Characterization
Of The
Anacostia River Watershed
In Prince George's County, Maryland

March 2005

In support of
Prince George's County's
Watershed Restoration Action Strategy
for the Anacostia River Watershed

Product of the
Maryland Department of Natural Resources
Watershed Services
In partnership with Prince George's County

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Executive Summary

The Anacostia watershed covers about 178 square miles with a drainage area that is 49% in Prince George's County, Maryland, 34% in Montgomery County, Maryland, and 17% in the District of Columbia. About two thirds of the watershed is characterized by Coastal Plain and the remaining is in the Piedmont province. The mainstem of the river is tidal throughout the District of Columbia. The head of tide in the Anacostia River mainstem is just outside of the District in the vicinity of Bladensburg in Prince George's County. The Bladensburg vicinity is also where the two major branches of the non-tidal Anacostia River, the Northeast Branch and the Northwest Branch, have their confluence.

Prince George's County is receiving a Federal grant to prepare a Watershed Restoration Action Strategy (WRAS) for its portion of the Anacostia River Watershed. As part of the WRAS project, the Maryland Department of Natural Resources (DNR) is providing technical assistance, including preparation of a watershed characterization (compilation of available water quality and natural resources information and identification of issues), a stream corridor assessment (uses field data to catalog issues and rate severity) and a synoptic survey (analyzes benthic macroinvertebrates, fish and water samples with focus on nutrients). The County will consider the information generated in these efforts as it drafts the County Watershed Restoration Action Strategy.

Water Quality

In Prince George's County portion of the Anacostia River watershed, the majority of streams have a designated use established in the Code of Maryland Regulations that calls for conditions that support water contact recreation and protection of aquatic life. Two small portions of the County near the border with Montgomery County have designated uses intended to protect existing or potential trout habitat. The designated use for Paint Branch and all its tributaries above the Capital Beltway (I 495) is for naturally reproducing trout populations. The designated use for Northwest Branch and all tributaries above East West Highway (Rt. 410) is for recreational trout, i.e. to provide conditions for survival of stocked trout.

Overall in the watershed, water quality impairments that affect these designated uses include nutrients, sediment, bacteria, biological oxygen demand, biological impairment (poor or very poor ranking for fish or benthic macroinvertebrates based on in-stream assessments) and toxics (polychlorinated biphenols (PCBs) and the pesticide Hepachlor Epoxide).

Work is underway to devise Total Maximum Daily Loads (TMDL) that will establish limits for pollutants causing impairments for Maryland's portion of the Anacostia River watershed. Completion of a TMDL for bacteria (fecal coliform) should be available for public comment in 2005. Additionally, data is being collected via in-stream monitoring that will inform Maryland's creation of additional TMDLs for nutrients and other impairments. TMDLs are already completed for various pollutants in the District of Columbia's portion of the Anacostia River watershed, including nutrients, sediment and others, that will be

used to support Maryland's TMDL efforts for the Anacostia River watershed.

Long term monitoring in the Anacostia River mainstem near the Alternate Route 1 Bridge (adjacent to Bladensburg) shows a trend toward decreasing nitrogen concentration between 1986 and 2002. However, no trend is identified for either phosphorus or sediment during the same time period

Overall, recent short term monitoring demonstrates the kinds of pollution problems that are causing the use impairments. Monitoring in the Anacostia maintem by the District of Columbia near the border with Maryland shows that low dissolved oxygen (less than 5 milligrams per liter) is common during summer. Monitoring data for dissolved oxygen by Maryland collected in 2002 and 2003 in upstream nontidal tributaries shows consistently higher concentrations upstream. At these Maryland monitoring sites, collected data tend to also demonstrate elevated levels of nitrogen, phosphorus and bacteria. In the area between the District and Maryland monitoring referenced above, experience accumulated by operators of the Bladensburg Waterfront Park (and their predecessors) indicate that sedimentation there is very high.

Permits issued to dischargers in the Prince George's portion of the Anacostia show that point sources of nutrients are small compared to water quality problems in the river. Point source nutrient discharges consist of two small federally operated sewage effluent discharges that are less than 200,000 gallons per day each. Also, high bacteria counts in the river are also not linked to point source discharges. Instead, the bacteria probelms appear to be associated with stormwater runoff and leaks from the aging sanitary sewer system that serves 74% of land area in the Prince George's County portion of the Anacostia River watershed.

Natural Resources

Coastal plain geology underlies more than three quarters of the Anacostia River watershed in Prince George's County. Much of this area, that has not been made impervious by pavement and rooftops probably serves as recharge areas for aquifers like the Potomac and Aquia.

Over 70% of the watershed is some type of well-drained soil including prime agricultural soil, which accounts for about 16% of the total watershed. About 20% of local soils have drainage limitations, including hydric soils that tend to be adjacent to streams. The remaining soils in the project area include sandy soils, borrow pits and soils that have been modified by human activity.

Green Infrastructure is a network of natural areas identified by DNR that are ecologically important on a statewide or regional scale. The Green Infrastructure includes areas like large blocks of forest or wetlands, habitat for sensitive species and protected conservation areas. These areas are grouped into hubs that contain the bulk of these resources and corridors than link the hubs together. In the Anacostia River watershed in Prince George's County, Green Infrastructure hubs are almost entirely on properties in public ownership. Two large hubs are in the National Agricultural Research Center and in Greenbelt Regional Park, both of which are managed by the federal government. Other smaller hubs are in Fairfield Regional Park, Indian Creek Stream Valley Park, Northway Fields Park in Greenbelt and the Prince George's Sports Center. Protecting and enhancing these hubs and corridors between them is critical to the long term wellbeing of natural habitat in the project area.

A GIS assessment of potential forest interior habitat found that the largest areas are associated with Green Infrastructure hubs. It also

found that smaller areas in the project area that do not meet Green Infrastructure criteria may be locally important for some forest species. Some of the smaller forest interior habitat areas are located in or around Capitol Heights, Glenarden, College Park and Riverdale Park.

There are nearly 2,000 acres of wetlands are identified in the Prince George's County portion of the Anacostia watershed. A large fraction of these wetlands are concentrated in a few areas around streams and the remaining smaller wetlands are more dispersed in the watershed. Several wetland areas are afforded additional regulatory protection as Wetlands of Special State Concern including about 475 acres in the Upper Beaverdam Creek watershed. In this project area, the Wetlands of Special State Concern include several wet forest areas, bogs (characterized by high-quality low-nutrient water) and some seasonal pond habitats. Since tracking of permitted wetland changes was initiated in 1991, a small net gain of about 5 acres has occurred in the project area.

An assessment of stream buffer condition in the Prince George's County portion of the Anacostia River watershed was conducted using computerized GIS. Of the total 179 miles of stream identified in the project area, about 73% (132 miles) of riparian area had some form of naturally vegetated stream buffer. About 13% of the stream buffer was in some form of developed land use. Streams lacking naturally vegetated buffers, including all types of mowed grass, agriculture and barren land, accounted for 14% (24 miles) of the stream mile total. Among the streams lacking naturally vegetated buffers, about 10 miles of stream flow through areas of hydric soil. Restoration of natural vegetation on these hydric soils may provide multiple benefits like shading streams, intercepting nutrients before they enter streams and restoring wetland habitats.

Living Resources and Habitat

Spawning of anadromous fish including white perch and herring is documented in Maryland's portion of the Anacostia River mainstem. According to DNR Fisheries Service GIS data, spawning also extends upstream into Lower Beaverdam Creek near the District of Columbia, lower Northwest Branch and lower Northeast Branch. In cooperation with local jurisdictions, DNR Fisheries Service has released about 11 million herring larva into the Anacostia in an effort to rebuild local populations. Assessments of fish communities in nontidal streams by Maryland Biological Stream Survey (MBSS) using their Fish Index of Biological Integrity found conditions that ranked as "good" only in the vicinity of the National Agricultural Research Center. Other areas assessed by MBSS ranked as fair, poor or very poor. However, there are signs of improvement. Fish surveys have documented increasing numbers of hickory shad. Additionally, small mouth bass have established a self-sustaining population in Upper Northwest Branch following stocking by DNR Fisheries Service in Montgomery County.

For the entire Anacostia River watershed, about 130 blockages to fish movement are identified by the Metropolitan Washington Council of Governments (MWCOG). Fourteen of these have been corrected using mitigation funds from the Wilson Bridge project. However, in lower Northwest Branch where blockage removal has been successful, a new blockage has appeared. The dynamic instability that created the new blockage is probably associated with excess storm flows.

An advisory on fish consumption in effect for bluegill and bass (small mouth and large mouth) because they may contain methylmercury at levels that could affect human health based tissue samples from local fish.

Assessments of benthic macroinvertebrates using MBSS techniques have tended to rate most sites in the Prince George's County portion of the Anacostia River as very poor or poor. These sites are listed for biological impairment on the State's list of impaired waters. However, sites in the vicinity of the National Agricultural Research Center were ranked as fair and good.

Maryland tracks sensitive species of 13 animals and 99 plants in the Anacostia River watershed in Prince George's County. These species are found in at least 20 ecologically significant areas (ESAs) mapped by the DNR Natural Heritage program.

Land Use

Various forms of urban development comprises the dominant land use in Prince George's County's portion of the Anacostia River watershed according to 2002 Prince George's County data. Development covers about 50% of the watershed and mowed grass covers an additional 10% of the watershed. Woodland covers about 34% of the watershed. Together all other land use types including agriculture account for about 6% of the area.

Privately owned land covers about 72% the Anacostia River watershed in Prince George's County. On this private land, easements or other mechanisms other than zoning that limit conversion of nondeveloped land to development are generally not found in the watershed.

Public land, owned and managed by the Federal or local governments, covers about 28% of the watershed. These public lands contain much of the surviving natural habitat in the Anacosatia River watershed. No State Parks are located in the watershed. Maintaining and enhancing these public natural areas is key to habitat management here.

Based on an assessment of average impervious area in Prince George's County's portion of the Anacostia River watershed, only the Upper Beaver Creek subwatershed has an average imperviousness less than 10%. All subwatersheds in the project area near the District of Columbia have at least 20% average imperviousness and most are greater than 30%. These levels of average imperviousness degrade water quality and also disrupt or eliminate many types of aquatic habitat in local streams and rivers.

Introduction

Watershed Planning Background

As a foundation for watershed monitoring, analysis and planning, the State of Maryland defined over 130 watersheds that cover the entire State in the 1970s. In 1998, the Maryland Clean Water Action Plan presented an assessment of water quality conditions in each of these watersheds. Based on these assessments, it also established State priorities for watershed restoration and protection.

In the Maryland Clean Water Action Plan, the Anacostia River watershed is designated Category 1 for restoration and Category 3 for protection. These State designations mean that both water quality impairments that need restoration and resources that require protection are found in this watershed.

In 2000, the Maryland Department of Natural Resources (DNR) initiated the Watershed Restoration Action Strategy (WRAS) Program as one of several new approaches to implementing water quality and habitat restoration and protection. The WRAS Program solicits local governments to focus on priority watersheds for restoration and protection. Since inception of the program, local governments have received grants and technical assistance from DNR for 20 WRAS projects in which local people identify local watershed priorities for restoration, protection and implementation.

Anacostia Overview

The Anacostia River watershed covers about 178 square miles as shown in Map1 Location. Maryland's portion of the watershed, which totals about 145 square miles, is designated "02140205" as one of Maryland's "8-digit" watersheds that are used for statewide analysis.

Map 2 Anacostia River Major Subwatersheds shows the relative location of Prince George's County in the watershed in greater detail. The map highlights how subwatersheds defined by the State of Maryland may have headwaters in Montgomery County with streams that flow into Prince George's County. Additionally, the map also shows that streams with origins in Montgomery or Prince George's County flow into Washington DC. The table below summarizes the relative area of these three major jurisdictions.

Governance Areas in the Anacostia River Watershed			
State/District	County	Towns	Square Miles
Maryland	Prince George's	Not In Municipalities	60
		In Municipalities	26
	Montgomery	(not broken out)	59
Washington, District of Columbia			33
Total Watershed			178

Anacostia WRAS Project

The WRAS project area in Prince George's County, Maryland totals about 86 square miles including portions of municipalities within the project area boundary. For this part of the watershed, Prince George's County is working on a WRAS project to be completed in 2005. In the WRAS, the County will identify and prioritize local restoration and protection needs associated with water quality and habitat. To support the County's effort, the Maryland Department of Natural Resources (DNR) is supplying grant funding and technical assistance, which includes production of this Watershed Characterization.

Map 3 Prince George's County Subwatersheds and Designated Stream Use presents the subwatersheds that are used for analytical purposes throughout the Watershed Characterization. The Watershed Characterization focuses primarily on the WRAS project area in Prince George's County. Information on upstream areas of the Anacostia River watershed in Montgomery County, Maryland is occasionally presented when it is immediately available.

Purpose of the Characterization

The Watershed Characterization helps to meet several objectives for the WRAS project:

- Summarize immediately available information and issues
- Provide preliminary findings based on this information
- Identify sources for more information or analysis
- Suggest opportunities for additional characterization and restoration work.
- Provide a common base of knowledge about the watershed for government, citizens, businesses and other interested groups.

The Watershed Characterization adds to other efforts that are important for the County's WRAS project:

- Local investigation by the County
- Stream Corridor Assessment, in which DNR personnel physically walk the streams and catalogue important issues
- Synoptic water quality survey, i.e. a program of water sample analysis, that can be used to focus on local issues like nutrient hot spots, point source discharges or other selected issues. This is also part of the technical assistance offered by DNR
- Technical assistance and assessment by partner agencies or contractors

Moving Beyond The Characterization

In addition to the information presented in this document, it is important to identify gaps in available watershed knowledge and to gauge the importance of these gaps. As new information becomes available, the Watershed Characterization and other components of the WRAS should be updated and enhanced as needed. Here are some examples of issues for potential additional work:

- Habitat: physical structure, stream stability, biotic community (incl. the riparian zone)
- Water Quantity: high water–storm flow and flooding; low water–baseflow problems from dams, water withdrawals, reduced infiltration
- Water Quality: water chemistry; toxics, nutrients, sediment, nuisance odors/scums, etc.
- Cumulative effects associated with habitat, water quantity and water quality.

Restoration and natural resource protection is an active evolving process. The information that supports the Watershed Restoration Action Strategy, including the Watershed Character-

ization, should be maintained as living documents within an active evolving restoration process. These documents will need to be updated periodically as new, more relevant information becomes available and as the watershed response is monitored and reassessed.

More Information Sources

The WRAS Program Internet home page has additional information on the program and an index of available electronic copies of WRAS-related documents that can be downloaded free of charge. Available documents include detailed program information, completed WRAS strategies, stream corridor assessments, synoptic surveys and watershed characterizations. Please visit the WRAS Home Page at http://www.dnr.state.md.us/watersheds/wras/

Additional information on over 130 watersheds in Maryland is available on DNR's Internet page Surf Your Watershed at http://www.dnr.state.md.us/watersheds/surf/index.html

The Maryland Clean Water Action Plan is available at www.dnr.maryland.gov/cwap/

Water Quality

Water quality is in many respects the driving condition in the health of Maryland's streams. Historically, efforts to protect water quality have focused on chemical water quality. More recently, additional factors are being considered like measurements of selected biological conditions and physical conditions that affect habitat quality in streams and estuaries. This expanded view is reflected in current approaches to stream monitoring, data gathering, and regulation as reflected in this watershed characterization.

Designated Uses For Streams

Streams and other water bodies in Maryland are each assigned a "designated use" in the Code of Maryland Regulation (COMAR) 26.08.02.08. Each use is associated with water quality criteria that are necessary to support that use. Together, the designated use and the criteria are commonly referred to as "Water Quality Standards;" they are established by the Maryland Department of the Environment (MDE) in regulation.

In the Prince George's County portion of the Ancostia River watershed, all bodies of water are categorized under one of three designated uses. Map 3 Prince George's County Subwatersheds and Designated Stream Use shows the distribution these designated uses:

- Use 1- Recreation and Aquatic Life applies to all Anacostia waters except for those designated as Use 3 or Use 4.
- Use 3- Natural Trout designation calls for conditions that support a naturally reproducing trout population. It applies to Paint Branch and all its tributaries above the Capital Beltway (I 495).
- Use 4- Recreational Trout designation is intended to support adult trout that are stocked. Northwest Branch and all tributaries above East West Highway (Rt. 410).

Use Impairments

Some streams or other water bodies in the WRAS project area cannot be used to the full extent envisioned by their designated use in Maryland regulation. In these waterbodies, water quality or habitat impairments are generally the cause. These areas, known as "impaired waters", are tracked by the Maryland Department of the Environment under Section 303(d) requirements of the Federal Clean Water Act. The list of impairments for waterbodies in the Anacostia River watershed are summarized below.

Bacteria

The Anacostia River was listed in 2002 for impairments associated with fecal coliform bacteria from point, nonpoint and natural sources. This assessment is based on data from the long term monitoring station in the river (ANA0082).

Biological

Numerous specific sites on nontidal streams in the Anacostia River watershed were listed in 2002 for biological impairment associated with unknown causes: Beaverdam Creek, Cattail Branch, Indian Creek, Little Paint Branch, Lower Beaverdam Creek, Northeast Branch, Northwest Branch (and unnamed tributaries), Paint Branch and Sligo Creek. These listings result from findings by the Maryland Biological Stream Survey (MBSS) using their indices of biological integrity for fish and benthos for in-stream assessment. Using either index, a rating of poor or very poor is considered a biological impairment. (See Biological Monitoring In Streams.)

Biological Oxygen Demand

The Anacostia River was listed in 1996 for impairment caused by biological oxygen demand (BOD) associated with nonpoint and natural sources. The source of the information for this listing is Washington DC's May 2001 Total Maximum Daily Load (TMDL). BOD is a measure of oxygen consumption by biological processes over a set period of time (typically five days).

Nutrients

The Anacostia River was listed in 1996 for impairments associated with nutrients from point, nonpoint and natural sources. Nutrients of importance here may by phosphorus, nitrogen or both.

Sediment

The Anacostia River was listed in 1996 for impairments by sediment associated with point, nonpoint and natural sources.

Toxics

The Anacostia River was listed in 2002 for impairments associated with two synthetic toxic compounds: polychlorinated biphenols (PCBs) and the pesticide Hepachlor Epoxide.

Total Maximum Daily Loads

The federal Clean Water Act (CWA) requires states to assess their waters and identify those that do not meet water quality standards. Maryland documents its impaired waters as part of an integrated assessment of water quality. The integrated assessment combines the State's water quality inventory, required under CWA Section 305(b), and the identification of impaired waters for which technology-based controls are insufficient to achieve standards, required under CWA Section 303(d). The impaired waters identified under section 303(d)

are included in "Part 5" of Maryland's integrated list of waters, and constitute Maryland's "303(d) List" of impaired waters. The District of Columbia manages a similar assessment process for its portion of the Anacostia River watershed.

The State of Maryland and the District of Columbia are responsible for conducting studies of waters identified on their respective 303(d) lists to establish Total Maximum Daily Loads (TMDLs). A TMDL is the amount of pollutant that a water body can assimilate and still meet its designated use. A water body may have multiple impairments and multiple TMDLs to address them. In general, TMDLs have two key parts:

1- Maximum pollutant load that the water can accept while still allowing the water body to meet its intended use.
2- Allocation of the maximum pollutant load to specific pollutant sources.

In the District of Columbia, the Department of Health Bureau of Environmental Quality (DHBEQ) is responsible for TMDL analyses. In Maryland, the Department of Environment (MDE) is responsible.

Maryland's Impaired Waters and TMDL Status

Although Maryland has not established TMDLs for its portions of the Anacostia River, it participated in the District of Columbia's process to develop TMDLs for the tidal Anacostia River (See Below). It was logical to assess the downstream impairments first, given that they are likely to place the greatest constraints on the upstream sources of loads. However, it is widely acknowledged that the information about upstream sources was limited when the Anacostia River TMDLs were developed by the District of Columbia under a court-sanctioned schedule.

In response to those data limitations, MDE has coordinated an on-going multi-year water quality monitoring initiative in cooperation with the US Geological Survey and Prince George's County. This monitoring will collect data on a suite of substances including toxic substances, nutrients, bacteria, sediments and environmental parameters like flow and temperature. This information will be used to verify the baseline loading estimates associated the TMDLs for the tidal Anacostia River, described below, and will be used to support TMDL analyses for Maryland's portion of the Anacostia River watershed. TMDLs for bacteria (fecal coliform) are currently being prepared by MDE, and are scheduled for completion in 2005. (1)

District of Columbia's Impaired Waters and TMDL Status

Washington DC's portion of the Anacostia River watershed has been addressed in numerous TMDLs prepared by the District of Columbia Department of Health Bureau of Environmental Quality. These TMDLs limit numerous pollutants that are negatively affecting water quality including bacteria, biological oxygen demand, total suspended solids, oil & grease, heavy metals (zinc, lead, copper, arsenic) and synthetic organic compounds (PCBs, PAHs, chlordane, heptachlor epoxide, dieldrin, DDD, DDE, DDT). Two of the Washington DC TMDLs, biological oxygen demand and total suspended solids, are summarized here. (2)

District of Columbia's Biological Oxygen Demand TMDL

The purpose of the TMDL is to set a limit for biological oxygen demand (BOD) that would maintain dissolved oxygen concentrations greater than the water quality standard of 5.0 mg/l. The March 2001 TMDL recommends load reductions for nitrogen and phosphorus but it does not establish a TMDL for either. (3)

According to the TMDL, water quality monitoring indicates that waters originating in Maryland and Washington DC contribute to low dissolved oxygen during summer months.

Computer modeling that supports Washington DC's BOD TMDL makes several key predictions:

- Dissolved oxygen concentrations depend mostly on the amount of BOD in the water body although algae and nitrogen compounds (ammonia and Total Kjeldahl Nitrogen) affect dissolved oxygen to a lesser extent.
- Reducing BOD would have the most immediate positive affect on raising dissolved oxygen in the Anacostia River.
- Reducing nitrogen loads will likely have some beneficial effect in upper tidal Anacostia waters based on current day conditions. In other areas of the tidal Anacostia River, algae growth is limited by insufficient light. In most areas of the river, light penetration is inhibited by excessive suspended solids in the water.
- Reduction of phosphorus loads are not likely to have significant affect on dissolved oxygen concentrations in the Anacostia River based on current day conditions. However, the model scenarios suggest that control of nutrients in the Anacostia will be more important if suspended sediments where reduced to the point that increasingly available light allows more algae growth.
- When load reductions for BOD and suspended solids are achieved, algal growth will likely become a more important factor

Biological Oxygen Demand, District of Columbia TMDL			
	Baseline Load (lbs/yr)	Allocation (lbs/yr)	Percent Reduction
Maryland	2,102,821	1,036,268	51
DC CSO	1,574,133	152,906	90
DC Stormwater	287,876	132,807	54
Total Watershed	3,964,830	1,339,205	66

Nitrogen Estimated Load and Modeled Reduction, District of Columbia			
	Baseline Load (lbs/yr)	Target (lbs/yr)	Percent Reduction
Maryland	842,837	590,859	30
DC CSO	95,675	12,171	87
DC Stormwater	71,135	44,515	37
Total Watershed	1,009,647	647,545	36

Phosphorus Estimated Load and Modeled Reduction, District of Columbia			
	Baseline Load (lbs/yr)	Target (lbs/yr)	Percent Reduction
Maryland	119,431	84,248	29
DC CSO	55,878	8,047	86
DC Stormwater	10,990	7,338	33
Total Watershed	186,299	99,633	47

in driving dissolved oxygen levels in the tidal Anacostia. At that time, nutrient load control will likely be a more important for maintaining dissolved oxygen levels.

In Maryland, contributions to BOD originate from nonpoint sources including stormwater outfalls. In Washington DC, contributions to BOD are from both nonpoint sources (including stormwater outfalls) and combined sewer overflows (which are regulated point sources).

The BOD TMDL calls for a great reduction of stormwater-related pollutants: 50% BOD reduction and 30% nutrient reduction. Both Washington DC and Maryland contribute these stormwater pollutants. The TMDL also calls for a 90% reduction in BOD associated with combined sewer overflow.

District of Columbia's Total Suspended Solids TMDL

The purpose of this TMDL is to establish a limit for total suspended solids (TSS) that would maintain water clarity sufficient to see a secchi disc at an average of 0.8 meters depth during the period of April through October during an average flow year. Meeting this minimum level of water clarity is intended to allow for growth of submerged aquatic vegetation (SAV). (4, 5)

The computer modeling that supports the January 2002 TMDL used data from 1988, 1989 and 1990 to generate load estimates and TMDL in the table below. Water clarity is affected by both suspended solids and algae so the TMDL takes both into account.

Total Suspended Solids, Average for April Through October			
	Baseline Load (lbs)	TMDL Allocation (lbs)	Percent Reduction
Maryland	18,288,000	2,558,000	86
DC CSO	587,000	99,000	83
DC Stormwater	829,000	145,000	83
Total Watershed	19,704,000	2,802,000	86

Water Quality Monitoring And Analysis

Map 4 Water Quality Monitoring shows the relative locations of selected sampling sites in the watershed that are referenced in the following assessment.

Maryland has maintained one long term monitoring station on the Anacostia River since the middle 1980s. Status and trends for this station are summarized on the next page. (6)

During the summer of 2000, continuous monitoring was conducted by the District of Columbia at the New York Avenue Bridge, which is close to the border between Maryland and Washington DC. The data collected shows that dissolved oxygen (DO) less than 5.0 mg/l is common in the Anacostia River mainstem during warm months. This finding indicates that water quality in the mainstem frequently fails to meet water quality standards for dissolved oxygen as adopted by both Maryland and Washington DC. Dissolved oxygen values lower than 4.0 or 5.0 mg/l impair fish growth and reproduction, particularly in the younger fish. Values less than 2.0 mg/l may cause fish mortality.

MDE provided a collection of water quality monitoring data from various sites shown on Map 4 Water Quality Monitoring and summary tables of data are in Appendix B – Maryland Water Quality Summary. Five of these sites

Long Term Monitoring Anacostia River Station ANA0082		
Parameter	Status 2000-2002 Average	Trend 1986-2002
Nitrogen	Less than 1.7 mg/l	Decreasing
Phosphorus	Between 0.036 and 0.073 mg/l	No Trend
Suspended Solids	Less than 5.4 mg/l	No Trend

(Northwest Branch, Northeast Branch, Paint Branch, Indian Creek and Upper Beaverdam Creek) are in-stream monitoring stations. (7)

Overall, data from the five in-stream monitoring sites were reported for a one-year period running from October 2002 through October 2003 is summarized by water quality parameter below. These sites are all in nontidal streams in Prince George's County's portion of the Anacostia River watershed:

- Dissolved oxygen at the five sites for all samples was consistently higher than 6 mg/l.
- Total nitrogen concentrations averaged between 1.4 and 1.7 mg/l at all five sites. In general for nontidal streams, average total nitrogen concentrations over 1.0 mg/l tend to reflect human activity in the watershed and are considered elevated over natural conditions.
- Total phosphorus concentrations averaged between 0.02 and 0.04 mg/l at four sites: Northwest Branch, Northeast Branch, Paint Branch and Indian Creek. At the Upper Beaverdam Creek site, average total phosphorus was 0.17 mg/l. In general for nontidal streams, average total phosphorus concentrations over 0.1 mg/l tend to reflect human activity in the watershed and are considered elevated over natural conditions.
- Total suspended solids in Paint Branch were the lowest on average and Upper Beaverdam Creek were highest on average (4.2 mg/l and 15.0 mg/l respectively). The other three stations averaged between 9 and 11.4 mg/l.
- Bacteria information at the in-stream sites was reported as the most probable number (MPN) of Enterococcus organisms. This type of bacteria is considered to be an indicator of pathogens associated with human waste. Paint Branch most frequently reported a MPN less than 100 and it had the lowest average (327 MPN). Upper Beaverdam Creek most frequently reported a MPN over 100 and it had the highest average 896 MPN. All five stations experienced episodes when MPNs where reported in the thousands.

Point Sources

Discharges from pipes or other "discrete conveyances" are called "point sources." Point sources may contribute pollution to surface water or to groundwater. For example, wastewater treatment discharges have the potential to contribute nutrients or microbes that consume oxygen (measured as Biochemical Oxygen Demand (BOD)) reducing oxygen available for other aquatic life. Industrial point sources have the potential to contribute various forms of pollution. Some understanding of point source discharges in a watershed can be useful in helping to identify and prioritize potential restoration measures.

Many point sources operate under permits issued by the Maryland Department of the Environment (MDE). A listing of permits for

the WRAS project area extracted from MDE's database is summarized below. Map 5 MDE Permits, Marinas and Local Sewer Service shows the distribution of permits across the Prince George's County portion of the Anacostia River watershed. The Appendix C - MDE Permits lists each permit and summarizes some basic information about each. Characteristics of these permitted discharges (volume, temperature, pollutants, etc.) are tracked by MDE and most is accessible to the public. Overall findings for the Prince George's County portion of the watershed are summarized below:

- Two discharges of treated sewage effluent are permitted in the project area. The facilities that treat this effluent serve two US Dept. of Agriculture facilities: East (about 130,000 gallons per day discharging to Upper Beaverdam Creek) and West (about 190,000 gallons per day discharging to Little Paint Branch). Summary tables of selected discharge data for these two plants for the 2001 are reported at the end of Appendix B – Maryland Water Quality Monitoring.
- The absence of permitted sewage effluent discharge is associated with the fact the about 74% of the Anacostia River watershed in Prince George's County totaling approximately 40,920 acres is served by public sewer. Many remaining areas that lack sewer service are planned for future service. If all potential future service areas are eventually connected to the system, about 81% of the area would be served covering nearly 44,600 acres. Sewage collected in this network of pipes is transported outside of Maryland to the Blue Plains Wastewater Treatment Plant operated by the District of Columbia. However, leaks from the collection system are know to occur, which contributes to water quality impairments by bacteria and nutrients.
- 56 general permits in the watershed are typically discharges from swimming pools. However, this category of permit also includes permits for hydrant flushing and concrete or asphalt plants.
- 64 general industrial stormwater permits in the watershed involve drainage of rainwater from various types of facilities.
- 12 industrial surface discharge permits mostly typically involve discharge of cooling tower blow-down and/or noncontact cooling water. Only one permit in this category appears to directly serve an industrial process, which is manufacture of inorganic pigments. Other types of permits included in this category are vehicle washing, the FDA Center for Veterinary Medicine, a sand & gravel mine, a fire fighting training facility and a pond.
- 16 groundwater discharge permits to municipalities are granted to cover discharges associated with streets, buildings, etc.
- Seven permits for general oil contamination groundwater remediation involves pumping and treating contaminated groundwater before discharging the cleansed water.

Marinas

There is one marina operating in Maryland's portion of the Anacostia River watershed. It is located at the Bladensburg Waterfront Park operated by Maryland-National Capital Park and Planning Commission. Map 5 MDE Permits, Marinas and Local Sewer Service shows the general location of the park.

Water depth in this part of the tidal Anacostia River is typically less than four feet and near constant dredging is necessary to maintain this depth. As a consequence of the water depth limitation, only shallow draft craft like pontoon boats or canoes operate out of this facility. Pump out facilities are not needed to serve this type of watercraft.

Natural Resources

Water quality and quantity in surface waters and groundwater are greatly influenced by natural resources. Physical factors like geology and soils largely determine local topography, hydrology and potential for erosion. Variation of vegetation types in riparian areas and throughout the watershed produces additional influences that determine potential for stormwater infiltration or runoff and habitat quality. This chapter presents immediately available natural resource information from DNR for the Anacostia watershed in Prince George's Co.

Geology Summary – Anacostia In Prince George's County		
Category	**Acres**	**Percent**
Potomac Group	40,673	74
Lowland Deposits	10,014	18
Monmouth, Aquia, Calvert Formations	2,292	4
Boulder Gneiss	1,213	2
Upland Deposits	829	2
Total Anacostia in Prince George's	55,021	100

Geology

Map 6 Geology shows that Coastal Plain deposits are beneath most of the project area. Significant portions of the watershed including the Potomac Group and the Monmouth, Aquia and Calvert formations areas may serve as important recharge areas for aquifers that are tapped by wells to the east and south.

Soils

Soil type and moisture conditions greatly affect how land may be used and the potential for vegetation and habitat on the land. Soil conditions are also one determining factor for water quality in streams and rivers. Local soil conditions vary greatly from site to site, as published information in the Soil Survey for Prince George's County reports. This information has been summarized by the Maryland Dept. of Planning into Natural Soil Groups to identify useful generalizations about groups of soils.

Map 7 Soils shows the distribution of natural soils groups in the Prince George's County portion of the Anacostia River watershed. About 33% of the watershed is well drained with slow permeability and strong acidy. About 16% of the watershed, nearly 10,300 acres, is prime agricultural land. However, only about 554 acres of this prime agricultural soil is in agricultural use according to 2002 land use information furnished by Prince George's County. An additional 22% of the watershed has soil similar to prime agricultural soil but with slopes greater than 8%.

Hydric soils (areas with wetness limitations) account for about 15% of the Anacostia watershed in Prince George's County. The map shows that these soils tend to be found along streams. Soils with other types of drainage limitations cover another 5% of the watershed.

Sandy soils that are excessively well drained cover nearly 2,500 acres or about 5 % of the project area. These soils tend to present limitations for growing plants because water retention in the root zone is frequently limited to relatively short periods of time. The rapid infiltration of water in these soils may present concerns for stormwater management because these areas probably recharge aquifers that are used for public water supply in areas to the east and south.

The project area exhibits significant areas of manipulated soil conditions including borrow pits and made land. Together, these manipulated areas account for over 1,700 acres -- nearly 4% of the Anacostia watershed in Prince Goerge's County. In these areas, typical soil survey categories and assessments may not apply and site-specific soil analysis may be necessary as a precursor to building or other intensive use.

Green Infrastructure

Forest and wetlands lands in the Anacostia River watershed, particularly extensive areas of contiguous natural lands, provide valuable water quality and habitat benefits. In general, actions taken to assure that forest cover will be maintained, to avoid fragmentation of forest, and to restore forest in areas that have been cleared will contribute significantly to improving the water quality in this watershed and to conserving the biodiversity of the State.

DNR has mapped a network of ecologically important lands, comprised of hubs and corridors that link the hubs, using computerized GIS. These "Green Infrastructure" hubs contain one or more of the following:

- Areas containing sensitive plant or animal species;
- Large blocks of contiguous interior forest (at least 250 contiguous acres, plus the 300 foot transition zone);
- Wetland complexes with at least 250 acres of unmodified wetlands;
- Streams or rivers with aquatic species of concern, rare coldwater or blackwater ecosystems, or important to anadromous fish, and their associated riparian forest and wetlands; and
- Conservation areas already protected by public (primarily DNR or the federal government) and private organizations like The Nature Conservancy or Maryland Ornithological Society.

This Green Infrastructure provides the bulk of the state's natural support system for ecosystem services like cleaning the air, filtering and cooling water, storing and cycling nutrients, conserving and generating soils, pollinating crops and other plants, regulating climate, protecting areas against storm and flood damage, and maintaining hydrologic function. For more information on the Green Infrastructure identification project in Maryland, see www.dnr.maryland.gov/greenways/

Protection of Green Infrastructure lands may be addressed through various existing programs including public lands management, Rural Legacy, Program Open Space, conservation easements and others. Within Program Open Space, the Green Print program helps to target funds to protect Green Infrastructure areas.

Map 8 Green Infrastructure shows that, from the statewide perspective that guided the analy-

sis, several Green Infrastructure hubs are found in Prince George's County's portion of the Anacostia River Watershed. It appears that the two largest hubs have survived development of the metropolitan area because of federal land ownership and the protection from development that it has afforded. (See table below.)

Other smaller Green Infrastructure hubs are generally in locally managed park areas listed below. It is also likely that these woodland areas contribute to the Green Infrastructure due to local government protection from development. However the entire hub shown on the map may not be protected from development:

- Fairfield Regional Park
- Indian Creek Stream Valley Park
- Northway Fields Park in Greenbelt
- Prince George's Sports Center

Woodland Acreage Summary For Large Green Infrastructure (GI) Hubs				
Site	Management	Acreage		Percent Of Site
		Total	GI Woodland	
National Agricultural Research Center (Beltsville)	Federal	9,177	3,173	35
Greenbelt Regional Park	Federal	1,141	1,018	89

Forest Habitat

Large blocks of forest provide habitat for specialized species that need conditions with relatively little influence by species from open areas or humans. For example, forest interior dwelling birds require forest interior habitat for their survival and they cannot tolerate much human presence. Map 9 Forest Interior shows blocks of contiguous forest that are at least 50 acres in size with at least 10 acres of forest interior (forest edge is at least 300 feet away). These woodlands may be locally important within the watershed. This size threshold was chosen to help ensure that the forest interior is large enough to likely provide locally significant habitat for sensitive forest interior dwelling species.

Several findings on forest interior can be seen on the map or interpreted in comparing it with the Green Infrastructure and protected lands maps:

- Forest interior areas (50 acre definition) are more numerous and more widely distributed than Green Infrastructure hubs because the forest interior size threshold is lower.
- Within Green Infrastructure hubs, large forest blocks vary in forest interior habitat quality. For example in the Greenbelt Regional Park, most of the forest west of I-95 is rated as high quality forest habitat. However, most of the forest east of I-95 is rated as "other" quality forest habitat.
- Some large forest blocks on the map do not meet Green Infrastructure qualifications but may be locally significant forest habitat. Some examples are the large forest blocks in and around Capitol Heights, in Glenarden and near the boundary of College Park and Riverdale Park. In and around these wooded areas, site management can have important implications for habitat as well as other quality of life issues. For example, the absence of native food plants, the presence of nonnative invasive vegetation and choice of management techniques can significantly affect the quality of habitat in the woodland. Also, around the edge of the woodlands, lawn maintenance and maintenance of mani-

cured vegetation instead of natural vegetation affect conditions in the woodland.

Wetlands

In the context of the Watershed Restoration Action Strategy (WRAS), wetlands serve valuable water quality and habitat functions that may not be provided by other land uses. Therefore, protection and enhancement of existing wetlands, and restoration of past wetland areas, can be a valuable element in the WRAS.

Map 10 Wetlands shows the distribution and categories of the nearly 2,000 acres of wetlands in the watershed that are identified in DNR's Wetland Inventory. The map shows that a large fraction of these wetlands are concentrated in several areas associated with streams and their riparian area and/or floodplains. Other small areas of wetlands are more dispersed.

The remainder of this section of wetlands is contributed by the Maryland Department of Environment, which has regulatory authority over lands in the State. (8)

General Description

The Anacostia River watershed in Maryland covers area that is in two physiographic provinces: the Piedmont and Coastal Plain. However, the Prince George's portion of the watershed is entirely within the Coastal Plain. Channel morphology changes near the boundary of the Piedmont/Coastal Plain physiographic regions. Significant sediment deposition normally occurs in the transition area downstream of the boundary as the material, which had been carried by the higher velocity flows from the Piedmont, settles out since it can no longer be transported by the slower flows of the flatter Coastal Plain province. Existing mud flats and debris along the tidal shoreline limit the extent of vegetated wetlands. The elevation of the mud flats and their prolonged inundation during high tides are unfavorable conditions for supporting emergent vegetation. Debris is also believed to abrade the shoreline and smother vegetation that may colonize the shoreline. The mudflats themselves may also be important habitat for wildlife species such as shorebirds. (9)

Remaining tidal wetlands in the Washington Metropolitan basin, which includes the Anacostia watershed, are of three major types: shrub swamp dominated by smooth alder and black willow, tidal swamp forest with red maple and ash, tidal fresh marshes with smartweed and rice cutgrass, and fresh marshes dominated by spatterdock. The estimated total acreage in the basin in Maryland is less than 300 acres. (10)

Native plants in the floodplains of Coastal Plain watershed include birch, elm, alder, willow, red maple, sycamore, and beech. However, extensive land clearing and landscaping has results in the introduction and spread of many non-native woody and herbaceous species.

Nontidal wetlands were likely historically supported by both overbank flooding and high ground water seepage as hydrology sources, as suggested by the description of hydric soils in the *Soil Survey of Prince George's County*. However, intense urbanization has resulted in incised stream channels, so that overbank flooding rarely occurs. Remaining wetlands may be drier than they were in times of less urbanization since the remaining hydrology is often from groundwater alone. Lack of overbank flooding would also reduce the importance of the wetland as an area of floodwater attenuation. Remaining wetlands probably still provide water quality benefits by uptake and transformation of nutrients and sediment

trapping. The nontidal wetlands most effective at nutrient transformation may be the wetlands on the very poorly drained Johnston soils with their high organic matter. The soil type is not common in the county, but there is an extensive area on the Beltsville Agricultural Research Center property. These wetlands are probably among the least disturbed in the watershed and include the Beltsville Bottomland Forest nontidal wetland of special State concern.

Some wetlands on abandoned mine sites in the Little Paint Branch sub-watershed have been found to support vernal pools and amphibian breeding habitat in their intermitent waters. Some vernal pools also exist as seeps from toes of slopes within the floodplain. A large wetland system of mature forest split by a utility right of way contains an area with bog conditions and a rare plant species. The site is known as McKnew Bog and may qualify as a nontidal wetland of special State concern, though the site has not been evaluated for formal designation. This site is also supported by seepage from adjacent slopes. (11)

In the Indian Creek sub-watershed, there are additional wetlands in sediment and wash ponds associated with a mining operation. The wetlands are largely dominated by Phragmites, and show little vegetative diversity. The major function provided by these wetlands is water quality improvement. There is some evidence that Phragmites is one of the more effective plants for uptake of nutrients and some metals. Some vernal pools, critical as amphibian breeding habitat, also exist in some of the mined areas. On the west side of I-95, a series of wetlands supported by groundwater seepage along the highway embankment contain a diverse bog plant community. The site, Aitcheson's Bog, may also be considered for future listing as a nontidal wetland of special State concern.

Wetlands of Special State Concern

Designated nontidal Wetlands of Special State Concern, as described by the Maryland Department of Natural Resources in *Ecological Significance of Nontidal Wetlands of Special State Concern* (1991), are summarized below:

- *Beltsville Bottomland Forest* is an extensive site on the Beltsville Agricultural Research Center that supports numerous bottomland and forest interior bird species. The site is also part of a large contiguous forest extending through the Patuxent Research Refuge and Ft. Meade. Large forest systems are rare in central Maryland.
- *Buck Lodge Road Bog* is an acidic, sphagnous seep wetland in a powerline right of way. The maintenance of the right of way, which prevents woody plant succession, mimics the effect that fire and floods once had on the plant community. The site supports several rare plant species adapted to the very wet, acidic conditions.
- *Route I-95 Bog* is an acidic, sphagnous bog in a powerline right of way with some rare plant species.
- *Beck Woods* represents a complex of rare large, mature forested wetland, shallow open water, and emergent wetlands. It has one of the highest concentrations of neotropical migrant birds in the mid-Atlantic region. There is also a high diversity of dragonfly species and habitat for amphibians and waterfowl in addition to migratory songbirds and other wildlife. Beck Woods, Beltsville Bottomland Forest, Beltsville Airport Bog, and Beltsville Forest and Meadow are nearly contiguous nontidal wetlands of special State concern. The wetlands have often been used for research.
- *Beltsville Airport Bog* is a diverse shrub bog and emergent wetland complex. Non-forested wetlands of this size are unusual in

central Maryland. The wetlands supported at least two rare plants in 1991, provide important amphibian habitat and dense shrub wetland is excellent bird habitat.

- *Beltsville Forest and Meadow* consists of bottomland forest, shrub swamp, and an emergent and bog area under a powerline. The area provides excellent habitat for insects, amphibians, birds, and large mammals. Beck Woods, Beltsville Bottomland Forest, Beltsville Airport Bog, and Beltsville Forest and Meadow are nearly contiguous nontidal wetlands of special State concern. The wetlands have often been used for research.
- *Beltsville Seasonal Ponds* are isolated depressions similar to Delmarva Bays that are found primarily on the Eastern Shore. The ponds are generally dry in the summer, and supported at least one rare plant species in 1991. The site has often been used for research and provides excellent breeding habitat for salamanders and breeding habitat for migratory songbirds.

Tracking Wetland Change

The Anacostia River watershed once had extensive areas of wetlands, particularly tidal freshwater wetlands. In its 1994 report, the U.S. Army Corps of Engineers, mentioned historical sources describing extensive marshes dominated by wild rice. There was an estimated 2,600 acres of tidal marsh in the Anacostia River extending through Washington DC to Bladensburg in Maryland. In Prince George's County, flood control projects resulted in the loss of 800 acres of wetlands. This included 713 acres of wetlands along Northeast Branch and Northwest Branch and 134 acres along Indian Creek and Paint Branch. An additional 348 acres of area identified by the Corps of Engineers as bottomland hardwood, which may also have included wetlands, was also lost. One Prince George's County flood control project was completed as recently as 1975. At the time of the 1994 report, an estimated 100 acres of vegetated tidal wetlands remained, primarily due to dredging and channelization of the entire tidal portion of the river in the 1920's and 1930's. The largest remaining tidal marsh is Kenilworth Marsh in the District of Columbia.

Within Maryland, oversight of activities affecting wetlands involves several regulatory jurisdictions. The Maryland Department of the Environment (MDE) is the lead agency for

Tracking Nontidal Wetland Change Anacostia River Watershed In Maryland 1/1/1991 through 12/31/2003 Tracking MDE In Acres				
Permanent Impacts	**Permittee Mitigation**	**Programmatic Gains**	**Other Gains**	**Net**
-28.21	32.33	0	1.11	5.23

Notes for the tracking wetlands table: 1) Regulatory tracking for authorized nontidal wetland losses began in 1991. Comprehensive tracking of voluntary wetland gains began in 1998. 2) "Permanent Impacts" refers to acres altered (filled, drained) under permit from MDE. 3) "Permittee Mitigation" refers to acres restored by a permit holder as required by terms of the permit from MDE. 4) "Programmatic Gains" refers to acres restored by MDE using fees paid into a compensation fund by a permit holder in lieu of undertaking mitigation himself. 5) "Other Gains" refers to acres of wetlands restored when not required as mitigation for permitted losses.

the State. It cooperates with DNR, the Army Corps of Engineers and other Federal and local agencies. As part of its responsibility, MDE tracks State permitting and the net gain or loss of wetlands over time. The following table summarizes MDE's record of changes that have occurred in the watershed.

Restoration

In the northern part of the Indian Creek subwatershed, some wetlands have developed or have been expanded as a result of mining activities. There are also some disturbed areas that may be suitable for creation, restoration, or enhancement. There are other areas along Indian Creek that were investigated for mitigation potential, though these were primarily for stream restoration. There were opportunities noted for riparian buffer enhancement, removal of fish blockages, but opportunity to re-establish floodplain connections were fair to poor. Small areas of filled wetlands were also noted.

Despite the extensive development, a number of partially forested stream valley parks and several nontidal Wetlands of Special State Concern remain. Enhancement opportunities may exist in the stream valley park, though wetlands may be limited. Parks to be investigated under the Army Corps study include Northwest Branch, Paint Branch and Beltsville Community Park. Some opportunity may exist also on Beltsville Agricultural Research Center (BARC) property. Several sites on BARC property have been used for wetland mitigation, and other opportunities may exist. Opportunities for expanding, enhancing, or increasing protection of the nontidal Wetlands of Special State Concern are encouraged.

In 1993, approximately 32 acres of tidal wetlands were created using dredged material at Kenilworth Marsh in the District of Columbia. In order to measure success, one of the reference sites for comparison was at Dueling Creek in Prince George's County. This site is one of the few remaining marshes in the Anacostia system. Prior to channelization however, the marsh may have part of the Anacostia River bottom. The site has also been used or recommended as a reference site for other tidal restoration projects. In restoring tidal freshwater wetlands, critical factors for success include establishing correct elevations, excluding goose predation by mechanical means or selection of plant species not preferred by geese, and consideration of natural revegetation potential and whether or not planting is appropriate. (12)

The goal for restoration in Prince George's County in the Corps project was to restore fish and wildlife habitat. Potential sites were investigated in Prince George's County in Bladensburg, but were rejected as it was considered infeasible to restore wetlands while maintaining the integrity of the flood control project. In the 1994 Corps of Engineers feasibility report, 34 sites in the entire watershed were evaluated as possible wetland creation sites. Additional sites were evaluated for wetland creation as part of retrofit stormwater projects. Some of these projects have since been constructed. Several wetland/stormwater retrofit were constructed in Montgomery County in the Paint Branch watershed in 2000, and three similar projects were completed in the Prince George's County portion of the watershed in 2001-2002: Indian Creek Stormwater Management Facilities Nos. 10 and 5, and the Greenleaf Road Stormwater Management Facility. The three projects created 1.1 acres of wetlands. Approximately 3.5 acres of wetlands were created in the floodplain of Northwest Branch near Fordham Street.

Preservation

Two categories of significance for wetland

preservation in the Anacostia River watershed are Nontidal Wetlands of Special State Concern and tidal wetlands.

Floodplains

Map 11 Floodplains And Hydric Soil shows that floodplains cover over 4,300 acres in Prince George's County's portion of the Anacostia River watershed. In aggregate, these floodplains are roughly twice as common as wetlands in the watershed.

As the map shows, hydric soils tend to occur along streams but they extend well beyond the areas now defined as floodplains. There appears to be a pattern that can be seen by comparing hydric soils to floodplains to wetlands. The pattern suggests that in many riparian areas currently containing hydric soils may represent historic bottom lands that had wetland and/or floodplain functions. This pattern also supports the theory that hydric soils are remnants left behind after landscape alterations reduced wetlands and floodplains from their historic geographic extent.

Stream Buffers

The Anacostia River watershed in Prince George's County has about 196 miles of streams, including the Anacostia River mainstem, according to data from the Maryland Department of Planning. Using the streams data and land use data (2002 Prince George's County) in computerized GIS, the land adjacent to these streams was identified as shown in Map 12 Stream Buffers and Open Land on Hydric Soil. This method of assessing buffer condition can be used in the absence of field data collected by stream corridor assessment. Findings of this assessment summarized in the table and the map suggest that opportunities for stream buffer restoration are available for further investigation.

Areas that lack naturally vegetated buffers are divided into three categories: Developed land, open land (agricultural land or barren land) on hydric soil and open land on non-hydirc soils. Based on this limited assessment, creating naturally vegetated stream buffers on open land on hydric soil offers the greatest potential for improving water quality and habitat as described in the following sections.

The map also shows stream buffer restoration projects reported 1998 through 2002 in the Forest Service database. The database lists 30 projects stretching along nearly 3.9 miles of stream bank and covering nearly 21 acres.

Benefits of Stream Buffers

Natural vegetation like forest in riparian zones provides numerous benefits:

Stream Buffer Summary Anacostia Watershed in Prince George's County		
Riparian Area Land Type	Miles	Percent
Naturally Vegetated Buffers	132	73
Developed Lands	23	13
Open Land On Hydric Soil	10	6
Open Land On Other Soils	14	8
Total (excludes 17 miles lacking LU data)	179	100

- Reducing surface runoff
- Preventing erosion and sediment movement
- Using nutrients for vegetative growth and moderating nutrient entry into the stream
- Moderating temperature, particularly reducing warm season water temperature
- Providing organic material (decomposing leaves) that are the foundation of natural food webs in stream systems
- Providing overhead and in-stream cover and habitat
- Promoting high quality aquatic habitat and diverse populations of aquatic species.

Headwater Streams

Headwater streams are also called first order streams. For many watersheds, first order streams drain the majority of the land within the entire watershed. Therefore, stream buffers restored along headwater streams tend to have greater potential to intercept nutrients and sediments than stream buffers placed elsewhere. In targeting stream buffer restoration projects, giving higher priority to headwater streams is one approach to optimizing nutrient and sediment retention.

Restoring headwater stream buffers can also provide habitat benefits that can extend downstream of the project area. Forested headwater streams provide important organic material, like decomposing leaves that "feed" the stream's food web. They also introduce woody debris that enhances in-stream physical habitat. The potential for riparian forest buffers to significantly influence stream temperature is greatest in headwater regions. These factors, in addition to positive water quality effects, are key to improving aquatic habitat.

Land Use Adjacent To Streams

One factor that affects the ability of stream buffers to intercept nonpoint source pollutants is adjacent land use. Nutrient and sediment loads from different land uses can vary significantly.

Stream buffers can effectively intercept nonpoint source sediment and phosphorus if these pollutants arising from land that is characterized by continuing soil disturbance/exposure. Examples of these land uses are some types of agriculture, grass lawns and athletic fields, unpaved roads and parking areas.

Based on monitoring conducted in Maryland, nonpoint source nitrogen entering streams appears to be greatest from development using septic systems and from certain types of agriculture depending on past and present application of fertilizer and manure. Targeting stream buffer restoration, using deep-rooted vegetation, to these areas may intercept nitrogen in groundwater before it emerges in streams. Naturally vegetated stream buffers on hydric soil have the potential to intercept nitrogen because plant roots are more likely to be in contact with groundwater for longer periods of time.

Optimizing Stream Buffer Restorations

Strategic targeting of stream buffer restoration projects may provide many different benefits. To maximize multiple benefits, site selection and project design need to incorporate numerous factors. For example, finding a site with a mix of attributes like those below could result in the greatest control of nonpoint source pollution and enhancement to living resources:

- Land owner willingness / incentives
- Marginal land use in the riparian zone
- Headwater stream areas
- Soil type like hydric or highly erodible soils
- Selecting appropriate woody or grass species, natural vegetation for habitat
- Enhancing adjacent wetlands and habitat.

Living Resources and Habitat

Living resources, including all the animals, plants and other organisms require water to survive. They and their habitats are intimately connected to water quality and availability. Living resources respond to changes in water and habitat conditions in ways that help us interpret the status of water bodies and the effects of watershed conditions. In some cases, water quality is measured in terms of its ability to support specific living resources like trout or shellfish. Information on living resources is presented here to provide a gauge of water quality and habitat conditions in the watershed. It is also a potential measure of efforts to manage water quality and watersheds for the living resources that depend on them.

Fish

Map 13 Fish Spawning and MBSS Index shows that spawning of anadromous fish like white perch and herring is documented in Maryland's portion of the Anacostia River mainstem according to DNR Fisheries Service historic and current. Additionally DNR Fisheries Service data indicates that spawning also extends upstream into Lower Beaverdam Creek near the District of Columbia, lower Northwest Branch and lower Northeast Branch.

The map also shows that fish communities in lower Northwest Branch and lower Northeast Branch were ranked as "good" by the Maryland Biological Stream Survey (MBSS) using their Fish Index of Biological Integrity. This finding suggests that at least some fish species are coping with water quality impairments affecting the area. However, the map also shows that some upstream areas, like Lower Beaverdam Creek, are rated poor or very poor using the same index. These low ratings are included in Maryland's 303(d) list of impairments. (See impairments.)

DNR Fisheries Service is cooperating with local jurisdictions in an ongoing monitoring and stocking program for herring. Some of the herring that enter the Anacostia River for spawning are briefly captured to collect eggs. The eggs are taken to DNR's Manning Hatchery where they are fertilized and the larva that hatch are nurtured for a short time. Over the past five years, about 11 million herring larva have been released in the Anacostia.

Signs of improvements have been observed in fish surveys conducted in the Anacostia watershed. Increasing numbers of hickory shad are appearing in fish counts. Additionally, small mouth bass have established self-sustaining populations in Upper Northwest Branch. This population arose from stocking by DNR Fisheries Service in Montgomery County. Small mouth bass are now being found in some Prince George's County streams.

Overall, fish monitoring and supplemental fish stocking will continue to be necessary to document local conditions and trends. Also, improvements to water quality and habitat are necessary to sustain and improve fish populations.

Fish Passage Blockage

Limits to the extent of anadromous fish spawning tend to be associated with fish blockages in the Anacostia River watershed. About 130 blockages were identified across the watershed in an inventory conducted between 1998 and 2000 by the Metropolitan Washington Council of Governments (MWCOG). About 50 of these blockages are ranked as priority for removal. DNR's 2004 Stream Corridor Assessment can be used to update the blockage list.

Fourteen fish blockages have been corrected in the Anacostia Watershed using Wilson Bridge mitigation funds. Removal of a series of fish blockages in lower Northwest Branch and lower Sligo Creek in the past five years has expanded spawning for anadromous fish. However, in the lower Northwest Branch stream segment that was opened to fish passage by these projects, a new blockage has appeared that hampers fish spawning potential. Apparently, in-stream erosion is continuing to unearth buried utilities and near-stream structures in this part of the Anacostia watershed. This experience suggests that new blockages will continue to be created as waterways adjust to excessive stormwater flows. (13, 14)

Fish Consumption Advisory

Two fish tissue monitoring sites are located in Prince George's County's portion of the Anacostia River watershed: Anacostia River mainstem at the Bladenburg Road Bridge and the Northeast Branch near the Riverdale Road Bridge downstream of the gage. Considering data from these stations and others around the State, MDE issued revised fish consumption advisories for Maryland in June 2004. (15)

The June 2004 Advisory did not single-out water bodies in the Anacostia River watershed but several advisories from Maryland and the District of Columia are applicable to fish caught in the watershed:

- Consumption of fish from the Anacostia River in Washington DC is banned due to contamination by PCB (polychlorinated biphenols) and pesticides. (16)
- Statewide advisories for methyl mercury affect portions of the watershed as summarized in the table below. This toxic compound accumulates over time in the bodily tissues of fish and people who eat them. Eventually mercury levels in a person could reach levels that would cause damage to nerves and cause other problems.

Statewide - 2004 Advisory On Fish Consumption For Methyl-Mercury Recommended Maximum Allowable Meals Per Year

Species	Area	General Population 8oz meal	Women 6oz meal	Children 3oz. meal
Smallmouth & Largemouth Bass	Lakes, Impoundments	48	48	24
	Rivers and Streams	no advisory	96	96
Bluegill	Lakes, Impoundments	96	96	96

In the fish consumption advisory table, summary table, recommendations by MDE are listed in "meals per year". An easier way to consider the recommendation might be to think in terms of weekly menus. For example, it would be best to limit eating bluegill taken from ponds or lakes to less than two meals a week. For smallmouth and largemouth bass from ponds and lakes, the recommendation is to limit consumption to less than one meal per week for adults and less than one meal per month for children. (Children are more susceptible to effects of mercury toxicity than adults.)

Biological Monitoring In Streams

Unimpaired natural streams may support a great diversity of species like bacteria, algae, fish, birds, reptiles, mammals and invertebrates like crayfish and insects. All these groups of organisms have been extensively assessed relative to water quality and habitat quality. One group, benthic invertebrates, was found to serve as a good indicator of stream condition including water quality and habitat quality.

Why Benthos Is Important

Benthic invertebrates are sometimes called "stream bugs" though that name overly simplifies the diverse membership of this group. This group includes mayflies, caddisflies, crayfish, etc., that inhabit the stream bottom, its sediments, organic debris and live on plant life (macrophytes) within the stream. Benthic macro-invertebrates are an important component of a stream's ecosystem.

The food web in streams relies significantly on benthic organisms. Benthos is often the most abundant source of food for fish and other small animals. Many benthic macroinvertebrates live on decomposing leaves and other organic materials in the stream. By this activity, these organisms are significant processors of organic materials in the stream. Benthos often provides the primary means that nutrients from organic debris are transformed to other biologically usable forms. These nutrients become available again and are transported downstream where other organisms use them.

Assessment of benthic organisms is a valuable tool for stream evaluation. This species group has been used extensively in water quality assessment, in evaluating biological conditions of streams and in gauging influences on streams by surrounding lands. These organisms serve as good indicators of water resource integrity because they are fairly sedentary in nature and their diversity offers numerous ways to interpret conditions like their different sensitivities to changing conditions, their wide range of functions in the stream and their use of different life cycle strategies for survival.

Assessment Of Local Streams

During the 1990s, the Maryland Biological Stream Survey (MBSS) developed a standardized procedure for assessing benthic populations and communities. Their assessments are translated into an index that is intended to communicate overall in-stream conditions relative to comparable streams. Beginning in 1994, MBSS has been assessing stream conditions using this method. Conditions that underlie MBSS indices are complex and apply primarily to a local stream segment. Typically, a stream segment ranks as a mix of good, fair, poor and/or very poor for the indices developed for benthic macroinvertebrates, fish and physical habitat. There is a tendency for good/fair conditions to be associated with watersheds with the least disturbance (natural vegetation, forest) and for poor/very poor conditions to be associated with greater disturbance (impervious area, agriculture, construction sites).

MBSS findings relating to benthic macroinvertabrates are displayed on Map 14 Benthos - MBSS Index and summarized in the following table. Overall, very poor ratings were reported for most of sites assessed in the watershed.

Poor and very poor ratings are most commonly found in streams that drain areas that are dominated by development or intensive agriculture. The causes are frequently associated with excessive stormwater flows, reduced groundwater inflow, and poor habitat conditions like unstable substrate.

Ratings of good or fair tend to be associated with the relatively undisturbed watersheds including conditions like areas of forest and naturally vegetated riparian areas, and extensive use of best management practices that are carefully installed and maintained.

MBSS Benthic Index Summary
Anacostia River Watershed In Prince George's County

Subwatershed	Data Collection	Findings
Indian Creek	1994	Poor and Very Poor
Little Paint Branch	1997	Very Poor
Lower Beaverdam Cr. / Cattail Cr	1997	Very Poor
Northeast Branch	2000	Very Poor
Northwest Branch	1997, 2000	Very Poor
Upper Beaverdam Creek	1997	Good, Fair, Very Poor

Sensitive Species

Sensitive species are generally recognized as being the plants or animals that are most at risk in regards to their ability to maintain healthy population levels. The most widely known are perhaps the State and Federally-listed Endangered or Threatened animals such as the bald eagle. In addition to charismatic animals such as these however, both the United States Fish and Wildlife Service and the Maryland DNR work through their respective Federal and State programs to protect a wide variety of declining non-game animals, rare plants, and the unique natural communities that support them.

For the purposes of watershed restoration, it is valuable to account for the known locations and areas of potential habitat for sensitive species in a given area. They are often indicators, and sometimes, important constituents, of the network of natural areas which form the foundation for many essential natural watershed processes. In fact, in addition to conserving biodiversity in general, protecting these species and/or promoting expansion of their habitats can be an effective component for a watershed restoration program.

DNR's Wildlife and Heritage Service identifies important areas for sensitive species conservation in different ways. Several sensitive species overlays are used by the State of Maryland to delineate habitat associated with these species. The purpose of utilizing these delineations is to help protect sensitive species by identifying the areas in which they are known to occur. Doing so allows DNR to work toward the conservation of these sensitive resources by evaluating potential impacts of proposed actions that may affect them. Specifically, working with established procedures, the Wildlife and Heritage Service reviews projects and provides recommendations for activities within these overlays.

Map 15 Sensitive Species shows the general locations of sensitive species conservation areas in Prince George's County's portion of the Anacostia River watershed. A list of rare species tracked by Maryland in the Anacostia River watershed, including 98 plants and 14 animals, is in the Appendix D - Sensitive Species. (17)

The geographic areas covered by these overlays are course filters. To allow for uncertainty pertaining to interpretation discrepancies, the polygons used on the map to depict these locations have been buffered. Accurate on the ground information regarding species locations and habitat delineations for a specific area can be obtained from DNR's Natural Heritage Program.

It is also important to note that outside of the Chesapeake Bay Critical Area, DNR generally only places requirements on projects requiring a permit/approval or those that are utilizing State funds. However, there are more broadly applied State and Federal laws and regulations that address "takings" of listed species.

In addition, many counties have incorporated safeguards for areas associated with sensitive species into their project and permit review processes as well as adopting specific ordinances in some cases to protect them. In all instances, property owners are encouraged to seek advice on protecting the sensitive species / habitat within their ownership.

Ecologically Sensitive Area (ESA)

At least 20 ESAs are identified in the Prince George's County portion of the Anacostia River Watershed as shown in Map 15 Sensitive Species. Each ESA contains one or more sensitive species habitats. However, the entire ESA is not considered sensitive habitat. The ESA is an envelope identified for review purposes to help ensure that applications for permit or approval in or near sensitive areas receive adequate attention and safeguards for the sensitive species / habitat they contain.

Wetlands of Special State Concern (WSSC)

There are several WSSCs are designated in the project area. About 475 acres are designated in the Upper Beaverdam Creek subwatershed. Around 10 acres are designated in the Prince George's County portion of the Paint Branch subwatershed, which is mostly on Little Paint Branch and also in a small area on the northwestern edge of College Park. These selected wetlands, which generally represent the best examples of Maryland's nontidal wetland habitats, are afforded additional protection in State law beyond the permitting requirements that apply to wetlands generally. The Maryland Department of the Environment may be contacted for more information regarding these regulations. To help ensure that proposed projects that may affect a WSSC are adequately reviewed, an ESA is always designated to encompass each WSSC and the area surrounding it. For a listing of designated sites see COMAR 26.23.06.01 at www.dsd.state.md.us

Natural Heritage Area (NHA)

No NHAs are located in the Anacostia River Watershed. In general, NHAs are designated because they represent rare ecological communities. They are areas that provide important sensitive species habitat. They are designated in State regulation (COMAR 08.03.08.10) and are afforded specific protections in the Critical Area Law criteria. For proposed projects that could potential affect a particular NHA, recommendations and/or requirements may be put in place during the permit or approval process.

Land Use And Land Cover

Water quality in streams and rivers is greatly influenced by riparian area land, land use throughout the watershed, soils, vegetative cover and many other terrestrial factors. This chapter explores immediately available information within DNR that relate to land in the Anacostia River watershed within Prince George's County.

Land Use

Map 16 Land Use shows the distribution of major land use categories in Maryland's portion of the Anacostia river watershed based on 2002 data from two sources:

- For Prince George's County only, using County land use data for their portion of the Anacostia watershed, about half of the watershed is developed and about a third is woodland (including most types of terrestrial natural vegetation areas). Lawns and other types of grassland account for about a tenth of the watershed. All forms of agriculture account for about 4% of the total project area All other land uses combined account for only about 2% of the Anacostia River watershed in Prince George's County.
- For Montgomery County only, using 2002 land use/cover data from the Maryland Department of Planning (which is not directly comparable to the data referenced for Prince George's County), more that half of Montgomery County's portion of the watershed is also developed.

Viewing these generalized land use categories as indicators of potential nonpoint sources of nutrients, developed lands are likely to contribute the greatest loads to local waterways. Agricultural lands likely contribute a less significant portion of nonpoint source nutrient loads.

The Metropolitan Washington Council of Governments (MWCOG), in cooperation with Maryland DNR and the University of Maryland has developed a land use / land cover data sets for the entire Anacostia River watershed using several sources of remote sensing data. These include 1999-2000 LANDSAT 7 imagery and 2000-2001 IKONOS imagery. Land use assessments that cover more than one local jurisdiction are available.

Protected Lands

As used in the context of watershed restoration, "protected land" includes any land with some form of long-term limitation on conversion to development. This protection may be in various forms: public ownership for natural resource or low impact recreation, private ownership where a third party acquired the development rights or otherwise acquired the right to limit use through the purchase of an easement, etc. The extent of "protection" varies greatly from one circumstance to the next. For some protected land, it may be necessary to explore the details of land protection parcel by parcel through the local land records office to determine the true extent of protection.

For purposes of watershed restoration, an understanding of existing protected lands can provide a starting point in prioritizing potential restoration activities. In some cases, protected lands may provide opportunities for restoration projects because owners of these lands may value natural resource protection or enhancement goals.

Map 17 Protected Land presents the status of protected lands in the Prince George's County portion of the Anacostia River watershed. The largest category of protected land in the watershed is in Federal ownership encompassing nearly 10,500 acres. The majority of this land is managed by the National Agricultural Research Center (Beltsville) covering about 9,177 acres. The National Park Service manages about 1,141 acres in Greenbelt Regional Park. The remaining Federal land is managed by other Federal entities.

Other protected land on the map tends to be publicly owned by the Maryland-National Capital Park and Planning Commission. This land cover about 3,559 acres and is managed for conservation/recreation purposes. The pattern of this ownership, the result of many years of effort to protect riparian areas along streams, probably serves to support improvement in water quality and habitat. This pattern of conservation ownership is even more visible in Montgomery County that is also shown on the map (but not included in the acreage summary).

Impervious Area

Roads, parking areas, roofs and other human constructions are collectively called impervious surface. Impervious surface blocks the natural seepage of rain into the ground. Unlike many natural surfaces, impervious surface typically concentrates stormwater runoff, accelerates flow rates and directs stormwater to the nearest stream. Watersheds with small amounts of impervious surface tend to have better water quality in local streams than watersheds with greater amounts of impervious surface.

Map 18 Impervious Surface reflects data developed by the University of Maryland's Regional Earth Sciences Application Center (RESAC). It shows that the urban/suburban character in most of the Anacostia River watershed in Prince George's County contributes to significant average imperviousness in most subwatersheds. This assessment indicates that most stream water quality and aquatic habitat in this area probably has significant negative impacts caused by stormwater.

Only one subwatershed, Upper Beaverdam Creek, has an average imperviousness that is less than 10%. This condition appears to be a result of Federal ownership associated with the National Agricultural Research Center.

All the subwatersheds close to the District of Columbia in Prince George's County average at least 20% impervious. Most of these subwatersheds are between 30% and 35% average imperviousness. Average imperviousness of this magnitude always has negative impacts on water quality and aquatic habitat unless extensive mitigation efforts are successfully implemented.

The map also shows local average percent impervious that various from high imperviousness (dark) to low imperviousness (light). The patterns of dark and light areas on the map show that some stream riparian areas, like the Northwest Branch, do not have development immediately adjacent to the stream. The undeveloped area of Greenbelt Regional Park can also be readily seen on the map due to its low imperviousness.

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Appendix A - Glossary	
303(d)	A section of the federal Clean Water Act requiring the states to report waters impaired for the uses for which they have been designated, and the reasons for the impairment. Waters included in the "303(d) list" are candidates for having TMDLs developed for them.
305(b)	A section of the federal Clean Water Act that requires periodic assessment of the status of waters in a State or similar jurisdiction.
319	A section of the federal Clean Water Act dealing with non-point sources of pollution. The number is often used alone as either a noun or an adjective to refer to some aspect of that section of the law, such as grants.
8-digit watershed	Maryland has divided the state into 138 watersheds, each comprising an average of about 75 square miles, that are known as 8-digit watersheds because there are 8 numbers in the identification number each has been given. These nest into the 21 larger 6-digit watersheds in Maryland which are also called Tributary Basins or River Basins. Within the Chesapeake Bay drainage, 8-digit watersheds also nest into 10 Tributary Team Basins.
Anadromous Fish	Fish that live most of their lives in salt water but migrate upstream into fresh water to spawn.
Benthos	Organism that live on the bottom of a body of water.
BMP	Best Management Practice. As used here refers to on-the-ground approaches to control erosion, sedimentation, or stormwater movement.
CBNERR	The Chesapeake Bay National Estuarine Research Reserve in a federal, state and local partnership to protect valuable estuarine habitats for research, monitoring and education. The Maryland Reserve has three components: Jug Bay on the Patuxent River in Anne Arundel and Prince Georges' Counties, Otter Point Creek in Harford County and Monie Bay in Somerset County.
COMAR	Code Of Maryland Regulations (Maryland State regulations)
CREP	Conservation Reserve Enhancement Program, a program of MDA. CREP is a federal/state and private partnership which reimburses farmers at above normal rental rates for establishing riparian forest or grass buffers, planting permanent cover on sensitive agricultural lands and restoring wetlands for the health of the Chesapeake Bay.
CRP	Conservation Reserve Program, a program of Farm Service Agency in cooperation with local Soil Conservation Districts. CRP encourages farmers to take highly erodible and other environmentally-sensitive farm land out of production for ten to fifteen years.
CWAP	Clean Water Action Plan, promulgated by EPA in 1998. It mandates a statewide assessment of watershed conditions and provides for development of Watershed Restoration Action Strategies (WRASs) for priority watersheds deemed in need of restoration.

Appendix A - Glossary	
CWiC	Chesapeake 2000 Agreement watershed commitments. CWiC is a shorthand phrase used in the Chesapeake Bay Program.
CZARA	The Coastal Zone Reauthorization Amendments of 1990, intended to address coastal non-point source pollution. Section 6217 of CZARA established that each state with an approved Coastal Zone Management program must develop and submit a Coastal Non-Point Source program for joint EPA/NOAA approval in order to "develop and implement management measures for NPS pollution to restore and protect coastal waters".
CZMA	Coastal Zone Management Act of 1972, establishing a program for states and territories to voluntarily develop comprehensive programs to protect and manage coastal resources (including the Great Lakes). Federal funding is available to states with approved programs.
Conservation Easement	A legal document recorded in the local land records office that specifies conditions and/or restrictions on the use of and title to a parcel of land. Conservation easements run with the title of the land and typically restrict development and protect natural attributes of the parcel. Easements may stay in effect for a specified period of time, or they may run into perpetuity.
DNR	Department of Natural Resources (Maryland State)
EPA	Environmental Protection Agency (United States)
ESA	Ecologically Significant Area, an imprecisely defined area in which DNR has identified the occurrence of rare, threatened and/or endangered species of plants or animals, or of other important natural resources such as rookeries and waterfowl staging areas.
GIS	Geographic Information System, a computerized method of capturing, storing, analyzing, manipulating and presenting geographical data.
MBSS	Maryland Biological Stream Survey, a program in DNR that samples small streams throughout the state to assess the condition of their living resources.
MDA	Maryland Department of Agriculture
MDE	Maryland Department of the Environment
MDP	Maryland Department of Planning
MET	Maryland Environmental Trust, an organization that holds conservation easements on private lands and assists local land trusts to do similar land protection work.
MGS	Maryland Geological Survey, a program in DNR
MWCOG	Metropolitan Washington Council of Governments is a regional agency focused on assisting and coordinating selected local government activities in and around Washington DC including, but not limited to, transportation and environment.
NHA	Natural Heritage Area, a particular type of DNR land holding, designated in COMAR

Appendix A - Glossary	
NOAA	National Oceanic and Atmospheric Administration, an agency of the US Department of Commerce that, among other things, supports the Coastal Zone Management program, a source of funding for some local environmental activities, including restoration work.
NPS	Non-Point Source, pollution that originates in the landscape that is not collected and discharged through an identifiable outlet.
NRCS	Natural Resources Conservation Service, formerly the Soil Conservation Service, an agency of the US Department of Agriculture that, through local Soil Conservation Districts, provides technical assistance to help farmers develop conservation systems suited to their land. NRCS participates as a partner in other community-based resource protection and restoration efforts.
PDA	Public Drainage Association
RAS	Resource Assessment Service, a unit of DNR that carries out a range of monitoring and assessment activities affecting the aquatic environment.
Riparian Area	1. Land adjacent to a stream. 2. Riparian areas are transitional between terrestrial and aquatic ecosystems and are distinguished by gradients in biophysical conditions, ecological processes, and biota. They are areas through which surface and subsurface hydrology connect waterbodies with their adjacent uplands. They include those portions of terrestrial ecosystems that significantly influence exchanges of energy and matter with aquatic ecosystems (i.e. a zone of influence). Riparian areas are adjacent to perennial, intermittent, and ephemeral streams, lakes, and estuarine-marine shorelines. (National Research Council, *Riparian Areas: Functions and Strategies for Management*. Executive Summary page 3. 2002)
SAV	Submerged Aquatic Vegetation, important shallow-water sea grasses that serve as a source of food and shelter for many species of fin- and shell-fish.
SCA(M)	Stream Corridor Assessment is an activity carried out by DNR Watershed Services in support of WRAS development and other management needs, in which trained personnel walk up stream channels noting important physical features and possible sources of problems.
SCD	Soil Conservation District is a county-based, self-governing body whose purpose is to provide technical assistance and advice to farmers and landowners on the installation of soil conservation practices and the management of farmland to prevent erosion.
Synoptic Survey	A short term sampling of water quality and analysis of those samples to measure selected water quality parameters. A synoptic survey as performed by DNR in support of watershed planning may be expanded to include additional types of assessment like benthic macroinvertebrate sampling or physical habitat assessment.

Appendix A - Glossary	
TMDL	Total Maximum Daily Load, a determination by MDE of the upper limit of one or more pollutants that can be added to a particular body of water beyond which water quality would be deemed impaired.
Tributary Teams	Geographically-focused groups, appointed by the Governor, oriented to each of the 10 major Chesapeake Bay tributary basins found in Maryland. The teams focus on policy, legislation, hands-on implementation of projects, and public education. Each basin has a plan, or Tributary Strategy.
USFWS	United States Fish and Wildlife Service, in the Department of Interior
USGS	United States Geological Survey
Water Quality Standard	Surface water quality standards consist of two parts: (a) designated uses of each water body; and (b) water quality criteria necessary to support the designated uses. Designated uses of for all surface waters in Maryland (like shell fish harvesting or public water supply) are defined in regulation. Water quality criteria may be qualitative (like "no objectionable odors") or quantitative (toxic limitations or dissolved oxygen requirements)
Watershed	All the land that drains to an identified body of water or point on a stream.
WRAS	Watershed Restoration Action Strategy, a document outlining the condition of a designated watershed, identifying problems and commiting to solutions of prioritized problems.
WSSC	Wetland of Special State Concern, a designation by MDE in COMAR.
WWTP	Wastewater Treatment Plant. Usually refers to sewage treatment facility.

Appendix B – Maryland Water Quality Summary
Anacostia River Watershed Characterization
MDE Data Summarized By DNR Watershed Services

Throughout this appendix, “Bact.” means Enterococcus bacteria.

Northwest Branch Station NWA0002									
DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
10/7/2002	6.5	316	0.1	7.2	0.7411	0.0251	2.4	30	2.38
10/21/2002	9.8	270	0.1	7.2	1.2208	0.0396	5.2	170	0.7
11/6/2002	10.9	172	0	7.7	1.426	0.1137	36	4110	4.48
11/18/2002	11.3	181	0	6.9	1.175	0.101	30.4	2600	1.89
12/2/2002	14	320	0.2	7	1.6393	0.0265	4.5	140	0.14
12/16/2002	12.1	444	0	7.2	1.6415	0.045	9.2	420	0.7
1/6/2003	12.6	3700	2	6.9	2.5889	0.0548	10	290	0.72
1/21/2003	14.2	700	0	6.9	2.3578	0.0232	20.8	110	
2/3/2003	13.2	696	0.3	7	2.3	0.0299	6.7	70	1.32
3/3/2003	13.1	645	0.3	7.4	1.734	0.0897	58	400	3.36
3/17/2003	10.8	447	0.2	7.5	1.7817	0.0153	2.5	20	1.68
4/21/2003	10.3	376	0.2	7.4	1.6325	0.0168	3.2	40	9.52
5/5/2003	9.6	369	0.2	7.4	1.4389	0.02	3.7	20	7.56
5/19/2003	10	291	0.1	7.4	1.5655	0.0415	6.8	380	2.1
6/2/2003	9.3	347	0.2	7.4	1.6747	0.0316	6.4	90	0.84
6/16/2003	8.8	335	0.2	7.4	1.6016	0.0397	8	160	1.26
6/23/2003	8.8	319	0.2	7.5	1.7191	0.0379	7.2	120	1.12

Northwest Branch Station NWA0002

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
7/7/2003	7.5	241	0.1	7.3	1.77	0.0644	20.8	4110	7
7/21/2003	9.7	353	0.2	7.7	1.5924	0.018	2.4	30	4.48
8/4/2003	6.8	294	0.1	7.1	1.601	0.0417	7	1580	2.8
8/18/2003	8.1	252	0.1	7.7	1.6079	0.0505	7.1	310	3.5
8/25/2003	10.1	341	0.2	7.8	1.3383	0.0248	2.6	30	3
9/8/2003	9	325	0.2	7.5	1.3766	0.0319	3.7	40	1.68
9/22/2003	8	290	0.1	7.4	1.4057	0.0552	26	1500	1.82
10/6/2003	10.3	346	0.2	7.6	1.8458	0.0123	2.4	10	1.4
10/20/2003	9.9	325	0.2	7.5	1.3572	0.0221	2.4	70	0.96
AVERAGE	10.2	488	0.2	7.3	1.6	0.04	11.4	648	3

Northeast Branch Station NEB0002

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
10/7/2002	7.5	334	0.1	7.6	0.5711	0.0152	2.4	20	2.66
10/21/2002	10.5	330	0.1	7.5	1.2799	0.0284	2.4	60	0.98
11/6/2002	10.7	183	0	8.8	1.64	0.1265	39.3	7700	3.36
11/18/2002	11.4	205	0	6.8	1.337	0.0779	22.8	1240	1.512
12/2/2002	14.4	280	0.1	6.8	1.5162	0.0293	3.5	60	0.28

Northeast Branch Station NEB0002

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
12/16/2002	11.3	385	0	7.1	1.5825	0.0344	7.2	190	0.42
1/6/2003	12.6	1829	1	6.8	1.5238	0.0516	13.3	230	0.7
1/21/2003	14.8	454	0	7	1.9338	0.0396	6	10	0.24
2/3/2003	13.6	535	0.2	7.5	1.7772	0.0284	3.6	390	1.2
3/3/2003	13.7	455	0.2	7.2	1.518	0.0698	38	200	0.42
3/17/2003	10.6	389	0.2	7.3	1.4851	0.024	4	60	1.26
4/21/2003	12.5	314	0.2	7.7	1.2738	0.0233	5.2	50	11.9
5/5/2003	11.1	307	0.2	7.8	1.228	0.021	3.1	30	6.44
5/19/2003	10.1	253	0.1	7.3	1.2253	0.0535	8.7	500	2.1
6/2/2003	9.6	257	0.1	7.4	1.2693	0.0484	7.2	170	2.16
6/16/2003	8.7	258	0.1	7.3	1.2775	0.0512	9.2	160	1.12
6/23/2003	8.7	215	0.1	7.1	1.2551	0.0474	10.4	310	1.26
7/7/2003	8.3	274	0.1	7.5	1.2872	0.024	2.6	70	2.8
7/21/2003	11.1	283	0.1	8.6	1.2433	0.0209	2.4	10	5.32
8/4/2003	7.8	255	0.1	7.3	1.2706	0.024	2.9	260	3.92
8/18/2003	8.2	241	0.1	7.7	1.284	0.0495	17.3	360	5.46
8/25/2003	10.8	281	0.1	8.6	1.1178	0.0329	2.9	10	2.16
9/8/2003	9.9	279	0.1	7.9	1.1949	0.0337	16.4	50	1.4
9/22/2003	8.5	245	0.1	7.5			3	300	1.4
10/6/2003	12	270	0.1	8.6	1.4497	0.015	2.4	120	2.66
10/20/2003	10.1	269	0.1	7.6	1.5099	0.0303	3.1	100	2.1
AVERAGE	10.7	361	0.1	7.6	1.4	0.04	9.2	487	3

Paint Branch Station PNT0001

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
10/7/2002	8.9	375	0.2	7.9	0.6761	0.0112	2.4	40	2.38
10/21/2002	9.8	300	0.1	7.5	1.1544	0.0145	2.4	70	0.84
11/6/2002	10.4	165	0	7.2	1.387	0.064	18.7	4350	4.032
11/18/2002	10.8	207	0	7	1.2001	0.0482	15.2	1180	1.54
12/2/2002	13.1	270	0.1	7.1	1.52615	0.0269	2.4	20	0.14
12/16/2002	11.5	402	0	7.3	1.432	0.0224	4.3	60	0.28
1/6/2003	12.3	1570	0.8	6.9	1.5212	0.0217	6.4	170	0.7
1/21/2003	13.6	403	0	7	1.77615	0.016	3.4	10	0.48
2/3/2003	13.1	490	0.2	7.3	1.8073	0.0134	2.4	10	1.2
3/17/2003	10.8	362	0.2	7.6	1.5253	0.0124	2.4	10	0.98
4/21/2003	11.1	304	0.1	7.6	1.3921	0.0136	2.4	10	3.22
5/5/2003	10.5	298	0.1	7.6	1.3579	0.0143	2.4	10	2.8
5/19/2003	9.7	255	0.1	7.4	1.2474	0.034	5.2	560	1.96
6/2/2003	9.4	268	0.1	7.5	1.3121	0.017	2.4	70	0.84
6/16/2003	8.6	257	0.1	7.4	1.3273	0.0234	4.4	120	1.2
6/23/2003	8.3	235	0.1	7.3	1.3472	0.0226	5.2	170	1.26
7/7/2003	7.8	265	0.1	7.4	1.4518	0.0162	2.4	170	1.26
7/21/2003	9	379	0.2	8	1.5451	0.0132	2.4	10	2.24
8/4/2003	7.7	249	0.1	7.4	1.3265	0.0147	2.4	120	2.38
8/18/2003	7.8	229	0.1	7.7	1.2497	0.0204	2.4	500	2.28
8/25/2003	9.2	262	0.1	7.8	1.3646	0.013	2.4	20	1.2
9/8/2003	8.5	262	0.1	7.6	1.2974	0.014	2.4	20	0.56
9/22/2003	8	235	0.1	7.4	1.3515	0.0286	2.9	400	0.84
10/6/2003	10	257	0.1	7.6	1.6758	0.0147	2.4	30	1.26

Paint Branch Station PNT0001

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
10/20/2003	10.1	252	0.1	7.7	1.3333	0.0122	2.4	50	0.84
AVERAGE	10.0	342	0.1	7.4	1.4	0.02	4.2	327	1

Indian Creek Station INC0030

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
10/7/2002	8.1	249	0	7.4	1.0047	0.0171	2.4	570	1.12
10/21/2002	9.2	260	0.1	7	1.3912	0.0262	7.7	130	0.84
11/6/2002	9.9	189	0	7.2	1.696	0.1113	28	7270	3.08
11/18/2002	10.6	221	0	6.8	1.527	0.082	20	990	2.38
12/2/2002	11.4	240	0.1	6.7	1.6269	0.0143	2.4		0.7
12/16/2002	11	295	0	7	1.5693	0.0368	8.5	190	0.98
1/6/2003	10.6	2755	1.5	6.6	1.5383	0.037	25.5	100	0.7
1/21/2003	13.1	318	0	6.7	1.8239	0.0113	3.4	10	0.96
2/3/2003	12.4	413	0.2	7	1.7086	0.0154	3.3	10	2.52
3/3/2003	12.8	318	0.2	7.3	1.39	0.0747	34	50	0.84
3/17/2003	10.4	340	0.2	7.1	1.4817	0.0169	5.1	30	2.94
4/21/2003	10.9	299	0.1	7.2	1.4729	0.0136	3.4	140	7.14
5/5/2003	9.1	303	0.1	7.1	1.6553	0.016	2	70	3.36
5/19/2003	9.3	256	0.1	7.1	1.5029	0.0455	8.8	7700	3.5

Indian Creek Station INC0030

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
6/2/2003	8.6	270	0.1	7.1	1.5598	0.04	8	110	1.56
6/16/2003	7.9	265	0.1	7.2	1.4167	0.043	7.2	130	1.92
6/24/2003	7.9	258	0.1	7.1	1.617	0.061	57	60	2.1
7/7/2003	7	284	0.1	7.1	1.6029	0.0223	3.6	110	1.12
7/21/2003	7.9	289	0.1	7.1	1.6112	0.0126	2.6	280	0.98
8/4/2003	6.9	273	0.1	6.9	1.4527	0.0167	2.4	300	1.96
8/18/2003	7.2	280	0.1	7.3	1.42	0.0326	3.1	310	9.24
8/25/2003	8.2	291	0.1	7.4	1.435	0.0128	2.4	160	1.08
9/8/2003	8.1	277	0.1	7.1	1.5518	0.0179	2.4	60	0.98
9/22/2003	7.5	254	0.1	7	1.4711	0.0265	3.7	100	1.96
10/6/2003	8.8	268	0.1	7.1	1.6815	0.0126	2.4	50	0.98
10/20/2003	8.9	265	0.1	7.2	1.5181	0.0211	4.1	150	1.8
AVERAGE	9.4	374	0.1	7.1	1.5	0.03	9.7	763	2

Upper Beaverdam Creek Station BED0001

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
10/7/2002	7.4	304	0.1	7.6	3.4251	0.8937	6.3	1860	2.8
10/21/2002	8.9	260	0.1	6.9	1.9477	0.2053	6	840	0.7
11/6/2002	8.7	167	0	6.9	2.048	0.1843	43.3	8660	2.94

Upper Beaverdam Creek Station BED0001

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
11/18/2002	8.8	166	0	6.3	1.567	0.098	19.2	4110	1.89
12/2/2002	11.6	210	0.1	6.6	1.5275	0.1042	8.8	210	1.68
12/16/2002	10.6	243	0	6.5	1.6251	0.085	16	750	2.24
1/6/2003	11.7	392	0.2	6.6	1.65	0.086	21.6	1400	1.68
1/21/2003	13.2	260	0.1	6.6	1.9329	0.0965	9.1	660	3.36
2/3/2003	12.1	314	0.1	6.9	2.073	0.134	36	780	7.98
3/3/2003	11.8	300	0.1	6.7	1.573	0.0741	28.7	520	1.12
3/17/2003	9.9	250	0.1	6.9	1.63	0.1174	9.6	20	5.88
4/21/2003	10.8	217	0.1	7.1	1.302	0.1154	7.6	110	10.92
5/5/2003	9.3	212	0.1	7	1.417	0.0507	5	190	8.96
5/19/2003	9	173	0.1	6.7	1.311	0.1084	14.8	200	2.24
6/2/2003	8.5	161	0.1	6.8	1.325	0.1097	15.5	50	3.5
6/16/2003	7.6	158	0.1	6.8	1.605	0.1533	36	370	2.1
6/24/2003	7.2	151	0.1	6.8	1.481	0.1374	14	100	2.24
7/7/2003	6.4	181	0.1	6.8	1.6087	0.1221	13.8	290	1.12
7/21/2003	6.9	98	0.1	7	2.127	0.3332	10.8	100	2.24
8/4/2003	6.3	181	0.1	6.8	1.6687	0.1301	12.4	470	2.24
8/18/2003	6.4	176	0.1	7.1	1.613	0.2087	11.2	270	2.52
8/25/2003	7.1	196	0.1	7.2	2.0333	0.2332	8.7	470	1.26
9/8/2003	7.1	230	0.1	7	1.7718	0.2544	8	460	1.12
9/22/2003	7	180	0.1	6.8	1.4186	0.1363	7	100	0.42
10/6/2003	8.9	198	0.1	7	1.8572	0.0954	12.7	70	1.26
10/20/2003	8.9	191	0.1	7.1	1.6178	0.1228	8.4	230	1.12
AVERAGE	8.9	214	0.1	6.9	1.7	0.17	15.0	896	3

USDA West Wastewater Treatment Plant On Little Paint Branch MD0020851

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
2/15/2001	9.2	1020	0.5	7.2	9.3108	0.6608	2.4		
8/30/2001	7.2	550	0.3	7.4	5.2323	0.5847	2.4		
AVERAGE	8.2	785	0.4	7.3	7.3	0.62	2.4	--	---

USDA East Wastewater Treatment Plant On Upper Beaverdam Creek MD0020842

DATE	DO MG /L	CONDUCTIVITY µOMHOS /CM	SALINITY PPT	pH	TN MG /L	TP MG /L	TSS MG /L	Bact. MPN	CHLOROPHYLL µG /L
2/15/2001	10	731	0.4	7.8	12.29	4.8753	17		
8/30/2001	7.6	485	0.3	7.2	11.0302	3.3143	2.4		
AVERAGE	8.8	608	0.4	7.5	11.7	4.09	9.7	---	---

Appendix C - MDE Permits
Anacostia River Watershed

Contents

MDE Permits In Prince George's County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
GENERAL OIL CONTAMINTION GROUNDWATER REMEDIATION	BELTSVILLE SHELL	2003-OGR-4715	MDG914715	BELTSVILLE
	BP AMOCO	2004-OGR-4957	MDG914957	LANHAM
	BP/AMOCO #5172	2004-OGR-4998	MDG914998	LANDOVER HILLS
	BP/AMOCO SERVICE STATION #5155	2003-OGR-4977	MDG914977	COLLEGE PARK
	CROWN GAS STATION, MD-111	2003-OGR-4967	MDG914967	MT. RANIER
	CROWN MD-114	2003-OGR-4964	MDG914964	BLADENBURG
	FORMER CHEVRON 122208	2003-OGR-8514	MDG918514	CHILLUM
SURFACE INDUSTRIAL DISCHARGE Part 1 of 2	CAPITOL OFFICE PARK	04DP3463	MD0069205	GREENBELT
	FDA - CENTER FOR VETERINARY MEDICINE	03DP3215		LAUREL
	HEWLETT-PACKARD COMPANY	04DP3468	MD0069256	GREENBELT
	LAUREL SAND & GRAVEL, INC.	02DP0219	MD0001953	LAUREL
	MARYLAND FIRE & RESCUE INSTITUTE - COLLEGE PARK	99DP1941	MD0059161	COLLEGE PARK
	MARYLAND NATIONAL GUARD - LAUREL ARMORY	00DP3192	MD0067717	LAUREL
	NASA - GODDARD SPACE FLIGHT CENTER	00DP3156	MD0067482	GREENBELT
	NATIONAL ARCHIVES & RECORDS ADMINISTRATION	04DP2904	MD0065871	COLLEGE PARK
	ROCKWOOD PIGMENTS, N.A., INC.	98DP0492	MD0003425	BELTSVILLE

MDE Permits In Prince George's County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
SURFACE INDUSTIRAL DISCHARGE Part 1 of 2	THE WASHINGTON POST	02DP3403	MD0068900	COLLEGE PARK
	UNIVERSITY OF MARYLAND - COLLEGE PARK	01DP2618	MD0063801	COLLEGE PARK
	WMATA - LANDOVER METROBUS GARAGE FACILITY	00DP2725	MD0064521	LANDOVER
SURFACE TREATED SEWAGE EFFLUENT	USDA EAST-SIDE WWTP	97DP2525	MD0020842	BELTSVILLE
	USDA WEST-SIDE WWTP	97DP2787	MD0020851	BELTSVILLE
GENERAL PERMITS Part 1 of 3	A.H. SMITH - BRANCHVILLE	00MM2865	MDG492865	BRANCHVILLE
	ADELPHI RECREATION, INC.	01SI6570	MDG766570	ADELPHI
	BARDON, INC - LAUREL CONCRETE PLANT	00MM9755A	MDG499755	LAUREL
	BELCREST PLAZA	01SI6643	MDG766643	HYATTSVILLE
	CHANEY ENTERPRISES - SEAT PLEASANT	00MM9867	MDG499867	SEAT PLEASANT
	CHARLESTOWNE NORTH APARTMENTS	01SI6155	MDG766155	GREENBELT
	CHEROKEE MARYLAND PROPERTIES - MUIRKIRK PIT	00MM2331	MDG492331	BELTSVILLE
	CHESTNUT RIDGE	01SI6490	MDG766490	LAANHAM
	CITY OF BOWIE WATER SYSTEM	00HT9557		BOWIE
	CLARK CONSTRUCTION GROUP - COLLEGE PARK	00MM9795	MDG499795	COLLEGE PARK
	COLUMBIA PARK	01SI6594	MDG766594	LANDOVER
	COURTYARD BY MARRIOTT - LANDOVER	01SI6137	MDG766137	LANDOVER
	FAIRLANDS SPORTS & AQUATIC COMPLEX	01SI6253	MDG766253	LAUREL
	FINIAN'S COURT APARTMENTS	01SI6457	MDG766457	LANHAM
	FLETCHER'S FIELD APARTMENTS	01SI6719	MDG766719	HYATTSVILLE
	FOUNTAIN PARK APARTMENTS	01SI6750	MDG766750	HYATTSVILLE
	FOX CLUB APARTMENTS	01SI6644	MDG766644	HILLSIDE
	GATEWAY GARDENS	01SI6485	MDG766485	BLADENSBURG
	GLEN WILLOW APARTMENTS	01SI6454	MDG766454	SEAT PLEASANT
	GREENWAY VILLAGE APARTMENTS	01SI6233	MDG766233	GREENBELT
	HAMILTON POOL	01SI6431	MDG766431	HYATTSVILLE

MDE Permits In Prince George's County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
GENERAL PERMITS Part 2 of 3	HAMPTON INN COLLEGE PARK	TBA		COLLEGE PARK
	HERITAGE SQUARE	01SI6596	MDG766596	NEW CARROLLTON
	HIGHVIEW APARTMENTS - HYATTSVILLE	01SI6752	MDG766752	HYATTSVILLE
	KENILWORTH TOWERS	01SI6597	MDG766597	BLADENSBURG
	KNIGHTS OF COLUMBUS POOL	01SI6308	MDG766308	COLLEGE PARK
	LAFARGE - BRANCHVILLE BLACKTOP	00MM9825		BRANCHVILLE
	LAFARGE - LANDOVER BLACKTOP PLANT	00MM9849		LANDOVER
	LAKESIDE NORTH	01SI6759	MDG766759	GREENBELT
	LANE MANOR SPLASH POOL	01SI6432	MDG766432	HYATTSVILLE
	LANSDOWNE VILLAGE	01SI6599	MDG766599	BLADENSBURG
	M-NCPPC - ELLEN LINSON SWIMMING POOL	01SI6709	MDG766709	COLLEGE PARK
	MAPLE RIDGE APARTMENTS	01SI6743	MDG766743	LANDOVER
	MARYLANDER CONDOMINIUMS	TBA		ADELPHI
	NEW CARROLLTON RECREATION CLUB, INC.	01SI6884	MDG766884	NEW CARROLLTON
	OAKTON APARTMENTS	01SI6391	MDG766391	ADELPHI
	PARKVIEW GARDENS APARTMENTS	01SI6811	MDG766811	RIVERDALE
	PRINCE GEORGE'S SPORTS & LEARNING COMPLEX	01SI6430	MDG766430	LANDOVER
	RIVERDALE TOWERS	01SI6367	MDG766367	RIVERDALE
	RIVERDALE TOWNE APARTMENTS	01SI6439	MDG766439	LANHAM
	ROCKVILLE FUEL & FEED COMPANY - PLANT 4	00MM9769	MDG499769	BRANCHVILLE
	SEVEN SPRINGS VILLAGE APARTMENTS	01SI6524	MDG766524	COLLEGE PARK
	SUBURBAN AQUATIC CLUB, INC.	01SI6822	MDG766822	LANHAM
	SUBURBAN HILL	01SI6261	MDG766261	SILVER SPRING
	THE LIGHTHOUSE AT TWIN LAKES	TBA		BELTSVILLE
	TOWERS OF WESTCHESTER PARK	TBA		COLLEGE PARK
	UNIVERSITY GARDENS & ISABELLA PARK	01SI6760	MDG766760	ADELPHI

MDE Permits In Prince George's County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
GENERAL PERMITS Part 3 of 3	UNIVERSITY OF MARYLAND - COLLEGE PARK	00HT9427		COLLEGE PARK
	UNIVERSITY SQUARE APARTMENTS	01SI6326	MDG766326	GREENBELT
	USDA - AGRICULTURAL RESEARCH CENTER	00HT9429		BELTSVILLE
	VILLAGES AT MONTPELIER - SMALL POOL	01SI6797	MDG766797	LAUREL
	WILDERCROFT APARTMENTS	01SI6755	MDG766755	RIVERDALE
	WOODLAND LANDING APARTMENTS	01SI6757	MDG766757	LANHAM
	WOODS OF MARLTON - COLLEGE PARK	01SI6871	MDG766871	COLLEGE PARK
	WSSC - WATER DISTRIBUTION SYSTEM	00HT9504		LAUREL
	WYNFIELD PARK	01SI6470	MDG766470	COLLEGE PARK
GENERAL INDUSTRIAL STORMWATER Part 1 of 3	AGGREGATE & DIRT SOLUTIONS, LLC.	02SW1725		CAPITOL HEIGHTS
	AIRGAS EAST, INC. - HYATTSVILLE	02SW0008		HYATTSVILLE
	ALLSTAR USED AUTO PARTS, INC.	02SW1136		BELTSVILLE
	ATLANTIC TRANSPORTATION EQUIPMENT, LTD	02SW1741		BELTSVILLE
	ATMAN CORPORATION	02SW1779		LAUREL
	BARDON, INC. - LAUREL VEHICLE MAINTENANCE SHOP	02SW1662		LAUREL
	BARDON, INC. - MILLVILLE QUARRY- BLADENSBURG TERM.	02SW0772		HYATTSVILLE
	BATES TRUCKING COMPANY	02SW1856		BLADENSBURG
	BAXTER MARYLAND VACCINES - BLDG 5	02SW1661		BELTSVILLE
	BAXTER MARYLAND VACCINES - BLDG. 1	02SW1659		BELTSVILLE
	BAXTER MARYLAND VACCINES - BLDG. 2	02SW1660		BELTSVILLE
	BELTSVILLE AUTO RECYCLERS, INC.	02SW1721		BELTSVILLE
	BELTWAY USED AUTO PARTS	02SW1464		TUXEDO
	BFI - PRINCE GEORGE'S COUNTY	02SW1093		HYATTSVILLE
	BRANDYWINE ENTERPRISES - SHOP AND PLANT	02SW0149		FAIRMONT HEIGHTS
	CHEVERLY DEPARTMENT OF PUBLIC WORKS	02SW0197		CHEVERLY
	D.C. MATERIALS	02SW1745		HYATTSVILLE

MDE Permits In Prince George's County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
GENERAL INDUSTRIAL STORMWATER Part 2 of 3	DURON, INCORPORATED	02SW0466		BELTSVILLE
	EARL CENTER LUMBER COMPANY	02SW1621		LAUREL
	EAST-WEST MOTORS, INC.	02SW1724		LAUREL
	FEDERAL EXPRESS - BELTSVILLE	02SW1052		BELTSVILLE
	FIRST TRANSIT, INC. - BELTSVILLE	02SW1839		BELTSVILLE
	GIANT OF MARYLAND - LANDOVER	02SW0098		LANDOVER
	GINDER MOTOR COMPANY, INC.	02SW1366		CEDAR HEIGHTS
	GOLD LINE, INC.	02SW1083		TUXEDO
	GRIFFITH ENERGY SERVICES, INC. - CHEVERLY	02SW1380		CHEVERLY
	HALLE ENTERPRISES, INC.	02SW1829		BELTSVILLE
	INTERSTATE BRANDS CORP. - BEAVER HEIGHTS	02SW1076		BEAVER HEIGHTS
	INTERSTATE BRANDS CORP. - BELTSVILLE	02SW1077		BELTSVILLE
	J & M AUTO, INC.	02SW1679		HYATTSVILLE
	JIFFY JOHN COMPANY, INC.	02SW1299		CAPITOL HEIGHTS
	JOSEPH SMITH & SONS	02SW0654		BEAVER HEIGHTS
	KENILWORTH RECYCLING PLANT	02SW1429		CAPITOL HEIGHTS
	LAUREL SAND & GRAVEL, INC.	02SW0621		LAUREL
	METRO RE-UZ-IT COMPANY, INC.	02SW1357		HYATTSVILLE
	NAZARIO CONSTRUCTION COMPANY, INC.	02SW1276		BELTSVILLE
	NAZCON READY MIX PLANT - MARYLAND AVENUE	02SW1277		BELTSVILLE
	NAZCON, INC. - ODELL ROAD	02SW1561		BELTSVILLE
	OVERNITE TRANSPORTATION COMPANY - LANDOVER	02SW1065		LANDOVER
	PERKINS ELMER FLUID SCIENCE	02SW0316		BELTSVILLE
	PETER PAN BUS LINES - TUXEDO	02SW1158		TUXEDO
	PITT OHIO EXPRESS - TEMPLE HILLS	02SW1694		TEMPLE HILLS
	PR. GEO. COUNTY DEPT. OF PUBLIC WORKS - GLENN DALE	02SW1222		GLENN DALE

MDE Permits In Prince George's County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
GENERAL INDUSTRIAL STORMWATER Part 3 of 3	PRINCE GEORGE'S SCRAP, INC.	02SW0648		COLLEGE PARK
	ROLLINS RECYCLING CENTER, INC.	97SW1195		CAPITOL HEIGHTS
	SECURITY STORAGE CO. OF WASHINGTON - HYATTSVILLE	02SW0874		HYATTSVILLE
	SECURITY STORAGE CO. OF WASHINGTON - LANDOVER	02SW0871		LANDOVER
	SHA - METRO SHOP	02SW1326		LANDOVER
	SMITHFIELD PACKING COMPANY - LANDOVER	02SW0481		LANDOVER
	STONE INDUSTRIAL PRECISION PRODUCTS	02SW0007		COLLEGE PARK
	STRITTMATTER LAND, LLC	02SW1763		LAUREL
	THE RECYCLING CENTER	02SW1754		LAUREL
	TRY IT AGAIN, INC.	02SW1393		FAIRMOUNT HEIGHTS
	TURBO HAUL, INC.	TBA		BELTSVILLE
	U.S. ARMY - ADELPHI LABORATORY CENTER	02SW0010		ADELPHI
	UNITED PARCEL SERVICE - LANDOVER	02SW0740		LANDOVER
	UNITED PARCEL SERVICE - LANDOVER #2	02SW0858		LANDOVER
	UNITED STATES POSTAL SERVICE - RIVERDALE VMF	02SW1103		RIVERDALE
	WASHINGTON WOODWORKING COMPANY, LLC	02SW0584		LANDOVER
	WMATA - GREENBELT YARD	02SW1242		BELTSVILLE
	WMATA - NEW CARROLLTON YARD	02SW0328		HYATTSVILLE
	WORLD RECYCLING COMPANY	02SW1365		CHEVERLY
	WSSC - ANACOSTIA EQUIPMENT SHOP	02SW1735		HYATTSVILLE
	WSSC - ANACOSTIA GARAGE	02SW1736		HYATTSVILLE
MS4 GENERAL DISCHARGE Part 1 of 2	CITY OF COLLEGE PARK MS4	03-IM-5500-030		COLLEGE PARK
	CITY OF GLENARDEN MS4	03-IM-5500-031		GLENARDEN
	CITY OF GREENBELT MS4	03-IM-5500-032		GREENBELT
	CITY OF HYATTSVILLE MS4	03-IM-5500-033		HYATTSVILLE
	CITY OF NEW CARROLTON MS4	03-IM-5500-035		NEW CARROLLTON

MDE Permits In Prince George's County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
MS4 GENERAL DISCHARGE Part 2 of 2	CITY OF SEAT PLEASANT MS4	03-IM-5500--036		SEAT PLEASANT
	TOWN OF BERWYN HEIGHTS MS4	03-IM-5500-005		BERWYN HEIGHTS
	TOWN OF BLADENSBURG MS4	03-IM-5500-037		BLADENSBURG
	TOWN OF BRENTWOOD MS4	03-IM-5500-002		BRENTWOOD
	TOWN OF CAPITOL HEIGHTS MS4	03-IM-5500-006		CAPITOL HEIGHTS
	TOWN OF CHEVERLY MS4	03-IM-5500-038		CHEVERLY
	TOWN OF COLMAR MANOR MS4	03-IM-5500-039		COLMAR MANOR
	TOWN OF COTTAGE CITY MS4	03-IM-5500-040		COTTAGE CITY
	TOWN OF LANDOVER HILLS MS4	03-IM-5500-041		LANDOVER HILLS
	TOWN OF RIVERDALE PARK MS4	03-IM-5500-004		RIVERDALE PARK
	TOWN OF UNIVERSITY PARK MS4	03-IM-5500-043		UNIVERSITY PARK

MDE Permits In Montgomery County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
GENERAL OIL CONTAMINATION GROUNDWATER REMEDIATION	FREESTATE PETROLEUM CORPORATION	2003-OGR-1761	MDG911761	BURTONSVILLE
	SHERWOOD HIGH SCHOOL	2003-OGR-8975	MDG918975	SANDY SPRING
SURFACE INDUSTRIAL DISCHARGE	GANNETT MARYLAND OPERATIONS CENTER	04DP3477	MD0069329	SILVER SPRING
	HOLY CROSS HOSPITAL	04DP3470	MD0069272	SILVER SPRING
	HOWARD HUGHES MEDICAL INSTITUTE	04DP3482	MD0069337	CHEVY CHASE
	INTERNATIONAL FABRICARE INSTITUTE, INC.	99DP3093	MD0067148	SILVER SPRING
	MARYLAND MILITARY FACILITY - WHITE OAK ARMORY	00DP2867	MD0065625	SILVER SPRING
	SILVER SPRING REDEVELOPMENT PROJECT	04DP3307	MD0068241	SILVER SPRING
	TROTTERS GLEN GOLF COURSE	03DP3249		OLNEY

MDE Permits In Montgomery County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
SURFACE INDUS. WITH GROUNDWATER	PEPSI BOTTLING GROUP	00DP3111	MD0067253	SILVER SPRING
GENERAL PERMITS Part 1 of 2	BEL PRE RECREATION ASSOCIATION	01SI6474	MDG766474	SILVER SPRING
	BOYS AND GIRL CLUB	01SI6351	MDG766351	SILVER SPRING
	CALVERTON SWIM CLUB	01SI6236	MDG766236	SILVER SPRING
	CHATEAU APARTMENTS	01SI6758	MDG766758	SILVER SPRING
	COLESVILLE TOWERS APARTMENTS	01SI6550	MDG766550	SILVER SPRING
	COLUMBIA UNION COLLEGE	01SI6482	MDG766482	TAKOMA PARK
	FRANKLIN KNOLLS SWIM CLUB	01SI6791	MDG766791	SILVER SPRING
	HAMPSHIRE WEST APARTMENTS	01SI6751	MDG766751	SILVER SPRING
	INDIAN SPRING COUNTRY CLUB	01SI6606	MDG766606	SILVER SPRING
	KEMP MILL SWIM CLUB	01SI6438	MDG766438	SILVER SPRING
	LONG BRANCH OUTDOOR POOL	01SI6654	MDG766654	SILVER SPRING
	MAPLEVIEW	TBA		TAKOMA PARK
	MONTGOMERY COLLEGE - TAKOMA PARK	01SI6149	MDG766149	TAKOMA PARK
	MONTGOMERY PAINT BRANCH	01SI6581	MDG766581	SILVER SPRING
	MONTGOMERY WHITE OAK	01SI6584	MDG766584	SILVER SPRING
	OAK HILL APARTMENTS	01SI6529	MDG766529	SILVER SPRING
	OAKVIEW POOL	01SI6271	MDG766271	SILVER SPRING
	PARK RICHIE APARTMENTS	01SI6753	MDG766753	TAKOMA PARK
	PARKLAND POOL ASSOCIATION	01SI6519	MDG766519	SILVER SPRING
	PERCONTEE INC. - MCCENEY TRACT	00MM9863	MDG499863	SILVER SPRING
	PLYERS MILL CROSSING POOL	01SI6543	MDG766543	SILVER SPRING
	QUALITY INN - LANGLEY PARK	TBA		TACOMA PARK
	ROBIN HOOD SWIM CLUB	01SI6874	MDG766874	SILVER SPRING
	STONEHEDGE CONDOMINIUM	01SI6467	MDG766467	SILVER SPRING
	THE ASPEN HILL CLUB	01SI6150		SILVER SPRING
	TWIN FARMS SWIM & TENNIS CLUB	01SI6848	MDG766848	SILVER SPRING

MDE Permits In Montgomery County

Anacostia River Watershed, June 2004

FACILITY TYPE	NAME	MD PERMIT	NPDES	CITY
GENERAL PERMITS Part 2 of 2	VILLAS AT LANGLEY	01SI6388	MDG766388	HYATTSVILLE
	VILLEY MILL OUTDOOR POOL	01SI6661	MDG766661	WHEATON
	WALTER REED ARMY MEDICAL CNTR - GLEN HAVEN HOUSING	00HT9461		SILVER SPRING
	WARWICK APARTMENTS	01SI6810	MDG766810	SILVER SPRING
	WAYNE MANCHESTER TOWERS APARTMENTS	01SI6589	MDG766589	SILVER SPRING
	WHITE OAK TOWERS APARTMENTS	01SI6590	MDG766590	SILVER SPRING
GENERAL INDUSTRIAL STORMWATER	COCA-COLA BOTTLING CO. - SILVER SPRING	02SW1234		SILVER SPRING
	M-NCPPC - BROOKSIDE GARDENS MAINTENANCE YARD	02SW0389		WHEATON
	M-NCPPC - LAYHILL/BONIFANT RUBBLE FILL	02SW0344		SILVER SPRING
	M-NCPPC - MARTIN LUTHER KING, JR. PARK	02SW0338		WHITE OAK
	M-NCPPC - NORTHWEST PARK GOLF COURSE	02SW0398		WHEATON
	M-NCPPC - OLNEY MANOR PARK MAINTENANCE YARD	02SW0341		OLNEY
	M-NCPPC - SLIGO CREEK GOLF COURSE	02SW0342		SILVER SPRING
	M-NCPPC - WHEATON REGIONAL PARK	02SW0343		WHEATON
	MONTGOMERY COLLEGE - TAKOMA PARK	02SW0289		TAKOMA PARK
	MONTGOMERY COUNTY - COLESVILLE DEPOT	02SW0267		SILVER SPRING
	MONTGOMERY COUNTY PUBLIC SCHOOLS - RANDOLPH	02SW0522		SILVER SPRING
	MONTGOMERY COUNTY SCHOOLS - WEST FARM DEPOT	02SW1258		COLESVILLE
	SHA - FAIRLAND SHOP	02SW1320		SILVER SPRING
	WMATA - GLENMONT YARD	02SW1241		GLENMONT
MS4 GENERAL DISCHARGE	CITY OF TAKOMA PARK MS4	03-IM-5500-028		TAKOMA PARK

Appendix D - Sensitive Species
Anacostia Watershed In Maryland

EXPLANATION OF RANK AND STATUS CODES

As of January 2003, the global and state ranking system is used by all 50 state Natural Heritage Programs and numerous Conservation Data Centers in other countries in this hemisphere. Because they are assigned based upon standard criteria, the ranks can be used to assess the range-wide status of a species as well as the status within portions of the species' range. The primary criterion used to define these ranks are the number of known distinct occurrences with consideration given to the total number of individuals at each locality. Additional factors considered include the current level of protection, the types and degree of threats, ecological vulnerability, and population trends. Global and state ranks are used in combination to set inventory, protection, and management priorities for species both at the state as well as regional level.

Blank means that no rank or status is assigned – all categories.

GLOBAL RANK

- G1 Highly globally rare. Critically imperiled globally because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres) or because of some factor(s) making it especially vulnerable to extinction.
- G2 Globally rare. Imperiled globally because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres) or because of some factor(s) making it very vulnerable to extinction throughout its range.
- G3 Either very rare and local throughout its range or distributed locally (even abundantly at some of its locations) in a restricted range (e.g., a single western state, a physiographic region in the East) or because of other factors making it vulnerable to extinction throughout its range; typically with 21 to 100 estimated occurrences.
- G4 Apparently secure globally, although it may be quite rare in parts of its range, especially at the periphery.
- G5 Demonstrably secure globally, although it may be quite rare in parts of its range, especially at the periphery.
- GH No known extant occurrences (i.e., formerly part of the established biota, with the expectation that it may be rediscovered).
- GU Possibly in peril range-wide, but its status is uncertain; more information is needed.
- GX Believed to be extinct throughout its range (e.g., passenger pigeon) with virtually no likelihood that it will be rediscovered.
- G? The species has not yet been ranked.
- _Q Species containing a "Q" in the rank indicates that the taxon is of questionable or uncertain taxonomic standing (i.e., some taxonomists regard it as a full species, while others treat it at an infraspecific level).
- _T Ranks containing a "T" indicate that the infraspecific taxon is being ranked differently than the full species.

STATE RANK

S1 Highly State rare. Critically imperiled in Maryland because of extreme rarity (typically 5 or fewer estimated occurrences or very few remaining individuals or acres in the State) or because of some factor(s) making it especially vulnerable to extirpation. Species with this rank are actively tracked by the Natural Heritage Program.

S2 State rare. Imperiled in Maryland because of rarity (typically 6 to 20 estimated occurrences or few remaining individuals or acres in the State) or because of some factor(s) making it vulnerable to becoming extirpated. Species with this rank are actively tracked by the Natural Heritage Program.

S3 Rare to uncommon with the number of occurrences typically in the range of 21 to 100 in Maryland. It may have fewer occurrences but with a large number of individuals in some populations, and it may be susceptible to large-scale disturbances. Species with this rank are not actively tracked by the Natural Heritage Program.

S3.1 A species that is actively tracked by the Natural Heritage Program because of the global significance of Maryland occurrences. For instance, a G3 S3 species is globally rare to uncommon, and although it may not be currently threatened with extirpation in Maryland, its occurrences in Maryland may be critical to the long term security of the species. Therefore, its status in the State is being monitored.

S4 Apparently secure in Maryland with typically more than 100 occurrences in the State or may have fewer occurrences if they contain large numbers of individuals. It is apparently secure under present conditions, although it may be restricted to only a portion of the State.

S5 Demonstrably secure in Maryland under present conditions.

SA Accidental or considered to be a vagrant in Maryland.

SE Established, but not native to Maryland; it may be native elsewhere in North America.

SH Historically known from Maryland, but not verified for an extended period (usually 20 or more years), with the expectation that it may be rediscovered.

SP Potentially occurring in Maryland or likely to have occurred in Maryland (but without persuasive documentation).

SR Reported from Maryland, but without persuasive documentation that would provide a basis for either accepting or rejecting the report (e.g., no voucher specimen exists).

SRF Reported falsely (in error) from Maryland, and the error may persist in the literature.

SU Possibly rare in Maryland, but of uncertain status for reasons including lack of historical records, low search effort, cryptic nature of the species, or concerns that the species may not be native to the State. Uncertainty spans a range of 4 or 5 ranks as defined above.

SX Believed to be extirpated in Maryland with virtually no chance of rediscovery.

SYN Currently considered synonymous with another taxon and, therefore, not a valid entity.

SZ A migratory species which does not inhabit specific locations for long periods of time.

S? The species has not yet been ranked.

-B This species is migratory and the rank refers only to the breeding status of the species. Such a migrant may have a different rarity rank for non-breeding populations.

-N This species is migratory and the rank refers only to the non-breeding status of the species. Such a migrant may have a different rarity rank for breeding populations.

STATE STATUS

This is the status of a species as determined by the Maryland Department of Natural Resources, in accordance with the Nongame and Endangered Species Conservation Act. Definitions for the following categories have been taken from Code of Maryland Regulations (COMAR) 08.03.08.

- E Endangered; a species whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.
- I In Need of Conservation; an animal species whose population is limited or declining in the State such that it may become threatened in the foreseeable future if current trends or conditions persist.
- T Threatened; a species of flora or fauna which appears likely, within the foreseeable future, to become endangered in the State.
- X Endangered Extirpated; a species that was once a viable component of the flora or fauna of the State, but for which no naturally occurring populations are known to exist in the State.
- * A qualifier denoting the species is listed in a limited geographic area only.
- PE Proposed Endangered; a species whose continued existence as a viable component of the State's flora or fauna is determined to be in jeopardy.
- PT Proposed Threatened; a species of flora or fauna which appears likely, within the foreseeable future, to become endangered in the State.
- PX Proposed Endangered Extirpated; a species that was once a viable component of the flora or fauna of the State, but for which no naturally occurring populations are known to exist in the State.
- PD Proposed to be deleted or removed from the State Threatened & Endangered Species list.

FEDERAL STATUS

This is the status of a species as determined by the U.S. Fish and Wildlife Service's Office of Endangered Species, in accordance with the Endangered Species Act. Definitions for the following categories have been modified from 50 CRF 17.

- LE Taxa listed as endangered; in danger of extinction throughout all or a significant portion of their range.
- LT Taxa listed as threatened; likely to become endangered within the foreseeable future throughout all or a significant portion of their range.
- PE Taxa proposed to be listed as endangered.
- PT Taxa proposed to be listed as threatened.
- C Candidate taxa for listing for which the Service has on file enough substantial information on biological vulnerability and threat(s) to support proposals to list them as endangered or threatened.

Current and Historical Rare, Threatened, and Endangered Species
Anacostia River Watershed (02140205) January 2004

Scientific name	Common name	G-rank	S-rank	MD	US
Agalinis obtusifolia	Blunt-leaved gerardia	G4G5Q	S1	E	
Agalinis setacea	Thread-leaved gerardia	G5?	S1	E	
Agrimonia striata	Woodland agrimony	G5	S1	E	
Aimophila aestivalis	Bachman's sparrow	G3	SHB	X	
Amelanchier obovalis	Coastal juneberry	G4G5	SR		
Amelanchier stolonifera	Running juneberry	G5	S2	T	
Ammodramus henslowii	Henslow's sparrow	G4	S1S2B	T	
Anagallis minima	Chaffweed	G5	SU	X	
Antennaria solitaria	Single-headed pussytoes	G5	S2	T	
Apocynum sibiricum	Clasping-leaved dogbane	G5?	SH	X	
Arethusa bulbosa	Arethusa	G4	SH	X	
Aristida curtissii	Curtiss' three-awn	G5T5	SU		
Arnica acaulis	Leopard's-bane	G4	S1	E	
Arundinaria gigantea	Giant cane	G5	S2		
Asclepias rubra	Red milkweed	G4G5	S1	E	
Aster concolor	Silvery aster	G4?	S1	E	
Aster radula	Rough-leaved aster	G5	S1	E	
Baptisia australis	Wild false indigo	G5	S2	T	
Bidens mitis	Small-fruited beggar-ticks	G4?	S1	E	
Buchnera americana	Blue-hearts	G5?	SH	X	
Calopogon tuberosus	Grass-pink	G5	S1	E	
Carex aquatilis	Water sedge	G5	S1		
Carex echinata	Little prickly sedge	G5	S1		
Carex lacustris	Lake-bank sedge	G5	S2	T	
Carex pellita	Woolly sedge	G5	S2?		
Carex shortiana	Short's sedge	G5	S2	E	
Carex tenera	Slender sedge	G5	SH	X	
Carex venusta	Dark green sedge	G4	S2	T	
Carex vestita	Velvety sedge	G5	S2	T	
Chlorotettix sp 1	A cicadellid leafhopper	G?	SU		
Cicindela patruela	Green-patterned tiger beetle	G3	S1	E	
Coptis trifolia	Goldthread	G5	S1	E	
Corallorhiza wisteriana	Wister's coralroot	G5	S1	E	
Cyperus retrofractus	Rough cyperus	G5	S2		
Desmodium rigidum	Rigid tick-trefoil	G?Q	S1	E	
Eriocaulon decangulare	Ten-angled pipewort	G5	S2		
Etheostoma vitreum	Glassy darter	G4G5	S1S2	T	
Eupatorium maculatum	Spotted Joe-pye-weed	G5	SU	X	
Euphorbia obtusata	Blunt-leaved spurge	G5	S1	E	
Euphorbia zinniiflora	Flowering spurge	G5	SU		
Gentiana andrewsii	Fringe-tip closed gentian	G5?	S2	T	

Current and Historical Rare, Threatened, and Endangered Species
Anacostia River Watershed (02140205) January 2004

Scientific name	Common name	G-rank	S-rank	MD	US
Gentiana villosa	Striped gentian	G4	S1	E	
Gomphus rogersi	Sable clubtail	G4	S1	E	
Gratiola viscidula	Short's hedge-hyssop	G4G5	S1	E	
Haliaeetus leucocephalus	Bald eagle	G4	S2S3B	T	LT
Ilex decidua	Deciduous holly	G5	S2		
Iris prismatica	Slender blue flag	G4G5	S1	E	
Iris verna	Dwarf iris	G5	S1	E	
Juglans cinerea	Butternut	G3G4	S2S3		
Juncus brachycarpus	Short-fruited rush	G4G5	SU		
Juncus longii	Long's rush	G3G4Q	S1	E	
Kyllinga pumila	Thin-leaved flatsedge	G5	S1	E	
Laccophilus schwarzi	Schwarz' diving beetle	G?	SX		
Lathyrus palustris	Vetchling	G5	S1	X	
Lechea tenuifolia	Narrow-leaved pinweed	G5	SH	X	
Leptodea ochracea	Tidewater mucket	G4	SU		
Limotettix minuendus	Eastern sedge barrens planthopper	G1	S1		
Linum floridanum	Florida yellow flax	G5?	SH	X	
Linum intercursum	Sandplain flax	G4	S2	T	
Ludwigia hirtella	Hairy ludwigia	G5	S1	E	
Lupinus perennis	Wild lupine	G5	S2	T	
Lycopodiella caroliniana	Carolina clubmoss	G5	S1	X	
Lygodium palmatum	Climbing fern	G4	S2	T	
Melica mutica	Narrow melicgrass	G5	S1	T	
Melothria pendula	Creeping cucumber	G5?	S1	E	
Micranthemum micranthemoides	Nuttall's micranthemum	GH	SH	X	
Neotoma magister	Allegheny woodrat	G3G4	S1	E	
Nephus gordoni	A coccinellid beetle	G?	SU		
Onosmodium virginianum	Virginia false-gromwell	G4	S1	E	
Orthilia secunda	One-sided pyrola	G5	SH	X	
Panicum aciculare	Bristling panicgrass	G4G5	SU		
Panicum oligosanthes	Few-flowered panicgrass	G5	S2S3		
Panicum scabriusculum	Tall swamp panicgrass	G4	S1	E	
Parthenium integrifolium	American feverfew	G5	S1	E	
Passiflora incarnata	Purple passionflower	G5	S1?		
Percina notogramma	Stripeback darter	G4	S1	E	
Plantago cordata	Heart-leaved plantain	G4	SH	X	
Platanthera blephariglottis	White fringed orchid	G4G5	S2	T	
Platanthera flava	Pale green orchid	G4	S2		
Platanthera peramoena	Purple fringeless orchid	G5	S1	T	
Polygala cruciata	Cross-leaved milkwort	G5	S2	T	
Potamogeton spirillus	Spiral pondweed	G5	S1		
Prunus pumila	Eastern dwarf cherry	G5	SU		

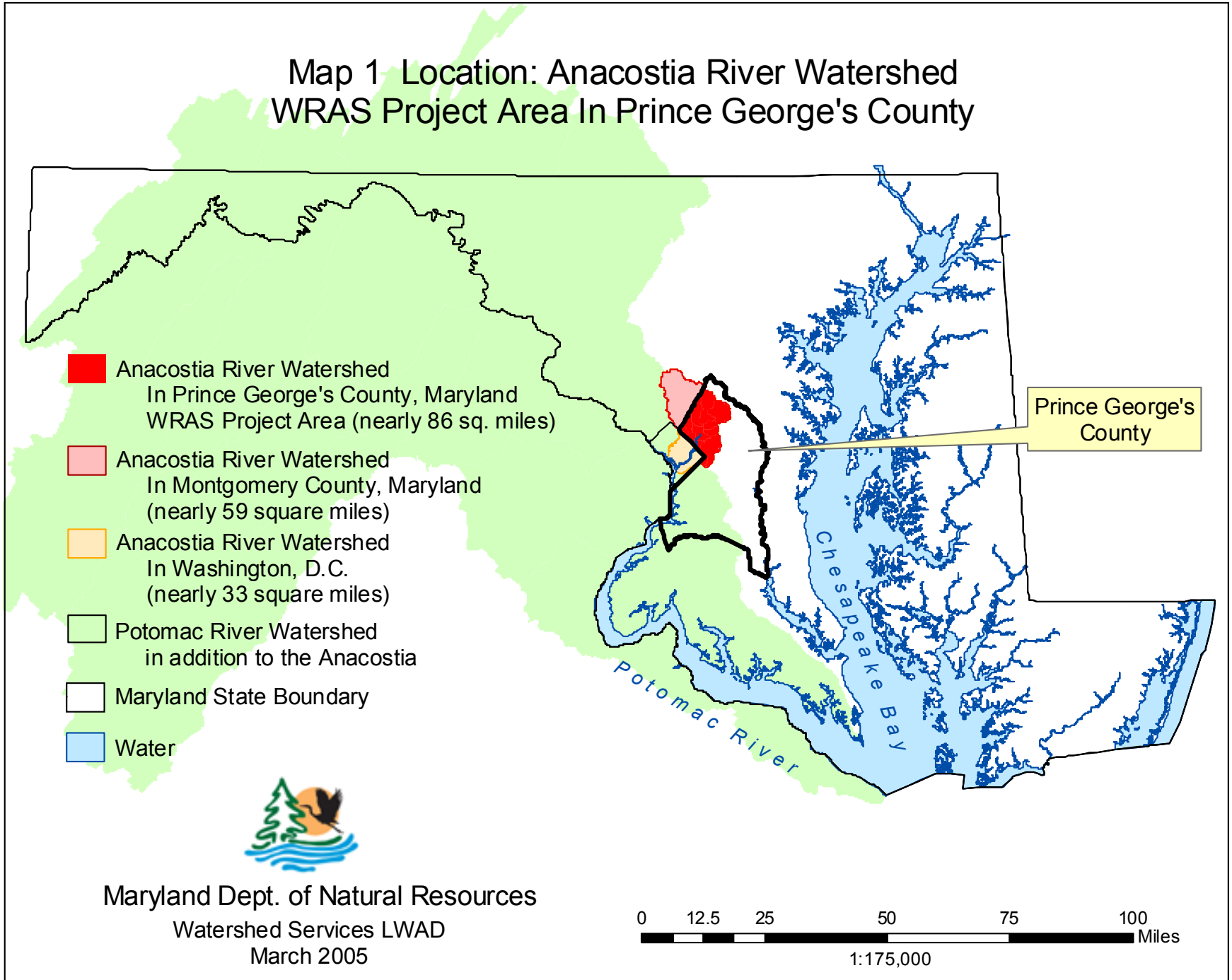
Current and Historical Rare, Threatened, and Endangered Species
Anacostia River Watershed (02140205) January 2004

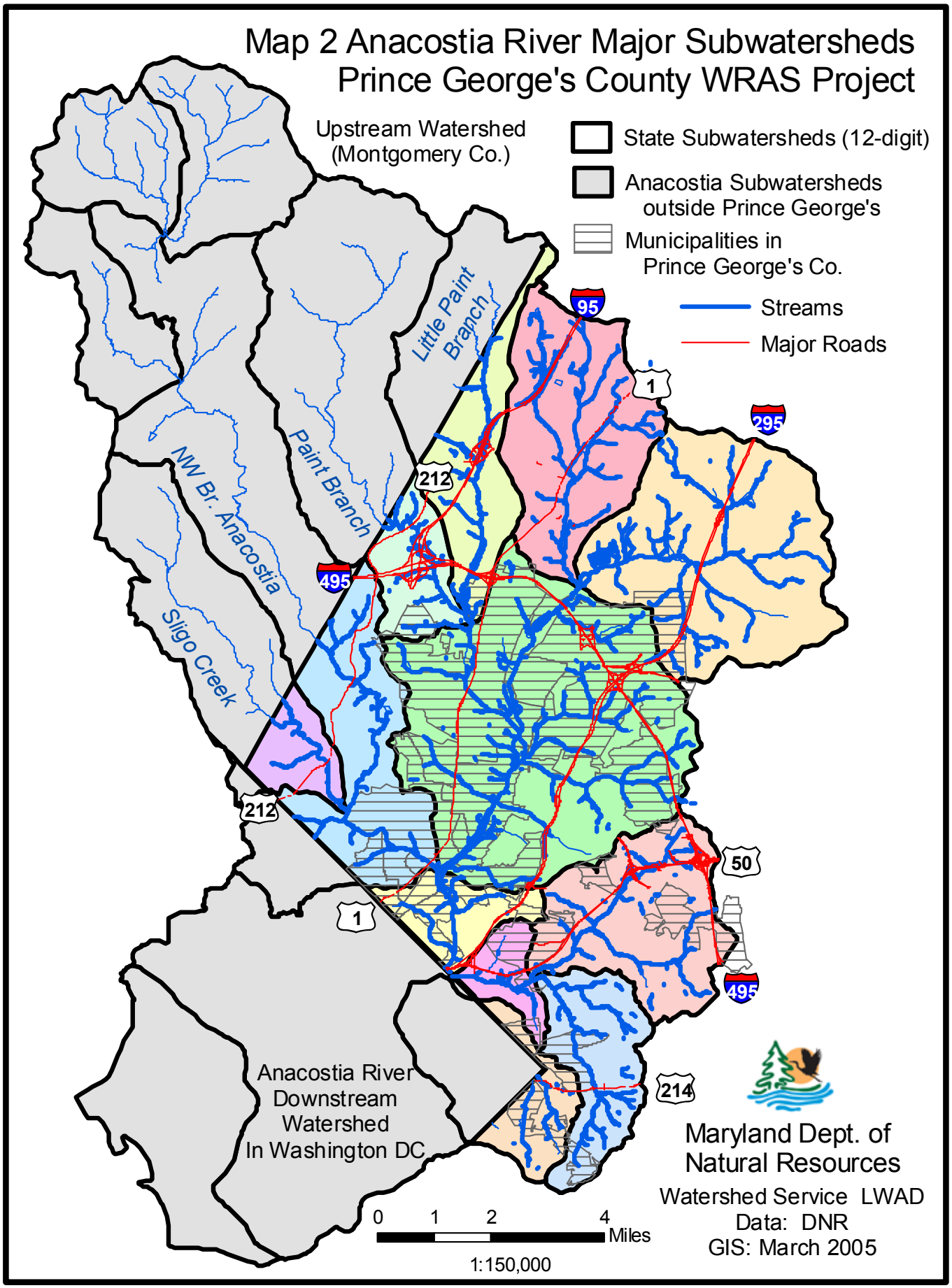
Scientific name	Common name	G-rank	S-rank	MD	US
Pycnanthemum pycnanthemoides	Southern mountain-mint	G5	SH	X	
Pyrola virens	Greenish-flowered pyrola	G5	SH	X	
Ranunculus ambigens	Water-plantain spearwort	G4	SH	X	
Reithrodontomys humulis	Eastern harvest mouse	G5	SH	X	
Rhynchospora cephalantha	Capitate beakrush	G5	S1	E	
Rhynchospora globularis	Grass-like beakrush	G5?	S1	E	
Rhynchospora microcephala	Tiny-headed beakrush	G5	S2S3		
Sagittaria engelmanniana	Engelmann's arrowhead	G5?	S2	T	
Salix tristis	Dwarf prairie willow	G4G5	S1		
Sanguisorba canadensis	Canada burnet	G5	S2	T	
Sarracenia purpurea	Northern pitcher-plant	G5	S2	T	
Scirpus smithii	Smith's clubrush	G5?	SU	X	
Scirpus verecundus	Bashful bulrush	G4G5	S2S3		
Scleria reticularis	Reticulated nutrush	G4	S2		
Silene nivea	Snowy campion	G4?	S1	E	
Smilax pseudochina	Halberd-leaved greenbrier	G4G5	S2	T	
Solidago speciosa	Showy goldenrod	G5	S2	T	
Sorex hoyi winnemana	Southern pygmy shrew	G5T4	S2		
Sperchopsis tessellatus	A hydrophilid beetle	G?	S2		
Sphenopholis pensylvanica	Swamp-oats	G4	S1S2	T	
Sphodros rufipes	Red-legged purse-web spider	G4	S1S2		
Spiranthes ochroleuca	Yellow nodding ladys' tresses	G4	S1	E	
Stellaria alsine	Trailing stitchwort	G5	S1	E	
Stenanthium gramineum	Featherbells	G4G5	S1	T	
Thelypteris simulata	Bog fern	G4G5	S2	T	
Tofieldia racemosa	Coastal false asphodel	G5	SX	X	
Torreyochloa pallida	Pale mannagrass	G5?	S1	E	
Vitis cinerea	Graybark	G4G5	SU		
Vitis rupestris	Sand grape	G3	S1		

Other:
Colonial Waterbird nesting colony

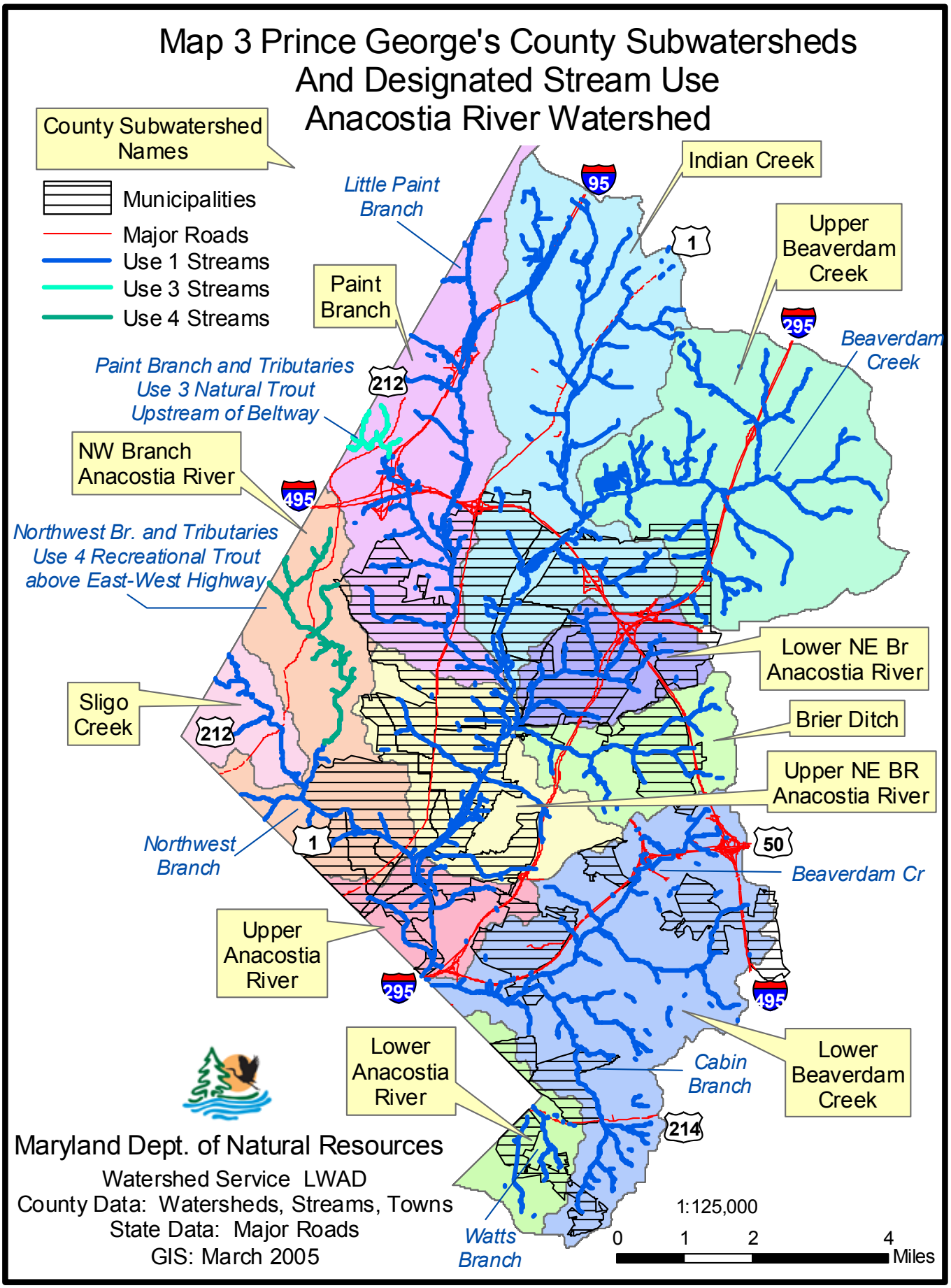
This list was created by the Dept. of Natural Resources Natural Heritage Program in January 2004. Color code for rows: No color – plants;
Yellow – animals (mammals, birds, etc.)

Map 1 Location: Anacostia River Watershed
WRAS Project Area In Prince George's County




Map 2 Anacostia River Major Subwatersheds
Prince George's County WRAS Project
Upstream Watershed
(Montgomery Co.)
State Subwatersheds (12-digit)
Anacostia Subwatersheds
outside Prince George's
Municipalities in
Prince George's Co.
Streams
Major Roads
Little Paint Branch
Paint Branch
NW Br. Anacostia
Sligo Creek
95
295
212
495
1
50
214
Anacostia River
Downstream
Watershed
In Washington DC
0 1 2 4
Miles
1:150,000
Maryland Dept. of
Natural Resources
Watershed Service LWAD
Data: DNR
GIS: March 2005

Map 3 Prince George's County Subwatersheds And Designated Stream Use Anacostia River Watershed



Maryland Dept. of Natural Resources

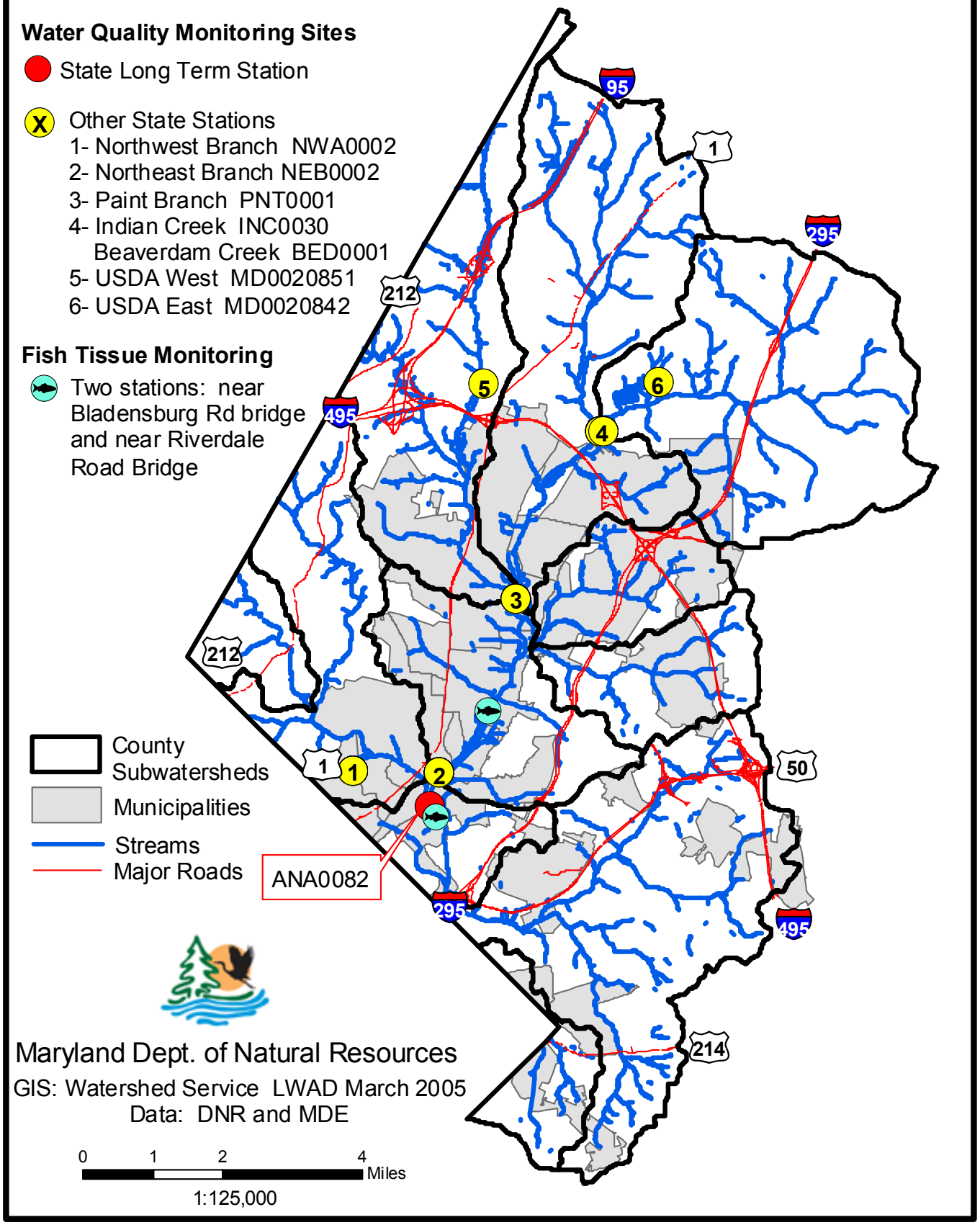
Watershed Service LWAD

County Data: Watersheds, Streams, Towns

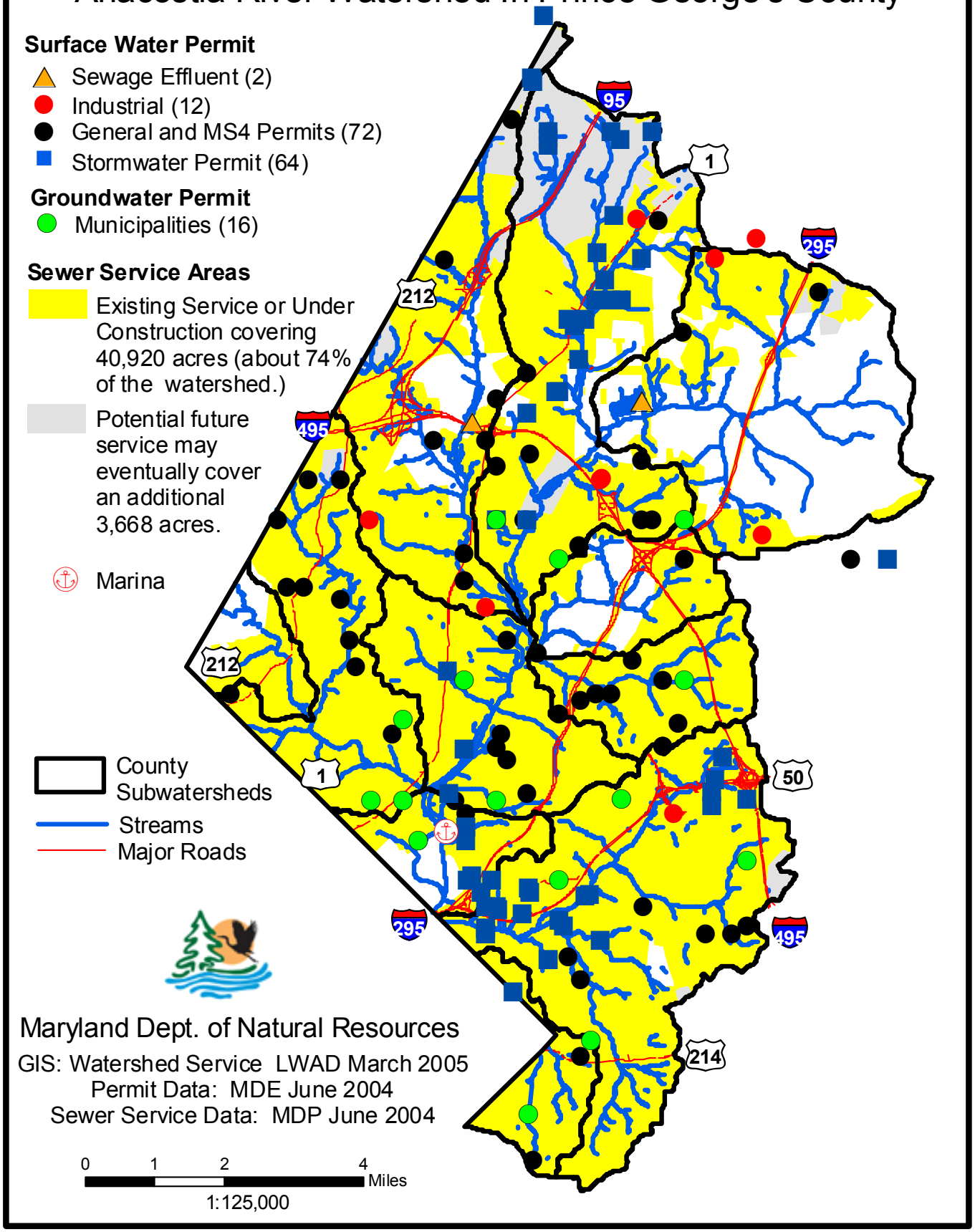
State Data: Major Roads

GIS: March 2005

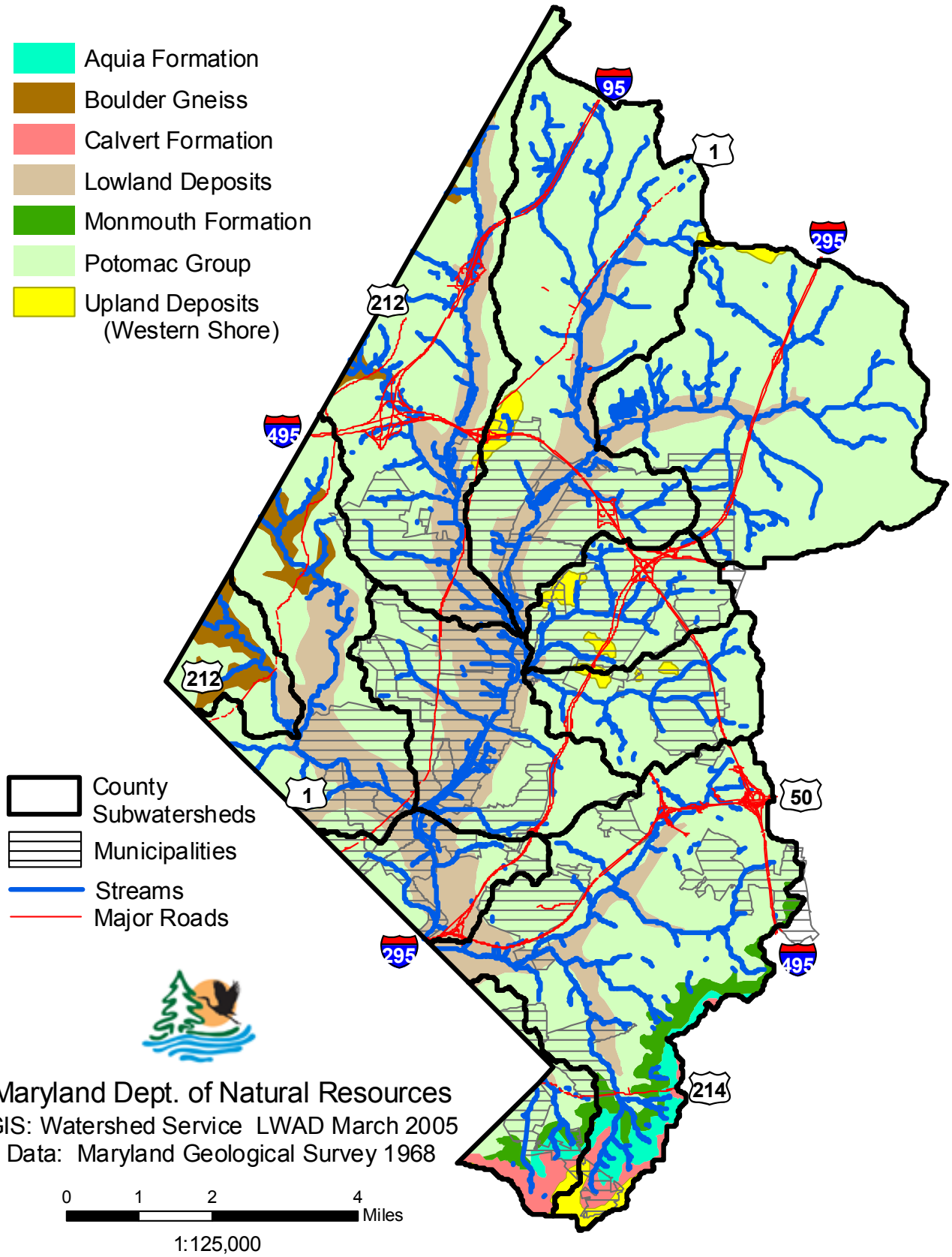
Map 4 Water Quality Monitoring
Anacostia River Watershed In Prince George's County



Map 5 MDE Permits, Marinas and Local Sewer Service Anacostia River Watershed In Prince George's County



Map 6 Geology
Anacostia River Watershed In Prince George's County

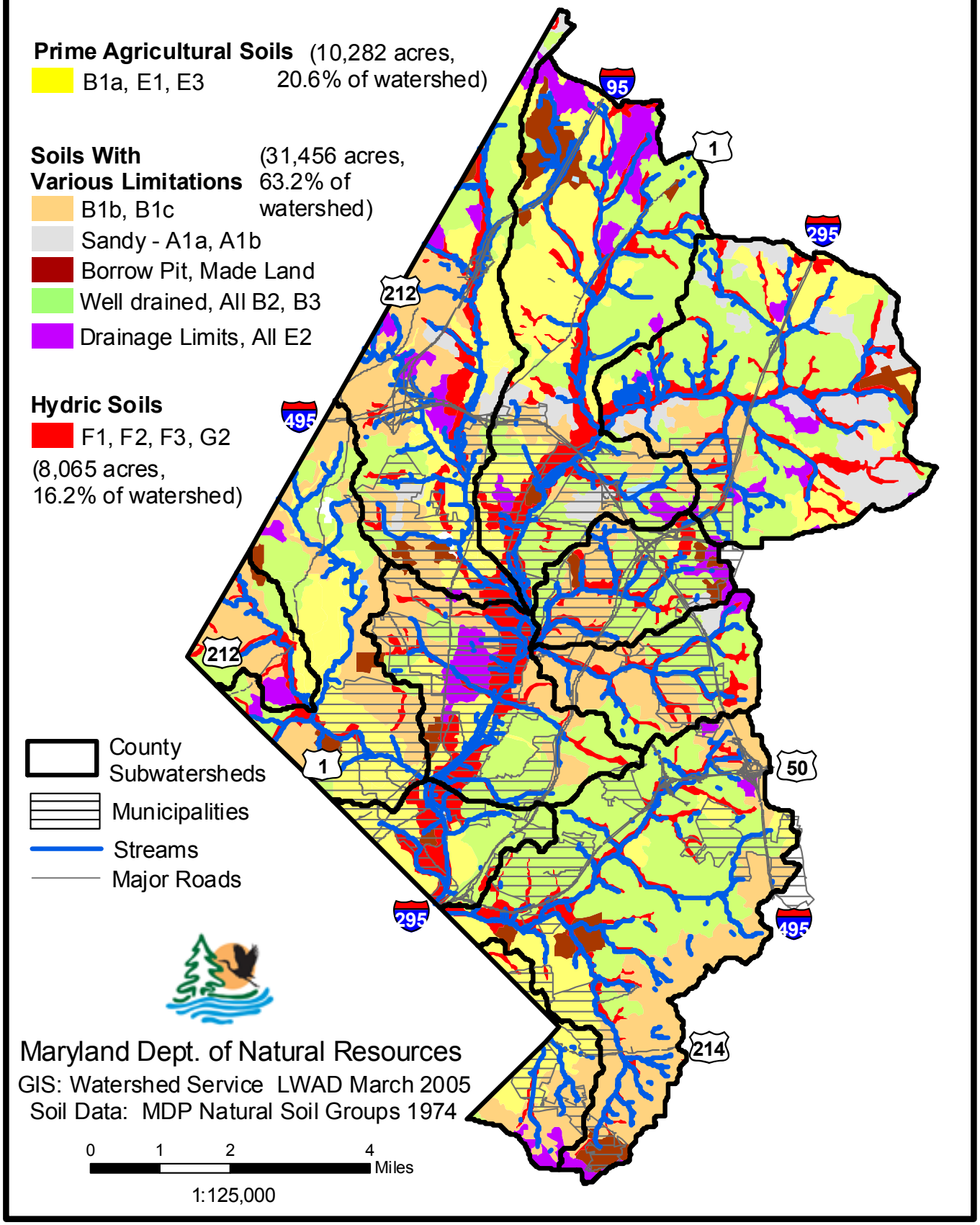


Maryland Dept. of Natural Resources
GIS: Watershed Service LWAD March 2005
Data: Maryland Geological Survey 1968

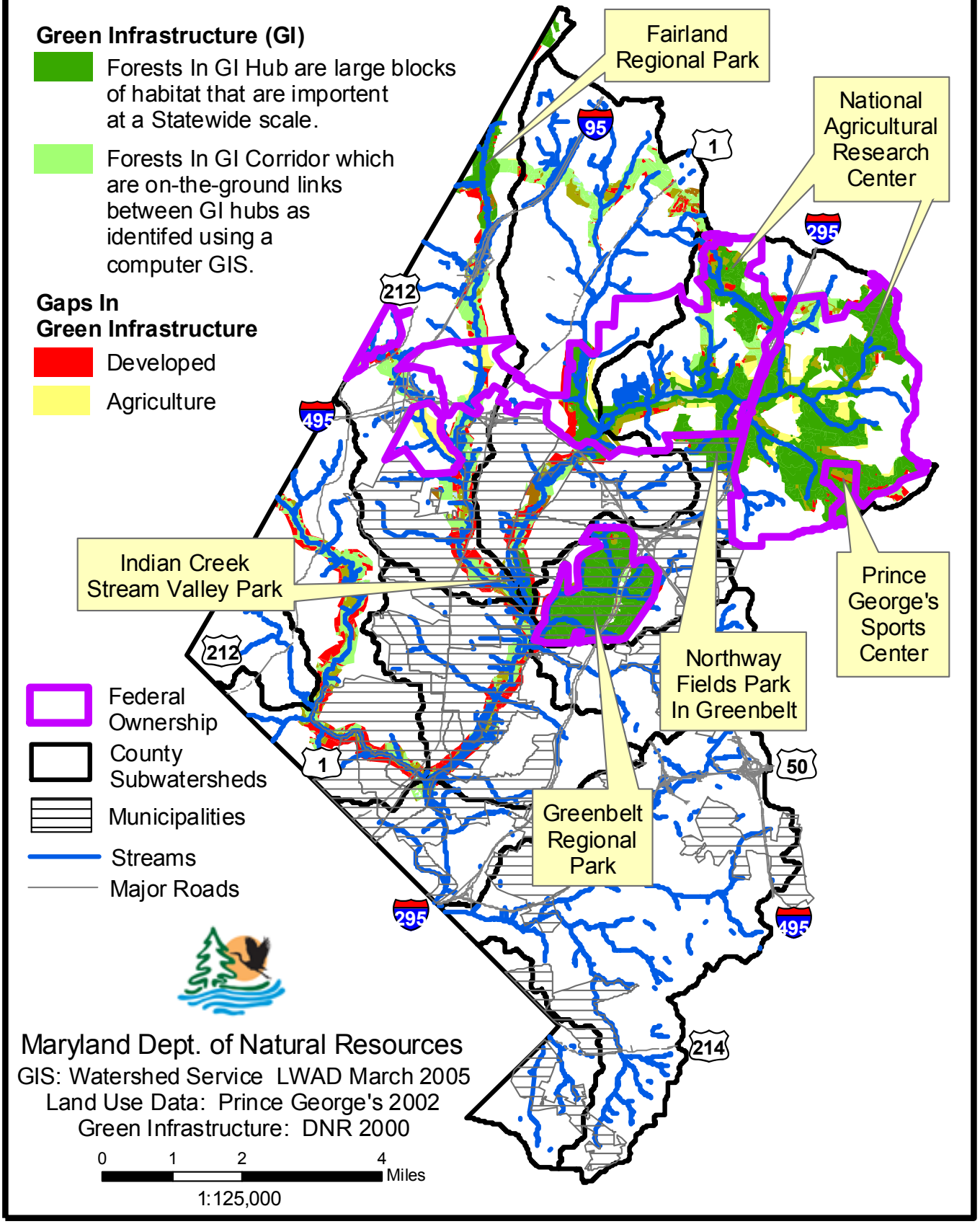
0 1 2 4 Miles

1:125,000

Map 7 Soils
Anacostia River Watershed In Prince George's County



Map 8 Green Infrastructure
Anacostia River Watershed In Prince George's County

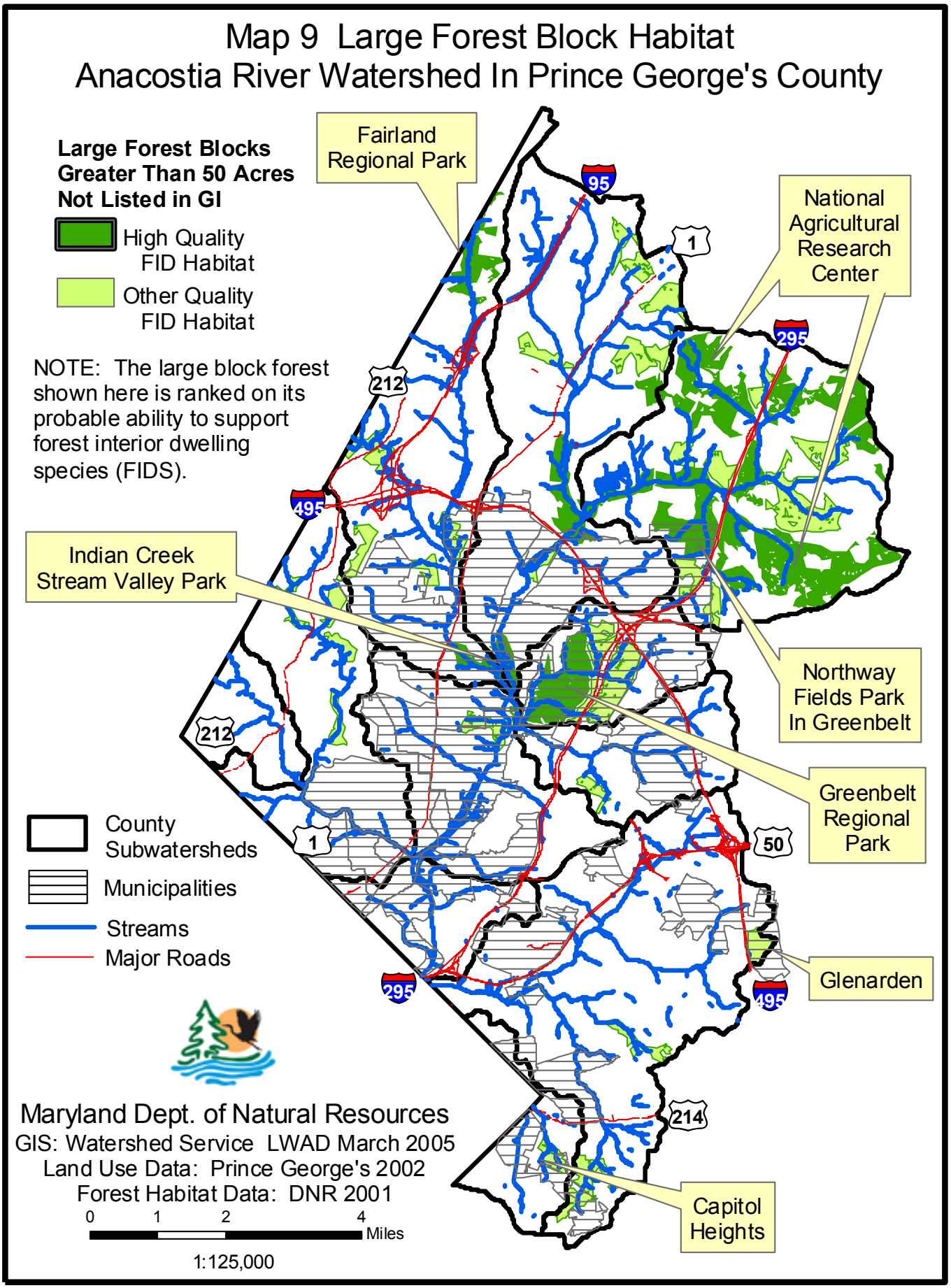


Maryland Dept. of Natural Resources
GIS: Watershed Service LWAD March 2005
Land Use Data: Prince George's 2002
Green Infrastructure: DNR 2000

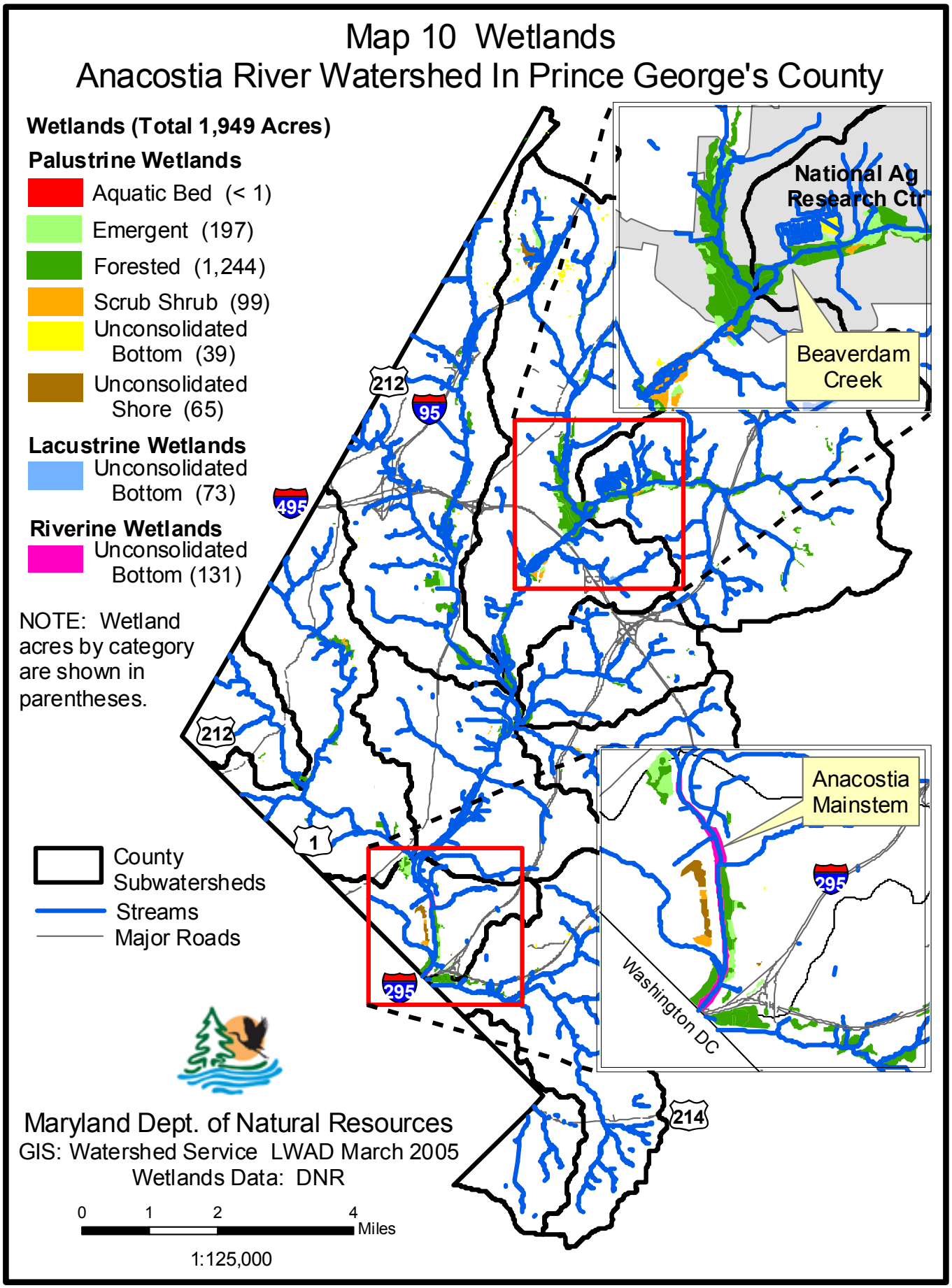
0 1 2 4 Miles

1:125,000

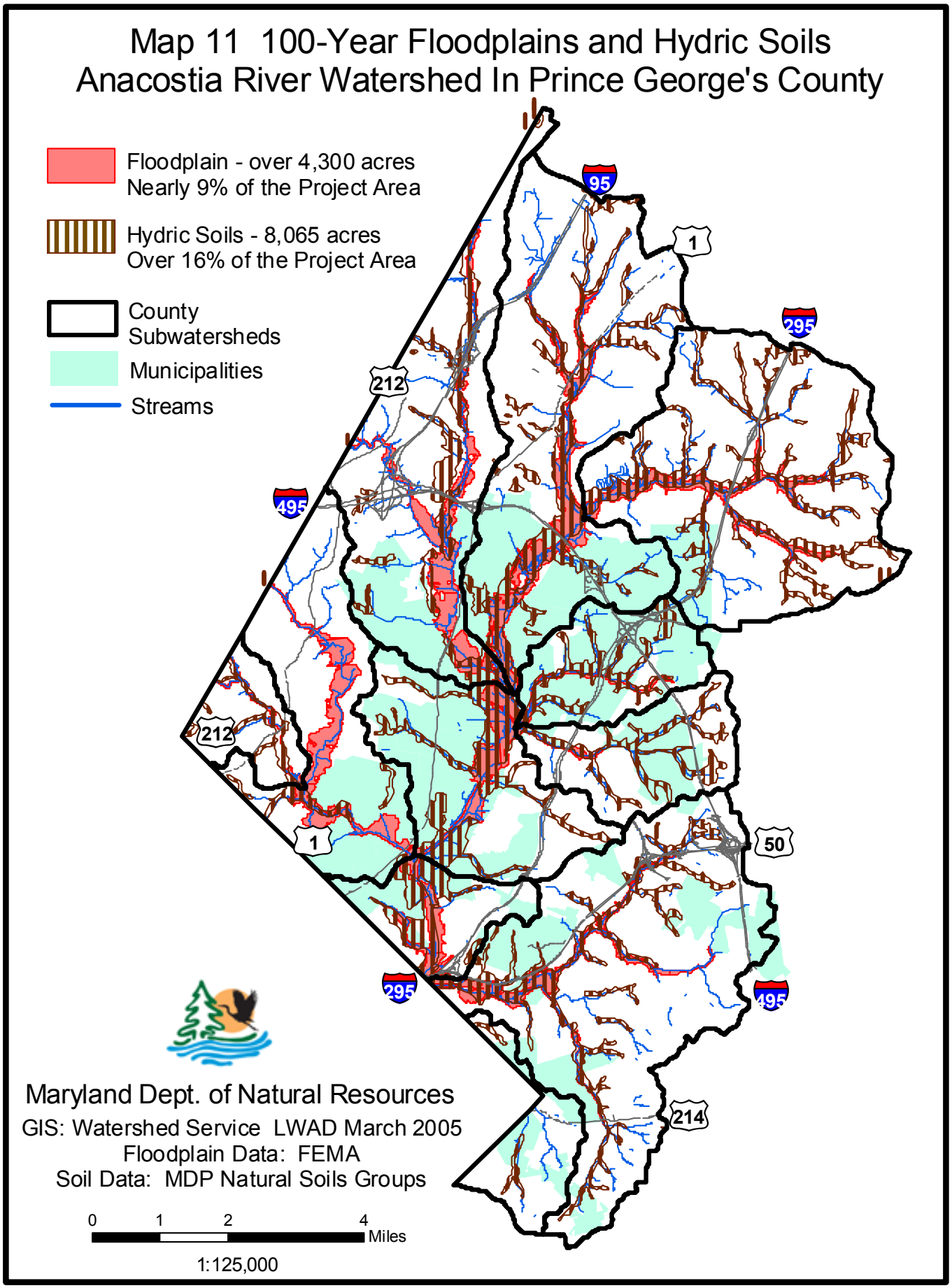
Map 9 Large Forest Block Habitat
Anacostia River Watershed In Prince George's County



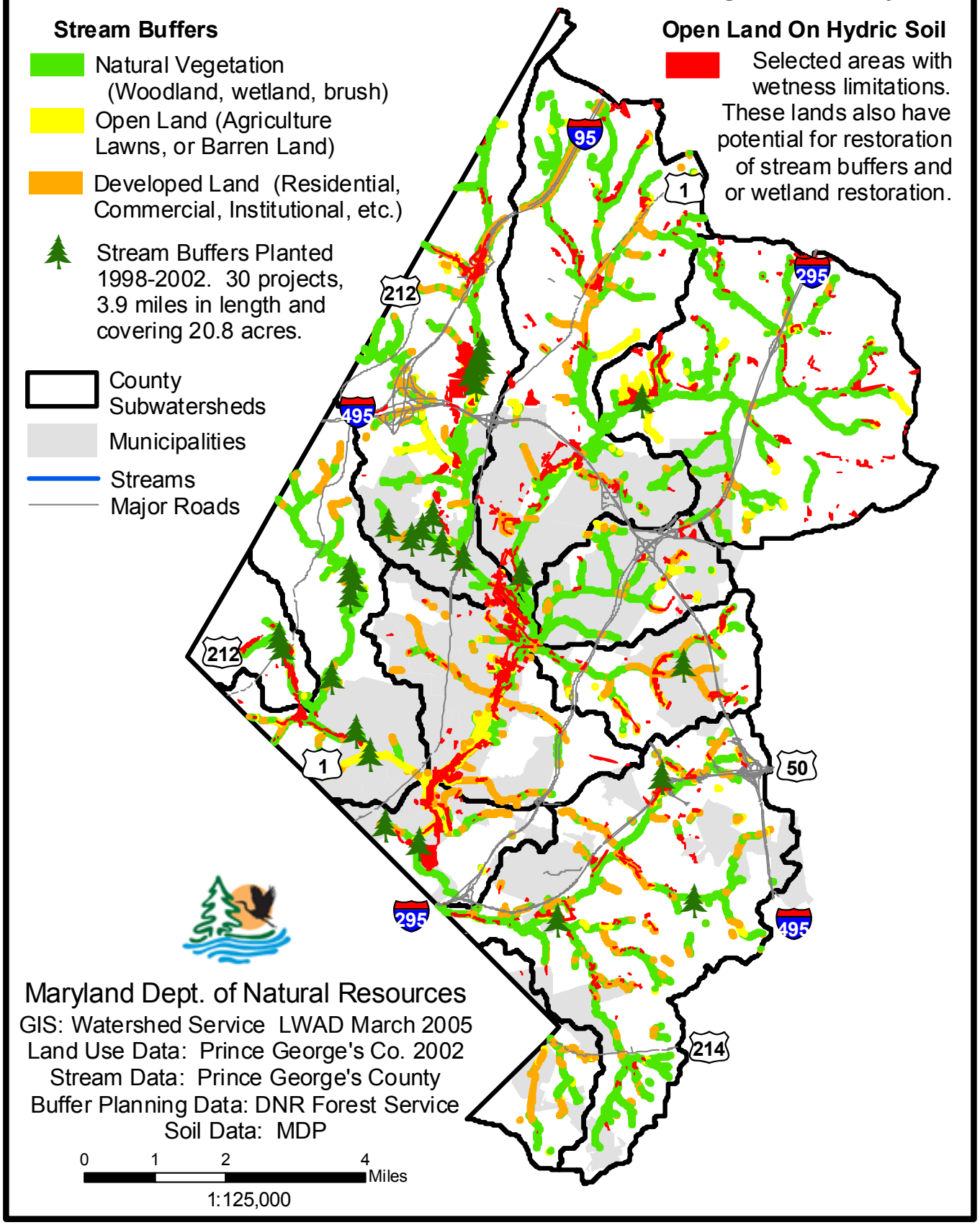
Map 10 Wetlands
Anacostia River Watershed In Prince George's County



Map 11 100-Year Floodplains and Hydric Soils
Anacostia River Watershed In Prince George's County

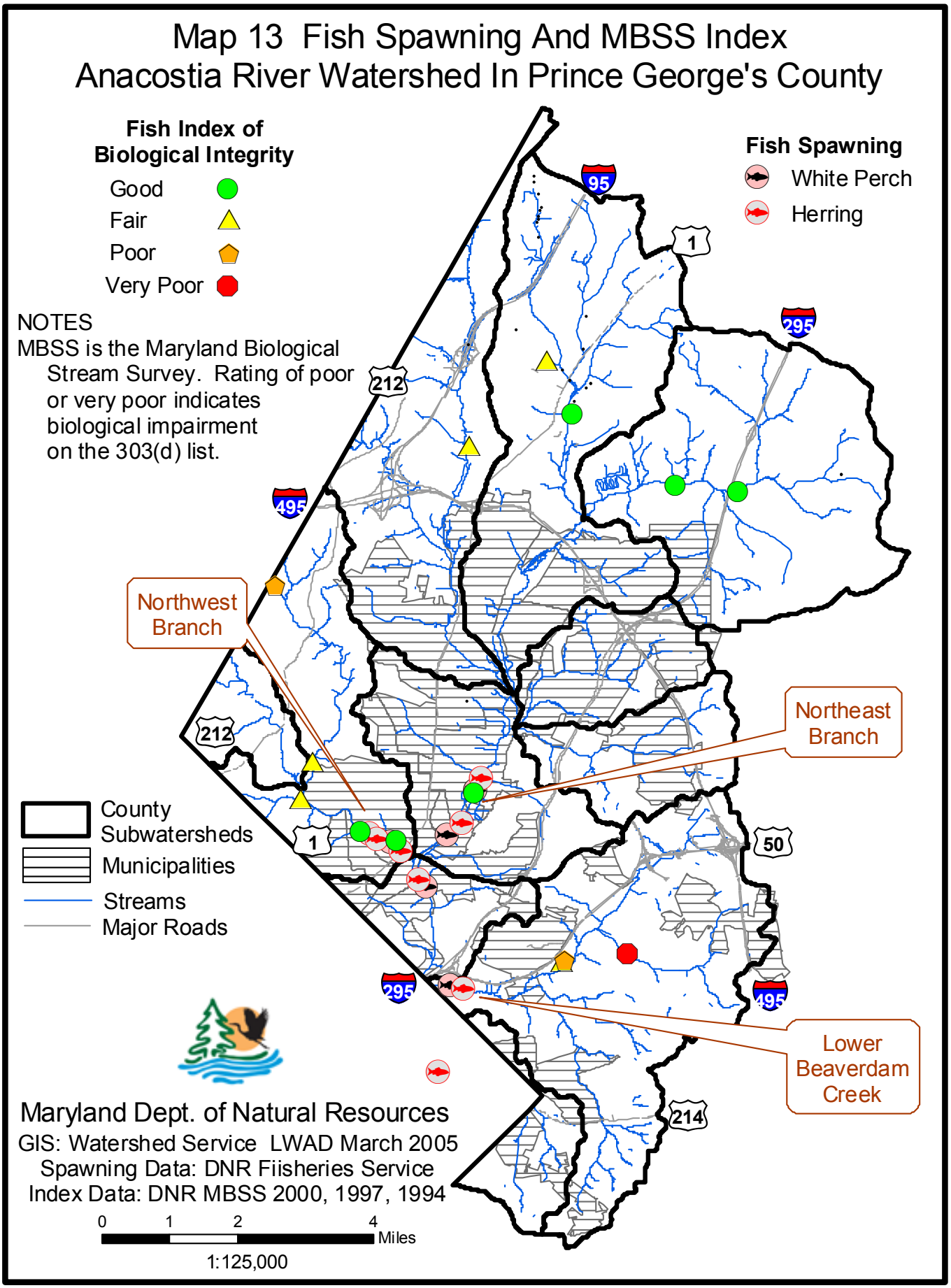


Map 12 Stream Buffers And Open Land On Hydric Soil Anacostia River Watershed In Prince George's County

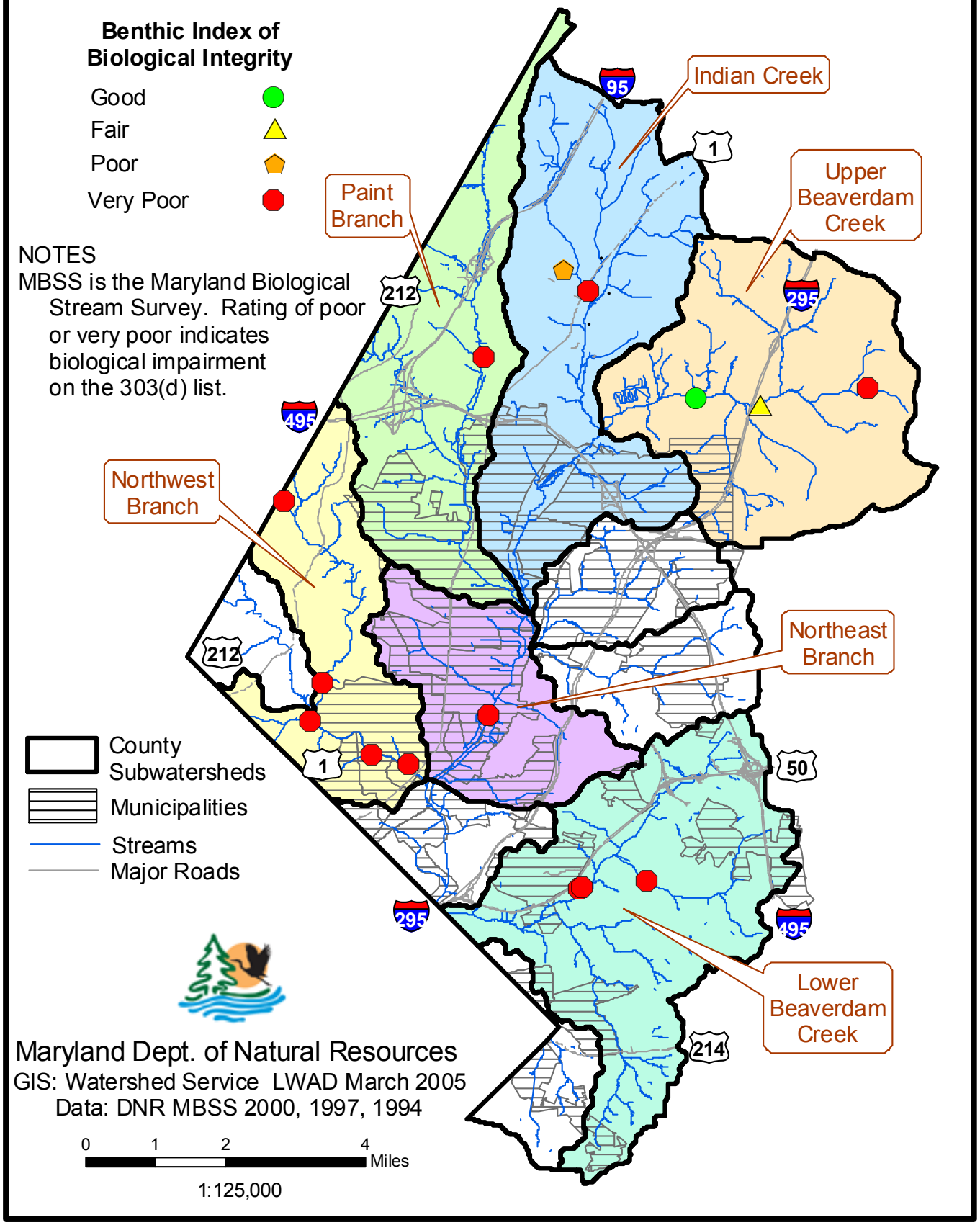


Maryland Dept. of Natural Resources
GIS: Watershed Service LWAD March 2005
Land Use Data: Prince George's Co. 2002
Stream Data: Prince George's County
Buffer Planning Data: DNR Forest Service
Soil Data: MDP

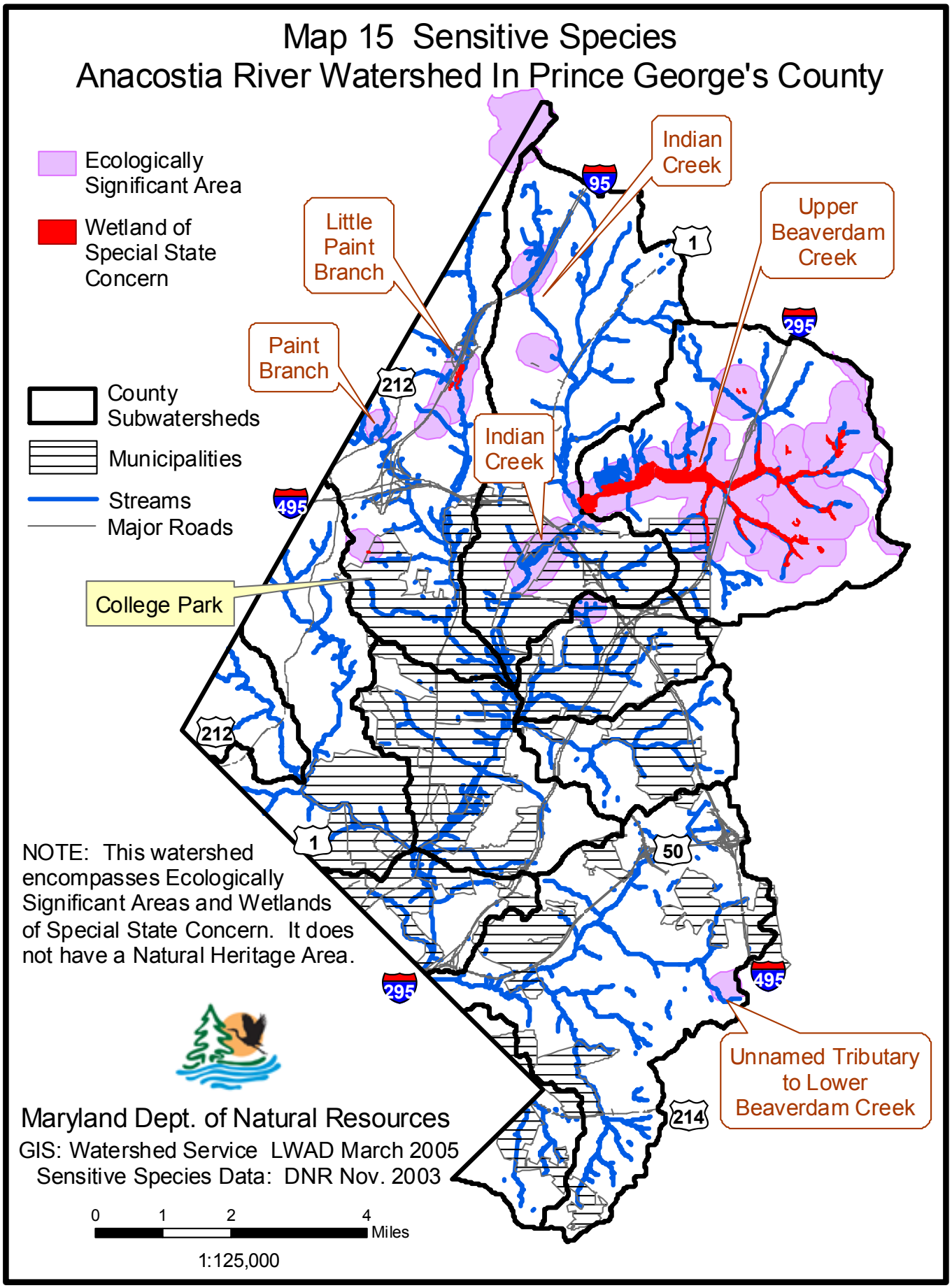
Map 13 Fish Spawning And MBSS Index
Anacostia River Watershed In Prince George's County



Map 14 Benthos - MBSS Index
Anacostia River Watershed In Prince George's County



Map 15 Sensitive Species
Anacostia River Watershed In Prince George's County



NOTE: This watershed encompasses Ecologically Significant Areas and Wetlands of Special State Concern. It does not have a Natural Heritage Area.

Maryland Dept. of Natural Resources

GIS: Watershed Service LWAD March 2005

Sensitive Species Data: DNR Nov. 2003

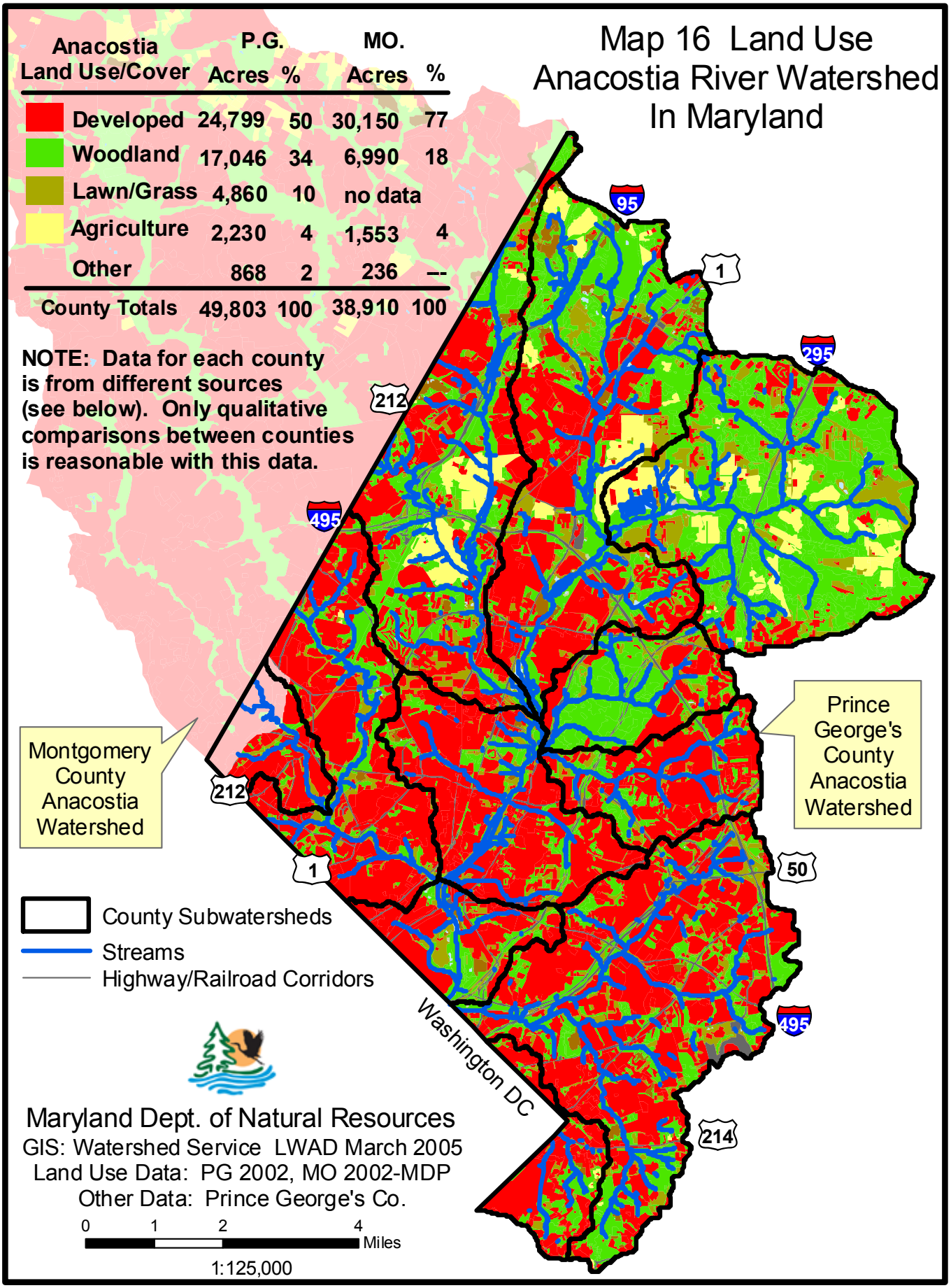
0 1 2 4 Miles

1:125,000

Map 16 Land Use Anacostia River Watershed In Maryland

Anacostia Land Use/Cover	P.G. Acres	%	MO. Acres	%
Developed	24,799	50	30,150	77
Woodland	17,046	34	6,990	18
Lawn/Grass	4,860	10	no data	
Agriculture	2,230	4	1,553	4
Other	868	2	236	---
County Totals	49,803	100	38,910	100

NOTE: Data for each county is from different sources (see below). Only qualitative comparisons between counties is reasonable with this data.

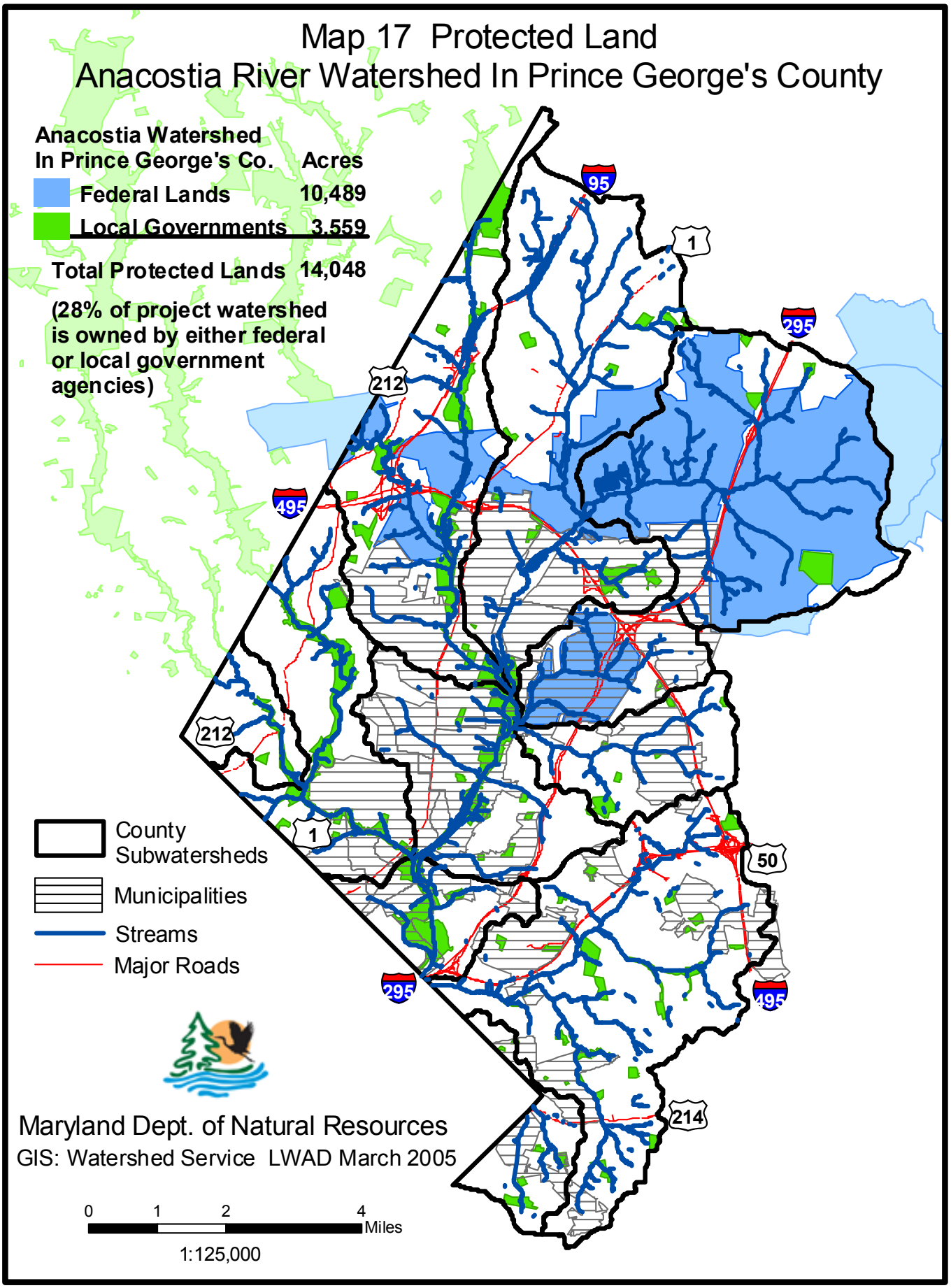


Maryland Dept. of Natural Resources
GIS: Watershed Service LWAD March 2005
Land Use Data: PG 2002, MO 2002-MDP
Other Data: Prince George's Co.

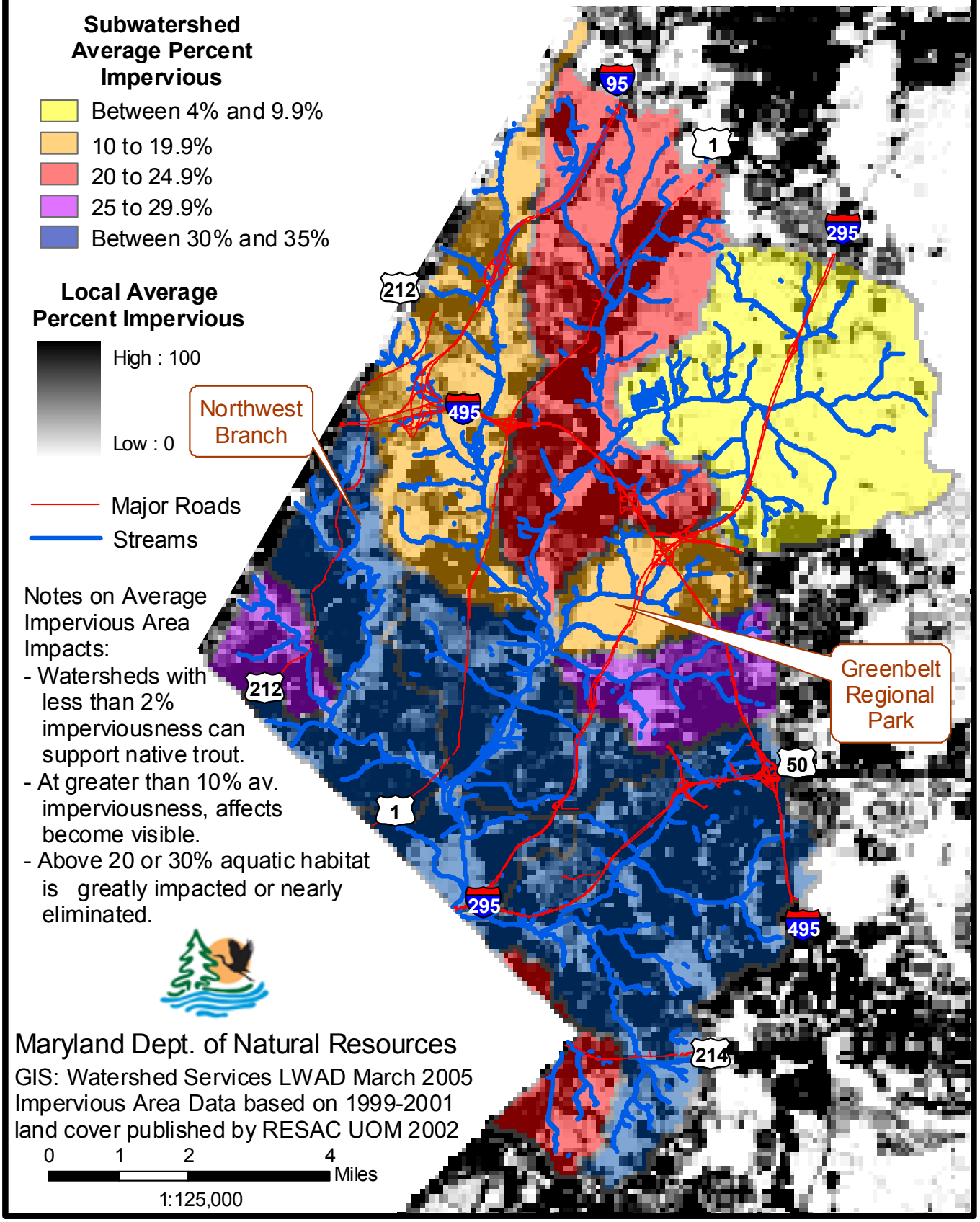
0 1 2 4 Miles

1:125,000

Map 17 Protected Land
Anacostia River Watershed In Prince George's County



Map 18 Impervious Area
Anacostia River Watershed In Prince George's County



Notes on Average Impervious Area Impacts:

- Watersheds with less than 2% imperviousness can support native trout.
- At greater than 10% av. imperviousness, affects become visible.
- Above 20 or 30% aquatic habitat is greatly impacted or nearly eliminated.

Maryland Dept. of Natural Resources

GIS: Watershed Services LWAD March 2005
Impervious Area Data based on 1999-2001 land cover published by RESAC UOM 2002

0 1 2 4 Miles

1:125,000