ROCK CREEK WATERSHED HABITAT SURVEY AND INVENTORY OF FAUNA & FLORA

Montgomery County, Maryland

THE MARYLAND-NATIONAL CAPITAL PARK & PLANNING COMMISSION

ROCK CREEK WATERSHED HABITAT SURVEY AND INVENTORY OF FAUNA AND FLORA MONTGOMERY COUNTY, MARYLAND

By

Robert Shosteck

March, 1977

Prepared for: The Water Resources Planning Section,
Montgomery County Planning Department

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION
Montgomery County Planning Board

ABSTRACT

TITLE: Rock Creek Watershed Habitat Survey and Inventory of Fauna and Flora, Montgomery County, Maryland

AUTHOR: Robert Shosteck

SUBJECT: Environmental Inventory

DATE: March, 1977

PLANNING AGENCY: The Maryland-National Capital Park and Planning Commission

SOURCE OF COPIES: The Maryland-National Capital Park and Planning Commission 8787 Georgia Avenue, Silver Spring, Maryland 20907

SERIES NUMBER: 0357772501

NUMBER OF PAGES: 94

ABSTRACT: This report describes the ecology and natural history of Rock Creek Watershed in Montgomery County, Maryland, from the District of Columbia boundary northwesterly to the headwaters. Information derived from topographic maps and aerial photographs combined with field studies is used to describe natural habitats and to note areas of special interest considered worthy of preservation based on environmental uniqueness or criticality. Also, areas are noted which are considered suitable candidates for extension of the parklands or for protection to prevent or correct environmental degradation. Segments of the stream valley are described in detail progressing upstream from south to north. Inventories of the fauna and flora and descriptions of wildlife typical of each habitat in Rock Creek Watershed are provided in the last three chapters.

The opinions, findings and conclusions expressed in this report are those of the author and do not necessarily represent those of the Maryland-National Capital Park and Planning Commission. This report was prepared as part of a comprehensive stormwater management plan for the Rock Creek Watershed being developed by M-NCPPC.

THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

Royce Hanson, Chairman
W. C. Dutton, Jr., Vice Chairman

Montgomery County Planning Board:

Royce Hanson, Chairman
Mable Granke
Richmond M. Keeney
George O. Kephart
Helen Scharf

Prince George's County Planning Board:

W. C. Dutton, Jr., Chairman
Edwin H. Brown
John W. Churchill
Ann Hopper
Raymond G. LaPlaca

DEPARTMENT HEADS

Don L. Spicer
Executive Director

A. Edward Navarre
Secretary-Treasurer

Richard E. Tustian
Montgomery County Planning Director

John F. Downs, Jr.
Prince George's County Planning Director

COMMISSION REGIONAL OFFICES

8787 Georgia Avenue, Silver Spring, Maryland 20907
6600 Kenilworth Avenue, Riverdale, Maryland 20840

TABLE OF CONTENTS

TABLES

FIGURES

Chapter 1

Introduction

This study of the Rock Creek watershed in Montgomery County was undertaken in August, 1976, on the basis of an agreement with the Commission dated August 20, 1976. The survey and report embrace the stream valley and the watershed, from the D.C. line to the Creek's source in the vicinity of Laytonsville. Commission-owned land was studied intensively by field trips to the areas and by the study of topographical maps and aerial photographs. Field trips included travel by foot through park areas and adjacent woodlands, pastures, old fields and cultivated areas to make assessment of their environmental impact on the stream valley and the need to control present or possible future damage to the environment by acquisition of such areas or the securing of easements.

1.1 Methodology

Reliance was placed chiefly on field observation, in the gathering of data on habitats, flora and fauna, environmental hazards and unique aspects of an area. Canoes were used twice to study the shoreline of Lake Needwood, the marsh at its upper end and the short navigable portions of Mill Branch and Rock Creek above the lake.

Woods trails were followed where these existed. Many side excursions were made to high points, adjacent woodlands and into unique areas to obtain a maximum amount of data on a particular area and to aid in the interpretation of aerial photographs.

The park staff at Meadowside Nature Center and at Lake Needwood was especially helpful in providing supplemental information, occasional transportation, and personnel to accompany me on trips into trailless areas.

The determination of specific habitat areas was made primarily by field observation and pencilled notes on the 200-foot scale topographic maps provided by the Commission. The specific outlines of each habitat area in a given sector

were prepared later by interpretation of the aerial photographs. These clearly distinguished most of the habitats identified on each map.[1/]

Floodplain often gradually merges into woodland, and there often was not a sharp line of demarcation. In most instances the boundaries were determined by the stream valley contour lines, since ground observation indicated that these were a reliable guide.

The aerial photographs clearly distinguished cultivated grass and pasture from woodlands and from old field communities. These photographs also helped distinguish the very small areas of conifers from deciduous hardwoods. The relatively few marshlands were all of small extent and easily marked on the maps.

Clearly established, but informal foot trails as well as some bicycle and bridle trails also are indicated on the maps, as are some dirt roads and other works of man not shown on the topo maps.

Notes were made on birds, mammals, reptiles and other fauna observed; also on trees, shrubs and herbaceous plants. About fifty plant specimens were collected, pressed and deposited in the herbarium at Meadowside Nature Center.

1.2 Description of Habitats

Seven habitat types were selected for delineation on the 200-foot scale maps on the basis of utility and feasibility. These were chosen after consultation with some Commission staff members and after a review of literature relating to the use of habitat types.

1.21 Grassland and Cultivated land

This category, identified by white (unmarked) background on the map, includes every type of open land, such as pasture, meadow, fallow or cultivated fields and open park (grass) land. In the text, the specific use of a tract of open farm land is often noted. Such usage may change from year to year through crop rotation.

1.22 Old Field Community

Identified by broken parallel lines, this category embraces once-cultivated land, abandoned within a decade, more or less. Much of the land so designated was purchased in recent years by the Commission and permitted to return to its natural forested state. The point at which the old field community becomes a hardwood community often involved an arbitrary judgement. Usually the change of designation was made when the new tree growth was about ten years old and was clearly dominant over all other types of vegetation.

Dominant plant species included the coarse summer and fall-flowering annuals and perennials, blackberry vines, multiflora rose, and young saplings of

---

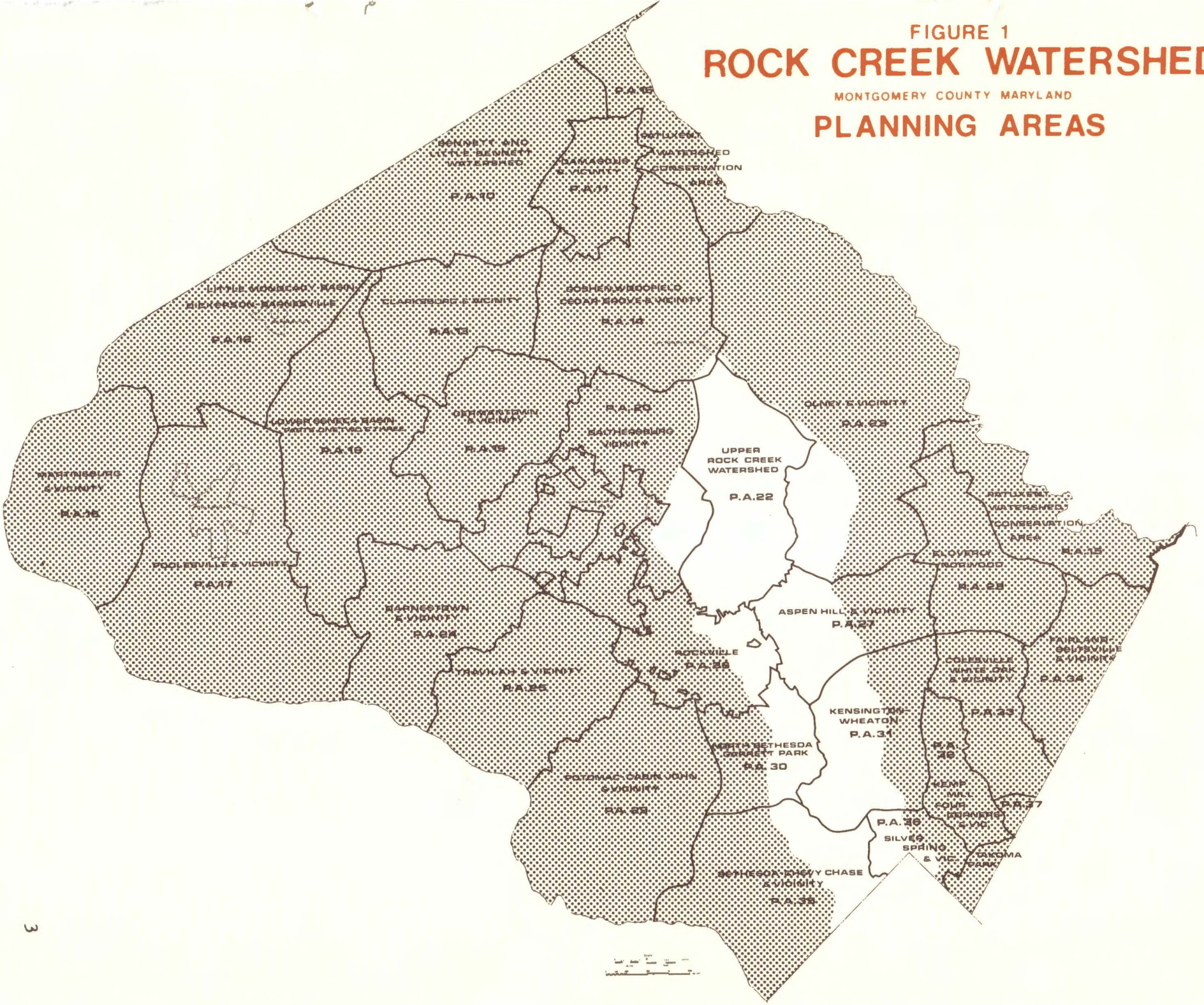
[1/] Reference to 1-inch to 200-foot scale topographic maps depicting habitat areas. These are available for inspection at M-NCPPC offices in Montgomery County.

FIGURE 1

ROCK CREEK WATERSHED

MONTGOMERY COUNTY MARYLAND

PLANNING AREAS



hardwoods that grew in adjoining woodlands--wild cherry, various oaks, ash, and poplar. Occasionally there were scattered conifers, as red cedar and Virginia pine.

1.23 Hardwoods

The areas designated as hardwoods, identified by parallel lines, are cutover woodlots, the trees from ten to perhaps fifty years old. Interspersed, are single, much older specimens, chiefly sycamore, tulip poplar, red maple, white and red oak, hickory, beech and sour gum. These older trees were spared, it is assumed, because of inaccessibility, hollow trunks, or non-marketability of the species.

The few areas with a considerable number of mature trees are noted in the reports on specific park areas where they occur.

The number of species and the dominance of any one or more species varied with areas and topography. Tulip poplars seem to hold a commanding position, being observed in every area and most numerous per acre in many areas.

1.24 Coniferous Woods

This habitat type is designated by lines of dots. There are very few areas in this category. In several cases they represent plantings of white pine or other conifer, as spruce and hemlock. Other areas are Virginia pine succession growth, on land that was once cultivated. In several instances the pine, while still dominant, is being succeeded by climax hardwoods.

1.25 Marsh Land

This habitat type is designated by parallel vertical lines. A few small areas that came under this designation were open wet lands, distinguished by a unique flora. Woody plants include willow and alder; while herbaceous plants include aquatic sedges and rushes, tearthumb, arrowhead, smartweed, cattail, millet, pondweed and spatterdock.

There were numerous amphibians; some snakes and ducks also were noted. Occasional kingfishers and swallows were seen.

1.26 Wooded Floodplain

This habitat, identified by diagonal, parallel lines, occurs primarily along Rock Creek and its principal tributaries. The areas are low-lying, flat bottom land with poor drainage and subject to periodic flooding after heavy rainfalls.

Typical vegetation includes red maple, box elder, ironwood, white ash, willow, spicebush, skunk cabbage, greenbrier, multiflora rose and jack-in-the-pulpit. Evidences of muskrat, raccoon and opossum were noted; kingfishers and ducks sighted. Bedding sites of deer were also seen.

These areas are readily identified on the 200-foot topographical maps by the relatively great distance, often several hundred feet, between the watercourse and the first contour line. In many instances the floodplain gradually merges into hardwood forest as the ground level rises imperceptibly. In such cases the dividing line is somewhat arbitrary, often governed by the location of the 5-foot contour line.

1.27 Swampy Floodplain

Diagonal broken lines identify this habitat. It differs from the preceding in the extremity of its wetness. The drainage is so poor that the land is wet and muddy virtually the year round and difficult to traverse. Extensive temporary ponds occur after heavy rains.

Chapter 2

Environmental Impacts

2.1 The Rock Creek Watershed - Its Impact on Our Environment

The wooded portion of this watershed plays a very important role in determining the present and future quality of the environment of the people who live, work or play in this area. Woodlands have a direct impact on wildlife, recreational activities, water quality, erosion and pollution control, and atmospheric temperature. Our woodland parks provide a haven for quiet rest, inspiration and enjoyment of outdoor activities.

Contrasted with other types of land cover, our woodlands form a permanent, stable habitat, persisting indefinitely unless disturbed by a natural or man-made catastrophe. They contribute to an ecologically stable natural environment.

An understanding of a natural ecosystem is essential to an appreciation of the importance of the wooded land cover of the Rock Creek watershed in contributing to the quality of our environment. The ecosystem has four basic elements; nonliving materials such as rocks, soil, water and minerals; food producers such as green plants; food consumers which embraces all kinds of animals, the invertebrates, birds, mammals, etc.; and the decomposers, made up mainly of fungi and bacteria in the topsoil, which break down plant and animal matter into eventual plant food. Lichens and mosses also play a minor role.

Much of Rock Creek's woodlands are identified as pre-climax; some as climax. It has developed over a long period of time, as successor to a coniferous woodland or to abandoned farmland. Typically this climax or pre-climax stage is a mixed hardwood forest in which one can observe ten or more species of trees and shrubs. An acre of streamside or slope land may have a few mature climax trees, many pre-climax trees from 10 to 50 years old, and thousands of seedlings, saplings, shrubs, vines and herbs beneath the forest canopy.

The topsoil teems with a multitude of organisms, worms, insects, fungi and bacteria. Animal life subsists on both the plant life and on the smaller organisms.

The forest plays an important role in conserving plant nutrients. The leaves, twigs and branches that die and fall to the ground are soon transformed into litter and humus. These act as a sponge, holding down water runoff and loss of nutrients. The excessive runoff and soil erosion in the Rock Creek watershed is a direct consequence of the removal of the tree cover in a very large part of the area, incidental to urbanization and agricultural activities.

We can fully appreciate the value and importance of this forested area in our watershed by an awareness and understanding of other benefits of woodlands. The leafy canopy prevents much of the sunlight from reaching the ground. This helps to moderate temperature extremes. The day is noticeably cooler, the nights somewhat warmer than in nearby open areas. Scientists have found a difference of six to eight degrees; a welcome relief during hot weather. The air also feels cooler because of the cooling effect of transpiration, the evaporation of water vapor from leaf pores. One large shade tree can give off up to a hundred gallons of water on a hot day, providing a significant cooling of the immediate area. The moderating impact on air temperature makes the park area especially attractive for picnicking, hiking, biking and relaxation during spells of hot weather.

During the colder months a forest has an appreciable effect in slowing down wind speed, while acting as an effective windbreak. Trees have the same impact on winds at other times of the year, when it may be less noticed or appreciated.

Trees are also effective sound barriers, absorbing sound and making it less intense. While trees have little impact on sounds above, such as aircraft, they can reduce sound considerably from a busy highway if the tree barrier is more than 300 feet deep.

Tree leaves also collect dust particles, removing them from the air. A mature hardwood may have as much as 15,000 square feet of leaf surface to which dust can adhere. This is translated to several pounds of dust collected each summer by one big tree.

A most significant function of trees is one which cannot be observed, but which affects us in countless ways. During the growing season, trees, as well as all other green plants, carry on photosynthesis. This is the process whereby the plant uses sunlight to combine carbon dioxide from the air with water and minerals carried up from its roots to manufacture food for its own use. Countless species of animals, birds, and insects feed on plants. Green vegetation gives off oxygen as a by-product, essential for survival of all animal life, including man. Forests account for a major part of this carbon dioxide-oxygen exchange.

Turning to esthetic considerations, forests add a dimension of beauty and interest to the landscape and make possible the observation of many forms of wildlife that inhabit the forest.

A woodland is the natural habitat of many mammals and scores of bird species. It is also a home for amphibians, reptiles, and insect life; and its streams are the home for fish and other aquatic life. In the fall the vari-colored foliage of trees lures great numbers of visitors to the parks.

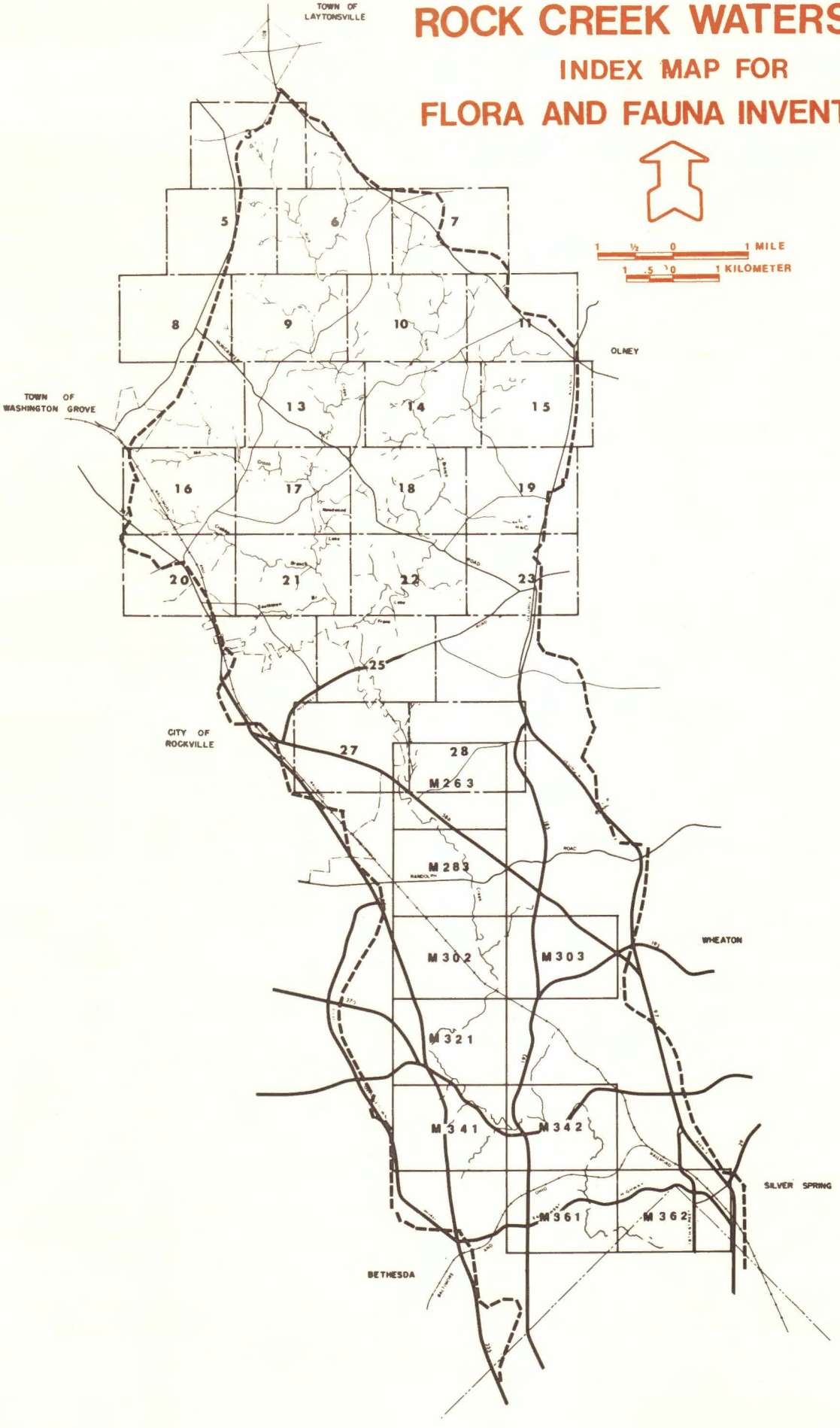
Soil erosion is a serious and continuing problem in the Rock Creek watershed. This problem can be controlled to some extent by engineering techniques. A

FIGURE 2

ROCK CREEK WATERSHED

INDEX MAP FOR

FLORA AND FAUNA INVENTORY



more permanent control is through an increase in the wooded area in this watershed.

Studies have shown that forests with undisturbed litter and humus covering are effective in minimizing erosion and loss of soil nutrients. This is due to the fact that there is little or no water runoff from the surface after a heavy rain.

Wooded tracts also have a marked effect on the amount of sediment entering streams. A study made by the U.S. Forest Service showed six times as much sediment entered streams from adjacent cultivated land as from nearby forest land.

Forests also reduce the intensity of flooding due to heavy rain or melting snow. When open fields are frozen solidly the forest floor is open to some percolation, hence less runoff of water. Snow remains longer on the forest floor than in open areas, thus easing runoff during warm spells.

2.2 Impact of Urbanization on Rock Creek

The greater Washington area is one of the few metropolitan areas that is bisected by a stream valley park. This Maryland park--about 4,000 acres--is utilized by hundreds of thousands for various recreational activities and, to a lesser extent, for commuting to and from work.

At the same time the stream valley is the natural drainage for fifty square miles of adjacent urbanized areas. The effects of erosion, pollution and sedimentation are to be seen everywhere along Rock Creek and its major tributaries.

The evidence of urbanization's impact is most pronounced after a heavy rain. The creek swells and often overflows its bank within a few hours. Scores of storm sewers that empty the runoff into the creek and its tributaries along its twenty-mile course in Montgomery County carry a heavy load of topsoil and rubbish; one estimate is 100,000 tons per square mile per year. Added to the storm sewer waters is the runoff from grassland and from cultivated land which are no longer able to absorb an appreciable amount of the rainfall. This problem has grown gradually with the increased urbanization of the County. It is aggravated every time a new street is put through, ground is leveled for housing or a new shopping center is constructed.

Urbanization also has an opposite effect. When development of a tract of land takes place, springs and small streams fed by underground aquifers that store and gradually release ground water often are covered up, and a sewer line replaces the former stream. Thus, there is a marked diminution in the amount of water that reaches Rock Creek in a steady year-round flow. During extended dry spells the flow of water is markedly diminished and in many tributaries the flow may cease temporarily. The flooding and temporary drying of tributaries, the deposition of silt, and bank erosion all adversely affect vegetation. Many fragile species of wildflowers now are absent from the floodplain, their natural habitat. In many floodplain areas undesirable species, such as Japanese honeysuckle and multiflora rose, tough species that can withstand adverse conditions, due to flooding and sedimentation, have become well-established.

The rapid accumulation of sedimentation in Lakes Frank and Needwood is a clear reflection of the problem of soil erosion in the Rock Creek Watershed. Both of these lakes are in the upper reaches of Rock Creek and its North

Branch, where urbanization is much less extensive than downstream from these lakes.

Relatively little can be done in the immediate future about the problem of erosion, pollution, sedimentation that has arisen from existing urbanization. We can take steps to prevent a worsening of this situation in the years ahead by accelerating the program of land acquisition. Of special importance is the purchase of stream valley woodlands and abandoned fields. Over a period of time the latter can be naturally restored to woodlands. These measures will help to stabilize runoff stormwaters.

We cannot overlook the contribution of land presently under cultivation to the problem of stormwater runoff and sedimentation. Instances of severe runoff and soil erosion were noted in corn fields on sloping land in the upper Rock Creek watershed. Such land--in a few cases less than 100 feet from Rock Creek--should be acquired and taken out of cultivation or owners persuaded to convert it to pasture land.

A contributing factor in the erosion and sedimentation of Rock Creek is the growing use of motorbikes or minibikes in park areas up county. Evidence of such illegal use was noted in three diverse areas. The largely teenage, unlicensed, motorbike drivers crisscross park areas with paths and take special delight in speeding up and down hills, wearing away the topsoil and creating gullies through erosion. This activity has had an adverse effect upon the vegetative community in the park area south of Parklawn Cemetery.

Chapter 3

Description Of Segments Of The Rock Creek Stream Valley

3.1 D.C. Line to Connecticut Avenue (Sheets M-361, M-362, and M-342)

This segment of the park extends for four miles along the creek and averages about 1,000 feet in width. It is bordered by urbanized areas, except for 1.2 miles along the east side, between the B&O Railroad and I-495, where the undeveloped land is part of the Forest Glen Section of the Army Medical Center.

The park occupies the Rock Creek floodplain, except for a very narrow strip of slope, typically less than 100 feet wide, along the east side and at several points on the west side. The entire area is subject to flooding after heavy rains.

From the D.C. line to the B&O overpass, the park consists of grassy area with recreational facilities plus patches of open woods. A bicycle trail extends from East-West Highway northward.

More than half of the park area between the D.C. line and the B&O Railroad overpass is in grassland. The remainder is wooded. There appears to be less than an acre of open unmowed land in this segment of the park.

Most of this open grassy area is used for or is immediately adjacent to recreational facilities. However, several areas were noted that are used little, if at all, and might well revert to open field status. This move would save on maintenance costs and enrich the environment by leading to the natural introduction of many new species, both fauna and flora. The areas recommended for such reversion are listed below.

A. Approximately four acres north of East-West Highway and east of Beach Drive, on the west side of Rock Creek.

B. Approximately two acres on the east side of Rock Creek, south of the B&O overpass.

C. A 50- to 100-foot strip along both sides of Rock Creek in areas not used for recreational purposes.

North of the railroad overpass, the park is largely densely wooded floodplain. The bike trail and then a foot trail follows the east side. The latter should be improved and given official status as a foot trail for hikers. This would provide access to several areas of natural and historic interest and make possible a continuous walking route through Rock Creek Park, D.C. and Maryland.

An open marshy area covers about half of the floodplain on the east side from the railroad overpass to the bend in the Creek. This is of recent origin, probably created in the past decade, judging from the fact that standing snags still have bark. It appears to have developed as a result of the alteration of drainage in the area. It now contains typical marsh vegetation and animal life.

The wooded floodplain on either side of the bike trail contains many old trees, chiefly sycamore and tulip poplar, many 100-150 years old. There are also fine specimens of mature red maple, river birch, black and red oak, and white ash in the area.

The floodplain suddenly narrows to less than 100 feet; in a few places, less than 25 feet wide. The slope here is covered with banks of ferns, and old beech trees are predominant among the hardwoods. There are several very old tulip poplars, the largest measuring 16 feet in circumference.

The foot trail follows the slope and then the route of a former road built by the Army Medical Center. There is a small man-made pond, and the woods in the vicinity appear to have been clear cut about a decade ago. This area has reverted to old field status.

The floodplain again widens here. It is very wet, wooded, and heavily overgrown. The foot trail follows the edge of the slope, to the former route of Beach Drive, then along the old road to the present Beach Drive bridge over Rock Creek. Enroute, it passes a former rock quarry.

The west side of Rock Creek north of the B&O overpass is a wooded thicket for about 600 feet to the vicinity of Clean Drinking Manor spring. This protected spring supplied water to a manor under this name, patented about 1699. It is now in park property, well protected and provides clean drinking water.

The route from this point follows a short path to the bike bridge over Rock Creek, then the bike path northward. Gardens occupy an area to the left of this trail. The path now enters a wooded area, formerly a nursery. It passes a tract of mature white pine and spruce left by the nursery about 40 years ago. A knowledgeable passerby is apt to see other exotic trees and shrubs once part of the nursery. The right side is a wet wooded floodplain and beyond is a willow swamp, somewhat open.

The bike route passes through a walnut grove as it emerges near Jones Mill Road. The largest tree has an 11-foot circumference. One can barely discern the route of the millrace between rows of trees, to the mill site, at the point where Beach Drive formerly made a sharp right turn toward Rock Creek. A marker in the stone post on the corner of LeVelle Drive and Beach Drive commemorates Clean Drinking Manor, 1686.

An extensive, semi-open willow marsh occupies much of the floodplain beyond I-

495. A footpath follows the creek northward from the point where Beach Drive comes to within 150 feet of Rock Creek. This path joins the bike trail within 800 feet of Connecticut Avenue.

Several historic sites are located in this lower section of the park. The impressive classical-revival style barn (part of Meadowbrook Stables) once belonged to the Callaghan estate, one of the early wealthy land-holding families of Montgomery County.

Farther upstream, above East-West Highway, was the Clean Drinking Manor, patented in 1699 to Col. John Courts. Charles Jones, who married Courts' daughter, erected a manor house in 1750. Many notable guests were entertained here, including Washington, Clay and Webster. The manor was occupied until 1911 when it tumbled down some time after the death of Nicholas Jones, its last occupant.

Two nearby road names recall the Jones family, as does the mill site, located at Jones Mill Road and LeVelle Drive. The original spring was mentioned earlier in this report.

Reference was made earlier in this report to the unusual stand of mature timber and fern undergrowth along the west bank. This habitat deserves maximum protection. This can be achieved through the acquisition of a 200- to 400- foot strip of wooded slope extending from the County maintenance yard to the urbanized area known as Forest Glen Park. Most of this woodland is under the jurisdiction of the Army Medical Center. A small portion, unfortunately, has already been cleared.

Large Trees on This Route

Sycamore	9' circ.	200' N. of B&O overpass, in floodplain
Sycamore	12'3" circ.	225' N. of B&O overpass, in floodplain
Sycamore	10'0" circ.	300' N. of B&O overpass, infloodplain
White ash	9'0" circ.	450' N. of B&0 overpass, in floodplain
Sycamore	14'10" circ.	Left side of bike path, near crossing
American elm	10'2" circ.	near bike bridge
Sycamore	15'0" circ.	near bike bridge
Tulip poplar	16'0" circ.	hillside trail
Tulip poplar	16'5" circ.	hillside trail
Beech	10'0" circ.	hillside trail
Sycamore	15'0" circ.	Jones Mill Road in walnut grove
Walnut	11'0" circ.	Jones Mill Road in walnut grove

3.2 Connecticut Avenue to Knowles Avenue (Sheets M-341 and M-321)

This three-mile segment of Rock Creek Valley is urbanized on both sides of the narrow strip forming the park. For almost half the distance the park strip is shared with I-495, which narrows the park to a mere 200 feet, gradually widening northward to 900 feet. This portion of the park provides space for Beach Drive, a bike trail and many picnic and recreational facilities.

For the most part the park area is floodplain with only small segments not subject to periodic flooding following heavy rains. Virtually all park facilities and greensward are on the east side, as is the bike trail.

The west bank is largely undeveloped, typically an almost inpenetrable thicket, canopied by old trees. The thicket and swampy area south of Cedar Lane on the west bank is home for a colony of beavers established in 1976. These animals may have migrated downstream from upper Rock Creek, halting their migration in the midst of a poplar thicket, an attractive food supply. The floodplain thicket also is the habitat of small mammals, such as raccoons and squirrels, woodland song birds and ducks.

All through this floodplain area one may observe magnificant specimens of trees which have survived the vicissitudes of a century or more, chiefly tulip poplar, sycamore, white oak and red maple. Exceptional specimens may be seen on the north side of Beach Drive and Grosvenor Lane, and several hundred feet south of Knowles Avenue and Weymouth Street, near the creek bank.

The park area along the bike trail from Franklin Street to Saul Road has unique features worthy of mention. The only pure stand of conifers in this section of the park can be seen here. These Virginia pines were the succession growth on abandoned farmland. They, in turn, are being succeeded by hardwoods in a portion of the stand. Further along, where the trail enters the woods, are scores of trees that may be approaching the century mark. These trees, mainly tulip poplar and sycamore, apparently were spared the axe because of their inaccessibility.

While most of the east bank is open woods and grassland that is mowed regularly, there are many open places, especially along minor tributaries and in horseshoe bends in Rock Creek where mowing is not feasible. Here the wildflower enthusiast can see a diverse array of species, especially in summer and fall. These small natural islets should remain undisturbed for all to see and enjoy.

It appears that the extensive mowing of grass in much of this stream valley is done for esthetic reasons, not because of public use. The Commission could save a considerable sum in maintenance costs if the mowing were restricted to picnicking and recreational areas and to a narrow strip along Beach Drive and the bicycle paths. The remaining open area would then revert to field status. This would lead to return of all kinds of open field wildflowers and the birds and mammals such a habitat supports.

This bike trail is very popular, especially on weekends. Its use is shared by bikers, hikers and joggers. It appears desirable to take some sort of a periodic traffic count, either manually or by some mechanical means. Specific data on traffic would provide a convincing argument for the extension of the trail beyond Wexford Drive, present terminus of the Rock Creek bike route.

This segment of the park, like other areas of the lower park, suffers from the same consequences of heavy runoff after rainstorms. Serious erosion and sedimentation are evident at many points, and the stream and floodplain provide ample evidence of another consequence of flooding--the numerous tires, plastic objects and trashy debris seen so frequently. There is considerable and unsightly erosion at almost every storm sewer outlet and at the many small tributaries that empty into Rock Creek. Urbanization is here to stay; an effort can be made to repair and stabilize.

Consideration should be given to the improvement in the existing informal foot trail along the northwest bank of the creek from Kensington-Garrett Park Road southeasterly to Rockville Pike. The people living in the adjacent area do not have ready access to the bike and hike trail on the Kensington side. Such a trail with a foot bridge over Rock Creek at a midpoint would be a worthwhile improvement.

3.3 Fleming Avenue Local Park (Sheet M-321)

This local park fronts on Fleming Avenue to the west, Capital Beltway on the south, the Grosvenor estate and a non-profit organization, Renewable Natural Resources Foundation, on the north and east. The park is chiefly open grassland with recreational facilities, except for the wooded southeast portion. This is a combination of hardwoods, some 40-50 years and new growth under 10 years. A ravine here is the source of a small brook feeding into a tributary of Rock Creek.

This park should be considered for enlargement because of two unique features of adjacent terrain. The narrow wooded triangle to the east and a small area to the northeast are the source of a significant tributary of Rock Creek. This triangle appears to have little commercial value since it abuts the Beltway and is relatively inaccessible.

The stream's source is a spring above a small man-made pond, about 100 feet from the northeast corner of the park on Foundation property. It passes within several feet of the northeast corner of the park and proceeds eastwardly through mature hardwoods to a culvert beneath the Beltway. The slopes here are relatively steep, a drop of 50 feet from high point to the stream bed.

This wooded area shows evidence of considerable uncontrolled use by persons living in the area. There are numerous trails, picnic and camp sites, some trash and cutting of small trees. The suggested acquisition area is under ten acres.

3.4 Knowles Avenue to Veirs Mill Road (Sheets M-303, M-283 and M-263)

This segment of the park is about 4 miles long and from 700 to 2,000 feet in width. Park borders are completely urbanized, except for a cemetery which abuts for a half mile. The stream valley shows all of the consequences of excessive runoff of stormwaters, such as stream bank erosion, deep gullies in minor tributaries, and all sorts of debris, including old tires, grocery carts, lumber, plastic items, old appliances, and uprooted trees and broken branches. Many otherwise healthy trees have toppled into the creek because of erosion of the stream bank.

The park area is entirely wooded except for grassy recreational areas and open roadsides. The wooded floodplain and adjacent slopes are covered with mixed hardwoods. There are many mature trees, some in excess of 100 years old in many areas. A number of these trees were measured and are listed at the end of this section.

There are several areas of special interest. North of the B&O Railroad overpass, to the right of the baseball field in the Ken-Gar Recreational Area, is a crescent-shaped marsh about 400 feet long. This area contains the usual marsh vegetation and is the habitat of marsh-loving birds, frogs, and insects. North of

this area is the extensive outcrop of a former quarry. The site of Newport Mill is of local historical significance. This merchant grist mill, also known as Duvall's Mill, stood on the east bank of Rock Creek, a short distance north of the B&O Railroad overpass. Because of alterations in the land, no certain trace of this mill remains.

The stone arch railroad bridge, festooned with vines, was constructed in the early Twentieth Century, replacing an earlier wooden bridge over the creek.

Above Garrett Park Road a wide, grassy path follows the route of a sewer line laid through the park some years ago. This path and other informal trails further upstream should be identified as walking, possibly walking and biking trails, and improved where needed. The improvements needed are chiefly the elimination of low, wet places along the trail by elevation and drainage. The suggested trail route would cross over to the west bank at the Randolph Hills footbridge to take advantage of the woods trail on that side. What is probably the largest tulip poplar in the park is within 100 feet of this footbridge.

The narrow strip of west bank woodland, both on floodplain and slope, between this bridge and Veirs Mill Road, contains scores of century-old trees and hundreds of others which can be classified as mature specimens. An informal trail used by local residents traverses this area. It should be considered for improvement and given official status as a hike and bike trail.

The Veirs Mill site is of local historic importance. This merchant grist mill, also known as Rock Creek Mills, was built about 1838 by Sam C. Veirs and abandoned by its last owners in 1910. The head race of the mill is visible on the west side of Rock Creek for some distance above the mill site.

The mill site can be seen on the west side of Rock Creek a few hundred yards below the Veirs Mill Road crossing. Visible are the ruins of the stone dam and scattered, crudely cut stones that mark the foundation of the mill. The stone dam may have been a later development to create a pond that held the water for a turbine mill. Also in the area is the site of a former stone quarry. About 1,800 feet of the west bank of Rock Creek, from the vicinity of Randolph Road to Edgebrook Road, is largely mowed floodplain, except for an intermittent wooded strip along the creek. Except for the baseball field at the north end, it is recommended that a wider strip along the creek be permitted to revert to old field and eventually woodland. A similar suggestion is made for the grassy area on the west side of Rock Creek, south of the Randolph Hills Recreation Center.

Measured Specimens of Large Trees

Species	Location	Circumference
Tulip poplar	South of Knowles Avenue, West Side	10.5'
Red oak	South of Knowles Avenue, West side	11'
Sycamore	1/4 mile above Wexford Road	23'
River birch	Opposite Randolph Hill Recreation Center	9.5'
Tulip poplar	Near Randolph Hills Recreation Center	15'
Black oak	50' South of Randolph Road, on slope	12.5'
Sycamore	Above Randolph Road opposite play field	14'

Reducing the acreage of mowed grassland to the amount of land consistent with actual usage would eliminate the maintenance costs of mowing. More importantly, an old field community would lead to the natural introduction of a variety of colorful and interesting native plants and with it a bird and mammal population that would enhance the natural history interest of the area.

3.5 Coleman Tract

A substantial park area surrounds the Coleman tract. This area lies south and east of Parklawn Cemetery, extending 2,800 feet on its south border and 2,200 feet on its west border next to the cemetery. The privately owned Coleman property of about 22 acres occupies the high central part of this tract.

The area is bordered on the south by a strip of land identified as "Proposed Outer Belt Freeway." This was once open land now reverted to young tree growth. To the west and southwest is an urbanized area of garden apartments. Rock Creek forms the northeast border of this triangular area.

One entrance to the tract is via the unused Gaynor Road and either of two woods roads leading west from Gaynor Road. The former bridge over Rock Creek was removed some years ago.

The vehicular entrance to the Coleman property is via a bridge over Rock Creek opposite St. Jude's Church on Veirs Mill Road. This access road traverses park property and enters the Coleman property from the west.

A major problem in this park area is the maze of motor bike trails throughout the south quadrant of the park and, to a lesser degree, in other adjacent areas. The heavily used trails downhill toward Gaynor Road are severely eroded and gullied because of this illegal public usage. Immediate remedies are needed. Suggested are the barricading of the eroded trails with trunks of dead trees and patrolling of the entrances to the park from the urbanized areas to the west and south, to apprehend trespassers on motorbikes.

Another problem of lesser significance is the use of the park area for the dumping of trash, especially large appliances, such as refrigerators and automobile bodies. This can be prevented by the effective barricading of potential road entries into the area.

A considerable portion of park land to the north and northeast of the Coleman property is former pasture or cultivated land which was allowed to revert to forest land. This area is very difficult to penetrate because of the tangle of shrubs and vines. It should be good cover for small mammals, birds and snakes. The outer belt freeway strip to the south is a similar type of habitat.

Some unusual and interesting plants occur in this area. Among introduced species is the wisteria, which has spread widely through the southeast corner of the park land, west of Gaynor Road. Also noted were periwinkle, Fortune's euonymus, a spruce, Japanese knotweed and Eleagnus.

Native plants that are noteworthy included the sourwood, Carolina poplar, great lobelia, giant horsetail, ground cherry, crabapple, bittersweet, thimbleweed and some large colonies of wild ginger.

3.6 Veirs Mill Road to North Branch (Sheets 25, 27, 28 and M-263)

This three-mile segment of the park is from 1,000 to 1,500 feet in width most of the way, except for a somewhat wider area, up to 3,000 feet, north of Route 28, in the vicinity of Lake Bernard Frank. The park area is bordered on the west by four school properties, a golf course and by woodlands belonging to the City of Rockville. The east border is urbanized except for two schools.

The impact of severe erosion, due to the flow of stormwater, is noticeable along this route. Most storm sewer outlets and minor tributaries are deeply gullied. The stream valley is strewn with quantities of refuse, such as old tires, remnants of appliances, metal and plastic trash, lumber, tree limbs, etc. These apparently were carried into the stream during heavy runoffs.

A grass-covered sewer line follows Rock Creek the entire length of this segment. This treeless swath varies in width from 20 to 50 feet. The original grass planting is slowly being superseded by sun-loving flowering plants, a process to be encouraged by elimination of mowing. Natural succession should lead to the reappearance of trees along the entire length of the sewer line other than the immediate borders of trails.

A steep, rocky slope, rising up to 100 feet from the east side of the stream, is a unique landscape feature for a distance of 1,800 feet from the confluence of the North Branch with Rock Creek, southward. This slope is clothed with hardwoods and an understory that includes mountain laurel and ferns.

The west side here is a narrow floodplain, with mixed hardwoods covering the slopes up to the line of the school property.

The area around the dual spans of Route 28 over Rock Creek is predominantly scrub pine, with some admixture of hardwoods. Southwest of the spans is a large wooded area, hardwoods about 25-30 years old, belonging to the City of Rockville. This area should be preserved because of the unique "fern valley" ravine 600 feet south of Route 28. The floor of this valley is literally covered with Christmas fern, and by lesser numbers of maidenhair, Massachusetts, and other fern species. The park boundary line presently bisects this valley. Any alteration in the upper, city-owned portion of the valley, such as tree-cutting, would endanger or destroy this unique area.

Rock Creek meanders southward through a wooded floodplain, 300-500 feet in width, except for the open, grassy sewer line. The park incorporates a narrow strip 1,000 to 1,500 feet in width, with urban areas on either side.

The east border of the park, from the vicinity of Broome Junior High School to the end of Oriental Avenue, is a unique habitat area. It consists of a long, narrow, and shallow pond filled with aquatic vegetation and surrounded by a marsh. Typical aquatic vegetation such as cattail, arrowhead, sedge, and water plantain predominate. A green heron was noted feeding here, and frogs were plentiful. This should be preserved as a natural area. An informal path follows the west bank of this pond.

The west side of Rock Creek, formerly open land, is now largely covered with young hardwoods.

The area of the great horseshoe bend in Rock Creek immediately north of Veirs Mill Road was transformed into an island with the construction of a new channel

on the east side. The island is about 400 by 800 feet, some eight acres. It includes, near its center, a wooded ridge 40 feet above the floodplain. This island is covered with hardwoods, including many mature specimens, and there is an informal trail around its perimeter. It is easily accessible from the south corner, where it is channelized parallel to Veirs Mill Road. This island has a potential as a nature study area. It has been undisturbed by man for a long time judging by the number of mature trees. A black oak near the northeast corner has a circumference of 10.5 feet. There are five schools within a radius of a mile which could take advantage of a nature study area here.

The site of Horner's Mill is of local historical importance. The first mill on this site, built and operated by the Prather family, was constructed in the late 1700's. It is located on the north bank of Rock Creek, about 600 feet east of Avery Road. One can easily trace the head race from an old dam site near Southlawn Lane, along the north bank past Avery Road to the Mill site. The caved-in stone walls of the wheel pit are clearly evident. A small pool, the home of amphibians and other aquatic life, marks the wheel pit site. Also visible are the rough-hewn stones marking the foundation of a mill building.

3.7 Crabbs Branch (Sheets 20 - 21)

Crabb's Branch flows into Rock Creek from the west, about 400 feet below Lake Needwood dam. About 1.5 miles of the stream valley was traversed as far as the Carnegie Institute property. The floodplain ranges from 200 to 400 feet in width in the lower wooded half and is 300 to 600 feet wide in the upper marsh and open field area.

The stream is rocky and rapid flowing, falling 125 feet from the Carnegie property to its confluence with Rock Creek. From the Atlantic Seaboard pipeline westward, there are few trees on the floodplain, except for scattered willows along the streambank. The floodplain is open marsh for a considerable distance, bordered by cultivated fields. There is no open water other than the branch itself. This marsh plant community includes cattails, panic grass, bulrush, sedge, arrowheads, and tearthumb.

The woods covering the slopes on either side to the vicinity of the pipeline are mixed hardwoods, mostly about fifty years old with occasional older specimens.

Several odorous seeps of polluted water arise from the slopes on the south side of the branch. These originate in the County incinerator--landfill area which borders the park. These seeps pollute both the branch and Rock Creek and should be eliminated, if practicable.

The small wooded area of about 2.5 acres, northwest of the pipe line and south of the branch, should be acquired as part of the park. It is also recommended that the park boundary now paralleling Crabb's Branch on the north side for about 2,000 feet should be changed to include the stream and its marshy floodplain. This involves acquisition of a strip about 400 feet wide, an area of about 19 acres. The marshy area includes stable field borders which together form an important habitat area. About 20 species of wildflowers were noted (August) and there was an abundance of insects and bird life. A few small pools in the area are inhabited by schools of "minnows." There are relatively few such extensive open marshes and low-lying open fields in the park.

A very old tulip poplar is located along a fence row south of the Carnegie

Institute property, about 1,400 feet west of the westernmost corner of parkland. This tree is made up of three major branches arising from a three-foot trunk. Their total circumference is 19 feet; the major branch, 11 feet.

3.8 Lake Needwood and Lake Frank Areas (Sheets 17, 21, 22, 25)

These two areas in the Rock Creek basin are unique in that their public use exceeds that of any other area in the park, perhaps more than all areas combined. If this is truly the case, then a prime concern of the Commission is the protection of these areas from deterioration due to erosion, pollution and sedimentation, and to improve the environment by any practical means.

A careful inspection of these areas revealed that a very large proportion of the watershed is in woods or in old field communities which are slowly transforming into young hardwood forests. This augurs well for the future.

It is important that a number of spring-fed minor tributaries feeding into these lakes be protected from destruction or pollution. These minor stream valleys play an important role in the ecology of the area, and their alteration would result in a severe loss, both in terms of depletion or changes in the area's flora and fauna and in the educational use that is made of these areas, especially by the Meadowside Nature Center and the Lathrop Smith Environmental Educational Center.

A number of the minor tributaries referred to above originate in or pass through privately held areas now in woodlands. The pressures of urbanization could result in the partial destruction of these minor watersheds and with it changes for the worse in the adjacent environment.

Urbanization has already occurred in a number of areas very close to both lakes. This has resulted in the disappearance or near disappearance of a number of tributaries originating in these urban areas, all to the detriment of the park.

This report identifies adjacent privately owned wooded areas which are the sources of minor tributaries and which are still in private hands. These should be purchased for inclusion in the park system to protect the quality of the park in the future.

Both lake areas include small, open marshes, which are uncommon in the park. Muskrat Marsh is located at the head of Lake Frank, where North Branch makes a U-shaped bend as it merges with the lake. It is the home of a colony of beavers as well as muskrats and wild ducks.

Lake Needwood includes a major marshy area that extends from Needwood Road to the juncture of Rock Creek and Mill Branch. There is a smaller marshy area in the angle between Needwood Road and Beach Drive.

These unique areas provide shelter and food for many forms of aquatic life, waterfowl, muskrats, amphibians, snakes, fish, mollusks and insects, sedges, rushes, arrowhead, smartweed, water plantain, cattail--to mention the more important marsh types. These are often inter-dependent, and some are significant as food for non-marsh species.

Several significant historic sites have been identified in this area and are deserving of protection and, if feasible, incorporation into the park system.

"Rock Spring," an old Victorian farmhouse, once belonged to the Farquahar family. It is located on Rock Spring Drive off Bauer Drive and south of the inlet on the east side of Lake Frank. Still standing is an old barn and a nearby spring, both part of the original farm. These are just outside of present park boundary.

There is also an abandoned log tenant house, dating from the 1860-1870 period, which is worthy of preservation and inclusion in the park. It is located near the east boundary of the park, readily accessible from the end of Emory Lane, north of Jasmine Drive.

The Milton Farm, which dates from the mid-19th Century, is the last operating farm east of Rock Creek and south of Muncaster Mill Road. It lies as a buffer between the urbanized area to the east and the parkland in Rock Creek Valley. At one point this privately owned land is only 100 feet from the Creek. This farm should be acquired primarily to protect the park from eventual intrusion of urbanization to within a few hundred feet. The environmental impact of such urbanization could be very damaging.

The site of Muncaster Mill is within park boundaries, on the southwest corner of the intersection of Route 115 and North Branch of Rock Creek. The merchant grist mill was built in 1820 and abandoned in 1925. It was burned to its foundation in 1935. John Elgar built this mill, which was later sold to E. Muncaster, who operated it until 1878. George E. White leased it from Muncaster and operated it until 1920, when William Dove tooe it over.

This was the last mill to operate in Rock Creek Park. During its lifetime the mill served 30 to 50 farmers in the area. There was a large dam about a half mile upstream marking the start of the headrace. Traces are visible today upstream from the police stable. For some years there was a sawmill, operated by a water turbine. The sawmill foundation is about 75 feet west of the grist mill site. An old miller's house stands on Emory Lane near Muncaster Mill Road.

3.81 Areas Recommended for Acquisition

Lake Frank Area

1) Old field area west of Environmental Education Center, about 42 acres.

2) Tract between Center and Muncaster Mill Roads, exclusive of existing residence, about 60 acres. This tract includes a spring which is the origin of stream that flows into North Branch, west of Nature Center. The tiny Prather family cemetery, dating from the late 1700's, is located in this tract.

3) Tract beginning 2,800 feet west of Nature Center, includes small stream feeding into stream described above. This tract extends to Avery Road - 28 acres.

4) Pine tract north of fire road and east of Avery Road, northwest of Lake Frank Dam, including an historic church and a unique pine stand; 6 acres, including a sliver of private land on the opposite side of Avery Road.

Lake Needwood Area

1) Deep ravine and source of small tributary of Rock Creek, beginning 1,700 feet north of Southlawn Lane, about 2 or 3 acres. The lower part of this ravine in Rock Creek Park is an interesting fern-clad valley worthy of protection.

2) Hilly, wooded area lying west of Avery Road, west of present park boundary and north of Southlawn Road, extending 1,400 feet north of intersection of Southlawn and Avery Roads, about 22 acres. Acquisition of this tract would serve several purposes. It would protect the nearby Rock Creek watershed from the adverse impact of possible urbanization of a steep tract. It would provide a more adequate physical connection between the park's two most important tracts--Lake Needwood and Lake Frank. These are now joined by a sliver of land near the road intersection. It is here that the Big Pines Trail unites the two areas.

3.9 Mill Creek - Needwood Road to Redland Road, westward (Sheet 16 and 17)

This stream valley extends a distance of 1.8 miles from its juncture with Rock Creek, above Needwood Road, to the crossing at Redland Road. The park portion of the valley is entirely wooded, with most areas having 40-50 years' growth, and some only 10-20 years' growth.

The floodplain ranges from 200 to 400 feet in width, narrower at only two points. The growth here is mixed hardwoods, with tulip poplar, red maple, and white ash, the dominant species. A developed trail follows the south bank of the creek from Needwood Road to the first main tributary on the south; beyond this the trail is an informal one, a hiker's-hunter's trail all the way to Redland Road.

The park boundaries are very irregular, reflecting the urbanization of three major upland areas that abut the valley. At only one point, a wooded estate near Redland Road, does urban area come within 200 feet of the stream.

This valley has several unique features which should be preserved. The steep slope on the south bank on either side of Kildeer Drive beyond the first major tributary is heavily clothed in ferns, with Christmas fern the dominant species. This area also has some major rock outcrops, a unique scenic feature.

Along the north bank, about 1,300 feet from Redland Road is a quiet, narrow pond, the former bed of a tributary of Mill Creek. Today, it is the habitat of aquatic plants and insects, frogs and snakes.

Downstream several hundred feet from this pond is a black oak 10 feet in circumference. Nearby is a dramatic example of the impact of stream flooding and erosion. During a recent heavy rain the streambank was further undermined and eroded, resulting in the toppling of a large red oak, a smaller red maple and five smaller ironwoods, all within a space of about 50 feet in a sharp bend in the stream. All but the large oak were still alive. These are good photographic evidence of the damage caused by heavy bank erosion.

A narrow, wooded segment of the stream valley beyond Redland Road--about 1,700 feet in length--has been acquired by the Commission. This strip, which extends to Shady Grove Road, is bounded on the south by an urbanized area and

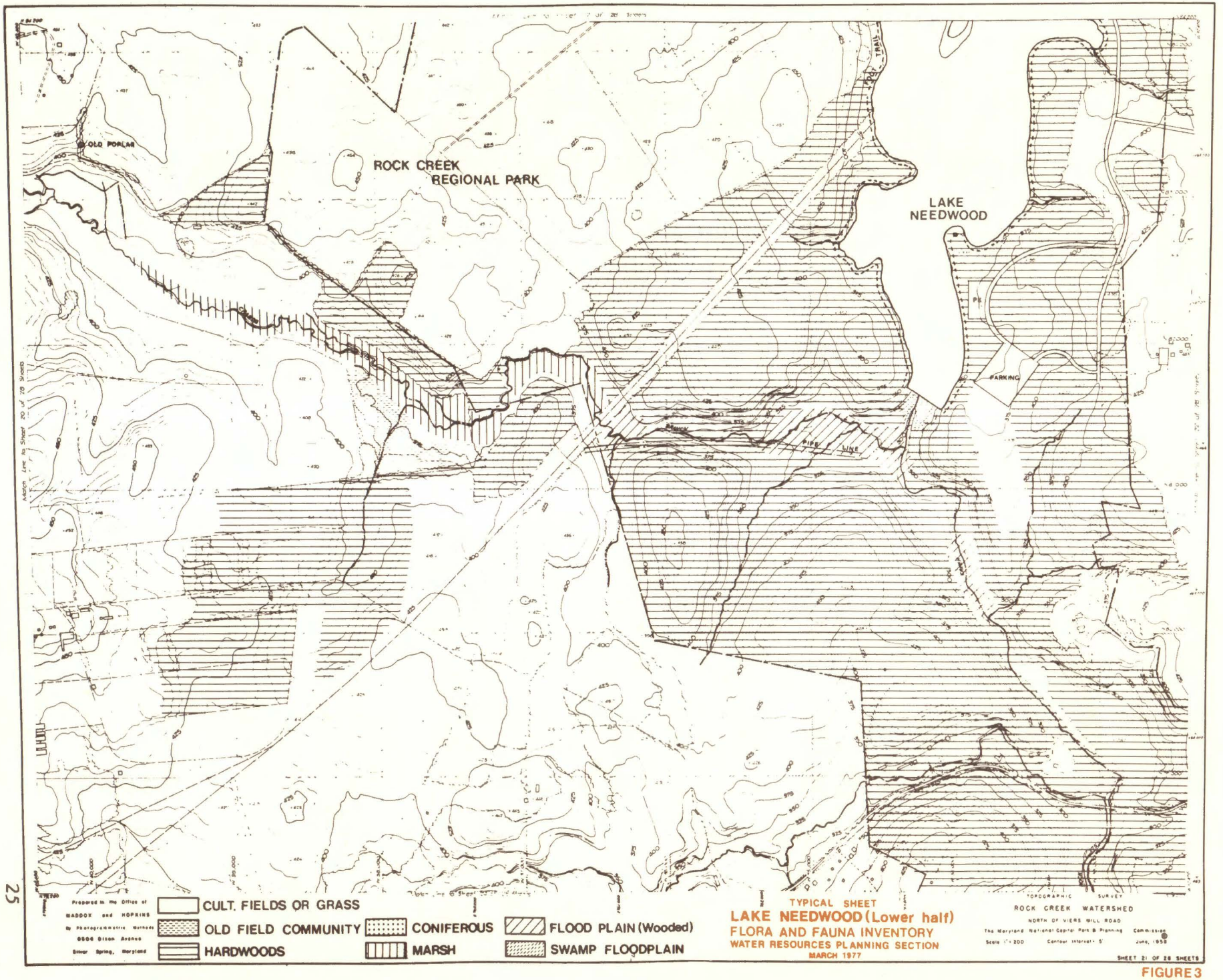

OLD POPLAR
ROCK CREEK
REGIONAL PARK
LAKE
NEEDWOOD
TRAIL
PARKING
PIPE LINE
CULT. FIELDS OR GRASS
OLD FIELD COMMUNITY
HARDWOODS
CONIFEROUS
MARSH
FLOOD PLAIN (Wooded)
SWAMP FLOODPLAIN
Prepared in the Office of
MADDOX and HOPKINS
By Photogrammetric Methods
8506 Gilson Avenue
Silver Spring, Maryland
TYPICAL SHEET
LAKE NEEDWOOD (Lower half)
FLORA AND FAUNA INVENTORY
WATER RESOURCES PLANNING SECTION
MARCH 1977
TOPOGRAPHIC SURVEY
ROCK CREEK WATERSHED
NORTH OF VIERS MILL ROAD
The Maryland National Capital Park & Planning Commission
Scale 1" = 200' Contour Interval - 5' June, 1958
SHEET 21 OF 28 SHEETS

FIGURE 3

on the north by farmland and a narrow strip of woods. The latter includes a small tributary of Mill Creek. This and an adjoining strip of cultivated land along Redland Road would be a desirable park acquisition. It would provide added protection for the stream valley.

3.10 Muncaster Mill Road to Muncaster Road (Sheet 13)

This segment of Rock Creek park is surrounded by cultivated land and woodlands, all in a rural area. The stream valley, both floodplain and slopes, is almost entirely wooded. The floodplain ranges in width from less than 200 feet to a maximum of about 600 feet; the average, 300-400 feet.

The upper part of this tract, extending about 1,800 feet downstream from Muncaster Road, is thinly wooded pasture land easily traversed. This is followed by heavily wooded floodplain difficult to traverse because of heavy undergrowth. Much of the land above the floodplain, previously in pasture or cultivated, has reverted to "old field" status, with young hardwoods competing with rank, weedy growth.

The pond on the east bank, once maintained by the Commission, is largely choked with aquatic plants and is now the habitat of waterfowl and other forms of aquatic life. The foundation of the former recreational building is nearby.

Walking is difficult along either bank of Rock Creek from the pond to Route 115 because of the dense undergrowth and thicket. Here much of the floodplain is in transition from old field to forest status except for the swampy area north and east of the junior high school property. This is somewhat open, permitting a dense growth of herbaceous vegetation.

An old dump of appliances and trash is located on a ravine at the edge of and within park property, about 600 to 800 feet north of the northeast corner of the school property. This trash appears to have been dumped about a decade ago.

The segment of the stream valley within a quarter of a mile of Route 115 is covered with a dense, weedy growth and only willows lining the banks of the stream.

There was considerable evidence of wildlife throughout the area, chiefly tracks and scats of deer, raccoon, woodchuck, fox and mice. Grouse, quail, doves, ducks, herons, snakes and frogs were observed.

There is relatively little human intrusion in this stream valley since there are no open trails on either bank of Rock Creek for the entire distance.

The large proportion of land classified as old field community augurs well for an increase in abundance of wildlife in this area. Such transitional habitats provide cover, food, and nesting sites for many species of mammals and birds.

3.11 Norbeck Estates Local Park (Sheet 19)

This local park embraces the valley of a tributary of North Branch for approximately 1,800 feet. It is a park-like woodland covered largely with mature hardwoods. The north boundary and the upper half of the south border is the Norbeck Estates community. The park has picnicking, recreational and

playground facilities; also two ponds. Both appear to serve as water retaining ponds to hold stormwater after heavy rains. Ducks occupy one pond.

The water flowing in this brook is clear, and at least two species of fish were noted. A pool at the upper end, in a semi-open area, is full of algae, suggesting an excessive pollution by fertilizers from nearby properties.

The steep wooded slope on the south border of the park is covered with hardwoods, including a beech that measured 14 feet in circumference. The principal species are red maple, tulip poplar, white oak and beech.

This wooded slope is entirely outside the park boundary which, for about 800 feet, is the stream itself or ten feet south of it. It is uncertain whether or not the old beech mentioned above is within the park.

A strip of 100 to 200 feet of this steep slope should be added to the park to protect both the watershed and the stability and esthetic quality of this local park. Such a strip would amount to 7-8 acres. The park and the Rock Creek watershed require added protection through the acquisition of the woods on either side of the tributary from its present western boundary all the way to its juncture with North Branch.

3.12 Muncaster Road to Laytonsville Golf Course (Sheets 9, 6 & 3)

This segment of Rock Creek valley differs from other areas surveyed in that more than three-fourths of the land is under cultivation; less than one-fourth wooded. It is also more level than other areas, since the maximum difference in elevation between the stream and nearby hills is but 75 feet.

There is little erosion or pollution, since the stream carries a relatively small volume of water in this headwater area, and the absence of urbanization likewise diminishes the problem of runoff, sedimentation and pollution.

Rock Creek is bordered by narrow strips of hardwood forest and by old fields covered with luxuriant vegetation, largely perennials and annuals. In some areas cultivated fields, chiefly in corn, come very close to the stream. A former man-made pond, located 3,200 feet upstream from Muncaster Road bridge over Rock Creek, was emptied in past years and now has a heavy growth of weeds.

Existing woods are somewhat open, suggesting former use as pasture land. One area is still used for cattle pasturage.

The only wooded area with trees in excess of 50 years of age is about a half mile from Muncaster Road on the right side of the creek. Here a white oak measured 11.5 feet in circumference. There are other trees, oaks and tulip poplar which are about the same size as the white oak.

There is abundant evidence of the presence of wildlife, such as deer-bedding grounds and droppings, woodchuck holes, and raccoon tracks. Wild ducks, quail and mourning doves were observed. No extensive marshlands were noted; only very small areas with cattails and arrowheads.

The pond referred to earlier was about 50 feet by 100 feet. Its restoration should be considered in any future development plan for the area.

The area between the north boundary of present Commission holdings and its small area near the PEPCO power line is one mile, as the crow flies. The stream valley here is bordered by a narrow strip of woods. The upper portion is heavily wooded while the lower is more open woods and old fields.

Rock Creek branches about a half mile below the PEPCO transmission line. The right branch includes a wooded tract almost a mile in length, about one-quarter mile wide and extending well beyond the PEPCO line. This tract, as well as the narrower wooded stream valley of the left fork of Rock Creek, should be considered for inclusion in the park domain.

A parcel of park property is adjacent to the Laytonsville golf course, under control of the Montgomery County Revenue Authority. A protected spring and old spring house on this golf course is considered to be the source of Rock Creek. To the east is a new development, Laytonsville Knolls. This new community is directly north of the wooded tract referred to in the paragraph above. It might endanger Rock Creek park in future years if this wooded area were destroyed to make way for urbanization, such as the enlargement of Laytonsville Knolls.

There are almost no trails along Rock Creek in this area because of the lack of urbanization and the absence of fishing opportunities.

Several places of significant historic interest are situated in this segment of the Rock Creek watershed. A tract known as Bussard's farm lies on the west side of Rock Creek. The farm belongs to the Commission but is occupied and operated by a farm family.

The farm house, believed to date from the 1860's, has been altered in Victorian style. The huge barn, over 60 years old, is considered among the finest in the county from a structural and architectural standpoint. There are 12 buildings on the farm in addition to the farmstead. A gravel road provides access from Muncaster Road.

This farm, with its rolling hills, cultivated area, old fields and woodlots to the east, should be considered a prime candidate for a Montgomery County Farm Museum.

To the north, on the east side of a branch of Rock Creek and within 1,000 feet of Muncaster Road and a half mile south of Route 108, is the Dooley log house, now covered with shingles. This house was built in the late 1700's and is worthy of preservation. It is situated within 800 feet of Rock Creek and is in private hands.

Some of the farmland in this upper watershed area is now farmed by a no-till cultivation method whereby herbicide and seed are mechanically applied. This area deserves monitoring to ascertain whether any environmentally adverse effects result from the heavy application of herbicides each season. A heavy growth of weeds was observed in the corn plants which sprouted after the application of the herbicide.

3.13 Flower Valley Local Park (Sheet 23)

This small park of fewer than ten acres is accessible from Sycamore Lane and Hornbeam Drive. A small area at the east end provides recreational and picnic facilities, while the remainder is largely wooded.

A small stream which originates in the urban area to the northeast is the source of considerable pollution, evidenced by the scummy growth of algae in quiet, open portions of the stream. This pollution appears to originate as runoff fertilizer used on gardens and lawns. The stream becomes clear once it enters the woods. The open woods along the stream are made up of hardwoods with tulip poplar predominant.

The wood's edge remains undisturbed, the habitat of a great variety of wildflowers. The great lobelia, relatively uncommon, was noted here.

A woods road, used as a walking trail, follows the south bank; and a footpath parallels the park boundary on the north side, extending from the grassy area near the parking lot to the west exit on Sycamore Lane. Several new footbridges cross the creek, connecting nearby urban areas with park facilities.

The small park is unique in containing several habitat areas. Below the parking lot is a marshy area on either side of the stream. Two old field communities can be identified where young trees compete with coarse weeds. There is an open woods edge and the hardwood forest to the west and south. A young plantation of white pine forms a border between Hornbeam Drive properties and the park.

3.14 Muncaster Mill Road to Bowie Mill Road (Sheets 14, 18)

This segment of the park system is 3.1 miles in length and varies in width from 2,400 feet to 900 feet at Bowie Mill Road and at the gas line crossing above Norbeck Country Club.

The area immediately adjacent to the Creek is wooded the entire distance except for a segment about 1,800 feet long, under lease to the golf club. About half of this woodland is new growth, classified as "old field community". There are many small open areas, the habitat of aggressive perennial and annual weeds.

The combination of young woodlands and open areas make for an ideal habitat for small game and birds, as well as for insect life and snakes. In September, many goldfinches, sparrows, and robins were observed here. At only two points--opposite the golf club and south of Bowie Mill Road--did cultivated fields approach to within 200 feet of North Branch's west bank.

The only wet areas are found immediately above the gas line crossing where an important tributary enters North Branch. This wet area is 150-300 feet in width, and much of it is temporarily under water after a heavy rain. Skunk cabbage predominates as ground cover beneath red maples and other floodplain trees. This wet area also extends along the winding brook which parallels the gas pipeline. This narrow wedge of wooded land is 200 to 400 feet wide and is characterized by a steep rise in the north side, a 40 foot rise in 100 feet. This strip extends for about 1,500 feet from the present park boundary toward Cashell Road. Its public ownership would prevent future urbanization of part of the slope which fronts on Ridge Drive, part of Olney Acres development.

Large-scale urbanization is proceeding to the west of North Branch on a former nursery property of 28 acres fronting on Bowie Mill Road south of Dun Horse Drive. This property is 700 feet north of a Commission-owned tract of about 20 acres on Bowie Mill Road.

Major area urbanization also has occurred in Norbeck Estates, south of the golf course. This tract is bounded on the south by Norbeck Estates Local Park, which embraces a tributary of North Branch and extends to the present North Branch park boundary.

A hilly, wooded area abuts the local park to the south. It rises from 360 feet to 443 feet above sea level. This small tract should be considered for future acquisition to forestall further encroachment of urbanization from the existing development along nearby Emory Lane.

The occupied tract of park land on the west side of the branch, about 1800 feet northeast of Grist Mill Drive should be inspected in regard to compliance with any existing lease. The tract is covered with many lanes made by motor vehicles, and there is some hillside erosion.

A chain-link fence has been erected along the line of the land leased to the Norbeck Country Club, making impossible any access to a long stretch (about 1,600 feet) of the west bank of North Branch to hikers and others. If the lease permits such closure, a foot trail will be limited to the west bank.

At present there are no clear, open trails for the entire three-mile distance except for a well-defined path, apparently much used, along the east side adjacent to Norbeck Estates. This path follows the edge of the slope, with several trails leading into the community and into the local park.

A unique feature of this park area is a stand of white pine on the west bank slope, about 1,000 feet south of Bowie Mill Road. Some trees are up to 16 inches in diameter. Evidence of beaver activity was noted south of the confluence of North Branch and the stream from Norbeck Estates Park. No tree cutting was recent. Several large trees, perhaps a century old, were noted. These were isolated specimens, white oak and tulip poplar.

3.15 Bowie Mill Road to Vicinity of Route 108 (Sheets 7, 10)

The area encompassed in this report extends from Bowie Mill Road on the south, almost to the source of Rock Creek, near Route 108. That portion of the stream valley presently held by the Maryland-National Capital Park and Planning Commission occupies a 1.7 mile sliver, 200 to 500 feet wide, except for a block in the middle about 2,000 feet wide. More than 90 percent of the Commission land is in hardwood, largely second growth timber. A large portion, possibly 75 percent, of the land adjoining this public land is forest; the remainder is cultivated old field community. Insofar as forests play such an important role in protecting and stablizing a watershed, it is recommended that the publicly-owned portion be widened to include more of this wooded land.

One urbanized area, Granby Woods, already approaches within 500 feet of Rock Creek. Commission-held land extends only about 50 feet west of Rock Creek at two points in this area. The area marked on the map as an "old field community" and a strip of cultivated land to the south of it should be given a high acquisition priority. Similarly, the large wooded tract south of the above-mentioned land, about 35 acres, identified by a pond in its northwest corner, is a desirable area for acquisition as a buffer to the expanding urban areas.

In general, the extremely narrow corridors of publicly owned land in the lower quarter and upper half of this area ought to be widened considerably for the

future protection of this watershed. Consideration should be given to extending the park area 2,000 feet to provide a future access from Route 108. Presently, the only access is from Bowie Mill Road.

This area is currently utilized recreationally by horseback riders. Three bridle trails cross the park land. There are no continuous foot trails along Rock Creek.

There is ample evidence of wildlife in this area--deer, raccoon and woodchucks, in particular. There are a number of water-filled oxbows, former stream beds of the creek, which provide a habitat for frogs and snakes and aquatic insects. Small fish are abundant in pools in the creek.

The site of Bowie Mill may be seen on the west side of North Branch several hundred feet upstream from the present bridge. The mill race is clearly visible above the Mill site. The Mill stood near the former route of Bowie Mill Road, where it bridged Rock Creek.

This Mill was built in the early 1800's by J. D. Bowie on land originally patented to Nathan Magruder in 1786. It closed down about 1905 due to lack of water in the creek and to technological changes which made flour and meal cheaper to produce in larger mid-west mills.

Two structures of historic interest are located in the Bowie Mill area. "Flint Hill" is a white house at the top of the hill off Bowie Mill Road. The oldest portion dates from 1866. It was built of logs, nogged with bricks. The building is now covered with clapboard and is known as the Fraley farm.

"Roseneath" is situated on a high point off the intersection of Bowie Mill and Bready Roads, east of North Branch. Washington Bowie I built this house for his son between 1825 and 1830. It is now owned by the St. Clair family.

3.16 North Branch, Unit 5, on Route 108 (Sheet 11)

This wedge-shaped wooded area is on the west side of Route 108, beginning 1,600 feet north of Briars Road intersection with Route 108 and extending along Route 108 for over a half mile.

This tract is the source of a tributary of North Branch. The mixed hardwoods here are 40-60 years old, though much older specimens are scattered through the area. The largest tree observed was a white oak four feet in diameter. It is located about 600-800 feet from Route 108 along the south boundary road. Chinquapin bushes were also observed here. This shrubby relative of the chestnut is uncommon in the Rock Creek basin.

The main stream that normally flows through this area, east to west, was entirely dry in mid-September because of lack of substantial rain the preceding month. A few pools were heavily tracked by raccoons. No springs were seen in the area. If any existed, they were dried up.

The entire area is relatively flat, the altitude ranging from 450 feet to 484 feet at a high point near the western boundary.

The open park-like nature of this tract suggests its possible use as a camping area for small groups--given the availability of water.

This tributary goes southward, outside the present park boundary, through a large part of the Keys Farm and eventually joins the North Branch. This farm has an interesting old spring house and an old family cemetery. This portion of the watershed should be considered for eventual inclusion in the park system.

3.17 Cashell Road Local Park (Sheet 15)

The undeveloped triangular park is bounded by a gas pipe line and urbanized area on the west, a PEPCO transmission line on the east, and the edge of a wooded tract on the south. Only a narrow strip along the gas pipe line is open and grassy. The tract is predominantly young woods and old field community.

A clear stream flows through the area from east to west, crossing Cashell Road and eventually entering North Branch.

The most interesting area in this park is the 200 foot wide open swath that is the route of a second gas pipe line. This area contains a profusion of wildflowers--approximately twenty species in bloom in the late summer. It appears that the pipe line owners clear the land of vegetation periodically to discourage tree growth. The by-product of their efforts is the exceptional development of open field vegetation.

A narrow marsh marks the area where the small stream crosses the pipeline. Here was observed the narrow-leaf cattail, uncommon in the area, as well as several other species of semi-aquatic plants.

Most of the wooded area was virtually inpenetrable since brambles, vines and dense shrubbery competed with young trees for the available space.

If this park is to be developed for any use in the next few years, it will be limited largely to the narrow area to the east of Overwood Drive, along the pipeline that parallels this street.

An alternative to be considered is the acquisition of the 200-foot wide strip of woods that borders the south boundary of the park. This is gently sloping, high terrain, and adjoins a large cultivated field.

The plentiful supply of clear-flowing water in this park, despite a lack of rainfall for about a month, also suggests the possibility of developing a pond in the middle of this tract, immediately upstream from the gas pipe line crossing.

3.18 Pope Farm Tract (Sheets 8 & 9)

This tract of land, centered in the Pope Farm, lies northeast of Routes 115 and 124, but with relatively little frontage on either road. About five-sixths of the area is cultivated land; the remainder is woodland. Approximately 30 acres are used as a tree nursery for the Commission, while the remaining cultivated land is rented to neighboring farmers.

The structures here are of historic interest. The Pope house, a typical Victorian building, dates from 1900. The original family home nearby, a clapboard structure, dates from early Nineteenth Century. Nearby is a blacksmith shop and an ice house. A family cemetery east of the house dates from the late Eighteenth Century. Members of the Cooke and Magruder families are buried here.

A woodlot made up of a mixture of mature hardwoods of about six acres stands in the middle of the tract. There is very little understory growth. Two fast-flowing streams merge in this wooded area; and there is a spring in the northwest corner. The south border of the Pope Tract is also wooded. The center woodlot would be a good site for a future picnic area or day camp, with its old trees, rolling landscape, and clear, fast-flowing brooks.

The stream which drains this area runs close to the south border of the tract and then flows through a marshy area, eventually reaching Rock Creek. This marsh also is fed by a spring originating a few feet inside park land, just east of the farm buildings.

Nursery employees report that the marsh and environs is the habitat of pheasant, snipe, heron, snapping turtle, fox, rabbit, woodchuck and dove. Watercress grows along the entire length of this stream. This reflects the cleanliness and the year-round continuity of the water. Another unique feature of the marsh is the abundance of spearmint.

This marsh, which has little commercial value because of the drainage problem, is worthy of acquisition by the Commission as park land because it is an interesting and significant wildlife habitat. Its acquisition would provide a few more acres of watershed for the park system. Pigs now root in a part of the area near an abandoned house. This tract also has a notable out-cropping of quartz boulders, a geological phenomenon that may have an interesting explanation.

Conversations with area residents elicited the information that Montgomery County was interested in the possible acquisition of the western portion of this tract, fronting on Route 124, for recreational use, including the construction of a large community swimming pool. Such a move could have a serious adverse environmental impact on the watershed if, at the same time, public sewage connections are not available. The emptying of the heavily chlorinated water from a large swimming pool into a small tributary of Rock Creek could have a devastating impact upon aquatic life, indirectly on all other forms of life in the area, and an adverse impact on Rock Creek itself when such water reached the creek. The construction of buildings and the paving of a large area for parking purposes would lead to a rapid runoff of storm water, which would have a deleterious effect upon the creek. It is to be hoped that these environmental factors will be taken into account in any plans for public recreational use of the area.

3.19 Carson Farm Tract (Unit 15 Rock Creek Park, Sheet 5)

This tract of about 55 acres is located off Route 124, northeast of Montgomery County Airpark. Access is by a right of way on a gravel road 1,500 feet east and north of Route 124. Major features of this tract include a mixed hardwood woodlot of about 2.5 acres in high ground northeast of the farmhouse, a stream which crosses the middle of the tract from west to east and a tributary which arises from the south-central portion of the tract. An old log meat house, chinked with mortar, is of some historic interest. All other buildings appear to be Twentieth Century.

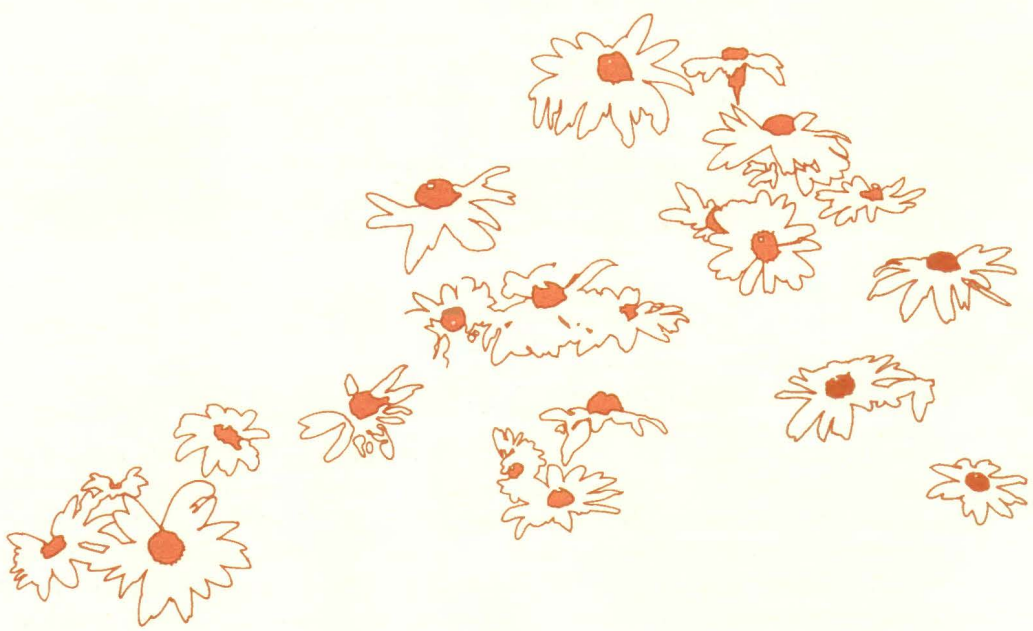
About 12 acres around the farmhouse and to the north are cultivated or pasture; the remainder is old field community except for a tree nursery (about 2 acres) and the woodlot alluded to previously.

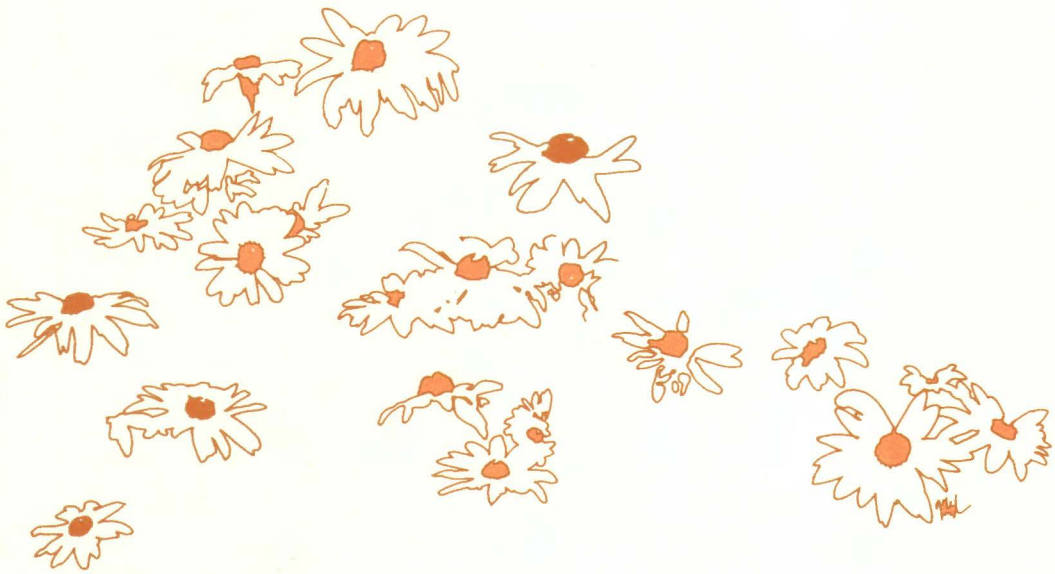
The occupant of the property reports an abundance of wildlife on the tract. This is a reflection of the fact that about 70 percent of the area has reverted to old field community, also, that there are two small man-made ponds along the stream and a very dense thicket bordering most of the watercourse. He reports the presence of deer, pheasant, mink, raccoon, opossum, squirrel, waterfowl and trout.

An inspection was made of the 1.5-acre pond west of the tract on the adjoining property. This is the source of the stream that flows through the tract. There is no evidence of any use being made of this pond, now surrounded by young tree growth. If acquired for park purposes, this pond and several acres surrounding it would make an attractive public fishing area and assure the flow of water in the stream flowing through the park property.

The Carson tract is at the north-northwest boundary of the Rock Creek watershed. The stream valley to the east, approximately 50 to 60 acres, should be acquired to provide for the public control of the entire segment of the watershed.

A smaller tract to the north, about 30 acres, should likewise be considered for acquisition. This includes a small tributary of Rock Creek that is bordered by woodland. The greater part of this tract is now old field community.





Chapter 4

Description Of Inventory Of Fauna

4.1 Mammals

Over 30 species of mammals are believed to live in the park today. Before American independence, there were about 44 species of mammals in this area. Among these were many large mammals that were not able to survive hunting or the destruction of their natural habitat. These mammals include bison, elk, puma, wolf, marten, mink, otter, bobcat, bear and porcupine. The beaver, long absent from the area, has made a comeback along the Potomac River above Key Bridge and in several areas of Rock Creek Park.

The actual numbers of many of the species that remain have declined because of the impact of urbanization in the form of air and water pollution, human and vehicular traffic, the depredations of dogs and cats, and diminished availability of cover or food supply. That many of these wild animals are still with us attests to their resourcefulness, adaptability to changing environments, and mobility in seeking food and shelter.

Some species have actually increased in numbers over the past several decades because of access to food in the form of refuse deposited in trash cans or discarded by people, and to animals killed on roads by vehicles. An omnivorous diet probably has helped opossums, raccoons, and skunks to continue existence in the park.

The shelter and food supply of a number of species, such as squirrels, chipmunks and various mice, has been largely unaffected by the encroachments of urbanization. In one way, these mammals have benefited since their predators have declined in numbers because of man's activities.

Several species, accidental introductions over the past 200 years, have become naturalized in the park. These include the black and Norway rats, house mice, stray cats and dogs.

During daylight hours you will see squirrels and chipmunks along park trails

since they are then active on the ground and in the trees. A large group of mammals are active between dusk and dawn and can be seen only if you are willing to watch for them in the evening or before sunrise. These include the deer, fox, raccoon, opossum, bat, skunk, weasel, woodchuck, and flying squirrel. Some simply do not move about in the open and will not be seen unless their usual haunts are disturbed. This goes for moles, mice, and shrews. Bats fly at dusk and can be seen at close range only in their daylight shelters--rock caves, hollow trees, or attics.

You must look for rabbits in their preferred habitat such as in bushy, heavily overgrown areas where they find shelter and protection from their chief enemies, the owls, hawks, and some mammals. Rabbits are not as abundant as one might expect because of the lack of a suitable habitat in much of the park.

If you do not get to see many of the animals, you can still find evidences of their presence. Raccoon and other tracks can readily be identified on muddy stream banks and sand bars. You can find mouse runways in the grass and the nests of many kinds of small rodents secreted in hollow logs, beneath fallen trees, and under rocks.

The major impact of pollution on the non-herbivorous mammal population in the park has been in the reduction in food supply. Frequent floods after heavy rains, affecting both Rock Creek and its tributaries, have diminished the numbers of birds, amphibians, reptiles and insect and other invertebrates. Insofar as these are important food sources for some mammals, their decline due to an adverse environment has serious consequences for the mammals that depend on them for all or part of their food supply.

Deer and foxes are faced with unique problems. Deer and, to a lesser extent, foxes require a large area where they are free of harassment by people and dogs.

Scientific observations suggest that the area bat population has declined because bats are susceptible to the toxic sprays used to control insect pests on farms and in gardens. Also, bats are often killed if found in attics and outbuildings.

Most small rodents and insectivores (the mice, shrews, and moles) are little affected by changes in the quality of the environment.

Another negative environmental factor is the impact of free-roaming cats and dogs on the mammal population of the park. These animals are known to harass and kill many kinds of mammals as well as birds, reptiles, and amphibians.

Mammals of Rock Creek Park, Maryland

Opossum[1/ 2/]	Didelphis marsupialis virginiana
Pigmy shrew[1/ 2/]	Microsorex hoyi winnemana
Hollister masked shrew[4/]	Sorex cinereus fontinalis
Short-tailed shrew[1/ 2/]	Blarina brevicauda kirtlandi
Least shrew[1/ 2/]	Cryptotis parva
Eastern mole[1/ 2/]	Scalopus a. aquaticus
Star-nosed mole[1/ 2/]	Condylura c. cristata
Eastern cottontail[1/ 2/]	Sylvilagus floridanus mallurus
Eastern chipmunk[1/ 2/]	Tamias striatus
Woodchuck[1/ 2/]	Marmota m. monax
Red squirrel[1/]	Tamiasciurus hudsonicus loquax
Eastern gray squirrel[1/ 2/]	Sciurus carolinensis pennsylvanicus
Flying squirrel[1/]	Glaucomys v. volans
White-footed deer mouse[1/ 2/]	Peromyscus leucopus noveboracensis
Beaver[1/]	Castor canadensis
Eastern wood rat[1/ 2/]	Neotoma floridana magister
Meadow vole[1/ 2/]	Microtus p. pennsylvanicus
Pine vole[1/ 2/]	Pitymus pinetorum scalopsoides
Mink[4/]	Mustela vison mink
Muskrat[1/ 2/]	Ondatra zibethicus macrodon
Roof rat[1/]	Rattus rattus alexandrinus
Norway rat[1/ 2/]	Rattus norvegicus
Black rat[1/]	Rattus rattus
House mouse[1/ 2/]	Mus musculus
Meadow jumping mouse[2/]	Zapus hudsonius americanus
Red fox[1/ 2/]	Vulpes vulpes fulva
Gray fox[1/ 2/]	Urocyon c. cinereoargenteus
Raccoon[1/ 2/]	Procyon l. lotor

Long-tailed weasel[1/] [2/]	Mustela frenata noveboracensis
Striped skunk[1/] [2/]	Mephitis mephitis nigra
White-tailed deer[1/] [2/]	Odocoileus virginianus borealis
Silver haired bat[3/]	Lasionycteris noctivagans
Big brown bat[3/]	Eptesicus f. fuscus
Hoary bat[3/]	Lasiurus c. cinereus
Evening bat[3/]	Nyctceius h. humeralis
Eastern pipistrelle[3/]	Pipistrellus s. subflavus
Red bat[4/]	Lasiurus b. borealis

1/ Observed by staff at Meadowside Nature Center, Rock Creek Park, Maryland.

2/ Observed or collected by Charles W. Prettyman while engaged in research in Rock Creek Park, Maryland, as graduate student at the University of Maryland.

3/ From records of Nature Center, Rock Creek Park, D. C.

4/ Reported for the Rock Creek basin in "Mammals of Maryland" by John L. Paradiso, North American Fauna, No. 66.

Birds are largely at the pinnacle of a food chain because so many species are carnivorous or largely so. The food chain begins with green plants which manufacture food in the presence of sunlight. This vegetation is eaten by insects and by small rodents, which in turn are preyed upon by birds and other higher animals.

A large group of birds, seed-eaters and omnivorous species, subsist entirely or partly on various types of vegetation, as seeds, berries, nuts and fruits. The diet of many birds also may reflect the kinds of foods available to them at any given season. Even most seed-eaters feed their young on insect larvae because they are soft and easily digestible.

Bird numbers are kept under control by the availability of food and nesting sites and by predators, which eat the eggs, young and also capture adults. When food is scarce, birds also become easy prey to disease and parasites. The young often fall from the nest and become vulnerable to predators or die from neglect. Many adults are lost in the course of their annual migration to and from northern breeding grounds.

In recent years the increased use of pesticides has affected bird populations. Birds may feed on fish, insects, fruits or seeds tainted with pesticides, which affects their ability to produce hatchable eggs.

Birds are directly helpful to man by their destruction of weed seeds, harmful insects, mice and other small mammals injurious to gardens and to crops. Because of their high rate of metabolism and the need to feed one or more broods of young during the breeding season, birds are voracious feeders. Many species thus keep a strong check on destructive insects. Some birds, notably crows and vultures, perform a valuable service as scavengers, feeding on dead animals. Seed-eating species, by their droppings, help spread plant and tree seeds, some useful to man, others considered as pests. During the winter, resident seed-eating birds subsist largely on a great variety of weed seeds, such as ragweed, crabgrass, other wild grasses, and pigweed. Their diet includes some insects at other seasons.

Birds possess remarkable adaptations for aerial life. All have extremely keen vision, often combining telescopic and microscopic ability. Hawks can sight their prey at great distances.

In addition to exceptional sight, birds display modifications of bills, tongues, wings, tails, feet, bones and body shape for their special way of life. The woodpecker has a strong, straight bill, two toes forward and two backward, useful for a firm grasp on bark, and tail feathers ending with a sharp shaft tip for propping against a treetrunk. Its horn-tipped, barbed tongue is a good tool for extracting insects out of the pecked hole in the treetrunk.

Owls and hawks have strong, curved talons for seizing prey, while ducks have webbed feet for swimming. Predatory birds' bills are hooked to simplify tearing of flesh. Ducks have broad bills to shovel and sieve submerged and floating vegetation.

Birds that subsist mainly on insects, such as chickadees, warblers, titmice and nuthatches, have slender bills to facilitate feeding on insects among leaves or extracting them from bark crevices.

Sparrows, finches and cardinals are seed-eaters, possessing short, stout bills, useful in removing seed hulls and in cracking seeds. Their bills, though short, are sharp-tipped, enabling the birds to capture insects when these are abundant.

Birds that live on the ground in bushy and grassy areas have strong legs and short wings to enable them to become airborne quickly, without becoming entangled in brush. Meadowlarks, quail and sparrows have such short wings.

Birds that capture their food on the wing usually have narrow, long and angled wings, also rather wide mouths. Among these are swallows, swifts, nighthawks and whip-poor-wills. Vultures and some hawks have broad wings that enable them to soar along air currents in their search for food.

Birds are virtually unique among vertebrates in their instinct for migration. While "resident species" remain in one locality throughout their lives, many other species migrate each winter to areas far south of their breeding grounds and return in the spring. A birds' migratory habits are responses to changes in the environment. When breeding is completed in the north and the end of summer approaches, the food supply diminishes. The shortening day and changes in temperature, pressure and wind stimulate the nervous and gland systems in birds, especially the pituitary, to accumulate a reserve of fat and to prepare for the journey south.

Birds follow a characteristic migratory route, called a flyway. Birds observed in Rock Creek Park take the Atlantic flyway in their migrations between this area, Latin America and Canada and the northern United States. two major migrations occur, a spring flight northward and a fall migration southward.

Some birds, as swallows and hawks, travel by day, while others, as warblers, thrushes and vireos, travel at night. Many of these night migrants are attracted to or confused by bright lights of airports and radio towers, and the death toll due to collisions often is staggering.

A knowledge of bird habitats is of importance in determining what birds are likely to be seen in a given type of park cover. There are several kinds of habitats, some natural, others, manmade. There is floodplain woodland as distinguished from the upland forest; the former with a greater density and variety of bird life than the latter. Within either, there are thickets which attract many bird species.

River courses support a particular group of birds which derive their food from the stream or from food and cover available because of the opening to sunlight.

With man's intense occupancy and use of the Rock Creek watershed for more than two centuries, many changes have been made in the landscape. These have altered the wildlife habitats of the area. With the development of roads, golf courses, picnic areas and other recreation facilities and clearing of land for agricultural use, scores of miles of woodland margins have come into existence. These are narrow strips between the forest and the adjacent open areas. Shrubs, weeds and young trees develop along such strips, which are from five to fifty feet wide. This man-created strip supports a variety of bird life which finds food, cover and nesting sites in this habitat. Similarly, "old field communities," former croplands allowed to revert to nature, supports a similar variety of bird life.

Open grassy areas in the park attract another group of birds. Birds of prey, as owls, hunt small rodents living in grasslands or meadows. Many insect-eating birds which catch their prey on the wing can be observed in such open areas. All through the park, the grassy borders are interrupted by weed-bordered gullies through which flow small tributaries of Rock Creek. Many species of birds that eat weed seeds or seek cover in such areas may be observed here.

Of the approximate 145 species of birds observed in Rock Creek Park, three of them, the starling, English sparrow and the pigeon or rock dove, are exotics--introduced into America from their native habitat overseas. All have become fully acclimated and have spread into virtually every habitable part of North America, multiplying rapidly and often supplanting less vigorous native species.

All three species have adjusted well to man's agricultural and urban activities and have rapidly adapted to changes in climate, food and to available nesting sites. Had Europeans not settled in America in the Seventeenth Century, it is unlikely that there would be a place for these three species on this continent.

In the park one is apt to see any of these species in areas changed for man's use, such as picnic areas, around horse barns, roadsides, and in or near any other type of recreational facility. They usually do not visit in large flocks, chiefly because the park is largely wooded and does not offer a significant source of food to any of these species. However, large flocks may be observed flying through or roosting, especially the starling.

Blackbird, redwinged
Bobwhite
Bufflehead
Bunting, indigo
Cardinal
Catbird
Chat, yellow-breasted
Chickadee, Carolina
Coot, American
Cowbird, brown-headed
Creeper, brown
Crow, common
Crow, fish
Dove, mourning
Dove, rock
Duck, black
Duck, ruddy
Duck, scaup
Duck, wood
Egret, common
Egret, cattle
Flicker, yellow-shafted
Flycatcher, great-crested
Gnatcatcher, blue-gray
Goldfinch, American
Goose, Canada
Grebe, pied-billed
Grackle, common
Grosbeak, rose-breasted
Grosbeak, blue
Gull, herring
Hawk, broad-winged
Hawk, Cooper's
Hawk, marsh
Hawk, red-shouldered
Hawk, red-tailed
Hawk, sharp-shinned
Hawk, sparrow
Heron, great blue
Heron, little blue
Heron, green
Heron, Louisiana
Jay, blue
Junco, slate-colored
Killdeer
Kingbird, eastern
Kingfisher, belted
Kinglet, golden-crowned
Kinglet, ruby-crowned
Mallard
Martin, purple
Meadowlark, eastern
Merganser, common
Merganser, hooded
Merganser, red-breasted
Mockingbird

Nighthawk, common

Nuthatch, white-breasted

Oriole, Baltimore

Oriole, orchard

Osprey

Owl, barred

Owl, great horned

Owl, screech

Pewee, eastern wood

Phalarope, Wilson's

Phoebe, eastern

Pheasant, ringnecked

Pintail

Pintail, blue-winged

Robin

Sandpiper, least

Sandpiper, pectoral

Sandpiper, semipalmated

Sandpiper, solitary

Sandpiper, spotted

Snipe, common

Sparrow, chipping

Sparrow, house (English)

Sparrow, field

Sparrow, fox

Sparrow, grasshopper

Sparrow, song

Sparrow, savannah

Sparrow, swamp

Sparrow, tree

Sparrow, white-crowned

Sparrow, white throated

Starling

Swan, mute

Swallow, bank

Swallow, barn

Swallow, rough-winged

Swallow, tree

Swift, chimney

Tanager, scarlet

Teal, blue-winged

Teal, green-winged

Thrasher, brown

Thrush, gray-cheeked

Thrush, hermit

Thrush, Swainson's

Thrush, wood

Titmouse, tufted

Towhee, rufous-sided

Veery

Vireo, red-eyed

Vireo, solitary

Vireo, white-eyed

Vireo, yellow-throated

Vireo, warbling

Vulture, black

Vulture, turkey

Warbler, blackpoll

Warbler, black-throated blue

Warbler, black-throated green

Warbler, black and white

Warbler, blue-winged

Warbler, chestnut-sided

Warbler, Kentucky

Warbler, myrtle

Warbler, Nashville

Warbler, palm

Warbler, parula

Warbler, pine

Warbler, prairie

Warbler, prothonotary

Warbler, yellow

Waterthrush, northern

Waxwing, cedar

Whip-poor-will

Widgeon, American

Woodcock, American

Woodpecker, downy

Woodpecker, hairy

Woodpecker, pileated

Woodpecker, red-bellied

Woodpecker, red-headed

Wren, Carolina

Wren, house

Wren, winter

Yellowlegs, greater

Yellowlegs, lesser

Yellowthroat

Data based on observations reported in The Atlantic Naturalist Volume 31, No. 2 of the Audubon Naturalist Society and on records of observations in the files of the Meadowside Nature Center, Rock Creek Park, Maryland, and Maryland Birdlife, September, 1971, and December, 1972.

These groups are less abundant in the park, compared with birds or mammals. The number of species and total population appears to have declined over the last half century, especially in the lower, urbanized portion of Rock Creek Park. This becomes evident in a comparison of the species now seen in the park with Smithsonian Institution records of specimens found during the past 75 years and with records for the occurrence of various species in the surrounding area.

We can only speculate as to the reasons for the disappearance of species and the decline in numbers of surviving species. The steady urbanization of the Rock Creek watershed over the past fifty years is the basic cause. There is the great increase in the number of people using the park and the disposition to kill snakes through superstition or ignorance and to remove snakes, turtles, salamanders and frogs caught in the park. Such removal usually means the early death of the animal, removed from its natural environment and source of food.

The increased automobile traffic in the park, a cause of mortality for all forms of animal life moving on the ground, may account for some losses among snakes, turtles and frogs. Water and air pollution is believed to be an important factor. Pollutants are deposited from the air or carried in runoff waters from urban areas adjacent to the park. These destroy food sources of many amphibians and reptiles. Heavy spring rains, with accompanying floods, can wash away the eggs of various amphibians, destroying one generation. These floods also wash away or destroy the food supply of some species.

All of this suggests that we have paid a dear price in the impoverishment of the environment of many forms of animal life in our area, with the consequent decline in their numbers. Today, strolling along park trails, you are unlikely to encounter many members of this interesting group in our fauna. You are unlikely to find many snakes, frogs, toads, or turtles in places frequented by large numbers of people, such as the vicinity of picnic areas. They are most likely to be found in secluded places where few people go, especially in the flood plain, in woodlands, marshes and in or along streams. The box turtle is likely to be seen where suitable food plants occur. Snakes are most apt to be seen in swamps, thickets, rock or brushy areas, where they find the insects and amphibians which form part of their diet.

We are usually very much more aware of the relation of birds and animals to their environment than we are of reptiles and amphibians. Turtles are important as scavengers and also eat all sorts of small wild fruits, herbage and fungi. They in turn, as juveniles, are eaten by skunks, raccoons, crows and by birds of prey.

Snakes play an important role in consuming worms, insects, bird eggs, small fish, amphibians, mice and smaller snakes. They, in turn, are preyed upon by mammals and birds of prey.

Amphibians start out in life as herbivorous tadpoles, which subsist on green and blue-green algae, diatoms and desmids--all microscopic, one-celled aquatic plants. They also consume dead animal matter found in ponds and streams. A dramatic change occurs when they transform into the adult stage. They become carnivorous, eating flies, grasshoppers, mosquitoes, beetles, caterpillars, ants, bugs, worms, grubs, snails and small crustaceans. All amphibians, in turn, are part of the food supply of mammals and of some large birds, as crows and hawks.

Most amphibians spend the early part of their life cycle in water and breed in water; thus, as adults they generally are found near water or in moist areas. Only the toad wanders some distance from its birthplace.

The very name "amphibian" helps to set this group apart from all others. It means "double life" in Greek, in reference to the beginning of life in water as a tadpole, getting oxygen as fishes do, through gills, later transforming to an air-breathing creature on land.

Frogs and toads were the first animals to develop the ability to produce sounds by means of vocal cords. Insect sounds, to set the record straight, are not emitted by vocal cords. Each species has developed its unique sound, from the shrill whistle of the spring peeper to the low grunt of the bullfrog.

One of the best areas in the park for observing frogs in the spring is the flood plain. Here one can listen to the courtship call of the spring peeper or tree frog, the gray tree frog and the American toad. These courtship calls of the males attract the females. The best time to hear them is on a cloudy day or in the early evening.

The earliest is a tree frog, the spring peeper, which is no larger than a man's thumb. In April the tiny female may lay as many as a thousand eggs in a pool. Other amphibians lay masses of eggs in the hundreds, even a thousand. The losses to predators are enormous between the tadpole stage and adulthood.

Compared with frogs, salamanders are secretive creatures found in or near small streams, springs or ponds, hiding beneath rocks, logs or beneath dead leaves and debris.

Since both reptiles and amphibians are cold-blooded animals, they hibernate during cold weather and are not seen for four or five months of the year. Turtles hibernate in loose soil or in a burrow. Toads dig into soft earth, seek shelter in hollow logs or trees, or crawl beneath debris which offers insulation.

Frogs go to the bottom of ponds where they spend the winter in mud or among dead leaves. Though they are air-breathing creatures they can obtain oxygen from water through their skin when temperatures fall below 40°F.

Amphibians and reptiles store food in the form of body fat, which usually is sufficient to keep them alive through the winter months in their state of inactivity. They become active again in early spring with the advent of warm weather.

A final word on snakes. Unfortunately, many people have an unfounded fear of snakes, and a good deal of superstition surrounds them. Snakes usually are inoffensive and will make every effort to get away.

Amphibians and Reptiles of Rock Creek Basin

Occurrence key
C = Common U = Uncommon

Eastern newt	Notophthalmus viridescens	C
Spotted salamander	Ambystoma maculatum	C
Marbled salamander	Ambystoma opacum	C
Dusky salamander	Desmognathus fuscus	C
Two-lined salamander	Eurycea bislineata	U
Long-tailed salamander	Eurycea longicauda	U
Four-toed salamander	Hemidactylium scutatum	U
Red-backed salamander	Plethodon cinereus	C
Slimy salamander	Plethodon glutinosus	U
Mud salamander	Pseudotriton montanus	U
Red salamander	Pseudotriton ruber	U
American toad	Bufo americanus	C[1/]
Fowler's toad	Bufo fowleri	U
Northern cricket frog	Acris crepitans	C
Spring peeper	Hyla crucifer	C[1/]
Gray treefrog	Hyla versicolor	C
Northern chorus frog	Pseudacris triseriata	U
Bullfrog	Rana catesbeiana	C[1/]
Green frog	Rana clamitans	C[1/]
Pickerel frog	Rana palustris	U[1/]
Wood frog	Rana sylvatica	C[1/]
Leopard frog	Rana pipiens	C[1/]
Eastern fence lizard	Sceloporus undulatus	U
Five-lined skink	Eumeces fasciatus	U
Worm snake	Carphophis amoenus	C[1/]
Black racer	Coluber constrictor	C[1/]

Ringneck snake	Diadophis punctatus	C[1/]
Corn snake	Elaphe guttata	U
Black rat snake	Elaphe obsoleta	C[1/]
Hognose snake	Heterodon platyrhinos	U
Mole snake	Lampropeltis calligaster	U
King snake	Lampropeltis getulus	C
Milk snake	Lampropeltis triangulum	U[1/]
Water snake	Natrix sipedon	C
Rough green snake	Opheodrys aestivus	C[1/]
Queen snake	Regina septemvittata	U
Brown snake	Storeria dekayi	C
Ribbon snake	Thamnophis sauritus	U
Garter snake	Thamnophis sirtalis	C
Smooth earth snake	Virginia valeriae	C
Copperhead	Agkistrodon contortrix	U[1/]
Snapping turtle	Chelydra serpentina	C[1/]
Painted turtle	Chrysemys picta	C
Spotted turtle	Clemmys guttata	U
Box turtle	Terrapene carolina	C[1/]
Eastern mud turtle	Kinosternon subrubrum	U
Stinkpot	Sternotherus odoratus	C[1/]

This list is based on data supplied by R. Bruce Bury, Chief, Herpetology Section, Fish and Wildlife Service, from records of the Smithsonian Institution; also, from a list of amphibians and reptiles reported for Montgomery County in a distribution survey published by John E. Cooper

The list also incorporates species collected or observed in the Rock Creek basin by Charles W. Prettyman while engaged in graduate research in zoology at the University of Maryland; also species reported for the area in Maryland Turtles, Frank J. Schwartz, formerly with Natural Resources Institute of the University of Maryland, 1967.

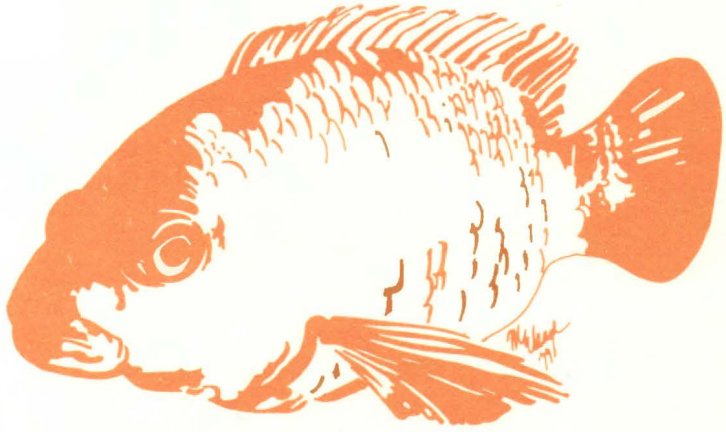
1/ Species observed by staff at Meadowside Nature Center, Rock Creek Park, Maryland.

4.4 Fishes

The number and diversity of fishes found in Rock Creek and its tributaries is believed to have declined considerably over the past several decades because of the continued urbanization of the stream's watershed. This has resulted in a great increase in sedimentation and pollution, both detrimental to fish life. These factors also have reduced the supply of food for fish--the insects, crustaceans and aquatic plants on which they depend for sustenance.

Thirty fish species are recorded for Rock Creek. A number of these are found only occasionally or rarely. Some of those that are seen are believed to enter accidentally from stocked ponds and tributaries upstream.

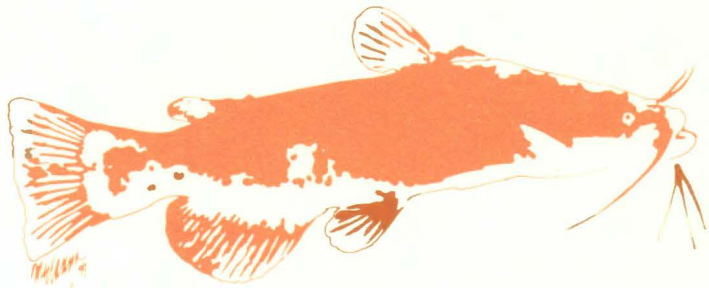
With increased concern for the quality of the environment, there is hope that Rock Creek and its watershed will be given more protection than in the past and that the fish populations will increase with the gradual reduction of pollution and sedimentation.

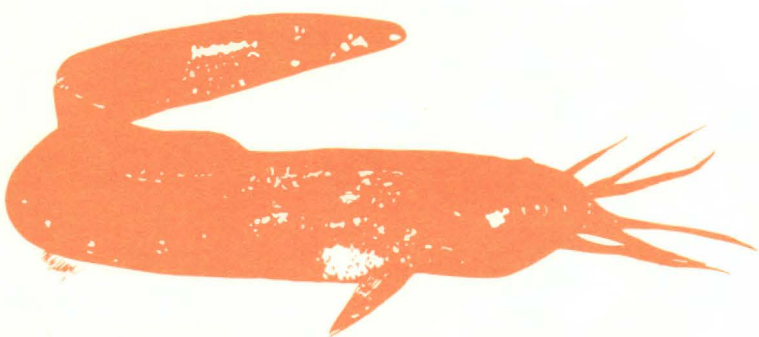


Fishes Collected in Rock Creek, Maryland[1/]

American eel	Anguilla rostrata
Brown trout	Salmo trutta
Blacknose dace	Rhinichthys atratulus
Longnose dace	Rhinichthys cataractae
Rosyside dace	Clinostomus funduloides
Rosyface dace	Notropis rubellus
Cutlips minnow	Exoglossum maxillingua
Fallfish	Semotilus corporalis
Creek chub	Semotilus atromaculatus
Golden shiner	Notemigonus crysoleucas
Carp	Cyprinus carpio
Spottail shiner	Notropis hudsonius
Spotfin shiner	Notropis spilopterus
Silverjaw minnow	Ericymba buccata
Common shiner	Notropis cornutus
Swallowtail shiner	Notropis procne
Satinfin shiner	Notropis analostanus
White sucker	Catostomus commersoni
Hogsucker	Hypentilium nigricans
Yellow bullhead	Ictalurus natalis
Channel catfish	Ictalurus punctatus
Margined madtom	Noturus insignis
Largemouth bass	Micropterus salmoides
Pumpkinseed sunfish	Lepomis gibbosus
Bluegill sunfish	Lepomis macrochirus
Green sunfish	Lepomis cyanellus
Redbreast sunfish	Lepomis auritus

Tessellated darter	Etheostoma olmstedi
Shield darter	Percina peltata
Mottled sculpin	Cottus bairdi





1/ Data taken from Provisional Inventory of the Fishes of Rock Creek, Little Falls Branch, Cabin John Creek and Rock Run, Montgomery County, Maryland, by Alan J. Dieterman. The Commission, June 1976.

Chapter 5

Description And Inventory Of The Flora

5.1 Trees and Shrubs[1/]

A walk along any of the park trails reveals a wide variety of trees and shrubs. Some aged giants may tower almost a hundred feet skyward, while others range from a small shrub to a slender tree twenty feet tall.

The story of this park forest, its vicissitudes from the time of the earliest Eighteenth Century settlers until the present day, is an interesting and instructive one.

The European settlers who came into this area in the Eighteenth Century found a largely virgin woodland inhabited by Indians and by an abundance of game. The first settlers hunted game and traded with the Indians. It wasn't long before they began clearing the land, using some of the timber, but burning a great deal of the wood just to get the land cleared for crops. Later, a number of dams were built along Rock Creek, harnessing it for waterpower to run grist, saw and bone mills.

The main crop in the early days was tobacco, which brought about rapid soil depletion and erosion. Some land was used for grain crops, which also depleted the soil of its minerals stored up for centuries on the forest floor.

Land records and descriptive accounts indicate that a large part of the more level and rolling areas of the Rock Creek watershed was cleared and placed under cultivation. Over the years, with each heavy rain, a good deal of the topsoil was washed away down slopes and gullies, into the creek, and eventually was borne into the Potomac River.

[1/] This introduction is based in part on "Forests and the Environment," Virginia Polytechnic Institute and State University, Publication 511, July, 1972.

As the soil on the farms became thinner and poorer, the production of tobacco and grains declined to the point where it became unprofitable to work the land. Many farms were abandoned.

Now a natural process began. Wild plants, those we classify as weeds, quickly took over the abandoned lands. Producing vigorous seeds by the millions, these weeds quickly covered the once cultivated lands, curtailing further soil erosion. Not far behind these pioneering plants were the prolific insects that fed upon them and the higher forms of animal life, chiefly birds and small mammals which subsisted on the insects.

The second season of the recapture of the land still saw dominance of the weeds, but new species made their appearance, those requiring some moisture and partial shade, such as coarse grasses and asters.

By the third year, conditions were ready for germination of tree seedlings, chiefly Virginia pine. These pioneer trees, growing taller each year, produced more and more shade, placing in jeopardy the survival of the sun-loving weeds, largely annuals and biennials. In about five or six years, a pure stand of pine or of mixed hardwoods had developed, succeeding the weeds.

These trees, which began their ascendancy over a period after the middle of the Nineteenth Century, reached maturity in about a half century. During this period, there were still some mature hardwoods around, in the deep ravines unsuitable for cultivation, along steep slopes, and in rocky areas.

Through the years nature took its toll of these mature trees--some felled by storms, by insect depredations, and by fungus invasion of broken branches and trunks.

There were few seedlings to take the place of these fallen pine trees, since young pines cannot survive long in the shade. However, seedlings of broad-leaved trees quickly spring up in the openings created by fallen pines. Or young hardwoods, which formed the understory during the dominance of the pines,. grew rapidly to fill the opening created by the demise of one or more mature pines.

Here and there, in upland areas of the park, one finds dead pines, both standing and fallen; likewise, a few venerable trees which have passed their prime. These have only small openings in the canopy above and are very crowded by more vigorous hardwoods. Another decade and these old pines will be largely gone, succeeded by the climax community made up of oaks, hickory and tulip poplar and, to a lesser extent, of ash, beech, red maple and sour gum.

The succession from the pine to the climax hardwood community has not been a uniform one because farm lands were not all abandoned at the same time, and, as indicated earlier, some of the land was logged but not farmed.

This hardwood climax community is likely to remain a stable one, unless a calamity intervenes, such as fire, disease, or insect ravage. Logging will not take place in that part of the watershed which is in the public domain as parkland. As individual trees die from various causes, they will be replaced by hardwoods now in the understory.

This understory is a mixture of young hardwoods and small trees, shrubs, and vines. Among the important species are the dogwood, shadbush, spicebush,

witch hazel, grape, poison ivy, mountain laurel, blueberry, wild azalea, pawpaw, arrow-wood, elderberry, maple-leaved viburnum, sassafras, redbud, blackhaw, ironwood and hazelnut. These are mainly understory species adapted for survival in the partial shade of larger trees.

Scattered through the park are individual trees estimated to range in age from 150 to 250 years. These trees witnessed the momentous events in the land's history and were spared the woodsman's axe because of their inaccessibility, lack of economic value, or because of their esthetic value as shade trees near a home or mill.

Also scattered through the park are many exotic species introduced for horticultural purposes in the past century. Among these are the ailanthus, paulownia and mimosa.

The climax forest is the home of many birds, animals, reptiles, amphibians and insects which find food and shelter in this environment. The squirrels and chipmunks are perhaps the commonest and are active during the day, hence seen most often. But many other forms of life subsist, directly or indirectly on the forest. Many birds are year-round residents and subsist on seeds, buds, berries and insects; a few on small mammals.

Other forest dwellers are secretive and nocturnal or few in numbers and thus are seldom seen, although tracks and droppings attest to their presence. Among these are the raccoons, owls, woodpeckers, skunks, opossums, rats, turtles, frogs and salamanders.

Traveling along the forest trail, one notes how well much of the land has been restored by nature--the rich humus and the lush growth of herbage of all sorts. There is much evidence of land erosion, mostly of recent origin, going back less than half a century or so to the rapid runoff of waters from surrounding urbanized areas after heavy rainfalls. It continues to this day and is the price we pay for the urban development of this area.

Alder, smooth	Alnus serrulata
Ampelopsis, American	Ampelopsis cordata
Ash, white	Fraxinus americanus
Azalea, pink	Rhododendron nudiflorum
Barberry, European	Berberis vulgaris
Basswood	Tilia americana
Beech	Fagus grandifolia
Birch, river	Betula nigra
Bittersweet, American	Celastrus scandens
Bittersweet, Asiatic	Celastrus orbiculatus[1/]
Blackberry	Rubus spp.
Blackhaw	Viburnum prunifolium
Bladdernut	Staphylea trifolia[1/]
Blueberry	Vaccinium spp.
Butternut	Juglans cinerea
Buttonbush	Cephalanthus occidentalis
Catalpa	Catalpa bignonoides
Cherry, black	Prunus serotina
Cherry, choke	Prunus virginiana[1/]
Cherry, sweet	Prunus avium
Chestnut, American	Castanea dentata
Chestnut, Asiatic	Castanea mollisima
Chinquapin	Castanea pumila
Cottonwood	Populus deltoides
Clematis, Virginia	Clematis virginiana
Deerberry	Vaccinium stamineum
Dogwood, flowering	Cornus florida
Dogwood, silky	Cornus amomum

Elderberry	Sambucus canadensis
Elm, American	Ulmus americana
Fringetree	Chionanthus virginicus[1/]
Grape, chicken	Vitis vulpina
Greenbrier, common	Smilax rotundifolia
Greenbrier, redberry	Smilax rotundifolia walteri[1/]
Hackberry	Celtis occidentalis
Hazelnut	Corylus Americana
Hawthorn	Crataegus spp.
Hemlock, eastern	Tsuga canadensis
Hercules' club	Aralia spinosa[1/]
Hickory, bitternut	Carya cordiformis
Hickory, mockernut	Carya tomentosa
Hickory, pignut	Carya glabra
Hickory, shagbark	Carya ovata[1/]
Holly, American	Ilex opaca
Honeysuckle, Tartarian	Lonicera tatarica
Honeysuckle, Japanese	Lonicera japonica
Hop tree	Ptelea trifoliata
Hop hornbeam	Ostrya virginiana
Huckleberry, black	Gaylussacia baccata
Hydrangea	Hydrangea arborescens[1/]
Ivy, English	Hedera helix
Juneberry	Amelanchier canadensis
Locust, black	Robinia pseudo-acacia
Locust, honey	Gleditsia triacanthos
Magnolia, bigleaf	Magnolia acuminata[1/]
Magnolia, Virginia	Magnolia virginiana[1/]
Mimosa	Albizzia julibrissin

Maple, ash-leaved (or Box-elder)	Acer negundo
Maple, red	Acer rubrum
Maple, Norway	Acer platanoides
Maple, sugar	Acer saccharum
Maple, silver	Acer saccharinum
Mock-orange	Philadelphus inodorus[1/]
Mountain laurel	Kalmia latifolia
Mulberry red	Morus rubra
Mulberry, white	Morus alba
Ninebark	Physocarpus opulifolius[1/]
Oak, overcup	Quercus lyrata[1U/]
Oak, post	Quercus stellata
Oak, white	Quercus alba
Oak, chestnut	Quercus prinus
Oak, swamp white	Quercus bicolor
Oak, scarlet	Quercus coccinea
Oak, pin	Quercus palustris
Oak, red	Quercus rubra
Oak, black	Quercus velutina
Oak, spanish	Quercus falcata
Oak, blackjack	Quercus marilandica
Oak, shingle	Quercus imbricaria
Oak, willow	Quercus phellos
Oak, sawtooth	Quercus acutissima[1/]
Oleaster	Elaeagnus pungens
Osage orange	Maclura pomifera[1/]
Paulownia	Paulownia tomentosa
Pawpaw	Asimina triloba[1/]
Persimmon	Diospyrus virginiana

Pine, Virginia	Pinus virginiana
Pine, white	Pinus strobus
Pine, pitch	Pinus rigida[1/]
Poison ivy	Rhus radicans
Privet, common	Ligustrum vulgare
Privet, California	Ligustrum ovalifolium[1/]
Raspberry	Rubus strigosus
Redbud	Cercis canadensis
Redcedar	Juniperus virginiana
Rose, multiflora	Rosa multiflora
Rose of Sharon	Hibiscus syriacus[1/]
Sassafras	Sassafras albidum
Sour gum	Nyssa sylvatica
Spicebush	Lindera benzoin
Strawberry-bush	Euonymus Americanus[1/]
Sumac, staghorn	Rhus typhina
Sumac, dwarf	Rhus copallina
Sweet gum	Liquidambar styraciflua
Sycamore	Platanus occidentalis
Tree of heaven	Ailanthus altissima
Trumpet creeper	Campsis radicans
Tulip poplar	Liriodendron tulipifera
Viburnum, maple-leaved	Viburnum acerifolium
Viburnum, arrow-wood	Viburnum dentatum
Virginia creeper	Parthenocissum quinquefolia
Walnut, black	Juglans nigra
Willow, black	Salix nigra
Willow, weeping	Salix babylonica
Wineberry	Rubus phoenicolasius

Wisteria, Chinese	Wisteria sinensis
Witch hazel	Hamamelis virginiana

1/ These trees have not been observed in Rock Creek Park, Maryland, by the author or by the staff at Meadowside Nature Center. Most of these are believed to occur in the park since they have been observed in the park south of the D.C. line.

5.2 Wild Flowers

When one thinks of wildflowers, he usually has in mind the woodland denizens that make such a striking display in the spring. They are in greatest profusion in the floodplain along creek-side trails, though they are seen in the many upland wooded areas in the park. Woods flowers that bloom in summer and fall often are less showy and more weedy than the spring flowers, and they do not tend to stand out as crisply amidst the dense greenery of summer.

Another important wildflower habitat is open areas, the roadsides, grassy meadows, woodland borders, and abandoned fields. These open areas, dominated by sunloving annuals and perennials, are pioneer habitats, unstable, with transient plant communities. Here one finds many introduced weeds that have no permanent place in the natural community.

Follow one of the park's typical floodplain trails--along Rock Creek between the B&O overpass and Route I-495. The flowers here are adapted to the woodland environment, and most would not survive in an open habitat. They require a moist, shady and sheltered environment rich with nutrients drawn from the decaying litter on the forest floor.

Many species leaf out and flower early in spring before the trees and shrubs form a leafy canopy overhead, shutting out vital sunlight. The open canopy of early spring enables the plants to capture enough light to get through their reproductive cycle and to manufacture and resupply food to their roots, corms or bulbs.

The woodland habitat has diminished with the shrinkage of forested regions in North America since the arrival of European man. Many species probably have had their range reduced sharply during the past 200 years as the forests have been cleared and the land converted to agricultural use. Many early farms were abandoned in the decades after the Civil War, and ecological succession brought about natural reforestation. The native wildflowers have not all returned. Some survived in pockets in ravines and on rocky slopes not logged and gradually spread into their former habitat as the forests were re-established.

Woodland flowers tend to produce seeds in relatively small quantity, and these often drop nearby to form colonies. Many species spread vegetatively by runners and rootstocks, thereby compensating for poor or uncertain seed production and dispersal. Woodland species depend largely on insects for pollination, hence they are notable nectar producers. Some have developed intricate devices, e.g. long spurs filled with nectar, as in the columbine, which aid in pollination.

Since many woodland species do not rely on wind to spread seeds, they depend on other means to extend their range--seeds eaten and dispersed by birds and small mammals, explosive devices to scatter seeds (jewelweed, violet) and bristly or burred fruits, seeds that attach to passersby and thus are dispersed.

Japanese honeysuckle has taken over in many areas of the park. Relatively few herbaceous plants survive where this has occurred, since the honeysuckle has smothered so many of them. This exotic plant inhibits the growth of all kinds of tree seedlings by denying them the light essential to their development. We hesitate to contemplate what might happen in the years to come as mature hardwoods succumb to natural hazards and are not replaced by young trees for lack of seedlings.

How important is the role of woodland flowers in the ecology of the forest? The diverse ground-cover species complement the trees and shrubs above by providing food and shelter to the birds and mammals of the forest, as well as nectar, pollen, leaves, flowers and seeds to the numerous insects in the food chain of the forest. The spring flowers are an important early source of nectar and pollen while other sources of food are still scarce in the forest.

Species that form colonies and carpet the forest floor help to retard and prevent erosion especially on the slopes during spring runoff.

Many of the sun-loving open-area species mentioned earlier are aggressive and vigorous and in a season or two will take over any open area, whether created by man or by nature, as when a tree dies and falls leaving a hole in the canopy. Certain species that grow with a creeping habitat are able to survive periodic mowings and constant treading and thus are quite adapted to heavily mowed and much-used waysides.

Most of these vigorous species, often described as weeds, are heavy seed producers, their seeds distributed readily by wind, like the dandelion seeds with their silky "parachutes." One plant may produce 50,000 seeds in a season. Sometimes the seeds are borne in a fleshy fruit (e.g., berry) that birds and mammals eat. The seeds may pass through their digestive tracts unharmed and germinate where they are deposited in the droppings, often at distant places. Still others are enclosed in burred fruits that attach readily to passersby, whether animal or human, and may be transported considerable distances.

Many of the low-growing species found in sunny open areas spread vegetatively as well as by seeds. Some prostrate plants, such as ground-ivy and chickweed, can spread over a wide area in a single season, producing flowers and seeds wherever the creeping stems grow.

Some of our coarser, taller plants have adapted to exposed, windy, and arid habitats. Many of these have dense, hairy, or woolly leaf surfaces (e.g., common mullein) that, presumably, retard water loss.

About two dozen species that have been introduced from Europe or Asia during the past three centuries, often by accident, have become widespread, including Rock Creek Park. Among those you are most likely to see are: bladder campion, chicory, celandine, ox-eye daisy, dandelion, dayflower, orange hawkweed, heal-all, hopclover, mullein, mustard, red clover, yarrow, and wild carrot.

Weedy areas offer food and shelter to many birds, rabbits, and small rodents. They retard erosion and runoff and the drying out of the soil.

Flowers of Rock Creek Watershed

Adder's-tongue	Erythronium americanum
Agrimony, yellow	Agrimonia spp.
Alexanders, golden	Zizia aurea
Alum-root	Heuchera americana
Arrowhead	Sagittaria latifolia
Aster, New England	Aster novae-angliae
Aster, white-topped	Seriocarpus asteroides
Avens, white	Geum canadense
Avens, yellow rough	Geum strictum
Beard-tongue	Penstemon digitalis
Bedstraw, rough	Galium asprellum
Beebalm	Monarda clinopodia
Beechdrops	Epifagus virginiana
Beggar-ticks	Bidens frondosa
Bellwort	Uvularia perfoliata
Bergamot, wild	Monarda fistulosa
Bindweed, field	Convolvulus arvensis
Bindweed, hedge	Convolvulus sepium
Bittercress, Pennsylvania	Cardamine pensylvanica
Black snakeroot	Sanicula marilandica
Black-eyed Susan	Rudbeckia hirta
Bloodroot	Sanguinaria canadensis
Bluebell, Virginia	Mertensia virginica
Blue-eye grass	Sisyrinchium mucronatum
Bluet, common	Houstonia caerulea
Boneset	Eupatorium perfoliatum
Buckwheat	Fagopyrum sagittatum
Buckwheat, clumbing false	Polygonum scandens

Bugleweed	Lycopus virginicus
Bur cucumber	Sicyos angulatus
Bushclover	Lespedeza, spp.
Buttercup, bulbous	Ranunculus bulbosus
Buttercup, small-flowered	Ranunculus abortivus
Butterfly-weed	Asclepias tuberosa
Cactus, prickly-pear	Opuntia humifusa
Cancer-root	Orobanche uniflora
Campion, bladder	Silene cucubalus
Campion, starry	Silene stellata
Cardinal-flower	Lobelia cardinalis
Carrion-flower	Smilax herbacea
Carrot, wild	Daucus carota
Cat's ear	Hypochoeris radicata
Cattail, common	Typha latifolia
Cattail, narrow-leaf	Typha angustifolia
Celandine, lesser	Ranunculus ficaria
Cheeses	Malva neglecta
Chervil, wild	Chaerophyllum procumbens
Chickweed, common	Stellaria media
Chickweed, star	Stellaria pubera
Chicory	Chichorium intybus
Chrysogonum	Chrysogonum virginianum
Cinnamon-vine	Dioscorea batatas
Cinquefoil, common	Potentilla simplex
Cinquefoil rough-fruited	Potentilla recta
Cinquefoil, silvery	Potentilla argentea
Clearweed	Pilea pumila
Cleavers	Galium aparine

Clover, hop	Trifolium agrarium
Clover, red	Trifolium pratense
Clover, smaller hop	Trifolium procumbens
Clover, white	Trifolium repens
Cocklebur, clotbur	Xanthium chinense
Cohosh, black	Cimicifuga racemosa
Coltsfoot	Tussilago farfara
Comfrey, wild	Symphytum officinale
Coneflower, green-headed	Rudbeckia laciniata
Coreopsis, whorled	Coreopsis verticillata
Corydalis, yellow	Corydalis flavula
Cowcress; field peppergrass	Lepidium campestre
Cranefly orchis	Tipularia discolor
Cress, spring	Cardamine bulbosa
Cress, winter	Barbarea vulgaris
Cress, yellow	Rorippa islandica
Crownbeard	Verbesina occidentalis
Cucumber, Indian	Medeola virginiana
Daisy, ox-eye	Chrysanthemum leucanthemum
Dandelion	Taraxacum officinale
Dandelion, dwarf	Krigia virginica
Dayflower, Asiatic	Commelina communis
Daylily	Hemerocallis fulva
Dead nettle, purple	Lamium purpureum
Dock, curly	Rumex crispus
Dodder	Cuscuta gronovii
Dogbane, intermediate	Apocynum medium
Dutchman's breeches	Dicentra cucullaria
Elephant's foot	Elephantopus carolinianus

Enchanter's nightshade	Circaea quadrisulcata
Figwort	Scrophularia lanceolata
Figwort, Maryland	Scrophularia marilandica
Fireweed	Epilobium angustifolium
Fleabane, daisy	Erigeron annuus
Fly-poison	Amianthium muscaetoxicum
Forget-me-not	Myosotis scorpioides
Gallant soldiers	Galinsoga parviflora
Garlic, field	Allium vineale
Garlic-mustard	Alliaria officinalis
Geranium, wild	Geranium maculatum
Gill-over-the-ground	Glechoma hederacea
Ginger, wild	Asarum canadense
Goatsbeard	Tragopogon pratensis
Golden-aster, Maryland	Chrysopsis mariana
Goldenrod	Solidago, spp.
Grass, barnyard	Echinochloa crusgalli
Grass, cockspur	Echinochloa walteri
Grass, panic	Panicum, spp.
Grass, wool	Scirpus cyperinus
Green dragon	Arisaema dracontium
Groundsel, common	Senecio vulgaris
Ground cherry	Physalis heterophylla
Hawkweed, rough	Hieracium scabrum
Hawksbeard, smooth	Crepis capillaris
Heal-all	Prunella vulgaris
Hedge-mustard	Sisymbrium officinale
Henbit	Lamium amplexicaule
Hepatica	Hepatica americana

Hog peanut	Amphicarpa bracteata
Hollyhock	Althaea rosea
Honewort	Cryptotaenia canadensis
Horehound, cutleaf water	Lycopus americanus
Horsebalm	Collinsonia canadensis
Horseweed	Erigeron canadensis
Houstonia, tall	Houstonia purpurea
Indian pipe	Monotropa uniflora
Indian tobacco	Lobelia inflata
Ironweed	Veronica noveboracensis
Jack-in-the-pulpit	Arisaema triphyllum
Jimsonweed	Datura stramonium
Joe-pye weed	Eupatorium purpureum
Knapweed, brown	Centaurea jacea
Knotweed	Polygonum spp.
Knotweed, Japanese	Polygonum cuspidatum
Knotweed, Virginia	Tovara virginiana
Lady's thumb	Polygonum persicaria
Lamb's quarters	Chenopodium album
Lettuce, prickly	Lactuca scariola
Lettuce, yellow	Lactuca canadensis
Licorice, wild white	Galium circaezans
Lily, Canada	Lilium canadense
Lobelia, great	Lobelia siphilitica
Loosestrife, fringed	Lysimachia ciliata
Lopseed	Phryma leptostachya
Lychnis, evening	Lychnis alba
May-apple	Podophyllum peltatum
Mayweed	Anthemis arvensis

Meadow-rue, early	Thalictrum dioicum
Meadow-rue, tall	Thalictrum polygamum
Medick, black	Medicago lupulina
Mercury, three-seeded	Acalypha virginica
Milkweed, purple	Asclepias purpurascens
Milkweed, swamp	Asclepias incarnata
Mint, water	Mentha aquatica
Mistflower	Eupatorium coelestinum
Moneywort	Lysimachia nummularia
Monkeyflower	Mimulus ringens
Moonseed	Menispermum canadense
Morning-glory, ivy-leaved	Ipomoea hederacea
Mountain-mint	Pycnanthemum spp.
Mugwort	Artemisia vulgaris
Mullein	Verbascum thapsus
Mustard, black	Brassica nigra
Mustard, tumble	Sisymbrium altissimum
Nettle, false	Boehmeria cylindrica
Nettle, horse	Solanum carolinense
Nettle, stinging	Urtica dioica
Nettle, wood	Laportea canadensis
Nightshade, purple	Solanum dulcamara
Nipplewort	Lapsana communis
Partridgeberry	Mitchella repens
Pennyroyal, American	Hedeoma pulegioides
Peppergrass	Lepidium virginicum
Peppermint	Mentha piperita
Periwinkle	Vinca minor
Phlox, fall	Phlox paniculata

Pigweed; Redroot	Amaranthus hybridus
Pimpernel, scarlet	Anagallis arvensis
Pink, deptford	Dianthus armeria
Pipsissewa	Chimaphila umbellata
Plantain, common	Plantago major
Plantain-lily	Hosta spp.
Plantain, rattlesnake	Goodyera pubescens
Pokeweed	Phytolacca americana
Potato-vine, wild	Ipomoea pandurata
Primrose, evening	Oenothera biennis
Purslane	Portulaca oleracea
Pussytoes	Antennaria plantaginifolia
Ragweed, giant	Ambrosia trifida
Ragweed, small	Ambrosia artemisiifolia
Ragwort, golden	Senecio aureus
Rattlesnake-weed	Hieracium venosum
Robin-plantain	Erigeron pulchellus
Rose-pink	Sabatia angularis
Rue-anemone	Anemonella thalictroides
Ruellia	Ruellia carolinesis
Rush, common	Juncus effusus
Sage, Lyre-leaf	Salvia lyrata
St. Andrew's cross	Ascyrum hypericoides
St. John'swort, common	Hypericum perforatum
St. John'swort, spotted	Hypericum punctatum
Sarsaparilla, wild	Aralia nudicaulis
Saxifrage	Saxifraga virginiensis
Sedge, Lancaster	Cyperus lancastriensis
Sensitive plant, wild	Cassia nictitans

Sheep sorrel; Sourgrass	Rumex acetosella
Shepherd's purse	Capsella bursa-pastoris
Showy orchis	Orchis spectabilis
Skullcap, downy	Scutellaria incana
Skullcap, mad-dog	Scutellaria laterifolia
Skullcap, showy	Scutellaria serrata
Skunk cabbage	Symplocarpus foetidus
Smartweed	Polygonum spp.
Snakeroot, white	Eupatorium rugosum
Sneezeweed, purple-headed	Helenium nudiflorum
Soapwort; Bouncing bet	Saponaria officinalis
Solomon's seal	Polygonatum biflorum
Solomon's seal, false	Smilacina racemosa
Sow thistle	Sonchus arvensis
Spanish needles	Bidens bipinnata
Speedwell, common	Veronica officinalis
Speedwell, slender	Veronica filiformis
Spiderwort	Tradescantia virginiana
Spikenard	Aralia racemosa
Spring beauty	Claytonia virginica
Spurge, flowering	Euphorbia corollata
Squaw-root	Conopholis americana
Stargrass	Hypoxis hirsuta
Star-of-Bethlehem	Ornithogalum umbellatum
Stitchwort, lesser	Stellaria graminea
Stonecrop, ditch	Penthorum sedoides
Stonecrop, mossy	Sedum acre
Strawberry, Indian	Duchesnea indica
Strawberry, wild	Fragaria virginiana

Sundrops	Oenothera fruticosa
Sunflower	Helianthus annuus
Sweet cicely	Osmorhiza claytoni
Sweet-clover, white	Melilotus alba
Sweet-clover, yellow	Melilotus officinalis
Sweet-everlasting	Gnaphalium obtusifolium
Tearthumb, arrow-leaved	Polygonum sagittatum
Tearthumb, halberd-leaved	Polygonum arifolium
Thimbleweed	Anemone virginiana
Thistle, bull	Cirsium vulgare
Thistle, field	Cirsium discolor
Tickseed-sunflower	Bidens aristosa
Tick-trefoil	Desmodium spp.
Toadshade; Trillium	Trillium sessile
Toothwort	Dentaria laciniata
Touch-me-not, pale	Impatiens pallida
Touch-me-not, spotted	Impatiens capensis
Trailing arbutus	Epigaea repens
Trillium, painted	Trillium undulatum
Twayblade	Liparis lilifolia
Twinleaf	Jeffersonia diphylla
Velvetleaf	Abutilon theophrasti
Venus' looking-glass	Specularia perfoliata
Vervain, purple	Verbena angustifolia
Vervain, white	Verbena urticifolia
Vetch, hairy	Vicia villosa
Vetch, purple	Vicia americana
Violet, common blue	Viola papilionacea
Violet, white	Viola, spp.

Violet, yellow	Viola pubescens
Virgin's bower	Clematis virginiana
Watercress	Nasturtium officinale
Waterleaf, Virginia	Hydrophyllum virginianum
Water hemlock	Cicuta maculata
Water-plantain	Alisma triviale
Water-plantain	Alisma subcordatum
Whitlow-grass	Draba verna
Wildbean, trailing	Strophostyles helvola
Wild yam	Dioscorea glauca
Willow-herb, northern	Epilobium glandulosum
Wingstem	Verbesina alternifolia
Wintergreen, spotted	Chimaphila maculata
Wood-nettle	Laportea canadensis
Wood-sorrel, violet	Oxalis violacea
Wood-sorrel, yellow	Oxalis stricta
Wormseed; Mexican tea	Chenopodium ambrosioides
Yarrow	Achillea millefolia

Chapter 6

Description And Inventory Of Non-Flowering Plants

6.1 Ferns and Fern Allies

From the viewpoint of number of species found in Rock Creek Park, the approximately twenty species of ferns and fern allies are insignificant when compared with flowering plants. Their chief interest is the antiquity of the group in evolutionary time, their unusual means of reproduction, and their beauty or symmetry.

A few species found in the park are adapted to dry and rocky habitats, but the majority prefer shaded, usually moist, situations. The very existence of ferns is intimately associated with the climax forest. If a forest is destroyed by cutting or fire, the ferns will disappear for a long time, perhaps for several decades or longer, until a suitable tree-clothed environment is restored.

The numbers of fern plants and their distribution in the Rock Creek watershed may have declined to some extent, owing to periodic flooding of tributaries of Rock Creek after heavy rains and to the invasion of Japanese honeysuckle in many areas. Erosion of topsoil in stream valleys and on steep slopes, due largely to heavy runoff of rain water, has created an environment unsuited for the continued development of ferns. Ferns can make a comeback in such areas in time, if these adverse conditions are corrected.

Ferns are believed to have evolved during the Upper Devonian period in geological history, about 300 million years ago, and reached a climax in size and in numbers during the Carboniferous era, about 250 million years ago. These ancient ferns make up a part of today's coal deposits, an important source of energy.

Two kinds of fern allies can be found in the park; horsetails (Equisetum) and club-mosses (Lycopodium).

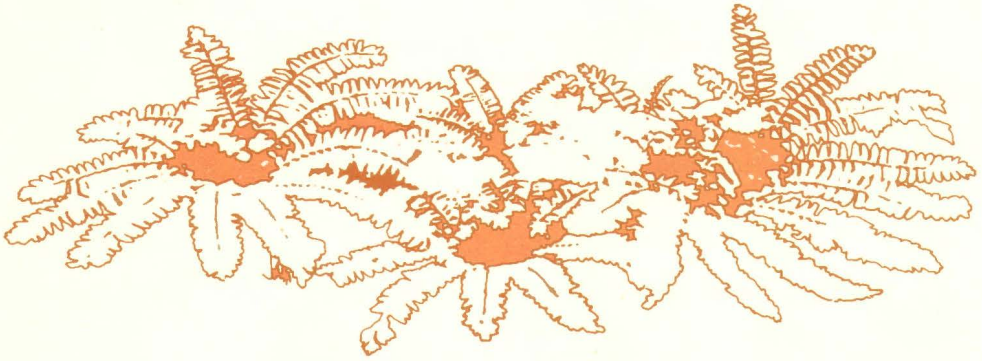
The common scouring rush (Equisetum hiemale) is a tall, slender, green, bamboo-like jointed plant. Single unbranched shoots arise from an underground

rootstock. These may be sterile but usually have a terminal cone or strobilus that bears spores.

Field horse-tail (Equisetum arvense) has two kinds of erect stems. The sterile ones are green and bushy, with many lateral branches arising from a single stalk. The fertile stems are pinkish or brownish, unbranched and succulent, and are found only in spring.

The Club-mosses, also ancient plants, are related to ferns because of their similar mode of reproduction. They are known by a variety of names: ground pine, running pine, Christmas green, crowsfoot and tree clubmoss. These names arose because of supposed resemblance to other familiar plants or because of their use, in the case of Christmas green.

Three common species are the Shining Clubmoss (Lycopodium lucidulum) with 6-inch erect stems and shining leaves; Tree club-moss (L. obscurum) which looks like a miniature, branched pine tree; and Running pine or Christmas green (L. complanatum) with leaves in a single plane.



Shining clubmoss	Lycopodium lucidulum
Tree clubmoss	Lycopodium obscurum
Running pine; Christmas green	Lycopodium complanatum
Cinnamon fern[1]	Osmunda cinnamonea
Interrupted fern[1]	Osmunda claytoniana
Royal fern	Osmunda regalis var. spectabilis
Christmas fern[1]	Polystichum acrostichoides
Sensitive fern[1]	Onoclea sensibilis
Netted chain fern	Lorinseria areolata
Polypody[1]	Polypodium virginianum
New York fern[1]	Thelypteris noveboracensis
Southern lady fern[1]	Athyrium filix-femina asplenoides
Silvery spleenwort	Athyrium thelypterioides
Spinulose wood fern	Dryopteris spinulosa
Hay-scented fern[1]	Dennstaedtia punctilobula
Broad beech fern	Thelypteris hexagonoptera
Ebony spleenwort	Asplenium platyneuron
Rattlesnake fern[1]	Botrychium virginianum
Maidenhair fern[1]	Adiantum pedatum

[1] Observed by author in Rock Creek Park, Maryland. All others reported in Rock Creek, D.C. or in the greater Washington area.

Mosses, liverworts and hornworts comprise a group of plants known as the bryophytes. Of these, the mosses are by far the most abundant group in the park.

They, along with lichens, have the structural and physiological features which enable them to withstand a wide range of ecological tolerances. Thus, certain species are found in their pioneering role in the colonization of land as they become established on bare rock, barren mineral soil or fallen logs.

When these plants die, they leave a base of soil which eventually supports ferns, conifers and flowering plants. They are thus an important link in the process of soil formation, such soil being made up of rock decomposed by these plants and organic soil created from their remains.

Look for an undisturbed stream bank, with its conspicuous carpet of bryophytes. These minute plants growing close together serve as a sponge for raindrops and runoff water, thereby holding and conserving water. Concurrently, the soil beneath the mats and clumps of these plants is protected from sheet erosion by both water and wind. It is in these two ways that the bryophytes play their greatest, though subtle, role in the natural economy of our land.

Lacking true roots, stems and leaves with an efficient conducting system for obtaining and transporting water, the bryophytes are reduced in size and many species grow in moist habitats, some even submerged in fresh water.

However, they are not restricted to these habitats. They can survive prolonged arid conditions, especially on exposed rocks and tree trunks, getting sufficient moisture from dew. When subjected to severe drought, their appearance will alter considerably. Their leaves may become tightly appressed toward the stem or they may crinkle or curl. When rain falls, they recover instantly, their cells regaining turgidity and resuming food production by photosynthesis. They now "come alive" and display their beauty. At the same time the little society of invertebrates, such as small insects which live and feed among the mosses, renew activity.

Whereas most forest floor plants are deciduous, the bryophytes remain green all year. The low temperature merely slows their metabolic activities, and with the arrival of spring new growth begins anew at the tip of each plant.

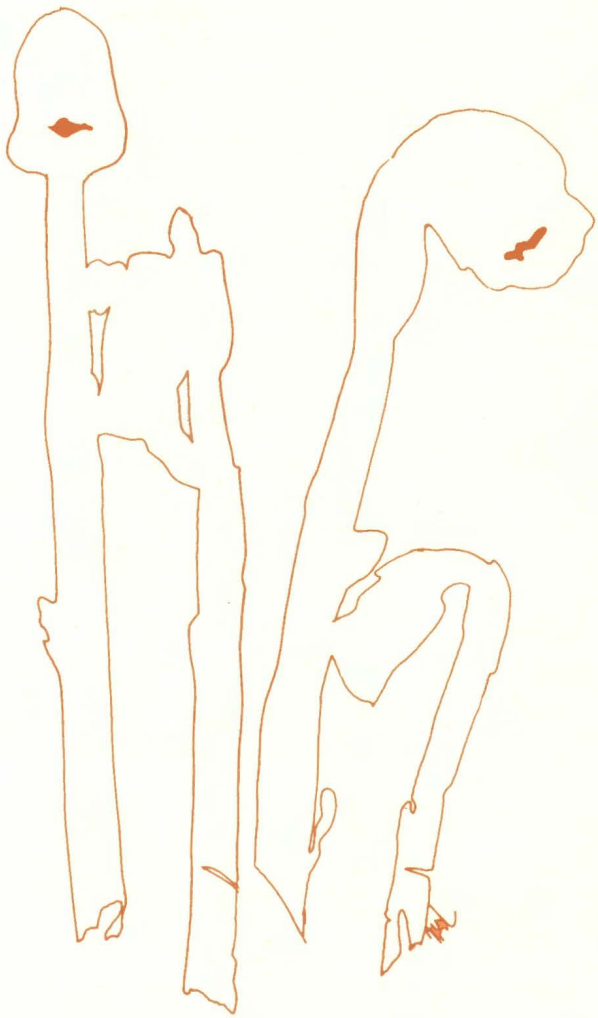
Growing in masses, mosses are conspicuous and recognizable. Those species which have an erect habit of growth form tufts or cushions, and their stems are usually unbranched. Others have a prostrate habit of growth as the stems are many times branched and intertwined to form mats. Moss leaves are spirally arranged on the stem axis and may or may not have a midrib.

With the leafy liverworts, the leaves are two-ranked, lack a midrib, and may be lobed. The liverworts and the hornworts have flat, thin, circular or ribbon-like plant bodies.

Propagation is accomplished primarily by vegetative means. Cushions and mats increase in size with new spring growth at the tips and death of the oldest parts. Thus, new plants may separate from the old. New plants arise from break up of moss leaves and stems.

In addition to vegetative reproduction, the moss or liverwort also reproduces by a gametophyte or sex phase of its life cycle. Egg cells and motile sperm cells are produced at the tips of the main stem or its branches. Within a thin film of water, the sperm cell reaches the egg cell, the two fusing to form a diploid cell. This, by cell division, eventually forms the sporophyte (spore-bearing plant) phase of the life cycle, represented by the familiar spore capsule atop a stalk.

A spore is discharged and may eventually germinate and grow into a new moss plant. This method of propagation is effective but slow and takes a very long time for mosses to spread.



Common Mosses and Liverworts of the Rock Creek Basin[1]

---[2]	Grimmia
---	Hedwigia
---	Conocephalum
Peatmoss	Sphagnum
Starmoss	Atrichum
---	Brachythecium
Little broom moss	Dicranella
Big broom moss	Dicranum
---	Hypnum
Pincushion moss	Leucobryum
---	Mnium
---	Pogonatum
Haircap moss	Polytrichum
Fern moss	Thuidium

[1] These mosses were collected in Rock Creek Park, D.C. It is probable that all of these occur north of the District line in Rock Creek Valley. Liverworts have been observed in the park but not identified as to species.

[2] A dash indicates absence of a common name.

6.3 Fungi, Lichens and Related Groups

These interesting plants belong to a simple order of vegetation since they do not have leaves, flowers or seeds. As they lack chlorphyll, the green substances of leaves, they must depend for nourishment on living or dead organic matter. Unlike a tree or a flower, a fungus cannot manufacture its own food.

Fungi reproduce by means of microscopic spores dropped from a mature fruiting body, such as a mushroom. Upon maturing, these spores fall from the gills in huge numbers to be wafted away by the wind. A single shaggy mane mushroom is estimated to cast off five billion spores.

The fungi come in a great variety of forms, some familiar to most of us. Among these are mushrooms or toadstools, bracket fungi on trees, mildews and rusts.

Fungi play a very important role in what is often called the carbon cycle. They attack wood, converting it into simpler substances, and release carbon dioxide. Some decay fungi attack sound wood while other species complete the job on already decaying or dead wood and bark. The fungi, as well as bacteria and insects, all contribute to this conversion of decadent or dead wood to humus, the basis for new plant growth. Humus also holds rain water so that it gradually soaks into the ground, providing life-giving moisture to green vegetation.

Some mushrooms are edible and considered gourmet food. It is important that the mushroom collector become fully familiar with these fungi since edible ones often closely resemble toxic species. One should learn the distinguishing characteristics of the poisonous ones to avoid picking them. The serious student of fungi should make use of a mushroom guide, join a mycological group, and learn to identify species with the help of an expert in the field.

One group of fungi, seldom seen by any other than plant scientists, plays a very important role in a woodland ecosystem. These fungi are very intimately associated with underground biological activity that surrounds the root systems of many trees, shrubs and herbs. They are dependent upon this activity for their well-being and very existence.

This micro-environment that surrounds the rootlets of a green plant is the main passageway for interaction between plants and soil. These roots are surrounded by micro-organisms such as bacteria, fungi, nematodes and protozoa. Certain fungi grow upon and invade portions of near-surface root systems responsible for the absorption of nutrients by the herb, shrub or tree. The latter host plants could not survive without the close association of these fungi, known as mycorrhizae. They remain unseen and usually unknown, except when they produce mushrooms in late summer beneath certain tree species.

Researchers have found that nutrients are absorbed by the slender, thread-like roots of the fungi and translocated into the tree's root tissues. The association appears to benefit the fungi, too, since attachment to the plant's roots is a requisite for fruiting under natural conditions. Thus, certain species of mushrooms are found only near certain tree species; for example, birch, beech, oak, pine, spruce and sweet gum. Some produce very small underground fruiting bodies never seen by passersby. This also is true of the fungi associated with maples and tulip poplar.

Indian pipe, common in the park, is considered a parasite since it has no green coloring matter and thus cannot produce its own food. The roots of this plant are profusely covered with mycorrihiza that also are closely associated with the tree species beneath which the Indian pipe grows.

These usually unseen fungi thus play an important beneficial role for the host plant, primarily in increasing the solubility of minerals, improving uptake of nutrients, protecting roots against pathogens, producing plant growth hormones, and moving carbohydrates from one plant to another.

Lichens, which have a close link to fungi, are found growing on rocks, boulders and on the bark of mature trees in Rock Creek Park. They are recognized by their graying, scabby crust-like appearance and roundish or irregular form of growth. A lichen is an intimate partnership between a fungus and an alga. The two exchange food and are completely dependent on each other; the alga producing and providing food for the fungus, while the latter provides protection for the alge. This living in togetherness is called symbiosis.

The lichen grows very slowly and is a plant pioneer in colonizing a rocky surface. It slowly secretes acid which helps to break down the cementing material of rocks, freeing the harder rock granules. The alternate swelling and shrinking of the lichen during spells of wet and dry weather also have an eroding effect upon the rocks, loosening particles on the surface. If you loosen a bit of lichen with a knife, you will notice or feel gritty rock particles on the under sides.

Very gradually, over a period of decades, the bits of eroded rock and decayed plant material form a thin layer of soil. This is hospitable to mosses, then grass and small rock-loving flowering plants. Eventually when the rock disintegrates further, larger plants, as well as shrubs and trees, can gain a foothold.

Weathering, due to freezing and thawing, wind and rain, also hastens the decomposition of rock into soil. Small insects and worms also contribute to the reworking and the further decomposition of rocks.

Field mushroom	Agaricus compestris
Fir-cone amanita	Amanita strobiliformis
Deadly amanita	Amanita phalloides
Slight-volvate amanita	Amanita parcivolvata
Fly agaric	Amanita muscaria
Booted amanita	Amanita cothurnata
Honey mushroom	Amanita solitaria mellea
Honey-colored clitocybe	Armillariella tabescens
Bolete	Boletus miniato-olivaceus
Separating boletus	Boletus separans
Berkeley's polyporus	Bondarzewia berkelei
Red chantrelle	Cantharellus cinnabarinus
chantrelle	Cantharellus cibarius
Green-gill lepiota	Chlorophyllum esculentum
Bluecap	Clitocybe nuda
Plum clitopilus	Clitopilus prunulus
Coltricia	Coltricia perennis
Coriolus	Coriolus biformis
Many-colored polypore	Coriolus versicolor
Cinnamon-colored cortinarius	Cortinamius cinnamoneus
Death trumpet	Craterellus cornucopioides
---1/	Crepidotus crocophyllus
---	Cryptoporus volvatus
Oak-loving bracket fungus	Daedalea quercina
Currycomb fungus	Daedalea confragosa
Beefsteak fungus	Fistulina hepatica
---	Fomitopsis annosa
---	Geastrum limbatus

---	Gloeophyllum trabeum
---	Helvella queletii
---	Helvella griseoalba
---	Helvella crispa
---	Helvella macropus
---	Helvella elastica
---	Helvella lacunosa
Vermilion hygrophorus	Hygrophorus miniatus
---	Hygrophorus borealis
---	Inocybe rimosellus
---	Irpex lacteus
Amethyst laccaria	Laccaria amethystea
Blue milky-cap	Lactarius indigo
Peppery milky-cap	Lacterius piperatus
Birch polypore	Lenzites betulina
Parasol mushroom	Lepiota procera
---	Lycoperdon umbrinum
Puffball	Lycoperdon molle
Pink puffball	Lycoperdon subincarnatum
---	Marasmius minutus
Beefsteak morel	Morchella esculenta
Morel	Morchella augusticeps
Morel	Morchella esculenta
Morel	Morchella semilibera
Morel	Morchella deliciosa
---	Mycorrhaphium adustum
Cracked fomus	Phellinus rimosus
---	Phellinus pomaceus
Fatty pholiota	Pholiota adiposa

Oster mushroom	Pleurotus ostreatus
Chicken fungus	Polyporus sulphureus
---	Polyporus tephroleucus
Locust polypore	Polyporus robiniophilus
---	Polyporus dichrous
Cauliflower fungus	Ramaria aurea
Smoky russula	Russula adusta
Earthstar	Scleroderma geaster
---	Scleroderma cepa
Chambered stinkhorn	Simblum sphaerocephalum
Ochrey hydnum	Steccherinum ochraceum
---	Stereum complicatum
---	Stereum ostrea
Undecided boletus	Tylopilus indecisus
Bitter boletus	Tylopilus felleus
Bell omphalia	Xeromphalina campanella
Blackfinger mushroom	Xylaria polymorpha
---	Xylaria oxyacanthae

1/ A dash indicates absence of a common name.

The data on mushrooms and other fungi of the Rock Creek Basin is derived chiefly from the catalogue of the National Fungus Collection, U.S. Department of Agriculture, Beltsville. The author appreciates the guidance and assistance of Dr. Lekh R. Batra and David F. Farr. The former added to the list from records of his collecting trips in the Rock Creek area.

APPENDIX A

KEY TO UNIQUE NATURAL AREAS AND GEOLOGICAL SITES IN ROCK CREEK WATERSHED (SOUTH TO NORTH)

1. Classical-revival style barn, once part of Callaghan Estate, now part of Meadowbrook Stables.

4. Area of exotic trees, chiefly pine and spruce, planted over 40 years ago when this site was part of a nursery.

5. Walnut grove, largest tree--11 feet in circumference.

6. Half-mile stretch of east bank of Rock Creek with scores of trees more than a century old, chiefly sycamore, tulip poplar, American elm, beech and white ash.

7. Bronze marker noting location of Clean Drinking Manor at right entrance to LeVelle Drive. Across the highway is a trace of millrace of Jones Mill.

9. Site of an old stone quarry

10. Extensive marshy area, unique habitat of marsh plants and animals.

11. Site of active beaver colony, only one in Rock Creek Park.

12. Succession growth of Virginia pine.

13. White Oak, the "Linden Oak," about 200 years old. There is a bronze marker in front of the tree. (I.H.S.)*

14. Mature stand of hardwoods, chiefly tulip plplar, sycamore, white oak and red maple, many 75 to 125 years old.

15. A tulip poplar that is more than a century old.

16. Unique pond at edge of Fleming Park is a source of Rock Creek tributary.

17. Unique marsh, near Ken-Gar Recreation Area.

19. Site of extensive stone quarry.

21. Oldest tulip poplar in Rock creek Park, estimated over 200 years old.

22. Mature stand of hardwoods; namely, tulip poplar, sycamore, and black and red oak.

23. Coleman Estate, 22-acre park tract, contains many exotic species with wisteria covering several acres of the understory. There is an abundance of Fortune's euonymus, eleagnus periwinkle, and crabapple.

25. Unique island with potential as nature trail. Has wooded ridge 40 feet above floodplain with mature hardwoods.

26. Narrow, long, shallow pond surrounded by a marsh--contains abundant and varied aquatic plants and animals.

27. Ravine with ferns predominant on floor of valley; includes rare maidenhair fern.

29. Site of Horner's Mill, built in late 1700's by pioneer Prather family. Head-race and dam, as well as walls of wheel pit, still visible. Wheel pit site is a small pool filled with aquatic life.

31. Extensive marsh along Crabb's Branch.

34. Old spring.

37. Muskrat Marsh, unique aquatic-marsh habitat

38. Rock Springs. (I.H.S.)*

48. Marsh at head of Lake Needwood containing waterfowl, aquatic plants and animals.

49. Pond and marsh in former stream bed.

50. Steep, rocky slope clothed in hardwoods; understory is mainly mountain laurel and ferns.

52. Old beech tree in beech grove.

55. Stand of mature white pine, unique in area, probably planted.

58. Mature woodland with several white oaks and tulip poplars about 100 years old.

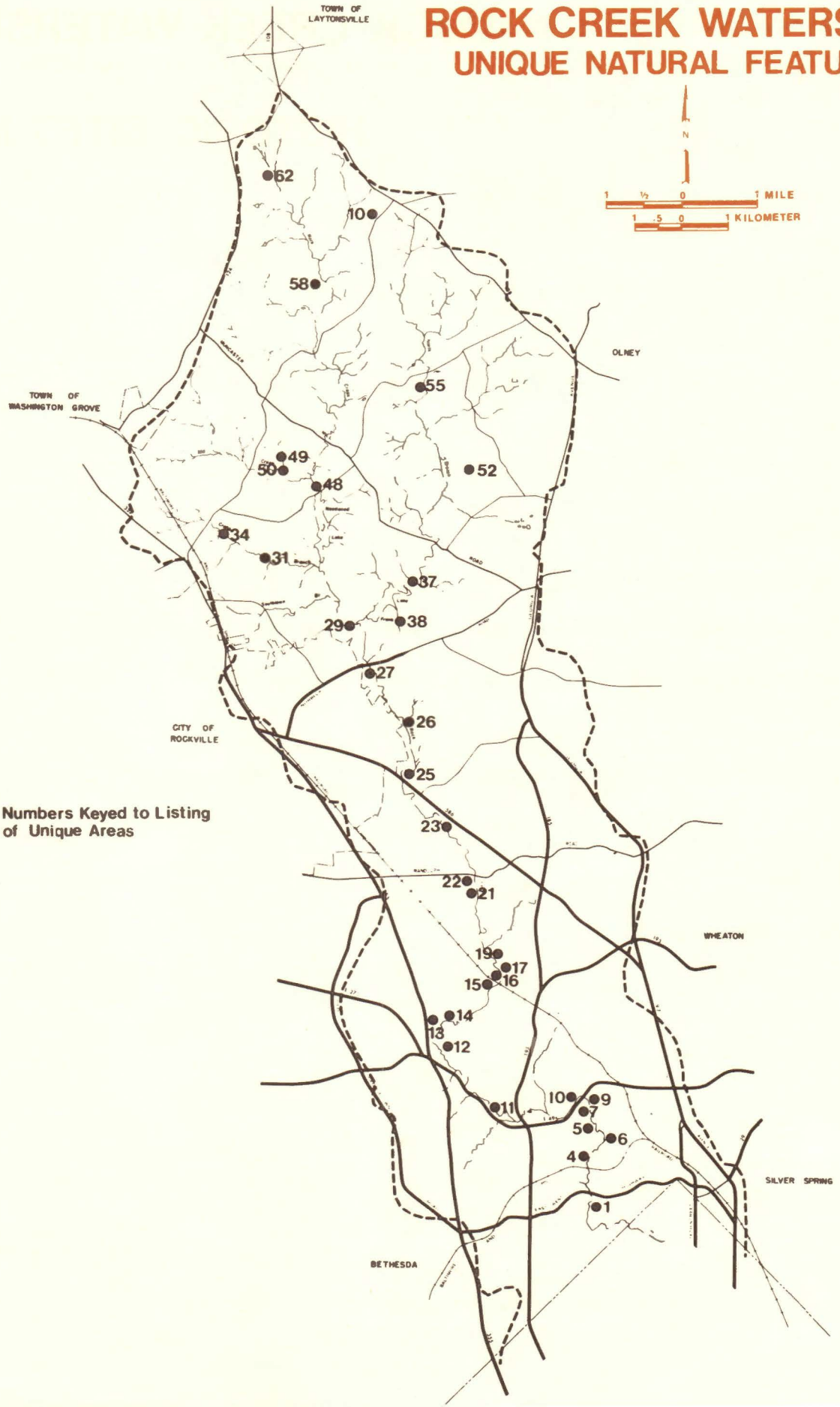
62. Area of farm with two ponds surrounded by old field community with abundance of wildlife areas; suggested as wildlife sanctuary.

---

*I.H.S. = Listed in Inventory of Historic Sites.

FIGURE 4

ROCK CREEK WATERSHED
UNIQUE NATURAL FEATURES



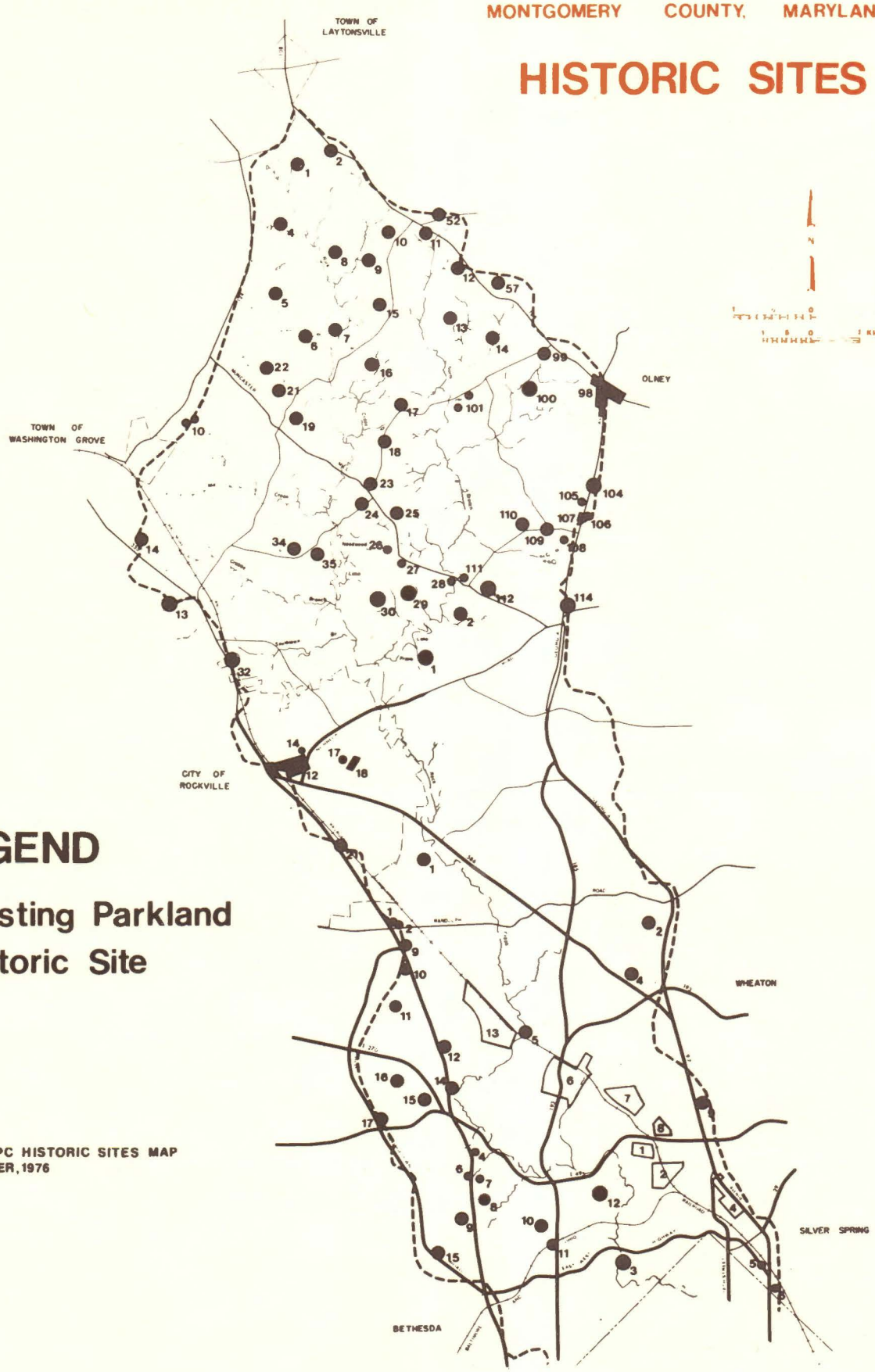
APPENDIX A-2

FIGURE 5

ROCK CREEK WATERSHED

MONTGOMERY COUNTY, MARYLAND

HISTORIC SITES MAP



SOURCE: MNCPPC HISTORIC SITES MAP
OCTOBER, 1976

APPENDIX A-3

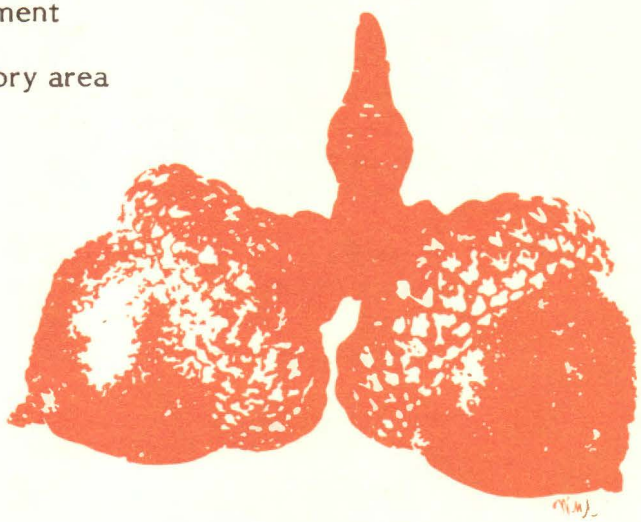
SUMMARY OF AREAS RECOMMENDED FOR ACQUISITION

Location	Acres	Map No.	Reasons (See key below)
West side of Rock Creek, south of I-495	5-10	M361-M342	U
North Branch, Unit 5, part of Keys Farm	10-20	11	E
Crabbs Branch, northwest of pipeline	2.5	20-21	E
Either side, Crabbs Branch	19	20-21	E
Crabbs Branch, south of Carnegie Institute	5	20-21	U
Cashell Road - southern boundary	5	15	R
Lake Frank and Lake Needwood areas:			
Area west of Environmental Center	42	22	E
Area north of Environmental Center	60	22	E
Area west of Nature Center	28	22	E
Area east of Avery Road	6	25	E,U
Route 28 and Rock Creek	11	25	E
North of Southlawn Lane	3	21	E,U
Southlawn and Avery Road Area	22	21-22	E,R
Rock Spring	2	22	E,U
Old tenant house, Emory Lane	2	22	U
Milton Farm, east of Rock Creek	35	22	E
Upper Rock Creek - area between two M-NCPPC tracts along stream	indet.	6	E
Upper Rock Creek - east tributary above M-NCPPC tract	indet.	6	E
Dooley Farm off Muncaster Road and south of Route 108	10	6	E,U
Mill Creek - upstream from Redland Road	12	16,17	E
Norbeck Estates Local Park	8	19	E,U
Fleming Avenue Local Park	10	M-321	E
Marsh south of Pope Farm tract	8	8,9	E,U
North Branch tributary, north of Norbeck Country Club	30	14	E
Hilly area south of Norbeck Estates	25	18	E

Location	Acres	Map No.	Reasons (See key below)
North Branch			
Area south of Unit 4, east side of the branch	25	10,14	E
Area north of Unit 4, east side of the branch	30	7,10	E
Area east of Granby Woods	18	10	E
Area below Granby Woods, southwest of Unit 4	40	10	E
Corridor south of Route 108	30	7	E

Key:

E - Preservation of Watershed Environment
R - Future Recreational Use
U - Unique natural history or local history area
indet.- indeterminate area



ACKNOWLEDGEMENTS

The author expresses his sincere appreciation to the following individuals for their help and advice in the preparation of this report: Tony Janda, Chief Park Naturalist; Park Naturalists Bill Nopper, Sara Lustbader and Julie Melvin; Draftsmen Harrison Leffler and Ed Swindell; Gene Eliot, Park Delineation Specialist; Mike Dwyer, Park Historian; and John Galli, graduate student.

He is also grateful to the staff members of the Water Resources Planning Section, named below, for their orientation, advice and assistance.

Marie Elaine Lanza, graphic designer, deserves special thanks for her beautiful cover design and outstanding illustrations.

This report was prepared as part of a comprehensive storm water management plan for the Rock Creek Basin, which is being developed by the Maryland-National Capital Park and Planning Commission. The work under this contract was carried out under the overall direction of Nazir Baig, Environmental Engineering Coordinator, Water Resources Planning Section, with assistance from John Stewart, Edward Murphy, Fred Peacock and Theresa Augustono. Typing of the draft report was performed by Susan Himmelwright and the final copy was prepared by Cynthia Potter and Kathryn Bolton.

This report is not presented as a complete inventory of the fauna and flora of the Rock Creek basin, since many species which occur in the area are probably unrecorded in it. It is hoped that this report will serve as a basis for more comprehensive future surveys.

A number of faunal groups, such as the invertebrates, are not included in this report. While the significance of these groups is not overlooked, it was not feasible to inventory these groups within the time span allocated for the survey.

The opinions, findings and conclusions expressed in this report are those of the author and not necessarily those of the Commission.

Robert Shosteck