/1.00	4.3/1.4	*	18.7/14.9	13.1/6.7	1	*	8	1
Fraxinus quadrangulata	Blue ash	100/2.88	38/0.50	13/Tr	25/1.38	32.9/16.2	15.8/3.6	6.4/Tr	8.6/9.3	1	6	8	1
Lindera benzoin	Spicebush	13/0.25	*	13/0.13	25/1.88	4.3/1.4	*	6.4/2.6	8.6/12.6	1	*	6	1
Lonicera japonica	Japanese honeysuckle	63/2.25	63/3.38	75/1.75	88/4.75	20.7/12.7	26.3/24.5	36.9/34.9	30.3/31.9	1	1	1	*
Prunus virginiana	Choke cherry	-	-	*	-	-	-	*	-	-	-	*	-
Quercus prinus	Chestnut oak	13/2.00	*	*	-	4.3/11.3	*	*	-	*	*	*	-
Rhus radicans	Poison ivy	*	*	-	25/0.50	*	*	-	8.6/3.4	*	*	-	1
Rubus sp.	Blackberry	13/0.25	13/0.50	13/0.38	13/1.38	4.3/1.4	5.4/3.6	6.4/7.6	4.5/9.3	1	1/8	1	1
Symphoricarpos orbiculatus**	Coralberry	-	-	13/0.25	25/1.00	-	-	6.4/5.0	8.6/6.7	-	-	1	1
Shrub A		*	-	-	*	*	-	-	*	*	-	-	*
Virginia Pine (11)													
Cercis canadensis	Eastern redbud	-	-	*	-	-	-	*	-	-	-	*	-
Cornus florida	Flowering dogwood	13/0.13	25/6.63	*	-	33.3/25.0	100.0/100.0	*	-	1	1/8	*	-
Lonicera tatarica	Tartarian honeysuckle	*	*	-	-	*	*	-	-	*	*	-	-
Prunus serotina	Black cherry	*	*	*	-	*	*	*	-	*	*	*	-
Quercus prinus**	Chestnut oak	13/0.13	-	-	-	33.3/25.0	-	-	-	1	-	-	-
Quercus sp.**	Oak	13/0.25	-	-	-	33.3/50.0	-	-	-	1	-	-	-

*Taxa was observed in plots during indicated previous sampling period (1977-1978), but not during the current sampling period.
-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy, 2 - Diseased, 4 - Mechanical Injury, 6 - Dead, 8 - Dormant.
Tr - Trace

Table C-4

Species Composition, Frequency, Cover, and Condition of Herbaceous Stratum for Each Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	Frequency (%) Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency (%) Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Mode Condition*** 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer saccharum	Sugar maple	50/2.88	50/2.38	38/1.25	50/3.38	11.6/12.6	13.2/13.0	6.4/4.9	10.1/10.3	1	1	1	1
Aesculus octandra	Yellow buckeye	-	-	13/0.25	13/0.13	-	-	2.2/1.0	2.6/0.4	-	-	1	1
Anemonella thalictroides	Rue anemone	-	-	-	-	-	-	-	-	-	-	-	-
Ariseama atrorubens	Jack-in-the-pulpit	-	-	13/0.25	13/0.75	-	-	2.2/1.0	2.6/2.3	-	-	1	1
Asarum canadense	Wild ginger	50/8.63	50/7.25	50/6.00	50/10.00	11.6/37.7	13.2/39.7	8.5/23.4	10.1/30.4	1	1	1	1
Asimina triloba	Pawpaw	13/0.50	-	*	-	3.0/2.2	-	*	-	1	-	*	-
Boehmeria cylindrica**	False nettle	-	-	-	13/0.88	-	-	-	2.6/2.7	-	-	-	1
Carya cordiformis	Yellow-bud hickory	-	-	-	*	-	-	-	*	-	-	-	*
Circaea alpina**	Small enchanter's nightshade	25/Tr	-	-	-	5.8/Tr	-	-	-	1	-	-	-
Claytonia virginica	Spring beauty	-	-	100/3.50	-	-	-	16.9/13.7	-	-	-	1	-
Dentaria laciniata	Cut-leaved toothwort	*	*	100/11.38	-	*	*	16.9/44.4	-	*	*	1	-
Erigenia bulbosa	Harbinger-of-spring	-	-	100/1.00	-	-	-	16.9/3.9	-	-	-	1	-
Eupatorium serotinum	Late-flowering thoroughwort	50/8.00	50/6.63	25/0.25	50/12.38	11.6/34.9	13.2/36.3	4.2/1.0	10.1/37.6	1	1	1	1
Fraxinus americana	White ash	25/0.75	38/0.88	*	25/1.25	5.8/3.3	10.1/4.8	*	5.1/3.8	1	1	*	1
Galium boreale	Northern bedstraw	-	-	50/0.50	13/0.13	-	-	8.5/2.0	2.6/0.4	-	-	1	1
Glechoma hederacea**	Gill-over-the-ground	13/Tr	25/Tr	-	-	3.0/Tr	6.6/Tr	-	-	1	1	-	-
Geum canadense	Canadian avens	-	-	-	*	-	-	-	*	-	-	-	*
Impatiens pallida**	Yellow jewelweed	-	-	-	13/0.25	-	-	-	2.6/0.8	-	-	-	1
Lindera benzoin**	Spice bush	-	-	-	13/0.25	-	-	-	2.6/0.8	-	-	-	1
Maianthemum canadense	Canada mayflower	50/0.50	50/0.38	-	*	11.6/2.2	13.2/2.1	-	*	1	1	-	*
Parthenocissus quinquefolia	Virginia creeper	25/0.50	13/0.13	-	13/0.63	5.8/2.2	3.4/0.7	-	2.6/1.9	1	1	-	1
Phryma leptostachya	Lopseed	-	-	-	-	-	-	-	-	-	-	-	-
Pilea pumila	Clearweed	40/0.75	38/0.63	13/Tr	50/1.50	9.3/3.3	10.1/3.4	2.2/Tr	10.1/4.6	1	1	1	1
Pinus strobus	White pine	-	-	-	-	-	-	-	-	-	-	-	-
Ranunculus abortivus**	Small-flowered buttercup	-	-	0.25/0.38	-	-	-	4.2/1.5	-	-	-	1	-
Rhus radicans	Poison ivy	13/Tr	-	13/Tr	13/Tr	3.0/Tr	-	2.2/Tr	2.6/Tr	1	-	1	1
Sanicula trifoliata	Snakeroot	-	-	-	25/Tr	-	-	-	5.1/Tr	-	-	-	1
Sassafras albidum**	Sassafras	13/0.25	-	-	-	3.0/1.1	-	-	-	1	-	-	-
Tilia americana	Basswood	-	-	-	-	-	-	-	-	-	-	-	-
Ulmus rubra	Slippery elm	50/Tr	38/Tr	13/Tr	*	11.6/Tr	10.1/Tr	2.2/Tr	*	1	1	1	*
Viola sororia	Wooly-blue violet	13/0.13	13/Tr	13/0.38	*	3.0/0.6	3.4/Tr	2.2/1.5	*	1	1	1	*
Viola sp.	Violet	-	-	25/0.50	*	-	-	4.2/2.0	*	-	-	1	*
Vitis aestivalis	Summer grape	-	-	-	-	-	-	-	-	-	-	-	-

*Taxa was observed in plots during indicated previous sampling period (1977-1978), but not during the current sampling period.
-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy.
Tr - Trace

Oak-Maple Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Mode Condition 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer saccharum	Sugar maple	75/2.38	75/2.88	50/0.25	50/3.25	9.9/13.1	10.8/18.7	5.5/1.6	5.4/6.8	1	1	1	1
Actea rubra**	Red baneberry	-	13/0.13	-	-	-	1.9/0.8	-	-	-	1	-	-
Allium canadense	Wild garlic	-	38/0.13	38/0.88	-	-	5.5/0.8	4.2/5.5	-	-	1	1	-
Anemone quinquefolia	Wood anemone	-	-	38/0.63	-	-	-	4.2/3.9	-	-	-	1	-
Anemonella thalictroides	Rue anemone	-	-	13/Tr	-	-	-	1.4/Tr	-	-	-	1	-
Arabis sp.	Rock-cress	-	-	13/0.25	13/0.25	-	-	1.4/1.6	1.4/0.5	-	-	1	1
Arisaema stewardsons**	Jack-in-the-pulpit	-	13/0.25	-	-	-	1.9/1.6	-	-	-	1	-	-
Aster azureus	Azure aster	-	-	-	-	-	-	-	-	-	-	-	-
Aster divaricatus	White wood aster	25/0.25	13/0.25	-	25/4.88	3.3/1.4	1.9/1.6	-	2.7/10.2	1	1	-	1
Boehmeria cylindrica**	False nettle	-	-	-	25/0.75	-	-	-	2.7/1.6	-	-	-	1
Botrychium virginianum	Virginia grape-fern	-	-	-	-	-	-	-	-	-	-	-	-
Carex sp.**	Sedge	-	-	-	13/0.13	-	-	-	1.4/0.3	-	-	-	1
Carya cordiformis	Yellowbud hickory	-	-	-	-	-	-	-	-	-	-	-	-
Caryophyllaceae**	Chickweed	-	-	25/2.13	-	-	-	2.8/13.3	-	-	-	1	-
Cercis canadensis	Eastern redbud	38/0.38	25/Tr	-	13/0.13	5.0/2.1	3.6/Tr	-	1.4/0.3	1	1	-	1
Circea alpina**	Small enchanter's nightshade	-	-	-	13/0.25	-	-	-	1.4/0.5	-	-	-	1
Clematis viorna**	Leather leaf	38/0.38	-	-	-	5.0/2.1	-	-	-	1	-	-	-
Cornus florida	Flowering dogwood	63/0.88	75/0.75	13/Tr	50/1.00	8.3/4.8	10.8/4.9	1.4/Tr	5.4/2.1	1	1	1	1
Delphinium tricorne	Dwarf larkspur	-	-	38/3.25	-	-	-	4.2/20.3	-	-	-	1	-
Dentaria laciniata	Cut-leaved toothwort	13/0.13	-	100/2.75	-	1.7/0.7	-	11.1/17.1	-	1	-	1	-
Desmodium glutinosum**	Pointed-leaved tick-trefoil	-	13/0.25	-	-	-	1.9/1.6	-	-	-	8	-	-
Dicentra cucullaria	Dutchman's breeches	-	-	*	-	-	-	*	-	-	-	8	-
Dicotyledonae	Dicot	25/0.50	*	*	13/0.13	3.3/2.7	*	*	1.4/0.3	1	1	8	1
Dioscorea villosa**	Wild yam	38/1.63	38/1.50	-	-	5.0/9.0	5.5/9.7	-	-	1	1	-	-
Elymus virginicus	Virginia wild rye	13/Tr	-	25/0.50	38/0.63	1.7/Tr	-	2.8/3.1	4.1/1.3	1	-	1	1
Erigena bulbosa	Harbinger-of-spring	-	-	25/0.13	-	-	-	2.8/0.8	-	-	-	1	-
Eupatorium sp.**	Thoroughwort	13/0.25	13/0.13	-	13/0.50	1.7/1.4	1.9/0.8	-	1.4/1.0	1	1	-	1
Fagus grandifolia**	Beech	-	-	-	13/0.13	-	-	-	1.4/0.3	-	-	-	1
Fraxinus americana	White ash	-	-	-	50/1.88	-	-	-	5.4/3.9	-	-	-	1
Fraxinus quadrangulata	Blue ash	38/1.88	13/0.75	13/0.13	25/0.50	5.0/10.3	1.9/4.9	1.4/0.8	2.7/1.0	1	1	1	1
Galium boreale	Northern bedstraw	88/0.38	75/0.25	25/Tr	25/0.25	11.6/2.1	10.8/1.6	2.8/Tr	2.7/0.5	1	1	1	1
Galium circaezans	White wild licorice	-	-	88/0.75	38/0.38	-	-	9.7/4.7	4.1/0.8	-	-	1	1
Galium triflorum	Fragrant bedstraw	13/0.38	-	-	-	1.7/2.1	-	-	-	1	-	-	-
Geum canadense	Canadian avens	38/0.63	-	38/0.38	25/0.88	5.0/3.3	-	4.2/2.4	2.7/1.8	1	-	1	1
Hydrophyllum appendiculatum	Appendaged water leaf	*	-	-	-	*	-	-	-	*	-	-	-
Hystrix patula**	Bottlebrush	13/0.13	25/Tr	-	-	1.7/0.7	3.6/Tr	-	-	1	1	-	-
Jeffersonia diphylla	Twin leaf	-	-	50/0.38	50/0.88	-	-	5.5/2.4	5.4/1.8	-	-	1	1
Liliaceae**	Lily	-	13/0.25	-	-	-	1.9/1.6	-	-	-	1	-	-
Lindera benzoin	Spicebush	-	-	-	-	-	-	-	-	-	-	-	-
Monocotyledoneae**	Monocot	13/0.25	-	-	-	1.7/1.4	-	-	-	1	-	-	-
Osmorhiza claytonii	White snakeroot	-	-	-	-	-	-	-	-	-	-	-	-
Ostrya virginiana	Ironwood	-	-	*	25/0.50	-	-	*	2.7/1.0	-	-	*	3
Parthenocissus quinquefolia	Virginia creeper	13/0.25	-	50/Tr	75/3.63	1.7/1.4	-	5.5/Tr	8.1/7.6	1	-	1	1
Phryma leptostachya	Lopseed	13/0.13	-	-	13/0.50	1.7/0.7	-	-	1.4/1.0	1	-	-	1
Pilea pumila**	Clearweed	-	-	-	25/Tr	-	-	-	2.7/Tr	-	-	-	1
Prunus serotina	Black cherry	13/0.13	13/0.25	50/0.38	*	1.7/0.7	1.9/1.6	5.5/2.4	*	1	1	1	*
Quercus prinus	Chestnut oak	*	13/Tr	-	-	*	1.9/Tr	-	-	*	1	-	-
Rhus radicans	Poison ivy	25/2.50	13/0.75	38/Tr	13/1.63	3.3/13.7	1.9/4.9	4.2/Tr	1.4/3.4	1	8	8	1
Senicula trifoliata	Snakeroot	63/3.25	25/0.88	75/2.38	100/17.75	8.3/17.9	3.6/5.7	8.3/14.8	10.7/36.9	1	1	1	1
Smilax herbacea	Carrion-flower	*	-	-	50/1.25	*	-	-	5.4/2.6	*	-	-	1
Symphoricarpos orbiculatus	Coralberry	-	-	-	-	-	-	-	-	-	-	-	-
Ulmus rubra	Slippery elm	63/1.50	63/2.00	25/0.38	38/5.00	8.3/8.2	9.1/13.0	2.8/2.4	4.1/10.4	1	1	1	1
Viburnum prunifolium	Black-haw	-	-	-	-	-	-	-	-	-	-	-	-
Viola sororia	Wooly-blue violet	25/Tr	25/0.25	75/0.50	100/1.00	3.3/Tr	3.6/1.6	8.3/3.1	10.7/2.1	1	1	1	1

*Taxa was observed in plots during indicated previous sampling period (1977-1978), but not during the current sampling period.
-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy, 3 - Insect Damage, 8 - Dormant.
Tr - Trace.

Table C-4 (Contd)

Chestnut Oak Cover Type

Scientific Name	Common Name	Frequency ($)/Areal Cover ($) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency ($)/Areal Cover ($) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Mode Condition 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer saccharum	Sugar maple	-	-	-	*	-	-	-	*	-	-	-	*
Actea rubra†	Red Baneberry	-	-	13/0.25	-	-	-	1.7/2.5	-	-	-	1	-
Actinomeris alternifolia	Wingstem	-	-	-	*	-	-	-	*	-	-	-	*
Allium canadense	Wild garlic	-	-	63/0.13	-	-	-	8.0/1.3	-	-	-	1	-
Anemone quinquefolia	Wood anemone	-	-	-	-	-	-	-	-	-	-	-	-
Anemone virginica	Thimbleweed	63/0.63	25/0.13	-	13/0.38	7.0/2.9	4.2/1.0	-	1.1/0.9	1	1/8	-	1
Anemonella thalictroides	Rue anemone	-	-	-	*	-	-	-	*	-	-	-	*
Arabis laevigata	Smooth rock-cress	-	-	*	-	-	-	*	-	-	-	*	-
Aster azureus	Azure aster	-	-	25/0.25	*	-	-	3.2/2.5	*	-	-	1	*
Carex sp.	Sedge	13/0.13	-	-	25/Tr	1.4/0.6	-	-	2.1/Tr	1	-	-	1
Celtis occidentalis	Hackberry	*	*	-	25/2.13	*	*	-	2.1/5.3	*	*	-	1
Cercis canadensis	Eastern redbud	13/Tr	-	-	13/0.13	1.4/Tr	-	-	1.1/0.3	1	-	-	1
Clematis viorna	Leather flower	25/0.50	-	*	63/1.50	2.8/2.3	-	*	5.4/3.7	8	-	*	1
Cornus florida	Flowering dogwood	*	13/Tr	13/Tr	-	*	2.2/Tr	1.7/Tr	-	*	1	1	-
Delphinium tricorne	Dwarf larkspur	-	-	25/0.25	-	-	-	3.2/2.5	-	-	-	1	-
Dentaria laciniata	Cut-leaved toothwort	-	-	13/Tr	-	-	-	1.7/Tr	-	-	-	1	-
Dicotyledonae	Dicot	63/0.38	-	-	*	7.0/1.7	-	-	*	1	-	-	*
Dioscorea villosa	Wild yam	88/4.00	13/0.25	-	38/2.88	9.8/18.2	2.2/1.9	-	3.2/7.1	1	8	-	1
Diospyros virginiana	Persimmon	-	-	-	-	-	-	-	-	-	-	-	-
Elymus virginicus	Virginia wild rye	*	25/Tr	-	38/0.25	*	4.2/Tr	-	3.2/0.6	*	1	-	1
Eupatorium maculatum	Spotted joe-pye-weed	-	13/0.13	25/0.25	38/0.50	-	2.2/1.0	3.2/2.5	3.2/1.2	-	1	1	1
Fraxinus americana	White ash	13/0.25	25/0.13	*	25/0.38	1.4/1.1	4.2/1.0	*	2.1/0.9	1	8	*	1
Fraxinus quadrangulata	Blue ash	-	-	*	-	-	-	*	-	-	-	*	-
Galium circaezans	White wild licorice	75/0.50	63/0.25	38/Tr	88/0.50	8.4/2.3	10.6/1.9	4.8/Tr	7.5/1.2	1	1	1	1
Geum canadense	Canadian avens	*	-	-	-	*	-	-	-	*	-	-	-
Helianthus sp.	Sunflower	13/0.38	-	13/0.25	38/1.88	1.4/1.7	-	1.7/2.5	3.2/4.7	1	-	1	1
Hystrix patula	Bottlebrush	-	-	-	-	-	-	-	-	-	-	-	-
Jeffersonia diphylla	Twinleaf	13/Tr	-	3/2.50	25/1.13	1.4/Tr	-	3.2/2.5	2.1/2.8	7	-	1	1
Juniperus virginiana	Eastern red cedar	-	-	-	-	-	-	-	-	-	-	-	-
Krigia sp.**	Dwarf dandelion	25/0.50	13/0.13	13/Tr	-	2.8/2.3	2.2/1.0	1.7/Tr	-	1	7	1	-
Leptostaycha sp.	Mint	-	-	13/0.13	-	-	-	1.7/1.3	-	-	-	1	-
Lactuca sp.	Wild lettuce	-	*	*	-	-	*	*	-	-	*	*	-
Lonicera japonica	Japanese honeysuckle	75/6.38	88/7.38	50/3.25	50/5.88	8.4/29.0	14.8/56.0	6.4/32.3	4.3/14.6	1	1	1	1
Maianthemum canadense	Canada mayflower	-	-	-	-	-	-	-	-	-	-	-	-
Monocotyledonae	Monocot	-	-	25/0.25	-	-	-	3.2/2.5	-	-	-	1	-
Muhlenbergia sobolifera	Muhly grass	-	-	25/0.13	*	-	-	3.2/1.3	*	-	-	1	*
Oenothera sp.	Evening primrose	-	-	-	-	-	-	-	-	-	-	-	-
Ostrya virginiana	Ironwood	13/0.63	-	-	-	1.4/2.9	-	-	-	1	-	-	-
Panicum boscii	Bosc's panicum	25/0.25	25/0.38	13/Tr	13/1.13	2.8/1.1	4.2/2.9	1.7/Tr	1.1/2.8	1	1	1	1
Panicum clandestinum**	Corn grass	13/0.75	13/0.13	-	-	1.4/3.4	2.2/1.0	-	-	1	1	-	-
Parthenocissus quinquefolia	Virginia creeper	38/1.00	*	*	25/1.38	4.2/4.6	*	*	2.1/3.4	1	*	*	1
Pinus virginiana	Virginia pine	13/0.13	13/0.13	13/0.13	13/0.13	1.4/0.6	2.2/1.0	1.7/1.3	1.1/0.3	1	1	1	1
Polygonatum biflorum	Solomon's seal	-	-	-	*	-	-	-	*	-	-	-	*
Prunus serotina	Black cherry	63/0.75	63/0.88	63/0.75	38/0.75	7.0/3.4	10.6/6.7	8.0/7.5	3.2/1.9	1	1	1	1
Quercus muehlenbergii	Chinkapin oak	*	38/0.38	-	25/2.25	*	6.4/2.9	-	2.1/5.6	*	8	-	1
Quercus velutina	Black oak	*	*	-	*	*	*	-	*	*	*	-	*
Rhus aromatica	Fragrant sumac	25/0.38	-	13/Tr	13/0.13	2.8/1.7	-	1.7/Tr	1.1/0.3	1	-	8	1
Rhus radicans	Poison ivy	13/0.38	-	25/Tr	13/0.25	1.4/1.7	-	3.2/Tr	1.1/0.6	1	-	8	1
Robinia pseudoacacia	Black locust	38/1.13	13/0.25	-	25/1.13	4.2/5.2	2.2/1.9	-	2.1/2.8	1	8	-	1
Rosa sp.	Rose	13/0.13	*	*	13/0.13	1.4/0.6	*	*	1.1/0.3	1	*	*	1
Ruellia caroliniensis	Hairy ruellia	-	-	-	75/1.00	-	-	-	5.4/2.5	-	-	-	1
Sanguinaria canadensis	Blood root	-	-	-	-	-	-	-	-	-	-	-	-
Sanicula trifoliata	Snakeroot	*	-	50/0.13	88/1.00	*	-	6.4/1.3	7.5/2.5	*	-	1	1
Smilacina racemosa	False solomon's seal	-	-	38/0.50	63/1.25	-	-	4.8/5.0	5.4/3.1	-	-	1	1
Smilax herbacea	Carrion-flower	*	-	-	-	*	-	-	-	*	-	*	-
Solidago ulmifolia	Goldenrod	50/1.38	63/1.38	25/0.25	38/1.00	5.6/6.3	10.6/10.5	3.2/2.5	3.2/2.5	1	1	1	1
Solidago sp.	Goldenrod	*	13/Tr	*	*	*	2.2/Tr	*	*	*	8	*	*
Symphoricarpos orbiculatus	Coralberry	-	*	13/0.13	13/0.38	-	*	1.7/1.3	1.1/0.9	-	*	1	1
Taraxacum officinale	Dandelion	25/Tr	-	13/0.38	*	2.8/Tr	-	1.7/3.8	*	1	-	1	*
Thalictrum dioicum	Early meadow-rue	13/0.13	13/0.13	63/0.75	63/3.25	1.4/0.6	2.2/1.0	8.0/7.5	5.4/8.1	1	1	1	1
Ulmus rubra	Slippery elm	50/0.75	63/1.13	13/Tr	13/0.25	5.6/3.4	10.6/8.6	1.7/Tr	1.1/0.6	1	8	8	1
Veratrum sp.	Veratrum	-	-	63/1.63	63/3.38	-	-	8.0/16.2	5.4/8.4	-	-	1	1
Viola sororia	Hooly-blue violet	*	-	*	-	*	-	*	-	*	-	*	-
Vitis aestivalis	Summer grape	25/0.50	-	-	13/0.25	2.8/2.3	-	-	1.1/0.6	1	-	-	1

†Tentative identification; taxa observed in plots for first time during the current sampling period.
*Taxa was observed in plots during indicated previous sampling period (1977-1978), but not during the current sampling period.
-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy, 7 - Dying, 8 - Dormant.
. Tr - Trace

Red Pine Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Mode Condition 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer saccharum**	Sugar maple	13/0.38	25/0.50	-	13/0.50	1.4/1.0	3.6/1.2	-	1.2/0.8	1	1	-	1
Actea rubra**	Baneberry	-	-	13/0.13	-	-	-	2.3/2.3	-	-	-	1	-
Ambrosia artemisiifolia**	Common ragweed	-	-	-	13/0.13	-	-	-	1.2/0.2	-	-	-	1
Aster sp.**	Aster	-	-	-	13/0.13	-	-	-	1.2/0.2	-	-	-	1
Boehmeria cylindrica**	False nettle	-	-	-	50/1.25	-	-	-	4.6/2.1	-	-	-	1
Carex sp.**	Sedge	25/0.13	-	13/Tr	25/0.13	2.8/0.3	-	2.3/Tr	2.3/0.2	1	-	1	1
Cercis canadensis	Eastern redbud	75/2.63	63/1.38	-	50/4.25	8.3/7.0	9.1/3.2	-	4.6/7.1	1	8/1	-	1
Circea alpina**	Small enchanter's nightshade	-	-	-	25/1.63	-	-	-	2.3/2.7	-	-	-	1
Cornus florida	Flowering dogwood	50/6.25	63/7.63	38/0.13	63/14.38	5.5/16.6	9.1/17.8	6.8/2.3	5.8/24.1	1	1	8	1
Cruciferae**	Mustard	-	13/0.38	13/0.25	-	-	1.9/0.9	2.3/4.3	-	-	1	1	-
Dentaria laciniata	Cut-leaved toothwort	-	-	25/0.25	-	-	-	4.5/4.3	-	-	-	1	-
Dicotyledonae	Dicot	*	-	-	-	*	-	-	-	*	-	-	-
Erigeron sp.**	Daisy fleabane	-	-	-	13/0.13	-	-	-	1.2/0.2	-	-	-	1
Eupatorium serotinum	Late-flowering thoroughwort	25/1.00	25/0.88	*	25/0.88	2.8/2.7	3.6/2.0	*	2.3/1.5	1	1	*	1
Fagus grandifolia	Beech	25/Tr	13/Tr	*	25/0.25	2.8/Tr	1.9/Tr	*	2.3/0.4	1	1	*	1
Fragaria virginiana	Wild strawberry	*	25/0.25	*	25/0.13	*	3.6/0.6	*	2.3/0.2	*	1	*	1
Fraxinus americana	White ash	50/1.63	50/3.13	13/Tr	50/4.00	5.5/4.3	7.2/7.3	2.3/Tr	4.6/6.7	1	8/1	8	1
Fraxinus quadrangulata	Blue ash	-	*	*	38/2.01	-	*	*	3.5/3.3	-	*	*	1
Gallium asprellum	Rough bedstraw	50/0.75	38/0.13	-	*	5.5/2.0	5.5/0.3	-	*	1	1	-	*
Gallium circaezans	White wild licorice	25/0.25	13/0.38	13/0.13	50/1.63	2.8/0.7	1.9/0.9	2.3/2.3	4.6/2.7	1	1	1	1
Gallium triflorum	Fragrant bedstraw	-	-	38/0.63	13/Tr	-	-	6.8/10.9	1.2/Tr	-	-	1	1
Geum canadense	Canadian avens	63/1.38	13/0.25	*	*	6.9/3.7	1.9/0.6	*	*	1	1	*	*
Liriodendron tulipifera	Yellow poplar	13/0.63	13/0.50	-	13/Tr	1.4/1.7	1.9/1.2	-	1.2/Tr	1	2	-	1
Lonicera japonica	Japanese honeysuckle	63/12.88	63/19.75	63/1.38	63/7.50	6.9/34.2	9.1/46.0	11.3/23.8	5.8/12.6	1	1	1	1
Muhlenbergia sobolifera	Muhly grass	-	-	13/Tr	*	-	-	2.3/Tr	*	-	-	1	*
Panicum boscii**	Bosc's panicum	13/Tr	13/Tr	13/0.13	-	1.4/Tr	1.9/Tr	23./2.3	-	1	1	1	-
Parthenocissus quinquefolia	Virginia creeper	50/2.38	-	25/Tr	88/3.25	5.5/6.3	-	4.5/Tr	8.1/6.8	1	-	8	1
Phryma leptostachya	Lopseed	25/1.00	13/0.50	-	13/0.25	2.8/2.6	1.9/1.2	-	1.2/0.4	1	1	-	1
Pilea pumila	Clearweed	-	-	-	*	-	-	-	*	-	-	-	*
Pinus strobus	White pine	25/0.13	13/0.13	25/0.25	13/Tr	2.8/0.3	1.9/0.3	4.5/4.3	1.2/Tr	1	1	1	1
Prunus serotina	Black cherry	75/1.75	75/2.63	63/0.75	38/0.75	8.3/4.6	10.8/6.1	11.3/13.0	3.5/1.3	1	1	1	1
Quercus prinus	Chestnut oak	25/1.00	25/1.38	-	25/1.88	2.8/2.7	3.6/3.2	-	2.3/3.2	1	1	-	1
Quercus velutina	Black oak	13/0.38	25/0.50	-	13/1.00	1.4/1.0	3.6/1.2	-	1.2/1.7	1	1	-	1
Rhus radicans	Poison ivy	38/0.50	13/0.50	25/Tr	75/1.75	4.2/1.3	1.9/1.2	4.5/Tr	6.9/2.9	1	1	8/1	1
Rosa sp.	Rose	13/0.25	13/0.25	13/0.25	13/0.38	1.4/0.7	1.9/0.6	2.3/4.3	1.2/0.6	1	1	1	1
Rubus sp.	Blackberry	13/0.50	25/0.75	25/0.25	38/2.13	1.4/1.3	3.6/1.7	4.5/4.3	3.5/3.6	1	1	1	1
Sanicula trifoliata	Snakeroot	63/1.00	38/0.50	100/1.13	100/5.63	6.9/2.7	5.5/1.2	18.0/19.3	9.2/9.4	1	1	1	1
Sassafras albidum	Sassafras	25/0.13	25/0.63	-	38/0.88	2.8/0.3	3.6/1.5	-	3.5/1.5	1	8/1	-	1
Smilax herbacea	Carrion-flower	*	-	-	-	*	-	-	-	*	-	-	-
Solidago sp.**	Goldenrod	-	-	-	13/0.13	-	-	-	1.2/0.2	-	-	-	1
Symphoricarpos orbiculatus	Coralberry	-	-	-	-	-	-	-	-	-	-	-	-
Taraxacum officinale**	Dandelion	-	-	-	13/Tr	-	-	-	1.2/Tr	-	-	-	1
Ulmus rubra	Slippery elm	13/0.38	-	25/0.13	25/0.63	1.4/1.0	-	4.5/2.3	2.3/1.1	1	-	1	1
Viola sororia	Wooly-blue violet	13/0.13	-	-	-	1.4/0.3	-	-	-	1	-	-	-
Vitis rotundifolia	Muscadine grape	-	-	-	13/0.13	-	-	-	1.2/0.2	-	-	-	1

*Taxa was observed in plots during indicated previous sampling period (1977-1978), but not during the current sampling period.
-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy, 2 - Diseased, 8 - Dormant
Tr - Trace

Table C-4 (Contd)

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Mode Condition 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer negundo	Boxelder	-	25/0.50	38/0.25	-	-	3.1/0.9	5.5/1.2	-	-	1	1	-
Acer saccharum**	Maple	-	63/0.63	-	-	-	7.7/1.1	-	-	-	1	-	-
Actinomeris alternifolia	Wingstem	38/4.25	38/3.50	*	50/4.63	6.4/5.1	4.6/6.1	*	7.2/6.2	1	1	*	1
Amaranthus sp.	Pigweed	-	-	-	-	-	-	-	-	-	-	-	-
Arisaema atrorubens**	Jack-in-the-pulpit	-	-	-	13/0.38	-	-	-	1.9/0.5	-	-	-	1
Aster divaricatus	White wood aster	-	25/0.75	13/0.13	-	-	3.1/1.3	1.9/0.6	-	-	1	1	-
Bidens sp.	Beggar's ticks	*	-	-	-	*	-	-	-	*	-	-	-
Carex sp.	Sedge	25/2.63	50/5.75	38/4.75	63/3.13	4.2/3.2	6.1/10.0	5.5/23.5	9.1/4.2	1	1	1	1
Circaea alpina	Small enchanter's nightshade	-	50/1.50	-	*	-	6.1/2.6	-	*	-	1/2	-	*
Claytonia virginica	Spring beauty	-	-	50/1.25	-	-	-	7.2/6.1	-	-	-	1	-
Commelina virginica	Virginia dayflower	13/0.25	13/0.38	-	13/0.63	2.2/0.3	1.6/0.7	-	1.9/0.8	1	1	-	1
Cornus florida	Flowering dogwood	13/1.25	*	25/0.38	13/1.13	2.2/1.5	*	3.6/1.9	1.9/1.5	1	*	8	1
Cryptotaenia canadensis	Honewort	-	-	-	*	-	-	-	*	-	-	-	*
Dentaria laciniata	Cut-leaved toothwort	*	*	50/3.50	-	*	*	7.2/17.1	-	*	*	1	-
Dicentra cucullaria**	Squirrel corn	-	-	13/0.50	-	-	-	1.9/2.4	-	-	-	1	-
Dicotyledoneae**	Dicot	25/1.38	-	-	-	4.2/1.7	-	-	-	1	-	-	-
Elymus virginicus	Virginia wild rye	25/1.00	25/0.13	50/4.75	25/0.38	4.2/1.2	3.1/0.2	7.2/23.3	3.6/0.5	1	1/6	1	1
Erigenia bulbosa**	Harbinger-of-spring	-	-	13/Tr	-	-	-	1.9/Tr	-	-	-	1	-
Eupatorium serotinum	Late-flowering thoroughwort	88/16.38	100/17.38	38/0.38		14.8/19.8	12.2/30.3	5.5/1.9		1	1	1	1
Fragaria virginiana**	Wild strawberry	-	-	13/0.13	-	-	-	1.9/0.6	-	-	-	1	-
Galium circaezans	White wild licorice	*	*	25/Tr	13/Tr	*	*	3.6/Tr	1.9/Tr	*	*	1	1
Galium triflorum	Fragrant bedstraw	-	-	25/0.25		-	-	3.6/1.2		-	-	1	
Geum canadense	Canadian avens	38/0.75	63/1.00	*	13/0.25	6.4/0.9	7.7/1.7	*	1.9/0.3	1	1	*	1
Glechoma hederacea**	Gill-over-the-ground	-	13/Tr	-	-	-	1.6/Tr	-	-	-	1	-	-
Hydrophyllum appendiculatum**	Appendaged waterleaf	-	-	50/1.00	-	-	-	7.2/4.9	-	-	-	1	-
Impatiens biflora**	Jewelweed	13/0.38	-	-	-	2.2/0.5	-	-	-	1	-	-	-
Impatiens pallida	Yellow jewelweed	50/12.13	38/0.63	75/1.25	100/28.75	8.4/14.7	4.6/1.1	10.8/6.1	14.4/38.6	1	7	1	1
Jeffersonia diphylla	Twinleaf	-	-	-	-	-	-	-	-	-	-	-	-
Laportea canadensis	Wood nettle	23/3.13	25/2.88	-	88/14.25	4.2/3.8	3.1/5.0	-	12.7/19.1	1	1/7	-	1
Lindera benzoin	Spicebush	*	-	-	13/0.63	*	-	-	1.9/0.8	*	-	-	1
Osmorhiza claytonii	White snakeroot	-	-	*	13/0.63	-	-	*	1.9/0.8	-	-	*	1
Parthenocissus quinquefolia	Virginia creeper	38/0.75	13/0.13	13/Tr	25/0.25	6.4/0.9	1.6/0.2	1.9/Tr	3.6/0.3	1	8	1	1
Pilea pumila	Clearweed	75/35.13	88/18.63	25/0.13	75/11.13	12.6/42.4	10.7/32.4	3.6/0.6	10.8/14.9	1	1	1	1
Polygonum cespitosum	Long-bristled smartweed	25/0.25	38/0.50	-	25/0.75	4.2/0.3	4.6/0.9	-	3.6/1.0	1	1	-	1
Prunus serotina**	Black cherry	-	25/0.63	-	-	-	3.1/1.1	-	-	-	1	-	-
Quercus prinus**	Chestnut oak	-	50/0.50	-	-	-	6.1/0.9	-	-	-	1	-	-
Rhus radicans	Poison ivy	13/0.50	13/Tr	13/Tr	25/0.75	2.2/0.6	1.6/Tr	1.9/Tr	3.6/1.0	1	1	1	1
Rosa sp.**	Rose	-	-	13/0.25	-	-	-	1.9/1.2	-	-	-	1	-
Ruellia caroliniensis**	Hairy ruellia	-	-	-	13/0.63	-	-	-	1.9/0.8	-	-	4	1
Sanicula trifoliata	Snakeroot	13/0.13	13/0.75	50/0.38	63/4.38	2.2/0.2	1.6/1.3	7.2/1.9	9.1/5.9	1	1	1	1
Smilax herbacea	Carrion-flower	*	*	-	-	*	*	-	-	*	*	-	-
Solidago sp.	Goldenrod	*	-	*	*	*	-	*	*	*	-	*	*
Ulmus rubra**	Slippery elm	-	-	13/Tr	-	-	-	1.9/Tr	-	-	-	1	-
Umbelliferae sp.	Umbel	-	-	*	-	-	-	*	-	-	-	*	-
Urtica dioca**	Stinging nettle	25/1.50	-	-	-	4.2/1.8	-	-	-	1	-	-	-
Viola eriocarpa	Smoothish-yellow violet	13/0.25	*	25/0.38	13/0.88	2.2/0.3	*	3.6/1.9	1.9/1.2	1	*	1	1
Viola sororia	Mooly-blue violet	38/0.75	50/1.25	25/0.75	38/1.00	6.4/0.9	6.1/2.2	3.6/3.7	5.5/1.3	1	1	1	1

*Taxa was observed in plots during indicated previous sampling period (1977-1978), but not during the current sampling period.
-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy, 2 - Diseased, 6 - Dead, 8 - Dormant.
Tr - Trace

Table C-4 (Contd)

Oak-Hickory Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency (%)/Areal Cover (%) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Mode Condition 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer saccharum	Sugar maple	-	-	-	*	-	-	-	*	-	-	-	*
Actea rubra**	Baneberry	-	-	13/Tr	-	-	-	1.5/Tr	-	-	-	1	-
Actinomeris alternifolia**	Wingstem	-	-	-	13/0.63	-	-	-	2.1/2.1	-	-	-	1
Aesculus glabra**	Ohio buckeye	-	-	-	13/0.13	-	-	-	2.1/0.4	-	-	-	2
Allium canadense	Wild garlic	-	-	38/0.13	-	-	-	4.4/0.3	-	-	-	1	-
Amaranthus sp.	Pigweed	-	-	-	-	-	-	-	-	-	-	-	-
Anemone canadensis	Wood anemone	-	-	-	-	-	-	-	-	-	-	-	-
Anemone quinquefolia**	Wood anemone	-	13/Tr	-	-	-	3.7/Tr	-	-	-	8	-	-
Anemonella thalictroides	Rue anemone	-	-	-	-	-	-	-	-	-	-	-	-
Asarum canadense	Wild ginger	13/0.25	-	25/2.38	13/Tr	3.0/1.2	-	2.9/5.9	2.1/Tr	1	-	1	1
Aster azureus	Azure aster	-	13/0.13	13/Tr	13/0.38	-	3.7/1.7	1.5/Tr	2.1/1.3	-	1	1	1
Cardamine douglassii	Purple cress	*	-	25/0.13	-	*	-	2.9/0.3	-	*	-	1	-
Carex sp.	Sedge	25/0.13	25/0.13	13/0.25	25/0.25	5.8/0.6	7.0/1.7	1.5/0.6	4.1/0.9	1	1	1	1
Carya cordiformis	Yellowbud hickory	-	-	-	-	-	-	-	-	-	-	-	-
Cercis canadensis	Eastern redbud	38/1.38	38/0.13	13/0.13	25/1.25	8.9/6.8	10.7/1.7	1.5/0.3	4.1/4.3	8	8	1	2/1
Circaea alpina	Small enchanter's nightshade	13/Tr	13/0.13	-	-	3.0/Tr	3.7/1.7	-	-	1	1	-	-
Commelina sp.	Dayflower	-	-	25/0.25	13/0.25	-	-	2.9/0.6	2.1/0.9	-	-	1	1
Compositae	Sunflower	*	13/Tr	13/0.25	*	*	3.7/Tr	1.5/0.6	*	*	1	1	8
Cornus pricea	Miss price's cornel	-	-	-	-	-	-	-	-	-	-	-	-
Delphinium tricorne	Dwarf larkspur	-	-	100/5.75	-	-	-	11.5/14.3	-	-	-	1	-
Dentaria laciniata	Cut-leaved toothwort	13/Tr	-	100/6.00	-	3.0/Tr	-	11.5/14.9	-	8	-	1	-
Dicentra cucullaria**	Squirrel corn	-	-	25/0.75	-	-	-	2.9/1.9	-	-	-	1	-
Erythronium albidum	White trout-lily	-	-	38/3.63	-	-	-	4.4/9.0	-	-	-	1	-
Eupatorium serotinum	Late-flowering thoroughwort	75/3.00	75/3.63	13/Tr	75/7.25	17.5/14.9	21.1/47.3	1.5/Tr	12.3/24.6	1	1	1	1
Fraxinus americana	White ash	-	-	-	-	-	-	-	-	-	-	-	-
Fraxinus quadrangulata	Blue ash	25/0.50	13/0.13	13/Tr	25/0.63	5.8/2.5	3.7/1.7	1.5/Tr	4.1/2.1	1	8	1	2/1
Galium circaezans	White wild licorice	-	-	50/0.13	-	-	-	5.8/0.5	-	-	-	1	-
Geum canadense	Canadian avens	*	25/0.50	*	*	*	7.0/6.5	*	*	*	1	*	*
Glechoma hederacea	Gill-over-the-ground	*	-	-	-	*	-	-	-	*	-	-	-
Heuchera (americana)**	Heuchera	25/0.38	-	-	-	5.8/1.9	-	-	-	1	-	-	-
Hydrophyllum appendiculatum	Appendaged waterleaf	-	-	-	-	-	-	-	-	-	-	-	-
Hystrix patula	Bottlebrush	-	25/Tr	25/0.25	38/0.50	-	7.0/Tr	2.9/0.6	6.3/1.7	-	1	1	1
Lonicera japonica	Japanese honeysuckle	25/2.25	25/1.38	38/0.75	38/3.25	5.8/11.2	7.0/18.0	4.4/1.9	6.3/11.0	1	1	1	1
Mertensia virginica	Bluebells	-	-	100/17.25	-	-	-	11.5/42.9	-	-	-	1	-
Muhlenbergia sobolifera	Muhly grass	-	-	-	-	-	-	-	-	-	-	-	-
Nepeta cataria	Catnip	*	13/Tr	-	-	*	3.7/Tr	-	-	*	1	-	-
Panicum clandestinum**	Corngrass	13/Tr	-	-	-	3.0/Tr	-	-	-	1	-	-	-
Parthenocissus quinquefolia	Virginia creeper	100/10.38	25/0.25	50/Tr	100/10.63	23.3/51.5	7.0/3.3	5.8/Tr	16.5/36.1	1	1/8	8	1
Pilea pumila**	Clearweed	-	-	-	13/Tr	-	-	-	2.1/Tr	-	-	-	1
Polygonatum biflorum	Solomon's seal	-	-	*	-	-	-	*	-	-	-	*	-
Prunus serotina**	Black cherry	-	-	-	13/0.13	-	-	-	2.1/0.4	-	-	-	1
Quercus prinus	Oak	13/0.13	13/0.13	-	13/0.13	5.0/0.8	3.7/1.7	-	2.1/0.4	1	1	-	1
Rhus radicans	Poison ivy	*	-	-	*	*	-	-	*	*	-	-	*
Robina pseudoacacia	Black locust	-	-	-	-	-	-	-	-	-	-	-	-
Rubus sp.	Blackberry	*	-	-	13/0.13	*	-	-	2.1/0.4	*	-	-	1
Sanguinaria canadensis	Bloodroot	-	-	-	13/0.25	-	-	*	2.1/0.9	-	-	*	1
Sanicula trifoliata	Snakeroot	*	-	13/0.13	38/0.88	*	-	1.5/0.3	6.3/3.0	*	-	1	1
Smilacina racemosa	False solomon's seal	-	-	38/0.63	38/0.75	-	-	4.4/1.6	6.3/2.6	-	-	1	1
Solidago sp.	Goldenrod	*	*	-	-	*	c	-	-	8	8	-	-
Symphoricarpos orbiculatus	Coralberry	-	-	13/0.13	13/Tr	-	-	1.5/0.3	2.1/Tr	-	-	1	1
Trillium sessile	Toadshade	-	-	50/1.13	25/0.73	-	-	5.8/2.8	4.1/2.6	-	-	1	1
Ulmus rubra	Slippery elm	25/0.63	13/0.13	25/0.13	25/0.38	5.8/3.1	3.7/1.7	2.9/0.3	4.1/1.3	1	8	8/1	1
Viola sororia	Wooly-blue violet	13/Tr	-	-	-	3.0/Tr	-	-	-	1	-	-	-
Vitis aestivalis	Summer grape	13/1.13	13/1.00	-	13/0.88	3.0/5.6	3.7/13.0	-	2.1/3.0	1	1	-	1

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-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
Mode Condition: 1 - Healthy, 2 - Diseased, 8 - Dormant
Tr - Trace
( ) - Indicates tentative identification of species.

Table C-4 (Contd)

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	Frequency ($)/Areal Cover ($) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency ($)/Areal Cover ($) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Mode Condition 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer negundo	Boxelder	13/0.50	13/0.50	13/0.13	25/1.13	1.5/1.0	2.9/1.4	1.9/0.8	2.8/1.7	1	2	1	1
Acer saccharum	Sugar maple	38/Tr	-	*	*	4.2/Tr	-	*	*	1	-	*	*
Actinomeris alternifolia	Wingstem	38/1.13	13/0.25	-	25/3.13	4.2/2.2	2.9/0.7	-	2.8/4.7	1	6	-	3
Allium canadense	Wild garlic	-	-	-	-	-	-	-	-	-	-	-	-
Anemone canadensis	Canada anemone	13/0.38	13/Tr	-	*	1.5/0.7	2.9/Tr	-	*	1	7	-	*
Arabis laevigata	Smooth rock-cress	*	-	-	*	-	-	-	*	*	-	-	*
Asimina triloba	Paw paw	25/1.25	25/4.00	-	38/2.63	2.8/2.5	5.5/11.4	-	4.2/5.9	1	1	-	1
Aster divaricatus**	White wood aster	13/0.25	-	-	-	1.5/0.5	-	-	-	1	-	-	-
Boehmeria cylindrica**	False nettle	-	-	-	13/0.50	-	-	-	1.4/0.7	-	-	-	1
Cardamine douglassii	Purple cress	-	-	-	-	-	-	-	-	-	-	-	-
Carex sp.	Sedge	13/Tr	13/Tr	13/0.13	25/Tr	1.5/Tr	2.9/Tr	1.9/0.8	2.8/Tr	1	1	1	1
Carya cordiformis	Yellowbud hickory	38/0.38	-	-	-	4.2/0.7	-	-	-	1	-	-	-
Carya ovata	Shagbark hickory	-	-	-	25/0.88	-	-	-	2.8/1.3	-	-	-	1
Cercis canadensis	Eastern redbud	25/0.13	13/Tr	-	25/0.25	2.8/0.3	2.9/Tr	-	2.8/0.4	1	1	-	1
Circaea alpina	Small enchanters nightshade	13/Tr	-	-	38/0.75	1.5/Tr	-	-	4.2/1.1	1	-	-	1
Compositae**	Sunflower	13/0.13	-	-	-	1.5/0.3	-	-	-	1	-	-	-
Convolvulus sp.	Bindweed	-	-	-	-	-	-	-	-	-	-	-	-
Dentaria laciniata	Cut-leaved toothwort	13/0.13	-	100/3.25	-	1.5/0.3	-	15.0/32.0	-	1	-	1	-
Dicotyledonae	Dicot	*	-	13/Tr	13/0.13	*	-	1.9/Tr	1.4/0.2	*	-	1	1
Erigenia bulbosa	Harbinger-of-spring	-	-	88/1.25	-	-	-	13.2/7.6	-	-	-	1	-
Eupatorium serotinum	Late-flowering thoroughwort	100/3.63	100/2.75	-	50/3.63	11.2/7.2	22.0/7.8	-	5.6/5.4	1	1	-	1
Fraxinus americana	White ash	13/0.75	13/0.25	13/Tr	63/2.63	1.5/1.5	2.9/0.7	1.9/Tr	4.5/3.9	1	3	8	1
Fraxinus quadrangulata	Blue ash	50/2.63	25/0.63	-	-	5.6/5.2	5.5/1.8	-	-	1	8/1	-	-
Gallium triflorum	Bedstraw	-	-	38/Tr	13/Tr	-	-	5.7/Tr	1.4/Tr	-	-	1	1
Geum canadense	Canadian avens	63/1.13	50/0.63	*	13/0.13	7.0/2.2	11.0/1.8	*	1.4/0.2	1	1	*	1
Glechoma hederacea	Gill-over-the-ground	*	*	-	13/Tr	*	*	-	1.4/Tr	*	*	-	1
Helianthus sp.	Sunflower	-	-	-	-	-	-	-	-	-	-	-	-
Heuchera sp.**	Heuchera	-	-	13/Tr	-	-	-	1.9/Tr	-	-	-	1	-
Hydrophyllum appendiculatum	Appendaged waterleaf	-	-	-	-	-	-	-	-	-	-	-	-
Linderia benzoin	Spice bush	25/0.63	*	-	*	2.8/1.2	*	-	*	1	*	-	*
Lonicera japonica	Japanese honeysuckle	88/19.25	100/25.75	100/7.13	100/23.50	9.8/38.0	22.0/73.3	15.0/43.5	11.1/35.0	1	1	1	1
Parthenocissus quinquefolia	Virginia creeper	88/3.13	-	50/Tr	100/10.63	9.8/6.2	-	7.5/Tr	11.1/15.8	1	-	1	1
Prunus serotina**	Black cherry	13/0.13	-	-	25/0.13	1.5/0.3	-	-	2.8/0.2	1	-	-	1
Ranunculus sp.	Buttercup	-	-	*	-	-	-	*	-	-	-	*	-
Ruellia caroliniensis**	Hairy ruellia	-	-	-	-	-	-	-	-	-	-	-	-
Rhus radicans	Poison ivy	75/14.13	38/0.25	25/Tr	63/11.13	8.4/27.9	8.4/0.7	3.7/Tr	7.0/16.6	1	1	1	1
Rosa sp.	Rose	25/0.38	-	13/0.25	25/0.38	2.8/0.7	-	1.9/1.5	2.8/0.6	1	-	1	1
Rubus sp.	Blackberry	13/0.13	13/0.13	13/0.13	13/0.75	1.5/0.3	2.9/0.4	1.9/0.8	1.4/1.1	1	1	1	1
Sanicula trifoliata	Snakeroot	-	-	63/0.63	75/1.38	-	-	9.4/3.8	8.4/2.1	-	-	1	1
Saxifragaceae	Saxifrage	*	*	-	-	*	*	-	-	*	*	-	-
Symphoricarpos orbiculatus	Coralberry	25/0.38	*	75/1.00	63/2.00	2.8/0.7	*	11.2/6.1	7.0/3.0	1	*	1	1
Taraxacum officinale	Dandelion	-	-	13/0.13	13/0.50	-	-	1.9/0.8	1.4/0.7	-	-	1	1
Trillium sessile	Toadshade	-	-	13/0.25	-	-	-	1.9/1.5	-	-	-	1	-
Ulmus rubra	Slippery elm	25/Tr	13/Tr	*	13/0.13	2.8/Tr	2.9/Tr	*	1.4/0.2	1	8	*	1
Viola sororia	Wooly-blue violet	25/0.13	13/Tr	25/0.13	13/0.25	2.8/0.3	2.9/Tr	3.7/0.8	1.4/0.4	1	1	1	1
Umbelliferae	Umbel	-	-	*	-	-	-	*	-	-	-	*	-
Vitis aestivalis	Summer grape	13/Tr	*	-	13/Tr	1.5/Tr	*	-	1.4/Tr	1	*	-	1
Vitis rotundifolia**	Muscadine grape	-	-	-	13/0.25	-	-	-	1.4/0.4	-	-	-	1

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-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy, 2 - Diseased, 3 - Insect Damage, 6 - Dead, 7 - Dying, 8 - Dormant.
Tr - Trace

Table C-4 (Contd)

Virginia Pine Cover Type

Scientific Name	Common Name	Frequency ($)/Areal Cover ($) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Relative Frequency ($)/Areal Cover ($) 1978 Sep	1978 Oct	1979 Apr	1979 Jun	Node Condition 1978 Sep	1978 Oct	1979 Apr	1979 Jun
Acer saccharum	Sugar maple	13/0.13	13/Tr	-	13/Tr	2.4/0.8	2.5/Tr	-	1.8/Tr	1	1	-	1
Actinomeris alternifolia**	Wing stem	13/0.63	-	-	-	2.4/3.7	-	-	-	1	-	-	-
Allium canadense	Wild garlic	-	*	63/0.13	-	-	*	11.3/5.7	-	-	*	1	-
Asplenium platyneuron	Ebony spleenwort	*	-	-	-	*	-	-	-	*	-	-	-
Botrychium virginianum	Virginia grape-fern	-	-	-	-	-	-	-	-	-	-	-	-
Bryophyta	Moss	-	-	-	-	-	-	-	-	-	-	-	-
Campsis radicans	Trumpet vine	-	-	-	-	-	-	-	-	-	-	-	-
Carex leersii	Little prickly sedge	*	25/0.50	*	*	*	4.8/5.5	*	*	*	1	*	*
Carex swanii	Swan's sedge	-	-	38/0.25	25/Tr	-	-	6.8/11.0	3.5/Tr	-	-	1	1
Carya cordiformis	Yellowbud hickory	-	13/Tr	-	-	-	2.5/Tr	-	-	-	1	-	-
Cercis canadensis	Eastern redbud	50/0.13	25/Tr	-	50/0.25	9.2/0.8	4.8/Tr	-	6.9/1.3	1	1	-	1
Compositae	Sunflower	-	-	*	13/Tr	-	-	*	1.8/Tr	-	-	*	-
Cornus florida	Flowering dogwood	100/5.63	1.0/5.00	100/0.38	100/6.38	18.5/32.8	19.3/55.4	18.0/16.6	15.9/32.9	1	1	8	1
Desmodium paniculatum	Panicled tick-trefoil	-	-	-	*	-	-	-	*	-	-	-	*
Dioscorea villosa	Wild yam	*	-	-	*	-	-	-	-	*	-	-	-
Elymus virginicus	Virginia wild rye	38/0.13	13/Tr	13/Tr	-	7.0/0.8	2.5/Tr	2.3/Tr	-	1	1	1	-
Eupatorium serotinum	Late-flowering thoroughwort	-	-	-	-	-	-	-	-	-	-	-	-
Fagus grandifolia	Beech	13/0.13	-	-	38/0.63	2.4/0.8	-	-	5.3/3.2	1	-	-	1
Fragaria virginiana	Wild strawberry	13/0.13	25/0.13	13/0.13	13/0.13	2.4/0.8	4.8/1.4	2.3/5.7	1.8/0.7	1	1	1	1
Fraxinus americana	White ash	*	-	*	25/1.25	*	-	*	3.5/6.4	*	-	*	1
Fraxinus quadrangulata	Blue ash	38/0.75	-	-	13/0.25	7.0/4.4	-	-	1.8/1.3	1	-	-	1
Gallium circaezans	White wild licorice	50/0.13	38/0.25	38/Tr	50/0.13	9.2/0.8	7.3/2.8	6.8/Tr	6.9/0.7	1	1	1	1
Gallium triflorum**	Fragrant bedstraw	-	-	-	13/Tr	-	-	-	1.8/Tr	-	-	-	1
Geum canadense	Canadian avens	-	-	-	13/Tr	-	-	-	1.8/Tr	-	-	-	1
Hamamelis virginiana	Witch-hazel	-	*	*	-	-	*	*	-	-	*	*	-
Jeffersonia diphyla	Twin leaf	-	-	13/0.13	13/0.13	-	-	2.3/5.7	1.8/0.7	-	-	1	1
Juniperus virginiana**	Eastern red cedar	-	-	13/Tr	-	-	-	2.3/Tr	-	-	-	1	-
Lonicera japonica	Japanese honeysuckle	13/0.25	13/0.25	13/0.13	13/0.25	2.4/1.5	2.5/2.8	2.3/5.7	1.8/1.3	1	1	1	1
Luzula multiflora**	Cyperus	-	-	13/0.13	38/0.75	-	-	2.3/5.7	5.3/5.9	-	-	1	1
Osmorhiza claytonii	White snakeroot	*	-	-	-	*	-	-	-	*	-	-	-
Panicum boscii**	Bosc's panicum	25/Tr	13/Tr	-	-	4.6/Tr	2.5/Tr	-	-	1	1	-	-
Parthenocissus quinquefolia	Virginia creeper	25/7.13	25/Tr	13/Tr	63/4.63	4.6/41.5	4.8/Tr	2.3/Tr	8.7/23.8	1	8	8	1
Phryma leptostachya	Lopseed	-	25/0.75	-	13/Tr	-	4.8/8.3	-	1.8/Tr	-	1	-	1
Pinus virginiana	Virginia pine	-	13/Tr	-	-	-	2.5/Tr	-	-	-	1	-	-
Podophyllum peltatum	May apple	-	-	13/Tr	13/0.25	-	-	2.3/Tr	1.8/1.3	-	-	1	1
Prunus serotina	Black cherry	50/0.63	63/0.63	75/0.63	75/1.25	9.2/3.7	12.2/7.0	13.5/27.5	10.4/6.4	1	1	1	1
Quercus rubra	Red oak	25/0.75	25/0.63	*	*	4.6/4.4	4.8/7.0	*	*	1	1	*	*
Rhus radicans	Poison ivy	13/0.25	-	38/Tr	13/0.50	2.4/1.5	-	6.8/Tr	1.8/2.6	1	-	1	1
Robinia pseudoacacia	Black locust	*	-	-	-	*	-	-	-	*	-	-	-
Rosaceae	Rose	*	-	-	-	*	-	-	-	*	-	-	-
Rubus sp.	Blackberry	-	-	-	-	-	-	-	-	-	-	-	-
Sanicula trifoliata	Snakeroot	63/0.38	63/0.63	75/0.25	75/1.50	11.6/2.2	12.2/7.0	13.5/11.0	10.4/7.7	1	1	1	1
Smilax sp.	Greenbrier	-	-	-	13/0.13	-	-	-	1.8/0.7	-	-	-	1
Smilax herbacea	Carrion-flower	*	13/0.13	-	-	*	2.5/1.4	-	-	*	1	-	-
Solidago sp.	Goldenrod	-	13/0.13	13/0.13	-	*	2.5/1.4	2.3/5.7	-	*	1	1	-
Taraxacum officinale	Dandelion	-	-	-	*	-	-	-	*	-	-	-	*
Ulmus rubra	Slippery elm	-	-	-	13/0.13	-	-	-	1.8/0.7	-	-	-	1
Viola sororia	Wooly-blue violet	*	-	13/Tr	13/Tr	*	-	2.3/Tr	1.8/Tr	*	-	1	1

*Taxa was observed in plots during indicated previous sampling period (1977-1978), but not during the current sampling period.
-Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1978-1979 sampling period.
***1 - Healthy, 8 - Dormant.
Tr - Trace.

Table C-5

Mean ($\bar{x}$) and Standard Error (SE) Values* for
Soils Parameters for Each Cover Type

Soil Moisture (%)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	31.9	1.9	36.3	1.2	40.3	2.0	35.6	1.5
02	Oak-Maple	28.1	1.7	28.5	1.5	34.8	2.8	30.5	1.9
03	Chinkapin Oak	22.3	2.9	29.1	2.0	35.2	2.0	26.2	1.0
04	Red Pine	20.0	0.5	21.7	1.4	29.4	1.0	23.6	1.5
05	Sycamore-Boxelder	21.5	0.5	25.9	1.4	28.5	1.8	25.1	1.2
06	Oak-Hickory	18.6	1.2	23.6	1.0	27.2	1.4	20.4	0.7
09	Walnut-Hickory-Buckeye	30.6	2.9	34.2	0.9	35.5	1.5	32.5	1.1
10	Orchard	14.7	2.7	23.4	3.3	24.4	1.0	21.9	0.7
11	Virginia Pine	19.1	1.2	22.0	0.6	25.9	2.1	19.0	0.5

Soil Bulk Density (g/cm^3)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	1.01	0.08	0.98	0.03	0.87	0.04	0.86	0.04
02	Oak-Maple	0.91	0.02	1.07	0.06	0.99	0.07	1.02	0.04
03	Chinkapin Oak	0.79	0.05	0.90	0.07	0.87	0.03	0.93	0.03
04	Red Pine	1.06	0.03	1.18	0.07	1.22	0.08	1.19	0.07
05	Sycamore-Boxelder	0.76	0.22	1.11	0.04	1.09	0.04	1.10	0.04
06	Oak-Hickory	0.98	0.01	1.10	0.06	1.14	0.06	1.03	0.02
09	Walnut-Hickory-Buckeye	0.86	0.07	0.90	0.03	0.98	0.03	0.89	0.05
10	Orchard	1.02	0.12	1.24	0.06	1.10	0.03	1.17	0.03
11	Virginia Pine	0.90	0.07	1.03	0.04	1.05	0.04	1.11	0.04

*Based on 4 replicates per cover type per date sampled

Table C-5 (Contd)

Soil pH (measured in water)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	6.6	0.1	6.7	0.1	7.4	0.1	7.3	0.1
02	Oak-Maple	6.5	0.1	6.8	0.1	7.3	0.2	6.9	0.4
03	Chinkapin Oak	6.4	0.1	7.0	0.1	7.5	0.1	7.3	0.2
04	Red Pine	6.3	0.2	6.4	0.3	6.3	0.3	6.1	0.3
05	Sycamore-Boxelder	6.2	0.1	6.2	0.2	6.9	0.4	6.9	0.5
06	Oak-Hickory	6.7	0.1	6.8	0.1	7.7	0.1	7.8	0.1
09	Walnut-Hickory-Buckeye	6.9	0.1	7.1	0.1	7.4	0.1	7.3	0.1
10	Orchard	6.4	0.2	6.7	0.2	5.9	0.2	5.7	0.5
11	Virginia Pine	6.5	0.1	6.2	0.0	6.2	0.2	5.6	0.3

Soil Conductivity (μmho/cm)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	375	71	400	44	263	62	286	34
02	Oak-Maple	340	30	262	22	220	82	211	25
03	Chinkapin Oak	333	14	488	49	278	16	209	9
04	Red Pine	194	42	171	17	183	46	228	26
05	Sycamore-Boxelder	323	24	238	20	231	108	233	26
06	Oak-Hickory	475	66	370	38	464	101	264	39
09	Walnut-Hickory-Buckeye	321	63	255	45	264	22	258	25
10	Orchard	328	46	313	95	626	77	333	26
11	Virginia Pine	92	14	108	11	204	21	140	7

*Based on 4 replicates per cover type per date sampled.

Table C-5 (Contd)

Soil Moisture and Conductivity Yearly Rankings

Code	Cover Type	Soil Moisture (%) 1978-1979 $\bar{x}$	Soil Moisture (%) 1978-1979 SE	Soil Moisture (%) 1978-1979 Rank	Soil Moisture (%) 1977-1978 Rank	Soil Conductivity (micromhos/cm) 1978-1979 $\bar{x}$	Soil Conductivity (micromhos/cm) 1978-1979 SE	Soil Conductivity (micromhos/cm) 1978-1979 Rank	Soil Conductivity (micromhos/cm) 1977-1978 Rank	Maximum Single Value (Sep 78-Jun 79)
01	Maple-Basswood	36.0	1.7	1	1	331	34	3	1	560 (Sep 1978)
02	Oak-Maple	30.5	1.6	3	3	258	30	6	7	420 (Sep 1978)
03	Chinkapin Oak	28.2	2.7	4	4	327	60	4	5	625 (Oct 1978)
04	Red Pine	23.7	2.1	6	6	194	13	8	8	320 (Sep 1978)
05	Sycamore-Boxelder	25.3	1.5	5	7	256	23	7	6	440 (Apr 1979)
06	Oak-Hickory	22.5	1.9	7	5	393	49	2	3	770 (Apr 1979)
09	Walnut-Hickory-Buckeye	33.2	1.1	2	2	275	16	5	4	461 (Sep 1978)
10	Orchard	21.1	2.2	8	8	400	76	1	2	850 (Apr 1979)
11	Virginia Pine	21.5	1.6	9	9	136	25	9	9	240 (Apr 1979)

Table C-5 (Contd)

Soil Cation Exchange Capacity (meg/100g)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	37.8	1.8	43.6	9.9	70.4	8.1	29.1	1.6
02	Oak-Maple	34.9	3.2	23.9	4.7	42.7	3.2	30.6	2.2
03	Chinkapin Oak	38.6	1.9	45.4	8.4	86.0	8.8	29.0	2.4
04	Red Pine	18.9	1.3	25.8	1.1	17.0	1.9	14.9	0.7
05	Sycamore-Boxelder	18.9	0.6	21.4	1.5	24.0	2.1	14.0	0.7
06	Oak-Hickory	31.4	1.9	40.3	2.7	34.0	3.1	26.0	2.2
09	Walnut-Hickory-Buckeye	37.7	1.6	57.5	2.7	52.4	4.4	33.8	3.3
10	Orchard	16.9	0.6	17.3	1.4	16.8	1.8	12.2	0.2
11	Virginia Pine	17.1	1.2	20.6	0.7	13.4	1.1	14.2	2.0

Soil Base Saturation (%)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	30.8	3.5	75.0	11.6	88.8	6.2	73.2	6.9
02	Oak-Maple	34.9	3.0	72.9	18.4	98.8	7.4	52.9	3.0
03	Chinkapin Oak	28.1	8.2	75.3	12.9	70.3	7.1	71.9	6.3
04	Red Pine	28.4	2.2	23.5	9.6	60.9	22.9	39.4	3.6
05	Sycamore-Boxelder	47.7	9.9	51.9	23.8	76.6	30.6	76.2	23.0
06	Oak-Hickory	47.6	3.4	40.2	21.6	141.1	28.5	83.4	6.9
09	Walnut-Hickory-Buckeye	35.6	2.1	40.2	6.7	91.9	11.1	61.7	4.7
10	Orchard	30.6	5.0	44.0	9.1	48.4	30.0	48.4	7.9
11	Virginia Pine	22.1	3.2	32.7	5.5	44.9	27.1	14.7	7.4

*Based on 4 replicates per cover type per date sampled

APPENDIX D

PSI - MARBLE HILL VEGETATION AND SOILS DATA

1977-1978 ANNUAL REPORT

Table D-1

Percentage of Ground Surface Covered by Vegetation and Litter in the Herbaceous Stratum of Each Vegetation Cover Type

		Areal Cover (%)*											
		Vegetation				Litter				Total			
		1977		1978		1977		1978		1977		1978	
Code	Cover Type	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun	Sep	Oct	Apr	Jun
01	Maple-Basswood	13.9	13.5	36.0	20.0	60.5	83.3**	63.5	70.0	74.4	96.9**	99.5	90.0
02	Oak-Maple	13.4	7.6**	17.6**	29.5	73.5	92.5**	81.1	69.1	96.9	100.0	98.7**	98.6
03	Chinkapin oak	13.0	11.1	8.8	36.8	79.8	88.9**	85.4	59.5	95.8	100.0	94.2	96.3
04	Red pine	[illegible]	14.4**	10.6	36.8	62.5	85.6**	89.4	63.2	100.0	100.0	100.0	100.0
05	Sycamore-Boxelder	66.4	19.6**	20.6	90.0**	22.5	80.4**	79.1	10.0**	88.9	100.0	99.7	100.0
06	Oak-Hickory	[illegible]	2.3	47.0	19.4	55.5	95.8**	47.9	53.3	66.9	98.1**	94.9	72.7
09	Walnut-Hickory-Buckeye	33.8	13.1	30.6**	72.6**	59.3	86.6	67.9**	26.0**	93.1	99.7	98.5	98.6
11	Virginia pine	19.8	3.4**	2.3	12.6**	76.8	96.5**	96.6	72.4	96.6	99.9	98.9	85.0**

*Based on mean of 8 plots per cover type per sample date.

**Significant changes from 1976-1977 sampling period (>10.0%).

Table D-2

Species Composition, Frequency, Basal Area, and Condition of the Tree and Sapling Strata by Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Acer saccharum	Sugar maple	5	-*	100	14.1	40.0	41.5	1	1	1	1
Fraxinus americana	White ash	1	(1)**	50	1.2	10.0	3.5	1	8	8	1
Juglans nigra	Black walnut	1	-	50	4.0	20.0	11.8	1	8	8	1
Tilia americana	Basswood	3	-	50	14.0	20.0	41.2	3	8	8	1
Total Live		10	(1)	250	33.3	90.0	98.0				
Dead condition											
Fraxinus americana	White ash	1	-	50	0.7	10.0	2.1				
Total Dead		1	-	50	0.7	10.0	2.1				
TOTAL		11	(1)	300	34.0	100.0	100.1				
Sapling stratum											
No saplings occurred in plots											

* - indicates no change

** (n) indicates loss of "n" individuals

*** 1 - Healthy, 3 - Insect damage, 8 - Dormant

Table D-2 (Contd)

Oak-Maple Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Acer saccharum	Sugar maple	7	1	100	10.0	20.0	30.2	1	1	1	1
Cornus florida	Flowering dogwood	1	(1)**	50	0.4	10.0	1.2	1	8	8	1
Fraxinus americana	White ash	3	-*	50	5.9	10.0	17.8	1	8	1	1
Juniperus virginiana	Eastern red cedar	1	-	50	0.4	10.0	1.2	2	1	1	1
Prunus serotina	Black cherry	2	-	100	2.9	20.0	8.7	1/7	8	1	1
Quercus prinus	Chestnut oak	1	-	50	5.9	10.0	17.8	1	1	7	1
Quercus velutina	Black oak	1	-	50	6.1	10.0	18.4	1	1	1	1
Total Live		16	-	450	31.6	90.0	95.3				
Dead condition											
Acer saccharum	Sugar maple	1	-	50	1.5	10.0	4.5				
Total Dead		1	-	50	1.5	10.0	4.5				
TOTAL		17	-	500	33.1	100.0	99.8				
Sapling stratum											
Live condition											
Acer saccharum	Sugar maple	4	(1)	100	2.4	100.0	100.0	8	1/8	8	1
Total Live		4	(1)	100	2.4	100.0	100.0				
Dead condition											
None											
Total Dead		0		0	0	0	0				
TOTAL		4	(1)	100	2.4	100.0	100.0				

* - indicates no change

** (n) indicates loss of "n" individuals

*** 1 - Healthy, 2 - Diseased, 7 - Dying, 8 - Dormant

Table D-2 (Contd)

Chinkapin Oak Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Acer saccharum	Sugar maple	1	-*	50	0.4	10.0	1.9	1	8	8	1
Fraxinus americana	White ash	7	-	100	4.1	20.0	19.3	1	8	1	1
Fraxinus quadrangulata	Blue ash	2	1	50	1.0	10.0	4.7	1	8	1/8	1
Juniperus virginiana	Eastern red cedar	5	-	100	2.9	20.0	13.7	1	1	1	1
Quercus muehlenbergii	Chinkapin oak	11	-	100	11.1	20.0	52.4	1	8	1	1
Quercus rubra	Red oak	1	-	50	0.6	10.0	2.8	1	8	1	1
Ulmus rubra	Slippery elm	1	-	50	0.4	10.0	1.9	1	8	1	1
Total Live		28	1	450	20.5	90.0	96.7				
Dead condition											
Fraxinus quadrangulata	Blue ash	0	(1)**	0	0	0	0				
Quercus muehlenbergii	Chinkapin oak	2	-	50	0.7	10.0	3.3				
Total Dead		2	(1)	50	0.7	10.0	3.3				
TOTAL		30	-	500	21.2	100.0	100.0				
Sapling stratum											
Live condition											
Juniperus virginiana	Eastern red cedar	2	-	50	0.5	100.0	100.0	1	1	1	
Total Live		2	-	50	0.5	100.0	100.0				
Dead condition											
None											
Total Dead		0	-	0	0	0	0				
TOTAL		2	-	50	0.5	100.0	100.0				

* - indicated no change

** (n) indicates loss of "n" individuals

*** 1 - Healthy, 8 - Dormant

Table D-2 (Contd)

Red Pine Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Fraxinus americana	White ash	2	-	50	2.6	13.0	6.5	1	8	1/8	1
Liriodendron tulipifera	Yellow poplar	2	1	50	4.2	13.0	10.5	1/2	8	1/2	1
Pinus resinosa	Red pine	15	1	100	21.2	25.0	53.1	1/2	1	2	1/7
Pinus strobus	White pine	4	(1)**	100	6.3	25.0	15.8	1/4	4	1/4	1
Total Live		23	1	300	34.3	76.0	85.9				
Dead Condition											
Pinus resinosa	Red pine	6	(2)	100	5.6	25.0	14.0				
Total Dead		6	(2)	100	5.6	25.0	14.0				
TOTAL		29	(1)	400	39.9	101.0	99.9				
Sapling stratum											
No saplings occurred in plots											

*- indicates no change

**(n) indicates loss of "n" individuals

***1 - Healthy, 2 - Diseased, 4 - Mechanical Injury, 7 - Dying, 8 - Dormant

Table D-2 (Contd)

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (%)	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Acer negundo	Boxelder	1	-*	50	0.5	14.3	1.0	1	8	1	1
Cornus florida	Flowering dogwood	2	-	50	1.2	14.3	2.4	1	8	1	1
Juglans nigra	Black walnut	2	-	50	4.4	14.3	8.7	1	8	8	1
Platnus occidentalis	Sycamore	4	-	50	38.6	14.3	76.7	2	8	1	1
Prunus serotina	Black cherry	1	-	50	0.4	14.3	0.8	2	1	1	1
Tilia americana	Basswood	1	-	50	0.9	14.3	1.8	1	8	1	1
Ulmus rubra	Slippery elm	1	-	50	4.3	14.3	8.5	1	8	1	1
Total Live		12	-	350	50.3	100.2	99.9				
Dead condition											
None		0	-	0	0	0	0				
Total Dead		0	-	0	0	0	0				
TOTAL		12	-	350	50.3	100.2	99.9				
Sapling stratum											
Live condition											
Acer negundo	Boxelder	2	-	50	1.3	33.3	65.0	7	8	7	7
Celtis occidentalis	Hackberry	0	(1)**	0	0.0	0.0	0.0				
Total Live		2	(1)	50	1.3	33.3	65.0				
Dead condition											
Celtis occidentalis	Hackberry	1	1	50	0.5	33.3	25.0				
Ulmus rubra	Slippery elm	1	-	50	0.2	33.3	10.0				
Total Dead		2	1	100	0.7	66.6	35.0				
TOTAL		4	-	150	2.0	99.0	100.0				

*- indicates no change

**(n) indicates loss of "n" individuals

***1 - Healthy, 2 - Diseased, 7 - Dying, 8 - Dormant

Table D-2 (Contd)

Oak-Hickory Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (m^2/ha)	Mode Condition *** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Aesculus glabra	Ohio buckeye	4	(1)**	100	2.7	18.2	7.1	2	8	1	1
Catalpa speciosa	Northern catalpa	1	-*	50	3.6	9.1	9.4	1	8	8	1
Fraxinus americana	White ash	1	-	50	1.0	9.1	2.6	1	8	8	1
Fraxinus quadrangulata	Blue ash	7	-	100	15.7	18.2	41.1	1	8	8	1
Quercus rubra	Red oak	2	-	50	12.3	9.1	32.2	1	8	1	1
Ulmus rubra	Slippery elm	1	-	50	0.9	9.1	2.4	2	8	1	1
Total Live		16	(1)	400	36.2	72.8	94.8				
Dead condition											
Aesculus glabra	Ohio buckeye	1	1	50	0.5	9.1	1.3				
Fraxinus quadrangulata	Blue ash	3	-	100	1.5	18.2	3.9				
Total Dead		4	1	150	2.0	27.3	5.2				
TOTAL		20	-	550	38.2	100.1	100.0				
Sapling stratum											
No saplings occurred in plots											

* - indicates no change

** (n) indicates loss of "n" individuals

*** 1 - Healthy, 2 - Diseased, 8 - Dormant

Table D-2 (Contd)

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (m^2/ha)	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Aesculus glabra	Ohio buckeye	7	(1)	50	7.6	10.0	23.2	1	8	1	1
Carya ovata	Shagbark hickory	2	-*	50	8.8	10.0	26.8	2	8	8	1
Cercis canadensis	Eastern redbud	2	-	50	0.8	10.0	2.4	2	8	8	1
Fraxinus americana	White ash	1	(1)**	50	3.4	10.0	10.4	1	8	1	1
Fraxinus quadrangulata	Blue ash	2	1	50	0.7	10.0	2.1	1	8	8	1
Juglans nigra	Black walnut	1	-	50	9.0	10.0	27.4	7	8	7	1
Ulmus rubra	Slippery elm	2	-	50	0.8	10.0	2.4	2	8	1	1
Total Live		18	(1)	350	31.1	70.0	94.7				
Dead condition											
Aesculus glabra	Ohio buckeye	1	1	50	0.6	10.0	1.8				
Fraxinus americana	White ash	1	1	50	0.5	10.0	1.5				
Ulmus rubra	Slippery elm	1	-	50	0.6	10.0	1.8				
Total Dead		3	2	150	1.7	30.0	5.1				
TOTAL		21	2	500	32.8	100.0	99.8				
Sapling stratum											
No saplings occurred in plots											

* - indicates no change

** (n) indicates loss of "n" individuals

*** 1 - Healthy, 2 - Diseased, 7 - Dying, 8 - Dormant

Table D-2 (Contd)

Virginia Pine Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Change in No. Individuals in Sample between 1976-1977 and 1977-1978	Frequency (%)	Basal Area (m^2/ha)	Relative Frequency (%)	Relative Basal Area (m^2/ha)	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Tree stratum											
Live condition											
Cercis canadensis	Eastern redbud	8	6*	100	3.9	28.6	13.8	1	8	8	1
Cornus florida	Flowering dogwood	1	(2)**	50	0.8	14.3	2.8	1	8	8	1
Diospyros virginiana	Persimmon	0	(1)	0	0.0	0.0	0.0				
Juniperus virginiana	Eastern red cedar	1	(1)	50	1.4	14.3	4.9	1	2	1	1
Liriodendron tulipifera	Yellow poplar	1	-	50	0.3	14.3	1.1	1	8	1	1
Pinus virginiana	Virginia pine	11	(1)	100	21.9	28.6	77.4	1/2	1	1	1
Total Live		22	1	350	28.3	100.1	100.0				
Dead condition											
None											
Total Dead		0	-	0	0.0	0.0	0.0				
TOTAL		22	1	350	28.3	100.1	100.0				
Sapling stratum											
Live condition											
Cercis canadensis	Eastern redbud	1	-	50	0.2	33.3	33.3	2	8	8	1
Cornus florida	Flowering dogwood	1	(1)	50	0.2	33.3	33.3	1	8	8	1
Juniperus virginiana	Eastern red cedar	0	(1)	0	0.0	0.0	0.0				
Liriodendron tulipifera	Yellow poplar	0	1	0	0.0	0.0	0.0				
Pinus virginiana	Black cherry	0	(1)	0	0.0	0.0	0.0				
Total Live		2	(4)	100	0.4	66.6	66.6				
Dead condition											
Cercis canadensis	Eastern redbud	0	(1)	0	0.0	0.0	0.0				
Cornus florida	Flowering dogwood	1	1	50	0.2	33.3	33.3				
Total Dead		1	-	50	0.2	33.3	33.3				
TOTAL		3	(4)	150	0.6	99.9	99.9				

* - indicates no change

** (n) indicates loss of "n" individuals

*** 1 - Healthy, 2 - Diseased, 8 - Dormant

Table D-3

Species Composition, Frequency, Areal Cover, and Condition of the Shrub Stratum by Cover Type

Scientific name	Common name	Frequency (%) / Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency / Relative Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Maple-Basswood (01)													
Asimina triloba	Pawpaw	38/1.50	50/40.0	38/1.00	25/1.00	100.0/100.0	100.0/100.0	100.0/100.0	100.0/100.0	1	1	8	1
Oak-Maple (02)													
Acer saccharum	Sugar maple	25/4.10	25/ 1.75	25/0.63	25/2.00	33.3/ 27.9	39.7/ 60.8	28.1/ 13.6	28.4/ 19.0	1	8	8	1
Cornus florida	Flowering dogwood	25/8.10	13/ 0.63	25/2.13	25/5.75	33.3/ 55.1	20.6/ 21.9	28.1/ 45.9	28.4/ 54.7	1	8	1	1
Prunus serotina	Black cherry	–	–	13/0.13	*	–	–	14.6/ 2.8	*	–	–	1	*
Smilax sp.	Greenbriar	–	–	–	13/0.13	–	–	–	14.8/ 1.2	–	–	–	1
Ulmus rubra	Slippery elm	25/2.50	25/0.50	13/1.75	25/2.63	33.3/ 17.0	39.7/ 17.4	14.6/ 37.7	28.4/ 25.0	1	8	8	1
Chinkapin Oak (03)													
Aesculus octandra**	Ohio buckeye	–	–	13/0.13	–	–	–	12.6/ 4.5	–	–	–	1	–
Celtis occidentalis	Hackberry	*	*	*	50/2.25	*	*	*	28.2/ 21.1	*	*	*	1
Clematis viorna	Leather flower	*	*	*	25/1.38	*	*	*	14.1/ 13.0	*	*	*	1
Diospyros virginiana	Persimmon	–	–	*	*	–	–	*	*	–	–	*	*
Juniperus virginiana	Eastern red cedar	*	*	13/0.50	25/2.00	*	*	12.6/ 17.3	14.1/ 18.8	*	*	1	1
Lonicera japonica	Japanese honeysuckle	–	*	*	13/0.50	–	*	*	7.3/ 4.7	–	*	*	1
Passiflora lutea	Yellow passion-flower	*	*	*	*	*	*	*	*	*	*	–	*
Prunus serotina**	Black cherry	–	–	13/0.33	–	–	–	12.6/ 21.8	–	–	–	1	–
Quercus muehlenbergii**	Chinkapin oak	13/0.50	13/ 0.50	13/0.25	–	25.0/ 10.8	50.0/ 62.4	12.6/ 8.7	–	1	8	1	–
Rhus aromatica**	Fragrant sumac	–	–	–	13/0.75	–	–	–	7.3/ 7.0	–	–	–	1
Robinia pseudoacacia	Black locust	13/1.00	*	13/0.25	13/1.25	25.0/21.6	*	12.6/ 8.7	14.1/ 22.4	1	*	1	1
Symphoricarpos orbiculatus**	Coralberry	–	–	13/0.13	–	–	–	12.6/ 4.5	–	–	–	1	–
Ulmus rubra	Slippery elm	38/3.13	13/ 0.38	25/1.00	25/2.38	50.0/ 67.6	50.0/ 37.6	24.3/ 34.6	7.3/ 11.7	1	8	2	1
Viburnum prunifolium	Black haw	–	–	–	13/0.13	–	–	–	7.3/ 1.2	–	–	–	6
Red Pine (04)													
Acer saccharum	Sugar maple	*	13/ 0.25	25/0.13	25/1.88	*	20.3/ 14.3	39.7/ 9.4	18.0/ 35.7	*	1	1	1
Cornus florida	Flowering dogwood	25/1.50	13/ 0.25	*	*	24.8/ 35.2	20.3/ 14.3	*	*	1	1	*	*
Fraxinus americana	White ash	38/2.38	25/ 0.25	25/0.25	63/2.75	37.6/ 55.9	39.1/ 14.3	39.7/ 18.1	45.3/ 52.3	1	8	2	1
Lonicera japonica	Japanese honeysuckle	25/0.25	13/ 1.00	–	13/Tr	24.8/ 5.9	20.3/ 57.1	–	9.3/ Tr	1	1	–	1
Parthenocissus quenquefolia	Virginia creeper	13/0.13	–	–	25/0.38	12.9/ 3.1	–	–	18.0/ 7.2	1	–	–	1
Vitis rotundifolia	Muscadine grape	*	*	13/1.00	13/0.25	*	*	20.6/ 72.5	9.3/ 4.8	*	*	8	1
Sycamore-Boxelder (05)													
Aesculus octandra**	Ohio buckeye	–	–	13/0.38	13/Tr	–	–	50.0/ 43.2	33.0/ Tr	–	–	1	1
Cornus florida**	Flowering dogwood	–	–	13/0.50	13/Tr	–	–	50.0/ 56.8	33.0/ Tr	–	–	1	1
Lindera benzoin**	Spicebush		13/ 0.38	–	13/Tr		100.0 100.0	–	33.0/ Tr		1	–	1
Ulmus rubra	Slippery elm	*	*	*	*	*	*	*	*	*	*	*	*
Oak-Hickory (0E)													
Cercis canadensis	Eastern redbud	50/2.50	38/ 0.63	13/0.75	25/3.38	28.2/ 19.8	33.3/ 14.4	20.3/ 7.2	28.1/ 21.8	1/2	8	1	1
Cornus prieeae**	Miss Price's cornel	13/0.75	13/ 0.75	13/0.63	–	7.4/ 5.9	11.4/ 17.1	20.3/ 6.1	14.6/ 3.2	1	1	1	1
Fraxinus quadrangulata**	Blue ash	38/1.13	–	–	–	21.4/ 8.9	–	–	–	1	–	–	–
Gymnocladus dioica	Kentucky coffee-tree	13/0.50	*	13/ Tr	13/0.88	7.4/ 4.0	*	20.3/ Tr	14.6/ 5.7	2	*	8	1
Juniperus virginiana**	Eastern red cedar	13/0.63	25/0.63	–	–	7.4/ 5.0	21.9/ 14.4	–	–	1	1	–	–
Symphoricarpos orbiculatus**	Coralberry	–	–	–	13/0.38	–	–	–	14.6/ 2.4	–	–	–	1
Ulmus rubra	Slippery elm	50/7.13	38/ 2.38	25/9.0	25/9.88	28.2/ 56.4	33.3/ 54.2	39.1/ 86.7	28.1/ 63.7	1	8	1	1
Walnut-Hickory-Buckeye (09)													
Acer negundo	Boxelder	*	*	13/0.13	13/0.63	*	*	6.0/ 3.5	4.1/ 2.1	*	*	8	1
Acer saccharum	Sugar maple	25/2.13	*	38/0.68	38/4.25	14.1/ 18.9	*	17.6/ 18.4	12.0/ 14.5	1	–	1	1
Aesculus glabra	Ohio buckeye	*	*	*	–	*	*	*	–	*	*	*	–
Asimina triloba	Pawpaw	13/1.00	25/ 1.63	*	50/9.00	7.4/ 8.9	22.1/ 20.0	–	15.8/ 30.8	1	8	–	1
Carya ovata	Shagbark hickory	25/1.63	–	–	–	14.1/ 14.5	–	–	–	1/2	–	–	–
Cercis canadensis	Eastern redbud	*	*	*	–	*	*	*	–	*	*	*	–
Fraxinus americana	White ash	25/1.50	*	*	63/2.75	14.1/ 13.3	*	*	19.9/ 9.4	1	*	*	1
Fraxinus quadrangulata	Blue ash	25/2.38	25/ 0.73	38/0.75	13/2.75	14.1/ 12.1	22.1/ 9.2	17.6/ 20.3	4.1/ 9.4	1	8	8	1
Linderia benzoin	Spicebush	25/1.00	25/ 0.63	38/0.38	38/5.00	14.1/ 8.9	22.1/ 7.7	17.6/ 10.3	12.0/ 17.1	1	8	8	1
Lonicera japonica	Japanese honeysuckle	13/1.00	38/ 5.13	50/0.75	75/4.00	7.4/ 8.9	33.6/ 63.0	23.1/ 20.3	23.7/ 13.7	1	1	1	1
Prunus virginiana**	Choke cherry	–	–	13/0.25	–	–	–	6.0/ 6.8	–	–	–	8	–
Quercus prinus	Chestnut oak	*	*	13/0.38	–	*	*	6.0/ 10.3	–	*	*	8	–
Rhus radicans	Poison ivy	13/0.13	*	*	–	7.4/ 1.2	*	*	–	1	*	*	–
Rubus sp.**	Blackberry	–	–	13/0.38	13/0.38	–	–	6.0/ 10.3	4.1/ 1.3	–	–	8	1
Shrub A.**		13/0.50	–	–	13/0.50	7.4/ 4.4	–	–	4.1/ 1.7	6	–	–	1
Virginia Pine (1:)													
Cercis canadensis**	Eastern redbud	–	–	13/ Tr	*	–	–	20.3/ Tr	*	–	–	8	*
Cornus florida	Flowering dogwood	*	25/ 0.38	13/ Tr	*	*	50.0/ 43.2	20.3/ Tr	*	*	1/8	8	*
Lonicera tatarica	Tartarian honeysuckle	*	*	*	*	*	*	*	*	*	*	*	*
Prunus serotina	Black cherry	*	75/ 0.50	38/2.63	*	*	50.0/ 56.8	59.4/100.0	*	*	8	1	*

*Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.
– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.
**Taxa observed in plots for the first time during 1977-1978 sampling period.
***1 - Healthy, 2 - Diseased, 6 - Dead, 8 - Dormant.
Tr - Trace

Table D-4

Species Composition, Frequency, Cover, and Condition of Herbaceous Stratum by Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency (%)/Relative Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Acer saccharum	Sugar maple	63/2.38	50/1.63	50/2.88	50/3.38	16.7/17.0	45.0/12.1	8.3/8.0	11.0/16.9	1	1	1	1
Aesculus octandra	Yellow buckeye	*	*	13/0.25	13/0.38	*	*	2.2/0.7	2.9/1.9	*	*	1	1
Anemonella thalictroides	Rue anemone	–	–	*	–	–	–	*	–	–	–	*	–
Ariseama atrorubens	Jack-in-the-pulpit	–	–	*	*	–	–	*	*	–	–	*	*
Asarum canadense	Wild ginger	63/4.13	38/6.13	50/5.38	50/5.00	16.7/29.5	34.2/45.3	8.3/14.9	11.0/25.0	1	1	1	1
Asimina triloba	Pawpaw	13/Tr	*	25/1.00	–	3.4/Tr	*	4.2/2.8	–	1	*	1	–
Carya cordiformis	Yellowbud hickory	–	–	–	13/0.38	–	–	–	2.9/1.9	–	–	–	1
Claytonia virginica	Spring-beauty	–	–	100/3.50	–	–	–	16.6/9.7	–	–	–	1	–
Dentaria laciniata	Cut-leaved toothwort	13/0.13	50/0.38	100/19.38	–	3.4/0.9	4.5/2.8	16.6/53.8	–	1	1	1	–
Erigenia bulbosa	Harbinger-of-spring	–	–	100/1.63	–	–	–	16.6/4.5	–	–	–	1	–
Eupatorium serotinum	Late flowering thoroughwort	38/5.00	50/5.25	38/0.88	38/7.88	10.1/35.7	4.5/38.8	6.3/2.4	8.4/39.3	1	1	1	1
Fraxinus americana	White ash	63/1.25	13/0.13	13/0.13	38/0.88	16.7/8.9	11.7/1.0	2.2/0.4	8.4/4.4	1/2	1	1	1
Galium boreale	Northern bedstraw	–	–	38/0.50	–	–	–	6.3/1.4	–	–	–	1	–
Geum canadense**	Canadian avens	–	–	–	38/0.25	–	–	–	8.4/1.2	–	–	–	1
Maianthemum canadense**	Canada mayflower	–	–	–	38/0.50	–	–	–	8.4/2.5	–	–	–	1
Parthenocissus quinquefolia	Virginia creeper	*	*	–	13/0.50	*	*	–	2.9/2.5	*	*	–	1
Phryma leptostachya	Lopseed	*	*	–	–	*	*	–	–	*	*	–	–
Pilea pumila**	Clear weed	25/0.50	–	–	38/0.63	6.6/3.6	–	–	8.4/3.1	1	–	–	1
Pinus strobus	White pine	*	*	–	–	*	*	–	–	*	*	–	–
Rhus radicans	Poison ivy	50/0.25	*	–	25/0.13	13.2/1.8	*	–	5.5/0.6	1	*	–	1
Sanicula trifoliata	Snakeroot	*	*	–	–	*	*	–	–	*	*	–	–
Tilia americana	Basswood	–	*	–	–	–	*	–	–	–	*	–	–
Ulmus rubra	Slippery elm	*	*	25/Tr	50/Tr	*	*	4.2/Tr	11.0/Tr	*	*	1	1
Viola sororia	Wooly-blue violet	50/0.38	–	50/0.50	38/0.13	13.2/2.7	–	8.3/1.4	8.4/0.6	1/2	1	–	1
Viola sp.	Violet	–	–	–	13/Tr	–	–	–	2.9/Tr	–	–	–	1
Vitis aestivalis	Summer grape	*	*	–	–	*	*	–	–	*	*	–	–

*Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

**Taxa observed in plots for the first time during 1977-1978 sampling period.

***1 - Healthy, 2 - Diseased.

Tr = Trace

Table D-4 (Contd)

Oak-Maple Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Acer saccharum	Sugar maple	75/2.13	13/0.63	63/2.00	63/3.75	11.4/9.1	3.2/8.3	7.7/11.5	3.8/12.7	1	1	1	1
Allium canadense	Wild garlic	–	50/1.38	50/1.00	–	–	12.4/18.3	6.1/5.7	–	–	1	1	–
Anemone quinquefolia	Wood anemone	–	–	75/2.88	–	–	–	9.2/16.5	–	–	–	1	–
Anemonella thalictroides	Rue anemone	–	–	13/Tr	–	–	–	1.6/Tr	–	–	–	1	–
Arabis sp.	Mustard	–	–	–	13/0.13	–	–	–	2.0/0.4	–	–	–	1
Aster divaricatus	White-wood aster	13/Tr	13/0.25	–	–	2.0/Tr	3.2/3.3	–	–	1	1	–	–
Aster azureus	Azure aster	–	*	–	*	–	*	–	*	–	*	–	*
Botrychium virginianum	Virginia grape-fern	–	–	–	*	–	–	–	*	–	–	–	*
Carya cordiformis	Yellowbud hickory	–	–	*	*	–	–	–	*	–	–	*	*
Cercis canadensis	Eastern redbud	13/Tr	13/0.13	–	25/Tr	2.0/Tr	3.2/1.7	–	3.8/Tr	1	1	–	1
Cornus florida	Flowering dogwood	63/2.63	13/0.13	*	13/0.13	9.6/11.3	3.2/1.7	*	2.0/0.4	1	1	*	1
Delphinium tricorne	Dwarf larkspur	–	–	25/1.50		–	–	3.1/8.6		–	–	1	–
Dentaria laciniata	Cut-leaved toothwort	–	-	100/2.50	–	–	–	12.1/14.3	–	–	–	1	–
Dicentra cucullaria	Dutchman's breeches	–	–	13/0.13	–	–	–	1.6/0.7	–	–	–	1	–
Dicotyledonae	Dicot	13/0.13	25/0.25	38/1.13	25/2.25	2.0/0.6	6.2/3.3	4.7/6.5	3.8/7.6	1	1	1	1
Elymus virginicus	Virginia wild rye	13/Tr	13/0.13	13/Tr	13/0.25	2.0/Tr	3.2/1.7	1.6/Tr	2.0/0.8	1	1	1	1
Erigena bulbosa	Harbinger-of-spring	–	–	25/Tr	–	–	–	3.1/Tr	–	–	–	1	–
Fraxinus americana	White ash	*	*	*	25/2.75	*	*	*	3.8/9.3	*	*	*	1
Fraxinus quadrangulata	Blue ash	38/1.38	*	25/0.50	*	5.8/5.9	*	3.1/2.9	*	1	*	1	*
Galium boreale	Northern bedstraw	63/0.25	38/0.38	*	13/0.25	9.6/1.1	9.4/5.0	*	2.0/0.8	1	1	*	1
Galium circaezans	White wild licorice	*	–	100/0.13	75/0.38	*	–	12.1/0.7	11.3/1.3	*	–	1	1
Geum canadense	Canadian avens	25/0.38	75/2.38	38/0.89	38/0.75	3.8/1.6	18.6/31.5	4.7/5.1	5.7/2.5	1	1	1	1
Hydrophyllum appendiculatum	Appendiged waterleaf	38/1.63	*	–	–	5.8/7.0	*	–	–	1	*	–	–
Jeffersonia diphylla	Twinleaf	*	*	50/0.75	–	*	*	6.1/4.3	–	*	*	1	–
Lindera benzoin	Spicebush	*	–	–	–	*	–	–	–	*	–	–	–
Osmorhiza claytonii	White snakeroot	–	–	13/0.50		–	–	1.6/2.9		–	–	1	–
Ostrya virginiana	Ironwood	*	*	38/0.13	*	*	*	4.7/0.7	*	*	*	1	*
Parthenocissus quinquefolia	Virginia creeper	50/2.00	25/0.25	25/0.13	75/5.00	7.6/8.6	6.2/3.3	3.1/0.7	11.3/16.9	1	1	1	1
Phryma leptostachya	Lopseed	13/0.38	–	–		2.0/1.6	–	–		1	–	–	–
Prunus serotina	Black cherry	25/0.25	50/0.63	25/0.13	25/0.25	3.8/1.1	12.4/8.3	3.1/0.7	3.8/0.8	1	1	1	1
Quercus prinus	Chestnut oak	13/0.13	*	–	*	13.4/26.8	*	–	*	1	*	–	*
Rhus radicans	Poison ivy	25/1.00	13/0.13	–	13/1.88	3.8/4.3	3.2/1.7	–	2.0/6.4	1	1	–	1
Sanicula trifoliata	Snakeroot	88/6.25	38/0.63	–	75/5.75	13.4/26.8	9.4/3.3	–	11.3/19.5	1	1	–	1
Smilax herbacea	Carrion-flower	13/0.13	*	–	50/2.63	2.0/0.6	*	–	7.5/8.9	1	*	–	1
Symphoricarpos orbiculatus	Coralberry	*	–	–	–	*	–	–	–	*	–	–	–
Ulmus rubra	Slippery elm	75/4.63	25/0.25	38/0.13	38/2.75	11.4/19.9	6.2/3.3	4.7/0.7	15.8/7.5	1	1	1	1
Viburnum prunifolium	Black-haw	–	–	*	*	–	–	*	*	–	–	*	*
Viola sororia	Wooly-blue violet	–	–	50/0.38	75/1.00	–	–	6.1/2.2	11.3/3.4	–	–	1	1

*Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

**Taxa observed in plots for the first time during 1977-1978 sampling period.

***1 - Healthy

Tr = Trace

Table D-4 (Contd)

Chinkapin Oak Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency (%)/Relative Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Acer saccharum**	Sugar maple	–	–	–	13/0.13	–	–	–	1.3/0.3	–	–	–	1
Actinomeris alternifolia**	Wing stem	–	–	–	13/0.13	–	–	–	1.3/0.3	–	–	–	1
Allium canadense	Wild garlic	–	–	63/Tr	–	–	–	6.9/Tr	–	–	–	1	–
Anemone quinquefolia	Wood anemone	–	–	*	–	–	–	*	–	–	–	*	–
Anemone virginica	Thimbleweed	13/0.13	13/0.25	*	13/0.25	1.8/0.8	3.5/2.3	*	1.3/0.6	1	8	*	–
Anemonella thalictroides	Rue anemone	–	–	–	50/1.63	–	–	–	4.9/4.0	–	–	–	1
Arabis laevigata	Smooth rock-cress	–	–	13/0.13	*	–	–	1.4/1.6	*	–	–	1	*
Aster azureus	Azure aster	–	–	–	38/0.38	–	–	–	3.7/0.9	–	–	–	1
Carex sp.**	Sedge	–	–	–	13/0.13	–	–	–	1.3/0.3	–	–	–	1
Celtis occidentalis	Hackberry	13/0.25	13/0.13	*	*	1.8/1.6	3.5/1.2	*	*	1	8	*	7
Cercis canadensis	Eastern redbud	*	*	–	13/0.13	*	*	–	1.3/0.3	1	*	–	1
Clematis viorna	Leather flower	38/0.50	*	63/0.63	88/8.13	5.4/3.2	*	6.9/7.6	8.6/20.1	1	*	1	1
Cornus florida**	Flowering dogwood	13/0.13	–	–	–	1.8/0.8	–	–	–	1	–	–	–
Delphinium tricorne**	Dwarf larkspur	–	–	100/0.25	–	–	–	11.0/3.0	–	–	–	1	–
Dentaria laciniata	Cut-leaved toothwort	–	–	*	–	–	–	*	–	–	–	*	–
Dioscorea villosa	Wild yam	38/1.50	13/0.13	–	100/7.50	5.4/9.6	3.5/1.2	–	9.8/18.6	1	1	–	1
Diospyros virginiana	Persimmon	*	*	–	–	*	*	–	–	*	*	–	–
Elymus virginicus**	Virginia wild rye	13/0.13	–	–	–	3.5/1.2	–	–	–	8	–	–	–
Eupatorium maculatum	Spotted joe-pye-weed	–	50/1.00	–	50/0.88	–	13.5/9.0	–	4.9/2.1	–	1/7	–	1
Fraxinus americana	White ash	13/0.25	*	13/0.13	25/0.63	1.8/1.6	*	1.4/1.6	2.4/1.6	1	*	1	1
Fraxinus quadrangulata	Blue ash	*	*	13/Tr	*	*	*	1.4/Tr	*	*	*	1	*
Galium circaezans	White wild licorice	75/0.63	13/0.13	–	75/0.63	10.5/4.0	3.5/1.2	–	7.3/1.6	1	7	–	1
Geum canadense	Canadian avens	13/Tr	*	–	–	1.8/Tr	*	–	–	1	*	–	–
Helianthus sp.	Sunflower	*	–	–	–	*	–	–	–	*	–	–	–
Hystrix patula	Bottlebrush	–	–	–	*	–	–	–	*	–	–	–	*
Jeffersonia diphylla	Twinleaf	*	–	38/0.50	38/1.00	*	–	4.2/6.0	3.7/2.5	*	–	1	1
Juniperus virginiana	Eastern red cedar	13/Tr	13/0.13	*	–	1.8/Tr	3.5/1.2	*	–	1	1	*	–
Labiatae**	Mint	–	–	25/Tr	–	–	–	2.7/Tr	–	–	–	1	–
Lactuca sp.**	Wild lettuce	–	13/01.3	13/0.13	–	–	3.5/1.2	1.4/1.6	–	–	1	1	–
Lonicera japonica	Japanese honeysuckle	63/4.63	63/6.13	63/1.0	50/7.38	9.1/29.5	17.0/55.4	6.9/12.0	4.9/18.3	1	1	1	1
Maianthemum canadense	Canada mayflower	–	–	*	–	–	–	*	–	–	–	*	–
Muhlenbergia sobolifera	Muhly grass	13/0.13	13/0.25	–	38/0.38	1.8/0.8	3.5/2.3	–	3.7/0.9	1	7	–	1
Oenothera sp.	Evening primrose	*	*	*	*	*	*	*	*	*	*	*	*
Ostrya virginiana	Ironweed	*	*	*	*	*	*	*	*	*	*	*	*
Panicum boscii	Bosc's panicum	25/0.25	13/0.75	13/Tr	*	3.4/1.6	3.5/6.8	1.4/Tr	*	1	7	1	*
Parthenocissus quinquefolia	Virginia creeper	13/0.38	13/0.13	13/Tr	25/1.00	1.8/2.4	3.5/1.2	1.4/Tr	2.4/2.5	1	8	1	1
Pinus virginiana	Virginia pine	*	13/0.13	*	13/0.13	*	3.5/1.2	*	1.3/0.3	*	1	*	1
Polygonatum biflorum	Solomon's seal	–	–	–	50/1.63	–	–	–	4.9/4.0	–	–	–	1
Prunus serotina	Black cherry	25/0.50	25/0.38	63/0.63	38/0.88	3.4/3.2	6.7/3.4	6.9/7.6	3.7/2.1	1	1	1	1
Quercus muehlenbergii	Chinkapin oak	13/Tr	13/0.13	*	36/1.13	1.8/Tr	3.5/1.2	*	3.7/2.8	1	8	*	1
Quercus velutina	Black oak	13/0.13	*	–	–	1.8/0.8	*	–	–	1	*	–	–
Rhus aromatica	Fragrant sumac	–	–	–	*	–	–	–	*	–	–	–	*
Rhus radicans**	Poison ivy	13/0.13	–	13/Tr	13/0.13	1.8/0.8	–	1.4/Tr	1.3/0.3	1	–	1	1
Robinia pseudoacacia	Black locust	13/1.38	*	*	13/0.50	1.8/8.9	*	*	1.3/1.2	1	*	*	1
Rosa sp.	Rose	13/0.13	13/0.13	13/Tr	13/0.13	1.8/0.8	3.5/1.2	1.4/Tr	1.3/0.3	1	8	1	1
Ruellia caroliniensis	Hairy ruellia	–	–	–	13/0.13	–	–	–	13/0.13	–	–	–	1
Sanguinaria canadensis	Bloodroot	–	–	*	–	–	–	*	–	–	–	*	–
Sanicula trifoliata	Snakeroot	38/0.25	–	63/0.13	50/0.75	5.4/1.5	–	6.9/1.6	4.9/1.9	1	–	1	1
Smilacina racemosa**	False Solomon's seal	–	–	63/1.13	–	–	–	6.9/13.6	–	–	–	1	–
Smilax herbacea**	Carrion-flower	13/0.50	–	–	–	1.8/3.2	–	–	–	1	–	–	–
Solidago ulmifolia	Goldenrod	75/1.63	13/0.25	100/1.00	38/1.88	10.9/1.63	3.5/2.3	11.0/12.0	3.7/4.7	1	7	1	1
Solidago sp.**	Goldenrod	25/0.50	–	–	–	3.4/3.2	–	–	–	1	–	–	–
Symphoricarpos orbiculatus	Coralberry	*	13/0.25	13/0.25	13/0.75	*	3.5/2.3	1.4/2.0	1.3/1.9	*	8	1	1
Taraxacum officinale**	Common dandelion	–	–	13/0.38	13/0.13	–	–	1.4/4.6	1.3/0.3	–	–	1	1
Thalictrum dioicum	Early meadow-rue	38/0.63	25/0.38	63/0.63	–	5.4/4.0	6.7/3.4	6.9/7.6	–	1	1	1	–
Ulmus rubra	Slippery elm	50/0.75	13/0.13	*	38/1.50	7.0/4.8	3.5/1.2	*	3.7/3.7	1	8	*	1
Veratrum sp.**	False helleborne	–	–	–	25/0.25	–	–	–	2.4/0.6	–	–	–	1
Viola sororia**	Wooly-blue violet	13/Tr	–	13/Tr	–	1.8/Tr	–	1.4/Tr	–	1	–	1	–
Vitis aestivalis	Summer grape	13/0.25	–	–	*	1.8/1.6	–	–	*	1	–	–	*
Dicotyledonae	Dicot B	13/0.13	–	–	13/0.13	1.8/0.8	–	–	1.3/0.3	1	–	–	1
Monocotyledonae	Monocot A	–	–	63/1.4	–	–	–	6.9/16.8	–	–	–	1	–

*Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

**Taxa observed in plots for the first time during 1977-1978 sampling period.

***1 - Healthy, 7 - Dying, 8 - Dormant

Tr - Trace

Table D-4 (Contd)

Red Pine Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Cercis canadensis	Eastern redbud	75/2.63	38/0.50	–	63/2.00	10.1/7.1	10.4/3.5	–	9.2/5.4	1/2	1	–	1
Cornus florida	Flowering dogwood	63/6.50	63/1.38	38/0.13	25/4.63	8.5/17.6	17.2/9.6	7.4/1.2	3.7/12.6	1	8	1	1
Dentaria laciniata	Cut-leaved toothwort	–	–	38/2.13	–	–	–	7.4/20.0	–	–	–	1	–
Eupatorium serotinum	Late-flowering thoroughwort	13/1.00	13/0.50	13/0.13	*	1.7/2.7	3.6/3.5	2.5/1.2	*	1	1	1	*
Fagus grandifolia	Beech	13/0.25	13/0.13	25/0.50	13.0.75	1.7/0.7	3.6/1.0	4.9/4.7	1.9/2.0	1	8	1	1
Fragaria virginiana	Wild strawberry	13/0.25	*	13/Tr	13/Tr	1.7/0.7	*	2.5/Tr	1.9/Tr	1	*	1	1
Fraxinus americana	White ash	63/1.25	*	25/Tr	50/2.63	8.5/3.4	*	4.9/Tr	7.3/7.1	1	*	1	1
Fraxinus quadrangulata	Blue ash	*	25/0.25	13/0.13	–	*	6.8/1.7	2.5/1.2	–	*	8	1	–
Galium asprellum	Northern bedstraw	13/0.13	25/0.25	–	13/0.38	1.7/0.4	6.8/1.7	–	1.9/1.0	1	1	–	1
Galium circaezans	White wild licorice	50/0.50	13/0.13	–	38/0.75	6.7/1.4	3.6/1.0	–	5.6/2.0	1	1	–	1
Galium triflorum	Fragrant bedstraw	*	*	38/0.50	13/0.13	*	*	7.4/4.7	1.9/0.4	*	*	1	1
Geum canadense	Canadian avens	*	–	38/0.13	38/1.13	*	–	7.4/1.2	5.6/3.1	*	–	1	1
Liriodendron tulipifera**	Yellow poplar	–	–	–	13/0.38	–	–	–	1.9/1.0	–	–	–	1
Lonicera japonica	Japanese honeysuckle	50/14.00	50/8.89	*	50/11.25	6.7/37.9	13.7/61.7	*	7.3/30.6	1	1	*	1
Muhlenbergia sobolifera	Muhly grass	–	–	–	13/0.13	–	–	–	1.9/0.4	–	–	–	1
Parthenocissus quinquefolia	Virginia creeper	25/2.13	–	38/0.13	38/2.63	3.4/5.8	–	7.4/1.2	5.6/7.1	1	–	1	1
Phryma leptostachya	Lopseed	38/2.25	*	–	13/1.63	5.1/6.1	*	–	1.9/4.4	1	*	–	1
Pilea pumila**	Clearweed	–	–	–	13/0.13	–	–	–	1.9/0.4	–	–	–	1
Pinus strobus	White pine	25/0.13	25/0.25	13/0.13	*	3.4/0.4	6.8/1.7	2.5/1.2	*	1	1	1	*
Poaceae	Grass	–	–	*	–	–	–	*	–	–	–	*	–
Prunus serotina	Black cherry	50/0.88	13/0.38	75/1.63	50/1.13	6.7/2.4	3.6/2.6	14.7/15.3	7.3/3.1	1	1	1	1
Quercus prinus	Chestnut oak	13/0.25	25/0.88	–	–	1.7/0.7	6.8/6.1	–	–	1	1	–	–
Quercus velutina	Black oak	38/1.13	13/0.25	–	38/1.00	5.1/3.1	3.6/1.7	–	5.6/2.7	1	8	–	1
Rhus radicans	Poison ivy	25/0.63	–	13/Tr	38/0.63	3.4/1.7	–	2.5/Tr	5.6/1.7	1/2	–	1	1
Rosa sp.	Rose	13/0.25	*	13/Tr	25/0.25	1.7/0.7	*	2.5/Tr	3.7/0.7	1	*	1	1
Rubus sp.	Blackberry	13/0.13	–	–	25/0.63	1.7/0.4	–	–	3.7/1.7	1	–	–	1
Sanicula trifoliata	Snakeroot	75/1.75	50/0.63	68/1.88	88/4.25	10.1/4.7	13.7/4.4	–	12.9/11.5	1	1/6	–	1
Sassafras albidum	Sassafras	25/0.50	*	–	*	3.4/1.4	*	–	*	1	*	–	*
Smilax herbacea**	Carrion-flower	13/Tr	–	–	–	1.7/Tr	–	–	–	1	–	–	–
Symphoricarpos orbiculatus	Coralberry	*	–	–	–	*	–	–	–	*	–	–	–
Ulmus rubra	Slippery elm	13/0.13	–	–	13/0.38	1.7/0.4	–	–	1.9/1.0	1	–	–	1
Viola sororia	Wooly-blue violet	13/0.13	–	–	*	1.7/0.4	–	–	*	1	–	–	*
Vitis rotundifolia	Muscadine grape	*	–	–	–	*	–	–	–	*	–	–	–
Dicotyledonae**	Dicot	13/0.13	–	–	*	1.7/0.4	–	–	*	1	–	–	*

* Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

** Taxa observed in plots for the first time during 1977-1978 sampling period.

*** 1 - Healthy, 2 - Diseased, 6 - Dead, 8 - Dormant.

Tr = Trace

Table D-4 (Contd)

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Acer negundo	Boxelder	*	–	25/Tr	*	*	–	4.1/Tr	*	*	–	1	*
Actinomeris alternifolia	Wing-stem	38/1.00	38/0.63	25/0.75	38/5.75	6.1/1.5	7.2/3.1	4.1/3.6	6.4/6.2	2	7	1	1
Amaranthus sp.	Pigweed	–	*	–	–	–	*	–	–	–	*	–	–
Aster sp.**	Aster	–	13/0.13	–	–	–	2.4/0.6	–	–	–	1	–	–
Bidens sp.**	Beggar's ticks	13/0.63	–	–	–	2.1/0.9	–	–	–	1	–	–	–
Carex sp.	Sedge	50/3.63	50/5.63	50/6.38	50/5.88	8.1/5.4	9.4/27.9	8.2/30.7	8.4/6.3	1	1	1	1
Circaea alpina	Small enchanter's nightshade	*	*	–	13/0.25	*	*	–	2.2/0.3	*	*	–	1
Claytonia virginica	Spring-beauty	–	–	50/1.25		–	–	8.2/6.0		–	–	1	–
Commelina sp.	Dayflower	13/0.13	13/0.88	–	13/0.38	2.1/0.2	2.4/4.4	–	2.2/0.4	1	7	–	1
Cornus florida	Flowering dogwood	38/1.63	25/0.38	*	13/1.38	6.1/2.4	4.7/1.9	*	2.2/1.5	1	8	*	1
Cryptotaenia canadensis	Honewort	–	–	–	13/0.13	–	–	–	2.2/0.1	–	–	–	1
Dentaria laciniata	Cut-leaved toothwort	13/0.25	13/0.13	50/4.13	–	2.1/0.4	2.4/0.6	8.2/19.9	–	1	1	1	–
Elymus virginicus	Virginia wild rye	25/0.88	25/1.13	13/0.13	38/1.50	4.0/1.3	4.7/5.6	2.1/0.6	6.4/1.6	1	1	1	1
Eupatorium serotinum	Late-flowering thoroughwort	25/2.26	88/4.75	–	50/5.63	4.0/3.3	16.6/23.5	–	8.4/6.1	1	1	–	1
Galium circaezans	White wild licorice	13/0.13	13/0.13	25/0.25	13/0.13	2.1/0.2	2.4/0.6	4.1/1.2	2.2/0.1	1	1	1	1
Galium triflorum	Fragrant bedstraw	–	–	13/0.25	–	–	–	2.1/1.2	–	–	–	1	–
Geum canadense	Canadian avens	50/1.63	50/0.63	13/0.13	50/4.88	8.1/2.4	9.4/3.1	2.1/0.6	8.4/5.3	1	1	1	1
Impatiens pallida	Yellow jewelweed	50/6.50	38/0.38	50/3.75	63/27.38	8.1/9.7	7.2/1.9	8.2/18.0	10.6/29.5	1	6	1	1
Jeffersonia diphylla	Twinleaf	–	–	*	–	–	–	*	–	–	–	*	*
Urtica dioica**	Wood nettle	50/4.25	–	–	13/6.00	8.1/6.3	–	–	2.2/6.5	1	–	–	1
Lindera benzoin**	Spicebush	13/0.38	–	–	–	2.1/0.6	–	–	–	1	–	–	–
Osmorhiza claytonii**	White snakeroot	–	–	50/0.88	–	–	–	8.2/4.2	–	–	–	1	–
Parthenocissus quinquefolia	Virginia creeper	25/1.00	*	13/0.13	25/2.00	4.0/1.5	*	2.1/0.6	4.2/2.2	1	*	1	1
Pilea pumila	Clearweed	88/40.75	63/4.00	50/Tr	63/26.88	14.2/60.5	11.9/19.8	8.2/Tr	10.6/29.0	1	6	1	1
Polygonum cespitosum	Long-bristled smartweed	*	13/0.13	–	–	*	2.4/0.6	–	–	*	1	–	–
Rhus radicans	Poison ivy	13/0.25	13/0.13	25/0.38	13/0.63	2.1/0.4	2.4/0.6	4.1/1.8	2.2/0.7	1	8	1	1
Sanicula trifoliata	Snakeroot	13/0.38	25/0.13	68/0.88	63/1.63	2.1/0.6	4.7/0.6	11.2/4.2	10.6/1.8	6	1	1	1
Smilax herbacea	Carrion-flower	13/0.25	13/0.38	–	–	2.1/0.4	2.4/1.9	–	–	1	1	–	–
Solidago sp.	Goldenrod	25/0.50	*	13/0.25	25/0.88	4.0/0.7	*	2.1/1.2	4.2/0.9	1	*	1	1
Umbelliferae sp.**		–	–	13/0.13	–	–	–	2.1/0.6	–	–	–	1	–
Viola eriocarpa	Smoothish yellow violet	13/0.25	13/0.38	13/0.13	*	2.1/0.4	2.4/1.9	2.1/0.6	*	1	1	1	*
Viola sororia	Wooly-blue violet	38/0.63	25/0.25	50/1.00	38/1.38	6.1/0.9	4.7/1.2	8.2/4.8	6.4/1.5	1	1	1	1

*Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

**Taxa observed in plots for the first time during 1977-1978 sampling period.

***1 - Healthy, 2 - Diseased, 6 - Dead, 7 - Dying, 8 - Dormant.

Tr = Trace

Table D-4 (Contd)

Oak-Hickory Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency (%)/Relative Areal Cover 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Acer saccharum	Sugar maple	–	–	–	13/Tr	–	–	–	2.7/0.7	–	–	–	1
Allium canadense	Wild garlic	–	–	25/Tr	–	–	–	3.5/Tr	–	–	–	1	–
Amaranthus sp.	Pigweed	*	–	–	–	*	–	–	–	*	–	–	–
Anemone canadensis	Canada anemone	–	–	*	–	–	–	*	–	–	–	*	–
Anemonella thalictroides	Rue anemone	–	–	*	–	–	–	*	–	–	–	*	–
Asarum canadense	Wild ginger	–	–	–	13/Tr	–	–	–	2.7/Tr	–	–	–	1
Aster azureus	Azure aster	*	*	–	*	*	*	–	*	*	*	–	*
Cardamine douglassii	Purple cress	13/0.13	–	25/Tr	*	3.1/1.1	–	3.5/Tr	*	6	–	1	*
Carya cordiformis	Yellowbud hickory	–	*	–	–	–	*	–	–	–	*	–	–
Cercis canadensis	Eastern redbud	13/0.38	*	50/0.25	38/1.63	3.1/3.3	*	7.0/0.7	7.9/8.4	1	*	1	1
Circaea alpina	Small enchanter's nightshade	13/0.13	25/0.25	–	–	3.1/1.1	19.5/11.0	–	–	1	1/8	–	–
Commelina sp.	Dayflower	*	–	–	–	*	–	–	–	*	–	–	–
Compositae**	Sunflower	13/0.25	–	–	13/0.25	3.1/2.2	–	–	2.7/1.3	1	–	–	1
Cornus priceae	Miss Price's cornel	–	–	–	–	–	–	–	–	–	–	–	–
Carex sp.	Sedge	25/0.25	–	–	*	5.9/2.2	–	–	*	1	–	–	*
Delphinium tricorne**	Dwarf larkspur	–	–	88/4.88	–	–	–	12.3/14.1	–	–	–	1	–
Dentaria laciniata	Cut-leaved toothwort	–	–	88/2.00	–	–	–	12.3/5.8	–	–	–	1	–
Erythronium albidum	White trout-lily	–	–	75/6.13	–	–	–	10.5/17.6	–	–	–	1	–
Eupatorium serotinum	Late-flowering thoroughwort	50/1.13	13/0.13	–	50/2.25	11.5/9.8	10.2/5.7	–	10.4/11.6	1	1	–	1
Fraxinus americana	White ash	*	*	–	–	*	*	–	–	*	*	–	–
Fraxinus quadrangulata	Blue ash	13/Tr	13/0.25	–	*	3.1/Tr	10.2/11.0	–	*	1	1	1	1
Geum canadense	Canadian avens	13/0.38	13/0.13	25/0.38	25/0.50	3.1/3.3	10.2/5.7	3.5/1.1	5.2/2.6	1	1	1	1
Galium circaezans**	White wild licorice	–	–	25/Tr	–	–	–	3.5/Tr	–	–	–	1	–
Gleochoma hederacea**	Gill-over-the-ground	13/0.13	–	–	–	3.1/1.1	–	–	–	1	–	–	–
Hydrophyllum appendiculatum	Appendaged water leaf	*	*	–	–	*	*	–	–	*	*	–	–
Hystrix patula	Bottlebrush	*	*	*	38/Tr	*	*	*	7.9/Tr	*	*	*	1
Lonicera japonica	Japanese honeysuckle	13/0.25	*	–	13/1.13	3.1/2.2	*	–	2.7/5.8	1	*	–	1
Mertensia virginica	Bluebells	–	–	100/15.5	–	–	–	14.0/44.9	–	–	–	1	–
Muhlenbergia sobolifera	Muhly grass	*	*	*	*	*	*	*	*	*	*	*	*
Nepeta cataria**	Catnip	13/Tr	–	–	–	3.1/Tr	–	–	–	2	–	–	–
Parthenocissus quinquefolia	Virginia creeper	88/6.50	13/0.13	75/0.25	75/9.63	20.9/56.2	10.2/5.7	10.5/0.7	15.6/49.6	1	1	1	1
Polygonatum biflorum	Solomon's seal	*	*	25/0.75	–	*	*	3.5/2.2	–	*	*	1	–
Quercus sp.	Oak	–	–	–	13/0.13	–	–	–	2.7/0.7	–	–	–	1
Rhus radicans	Poison ivy	25/0.38	–	–	13/0.13	5.9/3.3	–	–	2.7/0.7	1	–	–	1
Robina pseudoacacia	Black locust	*	*	*	*	*	*	*	*	*	*	*	*
Rubus sp.**	Blackberry	13/0.38	–	–	–	3.1/3.3	–	–	–	1	–	–	–
Sanguinaria canadensis	Bloodroot	–	–	13/1.50	13/1.00	–	–	1.8/4.3	2.7/5.2	–	–	1	1
Sanicula trifoliata	Snakeroot	13/0.13	–	–	13/0.25	3.1/1.1	–	–	2.7/1.3	1	–	–	1
Smilacina racemosa	False Solomon's-seal	*	–	–	13/0.50	*	–	–	2.7/2.6	*	–	–	1
Solidago sp.**	Goldenrod	13/0.25	13/0.13	–	–	3.1/2.2	10.2/5.7	–	–	1	1	–	–
Symphoricarpos orbiculatus	Coralberry	*	*	13/0.25	*	*	*	1.8/0.7	*	*	*	1	*
Trillium sessile	Toadshade	–	–	50/1.75	13/0.25	–	–	7.0/5.1	2.7/1.3	–	–	–	1
Ulmus rubra	Slippery elm	38/0.50	38/1.25	38/0.88	50/1.75	9.0/4.3	29.7/55.1	5.3/2.5	10.4/9.0	2	1/6	1	1
Viola sororia**	Wooly-blue violet	13/0.13	–	–	–	3.1/1.1	–	–	–	1	–	–	–
Vitis aestivalis	Summer grape	13/0.38	*	–	75/9.63	3.1/3.3	*	–	15.6/49.6	1	*	–	1

*Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

**Taxa observed in plots for the first time during 1977-1978 sampling period.

***1 - Healthy, 6 - Dead, 8 - Dormant.

Tr = Trace

Table D-4 (Contd)

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Relative Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct	1978 Apr	1978 Jun	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Acer negundo	Boxelder	13/0.13	13/0.13	13/0.25	*	1.3/0.4	3.0/1.0	1.7/0.9	*	1	1	1	*
Acer saccharum**	Sugar maple	13/Tr	–	13/Tr	25/Tr	1.3/Tr	1.7/Tr	–	2.8/Tr	1	–	1	1
Actinomeris alternifolia	Wingstem	38/0.88	–	–	38/1.25	3.8/2.6	–	–	4.2/1.7	1	–	–	1
Allium canadense	Wild garlic	–	–	*	–	–	–	*	–	–	–	*	–
Anemone canadensis	Canada anemone	–	–	–	13/0.38	–	–	–	1.4/0.5	–	–	–	1
Arabis laevigata	Smooth rock-cress	13/0.13	–	–	13/0.25	1.3/0.4	–	–	1.4/0.3	1	–	–	1
Asimina triloba	Pawpaw	25/1.13	*	*	25/2.75	2.5/3.4	*	*	2.8/3.8	1	*	*	1
Cardamine douglassii	Purple cress	–	–	–	*	–	–	–	–	–	–	–	*
Carex sp.**	Sedge	–	–	–	25/0.13	–	–	–	2.8/0.2	–	–	–	1
Carya cordiformis	Yellowbud hickory	13/0.25	*	–	*	1.3/0.7	*	–	*	1	*	–	*
Carya ovata	Shagbark hickory	–	*	–	–	–	*	–	–	–	*	–	–
Cercis canadensis	Eastern redbud	50/0.13	*	–	63/0.88	5.1/0.4	*	–	7.0/1.2	1	*	–	1
Circaea alpina	Small enchanter's nightshade	38/0.50	–	–	13/0.38	3.8/1.5	–	–	1.4/0.5	1	–	–	1
Convolvulus sp.	Bindweed	*	–	–	*	*	–	–	–	*	–	–	–
Carex sp.	Sedge	50/0.38	13/Tr	13/Tr	*	5.1/1.1	3.0/Tr	1.7/Tr	*	1	1	1	*
Dentaria laciniata	Cut-leaved toothwort	–	–	100/7.63	–	–	–	13.0/28.9	–	–	–	1	–
Dicotolydonae**	Dicot A	13/Tr	–	–	–	1.3/Tr	–	–	–	1	–	–	–
Dicotolydonae**	Dicot B	25/0.63	–	–	–	2.5/1.9	–	–	–	1	–	–	–
Erigenia bulbosa	Harbinger-of-spring	–	–	88/1.38	–	–	–	11.4/5.2	–	–	–	1	–
Eupatorium serotinum	Late-flowering thoroughwort	63/1.63	75/1.63	–	88/3.25	6.3/4.8	17.5/12.3	–	9.7/4.5	1	1	–	1
Fraxinus americana	White ash	38/1.38	–	13/0.13	63/2.63	3.8/4.1	–	1.7/0.5	7.0/3.6	1	–	1	1
Fraxinus quadrangulata	Blue ash	38/1.13	*	*	*	3.8/3.4	*	*	*	1	*	*	*
Galium aparine**	Bedstraw	–	–	50/Tr	–	–	–	6.5/Tr	–	–	–	1	–
Geum canadense	Canadian avens	13/0.25	25/0.25	50/0.75	25/0.63	1.3/0.7	5.8/1.9	6.5/2.8	2.8/0.9	–	1/6	1	1
Glechoma hederacea	Gill-over-the-ground	13/0.13	13/0.13	*	–	1.3/0.4	3.0/1.0	*	–	1	1	*	–
Helianthus sp.	Sunflower	*	–	–	–	*	–	–	–	*	–	–	–
Hydrophyllum appendiculatum	Appendaged water leaf	*	–	–	–	*	–	–	–	*	–	–	–
Linderia benzoin	Spicebush	25/0.25	13/0.13	–	25/0.38	2.5/0.7	3.0/1.0	–	2.8/0.5	1	8	–	1
Lonicera japonica	Japanese honeysuckle	100/12.75	100/8.63	88/11.50	100/36.25	10.0/37.8	23.3/64.9	11.4/43.5	11.0/50.0	1	1	1	1
Parthenocissus quinquefolia	Virginia creeper	88/3.63	*	25/0.13	100/6.50	8.8/10.8	*	3.3/0.5	11.0/9.0	1	*	1	1
Ranunculus sp.**	Buttercup	–	–	13/0.13	–	–	–	1.7/0.5	–	–	–	1	–
Rhus radicans	Poison ivy	88/4.75	38/0.38	63/0.25	75/12.25	8.8/14.1	8.9/2.9	8.2/0.9	8.3/16.9	1	8	1	1
Rosa sp.**	Rose	25/0.38	25/0.25	–	25/0.75	2.5/1.1	5.8/1.9	–	2.8/1.0	1	1	–	1
Rubus sp.	Blackberry	*	13/0.63	*	13/1.25	*	3.0/4.7	*	1.4/1.7	*	1	*	1
Sanicula trifoliata	Snakeroot	75/1.25	63/0.75	63/1.38	75/1.88	7.5/3.7	14.7/5.6	8.2/5.2	8.3/2.6	1	1	1	1
Saxifragaceae**	Saxifrage	13/0.13	25/0.25	–	–	1.3/0.4	5.8/1.9	–	–	1	1	–	–
Symphoricarpos orbiculatus	Coralberry	50/1.25	13/0.13	63/1.13	25/0.50	5.1/3.7	3.0/1.0	8.2/4.3	2.8/0.7	1	1	1	1
Taraxacum officinale**	Dandelion	–	–	–	13/0.13	–	–	–	1.4/0.2	–	–	–	1
Trillium sessile	Toadshade	–	–	13/0.38	–	–	–	1.7/1.4	–	–	–	1	–
Ulmus rubra	Slippery elm	38/0.38	–	25/Tr	38/Tr	3.8/1.1	–	3.3/Tr	4.2/Tr	1	–	1	1
Viola sororia**	Wooly-blue violet	25/0.13	–	13/0.13	13/Tr	2.5/0.4	–	1.7/0.5	1.4/Tr	1	–	1	1
Umbelliferae**	Umbel	–	–	63/1.25	–	–	–	8.2/4.7	–	–	–	1	–
Vitis aestivalis	Summer grape	13/0.13	*	–	13/0.13	1.3/0.4	*	–	1.4/0.2	1	*	–	1

*Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

**Taxa observed in plots for the first time during 1977-1978 sampling period.

***1 - Healthy, 6 - Dead, 8 - Dormant.

Tr = Trace

Virginia Pine Cover Type

Scientific Name	Common Name	Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct†	1978 Apr†	1978 Jun†	Relative Frequency (%)/Areal Cover (%) 1977 Sep	1977 Oct†	1978 Apr†	1978 Jun†	Mode Condition*** 1977 Sep	1977 Oct	1978 Apr	1978 Jun
Acer saccharum**	Sugar maple	13/0.25	13/0.13	–	13/Tr	2.8/1.3	4.1/3.6	–	2.3/Tr	1	1	–	1
Allium canadense	Wild garlic	–	38/0.25	38/0.13	–	–	11.9/6.8	7.9/6.0	–	–	1	1	–
Asplenium platyneuron	Ebony spleenwort	25/0.50	*	*	*	5.3/2.5	*	*	*	1	*	*	*
Botrychium virginianum	Virginia grape-fern	*	–	–	*	*	–	–	*	*	–	–	*
Bryophyta	Mosses	–	–	*	*	–	–	*	*	–	–	*	*
Campsis radicans	Trumpet vine	*	*	–	*	*	*	–	*	*	*	–	*
Carex leersii	Little prickly sedge	25/0.13	38/0.38	25/0.13	13/0.13	5.3/0.7	11.9/10.4	5.2/6.0	2.3/1.0	1	1	1	1
Carex sp.	Sedge	–	–	–	25/0.25	–	–	–	4.5/2.0	–	–	–	1
Carya cordiformis	Yellowbud hickory	*	*	–	*	*	*	–	*	*	*	–	*
Cercis canadensis**	Eastern redbud	13/Tr	–	–	50/Tr	2.8/Tr	–	–	9.0/Tr	1	–	–	1
Compositae**	Sunflower	–	–	13/Tr	–	–	–	2.7/Tr	–	–	–	1	–
Cornus florida	Flowering dogwood	100/4.88	38/0.38	88/0.75	100/3.38	21.3/24.7	11.9/10.4	18.3/34.7	18.0/26.8	1	8	1	1
Desmodium paniculatum	Panicled tick-trefoil	*	*	–	13/0.13	*	*	–	2.3/1.0	*	*	–	1
Dioscorea villosa**	Wild yam	13/0.25	–	–	–	2.8/1.3	–	–	–	1	–	–	–
Eupatorium serotinum	Late-flowering thoroughwort	*	*	–	*	*	*	–	*	*	*	–	*
Fragaria virginiana	Wild strawberry	13/0.25	*	*	*	2.8/1.3	*	*	*	1	*	*	*
Fraxinus americana	White ash	13/0.13	*	25/0.25	–	2.8/0.7	*	5.2/11.6	–	1	*	1	–
Fraxinus quadrangulata	Blue ash	25/0.50	*	–	38/1.25	5.3/2.5	*	–	6.8/9.9	1	*	–	1
Galium circaezans	White wild licorice	13/0.13	13/0.13	38/0.13	50/0.25	2.8/0.7	4.1/3.6	7.9/6.0	9.0/2.0	1	1	1	1
Geum canadense	Canadian avens	*	*	–	25/0.25	*	*	–	4.5/2.0	*	*	–	1
Hamamelis virginiana**	Witch-hazel	–	13/0.25	13/0.13	–	–	4.1/6.8	2.7/6.0	–	–	8	1	–
Jeffersonia diphyla	Twinleaf	–	–	–	13/0.13	–	–	–	2.3/1.0	–	–	–	1
Lonicera japonica	Japanese honeysuckle	25/6.38	13/0.50	13/0.13	13/0.25	5.3/32.2	4.1/13.7	2.7/6.0	2.3/2.0	1	1	1	1
Osmorhiza claytonii**	Sweet cicely	13/Tr	–	–	–	2.8/Tr	–	–	–	1	–	–	–
Parthenocissus quinquefolia	Virginia creeper	13/2.38	13/0.13	50/0.13	38/4.38	2.8/12.0	4.1/3.6	10.4/6.0	6.8/34.7	1	8	1	–
Phryma leptostachya**	Lopseed	–	13/0.50	–	–	–	2.8/2.5	–	–	–	1	–	–
Pinus virginiana**	Virginia pine	–	13/0.13	–	–	–	4.1/3.6	–	–	–	1	–	–
Podophyllum peltatum**	May-apple	–	–	13/Tr	13/0.13	–	–	2.7/Tr	2.3/1.0	–	–	1	1
Prunus serotina	Black cherry	13/0.13	75/1.00	63/0.38	38/0.38	2.8/0.7	23.6/27.4	13.1/17.6	6.8/3.0	1	1	1	1
Quercus rubra	Red oak	*	*	13/Tr	25/0.38	*	*	2.7/Tr	4.5/3.0	*	*	1	1
Rhus radicans	Poison ivy	38/2.50	–	–	13/0.38	8.1/12.6	–	–	2.3/3.0	1	–	–	1
Robinia pseudoacacia**	Black locust	25/0.38	–	–	–	5.3/1.9	–	–	–	1	–	–	–
Rosaceae**	Rose family	13/0.25	–	–	–	2.8/1.3	–	–	–	1	–	–	–
Rubus sp.	Blackberry	*	*	–	*	*	*	–	*	*	*	–	*
Sanicula trifoliata	Snakeroot	50/0.25	38/0.25	88/Tr	50/0.88	10.7/1.3	11.9/6.8	18.3/Tr	9.0/7.0	–	1	1	1
Smilax sp.	Greenbriar	*	*	–	–	*	*	–	–	*	*	–	–
Smilax herbacea	Carrion-flower	*	13/0.13	–	*	*	4.1/3.6	–	*	*	1	–	*
Solidago sp.	Goldenrod	*	*	–	*	*	*	–	*	*	*	–	*
Taraxacum sp.**	Common dandelion	–	–	–	13/0.13	–	–	–	2.3/1.0	–	–	–	1
Ulmus rubra	Slippery elm	*	–	–	–	*	–	–	–	*	–	–	–
Viola sororia**	Wooly-blue violet	13/Tr	–	–	13/Tr	2.8/Tr	–	–	2.3/Tr	1	–	–	1

* Taxa was observed in plots during indicated previous sampling period (1976-1977), but not during the current sampling period.

– Taxa was not observed in plots during indicated sampling period previously nor during the current sampling period.

** Taxa observed in plots for the first time during 1977-1978 sampling period.

*** 1 - Healthy, 8 - Dormant.

† Sampling station 101 relocation may reflect some differences between years.

Tr = Trace

Table D-5

Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil Parameters for Each Vegetation Cover Type

Soil Moisture (%)

Code	Cover Type	1977 Sep $\bar{x}$	1977 Sep SE	1977 Oct $\bar{x}$	1977 Oct SE	1978 Apr $\bar{x}$	1978 Apr SE	1978 Jun $\bar{x}$	1978 Jun SE
01	Maple-Basswood	33.9	1.5	40.2	1.0	39.3	3.3	38.8	2.3
02	Oak-Maple	26.8	1.6	32.8	1.8	35.9	0.6	32.8	0.8
03	Chinkapin Oak	22.2	1.6	30.0	2.8	29.6	3.2	31.2	0.7
04	Red Pine	19.9	2.0	25.8	0.9	28.1	1.0	25.5	0.4
05	Sycamore-Boxelder	21.0	2.3	27.3	1.3	24.8	2.5	27.8	1.6
06	Oak-Hickory	16.5	0.8	27.4	1.1	29.5	0.6	22.1	0.3
09	Walnut-Hickory-Buckeye	34.5	1.5	39.2	2.4	34.3	3.0	41.3	2.2
10	Orchard	14.6	4.2	24.6	0.7	24.6	1.0	23.4	0.7
11	Virginia Pine	20.9	2.1	26.7	0.9	26.7	0.9	24.4	1.2

Soil Bulk Density (g/cm^3)

Code	Cover Type	1977 Sep $\bar{x}$	1977 Sep SE	1977 Oct $\bar{x}$	1977 Oct SE	1978 Apr $\bar{x}$	1978 Apr SE	1978 Jun $\bar{x}$	1978 Jun SE
01	Maple-Basswood	0.711	.063	0.68	0.06	0.718	.057	0.729	.040
02	Oak-Maple	0.743	.027	0.73	0.07	0.744	.051	0.863	.038
03	Chinkapin Oak	0.737	.043	0.93	0.19	0.729	.040	0.810	.024
04	Red Pine	0.870	.061	0.94	0.17	0.941	.018	0.969	.077
05	Sycamore-Boxelder	0.731	.026	1.18	0.39	0.937	.046	1.004	.035
06	Oak-Hickory	0.805	.034	0.79	0.15	0.728	.066	0.845	.054
09	Walnut-Hickory-Buckeye	0.773	.040	1.02	0.31	0.701	.032	0.661	.046
10	Orchard	0.923	.066	1.48	0.30	0.848	.091	0.939	.045
11	Virginia Pine	1.009	.050	0.90	0.10	0.743	.094	0.788	.049

* Based on 4 replicates per cover type per date sampled.

Table D-5 (cont'd)

Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil Parameters for Each Vegetation Cover Type

Soil pH (measured in water)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	7.3	0.5	7.5	0.0	7.1	0.2	6.3	0.1
02	Oak-Maple	7.2	0.3	6.9	0.6	7.3	0.1	6.7	0.1
03	Chinkapin Oak	7.3	0.2	7.6	0.2	7.2	0.1	6.6	0.1
04	Red Pine	5.8	0.2	5.6	0.3	6.2	0.1	6.1	0.1
05	Sycamore-Boxelder	6.7	0.6	7.0	0.6	6.5	0.4	6.1	0.2
06	Oak-Hickory	7.7	0.1	7.9	0.1	7.5	0.1	6.6	0.1
09	Walnut-Hickory Buckeye	7.5	0.1	7.4	0.1	7.1	0.1	6.6	0.1
10	Orchard	6.9	0.2	7.1	0.2	6.1	0.1	6.3	0.0
11	Virginia Pine	5.9	0.3	5.4	0.2	5.6	0.2	5.7	0.1

Soil Conductivity (μmho/cm)

Code	Cover Type	1978 Sep $\bar{x}$	1978 Sep SE	1978 Oct $\bar{x}$	1978 Oct SE	1979 Apr $\bar{x}$	1979 Apr SE	1979 Jun $\bar{x}$	1979 Jun SE
01	Maple-Basswood	232	21	272	21	76	8	567	54
02	Oak-Maple	207	17	210	19	90	5	407	47
03	Chinkapin Oak	225	11	230	31	113	20	426	25
04	Red Pine	159	13	192	46	4	119	5	
05	Sycamore-Boxelder	260	15	192	20	144	36	328	64
06	Oak-Hickory	278	19	228	14	137	41	388	30
09	Walnut-Hickory-Buckeye	235	13	290	28	169	30	321	32
10	Orchard	247	22	183	29	246	18	403	111
11	Virginia Pine	166	14	158	10	59	18	106	11

* Based on 4 replicates per cover type per date sampled.

Table D-5 (cont'd)

Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil Parameters for Each Vegetation Cover Type

Soil Cation Exchange Capacity (meq/100g)

Code	Cover Type	1977 Sep $\bar{x}$	1977 Sep SE	1977 Oct $\bar{x}$	1977 Oct SE	1978 Apr $\bar{x}$	1978 Apr SE	1978 Jun $\bar{x}$	1978 Jun SE
01	Maple-Basswood	50.4	20.5	12.5	1.1	42.9	3.6	49.4	3.2
02	Oak-Maple	18.7	4.6	13.5	1.5	40.1	4.7	35.6	1.8
03	Chinkapin Oak	23.6	2.6	13.2	1.3	41.5	3.3	42.4	1.4
04	Red Pine	18.2	1.2	10.6	0.9	20.9	2.1	19.1	1.1
05	Sycamore-Boxelder	18.9	0.9	12.6	0.4	21.0	2.4	28.6	4.7
06	Oak-Hickory	23.1	1.2	15.8	1.3	27.1	4.5	30.7	1.8
09	Walnut-Hickory-Buckeye	25.2	1.8	16.6	4.0	43.5	2.9	41.5	6.3
10	Orchard	18.2	1.3	10.8	1.2	14.3	1.1	15.6	0.4
11	Virginia Pine	14.9	0.8	11.5	1.0	20.7	2.0	17.1	0.7

* Based on 4 replicates per cover type per date sampled.

Code	Cover Type	1977 Sep $\bar{x}$	1977 Sep SE	1977 Oct $\bar{x}$	1977 Oct SE	1978 Apr $\bar{x}$	1978 Apr SE	1978 Jun $\bar{x}$	1978 Jun SE
01	Maple-Basswood	36.0	16.9	58.8	20.0	23.8	5.4	33.9	5.5
02	Oak-Maple	61.0	14.9	63.6	15.0	20.0	4.7	29.9	4.5
03	Chinkapin Oak	48.5	9.2	89.0	9.4	28.8	3.2	23.2	1.2
04	Red Pine	27.6	1.8	27.1	4.3	23.4	5.2	25.4	3.0
05	Sycamore-Boxelder	71.8	20.3	55.8	8.3	36.3	6.8	48.5	9.0
06	Oak-Hickory	74.2	5.8	66.5	9.3	41.1	6.8	51.3	5.6
09	Walnut-Hickory-Buckeye	81.1	6.8	94.9	38.0	37.4	6.1	32.1	3.1
10	Orchard	29.6	1.9	49.2	5.6	31.6	7.5	31.0	1.4
11	Virginia Pine	22.9	2.7	25.8	2.0	34.6	7.7	27.1	4.3

* Based on 4 replicates per cover type per date sampled.

Table D-5 (cont'd)

Moisture and Conductivity Rankings and Maximum Values

Code	Cover Type	Soil Moisture (%) $\bar{x}$	SE	Rank	Soil Conductivity (micromhos/cm) $\bar{x}$	SE	Rank	Maximum Single Value (Sep 77-Jun 78)
01	Maple-Basswood	41.1	6.7	1	286.8	102.1	1	698*
02	Oak-Maple	43.7	9.9	3	228.5	65.8	7	525*
03	Chinkapin Oak	42.2	11.9	4	248.5	65.1	5	500*
04	Red Pine	39.7	13.5	6	129.0	31.5	8	328**
05	Sycamore-Boxelder	39.7	13.1	7	231.0	40.2	6	515*
06	Oak-Hickory	40.6	14.4	5	257.8	52.3	3	478*
09	Walnut-Hickory-Buckeye	45.1	7.0	2	253.8	33.4	4	370*
10	Orchard	39.5	15.4	8	269.8	46.9	2	710*
11	Virginia Pine	39.2	13.3	9	122.3	25.0	9	203***

* In June 1978
** In October 1977
*** In September 1977

APPENDIX E

PSI-MARBLE HILL VEGETATION AND SOILS DATA,

1976-1977 ANNUAL REPORT

Table E-1

Percentage of Ground Surface Covered by Vegetation and Litter in the Herbaceous Stratum of Each Vegetation Cover Type

Code	Cover Type	Areal Cover (%)*											
		Vegetation				Litter				Total			
		Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun
01	Maple-Basswood	20.6	17.5	31.6	17.8	53.8	58.8	65.3	72.0	74.4	76.3	96.9	89.8
02	Oak-Maple	25.1	19.4	6.5	30.6	67.4	76.9	89.1	65.3	92.5	96.3	95.6	95.9
03	Chinkapin Oak	15.9	12.9	6.3	33.1	71.6	77.1	81.2	58.8	87.5	90.0	87.5	91.9
04	Red pine	29.8	25.8	7.0	41.6	70.2	74.2	93.0	58.4	100.0	100.0	100.0	100.0
05	Sycamore-Boxelder	70.0	57.5	15.5	51.3	21.9	38.8	81.4	45.0	91.9	96.3	96.9	96.3
06	Oak-Hickory	12.1	8.1	38.6	15.6	52.9	60.6	48.3	60.7	65.0	68.7	86.9	76.3
09	Walnut-Hickory-Buckeye	29.1	16.5	8.0	46.3	61.9	81.4	86.4	48.1	91.0	97.9	94.4	94.4
11	Virginia pine	13.8	12.9	9.5	23.0	73.7	74.6	89.4	76.1	87.5	87.5	98.9	99.1

*Based on mean of 8 plots per cover type per sample date.

Table E-2

Species Composition, Frequency, Basal Area, and Condition of the Tree and Sapling Strata for Each Vegetation Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live Condition							
Acer saccharum	Sugar maple	5	1.00	33.3	14.0	41.2	Healthy
Tilia americana	Basswood	3	0.50	16.7	13.5	39.7	Healthy
Juglans nigra	Black walnut	1	0.50	16.7	4.0	11.8	Healthy
Fraxinus americana	White ash	2	0.50	16.7	1.9	5.6	Healthy/mechanical injury
Total Live		11	2.50	83.4	33.4	98.3	
Dead Condition							
Fraxinus americana	White ash	1	0.50	16.7	0.6	1.8	
Total Dead		1	0.50	16.7	0.6	1.8	
TOTAL		12	3.00	100.1	34.0	100.0	
Sapling stratum							
No saplings occurred in plots							

Table E-2 (Contd)

Oak-Maple Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live Condition							
Acer saccharum	Sugar maple	6	1.00	20.0	9.6	30.0	Healthy
Quercus prinus	Chestnut oak	1	0.50	10.0	6.2	19.4	Mechanical injury
Quercus velutina	Black oak	1	0.50	10.0	5.6	17.5	Healthy
Fraxinus americana	White ash	3	0.50	10.0	5.6	17.5	Healthy
Prunus serotina	Black cherry	2	1.00	20.0	2.7	8.4	Healthy/dying
Cornus florida	Flowering dogwood	2	0.50	10.0	0.8	2.5	Healthy/diseased
Juniperus virginiana	Eastern red cedar	1	0.50	10.0	0.4	1.3	Diseased
Total Live		16	4.50	90.0	30.9	96.6	
Dead Condition							
Acer saccharum	Sugar maple	1	0.50	10.0	1.1	3.4	
Total Dead		1	0.50	10.0	1.1	3.4	
TOTAL		17	5.00	100.0	32.0	100.0	
Sapling stratum							
Live Condition							
Acer saccharum	Sugar maple	5	1.00	100.0	1.8	100.0	Healthy
Total Live		5	1.00	100.0	1.8	100.0	
Dead Condition							
None							
Total Dead		0	0	0	0	0	
TOTAL		5	1.00	100.0	1.8	100.0	

Table E-2 (Contd)

Chinkapin Oak Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live condition							
Quercus muehlenbergii	Chinkapin oak	11	1.00	16.7	10.7	49.5	Healthy
Fraxinus americana	White ash	7	1.00	16.7	4.9	22.7	Healthy
Juniperus virginiana	Eastern red cedar	5	1.00	16.7	2.9	13.4	Healthy
Quercus rubra	Red oak	1	0.50	8.3	0.6	2.8	Healthy
Acer saccharum	Sugar maple	1	0.50	8.3	0.4	1.9	Healthy
Ulmus rubra	Slippery elm	1	0.50	8.3	0.4	1.9	Diseased
Fraxinus quadrangulata	Blue ash	1	0.50	8.3	0.3	1.4	Dying
Total Live		27	5.00	83.3	20.2	93.5	
Dead condition							
Quercus prinus	Chestnut oak	2	0.50	8.3	0.7	3.2	
Fraxinus quadrangulata	Blue ash	1	0.50	8.3	0.7	3.2	
Total Dead		3	1.00	16.7	1.4	6.4	
TOTAL		30	6.00	100.0	21.6	99.9	
Sapling stratum							
Live condition							
Juniperus virginiana	Eastern red cedar	1	0.50	100.0	0.8	100.0	Healthy
Total Live		1	0.50	100.0	0.8	100.0	
Dead condition							
None							
Total Dead		0	0	0	0	0	
TOTAL		1	0.50	100.0	0.8	100.0	

Table E-2 (Contd)

Red Pine Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live condition							
Pinus resinosa	Red pine	6	1.00	16.7	3.7	9.4	Healthy
		5	1.00	16.7	9.5	24.1	Diseased
		3	1.00	16.7	4.4	11.2	Dying
Pinus strobus	White pine	5	1.00	16.7	7.5	19.0	Healthy
Liriodendron tulipifera	Yellow poplar	1	0.50	8.3	3.6	9.1	Healthy
Fraxinus americana	White ash	2	0.50	8.3	2.4	6.1	Healthy
Total Live		22	5.00	83.4	31.1	78.9	
Dead condition							
Pinus resinosa	Red pine	8	1.00	16.7	8.3	21.1	
Total Dead		8	1.00	16.7	8.3	21.1	
TOTAL		30	6.00	100.1	39.4	100.0	
Sapling stratum							
No saplings occurred in plots							

Table E-2 (Contd)

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live condition							
Platanus occidentalis	Sycamore	4	0.50	14.3	31.9	74.0	Diseased
Juglans nigra	Black walnut	2	0.50	14.3	4.3	10.0	Healthy
Ulmus rubra	Slippery elm	1	0.50	14.3	4.2	9.7	Healthy
Cornus florida	Flowering dogwood	2	0.50	14.3	1.1	2.6	Healthy
Tilia americana	Basswood	1	0.50	14.3	0.8	1.9	Healthy
Acer negundo	Boxelder	1	0.50	14.3	0.5	1.2	Healthy
Prunus serotina	Black cherry	1	0.50	14.3	0.3	0.7	Mechanical injury
Total Live		12	3.50	100.1	43.1	100.1	
Dead condition							
None							
Total Dead		0	0	0	0	0	
TOTAL		12	3.50	100.1	43.1	100.1	
Sapling stratum							
Live condition							
Acer negundo	Boxelder	2	0.50	33.3	1.3	65.0	Healthy/diseased
Celtis occidentalis	Hackberry	1	0.50	33.3	0.4	20.0	Healthy
Total Live		3	1.00	66.6	1.7	85.0	
Dead condition							
Ulmus rubra	Slippery elm	1	0.50	33.3	0.3	15.0	
Total Dead		1	0.50	33.3	0.3	15.0	
TOTAL		4	1.50	99.9	2.0	100.0	

Table E-2 (Contd)

Oak-Hickory Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live condition							
Fraxinus quadrangulata	Blue ash	7	1.00	20.0	15.3	41.5	Healthy
Quercus velutina	Black oak	2	0.50	10.0	11.7	31.7	Healthy
Catalpa speciosa	Northern catalpa	1	0.50	10.0	3.7	10.0	Insect injury
Aesculus glabra	Ohio buckeye	5	1.00	20.0	3.0	8.1	Healthy
Fraxinus americana	White ash	1	0.50	10.0	1.0	2.7	Diseased
Ulmus rubra	Slippery elm	1	0.50	10.0	0.9	2.4	Insect injury
Total Live		17	4.00	80.0	35.6	96.4	
Dead condition							
Fraxinus quadrangulata	Blue ash	3	1.00	20.0	1.3	2.4	
Total Dead		3	1.50	20.0	1.3	3.5	
TOTAL		20	5.50	100.1	36.9	99.9	
Sapling stratum							
No saplings occurred in plots							

Table E-2 (Contd)

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live condition							
Carya ovata	Shagbark hickory	2	0.50	12.5	8.5	28.1	Healthy
Juglans nigra	Black walnut	1	0.50	12.5	8.3	27.4	Mechanical injury
Aesculus glabra	Ohio buckeye	8	0.50	12.5	7.4	24.4	Healthy
Fraxinus americana	White ash	2	0.50	12.5	3.5	11.6	Healthy
Ulmus rubra	Slippery elm	2	0.50	12.5	0.8	2.6	Diseased
Cercis canadensis	Eastern redbud	2	0.50	12.5	0.8	2.6	Healthy/diseased
Fraxinus quadrangulata	Blue ash	1	0.50	12.5	0.3	1.0	Healthy
Total Live		18	3.50	87.5	29.6	97.7	
Dead condition							
Ulmus rubra	Slippery elm	1	0.50	12.5	0.7	2.3	
Total Dead		1	0.50	12.5	0.7	2.3	
TOTAL		19	4.00	100.0	30.3	100.0	
Sapling stratum							
Live condition							
Fraxinus americana	White ash	1	0.50	100.0	0.6	100.0	Healthy
Total Live		1	0.50	100.0	0.6	100.0	
Dead condition							
None							
Total Dead		0	0	0	0	0	
TOTAL		1	0.50	100.0	0.6	100.0	

Table E-2 (Contd)

Virginia Pine Cover Type

Scientific Name	Common Name	No. Individuals in Sample	Frequency	Relative Frequency (%)	Basal Area (m^2/ha)	Relative Basal Area (%)	Mode Condition
Tree stratum							
Live condition							
Pinus virginiana	Virginia pine	12	1.00	18.2	11.6	54.5	Healthy
Liriodendron tulipifera	Yellow poplar	1	0.50	9.1	3.5	16.4	Healthy
Juniperus virginiana	Eastern red cedar	2	1.00	18.2	1.9	8.9	Dying/Healthy
Cornus florida	Flowering dogwood	3	1.00	18.2	1.8	8.5	Healthy
Cercis canadensis	Eastern redbud	2	1.00	18.2	1.1	5.2	Healthy
Diospyros virginiana	Persimmon	1	0.50	9.1	0.6	2.8	Healthy
Total Live		21	5.00	91.0	20.5	96.3	
Dead condition							
Juniperus virginiana	Eastern red cedar	1	0.50	9.1	0.8	3.8	
Total Dead		1	0.50	9.1	0.8	3.8	
TOTAL		22	5.50	100.1	21.3	100.1	
Sapling stratum							
Live condition							
Pinus virginiana	Virginia pine	1	0.50	16.7	1.5	25.9	Healthy
Cercis canadensis	Eastern redbud	1	0.50	16.7	1.3	22.4	Diseased
Juniperus virginiana	Eastern red cedar	1	0.50	16.7	1.3	22.4	Diseased
Cornus florida	Flowering dogwood	2	1.00	33.3	1.3	22.4	Healthy
Total Live		5	2.50	83.4	5.4	93.1	
Dead condition							
Cercis canadensis	Eastern redbud	1	0.50	16.7	0.4	6.9	
Total Dead		1	0.50	16.7	0.4	6.9	
TOTAL		6	3.00	100.1	5.8	100.0	

Table E-3

Species Composition, Frequency, Cover, and Condition of the Shrub Stratum for Each Cover Type

Scientific Name	Common	Frequency				Relative Frequency (%)				Areal Cover (%)				Relative Cover (%)				Mode Condition			
		Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun
Maple-Basswood (01)																					
Asimina triloba	Paw Paw	0.25	0.25	0.38	0.38	100.0	100.0	100.0	100.0	0.88	1.00	1.38	2.00	100.0	100.0	100.0	100.0	Healthy	Dormant	Healthy	Healthy
Total		0.25	0.25	0.38	0.38	100.0	100.0	100.0	100.0	0.88	1.00	1.38	2.00	100.0	100.0	100.0	100.0				
Oak-Maple (02)																					
Acer saccharum	Sugar maple	0.50	0.38	0.25	0.38	49.5	42.7	39.1	42.7	1.63	2.25	1.13	1.63	22.5	46.1	37.5	21.0	Healthy	Healthy	Dormant	Diseased
Cornus florida	Flowering dogwood	0.25	0.25	0.13	0.25	24.8	28.1	20.3	28.1	3.50	2.00	1.38	4.75	54.9	40.9	45.8	61.2	Healthy	Healthy	Healthy	Healthy
Ostrya virginiana	Ironwood	0.13	0.13	0.13	0.13	12.9	14.6	20.3	14.6	1.00	0.63	0.50	1.38	15.7	12.8	16.6	17.8	Browsed	Browsed	Healthy	Healthy
Prunus serotina	Black cherry	0.13	0.13	0.13	0.13	12.9	14.6	20.3	14.6	0.25	0.01	0	0	3.9	0.3	0	0	Healthy	Dead	Dead	Dead
Total		1.01	0.89	0.64	0.89	100.1	100.0	100.0	100.0	6.38	4.89	3.01	7.76	100.0	100.1	99.9	100.0				
Chinkapin Oak (03)																					
Celtis occidentalis	Hackberry	0.13	0.13	0.13	0.13	14.4	11.3	12.6	10.2	0.13	0.13	0.38	0.88	4.8	4.5	15.1	10.8	Dying	Dormant	Dormant	Healthy
Clematis viorna	Leather-flower	0.13	0.25	0.13	0.25	14.4	21.7	12.6	19.7	0.13	0.25	0	1.25	4.8	9.1	0	15.4	Healthy	Dormant	Dormant	Healthy
Diospyros virginiana	Persimmon	-*	-	0.13	-	-	-	12.6	-	-	-	0.13	-	-	-	5.2	-	-	-	Dormant	-
Juniperus virginiana	Eastern red cedar	0.25	0.25	0.25	0.25	27.8	21.7	24.3	19.7	1.38	1.38	1.25	1.50	52.4	50.0	49.6	18.4	Healthy	Healthy	Healthy	Diseased
Lonicera japonica	Japanese honeysuckle	-	0.13	0.13	0.13	-	11.3	12.6	10.2	-	0.25	0.13	0.25	-	9.1	5.2	3.1	-	Healthy	Dormant	Healthy
Passiflora lutea	Yellow passion-flower	0.13	0.13	-	-	14.4	11.3	-	-	0.25	0.13	-	-	9.5	4.5	-	-	Healthy	Dormant	-	-
Robinia pseudoacacia	Black locust	0.13	0.13	0.13	0.13	14.4	11.3	12.6	10.2	0.50	0.50	0.38	1.38	19.1	18.2	15.1	17.9	Healthy	Healthy	Dormant	Healthy
Ulmus rubra	Slippery elm	0.13	0.13	0.13	0.25	14.4	11.3	12.6	19.7	0.25	0.13	0.25	2.38	9.5	4.5	9.9	29.2	Healthy	Dormant	Dormant	Healthy
Viburnum prunifolium	Blackhaw	-	-	-	0.13	-	-	-	10.2	-	-	-	0.50	-	-	-	6.1	-	-	-	Healthy
Total		0.90	1.15	1.03	1.27	99.8	99.9	99.9	99.9	2.64	2.77	2.52	8.14	100.1	99.9	100.1	100.0				
Red Pine (04)																					
Acer saccharum	Sugar Maple	0.13	0.13	0.13	0.13	16.9	16.9	20.3	10.2	1.88	1.88	1.00	1.75	20.2	23.4	44.2	17.7	Healthy	Healthy	Healthy	Mech. injury
Cornus florida	Flowering dogwood	0.13	0.13	0.13	0.13	16.9	16.9	20.3	10.2	1.25	0.50	0.13	1.00	13.3	6.3	5.8	10.1	Insect injury	Healthy	Healthy	Healthy
Fraxinus americana	White ash	0.38	0.38	0.25	0.38	49.4	49.4	39.1	29.7	1.88	1.25	0.50	2.13	20.0	15.6	22.1	21.5	Insect injury	Dormant	Healthy	Mech. injury
Lonicera japonica	Japanese Honeysuckle	-	-	-	0.38	-	-	-	29.7	-	-	-	0.50	-	-	-	5.1	-	-	-	Healthy
Parthenocissus quinquefolia	Virginia creeper	-	-	-	0.13	-	-	-	10.2	-	-	-	0.13	-	-	-	1.3	-	-	-	Healthy
Vitis rotundifolia	Muscadine grape	0.13	0.13	0.13	0.13	16.9	16.9	20.3	10.2	4.38	4.38	0.63	4.38	46.7	54.7	27.9	44.3	Healthy	Healthy	Dormant	Healthy
Total		0.77	0.77	0.64	1.28	100.1	100.1	100.0	100.2	9.38	8.01	2.26	9.89	100.0	100.0	100.0	100.0				
Sycamore-Boxelder (05)																					
Ulmus rubra	Slippery elm	0.13	0.13	0.13	0.13	100.0	100.0	100.0	100.0	1.88	1.50	1.00	2.50	100.0	100.0	100.0	100.0	Healthy	Healthy	Healthy	Healthy
Total		0.13	0.13	0.13	0.13	100.0	100.0	100.0	100.0	1.88	1.50	1.00	2.50	100.0	100.0	100.0	100.0				
Oak-Hickory (06)																					
Cercis canadensis	Eastern Redbud	0.13	0.13	0.13	0.13	25.5	25.5	25.5	25.5	2.50	2.50	0.63	3.13	23.5	33.3	17.9	25.0	Healthy	Healthy	Dormant	Healthy
Gymnocladus dioica	Kentucky coffee-tree	0.13	0.13	0.13	0.13	25.5	25.5	25.5	25.5	1.25	0.38	0.13	0.63	11.8	5.0	3.7	5.0	Mech. injury	Mech. injury	Mech. injury	Mech. injury
Ulmus rubra	Slippery elm	0.25	0.25	0.25	0.25	49.0	49.0	49.0	49.0	6.88	4.63	2.75	8.75	64.7	61.7	78.3	69.9	Healthy	Healthy	Healthy	Healthy
Total		0.51	0.51	0.51	0.51	100.0	100.0	100.0	100.0	10.63	7.51	3.51	12.51	100.0	100.0	99.9	99.9				
Walnut-Hickory-Buckeye (09)																					
Acer negundo	Boxelder	0.13	0.13	0.13	-	4.1	4.1	4.0	-	0.63	0.25	3.2	-	3.8	1.9	3.2	-	Healthy	Healthy	Healthy	-
Acer saccharum	Sugar maple	0.38	0.38	0.25	0.25	12.0	5.63	7.6	9.9	5.63	4.25	1.38	3.13	34.1	31.5	17.2	17.6	Healthy	Dormant	Dormant	Healthy
Aesculus glabra	Ohio buckeye	0.13	0.25	0.25	0.13	4.1	7.9	7.6	5.1	0.38	0.50	0.38	0	2.3	3.7	4.7	0	Dormant	Dormant	Dormant	Dead
Asimina triloba	Pawpaw	0.38	0.38	0.38	0.25	12.0	12.0	11.6	9.9	2.13	2.25	0.88	2.75	12.9	16.7	10.9	15.5	Healthy	Dormant	Dormant	Healthy
Carya ovata	Shagbark hickory	0.13	-	-	-	4.1	-	-	-	0.63	-	-	-	3.8	-	-	-	Healthy	-	-	-
Cercis canadensis	Eastern redbud	0.13	0.13	0.13	0.13	4.1	4.1	4.0	5.1	0.38	0.25	0.13	0.63	2.3	1.9	1.6	3.5	Healthy	Dormant	Dormant	Healthy
Fraxinus americana	White ash	0.13	0.25	0.25	0.13	4.1	7.9	7.6	5.1	0.25	0.50	0.38	0.25	1.5	3.7	4.7	1.4	Healthy	Healthy	Dormant	Healthy
Fraxinus quadrangulata	Blue ash	0.75	0.63	0.63	0.63	23.7	19.9	19.1	24.9	3.25	1.50	2.13	2.88	19.7	11.1	26.5	16.2	Healthy	Dormant	Dormant	Healthy
Lindera benzoin	Spicebush	0.25	0.25	0.38	0.38	7.9	7.9	11.6	15.0	1.00	1.00	0.88	2.00	6.1	7.4	10.9	11.3	Healthy	Healthy	Dormant	Healthy
Lonicera japonica	Japanese honeysuckle	0.50	0.50	0.63	0.50	15.8	15.8	19.1	19.8	1.75	1.88	1.00	4.38	10.6	13.9	12.4	24.6	Healthy	Healthy	Dormant	Healthy
Quercus prinus	Chestnut oak	0.13	0.13	0.13	0.13	4.1	4.1	4.0	5.1	0.38	0.25	0.38	1.75	2.3	1.9	4.7	9.8	Healthy	Healthy	Dormant	Healthy
Rhus radicans	Poison ivy	0.13	0.13	0.13	0.13	4.1	4.1	4.0	-	0.13	0.88	0.25	-	0.8	6.5	3.2	-	Healthy	Dormant	Dormant	-
Total		3.17	3.16	3.29	2.53	100.1	99.8	100.2	99.9	16.54	13.51	8.04	17.77	100.2	100.2	100.0	99.9				
Virginia Pine (11)																					
Cornus florida	Flowering dogwood	0.13	0.13	0.13	0.13	33.3	33.3	25.5	34.2	0.63	0.63	0.63	0.63	62.5	62.5	50.0	71.6	Healthy	Dormant	Dormant	Diseased
Lonicera tatarica	Tartarian honeysuckle	0.13	0.13	0.25	0.25	33.3	33.3	49.0	65.8	0.13	0.13	0.25	0.25	12.5	12.5	19.8	28.4	Healthy	Dormant	Dormant	Healthy
Prunus serotina	Black cherry	0.13	0.13	0.13	-	33.3	33.3	25.5	-	0.25	0.25	0.38	-	25.0	25.0	30.2	-	Healthy	Healthy	Healthy	-
Total		0.39	0.39	0.51	0.38	99.9	99.9	100.0	100.0	1.01	1.01	1.26	0.88	100.0	100.0	100.0	100.0				

*Taxa was not observed in plots during indicated (dash) sample period.

Table E-4

Species Composition, Frequency, Cover, and Condition of the Herbaceous Stratum for Each Cover Type

Maple-Basswood Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency (%)				Areal Covrr (%)				Relative Cover (%)				Mode Condition			
		SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN
Acer saccharum	Sugar maple	0.38	0.38	0.38	0.63	10.0	10.3	8.4	16.7	2.13	2.88	0.38	2.00	10.4	16.2	1.2	17.6	Healthy	Healthy	Dormant	Healthy
Aesculus octandra	Yellow buckeye	0.13	0.13	0.13	0.25	3.4	3.5	2.9	6.6	0.01	0.01	1.13	0.88	0.1	0.1	3.6	5.1	Healthy	Healthy	Healthy	Browsed
Anemonella thalictroides	Rue anemone	-*	-	0.13	-	-	-	2.9	-	-	-	1.00	-	-	-	3.2	-	-	-	-	-
Arisaema atrorubens	Jack-in-the-pulpit	-	-	0.13	0.25	-	-	2.9	6.6	-	-	0.13	0.50	-	-	0.4	2.9	-	-	Healthy	Healthy
Asarum canadense	Wild ginger	0.50	0.50	0.25	0.50	13.2	13.6	5.5	13.3	5.01	5.75	1.13	5.75	24.6	32.4	3.6	33.3	Healthy	Healthy	Healthy	Healthy
Asimina triloba	Pawpaw	0.13	0.13	-	-	3.4	3.5	-	-	0.01	0.01	-	-	0.1	0.1	-	-	-	-	-	-
Carya cordiformis	Yellowbud hickory	-	-	-	0.13	-	-	-	3.4	-	-	-	0.13	-	-	-	0.8	-	-	-	Insect Injury
Claytonia virginica	Spring-beauty	-	-	0.88	-	-	-	19.4	-	-	-	2.25	-	-	-	8.7	-	-	-	Healthy	-
Dentaria laciniata	Cut-leaved toothwort	-	-	1.00	-	-	-	22.0	-	-	-	22.13	-	-	-	69.9	-	-	-	Healthy	-
Erigenia bulbosa	Harbinger-of-spring	-	-	1.00	-	-	-	22.0	-	-	-	2.13	-	-	-	6.7	-	-	-	Healthy	-
Eupatorium serotinum	Late-flowering thoroughwort	0.50	0.50	-	0.50	13.2	13.6	-	13.3	6.00	7.00	-	5.00	29.4	39.5	-	29.0	Healthy	Healthy	-	Healthy
Fraxinus americana	White ash	0.38	0.38	0.13	0.38	10.0	10.3	2.9	10.1	1.25	1.00	0.13	1.38	6.1	5.6	0.4	8.0	Healthy	Healthy	Dormant	Healthy
Galium boreale	Northern bedstraw	-	-	0.13	-	-	-	2.9	-	-	-	0.13	-	-	-	0.4	-	-	-	Healthy	-
Parthenocissus quinquefolia	Virginia creeper	0.13	0.13	-	0.13	3.4	3.5	-	3.4	0.25	0.01	-	0.50	1.2	0.1	-	2.9	Insect Injury	Dormant	-	Healthy
Phryma leptostachya	Lopseed	-	-	-	-	6.6	6.8	-	-	4.63	0.25	-	-	22.7	1.4	-	-	Healthy	Dormant	-	-
Pinus strobus	White pine	0.13	0.13	-	-	3.4	3.5	-	-	0.01	0.01	-	-	0.1	0.1	-	-	Healthy	Healthy	-	-
Rhus radicans	Poison ivy	0.25	0.25	-	0.25	6.6	6.8	-	6.6	0.39	0.14	-	0.25	1.9	0.9	-	1.4	Healthy	Healthy	-	Healthy
Sanicula trifoliata	Snakeroot	0.13	0.13	-	-	3.4	3.5	-	-	0.25	0.25	-	-	1.2	1.4	-	-	Healthy	Healthy	-	-
Tilia americana	Basswood	-	0.13	-	-	-	3.5	-	-	-	0.01	-	-	-	0.1	-	-	-	Healthy	-	-
Ulmus rubra	Slippery elm	0.75	0.38	0.13	0.75	19.8	10.3	2.9	19.9	0.44	0.28	0.25	0.88	2.2	1.6	0.8	5.1	Healthy	Healthy	Healthy	Healthy
Viola sp.	Violet	-	-	0.25	-	-	-	5.5	-	-	-	0.38	-	-	-	1.2	-	-	Healthy	-	-
Vitis aestivalis	Summer grape	0.13	0.25	-	-	3.4	6.8	-	-	0.01	0.14	-	-	0.1	0.8	-	-	Healthy	Healthy	-	-
TOTAL		3.79	3.67	4.54	3.77	99.8	99.5	100.2	99.9	20.39	17.74	31.67	17.27	100.1	100.3	100.1	100.1				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-4 (Contd)

Oak-Maple Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency (%)				Areal Cover (%)				Relative Cover (%)				Mode Condition			
		SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN
Acer saccharum	Sugar maple	0.38	0.40	0.38	0.50	4.9	6.6	6.7	6.9	4.39	3.50	1.00	3.25	17.7	17.9	15.6	10.8	Healthy	Healthy	Dormant	Healthy
Allium canadense	Wild garlic	-*	0.50	0.50	-	-	6.6	8.8	-	-	0.50	1.25	-	-	2.6	19.5	-	-	Healthy	Healthy	-
Anemone quinquefolia	Wood anemone	-	-	0.38	-	-	-	6.7	-	-	-	0.75	-	-	-	11.7	-	-	-	Healthy	-
Anemonella thalictroides	Rue anemone	-	-	0.13	-	-	-	2.3	-	-	-	0.13	-	-	-	2.0	-	-	-	Healthy	-
Aster sp.	Aster	-	0.13	-	-	-	1.7	-	-	-	0.01	-	-	-	0.1	-	-	-	Healthy	-	-
Aster azureus	Azure aster	-	0.13	-	0.13	-	1.7	-	1.8	-	0.13	-	0.38	-	0.6	-	1.3	-	Healthy	-	Healthy
Botrychium virginianum	Virginia grape-fern	-	-	-	0.13	-	-	-	1.8	-	-	-	0.13	-	-	-	0.4	-	-	-	Healthy
Carya cordiformis	Yellowbud hickory	-	-	0.13	0.13	-	-	2.3	1.8	-	-	0	0.13	-	-	0	0.4	-	-	Dormant	Healthy
Cercis canadensis	Eastern redbud	0.13	0.25	-	-	1.7	3.3	-	-	0.01	0.14	-	-	0.1	0.7	-	-	Insect Injury	Insect Injury	-	-
Cornus florida	Flowering dogwood	0.38	0.63	0.25	0.50	4.9	8.3	4.4	6.9	2.51	0.76	0.63	2.63	10.1	3.9	9.8	8.7	Healthy	Healthy	Healthy	Healthy
Dentaria laciniata	Cut-leaved toothwort	-	-	1.00	-	-	-	17.6	-	-	-	1.00	-	-	-	15.6	-	-	-	Healthy	-
Dicentra cucullaria	Dutchman's breeches	-	-	0.13	-	-	-	2.3	-	-	-	0.25	-	-	-	3.9	-	-	-	Healthy	-
Dicotyledonae	Dicot A	0.13	0.13	-	0.25	1.7	1.7	-	3.5	0.13	0.13	-	2.13	0.5	0.6	-	7.1	Healthy	Healthy	-	Healthy
Elymus virginicus	Virginia wild rye	0.13	0.13	0.13	0.13	1.7	1.7	2.3	1.8	0.13	0.13	0.13	0.38	0.5	0.6	2.0	1.3	Dormant	Dormant	Healthy	Healthy
Erigenia bulbosa	Harbinger-of-spring	-	-	0.25	-	-	-	4.4	-	-	-	0.25	-	-	-	3.9	-	-	-	Healthy	-
Fraxinus americana	White ash	0.38	0.83	0.13	0.25	4.9	5.0	2.3	3.5	0.88	0.39	0	1.25	3.5	2.0	0	4.7	Healthy	Healthy	Dormant	Healthy
Fraxinus quadrangulata	Blue ash	0.13	0.13	0.25	0.13	1.7	1.7	4.4	1.8	0.38	0.13	0.13	0.25	1.5	0.6	2.0	0.8	Healthy	Healthy	Dormant	Healthy
Galium boreale	Northern bedstraw	0.75	0.75	0.50	0	9.6	9.9	8.8	-	0.78	0.64	0.13	-	3.1	3.3	2.0	-	Healthy	Healthy	Healthy	-
Galium circaezans	White wild licorice	0.13	-	-	0.68	1.7	-	-	8.7	0.01	-	-	0.63	0.1	-	-	2.1	Healthy	-	-	Healthy
Geum canadense	Canadian avens	0.38	0.25	0.13	0.25	4.9	3.3	2.3	3.5	0.26	0.25	0.13	0.38	1.1	1.3	2.0	1.3	Healthy	Healthy	Healthy	Healthy
Hydrophyllum appendiculatum	Appendaged waterleaf	0.88	0.88	-	-	11.3	11.6	-	-	5.76	6.90	-	-	23.2	35.4	-	-	Healthy	Healthy	-	-
Jeffersonia diphylla	Twinleaf	0.25	0.13	0.13	0.38	3.2	1.7	2.3	5.3	0.39	0.38	0	0.50	1.6	1.9	0	1.7	Healthy	Healthy	Healthy	Healthy
Linderia benzoin	Spicebush	0.25	-	-	-	3.2	-	-	-	0.26	-	-	-	1.1	-	-	-	Healthy	-	-	-
Ostrya virginiana	Ironwood	0.25	0.38	0.25	0.25	3.2	5.0	4.4	3.5	0.26	0.39	0.13	0.25	1.1	2.0	2.0	0.8	Healthy	Healthy	Healthy	Healthy
Parthenocissus quinquefolia	Virginia creeper	0.38	-	-	0.63	4.9	-	-	8.7	0.51	-	-	1.38	2.1	-	-	4.6	Healthy	-	-	Healthy
Prunus serotina	Black cherry	0.50	0.38	0.25	0.38	6.4	5.0	4.4	5.3	0.40	0.26	0.13	0.63	1.6	1.3	2.0	2.1	Healthy	Healthy	Healthy	Healthy
Quercus prinus	Chestnut oak	0.13	0.13	-	0.25	1.7	1.7	-	3.5	0.13	0.13	-	0.25	0.5	0.6	-	0.8	Healthy	Healthy	-	Healthy
Rhus radicans	Poison ivy	0.25	0.13	-	0.25	3.2	1.7	-	3.5	0.25	0.50	-	0.88	1.0	2.6	-	2.9	Healthy	Healthy	-	Healthy
Sanicula trifoliata	Snakeroot	0.63	0.63	-	1.00	8.1	8.3	-	13.9	1.63	1.25	-	8.50	6.6	6.4	-	28.3	Healthy	Healthy	-	Healthy
Smilax herbacea	Carrion-flower	0.50	0.50	-	0.38	6.4	6.6	-	5.3	2.13	1.64	-	1.88	8.6	8.4	-	6.3	Healthy	Healthy	-	Healthy
Symphoricarpos orbiculatus	Coralberry	0.25	-	-	-	3.2	-	-	-	0.39	-	-	-	1.6	-	-	-	Healthy	-	-	-
Ulmus rubra	Slippery elm	0.63	0.50	0.38	0.38	8.1	6.6	6.7	5.3	3.25	1.39	0.25	3.88	13.1	7.1	3.9	12.9	Healthy	Healthy	Healthy	Healthy
Viburnum prunifolium	Black haw	-	-	-	0.13	-	-	-	1.8	-	-	-	0.25	-	-	-	0.8	-	-	-	Healthy
Viola eriocarpa	Violet	-	-	0.38	0.13	-	-	6.7	1.8	-	-	0.13	0.13	-	-	2.0	0.4	-	-	Healthy	Healthy
TOTAL		7.82	7.57	5.68	7.22	100.6	99.7	100.1	99.9	24.84	19.55	6.42	30.07	100.3	99.9	99.9	100.0				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-4 (Contd)

Chinkapin Oak Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency (%)				Areal Cover (%)				Relative Cover (%)				Mode Condition			
		SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN
Allium canadense	Wild garlic	-	-	0.75	-	-	-	14.4	-	-	-	0.63	-	-	-	10.0	-	-	-	Healthy	-
Anemone quinquefolia	Wood anemone	-	-	0.13	-	-	-	2.5	-	-	-	0.13	-	-	-	2.1	-	-	-	Healthy	-
Anemone virginiana	Thimbleweed	-	-	0.25	0.13	-	-	4.8	1.4	-	-	0.13	0.13	-	-	2.1	0.4	-	-	Healthy	Healthy
Anemonella thalictroides	Rue anemone	-	-	-	0.50	-	-	-	5.5	-	-	-	1.75	-	-	-	5.4	-	-	-	Healthy
Arabis laevigata	Smooth rock-cress	-	-	-	0.13	-	-	-	1.4	-	-	-	0.13	-	-	-	0.4	-	-	-	Healthy
Aster azureus	Azure aster	-	-	-	0.13	-	-	-	1.4	-	-	-	0.25	-	-	-	0.7	-	-	-	Healthy
Celtis occidentalis	Hackberry	0.38	0.13	0.13	0.25	4.8	2.1	2.5	2.7	1.75	0.13	0.13	1.00	11.0	1.0	2.1	3.0	Healthy	Dormant	Dormant	Healthy
Cercis canadensis	Eastern redbud	0.13	0.25	-	0.13	1.7	4.0	-	1.4	0.13	0.25	-	0.13	0.8	1.9	-	0.4	Healthy	Healthy	-	Healthy
Clematis viorna	Leather flower	0.13	0.13	-	0.13	1.7	2.1	-	9.7	0.01	0.01	-	6.63	0.1	0.1	-	19.6	Healthy	Dormant	-	Healthy
Dentaria laciniata	Cut-leaved toothwort	-	-	0.13	-	-	-	2.5	-	-	-	0	-	-	-	0	-	-	-	Healthy	-
Dioscorea villosa	Wild yam	0.25	-	-	0.88	3.2	-	-	9.7	0.14	-	-	6.63	0.9	-	-	19.6	Healthy	-	-	Healthy
Diospyros virginiana	Persimmon	0.13	0.13	-	-	1.7	2.1	-	-	0.13	0.50	-	-	0.8	3.9	-	-	Healthy	Healthy	-	-
Eupatorium maculatum	Spotted Joe-pye-weed	-	-	-	0.13	-	-	-	1.4	-	-	-	0.38	-	-	-	1.1	-	-	-	Healthy
Fraxinus americana	White ash	0.38	0.25	-	0.13	4.8	4.0	-	1.4	0.38	0.25	-	0.13	2.4	1.9	-	0.4	Healthy	Healthy	-	Healthy
Fraxinus quadrangulata	Blue ash	0.25	0.13	0.25	0.25	3.2	2.1	4.8	2.7	0.14	0.13	0	0.25	0.9	1.0	0	0.7	Healthy	Healthy	Dormant	Healthy
Galium circaezans	White wild licorice	0.38	0.63	-	0.75	4.8	10.0	-	8.2	0.15	0.51	-	0.88	0.9	4.0	-	2.6	Healthy	Healthy	-	Healthy
Geum canadense	Canadian avens	0.63	0.50	-	-	8.0	7.9	-	-	1.04	0.51	-	-	6.5	4.0	-	-	Healthy	Healthy	-	-
Helianthus sp.	Sunflower	0.13	-	-	-	1.7	-	-	-	0.25	-	-	-	1.6	-	-	-	Healthy	-	-	-
Hystrix patula	Bottlebrush	0.13	-	-	0.25	1.7	-	-	2.7	0.88	-	-	0.38	5.5	-	-	1.1	Healthy	-	-	-
Jeffersonia diphylla	Twinleaf	0.25	-	0.13	0.25	3.2	-	2.5	2.7	0.14	0	0.13	0.88	0.9	-	2.1	2.6	Healthy	-	-	Healthy
Juniperus virginiana	Eastern red cedar	0.13	0.13	0.13	-	1.7	2.1	2.5	-	0.01	0.01	0.13	-	0.1	0.1	2.1	-	Healthy	Healthy	Healthy	Healthy
Lonicera japonica	Japanese honeysuckle	0.38	0.50	0.50	0.38	4.8	7.9	9.6	4.2	2.62	2.88	1.38	3.13	16.5	22.2	21.8	9.2	Healthy	Healthy	Healthy	-
Maianthemum canadense	Canada mayflower	-	-	0.25	-	-	-	4.8	-	-	-	0.13	-	-	-	2.1	-	-	-	Healthy	Healthy
Muhlenbergia sobolifera	Muhly grass	0.25	0.13	-	0.13	3.2	2.1	-	1.4	0.25	0.13	-	0.13	1.6	1.0	-	0.4	Healthy	Healthy	-	Healthy
Oenothera sp.	Evening primrose	0.13	0.25	0.11	0.25	1.7	4.0	2.5	2.7	0.13	0.25	0.50	1.25	0.8	1.9	7.9	3.7	Healthy	Healthy	Healthy	Healthy
Ostrya virginana	Ironwood	0.38	0.38	0.13	0.25	4.8	6.0	2.5	2.7	0.88	0.38	0.38	0.75	5.5	2.9	6.0	2.3	Healthy	Healthy	Dormant	Healthy
Panicum boscii	Bosc's panicum	0.13	0.25	-	0.13	1.7	4.0	-	1.4	0.63	0.63	-	0.75	3.9	4.8	-	2.3	Healthy	Healthy	-	Healthy
Parthenocissus quinquefolia	Virginia creeper	0.13	-	0.13	0.25	1.7	-	2.5	2.7	0.13	-	0	1.13	0.8	-	0	3.3	Healthy	-	Dormant	Healthy
Pinus virginiana	Virginia pine	0.13	0.13	0.13	0.13	1.7	2.1	2.5	1.4	0.13	0.13	0.13	0.25	0.8	0.9	2.1	0.7	Healthy	Healthy	Healthy	Healthy
Polygonatum biflorum	Solomon's-seal	-	-	-	0.63	-	-	-	6.9	-	-	-	1.38	-	-	-	4.2	-	-	-	Healthy
Prunus serotina	Black cherry	0.25	0.25	0.13	0.13	3.2	4.0	2.5	1.4	0.38	0.38	0.13	0.50	2.4	2.9	2.1	1.5	Healthy	Healthy	Healthy	Healthy
Quercus muehlenbergii	Chinkapin oak	0.25	0.13	0.13	0.25	3.2	2.1	2.5	2.7	0.75	0.13	0	1.38	4.7	1.0	0	4.2	Healthy	Healthy	Dormant	Healthy
Quercus velutina	Black oak	0.13	0.13	-	-	1.7	2.1	-	-	0.13	0.50	-	-	0.8	11.7	-	-	Healthy	Healthy	-	-
Rhus aromatica	Skunkbrush	-	-	-	0.13	-	-	-	1.4	-	-	-	0.13	-	-	-	0.4	-	-	-	Healthy
Robinia pseudoacacia	Black locust	0.50	0.50	0.25	0.13	6.4	7.9	4.8	1.4	1.63	1.63	0.13	1.00	10.2	12.6	2.1	3.0	Healthy	Healthy	Healthy	Healthy
Rosa sp.	Rose	0.25	0.25	0.13	0.13	3.2	4.0	2.5	1.4	0.14	0.25	0	0.13	0.9	1.0	0	0.4	Healthy	Healthy	Healthy	Healthy
Ruellia carolinensis	Hairy ruellia	-	-	-	0.13	-	-	-	1.4	-	-	-	0.13	-	-	-	0.4	-	-	-	Healthy
Sanguinaria canadensis	Bloodroot	-	-	0.13	-	-	-	2.5	-	-	-	0.13	-	-	-	2.1	-	-	-	Healthy	-
Sanicula trifoliata	Snakeroot	-	-	0.13	0.38	-	-	2.5	4.2	-	-	0	0.38	-	-	0	1.1	-	-	-	Healthy
Solidago ulmifolia	Goldenrod	0.88	0.88	0.38	0.50	11.2	13.9	7.3	5.5	1.51	1.75	0.63	1.25	9.5	13.5	10.0	3.7	Healthy	Healthy	Healthy	Healthy
Symphoricarpos orbiculatus	Coralberry	0.13	0.13	0.13	0.13	1.7	2.1	2.5	1.4	0.38	0.25	0.25	0.38	2.4	1.9	3.9	1.1	Healthy	Healthy	Healthy	Healthy
Thalictrum dioicum	Early meadow-rue	-	-	0.50	-	-	-	9.6	-	-	-	0.63	-	-	-	10.0	-	-	-	Healthy	-
Ulmus rubra	Slippery elm	0.25	0.13	0.13	0.13	3.2	2.1	2.5	1.4	0.76	0.38	0.63	0.13	4.8	2.9	10.0	0.4	Healthy	Dormant	Dormant	Healthy
Vitis aestivalis	Summer grape	0.13	-	-	0.13	1.7	-	-	1.4	0.13	-	-	0.13	0.8	-	-	0.4	Healthy	-	-	Healthy
Dicotyledonae	Dicot 8	0.25	-	-	-	3.2	-	-	-	0.25	-	-	-	1.6	-	-	-	Healthy			
TOTAL		7.85	6.32	5.21	9.11	100.5	100.7	100.1	99.3	15.98	12.97	6.33	33.86	100.4	100.0	100.6	100.7				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-4 (Contd)

Red Pine Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency (%)				Areal Cover (%)				Relative Cover (%)				Mode Condition			
		SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN
Cercis canadensis	Eastern redbud	0.75	0.75	-*	0.88	10.2	12.1	-	10.7	1.65	1.26	-	2.25	5.5	4.9	-	5.4	Insect Injury	Healthy	-	Healthy
Cornus florida	Flowering dogwood	0.75	0.63	0.38	0.63	10.2	10.2	9.1	7.7	4.63	4.13	0.38	5.75	15.5	16.0	5.6	13.8	Healthy	Healthy	Healthy	Healthy
Dentaria laciniata	Cut-leaved toothwort	-	-	0.25	-	-	-	6.0	-	-	-	0.63	-	-	-	9.3	-	-	-	Healthy	-
Eupatorium serotinum	Late-flowering thoroughwort	0.13	0.13	-	0.13	1.8	2.1	-	1.6	0.75	0.63	-	0.75	2.5	2.4	-	1.8	Healthy	Healthy	-	Insect Injury
Fagus grandifolia	Beech	0.13	0.13	0.13	0.13	1.8	2.1	3.1	1.6	0.25	0.25	0.13	0.25	0.8	1.0	1.9	0.6	Healthy	Healthy	Dormant	Healthy
Fragaria virginiana	Wild strawberry	0.13	0.13	0.13	0.13	1.8	2.1	3.1	1.6	0.38	0.25	0.31	0.63	1.3	1.0	1.9	1.5	Healthy	Healthy	Healthy	Healthy
Fraxinus americana	White ash	0.25	0.25	0.13	0.38	3.4	4.0	3.1	4.6	2.25	1.25	0.13	2.50	7.5	4.8	1.9	6.0	Insect Injury	Insect Injury	Dormant	Healthy
Fraxinus quadrangulata	Blue ash	0.13	0.13	0.13	-	1.8	2.1	3.1	-	0.38	0.38	0	-	1.3	1.5	0	-	Healthy	Healthy	Healthy	-
Gallium asprellum	Northern bedstraw	-	-	-	0.13	-	-	-	1.6	-	-	-	0.13	-	-	-	0.3	-	-	-	Healthy
Gallium circaezans	White wild licorice	0.50	0.38	-	0.38	6.8	6.1	-	4.6	0.51	0.26	-	0.63	1.7	1.0	-	1.5	Healthy	Healthy	-	Healthy
Gallium triflorum	Fragrant bedstraw	0.13	0.13	0.13	0.13	1.8	2.1	3.1	1.6	0.13	0.13	0	0.38	0.4	0.5	0	0.9	Healthy	Healthy	Healthy	Healthy
Geum canadense	Canadian avens	0.13	-	0.13	-	1.8	-	3.1	-	0.38	-	0	-	1.3	-	0	-	Healthy	-	Healthy	-
Lonicera japonica	Japanese honeysuckle	0.50	0.50	0.50	0.38	6.8	6.1	11.9	4.6	9.88	12.25	3.88	8.75	33.0	47.5	57.2	21.0	Healthy	Healthy	Healthy	Healthy
Muhlenbergia sobolifera	Muhly grass	-	-	-	0.13	-	-	-	1.6	-	-	-	0.25	-	-	-	0.6	-	-	-	Healthy
Parthenocissus quinquefolia	Virginia creeper	0.38	-	0.13	0.50	5.2	-	3.1	6.1	1.00	-	0	3.38	3.4	-	0	8.1	Healthy	-	Healthy	Healthy
Phryma leptostachya	Lopseed	0.13	0.13	-	0.25	1.8	2.1	-	3.0	1.00	0.13	-	1.50	3.4	0.5	-	3.6	Healthy	Healthy	-	Healthy
Pinus strobus	White pine	0.38	0.50	0.38	0.75	5.2	8.1	9.1	9.1	0.04	0.53	0.50	0.75	0.1	1.9	7.4	1.8	Healthy	Healthy	Healthy	Healthy
Poaceae	Grass family	-	-	0.13	-	-	-	3.1	-	-	-	0	-	-	-	0	-	-	-	Healthy	-
Prunus serotina	Black cherry	0.25	0.50	0.88	0.88	3.4	8.1	21.0	10.7	0.25	0.50	0.50	1.75	0.8	1.9	7.4	4.2	Healthy	Healthy	Healthy	Healthy
Quercus prinus	Chestnut oak	0.13	0.13	-	-	1.8	2.1	-	-	1.00	0.63	-	-	3.4	2.4	-	-	Healthy	Healthy	-	-
Quercus velutina	Black oak	0.25	0.38	-	0.25	3.4	6.1	-	3.0	1.13	1.01	-	1.50	3.8	3.9	-	3.6	Healthy	Healthy	-	Healthy
Rhus radicans	Poison ivy	0.75	-	-	0.50	10.2	-	-	6.1	0.80	-	-	1.13	2.7	-	-	2.7	Healthy	-	-	Healthy
Rosa sp.	Rose	0.13	0.13	0.13	0.13	1.8	2.1	3.1	1.6	0.50	0.01	0	0.25	1.7	0.1	0	0.6	Healthy	Dormant	Healthy	Healthy
Rubus sp.	Blackberry	-	0.13	-	0.13	-	2.1	-	1.6	-	0.13	-	0.25	-	0.5	-	0.6	-	Healthy	-	Healthy
Sanicula trifoliata	Snakeroot	0.88	0.75	0.63	0.88	12.0	12.1	15.0	10.7	2.13	1.63	0.50	4.13	7.1	6.3	7.4	9.9	Healthy	Healthy	Healthy	Healthy
Sassafras albidum	Sassafras	0.13	0.25	-	0.25	1.8	4.0	-	3.0	0.38	0.38	-	0.50	1.3	1.5	-	1.2	Healthy	Healthy	-	Healthy
Symphoricarpos orbiculatus	Coralberry	0.13	-	-	-	1.8	-	-	-	0.25	-	-	-	0.4	-	-	-	Dying	-	-	-
Ulmus rubra	Slippery elm	0.13	0.13	-	0.13	1.8	2.1	-	1.6	0.38	0.13	-	1.50	1.3	0.5	-	3.6	Healthy	Healthy	-	Healthy
Viola sp.	Violet	-	-	-	0.13	-	-	-	1.6	-	-	-	0.13	-	-	-	0.3	-	-	-	Healthy
Vitis rotundifolia	Muscadine grape	0.13	-	-	-	1.8	-	-	-	0.01	-	-	-	0	-	-	-	Healthy	-	-	-
Dicotyledonae	Vine A	-	-	-	0.13	-	-	-	1.6	-	-	-	2.63	-	-	-	6.3	-	-	-	Healthy
TOTAL		7.33	6.19	4.19	8.21	100.2	99.9	100.0	101.5	30.06	25.84	6.78	41.67	100.2	100.0	100.0	99.9				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-4 (Contd)

Sycamore-Boxelder Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency (%)				Areal Cover (%)				Relative Cover (%)				Mode Condition			
		SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN	SEP	OCT	MAR	JUN
Acer negundo	Boxelder	0.13	-*	-	0.25	2.4	0	0	5.4	0.13	-	-	0.25	0.2	-	-	0.5	Healthy	-	-	Healthy
Actinomeris alternifolia	Wingstem	0.38	0.38	-	0.38	7.1	6.7	-	8.2	2.63	1.88	-	4.75	3.8	3.3	-	9.3	Healthy	Dying	-	Healthy
Amaranthus sp.	Pigweed	-	0.13	-	-	-	2.3	-	-	-	0.13	-	-	-	0.2	-	-	-	Healthy	-	-
Circaea alpina	Small enchanter's nightshade	1.00	1.00	-	0.50	18.8	17.6	-	10.7	42.63	30.63	-	16.13	60.9	53.6	-	31.5	Healthy	Healthy	-	Healthy
Claytonia virginiana	Spring beauty	-	-	0.88	-	-	-	17.5	-	-	-	2.25	-	-	-	14.5	-	-	-	Healthy	-
Commelina sp.	Dayflower	0.13	0.13	-	0.13	2.4	2.3	-	2.8	0.13	0.13	-	0.13	0.2	0.2	-	0.3	Healthy	Healthy	-	Healthy
Cornus florida	Flowering dogwood	0.13	0.25	0.13	0.13	2.4	4.4	2.6	2.8	1.00	1.00	0.50	2.25	1.4	1.8	3.2	4.4	Healthy	Healthy	Healthy	Healthy
Cryptotaenia canadensis	Honewort	-	-	-	0.25	-	-	-	5.4	-	-	-	0.75	-	-	-	1.5	-	-	-	Healthy
Cyperaceae	Sedge	0.50	0.50	0.50	0.50	9.4	8.8	9.9	10.7	12.34	10.50	3.50	4.25	17.7	18.4	22.6	8.3	Healthy	Healthy	Healthy	Healthy
Dentaria laciniata	Cut-leaved toothwort	-	-	0.38	-	0	0	7.5	-	-	-	2.38	-	-	-	15.3	-	-	-	Healthy	-
Elymus virginicus	Virginia wild rye	0.38	0.83	0.38	0.25	7.1	6.7	7.5	5.4	2.88	3.25	3.00	1.50	4.1	5.7	19.3	2.9	Healthy	Healthy	Healthy	Healthy
Eupatorium serotinum	Late-flowering thoroughwort	0.25	0.50	-	0.75	6.7	8.8	-	16.1	1.50	2.75	-	7.00	2.1	4.8	-	13.7	Healthy	Healthy	-	Healthy
Gallium circaezans	White wild licorice	0.13	0.13	0.13	0.13	2.4	2.3	2.6	2.8	0.25	0.13	0.13	0.13	0.4	0.2	0.6	0.3	Healthy	Healthy	Healthy	Healthy
Gallium triflorum	Fragrant bedstraw	-	-	0.63	-	-	-	12.5	-	-	-	0.75	-	-	-	4.8	-	Healthy	Healthy	Healthy	-
Geum canadense	Canadian avens	0.63	0.75	0.38	0.25	11.8	13.2	7.5	5.4	2.75	1.89	0.75	0.63	3.9	3.3	4.8	1.2	Healthy	Healthy	Healthy	Healthy
Jeffersonia diphylla	Twinleaf	-	-	0.75	-	-	-	14.9	-	-	-	1.13	-	-	-	7.3	-	-	-	Healthy	-
Parthenocissus quinquefolia	Virginia creeper	0.13	0.13	0.13	0.13	2.4	2.3	2.6	2.8	0.13	0.13	0	0.38	0.2	0.2	0	0.7	Healthy	Diseased	Healthy	Healthy
Pilea pumila	Clearweed	-	-	-	0.50	-	-	-	10.7	-	-	-	11.63	-	-	-	22.7	-	-	-	Healthy
Polygonum cespitosum	Long-bristled smartweed	0.38	0.50	-	-	7.1	8.8	-	-	0.63	0.88	-	-	0.9	1.5	-	-	Healthy	Healthy	-	-
Rhus radicans	Poison ivy	0.13	0.13	-	0.13	2.4	2.3	-	2.8	0.13	0.01	-	0.50	0.2	0.0	-	1.0	Healthy	Healthy	-	Healthy
Sanicula trifoliata	Snakeroot	0.13	0.13	0.50	0.13	2.4	2.3	9.9	2.8	0.13	0.13	0.50	0.25	0.2	0.2	3.2	0.5	Healthy	Healthy	Healthy	Healthy
Smilax herbacea	Carrion-flower	0.13	-	-	-	2.4	-	-	-	0.13	-	-	-	0.2	-	-	-	Healthy	-	-	-
Solidago sp.	Goldenrod	0.38	0.25	-	-	7.1	4.4	-	-	1.25	2.25	-	-	1.9	3.9	-	-	Healthy	Healthy	-	-
Viola eriocarpa	Violet	0.38	0.38	0.25	0.25	7.1	6.7	5.0	5.4	1.38	1.50	0.63	0.75	2.0	2.6	4.1	1.5	Healthy	Healthy	Healthy	Healthy
TOTAL		5.32	5.67	5.04	4.66	99.4	99.9	99.6	100.2	70.2	57.19	15.52	51.28	100.3	99.9	99.9	100.3				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-4 (Contd)

Oak-Hickory Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency(%)				Areal Cover(%)				Relative Cover(%)				Mode Condition			
		Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun
Allium canadense	Wild garlic	-*		0.38	-	-	-	5.4	-	-	-	0.25	-	-	-	0.6	-	-	-	Healthy	-
Amaranthus sp.	Pigweed	0.13	-	-	-	2.3	-	-	-	0.01	-	-	-	0.1	-	-	-	Healthy	-	-	-
Anemone canadensis	Canada anemone	-	-	1.00	-	-	-	14.2	-	-	-	4.13	-	-	-	10.7	-	-	-	Healthy	-
Anemonella thalictroides	Rue anemone	-	-	0.13	-	-	-	1.8	-	-	-	0.13	-	-	-	0.3	-	-	-	Healthy	-
Aster azureus	Azure aster	0.13	0.13	-	0.13	2.3	2.8	-	2.8	0.13	0.13	-	0.25	1.0	1.6	-	1.6	Healthy	Healthy		Mech. Injury
Cardamine douglassii	Purple cress	-	-	0.38	0.13	-	-	5.4	2.8	-	-	0.50	0	-	-	1.3	0	-	-	Healthy	Dying
Carya cordiformis	Yellowbud hickory	-	0.13	-	-	-	2.8	-	-	-	0.13	-	-	-	1.6	-	-	-	Healthy	-	-
Cercis canadensis	Eastern redbud	0.50	0.50	0.13	0.50	9.0	10.9	1.8	10.9	1.88	1.13	0.13	2.25	15.6	14.2	0.3	14.3	Insect Injury	Dormant	Dormant	Healthy
Circaea alpina	Small enchanter's nightshade	-	0.13	-	-	-	2.8	-	-	-	0.13	-	-	-	1.6	-	-	-	Healthy	-	-
Commelina sp.	Dayflower	0.13	-	-	-	2.3	-	-	-	0.25	-	-	-	2.1	-	-	-	Healthy	-	-	-
Cornus pricese	Miss Price's cornel	-	-	-	0.13	-	-	-	2.8	-	-	-	0.25	-	-	-	1.6	-	-	-	Healthy
Cyperaceae	Sedge	0.88	0.63	0.13	0.38	15.8	13.8	1.8	8.3	0.68	0.88	0.13	0.50	5.6	11.0	0.3	3.2	Healthy	Healthy	Healthy	Healthy
Dentaria laciniata	Cut-leaved toothwort	-	-	0.88	-	-	-	12.5	-	-	-	4.63	-	-	-	12.0	-	-	-	Healthy	-
Erythronium albidum	White trout-lily	-	-	0.50	-	-	-	7.1	-	-	-	6.38	-	-	-	16.5	-	-	-	Healthy	-
Eupatorium serotinum	Late-flowering thoroughwort	0.50	0.25	-	0.25	9.0	5.5	-	5.5	1.14	1.00	-	1.25	9.5	12.6	-	8.0	Healthy	Healthy	-	Healthy
Fraxinus americana	White ash	0.13	0.13	-	-	2.3	2.8	-	-	0.01	0.01	-	-	0.1	0.2	-	-	Healthy	Dormant	-	-
Fraxinus quadrangulata	Blue ash	0.25	0.25	-	0.13	4.5	5.5	-	2.8	0.25	0.25	-	0.38	2.1	3.2	-	2.4	Healthy	Healthy	-	Healthy
Geum canadense	Canadian avens	0.25	0.13	0.25	0.13	4.5	2.8	3.5	2.8	0.14	0.25	0.25	0.13	1.1	3.2	0.6	0.8	Healthy	Healthy	Healthy	Healthy
Hydrophyllum appendiculatum	Appendaged waterleaf	0.13	0.38	-	-	2.3	8.3	-	-	0.01	0.26	-	-	0.1	3.3	-	-	Healthy	Healthy	-	-
Hystrix patula	Bottlebrush	0.25	0.13	0.13	0.25	4.5	2.8	1.8	5.5	2.89	2.13	0.25	0.63	24.0	26.8	0.6	4.0	Healthy	Dormant	Healthy	Healthy
Lonicera japonica	Japanese honeysuckle	0.13	0.13	-	0.13	2.3	2.8	-	2.8	0.13	0.13	-	0.13	1.0	1.6	-	0.8	Healthy	Healthy	-	Healthy
Mertensia virginica	Bluebells	-	-	1.00	-	-	-	14.2	-	-	-	15.88	-	-	-	41.1	-	-	-	Healthy	-
Muhlenbergia sobolifera	Muhly grass	0.13	0.25	0.25	0.13	2.3	5.5	3.5	2.8	0.25	0.25	0.25	0.13	2.1	3.2	0.6	0.8	Healthy	Dormant	Healthy	Healthy
Parthenocissus quinquefolia	Virginia creeper	0.88	0.13	0.25	0.88	15.8	10.9	3.5	19.3	2.38	0.39	0	5.13	19.8	4.9	0	32.7	Healthy	Dormant	Dormant	Healthy
Polygonatum biflorum	Solomon's-seal	0.13	0.13	0.38	-	2.3	2.8	5.4	-	0.13	0.01	0.75	-	1.0	0.2	1.9	-	Insect Injury	Dormant	Healthy	-
Rhus radicans	Poison ivy	0.13	-	-	-	2.3	-	-	-	0.01	-	-	-	0.1	-	-	-	Healthy	-	-	-
Robinia pseudoacacia	Black locust	0.13	0.13	0.13	0.13	2.3	2.8	1.8	2.8	0.25	0.25	0	1.00	2.1	3.2	0	6.3	Healthy	Insect Injury	Healthy	Healthy
Sanguinaria canadensis	Bloodroot	-	-	0.13	0.13	-	-	1.8	2.8	-	-	0.63	0.88	-	-	1.6	5.6		-	-	Healthy
Sanicula trifoliata	Snakeroot	-	-	-	0.25	-	-	-	5.5	-	-	-	0.38	-	-	-	2.4		-	-	Healthy
Smilacina racemosa	False Solomon's-seal	0.13	-	-	0.13	2.3	-	-	2.8	0.25	-	-	0.88	2.1	-	-	5.6	Dormant	-	-	Healthy
Symphoricarpos orbiculatus	Coralberry	0.13	0.13	0.13	0.13	2.3	2.8	1.8	2.8	0.13	0.13	0.38	0.25	1.0	1.6	1.0	1.6	Healthy	Dormant	Healthy	Healthy
Trillium sessile	Toadshade	-	-	0.63	-	-	-	8.9	-	-	-	3.88	-	-	-	10.0	-	-	-	Healthy	-
Ulmus rubra	Slippery elm	0.38	0.38	0.25	0.50	6.8	8.3	3.5	10.9	1.00	0.38	0.13	0.88	8.3	4.7	0.3	5.6	Healthy	Dormant	Dormant	Healthy
Vitis aestivalis	Summer grape	0.13	0.13	-	0.13	2.3	2.8	-	2.8	0.13	0.13	-	0.38	1.0	1.6	-	2.4	Healthy	Dormant	-	Healthy
Total		5.58	4.57	7.06	4.57	99.8	99.5	99.7	99.5	12.05	7.97	38.68	15.68	99.8	100.3	99.7	99.7				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-4 (Contd)

Walnut-Hickory-Buckeye Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency (%)				Areal Cover (%)				Relative Cover (%)				Mode Condition			
		Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun
Acer negundo	Boxelder	-*	-	0.13	1.3	-	-	2.9	1.7	-	-	0	0.38	-	-	0	0.6	-	-	Dormant	Healthy
Actinomeris alternifolia	Wingstem	-	-	-	0.13	-	-	-	1.7	-	-	-	0.75	-	-	-	1.3	-	-	-	Healthy
Allium canadense	Wild garlic	-	-	0.13	-	-	-	2.9	-	-	-	0.13	-	-	-	1.6	-	-	-	Healthy	-
Arabis laevigata	Smooth rock-cress	0.13	-	-	-	1.5	-	-	-	0.25	-	-	-	0.9	-	-	-	Healthy	-	-	-
Asimina triloba	Pawpaw	0.38	0.25	0.13	0.25	4.4	4.1	2.9	3.3	1.25	0.25	0.13	1.50	4.4	1.4	1.6	2.6	Healthy	Dormant	Dormant	Healthy
Cardamine douglassii	Purple cress	-	-	-	0.13	-	-	-	1.7	-	-	-	0.13	-	-	-	0.2	-	-	-	-
Carya cordiformis	Yellowbud hickory	0.25	0.25	-	0.25	2.9	4.1	-	3.3	0.50	0.38	-	0.38	1.8	2.1	-	0.6	Healthy	Dormant	-	Healthy
Carya ovata	Shagbark hickory	-	0.13	-	-	-	2.2	-	-	-	1.00	-	-	-	5.6	-	-	-	Healthy	-	-
Cercis canadensis	Eastern redbud	0.62	0.38	-	0.13	7.1	6.3	-	1.7	0.53	0.26	-	0.13	1.8	1.5	-	0.2	Insect Injury	Healthy	-	Healthy
Circaea alpina	Small enchanter's nightshade	-	-	-	0.13	-	-	-	1.7	-	-	-	0.13	-	+	-	0.2	-	-	-	Healthy
Convovulus sp.	Bindweed	0.13	-	-	-	1.5	-	-	-	0.01	-	-	-	0.0	-	-	-	Healthy	-	-	-
Cyperaceae	Sedge	0.25	0.25	-	0.13	2.9	4.1	-	1.7	0.39	0.14	-	0.13	1.4	0.8	-	0.2	Healthy	Dormant	-	Healthy
Dentaria lacinlata	Cut-leaved toothwort	-	-	1.00	-	-	-	22.0	-	-	-	2.88	-	-	-	35.8	-	-	-	Healthy	-
Erigenia bulbosa	Harbinger-of-spring	-	-	0.63	-	-	-	13.8	-	-	-	0.63	-	-	-	7.8	-	-	-	Healthy	-
Eupatorium serotinum	Late-flowering thoroughwort	0.88	0.63	-	0.50	10.1	10.4	-	6.5	2.88	3.88	-	2.00	10.1	18.9	-	3.4	Healthy	Insect Injury	-	Healthy
Fraxinus americana	White ash	0.38	0.38	0.25	0.38	4.4	6.3	5.5	5.0	1.13	1.00	0.13	1.63	3.9	5.6	1.6	2.8	Healthy	Healthy	Dormant	Healthy
Fraxinus quadrangulata	Blue ash	0.25	0.13	-	0.38	2.9	2.2	-	5.0	1.00	0.25	-	0.38	3.5	1.4	-	0.6	Healthy	Dormant	-	Healthy
Geum canadense	Canadian avens	0.38	-	0.38	0.25	4.4	-	8.4	3.3	0.38	-	0.25	0.38	1.3	-	3.1	0.6	Healthy	-	Healthy	Healthy
Glechoma hederacea	Gill-over-the-ground	0.13	0.25	0.13	-	1.5	4.1	2.9	-	0.13	0.14	0	-	0.4	0.8	0	-	Healthy	Healthy	Healthy	-
Helianthus sp.	Sunflower	0.13	-	-	-	1.5	-	-	-	0.25	-	-	-	0.9	-	-	-	Insect Injury	-	-	-
Hydrophyllum appendiculatum	Appendaged water-leaf	0.38	-	-	-	4.4	-	-	-	0.15	-	-	-	0.5	-	-	-	Healthy	-	-	-
Linderia benzoin	Spicebush	0.25	0.38	-	0.25	2.9	6.3	-	3.3	0.50	1.00	-	0.63	1.8	5.6	-	1.1	Healthy	Healthy	-	Healthy
Lonicera japonica	Japanese honeysuckle	1.00	1.00	1.00	1.00	11.5	16.5	22.0	13.0	9.00	7.88	2.50	17.63	31.5	44.1	31.1	30.0	Healthy	Healthy	Healthy	Healthy
Parthenocissus quinquefolia	Virginia creeper	0.88	0.13	-	1.00	10.1	2.2	-	13.0	2.50	0.01	-	19.13	8.8	0.1	-	32.6	Healthy	Dormant	-	Healthy
Rhus radicans	Poison ivy	0.88	0.63	-	0.75	10.1	10.4	-	9.8	4.63	0.89	-	8.00	16.2	5.0	-	13.6	Healthy	Dromant	-	Healthy
Rubus sp.	Blackberry	0.13	0.13	0.13	0.13	1.5	2.2	2.9	1.7	0.38	0.38	0.13	0.63	1.3	2.1	1.6	1.1	Healthy	Healthy	Healthy	Healthy
Sanicula trifoliata	Snakeroot	0.25	0.50	0.13	0.75	2.9	8.3	2.9	9.8	0.14	0.28	0.13	1.63	0.5	1.5	1.6	2.8	Healthy	Healthy	Healthy	Healthy
Symphoricarpos orbiculatus	Coralberry	0.50	0.38	0.38	0.75	5.8	6.3	8.4	9.8	1.63	0.39	1.00	2.88	5.7	2.2	12.4	4.9	Healthy	Dormant	Healthy	Healthy
Trillium sessile	Toadshade	-	-	0.13	-	-	-	2.9	-	-	-	0.13	-	-	-	1.6	-	-	-	Healthy	-
Ulmus rubra	Slippery elm	0.38	0.13	-	0.25	4.4	2.2	-	3.3	0.50	0.13	-	0.25	1.8	0.7	-	0.4	Healthy	Healthy	-	Healthy
Vitis aestivalis	Summer grape	0.13	0.13	-	-	1.5	2.2	-	-	0.50	0.13	-	-	1.8	0.7	-	-	Insect Injury	Healthy	-	-
TOTAL		8.69	6.06	4.55	7.67	100.2	100.4	100.4	100.3	28.63	17.89	8.04	58.70	100.3	100.1	99.8	99.8				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-4 (Contd)

Virginia Pine Cover Type

Scientific Name	Common Name	Frequency				Relative Frequency (%)				Areal Cover (%)				Relative Cover (%)				Mode Condition			
		Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun	Sep	Oct	Mar	Jun
Allium canadense	Wild garlic	-*	0.25	0.63	-	-	4.8	16.2	-	-	0.25	1.13	-	-	1.8	11.8	-	-	Healthy	Healthy	-
Asplenium platyneuron	Ebony spleenwort	0.25	0.25	0.25	0.25	4.1	4.8	6.4	4.2	0.50	0.63	0.25	0.38	3.8	4.5	2.6	1.7	Healthy	Healthy	Healthy	Healthy
Botrychium virginianum	Virgina grape-fern	0.13	-	-	0.13	2.1	-	-	2.2	0.13	-	-	0.25	1.0	-	-	1.1	Healthy	-	-	Healthy
Bryophyta	Mosses	-	-	0.25	0.25	-	-	6.4	4.2	-	-	1.75	1.00	-	-	18.3	4.5	-	-	Healthy	Healthy
Campsis radicans	Trumpet vine	0.25	0.13	-	0.25	4.1	2.5	-	4.2	1.00	0.13	-	1.00	7.6	0.9	-	4.5	Healthy	Dormant	-	Healthy
Carex leersii	Little prickly sedge	0.50	0.38	0.25	0.38	8.2	7.3	6.4	6.4	0.39	0.75	0.38	0.63	3.0	5.4	4.0	2.8	Healthy	Healthy	Healthy	Healthy
Carya cordiformis	Yellowbud hickory	0.25	0.13	-	0.25	4.1	2.5	-	4.2	0.25	0.13	-	0.38	1.9	0.9	-	1.7	Healthy	Healthy	-	Healthy
Cornus florida	Flowering dogwood	1.00	1.00	0.75	1.00	16.5	19.2	19.2	16.9	2.74	3.00	0.88	6.50	21.0	21.6	9.2	29.1	Healthy	Healthy	Dormant	Healthy
Desmodium paniculatum	Panicled tick-trefoil	0.25	0.13	-	0.25	4.1	2.5	-	4.2	0.63	0.13	-	0.50	4.8	0.9	-	2.2	Healthy	Healthy	-	Healthy
Eupatorium serotinum	Late-flowering thoroughwort	0.13	0.13	-	0.13	2.1	2.5	-	2.2	0.63	0.63	-	0.50	4.8	4.5	-	2.2	Healthy	Healthy	-	Healthy
Fragaria virginana	Wild strawberry	0.38	0.13	0.38	0.13	6.8	2.5	9.7	2.2	0.26	0.13	0.25	0.13	2.0	0.9	2.6	0.6	Healthy	Healthy	Healthy	Healthy
Fraxinus americana	White ash	0.13	0.13	-	-	2.1	2.5	-	-	0.38	0.13	-	-	2.9	0.9	-	-	Healthy	Dormant	-	-
Fraxinus quadrangulata	Blue ash	0.25	0.25	-	0.38	4.1	4.8	-	6.4	0.25	0.14	-	0.50	1.9	1.0	-	2.2	Healthy	Healthy	-	Healthy
Galium circaezans	White wild licorice	0.13	0.13	0.25	0.25	2.1	2.5	6.4	4.2	0.13	0.13	0.13	0.38	1.0	0.9	1.4	1.7	Healthy	Healthy	Healthy	Healthy
Geum canadense	Canadian avens	0.38	0.38	-	0.38	6.3	7.3	-	6.4	0.25	0.75	-	1.25	1.9	5.4	-	5.6	Healthy	Healthy	-	Healthy
Lonicera japonica	Japanese honeysucklee	0.13	0.25	0.25	0.13	2.1	4.8	6.4	2.2	1.25	3.88	4.13	2.88	9.5	27.9	43.3	12.9	Healthy	Healthy	Healthy	Healthy
Parthenocissus quinquefolia	Virginia creeper	0.25	0.13	0.13	0.13	4.1	2.5	3.3	2.2	1.14	0.13	0.13	2.00	8.7	0.9	1.4	9.0	Healthy	Dormant	Healthy	Healthy
Prunus serotina	Black cherry	0.13	0.13	0.13	0.50	2.1	2.5	3.3	8.4	0.13	0.13	0.13	0.50	1.0	0.9	1.4	2.2	Healthy	Healthy	Healthy	Healthy
Quercus rubra	Red oak	0.13	0.13	0.13	-	2.1	2.5	3.3	-	0.25	0.25	0	-	1.9	1.8	0	-	Healthy	Healthy	Healthy	-
Rhus radicans	Poison ivy	0.38	-	-	0.25	6.3	-	-	4.2	0.65	-	-	2.13	5.0	-	-	9.6	Healthy	-	-	Healthy
Rubus sp.	Blackberry	0.13	0.13	-	0.13	2.1	2.5	-	2.2	1.25	1.25	-	0.13	9.5	9.0	-	0.6	Healthy	Healthy	-	Healthy
Sanicula trifoliata	Snakeroot	0.25	0.50	0.50	0.50	4.1	9.6	12.8	8.4	0.14	0.50	0.38	0.75	1.1	3.6	4.0	3.4	Healthy	Healthy	Healthy	Healthy
Smilax sp.	Greenbriar	0.25	0.25	-	-	4.1	4.8	-	-	0.64	0.75	-	-	4.9	5.4	-	-	Healthy	Healthy	-	-
Smilax herbacea	Carrion-flower	0.13	0.13	-	0.13	2.1	2.5	-	2.2	0.13	0.13	-	0.38	1.0	0.9	-	1.7	Healthy	Dormant	-	Healthy
Solidago sp.	Goldenrod	0.13	0.13	-	0.13	2.1	2.5	-	2.2	0.01	0.01	-	0.13	0.1	0.1	-	0.6	Healthy	Healthy	-	Healthy
Ulmus rubra	Slippery elm	0.13	-	-	-	2.1	-	-	-	0.01	-	-	-	0.1	-	-	-	Healthy	-	-	-
TOTAL		6.07	5.20	3.90	5.93	100.0	99.9	99.8	99.9	13.15	13.96	9.54	22.3	100.4	100.1	100.0	99.9				

*Taxa was not observed in plots during indicated (dash) sample period

Table E-5

Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil Parameters for Each Vegetation Cover Type

Soil Moisture (%)

Code	Cover Type	Sep		Oct		Apr		Jun	
		$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE	$\bar{x}$	SE
01	Maple-Basswood	31.9	1.4	31.9	1.4	36.7	0.9	37.2	1.5
02	Oak-Maple	23.0	1.9	26.3	1.3	31.5	1.9	28.7	2.1
03	Chinkapin Oak	20.0	1.6	27.3	1.4	31.7	1.5	23.7	1.2
04	Red Pine	16.7	1.9	21.7	0.4	27.7	1.7	25.5	0.6
05	Sycamore-Boxelder	19.4	1.3	25.5	1.5	28.8	2.8	24.2	2.1
06	Oak-Hickory	17.1	0.8	19.7	1.3	22.0	1.5	24.7	1.4
09	Walnut-Hickory-Buckeye	25.3	1.1	31.0	0.9	33.0	1.1	32.2	1.5
10	Orchard	-	-	-	-	-	-	19.1	0.5
11	Virginia Pine	17.2	2.6	18.4	0.6	25.6	0.7	26.2	0.7

*Based on 4 per cover type per date sampled

Table E-5 (Contd)

Soil Bulk Density (g/cm^3)

Code	Cover Type	SEP $\bar{x}$	SEP S.E.	OCT $\bar{x}$	OCT S.E.	MAR $\bar{x}$	MAR S.E.	JUN $\bar{x}$	JUN S.E.
01	Maple-Basswood	0.865	0.078	0.674	0.112	0.732	0.089	0.700	0.083
02	Oak-Maple	0.931	0.042	0.926	0.062	0.816	0.457	0.823	0.044
03	Chinkapin oak	0.908	0.074	0.949	0.027	0.799	0.559	0.869**	0.030
04	Red pine	1.206	0.051	1.132	0.086	1.014	0.019	0.985	0.066
05	Sycamore-Boxelder	1.125	0.036	0.983	0.039	1.190	0.081	0.905	0.112
06	Oak-Hickory	0.929	0.097	1.040	0.030	0.862	0.428	0.711	0.035
09	Walnut-Hickory-Buckeye	0.894	0.022	0.893	0.031	0.844	0.049	0.768	0.069
10	Orchard	-***	-	-	-	-	-	1.080	0.074
11	Virginia pine	0.858	0.048	0.907	0.014	0.931	0.043	0.809	0.056

*Based on 4 replicates per cover type per date sampled

**Based on 3 replicates this sample date

***Dash indicates that cover type was not sampled on that date

Table E-5 (Contd)

Soil pH (measured in water)

Code	Cover Type	SEP $\bar{x}$	SEP S.E.	OCT $\bar{x}$	OCT S.E.	MAR $\bar{x}$	MAR S.E.	JUN $\bar{x}$	JUN S.E.
01	Maple-Basswood	7.8	0.1	8.6	0.0	7.5	0.0	7.5	0.1
02	Oak-Maple	7.2	0.4	8.5	0.3	7.1	0.3	7.0	0.4
03	Chinkapin oak	7.6	0.1	8.6	0.0	7.5	0.2	7.4	0.1
04	Red pine	7.0	0.5	7.5	0.1	5.3	0.2	6.0	0.2
05	Sycamore-Boxelder	7.2	0.4	8.1	0.2	6.0	0.9	7.0	0.4
06	Oak-Hickory	7.7	0.1	8.6	0.0	7.6	0.1	7.7	0.0
09	Walnut-Hickory-Buckeye	7.6	0.2	8.3	0.1	7.4	0.0	7.4	0.1
10	Orchard	-**	-	-	-	-	-	6.9	0.2
11	Virginia pine	6.2	0.2	6.5	0.2	6.1	0.6	6.4	0.1

*Based on 4 replicates per cover type per date sampled

**Dash indicates that cover type was not sampled on that date

Table E-5 (Contd)

Soil Conductivity (μmho/cm)

Code	Cover Type	SEP $\bar{x}$	SEP S.E.	OCT $\bar{x}$	OCT S.E.	MAR $\bar{x}$	MAR S.E.	JUN $\bar{x}$	JUN S.E.
01	Maple-Basswood	300	32	301	42	200	31	183	16
02	Oak-Maple	209	16	221	36	176	24	187	26
03	Chinkapin oak	280	34	194	20	194	14	198	11
04	Red pine	153	17	160	23	137	9	150	6
05	Sycamore-Boxelder	282	15	245	26	259	12	199	24
06	Oak-Hickory	635	127	216	13	310	28	222	23
09	Walnut-Hickory-Buckeye	207	27	263	28	210	28	168	13
10	Orchard	-**	-	-	-	-	-	170	6
11	Virginia pine	166	24	221	17	184	32	121	11

*Based on 4 replicates per cover type per date sampled

**Dash indicates that cover type was not sampled on that date

Table E-5 (Contd)

Soil Cation Exchange Capacity (meq/100g)

Code	Cover Type	SEP $\bar{x}$	SEP S.E.	OCT $\bar{x}$	OCT S.E.	MAR $\bar{x}$	MAR S.E.	JUN $\bar{x}$	JUN S.E.
01	Maple-Basswood	48.3	2.1	50.9	2.3	49.7	5.0	24.1	5.0
02	Oak-Maple	39.8	6.5	37.4	0.7	35.1	7.5	24.9	3.5
03	Chinkapin oak	50.1	4.1	43.4	3.8	56.4	3.3	20.4	4.8
04	Red pine	18.8	3.0	21.3	1.1	24.6	3.8	18.3	2.6
05	Sycamore-Boxelder	17.4	1.4	23.6	2.3	29.2	2.8	17.5	1.1
06	Oak-Hickory	36.9	2.2	35.7	3.5	44.1	3.5	22.5	1.2
09	Walnut-Hickory-Buckeye	50.6	1.8	52.1	1.4	43.8	3.38	22.4	3.1
10	Orchard	-**	-	-	-	-	-	16.9	1.2
11	Virginia pine	18.0	1.0	19.1	0.9	22.1	1.76	18.2	0.9

*Based on 4 replicates per cover type per date sampled

**Dash indicates that cover type was not sampled on that date

Table E-5 (Contd)

Soil Base Saturation (%)

Code	Cover Type	SEP $\bar{x}$	SEP S.E.	OCT $\bar{x}$	OCT S.E.	MAR $\bar{x}$	MAR S.E.	JUN $\bar{x}$	JUN S.E.
01	Maple-Basswood	59.6	7.9	69.6	2.3	25.4	3.8	62.2	11.6
02	Oak-Maple	68.0	7.6	61.5	5.4	61.5	28.7	60.8	7.3
03	Chinkapin oak	75.6	4.1	72.8	7.7	21.1	4.8	93.0	17.5
04	Red pine	64.7	6.3	40.8	2.4	23.0	2.6	62.1	7.0
05	Sycamore-Boxelder	104.2	20.3	70.7	7.7	46.9	12.2	76.9	13.9
06	Oak-Hickory	91.5	3.2	77.1	1.5	40.6	10.6	95.7	8.9
09	Walnut-Hickory-Buckeye	76.6	7.2	64.6	1.2	53.1	5.3	86.5	21.7
10	Orchard	-**	-	-	-	-	-	50.7	4.2
11	Virginia pine	48.9	4.6	40.4	2.9	35.2	10.0	39.0	3.7

*Based on 4 replicates per cover type per date sampled

**Dash indicates that cover type was not sampled on that date

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