# Anacostia Watershed
# Restoration Progress and Conditions Report
# 1990-1997

***prepared for:***
**Anacostia Watershed Restoration Committee**

***prepared by:***
**Department of Environmental Programs**
**Metropolitan Washington Council of Governments**

**May 1998**

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## Purpose of Report

The Anacostia Watershed Restoration Committee (AWRC) has issued this report to update the public on overall progress in restoring the Anacostia River, continuing problems and changing environmental conditions in the watershed. The report is intended to present, in an easy to read format, summary information related to each of the AWRC's six major restoration goals.

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## Message from the Chairman of the Anacostia Watershed Restoration Committee

*Dear Friends of the Anacostia Watershed,*

*This is a summary report to the citizens of the Anacostia watershed on both ongoing Anacostia restoration efforts and changing environmental conditions. During the past decade, the Anacostia Watershed Restoration Committee has maintained its commitment to the restoration and protection of the watershed through the six goals it established in 1991. The six goals call for:*

*1. Reduction of sediment, nutrient and toxic pollutant loads to the tidal river through retrofits, management practices and the control of trash and debris;*

*2. Improvement in the abundance and diversity of urban fisheries through stream restoration and protection;*

*3. Restoring the quality of fish habitat through the removal of fish barriers, and installation of fish habitat structures;*

*4. Enhancement of tidal and nontidal wetlands through their protection, restoration and creation;*

*5. Restoration and expansion of forest cover through protection, and watershed and riparian reforestation; and finally an*

*6. Increase in public awareness, stewardship, and volunteerism in watershed restoration activities through education and outreach, and through opportunities to actively participate in the restoration.*

*Over the past several years significant progress has been made toward all six goals. We are especially pleased with a number of recent efforts undertaken to help promote restoration through increased public involvement and awareness of the Anacostia, and in efforts to promote watershed restoration through new public/private partnerships. The first of these is being addressed, in part, under a recently established Anacostia Watershed Citizens Advisory Committee. In a continuing effort to enhance restoration progress, the AWRC will also work with business leaders, elected officials, and citizens to identify and explore new restoration partnerships and opportunities. These efforts and others during the period from 1990 to 1997 are the main focus of this report.*

*It is through our combined efforts and commitment that we are making a difference. However, we are clear in our understanding that much more remains to be done and our commitment must continue into the forseeable future. We look forward to the continued restoration and the challenges that will follow, for each one will bring us closer to our ultimate goal of a restored and balanced Anacostia watershed, a watershed that all citizens of the region, as well as its future generations, can enjoy.*

*Sincerely,*

*Dr. Richard Eskin, Chairman*
*Anacostia Watershed Restoration Committee*

# Background

## Historical Perspective

The Anacostia watershed remains a largely degraded urban ecosystem located in suburban Maryland and the District of Columbia. Within its 176 square mile drainage, Figure 1, there are nearly 805,000 inhabitants (1990 census), making it one of the most densely populated watersheds in the Chesapeake Bay basin. By the year 2010 that population is expected to increase by another 35,000 inhabitants (Warner et al., 1997).

During the 17th century the watershed was vastly different. It was a thriving center of Indian culture set amidst the Piedmont and Coastal Plain provinces. It contained healthy populations of sturgeon, american and hickory shad, white and yellow perch, redbreast sunfish, pickeral, catfish and herring, and provided the native Indians with an abundant food supply. Lush forests and abundant wildlife complemented clean waters that flowed into the Potomac River and ultimately emptied into the Chesapeake Bay.

In 1608, English Captain John Smith first surveyed the river, opening the watershed to European settlement and initiating changes in land use that have dramatically altered the watershed. Characterized by over 300 years of successive waves of cultivation of tobacco and cotton, small grains, corn and other row crops; dairying and livestock production; and urbanization; these changes have left little that resembles this once highly productive ecosystem.

The loss of important forest and wetland habitats, alteration of natural drainage patterns and streamflow, increases in erosion, sedimentation and nonpoint source pollution, and discharges of combined sewer overflow and industrial waste have all contributed to the decline of the ecological health of the watershed. Although the once pristine watershed reflects a system that has suffered from years of environmental neglect and urbanization, major restoration efforts since 1987 are beginning to improve conditions.

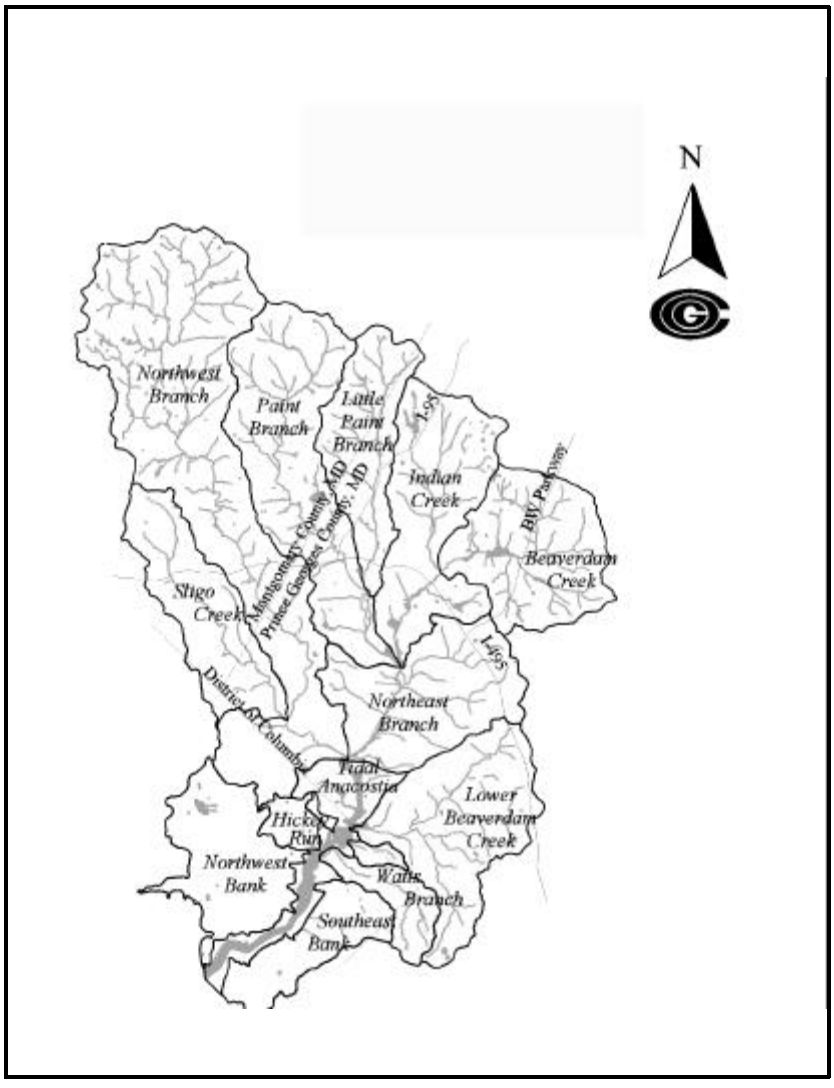



**Figure 1. Anacostia Watershed and Major Subwatersheds.**

### Land Use

Current land use in the Anacostia watershed reflects the general pattern of other metropolitan areas. The densest development is generally concentrated near the urban center (i.e., inside the Capital Beltway).

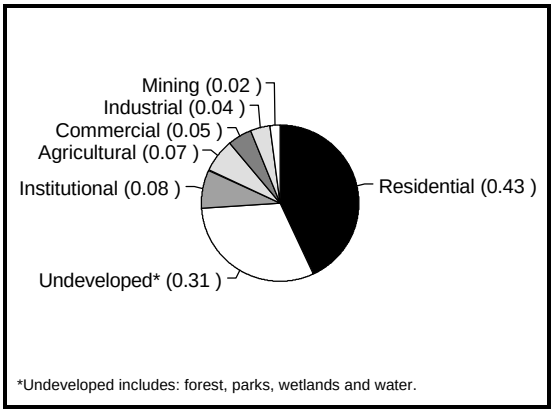



**Figure 2. Anacostia Watershed Existing Land Use** (modified from Warner, 1996).

As of 1990, nearly 70 percent of the Anacostia watershed has been developed. Residential development (single family houses, townhouses and apartments) is the single largest land use, comprising 43 percent of the watershed (Figure 2). Impervious surfaces associated with development, such as parking lots, roads, and roof tops, cover approximately 23 percent of the watershed (Warner et al., 1997). Runoff from these areas carries a variety of pollutants to streams and can seriously degrade aquatic habitat. Streams typically become degraded when impervious surfaces cover more than 10 percent of a watershed, unless mitigated by effective stormwater management controls. As Figure 3 shows, imperviousness in individual subwatersheds ranges from a low of 11 percent in Beaverdam Creek to 48 percent for the tidal Northwest Bank portion in the District of Columbia.

### Tidal River Hydrology

The Anacostia River is formed by two major tributaries, the Northwest and Northeast Branches (Figure 1). Downstream of the confluence of these two streams, the Anacostia is a channelized, freshwater tidal river which flows approximately 8.4 miles before joining the Potomac River. The hydrology of the entire Anacostia tributary system may be broadly characterized as being flashy (i.e., quick flow response to rainfall); whereas, the tidal river portion can be described as being sluggish with an average water residence time on the order of 30 to 35 days. Under periods of extremely low flow, this residence time can be as long as 100 to 110 days. As seen in Table 1, average daily inflow into the tidal river is approximately 138 cubic feet per second (i.e., 61,934 gallons per minute).

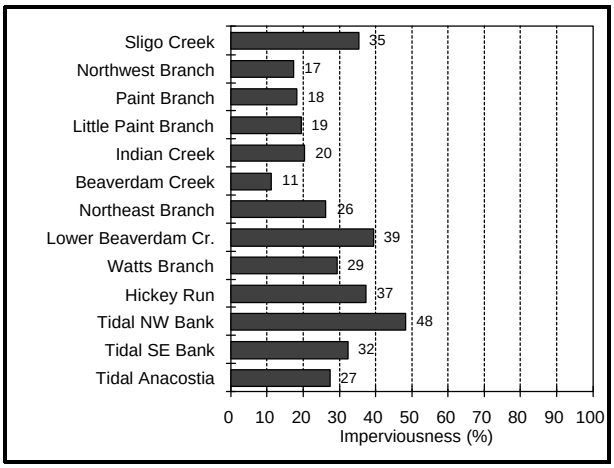



**Figure 3. Anacostia Subwatersheds Percent Impervious Land Surface** (modified from Warner et al., 1997).

| Average Daily Discharge (cfs)[1] | Maximum Discharge, June 1972[2] (cfs) | Minimum Discharge, Sept. 1966 (cfs) | Surface Area of Tidal River (acres) | Average Volume of Tidal River (gallons x $10^9$) | Average Tidal Volume (gallons x $10^6$) | Average Tidal Range (feet) |
|---|---|---|---|---|---|---|
| 138 | 31,180 | 1.8 | 850 | 3.72 | 765.6 | 2.95 |

[1] 1 cfs (cubic feet per second) = 7.48 gallons per second or 448.8 gallons per minute.
[2] Maximum discharge associated with Hurricane Agnes.

**Table 1. Anacostia River Hydrography** (Scatena, 1986).

**Restoration Effort**

Within the greater Washington metropolitan area, the Anacostia River has often been called “the other river” or “the forgotten river" (ICPRB, 1988). Prior to 1987, much of the environmental concern and focus was on the larger ailing Potomac River. However, a concerted and focused effort to restore and protect the Anacostia watershed began over a decade ago. During that time, local, state, regional and Federal government agencies, as well as environmental organizations, businesses and dedicated citizens have contributed significant resources toward its restoration and protection. Formal cooperation between government agencies came with the signing of the 1987 Anacostia Watershed Restoration Agreement and the establishment of the Anacostia Watershed Restoration Committee (AWRC) to oversee the restoration. Members of the AWRC include the District of Columbia, Montgomery and Prince George's counties in Maryland, the state of Maryland, and the U. S. Army Corps of Engineers. In addition to the members, the Metropolitan Washington Council of Governments and the Interstate Commission on the Potomac River Basin provide both technical and administrative staff support to the AWRC and its restoration efforts (Figure 4).

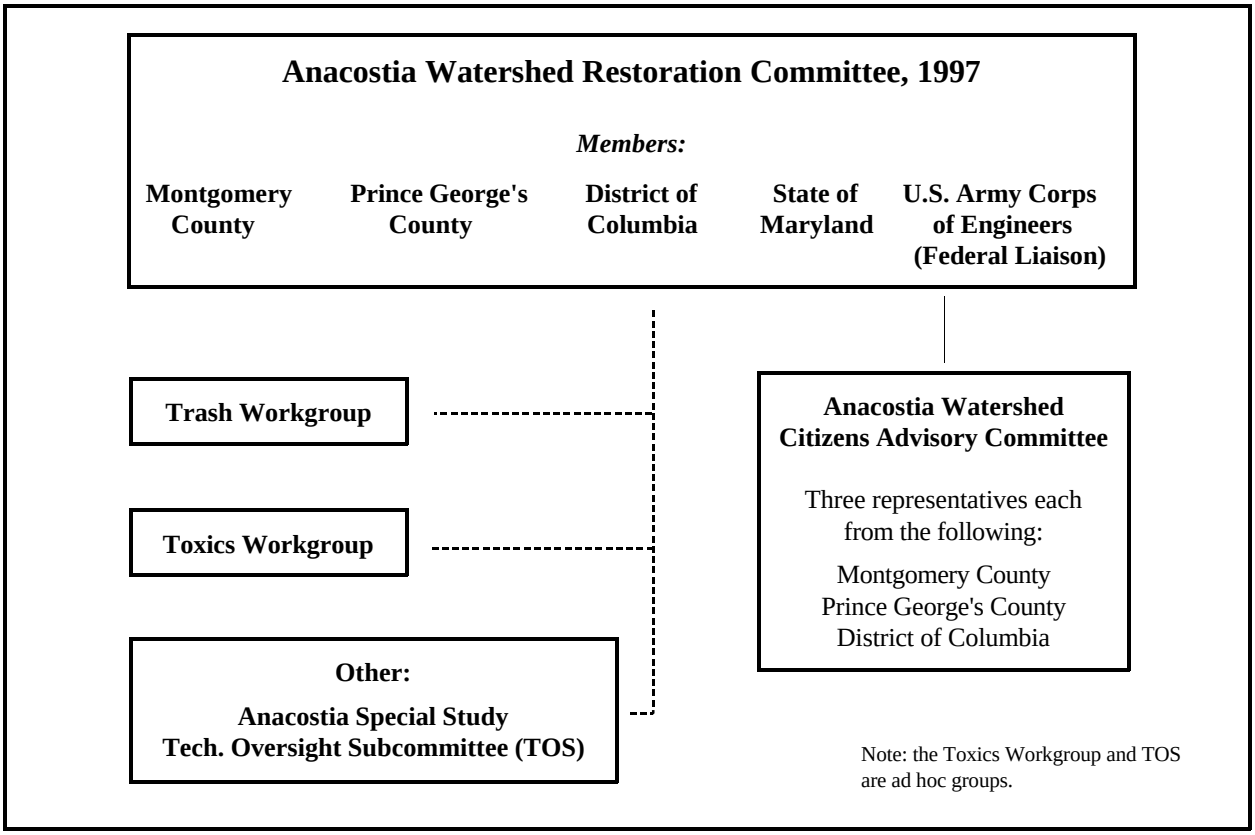



**Figure 4. General Anacostia Watershed Restoration Committee Structure**

Over the last 10 years, actions taken by the AWRC and affiliated organizations have resulted in substantial restoration progress. Shortly after it was created, the AWRC established a framework to guide long-term restoration efforts. The vision for a comprehensive, ecologically based restoration effort was laid out in a document: *A Commitment to Restore Our Home River: A Six-Point Action Plan to Restore the Anacostia River* (COG, 1991). To achieve those goals, the AWRC has identified some 580 restoration projects designed to correct existing environmental problems and enhance overall ecosystem quality. Of these, approximately 29 percent have either been completed or are in progress.

The successes have required the identification of problems, associated solutions, coordination of programs, and the mobilization of critical government, political and financial resources. One of the key features in the success of the Anacostia program has been both in the development of common watershed restoration goals and in the identification and establishment of partnerships. Currently, the restoration claims supporting partnerships from over sixty government agencies and environmental organizations. Most recently, another important partnership was established in 1996 with the creation of the AWRC's Anacostia Watershed Citizens Advisory Committee (AWCAC). The AWCAC has brought formal recognition of the importance and need for citizen input and involvement in the restoration. Through this new committee, the AWRC has strengthened its commitment to the restoration and to the citizens of the watershed.

Into the early 1990s, the driving force behind the restoration effort was primarily local and state governments, as well as regional organizations. As the restoration has broadened, active participation by the Federal landowners has increased and become a priority objective. Collectively, Federal agencies (including the National Park Service, the U.S. Environmental Protection Agency and the U.S. Departments of Agriculture and Defense) own and operate facilities that make up 15 percent of the total land area of the watershed.

The importance of the restoration has been recognized by both Congress and the White House via its selection in 1994 as a National Ecosystem Management Model by a White House Interagency Task Force. Unfortunately, the Anacostia has also been cited nationally as exemplifying urban watershed problems. These problems are typified by: conversion of natural drainage networks into man-made channels; increased runoff and urban pollutants from its impervious surfaces; channel erosion and associated loss of aquatic habitat from changes in land use; sediments laden with toxins and other pollutants from motor vehicles, electrical transformers, past applications of persistent pesticides, poorly timed applications of fertilizers, combined sewer overflows, atmospheric deposition and pet waste; and thousands of tons of trash and debris.

The current condition of the Anacostia watershed reflects over 300 years of environmental degradation. It will require decades of change and commitment to restore conditions to support a far greater ecological balance. It is gratifying that, after 10 years, signs of positive environmental change are beginning to emerge. The submerged aquatic vegetation that was once absent from the river is beginning to reappear, signaling some improvement in water clarity, as the volume and concentrations of pollutants from urban runoff have been reduced.

The incidence of environmental abuse and neglect that was commonly observed in the past, is much less prevalent today. In part this is due to tougher environmental laws and regulations coupled with the commitment being made by agencies and increasing numbers of groups and individuals to protect and restore the watershed.

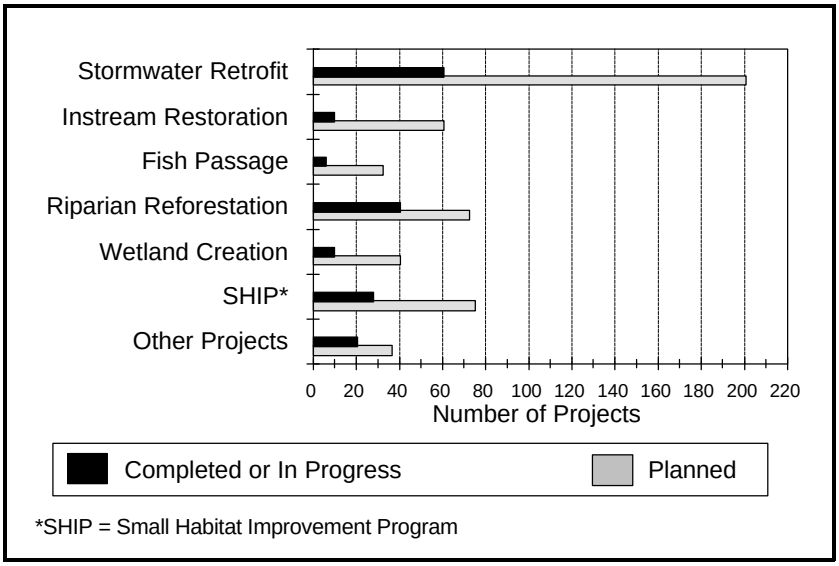



**Figure 5. Status of Restoration Projects as of 1997** (COG, 1998).

To date, approximately $20 million (1997 dollars) have been spent on implementing roughly 29 percent of the identified restoration projects (Figure 5), with additional millions of dollars spent on planning, design, land acquisition and maintenance. An additional $54 million have been spent on engineering controls designed to reduce the impacts of combined sewer overflows on

the tidal river and of leaking, aging sewer lines on tributary streams. The past 10 years of the restoration effort have included numerous milestone events (Table 2).

**Table 2. Anacostia Watershed Restoration Highlights, 1987-1997**

| | |
|---|---|
| ***1987*** | - Anacostia Restoration Agreement signed by Montgomery County, Prince George's County, District of Columbia and State of Maryland. Anacostia Watershed Restoration Committee formed.<br>- Watershed-wide restoration retrofit studies initiated. |
| ***1988-1990*** | - Retrofit inventories completed for Montgomery and Prince George's counties by Metropolitan Washington Council of Governments. A total of 207 stormwater retrofit, stream restoration, wetland creation and riparian reforestation projects identified.<br>- Interstate Commission on the Potomac River Basin performs fish and macroinvertebrate surveying to determine biological health of the tributary system.<br>- As part of its CSO abatement program, the District of Columbia completes construction of a $32 million swirl concentrator located near RFK stadium.<br>- Interstate Commission on the Potomac River Basin Anacostia Sub-Basin Coordinators Program formed.<br>- First printing of *In the Anacostia* newsletter produced by Interstate Commission on the Potomac River Basin. |
| ***1990-1991*** | - Local governments complete first Anacostia stormwater retrofit, stream restoration and small-scale tidal wetland demonstration projects in Sligo Creek, Montgomery County; Indian Creek, Prince George's County; and Kenilworth Marsh, District of Columbia.<br>- Metropolitan Washington Council of Governments completes retrofit inventory for the District of Columbia. Sixty restoration projects identified.<br>- First major Anacostia anadromous fish barrier, Northeast Branch grade control weir, modified by Maryland-National Capital Park and Planning Commission. |
| ***1991*** | - New Anacostia Restoration Agreement signed committing Montgomery County, Prince George's County, the District of Columbia and the State of Maryland to accomplishing the goals developed in *A Commitment to Restore Our Home River: A Six-Point Action Plan to Restore the Anacostia River*.<br>- Anacostia Watershed Restoration Committee membership expanded to include the U.S. Army Corps of Engineers as Federal liaison. |
| ***1992*** | - Major stormwater retrofit construction occurring in Prince George's County and elsewhere in the watershed.<br>- Prince George's County forms citizen-based Stream Teams.<br>- Systematic native fish reintroduction in Sligo Creek begins. |

| Table 2. Anacostia Watershed Restoration Highlights, 1987-1997 (cont'd.) | |
|---|---|
| ***1993*** | - Thirty-two acre Kenilworth Marsh restoration project completed in the District of Columbia.<br>- Construction begins on Sligo Creek Phase II (Montgomery County) and Greenbelt (Prince George's County) stream restoration projects.<br>- Maryland Department of Natural Resources establishes Anacostia Forester position.<br>- Prince George's County Bladensburg Marina and Port Towns (Bladensburg, Colmar Manor, Cottage City) environmental restoration and economic revitalization initiatives commence. |
| ***1994*** | - Upper Paint Branch Workgroup watershed protection and restoration recommendations endorsed and distributed by the Anacostia Watershed Restoration Committee.<br>- U.S. Army Corps of Engineers completes its Anacostia Watershed Feasability I Study. A total of 13 stormwater, stream restoration and wetland creation/restoration projects identified.<br>- White House panel designates the Anacostia restoration effort as a National Ecosystem Management Model.<br>- Last printing of Interstate Commission on the Potomac River Basin's *In the Anacostia* newsletter. Circulation hits peak of 17,000.<br>- Agreement of Federal Agencies on Ecosystem Management in the Chesapeake Bay and Anacostia River signed. |
| ***1995-1996*** | - U.S. Army Corps of Engineers completes Section 1135 Anacostia Floodway Rehabilitation Project consisting of fish barrier modifications, instream habitat enhancement and tree plantings along the lower portions of the Northeast and Northwest Branches.<br>- Montgomery County Council approves both a Special Protection Area designation and 248 acres of additional stream valley park acquisition to protect Upper Paint Branch's naturally reproducing brown trout population.<br>- U.S. Environmental Protection Agency Region III creates an Anacostia community liaison position to work with citizens, community leaders and restoration groups in the watershed. |
| ***1996*** | - Interstate Commission on the Potomac River Basin completes, for the District of Columbia, a District-only Toxics Action Plan for managing toxics in Anacostia River sediments.<br>- U.S. Environmental Protection Agency's coordination with the Anacostia Watershed Restoration Committee formalized through a Memorandum of Understanding.<br>- Anacostia Watershed Restoration Committee's Anacostia Watershed Citizen Advisory Committee formed.<br>- Montgomery County begins working on its Countywide Stream Protection Strategy. |
| ***1997*** | - U.S. Army Corps of Engineers completes first *Biennial Federal Workplan for the Anacostia River Watershed* and begins work on the Anacostia Federal Facilities Impact Assessment study.<br>- Montgomery County Council approves an Environmental Overlay Zone with a 10 percent imperviousness cap for the Upper Paint Branch.<br>- Little Paint Branch Workgroup formed by Maryland Department of Natural Resources to help develop a suite of watershed protection and restoration recommendations. |

## Six-Point Action Plan

Following the signing of the landmark 1987 Anacostia Watershed Restoration Agreement, the AWRC was established. Its mission is to oversee and guide the restoration process. In order to do this, the AWRC developed a restoration plan in 1991 to restore the Anacostia known as the *Six-Point Action Plan*.

The six major goals of the *Six-Point Action Plan* are as follows:

**GOAL 1: Dramatically reduce pollutant loads delivered to the tidal river so as to measurably improve water quality conditions by the turn of the century.**

**GOAL 2: Protect and restore the ecological integrity of urban Anacostia streams to enhance aquatic diversity and provide for a quality urban fishery.**

**GOAL 3: Restore the spawning range of anadromous fish to historical limits.**

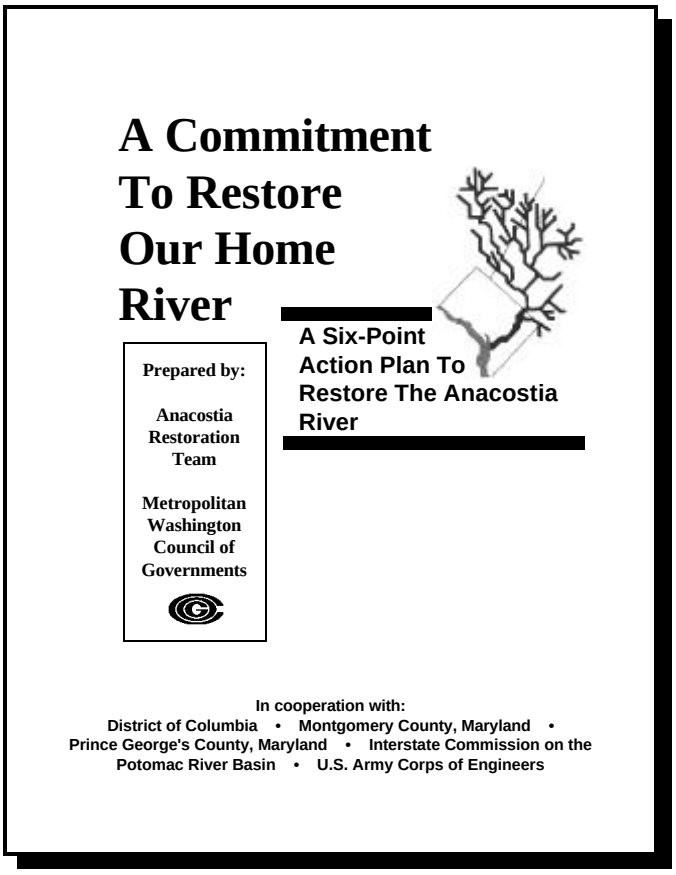
**GOAL 4: Increase the natural filtering capacity of the watershed by sharply increasing the acreage and quality of tidal and non-tidal wetlands.**

**GOAL 5: Expand the range of forest cover throughout the watershed and create a contiguous corridor of forest along the margins of its streams and rivers.**

**GOAL 6: Make the public aware of its key role in the cleanup of the river, and increase volunteer participation in watershed restoration activities.**

Using these goals, the AWRC and its many partners have made significant progress in the long road toward the restoration of the Anacostia. As previously stated, over the past 10 years, roughly 580 restoration projects have been identified, and of those, approximately 29 percent have been completed or are planned for implementation. This is a remarkable accomplishment given the human, institutional and financial resources required, and the short amount of time that has elapsed.

In order to accurately and concisely convey the restoration progress that has been made, each of the six goals is presented herein in a manner that provides a general description of the problem area, the strategy being implemented to address the problem and a short highlight of past and current initiatives and accomplishments associated with the restoration goal.



## Goal 1: Dramatically reduce pollutant loads delivered to the tidal river to measurably improve water quality conditions by the turn of the century.

**PROBLEM:** The tidal Anacostia River suffers from overall poor water quality due to a variety of factors that plague many urban rivers. Due to intense development, a high percentage of impervious surface and high stormwater runoff volumes, it receives large amounts of pollutants including sediment, excess nutrients, toxics and trash and debris. Additionally, with almost every significant rainfall event, it experiences combined sewer and stormwater overflows which discharge sewage and other pollutants directly into the river. Many of these factors contribute to both chronically low dissolved oxygen levels that frequently violate water quality standards and threaten aquatic life and high bacterial levels which make water contact activities (such as swimming and wading) unsafe.

**Sediment**

For well over 200 years, excessive erosion and subsequent sediment deposition have been a major Anacostia River problem. High sedimentation rates, associated with early tobacco growing in the 17th and 18th centuries, necessitated the first dredging of the Anacostia River in 1804. Continued high sediment deposition in the tidal river ultimately led, by 1830, to the demise and abandonment of Bladensburg as a major Atlantic seaport (Wright, 1977).

**Figure 6. M-NCPPC's Hydraulic Dredge (a.k.a., Mud Cat) Used For Removing River Sediment.**

Because the Anacostia River functions in many ways like a tidal lake, it is a very efficient sediment trap. It has been estimated that approximately 85 percent of the incoming sediment load remains trapped within the river (Scatena, 1986). This has necessitated frequent and costly sediment removal to maintain marina areas and navigation channels (Figure 6). In addition to adversely impacting navigation, reducing water clarity, degrading aquatic habitat and associated biota, sediment serves as a binding site for a broad range of urban pollutants and toxicants. These include: petroleum hydrocarbons, trace metals such as lead, mercury, cadmium, copper and zinc, PCBs, pesticides, herbicides, nutrients and bacteria.

Sediment-related stream quality degradation in the non-tidal portion of the Anacostia has been equally profound. Related impacts include: impairment of riffle and pool habitat through deposition of fine sediments such as sand, silt and clay; accelerated streambank and streambed erosion during stormflows; and high suspended solids loads which impair the biological community by obscuring the water for sight feeders and clogging or irritating exposed gills.

Using general suspended sediment-watershed area curves (Schueler, 1987), COG staff estimated annual total suspended solids loads (TSS) generated in the Anacostia watershed. As seen in Figure 7, the two largest subwatersheds (Northwest and Northeast Branch) each contribute the largest total TSS loads. Not surprisingly, TSS loads are generally a function of drainage area and land use, with the largest subwatershed and/or most highly developed one contributing the largest load. TSS loads for the intensively developed Lower Beaverdam Creek subwatershed are the highest per unit area in the watershed. Annual TSS loadings in the Anacostia watershed are estimated to be 48,200 tons, for an average of 0.43 tons/acre/year (Warner et al., 1997).

### Nutrients

In freshwater ecosystems, two nutrients, phosphorus and nitrogen, can significantly impact receiving waters. When present in sufficient concentrations they often trigger algal blooms, which eventually reduce the dissolved oxygen (DO) level of the water as decaying algal and other organic matter is broken down by microorganisms. Typical sources of phosphorus and nitrogen include fertilizers, animal wastes, automotive exhaust, organic material, soil, etc.

Using the Simple Method (Schueler, 1987), COG staff estimated total phosphorus (TP) and total nitrogen (TN) loads for the entire Anacostia watershed (Figure 7). As expected, the larger Northeast Branch portion of the watershed generates the largest TP and TN loads (50,000 and 340,000 lbs/year, respectively). However, when viewed on a pollutant load per acre basis, it is evident that the Lower Tributaries and Tidal Anacostia areas contribute disproportionately to the overall problem. Much of this is due to the high amount of impervious surface, low number of stormwater management controls, age of sanitary sewer lines, storm drainage and combined sewer systems present.

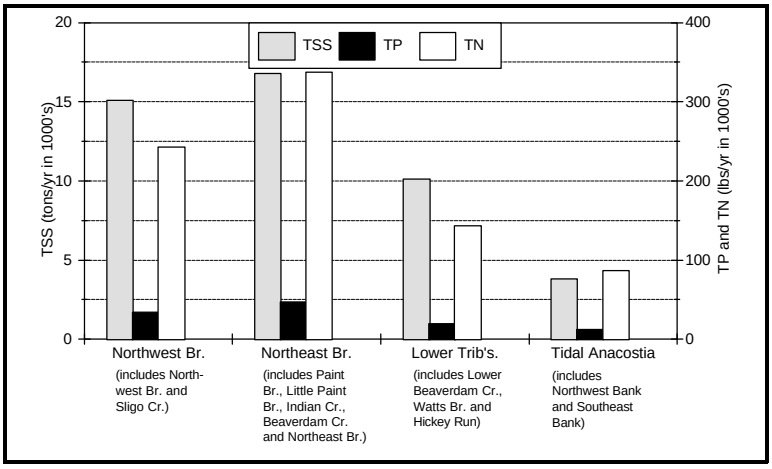



**Figure 7. Annual Total Suspended Solids (TSS), Total Phosphorus (TP) and Total Nitrogen (TN) Pollutant Load Estimates, 1990** (data from Warner et al., 1997).

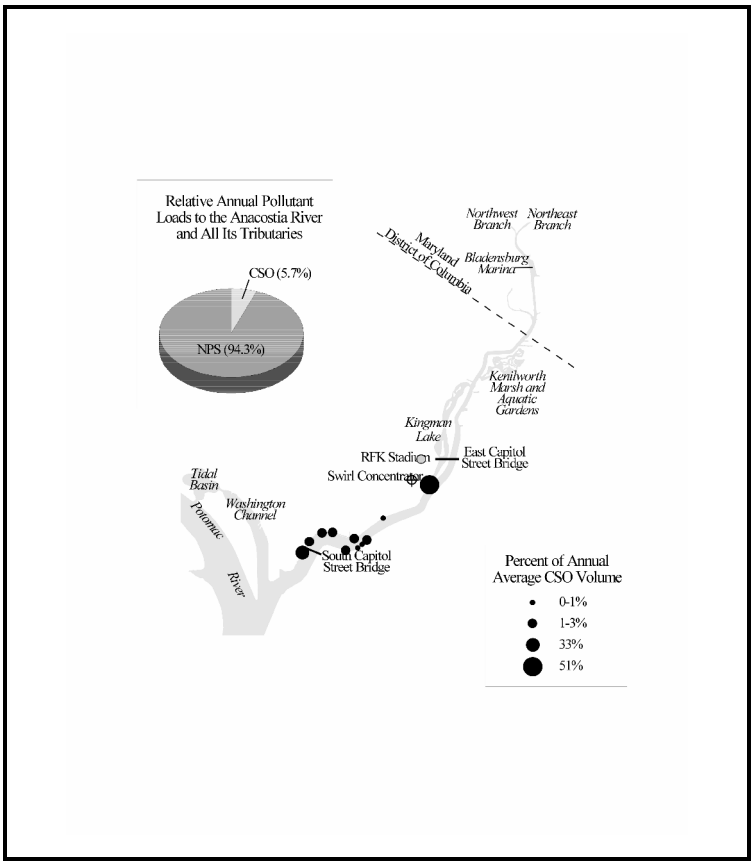



**Figure 8. Location and Relative Size of CSO Discharges to the Tidal Anacostia River** (COG, 1998).

### Combined Sewer Overflows-CSOs

Approximately 60 percent of the Anacostia watershed within the District of Columbia drains directly to the tidal Anacostia River via a combined sanitary and storm sewer system dating back as early as the late 1800s. As seen in Figure 8, there are 11 major combined sewer outfalls to the Anacostia River and all discharge in the vicinity of the East Capitol Street and South Capitol Street bridges. A CSO event occurs when rainfall exceeds the capacity of this combined system causing discharges of untreated sanitary waste and stormwater directly into the river. On average, overflows occur roughly 40 to 50 times a year, resulting in approximately 1.3 billion gallons of sanitary waste

discharged to the tidal river.

CSOs are the primary point source pollutants degrading the Anacostia River's water quality. However, only about six percent of the annual pollutant loads to the Anacostia River are from CSOs compared to about 94 percent from nonpoint sources (Warner et al., 1997). In recognition of the CSO problem, the District of Columbia initiated its CSO Abatement Program in the early 1980s (Nemura and Pontikakis-Coyne, 1991). Retrofitting of existing combined sewer systems, between 1988 to 1990, with inflatable dams and construction of an overflow treatment facility (a.k.a., swirl concentrator) have produced some improvement. However, it is estimated that well over $1 billion dollars may be required to correct the existing CSO problem.

**Toxics**

Toxics refer to a variety of contaminants including trace metals such as arsenic, mercury, copper, cadmium and lead; and organic compounds such as PAHs (polycyclic aromatic hydrocarbons), PCBs (polychlorinated biphenyls) and pesticides and herbicides (e.g., DDT, Chlordane and atrazine) which reach receiving waters from stormwater runoff, atmospheric deposition and industrial and municipal discharges.

These contaminants typically cling to particles suspended in water and settle to the bottom, whereupon, they can become ingested by bottom feeding organisms and potentially find their way up the food chain. As seen in Figure 9, the Anacostia River is one of three areas in the Chesapeake Bay recognized as posing a significant risk to aquatic life due to high levels of sediment contamination. It has been designated by the Chesapeake Bay Program as a "Region of Concern" and the District of Columbia Department of Consumer and Regulatory Affairs has developed an "Action Plan" to address the issue of toxics in the river (CBP, 1995).

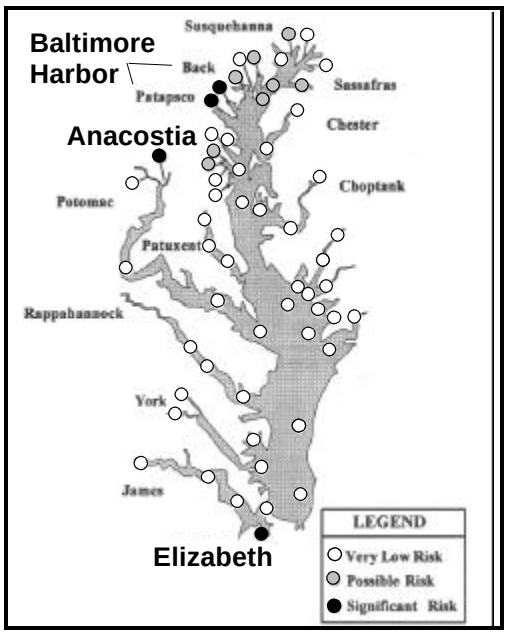



**Figure 9. Sediment Contamination and Risk to Aquatic Life from Chesapeake Bay Tributaries** (modified from CBP, 1995).

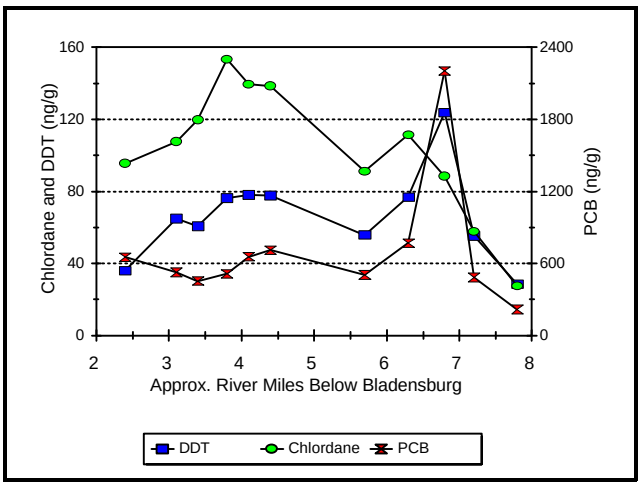



**Figure 10. Sediment Concentrations of Select Organic Compounds in the Anacostia River and Kingman Lake, 1991** (modified from Velinsky et al., 1992).

Several studies of tidal river sediments have found PCBs, DDT, DDE, Chlordane, trace metals and PAHs at detectable levels at all tidal Anacostia River sampling stations with levels of PCBs and Chlordane exceeding suggested criteria throughout the tidal river. However, the source(s) of contaminants could not be definitively determined (LTI, 1990). A subsequent study of tidal river sediments conducted in 1991 found concentrations of trace metals, such as cadmium, mercury, lead and zinc in the vicinity of the Washington Navy Yard to be at levels several times those expected to occur naturally. In addition, the study also found sharp increases in two organic sediment contaminants, DDT and PCB, just downstream of the Navy Yard (Figure 10). Potential sources identified include: the Navy Yard, the Bureau

of Engraving and Printing, the old Lionel freight yard and the U.S. Botanical Gardens. In contrast, concentrations of Chlordane were highest in and just downstream of Kingman Lake.

Currently, a major initiative, led by the District of Columbia Department of Health, is underway to study both toxic loadings to the tidal river from the Northwest and Northeast Branches, as well as, the control of and management of contaminated river sediments. Because of elevated levels of PCBs and Chlordane found in fish tissue, the District of Columbia, in 1994, issued a fish consumption advisory recommending that no bottom dwelling fish (such as catfish, eel and carp) be consumed and no more than 0.5 pounds of gamefish (such as largemouth bass and sunfish) be consumed by an adult per week. This advisory remains in effect.

**Organic Loadings**

Stormwater runoff, combined sewer overflows, leaking sewer lines, as well as natural processes, all contribute significant amounts of organic matter to the Anacostia River. Organic matter, which refers to anything derived from living organisms, must then be broken down or decomposed by microorganisms within the river. Depending on the timing and size of the load, the decomposition of this material can require a substantial amount of oxygen. One measure of the amount of oxygen required to decompose organic matter (principally organic carbon) over a fixed amount of time (typically 5 days) is termed the five-day biochemical oxygen demand ($BOD_5$). While $BOD_5$ does not account for the total oxygen demand to a water body, it does provide a good representation. When characterized as a pollutant load, $BOD_5$ is expressed in terms of the total organic load to a receiving waterbody that is biologically oxidizable.

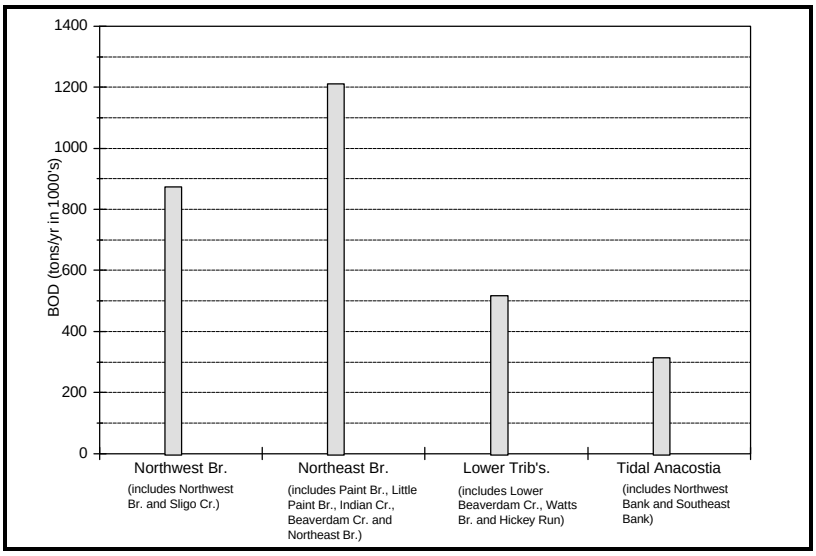



**Figure 11. Annual Biochemical Oxygen Demand ($BOD_5$) Pollutant Load Estimates, 1990** (data from Warner et al., 1997).

Again, using the Simple Method (Schueler, 1987), COG staff estimated $BOD_5$ pollutant loads for the entire Anacostia watershed. As seen in Figure 11, the Northwest and Northeast Branches (which together comprise approximately 74 percent of the total Anacostia watershed area) generate roughly 72 percent of the watershed's $BOD_5$ loads. In general, $BOD_5$ pollutant loads per subdrainage area increase with increasing subdrainage area size. The total $BOD_5$ pollutant load for the entire watershed is an estimated 2,915,680 lbs/year. This level is approximately 5 to 6 times higher than under pre-European settlement conditions.

High $BOD_5$ loads, particularly during the warmer summer months, can reduce tidal river dissolved oxygen (DO) concentrations to levels that are lethal to fish and other aquatic organisms. Other factors that influence DO concentrations include river flow, water temperature, CSO events, algal blooms and sediment oxygen demand (SOD). SOD has been found to have a major negative influence on DO within the tidal Anacostia River, particularly in the vicinity of CSO outfalls (An, 1992). The District of Columbia has established a minimum DO concentration of 5.0 mg/L to support aquatic life. Unfortunately, chronically low DO levels below this threshold have been and continue to be a major problem along the tidal river (Figure 12). For a significant portion of the tidal river, from below

Kenilworth Marsh downstream to approximately the South Capitol Street bridge, minimum summer DO levels were at or below 1.0 mg/L for the years 1987 to 1990 (Herson-Jones et al., 1994). While only two continuous DO monitoring stations have remained operational since 1990, data through 1996 show that very low summer DO levels are still a common occurrence.

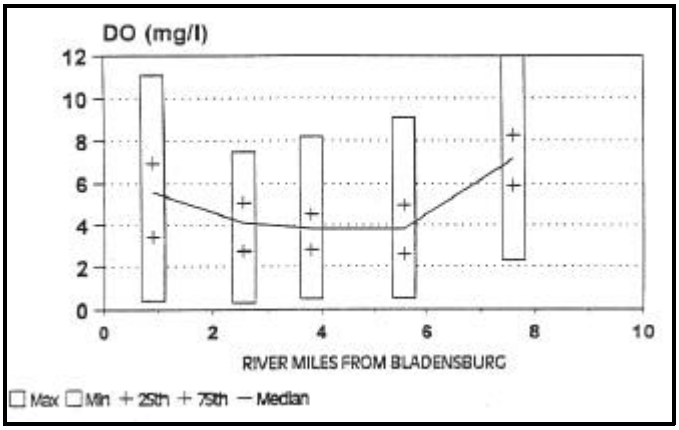



**Figure 12. Summer Dissolved Oxygen Levels for the Tidal Anacostia River, 1987-1990** (Herson-Jones et al., 1994).

Despite low DO levels, the number of fish kills reported in the tidal river over the past 10 years has generally been declining. The District of Columbia's Fisheries Management Branch which investigates reports of fish kills within the Anacostia River roughly defines a fish kill as the death of approximately 50 or more individuals within a spatially confined area (Tilak, 1997). From 1990 to 1996, the Fisheries Management Branch has observed two fish kills, one in June 1991 and the other in June 1992. Extremely low DO levels were believed responsible for the 1991 fish kill in which at least 10 fish species were identified. DO levels associated with the fish kill ranged from 0.4 to 1.8 mg/L (Tilak, 1997).

**Trash and Debris**

**Figure 13. Anacostia River Bank North of New York Avenue Bridge** (photo: DC WASA, 1993)**.**

It is estimated that over 20,000 tons of trash and debris enter the Anacostia River annually (PG DER, 1994). Without question, it remains one of the watershed's most highly visible and aesthetic problems (Figure 13). Trash and non-woody debris, which enter the watershed's tributaries and tidal river largely through urban storm drain systems, also have chemical and biological impacts on receiving waters including: interference with the establishment of aquatic plants, leaching of toxics from certain types of trash such as used oil filters and batteries, and floating trash hazards to wildlife through ingestion of or entanglement in floating debris (Herson-Jones et al., 1994). The types of trash and debris and the sources are many, making the management of this ubiquitous problem quite a formidable task (Figure 14).

**Figure 14. District of Columbia Trash Skimmer Boat Removing Floating Trash** (photo: DC WASA, 1993)**.**

In 1992, the Floating Debris Removal Program for the Anacostia and Potomac Rivers was developed by the District of Columbia Department of Public Works as a pilot project to address debris control problems intrinsic to the tidal Anacostia River. These control problems include: relatively low flow rates and long turnover times of approximately 90 days in flushing out debris, many stormwater and CSO outfalls, and many mudflats and deltas exposed at low tides, all of which tend to retain debris (Durrum, no date). While the collection of trash and debris does not address nor begin to control the sources of the problem, it does provide a means for quantifying it.

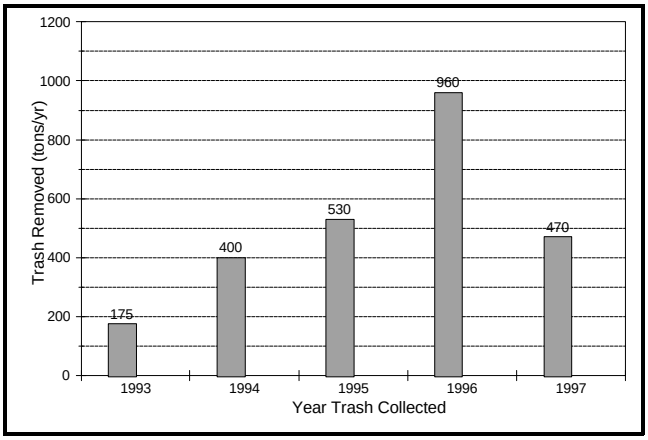



**Figure 15. Tons of Trash Removed Annually from the Tidal Anacostia River, 1993-1997** (DC WASA, 1998).

The District of Columbia Water and Sewer Authority which currently runs the debris removal program collected approximately 960 tons of trash and debris in 1996 (Figure 15). The significant increase collected in 1996 over the previous year was primarily due to several high runoff events. The increase in tonnage after 1993 was in part due to additional trash and debris collecting equipment (Donaldson, 1997).

**STRATEGY:** Appreciably reduce and/or eliminate the impact from combined sewer/stormwater overflow events and stormwater pollutant loadings; effectively control stormwater loadings from new and existing development; remove trash and debris currently trapped in the tidal river as well as throughout the watershed; prevent future trash and debris deposition through community education and heighten public awareness; evaluate and address the problem of toxic sediments in the tidal river.

**PROGRESS:**

**Reduced Fish Kills**

As previously stated, there have been no reported fish kills in the tidal river since June 1992. Despite generally poor water quality conditions present, the tidal Anacostia continues to support a relatively stable and diverse population of gamefish (Figure 16). Also, while still well below historical levels, some 37 fish species called the tidal Anacostia River their home in 1996.

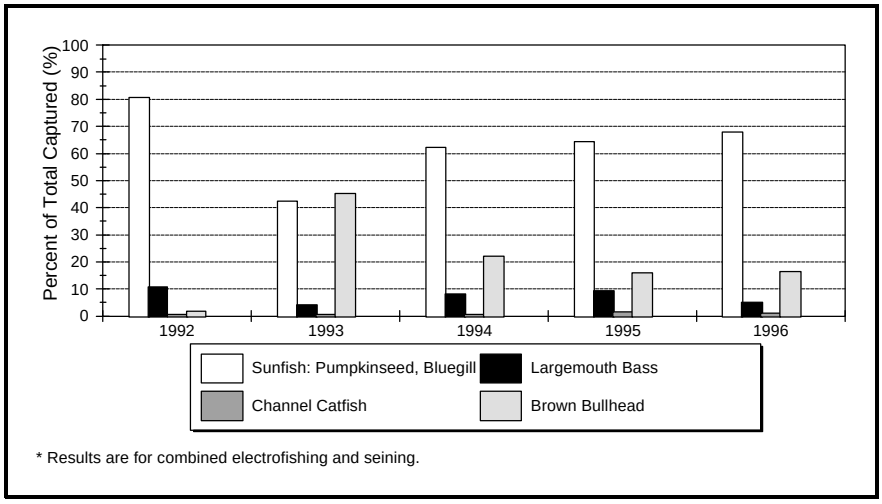



**Figure 16. Representative Gamefish Distribution in the Tidal River, 1992-1996** (data from DC FMP, 1993-97).

**Erosion and Sediment Control**

Since the mid-1980s, Montgomery and Prince George's counties and the District of Columbia have instituted stringent erosion and sediment and stormwater management controls for all new development. In the intervening years, hundreds of urban stormwater

best management practices, such as wetlands, wet ponds, infiltration trenches, extended detention dry ponds, sand filters, etc., have been constructed.

**Tidal River Sediment Transport Model**

As previously indicated, tidal Anacostia River sediments are highly impacted with organic and inorganic contaminants which have resulted in substantial biological impacts to benthos and fish. In 1997, the D.C. Department of Health-Environmental Health Administration worked closely with the Interstate Commission on the Potomac River Basin to develop a sediment transport model for determining deposition dynamics in the tidal Anacostia. Understanding the processes related to sediment transport will help answer questions on how sediment and related contaminants are deposited within the tidal Anacostia and into the Potomac River as well. The data will also help in developing remediation strategies for dealing with contaminated sediments in the Anacostia River.

**Stormwater Retrofit**

Starting in 1989, the District of Columbia, Montgomery and Prince George's counties, the state of Maryland and later the U.S. Army Corps of Engineers undertook the installation of stormwater retrofit projects to include both new stormwater controls for previously uncontrolled development and the modification of existing stormwater controls to enhance their pollutant removal and stream channel protection performance. To date, approximately 200 stormwater retrofits have been proposed. Approximately 60 projects have either been constructed or are in a planning or design phase (Figures 17 and 18).

**Figure 17. Hollywood Branch Peat Sand Filter, Montgomery County.**

Under section 219 of the Water Resources Act, the U.S. Army Corps of Engineers (with sponsorship from Prince George's County) initiated a study of the impacts of stormwater discharges from Federal facilities in the Anacostia River watershed in Prince George's County. The two-year Federal Facilities Pollution Prevention Study, which was recently completed, identified potential stormwater retrofit projects at four Federal facility sites.

In 1997, the Montgomery County Department of Environmental Protection completed a stormwater retrofit and stream restoration inventory for the environmentally sensitive Upper Paint Branch watershed. In addition to the 67 potential projects identified, the study included extensive stormflow modeling.

**Figure 18. Kentlands No. 2 Wetland, Prince George's County.**

**CSO Abatement**

In 1989, the D.C. Department of Public Works and the U.S. Environmental Protection Agency installed an innovative swirl concentrator facility to reduce the combined sewer/stormwater overflow from the Northeast Boundary Interceptor which services the largest combined sewer system drainage area in the Anacostia at approximately 4,278 acres (Warner et al., 1997). Since becoming fully operational in 1990, it is estimated that the swirl concentrator has reduced both

floatable material and total phosphorus discharges from this combined sewer system by approximately 25 to 30 percent. It also appears to have had a positive effect on DO levels in the river.

**Storm Drain Monitoring**

Since 1993, a total of 618 storm drain outfalls in the Prince George's County portion of the Anacostia have been screened by the County for possible illicit connections and pollution problems. Out of this total, 19 outfalls exhibited chemical pollution problems necessitating follow up enforcement actions.

**Sanitary Sewer Line System Upgrade**

The Washington Suburban Sanitary Commission, a regional water and sewer utility, has maintained an on-going rehabilitation and replacement program for aging sewer lines in the Anacostia's tributaries. The approximately $20 million dollar rehabilitation and replacement of aging trunk sewer lines in both Sligo Creek (Montgomery County) and Lower Beaverdam Creek (Prince George's County) was completed in 1997.

**Toxic Sediments**

In 1997, the D.C. Environmental Regulation Administration and the U.S. Environmental Protection Agency working with the Interstate Commission on the Potomac River Basin developed a remedial action plan for contaminated Anacostia River sediments.

**Biennial Federal Workplan**

In 1997, the U.S. Army Corps of Engineers completed its first *Biennial Federal Workplan for the Anacostia River Watershed*. The workplan includes an inventory of current, future and proposed projects and actions identified by Federal agencies that will contribute to the Anacostia restoration effort. The workplan also identifies gaps in Federal restoration efforts and provides recommendations on how to fill those gaps, including recommended activities on which Federal agencies should focus their efforts to achieve the ecosystem management approach for the watershed. The workplan also provides a detailed summary of current Anacostia restoration agreements and programs of Federal and local agencies.

**Anacostia Federal Facilities Impact Assessment Study**

Under this Congressionally mandated study, the U.S. Army Corps of Engineers with assistance from the Metropolitan Washington Council of Governments in 1997 identified over 50 stormwater retrofit, stream restoration, wetland creation, drainage remediation and riparian reforestation projects and management measures at 11 Anacostia Federal facility sites. The study is expected to be completed in early 1998.

**Subwatershed Restoration Plans**

The D.C. Environmental Regulation Administration and the U.S. Environmental Protection Agency, via the Hickey Run Comprehensive Pollution Abatement Program, contracted with the Metropolitan Washington Council of Governments to develop the first Subwatershed Action Plan (Shepp, 1991) for the Anacostia (completed in 1991) and to develop and apply a prototype petroleum hydrocarbon storm drain tracing system (also implemented in 1991) for Hickey Run (Shepp, 1993).

**Floatable Trash Reduction**

Beginning in 1992, the D.C. Department of Public Works (DC DPW), the Prince George's County Department of

Environmental Resources, the Prince George's County Maryland-National Capital Park and Planning Commission (M-NCPPC) and the Interstate Commission on the Potomac River Basin (ICPRB) developed floating trash management initiatives for the river and its larger tributaries. In 1993, DC DPW began using a small fleet of skimmer boats to remove trash and debris from the river. M-NCPPC, with assistance from the ICPRB and local volunteers, operated intermittently between 1993 and 1995, a trash boom upstream of the Bladensburg Marina to test the trapping efficacy of this technique. Over eight tons of floating debris were removed during the six-month-long trial period.


**Figure 19. Storm Drain Stenciling** (photo: PG DER, 1996).

The District of Columbia and Montgomery and Prince George's counties supported citizen initiatives to include stream cleanups and "Don't Dump" storm drain inlet stenciling, which identifies a storm drain's connection to the Anacostia watershed (Figure 19).

In 1995, the AWRC established a Trash Workgroup which subsequently developed a report and recommendations on trash reduction in the Anacostia. As a result, the workgroup in coordination with the AWRC will continue to develop initiatives designed to address trash and debris issues throughout the watershed.

The AWRC's Anacostia Citizens Advisory Committee (AWCAC) planned and conducted the first annual watershed-wide Anacostia River Cleanup Day. The April 1997 event, which both raised public awareness of the trash problem in the watershed and increased stream stewardship, brought together 800 volunteers who collected nearly 30 tons of trash and debris. The event, which was sponsored by AWCAC, the Anacostia Watershed Society and Seafarer's Yacht Club had three staging points: Bladensburg Marina, Kenilworth Park and Anacostia Park. The U.S. Army Corps of Engineers provided two trash barges to help pick up the trash. Additional equipment and supplies – front end loaders, generators, trucks, vans, canoes and boats, radios, phones and trash containers – were provided by a number of District of Columbia agencies, the Maryland-National Capital Park and Planning Commission, the towns of Bladensburg and Cheverly, Prince George's County Department of Environmental Resources, Browning-Ferris Industries and Washington Gas.

**Submerged Aquatic Vegetation**

Submerged aquatic vegetation (SAV) helps to improve water quality by filtering contaminants, using nutrients for growth and releasing dissolved oxygen. SAV also provides important habitat for fish and food for waterfowl. Poor water clarity prevents SAV growth. Unfortunately, for most of this century, SAV has been absent from the Anacostia River. However, in recent years, the tidal Anacostia River has shown slight signs of improved clarity, particulary in the lower reaches which are more strongly influenced by clearer Potomac River water. As a result, SAV such as wild celery, coontail, hydrilla, water stargrass and milfoil have begun to slowly establish themselves in the Anacostia River downstream of the East Capitol Street bridge (Figure 20).

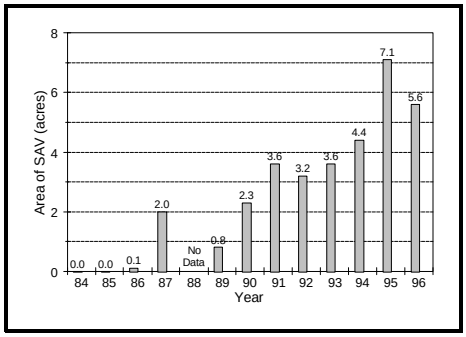



**Figure 20. Submerged Aquatic Vegetation in the Tidal River** (data from VIMS, 1998).

## Goal 2 Protect and restore the ecological integrity of Anacostia streams to enhance aquatic diversity and encourage a quality urban fishery.

**PROBLEM:** In much of the watershed, stream habitat has been severely degraded by urbanization, the associated inability to control stormwater runoff and by dozens of miles of engineered river and tributary modifications. COG staff have conservatively estimated that approximately 50 miles (17 percent) of the original Anacostia stream system have been directly altered in some fashion by human activities (Figures 21 and 22). Urbanization has also caused changes in the biological diversity, hydrology or stream flow, physical structure, ecology and overall water quality of the tidal Anacostia River and its tributaries.

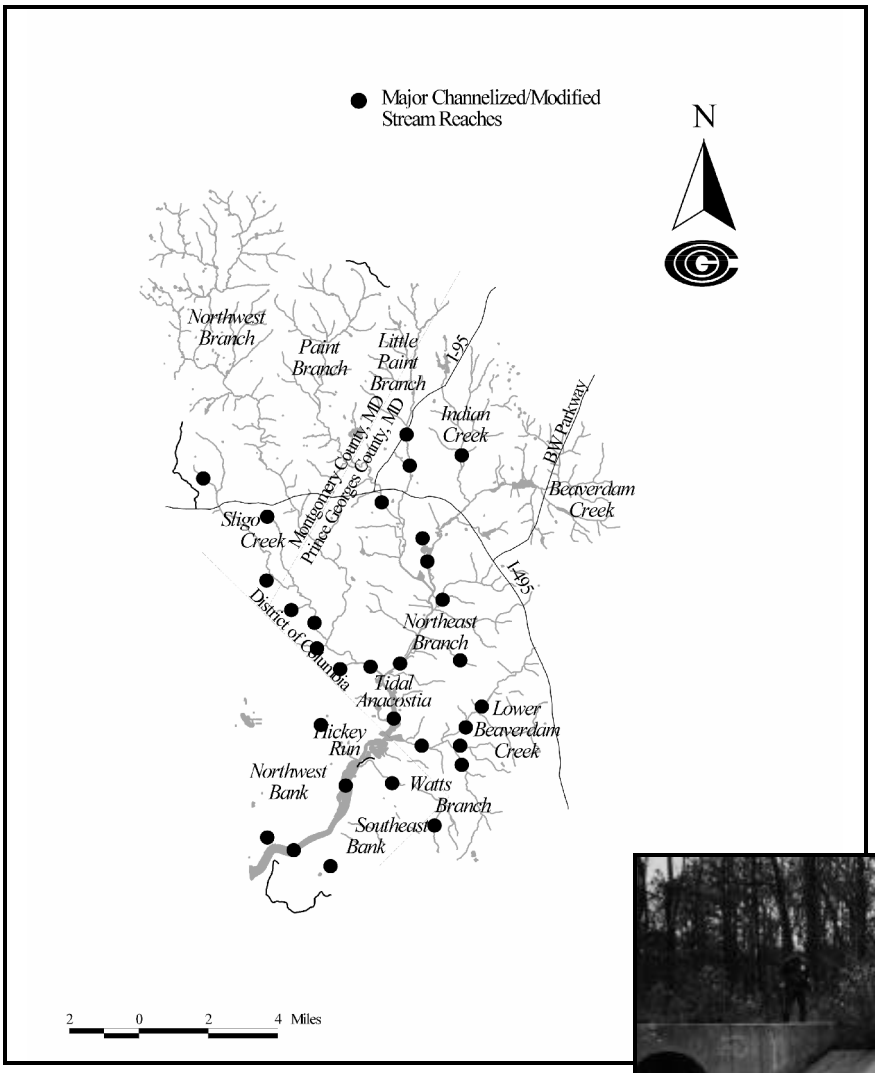



**Figure 21. Anacostia Watershed Channelized/ Modified Areas**

**Figure 22. Lower Beaverdam Creek - Channelized Stream Reach.**

**STRATEGY:** Design and implement stormwater retrofits to control runoff and restore an environmental balance to the receiving streams; protect and enhance the remaining habitat; apply stream restoration techniques to improve habitat in the most degraded streams; implement land-use controls and stringent stormwater and erosion and sediment control practices at new development sites, prioritizing the most critical and sensitive subwatersheds.

**PROGRESS:**

**Stream Restoration**

**Figure 23. Boulder Placement: Sligo Creek Stream Restoration Phase II, 1994.**

During the period 1991 to 1997, the Montgomery County Department of Environmental Protection, the Maryland Department of the Environment, the Metropolitan Washington Council of Governments, the U.S. Army Corps of Engineers and Prince George's County Department of Environmental Resources completed six major stream restoration projects. Approximately six miles of degraded habitat in Sligo Creek, Brier Ditch, Northwest Branch and Northeast Branch have been rehabilitated for fish and other aquatic life (Figure 23). Efforts are currently underway in both Montgomery and Prince George's counties to enhance aquatic habitat in approximately another 12 miles of stream by the year 2000.

The D.C. Environmental Regulation Administration, the U.S. Environmental Protection Agency, the U.S. Department of Agriculture (USDA) and the Metropolitan Washington Council of Governments have initiated efforts to restore a one-mile portion of Hickey Run (which flows through the USDA National Arboretum).

In 1993, the National Park Service, in conjunction with the Interstate Commission on the Potomac River Basin, began restoration work on the North Branch of Still Creek (which flows through Greenbelt National Park, located in the Northeast Branch).

As a first step toward the restoration of Watts Branch, the District of Columbia Environmental Regulation Administration in partnership with the Natural Resources Conservation Service, from 1989 to 1990, stabilized several hundred feet of badly eroding stream banks downstream of 44$^{th}$ Street.

As part of its Section 1135 Anacostia Floodway Rehabilitation Project, the U.S. Army Corps of Engineers in 1995 restored pool and riffle habitat and modified two major fish barriers within a two-mile length of the lower Northeast and Northwest Branches.

From 1995 to 1997, the Prince George's County Department of Environmental Resources, the Maryland-National Capital Park and Planning Commission and the Maryland Department of the Environment undertook initiatives to restore portions of Little Paint Branch, Quincy Manor Run, Brier Ditch and other Anacostia tributaries. Both the Little Paint Branch and Quincy Manor Run restoration projects will feature bioengineering techniques such as the use of willow stake plantings and live fascines in combination with streambank regrading and riparian reforestation. Construction in 1998 is anticipated.

**Figure 24. Children Stocking Native Fish in Wheaton Branch, 1992.**

### Native Fish Reintroduction

Between 1992 and 1994, seventeen species of native fish were reintroduced into a restored portion of Sligo Creek by an interagency cooperative team composed of the Montgomery County Department of Environmental Protection, the Maryland Department of the Environment, the Maryland Department of Natural Resources, the Maryland-National Capital Park and Planning Commission, the Interstate Commission on the Potomac River Basin, the Metropolitan Washington Council of Governments and local citizens (Figure 24). All reintroduced species, both pollution tolerant and intolerant such as the rosyside dace, mottled sculpin and northern hogsucker, are surviving.

**Figure 25. Paint Branch Brown Trout Captured One Mile Below Capital Beltway (I-495), 1996.**

### Paint Branch Trout Protection

In the Paint Branch subwatershed, the Anacostia's highest quality stream system, a naturally reproducing brown trout population has existed since the 1930s (Figure 25). Since 1979, annual electrofishing surveys by the Maryland Department of Natural Resources have documented both the distribution and relative abundance of Paint Branch trout. While facing increasing pressure from development, the Good Hope tributary (Paint Branch's principal spawning and nursery stream) has consistently produced trout for over 19 years in a row (Figure 26). This level of consistency remains unparalled anywhere in the state of Maryland.

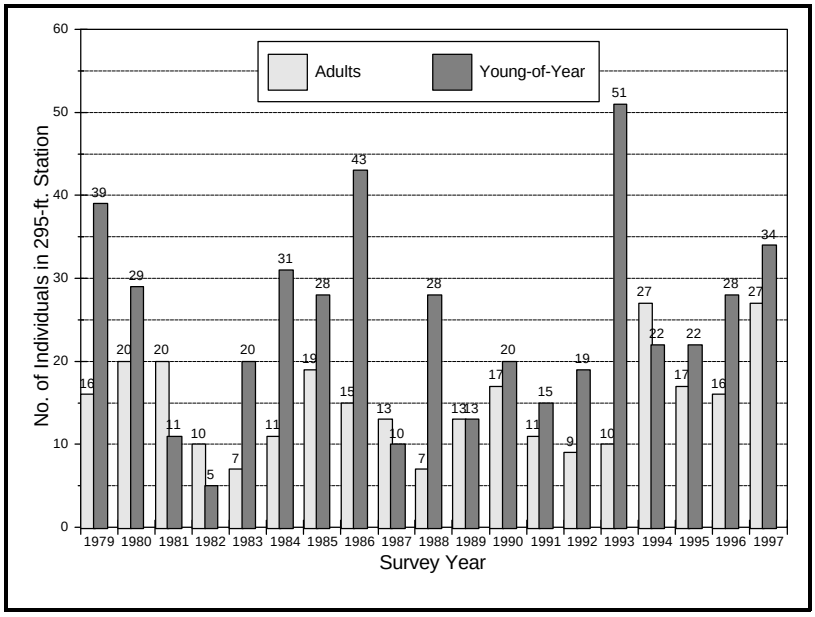



**Figure 26. Good Hope Tributary to Paint Branch: Station No. 1 Brown Trout Population Estimates, 1979-1997** (Gougeon, 1997).

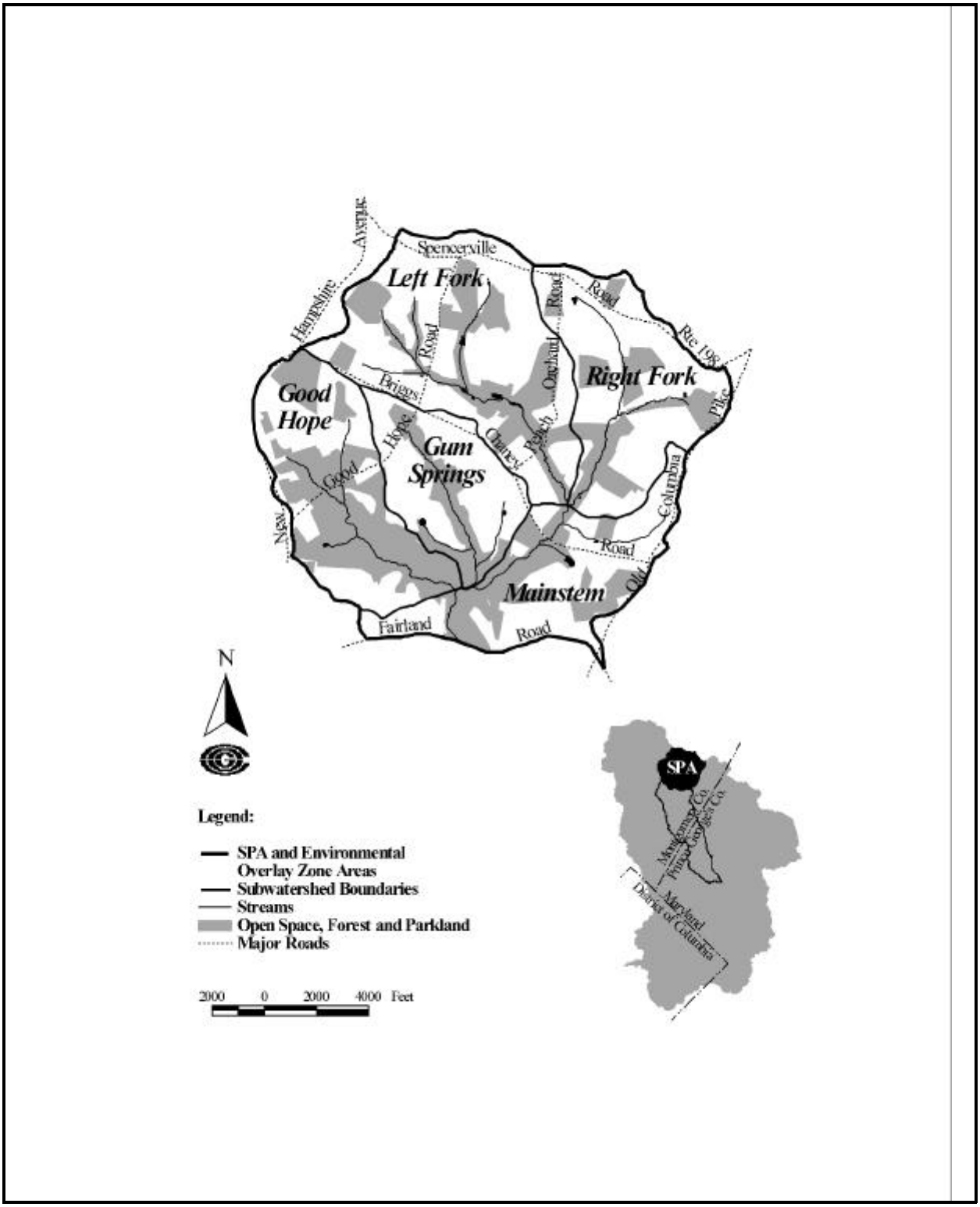



**Figure 27. Approved Upper Paint Branch Special Protection (SPA) and Environmental Overlay Zone Areas** (modified from M-NCPPC, 1996).

In recognition of the growing threats to this unique resource, a diverse workgroup, consisting of the Montgomery County Department of Environmental Protection, Maryland-National Capital Park and Planning Commission, Interstate Commission on the Potomac River Basin, Audubon Naturalist Society, Trout Unlimited and the Metropolitan Washington Council of Governments, developed a comprehensive watershed protection and restoration strategy for the Good Hope tributary. The Workgroup's recommendations, which were officially endorsed and distributed by the Anacostia Watershed Restoration Committee in October 1994, served as an important starting point for a triad of Upper Paint Branch watershed protection initiatives which soon followed.

Through the joint efforts of the Montgomery County Department of Environmental Protection and the Maryland-National Capital Park and Planning Commission, the Montgomery County Council in July 1995 officially designated the Upper Paint Branch (Figure 27) as a Special Protection Area (SPA). In addition to officially elevating the status of this subwatershed, the SPA designation featured environmentally strict restrictions and conditions for new development based on biological, physical and chemical performance monitoring goals.

This major step was followed by an aggressive stream valley conservation park acquisition initiative by the Maryland-National Capital Park and Planning Commission. The Limited Park Acquisition Amendment to the 1981 Eastern Montgomery County Master Plan (approved by the Montgomery County Council in May 1996) will add an additional 248 acres of parkland along both the Good Hope and Gum Springs tributaries of Paint Branch. The cost of this additional parkland is estimated between $13 and $15 million.

In July 1997, the Montgomery County Council approved an Environmental Overlay Zone (Figure 27) developed by the Maryland-National Capital Park and Planning Commission for the Upper Paint Branch. The zone places a 10 percent imperviousness cap on new watershed development and importantly prohibits highly polluting uses, such as the construction of new gas stations.

**Countywide Stream Protection Strategy**

In 1997, the Montgomery County Department of Environmental Protection in partnership with the Maryland-National Capital Park and Planning Commission developed a draft Countywide Stream Protection Strategy which establishes restoration and management priorities for the more than 200 sub-basins present in the County. The draft report is expected to be finalized and approved by the County Council in 1998.

**Little Paint Branch Workgroup**

In response to citizen concerns about the health of Little Paint Branch, the Maryland Department of Natural Resources formed a workgroup to determine the stream’s present condition and make recommendations on what future actions are needed for its protection and restoration. The Workgroup, which includes local citizens, environmental groups, and local, state, Federal and regional agency representatives, is expected to present its findings and recommendations to the AWRC in 1998.

## Goal 3 Restore the spawning range of anadromous (migratory) fish to historical limits.

**PROBLEM:** Historically, anadromous fish species (e.g., herring, shad, and striped bass) have migrated en masse from the Atlantic Ocean and Chesapeake Bay into the freshwater non-tidal Anacostia tributaries to spawn. During the past four decades, their annual upstream migrations have been largely prevented by over two dozen unintentional and man-made barriers located primarily along the lower portions of tributaries such as the Northwest and Northeast Branches, Paint Branch, Indian Creek, Lower Beaverdam Creek, Sligo Creek and Watts Branch (Figure 28).

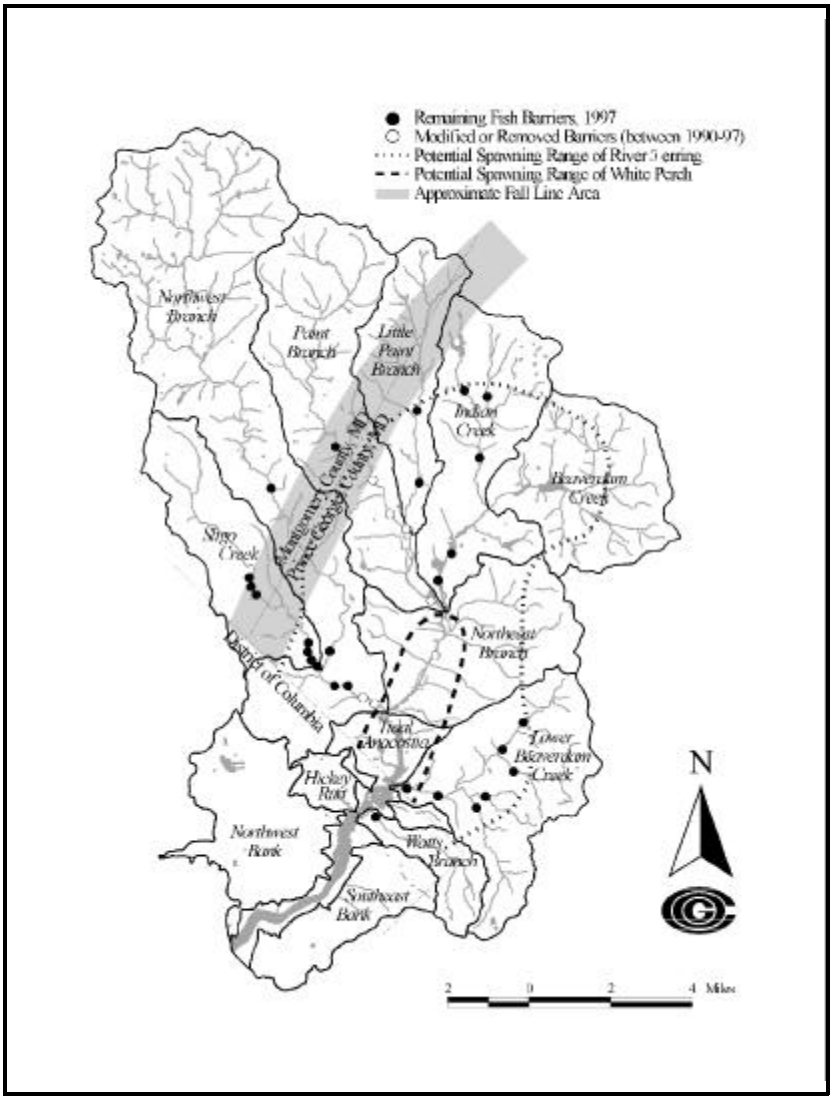



**Figure 28. Status of Major Anacostia Fish Barriers, 1997** (modified from ICPRB, 1993).

**STRATEGY:** Remove or modify key fish barriers to expand the available spawning range for anadromous fish, and improve the quality of their spawning habitat. Once expanded, selectively assist the anadromous fish communities to genetically "imprint" on their newly opened territory to encourage the return of future generations.

**PROGRESS:**

**Fish Barrier Removal/Modification**

Since the early 1970s, more than 25 major Anacostia fish blockages have been identified by the Maryland Department of Natural Resources, Interstate Commission on the Potomac River Basin and others. Recognizing fish barriers as a major state-wide problem, the Maryland Department of Natural Resources in 1987 made a major commitment to improve fish passage throughout the Chesapeake Bay Area, including the Anacostia. From 1989 to 1990, this initiative gained local momentum through the formation of the ad hoc Anacostia Anadromous Fish Workgroup. Led by the Interstate Commission on the Potomac River Basin (ICPRB), the workgroup (which comprised local, state, Federal and regional agency representatives) both established Anacostia fish blockage removal/modification priorities and helped strengthen overall coordination and support for this effort.

From 1990 to 1991, the ICPRB drop-in-the-bucket brigade manned by students from Paint Branch, Blair and Parkdale High Schools and Eastern Intermediate School captured and transported hundreds of alewife herring over the Northeast Branch weir. This fish reintroduction effort was done with the goal of chemically imprinting larval herring in the stream so that they might return years later as adults and proceed upstream of current barriers. Follow-up electrofishing monitoring of upstream areas suggest that this effort has had a positive effect.

In 1991, the Maryland-National Capital Park and Planning Commission working in partnership with a private developer, modified the Northeast Branch grade control weir located at River Road, greatly expanding the anadromous fish spawning range in this tributary system. This modification effort, which also included the creation of a large boulder field area for aiding anadromous fish passage and enhancing resident fish habitat, has been a major success for both fish and angler alike (Figures 29 and 30).

**Figure 29. Northeast Branch Weir Fish Barrier Modification Work, 1991.**

**Figure 30. Local Anglers Fishing Below Northeast Branch Weir at River Road, 1996.**

The Maryland State Highway Administration, in 1994, installed both a concrete step pool structure and Denil fish ladder along Paint Branch within the Capital Beltway (I-495) Inner and Outer Loop culverts. These structures have potentially opened up an additional two miles of stream to river herring (i.e., blueback and alewife herring).

As part of its $800,000 Section 1135 Anacostia Floodway Rehabilitation Project, the U.S. Army Corps of Engineers, in 1995, completed the following anadromous fish barrier-related projects:

a.) In coordination with the Maryland-National Capital Park and Planning Commission and Interstate Commission on the Potomac River Basin, the sheetpile grade control weir located near the mouth of the Paint Branch was

removed. The removal of this structure, in combination with the upstream modifications at the Capital Beltway, has effectively opened up the entire Paint Branch mainstem to the Fall Line.

b.) A Denil fish ladder was constructed within the concrete-lined "high speed" channel at Rhode Island Avenue (U.S. Route 1) in the Northwest Branch (Figure 31).

c.) The grade control weir located on the Northwest Branch immediately upstream of the 38th Street bridge in Prince George's County was notched to facilitate fish passage. The modification of this structure together with the installation of the Denil fish ladder have increased the anadromous fish spawning range in the Northwest Branch by approximately 1.8 miles.

**Figure 31. Northwest Branch U.S. Army Corps of Engineers Denil Fish Ladder at U.S. Route 1, 1995.**

**Figure 32. ICPRB Fisheries Biologist Measuring Alewife Herring Caught in Northwest Branch.**

During the period from 1990 to 1997, the Interstate Commission on the Potomac River Basin continued its on-going efforts to document and evaluate the range, strength and diversity of anadromous fish runs in major Anacostia tributaries such as the Northeast and Northwest Branches (Figure 32).

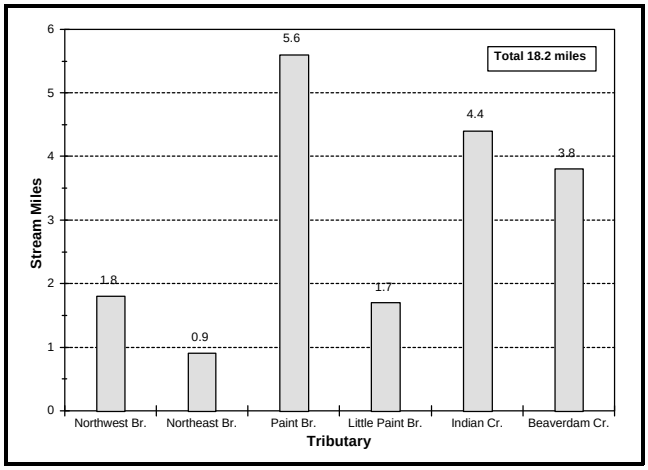



**Figure 33. Increase in Available Anacostia Tributary Herring Spawning Habitat, 1991-1997** (COG, 1998).

As seen in Figure 33, between 1991 and 1997, a total of approximately 18.2 miles of potential herring spawning habitat was recaptured in the Anacostia watershed. The greatest gains were recorded in the Northeast Branch tributaries such as Paint Branch, Little Paint Branch, Indian Creek and Beaverdam Creek (which were major beneficiaries from the modification of the Northeast Branch weir structure at River Road).

## Goal 4 Increase the natural filtering capacity of the watershed by sharply increasing the acreage and quality of tidal and non-tidal wetlands.

**PROBLEM:** Wetlands are a critical part of a watershed's ability to filter out pollutants, as well as provide wildlife and waterfowl habitat. To date more than 90 percent of the Anacostia's tidal wetlands and nearly 70 percent of its freshwater non-tidal wetlands have been destroyed or altered (Figures 34 and 35).

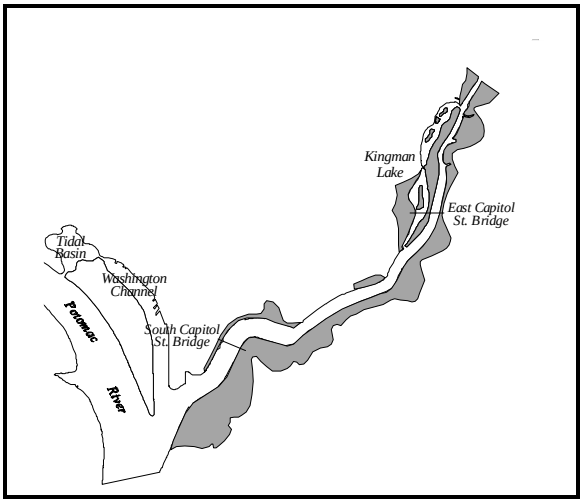



**Figure 34. Tidal Anacostia River Wetlands Filled (shaded areas) from 1902 to 1959** (modified from ICPRB, 1992).

**Figure 35. Northeast and Northwest Branches Confluence (foreground) with the Anacostia River.**

It is estimated that more than 6,500 acres of tidal and non-tidal wetlands have been lost from the watershed due to historic land conversion to agriculture, urban development, and filling and dredging along the tidal river (Figure 36). Almost 50 percent of the remaining acreage is classified as open water wetlands, which generally provide very specific and often limited habitat function.

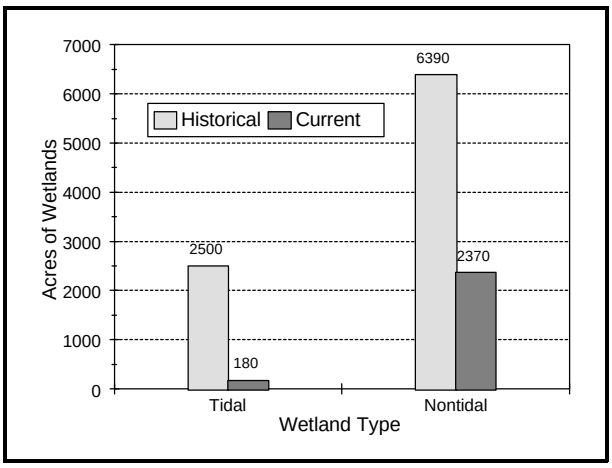



**Figure 36. Changes in Wetland Acreage Over Time** (modified from Warner, 1996).

**STRATEGY:** Permit no further net loss of wetlands in the watershed, restore the ecological integrity and function of existing degraded wetland areas, and create opportunities to establish several hundred acres of new tidal and non-tidal wetlands throughout the watershed.

**PROGRESS:**

**Figure 37. Kenilworth Marsh before Restoration, 1992.**

**Tidal Wetland Restoration**

The D.C. Department of Public Works, the Environmental Protection Agency, the National Park Service and the Metropolitan Washington Council of Governments initiated efforts to restore Kenilworth Marsh, a tidal freshwater system. Their efforts were successfully merged in late 1992 with a nearby ongoing U.S. Army Corps of Engineers Anacostia River dredging project which placed 130,000 cubic yards of dredge spoil material from the river into the marsh, resulting in the creation of 32 acres of emergent marshland. This effort represents the largest tidal freshwater marsh restoration project in the nation to date (Figures 37 and 38).

Through the U.S. Army Corps of Engineers' Anacostia Feasibility Study (1994), designs have been undertaken to restore Kingman Lake, a similar system to the Kenilworth Marsh, located on the same river reach. Lessons learned from the Kenilworth experience will be transferred to this project (approximately 46 acres of emergent wetland are planned).

Also identified in the Corps of Engineer's Anacostia Feasibility Study is the creation of an additional 30 acres of emergent river fringe wetlands to be located in the vicinity of nearby Kingman Lake. Though originally part of the Anacostia Feasibility Study project scope for the District of Columbia, due to funding considerations, this element will probably be phased to be a part of future initiatives.

**Constructed Wetlands**

Overall, approximately 138 acres of constructed wetlands have either been completed, or are currently in progress, within the Anacostia watershed.

In 1993, the Prince George's County Department of Environmental Resources, in cooperation with the U.S. Department of Agriculture's Beltsville Agricultural Research Center and the Washington Metropolitan Area Transit Authority, constructed 19

**Figure 38. Kenilworth Marsh after Restoration, Fall 1993.**

acres of non-tidal wetlands in Beaverdam Creek.

Prince George's County with assistance from the Maryland Department of the Environment, recently initiated efforts to design and construct a 0.5 acre wetland marsh facility in the Fairmount Heights area of the county. The project will both help reduce pollution from stormwater before it enters the Anacostia, as well as enhance wildlife habitat.

**Retrofit Pond Fringe Wetland Creation**

From 1989 to 1990, the Montgomery County Department of Environmental Protection, in cooperation with the Maryland-National Capital Park and Planning Commission and the Metropolitan Washington Council of Governments, created a total of 1.1 acres of fringe wetland habitat in four stormwater management ponds. Both emergent and submerged species, such as wild rice, common three square, soft-stem bulrush, arrowhead, wild celery, etc., were successfully incorporated in the plantings.

**Wetlands Regulation and Mitigation**

The Maryland Department of Natural Resources asserted new authority in 1992 to further protect non-tidal wetland areas; they are also evaluating ways to transfer wetland mitigation requirements to expand watershed-wide restoration efforts.

**Figure 39. Vernal Pool Water Quality Monitoring – Sligo Creek Watershed, 1994.**

**Amphibian Reintroduction**

As part of a larger Sligo Creek restoration effort, the Montgomery County Department of Environmental Protection, Maryland Department of the Environment, Maryland-National Capital Park and Planning Commission and the Metropolitan Washington Council of Governments constructed in 1991 and 1993 both vernal pool and shallow marsh habitat areas for the re-establishment of native amphibian populations (Figure 39). By 1995, utilization of the created habitat areas by six species had been documented (i.e., spring peeper, wood frog, green frog, bull frog, American toad and spotted salamander).

## Goal 5 Expand the range of forest cover throughout the watershed and create a contiguous corridor of forest along the margins of its streams and rivers.

**PROBLEM:** Once entirely forested, over 75 percent of the forest cover in the Anacostia watershed has been lost as a result of land clearing resulting from agriculture, timber harvesting activities, as well as the urbanization that has taken place. Much of this loss has occurred in the riparian forest areas along the stream and river banks, where forests play a critical role in maintaining stream temperature and water quality, preventing stream bank erosion and providing aquatic and terrestrial habitat.

Results from a recent assessment of riparian forest buffers in the Maryland portion of the Anacostia revealed that nearly 60 percent of all stream miles lack an adequate buffer of at least 150 feet on each side (Warner, 1996). As seen in Figure 40, Beaverdam Creek is the only remaining subwatershed with a relatively intact riparian buffer zone.

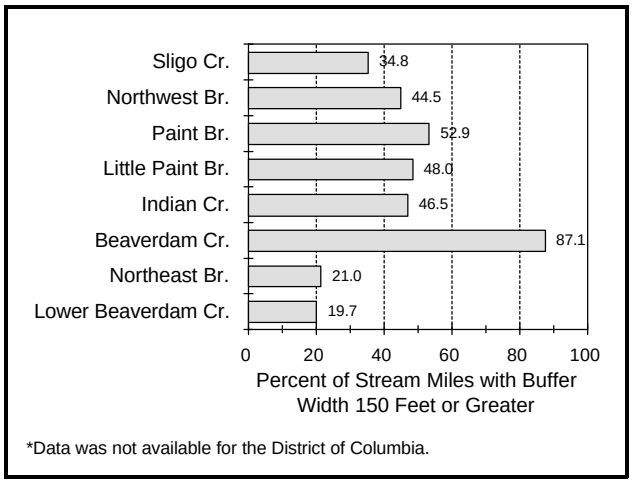



**Figure 40. Anacostia Subwatersheds Riparian Forest Buffer, 1992*** (modified from Warner, 1996).

**STRATEGY:** Minimize the loss of forest cover associated with new development and other activities by sound environmental planning as well as the local implementation of the 1991 Maryland Forest Conservation Act. Continue to reforest riparian and upland sites throughout the watershed. Design and implement riparian reforestation projects in critical areas of the watershed that will ultimately provide a continuous corridor of forest from the tidal river to the uppermost headwater streams.

**PROGRESS:**

**Riparian Buffer Reforestation**

In 1993, the Maryland Department of Natural Resources assigned a forester to the Anacostia watershed. Since then, the forester has coordinated the planting of more than 25,000 trees on approximately 50 acres and has also been active in public outreach activities.

Local and regional agencies and non-profit groups, to include the Maryland-National Capital Park and Planning Commission, Montgomery County Department of Environmental Protection, Prince George's County Department of Environmental Resources, D.C. Forest Council, Anacostia Watershed Society and the Metropolitan Washington Council of Governments, have reforested an estimated 40 acres. Much of the impetus has come from mitigation requirements created by county tree ordinances, buffer criteria and the Chesapeake Bay Critical Area program.

The District of Columbia, through its urban forester (hired in 1991), is exploring options with Federal landowners to reforest approximately 2.7 miles of riparian zone along the Anacostia.

The Metropolitan Washington Council of Governments is, on behalf of the District of Columbia Environmental Regulation Administration, working to reforest eight acres of riparian forest in and around the District of Columbia. Some of this acreage is being addressed in coordination with the Maryland Anacostia Forester.

**Figure 41. Joint COG/MD DNR/Anacostia Watershed Society Tree Planting at Univ. of Md. Pond – Paint Branch.**

Many civic associations and environmental groups, such as the Anacostia Watershed Society, D.C. Cares, Green Democrats, Eyes of Paint Branch and others, have been planting trees throughout the District of Columbia and Montgomery and Prince George's counties (Figure 41).

From 1994 to 1996, the Maryland Department of Natural Resources planted 20,000 seedlings and 150 containerized trees on approximately 30 acres at the U.S. Department of Agriculture's Beltsville Agricultural Research Center.

**Native Seed Bank**

In 1993, the Metropolitan Washington Council of Governments and the Earth Conservation Corps collected native seeds from local trees which were later propagated and planted in the watershed through a National Tree Trust program.

**Reforestation Site Maintenance**

From 1994 to 1996, the Metropolitan Washington Council of Governments, in coordination with D.C. Cares, organized eight reforestation site maintenance events in the watershed.

**Anacostia Floodway**

As part of its Section 1135 Anacostia Floodway Rehabilitation project, the U.S. Army Corps of Engineers, in 1995 and 1996, planted over 600 trees to increase shading of the Northeast and Northwest Branch channels.

**No-Mow Riparian Buffers**

As part of its Upper Sligo Creek riparian zone no-mow policy, the Maryland-National Capital Park and Planning Commission, in 1989, discontinued mowing along the stream. This has resulted in the regeneration of approximately 10 acres of riparian forest.

Since 1994, the U.S. Department of Agriculture's National Arboretum has modified their mowing policy to promote the regrowth of a natural buffer along a major tributary to Hickey Run.

The National Park Service has modified its mowing policy to promote a natural buffer along portions of the tidal river in the District of Columbia. It has also supported several citizen-based tree plantings.

At the request of the Metropolitan Washington Council of Governments and the Interstate Commission on the Potomac

River Basin, the U.S. Department of Agriculture's Beltsville Agricultural Research Center (in 1989) discontinued its channel maintenance practice of mowing all riparian vegetation down to the waterline along Paint and Little Paint Branch. By 1996, this resulted in the natural regeneration of approximately 12 acres of woody riparian vegetation and an improvement in both canopy coverage and instream habitat (Figures 42 and 43).

**Figure 42. Paint Branch BARC 1989.**

**Figure 43. Paint Branch BARC 1996.**

## Goal 6 Make the public aware of its key role in the Anacostia cleanup, and increase citizen participation in restoration activities.

**PROBLEM:** The majority of the watershed's citizens are unfamiliar with the environmental conditions of the watershed or the efforts that are ongoing to restore and protect it. Many essentially do not understand their connection to their streams and the relevant ecosystems. The success of the Anacostia restoration and its protection requires an informed and supportive public, and better appreciation of the watershed by its approximately 805,000 residents.

**STRATEGY:** Raise public awareness about the problems of the Anacostia River and associated ongoing restoration efforts; seek active public support and sustained commitment and involvement; educate the public concerning the watershed system and their role in reducing urban pollution; and, encourage a grassroots network of citizens to participate in a variety of restoration initiatives.

**PROGRESS:**

**Education and Outreach**

In 1988, the Interstate Commission on the Potomac River Basin (ICPRB) began to develop an Anacostia public outreach program. Through its efforts, the ICPRB has reached more than 60,000 people. The program effectively reached the public through the efforts of five sub-basin coordinators, publications focusing on sub-basin problems, newsletters and Anacostia information packets. The coordinators were instrumental in the formation of several citizen watershed groups and have enlisted others into Stream Teams programs run by Montgomery and Prince George's counties. They have given presentations, organized cleanups, and have worked on various restoration projects related to stream stewardship. Unfortunately, due to budgetary constraints, the Anacostia sub-basin coordinators program was discontinued in October 1997.

The Anacostia Watershed Society, a major private non-profit organization formed in 1989 and devoted to restoring the Anacostia River, has effectively mobilized many of the local communities and been the catalyst for numerous tree planting and stream cleanup projects. The Society also organizes river tours, community action days and a variety of other educational events that have brought much attention to the plight of the Anacostia.

Since its inception in 1992, the Lower Beaverdam Creek Task Force (a coalition of concerned citizens, civic and environmental groups and Prince George's County government representatives) has been actively working on addressing a broad range of environmental problems in the subwatershed. Major accomplishments include: Anacostia watershed education through public information meetings and river boat tours, trash reduction through a major adopt-a-stream campaign and public education; establishment of a used motor oil recycling center in Palmer Park; community signage; and both regular stream and alleyway trash cleanups.

In 1995, the District of Columbia with support from the Potomac Electric Power Company (PEPCO) established an Anacostia River Education Center. PEPCO has also recently created approximately 0.5 acres of tidal wetland habitat at its District of Columbia Benning Road Power Station.

In 1996, the AWRC formally established an Anacostia Citizens Advisory Committee (AWCAC) to provide advice on the ongoing restoration and to help educate and promote restoration efforts throughout the watershed. Since then, AWCAC members have been diligently working with local communities and environmental groups, serving as a critical information link with the AWRC.

In 1997, the D.C. Department of Health-Environmental Health Administration in conjunction with the D.C. Soil and Water Conservation District completed a broadcast-quality video to educate District residents about the ways they can help to reduce nonpoint source pollution to the Anacostia and Potomac rivers. Copies of the video have been made available to government cable television stations, schools and other organizations within the city interested in promoting environmental education.

The District of Columbia in partnership with the Alliance for the Chesapeake Bay has developed a Bayscape Community Watershed Stewardship Initiative for Popes Branch, a tributary of the Anacostia River. The goals of this initiative are to demonstrate an effective and transferable watershed-based education program that links community concerns with nonpoint source pollution prevention, stream restoration and "home river" stewardship in an urban environment. This will help empower home owners and watershed residents to actively participate in the restoration and protection of the Popes Branch watershed.

From the start of the restoration effort, the Maryland-National Capital Park and Planning Commission has committed itself to Anacostia public education and outreach through its nature centers and Anacostia Visitors Center at the Port of Bladensburg.

**COG Small Habitat Improvement Program**

In 1989, the Metropolitan Washington Council of Governments developed a Small Habitat Improvement Program (SHIP) designed to enlist volunteers to implement small scale restoration projects (such as storm drain stenciling, stream cleanups, tree plantings and maintenance, etc.) that rely upon citizen involvement and participation. Since 1989, more than 27 SHIP projects have been implemented watershed-wide.

**Stream Cleanup**

Since 1990, volunteers have removed over 200 tons of trash and debris from the river and its tributaries, sending a positive message of environmental stewardship (Figure 44).

**Figure 44. Citizen Stream Clean Up** (photo: PG DER, 1996).

**Port Towns and Bladensburg Marina Revitalization**

The Port Towns Revitalization Initiative for the Prince George's County river towns of Bladensburg, Colmar Manor and Cottage City was begun in 1993 by a coalition of municipalities, citizens, private organizations, businesses and government agencies at county, state and Federal levels. The purpose of the initiative is to revitalize these older communities through economic investment, political empowerment and community involvement, and environmental restoration. One of the centerpieces of this effort is the reconstruction of the Bladensburg Marina, which began in March 1997 and is expected to be completed in 1998.

**Stream Habitat Enhancement**

Since 1973, Trout Unlimited has been a major player in the overall effort to protect Paint Branch and its unique brown trout fishery. In addition to serving as lead advocacy and watchdog groups, Trout Unlimited together with the Eyes of Paint Branch have been responsible for orchestrating a variety of stream cleanups, tree plantings, education seminars and stream habitat enhancement projects in the Paint Branch (Figures 45 and 46).

**Figure 45. Trout Unlimited Construction of Gum Springs Check Dams, 1990.**

**Figure 46. Trout Unlimited Member Inspecting Handiwork.**

# Future Direction

The restoration that began ten years ago is still maturing and evolving. Efforts to restore and protect the ecological balance of the Anacostia have met with much success and have significantly contributed to improvements in the environmental condition of the watershed. However, we are still far from reaching our established goals. Recreational activities in the tidal river remain limited and in most cases are discouraged. Uncontrolled stormwater runoff and the high quantities of sediment and nonpoint source pollutants transported through the tributary system to the tidal river continue to be major problems. There is growing concern over toxic materials found in river sediments. Projected population increases are spurring development in headwater areas and additional roadway construction that will further aggravate water quality conditions and contribute increased pollutant loadings to an already overburdened system. There are also continuing concerns about trash and debris and the combined sewer overflows that plague the tidal river during significant rainfall events.

The question of how best to address these issues along with the revitalization of older Anacostia communities is often raised. Funding resources and support to continue current progress in the restoration effort are, as always, uncertain. The AWRC and its partners fully recognize the problems they face and have already identified many solutions. The following information is intended to provide some insight and thought to those challenges, as well as the future direction that the AWRC and the restoration must take.

## 1. Effectively integrate and involve citizens into the AWRC process.

The Anacostia watershed restoration effort is unusual in that the impetus for the effort stemmed from local, regional and state government, not from the grassroots citizenry as is more typical. As such, citizens were not directly involved with the AWRC from the outset. Over the years, the AWRC has worked to offer citizens of the watershed opportunities to participate in the restoration effort through its Small Habitat Improvement Program (SHIP). SHIP was designed to carry out small but meaningful restoration projects such as reforestation, wetland plantings, stream cleanups and storm drain stenciling. While this has been important, the AWRC felt that more citizen involvement and support was needed.

Recognizing this missing segment, the AWRC charged Metropolitan Washington Council of Governments staff with structuring the Anacostia Watershed Citizens Advisory Committee (AWCAC) and providing administrative support to the AWCAC. In Spring 1996, supported by the AWRC, the AWCAC was formally established and held its first meeting. The purpose of the AWCAC is to provide citizens residing within the watershed a formal line of communication to the AWRC regarding the restoration. It also permits the citizens an opportunity to develop ideas and activities in coordination with the AWRC that help promote environmental stewardship, as well as increase their understanding of the watershed, its environmental problems, and the ongoing restoration effort. In the future, it is critical that this structure be maintained and that opportunities be made to increase citizen involvement.

## 2. Identify and develop public-private partnerships.

To date, approximately 580 Anacostia restoration projects have been identified for the Anacostia watershed. Of these, about 29 percent have been either completed or are in progress. The remainder will require major financial resources, political will and citizen support to implement. In the spring of 1996, the AWRC also recognized that in order to help sustain the restoration progress, new public-private partnerships must be pursued and established. In light of this, the signatories of the 1987 Anacostia Watershed Restoration Agreement (Mayor of the District of Columbia, Governor of Maryland, and the County Executives from Prince George's and Montgomery counties) called on the AWRC to identify potential public and private partnership opportunities. Through these new partnerships, additional resources and

assistance could be tapped to help meet the needs of the restoration and help ensure continued progress.

## 3. Develop specific and quantifiable ecologically based restoration goals and associated targets with which to measure restoration progress.

As previously mentioned, the six restoration goals of the *Six-Point Action Plan* represent broad restoration concepts. In order to gauge restoration progress toward those broad goals, a series of measurable ecological indicators and associated restoration targets, specific to each indicator and subwatershed, will be needed. To partially fulfill this requirement, the District of Columbia's Environmental Regulation Administration, the U.S. Environmental Protection Agency's Chesapeake Bay Program Office and the AWRC have charged Metropolitan Washington Council of Governments staff with developing a system of watershed-wide ecological indicators and identification of potential restoration targets. This effort will be conducted in close concert with the local jurisdictions and with other agencies involved with the restoration, and where possible, will make use of existing ecological indicators and restoration targets already in use by the Anacostia jurisdictions. The vehicle for this cooperative effort will be the Anacostia Watershed Technical Oversight Subcommittee, an ad hoc technical subset of the larger AWRC membership.

## 4. Develop and maintain a viable, balanced monitoring network to provide data for the ecological indicators and restoration targets.

Ecological indicators and associated restoration targets will be developed cooperatively for the purpose of quantitatively assessing restoration progress for all six goals. In order to utilize this system of indicators and targets, a watershed-wide system of monitoring will be required. A long-term monitoring program will be developed and recommended to the AWRC. This program will be developed in conjunction with the member jurisdictions and many other involved agencies. It will include an examination of existing long-term programs to determine if any monitoring shortfalls exist. It is anticipated that this program will consist of a cost-effective, non-duplicative, scientifically balanced approach, which includes biological, physical and chemical components.

## 5. Close major gaps in the existing scope of the restoration effort.

While the restoration effort currently focuses upon numerous areas of restoration need, two major gaps remain: combined sewer overflow and toxic sediments. Both of these problems could require well over $1 billion to correct and are focused upon the tidal river in the District of Columbia. Combined sewers in the Anacostia contribute approximately 6 percent of the total watershed annual pollutant load (5,500,000 lbs/yr of total nitrogen, total phosphorus, lead, zinc, BOD and total suspended solids) from four major source areas. The District of Columbia Water and Sewer Administration is pursuing a comprehensive combined sewer overflow abatement program for all of the CSO areas within the District (to include the Anacostia, Potomac and Rock Creek drainage) to meet the goals of the U.S. Environmental Protection Agency's CSO Control Policy (Warner, et al., 1997). This initiative will require additional characterization monitoring and computer modeling to guide water resource managers toward the optimal approach for solving this major issue. The other major gap in the ongoing restoration effort consists of the remediation of contaminated sediments in the tidal portion of the river. The Anacostia watershed has been designated as a Region of Concern for toxic contamination by the U.S. Environmental Protection Agency's Chesapeake Bay Program. Elevated levels of contaminants that include total hydrocarbons, Chlordane, DDT and its metabolites, lead and PCBs have been consistently observed in various monitoring surveys throughout the tidal river in the District of Columbia. As previously stated, a fish consumption advisory remains in effect within District waters due to the bioaccumulation of Chlordane and PCBs and the human risk associated with eating fish.

In response, a Regional Action Plan for managing toxics in the sediments has recently been developed by the Interstate Commission on the Potomac River Basin for the District of Columbia Environmental Regulation Administration (DC ERA, 1996). The plan represents a first step in managing this problem. It features an overview of the problem, volumetric estimates of contamination, a discussion of potential remediation options and associated costs estimates. Management efforts are currently hampered by the absence of information regarding the existing sources of contaminants, both within the District of Columbia and upstream, from Montgomery and Prince George's counties, Maryland. Efforts are currently underway to identify the existence of any pertinent data in the upstream jurisdictions. Similar to the previously discussed CSO issue, sufficient monitoring to adequately characterize the input of toxicants into the system must first be collected, then modeling efforts to define the active fate and transport mechanisms for these compounds must be developed prior to undertaking any large-scale comprehensive management initiatives. In the shorter term, small-scale remediation pilot measures, such as capping, may be undertaken to determine the potential feasibility of physically isolating contaminants.

## 6. Explore, identify and create pathways for the cost-effective integration of Federal programs and initiatives with relevance to the Anacostia watershed restoration.

Various avenues to optimize Federal involvement and financial support will be investigated. The U.S. Army Corps of Engineers has been working in partnership with the AWRC and Metropolitan Washington Council of Governments staff to identify problems and to recommend solutions for Federal facilities within the watershed (comprising approximately 15 percent of the total watershed area). This effort includes the Congressionally mandated Anacostia Federal Facilities Impact Assessment project. In addition to working with the individual Federal land owners in the watershed, efforts are underway to integrate ongoing programs, currently existing within various natural resource management agencies, to optimize the use of Federal human and financial resources toward achieving the restoration of the watershed.

## 7. Pursue and maintain a closer working relationship with the local Congressional delegation.

Discussions are ongoing with U.S. Army Corps of Engineers and U.S. Environmental Protection Agency staff to identify existing legislative authorization which could be helpful in directing resources to the long-term restoration of the Anacostia watershed. Once a comprehensive review of existing legislation is conducted and compiled, the AWRC is expected to initiate a series of discussions with the local Congressional delegation to solicit their ideas, legislative support and assistance for the numerous remaining restoration initiatives.

## 8. Develop a Comprehensive Restoration Plan featuring authorship and input from all stakeholders involved in the Anacostia watershed restoration.

The Metropolitan Washington Council of Governments will work cooperatively with the AWRC members to develop a Comprehensive Restoration Plan for the Anacostia watershed. Input from the local jurisdictions and various stakeholders will be critical to obtaining widespread authorship and endorsement of the plan. Existing problems and needs will be prioritized to assist in guiding various implementation strategies. It is envisioned to function as a working, living document to help guide the focus and priorities of the restoration effort. It is expected that, over time and as changing situations in the watershed dictate, the plan will be revisited and updated to reflect the dynamic nature of the restoration effort. Importantly, the plan will not supersede local restoration priorities established to date through comprehensive watershed planning efforts, such as Montgomery County's Countywide Stream Protection Strategy.

As the restoration effort enters its second decade, priorities will continue to change. In many areas, with the notable exceptions of long-term stream channel geomorphology and sediment transport dynamics, combined sewer overflow

and toxics problems, we not only understand the problems, but have developed solutions specific to them in the form of retrofit and restoration projects. Even in the areas representing the current major gaps of the restoration effort, we understand the general parameters of those gaps.

A huge early revelation in this process has been an appreciation of not only the scope of the problems, but also an appreciation of the time required to bring about a meaningful restoration of the watershed. While time is relatively plentiful, the political will and financial resources required to implement the identified restoration projects and conduct additional monitoring and research are limited. Among the major current impediments in the pace and momentum of the restoration are funding, publicly approved subwatershed-specific restoration plans and a dwindling supply of "easy" publicly owned restoration sites. With the contracting local and state financial climate of the mid 1990s, there has been a slowing of implementation and an associated lessening of momentum. In addition, the success of the Anacostia restoration effort has spawned similar restoration efforts in other large watersheds in Montgomery and Prince George's counties, the state of Maryland and the District of Columbia. As a result, the Anacostia is now competing with other watersheds for a shrinking pool of funding.

From the start, the twin pillars critical to ensuring the long-term success of the restoration effort have been human and financial resources. If we can continue to build upon and maintain a broadly based coalition of citizens, environmental groups, all levels of government, and the private sector, we should be able to translate that energy into Congressional support for funding a broad spectrum of watershed restoration-related programs, projects and initiatives. The Anacostia watershed restoration effort has been designated as a National Ecosystem Management Model on the strength of its success to date. It is critical that sufficient local, state and Federal resources are directed and applied in a well-planned sequence to sustain the effort and to maintain and expand this unique example of urban watershed restoration.

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