

Natural Resources of Eastern Montgomery County

Geology, Soils and Topography

Eastern Montgomery County lies within the geologic provinces of the Piedmont and the Coastal Plain. Subsurface conditions in these two provinces support a wide range of natural features and are generally conducive to development. The most dramatic geologic feature of the area is the fall line, occurring at the provinces' boundary, which roughly parallels US 29, Columbia Pike/Colesville Road. Water flowing from the more resistant, metamorphic rock of the Piedmont into the erodible sedimentary rock and unconsolidated deposits of the Coastal Plain has created steep, rocky gorges with rapids and waterfalls. While this area is highly scenic, bike paths, sewers and road crossings are difficult to locate and construct because of the steep topography.

The topography of eastern Montgomery County is generally characterized as rolling hills with steeper slopes found along streams. Most of eastern Montgomery County has slopes of 15 percent or less.

The steepest slopes are found in the Northwest Branch stream valley, around the fall line of the Northwest, Paint and Little Paint branches, and along the streams flowing into the Patuxent River system. The average elevation for the eastern part of the County is between 200 and 400 feet above sea level to the south and between 400 and 600 feet above sea level in the northern portions.

Generally, soils in eastern Montgomery County are deep and have few limitations for development. This compares favorably with the rest of Montgomery County, where 40 percent of the soil has development constraints due to one or more of the following factors: a high groundwater table; shallow bedrock which is less than three feet below the surface, or excessive slopes. Soils most favorable for development in eastern Montgomery County are located in the southernmost areas near the District of Columbia and intensive development has, in fact occurred in White Oak, Four Corners and southern portions of Fairland.

Conditions in The Piedmont

Most of eastern Montgomery County lies within the Piedmont province. The subsurface geological formations found in this part of the province are generally resistant metamorphic rocks of gneiss and granite interspersed with mica schist. A metamorphic rock is one whose original mineralogy, texture or composition has been altered due to pressure or temperature. This process is often associated with the formation of mountain ranges; hence, metamorphic rocks are typically found in upland areas (on a regional scale). Soils are composed of mainly micaceous schist and tend to be deep, well drained and moderately sloping. Average depth to bedrock is 20 to 50 feet.

Conditions in The Coastal Plain

A small portion of the planning area along the Prince George's County border is within the Coastal Plain province. The Coastal Plain geology, which is a part of the Patuxent Formation, consists of unconsolidated sedimentary rock with interbedded gravel, sand and clay. A sedimentary rock is made up of particles transported by wind, water or ice to the site of deposition or by chemical precipitation at the deposition site. These rock types are usually found along existing or ancient riverine systems and coast lines, where wave action has caused erosion of the rock to form sand, pebbles and boulders. Soils here tend to be moderately well drained to well drained, gently sloping, and have a sandy and gravelly texture. The gravel and sand deposits in the Coastal Plain portion of eastern Montgomery County have historically been extracted for their mineral value. In the Coastal Plain the limitations on development are fewer than in the Piedmont, since the alluvial-type soils are much easier to work with. Depth to bedrock can be as much as 350 feet.

Ground Water Resources

The feasibility and productivity of wells is vastly different in the Piedmont and Coastal Plain areas due to the underlying geology. The rocky substrate of the Piedmont holds potable groundwater at deep levels (120-150 feet) but groundwater yields west of the fall line may be limited by low transmissivity. Groundwater typically lies near the surface of sandy Coastal Plain soils; generally, water supplies are plentiful in the Patuxent Formation. Currently, private wells provide less

than 10 percent of the area's drinking water and this is not expected to increase, given the expansion of the public water supply system. Community water service is either provided or proposed for most of the area, with the exception of the Patuxent watershed, where most of the potable water is obtained from wells.

Groundwater resources are very important to the health of stream ecosystems. Most of the eastern Montgomery County streams are fed by springs and seeps, especially in the headwaters (Chesapeake Environmental Management, Inc., 1996). Rainfall percolates through the soil to replenish or recharge the groundwater table, which is gradually released, feeding the base flow of the streams. The base flow is that water which makes up the majority of stream flow between rainfall events. Without this consistent source of water, streams would dry between storms, making it impossible to sustain most stream life. The amount of consistently cold, clear water is key to the quality of the stream system.

Forests and Vegetation

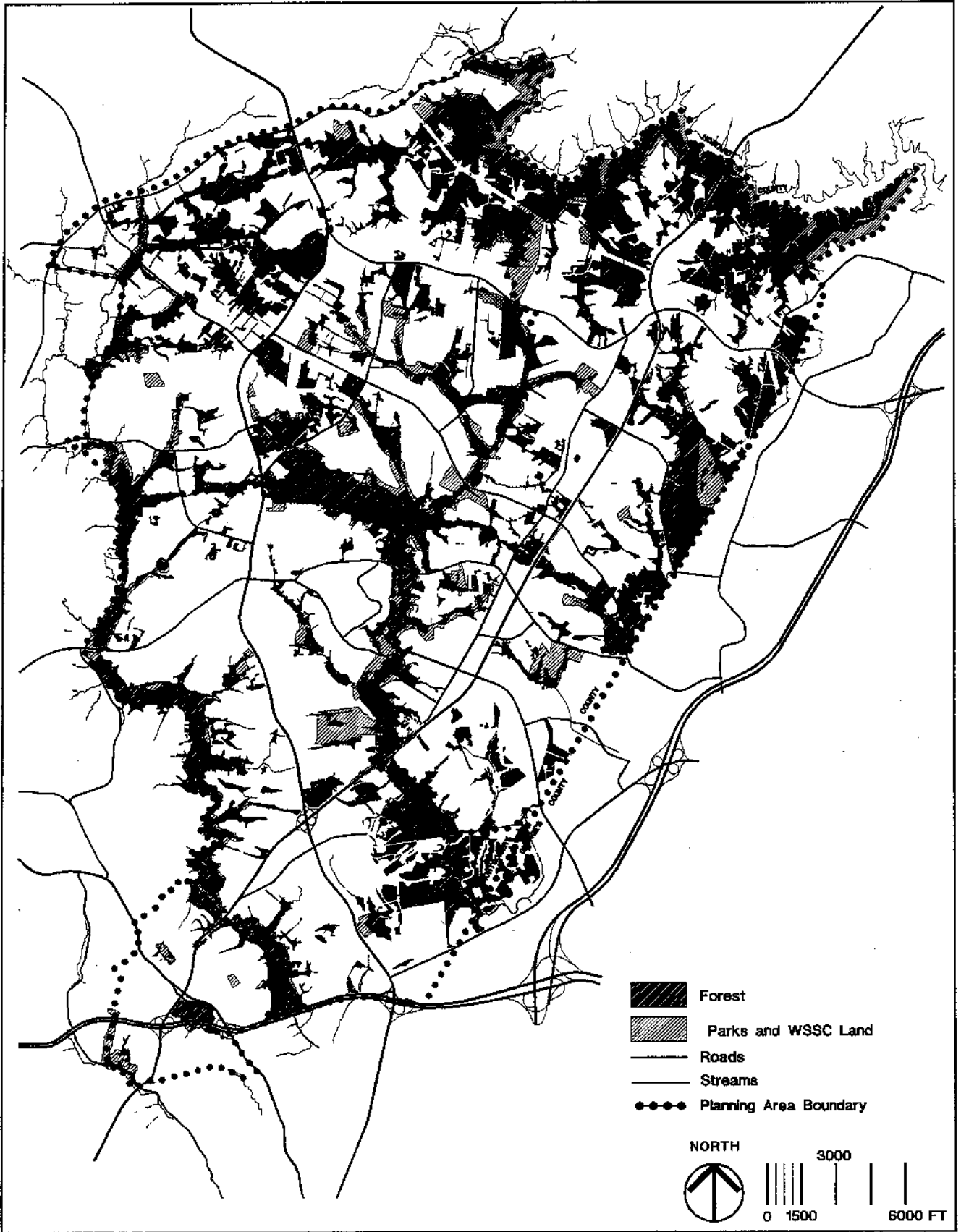
The remaining undeveloped natural areas in eastern Montgomery County are primarily in forest cover. The forests are a combination of deciduous and mixed deciduous and coniferous trees. They comprise a variety of species dominated by oaks in the drier upland areas and red maple in the bottomlands. Tulip poplar is a common co-dominant in both areas. Other species which occur often and may be dominant or co-dominant in some areas are hickory, American beech, sycamore, ash, silver maple, black walnut and Virginia pine (see Figure 2, page 9 for location of existing forest).

On a regional scale, Montgomery County is in a transition zone between vegetation zones with northern or southern affinities. It is also bounded on the south by the Potomac River, one of the major pathways in the eastern United States for the spread of plant species between the Appalachian Mountains and the Atlantic Coast. These factors originally gave the County one of the most diverse native floras in Maryland. Although the forests which once blanketed the County have been fragmented or converted to agriculture, meadows, or urban and suburban land uses, the County's open space (including parkland and undeveloped land) supports many plant species now considered to be rare, threatened or endangered in the state or throughout their range. The County's forested tracts form a component of the Atlantic flyway, a wide flight path from Canada to South America used by migrating birds.

The condition of the forests varies widely depending

Forest Cover

Figure 2



upon stand location and maturity. The forests located on drier upland slopes and ridges are commonly oak/hickory forests with an understory of shrubs and sapling trees without a well-developed herbaceous component. The forests on lower slopes and bottomlands are tulip poplar/red maple forests with more species diversity and a more developed understory. The best of these areas support a variety of canopy species with a well-developed sub-canopy, including trees, shrubs and various herbaceous species. The bottomland forests are usually more mature areas and therefore contain a relatively small invasive species component. Invasive species are much more common in upland forests and may be a major component of early successional areas which are changing from meadow and old field to forest.

Most of the forested areas in eastern Montgomery County are associated with the stream valleys and the Rocky Gorge reservoir, including several significant forest stands associated with undeveloped properties in the northern part of eastern Montgomery County. These stands are important contributors to the protection and recharge of baseflow for wetlands, seeps and springs in the area.

The majority of eastern Montgomery County's park land is forested, but most of these parks were logged within the last 50 years. The forests on park property are generally young, second-growth or sapling woods of poor quality with a high incidence of weedy exotic species. However, Northwest Branch Stream Valley Park, Paint Branch Stream Valley Park and Fairland Recreational Park all support pockets of better quality forest which are primarily on steep slopes, wet areas or other locations that were difficult to log.

The forest and associated vegetation is unusual in the vicinity of McKnew Local Park south of Sandy Spring Road near the Prince George's County line. Due to the presence of the fall line, its vegetational profile is a peculiarly rich mixture of Coastal Plain, Piedmont and even normally Western Piedmont (or mountainous) species. This is the most extensive site of naturally occurring Coastal Plain species in Montgomery County. A great diversity of vegetation is found along the entire fall line from Fairland southwest to the Burnt Mills area of White Oak.

Rivers and Their Watersheds

Two major river system—the Potomac River and the Patuxent River—drain the Washington, D.C. metropolitan area (see Figure 3, page 11). Portions of each system are contained within eastern Montgomery County (see Figure 4, page 12). Three main watersheds of the Anacostia

River system comprise the majority of eastern Montgomery County: Northwest Branch, Paint Branch and Little Paint Branch all flow northwest to southeast. Sligo Creek is a major subwatershed of Northwest Branch which covers a significant portion of the Four Corners planning area. Downstream of Montgomery County, they join and flow into the Anacostia River, which in turn empties into the Potomac River in the District of Columbia. The northern edge of eastern Montgomery County flows easterly to the Patuxent River watershed.

Northwest Branch drains a larger area (53.2 square miles) than any other Anacostia tributary. It flows 17.5 miles from its headwaters in Olney and Sandy Spring, southeast to Bladensburg downstream of eastern Montgomery County, where it meets the Northeast Branch to form the Anacostia River. This stream forms the western boundary of the eastern Montgomery County planning areas, running along the outer borders of Cloverly and White Oak. Its principal tributary is Sligo Creek. The Northwest Branch watershed, which lies mainly within the Piedmont geologic formations, is characterized by ridges and deep, narrow stream valleys, channels and floodplains created by moderate to high velocity streams flowing over moderate gradients.

Extensive stretches of undeveloped woodland and agricultural or low density areas surround the upper portions of the watershed in eastern Montgomery County. Although the upper reaches have stable, shaded banks and riffle/pool formations in the swift waters, the stream slows and widens in the downstream urbanized areas south of eastern Montgomery County. Publicly owned parkland borders the stream banks, with predominantly single-family residential use in the adjacent areas. The stream is known for its highly diverse riverscapes and scenic areas, particularly where it crosses the fall line. Its stream valley park extends for almost its entire length. Northwest Branch has a Use IV¹

¹Stream use designations as assigned by the Maryland Department of the Environment:

Use I and IP—Water Contact Recreation, Aquatic Life and Water Supply;

Use II—Shellfish Harvesting Waters;

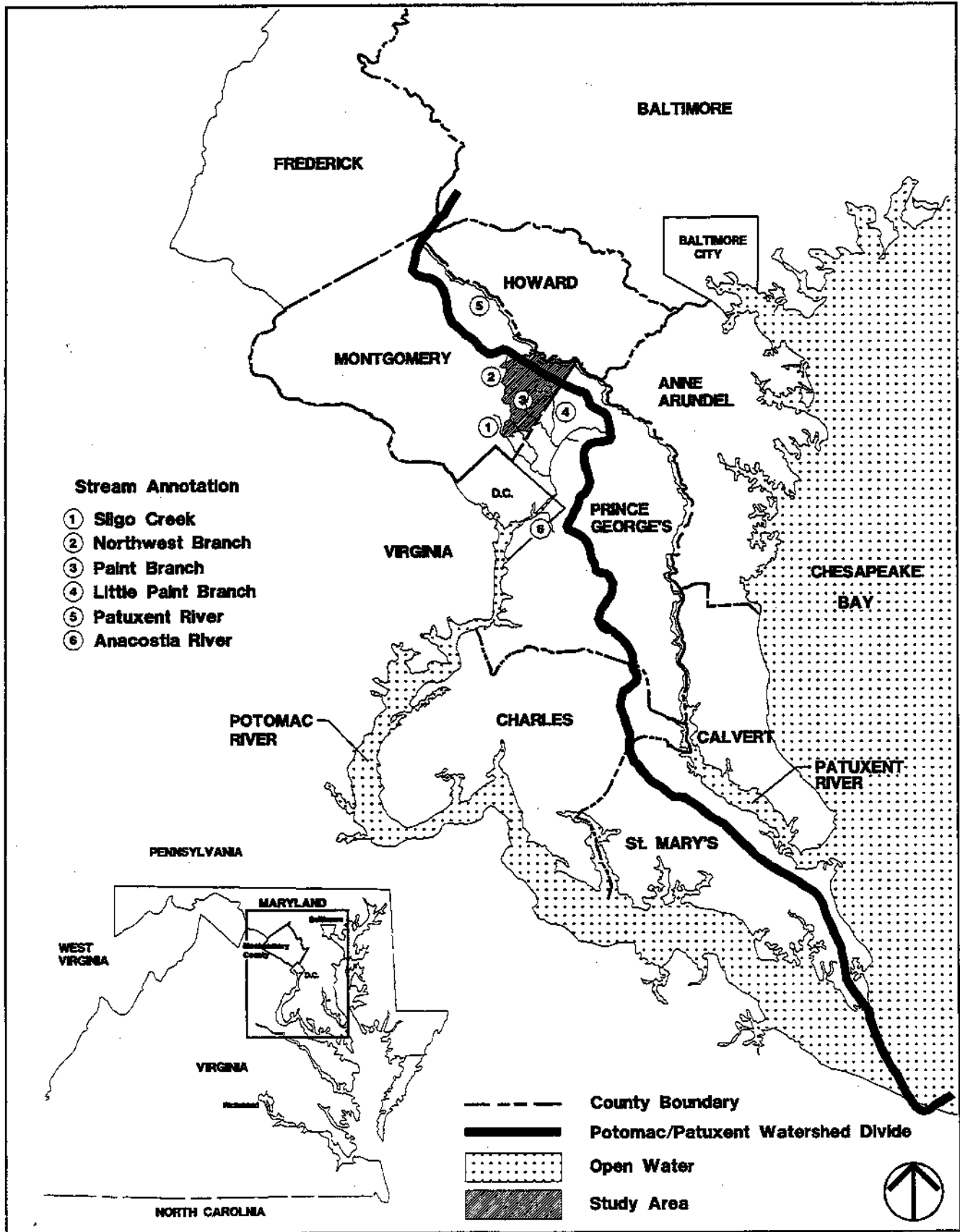
Use III and III-P—Natural Trout Waters, including those potentially or actually suitable for the growth and propagation of trout and capable of supporting natural trout populations and their associated food organisms;

Use IV and IV-P—Recreational Trout Waters, including those potentially or actually capable of supporting adult trout for put and take fishing; or managed as a special fishery by periodic restocking.

Each category has a corresponding set of standards, with Use III the most stringent designation. The 'P' designation indicates the water body is used as a public water supply and must meet toxic substance criteria to protect aquatic organisms as well as the standard criteria for Use I, III or IV waters. In eastern Montgomery County, only the Patuxent watershed has the 'P' designation.

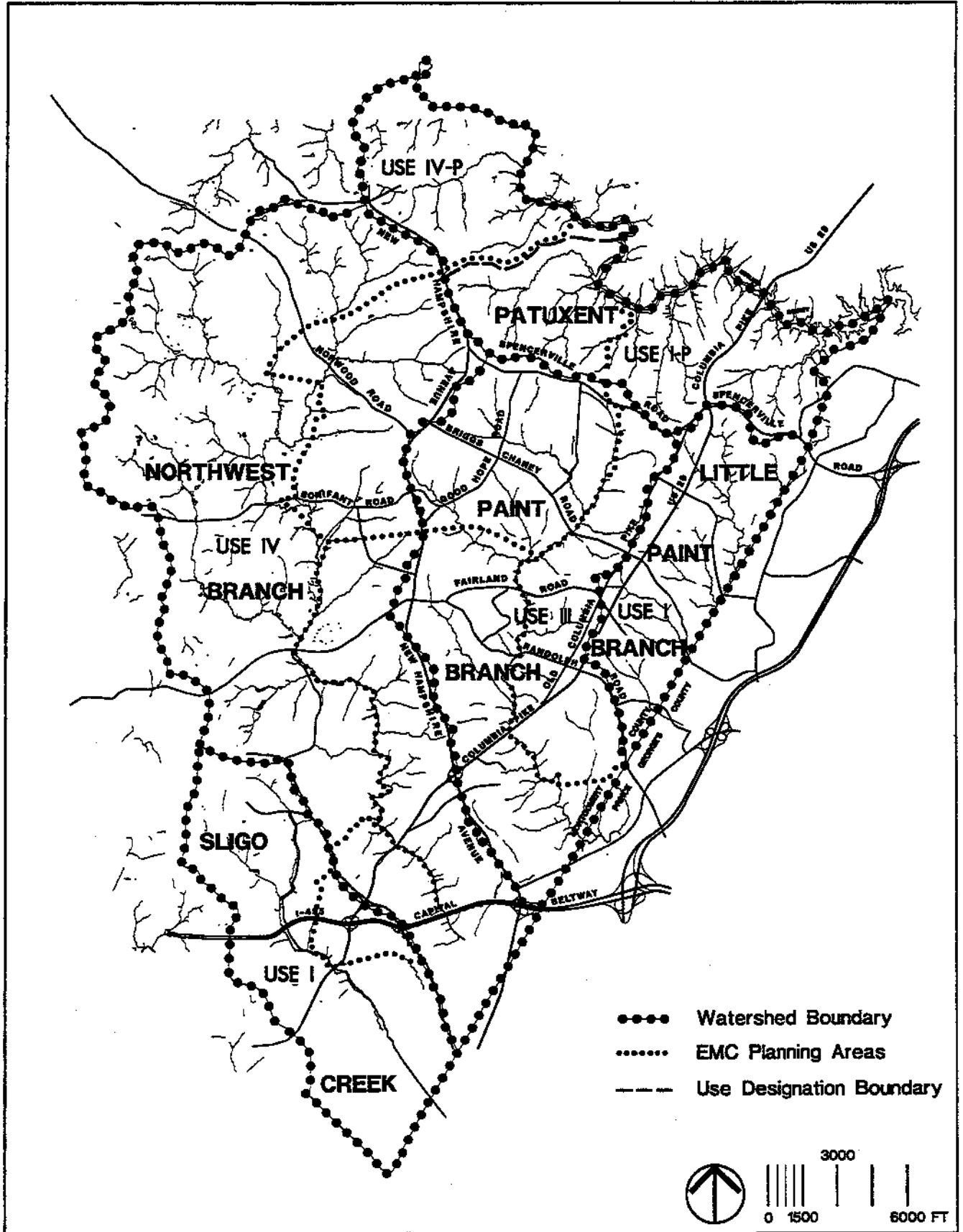
Chesapeake Bay Regional Map

Figure 3



Watersheds

Figure 4



designation, and trout are stocked on a put and take basis by the Maryland Department of Natural Resources (DNR).

Sligo Creek, a major tributary of Northwest Branch, drains an area of 13.3 square miles of dense commercial and residential development. The stream flows 8.2 miles beginning in Wheaton near the intersection of Ventura Avenue and Channing Drive to its juncture with the Northwest Branch in Hyattsville. Most of the stream is bordered by an almost continuous, narrow buffer of publicly owned parkland with many different species of trees shading its banks. However, there is little open space in the watershed outside this stream valley park, which harbors a variety of urban wildlife such as foxes, squirrels, opossums, groundhog and various bird species. It is designated as a Use I stream and because it is readily accessible; recreational use of the creek occurs throughout the year.

Paint Branch originates in the area south of Spencerville Road. It is 17 miles in length, draining a 31.5 square mile area. The mainstem of Paint Branch is a moderate-sized, fourth order stream which terminates at its confluence with Northeast Branch in the heart of Prince George's County. The upper portion, defined as being roughly north of Fairland Road in Montgomery County, flows through predominantly low-density residential areas interspersed with large tracts of undeveloped land. There is a particularly scenic area along the boulderstrewn gorge downstream from US 29, where the stream cuts through the fall line between the Piedmont and Coastal Plain geologic zones. This transitional area has also given rise to unusual forest communities composed of the diverse species of both geologic zones.

A wide variety of wildlife thrives in the watershed and several species of fish are found in the stream, the most notable being the brown trout, an indicator of very high water quality due to its requirements for cold, clean water and unsilted streambed conditions. The Paint Branch and its tributaries hold a special significance in Montgomery County, being among the very small number of naturally reproducing (Use III) trout streams in the County, and the only stream system with a proven, long term self-sustaining trout population. The brown trout fishery in Paint Branch extends from the upper reaches of the stream system near Spencerville Road (MD 198) into the mainstem as far as the Capital Beltway.

Besides the presence of high water quality, major contributing factors for supporting a self-sustaining trout population are a favorable physical habitat that

supports the trout and aquatic macroinvertebrates (including insects that fish feed upon), low stream temperature and steady base flow. Headwater streams provide critical spawning grounds for the trout. A large part of the Paint Branch watershed's seeps, springs and wetlands occur here and contribute to the cold, steady, high quality baseflow of the system. Fingerlings and young-of-year are almost exclusively found in the Upper Paint Branch whereas adult trout are able to withstand the poorer conditions of the mainstem in lower Paint Branch. Management efforts over the past 20 years by various organizations including DNR, and Trout Unlimited have succeeded in protecting the trout population

Little Paint Branch headwaters originate at points along US 29 in the Fairland planning area and within the Fairland Regional Park. The mainstem of the stream is in Prince George's County where it flows into the Paint Branch near College Park. Its watershed is 10.8 square miles in area, mostly suburban development, with open space provided by Fairland Recreational Park, which straddles the Montgomery/Prince George's County line and Beltsville Agricultural Research Center in Prince George's County. The stream valley park and its facilities are the center of recreational activity in the suburbanized watershed.

The Little Paint Branch is located just east of the Fall Line where coastal sediments overlay the rocks of the piedmont. This leads to situations where the streams have cut through the shallow coastal soils into the edge of the piedmont. This provides conditions that support an unusual combination of vegetation and wildlife where the land is still undeveloped or protected as parkland.

Patuxent River is the largest river entirely contained within the state of Maryland. The state has designated it a "scenic river" which provides for its specific protection by the Department of Natural Resources as a river of unusual value to the state. The river, which is a primary source of local drinking water, begins at Paffs Ridge in north central Montgomery County and flows in a general southeasterly direction to the Chesapeake Bay. Its watershed includes parts of Howard, Montgomery, Anne Arundel, Prince George's, Calvert, St. Mary's and Charles Counties-a total of 910 square miles, 61 of which are within Montgomery County.

Two large reservoirs on this river provide drinking water for Howard, Montgomery and Prince George's counties. The Rocky Gorge Reservoir in eastern Montgomery County stores 6.4 billion gallons of water; the Triadelphia reservoir, upriver of eastern

Montgomery County, stores 6.5 billion gallons. The 4,714-acre portion of the Patuxent watershed within eastern Montgomery County drains into the Rocky Gorge reservoir. The natural resources of the Patuxent River watershed include high-quality streams and wetlands, steep stream valleys and large forested areas that are partly on private land and partly protected through Washington Suburban Sanitary Commission (WSSC) land ownership. The reservoirs and their buffers are also environmentally significant in providing aquatic and terrestrial wildlife habitats.

The Patuxent watershed, particularly the upper portion, is mainly rural in character. Much of its total land cover is in agriculture or forest. However, farmland and open space throughout the watershed are rapidly being converted to low to medium density single-family residential development.

The Washington Suburban Sanitary Commission owns approximately 850 acres that provide a buffer area adjacent to the reservoir forming the northern border of eastern Montgomery County. These areas are carefully maintained for protection of the reservoirs and for recreational purposes including boating, fishing and hunting.

Wetlands

The majority of wetlands in eastern Montgomery County are upland, fresh water wetlands with varying types of vegetation (see Table 1, page 15). Most occur in narrow bands along the streams or are associated with springs, seeps, farm ponds or stormwater management ponds. The frequency, size, distribution and diversity of wetlands is far less in the more urbanized areas than in the upper or headwater sections of the watersheds.

Due to the eroding action of high storm flow velocities in urbanized areas, many of the urban streams are deeply incised and therefore have a low floodplain area and few adjacent wetlands. Functions of these wetlands typically include flood attenuation and nutrient/pollutant trapping. Although these wetlands do not provide exceptional wildlife habitat, they are part of stream systems that function as the only natural corridors for wildlife in the more urbanized portions of watersheds.

Wetlands identified in the suburban and rural watersheds are also typically associated with the stream valleys. However, the wetlands tend to spread out in the gentler slopes of headwater valleys and are both more frequent in distribution and larger in size than in the urban areas. Wetland functions in the less urbanized areas include groundwater recharge, baseflow maintenance, flood attenuation, nutrient/sediment trapping, food chain support, and terrestrial and aquatic wildlife habitat.

Eastern Montgomery County Wetlands

Table 1

Subwatershed	Size Of Sub-watershed (acres)	Wetland Cover (% of sub-watershed)	Wetland Type (acres)				
			Lacustrine	Palustrine			
				Forested	Scrub-Shrub	Emergent	Open Water
PAINT BRANCH							
Left Fork	1,400	2.6		29.8	3.4		3.5
Right Fork	941	3.0		26.6		0.7	1.1
Good Hope	986	1.8		17.4			0.3
Gum Springs	624	0.4		1.3			1.1
Fairland Farms	198	1.3		1.2	1.2		0.3
Hollywood Br	996	0.2		2.3			
West Farm	727	0.3					2.0
Mainstem	3,828	2.3		69.9	8.2	0.6	7.2
LITTLE PAINT BRANCH							
Silverwood	1,295	0.7			3.2	0.9	5.5
Galway	622	0.5		2.7			0.4
Tanglewood	631	0.4		2.1			0.4
Greencastle	901	1.8		6.9			9.4
NW BRANCH							
Hampshire Greens Trib	709	1.3		8.0			1.0
Mainstem	5,147	1.5		56.2	10.4	4.6	6.2
Johnson Road	498	0.4			2.2		
Bryants Nursery Run	1,030	0.2					2.2
SLIGO CREEK							
PATUXENT							
Belle Cote	723	0.8	6.0				
Burtonsville Park	442	0.1				0.6	
Spencerville Road	449	3.5	15.6				0.2
Dustin Road	425	2.2	9.4				

Eastern Montgomery County Wetlands (cont.)

Subwatershed	Size Of Sub-watershed (acres)	Wetland Cover (% of sub-watershed)	Wetland Type (acres)				
			Lacustrine	Palustrine			
				Forested	Scrub-Shrub	Emergent	Open Water
Main East	293	3.2	9.5	2.7			
Rocky Gorge	963	1.9	16.1				2.9
Millgrove	1,161	2.3	24.2				2.0
Main West	190	2.9	5.2			0.3	

Source: MD DNR 1988 non-tidal wetlands data, based on aerial photography analysis. Wetlands may be more extensive based on field delineation techniques.

Lacustrine System - lakes, ponds and reservoirs with less than 30% coverage of wetland trees, shrubs or emergent vegetation

Palustrine System - nontidal wetlands including marshes, swamps, bogs and some small ponds or ponded areas. Usually dominated by trees, shrubs and persistent emergents.