MARBLE HILL NUCLEAR GENERATING STATION
UNITS 1 AND 2
REMOTE SENSING AND GROUND TRUTH PROGRAM
FINAL REPORT

Prepared for

PUBLIC SERVICE COMPANY OF INDIANA, INC.
1000 East Main Street
Plainfield, Indiana 46168

Prepared by

TEXAS INSTRUMENTS INCORPORATED
Ecological Services
P.O. Box 225621
Dallas, Texas 75265

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FOREWORD

Texas Instruments Incorporated (TI) is pleased to submit this final report summarizing the methodology applied and results obtained during the fourth year of the remote sensing and ground truth program conducted within the prescribed area on and near the proposed Marble Hill Nuclear Generating Station, Units 1 and 2, near New Washington, Jefferson County, Indiana.

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SECTION I
INTRODUCTION

A. PROGRAM OBJECTIVES

The 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 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.

B. PROGRAM SCHEDULE AND STATUS

The scheduled and actual completion dates for each task are listed in Table I-1.

Table I-1

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

Task	Scheduled Completion Date	Actual Completion Date
Aerial CIR Photography	15-30 May 1980	9 June 1980
Photointerpretation	15 June 1980	16 June 1980
Vegetation, Data Collection	15 September 1979	30 August 1979
	29 October 1979	19 October 1979
	30 April 1980	25 April 1980
	30 June 1980	24 June 1980
Soil, Data Collection	15 September 1979	30 August 1979
	29 October 1979	19 October 1979
	31 March 1980	25 April 1980
	31 May 1980	18 June 1980
Reports		
Draft	31 July 1980	31 July 1980
Final	31 August 1980	15 September 1980

Methods of data collection, reduction and analysis are documented in Section II - Methodology; summarized data are presented in Section III - Results and Discussion.

SECTION II
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:

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

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

A. AERIAL COLOR INFRARED PHOTOGRAPHY

Aerial color infrared (CIR) photographs were obtained in June 1980. Five flight lines were required to obtain the coverage of the designated area shown in Figure II-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.

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

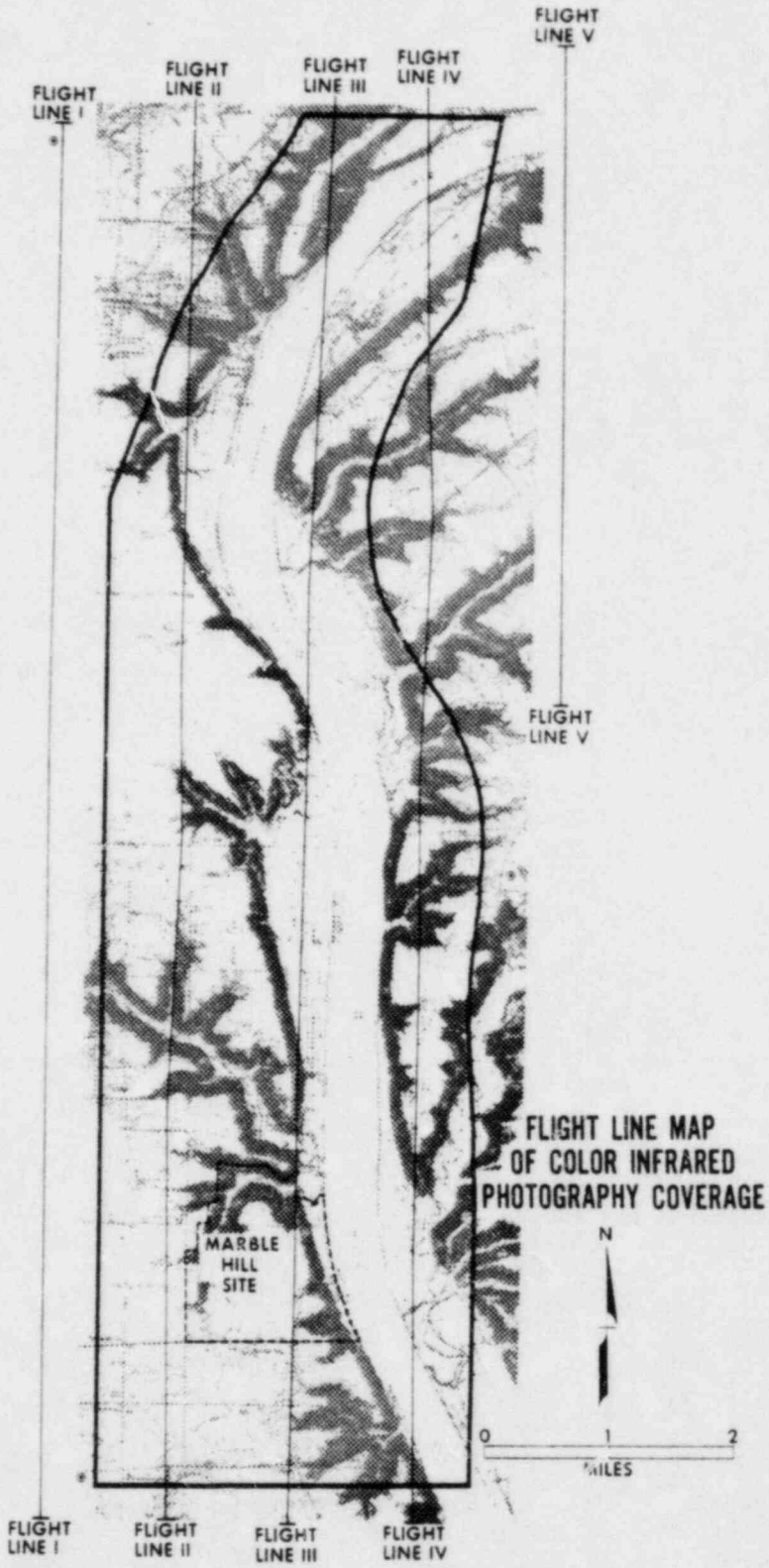


Figure II-1. Flight Line Map of Color Infrared Photography Coverage, June 1980

Cover type nomenclature corresponds with that presented in 1979 and 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 determined on the basis of predominant canopy species as indicated by composition 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).

The 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 dot sampling with a modified acreage grid (64 dots per square inch).

C. 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, and yellow as the loss of infrared 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 1979) were examined from CIR photographs and revisited during 1980 ground-truthing to monitor the status of each area.

Stressed areas of less than 5 acres were not field-checked, but locations were plotted on the photo overlays, assigned a reference number for monitoring purposes, and transferred to the vegetation cover type map.

D. VEGETATION SAMPLING AND ANALYSIS

Vegetation cover and condition were sampled by establishing duplicate permanent 100-square-meter quadrats 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 II-2. Direction from the cooling towers, proximity to the area of maximum salt deposition, and accessibility were considered in locating the permanent vegetation quadrats.

Duplicate circular nested plots were used to estimate vegetation cover by species in each representative unit. Figure II-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 II-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 subplot 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 1979 and during April and June 1980 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). Condition of orchard trees (cover type 10) was not recorded due to loss of access in April 1980.

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

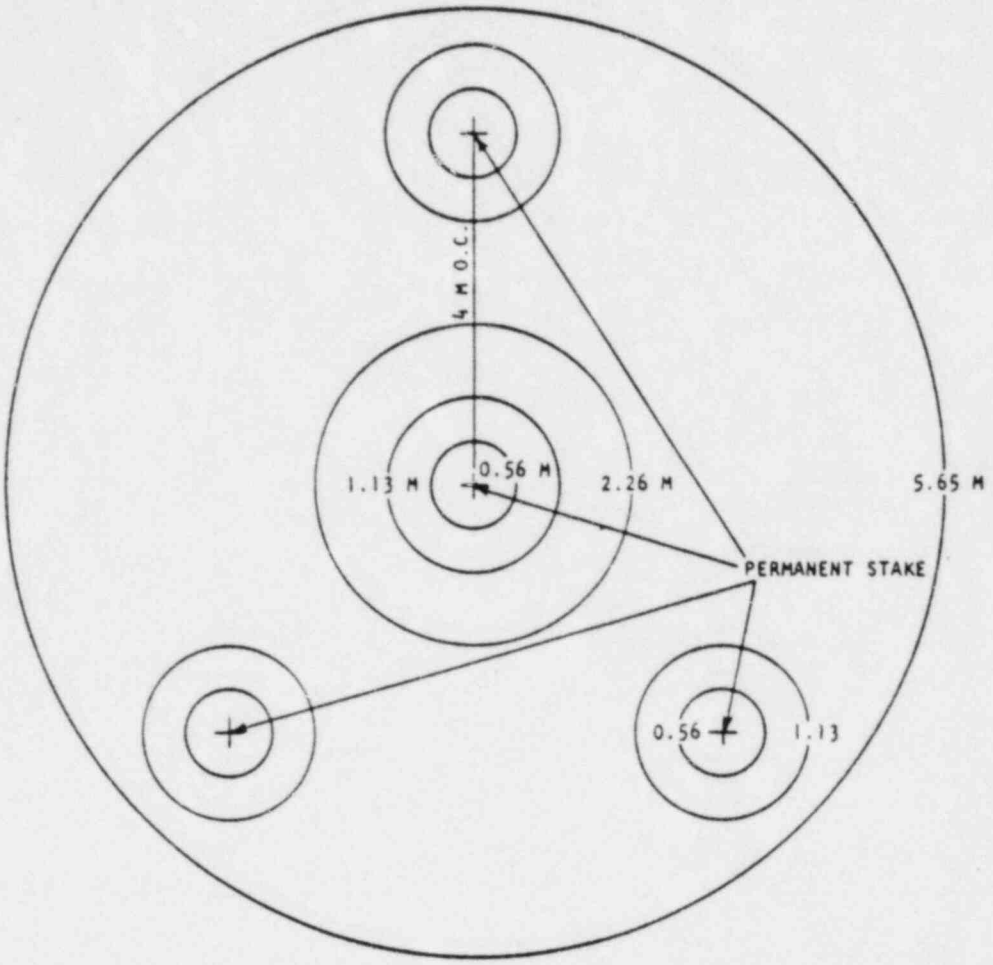


Figure II-3. Nested Circular Plots for Vegetation Sampling

Table II-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)

Diameters of saplings and trees (plot types 3 and 4) were individually measured in each of two plots per cover type during August 1979 and April 1980 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 II-2). Each individual was numbered with paint to facilitate recognition and identification of temporal change in apparent health or vigor (condition).

Table II-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 1979 and June 1980 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 August 1979 and April 1980 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:

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

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

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

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

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

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

E. SOIL SAMPLING AND ANALYSIS

Duplicate soil samples (0 to 15 centimeter depth) were collected from each permanent vegetation quadrat during August and October 1979 and April and June 1980. One set of duplicate soil samples was collected from each plot by excavation with a small hand trowel. These samples were placed in appropriately labeled whirlpacs, sealed, and returned to the Dallas laboratory for analysis of pH, conductivity, cation exchange capacity, and percent base saturation.

A second set of duplicate soil samples was collected from each plot for bulk density and soil moisture determinations; sample volume was measured using a sand displacement method (Rice 1968). Percentage 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:

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

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

Soil pH in water was determined by mixing equal portions, by weight, of soil and 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 potassium 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 was 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 III
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, and 1979-1980 sampling periods, quantitative and qualitative data were obtained and analyzed. This information will be used to characterize the present floristic and soil conditions in the Marble Hill study area. The data in this report primarily describe conditions in the 1979-1980 sampling period, although certain comparisons are made with previous sampling periods to better describe community dynamics.

During the 1979-1980 sampling period, 8 of the 15 map units (Table III-1) were sampled using permanent vegetation plots (map units 01, 02, 03, 04, 05, 06, 09, and 11). Changes in the estimated horizontal acreage of these types included clearing of about 6 acres of oak-maple and 5 acres of Virginia pine (Table III-1) for construction purposes. About 4 acres of unimproved pasture, which is not sampled, also were cleared for construction. This acreage now is designated for industrial use by the Marble Hill plant (Figure III-1). All of the land use changes were anticipated as part of the Marble Hill site development.

The distribution of vegetation cover types over the entire survey area is depicted in Figure III-2 (1:24,000 scale map located in the plastic pocket). 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. During the 1979-1980 sampling period, 128 plant taxa were observed in the sampling plots (Appendix Table A-1). Although plot sampling data varied from that of previous years, due to relocation of several plot centers where markers had been removed and establishment of two new sampling locations in the Virginia pine cover type (11) where original plots were displaced during construction, cover type characteristics were unchanged. Soil sampling on the Reed Orchard Company property was discontinued in April 1980.

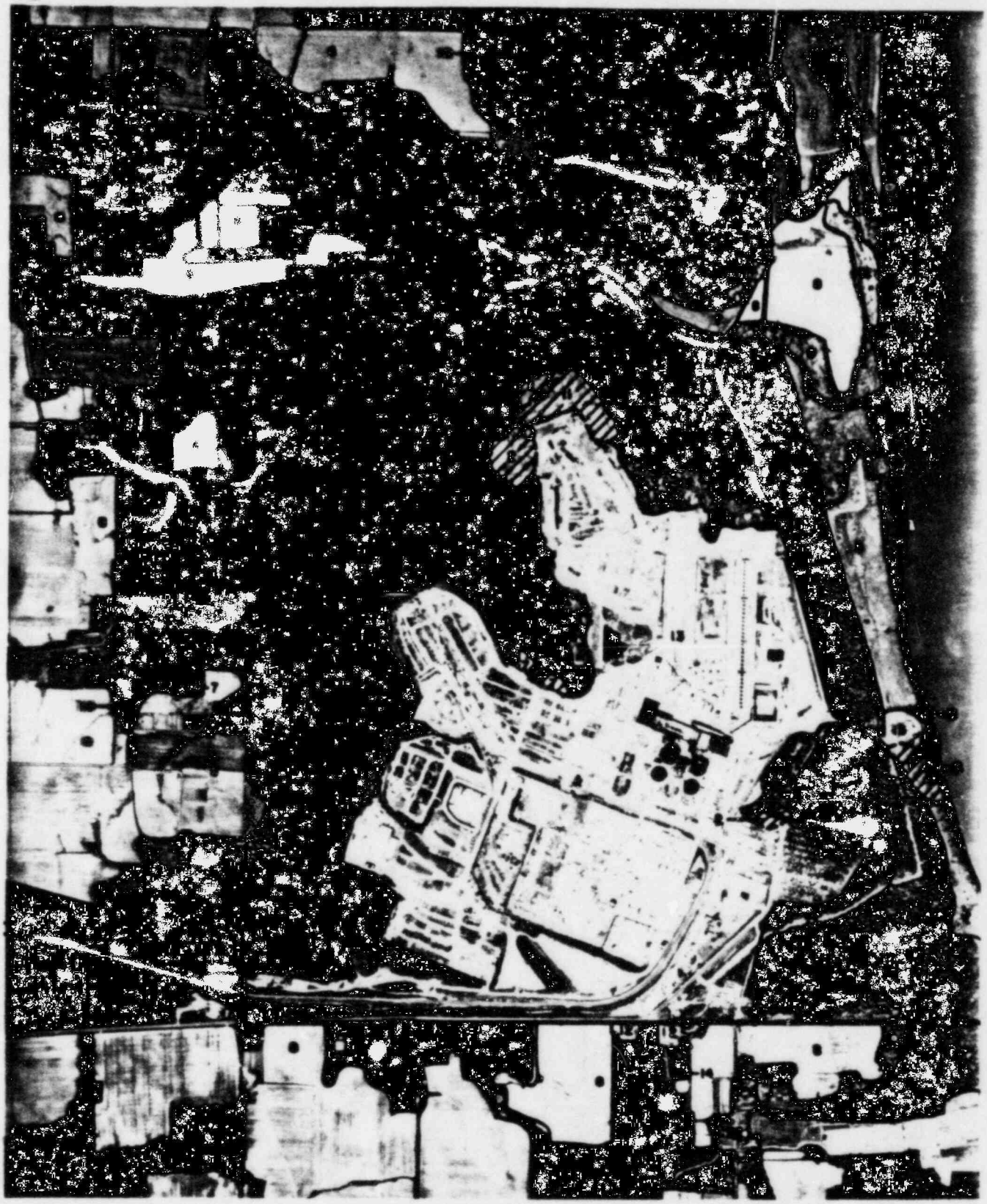


Figure III-1. Color Infrared Aerial Photography, Marble Hill Site Area, June 1980, Depicting Relationship of Construction Disturbance to June 1979 Vegetation Cover Types (Cross-Hatched Areas)

Table III-1

Estimated Horizontal Acreage for Each Vegetation Cover Type (Map Unit) June 1980, and On-Site Changes Due to Construction of Marble Hill Units 1 and 2

Map Unit	Land Use/Land Cover Type	Acreage	Percent of Total	Change in Acres from 1979
1	Maple-Basswood	611	3.6	–
2	Oak-Maple	2,106	12.3	-6
3	Chestnut oak	528	3.1	–
4	Red pine	16	0.1	–
5	Sycamore-Boxelder	596	3.5	–
6	Oak-Hickory	686	4.0	–
7	Unimproved pasture (includes scrubland)	2,735	16.0	-4
8	Cropland	5,162	30.2	–
9	Walnut-Hickory-Buckeye	660	3.9	–
10	Orchards	24	0.1	–
11	Virginia pine	185	1.1	-5
12	Residential/farmsteads	353	2.1	–
13	Industrial	528	3.1	+15
14	Water	2,883	16.9	–
15	Cemetery	1	0.0	–
	Total	17,074	100.0	

– = No change.

A. COVER TYPE ANALYSIS

1. Vegetation

A comparison of 1979-1980 values for total ground cover, vegetation cover, and litter cover for the four sampling periods shows that the June sampling period had the highest vegetation cover percentage and lowest litter cover percentage in all cover types except maple-basswood (Table III-2). Cover values from previous years indicate that this is a natural seasonal trend in which the highest vegetation cover percentage is present during the peak of the summer growing season.

The exception to this trend in the 1979-1980 sampling period — the maple-basswood cover type — had highest vegetation and litter cover in April. This variation is probably due to site characteristics of the cover type. Although the dense tree canopy shades and restricts the amount of herbaceous vegetation present in the summer, sparse and immature foliage allows growth of large populations of ephemerals in early spring. The litter cover is held in place by vegetation during spring, but is washed downslope during summer when herbaceous cover is inhibited. This exposes a greater proportion of bare ground and reduces total ground cover.

Table III-2

Mean ($\bar{x}$) and Standard Error (SE) of Cover Percentage for Vegetation, Litter, and Total Cover in Marble Hill Plots, 1976-1980

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	30.5	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	Chestnut 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	29.6	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	3.1	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.

Examination of the four-year means for vegetation, litter, and total cover shows that June and October generally have greater variation in vegetation and litter cover values than do April and September. This appears to be a phenomenon related to seasonal succession, which is influenced by weather and may vary from year to year. The general trend toward increased vegetation cover and decreased litter cover during October and June was less evident during 1979-1980, although a combination of seasonal variation and th relocation and establishment of new sample plots probably influenced this past year's sampling results. The effect of relocation is especially evident in the April and June sampling periods in the Virginia pine cover type, where an entirely new set of plots established in April 1980 showed a variation in cover from the original plots.

- Maple-Basswood (01)

The canopy dominants in this type remained sugar maple (Acer saccharum) and basswood (Tilia americana), and white ash (Fraxinus americana) and black walnut (Juglans nigra) were present as minor components (Table III-3). As in the past, saplings were sparsely distributed throughout the type and none occurred in the sample plots. All species in the tree stratum appeared healthy, and there was no new mortality.

Pawpaw (Asimina triloba) and two other species that has reached shrub classification were recorded in the shrub stratum (Table III-4). The newly recorded shrubs were sugar maple and yellow buckeye (Aesculus octandra).

Wild ginger (Asarum canadense), clearweed (Pilea pumila), late-flowering thoroughwort (Eupatorium serotinum), and sugar maple were the most important herbaceous species based on relative cover values over four samplings in this type (Table III-5). Vegetation cover values in April 1980 again were highest of the year with spring ephemerals, especially cut-leaved toothword (Dentaria lacinata) and spring beauty (Claytonia virginica), contributing most of the vegetative cover. The April sampling period also contained the greatest variety of herbaceous species, with 18 of the 27 taxa recorded in the type present.

Figure III-3 shows one of the sample plots in the maple-basswood cover type in June 1980. Note the relatively sparse understory vegetation and steeply sloping topography that is typical of this cover type.

Figure III-3. Maple-Basswood Sample Plot

Table III-3

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Maple-Basswood (01) Cover Type, 1979-1980

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 (02)

Sugar maple predominated in the tree stratum of this type while the dominance of the other tree species remained similar to that of previous samplings (Table III-6). A chestnut oak (Quercus prinus) that was reported dead in 1979 appears to be recovering. Other trees appeared to be healthy, except for a black cherry (Prunus serotina) that is diseased and may be dying.

Sugar maple remained the only component of the sapling stratum (Table III-6).

In the shrub startum, flowering dogwood (Cornus florida) remained the most important plant (Table III-4), followed by slippery elm (Ulmus rubra) and sugar maple.

As in previous years, black snakeroot (Sanicula trifoliata) was consistently the most important species in the herbaceous stratum (Table III-7). Other relatively important taxa included slippery elm, sugar maple, and Virginia creeper (Parthenscissus quinquefolia). Forty-one taxa were recorded from the herbaceous stratum sample plots during the sampling year.

During the June 1980 sampling period litter cover was noticeably disturbed, probably because of increased surface water run-off from areas disturbed by construction upslope. Although not apparent in the plots, some of the type's litter cover had been washed away exposing bare ground in several locations. The steepness of the slope in this cover type probably contributes to erosion problems.

Figure III-4 shows one of the plots in the oak-maple cover type in June 1980. Notice the greater number of saplings, shrubs, and herbaceous species compared to the maple-basswood cover type.

Table III-4

Species Composition, Frequency, Areal Cover, and Condition of the Shrub Stratum (Plot Type 2) by Cover Type, September and October 1979, and April and June 1980

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
Chestnut 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/ 5.6	–	–	–	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 prinus	Chestnut 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/ 2.6	–	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 III-4 (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/ 2.6	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 prinus	Chestnut 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 III-4 (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 III-5

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Maple-Basswood (01) Cover Type, 1979-1980

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/ 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/ 3.4	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	–
Maianthemum 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.

Figure III-4. Oak-Maple Sample Plot

Table III-6

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Oak-Maple (02) Cover Type, 1979-1980

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.

- Chestnut Oak (03)

Chestnut oak (Quercus prinus) remained dominant in the tree class of this type (Table III-8). White ash (Fraxinus americana) again was the second most numerous tree in the plots, because two individuals reported dead during the 1978-1979 sampling were still alive.

Many of the oaks within the sample plots were stressed from insect damage, and yellow buckeye saplings near the plots were infested with leaf blotch. Some of the eastern red-cedar trees, which are competing with hardwood species, were showing signs of suppression. The two eastern red-cedars in the sapling stratum are also showing signs of suppression, with portions of the branches dying back.

Twelve species were recorded for the shrub stratum, with eastern red-cedar, slippery elm, and hackberry (Celtis occidentalis) providing much of the areal cover (Table III-4).

Japanese honeysuckle (Lonicera japonica), an introduced weedy, twining vine, remained the most important herbaceous class species and continued to increase throughout the plots (Table III-9). This cover type contained more herbaceous taxa (45) than any other type.

A portion of the chestnut oak cover type is shown in Figure III-5. This type has a more open canopy than the other cover types, as evidenced by the presence of several shade-intolerant eastern red-cedars. Greater insolation is also ideal for Japanese honeysuckle and many other taxa that are characteristic of these plots. The chestnut oak type occurs on a rocky ridgetop site, which is susceptible to fire, insect outbreaks, and other natural disturbances, and many of its component species are characteristic of disturbed sites. Previous disturbances have produced various successional stages and the large variety of taxa noted in this type.

Table III-7

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Oak-Maple (02) Cover Type, 1979-1980

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
Sanguinaria 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.

Figure III-5. Chestnut Oak Sample Plot

Table III-8

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Chestnut Oak (03) Cover Type, 1979-1980

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	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 prinus	Chestnut 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 III-9

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Chestnut Oak (03) Cover Type, 1979-1980

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	2.8/ 1.1	–	–	1.3/ 3.3	1	–	–	1
Cercis canadensis	Eastern redbud	0.4/Tr	–	–	–	4.2/Tr	–	–	–	1	–	–	–
Circacea alpina	Northern enchanter's nightshade	–	–	0.1/0.4	–	–	–	1.4/ 3.6	–	–	–	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.

- Red Pine (04)

Red pine (Pinus resinosa) remained the predominant tree species during the 1979-1980 sampling (Table III-10). One red pine died during the 1979-1980 sampling period, but all remaining red pines appeared to be healthy as did other tree taxa in this cover type. Many of the red pines, although viable, were showing signs of being naturally suppressed by white pine (Pinus strobus). Red pine cannot tolerate competition from natural successors such as white pine, especially in the southern portion of its range (Fowells 1965). The continued decline of red pine indicates a successional trend toward a mixed white pine-deciduous hardwood stand.

Although the sapling stratum remained similar to that of the 1978-1979 sampling (Table III-10), the shrub stratum increased from 11 taxa to 19 taxa in 1979-1980 (Table III-4), giving the red pine cover type the largest variety of shrub taxa. Hardwood regeneration from sugar maple, white ash, and flowering dogwood accounted for much of the areal cover. The continued loss of red pines in the overstory appears to have increased hardwood regeneration and allowed establishment of less shade-tolerant taxa, including wild rose (Rosa sp.), wineberry (Rubus phoenicolasius), and other raspberry and blackberry species.

In the herbaceous stratum, Japanese honeysuckle was the most important of the 39 taxa observed in 1979-1980 (Table III-11).

Figure III-6 shows the red pine cover type in June 1980. In addition to stress from competition with white pine, many red pines were being covered by growth of muscadine vine (Vitis rotundifolia). The dense understory contains a comparatively large number of shrub and herbaceous taxa.

- Sycamore-Boxelder (05)

Little change occurred in the tree and sapling strata of this type, with sycamore (Platanus occidentalis) remaining the predominant canopy species (Table III-12). All trees were healthy except one diseased black cherry.

Figure III-6. Red Pine Sample Plot

Table III-10

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Red Pine (04) Cover Type, 1979-1980

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.

Table III-11

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Red Pine (04) Cover Type, 1979-1980

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/ 0.8	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/ 3.5	1/3	1	–	1

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

– Taxa not present.

Tr = trace.

Figure III-7. Sycamore-Boxelder Sample Plot

Table III-12

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Sycamore-Boxelder (05) Cover Type, 1979-1980

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	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.

Slippery elm and spicebush (Lindera benzoin) provided most of the areal cover in the shrub class (Table III-4).

Nine species unrecorded in previous sampling years and contributing only minor areal cover were observed in the herbaceous stratum (Table III-13). No single taxon was consistently most important, but lopseed (Phryma leptostachya), clearweed (Pilea pumila), late-flowering thoroughwort (Eupatorium serotinum), northern enchanter's nightshade (Circaea alpina), and sedge (Carex sp.) contributed most of the areal cover. Annual flooding, which is a natural occurrence in this cover type during spring runoff, has probably been responsible for introducing new herbaceous taxa in the type. Flooding undoubtedly will continue to influence species composition of these plots.

Figure III-7 shows one of the sample plots in the sycamore-boxelder cover type in June 1980.

- Oak-Hickory (06)

Ash predominated tree sampling plots in this cover type with white ash (Fraxinus americana), rather than blue ash (F. quadragulata) as was previously reported, being the more common species (Table III-14). Except for this correction, the tree and sapling sampling values remained similar to previous ones. All trees except Ohio buckeye (Aesculus glabra) appeared healthy, although slippery elm had exhibited some insect damage in the fall. Ohio buckeye was infested with leaf blotch.

In the shrub class, slippery elm and eastern redbud (Cercis canadensis) remained the more important species (Table III-4).

Thirty-six herbaceous-class species were observed (Table III-15); of these, seven were not recorded in previous sampling years. The highest vegetative ground cover values occurred in June, with April having the second-highest values. This varies somewhat from previous years, when large numbers of Virginia bluebells (Mertensia virginica) gave April the highest cover values. The 1979-1980 variation may be due in part to an increase in vine-like vegetation (e.g., Japanese honeysuckle, Virginia creeper), which is

Table III-13

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Sycamore-Boxelder (05) Cover Type, 1979-1980

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/ 6.7	–	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 laciniata	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/ 1.1	–	–	–	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	0.9/5.9	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	0.4/3.5	–	–	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	–	0.3/9.6	–	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.

less susceptible to water scouring on the steep slopes in this type. Secondly, the somewhat later development of the bluebells, which had not completely emerged during the April 1980 sampling, probably contributed to the higher June cover value. A portion of the oak-hickory cover type is shown in Figure III-8.

- Walnut-Hickory-Buckeye (09)

Shagbark hickory (Carya ovata) and black walnut (Juglans nigra) were the predominant overstory constituents in this type (Table III-16). Many of the overstory trees were unhealthy, with Ohio buckeye, shagbark hickory, and eastern redbud diseased and slippery elm and shagbark hickory showing insect injury. The black walnut seemed to be dying, but external signs of stress agents were not apparent.

Four species reached sapling class (Table III-16). These were yellow buckeye, white ash, blue ash, and chestnut oak.

The shrub stratum contained 15 species (Table III-4); as in the past, sugar maple, pawpaw, white ash, blue ash, and Japanese honeysuckle contributed most of the cover.

The herbaceous stratum contained 38 species, which was the same number present in the 1978-1979 sampling (Table III-17). Japanese honeysuckle, which continues to increase in the plots, was the most important species.

Figure III-9 shows one of the study plots in the walnut-hickory-buckeye cover type in June 1980. Note the dense understory, a large portion of which is Japanese honeysuckle.

- Virginia Pine (11)

Loss of the original study plots to expanded construction necessitated establishment of new plots in the Virginia pine cover type in April 1980. Since the new plots are located near the original plots, much of the data are similar and applicable to general characterization of the cover type. However, specific components of the new study plots vary and direct comparisons of numbers and sizes of species are not applicable.

Figure III-8. Oak-Hickory Sample Plot

Table III-14

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Oak-Hickory (06) Cover Type, 1979-1980

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.

Table III-15

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Oak-Hickory (06) Cover Type, 1979-1980

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	–	–	0.5/10.3	–	–	–	5.7/25.4	–	–	–	1	–
Eupatorium serotinum	Late-flowering thoroughwort	0.9/6.1	0.9/5.9	–	–	18.5/22.6	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	–	–	–	5.7/ 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	–	–	5.7/ 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/ 3.9	2.7/ 8.3	4.1/12.8	–	1.8/ 6.7	1	8	–	1

* 1 = healthy, 8 = dormant.

– Taxa not present.

Tr = trace.

Figure III-9. Walnut-Hickory-Buckeye Sample Plot

Table III-16

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Walnut-Hickory-Buckeye (09) Cover Type, 1979-1980

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.

Table III-17

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Walnut-Hickory-Buckeye (09) Cover Type, 1979-1980

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/ 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	0.5/ 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	3.6/ 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.

Figure III-10. Virginia Pine Sample Plot

Table III-18

Species Composition, Frequency, Basal Area, and Condition of Tree and Sapling Strata (Plot Types 4 and 3), Virginia Pine (11) Cover Type, April and June 1980*

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.

Virginia pine (Pinus virginiana) was predominant in the tree stratum (Table III-18). In the sapling class, four flowering dogwoods dominated, and a single sweetgum (Liquidambar styraciflua) also was present. All trees and saplings appeared to be healthy except one eastern red-cedar that was severely suppressed and apparently has died.

Seven shrub species were present, with black cherry and sweetgum as the most important taxa (Table III-4).

In the herbaceous class, 22 taxa were recorded (Table III-19). Japanese honeysuckle was the most important species, and sweet cicely (Osmorhiza claytoni) and Virginia creeper were major contributors to the total cover.

Figure III-10 shows a newly established study plot in the Virginia pine cover type in June 1980.

- Orchard (10)

An examination of the apple and peach plantings on the Reed Orchard Company property was discontinued due to loss of access in spring 1980.

2. Soils

- Moisture

Seasonal soil moisture fluctuations within each cover type were similar to cycles noted in previous years: April and October values generally were higher than those of September and June (Table III-20). Soil moisture content of the cover types generally was consistent with that of previous years, with the maple-basswood, walnut-hickory-buckeye, oak-maple, and chestnut oak types exhibiting highest values.

- Bulk Density

Bulk density values (Table III-21) supported the previous observation that those soils on the site with greater moisture holding capacity have lower bulk densities. The most compact soils, and those with lowest moisture

Table III-19

Species Composition, Frequency, Areal Cover, and Condition of Herbaceous Stratum (Plot Type 1), Virginia Pine (i1) Cover Type, April and June i980

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.i	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/ i.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	6.3/19.8	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/i.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.

capacity, appear to be associated with the orchard, red pine, sycamore-box-elder, oak-hickory, and Virginia pine cover types.

Table III-20

Mean ($\bar{x}$) and Standard Error (SE)* Values for Soil Moisture (%) for Each Vegetation Cover Type, September and October 1979, and April and June 1980

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
Chestnut 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.

- pH

As in the past, soil pH appeared lower during September and October sampling periods than during April and June (Table III-22). With the exception of the Virginia pine cover type in June, this applied to pine cover types as well as the hardwoods cover types. Values ranged from 5.2 in the Virginia pine cover type to 7.4 in the oak-hickory cover type. Although pH values overall were lower than those recorded during 1978-1979, the lowest and highest values again were recorded from these two cover types. The range of pH values noted during all monitoring periods (1976-1980) generally is within that common for humid region mineral soils – 5.0 to above 7 (Buckman and Brady 1969).

Table III-21

Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil Bulk Density (g/cm^3) for Vegetation Type, September and October 1979, and April and June 1980

Cover Type	Code	Sep 1979		Oct 1979		Arp 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
Chestnut 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 III-22

Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil pH** for Each Vegetation Type, September and October 1979, and April and June 1980

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
Chestnut 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.

- Conductivity

Soil conductivity values, indicative of soil salinity, were lowest during the June 1980 sampling period (Table III-23), as they generally were during the June 1979 sampling period. Except for the June 1980 values, 1979-1980 soil conductivities were higher than those of previous years. Highest values, ranging from 752 to 1625 micromhos/cm, were recorded during September 1979 in each cover type except chestnut oak. Highest value in the chestnut oak type was 673 micromhos/cm, recorded in April 1980. As in the past, the highest value of the sampling year was recorded for the orchard cover type, where fertilizers probably are applied.

Table III-23

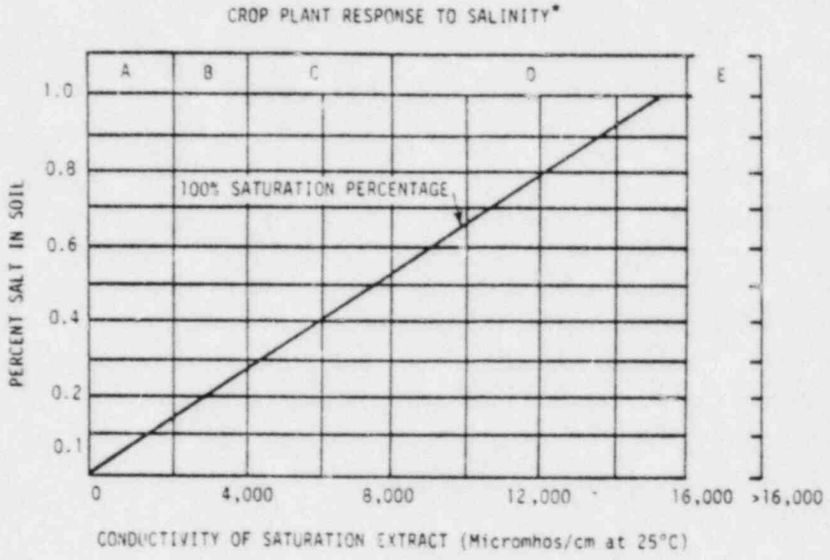
Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil Conductivity (μmho/cm) for Each Vegetation Cover Type, September and October 1979, and April and June 1980

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
Chestnut 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.

Recorded conductivity values, although higher, were within the range of neglible 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/cm usually have little or no effects on plants (Figure III-11); 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 III-24, the highest mean



*A. Negligible Effects on Yields
B. Restricted Yields of Only Very Sensitive Crops
C. Restricted Yields of Many Crops
D. Restricted Yields of All but Tolerant Crops
E. Satisfactory Yield of Only a Few very Tolerant Crops

Figure III-11. Relation of the Percent Salt in Soil to Electrical Conductivity of the Saturation Extract to Crop Response in the Conductivity Ranges (Designated by Letters A, B, C, D, E). (These ranges are related to crop response by salinity scale, after Richards 1954, p. 9).

Table III-24

1979-1980 Mean Values ($\bar{x}$) and Standard Error (SE) for Soil Moisture and Conductivity, with Yearly Rankings for Each Cover Type

		Soil Moisture (%)					Soil Conductivity (umho/cm at 25°C)					
Cover Type	Code	$\bar{x}$	SE	Rank 1979-1980	Rank 1978-1979	Rank 1977-1978	$\bar{x}$	SE	Rank 1979-1980	Rank 1978-1979	Rank 1977-1978	Maximum Single Value 1979-1980
Maple-Basswood	01	35.6	1.6	1	1	1	506	177	3	3	1	990 (Sep)
Oak-Maple	02	31.1	2.1	3	3	3	578	132	7	6	7	756 (Sep)
Chestnut oak	03	29.9	2.6	4	4	4	530	116	9	4	5	673 (Apr)
Red pine	04	23.7	2.0	8	6	6	475	104	8	8	8	752 (Sep)
Sycamore-Boxelder	05	26.4	1.1	5	5	7	623	148	6	7	6	890 (Sep)
Oak-Hickory	06	23.8	2.8	7	7	5	568	148	4	2	3	927 (Sep)
Walnut-Hickory-Buckeye	09	35.2	2.3	2	2	2	697	285	2	5	4	1458 (Sep)
Orchard**	10	21.1	1.0	9	8	8	1394	163	1	1	2	1625 (Sep)
Virginia pine	11	24.8	2.8	6	9	9	496	191	5	9	9	895 (Sep)

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

**Data collection terminated after October 1979.

electrical conductivity value for cover types sampled through the sampling year was 697 micromhos/cm in the walnut-hickory-buckeye 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 in the range reported as having a neglible effect on vegetation production.

- Cation Exchange Capacity and Base Saturation Percentage

Soils associated with the maple-basswood, oak-maple, chestnut-oak, oak-hickory, and walnut-hickory-buckeye cover types again exhibited the highest cation exchange values (Table III-25). As in the past, the highest cation exchange values were recorded in cover types having highest soil moisture values.

Seasonal trends in cation exchange capacity within the cover types are not apparent from the monitoring data, except for the possibility of lower values during June. Patterns for soil base saturation (Table III-26) were similar to those for cation exchange capacities.

Table III-25

Mean ($\bar{x}$) and Standard Error (SE) Values* for Soil Cation Exchange Capacity (meq/100 g) for Each Vegetation Cover Type, September and October 1979, and April and June 1980

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
Chestnut 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.

Table III-26

Mean ($\bar{x}$) and Standard Error (SE) Values* for Base Saturation (%) for Each Vegetation Cover Type, September and October 1979, and April and June 1980

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
Chestnut 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.

B. VEGETATION STRESS

June 1980 CIR photography revealed 155 discrete areas of vegetation stress (Figure III-2). The 64 areas less than 5 acres in extent are listed by cover type and location in Table III-27. These small areas consisted of several individuals or small stands that were moderately to severely affected by the various stress agents. Due to the widespread presence of locust leaf miner (Chalepus dorsalis) on black locust (Robinia pseudoacacia) and to a lesser extent, of leaf blotch (Guignardia aesculi) on buckeyes (Aesculus spp.), areas that appeared to have less than moderate infestations were not mapped. Thus, it was not feasible to record scattered individuals, and the extent of infestation of the locust leaf miner was greater than indicated on the map.

The majority of the stress areas less than 5 acres in size were produced by natural causal agents, especially locust leaf miner. However, a few man-induced stress areas were apparent in the Marble Hill construction area, primarily where road construction occurred on steeply sloping sites. In these locations, trees were stressed from erosion on the uphill side of the road and compaction and fill on the downhill side. Several of the trees showing stress from road compaction and fill over their root systems were sugar maples, which tend to have a shallow and wide-spreading root system

Table III-27

Cover Type, Location, and Causal Agent of Vegetation Stress Areas Covering Less Than 5 Acres within Marble Hill Survey Area, July 1980

Cover Type	Location*	No. of Stress Areas	Species	Causal Agent	Extent
5	1C	1	Black locust	Locust leaf miner	Moderate
2	2B	1	Black locust	Locust leaf miner	Moderate
9	2B	1	Black locust	Locust leaf miner	Moderate
9	2B	2	Black locust	Locust leaf miner	Severe
5	2B	1	Sycamore	Streambank erosion	Moderate
9	3A	1	Black locust	Locust leaf miner	Moderate
9	3B	2	Black locust	Locust leaf miner	Moderate
12	3B	1	Silver maple, black walnut	Streambank erosion	Severe
5	3C	1	American elm	Dutch elm disease	Severe
6	3C	1	Black locust	Locust leaf miner	Moderate
2	3C	4	Black locust	Locust leaf miner	Severe
9	4A	1	Black locust	Locust leaf miner	Moderate
2	4A	1	Black locust	Locust leaf miner	Moderate
1	4A	1	Black locust	Locust leaf miner	Moderate
2	4B	1	Black locust	Locust leaf miner	Moderate
9	4C	3	Black locust	Locust leaf miner	Severe
2	5A	1	Black locust	Locust leaf miner	Moderate
5	5C	1	Silver maple	Undetermined	None visual
2	6A	1	Black locust	Locust leaf miner	Moderate
1	6B	1	Black locust	Locust leaf miner	Moderate
1	6B	1	Black locust	Locust leaf miner	Moderate
5	6C	1	Silver maple	Streambank erosion	Severe
2	6D	1	Black locust	Locust leaf miner	Moderate
2	7D	1	Black locust	Locust leaf miner	Moderate
2	8B	2	Black locust	Locust leaf miner	Severe
1	8B	1	Black locust	Locust leaf miner	Moderate
6	8C	1	Black locust	Locust leaf miner	Moderate
9	8D	1	Black locust	Locust leaf miner	Severe
			Yellow buckeye	Leaf blotch	Moderate
7	9A	1	Black locust	Locust leaf miner	Moderate
2	9B	2	Black locust	Locust leaf miner	Severe
5	9C	3	Black locust	Locust leaf miner	Severe
2	10A	1	Black locust	Locust leaf miner	Severe
12	10A	1	Black locust	Locust leaf miner	Severe
13	10B	1	Chestnut oak	Oak wilt	Moderate
13	10C	1	Silver maple, slippery elm	Mechanical injury and secondary infection	Moderate
13	10C	1	Black locust	Locust leaf miner	Severe
6	10C	1	Black locust	Locust leaf miner	Moderate
1	10C	1	Maple, ash, basswood	Erosion (due to road construction)	Severe
1	10C	1	Sugar maple	Compaction (due to road construction)	Moderate
1	10C	1	Sugar maple, black walnut	Compaction (due to road construction)	Moderate
1	10C	1	Yellow Buckeye	Leaf blotch	Moderate
			Black locust	Locust leaf miner	Moderate
2	11A	3	Black locust	Locust leaf miner	Moderate
2	11B	3	Black locust	Locust leaf miner	Severe
2	11C	4	Black locust	Locust leaf miner	Severe
3	11C	2	Black locust	Locust leaf miner	Severe

*Keyed to location grid on vegetation cover type map (Figure III-2).

Table III-28

Cover Type, Location, and Causal Agent of Vegetation Stress Areas Greater Than or Equal to 5 Acres within Marble Hill Survey Area, July 1980

Cover Type	Location*	No. of Stress Areas	Species	Causal Agent	Extent
9	1C	2	Black locust	Locust leaf miner	Severe
5	1C	2	Black locust	Locust leaf miner	Severe
9	2B	1	Black locust	Locust leaf miner	Severe
5	2B	2	Black locust	Locust leaf miner	Moderate
9	2B	2	Black locust	Locust leaf miner	Severe
5	2C	3	Black locust	Locust leaf miner	Severe
5,3	3A	1	Black locust	Locust leaf miner	Moderate
5,9	3A	3	Ohio buckeye	Leaf blotch	Moderate
			Black locust	Locust leaf miner	Severe
			Various species	Road construction	Limited
6,7	3B	2	Silver maple, black walnut	Streambank erosion	Severe
			Black locust	Locust leaf miner	Moderate
2	4A	4	Black locust	Locust leaf miner	Severe
2	4A	1	Black walnut	Undetermined	None visual
1	4A	1	Black locust	Locust leaf miner	Moderate
1	4B	1	Black locust	Locust leaf miner	Moderate
5	4B	1	Black locust	Locust leaf miner	Moderate
9	4C	1	Black locust	Locust leaf miner	Moderate
9	4C	1	Black locust	Locust leaf miner	Moderate
			Ohio buckeye	Leaf blotch	Moderate
1	5B	2	Black locust	Locust leaf miner	Moderate
1	5B	1	Black locust, Ohio buckeye	Locust leaf miner, leaf blotch	Moderate
9	5C	1	Black locust, Ohio buckeye	Locust leaf miner, leaf blotch	Moderate
5	5C	1	Black locust	Locust leaf miner	Moderate
2	6A	1	Black locust	Locust leaf miner	Severe
2	6B	4	Black locust	Locust leaf miner	Severe
1	6B	1	Black locust	Locust leaf miner	Moderate
5	6B	1	Black locust	Locust leaf miner	Moderate
5	6C	1	Black locust	Locust leaf miner	Severe
9	6C	1	Black locust	Locust leaf miner	Moderate
6	6C	1	Black locust, oaks	Locust leaf miner, caterpillars	Moderate
2	6D	1	Black locust	Locust leaf miner	Moderate
2	7B	1	Black locust	Locust leaf miner	Moderate
5,8	7C	4	Black locust	Locust leaf miner	Severe
			Silver maple, black walnut, sycamore	Streambank erosion	Severe
5,6	7C	1	Black locust	Locust leaf miner	Severe
			Sycamore, silver maple	Streambank erosion	Severe
11	8B	1	Red pine	General decline	Moderate
2	8B	1	Black locust	Locust leaf miner	Moderate
3	8B	1	Black locust	Locust leaf miner	Moderate
5	8C	1	Silver maple	Streambank erosion	Moderate
8	8C	1	Silver maple, black locust	Streambank erosion, locust leaf miner	Moderate
3	9B	2	Black locust	Locust leaf miner	Moderate
			Chestnut oak, black oak	Caterpillars	Severe
			Ohio buckeye	Leaf blotch	Severe
2	9B	2	Black locust	Locust leaf miner	Moderate
11,2	9B	1	Black locust	Locust leaf miner	Moderate
			Chestnut oak, sugar maple	Caterpillars	Moderate
			Virginia pine	Mechanical injury	Severe
5	9B	1	Black locust	Locust leaf miner	Severe
5	9C	1	Black locust	Locust leaf miner	Severe
6	9C	1	Black locust	Locust leaf miner	Moderate
			Yellow buckeye	Leaf blotch	Moderate
			Black walnut	Undetermined	None visual
2	10B	6	Black locust	Locust leaf miner	Moderate
2	10B	2	Basswood, oaks	Caterpillars	Moderate
2	10B	2	White oak, ash	Compaction, mechanical injury	Severe
		2	Redbud, chestnut oak	Caterpillars	Moderate
			Black locust	Locust leaf miner	Moderate
11	10B	1	Black locust	Locust leaf miner	Moderate
			Black walnut	Undetermined	Moderate
4	10B	1	Red pine	General decline	Severe
5	10C	1	Silver maple, sycamore	Undetermined	None visual
6	10C	2	Black locust	Locust leaf miner	Moderate
			Yellow buckeye	Leaf blotch	Moderate
2	11A	1	Black locust	Locust leaf miner	Severe
2	11B	1	Black locust	Locust leaf miner	Moderate
2	11B	6	Black locust	Locust leaf miner	Severe
5	11C	1	Black locust	Locust leaf miner	Moderate
			Silver maple	Streambank erosion	Moderate
2	12B	1	Black locust	Locust leaf miner	Moderate
3	12C	1	Black locust	Locust leaf miner	Moderate

*Keyed to location grid on vegetation cover type map (Figure III-2).

(Harlow and Harrar 1969). Such stress is related to construction activities on the site and is expected to be restricted to the site by ongoing erosion control practices.

Stress areas greater than or equal to 5 acres are summarized by cover type, location, causal agent, and extent in Table III-28. Ninety-one areas were delineated, and most (83) were affected by the locust leaf miner as the primary or contributing stress agent. As in 1978-1979 (TI 1979), this beetle was present in nearly all stands of black locust making it the primary stress factor on vegetation in the study area. Figure III-12 shows a black locust with leaf miner symptoms and Figure III-13 gives a close-up of the mottling of the leaf surface on an infested tree

In the chestnut oak (3), oak-hickory (6), and walnut-hickory-buckeye (9) cover types, many of the Ohio buckeyes and yellow buckeyes were infested with leaf blotch. This disease, caused by the fungus Guignardia aesculi, produces irregular reddish-brown blotches with narrow, yellowish margins on the leaves (Carter 1964). In slight infestations, the dark blotches may be small and confined to interveinal or marginal tissue. In moderate to severe infestations, the dark blotches cover the leaf surface including the veins and midrib. Yellowing of the entire leaf and early senescence often accompany the severe infestations. If this occurs over several successive years, growth of these trees may be stunted. Generally, fungus infestation appeared less severe than in 1979, although scattered buckeyes, especially in the oak-hickory and walnut-hickory-buckeye cover types, exhibited severe infestation symptoms. Buckeye leaf blotch as well as the locust leaf miner have been observed in the study area since the 1978 sampling.

Moderate infestation of the lace bug (Corythucha ciliata) noted among sycamores in 1979, appeared to be lessening. However, erosion of the Ohio River bank apparently was affecting many of the sycamores along the river. Other tree species observed to be under stress along the streambank included black walnut, silver maple, and black locust (although most black locust were also suffering from leaf miner infestation).

Figure III-12. Black Locust Infested with Locust Leaf Minor

Figure III-13. Symptoms of Locust Leaf Minor Damage on Leaf Surface of Black Locust

On the Marble Hill construction site, vegetation stress was caused by several natural and man-induced factors. The locust leaf miner was common, especially along the eastern and western perimeters. Other insect damage was noted among oaks, basswood, and redbud on the northern and western perimeters. Natural suppression also was apparent, with continuing decline of red pine in area 10B due to competition with white pine.

Expansion of lay-down areas caused stress on adjacent trees with mechanical injury, soil compaction, and filling around trees being the primary factors involved. Brush piling to provide wildlife habitat in accordance with PSI's FES permit caused stress in otherwise undisturbed tree stands; most of this type of stress, which should be temporary, was observed along the northern perimeter in the Virginia pine cover type and along the western perimeter in the oak-maple cover type where oaks were affected. Several oaks along a drainage ditch at the base of a fill slope on the western edge of the construction area had died or were under stress from water-damaged root systems. All of the man-induced stress problems were related to construction and restricted to areas within the Marble Hill site boundaries. Such vegetation stress is expected and probably will continue to be observed during construction, since stress due to mechanical disturbance is often slow to appear and may be followed by secondary infestations of the already weakened trees.

SECTION IV

SUMMARY

During the Marble Hill monitoring period, extending from May 1976 to June 1980, several vegetation trends have become apparent, and expected ranges of soil parameters likely have been established. Predominant tree species generally have remained consistent in the cover types studied and sapling stratum species have been characteristic of these types. Annual herbaceous cover and litter cycles indicate that greatest total ground cover occurs in June and October. Natural changes in species composition occur mainly from invasion and suppression. Soil parameters, although exhibiting wide ranges in some instances, are within levels generally tolerable by most plant species.

Most vegetation stress noted in the study area continues to be related to natural causes, with the locust leaf miner presently the primary stress agent. However, as expected, expanded construction in the past year has contributed to man-induced stress, especially that related to mechanical injury, soil compaction, and filling. All of the stress due to construction is confined to the Marble Hill site. Leaf blotch, a fungal disease, remained the second-most important natural stress agent, as in the 1978-1979 sampling year.

Consistent sampling was disrupted in two of the study area's cover types during the 1979-1980 sampling year. All original vegetation sample plots were displaced in the Virginia pine cover type and new ones had to be established in April 1980, and soil sampling was discontinued on the Reed Orchard Company property after the October 1979 sampling.

SECTION V

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APPENDIX A

PLANT TAXA PRESENT IN SAMPLED COVER TYPES, SEPTEMBER 1976 THROUGH JUNE 1980

Table A-1

Plant Taxa Present in Sampled Cover Types, September 1976 through June 1980

Scientific Name	Common Name	Cover Type 01	02	03	04	05	06	09	11*
Acer negundo	Boxelder					x		x	
Acer rubrum	Red maple				o				o
Acer saccharum	Sugar maple	x	x	x	x	-	-	x	x
Actea rubra	Red baneberry		-	-	-		-		
Actinomeris alternifolia	Wingstem			x		x	-	x	-
Aesculus glabra	Ohio buckeye					-	-	x	
Aesculus octandra	Yellow buckeye	x	x	-		o	o		
Allium canadense	Wild garlic		x	x			-	-	-
Amaranthus sp.	Pigweed					-	-		
Ambrosia artemisiifolia	Common ragweed				-				
Anemone canadensis	Canada anemone						-	x	
Anemone quinquefolia	Wood anemone		-	-			-		
Anemone virginica	Thimbleweed			-					
Anemonella thalictroides	Rue anemone	-	x	x			-		
Arabis laevigata	Smooth rockcress		-	-				-	
Aralia spinosa	Hercules-club		-						
Arisaema atrorubens	Jack-in-the-pulpit	-	-			-			
Arisaema triphyllum	Small jack-in-the-pulpit	o					o		
Asarum canadense	Wild ginger	x				o	-		
Asimina triloba	Pawpaw	x						x	
Asplenium platyneuron	Ebony spleenwort								-
Aster sp.	Aster		-		-	-			
Aster azureus	Azure aster		-	-			-	-	
Aster divaricatus	White wood aster		x			-			
Bidens sp.	Beggar's ticks					-			
Boehmeria cylindrica	False nettle	-	-		-	o		-	
Botrychium virginianum	Virginia grape-fern		x						-
Bryophyta	Mosses								-
Bumellia lanuginosa	Chittamwood						-		
Campsis radicans	Trumpet vine								-
Cardamine douglassii	Purple cress					o	x	-	
Carex laeseii	Little prickly sedge								-
Carex swanii	Swan's sedge								-
Carex sp.	Sedge		x	x	x	x	x	x	
Carpinus caroliniana	Blue-beech	-	x						
Carya sp.	Hickory				o			-	
Carya cordiformis	Bitternut hickory	-	-				-	x	-
Carya ovata	Shagbark hickory							x	
Caryophyllaceae	Chickweed				o				
Catalpa speciosa	Northern catalpa						x		
Celtis occidentalis	Hackberry		x	x	o	x		-	
Cercis canadensis	Eastern redbud		x	x	x		x	x	-
Circaea alpina	Small enchanter's nightshade	x	-	o	x	x	x	x	
Claytonia virginica	Spring-beauty	x	-			x			
Clematis viorna	Leather flower		-	x					
Commelina virginica	Dayflower					x	-		
Compositae	Composite							-	-
Convolvulus sp.	Bindweed							-	
Cornus florida	Flowering dogwood		x	-	x	x	-		x
Cornus priceae	Miss Price's dogwood						x		
Corydalis flavula	Yellow fumewort					o			
Cruciferae	Mustard				x				
Cryptotaenia canadensis	Honewort					-			
Cynanchum laeve	Milk vine			o					
Delphinium tricorne	Dwarf larkspur	o	x	-			x		
Dentaria laciniata	Cut-leaved toothwort	x	x	-	x	x	x	x	
Desmodium glutinosum	Pointed-leaved tick-trefoil		-						
Desmodium paniculatum	Panicled tick-trefoil		o		o				-
Dicentra sp.	Bleeding heart								-
Dicentra cucullaria	Dutchman's breeches	o	x				-	o	
Dioscorea quaternata	Wild yam		o		o	o			o
Dioscorea villosa	Wild yam	-	-	x					-
Diospyros virginiana	Persimmon		-	o					-

x – Observed during 1979-1980 sampling.
o – Newly recorded during 1979-1980 sampling.
- – Observed during monitoring period, but not during 1979-1980 sampling.
* – New plots established in April 1980.

Table A-1 (Contd)

Scientific Name	Common Name	Cover Type 01	02	03	04	05	06	09	11*
Elymus virginicus	Virginia wild-rye		x	x		x			-
Erigenia bulbosa	Harbinger-of-spring	-	-			-		-	
Erigeron sp.	Daisy fleabane				-	o			
Erythronium albidum	White trout-lily						x		
Erythronium americanum	Adder's-tongue		-						
Euonymous americanus	American strawberry-bush						-		
Eupatorium maculatum	Spotted joe-pye-weed			x					
Eupatorium serotinum	Late-flowering thoroughwort	x			x	x	x	x	-
Eupatorium sp.	Thoroughwort		x						
Fagus grandifolia	American beech	-	x		x				x
Fragaria virginiana	Wild strawberry		o		-	-			x
Fraxinus americana	White ash	x	x	x	x	o	x	x	x
Fraxinus quadrangulata	Blue ash		x	x	-		x	x	-
Galium aparine	Cleavers	o	o		o	o	o	-	
Galium asprellum	Rough bedstraw				x				
Galium boreale	Northern bedstraw	-	x						
Galium circaezans	White wild licorice		x	x	x	x	x		x
Galium pilosum	Hairy bedstraw			o					o
Galium triflorum	Fragrant bedstraw	-	-		-	-		x	x
Geum canadense	Canadian avens		x	-	x	x	x	x	-
Glechoma hederacea	Gill-over-the-ground	-					-	x	
Gleditsia triacanthos	Honey locust						-	-	
Goodyera sp.	Rattlesnake plantain				-				
Gymnocladus dioica	Kentucky coffee-tree						-	-	
Hamamelis virginiana	Witch-hazel								-
Helianthus sp.	Sunflower			x				-	
Hemerocallis fulva	Day-lily	-							
Heuchera americana	Heuchera							-	
Hieracium sp.	Hawkweed			o	o				
Hydrophyllum appendiculatum	Appendaged water leaf		-				-	-	
Hypericum sp.	St. John's-wort					o			
Hystrix patula	Bottlebrush		x	-		-	x		
Impatiens biflora	Jewelweed					x			
Impatiens pallida	Yellow jewelweed	-	-		-	x			
Iris cristata	Wild iris		o						
Jeffersonia diphylla	Twinleaf		x	x		-			-
Juglans nigra	Black walnut	x				x		x	
Juniperus virginiana	Eastern red-cedar	-	x	x	-		-	-	x
Krigia sp.	Dwarf dandelion			-					
Lactua sp.	Lettuce			-					
Laportea canadensis	Wood nettle					x			
Leptostaycha sp.	Mint			-					
Liliaceae	Lily		-						
Lindera benzoin	Spicebush	-	-	-		x		x	
Liriodendron tulipifera	Yellow poplar		-		x				x
Liquidambar styraciflua	Sweetgum								o
Lonicera japonica	Japanese honeysuckle			x	x		x	x	x
Lonicera tatarica	Tartarian honeysuckle								-
Luzula multiflora	Woodrush								-
Maianthemum canadense	Canada mayflower	x		-					
Mertensia virginica	Virginia bluebell						x		
Muhlenbergia sobolifera	Muhly grass			-	-		x		
Monocotyledoneae	Monocot	o			o		o	o	
Neptea catarica	Catnip						-		
Oenothera sp.	Evening primrose			-					
Osmorhiza claytonii	White snakeroot		-			x			x
Ostrya virginiana	Ironwood		x	x					
Oxalis stricta	Yellow wood-sorrel								o

Table A-1 (Contd)

Scientific Name	Common Name	Cover Type 01	02	03	04	05	06	09	11*
Panicum boscii	Bosc's panicum		o	-	-				-
Panicum clandestinum	Corn grass			-		-			-
Parietaria pensylvanica	Pellitory							o	
Parthenocissus quinquefolia	Virginia creeper	x	x	x	x	x	x	x	x
Passiflora lutea	Yellow passion-flower			-					
Phryma leptostachya	Lopseed	x	x		x				-
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		o	o	o	o	o		o
Podophyllum peltatum	Mayapple					-			-
Polygonatum biflorum	Solomon's seal			x			-		
Polygonum cespitosum	Long-bristled smartweed					x			
Potentilla sp.	Cinquefoil	o	o	o	o	o	o	o	o
Prunus serotina	Black cherry		x	x	x	x	o	x	x
Prunus virginiana	Choke cherry							-	
Quercus coccinea	Scarlet oak		-						
Quercus falcata	Southern red oak		-						
Quercus palustris	Pin oak		-						
Quercus prinus	Chestnut oak		x	x	x	-	-	x	x
Quercus rubra	Northern red oak			x			x		-
Quercus velutina	Black oak		x	-	x		-		
Ranunculus abortivus	Small-flowered buttercup	x		o				o	
Ranunculus sp.	Buttercup							x	
Rhus aromatica	Fragrant sumac			x					
Rhus radicans	Poison ivy	x	x	x	x	x	x	x	x
Ribes sp.	Currant						o		
Robinia pseudoacacia	Black locust			x			-	-	-
Rosa sp.	Rose			-	x	x	-	x	
Rubus sp.	Blackberry				x		x	x	-
Rubus phoenicolasius	Wineberry				o				
Ruellia caroliniensis	Hairy ruellia			x		-			
Sanguinaria canadensis	Bloodroot		x	-			x		
Sanicula trifoliata	Black snakeroot	-	x	x	x	x	x	x	x
Sassafras albidum	Sassafras	-	-	-	x				
Smilacina racemosa	False Solomon's seal			-			x		
Smilax sp.	Greenbriar		x						-
Smilax herbacea	Carrion-flower		x	x	-	-		o	-
Solidago sp.	Goldenrod		o	x	-	-	x		-
Solidago ulmifolia	Elmleaf goldenrod			x					
Stellaria pubera	Star chickweed		o						
Swertia caroliniensis	Columbo			o					
Symphoricarpos orbiculatus	Coralberry		-	-	-		x	x	-
Taraxicum officinale	Common dandelion			x	x			x	-
Thalictrum dioicum	Early meadow-rue			-					
Thalictrum revolutum	Wax-leaved meadow-rue			o					
Tilia americana	Basswood	x				x			
Tradescantia virginiana	Spiderwort						-		
Trillium sessile	Toadshade	x	-				x	x	
Umbelliferae	Umbel							-	
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		-	-					
Viola eriocarpa	Smooth yellow violet		-			-			
Viola sororia	Woolly blue violet	x	x	x	-	x	-	x	-
Viola sp.	Violet	x							
Vitis asetivalis	Summer grape	x		x			x	x	
Vitis rotundifolia	Muscadine grape			o	x			-	
Xanthoxylum americanum	Prickly ash			o			o		

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