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A Floristic Study of the Woodland Area of Brighton Town Park, Brighton, New York

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A FLORISTIC STUDY OF THE WOODLAND AREA OF BRIGHTON TOWN PARK, BRIGHTON, NEW YORK

A Thesis

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DEDICATION

To Bob, my loving husband, for walking in the woods with me.

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INTRODUCTION

The disappearance of our woodlands has long been a consequence of the advancement of civilization. Out of concern for the loss of this natural resource, a survey of the vegetation of Monroe County was made during the years of 1938 to 1940 by Dr. Royal Eastman Shanks. From the data collected through several sources - field reconnaissance of existing natural and semi-natural areas, and a review of historical records and original land survey notes - the primeval vegetation of the county was reconstructed. In addition, a map of vegetation types was designed (Shanks, 1966). In this survey, Shanks described the original vegetation of the town of Brighton, New York, as being 80% Beech-Maple Forest and 20% Swamp Deciduous Forest. (Types according to Hawley, 1932.) At the present time, only small pockets of these forest types remain in Brighton. One of these, a small remnant of Beech-Maple Forest and Swamp Deciduous Forest now incorporated into a town park of Brighton, is the subject of this study. It includes 10 acres of woodland, 18 acres of open grassland, and a 17 acre manmade pond. The park is bounded on the north by Westfall Road, on the south by Highway 390, to the east by the Westfall Medical Center on Clinton Avenue, and to the west by cultivated farmland.

The land on which the park is located was settled in pioneer days by the Edmunds family, and was called Edmunds woods for many years. Eliphalet Edmunds purchased the land in 1816 for $12.00 an acre. His family settled there in 1824 and lived in a log cabin that had once served as a school house. A barn was built for the livestock in 1829, and a house for the growing family in 1831. Fields were cleared by cutting the forest trees in wide strips. The trees were dragged into wind rows and then burned. It was said that the wheat grew

noticeably taller in the rows enriched by the ashes. A six acre apple orchard was planted, along with pear trees and fruit trees of many varieties. Each spring the family made maple syrup from the many sugar maples in the woodland. The oldest maples were also periodically cut to provide lumber and firewood for the family. The great, great grandson of Eliphalet Edmunds, James Marvin Edmunds, remembers when the last of the "white wood" or sycamore trees were cut from the property. His childhood memories also include finding Hepatica, Dutchman's breeches and wild phlox in the woodland, species which are no longer found here. The land remained in the Edmunds' family until 1959, when it was sold after the death of James Polk Edmunds the great grandson of Eliphalet Edmunds. The former family burial plot is marked by patches of periwinkle, Vinca minor L. in the southwest corner of the woodland.

In 1975 this land was proposed to be used for the Genesee Expressway project, which would have created an overpass linking Highway 390 to the inner city of Rochester. The controversial plan was abandoned in 1977, at which time Mrs. Carmen Clark, executive director of the Brighton Recreation and Youth Service Agency sought the land for the development of a town park. A 25-year lease was established with New York State, the present owners, for $1.00. Work was begun on the area. An exercise trail, picnic pavilion and softball diamond were soon established. The new park was opened to the public in the Spring of 1981, at which time this study was begun.

The woodland area of the park provides an unique opportunity to study and enjoy a remnant of the two forest types, Beech-Maple and Swamp Deciduous forest, that once completely covered the town of

Brighton. The rich flora of the woodland in this park includes several species protected by the New York State Law as well as many other interesting and beautiful species. Since detail on the flora of this area, now protected as part of the Brighton Park System has not previously been recorded, this study was undertaken to provide that information. The purpose of this study was to record as completely as possible the present flora of the woodland area of Brighton Park, as well as to provide information on the frequency of occurrence and distribution of the species present. Factors that affect woodland composition such as soil type, soil pH, leaf litter, and moisture conditions were also considered.

The floristic study provides the necessary data on woodland composition to enable comparisons to be made with the past field studies of Dr. Royal Eastman Shanks in 1938-1940 of other Beech-Maple and Swamp Forests in Monroe County (Shanks, 1966). Comparison with the past flora of the area could reveal the loss of any species from the flora, and also serves to indicate changes in the flora that could lead to further losses of potentially valuable species.

A map of the woodland area, showing the relative position of habitat types and scarce species will provide a visual aid in understanding the ecology of the woodland. Scarce native species can be rapidly located in the woodland using the map. Their future abundance and distribution can be more easily ascertained if their present locations are marked.

The study also calls attention to the many plant species in the woodland that contain potentially toxic substances. These plants could prove dangerous to anyone who might accidentally eat them. Because

more people will be using the woodland area, and the threat of poisoning exists, this information is provided. Although not all the plants listed with toxic properties are potentially dangerous, the toxic substances they contain are interesting pharmacologically and are included in this list.

The gathering of information on the plants of this woodland is one purpose of this study. Another purpose is the photographic documentation, in the form of 35mm color slides, of many of the species present. The proposed use of these slides in the future is for education and for the development of an aesthetic appreciation of the rich flora found in the woodland of Brighton Park.

The woodland area of the park occupies a sloped hillside ranging in elevation from 500 feet on the west to 530 feet on the east. Large beech trees and sugar maples are predominant on the upper slopes of the woodland. On the lower wetter areas, tree species characteristic of the swamp forest are present. Slope and consequently water drainage are the major gradient factors controlling the distribution of tree species in the woodland. The mixture of tree species found in this woodland are representative of the two forest types described by Shanks for Brighton (SAF 57 Beech Sugar Maple and SAF 26 Swamp Forest). Forest cover types are used by the Society of American Foresters (SAF) to describe and classify forestland as it exists today.

The northern forest region is classified into 23 SAF forest types under four major groupings - Spruce Fir type, Pine and Hemlock type, Northern hardwood type and other northern types. (Society of American Foresters, 1980) Royal Eastman Shanks, in his work on the vegetation of Monroe County recognizes seven forest types for Monroe County - Oak-Chestnut-Pine type, Upland Oaks and Oak-Hickory type,

Oak-Chestnut and Beech Maple type, Beech-Sugar Maple type, Hemlock Hardwood type and a Swamp Forest type. (Shanks, 1966)

New numbers have been assigned by the Society of American Foresters to the forest types which were referenced by Shanks. The Swamp forest type described by Shanks, is best classified as part of the generalized type SAF 39 Black Ash-American Elm-Red Maple. The new type number for the Beech-Sugar Maple type is SAF 60.

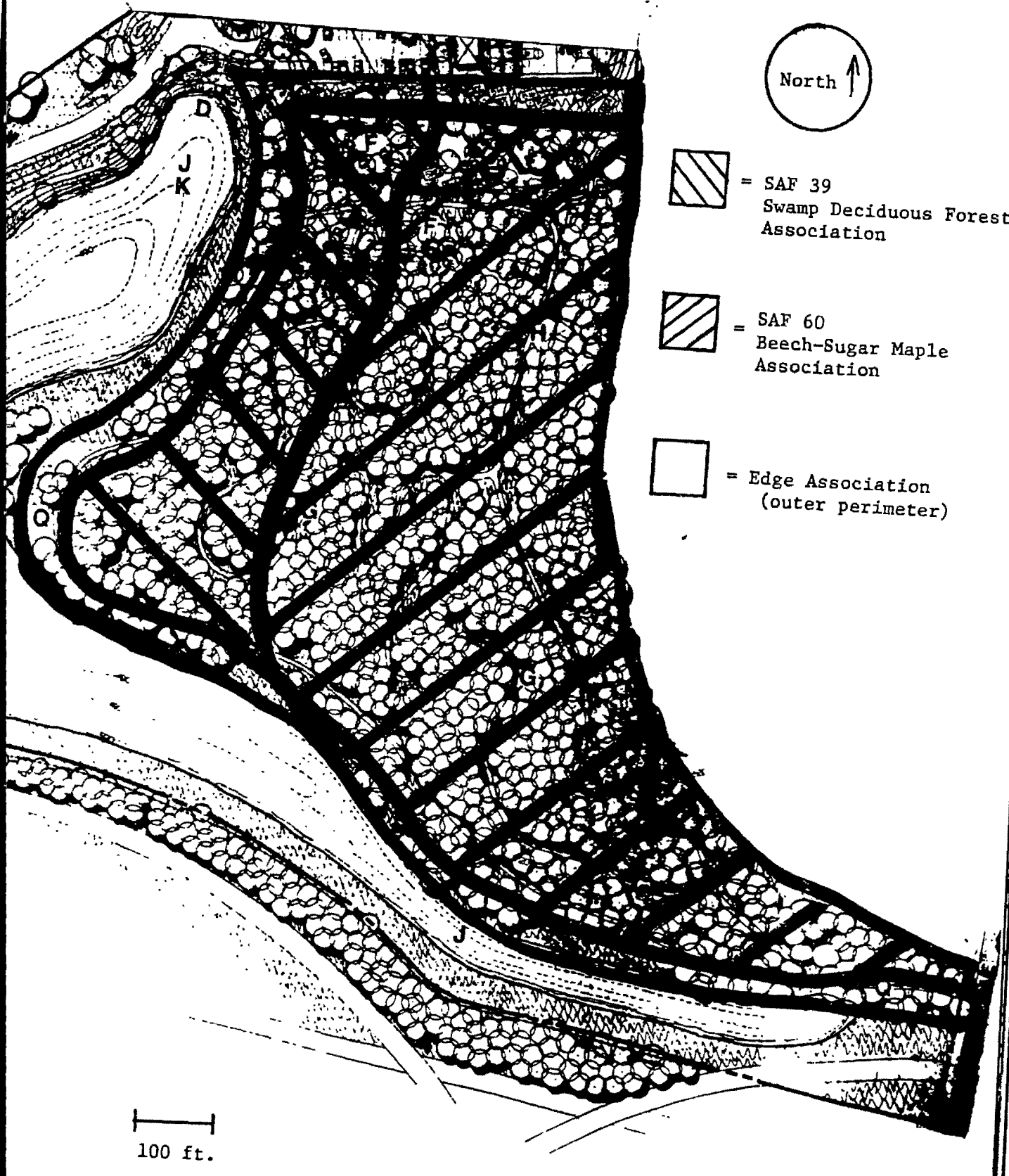
The geographic distribution of the beech-sugar maple type (SAF 60) is "primarily in the glaciated portion of the Midwest and Southern Canada, including Ohio, Indiana, parts of Illinois, southern Michigan, southeastern Wisconsin and in southern portions of Ontario and Quebec. It is found in northern New York and parts of New England." (Society of American Foresters, 1980) The geographical distribution of the Black Ash-American Elm-Red Maple type (SAF 39) is similar to that of (SAF 60). "In general the type is found in a zone extending 300 to 500 km (roughly 200-300 mi.) on either side of the Great Lakes and the St. Lawrence River." (Society of American Foresters, 1980) The study area is within this range.

The soils associated with these types of woodlands have been described:

> "In the glaciated portions of the northern part of the Beech-Maple type range, soils usually vary in p^H from 5.0 to 7.8. On deep loam soils, sugar maple occurs with beech, paper birch and yellow birch. In southern Quebec and Ontario, beech occurs mainly on well-drained, dry, deep, soils." (Carrier, 1969) (Society of American Foresters, 1980)

"The type (SAF 39) usually occupies moist to wet muck or shallow peat soils, and is found in swamps, gullies, and small depressions of slow drainage or in elongated areas along small sluggish streams, occasionally covering extensive areas where it is a temporary climax. The type also occurs on glacially derived soils of varying textures where the surface drainage pattern causes a high watertable. (Fowells, 1965) The soils are frequently but not always acid." (Society of American Foresters, 1980)

MAP OF WOODLAND FOREST ASSOCIATIONS



METHODS

Information on the flora of the woodland area of the park was gathered through weekly visits during the growing season of 1981. Observations were begun April 11, 1981 and continued through October, 1981. Monthly visits were also made during the winter months of November, December, January and February. Frequent visits on a daily to weekly basis were resumed in March of 1982 and have continued throughout May, 1982.

The species of vascular plants found in this woodland were identified. Nomenclature is according to Gleason and Cronquist (1963). Sedges and grasses were excluded from this study. Plants that were not easily identified in the field were collected so that more accurate measurement and observation could be made with the aid of magnification. A complete list of the species of vascular plants found in the woodland was compiled and arranged in phylogenetic order by family according to Cronquist (1968).

Field notes were written at each visit to the park, including information on the sequence of blooming times of the flowering plants and observations of the frequency of occurrence and distribution of the species found. Frequency of occurrence was described as scarce, frequent or common according to the system used for the mapping of flora in the Atlas of the British Flora. (Perring, 1983) The specific location of plants designated as scarce was noted, to be included in a map of the woodland. The distribution of all species was noted with respect to the presence in each of the three major habitat types of the woodland. These habitat types are Beech-Maple (SAF 60), Swamp Forest (SAF 39) and an edge habitat at the perimeter of the woodland.

The habitat designations are based on the early works of Shanks (1966) for Monroe County, and on forest cover type descriptions of the Society of American Foresters (1980). This information is included in the phylogenetic list of the species found in the woodland.

A map of the Park, designed by Katz and Schneider, March 30, 1978, was used in this study. The map clearly shows the woodland portion of the park and the trail that winds through it. Elevation is also clearly labeled on this map. The location of scarce native species was marked on this map. The distribution of the three habitat types was also recorded on the map. The gradation between habitat types is recognized as being gradual, distribution as shown on the map is therefore only approximate.

Data on soil pH were collected October 16, 1981. Ten samples, five from each of the two woodland habitat types were collected using a small trowel and labeled plastic bags. Care was taken to insure a well mixed sample for each collection site. The pH values were determined in the field, using a LaMotte Chemical Products Company, soil pH kit.

Additional field observations of the woodland include the seasonal changes in leaf litter on the woodland floor, and seasonal changes in the amount and pattern of light that reached the woodland floor. Plants which grew only in light patches created by tree falls were noted.

A review of the literature on plant toxicology provided the information on toxic substances present in the plant species of the woodland. This information is included in the phylogenetic list, and also in a separate list.

Photographs were taken of the plants of the woodland area throughout the year. An attempt was made to try to show each plant in several different stages of growth and to also show the plant as part of its habitat. The resulting 35mm color slides were labeled as to Family, genus and species, habitat type and month of bloom for flowering plants, or season in which the photograph was taken for non-flowering plants.

RESULTS AND DISCUSSION

Floristic Results

Beech-Sugar Maple Association

A Beech-Sugar Maple association (SAF 60) occupies the upper slopes of the woodland. Here, Beech Fagus grandifolia Ehrh. and Sugar Maple Acer saccharum Marsh. are the dominant species. "The climax status of these species is largely due to their ability to reproduce in their own shade, which is so dense that it eliminates the seedlings of less shade-tolerant species." (Shanks, 1966) The associated tree species are few in number and occur mainly on the edge of the woodland or in areas of overlap with the Swamp Deciduous Forest type. Sugar maple seedlings are widespread on the forest floor, and Beech reproduction from sprouting is widespread. The understory layer is extremely sparse in this section. Shrubs are present only in light patches created by tree falls. Sambucus pubens, Elderberry is common in the tree fall areas.

In the south-west corner of the woodland, highwinds have caused extensive tree falls, in the years 1979 and 1980. In this section of the woodland a dense understory layer of brambles, Rubus spp. and Elderberry, Sambucus pubens Michx. is present. Staghorn Sumac Rhus typhina L. and, Bittersweet nightshade, Solanum dulcamara L. are also abundant. One specimen of Tree of Heaven, Ailanthus altissima (Mill.) Swingle can be found in this area. These species are all pioneer species, rapidly invading an open area caused by disturbance, in this case disturbance by high winds, resulting in tree falls. The Beech

trees along the edge in this area, appear to be suffering from the increased exposure to full sunlight and wind.

The herbaceous layer of the Beech-Sugar maple area is extremely sparse throughout much of the growing season, but in early spring, before the canopy closes a dense layer of herbaceous species completely covers the woodland floor. The abundance of these flowering species provides a spectacular display of color in late April and early May. The Beech-Sugar maple area is especially rich in vernal species. A strong correlation between the presence of spring ephemerals and humus type was discovered by Curtiss, in a comparison of woodlands throughout Wisconsin. "All of the stands mentioned earlier with a high content of these earlier flowering herbs had a definite mull layer correlated with the complete breakdown of a given years leaf litter by the end of the following summer. On the other hand, the apparently similar stands which lacked the ephemerals invariably had more humus, with a deep layer of partially undecomposed and matted leaves and needles often 3 or 4 inches in depth." (Curtiss, 1959)

In this woodland a thick leaf litter is deposited each fall. It serves as a winter mulch over the woodland floor, protecting the plants from excessive freezing and thawing of the soil. As the leaf litter decomposes throughout the summer, organic humus and nutrients are returned to the soil. By midsummer exposed patches of soil are present, indicating the complete breakdown of leaf litter on the woodland floor. Soil pH values ranged from 6 to 7 in the Beech-Sugar Maple Association and 6.5 to 7.5 in the Swamp Forest association. No differences were found in the pH values of the two forest associations.

The vernal species are characterized as having a very short life cycle. They are able to reach the flowering stage, and set seed in just a few days. Both flowers and leaves usually appear together. All have some type of underground storage organ, either a bulb, a corm, a tuber, or a fleshy rhizome. Most also contain toxic secondary substances. They are low in stature, and often form large colonies of a single species.

The true ephemerals die back completely with no trace of leaves or fruits by the time the tree leaves are fully developed in June. Members of this group include the troutlilies Erythronium americanum Ker., squirrelcorn Dicentra canadensis (Goldie) Walp, spring beauty Claytonia virginica L. and toothwort Dentaria laciniata Muhl.

A modification of the ephemeral habit is seen in wild leeks Allium tricoccum Ait. The leaves of this plant emerge in early spring and then die back as the canopy closes. At the end of July, flower stalks appear completing the life cycle.

Many other species bloom in early spring, but differ from the ephemerals by retaining their leaves for part or all of the summer, and by ripening their fruits in summer. Included here are Bloodroot Sanguinaria canadensis L., Blue cohosh Caulophyllum thalictroides (L.) Michx., Jack in the Pulpit Arisaema triphyllum (L.) Schott., May apple Podophyllum peltatum L. and the Trilliums, Trillium grandiflorum (Michx.) Salisb. and T. erectum L.

The vernal species are present in both the Beech-Maple area and the Swamp-Forest area, but are more predominant in the former. These species are found in a variety of woodland types ranging throughout

the eastern deciduous forest region of the United States. Their continued presence in the flora is assured as long as the woodland habitat that they demand continues to exist. Characteristics that slow their dispersal into new habitats, and slow their recovery in disturbed habitats are related to their reproductive strategies. Many such as Trillium spp. and Erythronium spp. require a number of years of development before reaching a flowering age. Reproduction in many of the vernal species is primarily vegetative. The result of this is often a colony type distribution of the species which is locally abundant but not well dispersed. Three of the vernal species present in the woodland are afforded protected status under New York State Law. These are Trillium erectum L., Trillium grandiflorum (Michx.) Salisb. and Sanguinaria canadensis L.. In the woodland of Brighton Park, these species have a frequent to common occurrence.

Royal Eastman Shanks lists 57 species as characteristic of the Beech-Maple woodland in Monroe County, 27 of the species listed by Shanks are present in this woodland. The following is a list of these species. (Shanks, 1966)

Beech-Sugar Maple (Shanks, 1966)

Dominant tree species:

Sugar maple	Acer saccharum Marsh.
Beech	Fagus grandifolia Ehrh.
Basswood	Tilia americana L.

Associated tree species:

White ash	Fraxinus americana L.
Ironwood	Ostrya virginiana (Mill.) K. Koch
Shagbark hickory	Carya ovata (Mill.) K. Koch
Tulip tree	Liriodendron tulipifera L.
Hornbeam	Carpinus caroliniana Walt
Alternate-leaved dogwood	Cornus alternifolia L.

Ferns:

Christmas fern	Polystichum achrostichoides (Michx.) Schott
Lady fern	Athyrium filix-femina (L.) Roth
Common wood fern	Dryopteris austriaca (Jacq.) Woynar

Herbaceous plants:

White baneberry	Actea alba (L.) Mill.
Mayapple	Podophyllum peltatum L.
Blue cohosh	Caulophyllum thalictroides (L.) Michx.
Bloodroot	Sanguinaria canadensis L.
White geum	Geum canadense Jacq.

Enchanter's nightshade	Circaea latifolia Mill.
Virginia waterleaf	Hydrophyllum virginianum L.
Beechdrops	Epifagus virginiana (L.) Bart.
Blue-stemmed goldenrod	Solidago caesia L.
White snakeroot	Eupatorium rugosum Houtt.
Jack in the Pulpit	Arisaema triphyllum (L.) Schott.
Wild leek	Allium tricoccum Ait.
Trout lily	Erythronium americanum Ker.
Large flowered Trillium	Trillium grandiflorum (Michx.) Salisb.
False Solomon's Seal	Smilacina racemosa (L.) Desf.

Swamp Deciduous Forest Association

The lower elevations from 500 feet to approximately 510 feet are best described as having a swamp deciduous hardwood forest cover. (SAF type 39) Small pools of standing water have been observed here throughout the growing season. The dominant tree species, understory species and herbaceous species of this area are in agreement with those described by Shanks for this forest type in Monroe County. (Shanks, 1966)

> "The common characteristics of the species which make up the swamp forest is a low soil aeration requirement. On the other hand, they differ among themselves in moisture requirement and tolerance of drought... They generally do not form a very dense forest canopy and their seedlings are unable to survive in the shade of the climax species which succeed them when soil aeration has improved. Differences in moisture requirement, soil aeration requirement and light requirement among the swamp forest species, and variation of the habitat with respect to these factors account for the varying composition of this forest type. Certain species enter the swamp forest in such regular sequence following drainage improvement that they may be regarded as indicators of transitional phases in the succession toward the mesophytic beech-sugar maple climax." (Shanks, 1966)

Several indications of the dynamic nature of this forest type are observable in this woodland. A transitional stage is suggested by the presence of many young beech trees in the understory, but no sugar maples were found at the lower elevations. Of these two species, beech appears to be better adapted to tolerate the wet conditions of the swamp forest. The canopy is relatively open in this area. Although several large trees (dbh. 25-35 inches) are present, the majority of the trees are young (dbh. 6-12 inches). Several large dead trees are present (dbh. 30-40 inches). As they fall, open spaces will be

created, releasing tree species from the understory. The understory is composed primarily of small tree and shrub species. The most dominant ones include Viburnum lentago L., Ostrya virginiana (Muhl.) K. Koch and Carpinus caroliniana Walt.. Of the tree seedlings present Fraxinus pennsylvanica Marsh., Fraxinus nigra Marsh. and Tilia americana L. are predominant. Due to the open nature of the canopy in this area the herbaceous layer is quite dense and lush. A high diversity of herbaceous species is present, reflecting the wide range of light and moisture conditions of this forest type. Some of the more common herbaceous species of the lower wet areas are Onoclea sensibilis L., Arisaema triphyllum (L.) Schott and Polygonum virginianum L.. Rhus radicans L., poison ivy is widespread throughout this area. In open sunlight areas, the annual Impatiens biflora Walt. forms large stands.

Royal Eastman Shanks lists 81 different species for this forest type. 38 of the species listed by Shanks are present in this woodland. The following is a list of these species.

Swamp Forest (Shanks, 1966)

Dominant tree species:	
Silver maple	Acer saccharinum L.
Basswood	Tilia americana L.
White ash	Fraxinus americana L.
Swamp white oak	Quercus bicolor Willd.
Red ash	Fraxinus pennsylvanica Marsh.
Black ash	Fraxinus nigra. Marsh.
Associated tree species:	
Slippery elm	Ulmus rubra. Muhl.
Shagbark hickory	Carya ovata (Mill.) K. Koch
Bitternut hickory	Carya cordiformis (Wang.) K. Koch
Understory small trees, shrubs and vines:	
Hornbeam	Carpinus caroliniana Walt.
Nannyberry	Viburnum lentago L.
Toothed arrowwood	Viburnum dentatum L.
Spicebush	Lindera benzoin L.
Red-osier dogwood	Cornus stolonifera Michx.
Panicled dogwood	Cornus racemosa Lam.
Wild black currant	Ribes americanum Mill.
Pussy willow	Salix discolor Muhl.
Poison ivy	Rhus radicans L.
Virginia creeper	Parthenocissus quinquefolia (L.) Planch
Forest grape	Vitis vulpina L.

Ferns:	
Sensitive fern	Onoclea sensibilis L.
Lady fern	Athyrium filex-femina (L.) Roth
Common wood fern	Dryopteris austriaca (Jacq.) Woynar. var. spinulosa (Muell.) Fiori.
Composites:	
White snakeroot	Eupatorium rugosum Houtt
New England aster	Aster novae-angliae L.
White woodaster	Aster devaricatus L.
Canada goldenrod	Solidago canadensis L.
Tall wild lettuce	Lactuca candensis L.
Other Herbaceous Plants:	
Spotted touch-me-not	Impatiens biflora Walt.
False Solomon's seal	Smilacena racemosa (L.) Desf.
Mayapple	Podophyllum peltatum L.
White avens	Geum canadense Jacq.
Foam flower	Tiarella cordifolia L.
Virginia knotweed	Polygonum virginiaum
Virginia waterleaf	Hydrophyllum virginianum L.
Wood nettle	Laportea canadensis (L.) Gaud.
Clearweed	Pilea pumila (L.) Gray
Bittersweet nightshade	Solanum dulcama L.

Additional species found in the lower wet areas of the woodland not listed by Shanks include several introduced species:

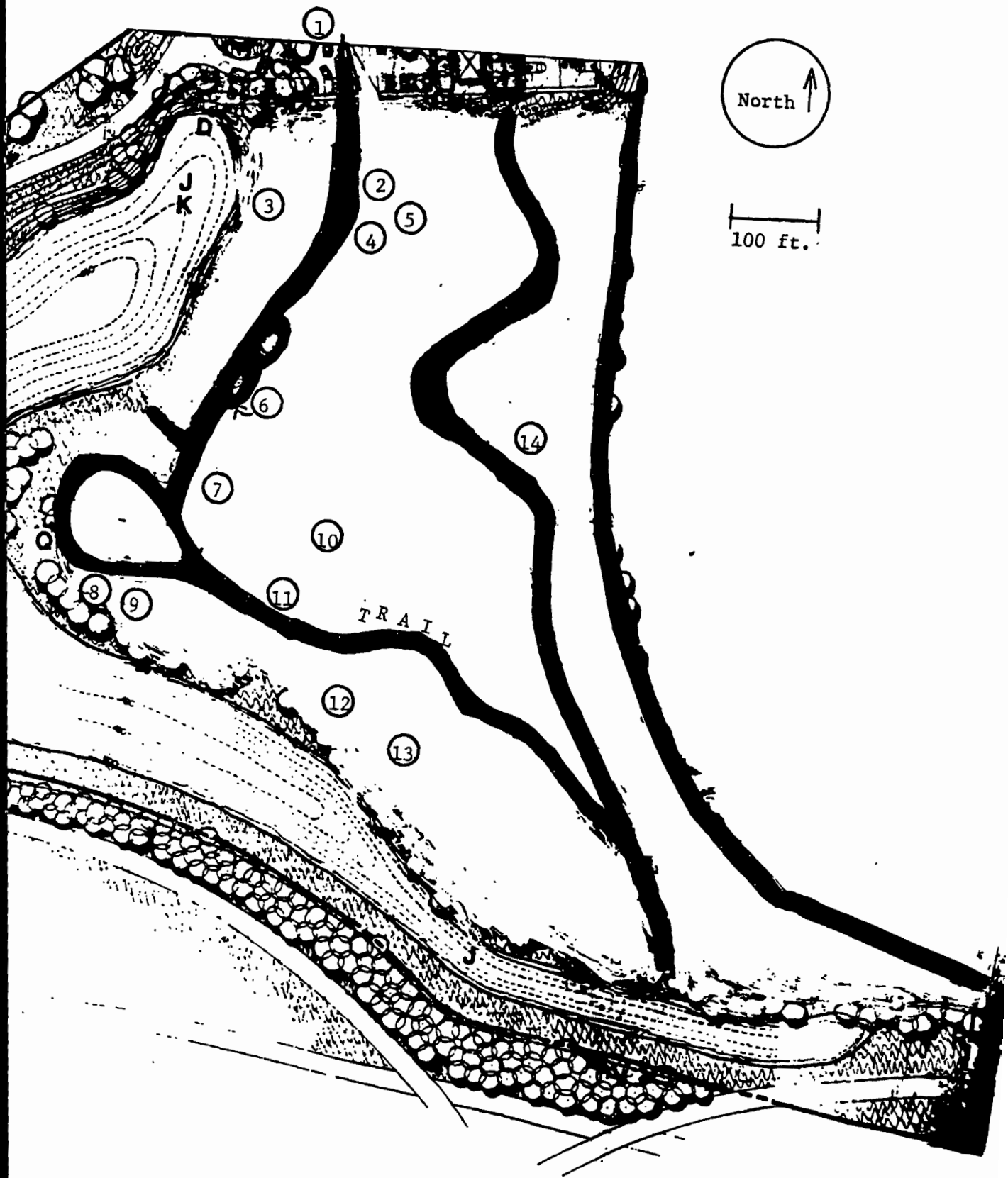
European barberry	Berberis vulgaris L.
Common buckthorn	Rhamnus catharticus L.
European buckthorn	Rhamnus frangula L.
Privet	Ligustrum vulgare L.
Honeysuckle	Lonicera tartarica L.

Map of Scarce Native Species

The following map shows the location of scarce native species. A number system is used to identify their location.

1. Apple Pyrus malus L.
2. Ohio buckeye Aesculus glabra Willd.
3. Wild geranium Geranium maculatum L.
4. Tulip tree Liroidendron tulipifera L.
5. Blue cohosh Caulophyllum thalictroides (L.) (Michx.)
6. Rattlesnake Root Prenanthes alba L.
7. Alternate-leaved dogwood Cornus alternifolia L.
8. Yellow geum Geum aleppicum Jacq.
9. Foamflower Tiarella cordifolia L.
10. Christmas fern Polystichum acrostichoides (Michx.) Schott.
11. Spicebush Lindera benzoin (L.) (Blume)
12. Long spurred violet Viola rostrata L.
13. Blue vervain Verbena hastata L.
14. Solomon's seal Polygonatum biflorum (Walt.) Ell.

MAP OF SCARCE NATIVE SPECIES



Edge Association

The edge association of the woodland is the perimeter where species characteristics of open meadows and woodlands intermingle. The diversity of species is very high in this area. Many important seed producing food plants for wildlife such as Rumex and Ambrosia are present here. Other food producing plants that are important to wildlife include the many fruit producing shrubs and small trees of the edge habitat. Cornus, Viburnum and Lonicera, are three common fruit bearing shrub genera of this habitat. The flowers of the edge habitat bloom profusely throughout the summer and fall months, long after the woodland ephemerals have vanished. Many introduced perennials and biennals are established here, such as Chrysanthemum leucanthemum L., Daucus carota L. and Dipsacus sylvestris Huds.

Toxic Plants

The plants of the woodland that contain toxic secondary substances are of interest first because all or parts of some of these plants can cause serious illness or even death if ingested. This is of serious concern in a park area. Secondly, the controlled use of toxic secondary plant substances can be of value medicinally. Research interest in finding natural sources of new drugs has brought increased value to these plants in the Pharmaceutical industry. A survey of the literature reveals that many of the species of plants of this woodland contain toxic secondary substances. (James, 1973) (Kingsbury, 1962) and (Muenscher, 1975) The presence of toxic substances in plants is widespread. These include glucosides, saponins, tannins, alkaloids, essential oils, organic acids and others. "They are not, so far as is known, essential to the basis of protoplasmic metabolism of the plant. They are of irregular or sporadic occurrence, appearing in some plants or plant families and not in others - this fact reinforcing the view that they are not essential to plant metabolism." (Whittaker, 1970)

A diverse range of toxic secondary substances is found in the plants of the woodland. The effects of these substances are as varied as the chemical compounds involved. They range in severity from dermititis caused by poison ivy, Rhus radicans L., to death from ingesting the berries of baneberry, Actaea alba L. and Actaea rubra Ait. Willd. (The common name refers to this toxicity.) Because of their strong physiological properties, many members of this flora have been used medicinally. May apple, Podophyllum peltatum L. and pokeweed, Phytolacca americana L. were used by the American Indians and early settlers to treat a variety of illnesses and ailments.

(Kingsbury, 1964) Further research in the area of toxic plant substances could reveal new pharmacological uses for many of these plants.

The vernal species of plants in this woodland all contain toxic secondary substances. One can only guess at the importance of these substances and why the early blooming plants all have this similar characteristic. The presence of these substances occurs throughout the entire plant but is concentrated in the carbohydrate rich storage organs of these plants. This possibly serves as a deterrent against animal predators in search of a winter meal, and thus gives the plant an advantage in survival.

Additionally, many toxic plants often have fruits that when fully ripe are eaten by wildlife. The ripe fruits could be less toxic than the other parts of the plant, which would be an advantage in seed dispersal. Or, because of a long history of co-existence, many animals could have developed adaptations that render the toxic substances less toxic to that animal. Past research on the effects of toxic plants on animals has been largely confined to the effects on grazing livestock. Further research in this area could reveal much about the complex interactions between plants and animals in a woodland setting.

Plants with Secondary Toxic Substances

HERBACEOUS PLANTS OF THE WOODLAND HABITAT:

White baneberry *Actaea alba* L. Mill Red baneberry *Actaea rubra* (Ait.) Willd.	All parts of the baneberries are considered toxic, due to the presence of glycosides. The ripe fruits are used by wildlife to a limited extent.
May apple *Podophyllum peltatum* L.	All parts of the plant are considered toxic, yet the ripe fruits are edible and are used by wildlife. Toxicity is due to the presence of a resin, podophyllin.
Blue cohosh *Caulophyllum thalictroides* L.	The rootstock contains the alkaloid, methylcytisine and glucosides.
Bloodroot *Sanguinaria canadensis* L.	Bloodroot contains several poppy alkaloids of which sanguinarine is one of the more important.
Squirrel corn *Dicentra canadensis* (Goldie) Walp.	All parts of the plant contain alkaloids, Aporphine, protoberberine, protopine and related groups of isoquinoline - structured alkaloids.
Pokeweed *Phytolacca americana* L.	The roots and older leaves contain an alkaloid, phytolaccine and a bitter acrid substance similar to saponin. The ripe fruits are valued by wildlife.
Bittersweet nightshade *Solamum dulcamara* L.	The plants contain several solanaceous alkaloids. The ripe fruits are eaten by many species of wildlife.
Jack in the Pulpit *Arisaema triphyllum* (L.) Schott	All parts of the plant but particularly the rhizome contain crystals of calcium - oxalate. The ripe fruit is eaten by wildlife.
Trillium spp.	The rootstocks of trillium are toxic. The principal is unknown.

TREES AND WOODY VINES:

Elderberry *Sambucus canadensis* L.	Fresh leaves, flowers, bark, young buds and roots contain a bitter alkaloid and also a glucoside. The ripe fruit is valuable to wildlife.
Sweet Cherry *Prunus avium* L.	The leaves and fruit stones contain cyanogenetic glycosides. The fruit is especially valuable to wildlife.
Black locust *Robinea pseudoacacia* L.	All parts of the plant contain a phytotoxin, robin and a glycoside robitin. Phytotoxins inhibit the growth of other plants within the vicinity.
Ohio buckeye *Aesculus glabra* Willd.	Young growth, sprouts and mature nuts are especially toxic. Alkaloids, glycosides and saponins are present throughout the plant.
Privet *Ligustrum vulgare* L.	A poisonous factor, andomedotoxin is in the foilage and berries, the foilage containing more toxin than the berries.
Buckthorn *Rhamnus cathartica* L.	Foilage, seeds and fruit contain glycosides and cascara sagrada a laxative. The fruits are eaten by wildlife.
Virginia creeper *Parthenocissus quinquefolia* (L.) Planch.	The berries have been shown to have toxicity, in experimental feedings with guinea-pigs. Yet, they are important fall and winter foods to many species of wildlife.
Poison ivy *Rhus radicans* L.	All parts of the plant contain a resin, uroshiol which can produce severe dermititis. The fruits are extemely valuable to wildlife.

HERBACEOUS PLANTS OF THE EDGE HABITAT

Tall buttercup *Ranunculus acris* L.	All species of *Ranunculus* contain acrid volatiles associated with gastrointestinal irritation.
Snakeroot *Eupatorium rugosum* Houtt.	All parts of the plant contain an alcohol, trematol.
Scarlet pimpernel *Anagallus arvensis* L.	Feeding tests with sheep have demonstrated toxicity. Dermititis has also been reported. The toxic principal is unknown.
White clover *Trifolium repens* L. Red clover *Trifolium pratense* L. Birdsfoot trefoil *Lotus corniculatus* L.	These plants have been shown occasionally to produce potentially toxic amounts of a cyanogenetic substance.
Barbarea vulgaris R. Br.	Mustard oil is considered the poisonous principal. It is composed of a mixture of allyl isothiocyanate and beta-phenyl isothiocyanate. Large quantities must be consumed to produce symptoms.
Rumex acetosa L. *Rumex acetosella* L. *Rumex crispus* L.	The species of Rumex owe their toxicity to soluble oxalates. Accumulation of dangerous levels of oxalates is rare.
Soapwort *Saponaria officinalis* L.	The plant and especially the seeds contain large amounts of saponin.
Horsetail *Equisetum arvense* L.	Silica, aconetic acid. Palmetic acid, necotine, equisitine, palustrine and dimethylsufone have been suggested as the toxic principal.

Species List of Vascular Plants

A phylogenetic list of the species of vascular plants found in the woodland has been compiled, the order of families is according to Cronquist (1968). The nonmenclature is according to Gleason and Cronquist (1963). The list includes common names, and frequency of occurrence described as scarce, frequent or common. The species presence in each of the three habitat types, Beech Maple (SAF 60), Swamp Forest (SAF 39) and edge of woods is recorded. Symbols are used to designate the species inclusion in the list of Shanks (1966). * Shanks-Beech Maple or ** Shanks-Deciduous Swamp. The presence of toxic substances is recorded. The growth habit is recorded as perennial, biennal or annual herb, shrub, understory tree, or tree. Introduced species are labeled, and the months of bloom for flowering plants are recorded. A star (★) in the margin of the list, indicates the species is included in the collection of 35mm. color slides.

Division Sphenophyta

Order Equisetales

★ Equisetum arvense L. Common horsetail

Edge of woods Frequent
(toxic, aconitic acid, equisetin alkaloid)

Division Pterophyta

Order Filicales

Family Polypodiaceae

★ Athyrium filix-femina (L.) Roth var. Michauxii Mett.

Lady Fern SAF 60 and SAF 39 ** frequent

★ Dryopteris austriaca (Jacq.) Woynar

Spinulose Shield Fern SAF 60 and SAF 39 ** * frequent

Dryopteris marginalis (L.) Gray

Marginal Shield Fern SAF 60 and SAF 39 frequent

★ Onoclea sensibilis L. Sensitive fern

SAF 39 ** Frequent

★ Polystichum acrostichoides (Michx) Schott. Christmas fern

SAF 60 * Scarce

Division Angiospermophyta

Class Magnoliatae

Subclass Magnoliidae

Order Magnoliales

---

* Shanks Beech Maple.

** Shanks Deciduous Swamp.

★ 35mm slides are available representing the species.

Family Magnoliaceae

Liriodendron tulipifera L. Tulip tree

SAF 60 * Scarce Only 2 specimens found, a large tree and a seedling. May

Family Lauraceae

★ Lindera benzoin (L.) Blume. Spicebush

SAF 39 ** scarce Small understory tree. April-May

Order Ranunculales

Family Ranunculaceae

Ranunculus abortivus L. Small flowered crowfoot

SAF 60, SAF 39 Edge of woods frequent perennial May

Anemone virginiana L. Tall Anemone

Edge of woods and SAF 39 frequent July-August

★ Ranunculus acris L. Tall buttercup

Edge of woods common Introduced perennial herb May

★ Actaea alba (L.) Mill. White baneberry

SAF 60 * frequent Several plants are present throughout the shaded areas. (toxic, purgative) perennial herb May-June

★ Actaea rubra (Ait.) Willd. Red baneberry

SAF 60 frequent A few plants are present in the shaded areas. (toxic, purgative) perennial herb May-June

Family Berberidaceae

★ Podophyllum peltatum L. Mayapple

SAF 60 * Common throughout the shaded areas. (toxic, podophyllin) perennial herb May

★ Caulophyllum thalictroides (L.) (Michx.) Blue cohosh

SAF 60 * scarce Only a few clumps of this species are present. (toxic, methylcytisine, glucosides) perennial herb April-May

Berberis vulgaris L. European barberry

Edge of woods scarce A few plants are present.
Introduced shrub May-June

Order Papaveraceae

Family Papaveraceae

★ Sanguinaria canadensis L. Bloodroot

SAF 60 * frequent Protected Native plant.
(toxic, sanguinarine, alkaloid) perennial herbs
April-May

Family Fumariaceae

★ Dicentra canadensis (Goldie) Walp. Squirrel corn

SAF 60 frequent Several colonies are present.
(toxic, cucullarine, alkaloid) perennial herb
April-May

Subclass Hamamelidae

Order Urticales

Family Ulmaceae

Ulmus rubra Muhl. Slippery elm

SAF 39 ** frequent May

Family Urticaeae

Laportea canadensis (L.) Wedd Wood-nettle

SAF 39 and SAF 60 ** frequent perennial herb
July-August

Boehmeria cylindrica (L.) Su. False nettle

SAF 39 frequent perennial herb July-August

Pilea pumila (L.) Gray Clearweed

SAF 39 ** frequent annual herb July-September

Order Juglandales

Family Juglandaceae

★ Carya ovata (Mill.) K. Koch. Shagbark hickory

SAF 39 * frequent May

★ Carya cordiformis (Wang.) K. Koch. Bitternut hickory

SAF 39 ** frequent May

Order Fagales

Family Fagaceae

★ Fagus grandifolia Ehrh. American beech

SAF 60 and SAF 30 * common Dominant tree specie throughout the sloped areas of the park, reproduction by sprouting is widespread, seedlings are also present in the lower wet areas of the woodland. May

Quercus alba L. White Oak

Quercus bicolor Willd. Swamp White Oak

SAF 39 ** scarce May

Family Betulaceae

Betula lutea Michx. Yellow birch

SAF 60 This tree species is present in association with Beech and Sugar Maple, only a few specimens are present in the woodland. May

★ Carpinus caroliniana Walt. Hornbeam

SAF 39 and SAF 60 ** * common Many small trees are present along the west edge. April-May

Ostrya virginiana (Mul.) K. Koch Ironwood

SAF 39 pre-dominant understory tree in the swamp forest type, it is also present along the western edge of the woodland. common understory tree April-May

Subclass Caryophyllidae

Order Caryophyllales

Family Phytolaccaceae

Phytolacca americana L. Pokeweed

SAF 60 frequent Clearing in woods. (toxic, phytolaccine, alkaloid) perennial herb August-September

Family Caryophyllaceae

Saponaria officinales L. Soapwort

Edge of woods frequent (toxic, saponins) Introduced perennial herb. May-July

Family Portulacaceae

★ Claytonia virginica L. Narrow leaved Spring Beauty

SAF 60 frequent Primarily found at the base of beech trees. April-May

Order Polygonales

Family Polygonaceae

★ Polygonum virginianum L. Virginia knotweed

SAF 39 ** Common along the pathway of the wetter north-west section. perennial herb August-September

Rumex crispus L. Sourdock

Edge of woods common Introduced perennial herb. May-June

Subclass Dilleniidae

Order Malvales

Family Tiliaceae

★ Tilia americana L. Basswood

SAF 39 and SAF 60 * ** frequent June

Order Violales

Family Violaceae

★ Viola rostrata Pursh. Long spurred violet

SAF 39 Edge of woods scarce perennial herb May

Viola odorata L. Sweet violet

SAF 60 scarce introduced perennial herb May

Order Salicales

Family Salicaceae

★ Salix bebbiana Sarg. Beaked willow

SAF 39 Edge of woods frequent small tree April

Salix discolor Muhl. Pussy willow

SAF 39 Edge of woods frequent small tree April

★ Populus deltoides Marsh. Cottonwood

Edge of woods frequent April-May

★ Populus tremuloides Michx. Quaking aspen

Edge of woods frequent April-May

Order Capparales

Family Cruciferae

★ Dentaria laciniata Muhl. Toothwort

SAF 60 common Abundant ground cover in early spring.
perennial herb April-May

★ Dentaria diphylla Michx. Toothwort

SAF 60 frequent perennial herb May

★ Alliaria officinalis Andrz. Garlic mustard

Edge of woods common introduced, biennial herb May

★ Barbarea vulgaris R.Br. Winter-cress

Edge of woods. frequent introduced, biennial herb May

Order Primulales

Family Primulaceae

Anagallis arvensis L. Scarlet pimpernel

Edge of woods. scarce introduced August-September

Subclass Rosidae

Order Rosales

Family Saxifragraceae

★ Ribes americanum Mill. Wild blackcurrant

SAF 39 Edge of woods frequent small shrub May

Tiarella cordifolia L. Foamflower

SAF 39 ** scarce perennial herb May-June

Family Rosaceae

★ Prunus virginiana L. Chokecherry

SAF 60 and SAF 39 and edge of woods. frequent
Present as an understory tree species. May

★ Prunus avium L. Sweet cherry

Edge of woods frequent Several large trees are present at the northern edge of the woodland. Introduced tree May

★ Pyrus malus L. Apple

scarce Edge of woods small tree May

★ Rubus spp. L. Bramble

Edge of woods and opening in woods. It is widespread in the open southwestern section of the woodland. common Biennal Stems from a perennial base. June

★ Fragaria virginiana Duchesne. Wild strawberry

SAF 39 Edge of woods frequent perennial herb
May-June

★ Potentilla recta L. Rough-fruited cinquefoil

Edge of woods frequent Introduced, perennial herb
June-August

Agrimonia gyposepala Wallr. Argimony

SAF 39 and edge of woods frequent perennial herb July-August

Geum canadense Jacq. White geum

SAF 39 * ** Edge of woods frequent perennial herb May-June

Geum aleppicum Jacq. - Yellow geum

Edge of woods scarce perennial herb June

Family Leguminosae

Robinia pseudoacacia L. Black locust

Edge of woods A small stand of these trees is present on the southwest edge of the woodland. (Phytotoxic, robin and a glycoside robitin) June

★ Trifolium pratense L. Red clover

Edge of woods frequent Introduced, perennial May-August

★ Melilotus alba Desr. White sweet clover

Edge of woods frequent Introduced, perennial June-August

Medicago lupulina L. Black-medic

Edge of woods frequent Introduced, annual May-September

★ Lotus corniculatus L. Birds-foot trefoil

Edge of woods frequent Introduced, perennial May-August

★ Vicia villosa Roth. Vetch

Edge of woods frequent Introduced, perennial June-August

★ Trifolium repens L. White clover

Edge of woods frequent Introduced, perennial May-September

Order Myrtales

Family Onagraceae

Circaea quadrisulcata (Maxim.) Franch and Sav. Enchanter's nightshade

SAF 39 and SAF 60 * frequent perennial herbs June-August

Oenothera biennis L. Evening primrose

Edge of woods frequent biennial herb June-September

Order Cornales

Family Cornaceae

Cornus alternifolia L.f. alternate-leaved dogwood

SAF 39 and edge of woods ** scarce shrub June

★ Cornus stolinfera Michx. Red-osier dogwood

SAF 39 and edge of woods ** frequent small clumps of these dogwoods are near the trail entrance. shrub May

★ Cornus racemosa Lam. Gray-stemmed dogwood

SAF 39 and edge of woods ** frequent Found in low wet areas in the N.W. part of the woodland. shrub June

Order Rhanales

Family Rhamnaceae

★ Rhamnus catharticus L. Buckthorn

SAF 39 and edge of woods Common along the northwestern edge of the woodland, also present as an understory specie in the swamp forest area. (toxic, glycosides and a laxative, cascara sagrada) Introduced, understory tree June

Rhamnus frangula L. European Buckthorn

SAF 39 and edge of woods frequent introduced shrub

Family Vitaceae

★ Vitis vulpina L. Forest grape

SAF 39 and edge of woods ** frequent woody vine

★ Parthenocissus quinquefolia (L.) Planch. Virginia creeper

SAF 39 and edge of woods ** frequent woody vine

Order Sapindales

Family Hippocastanaceae

Aesculus glabra Willd. Ohio buckeye

SAF 60 scarce Small seedling present in the southern section near the trail. (toxic, glucosides) May

Family Aceraceae

★ Acer saccharum Marsh. Sugar maple

SAF 60 * common Dominant tree specie throughout the upper woodland. April-May

★ Acer saccharinum L. Silver maple

SAF 39 and edge of woods frequent April-May

Family Anacardiaceae

Rhus typhina L. Staghorn sumac

Edge of woods frequent shrub June

Rhus radicans L. Poison ivy

SAF 39 ** common (toxic, uroshiol) perennial herb May

Family Simarubaceae

★ Ailanthus altissima (Mill.) Swingle Tree of Heaven

Edge of woods scarce One small specimen was found in the open wooded area in the northwest section of the woodland, west of the trail. Introduced, tree

Order Geraniales

Family Geraniaceae

★ Geranium maculatum L. Wild geranium

SAF 39 and edge of woods scarce perennial herb May-June

Family Balsaminaceae

★ Impatiens biflora Walt. Jewelweed

SAF 39 ** frequent annual July-August

Order Umbellales

Family Umbelliferae

★ Daucus carota L. Queen Anne's Lace

Edge of woods common introduced, biennial herb June-September

Subclass Asteridae

Order Gentianales

Family Apocynaceae

★ Vinca minor L. Periwinkle

SAF 60 frequent Introduced perennial herb April-May

Order Polemoniales

Family Solanaceae

★ Solanum dulcamara L. Bittersweet nightshade

Edge of woods common (toxic, solanine alkaloid) introduced, perennial herb. May-August

Order Lamiales

Family Verbenaceae

★ Verbena hastata L. Blue vervain

Edge of woods scarce perennial herb July-August

Family Hydrophyllaceae

Hydrophyllum virginianum L. Water-leaf

SAF 60, SAF 39 and edge of woods ** frequent perennial May-June

Hydrophyllum macrophyllum Nutt. Water-leaf

SAF 60, SAF 39 and edge of woods ** frequent perennial May-June

Order Lamiales

Family Labiatae

★ Prunella vulgaris L. Self-heal

Edge of woods common Introduced perennial herb July-August

Order Scrophulariaceae

Family Oleaceae

★ Fraxinus nigra Marsh. Black ash

SAF 39 and edge of woods frequent May

Fraxinus americana L. White ash

SAF 39 and edge of woods ** common May

Fraxinus pensylvanica Marsh. Green ash

SAF 39 and edge of woods ** frequent May

Ligustrum vulgare L. Privet

Edge of woods scarce introduced, shrub June

Family Scrophulariaceae

★ Verbascum thapsus L. Mullein

Edge of woods common introduced, biennial herb June-September

★ Verbascum blattaria L. Moth mullein

Edge of woods frequent introduced, biennial herb June-September

★ Linaria vulgaris null. Butter-and-eggs

Edge of woods frequent introduced, perennial May-September

Family Orobanchaceae

Epifagus virginiana (L.) Bart. Beechdrops

SAF 60 * common Parisitic on the roots of beech trees. September

Order Dipsacales

Family Caprifoliaceae

★ Viburnum dentatum L. Arrow wood

SAF 39 and edge of woods ** frequent shrub June

★ Sambucus pubens Michx. Red-Elderberry

Openings in woods common shrub May

★ Viburnum opulus L. Highbush cranberry

SAF 39 and edge of woods frequent shrub June-July

★ Viburnum lentago L. Nanny-berry

SAF 39 and edge of woods ** common shrub May-June

★ Lonicera canadensis Marsh. Fly honeysuckle

SAF 39 and edge of woods frequent shrub May

Lonicera tartarica L. var. Morrowii Gray Tartarian honeysuckle

SAF 39 and edge of woods ** frequent introduced, shrub May

Family Dipsacaceae

★ Dipsacus sylvestris Huds. Teasel

Edge of woods common introduced, biennial July-September

Family Compositae

★ Tussilago farfara L. Coltsfoot

SAF 39 scarce introduced, perennial herb April-May

★ Erigeron annus (L.) Pers. Daisy fleabane

Edge of woods frequent annual May-June

★ Chrysanthemum leucanthemum L. Ox-eye daisy

Edge of woods common introduced, perennial herb June-July

★ Rudbeckia hirta L. Blackeyed Susan

Edge of woods frequent Present along the southern edge of the woodland. perennial herb June-October

★ Cirsium vulgare (Savi) Tenore. Bull thistle

Edge of woods frequent Introduced, perennial herb June-September

★ Arctium minus Schk. Burdock

Edge of woods frequent Introduced, biennial herb July-October

★ Eupatorium rugosum Houtt. White snakeroot

SAF 39 and edge of woods ** frequent (toxic, trematol) perennial herb July-August

★ Aster novae-anglae L. New England Aster

Edge of woods ** common perennial herb July-September

★ Aster lucidulus (Gray) Wieg.

Edge of woods frequent perennial herb August-September

★ Aster dumosus L.

Edge of woods common perennial herb August-September

★ Aster divaricatus L.

SAF 60 and SAF 39 ** frequent perennial herb August-September

★ Solidago caesia L. Bluestemmed goldenrod

SAF 39 and SAF 60 * frequent perennial herb September

★ Solidago flexicaulis L.

SAF 39 and SAF 60 frequent perennial herb September

★ Solidago canadensis L.

Edge of woods ** common perennial herb August-September

★ Prenanthes alba L. Rattlesnake-root

SAF 60 scarce perennial herb August-September

Artemesia ludoviciana Nutt. Mugwort

Edge of woods common perennial herb July-October

Cichorium intybus L. Chickory

Edge of woods frequent Introduced, perennial herb July-September

Lactuca canadensis L. Wild Lettuce

Edge of woods ** frequent biennial herb July-September

Solidago graminifolia (L.) Salisb.

Edge of woods common perennial herb August-September

Aster novibelgii L.

Edge of woods frequent perennial herb August-September

Class Liliatae

Subclass Arecidae

Order Arales

Family Araceae

★ Arisaema triphyllum (L.) Schott Jack in the Pulpit

SAF 39 and SAF 60 frequent (toxic, calcium oxalate) perennial herb May-June

Subclass Liliidae

Order Liliales

Family Liliaceae

★ Allium tricoccum Ait. Wild Leek

SAF 60 * frequent bulbous herb July

★ Erythronium americanum Ker. Trout lily

SAF 60 and SAF 39 common bulbous herb April-May

Hemerocalus fulva. L. Daylily

Edge of woods. cultivated, perennial herb. June-July

★ Trillium erectum L. Wakerobin Trillium

SAF 60 frequent (rootstocks, toxic)
protected native plant April-May

★ Trillium grandiflorum (Michx.) Salisb. Large Flowered Trillium

SAF 60 * frequent (rootstocks, toxic)
protected native plant April-May

★ Smilacina racemosa (L.) Desf. False Solomon's Seal

SAF 60 * ** frequent perennial herb May-June

Smilacina stellata (L.) Desf. Small false Solomon's Seal

SAF 60 frequent perennial herb May

★ Polygonatum biflorum (Walt) Ell. Solomon's Seal

SAF 60 and SAF 39 scarce perennial herb May

Order Ochidales

Family Orchidaceae

★ Epipactis helleborine (L.) Crantz Helleborine

SAF 60 Beech maple Only one specimen found.
Introduced, perennial herb July-August

CONCLUSION

The values of natural undisturbed habitats are not readily apparent to all observers, and thus the loss of these habitats continues. Woodlands are vanishing at astonishing rates as the result of development and urban sprawl. The loss of woodlands goes hand-in-hand with the loss of various species of plants and animals that are unique to these habitats. The plants of the woodlands are valuable in several respects; they provide simple beauty, are food plants for wildlife, and many are potential sources for new drugs. The woodland habitat that encompasses these plants cannot be equalled as an ageless, timeless, uniquely peaceful atmosphere in which one can escape from the hectic pace of modern life and enjoy an ever changing scene of natural beauty.

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APPENDIX 1

Soil pH Measurements

SAF 39

1. pH 7
2. pH 6.5
3. pH 7
4. pH 6.5
5. pH 7.5

SAF 60

6. pH 6
7. pH 7
8. pH 7
9. pH 6.5
10. pH 6

APPENDIX 2
Soil Types

The soils of the area have been classified and mapped by the Soil Conservation Service. On the upper slopes of the woodland, a Cayuga silt loam is present (CeB 2-6% slope and CeC 6-12% slope). The lower areas on the western part of the woodland have an Odessa silt loam type of soil (OdA 0-2% slope).

> "In the Odessa series are deep, level to gently sloping, somewhat poorly drained soils that have a medium textured surface layer and a fine textured subsoil. These soils developed in deep deposits of calcareous lacustrine clay and silt in old glacial lakebeds. Areas are on intermediate slopes between high knobs and low depressions, mainly in old glacial Lake Dana.
> A representative Odessa soil has a surface layer, 7 inches thick of dark reddish-brown silt loam. The subsoil is mottled, neutral, reddish brown clay that is 16 inches thick. At a depth of 23 inches is the calcareous, very firm, reddish brown and brown silty clay substratum. Below a depth of 45 inches, the substratum consists of firm layers of clay, silt and very fine sand.
> A seasonal high watertable is within 6-12 inches of the surface and is perched on the subsoil and substratum layers that are slowly permeable. The depth of soil available for rooting is related to the height of the watertable and is mainly in the upper 15 to 24 inches."

> "In the Cayuga series are deep well drained and moderately well drained soils that have a medium-textured surface layer and a fine textured to moderately fine textured subsoil. These soils formed in lacustrine silt and clay are underlain by loamy, calcareous glacial till."

> "A representative gently sloping Cayuga soil in a cultivated area has a surface layer, about 7 inches thick, of dark grayish-brown silt loam. The subsoil extends to a depth of 37 inches. The upper 15 inches of the subsoil is extremely firm, reddish brown clay that has a few, distinct mottles in shades of brown. The lower part of the subsoil begins at a depth of 22 inches and is firm, dark yellowish-brown silty clay loam.
> A seasonal high watertable rises to within 18 to 24 inches of the surface and is perched above the moderately slowly to slowly permeable subsoil and underlying till. The depth of soil available for rooting is mainly 18 to 24 inches and corresponds to the height of the watertable."

APPENDIX 3

Food Values to Wildlife

Beech-Sugar Maple SAF 60	
Beech (Fagus)	38/31
Sugar Maple (Acer)	61/33
Basswood (Tilia)	7/10
Elderberry (Sambuccus)	51/79
Pokeweed (Phytolacca)	12/28
Raspberries (Rubus)	118/97
Deciduous Swamp Forest SAF 39	
Ash (Fraxinus)	12/20
Hickory (Carya)	23/25
Elm (Ulmus)	17/20
Dogwoods (Cornus)	84/64
Viburnums (Viburnum)	8/25
Honeysuckle (Lonicera)	4/14
Barberry (Berberis)	8/11
Buckthorn (Rhamnus)	24/25
Wild Grapes (Vitis)	94/75
Virginia Creeper (Parthinocissus)	26/30
Poison Ivy (Rhus radicans)	66/61
Edge Habitat	
Poplar (Populus)	46/28
Willow (Salix)	37/25
Sweet Cherry (Prunus)	104/81
Raspberries (Rubus)	118/97
Staghorn Sumac (Rhus)	46/50
Ragweed (Ambrosia)	164/71
Knotweed (Polygonum)	86/61
Clovers (Trifolium)	49/40
Docks (Rumex)	21/35

- Food values from Martin, C.A., Zim, H.S. and Arnold, L. Nelson. American Wildlife and Plants. Dover Publications, N.Y. 1961.

"The numerical ratio gives a rough quantitative index of the value of the plant as a wildlife food. The numerator provides a food-use index based on the percentage of total diet the plant represents. The denominator indicates the total species of animals that use the plant to an appreciable extent. A low numerator over a large denominator indicates that each plant is used by many wildlife species but only to a limited extent by each. A higher numerator and small denominator characterizes a plant of great importance to a limited segment of wildlife."

The data is based on field studies and laboratory studies on the use of trees, shrubs, weeds and herbs by birds and mammals throughout the United States.