

Rachel Carson Conservation Park Master Plan

June, 2000



Maryland National Capital Park and Planning & Planning Commission
Montgomery County Department of Park and Planning

ABSTRACT

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Author: The Maryland National Capital Park and Planning Commission

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Abstract: This Master Plan provides background materials, describes the planning process and outlines a plan for the development for Rachel Carson Conservation Park. It contains materials on natural and cultural resources, needs assessment, and implementation strategies and cost estimates.

Rachel Carson Conservation Park Master Plan

Prepared by:

The Maryland National Capital Park and Planning Commission
Montgomery County Department of Park and Planning

June, 2000

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Rachel Carson Conservation Park Master Plan

Approved June, 2000

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I. INTRODUCTION

One mission of the M-NCPPC - Montgomery County Department of Park and Planning is:

To provide a park system which, in harmony with the environment, conserves and enhances our natural and cultural resources, offers a variety of leisure opportunities, and is accessible, safe, and enjoyable for all.

In fulfilling this mission the Department maintains over 28,000 acres of parkland in Montgomery County. These parks, depending on their intended use, are categorized as regional, recreational, special, conservation, stream valley, local, or urban parks.

The Parks, Recreation & Open Space Master Plan (PROS Plan) 1998 describes conservation parks as:

"Generally large areas that preserve specific natural, archaeological, or historical features; are typically located in upland areas; and are acquired specifically for environmental preservation purposes. Conservation area parks may include outstanding examples of natural communities, self-sustaining populations of rare, threatened, or endangered plant and animal species, or unique archeological and historical resources. Given the sensitive nature of the resources in conservation parks, development is very limited and generally restricted to passive recreation areas and opportunities such as trails, fishing and picnic areas, and nature study. There are nine conservation parks in the county: They total over 2,100 acres."

Rachel Carson Conservation Park (RCCP) contains many of the elements described above. The area was nominated in September 1980 for designation as a National Natural Landmark in a report prepared by Western Ecosystems Technology, Inc. The report stated that, "the site contains the best known examples of a mature chestnut oak forest in the middle Atlantic states and contains rare orchids and other unusual plants in the herb ground layer". A report prepared by the Maryland Natural Heritage Program, Maryland Department of Natural Resources in 1993, titled Inventory of Rare, Threatened and Endangered Plant Populations and Significant Habitats on Select Park Lands of the M-NCPPC in Montgomery County, Maryland, identified five watchlist plant species on the site and recommended the area for special protection to preserve its high quality natural communities.

Originally part of the Hawlings River/Patuxent River Watershed Park, the portion west of Route 97 was renamed as the Rachel Carson Regional Park in 1977 in honor of the late Rachel Carson, a long time Montgomery County Resident and author of the classic "Silent Spring" and other books on the environment. In designating the park in Miss Carson's honor, "The Planning Board hopes that ... present and future generations will be reminded of the great debt we owe Rachel Carson for her efforts to preserve the values which will be demonstrated in the park, and of our continuing

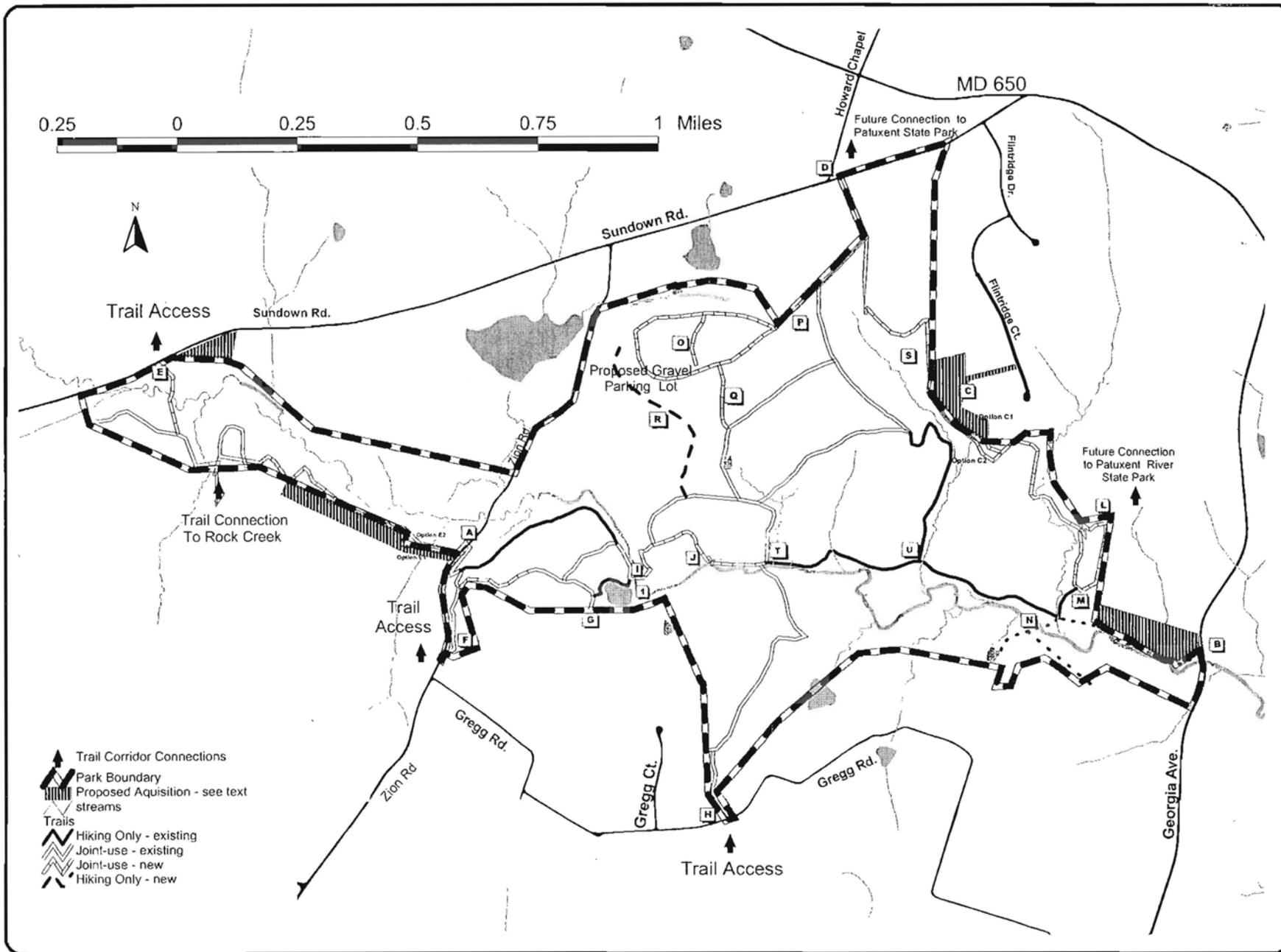


Figure 1 - Rachel Carson Conservation Park

Vicinity Map Montgomery County Maryland

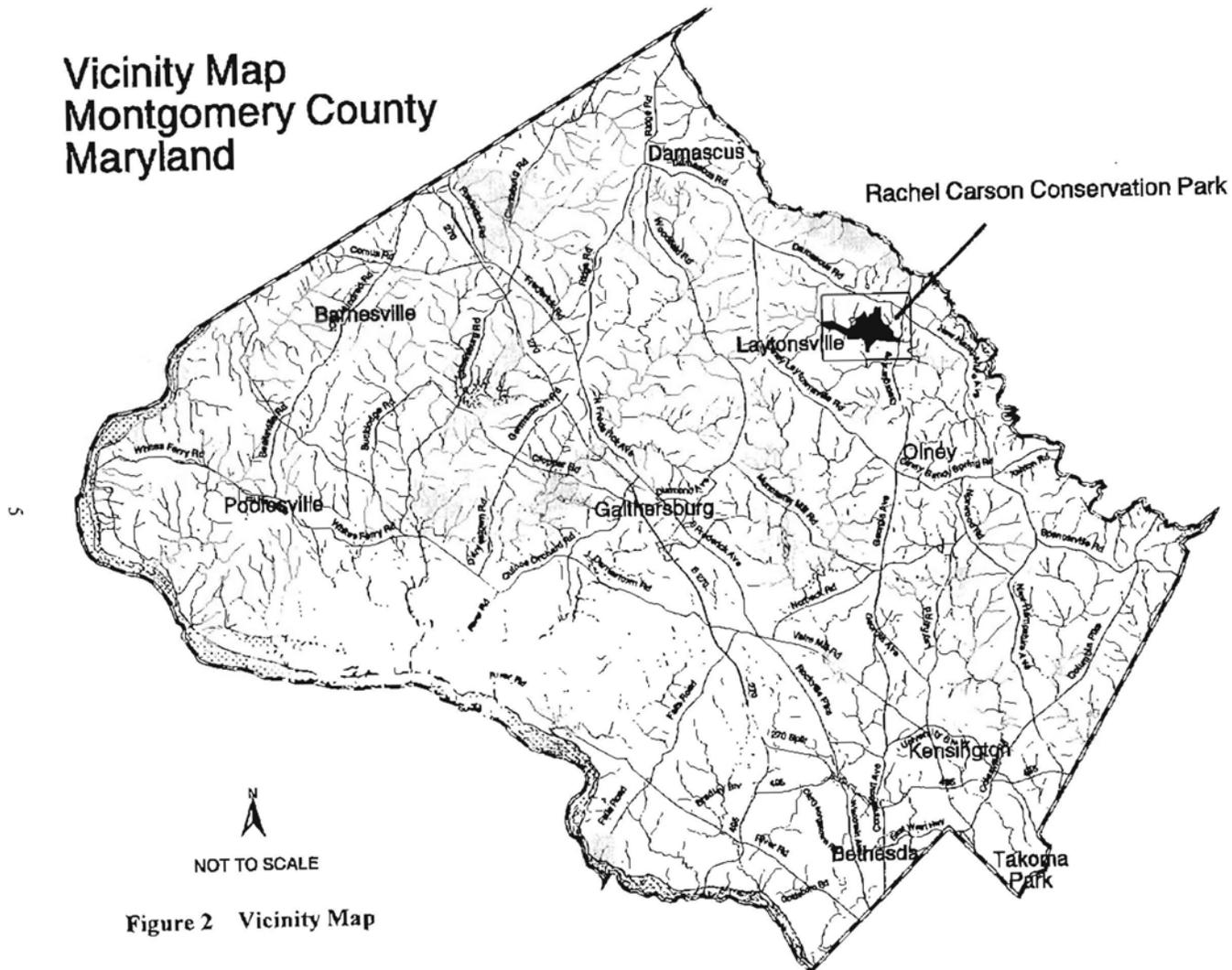


Figure 2 Vicinity Map

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responsibilities toward conservation of our natural environment". The classification of the park was changed from a regional park to a conservation park in the 1988 PROS plan.

A. Master Plan Overview

The Rachel Carson Conservation Park Master Plan serves as a guide for the conservation, development and management of the park. Part I describes the current status of land use in and around the park and outlines goals for the park based on definitions within the PROS plan. Part II provides an overview of the planning process, public input and current and future park needs. Part III outlines a development strategy and rationale for public access, a trail system, interpretation and maintenance. A strategy for implementing this master plan is outlined in part IV along with cost estimates. To insure the protection and enhancement of the park's resources part V outlines resource management issues and includes general recommendations.

B. Master Plan Purpose and goals

This master plan is intended to provide a guide for the future development of Rachel Carson Conservation Park that meets the following goals.

1. Preserve, conserve and enhance the natural and cultural resources of the Park.
2. Provide appropriate, safe access and quality passive recreational opportunities within the park.
3. Provide connections to regional trail systems.
4. Provide interpretive information on the natural and cultural history of this unique park.

C. Park Description/Location

Rachel Carson is a 648.9 acre Conservation Park located approximately one mile Southwest of Sunshine, Maryland as shown on the vicinity map (Figure 2). The park has road frontage on Sundown Road, Route 97 (Georgia Avenue), Gregg Road and Zion Road on the north, east, south and west respectively.

1. Acquisition

First acquisition was made in April 1964. At that time the park was known as Hawlings River/Patuxent River Watershed park. The park name was changed to Rachel Carson Regional Park in 1977 as mentioned above, and then to Rachel Carson Conservation Park in the 1988 PROS Plan. The existing park was acquired from 16 different property owners. The most recent acquisition was made in July 1990. The total amount spent to acquire real estate for the park, as of 10-1-99, was slightly more than \$1 million. Two properties, totaling 18 acres, remain to be acquired to complete the park as it is outlined on 1999 park acquisition maps. These parcels are identified on the Master Plan Map (Figure 1). This plan includes recommendations to acquire additional property that is not currently part of the acquisition program and/or establish trail easements that are off park property in an effort to make trail connections that provide for a safe, high quality passive recreational experience and at the same time protect the ecosystem.

2. Existing Facilities And Structures

There are currently no facilities maintained within RCCP for public use. Several structures in two locations on the property are currently leased out by the Department as private residences. One is a house with several outbuildings located at the end of a long driveway at 22201 Zion Road. The other is the old millers cottage and associated outbuildings located on Route 97 just south of the Hawlings River. The historical significance of these structures is discussed later in this document. A small, partially collapsed barn of no historical significance is located approximately one-half mile south east of the farmhouse on Zion Road.

Six man-made ponds are located on the property. None of these ponds function as storm water management (SWM) facilities and they are not currently being maintained. Three of the ponds are located just north of the driveway into the farmhouse at 22201 Zion Road; these are small and mostly silted-in. A small pond (less than a quarter acre) is located approximately one-third mile due south of the Zion Road farmhouse. Another small pond is located approximately .75 mi due west of the miller's cottage (this pond is best accessed via a private driveway off of Gregg Road). A larger pond of about one acre in size is located about 50 feet south of Hawlings River approximately one-third mile from Zion Road. Adjacent to the pond are the collapsed remains of a small log building of no historic significance. The park boundary east of the contact point with Gregg Road bisects a small pond that is mostly on private property but a small portion lies within the park.

There are approximately 8.5 miles of natural surface trails within RCCP. All existing trails in the park are informal; they have developed over time with use by neighbors, and were not designed by M-NCPPC. They have never been considered part of the M-NCPPC trail system, and have not been maintained by M-NCPPC.

A bridge was installed a number of years ago to provide trail access across the Hawlings River near the large pond. The bridge washed out several years ago and is now lodged in a precarious position downstream from its original location.

Most of the park is forested (see Forest Stand Delineation for a detailed description of forested areas). Eight areas of open land in various stages of succession are located with the park, ranging in size from approximately 3 to 30 acres. Descriptions of these areas are given below under Natural & Cultural Resources section of this Plan.

II. THE PLANNING PROCESS AND PUBLIC INPUT

The planning process for RCCP began with the development of the natural resource maps and mapping of existing trails during late 1995 and spring of 1996. A public meeting and field trip were held June 18 and 22, 1996 respectively to inform citizens that the Department was beginning the master planning process and to solicit comments. A questionnaire was developed to gather additional information on trail usage, and needs and distributed to attendees of the public meeting. A summary of the meeting and the results of the questionnaire are included in the appendix. The first staff draft was completed in January 1998 by a staff team representing various disciplines, including natural and cultural resources management, trail planning, park management, park police and others. It was presented at Park Plan Review (2/6/98), Community Planning Staff (2/18/98) and Development Review Committee (4/20/98). Additional meetings and field visits were held with neighbors and other interested parties in 1998 resulting in several changes to trail designations. Throughout the

planning process, the conservation of the park's unique natural and cultural resources was given the highest priority. An outline of the planning process is listed below:

1. Development of Natural Resources Inventory & Forest Stand Delineation (NRI-FSD)
2. Mapping and evaluation of existing trail system
3. Public information meeting to discuss the master planning process and gather public input
4. Development of Master Plan
5. Present Master Plan to Development Review Committee
6. Present Master Plan at Plan Review
7. Public meeting to review draft master plan and solicit comments with changes to be made as appropriate.
8. Plan approval by Park commission

A. Review of Other Master Plans

A review of master plan documents regarding issues relevant to planning Rachel Carson Park included: the 1980 Olney Master Plan, the 1980 Preservation of Agricultural and Rural Open Space Plan, the Rustic Roads Plan (staff draft), the Patuxent Functional Plan, the Master Plan of Historic Resources and the Countywide Park Trails Plan (M-NCPPC, 1998). The Olney Master Plan addresses Rachel Carson Park specifically and provides the following guidance:

“The plan supports designating a portion of the park as a ‘wild park’ interpretive and conservation area. This area would be used to demonstrate the interrelationships of animal and plant life in a natural environment.”

Applicable issues from other plans are as follows for specific details refer to the plans:

Preservation of Agricultural and Rural Open Space Plan - The area around the park is zoned Rural Density Transfer Zone (RDT). This plan contains rationale for RDT zoning related to wildlife preservation.

Rustic Roads Plan - Gregg Road is designated as a rustic road that should be maintained in its rustic character. Nearby Riggs Road is also a designated rustic road.

Both the Countywide Park Trails Plan (M-NCPPC, July, 1998) and Sandy Spring/Ashton Master Plan recognize the Hawlings River, which passes through RCCP, as a major greenway and potential trail corridor. The Countywide Park Trails Plan identifies RCCP as part of the proposed regional, natural surface, recreational trail system. An east west corridor through the park with connections to the southwest, north and east are depicted. This plan also recommends connections from Rock Creek Stream Valley Park to RCCP.

The Patuxent River Policy Plan was adopted by the Maryland General Assembly in 1984 and designated the Patuxent River Watershed Primary Management Area (PMA) and established development guidelines for use therein. These guidelines have been approved by the Montgomery County Planning board for use in the review of development proposals in the Patuxent River watershed.

B. Needs Analysis

1. Current Park Use

While RCCP has been marked on County maps for over 15 years, it is currently undeveloped and no systematic surveys of park use have been conducted. The only signs marking the park boundaries are no hunting signs that state, "by the authority of M-NCPPC". Despite its anonymity, the park has been serving several user groups. Primary users of the park are neighbors who hike or ride horseback on the informal trails. RCCP is also a field trip destination for nature study tours from County nature centers, local organizations including the Maryland Ornithological Society, Audubon Naturalist Society, US Department of Agriculture Graduate School and other County residents that have taken the initiative to seek it out. Equestrian use has increased in recent years as several commercial equestrian facilities and equestrian communities have been established adjacent to the park. Likewise, as word of this natural area has spread, use by those seeking to enjoy its unique natural and cultural features has increased.

2. Adjacent Land Use and Zoning

RCCP is located in Rural Planning Area within area 23 (Olney & vicinity). The park lies within the Agricultural Preserve Area - Rural Density Transfer Zone and local zoning is for one residential dwelling per 25 acres. Several large horse farms surround the park as well as a number of estates and developments with large lots many of which are used to support horses. In addition, several subdivisions in the vicinity, including two adjacent to the park, had been approved for smaller lot development under previous zoning regulations and are now being developed.

3. Trends

The 1994-95 National Recreation Survey showed that participation in outdoor passive recreation activities is increasing. The fastest growing activities were birdwatching (155% increase in past decade), hiking (94% increase), walking (43% increase). For comparative purposes golf increased by 29%, and bicycling increased by 2%. The Park, Recreation, and Open Space Survey for Montgomery County (May 1997) demonstrated clearly the importance of passive recreation to county citizens using the county park system. Fifty-eight respondents indicated that they had used unpaved park trails. Of these users, 85% percent used them for observing nature, 90% for walking, and 5% for horseback riding.

Other trends that will likely effect use of RCCP include:

- ◆ County residents, since 1990, have been working longer hours and making less money. With less time and money for vacations, residents will likely be looking to parks to provide more of their weekday and weekend entertainment. Demand for passive recreation will likely increase.
- ◆ The county's population is becoming older but also remaining more active. Demand for passive recreation will likely increase.

4. Future Potential Users

As the largest of nine conservation parks in the county, RCCP serves a regional or county-wide function in preserving exemplary natural ecosystems and providing high quality passive recreational opportunities. Therefore future use will be dictated not only by population growth in the local area, but will also grow as more people discover and seek out this unique natural area for passive recreation. Given the trends listed above, it seems likely that once RCCP is officially open, there

will be a significant increase in the number of hikers, birdwatchers, and others seeking nature study opportunities. Equestrian use will likely increase as well, although to a lesser extent.

III. MASTER PLAN FOR DEVELOPMENT

Rachel Carson Conservation Park will serve as a prime source of passive recreation and nature study for the north east portion of the county. As a conservation park, development will be limited to: Park access and parking (including associated stormwater management); a natural surface trail system for hiking and equestrian use; signage/structures for interpreting natural/conservation areas, and historic and archeological sites. The master plan map (Figure 1) illustrates the concept development plan.

A. Vehicular Access and Parking

1. Current Conditions

There are currently no public access points to the park that allow for parking and no signs posted identifying the area as RCCP (though it has been listed on county maps for over 15 years). A small dirt pull off on the east side of Zion Road approximately one-half mile south of Sundown Road is used by those who know about the park. There is an old trail at this location that currently receives little use and will not be maintained as part of this plan. To access the trail system from this point one must walk south on Zion for a quarter mile, around sharp, blind curves and cross a one lane bridge. Trails lead into the park from several other roads including Sundown, Georgia Avenue and Gregg Road; due to lack of shoulders, high speeds and blind curves no safe parking is available at these sites. The driveway into the rental property at 22201 Zion Road is currently marked with "private drive/no Parking" signs. There is currently no access to trails from this location.

2. Recommendations

- ◆ The most logical access point to the park is the driveway off of Zion Road. Access would be via a service road coming off of the driveway (see figure 1). The driveway entrance is not ideally located. It is on a curve in Zion Road but does meet the minimum sight distance of 200 feet dictated by the Department of Public Works & Transportation. The driveway itself is located within the stream buffer, but is not in the flood plain. The alternative to using this entrance would be to construct a new road, 200 feet long, through high priority forest. There is no shoulder at this point and visibility would be limited for vehicles exiting from the park. Taking all of this into consideration, we recommend using the existing drive as the primary access point to the park. Use of the driveway as the park entrance should not impact its use by tenants living in the park house at 22202 Zion Road.

The Department should work with Montgomery County Department of Public Works & Transportation (DPW&T) to make the final decision on road placement as well as any needed changes to road design, installation of traffic calming measures, and signage identifying park entrance.

- ◆ It is recommended that a gravel parking lot be built roughly 200 feet south of the driveway on the open field adjacent to the tree line (see map). The parking lot should be capable of holding 10-15 cars and allow space to turn around and park two small horse trailers. It is felt that this entrance should allow for some equestrian access but that access should be limited to a small number of trailers. It is extremely important that this park not become a hub or major access point to

regional trail systems through RCCP and beyond. As these regional trails are established, parking areas should be provided at other less sensitive access points. The park management staff will have the authority to restrict the use of this lot as one method of managing trail use. For example, the lot might be closed to trailers when equestrian use must be curtailed due to extremely wet conditions.

- ◆ A pavilion with picnic tables should be built near the parking area. This structure will serve as a gathering place and outdoor classroom for those visiting the park (see interpretation). A portable toilet should be placed near the parking lot and pavilion.
- ◆ The dirt pull-off area on Zion Road described above, is a problem area for refuse dumping and should be closed off permanently with rocks or guard rail as soon as a permanent parking area is developed.

3. Implementation

As more people learn about this park safe access is becoming an issue. Plans to develop a parking lot and access road along with the required storm water management should be started as soon as possible. Temporary parking could be established along the driveway on Zion Road until the parking lot is built.

B. Trails

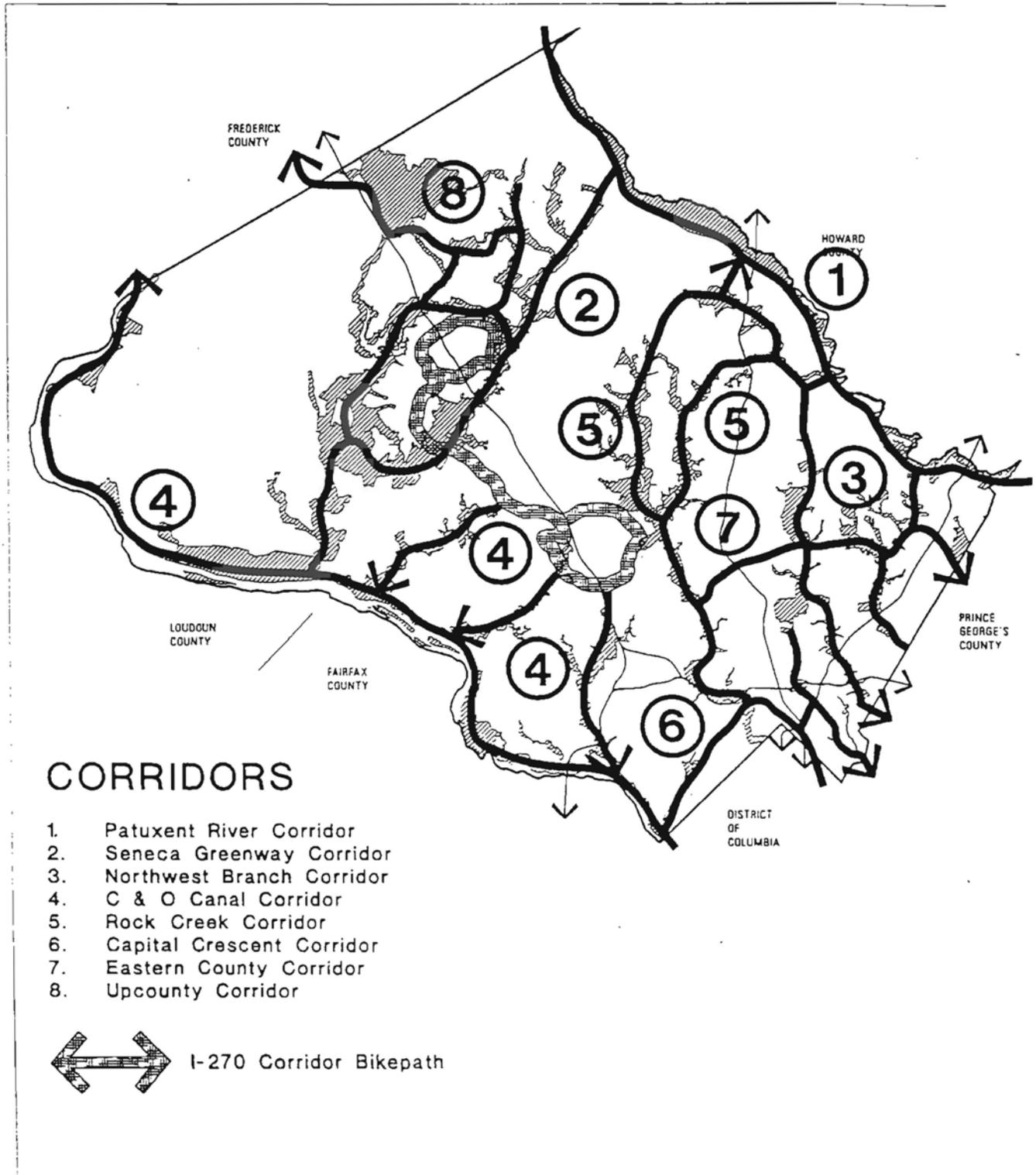
Outside of the parking facility, trails represent the most intensive development that will occur in this park and are the main focus of this Master Plan. The challenge was to redesign the current muddy, confusing and duplicative network of informal trails - that in many locations is causing extensive damage to wetlands and other resources - into a more user friendly system that protects the parks resources and provides a safe and enjoyable recreational experience. A major effort was made to maintain access for current "neighborhood users" and provide increased access for both hikers and equestrians from the general public without compromising the ecosystem.

Relation to Countywide Park Trails Plan

The Countywide Park Trails Plan (M-NCPPC, 1998) identifies 8 countywide trail corridors (see Figure 3). Rachel Carson Park is located in the Rock Creek Corridor. This corridor passes through RCCP providing access to the north (the Patuxent River), to the south (Rock Creek Regional Park) and to the east (the Hawlings River Stream Valley Park). These trail connections are reflected in the Master Plan for Rachel Carson Park however the development of trails which lie outside of the park, are not part of this plan. It is recommended, however, that the corridors that connect with Rachel Carson Park be given high priority in the Countywide Park Trails Plan and be established as soon as possible through the use of acquisition or easements.

1. Trail System Goals

- ◆ Preserve, conserve and enhance the natural and cultural resources of RCCP.
- ◆ Provide appropriate, safe access and quality passive recreational opportunities within the park.
- ◆ Provide connections to regional trail system.



2. Existing Conditions and Use

There are approximately 8.5 miles of natural surface trails within RCCP that have received decades of frequent equestrian and hiking use. All existing trails in the park are informal; they have developed over time with use by neighbors, and were not designed by M-NCPPC. They have never been considered part of the M-NCPPC trail system, and have not been maintained by M-NCPPC.

Park trails connect to other informal trail systems outside of the park running north/south and east/west. Several trail connections necessitate crossing roads and present potentially dangerous situations. For example, informal trails exist across Georgia Avenue in the Hawlings River Park, however, crossing this major road is dangerous due to a curve in the road, low visibility and high volume and speed of cars.

Trail conditions in RCCP are some of the worst in the park system. Several trails go through wetlands and moist flood plains. Under these conditions, wet spots become mud holes that grow ever larger as users attempt to circumvent the quagmire, destroying environmentally sensitive habitat. Trails also traverse steep slopes and highly erodible soils causing further erosion problems. There are currently no trail signs or maps. There is currently little park maintenance of trails; some clearing of fallen trees and brush is performed by trail users. A bridge that was installed 8 or 9 years ago was washed out by a flood shortly after installation and is not safe.

Equestrian use has increased significantly in recent years due to use of the area by commercial stable operations as well as adjacent residents. Zoning in proximity to the park is one dwelling per 25 Acres with a few smaller lots of 2-5 acres and is attractive to new buyers with horses. New "farmettes" will continue to bring more equestrian use to the area and this pressure poses a real threat to the Park. There is no trailer parking or trail heads on park property at present, but some adjacent property owners allow guests access to trails. Due to continuing development in the area, trail use by equestrians is expected to increase.

Interest in the park is growing among other users as well, as people discover this exceptional natural area for hiking, fishing, wildflower viewing, birdwatching, and nature study. There is no evidence of mountain bike activity in the park.

3. Developing the trail system

a. The concept

Trails through RCCP should offer opportunities to observe this outstanding natural area while protecting its resources. RCCP needs to provide trails for the growing equestrian community and for hikers seeking nature study or a more secluded, natural experience. Large areas of the park currently undisturbed by trails need to remain that way in order to preserve the rich natural community. The challenge for the Park Master Plan Team has been to provide a suitable trail system to meet these needs while preserving the Park's natural resources and repairing damage done unintentionally by users of the informal paths.

In analyzing, park resources, existing trails, current use, and trends for future use one thing became apparent. Due to its size and its sensitive natural resources, RCCP cannot continue meet the growing trail needs of the expanding equestrian community that surrounds the park. Equestrians, because they can cover a greater amount of territory in a shorter time period than hikers, need a more extensive

trail system than can be provided within RCCP without negatively impacting park resources. We recommend three approaches to address this concern and offer riders additional, attractive riding opportunities outside of the park.

1. As mentioned above, the Countywide Park Trails Plan includes connections to RCCP. This plan supports the development of these countywide connector trails and recommends that priority be given to trails connecting to RCCP. As this regional trail system is developed it will provide the opportunity for extensive and varied riding experiences outside the park and reduce pressure on park trails.
2. This plan provides for several connections to equestrian communities and facilities around the park. Throughout this document, particularly under section 7c below, are recommendations for working with the surrounding landowners to establish community trail systems. It is hoped that RCCP can provide a nucleus of trails that will serve to connect these community trails into a much larger system that loops through the surrounding equestrian communities. If successful, a typical ride might weave in and out of parkland offering a variety of trail experiences ranging from secluded woodlands and views of the Hawlings River to rural landscapes of farms, pastures and rustic roads. Development of this external trail system will further relieve pressure on park trails to provide all of the riding needs of the growing community.
3. This plan supports the development of an equestrian schooling facility proposed for parkland at the Oaks Landfill on Route 108. Such a facility might include a practice ring and cross country trails. Facilities like this, strategically located, would further reduce pressure on RCCP park trails by providing area riders with attractive, alternative destinations.

Given the conservation status of this park and the focus on natural resource preservation and nature study, some trails will be designated “hiker only” for those who are searching on foot for a more solitary natural experience.

b. Process

The process and guidelines/considerations for developing the recommended trail system are listed below.

1. Develop Natural Resources Inventory and Forest Stand Delineation (NRI-FSD) in order to identify sensitive areas within the park (e.g. stream buffers, steep slopes, erodible soils, interior forest habitat, wetlands, areas containing rare, threatened, endangered, watchlisted or other species of special concern, historic or archeological sites). The park in its entirety has been recommended as a Biodiversity Area by the Maryland Department Of Natural Resources Natural Heritage and Biodiversity Protection Program.
2. Identify positive and negative control points including: A) major access points to existing trail system (including those trails leading from private property), B) major connections to other park trail systems as identified in the Countywide Park Trails Plan (M-NCPPC, July, 1998), C) natural destinations/points of interest within the park (e.g. the Hawlings River, ponds, meadows, historic and archeological sites), D) Stream and road crossing locations, and E) areas to avoid such as environmentally sensitive areas

3. Map existing trails and evaluate for: A) negative environmental impacts, B) Poor trail conditions such as muddy areas or eroded surfaces, C) connections to points listed above, and D) meeting goals listed above for hiking and joint-use trails.
4. Meet with local communities and users in order to solicit input and comments into the trail planning process.
4. Develop a trail system and evaluate for environmental impacts, recreational opportunities, access, connectivity, etc.

c. Guidelines/Considerations

Results from the questionnaire given to people attending the public information meeting held 6-18-96 indicated the following: of those answering the questionnaire just over half of those using trails are equestrian users, other users were hikers, most lived adjacent to the park, over half of trail users used RCCP trails to access other trails outside of the park. When asked what was important in their trail experiences the overwhelming responses were seeing wildlife, relaxation and solitude. Also mentioned were the poor condition of the existing informal trails - mostly due to being water saturated - and the desire to have a safe, and drier system of trails. Some non-equestrian users expressed a desire to have some pedestrian only trails, commenting on the wet conditions of some trails and the impacts of horses in these locations.

These concerns, along with environmental considerations, and the emphasis on conservation and nature study desired for this park led to the following guidelines and considerations for the development of the trail system.

- ◆ Where possible within environmental constraints, maintain access points so as to not exclude access to those currently using park.
- ◆ To the greatest extent possible, where existing trails are not causing negative impacts, use existing trails to reduce additional damage to resources.
- ◆ Align trails, within environmental constraints, so as to provide aesthetic scenery, unique features and provide a quality hiking or riding experience.
- ◆ Design trails so as to provide walks or rides of varying lengths and destinations, allowing for access to additional trails outside of RCCP.
- ◆ On a trail by trail basis, identify the best way to mitigate existing environmental impacts including: trail re-alignment, surface and drainage improvements, trail closure, trail use restrictions (For example- some trail impacts can be addressed by designating trail use as hiker only).
- ◆ Reduce overall trail mileage within sensitive areas by reducing duplicative trails.
- ◆ Align trails so as to provide large undisturbed areas of high quality habitat.
- ◆ Identify gaps in trail system and make necessary connections to complete trail system.
- ◆ Minimize negative impacts by using best management practices in aligning and designing any new trails
- ◆ Design and trail widths will be according to standards in the Planning Guide to Trails. One exception will be the Joint-use trail that runs from Zion Rd. to the pond area (F to I on Figure 1) which will be slightly wider in order to accommodate maintenance equipment access.

- ◆ Woodland trails should be aligned so as to minimize clearing and avoid cutting trees >4-6 inches D.B.H. to prevent opening the forest canopy.
- ◆ All trails should be of natural surface; drainage structures, boardwalks or other surfacing improvements may be used to prevent erosion and cross wetland areas and streams.
- ◆ Provide a trail system that includes some trails set aside for pedestrian users only.
- ◆ To the greatest extent possible, maintain equestrian trails on the uplands in order to provide safe dry trails, minimize damage to sensitive wetland and floodplain habitats, and minimize the need for trail engineering and maintenance.

4. Trail use designation and alignment

The need for extensive trail engineering and maintenance can be minimized through appropriate trail alignment and judicious trail use designation.

Two categories of trails have been designated - "joint-use" (JU) which, in this plan, refers to natural surface trails designated for use by pedestrians and equestrians, and "hiker only" (HO) which are natural surface trails restricted to pedestrians.

Given the conservation status of this park and the focus on nature study, mountain biking will not be permitted in RCCP. This decision is based on a number of factors including 1) the desire to maintain as natural and peaceful experience as possible; 2) the fact that trails are already heavily used and the addition of another user group would add pressure to the resources and seriously compromise the conservation function of this park; 3) There is currently no use of the area by mountain bikers; 4) None of the connecting trails to the park permit mountain bike use. It is also noteworthy that the portion of Patuxent River State Park located one mile north of RCCP is designated "State wildlands", a designation that prohibits the use of bicycles or other mechanical devices.

Trails located on uplands, especially when aligned parallel to contours are easily drained and maintained. Trails located within flood plains are a greater challenge to build and maintain due to wet soil conditions and seasonal flooding. This is particularly true of equestrian trails which, due to the weight and sharp hooves of a horse, require special considerations to maintain stable trail surfaces in areas that are wet, steep, or prone to flooding or erosion. Where possible, this plan attempts to restrict trails in the floodplain to "hiking only" trails to minimize overall impacts to the resources and reduce maintenance needs. Hiking trails with their lower overall impacts can more easily be accommodated in flood plains. The desire to provide some pedestrian only trails meshes well with this concept.

An additional, and growing concern for floodplain trails is the increase of beavers in our stream valleys. During the past several years beaver have built several dams on the Hawlings River and its tributaries that have flooded trails and required users to create new trails and ford streams in new locations. The movements and flood producing activities of these industrious animals are unpredictable. Here again, dealing with temporary flooding due to beaver activity on hiking only trails is relatively simple and inexpensive compared to equestrian trails.

Because trail use can be used as an effective tool to manage impacts to trails and surrounding habitat, it is important that flexibility be maintained in designating trail usage. Park management staff will have the authority to change and adjust trail use in response to changing conditions and usage patterns. For example, a particular trail might be temporarily closed due to nesting wildlife, extremely wet or flooded conditions, or a trail designation may be changed if impacts to the resources become extensive.

5. General Recommendations

The following provides a general plan for improving the trail system while protecting the environment.

Recommended trail alignments are shown on the master plan map (Figure 1). HO trails are marked with single thick black lines and JU trails are marked in double lines. Alignments that follow previously established informal trails are marked with solid lines while new trails are marked as segmented lines. Informal trails that are not included in the master plan map will be closed off and allowed to regenerate.

A major concern in developing this plan was addressing the poor condition of the informal trail system. This concern was approached in several ways. The plan calls for realignment and/or closure of some existing sections, the construction of new trail sections using best management practices, surface and drainage improvements, and structural improvements to stream, and wetland crossings (i.e. bridges, boardwalks, stream bank stabilization etc.). Trail conditions and impacts can also be mitigated by designating trail use.

Trails will cross the Hawlings River in four locations (Identified on map as 1,2,3,4). Several alternatives are available to achieve these crossings. They include foot or equestrian bridges, equestrian fords, stepping stones for foot traffic or a combination of these structures. Given the complexities of engineering constraints, and State, Federal, and Local permitting requirements the choice of crossing structures will be decided during the design phase. Where necessary, small foot bridges or stepping stones will be provided for pedestrian crossings of small tributaries on all trails.

An important component of protecting the integrity of RCCP's resources is maintaining large areas of the park that are as free from human disturbance as possible. For this reason trails have been aligned to provide large undisturbed areas of quality habitat. In addition, informational and interpretive signage should encourage users to remain on designated trails to minimize impacts to vegetation and wildlife.

A summary of the proposed trail system compared to the old informal system is contained in table below.

Summary of Trail Mileage Comparing Proposed Trail System to Old Informal System.

Trail Type/Location	Original System	New System
Joint-Use (JU)	8.4	7.2
Hiking-Only (HO)	none	2
Total	8.4	9.2
New* JU trails	n/a	2.6
New* HO trails	n/a	.6
Trails in floodplain	2.6	1.3
In wetland	0.9	.2
In priority forest interior**	5.6	4.8

* Trails proposed to be constructed (most proposed trails follow pre-existing trails)

** Trail located greater than 100 yards from forest or park edge.

6. *Site Specific Recommendations and Options*

In a number of locations, situations arose where the best logical options for trail placements were just outside park property boundaries. This is not a new problem, but rather one that has surfaced repeatedly in recent years in trail planning projects. Most of our County parks are stream valley based. In many locations M-NCPPC owns only to the base or top of the stream valley slope. This means that the only land available for development or trail alignment is either steeply sloped or floodplain; both of which present environmental problems.

In sites where this situation arose in RCCP we have listed a number of options in order of preference. In some cases, the first option attempts to avoid placing the trail in an environmentally sensitive area. This might be accomplished by arranging for a short section of trail easement on private property just outside park boundaries or through the purchase of additional land. The next option places the trail in the least sensitive location within the park and assumes the use of best management practices in construction and maintenance. There will be situations where trail placement is not warranted given environmental concerns and the current state of the art of trail engineering.

Active construction and maintenance of natural surface trails in environmentally sensitive areas is a relatively new activity for the Department and efforts are underway to make more use of state of the art trail engineering and construction techniques. As more knowledge and experience is gained we will be better equipped to choose and build the best option for each location that will preserve resources and minimize maintenance needs.

Letters listed below identify locations for site specific recommendations and options as shown on the master plan map (Figure 1).

- A. Trail Crossing Zion Road - This is currently a somewhat dangerous road crossing located on a curve with limited visibility. Despite the narrow curving road, traffic speeds are high.

Recommendation - Work with DPW&T to install horse crossing signs, investigate tree pruning to improve sight distances and the installation of rumble strips or other devices to slow down traffic.

It is hoped that use of this crossing can be minimized through the creation of trail easements on surrounding properties.

- B. Crossing Georgia Avenue - The existing trail crossing is close to the Hawlings River at a dangerous curve in the highway. The road is narrow with no shoulders, visibility is poor and traffic speed is high. This is an extremely dangerous section of road for equestrian users to cross. None-the-less, riders do cross Georgia Ave. at this point. No suitable, safe crossing is currently available to connect RCCP trails to those in the Hawlings River Stream Valley Park.

Recommendations

1) Continue to work with private land owners, and through the park acquisition fund to acquire land and/or easements to the north or south of this point in order to make a safe connection between RCCP and the Hawlings River Stream Valley Park. One parcel of land is identified for acquisition just north of the stream crossing on Georgia Avenue. This property should be purchased, however, this parcel alone will not complete a satisfactory connection.

- 2) Work with the State Highway Administration on any road or bridge upgrades to Georgia Avenue (Route 97) at the Hawlings River crossing. Improvements should focus on straightening the road and providing a trail underpass. At this time no major road renovations are scheduled.
- 3) Until such time as a safe crossing of Georgia Avenue is identified, signage should be placed on the current informal trail stating "NOT A MAINTAINED TRAIL".
- 4) Discuss with the State Highway Administration the possibility of placing a horse crossing sign on Georgia Avenue for those who insist on crossing at this point.

C. Access to Flint Ridge Court - Construction is just beginning on the section of this community adjacent to the park. Large lot sizes will likely attract equestrian owners. A well used equestrian trail leads into the park from this area. Discussions regarding the following recommendations are underway.

Recommendations

- 1) Purchase lots 14 and 15 on Flintridge Court (figure 4) to preserve the high quality forest on these tracts, provide better trail connection around wetlands and steep slopes, and to provide community access to RCCP equestrian trail system.
- 2) Acquire through purchase or dedication portions of lots 17 and 18 (figure 4) on Flintridge Court to allow a wider route around wetlands and steep slopes and to cross stream at more stable site.
- 3) Work with developer to encourage development of equestrian trails within the community that could be expanded as adjacent land is developed.

D. Access from Sundown Road/Howard Chapel Road - This is an important connection north to the Patuxent River and associated trail systems.

Recommendation

- 1) Work with DPW&T and the surrounding property owners to preserve and/or acquire an equestrian corridor along the right-of-way of Howard Chapel Road - the shoulder may need widening or clearing to accommodate equestrian traffic.
- 2) Purchase additional property to the north of RCCP frontage on Sundown Road to make a connection to route 650.
- 3) Request horse crossing signs on Sundown Road.

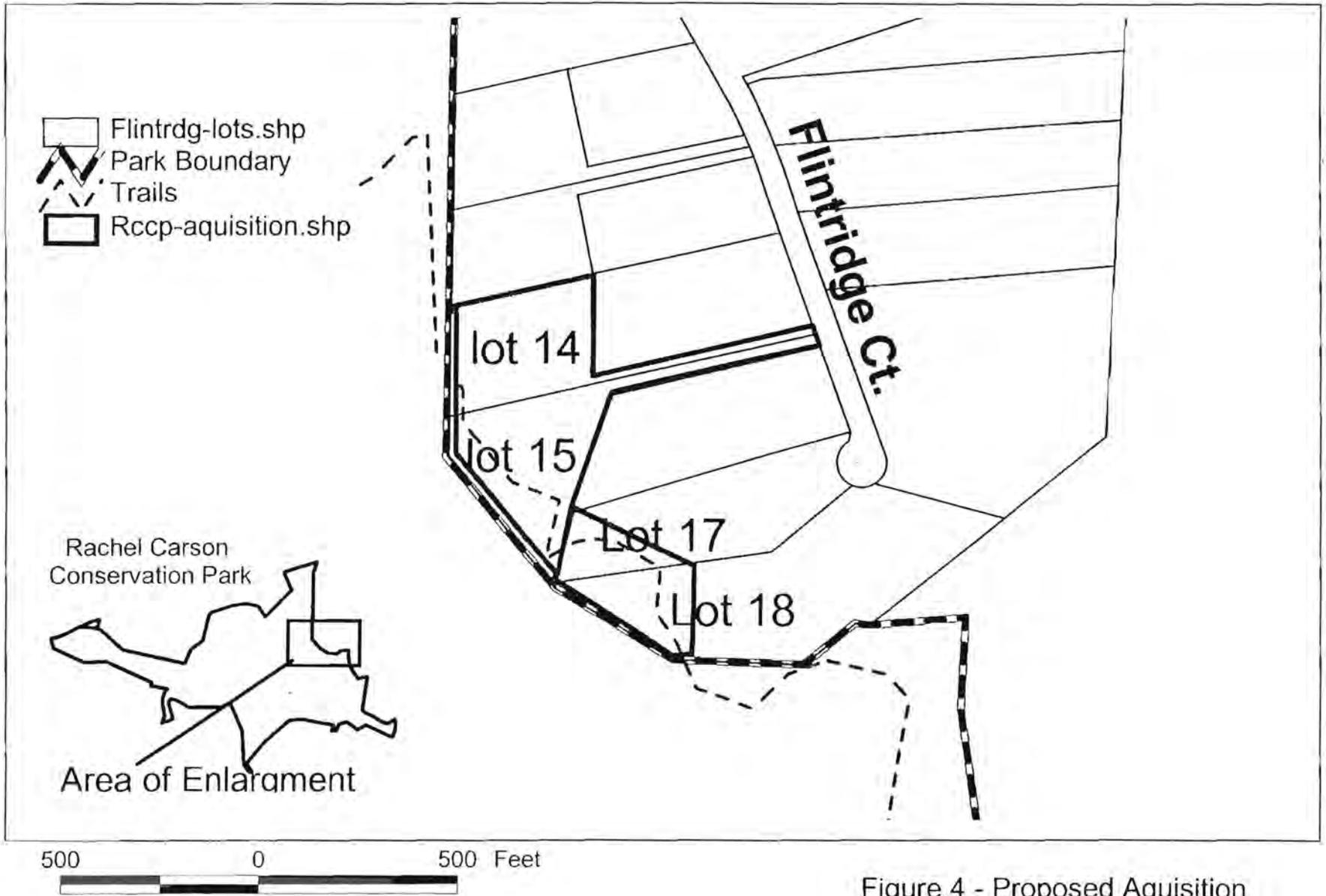


Figure 4 - Proposed Aquisition at Flintridge Court

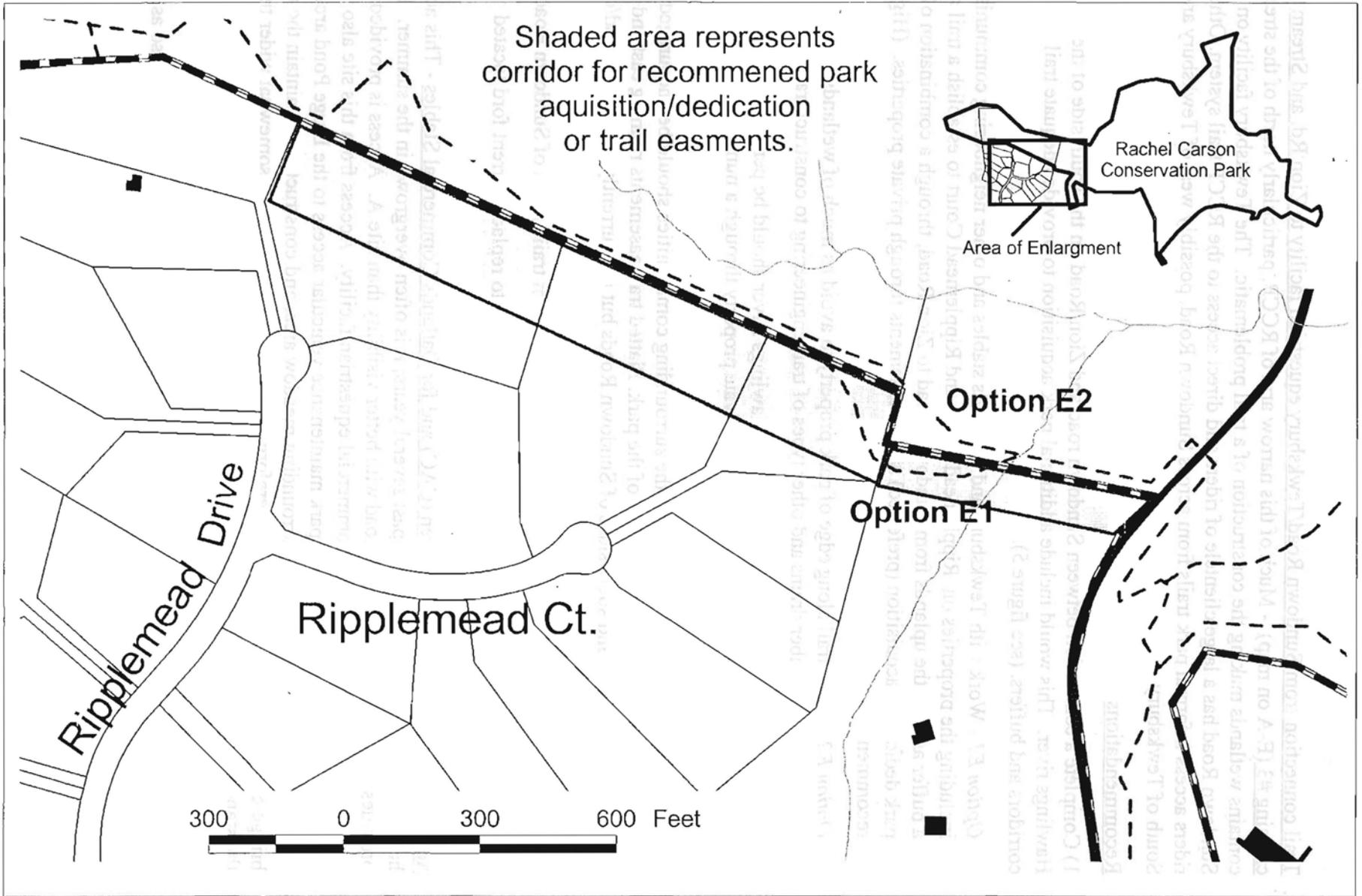


Figure 5 - Trail Options E1 & E2

- E. Trail connection from Sundown Road/Tewksbury equestrian facility to Zion Rd. and Stream crossing #3 (E-A on map) - Much of this narrow arm of RCCP, particularly north of the stream, contains wetlands making the construction of a trail problematic. The Tewksbury facility on Sundown Road has a large clientele of riders and direct access to the RCCP trail system. Other riders access informal park trails from across Sundown Road, possibly west of Tewksbury and South of Tewksbury.

Recommendations

1) Complete a connection between Sundown road and Zion Road on the south side of the Hawlings river. This would include additional park acquisition to provide adequate trail corridors and buffers. (see figure 5).

Option E1 - Work with Tewksbury and Oatlands stables and other neighboring communities, including the properties on Ripplemead Drive and Ripplemead Court to establish a trail and a buffer area on the uplands from Sundown Road to Zion Road, through a combination of park dedication/acquisition (preferred) and/or easements through private properties. (Highly recommended)

Option E2 - Align trail along edge of park property to avoid as much of wetlands as possible. Use turnpiking, timber drains and other types of trail engineering to construct trail.

2) All sections of trails on the north side of the Hawlings River should be permanently closed. Access for residents can be made available on private property through a number of existing or new trail easements.

3) As stated elsewhere in this document, the surrounding communities should be encouraged to establish equestrian connections outside of the park. Platted trail easements running east and west exist on both the north and south sides of Sundown Roads but are currently overgrown, and/or fenced off and not used.

4) Maintain trail access to Sundown Road to allow access from trails north of Sundown Road.

5) Establish an unimproved ford at point marked "3" on map to replace current ford located downstream in wetland area.

- F. Access at Center For Autistic Children (CAC) and for Oatlands Commercial Stables - This access has been used periodically over the past several years; it is often overgrown in the summer. It provides a better crossing of Zion Road with better visibility than site A. Access is provided from Zion Road and the Oatlands commercial equestrian facility. Access from this site also offers the best opportunity to allow park maintenance vehicular access to the Large Pond area (I) in order to maintain the pond, the surrounding meadow area, and construct and maintain the main bridge crossing of Hawlings River. Therefore, this section of trail will be somewhat wider than the standard trail width in order to accommodate maintenance vehicles.

Recommendations

1) Re-align trail so it begins at Zion road instead of the CAC driveway and construct it so as to provide maintenance vehicle access to the area around the large pond (I on map).

2) Work with Oatlands and other neighboring communities to establish connections and easements through their properties to allow use of this access point as an alternative to existing trail through wetlands in stream valley and current Zion Road crossing (A).

3) Work with DPW&T to install horse crossing signs, investigate tree pruning to improve sight distances and the installation of rumble strips or other devices to slow down traffic.

- G. Access at Gregg Court - Property owner on court maintains a trail that provides access for several neighbors to pond area and trail system. Trail is periodically mowed by property owner. Once the official trail is established all mowing on park property is to be done by park staff.

Recommendation - maintain this access point for neighborhood equestrian users to access trail system. Use signage to inform trail users in the park that this trail enters private property and is not a maintained park trail.

- H. Access from Gregg Road & Hawlings River Crossing #2 - A trail established over the past several years provides access from Gregg Road and private property on Gregg Court. This trail is in good condition for most of its length but as it approaches the River it goes straight down a valley, crosses some seasonally wet spots and leads to an unimproved ford across the Hawlings River.

Recommendations

1) Realign and engineer trail as needed to avoid steep and wet sites.

2) Engineer bank stabilization and use the existing ford for equestrian traffic. The best method for allowing foot traffic across this portion of the stream should be decided in the design stage.

- I. Hawlings River crossing #1 - The plan calls for a trail crossing of the Hawlings River in the vicinity of the large pond. The best structure to use to accomplish this will be decided in the design phase of the project. Options include a large bridge suitable for equestrian traffic; an equestrian ford and pedestrian bridge; or an equestrian ford with stepping stones for pedestrians.

Recommendation - Establish stream crossing at one of two locations

Option I 1 - Current ford site. Pros - This site is currently being used as a ford and no additional cutting of trails would be needed. Cons - The stream is deeply incised into sand and gravel banks. It may be difficult to stabilize this site.

Option I 2 - Locate crossing approximately 150 yards upstream from current ford site. Pros - The river bottom is bedrock at this site and it may provide a more stable substrate. Cons - an historic site consisting of a mill race, mill foundation and tail race exist at this location. Additional bridging could be needed to avoid impacting this site

- J. Trail leading east from ford near large pond (I to J on map) - A two hundred yard section of the trail to the east goes through wetlands.

Recommendation - re-route trail up hill about 75 yards and follow contours to avoid wet areas

- K. Trail leading north from Ford near large pond (I to K on map) - this trail is steep and deeply eroded.

Recommendation - re-route trail to switch-back and follow contours up hill slightly west of its present location. For the first 50-75 yards this trail will be the same as J above.

- L. Connection to Patuxent River trail system - Discussions are in progress with private property owners to complete a trail from this point to the Patuxent River equestrian trail system.

Recommendation -

1) Establish trail to this field and form a loop through field until such time as the connection is completed.

2) A HO connection can be made to point M below and signed, "HORSE TRAIL ENDS AHEAD AT PRIVATE PROPERTY - PARK TRAILS BEYOND THIS POINT - HIKING ONLY"

- N. Connection to areas to Southeast and Hawlings River crossing #4 - This section of trail crosses the Hawlings river and leads out of the park. It is currently used by only a few people who access the park from the southeast. The stream crossing is an old ford. The stream substrate is stable but some trail surface stabilization will be required on both sides. On the north side of the river, the trail crosses over a wetland area and crosses a small stream.

Recommendations

1) Until such time as a loop trail (see N to H below) is completed, outside of park, this trail should be signed "NOT A MAINTAINED TRAIL - LEADS TO PRIVATE PROPERTY"

- N to H - Completion of Southern loop trail - The connection of these points would complete a large loop trail. Making these connections within current park boundaries, however, would require traversing a number of steep slopes and wetlands, and the crossing of two tributary streams in steep terrain. The best option for this connection lies outside of the park. As explained under "trails concept" on page 10, it is hoped that RCCP can provide a nucleus of trails that will serve to connect a much larger system of trails that loop through the surrounding equestrian community. If a connection is deemed necessary within the park at some future time, it will likely require the purchase of additional parkland on the south boundary.

Recommendation - Work with surrounding community to help them complete an equestrian connection between these points outside park boundaries.

- O to R. Field trail at park entrance - No trails currently exist in the field that will become the main park entrance to connect with the main trail system.

Recommendation- A large figure 8 loop trail will be established in this field and connected to the rest of the system by three trails labeled P, Q, and R on figure 1. Trails P & Q will be JU trails and Trail R will be HO.

Small stream crossings - Small stream crossings will use small foot bridges, culverts or stepping stones along HO trails. No structural crossings will be used for small stream crossings on JU trails where hikers can easily step across fords. Where pedestrian crossings are needed on JU trails, small bridges will be constructed adjacent to or close to the ford.

General Trail Engineering Structures - A number of sections of trail will require small scale engineering to stabilize trail surfaces, cross small streams, wetlands or seeps, and traverse steep

slopes. Turnpiking, timber drains, water bars, and other construction techniques will be used to remove water from the trail, reduce erosion and otherwise stabilize trail surfaces to minimize impacts to resources. Areas that have been identified as requiring trail improvements are identified on the trail map with a large asterisk (*). Red asterisks indicate areas most in need of attention. Decisions on type of improvement and specifications will be made during the design and implementation phase. Where at all possible, any engineered sections of trail should be done using native materials on hand.

7. Additional Trail Related Recommendations

a. Develop Trail Map and Trail Marking System

In order to make the trail system user friendly, it is important to provide users with 1) a map of the trail system, and 2) a marking system along the trails so that the user can easily identify his/or her location on the map. Trails should be named and a high quality trail map that includes natural and cultural features as well as topography should be developed. Copies should be made available at the park entrance kiosk as well as at county nature and visitor centers. A system of color coded trail blazes should be developed and used to mark trails. Trail signs with mileage to next feature should be placed at major trail intersections.

b. Increase park users' involvement in trail maintenance and monitoring

This Plan proposes that the existing informal system of trails be improved and officially designated and maintained as part of the M-NCPPC trail system. However, this proposal will significantly increase the Park's operating costs for maintenance, management, and park policing. Yet the countywide Park Operations budget does not keep pace with the increasing demands for more and improved park facilities. It is therefore essential that park users, in Rachel Carson and in other parks in the Montgomery County system, be encouraged to play a greater role in assisting park staff in the maintenance and monitoring of the park. It is recommended that this be accomplished through several different programs:

Establish a Volunteer Trail Maintenance and Construction Program

Park staff are currently developing a countywide volunteer trail maintenance and construction program that will train and utilize volunteers to help build new and improve existing natural surface trails. In addition, as part of the trail maintenance program, volunteer trail monitors will be solicited to periodically inspect the condition of the trails and report tree falls and erosion problems to staff. It is recommended that a volunteer unit be established to assist with the implementation and maintenance of the Rachel Carson Park trail system proposed in this Plan.

Establish a Friends of Rachel Carson Conservation Park Organization

M-NCPPC has an affiliated foundation that accepts donations for the park system. Donated funds can be earmarked for a specific project or park by establishing a separate fund within the umbrella foundation. It is recommended that a "Friends of Rachel Carson Conservation Park" fund be established for the purpose of soliciting donations for park improvements, especially trail upgrades and maintenance. Frequent trail users, including commercial equestrian facilities in the immediate area, should be encouraged to either participate in the volunteer programs referenced above, or contribute to this fund.

Other possible endeavors of this group might include:

- Through community ties, help to acquire easements to create a community based system of equestrian trails outside of the park to augment and enhance local trail riding experiences. (see C below)
- Develop and distribute educational literature on trail etiquette.

Consider initiating a permit system for commercial equestrian use of the Park

Some of the most frequent users of the Park appear to be affiliated with the local commercial equestrian facilities in the immediate vicinity. While currently M-NCPPC does not charge trail user fees for any of the Park trails in the county, some other commercial uses of park land require permits and the payment of fees. In addition, private use of some facilities at other parks, such as reserved picnic shelters and boat mooring sites, require permits and fees. If sufficient assistance in trail patrolling, maintenance, and voluntary donations is not obtained, it may be necessary to institute a permit system for regular use of the Park by commercial operations, such as the equestrian facilities. A permit system would serve to identify the location and numbers of commercial facilities regularly using the Park, and would generate funds and/or in-kind service to be used specifically for trail maintenance at Rachel Carson Park. Permits could be based upon the number of Park trail users at a commercial equestrian facility, and payment could be in the form of fees or in-kind service. This option will be considered only when and if the voluntary programs referenced above are unsuccessful.

c. Work with Community to establish an area-wide trail system

As already mentioned, RCCP, due to its size and its sensitive natural resources, cannot alone meet the trail needs of the surrounding population. Equestrians, who can cover a greater amount of territory in a shorter time period than hikers, especially need a more extensive trail system than can be provided in RCCP. The equestrian community in the vicinity is expected to grow; the large lot zoning surrounding the Park is attractive to horse owners and stable operators. Trail easements can provide access to and complement the Park trail system. It is therefore important that not only M-NCPPC staff but also private citizens work with landowners to obtain trail easements.

M-NCPPC has been negotiating with public utilities, private property owners, developers, and trail users for many years to establish public trail easements. Staff will continue to work with the community to establish the major connections to other public trail systems, such as the Patuxent State Park and the Hawlings River and Rock Creek Stream Valley Park systems, through a combination of acquisition and easements. These connections are described in this Plan, and in the Countywide Park Trails Plan (M-NCPPC, 1998).

However, M-NCPPC does not have the staffing or funds to pursue trail easements or acquisition in every corridor that may be desired for a trail. The trail easements and trails established and maintained by private citizens are vital components of the area-wide trail system. Informal agreements are known to exist between equestrians and landowners for trail use, and trail user groups such as the Trail Riders of Today have been active in obtaining trail easements across private property. In other parts of the county, user groups maintain trails on private lands, and in other parts of the country, citizens have formed land trusts to purchase and maintain lands for conservation and trail use. As public budgets become more constrained, these recreational benefits provided by private citizens will become even more crucial. Trail user groups are encouraged to pursue these types of

private efforts to help meet the need for an extended network of trails, and especially for neighborhood trail connections.

d. Trail Maintenance

The long term maintenance of park trails is the responsibility of the park manager. In order to ensure that trails remain in good condition and do not become subject to over-use that could negatively impact park resources, regular inspections should be conducted. Such inspections should be conducted by staff and/or members of volunteer groups mentioned above. One option might be an annual trail walk/ inspection that included park staff and interested citizens. These evaluations will provide information to be used by the park manager in making decisions on trail maintenance or, if deemed necessary, temporary or permanent trail closures.

C. Increase Police Presence

As use of RCCP increases and facilities are established Park Police should patrol access points to prevent illegal use of the area. In addition to professional police staff, the Park Police currently manage a very successful program that trains and utilizes volunteers to patrol parks and park trail systems. Volunteers patrol on foot, horseback, mountain bicycle, or car, where appropriate, and notify park police of any park violations or safety problems. It is recommended that the Park Police's Volunteer Mounted Patrol be expanded and that volunteers should be recruited, trained and assigned to patrol Rachel Carson Park.

D. Interpretation

One focus of RCCP is public education and interpretation of natural and cultural features. It is recommended that the park manager, region interpretive staff, NRMU and historic preservation work in conjunction with the exhibit shop to develop a comprehensive interpretive plan for RCCP. The region should use a combination of permanent interpretive signs and/or brochure to inform and educate the casual park visitor. Signs should be used to stress the importance of staying on designated trails, not trampling vegetation or forging new trails. Some suggested locations for interpretation and information that might be provided is listed below.

- Rock outcrops - Geology; historical use as a stopping point on the underground railroad; Archeological evidence of quarrying and stone tool making.
- Remains of the head race and dam of Greenwood Mill - General information on mill; picture of how it looked in operation.
- Pond Area - General information on ponds; local wildlife (beaver, otter, mink, wood duck)
- Hawlings River - Discussion of watershed, water quality, aquatic species
- Forest wetlands - Value and function of wetlands, loss of wetlands, unique plants and wildlife.
- Large White Oak - Size and estimated age of oak, other relevant information.

- Upland Forest - Mature forest value; past land use; Quaker connection; wildlife/forest interior species.
- Public Access/Entrance points to park - Develop a kiosk for the main entrance with a map of the park, general information about trails, park regulations, and overview of unique natural and cultural attributes of RCCP. A scaled down version of the kiosk should be posted at each park access point.

RCCP already serves as a field trip destination for birding and nature study groups. It is anticipated that this use will increase as the park is made more accessible. As mentioned earlier in this plan a pavilion with picnic tables placed at the main entrance would serve as a meeting place, and outdoor classroom as well as a picnic location.

E. Clean-up of Dump sites

A number of old dump sites are scattered around the park. Most are small and composed of old bottles, parts of old farm implements, and other debris. These pose only minor visual impacts to the landscape and may be of some historical interest and should be left alone. Several sites, however, are composed of old tires, recent household waste, old car parts and other unsightly junk that should be removed. It is recommended that the following sites be cleaned up as part of developing this park.

- ◆ Old car located east of Zion Road, close to where new trail (F-P) will be cut through. As mentioned above this trail will be built to accommodate park maintenance vehicle access to the pond area and should allow for the removal of the automobile.
- ◆ A very large dump of old tires and other recent household junk is located about 1400 feet west of Georgia avenue on the north side of Hawlings River and should be removed. Because there might be historically or archeology significant materials below the dump, the park Archaeologist should survey the site before any activity begins and all excavation should be conducted under their supervision. Vehicular access is available across private property and through a field area of the park that is being cut for hay by the park neighbor (see old field management below).

IV. MASTER PLAN IMPLEMENTATION AND COSTS

A. Implementation

Implementation of trail improvements will be dictated by the Capital Improvement Program (CIP), regional funding and staffing priorities. Given these constraints, it is recommended that the Master Plan be implemented in several phases in order to best protect RCCP's resources. Phase I includes actions that are important to protecting natural and cultural resources and that should be taken as soon as possible; and access by maintenance vehicles that would facilitate future development efforts by park staff and volunteers. Phase II includes actions that would allow safe public vehicular access to the park. Funding would be higher than for phase I; most of it is already in the CIP for FY 00 and FY 04. Phase III would essentially complete the Park and provide for long term maintenance including staff.

Phase I

- Develop a volunteer trail monitoring and maintenance program.
- Establish figure-8 equestrian trail (O on figure 1) and connections in field by main entrance (P & Q).
- Layout and construction of new trail from Zion Road to large pond (A - I; 2400 L.F., 8' wide) to provide access for construction equipment to build bridge and facilitate natural resources management efforts including: meadow management, pond maintenance and exotic invasive control.
- Reposition and stabilize existing bridge as temporary pedestrian crossing (I)
- Construct highest priority renovations/construction on main trail (reroute I-J and wet area crossings).
- Designate and post trail usage as hiking only for 600 yard segment of trail running from T to U to remove equestrian traffic from this sensitive wetland area. Alternate trails currently exist for this route that would increase travel time by less than 10 minutes by horseback.
- Permanently close 700 yard section of trail (S on fig. 1). The lower section of this trail goes through a wetland area and is washed out and eroding. This duplicative route runs parallel to another trail less than 150 yards to the west.
- Design and obtain permits for trailhead at 22201 Zion Rd, including (O): gravel parking facility and gravel entrance road, including entrance sign for Zion rd., and any necessary stormwater management facilities
- Design trail crossing near large pond (I) - decision on a bridge or other structure will be made at this time.
- Devise and obtain approvals for signage plan, and install signs
- Design, print, and distribute interim trail map handouts

Phase II

- Construct gravel parking facility and gravel entrance road, at 22201 Zion Rd. including entrance sign and stormwater management facilities.
- Design, obtain permits for, and construct pavilion with 6 picnic tables and kiosk (for display map and trail info) at trailhead.
- Construct trail crossing structure near large pond (I)
- Renovate/ construct second priority trail sections
- Remove old car and junk pile

Phase III

- Renovate/construct third priority trail sections including trails north of Hawlings River and east of Zion Road (5400 L.F.; 4' wide; 2 stream crossings) and south of Hawlings River west of Zion Road - including small bridges, fords, and other engineering. (3600 L.F.; 4' wide; 2 stream crossings).
- Close informal trails that are not part of this plan. Note: Except for two short trail segments listed in Phase I, this process will be ongoing in phase II & III, as alternate routes are completed.
- Develop and installation remainder of trail signs, and interpretive signs.
- Design and print final handout maps with interpretive information

B. Implementation Cost Summary

Rough cost estimates for master plan implementation are listed in Table 1. More detailed costs will be determined during the design phase of each project. Costs will vary depending on use of volunteer labor and final decisions on types of bridging etc. Current CIP funds listed below would be applied to Phase II of implementation. Funding will primarily come from the CIP and operating budget supplemented by volunteer labor, and grants such as the Recreational Trails Act federal funding.

Current CIP FY 00-06 funding for Rachel Carson:

\$64,000 including \$10,000 in federal grant (Simms Act: Recreational Trail Grant)

In Trails: Natural Surface PDF

FY 00 Rachel Carson Conservation Park: (Phase I & II (in part))	\$ 25,000 County current receipts
Planning, design & construction supervision	\$ 8,000
	<u>\$ 10,000</u> SHA Grant
	\$ 43,000
FY 01-06 Rachel Carson Conservation Park: (Phase II (in part)& III (in part))	
Planning, design & construction supervision	<u>\$ 95,000</u>
	Total \$138,000

C. Staffing

The addition of one full-time career Maintenance Worker II and three additional summer seasonal positions is recommended in order to allow the North Region, Rock Creek area to cover additional maintenance responsibilities. It should also be noted that each new park that comes on line also effects the work program of other divisions within Park Operations. For example, the addition of ten miles of mostly wooded trails will certainly impact the work program of the Natural Resources division tree crew who will need to respond to large trees that fall across trails. It is important to evaluate these long term needs on the Park Operation level.

An important component of this plan is the long-term maintenance of trails. Recent years have seen a greater emphasis placed on natural surface trails and a recognition that construction and maintenance of these trails requires specialized techniques and expertise. The development of a specialized regional trail crew that would receive special training in order to fill this need is an idea that has been suggested. The RCCP Master Plan Committee highly recommends the development of such a crew.

D. Planned Life Cycle Replacement Program (PLAR)

The Montgomery County Park Commission has instituted a program wherein regular replacement and maintenance activities are tracked and programmed into the DIP based on anticipated life cycle criteria. The PLAR system keeps track of when the last replacement was done and will alert the park staff of items to look for in the near future as well as assure adequate funds and are put into place far enough ahead of time. Items within this master plan should be placed into PLAR during the design and implementation phase of the Master Plan.

Table 1. Master Plan Implementation Cost Summary

Implementation/project	Cost Estimate	Staffing
Phase I		
1. Develop a volunteer trail monitoring and maintenance program.	\$ 5,000	Park Development Division (PDD), Region, Volunteer Services.
2. Establish figure-8 equestrian trail and connections in field by main entrance (O, P & Q on fig. 1).	\$ 3,000	Region, Natural Resources Management (NRM), Park Planning & Resource Analysis (PPRA), PDD
3. Layout and construction of new trail from Zion Road to large pond (A - P; 2400 L.F., 8' wide) to provide access for construction equipment to build bridge and facilitate natural resources management efforts including: meadow management, pond maintenance and exotic invasive control.	\$ 8,500	Region, PDD, NRM, PPRA, Central Maintenance., Volunteers
4. Reposition and stabilize existing bridge as temporary pedestrian crossing	\$ 1,000	Region, PDD, Central Maintenance., Volunteers
5. Construct <u>highest priority renovations construction on main trail.</u>	\$ 8,500	Region, PDD, Central Maintenance., Volunteers
6. Designate and post trail usage as hiking only for 600 yard segment of trail running from T to U to remove equestrian traffic from this sensitive wetland area. Alternate trails currently exist for this route.	\$ 400.00	Region, NRM, PPRA, PDD

7. Permanently close 700 yard section of trail (S on fig. 1). The lower section of this trail goes through a wetland area and is washed out and eroding. This duplicative route runs parallel to another trail less than 150 yards to the west.	\$ 400.00	Region, NRM, PPRA, PDD
8. Design and obtain permits for trailhead at 22201 Zion Rd, including: gravel parking facility and gravel entrance road, including entrance sign for Zion rd., and any necessary stormwater management facilities	\$ 5,000	Region, PDD, Central maintenance
9. Design trail crossing near large pond (decision on a bridge or other structure will be made at this time)	\$ 5,000	Region, PDD, Central maintenance
10. Devise and obtain approvals for signage plan, and install signs	\$ 5,000	Region, PDD, Central maintenance
11. Design, print, and distribute interim trail map handouts	\$ 5,000	Region, PDD
Total Rough Cost Estimates for Phase I	\$ 46,800	
Phase II		
1. Construct gravel parking facility and gravel entrance road, at 22201 Zion Rd. including entrance sign and stormwater management facilities.	\$ 40,000	Region, PDD, Central maintenance.
2. Design, obtain permits for, and construct pavilion with 6 picnic tables and kiosk (for display map and trail info) at trailhead.	\$ 14,000	Region, PDD, Central maintenance
3. Construct trail crossing structure near large pond	\$ 40,000	Region, PDD, Central maintenance.
4. Renovate/ construct second priority trail sections	\$ 23,000	Region, PDD, Central maintenance.
4. Remove old car and junk pile	\$ 2,000	Region, PDD
Total Rough Cost Estimates for Phase II	\$ 119,000	

Phase III		
1. Renovate/construct third priority trail sections including trails west of Zion Road - including small bridges, fords, and other engineering. (3600 L.F.; 4' wide; 2 stream crossings)	\$ 55,000	
2. Close informal trails that are not part of this plan. Note: Except for two short trail segments listed in Phase I, this process will be ongoing in phase II & III, as alternate routes are completed.	\$ 2,000	Region, PDD, NRM, PPRA, Central Maintenance., Volunteers
3. Develop and install remainder of trail signs, and interpretive signs.	\$ 5,000	Region, PDD, NRM, PPRA, Central Maintenance., Volunteers
6. Design and print final handout maps with interpretive information	\$ 4,000	Region, Exhibit shop
Total Rough Cost Estimates for Phase III	\$ 66,000	
Total Rough Cost Estimates	\$ 231,800	

V. NATURAL & CULTURAL RESOURCES

In accordance with the Pros Plan definition for a Conservation Park, the protection and enhancement of natural and cultural resources have been given the highest priority in this master plan. To ensure continued protection and to preserve and enhance species diversity within the park, this section of the master plan provides an inventory of the park's natural and cultural resources and outlines recommendations for the future management of the natural resources and facilities in Rachel Carson Conservation park.

A. Inventory of Natural Resources

A brief overview of the park's natural resources is provided below. Maps showing geology, soils, slopes, and hydrology are on file in the office of the M-NCPPC Montgomery County Natural Resources Management Unit.

1. Geology

The park lies in the piedmont physiographic province of Maryland. The bedrock underlying this area is primarily slate, quartzite and phyllite. Quartzite outcrops occur along some ridges - one dramatic example has become known as Blick's Rock and is marked on the park map. Topography is steep and hilly with elevations ranging from 400 to 585 feet.

2. Soils

The floodplain of the Hawlings River is dominated by Cordorus silt loam (53 A), a moderately well drained to somewhat poorly drained soil subject to occasional flooding. Soils along several tributaries are Baile silt loam (6A), a federally recognized hydric soil. Slopes are mostly of Blocktown channery silt loam (116D- 116E) with 15 to 45 percent slopes and Brinklow-Blocktown channery silt loams with 8 to 25 percent slopes. These are shallow, well drained soils that have a moderate to severe hazard of erosion. Rock outcrops occur on knolls and the upper side slopes. Glenelg silt loam (2B- 2C) occurs on the broad ridge tops and side slopes in the uplands with 3 to 15 percent slopes. This is a very deep well drained soil with a moderate hazard of erosion on slopes over 8 percent. Occoquan (17C) loam also occurs in large areas of the uplands with a 8 to 15 percent slope. This is a deep, well drained soil with a moderate hazard of erosion.

3. Slopes

Terrain of RCCP is best described as rolling to steeply sloping. The steepest slopes (15% and greater) are hydraulically adjacent (within 200' of the stream bank) of the Hawlings River or its tributaries. The flood plains are narrow through most of the park becoming broad along the Hawlings River from Zion Road west.

4. Hydrology

RCCP is drained by the Hawlings river and approximately 10 smaller tributaries. Three of these tributaries have their source in the park. The Hawlings river is classified IV-P by the State based on temperature and dissolved oxygen standards which could support adult trout (the -P indicates that this area drains to a public drinking water supply - Rocky Gorge Reservoir). Overall, the stream maintains good resource conditions with the section within RCCP having some of the best stream habitat in the watershed. Above the park, in its headwaters, many small tributaries drain rolling agricultural lands to create the Hawlings River. Water is often somewhat turbid as it enters the park.

The quality of the stream improves as it flows through RCCP. Stream quality deteriorates markedly after it crosses Georgia Avenue and is effected by a change in soil type and uncontrolled runoff from Olney.

a. Stream Fisheries

Fish were sampled on the main stem of the Hawlings River at the upstream end of the park (downstream of Zion Road) and at the downstream end of the park (upstream of Georgia Avenue). Fish sampling and data analysis were done in accordance with the Montgomery County Water Quality Monitoring Program Stream Monitoring Protocols. Indices of Biological Integrity (IBI) were calculated for the fish communities at both sampling sites. IBIs provide an indication of how the fish community at a given site compares to the reference conditions which have been established by analyzing the fish communities at the least impacted stream sites in the County. IBIs for both sampling sites were in the GOOD range.

At both sites, the most abundant fish were rosyside dace (*Clinostomus funduloides*), which have an intermediate tolerance for pollution and which feed on insects. At both sites, northern hogsuckers (*Hypentelium nigricans*) and longnose dace (*Rhinichthys cataractae*), which are intolerant of pollution, were found. In general, the fish communities in Rachel Carson Conservation Park are healthy and diverse, indicating that water quality and in-stream habitat are good. The one negative feature of the watershed which has been observed repeatedly is the high level of fine sediments carried by the water. The sediment originates upstream of the park and the turbidity of the water is noticeable improved as the river flow through the park, probably due to the presence of high quality tributaries, which have low levels of suspended sediment, within the park.

5. Vegetation

Vegetation in Rachel Carson Conservation Park is a patchwork of high quality maturing forests, young woods and old fields in various stages of succession. As with all other larger M-NCPPC park properties, the entity we now call Rachel Carson Conservation Park is comprised of a number of smaller acreages which had different uses in the near past. While there are several large areas of young, weedy woods which were logged and/or grazed relatively recently, the majority of the park is dominated by high quality maturing, second-growth, mixed-deciduous forest. The M-NCPPC Natural Resources Management Group commissioned the Maryland Natural Heritage Program to perform an ongoing inventory of rare, threatened and endangered plant populations and significant habitats on select park lands of the M-NCPPC in Montgomery county. When the DNR botanists studied Rachel Carson, they found that diverse habitats and populations of five separate "watch list" species occur in this park.

The uplands are dominated by an oak/hickory association, with chestnut, white, red, scarlet and black oak common in the canopy; dbh of dominant trees range from 15-22", with trees measuring 22-35" frequently seen. Red maple, black gum, hickory, and tulip poplar are also common in the canopy.

The understory is diverse and very few alien invasives exist in closed canopy areas; sapling American chestnut, and well developed mountain laurel, blueberry, huckleberry, wild azalea, flowering dogwood, arrowwood, blackhaw, and mapleleaf viburnum are common. Specimen of chinquapin, a DNR watch list species, were noted on the upland slopes.

Rachel Carson Conservation Park Forest Stand Delineation

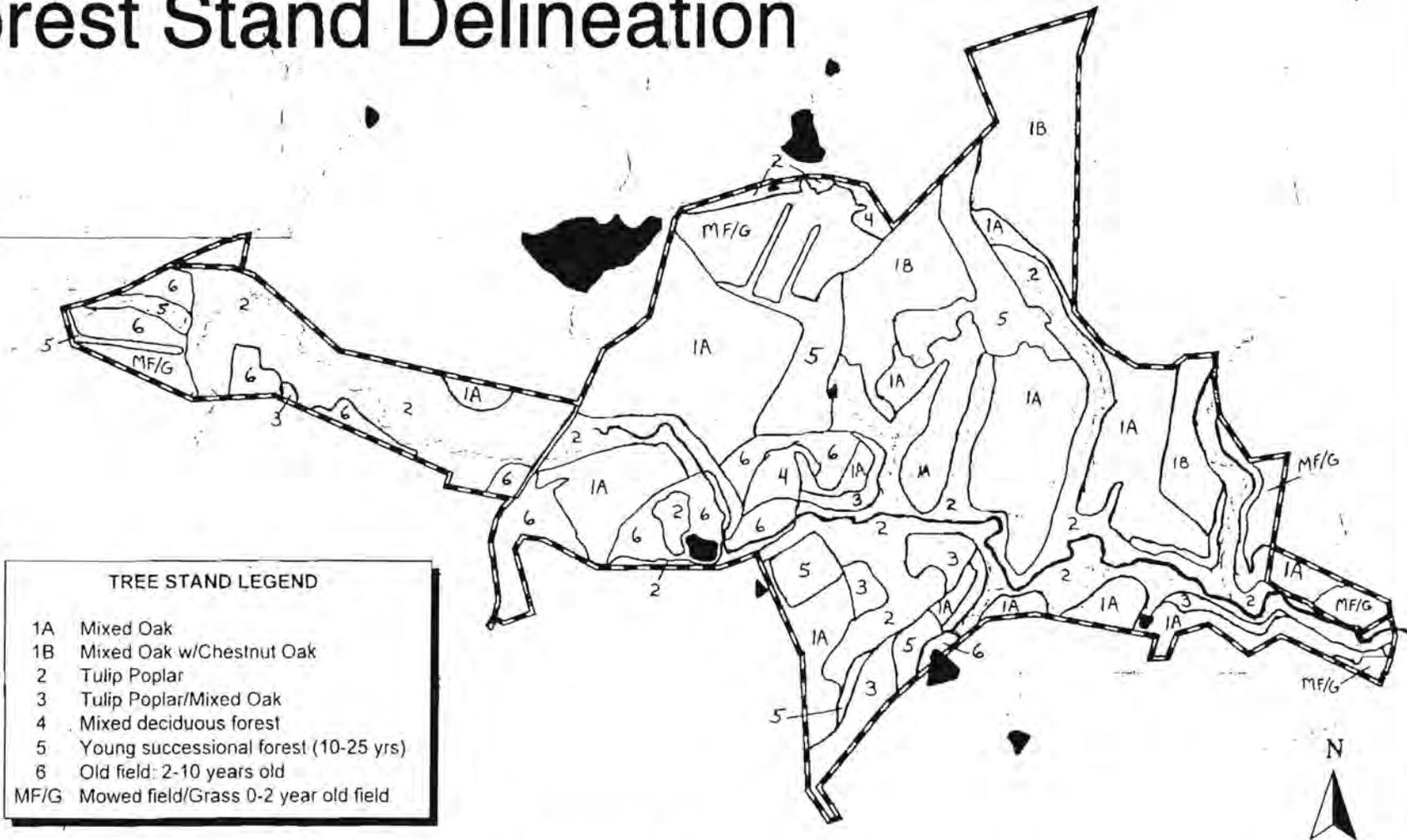


Figure 6. Forest Stand Delineation for Rachel Carson Conservation Park

At points where the canopy is broken (tree loss due to gypsy moth destruction, edge effect surrounding old fields and pastures, etc.), alien invasive growth is obvious. Multiflora rose, Japanese honeysuckle, Vietnamese stilt-grass, bittersweet, bush honeysuckle, tree of heaven, garlic mustard often dominate these areas. The herbaceous layer is often relatively sparse in the upland forests except for these open canopy areas.

The floodplain and lower slopes are dominated by tulip poplar, tulip poplar/mixed oak, and mixed deciduous forests. Tulip poplar usually dominates the canopy with red maple, silver maple, ash, black gum, sycamore, white oak, pin oak, all common. Scattered specimen of the DNR watchlist species, shingle oak, occur throughout the floodplain, along the lower slopes, and on the old field/young forest borders throughout the park. As with the upland forests, the mixed deciduous forests vary in age from young, second growth, weedy forests to the mature forest where dbh ranges from 15 to 22" (with frequent trees in the 24 to 36" dbh range).

The understory in these stands is dominated by spicebush, but many other species are common including muscledwood, arrow-wood, maple-leaf viburnum, serviceberry, pawpaw, blackhaw, flowering dogwood, winterberry, and witch hazel.

The herbaceous layer of the tulip poplar, tulip poplar/mixed oak, and mixed deciduous forests is extremely lush, full and diverse; ferns, woodland herbs, wildflowers, and vines blanket the floodplain floor. Green dragon and ellisia, DNR designated "watchlist" species, occur along the Hawlings River floodplain. Several species of orchids, including rattlesnake orchid, crane fly orchid, showy orchid, small woodland orchid, lady's slipper orchid, large whorled pogonia, putty-root, and lily-leaved twayblade have all been noted. As the DNR botanists point out, the presence of these orchids indicate high quality, relatively undisturbed forest.

Unfortunately, as in the upland forest areas, acres of old field in the early stages of forest succession, abandoned farm lanes, and recently grazed pastures exist where the population of exotic invasives is high. However, even in the areas of high invasive cover, shingle oak specimens were routinely noted, and a scattered population of the watchlist species, rough avens, occurs in the early succession fields west of Zion Road.

Several abandoned farm ponds exist which are filling in with (or encircled by) a good variety of native emergent aquatic vegetation.

Vegetationally speaking, Rachel Carson Conservation Park is one of our richest M-NCPPC park properties (A list of plant species is included in the Appendix). The presence on one contiguous property of high quality mixed-deciduous mesic forest, high quality oak dominated upland forest, lush floodplain forest, old fields in varying successional stages, old ponds with emergent aquatic species, and at least five documented state "watch list" species and multiple orchid species verify this point. The DNR Natural Heritage botanists who are trained to compare/contrast/ evaluate properties around the entire state as to botanical importance write "The entire park east of Zion Road should be considered an exceptional natural area for Montgomery county. Measures to assure its protection should be considered immediately."

a. Forest Stand Delineation

A forest stand delineation of Rachel Carson Conservation Park was done in order to determine priority areas for forest and tree retention before any development, and to aid in defining areas

necessary for reforestation during the preparation of a forest conservation plan. For forest conservation purposes, the 662.5 acre property can be divided into a 547.6 acre forested section, a 61.4 acre old field section, a 50.6 acre maintained field portion, and six ponds totaling approximately 2.9 acres.

Six forest stands were identified in Rachel Carson Conservation Park and are labeled on the Forest Stand Delineation (FSD) map (Figure 6), including Mixed Oak--Mixed Oak/Chestnut Oak, Tulip Poplar, Tulip Poplar/Mixed Oak, Mixed Deciduous, "Young Successional Forest" (tulip poplar, red maple, eastern red cedar, Virginia pine), and Old Field. A separate designation is made for Mowed Field (0-2 year) areas; these areas don't belong under the forest stand descriptions, but they do comprise 50.6 acres of Rachel Carson Park property and should be considered for reforestation purposes. Forest stand descriptions include stand acreage, structure, retention priority, and comments on the stand's overall condition. The complete FSD is included in the appendix.

6. Wildlife

A mosaic of rich forest, ponds, streams and oldfields in various successional stages provides habitat for a wide variety of terrestrial vertebrates. Below is a summary of breeding birds and other wildlife species found in RCCP.

a. Birds

Birds are excellent indicator species for evaluating habitat quality and making inferences about that habitat for other species. Six site visits were conducted between 6-9-96 and 8-13-96 specifically to collect data on breeding birds. Observations of birds were also recorded on other field visits both earlier and later in 1996. Fifty-five species of birds were detected as potentially breeding in the park. The list includes a number of forest interior species such as Kentucky warbler, Louisiana waterthrush, scarlet tanager, ovenbird, worm-eating warbler, pileated woodpecker, Great Horned Owl and Barred Owl indicating a high quality forest. Additional data on breeding birds was collected in June of 1997 as part of the Montgomery County Parks Breeding Bird Census and Mapping Project. A summary of survey techniques and species lists are included in the appendix.

b. Other wildlife

In addition to birds, RCCP is home to an impressive diversity of other terrestrial wildlife species including at least 24 species of mammals, 12 reptiles, and 12 amphibians. A complete species list is included in the appendix. Most of the species have been documented by NRMU staff through sightings, tracks, calls and trapping efforts between 1992 and 1996.

Mammals include common species like white-tailed deer and gray squirrels as well as uncommon species like mink and river otters. A number of sites are occupied by beaver colonies that over the past several years have cut trees, built dams and flooded areas of the park for short periods and then moved to new areas. As beaver become more established in the park there is the potential for flooding of stream valley trails.

The herps (reptiles and amphibians) include most of the common species of the county. Vernal pools and wetlands provide breeding habitat for spotted salamanders, wood frogs, spring peepers and other amphibians. Additional inventory work of these groups should be carried out.

B. Inventory of Archeological and Historic Resources

1. Archeological Resources

A Phase I pedestrian survey for archaeological resources within the Rachel Carson Conservation Area was conducted by the Park and Planning archaeologist in accordance with the "Standards and Guidelines for Archaeological Investigations in Maryland" (Maryland Historical Trust Technical Report Number 2, 1994).

The Park is important to archaeology for several reasons: Not only has little research been conducted in the area, but the Park's stream valley system makes it amenable to both prehistoric populations and later, water-powered technology. Sampling strategy yielded one prehistoric, one prehistoric/historical and two historical archaeological sites.

2. Prehistoric Archeological Sites

The two prehistoric sites were located near the Zion Road portion of the park. One consisted of a lithic scatter with no diagnostic artifacts to give it a time frame. The prehistoric component of the prehistoric/historical site consisted of a large outcropping of quartzite, part of the Atlantic Ridge, which showed signs of prehistoric quarrying activity, again no diagnostics were present.

The small upland campsite would have been used as seasonal short-term stays along well-traveled trails that followed the streams. The quarry would have been attractive to many differing populations down throughout the entire prehistoric period.

3. Historical Archeological Sites

Two of the historical sites were mills. The first was situated on Timber Neck patented in 1769 by Henry Gaither. The 1783 tax assessment lists a "new grist mill" on the property. Subsequently owned by the Griffith and Brown families, the Gaither Mill ceased functioning about the turn of the twentieth century.

The second mill, Greenwood, was a family or "custom" mill built by Allen Bowie Davis about 1840. The mill was later rented and ceased functioning in 1926. There are no visible mill ruins save for some stone embankments on the south side of the stream. The foundations were probably destroyed when Georgia Avenue was widened. The remains of the head race and dam are also visible upstream within the Rachel Carson Conservation Park boundaries.

In historic times, the prehistoric quarry was known to locals as Blick's Rock. It exists in folklore associated with the Underground Railroad, being a notable landmark for escaping slaves.

The Phase I archaeological survey has added to our scant knowledge of prehistoric populations and historic life in the area. Such surveys are becoming more important over time, since, "With the current and past intensive level of development in Montgomery County, a large portion of its archaeological record has been lost, and this loss increases yearly" (MD Historic Trust, White Paper Number 1, 1987:32). In fact, according to the Chief Archaeologist for the Trust, "More archaeologist sites have been lost in Montgomery County than any other county in the State" (Personal Communication). It is becoming a reality that the valuable record of Montgomery County's prehistoric and historical peoples is only preserved in those undisturbed portions of our county which, increasingly, lie solely in our Park system.

4. Historic Sites

There are two standing building complexes within the Park. The first of these, on Zion Road, was built by the Dwyer family the mid-nineteenth century. The present house and outbuilding complex date to the 1920s. The other structure faces Georgia Avenue. This was the miller's house for Greenwood Mill. Constructed in the years following the Civil War, it is currently rented out by the Parks.

C. Natural Resources Management Issues and Recommendations

The following is a general overview of natural resource management issues within the park. Some generalized management recommendations are outlined, however, a more detailed natural resources management plan will be developed at a later date. It will contain details such as timetables and methods for exotic invasive management, mowing regimes for maintaining open habitats, detailed wildlife habitat improvements, and stream restoration projects.

1. Exotic Invasives

By far, the greatest threat to the park's resources and natural diversity is the expansion of exotic invasive plant species. Exotic Invasive plants are species that are not native to the region and are extraordinarily adapted to out compete other species. The end result is often a vegetation cover dominated by the exotic species to the detriment of native species. Exotic species of particular concern in Rachel Carson Park include Multiflora Rose (*Rosa multiflora*), Bush Honeysuckle (*Lonicera* spp.), and Asiatic Bittersweet (*Celastrus orbiculatus*). Exotic Invasives often invade open, disturbed areas where they quickly take over and dominate. Gradually plants move into more established habitats including forest interiors and gradually increase in dominance. Asiatic Bittersweet is capable of growing into the forest canopy, shading out and killing forest trees.

2. Forest Stands

Forest stands are detailed in the NRI-FSD, appendix A. Primary management of forested areas will consist of vegetation monitoring to evaluate the impacts of deer, gypsy moths, exotic invasives and other potential forest pests on the species diversity. Baseline data is provided by the FSD and Six monitoring sites that have been established within the park.

3. Open Fields

Old fields dominated by grasses and wildflowers offer important habitat for a variety of species of plants and animals including wildflowers, bluebirds, meadowlarks, bobwhite, kestrels, and butterflies. Old field habitat was once fairly common in much of Montgomery County but as development expands, and old fields mature into young forests, this rich and diverse habitat is disappearing. Many of our parks that once provided large areas of old field habitat have now grown up in shrubs and young forests often dominated by exotic invasives.

The open fields that currently exist in Rachel Carson provide the opportunity to preserve examples of this habitat and the diversity of species it supports. To do so will require persistent and planned management efforts. Some of these areas should be allowed to mature to various stages of succession depending on their location. For example, small openings within otherwise large forest tracts should be allowed to mature to forest and thus reduce forest fragmentation. Other areas should be

maintained in the shrub stage, another habitat that is disappearing from the county and that provides habitat for a particular group of plant and animal species.

Maintenance of these areas will require a program of periodic mowing, tree removal, and exotic weed control. Details of site specific, management strategies for each open field will be outlined in a forthcoming Resource Management Plan for the park. The size, location and brief description of existing non-forested areas are listed below.

1. Approximately 33 acres adjacent to the driveway and farmhouse at 22201 Zion road were farmed until 1992 and have since been left fallow. It was mowed annually since 1994.
2. Approximately 10 acres adjacent to the large pond are oldfields composed of grasses and forbs that are becoming overgrown with multiflora rose, bush honeysuckle, bittersweet and other shrubs. A shrub swamp dominated by willow and buttonbush lies adjacent to the outflow structure of the pond and covers several acres. In the fall of 1995 beavers began to expand this area by damming the stream that flows out of the pond.
3. Approximately 7 acres lie south-east of Blick Rock and are dominated by grasses and being overrun with multiflora rose, bush honeysuckle and other exotic invasive species.
4. Approximately 5.5 acres lie approximately .3 miles north west of where Hawlings River crosses Route 97. Most of this field is in grass having been cut for hay fairly recently (8/95 unauthorized). A few acres adjacent to the small tributary that parallels the field is more overgrown and dominated by goldenrods and multiflora rose.
5. Approximately 16.5 acres lie in the far western boundary adjacent to Sundown Road. It is dominated by grasses and forbs and being overrun with exotic shrubs. A hedge of trees and shrubs borders the stream and an east west aligned fence row. A reforestation project was established on a section of this area between the stream and Sundown Road in 1995. Area south of stream was mowed for hay in 1997 (9/96 unauthorized). There is also a section of land that is in pasture and being encroached upon by adjacent stables.
6. Approximately 5 acres lie east of the area mentioned above. The field is dominated by goldenrods, other coarse perennials and beginning to get overgrown with exotic shrubs and young trees.
7. Approximately 10 acres along Zion Road are oldfield habitat dominated by patches of goldenrod, invasive exotic shrubs and young trees.

4. Ponds

The several ponds that exist on the property are in various states of repair. Efforts should be made to maintain and or restore these ponds in accordance with Maryland Dam Safety Regulations. Detailed analysis and recommendations should be included in the Forthcoming Natural Resources Management Plan.

5. Streams

Several stream monitoring sites have been established along the Hawlings. These sites will be monitored as part of the county's ongoing monitoring program administered cooperatively by Montgomery County Department of Environmental Protection (DEP) and M-NCPPC Natural Resources Management Unit (NRM).

In addition to the continuation of this important program, it is recommended that two other initiatives be included in the long-term Management of the Hawlings river and its tributaries within RCCP.

- ◆ Stream monitoring has shown an elevated level of turbidity in the Hawlings River as it enters the park as well as a tendency for water levels in the stream to rise quickly during storm events (flashy stream conditions). Park management staff, DEP and NRMU should work with the County Soil Conservation Service to investigate the source of the sediment in the stream and take what measures are possible to reduce stream flashiness and turbidity at or near its source.
- ◆ A number of areas within the park have erosion problems resulting from flashy stream conditions during heavy storm events and downed trees disrupting stream flows. Park management staff, DEP and NRM should work cooperatively where appropriate to employ stream bank restoration and habitat improvement structures where practical.

6. *Wildlife Management*

a. Habitat improvements and structures

The incorporation of nesting structures for wood ducks and bluebirds, as well as other habitat modifications could improve conditions for several species of wildlife in the park. Specific recommendations including habitat modification, mowing regimes, nesting structures, and other wildlife management efforts for specific species should be included in the forthcoming Natural Resources Management Plan.

b. Deer management

An over population of deer pose a threat to the biological diversity of plant and animal species in RCCP. An aerial population survey using forward looking infrared (FLIR) video equipment mounted on a helicopter found an extremely high population density of 176 deer per square mile in and around the park. The county's deer management plan recommends deer densities of 18-30 deer per square mile to maintain species and habitat diversity. There is evidence of a browse line, an indication that a reduction of plant density and possibly diversity is occurring. Management efforts should follow the Comprehensive Management Plan for White-tailed Deer in Montgomery County, Maryland and focus on reducing the population density to an acceptable level and maintaining it at this level.

D. Trail and Facility Management

Maintenance for RCCP will be minimal compared to most developed parks but it will be necessary. Maintenance will include:

- Trail maintenance - Clearing of woodland trails; mowing of meadow trails 8 - 12 times per year; maintenance and repair of trail structures including bridge(s), boardwalk, water bars, turnpiking and other trail surface improvement structures and signs.
- Maintenance of parking area and associated storm water management facility.
- Mowing of meadow areas (1 or 2 times/year) and other wildlife habitat work
- Exotic invasive control,

VI. Appendix

- A Forest Stand Delineation Supporting Information
- B Plant Species List RCCP
- C Fauna of Rachel Carson Conservation park
- D Breeding Bird Survey RCCP
- E Summary of Park User Survey questionnaire results
- F Aquatic survey data

Rachel Carson Conservation Park--Forest Stand Delineation

Completed by Carole F. Bergmann, Natural Resources Management Section

June, 1996

A forest stand delineation of Rachel Carson Conservation Park was done in order to determine priority areas for forest and tree retention before any development, and to aid in defining areas necessary for reforestation during the preparation of a forest conservation plan. For forest conservation purposes, the 662.5 acre property can be divided into a 547.6 acre forested section, a 61.4 acre old field section, a 50.6 acre maintained field portion, and six ponds totalling approximately 2.9 acres. Located east of the town of Laytonsville and north of Brookeville, most of Rachel Carson Conservation Park is bordered by private property. The park can be easily framed on a map, however, by locating Georgia Ave. (Rt. 97) to the east, Sundown Rd. to the north and west, and Gregg Rd. to the south.

Vegetational studies were conducted on 3/29/94, 6/6/95, 6/19/95, 7/14/95, 9/13/95, 3/20/96, 4/12/96, 4/29/96, 5/1/96, 5/13/96, 5/23/96, 5/31/96, 6/13/96. A thorough "walkthrough" was completed and species lists for woody and herbaceous plants were compiled, information on dominant and codominant species, size class, basal area, and general health of the stand recorded.

Six forest stands were identified in Rachel Carson Conservation Park and are labeled on the Forest Stand Delineation map, including Mixed Oak--Mixed Oak/Chestnut Oak, Tulip Poplar, Tulip Poplar/Mixed Oak, Mixed Deciduous, "Young Successional Forest" (tulip poplar, red maple, eastern red cedar, Virginia pine), and Old Field. A separate designation is made for Mowed Field (0-2 year) areas; these areas don't belong under the forest stand descriptions, but they do comprise 50.6 acres of Rachel Carson Park property and should be considered for reforestation purposes. Forest stand descriptions include stand acreage, structure, retention priority, and comments on the stand's overall condition.

Before the more detailed Forest Stand Narratives are presented, a brief vegetational overview and a few comments about the properties overall vegetational condition are in order. Vegetation in Rachel Carson Conservation Park is a patchwork of high quality maturing forests, young woods and old fields in various stages of succession. As with all other larger M-NCPPC park properties, the entity we now call Rachel Carson Conservation Park is comprised of a number of smaller acreages which had different uses in the near past. While there are several large areas of young, weedy woods which were logged and/or grazed relatively recently, the majority of the park is dominated by high quality maturing, second-growth, mixed-deciduous forest. The M-NCPPC Natural Resources Management Group commissioned the Maryland Natural Heritage Program to perform an ongoing inventory of rare, threatened and endangered plant populations and significant habitats on select park lands of the M-NCPPC in Montgomery county. When the DNR botanists studied Rachel Carson, they found that diverse habitats and populations of five separate "watch list" species occur in this park.

The uplands are dominated by an oak/hickory association, with chestnut, white, red, scarlet and black oak common in the canopy; dbh of dominant trees range from 15-22", with trees measuring 22-35" frequently seen. Red maple, black gum, hickory, and tulip poplar are also common in the canopy.

The understory is diverse and very few alien invasives exist in closed canopy areas; sapling American chestnut, and well developed mountain laurel, blueberry, huckleberry, wild azalea, flowering dogwood, arrowwood, blackhaw, and mapleleaf viburnum are common. Specimen of chinquapin, a DNR watch list species, were noted on the upland slopes.

At points where the canopy is broken (tree loss due to gypsy moth destruction, edge effect surrounding old fields and pastures, etc.), alien invasive growth is obvious. Multiflora rose, Japanese honeysuckle, Vietnamese stilt-grass, bittersweet, bush honeysuckle, tree of heaven, garlic mustard often dominate these areas. The herbaceous layer is often relatively sparse in the upland forests except for these open canopy areas.

The floodplain and lower slopes are dominated by tulip poplar, tulip poplar/mixed oak, and mixed deciduous forests. Tulip poplar usually dominates the canopy with red maple, silver maple, ash, black gum, sycamore, white oak, pin oak, all common. Scattered specimen of the DNR watchlist species, shingle oak, occur throughout the floodplain, along the lower slopes, and on the old field/young forest borders throughout the park. As with the upland forests, the mixed deciduous forests vary in age from young, second growth, weedy forests to the mature forest where dbh ranges from 15 to 22" (with frequent trees in the 24 to 36" dbh range).

The understory in these stands is dominated by spicebush, but many other species are common including musclewood, arrow-wood, maple-leaf viburnum, serviceberry, pawpaw, blackhaw, flowering dogwood, winterberry, and witch hazel.

The herbaceous layer of the tulip poplar, tulip poplar/mixed oak, and mixed deciduous forests is extremely lush, full and diverse; ferns, woodland herbs, wildflowers, and vines blanket the floodplain floor. Green dragon and ellisia, DNR designated "watchlist" species, occur along the Hawlings River floodplain. Several species of orchids, including rattlesnake orchid, crane-fly orchid, showy orchid, small woodland orchid, lady's slipper orchid, large whorled pogonia, putty-root, and lily-leaved twayblade have all been noted. As the DNR botanists point out, the presence of these orchids indicate high quality, relatively undisturbed forest.

Unfortunately, as in the upland forest areas, acres of old field in the early stages of forest succession, abandoned farm lanes, and recently grazed pastures exist where the population of exotic invasives is high. However, even in the areas of high invasive cover, shingle oak specimen were routinely noted, and a scattered population of the watchlist species, rough avens, occurs in the early succession fields west of Zion Road.

Several abandoned farm ponds exist which are filling in with (or encircled by) a good variety of native emergent aquatic vegetation.

Vegetationally speaking, Rachel Carson Conservation Park is one of our richest M-NCPPC park properties. The presence on one contiguous property of high quality mixed-deciduous mesic forest, high quality oak dominated upland forest, lush floodplain forest, old fields in varying successional stages, old ponds with emergent aquatic species, and at least five documented state "watch list" species and multiple orchid species verify this point. The DNR Natural Heritage botanists who are trained to compare/contrast/evaluate properties around the entire state as to botanical importance write "The entire park east of Zion Road should be considered an exceptional natural area for Montgomery county. Measures to assure its protection should be considered immediately." (A Species List is included in the Appendix.)

Stand Narratives:

Stand 1

Approximately 283.0 acres of upland forest in Rachel Carson Conservation Park are dominated by mixed oaks, including Quercus prinus, Q.alba, Q.falcata, Q.velutina, Q.rubra, Q.imbricaria, and Q.coccinea. Though size class does differ somewhat over the 662.5 acre park, the overwhelming majority of dominant trees in Stand 1 fit into the 15 to 25" dbh range. The stand has been further divided into Stand 1A (205.9 acres) or 1B (77.1 acres) due to the presence of a sizable proportion of chestnut oak in an otherwise mixed oak stand. Quercus prinus is found throughout the mixed oak stands of Rachel Carson Conservation Park; Stand 1B designates oak dominated forests where the chestnut oak component is especially high.

Other tree species typically found in Rachel Carson's mixed oak woods include Liriodendron tulipifera, Nyssa sylvatica, Carya tomentosa, C.glabra, Fagus grandifolia, Acer rubrum, Fraxinus americana, Prunus serotina, Pinus virginiana, and Juniperus virginiana. Tree and shrub understory specimen found in Rachel Carson's mixed oak woods include Cornus florida, Amelanchier canadensis, Kalmia latifolia, Vaccinium vacillans, V.corymbosum, V.stamineum, Rhododendron periclymenoides, Viburnum acerifolium, V.prunifolium, V.dentatum, Lindera benzoin, Rosa multiflora, Castanea dentata, C.pumila, and Hamamelis virginiana.

Herbaceous and vining species observed in the mixed oak stands of Rachel Carson include Uvularia sessifolia, U.perfoliata, Claytonia virginica, Dioscoria quaternata, Asarum canadense, Arisaema triphyllum, Podophyllum peltatum, Aralia nudicaulis, Circaea quadrisulcata, Chimaphila maculata, Erythronium americanum, Oxalis violaceae, Lycopodium complanatum, L.lucidulum, Tipularia discolor, Mitchella repens, Smilax rotundifolia, Parthenocissus quinquefolia, Rubus sp., Aster divaricatus, Rhus toxiodendron, Cimicifuga racemosa, Hepatica americana, Sanguinaria canadensis, Epigaea repens, Dentaria laciniata, Viola sp. and Goodyera pubescens. Some fern species noted include Polystichum acrostichoides, Thelypteris noveboracensis, Onoclea sensibilis, Athyrium filix-femina, Dennstaedtia punctilobula.

While the density of the herbaceous coverage varies considerably from the relatively lush areas bordering the tulip poplar dominated stands to the mixed oak/chestnut oak woods where the dominant ground cover is leaf litter and downed branches, the level of exotic invasive coverage remains absolutely minimal throughout the mixed oak stands. Exotic invasives including Lonicera japonica, Celastrus orbiculatus, and Microstegium vimineum generally occur only along trails, paths, and forest edges in Rachel Carson's mixed oak stands.

Though the large majority of the mixed oak acreage in Rachel Carson is of extremely high quality (good structural and species diversity, few exotic invasives, etc.), quite a few acres of oak forest have been effected by gypsy moth damage. One area in the south-central portion of the park has been particularly hard hit; the canopy has been essentially wiped out (designated by cross-hatching on the map). Though it is certainly not a mixed oak forest in reality at this juncture, it's hard to decide what other forest stand designation it should be placed in. Fortunately, most of the gypsy moth damage is not on such a massive

scale; when gypsy moth damage is indicated on the map, it means a number of trees in that location were killed and the canopy is somewhat open, not total devastation.

It's hard to pinpoint the location of the highest quality mixed oak woods in Rachel Carson Conservation Park. In comparison with other M-NCPPC park properties of equal or larger size, Rachel Carson undoubtedly has some of the largest solid blocks of high quality oak forest--sections of 40 to 50 acres each--in the park system. Though the exact species mix does change somewhat due to elevation, proximity to streams, soil composition, etc., over the property (proportion of chestnut oaks, hickory, white oaks in the mix), the general high quality character of the mixed oak woods remains.

Basal area in Stand 1 ranges between 110 and 130 in most of Rachel Carson Park. Deer browse is evident in every oak forest. The marked lack of exotic invasive intrusion in Stand 1 is one of this park's important features.

Stand 1A and 1B have been given priority "1-High" status. In this large stand there are areas with steep slopes and areas within the environmental buffers for floodplains, but even where the land is considered by definition to be buildable, Stand 1 contains many specimen trees and represents contiguous forest that connects the largest undeveloped or most vegetated tracts of land within and adjacent to the site.

Stand 2

Approximately 165.3 acres of Rachel Carson Conservation Park is dominated by Liriodendron tulipifera. The majority of the dominant tulip poplar in Stand 2 range from 16 to 30" dbh, with scattered 30 to 40" specimen. Also observed in Stand 2 were Acer rubrum, Nyssa sylvatica, Platanus occidentalis, Fraxinus pennsylvanica, Fagus grandifolia, Ulmus americana, Juglans nigra, Prunus serotina, and assorted Quercus species, including Quercus alba, Q.rubrum, Q.imbricaria. Lindera benzoin and Cornus florida dominate the tree and shrub understory, with Carpinus caroliniana, Ilex verticillata, Lopaca, Rhododendron periclymenoides, Viburnum prunifolium, V.acerifolium, V.dentatum, Hamamelis virginiana, Kalmia latifolia, Vaccinium vacillans, and V.corymbosum also noted.

The herbaceous level is rich and diverse in Stand 2 of Rachel Carson Conservation Park. Herbaceous and vining species noted include Podophyllum peltatum, Polygonatum biflorum, Smilacena racemosa, Aralia nudicaulis, Cimicifuga racemosa, Uvularia sessifolia, U.perfoliata, Symplocarpus foetidus, Arisaema triphyllum, Rubus hispidus, Rubus sp., Viola papilionacea, Viola spp., Circaea quadrisulcata, Geum virginianum, Dentaria laciniata, Agrimonia parviflora, Oxalis violacea, Thalictrum dioicum, Gallium circaezans, Osmorhiza claytoni, Medeola virginiana, Dioscorea quaternata, Claytonia virginica, Erythronium americanum, Anemone quinquefolia, Anemonella thalictroides, Impatiens capensis, Collinsonia canadensis, Geranium maculatum.

Numerous species of fern, often forming a lush groundcover, were observed including Polystichum acrostichoides, Botrychium virginianum, Athyrium filix-femina, Onoclea sensibilis, Osmunda cinnamomea, Thelypteris noveboracensis, T.hexagonoptera, Adiantum pedatum, Dennstaedtia punctilobula, and Pteridium aquilinum.

As with the mixed oak forests of Stand 1, it is hard to pinpoint where the highest quality tulip

poplar forests are in Rachel Carson. With a few exceptions, Stand 2 basically encompasses the floodplains, stream valleys, and swales of Rachel Carson Park, where dbh of dominant trees is consistently over 20", with many specimen trees. Dominant tulip poplar in buildable areas are 15 to 18" dbh. As with the mixed oak forest in Stand 1, most of the maturing, second growth tulip poplar forests are of high quality, with good structural and species diversity, and far fewer exotic invasives than are commonly found on most M-NCPPC floodplain property. Unfortunately, exotics including Lonicera japonica, Celastrus orbiculatus, Microstegium vimineum, Rosa multiflora, and Alliaria petiolata do appear along the paths and in clearings caused by openings in the canopy of Stand 2.

Basal area ranges between 100 and 130 in Stand 2 forests. Deer damage is obvious throughout Stand 2 forests. The State DNR Natural Heritage "Rare, Threatened and Endangered Species Report" referred to earlier describes how not a single individual of the relatively uncommon Lilium superbum was seen flowering in a population of literally hundreds along the Hawlings River. Every stem had been chewed off at 3 inches above the ground by deer.

Stand 2 has been given the priority of "1-High". A great deal of Stand 2 is associated with 1) intermittent or perennial streams and their buffers, 2) nontidal wetlands/seeps, 3) steep slopes, and/or 4) specimen trees. Even the technically buildable areas of Stand 2 represent contiguous forest that connects the largest undeveloped or most vegetated tracts of land within and adjacent to the site.

Stand 3

Stand 3 is dominated equally by mixed Quercus species and Liriodendron tulipifera. Approximately 33.3 acres of Rachel Carson Conservation Park has been given this designation; in these areas both dominant oaks and tulip poplars are in the 15 to 20" dbh range, with scattered 30" specimen. Other canopy trees observed include Acer rubrum, Nyssa sylvatica, Carya tomentosa, C. glabra, Pinus virginiana, Prunus serotina. Understory trees and shrubs include Carpinus caroliniana, Lindera benzoin, Cornus florida, Kalmia latifolia, Viburnum dentatum, V. acerifolium, V. prunifolium, Rhododendron periclymenoides, Vaccinium vacillans, V. corymbosum, Hamamelis virginiana, Ilex opaca, and I. verticillata.

As in Stand 1 and 2 in Rachel Carson Park, the herbaceous level shows great species diversity in Stand 3. Some of the many herbaceous and vining species noted include Mitchella repens, Smilax rotundifolia, Osmorhiza claytoni, Polystichum acrostichoides, Podophyllum peltatum, Smilacina racemosa, Arisaema triphyllum, Geum virginianum, Thelypteris noveboracensis, Uvularia sessifolia, and U. perfoliatum.

Stand 3 acreage often occurs in the "transition area band" between the oak dominated uplands and the tulip poplar dominated floodplains. Basal area ranged from 110 to 130. As with Stand 1 and 2, the amount of exotic invasive coverage was again much lower than in most of our M-NCPPC park properties. Unfortunately, deer browse was also evident throughout the stand, and there was spotty evidence of gypsy moth damage.

Stand 3 is given the priority rating of 1-High; as with Stands 1 and 2, it contains specimen trees,

has some areas associated with perennial streams and their buffers, and represents contiguous forest connecting vegetated tracts of land.

Stand 4

Stand 4 is designated "Mixed Deciduous" forest. Only a small percentage of Rachel Carson Conservation Park compared with Stand 1 and 2 (approximately 11.0 acres), has been placed in this category. These are rather disturbed areas near mowed fields or old fields with tangled, shrubby, congested undergrowth and no clear tree species dominant. This mixed deciduous forest has trees basically ranging from 4 to 12" dbh. Tree species observed include Juglans nigra, Robinia pseudoacacia, Acer rubrum, Liriodendron tulipifera, Quercus alba, Q. rubra, Q. imbricaria, Platanus occidentalis, Prunus serotina, Nyssa sylvatica. The only clear dominant among tree or shrub species is Lindera benzoin, which fills the understory along with Rosa multiflora and Rhus radicans.

Herbaceous and vining species are thick in Stand 5, including Circaea quadrisulcata, Rubus spp., Viola spp., Osmorhiza claytoni, Collinsonia canadensis, Gallium aparine, Geum virginianum, Impatiens capensis. Invasives such as Lonicera japonica, Alliaria petiolata, Celastrus orbiculatus, Glechoma hederacea, Microstegium vimineum are in evidence, and as with Stand 1, 2, and 3, deer browse was observed. Basal area ranges from 90 to 100 in Stand 4.

Though the forest quality is not as high in Stand 4 as in Stand 1, 2, or 3, it is given a priority of "1 - high" due to the fact that the great majority of acreage lies within the hydraulically adjacent steep slope buffer.

Stand 5

Approximately 55.0 acres of Rachel Carson Conservation Park are designated as Stand 5, "young forest"; these areas of somewhat weedy forest range in age from about 10 to 25 years. Though the exact composition of these woods varies somewhat from one location to another, Liriodendron tulipifera, Acer rubrum, Pinus virginiana, and Juniperus virginiana are the four dominant species throughout. Commonly observed additional trees include Prunus serotina, P. avium, Quercus species, Robinia pseudoacacia, and Platanus occidentalis. Dbh readings of dominant trees range from 3 to 10 inches with scattered larger trees, especially along old fence lines (a 51" dbh white oak was measured along one such former property boundary).

Understories in these young forests are usually overrun with shrubs and vines including Lindera benzoin, Rhus radicans, Smilax rotundifolia, Viburnum dentatum, V. prunifolium, V. acerifolium, and often exotic invasives, including Rosa multiflora, Lonicera japonica, L. morrowi, L. tatarica, and Celastrus orbiculatus. The herbaceous level varies from section to section in Stand 6 as well, with observed species including Podophyllum peltatum, Arisaema triphyllum, Solidago spp., Parthenocissus quinquefolia, Gallium aparine, Asplenium platyneuron, Aster divaricatus, Glechoma hederacea, Achillea millefolium, Agrimonia parviflora, Duchesnea indica.

Pinus virginiana was especially obvious in one section of the Stand 5 acreage. Though dying out

now, the Virginia pine ranged from 8 to 15" dbh and until recently had been the dominant tree. This area within Stand 5 in the north-central section of Rachel Carson has been crosshatched on the accompanying FSD map.

Assigning a priority rating to Stand 5 is not as straight forward a matter as it is for Stand 1, 2, or 3. For areas within the environmental buffer, the rating of "1 - high" is automatically given. In other areas, the rating of "3 - low" might be assigned because the woods are young and have poor structural diversity with many exotics present. However, the rating of "2 - moderate" is given because the forests do represent a portion of wooded property within a large contiguous forest, and if preserved and allowed to grow, will develop into a higher quality forest in time.

Stand 6

Approximately 61.4 acres of Old Field exist in Rachel Carson Conservation Park and are designated as Stand 6. The trees and shrubs covering these acres range in age from 2 to 10 years. Though much of the area designated "Old Field" can in no way be considered typical "forest", it is important to describe these portions of Rachel Carson in giving an overall vegetational map of the park. Dbh ranges from 1 - 5", with scattered larger trees along fence rows. Tree and shrub species commonly observed include Liriodendron tulipifera, Acer rubrum, Juniperus virginiana, Pinus virginiana, Cornus florida, Nyssa sylvatica, Robinia pseudoacacia, Quercus species including Q.alba, Q.rubra, Q.imbricaria, Q.falcata, Prunus serotina, Elaeagnus angustifolia, Viburnum dentatum, V.prunifolium, Sassafras albidum, Rhus typhina, R.radicans and R.copallina. Unfortunately, exotic invasive species are very obvious in Stand 6; as exemplified in sections close to Zion Rd., the native species are often surrounded and/or overrun by mounds of Rosa multiflora, Lonicera japonica, bush Lonicera species, and Celastrus orbiculatus.

Herbaceous species typically observed in Stand 6 include Agrimonia parviflora, Asplenium platyneuron, Daucus carota, Solidago graminifolia, Solidago spp., Clematis virginiana, Aster spp., Smilax rotundifolia, Verbascum thapsus, Parthenocissus quinquefolia, Gnaphalium obtusifolium, Dianthus armeria, Eupatorium coelestinum, Cirsium sp., and Achillea millefolium.

Assigning a priority rating for Stand 6 is again a somewhat difficult matter. Areas within environmental buffers automatically receive a rating of "1-high". The technically buildable areas are not sections of high forest quality and therefore receive a priority of "3 - low". However, the point must be made that these are still areas within the property boundaries of a "Conservation Park", and if the old fields are allowed to develop over time, will fill in with a higher quality woods, and provide a wooded buffer to the priority I woods which already exist.

Rachel Carson Conservation Park -- Species List

Species	Common name	Type
<i>Acer negundo</i>	boxelder	w
<i>Acer rubrum</i>	red maple	w
<i>Ailanthus altissima</i>	tree of heaven	w
<i>Alnus serrulata</i>	alder	w
<i>Amelanchier canadensis</i>	shadbush	w
<i>Berberis Thunbergii</i>	Japanese barberry	w
<i>Carpinus caroliniana</i>	muscle wood	w
<i>Carya glabra</i>	pignut hickory	w
<i>Carya tomentosa</i>	mockernut hickory	w
<i>Castanea dentata</i>	American chestnut	w
<i>Castanea pumila</i>	chinquapin	w
<i>Celastrus orbiculatus</i>	bittersweet	w
<i>Cephalanthus occidentalis</i>	buttonbush	w
<i>Chimaphila maculata</i>	spotted wintergreen	w
<i>Clematis virginiana</i>	virgin's bower	w
<i>Cornus florida</i>	dogwood	w
<i>Corylus americana</i>	hazelnut	w
<i>Elaeagnus angustifolia</i>	Russian olive	w
<i>Gaylussacia sp.</i>	huckleberry	w
<i>Hamamelis virginiana</i>	witch-hazel	w
<i>Ilex verticillata</i>	winterberry holly	w
<i>Juglans nigra</i>	black walnut	w
<i>Juniperus virginiana</i>	eastern red cedar	w
<i>Kalmia latifolia</i>	mountain laurel	w
<i>Lindera benzoin</i>	spicebush	w
<i>Liriodendron tulipifera</i>	tulip poplar	w
<i>Lonicera japonica</i>	Japanese honeysuckle	w
<i>Lonicera tartarica</i>	bush honeysuckle	w
<i>Lycopodium flabelliforme</i>	ground cedar	w
<i>Nyssa sylvatica</i>	black gum	w
<i>Parthenocissus quinquefolia</i>	virginia creeper	w
<i>Pinus virginiana</i>	Virginia pine	w
<i>Platanus occidentalis</i>	sycamore	w
<i>Prunus serotina</i>	black cherry	w
<i>Quercus alba</i>	white oak	w
<i>Quercus falcata</i>	southern red oak	w
<i>Quercus imbricaria</i>	shingle oak	w
<i>Quercus prinus</i>	chestnut oak	w
<i>Quercus rubra</i>	red oak	w

<i>Quercus stellata</i>	post oak	w
<i>Quercus velutina</i>	black oak	w
<i>Rhododendron periclymenoides</i>	wild azalea	w
<i>Rhus radicans</i>	poison ivy	w
<i>Rhus typhina</i>	staghorn sumac	w
<i>Robinia pseudo-acacia</i>	black locust	w
<i>Rosa multiflora</i>	multiflora rose	w
<i>Rubus allegheniensis</i>	blackberry	w
<i>Rubus</i> spp.	blackberry	w
<i>Salix nigra</i>	black willow	w
<i>Sassafras albidum</i>	sassafras	w
<i>Smilax rotundifolia</i>	greenbriar	w
<i>Spiraea</i> sp.	spirea	w
<i>Vaccinium stamineum</i>	deerberry	w
<i>Vaccinium vacillans</i>	lowbush blueberry	w
<i>Viburnum acerifolium</i>	mapleleaf viburnum	w
<i>Viburnum dentatum</i>	arrowwood viburnum	w
<i>Viburnum prunifolium</i>	blackhaw viburnum	w
<i>Vitis</i> spp.	wild grape	w
<i>Achillea millefolium</i>	yarrow	h
<i>Agrimonia parviflora</i>	many flowered agrimony	h
<i>Ambrosia artemisiifolia</i>	ragweed	h
<i>Ambrosia trifida</i>	ragweed	h
<i>Amphicarpa bracteata</i>	hog peanut	h
<i>Andropogon virginicus</i>	broomsedge	h
<i>Anemonella thalictroides</i>	windflower	h
<i>Anthoxanthum odoratum</i>	sweet vernal grass	h
<i>Apocynum cannabinum</i>	Indian hemp	h
<i>Arisaema dracontium</i>	green dragon	h
<i>Arisaema triphyllum</i>	jack in the pulpit	h
<i>Asclepias incarnata</i>	swamp milkweed	h
<i>Asclepias syriaca</i>	milkweed	h
<i>Asplenium platyneuron</i>	ebony spleenwort	h
<i>Aster</i> spp.	aster	h
<i>Aster divaricatus</i>	white wood aster	h
<i>Aster ericoides</i>	dense-flowered aster	h
<i>Botrychium virginianum</i>	rattlesnake fern	h
<i>Carex</i> spp.	sedges	h
<i>Chrysanthemum leucanthemum</i>	daisy	h
<i>Cimicifuga racemosa</i>	black snakeroot	h
<i>Circaea quadrisulcata</i>	enchanters nightshade	h
<i>Cirsium arvense</i>	canada thistle	h

<i>Collinsonia canadensis</i>	horse balm, richweed	h
<i>Cryptotaenia canadensis</i>	honewort	h
<i>Daucus carota</i>	queen anne's lace	h
<i>Desmodium nudiflorum</i>	naked flowered tick trefoil	h
<i>Dianthus armeria</i>	deptford pink	h
<i>Dichanthelium clandestinum</i>	deer tongue grass	h
<i>Dioscoria quaternata</i>	wild yam	h
<i>Duchesnea indicta</i>	Indian strawberry	h
<i>Elephantopus carolinianus</i>	elephant's-foot	h
<i>Ellisia nyctelea</i>	ellisia	h
<i>Erigeron annuus</i>	daisy fleabane	h
<i>Eupatorium coelestinum</i>	mist flower	h
<i>Eupatorium maculatum</i>	joe-pye weed	h
<i>Eupatorium purpureum</i>	joe-pye weed	h
<i>Euthamia graminifolia</i>	grass leaved goldenrod	h
<i>Galearis spectabilis</i>	showy orchid	h
<i>Galium aparine</i>	bedstraw	h
<i>Gallium circaezans</i>	wild licorice	h
<i>Gallium sp.</i>	bedstraw	h
<i>Geranium maculatum</i>	wild geranium	h
<i>Geum canadense</i>	white avens	h
<i>Geum laciniatum</i>	rough avens	h
<i>Glechoma hederaceae</i>	ground ivy	h
<i>Goodyera pubescens</i>	rattlesnake orchid	h
<i>Hepatica americana</i>	hepatica	h
<i>Houstonia purpurea</i>	large houstonia	h
<i>Hypericum perforatum</i>	St. John's wort	h
<i>Impatiens capensis</i>	jewelweed	h
<i>Isotria verticillata</i>	whorled pogonia	h
<i>Juncus effusus</i>	soft rush	h
<i>Leersia virginica</i>	white grass	h
<i>Lespedeza cuneata</i>	bush clover	h
<i>Lilium superbum</i>	turks-cap lily	h
<i>Liparis lilifolia</i>	lily-leaved tway blade	h
<i>Ludwigia alternifolia</i>	seedbox	h
<i>Lycopus virginicus</i>	bugleweed	h
<i>Lysimachia quadrifolia</i>	whorled loosestrife	h
<i>Medeola virginiana</i>	Indian cucumber	h
<i>Microstegium vimineum</i>	Vietnamese stilt grass	h
<i>Muhlenbergia schreberi</i>	nimblewill	h
<i>Nuphar advena</i>	spatterdock	h
<i>Osmunda cinnamomea</i>	cinnamon fern	h

<i>Osmunda claytoniana</i>	interrupted fern	h
<i>Oxalis corniculata</i>	wood sorrel	h
<i>Oxalis violacea</i>	violet wood sorrel	h
<i>Platanthera clavellata</i>	small woodland orchid	h
<i>Podophyllum peltatum</i>	mayapple	h
<i>Polygonatum biflorum</i>	solomon's seal	h
<i>Polygonum arifolium</i>	halberd leaved tearthumb	h
<i>Polygonum cespitosum</i>	smartweed	h
<i>Polygonum perfoliatum</i>	devils tear thumb	h
<i>Polygonum persicaria</i>	lady's thumb	h
<i>Polygonum sagittatum</i>	arrow-leaved tearthumb	h
<i>Polygonum spp.</i>	knotweed	h
<i>Polystichum acrostichoides</i>	christmas fern	h
<i>Prunella vulgaris</i>	self heal	h
<i>Pycnanthemum sp.</i>	mountain mint	h
<i>Rumex acetosella</i>	sheep sorrel	h
<i>Sagittaria latifolia</i>	duck potato	h
<i>Sanguinaria canadensis</i>	bloodroot	h
<i>Scutellaria lateriflora</i>	mad-dog skullcap	h
<i>Senecio aureus</i>	golden ragwort	h
<i>Smilacina racemosa</i>	false solomon's seal	h
<i>Solanum nigrum</i>	black nightshade	h
<i>Solidago canadensis</i>	goldenrod	h
<i>Solidago juncea</i>	goldenrod	h
<i>Solidago spp.</i>	goldenrod	h
<i>Stellaria media</i>	common chickweed	h
<i>Stellaria pubera</i>	great chickweed	h
<i>Symplocarpus foetidus</i>	skunk cabbage	h
<i>Thalictrum dioicum</i>	early meadow rue	h
<i>Thelypteris hexagonoptera</i>	broad beech fern	h
<i>Thelypteris noveboracensis</i>	New York fern	h
<i>Tipularia discolor</i>	cranefly orchid	h
<i>Tovara virginiana</i>	jumpseed	h
<i>Trifolium agrarium</i>	yellow hop clover	h
<i>Triodia flava</i>	tall red top	h
<i>Typha latifolia</i>	broad leaved cat-tail	h
<i>Uvularia perfoliata</i>	perfoliated bellwort	h
<i>Uvularia sessifolia</i>	sessile leaved bellwort	h
<i>Verbascum blattaria</i>	moth mullein	h
<i>Verbascum thapsus</i>	mullein	h
<i>Verbena hastata</i>	blue vervain	h
<i>Vernonia noveboracensis</i>	New York ironweed	h
<i>Viola spp.</i>	violets	h

<i>Osmunda claytoniana</i>	interrupted fern	h
<i>Oxalis corniculata</i>	wood sorrel	h
<i>Oxalis violacea</i>	violet wood sorrel	h
<i>Platanthera clavellata</i>	small woodland orchid	h
<i>Podophyllum peltatum</i>	mayapple	h
<i>Polygonatum biflorum</i>	solomon's seal	h
<i>Polygonum arifolium</i>	halberd leaved tearthumb	h
<i>Polygonum cespitosum</i>	smartweed	h
<i>Polygonum perfoliatum</i>	devils tear thumb	h
<i>Polygonum persicaria</i>	lady's thumb	h
<i>Polygonum sagittatum</i>	arrow-leaved tearthumb	h
<i>Polygonum</i> spp.	knotweed	h
<i>Polystichum acrostichoides</i>	christmas fern	h
<i>Prunella vulgaris</i>	self heal	h
<i>Pycnanthemum</i> sp.	mountain mint	h
<i>Rumex acetosella</i>	sheep sorrel	h
<i>Sagittaria latifolia</i>	duck potato	h
<i>Sanguinaria canadensis</i>	bloodroot	h
<i>Scutellaria lateriflora</i>	mad-dog skullcap	h
<i>Senico aureus</i>	golden ragwort	h
<i>Smilacina racemosa</i>	false solomon's seal	h
<i>Solanum nigrum</i>	black nightshade	h
<i>Solidago canadensis</i>	goldenrod	h
<i>Solidago juncea</i>	goldenrod	h
<i>Solidago</i> spp.	goldenrod	h
<i>Stellaria media</i>	common chickweed	h
<i>Stellaria pubera</i>	great chickweed	h
<i>Symplocarpus foetidus</i>	skunk cabbage	h
<i>Thalictrum dioicum</i>	early meadow rue	h
<i>Thelypteris hexagonoptera</i>	broad beech fern	h
<i>Thelypteris noveboracensis</i>	New York fern	h
<i>Tipularia discolor</i>	cranefly orchid	h
<i>Tovara virginiana</i>	jumpseed	h
<i>Trifolium agrarium</i>	yellow hop clover	h
<i>Triodia flava</i>	tall red top	h
<i>Typha latifolia</i>	broad leaved cat-tail	h
<i>Uvularia perfoliata</i>	perfoliated bellwort	h
<i>Uvularia sessifolia</i>	sessile leaved bellwort	h
<i>Verbascum blattaria</i>	moth mullein	h
<i>Verbascum thapsus</i>	mullein	h
<i>Verbena hastata</i>	blue vervain	h
<i>Vernonia noveboracensis</i>	New York ironweed	h
<i>Viola</i> spp.	violets	h

Due to a diversity of habitats Rachel Carson Conservation Park (RCCP) is home to an impressive diversity of terrestrial wildlife species including at least 24 species of mammals, 12 amphibians, 12 reptiles, 72 birds. Most of the species listed below have been recorded by NRMS staff through sightings, tracks, calls and trapping efforts. Species marked with an asterisk (*) have not been recorded but the presence of appropriate habitat and their occurrence in other areas close by, make their presence here likely.

Mammals

1. Virginia opossum - *Didelphis virginiana*
2. Masked shrew - *Sorex cinereus**
3. Northern short-tailed shrew - *Blarina brevicauda*
4. Eastern mole - *Scalopus aquaticus*
5. Little brown myotis - *Myotis lucifugus**
6. Red bat - *Lasiurus borealis**
7. Eastern cottontail - *Sylvilagus floridanus*
8. Eastern chipmunk - *Tamias striatus*
9. Woodchuck (groundhog) - *Marmota monax*
10. Gray squirrel - *Sciurus carolinensis*
11. Southern flying squirrel - *Glaucomys volans*
12. Beaver - *Castor canadensis*
13. White-footed mouse - *Peromyscus leucopus*
14. Meadow vole - *Microtus pennsylvanicus*
15. Pine vole - *M. pinetorum**
16. Muskrat - *Ondatra zibethicus*
17. Meadow jumping mouse - *Zapus hudsonius*
18. Red fox - *Vulpes vulpes*
19. Gray fox - *Urocyon cinereoargenteus*
20. Raccoon - *Procyon lotor*
21. Mink - *Mustela vison*
22. Striped skunk - *Mephitis mephitis**
23. River otter - *Lutra canadensis*
24. White-tailed deer - *Odocoileus virginianus*

Amphibians

1. Spotted salamander - *Ambystoma maculatum*
2. Northern dusky salamander - *Desmognathus fuscus*
3. Two-lined salamander - *Eurycea bislineata*
4. Red-backed salamander - *Plethodon cinereus*
5. American toad - *Bufo americanus*
6. Spring peeper - *Hyla crucifer*
7. Gray tree frog - *Hyla versicolor*
8. Upland chorus frog - *Pseudacris triseriata**
9. Bull frog - *Rana catesbeiana*
10. Green frog - *Rana clamitans*
11. Pickerel frog - *Rana palustris*
12. Wood frog - *Rana sylvatica*

Reptiles

1. Snapping turtle - *Chelydra serpentina**
2. Painted turtle - *Chrysemys picta**
3. Eastern box turtle - *Terrapene carolina*
4. Worm snake - *Carphophis amoenus**
5. Black racer - *Coluber constrictor**
6. Ringneck snake - *Diadophis punctatus**
7. Black rat snake - *Elaphe obsoleta*
8. Eastern kingsnake - *Lampropeltis getulus**
9. Northern water snake - *Nerodia sipedon*
10. Brown (Dekay) snake - *Storeria dekayi**
11. Eastern garden snake - *Thamnophis sirtalis*
12. Copperhead - *Agkistrodon contortrix**

Breeding bird species, Rachel Carson Conservation Park
 Completed by Rob Gibbs, Natural Resources Management Section
 August, 1996

Six site visits were conducted between 6-9-96 and 8-13-96 specifically to collect data on breeding birds. Observations of birds were also recorded on other field visits both earlier and later in 1996. Methods are adapted from the Maryland & DC Breeding Bird Atlas Project (1983-1987) Handbook.

Species	Habitats			
	Upland Forest	Floodplain Forest	Scrub	Pond/ Emergent Wetland
1 Canada Goose				X
2 Wood Duck		X		
3 Turkey Vulture		X		
4 Black Vulture	C			
5 Red-tailed Hawk	P			
6 Mourning Dove			P	
7 Yellow-billed Cuckoo	P			
8 Eastern Screech Owl		X		
9 Great Horned Owl	X			
10 Barred Owl*		X		
11 Chimney Swift		O		
12 Ruby-throated Hummingbird		P		
13 Belted Kingfisher				X
14 Northern Flicker	X	X		
15 Pileated Woodpecker*	X	X		
16 Redbellied Woodpecker		P		
17 Downey Woodpecker		P		
18 Eastern Kingbird			P	
19 Great Crested Flycatcher	C			
20 Eastern Phoebe			C	
21 Eastern Wood-Pewee		P		
22 Barn Swallow			O	
23 Blue Jay	X			
24 Common Crow	X		X	
25 Fish Crow		O		
26 Carolina Chickadee		P		
27 Tufted Titmouse		C		
28 White-breasted Nuthatch*		C		
29 Carolina Wren			C	
30 Mockingbird			X	
31 Gray Catbird			C	
32 Brown Thrasher			P	
33 American Robin		C		

Appendix E

SUMMARY OF INFORMATION REVIEWED FROM THE QUESTIONNAIRES GIVEN TO THE ATTENDEES OF THE PUBLIC FORUM 6/18/96 CONCERNING THE MASTERPLANNING OF RACHEL CARSON CONSERVATION CONSERVATION PARK

FOCUS: TRAIL USERS IN RCCP

NUMBER OF QUESTIONNAIRES RECEIVED---37 (total # of attendees about the same

PLEASE NOTE :this was not a scientific survey; however certain trends are self-evident

- 1) Number of times user in Park
 - 11---less than once a month
 - 11---2-6 days a week
 - 3---once or twice a month
 - 3---daily
 - 3---never
 - 2---2-4 times a month
 - 1---once a week
 - 1---no ans., 1---used to visit
- 2) Time of year using
 - 26---year round !
 - 2---spring
 - 2---all seasons except summer
 - 2---no ans.
- 3) Type of activity
 - 24---horseback riding
 - 19---hiking
 - 7---birding
 - 1---fishing
 - 1---"other"
 - Many had more than one activity----
 - of those that answered more than one choice----

 - Hikers---2 said it was their first choice, 2 their second, and 1 said hiking was third choice
 - Horseback riders, 3 said it was first choice, 2 said riding second
 - Birding was nobody's first choice of activity
- 4) Mode of transportation used to access park
 - Horse 22
 - foot 15
 - car 5
 - bike 1
- 5) Where do you access Park
 - 18 from road--17 from backyard

6) Hours spent in Park

19---1-2 hours
8---3-5 hours
4---varies from 1-5
2---less than 1 hour

7) Purpose of visit

15---to travel a certain trail
12---to visit a certain spot
11---to cover a certain distance
7---to go for a certain length of time
3---meet friends

Other purposes listed---law enforcement---enjoy peace,
solitude, explore, peace and quiet, look at wildlife

8) Do you continue trail outside RCCP

14---never
14---sometime
5---always
2---no ans.

9) Do you ride outside the Park (not a clear question)

19---yes
4---no ans.

Where? Patapsco, HawlingsRiver, Tridelphia, private
lands, Schooley Mill Pk. (cross to HoCo), C and O
Canal, Rock Creek, Wheaton, Potomav, Up-County,
other Md. and Va. trails, Patuxent (Howard Chapel
to Rte. 97)

10) Do you see others in Pk?

27---seldom
4---often
2---never
of those that observed others---all were seen on weekends
(early A.M., early P.M., and 1-6 P.M.)

11) What's important to your trail experience?

29---see wildlife (most desirable)
27---relaxation
21---solitude
18---exercize
14---trail condition
10---be with friends
13---weather
7---training

4---challenge yourself
note the importance of solitude and relative unimportance of
trail condition

- 12) What you like best about Park
quiet, solitude, beauty, river, wildlife, undeveloped, varied
scenery, large trail system, number of stream crossings
no trash, Blick rock, close to home mentioned often

What you like less

not well developed for field trips, no access, needs
better surfacing, boggy, develop cautiously, maintain
natural
look

- 13) included in # 12

- 14) What needs improvement

restrict where horses may go---horses spoil trails for
hikers---separate trails for users---wider trails---
more stable stream crossings---drier trails--leave log
"JUMPS"---JUMPING TRAIL---ACCESS/TRAILER PARKING---POND NEEDS
MOWing--mark trails---maps---limit horse trails

- 15) Other household members use Park?

43 other household members!

- 16) How close you live to Park

16---adjacent
6---10 miles
5---1-5 miles
4---within 1/4 mile
2---5-10 mi.

- 17) Age
17--- age 25-46
13--- " 45-59
1-----15-24

- 18) gender
24---female
11---male

- 19) Belong to HOA or Trail User Group
11---yes mostly TROT, Goshen Hunt, Park Police Friends Group
hiker-nature study group, Sundown Hills HOA and Unity-
Sunshine Assoc.

- ~~20~~ 20---no

Appendix F
Aquatic survey data

STATION: HWHW307
 LOCATION: Hawlings River mainstem just downstream of Zion Road
 DATE: 08/04/97

POPULATION ESTIMATES (% by site)

Species	Population estimate	% of total	SE	Trophic Guild	Tolerance Level
Northern hog sucker	5	1.3%	N/A	Insectivore	Intolerant
White sucker	80	21.5%	2.2	Omnivore	Tolerant
Central stoneroller	12	3.2%	4.2	Herbivore	Intermediate
Cutlips minnow	13	3.5%	1.1	Omnivore	Intermediate
Longnose dace	17	4.6%	0.7	Insectivore	Intolerant
Blacknose dace	66	17.7%	2.2	Generalist	Tolerant
Fallfish	17	4.6%	0.5	Generalist	Intermediate
Creek chub	6	1.6%	0.4	Generalist	Tolerant
Rosyside dace	109	29.3%	2.7	Insectivore	Intermediate
Golden shiner	1	0.3%	N/A	Omnivore	Tolerant
Common shiner	9	2.4%	1.2	Insectivore	Intermediate
Green sunfish	8	2.2%	N/A	Invertivore	Tolerant
Bluegill	14	3.8%	3.8	Insectivore	Tolerant
Pumpkinseed	3	0.8%	N/A	Invertivore	Tolerant
Tessellated darter	12	3.2%	0.9	Insectivore	Tolerant
Estimate totals	372	100%			

TROPHIC GUILD STRUCTURE

Insectivores	44.6%
Omnivores	25.3%
Generalists	23.9%
Invertivores	3.0%
<u>Herbivores</u>	<u>3.2%</u>
Total	100.0%

TOLERANCE LEVEL

Tolerant	51.1%
Intermediate	43.0%
<u>Intolerant</u>	<u>5.9%</u>
Total	100.0%

INDEX OF BIOLOGICAL INTEGRITY, FISH
 3rd and 4th ORDER STREAMS, SILT LOAM
 HWHW307, 08/04/97

METRIC	RESULTS	IBI SCORE
1. Total number of fish species	15	5
2. Number of riffle/run benthic insectivorous individuals	29	1
3. Number of minnow species (Cyprinidae)	9	5
4. Number of intolerant species	2	5
5. Proportion of tolerant individuals	51.1%	3
6. Proportion of individuals as omnivores/generalists	49.2%	3
7. Proportion of individuals as insectivores	44.6%	3
8. Proportion of individuals as pioneering species	24.7%	5
9. Total number of individuals (excluding tolerant)	182	3
10. Proportion with disease/anomalies	3.6%	5
TOTAL IBI SCORE		38
		GOOD

STATION: HWHW309

LOCATION: Hawlings River mainstem just upstream of Georgia Avenue

DATE: 07/26/96

POPULATION ESTIMATES (% by site)

Species	Population estimate	% of total	SE	Trophic Guild	Tolerance Level
Margined madtom	2	0.4%	1.9	Insectivore	Intermediate
Northern hog sucker	8	1.7%	0.3	Insectivore	Intolerant
White sucker	72	15.7%	6.5	Omnivore	Tolerant
Central stoneroller	8	1.7%	0.5	Herbivore	Intermediate
Cutlips minnow	8	1.7%	0.8	Omnivore	Intermediate
Longnose dace	24	5.2%	5.3	Insectivore	Intolerant
Blacknose dace	74	16.1%	10.9	Generalist	Tolerant
Fallfish	23	5.0%	1.0	Generalist	Intermediate
Creek chub	20	4.4%	1.9	Generalist	Tolerant
Rosyside dace	151	32.9%	13.3	Insectivore	Intermediate
Common shiner	23	5.0%	N/A	Insectivore	Intermediate
Green sunfish	7	1.5%	N/A	Invertivore	Tolerant
Bluegill	17	3.7%	2.2	Insectivore	Tolerant
Shield darter	1	0.2%	N/A	Insectivore	Intermediate
Tessellated darter	21	4.6%	3.1	Insectivore	Tolerant
Estimate totals	459	100%			

TROPHIC GUILD STRUCTURE

Insectivores	53.8%
Omnivores	17.4%
Generalists	25.5%
Invertivores	1.5%
Herbivores	1.7%
Total	100.0%

TOLERANCE LEVEL

Tolerant	46.0%
Intermediate	47.1%
<u>Intolerant</u>	<u>7.0%</u>
Total	100.0%

INDEX OF BIOLOGICAL INTEGRITY, FISH
 3rd and 4th ORDER STREAMS, SILT LOAM
 HWHW309, 07/26/96

METRIC	RESULTS	IBI SCORE
1. Total number of fish species	15	5
2. Number of riffle/run benthic insectivorous individuals	46	3
3. Number of minnow species (Cyprinidae)	8	5
4. Number of intolerant species	2	5
5. Proportion of tolerant individuals	46.0%	3
6. Proportion of individuals as omnivores/generalists	42.9%	3
7. Proportion of individuals as insectivores	53.8%	5
8. Proportion of individuals as pioneering species	26.6%	5
9. Total number of individuals (excluding tolerant)	248	3
10. Proportion with disease/anomalies	8.5%	3
TOTAL IBI SCORE		40
		GOOD