

# ANACOSTIA 2032: PLAN FOR A FISHABLE AND SWIMMABLE ANACOSTIA RIVER



An aerial photo of the Anacostia River showing Kingman and Heritage Islands

Submitted by:  
George S. Hawkins, Director  
The District Department of the Environment  
51 N Street, NE  
Washington, DC 20002

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## **A LETTER FROM THE DIRECTOR**

On behalf of Mayor Adrian Fenty and the District Department of the Environment (DDOE), it is my great pleasure to present the “Anacostia 2032: Plan for a Fishable and Swimmable Anacostia River.” As part of his commitment to transforming the District into a model of sustainability and environmental protection, Mayor Fenty has long made the restoration of the Anacostia River one of his administration’s top priorities. To date, the Mayor has convened District agencies in two CapStat sessions devoted to achieving measurable progress in cleaning up the river. In addition, the District regularly collaborates with regional, non-profit and individual partners in order to collectively address the issues that impact the health of the river. This Plan captures the momentum generated by these efforts in order to lay out a vision for the future of the Anacostia, as well as how to achieve that vision.



The Anacostia River is at once one of the District’s most valuable resources and one of our most challenging projects. Throughout the District’s history, the river has served as a descriptive geographic landmark, as an oasis amidst an urban center, and as a symbol of environmental degradation. Its riverbanks are home to both major parcels slated for economic development and one of the nation’s largest urban green spaces. Restoring the Anacostia therefore goes beyond simply reducing pollutants or meeting environmental standards—it requires returning the river to a state where it can be actively used and enjoyed by residents and visitors; where the Anacostia once again fully becomes a vibrant community resource. Thus, this Plan takes as its starting point the twin goals of making the Anacostia River fishable and swimmable; goals which evolved from standards originally laid out in the Clean Water Act over thirty years ago. The Plan then describes the strategies that the District will employ to achieve these goals. Each of these strategies includes understanding the challenges ahead, as well as the critical role played by our neighboring jurisdictions. However, with a continued commitment by District leaders and agencies, I am certain that this jewel of the District will be restored.

I would like to acknowledge the DDOE staff that played an integral role in developing this plan. Thanks to Steve Saari and Pete Hill of DDOE’s Watershed Protection Division, who served as the principal authors of the Plan; Monir Chowdhury of the Water Quality Division, for his valuable comments; and, Sheila Besse, Associate Director of the Watershed Protection Division, and Dr. Hamid Karimi, Deputy Director of the Natural Resources Administration, for their leadership in guiding the Plan’s development. There is no doubt that the Anacostia will benefit immeasurably from their contributions.

A handwritten signature in cursive script, which reads "George S. Hawkins". The signature is written in dark ink on a white background.

George S. Hawkins  
Director, District Department of the Environment



## **PREFACE**

The document that follows is the first attempt by the District to take a holistic look at what efforts may be required to restore the District's portion of Anacostia River to a "Fishable and Swimmable" state. As such the plan put forth here will be a living document – one that is amended and updated as more information and new technologies come to light.

The activities outlined in this document provide a roadmap for restoration work on the Anacostia. Like with any roadmap, there are multiple routes that end up at the same destination. The District Department of the Environment does not pretend that this effort provides *the one way* to clean the Anacostia River, instead the plan is meant to be a seed document that will spur initial efforts and further conversation about the best path towards our ultimate goal.

As we travel towards a clean river, we will face crossroads where the route will not be clear such as politically difficult issues like banning or charging for plastic shopping bags and finding funding for costly projects. We cannot now predict the path the District will take during its voyage towards a restored river. We can however say that with certainty that it will be a difficult journey and one where we will need the help of others along the way. We invite you to join us in this effort, for although the path will be arduous, the reward at the end will indeed be great!





## **EXECUTIVE SUMMARY**

The Clean Water Act, passed in 1972, sets a national goal of “water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, wherever attainable.” Through this legislation, the District established designated uses (functions a body of water should support) for each of its waterways. Two of the functions established for the Anacostia River are the following:

1. That it should be able to support long-term recreational contact, or whole body contact known as being “swimmable;” and
2. That it should have adequate aquatic habitat to support fish and other aquatic life commonly identified as being “fishable.”

Restoration efforts to attain Clean Water Act goals in the Anacostia River have been ongoing for more than twenty years, yet there is still a long way to go before the river can be considered fishable and swimmable. Restoration work will not be accomplished all at once, but instead will take place gradually over time. Our goal is to restore the Anacostia to a fishable and swimmable river by the year 2032. We recommend a series of stages that will allow the city to gauge its progress and serve as a guide for river restoration. The stages we propose are predominantly based on the Federal Clean Water Act’s designated uses and the District of Columbia’s Municipal Regulations, promulgated pursuant to the District’s Water Pollution Control Act. The five stages of the Anacostia’s restoration, in order of work, are:

1. Create a visually presentable river;
2. Make the river boatable;
3. Restore the river’s ability to support stable fish and wildlife populations;
4. Produce a swimmable river; and
5. Re-establish a river that supports fish that are safe to eat.

Although many actions will be required to restore the Anacostia, there are a handful of major activities that must first take place. For the most part, these are not new initiatives and do not require new planning efforts. Instead what is required is a true commitment from each of the city departments responsible for the implementation of these programs to work together to aggressively pursue the goal of a clean river. Also crucial is assurance from the City Council and Congress to find the funds necessary for this critical endeavor. The primary actions required to re-create a healthy Anacostia River ecosystem are:

- ❖ Aggressively control combined sewer overflows by expediting the implementation of the Long Term Control Plan (LTCP);
- ❖ Create upland habitat for wildlife and reduce stormwater flows by planting trees and native vegetation in parks, along roadways, on school grounds and all other public lands;
- ❖ Reconnect the Anacostia and its feeder streams to the lands that drain to them and create habitat for fish and wildlife through stream restoration using natural channel design, planting and protecting riparian forest buffers, and creating tidal and non-tidal wetlands;
- ❖ Institutionalize the use of Low Impact Development (LID) techniques to control stormwater on existing, new, and redeveloped property;

- ❖ Strengthen, implement, and enforce pollution prevention activities such as erosion and sediment control measures, street sweeping, and inspection of and enforcement against potentially polluting facilities;
- ❖ Encourage District homeowners and landowners to play a greater role in the restoration of the Anacostia by improving and increasing water quality education and outreach campaigns;
- ❖ Require the cleanup of toxic sites by polluters, which include the Federal and District governments; and
- ❖ Negotiate enforceable pollutant strategies for Anacostia River water coming from Maryland to the District.

A table detailing the Anacostia's major pollutants and actions needed to address these contaminants is on the following page. Both the cost and timelines are estimates based on the best available information at the current time. These figures may change as further information becomes available. Tables with additional work items are found throughout the document and in the first appendix. The tables in the document by no means list every restoration activity taking place or planned, but are meant to include the major efforts that will be required. The table in the first appendix is meant to be more inclusive and will be updated regularly as new information and activities come to light.

**A matrix of Anacostia pollutants, desired uses,  
lead agencies, and actions needed to achieve a clean river.**

Desired use	<i>Visually presentable</i>	<i>"Fishable/Boatable"</i>	<i>Supporting fish and wildlife</i>	<i>Swimmable</i>	<i>Able to consume fish</i>
EPA designated use categories	"trash free" (not a designated use)	Supporting Secondary Contact (class B)	Supporting Protection and Propagation of Fish, Shellfish, Wildlife (Class C)	Supporting Primary Contact (class A)	Supporting Fish Consumption Use (Class D)
Current status	Major problem	Not supporting	Not supporting	Not supporting	Not supporting
Pollutant or issue that is preventing attainment of desired use	<i>Primary:</i> Trash/floatables  <i>Secondary:</i> Oil and grease, trash	<i>Primary:</i> E. coli, Low Dissolved Oxygen (DO) due to high nutrient loads	<i>Primary:</i> Suspended solids (sediment), low DO  <i>Secondary:</i> limited habitat, legacy toxics	<i>Primary:</i> Bacteria (measured by E. coli)  <i>Secondary:</i> Oil and grease, trash	<i>Primary:</i> Organics, metals (i.e., legacy toxics)
Major source of primary pollutant	Illegal dumping, personal behavior	Combined sewer overflows (CSO), leakage from sanitary sewer pipes (SSP)	Stream bank collapse from unmitigated stormwater, CSOs, leakage from SSP, legacy sources	CSOs, leakage from SSP	Legacy sources
Recommended action(s)	Regional Bottle bill, Education, Enforcement	Implement Long Term Control Plan (LTCP), Ensure completion of WSSC and WASA repairs	Source control of stormwater (DC& MD), Stream restoration, MS4 implementation plan, Implement LTCP, Ensure completion of WSSC repairs	Implement LTCP, Ensure completion of WSSC and WASA repairs	Identify upstream hot spot sources through research, develop plan for remediating toxic hot spots
Lead agency on action(s)	DDOE, MD governor's office/grassroots activity	WASA, WSSC	-MS4 program (DC), -DDOE (stream restoration) -WASA -WSSC	WASA, WSSC	USEPA, NOAA, USGS, UMD, UDC, USACE
Resources needed to meet attainment	Bottle bill: limited funds, political capital  End of pipe BMPs: high maintenance budgets needed, high initial capital costs	LTCP: \$1 billion + ** WSSC repairs: \$100+ million	MS4 is currently funded at 4M/yr  DDOE restoration programs have limited funding	LTCP: \$1 billion + ** WSSC repairs: \$100+ million	Unknown costs for clean up of "hot spots", potentially cost prohibitive or technically unfeasible
Outlook for success	Good with political support of bottle bill and trash reduction plans	Good with LTCP funding, WSSC funding	Challenging but possible with source control, targeted restoration, and implementation of LTCP	Very challenging but possible under long-term horizon.	Poor, very difficult to clean up legacy sources
Timeframe for Cleanup to Occur	6 years	10 years	12 years	15 years	25 years

\*\*NOTE: The Long Term Control Plan is currently estimated to cost \$2 billion for all District Combined Sewer Systems – including those outside of the Anacostia Watershed.



## **INTRODUCTION**

In the early 1970's the Congress, responding to public pressure for clean streams and rivers, passed the Federal Water Pollution Control Act Amendments of 1972, which later became commonly known as the Clean Water Act. The act set a national goal of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, wherever attainable."

In response to this legislation, the District established designated uses (functions a body of water should support) for each of its waterways. Two of the functions established for the Anacostia River are to support long-term recreational contact, or whole body contact known as being "swimmable," and to have adequate aquatic habitat to support fish and other aquatic life, commonly identified as being "fishable."

In order to support these uses (fishable, swimmable), the Anacostia must meet the District's water quality criteria by being shown to have amounts of pollutants below levels dangerous to long-term contact by humans, fish, and wildlife. Unfortunately, much of the Anacostia does not meet the District's water quality standards for being fishable or swimmable. Currently, parts of the river have unacceptably high levels of metals, pathogens (bacteria), organics (chemicals such as pesticides, herbicides, or Polychlorinated Biphenyls (PCBs)) and total suspended solids (sediment). Additionally, sections of the river are further impaired at times when the river experiences low levels of dissolved oxygen. Low oxygen levels in the river occur because of large amounts of organic materials (often sewage) that are then decomposed by microorganisms, which use up the river's oxygen in the process. The use of dissolved oxygen to decompose organic materials is called biological oxygen demand or BOD. Low dissolved oxygen (DO) is harmful to fish and aquatic life.

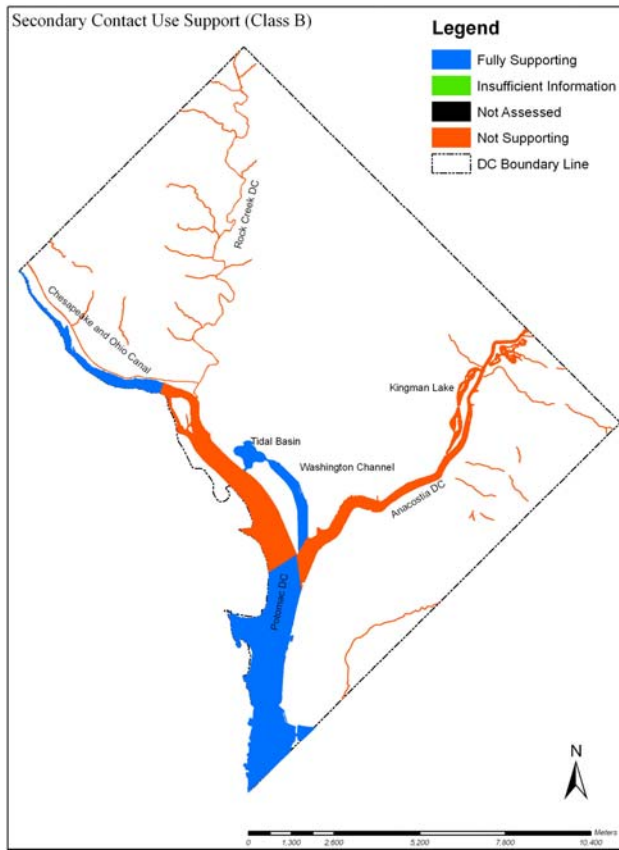
Of the impairments to the Anacostia's water quality, some keep the river from being swimmable, some keep it from being fishable, and some impact both. The primary pollutants that impact our ability to swim in the Anacostia include pathogens, metals,

### **Aquatic habitat: an important aspect of making the Anacostia River fishable.**

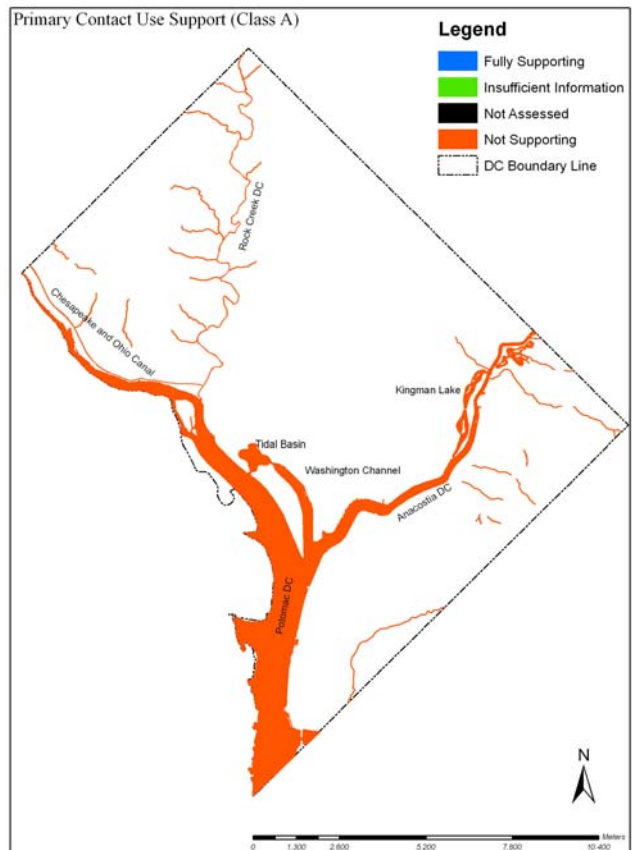
Fish needs are not very different from human needs. Fish need adequate oxygen, abundant food, clean water, and sufficient shelter to thrive. Cleaning the Anacostia will go a long way to restoring a healthy fishery. However to truly create a fishable river, we must also create good quality shelter for aquatic life.

- Wetlands and forested streams are great fish habitat. Many fish rely on wetlands for food and shelter and as a nursery for their young. Healthy wetlands also trap nutrients and control flooding and sediment.
- Riparian buffers provide cooling shade for smaller streams. Tree leaves provide valuable food for the aquatic insects that the fish feed upon and tree roots and fallen trees provide shelter for skittish fish.

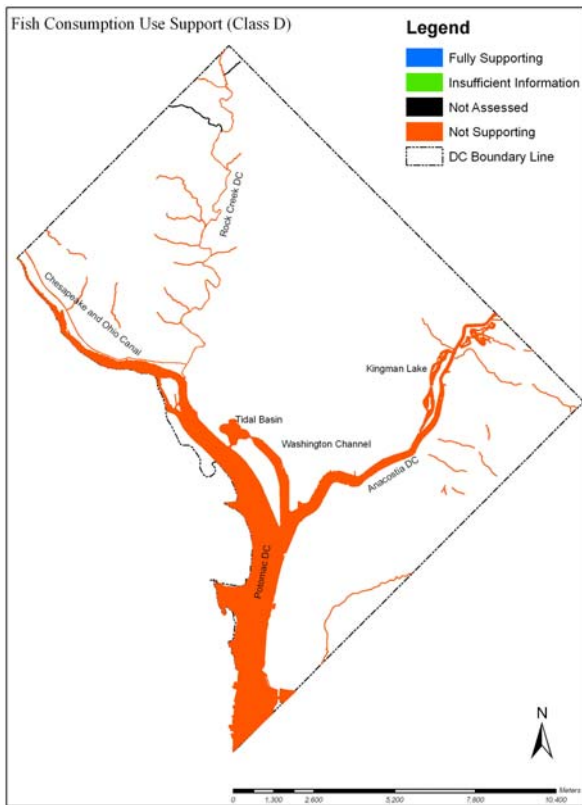
While cleaning the Anacostia's waters in order to make them fishable and swimmable, we must continue to create and restore our wetlands and riparian corridors – both for us and for the fish.



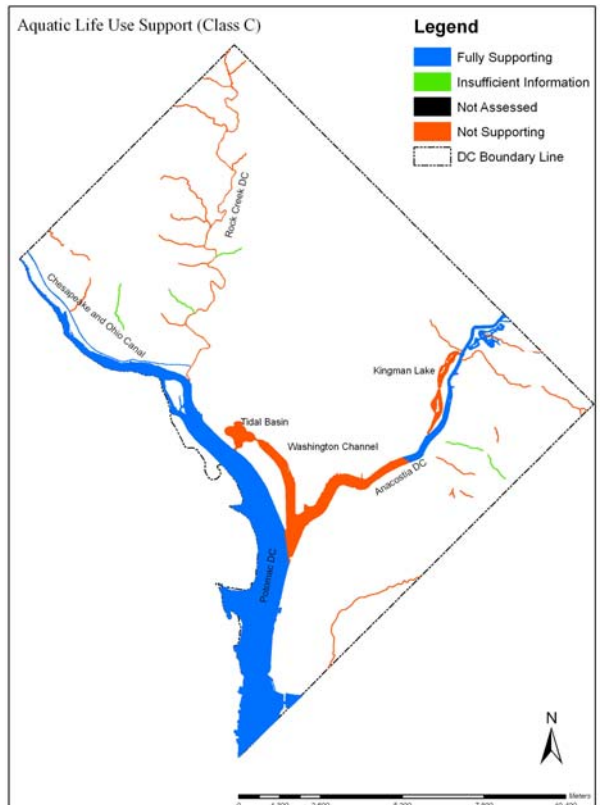
**Figure 2: Waters that support boating (secondary contact) in the District of Columbia.**



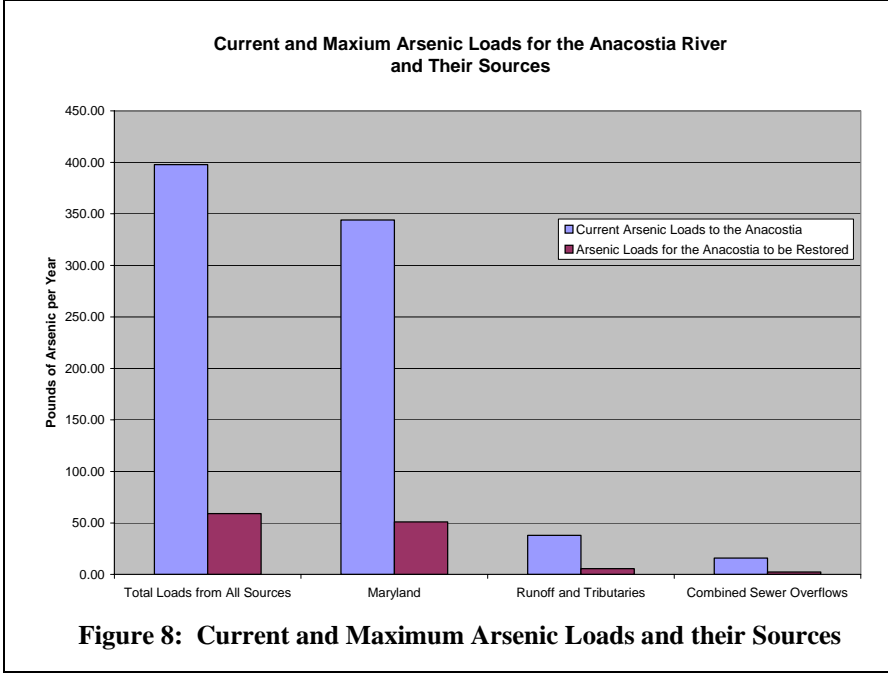
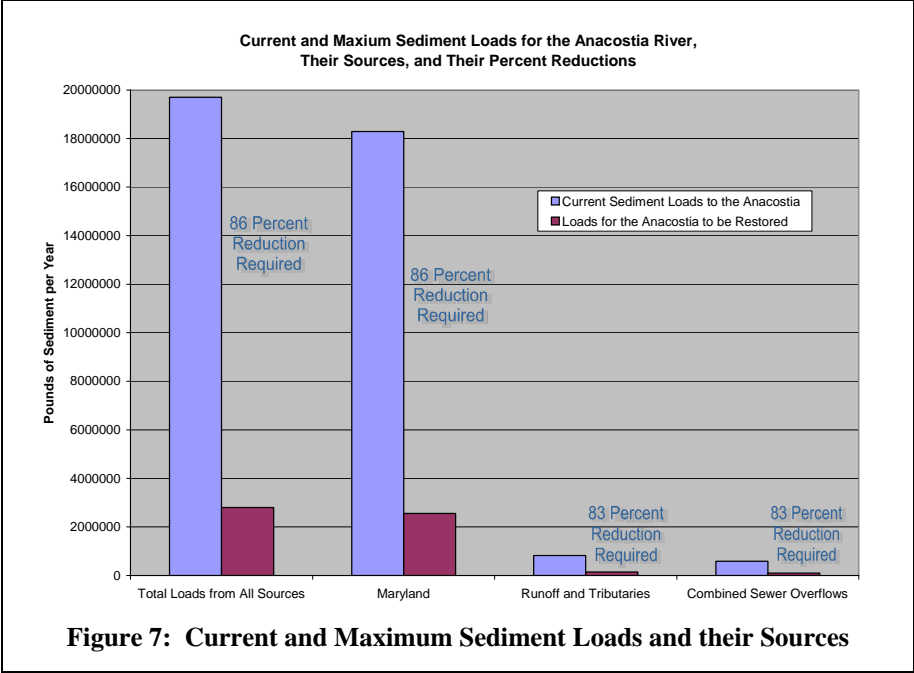
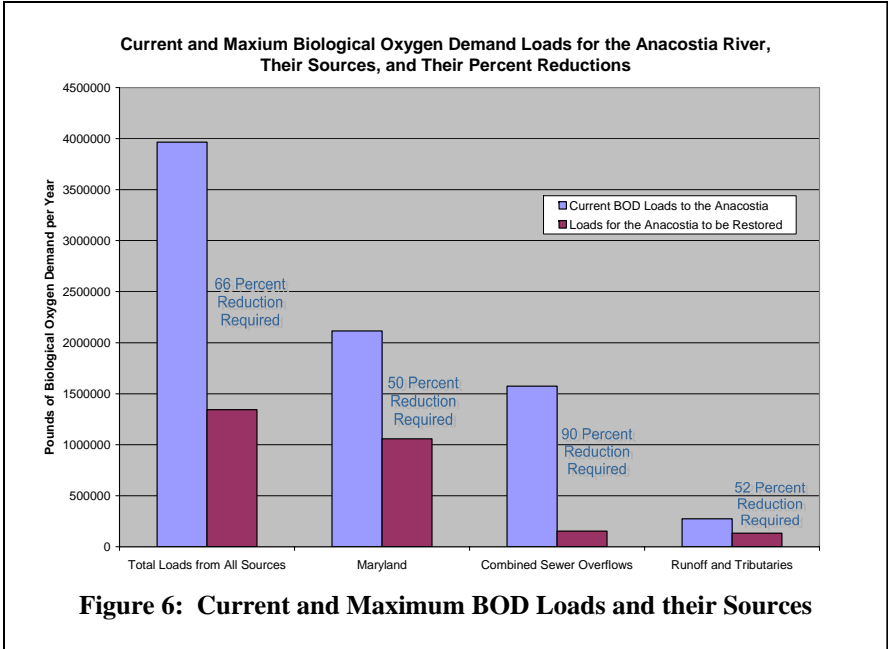
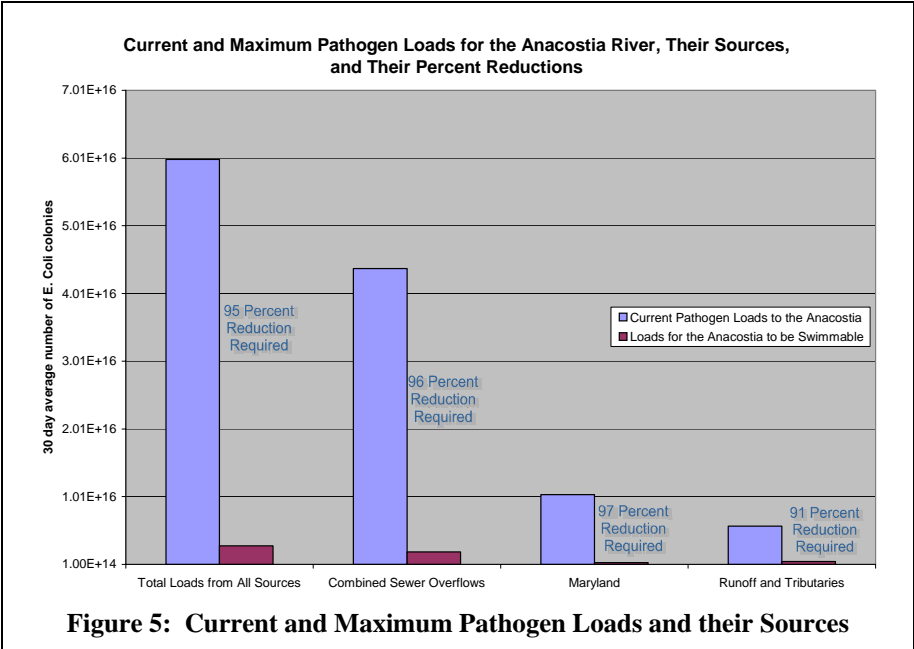
**Figure 1: Waters that support swimming (primary contact) in the District of Columbia.**



**Figure 3: Waters that support fish consumption in the District of Columbia.**



**Figure 4: Waters that support aquatic habitat in the District of Columbia.**



oil and grease, and organic chemicals. Those that impact the Anacostia’s fish and wildlife are metals, oil and grease, organic chemicals, suspended solids, and BOD.

In this document, we will first describe the current environmental conditions of the Anacostia by detailing the pollutants that keep it from being considered fishable and swimmable. We will then discuss a phased approach to restoring the river. Finally, we will provide the specific actions that the District will need to take to achieve each of these phases.

## **THE CURRENT STATE OF THE ANACOSTIA RIVER**

This section provides a snapshot of the Anacostia as it is now. We concentrate on the pollutants currently impacting the river, describing their negative effects, their current levels, and the reductions in pollution needed to restore the river to a level of fishable and swimmable.

It is important to note that there are other things that we must address to truly have a fishable and swimmable river. For example, we could produce a clean and clear river with healthy fish, but if floating trash remains in its waters, people will not want to swim there. Furthermore, pollutants that do not currently impact the Anacostia such as nitrogen and phosphorous (which impact fish habitat by creating algae blooms that rob fish of oxygen), may begin to impact the river as we improve water clarity, allowing blooms to take place.

### **Pathogens**

Some waterborne bacteria, viruses, and protozoa (e.g., microscopic pathogens) can cause human illnesses, ranging from typhoid and dysentery to minor skin diseases.

Escherichia coli (E. coli), a group of bacteria found in warm blooded animals, is commonly used as an indicator for illness-causing pathogens because it is too difficult and costly to test for all pathogens. Furthermore, where E. coli are found, it is likely that the water is contaminated with untreated sewage and that other pathogens are also present.

The presence of high levels of pathogens in the Anacostia is the primary reason that the river is considered not safe for swimming. Starting in January of 2008, the District switched from monitoring E. coli to E. coli to conform to EPA standards. The District uses the average number of colonies of E. coli present in standard-sized water quality samples collected over 30 days to determine if water is fit for human contact. The standard for primary contact (swimming) is 126 MPN/100 mL of water where MPN is an estimate of the “most probable number” of bacterial colonies in a 100 mL water sample. Figure 5 shows the sources of pathogen pollution, the current levels of pathogens in the Anacostia, the levels needed to make the river safe for swimming, and their associated percent reductions.



Citizens marking the city’s storm drains



## Low Dissolved Oxygen (High Biological Oxygen Demand Levels)

Oxygen concentrations in water naturally fluctuate, but human activities (such as sewage overflows and leaks and fertilizing lawns) can introduce large quantities of biodegradable organic materials to our streams resulting in severe oxygen depletion. Temperature can also influence the amount of oxygen dissolved in water – river and stream water that gets too hot can depress oxygen concentrations and may cause fish kills because warm water does not hold as much oxygen as cold water.



Citizens planting trees – a beautiful way to reduce stormwater to the Anacostia River.

Low levels of dissolved oxygen in the Anacostia primarily impact aquatic life. Therefore, correcting this problem will make the river more fishable. Figure 6 shows the sources of biological oxygen demand (BOD) in the Anacostia, the current levels of BOD, the levels needed to make the river suitable aquatic habitat, and their associated percent reductions.

There are two important levels of dissolved oxygen to consider when examining the health of the Anacostia. The first level is maintaining a daily average of 2.0 milligrams per liter (mg/L) of dissolved oxygen in the water throughout the year. This figure is important because oxygen levels of less than 2.0 mg/L may cause fish mortality. The second important level of dissolved oxygen is maintaining a daily average of 5.0 mg/L during the spawning season (March to June) and a minimum of 4.0 mg/L for the rest of the year. Dissolved oxygen levels of less than 4.0 mg/L impair fish growth and reproduction – particularly in younger fish.

## Oil and Grease

Oil and grease primarily impact aquatic life. Accumulations of oil and grease form a film over water which spreads and makes getting needed oxygen difficult or toxic for aquatic animals and plants. High levels of oil and grease also impact river recreation – people do not want to swim or boat in waters that smell like fuel or have a visible sheen of oil. For the Anacostia to be considered healthy for aquatic life, it must ensure average levels of oil and grease of less than 10.0 mg/L of water. This is approximately equal to the amount of oil that will cause a visible sheen on a water surface.

Because oil and grease are associated with a large range of human activities, they are ubiquitous in the environment. Information is currently lacking on the sources of oil and grease in the River. This data gap makes it difficult to determine specific loads by land use or facility. Based on the oil and grease standard of 10 mg/L and the amount of water from different sources, the District has, however, established load allocations for the river. Data analysis in 2003 showed that the Anacostia is not currently impaired due to oil and grease, however, we need to continue taking preventive measures.

## Total Suspended Solids

Total suspended solids in water come from sediment washing off of the land. In the Anacostia watershed, the majority of this sediment comes from stream bank erosion due to a high percentage of impervious surfaces (areas that can not infiltrate rainfall, such as rooftops, pavement), leading to alterations in natural hydrology. The increased volume and rate of urban stormwater runoff erodes soil from the land, stream banks, and streambeds. The suspended sediments are then carried to the main stem of the River where a slower flow regime causes the sediment to settle to the bottom of the river, covering valuable wildlife habitat.

Sediment becomes a pollutant when it exceeds its natural level and has a detrimental effect on water quality. Sediment has its greatest impact on aquatic life – clogging and abrading fish gills; suffocating fish eggs, clams and mussels, and aquatic insect larvae; and blocking sunlight from aquatic vegetation. For the Anacostia to have acceptable water quality for sediments, the water must be clear enough to see to a depth of 0.8 meters from April to October during an average flow year. This value is based on the clarity needed for submerged aquatic vegetation to receive enough light for photosynthesis. Suspended sediment also impacts aquatic recreation by reducing water clarity. Based on the water clarity standard of 0.8 meters visibility, the District has established load allocations for sediment entering the Anacostia River (see Figure 8).



Greenroofs hold stormwater thereby reducing sediment loads the Anacostia River.

## Toxic Metals

Metals occur naturally in the environment, but past industrial activities in the Anacostia watershed have led to higher than natural concentrations of some toxic metals. It is important to point out that some metals – in small quantities - are necessary for the health of organisms. Some metals however can kill or impair the health of organisms, even at low concentrations. Many of these same metals tend to accumulate in the food chain. The metals of particular concern in the Anacostia and its tributaries are: Arsenic, Lead, Copper and Zinc. Although each of these metals has different health impacts and enters the environment from different manufacturing processes, none of them are commonly created in the Anacostia watershed today, however manufactured items with these metals are ubiquitous in the watershed.

The primary threats from high levels of metals in the Anacostia waters are the health of aquatic organisms and the consumption of fish that have accumulated these dangerous metals. Some of these metals are difficult for organisms to process: they tend to accumulate in their tissues, elevating levels above those amounts found in the environment around them. The high levels of metals in their bodies can weaken or kill aquatic organisms. When these fish are consumed by humans, the amount of metals will

further concentrate in our bodies. The levels of dissolved metals permissible in the Anacostia are contained in the Table 1.

Table 1: Maximum Levels of Some Dissolved Metals Permissible in the Anacostia River

Metals	Protection of the Health of Aquatic Life		Fish Consumption Criteria
	Maximum Continuous Concentration Level	Maximum Short-term Concentration	Long-term Concentration
<b>Arsenic</b>	<b>150 (ug/L)</b>	<b>340 (ug/L)</b>	<b>0.14 (ug/L)</b>
<b>Copper</b>	<b>10.31 (ug/L)</b>	<b>15.31 (ug/L)</b>	<b>N/A</b>
<b>Lead</b>	<b>2.23 (ug/L)</b>	<b>57.15 (ug/L)</b>	<b>N/A</b>
<b>Zinc</b>	<b>95.04 (ug/L)</b>	<b>104.08 (ug/L)</b>	<b>N/A</b>

The necessary load reductions needed for arsenic in the Anacostia are shown in Figure 9. River loadings must be reduced by 85 percent from all sources to achieve levels of arsenic that are safe for fish consumption.

### Organic Chemicals

Organic chemicals are synthetic compounds that contain carbon. Some of these synthesized compounds are toxic and accumulate in our waters because they do not easily break down. These toxic chemicals are often recognized or suspected carcinogens, or known to interrupt reproductive pathways. The organic chemicals of concern in the Anacostia and its tributaries are: Chlordane, Dichlorodiphenyltrichloroethanes (DDT and its degraded forms DDE and DDD), Dieldrin, Heptachlor Epoxide, Polynuclear Aromatic Hydrocarbons (PAHs), and Polychlorinated Biphenyls (PCBs).

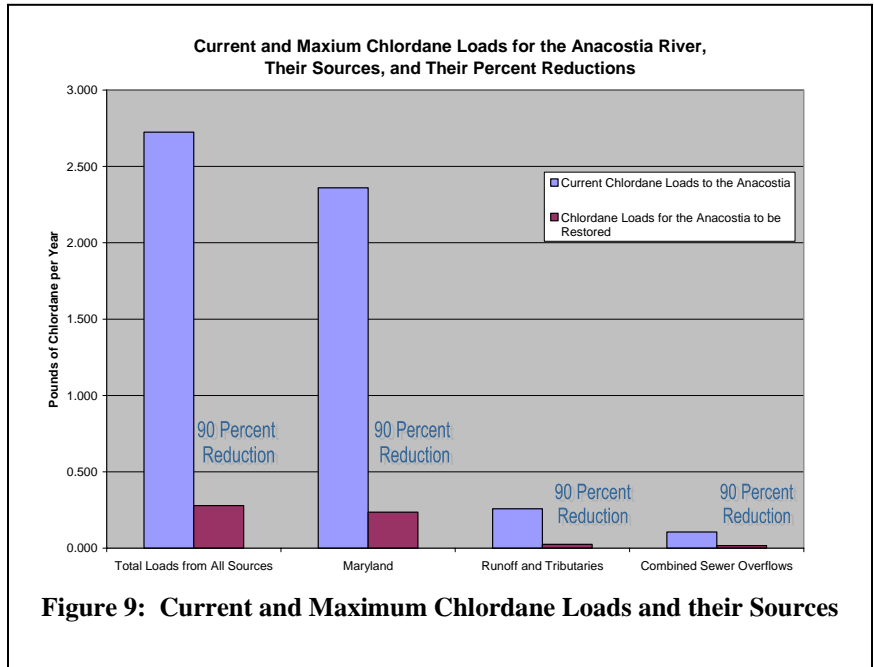


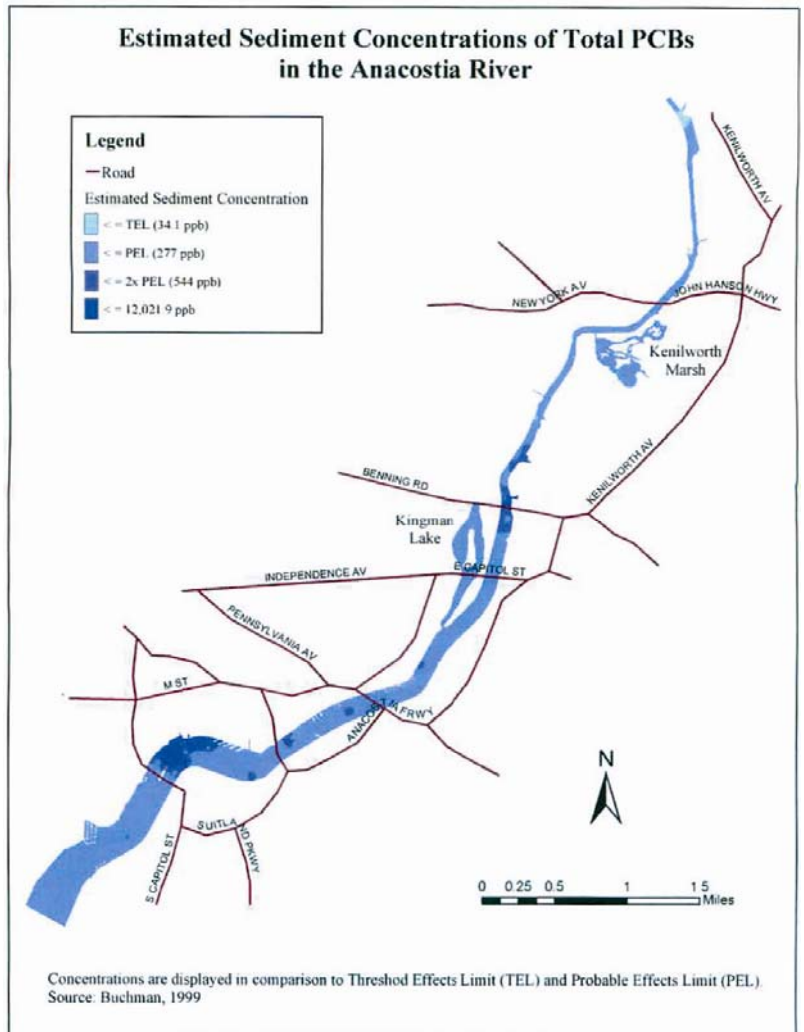
Figure 9: Current and Maximum Chlordane Loads and their Sources

These chemicals are no longer widely used in the Anacostia watershed and many of them have been banned outright in the United States. But, because these chemicals are persistent and because they tend to stick to sediments, the river bottom of the tidal Anacostia is layered with these chemicals – a legacy of earlier actions.

Similar to metals, the primary problems associated with high levels of organic chemicals in the Anacostia waters are harm to aquatic organisms and the consumption of fish that

contain high levels of these chemicals. Because these organic chemicals are difficult for organisms to process, they tend to accumulate in their tissues – leading to death or illness of animals and insects. Just as with metals, if fish with high levels of these chemicals are consumed by humans, the amount of these chemicals will further concentrate in our bodies.

The organic chemicals in the Anacostia are many and varied. Because of their persistence and their affinity to sediment they present a great challenge for cleanup. For example, looking at PCBs, modeling has indicated that even if 100 percent of the PCB loads were eliminated from streams feeding the Anacostia for 20 years, the tidal Anacostia would still violate water quality standards because of the persistence of pollutants in river bottom sediment. A more hopeful example is that of Chlordane. Its reduction loads are shown in Figure 9.



**Figure 10: A map of the tidal Anacostia showing the threshold effects level (TEL) for PCBs, below which adverse effects to aquatic organisms are expected to occur rarely, and the probable effects level (PEL), above which adverse effects are predicted to occur frequently.**

## **STAGES TO ACHIEVING A CLEAN ANACOSTIA RIVER**

In the previous section we described the current state of the Anacostia River focusing solely on the conditions that the District is required to address through the Clean Water Act. In this feasibility study, we will examine what actions are needed to address these conditions. We will also go beyond the regulated pollutants, addressing what other actions are required to fully restore the river to a fishable and swimmable state.

Restoration efforts on the Anacostia River have been ongoing for twenty years, and there is still a long way to go. Clearly, the work cannot be accomplished all at once, but will be done incrementally over time. Because of this, we propose a series of stages towards achieving a clean river. The stages we propose are predominantly based on the Clean Water Act’s designated uses and the District of Columbia’s Municipal Regulations. We propose five stages of restoration to make the river:

- Visually presentable
- Boatable
- Able to support stable fish and wildlife populations
- Swimmable
- Able to support fish that are safe to eat.

Each stage represents a period of time where the preponderance of work will address the pollutants that relate to that stage’s goals. Work from other stages may also occur simultaneously. For example, stage one involves making the river visually presentable by removing trash and oil and grease. While these efforts are taking place, the District will also work on other necessary long-term projects, such as creating additional wildlife habitat through wetland restoration.

### **A Visually Presentable River**



Native landscaping such as this planting at the James Creek Marina benefits wildlife and traps more stormwater than grass.

The first Anacostia River pollutants to address are the pollutants that, when reduced, will produce the greatest change in public perception of the river. By first addressing two pollutants - trash and oil and grease – the District will create a groundswell of public support for river restoration by producing a river that people want to save and believe can be healed. Restoration cannot occur without the public’s help and willingness to do their part.

An estimated 20,000 tons of trash enter the Anacostia each year (Source: Prince George’s County Department of Environmental Resources). For scale, this is the equivalent of 160,000 linebackers weighing 250 pounds each swimming in the river! Trash is omnipresent in the watershed and its sources vary from deliberate littering and illegal dumping, to accidental actions such as trash blowing out of trucks and cars and uncovered trashcans and dumpsters. The vast majority of the trash reaching the Anacostia could be prevented by changing personal behavior such as decreasing littering and illegal dumping, and increasing recycling and community cleanup events.

Here again, the public’s help will be needed to change personal behaviors like littering and illegal dumping.

Like trash, oil and grease are pollutants associated with a range of human activities and are ubiquitous in the environment. Oil and grease create a visible sheen on water surfaces when they exceed 10 mg/L. It does not take large quantities of oil to exceed this standard – the equivalent of a spill of two 55 gallon drums of oil is sufficient to contaminate the Anacostia River. When you consider the number of vehicles in the Anacostia basin area and the amount of oil and grease leaking from them or accidentally spilled during maintenance, it is easy to understand how easily the limits for oil and grease can be exceeded.

## **A Boatable River**

The second stage in working towards a restored Anacostia River is to create a river that supports recreation such as boating. A river that is navigable is different than a river that is “boatable.” A navigable river is one that is deep enough and free of obstructions so that vessels can pass. A boatable river is one that is safe for secondary contact activities – recreational activities that occur on the water and may involve minor contact with water – such as recreational canoeing and kayaking.

The major pollutant that must be addressed to allow recreational fishing and boating is human pathogens as measured by E. coli. There is currently no separate standard for secondary contact for E. coli. Previously the District used a fecal coliform standard of 1,000 MPN/100 mL of water averaged over 30 days, meaning that, on average, around 1,000 colonies of fecal coliform are found in 100 mL of water. Currently the monthly average is less than 5,000 MPN/100 mL (Source CBF).



**Kids canoeing during the city’s annual Anacostia Fair**

The primary source of pathogens in the District is combined sewer overflows, where raw sewage dumps directly into District streams and rivers during storm events due to an antiquated sewer design that combines sanitary waste and stormwater into one sewer system. Another pathogen source is leaking sanitary sewer pipes, where human waste flows into our waterways even during non-storm events. Additionally, direct runoff to the river from stormwater runoff carries bacteria from the waste of animals such as dogs and geese.

## **A River that Supports Stable Fish and Wildlife Populations**

Although the second stage of restoring the Anacostia River would make it safe for boating and recreational fishing, additional efforts will be required to make the river a haven for fish and wildlife. During the third stage of river restoration, the District will address a persistent pollutant problem that impacts our fisheries – low levels of dissolved oxygen (as described earlier). We will also work on reducing sediment loads to the river – a problem that will require coordination with Maryland, since the majority of District sediment loads come from our upstream neighbor. Finally, during this stage of restoration we will go beyond focusing on water quality to restore fish and wildlife habitat – providing locations for animals to live, eat, and breed.

The reason for low oxygen levels in the Anacostia is high levels of nutrients flowing into the river. Major sources of nutrients in the District are our combined and separated sewer systems. The stormwater and wastewater that flows into the Anacostia during storm events carries not only pathogens, but also high levels of nitrogen and phosphorous from human waste and activities. Although the District shares responsibility for nutrients flowing to the Anacostia the major load of nutrients in the River comes from Maryland.

Unlike the District, however Maryland's nutrient loads come from many diffuse sources including leaking sanitary sewer pipes and household fertilizer applications.



A rain garden filtering pollutants from a parking lot at the Washington Navy Yard.

There are two benchmarks to determine if the Anacostia has sufficient levels of dissolved oxygen to support aquatic life. The first benchmark is dissolved oxygen levels of 2.0 milligrams per liter (mg/L) daily throughout the year. Dissolved oxygen levels less than 2.0 mg/L may cause fish mortality. The second benchmark requires a daily average of 5.0 mg/L of dissolved oxygen during the spawning season (March to June) and a minimum of 4.0 mg/L for the rest of the year. Dissolved oxygen levels of less than 4.0 mg/L impair fish growth and reproduction – particularly in younger fish. Currently, dissolved oxygen levels fall below 5.0 mg/L an average of 93 days each year (Source EPA).

In addition to the nutrients, about 50,000 tons of sediment flow into the Anacostia each year. Imagine 2,500 dump trucks each year (almost seven per day) emptying their load of dirt into the river. There is no one major source of the Anacostia's sediment loads, however there are a few major causes. Sediment is eroding from our lands and stream banks primarily due to uncontrolled stormwater runoff and poor construction practices.

Unlike the legal limits of pollutants such as sediment or oil and grease, it is very difficult to quantify when an area is good habitat for fish and wildlife. We know that it is possible to clean the river, but still have it be essentially dead to wildlife. We believe that this is not the definition of a restored river. The District is a signatory to the Chesapeake 2000 Agreement, a voluntary effort to restore the Chesapeake Bay. This agreement set specific goals for habitat including:

- Removing barriers to fish migration;
- Restoring submerged aquatic vegetation;
- Creating and protecting wetlands;
- Performing stream restoration; and
- Planting riparian forest buffers and protecting existing forested lands.

We realize that habitat restoration is both a science and an art, and as such, it will be difficult to say when the Anacostia's habitat has been restored. However, we feel that in the end we will be able to determine our success by the amount and variety of fish and wildlife we find in and around the River.

## **A Swimmable River**

The fourth stage of Anacostia River restoration will require making the river safe for swimming and other immersion sports such as windsurfing. As with making the river

safe for secondary contact recreation, the major pollutant that must be addressed is human pathogens as measured by E. coli. The standard for primary contact requires reductions in E. coli levels to 126 MPN/100 mL.

To achieve this level of reductions, the District must fully implement its Long Term Control Plan for its combined sewer system. In addition, both Maryland and the District must aggressively seek out and repair leaking sewer infrastructure. It is likely that additional steps may be necessary to reduce E. coli levels such as controlling resident geese populations, educating pet owners to pick up after their pets, and fining those that do not.

### **A River that Supports Fish that are Safe to Eat**

During the final and most difficult stage of the Anacostia restoration effort, the District will work to create a river system that is clean enough to support fish consumption. Currently, fish consumption advisories are in place for all of the District's waters because of high levels of organic chemicals and metals in resident fish species. Realizing an Anacostia where the fish are safe to eat will take many years in the most optimistic outlook, and for some experts, is an uncertain prospect even in the long term. The reasons for this less than rosy forecast is that these contaminants are many and varied, they are persistent (staying in the environment a long time), they bioaccumulate (build up in organisms that ingest them), and the sources of some pollutants (like coal-fired power plants) are not well controlled.

It is difficult to make generalizations about the sources of these toxic metals and organic chemicals because they are so many and varied. The use of most of these toxic substances has now been banned and those that are still used are highly regulated. Some of these toxics have accumulated in hotspots near previous industrial activity, while others were used diffusely throughout the watershed. Because the tidal Anacostia flushes very slowly, those toxics found in hotspots on the tidal river tend to stay in place while those from upstream tend to be flushed downstream and accumulate in the tidal sediments. Despite their different origins, the majority of the toxics that contaminate Anacostia fish are called "legacy" toxins – toxic substances that accumulated in the environment over time and continue to be present in high quantities, despite their current disuse.

Dealing with the River's toxic metals and organic chemicals will require a two-pronged approach 1) addressing legacy pollutants and 2) tackling continued chronic contamination from upstream sources. The EPA has developed a plan to address toxics in the Anacostia, the details of which have not been included in this document. The District recognizes that as it continues to move towards greater development on the banks of the Anacostia it must develop a more comprehensive plan to address this complicated problem and will work with the federal government and upstream jurisdictions to do so.

### ***ACTIONS TO ATTAIN A CLEAN ANACOSTIA RIVER***

Unfortunately there is no magic wand for cleaning up the Anacostia – it will require many actions taking place simultaneously. Furthermore, the restoration work will take



many years and cost millions of dollars. In the previous section we outlined a strategy of stages for cleaning the river and gauging our progress towards a fishable and swimmable Anacostia River. In this section we will discuss each of the pollutants keeping us from achieving that goal, summarize the work that has gone on to date to address each pollutant, and outline strategies and impediments to achieving our goal related to that pollutant.

We will focus on each of the pollutants as they are addressed in the previous section working from the earliest stage of restoration to the last stage of work. It should be kept in mind that some pollutants will require action over many years to be reduced to acceptable levels. Although the primary focus may be on one or two pollutants during any one stage, actions will be taking place simultaneously to address other pollutants that are the focus of other stages. Furthermore, some strategies outlined for one pollutant will also be strategies to address other pollutants. In those cases, we will note that this strategy has already been discussed and provide a reference to the earlier discussion.

### **Goal: Create a Visually Presentable River**

***Vision: An Anacostia River that is trash free by 2013 (Anacostia Trash Reduction Strategy (MWCOG) and Potomac River Trash Treaty (Alice Ferguson Foundation))***

### **Pollutant Addressed: Trash**

#### ***Accomplishments to date:***

The District has a long history of trash reduction efforts in the Anacostia River. Since 1992, the Floating Debris Removal Program for the Anacostia and Potomac Rivers has removed an average of approximately 500 tons of trash annually from the Anacostia River. This program was developed by the District of Columbia Department of Public Works and is currently run by the District of Columbia Water and Sewer Authority. While the collection of trash and debris does not address or begin to control the sources of the problem, it does provide a means for quantifying it.

In addition to this effort focused solely on trash reduction, the District has undertaken other efforts that may have had other goals, but have also resulted in reduced trash to the Anacostia. One such effort was the installation of a “swirl concentrator” near RFK stadium that was installed to reduce the amount of waste from combined sewer overflows. This facility has had an ancillary benefit of removing litter and debris from combined sewers before flowing into the Anacostia River. The city street sweeping



A heron on the Anacostia overlooking a trash boom.

program, although focused on reducing other pollutants is another program that has reduced trash to the Anacostia River.

Between 1998 and 2004, the Metropolitan Washington Council of Governments (MWCOG) conducted an annual survey of trash in the Anacostia Watershed. These surveys, although thorough, have not been comprehensive. They have however, provided an indication of trash hotspots in the watershed. This survey contributed to the creation of the *Anacostia Trash Reduction Strategy* by MWCOG in 2007. The *Strategy* outlines six general objectives for the Anacostia River jurisdictions to pursue in order to achieve a trash free Anacostia. Some of these objectives will be reiterated as strategies here.

Some efforts have been made to test innovative technologies to keep trash out of the Anacostia. Prince George's County has installed trash traps at the end of stormwater outfalls and floating trash traps in waterways that will, over their lifetime, capture thousands of tons of trash that otherwise would have floated into District waters. Montgomery County is also testing new inserts in storm drains that capture trash.

One cannot overlook the massive number of volunteer hours that have gone into removing trash from the Anacostia and its banks. The Anacostia Watershed Society alone has documented over 40,000 volunteers that have collected over 500 tons of trash and removed over 10,000 tires from the river.

### ***Strategies Outside of District Boundaries – Voluntary:***

The District should follow two major paths of voluntary actions to reduce trash loads coming into the Anacostia from Maryland. One path is to work with the Anacostia Watershed Restoration Partnership (AWRP) to implement the *Anacostia Trash Reduction Strategy* published earlier this year. Some of the goals put forth in this document include:

- ❖ Create a common inter-jurisdictional environmental education and social marketing campaign and evaluation system which will be multilingual, multicultural, and include opportunities for tailoring the marketing efforts to specific local needs;
- ❖ Engage major businesses and grant institutions in the watershed to provide financial and other support for trash reduction-related projects and initiatives;

### **Policy Changes can lead to big improvements in the Anacostia River water quality**

Specific changes in policy could lead to major improvements in water quality in the Anacostia over the next two decades. Addressing these issues requires the integrated involvement of multiple District Government agencies, WASA and the mayor's office. One example follows here and others are included text boxes throughout this document:

#### ***Tax incentives for the adoption of green roofs:***

Green roofs have been established as effective at treating stormwater, reducing energy costs, and reducing the urban heat island effect. Although they have large social benefits, green roofs are typically more expensive than traditional roofing materials. The District should look at establishing modified tax policies for new development or redevelopment that incorporates green roofs. Any reduction in tax receipts could be offset by the general benefit to the city in reduced energy demand, lower summertime temperatures, and lower stormwater runoff and associated impacts.

- ❖ Investigate the cost effectiveness of different technologies such as street sweeping, inlet grates, and end-of-pipe devices, as well as innovative outreach and incentive programs. Share and disseminate information about their costs and effectiveness.
- ❖ Investigate feasibility of developing a regional initiative to provide payments for the return of glass bottles and plastic containers.
- ❖ Investigate ways to enhance anti-littering/dumping codes and enforcement across jurisdictions such as creating more common anti-litter/dumping codes and penalties.

### **The Anacostia Watershed Restoration Partnership (AWRP)**

While most of the *Anacostia River* lies within the District of Columbia, most of the *Anacostia watershed* lies in Maryland. As with all rivers, the quality of the river is directly related to the condition of the watershed. While it is important for the District to do its part to reduce pollution and improve the river's condition, it is equally important for the District to work with other governmental agencies that work to improve the Anacostia watershed. To this end, the District of Columbia is a member of the Anacostia Watershed Restoration Partnership (AWRP), a coalition of government agencies and others working on the restoration of the watershed.

AWRP's major partners are the District of Columbia, Montgomery County, Prince George's County, the State of Maryland, the US Environmental Protection Agency, and the US Army Corps of Engineers. Additional other partners include several other government agencies and some non-governmental organizations, including the National Park Service, the National Oceanic and Atmospheric Administration, the Summit Fund, the University of Maryland, and the Maryland-National Capital Park and Planning Commission.

Working with the Partnership allows the District of Columbia to coordinate its efforts with other jurisdictions in the region and other key stakeholders and helps restore the health of the Anacostia by working to restore the watershed. Some of its recent initiatives have included:

- ❖ The development of a watershed-wide Ecological Restoration Plan as directed by Congress as part of the Water Resources Development Act, and seeking federal funds to help pay for the restoration;
- ❖ Monitoring of trash and the development of a trash TMDL, as well as the implementation of a watershed-wide Trash Reduction Strategy;
- ❖ Encouraging and assisting its members to implement improved stormwater controls, including Low Impact Development (LID) projects; and
- ❖ Implementing and assisting its members to implement stream restoration, riparian buffer restoration, fish passage, wetlands restoration and other projects to restore watershed habitat.

The second upstream voluntary effort that the District should engage in is to provide input as Maryland develops its Total Maximum Daily Load (TMDL) for trash in the Anacostia. This TMDL would set legally binding limits to the amount of trash allowed to

enter the District of Columbia. Providing input as this effort goes forward will help ensure that the limits set are acceptable to the city.

***Strategies Outside of District Boundaries – Regulatory:***

Once Maryland has developed its trash TMDL, the District will seek to ensure that the upstream jurisdictions take action to implement the TMDL.

Table 2: Strategies for Anacostia Trash Reduction Outside of the District of Columbia

Strategy:	Benefit:	District's Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:	Notes:
Inter-jurisdictional educational and marketing campaign	Increased awareness and increased participation in trash reduction efforts	Initial investment: \$1,000,000 After: \$150,000 annually	Lead: DPW, Clean City Coordinator Partners: Montgomery and P.G. Counties, AWRP	Development: 1-2 years  Continuous after	Campaign developed, recycling rates, litter fines collected	Required under the MS4 Permit
Seek support from businesses and non-profits for trash reduction	Additional support available for trash reduction efforts	Net gain of funds	Partners: Montgomery and P.G. Counties, AWRP	Development: 1-2 years  Continuous after	Amount of funds collected, number of volunteers gained	
Investigate the cost effectiveness of different technologies	Increased knowledge of best trash reduction practices	\$125,000	Lead: DDOE Partners: MDE	Under development  Completed in 1-2 years	Report developed for best trash reduction practices for region	MDE is also contributing \$125,000 to this work
Investigate feasibility of regional deposit bill on recyclable containers	Understanding of cost and benefits and challenges to implementing a regional bottle bill	\$100,000	Lead: Office of Legislative Affairs Partners: Montgomery and P.G. Counties, AWRP	1-2 years	Report developed studying potential for a regional bottle bill	
Work with Maryland to strengthen its MS4 permit	Stronger permits for reducing stormwater pollution coming into the District from Maryland	Staff time	Lead: DDOE Partners: Maryland, Montgomery and P.G. Counties, AWRP	1-2 years and continuous as the permits are renewed	Stronger MS4 permits for Maryland jurisdictions in the Anacostia watershed	
Negotiate an enforceable trash reduction strategy for Maryland and, make sure that Maryland implements its trash TMDL	Ensures that Maryland implements its trash TMDL	Uncertain	Lead: DDOE Attorney General	4-5 years	Maryland implements trash TMDL	

***Strategies Inside of District Boundaries – Voluntary:***

The District’s voluntary efforts should, if possible, mirror or work with regional voluntary efforts such as developing and carrying out social marketing and education campaigns related to reducing litter and expanding recycling. The city should build upon its existing Adopt a Block and Adopt a Storm Drain programs run through the Clean City Coordinator, and should encourage community groups and non-profits to undertake trash reduction activities by offering both supplies and monetary grants.



A trash skimmer at work on the Anacostia.

Other non-regulatory efforts might include expanding demonstration projects of technology shown to reduce trash such as catch basin inserts and grills, storm sewer outfall trash separators, and additional trash booms and trash skimming.

***Strategies Inside of District Boundaries – Regulatory:***

Much of the work towards trash reduction in the District of Columbia could be accomplished through regulatory actions. There are some existing legal requirements that the District can use to reduce trash in the Anacostia, and we will suggest some new regulations as well.



Illegal dumping in Marvin Gaye Park near Watts Branch.

There are two existing legal frameworks that address trash and a third is under development. The two existing efforts are the Long Term Control Plan and the Municipal Separate Storm Sewer System (MS4). Neither of these efforts deals solely with trash, however both do contain efforts that will reduce trash to the Anacostia. The Long Term Control Plan will eliminate a great deal of trash going into the river by creating storage tunnels where trash laden stormwater will be stored until it can be treated at Blue Plains.

The District has committed to a number of activities that have been shown to reduce trash. For example, the District will develop and implement an enhanced street sweeping strategy. The District also intends to retrofit 50 catch basins for trash control, as well as use water quality catch basins for trash control in all new roadway reconstruction

projects. A trash survey and trash removal strategy / trash reduction plan for the Anacostia River will also be completed by the end of Fiscal Year 2009.

The third legal framework that is currently under development is a trash TMDL for the District of Columbia. Completion of this TMDL will also aid the District in completing its MS4 permit obligations. As a result, it is likely that once this TMDL is approved by the EPA, it will be incorporated as a component of the District's MS4 permit.

Other regulatory actions that exist or could be enacted to eliminate trash from the Anacostia River include strengthening current anti-dumping laws and enforcement. The DDOE has committed to establishing an Enforcement Office, and to work with the Metropolitan Police Department and Department of Public Works to improve illegal dumping enforcement efforts. Similarly, the District could reinstitute ticketing of persons who litter much in the same way that enforcement of jaywalking laws has increased. The revenue from such efforts could be directed solely to further reducing District litter. These efforts would therefore decrease the amount of trash in the Anacostia, create strong public awareness of the problem, and provide a funding source for trash reduction activities.

Additional efforts that the District should consider include instituting a deposit on recyclable containers, as has been done in 11 states. Studies have shown that recyclable beverage containers represent 40-60 percent of litter (Source: Container Recycling Institute). A similar effort could be made to ban the use of plastic bags by grocery and convenience stores as was recently done in San Francisco or charge a high fee for each bag as is being done in Ireland. Plastic bags make up such a large portion of trash in the annual Potomac River Cleanup that the Alice Ferguson Foundation now tracks the number of grocery bags found at cleanup sites. Finally, the District could require fast food restaurants and retail locations with large parking lots to clean their property of trash (manually or by sweeper) on a daily basis.

Table 3: Strategies for Anacostia Trash Reduction in the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:	Notes:
Educational and marketing campaign	Increased awareness and increased participation in trash reduction efforts	Initial investment: \$1,000,000 After: \$750,000 annually	Lead: DPW Clean City Coordinator	Development: 1 year  Continuous after	Campaign developed, recycling rates, litter fines collected	DPW currently working on a campaign; Required under the MS4 Permit
Increased demonstration and monitoring of trash reduction technology	Reduced trash, increased knowledge of effective reduction practices	\$200,000 annually	Lead: WASA, DDOE, DDOT, DPW Partners: Federal agencies	Continuous funding for at least 10 years	Number of trash reduction demonstration technologies installed	
Increased enforcement of litter laws	Reduced littering, revenue stream for litter reduction, increased awareness	Net gain	Lead: DPW, DCMPD	Implement immediately  Continuous for long term	Number of fines collected, recycling rates	
Strengthen and improve enforcement of anti-dumping laws	Reduced illegal dumping events	Monetarily neutral	Lead: DPW, DCMPD	1-2 years  Continuous for long term	Number of illegal dumping arrests, number of illegal dumping convictions	
Develop a deposit bill on recyclable containers	Reduced litter from beverage containers	\$500,000 for startup then monetarily neutral	Lead: DPW, DDOE	Develop: 1-2 years Continuous for long term	Bottle bill instituted	11 states currently have bottle bills
Explore ban/fee on plastic bags at convenience and grocery stores	Reduced litter from grocery bags	No cost	Lead: DPW, DDOE	1 year	Bag bill instituted	Recently passed in San Francisco
Survey litter in the District to determine sources and recommend methods of control	Knowledge of the sources of litter and strategies for reduction	\$125,000	DPW, Clean City Coordinator	1 year	Report developed on sources of trash in the District and recommended methods of control	Additional \$125,000 being invested by MDE on similar research
Develop Trash TMDL implementation plan	Plan created to implement trash TMDL	\$100,000	Lead: DDOE Others: WASA, DPW	1-2 years	Plan Developed	
Develop Trash TMDL	Limits set to amount of trash allowed to the Anacostia	\$100,000	Lead: DDOE	2-3 years	TMDL Developed	
Increase street sweeping	Reduced trash from public streets	\$500,000 two years \$100,000 after	Lead: DPW	Implement: 1-2 years Continuous for long term	Number of road miles swept	

Table 3: continued

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:	Notes:
Better enforcement of trash around retail and fast food parking lots	Reduced litter from retail and fast food facilities	Monetarily neutral	Lead: DPW, DOH, DCMPD	Implement: 1 year Continuous for long term	Amount of trash around retail and fast food locations, number of violations	
Increased catch basin clean outs	Reduced trash from catch basins	\$500,000 two years \$100,000 after	Lead: WASA, DDOT	Implement: 1 year Continuous for long term	Number of catch basins cleaned	
Increased surveillance of dumping hot spots	Reduced trash from illegal dumping	\$200,000 annually	Lead: DCMPD, DPW, Clean City Coordinator	1-2 years Continuous for long term	Number of cameras, number of arrests, number of convictions of illegal dumpers	Was successfully implemented in Marvin Gaye Park.
Develop small grants program for non-profits and communities for volunteer cleanup efforts	Reduced trash and increased community involvement, free labor	\$50,000 annually	Lead: DDOE Others: Clean City Coordinator, DPW	1-2 years Continuous for long term	Number of grants provided, number of cleanup activities held	
Use of non-violent offenders as cleanup crews	Reduced trash, free labor	\$50,000 annually	Lead: Department of Corrections, DPW, Clean City Coordinator	1-2 years Continuous for long term	Number of service hours performed by offenders	
Install solar trash compactors on public trash cans	Reduced overflow of public trash cans	\$300,000 initial pilot project \$50,000 annually if successful	Lead: DPW	1-2 years to implement pilot project. Continuous for 10 years if successful	Number of trash compactors installed	Philadelphia has installed similar systems

### *Challenges*

There are two great challenges to addressing trash in the Anacostia River, one is voluntary and the second is regulatory. The voluntary challenge will be to change people’s behavior – from the individual citizen deciding whether to recycle a can or throw it out of their car window, to the police officer deciding whether to fine the person cleaning out their car ashtray at a stoplight, to the judge deciding on the penalty for the convicted illegal dumper. On the regulatory side, the largest challenge will be instituting a region-wide bottle bill. This effort will require the political will to overcome challenges from affected businesses and consumers and must be carried out across jurisdictional boundaries in order to have its intended effect.



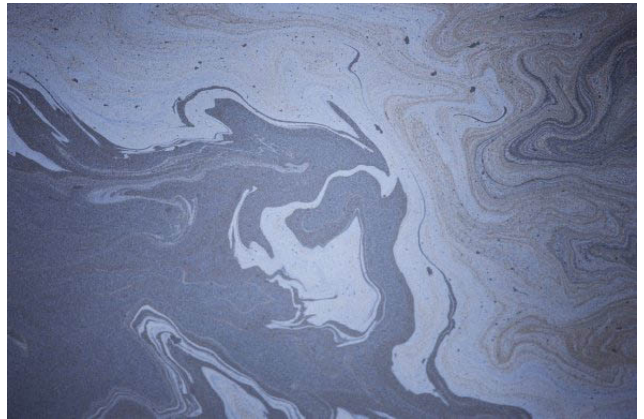
## Goal: Create a Visually Presentable River

*Vision: Create an Anacostia River free of Oil and Grease.*

### Pollutants Addressed: Oil and Grease

#### *Accomplishments to date:*

The Anacostia and one of its tributaries, Hickey Run, were first listed as impaired by oil and grease in 1996. Since that time, the District has taken action to address these pollutants and has had major success. In 1998, a TMDL was established by the District and EPA for Hickey Run, calling for a reduction in point source loads by 89 percent and non-point source loads by 30 percent. Using EPA Section 319 Nonpoint Source Program funding, targeted enforcement actions, and Clean Water Act permit requirements, oil and grease loadings decreased by 88 percent and Hickey Run is now achieving the 10mg/L water quality standard. As a result, Hickey Run was removed from the 2004 Section 303(d) List of Impaired Waters for oil and grease, and is a restoration success story for an Anacostia tributary stream.



A visible sheen on water from oil.

While restoration work was taking place in the Hickey Run watershed, a TMDL for oil and grease was created for the District portion of the Anacostia in 2003. Developing a TMDL for the Anacostia required more time and effort than that of Hickey Run because of the greater size and complexity of the river. Analysis of current data suggests that oil and grease levels in the Anacostia River are now within their TMDL limits due to the restoration efforts on Hickey Run.

#### *Strategies Outside of District Boundaries – Voluntary:*

None of the Anacostia's tributaries outside of the District are listed on the Environmental Protection Agency's (EPA) 303(d) report as polluted for oil and grease, therefore the city does not have a legal framework to help push oil and grease reductions outside of the District's waters. Although no waterways are listed for oil and grease, that does not mean that oil and grease from Maryland are not contributing to the pollution within the District's boundaries. In fact, the Oil and Grease TMDL developed by the District and accepted by the EPA sets a limit on the amount of oil and grease entering District waters from Maryland.

The city should be proactive in working with the upstream jurisdictions. It should promote its successful oil and grease reduction efforts and look for ways to partner with Prince George's and Montgomery County in developing new and innovative methods for ensuring oil and grease loads do not increase from their streams. These efforts can be accomplished through forums such as the Anacostia Watershed Restoration Partnership.

***Strategies Inside of District Boundaries – Voluntary:***



A voluntary oil drop off location.

Although the District may have already achieved its Clean Water Act goal of reducing oil and grease in the Anacostia River, it cannot claim success and relax. The District must continue to work to maintain its water quality standard because it does not take a large amount of oil and grease to violate the TMDL standard, and because these pollutants are so widely used in the watershed.

One way of ensuring that the Anacostia meets its water quality benchmark is to continue the program that helped the District succeed in attaining its standard. The District succeeded in Hickey Run through a campaign called Environmental Education for the Compliance of Auto Repair Shops (EE-CARS) – a mixed education and enforcement campaign aimed

at small auto repair shops. This program should be expanded Anacostia-wide and should revisit businesses on a regular basis. Return visits are needed because of the high turnover in mechanics and ownership at these facilities. In addition to this campaign, the city could also step up existing programs aimed at inspecting underground and above ground storage tanks as well as stormwater treatment facilities at gas stations, auto repair shops, and fleet maintenance facilities.

It is believed that the Hickey Run watershed was the major contributor of oil and grease to the Anacostia. As stated earlier, its restoration has been a success. In order to keep oil and grease and floatable debris out of Hickey Run for the long-term, the District has helped the Arboretum with the design of a grease, oil, and trash BMP. The City should continue to push for its completion.

The District also should develop an education and outreach campaign aimed at do-it-yourself mechanics in the city.

**Policy changes can lead to big improvements in the Anacostia River water quality – Part II**

***Revise stormwater fee to encourage adoptions of infiltration practices:*** Cities such as Topeka, Kansas and Portland, Oregon have revised their stormwater fee structure to encourage home and business owners to maintain a greater percentage of pervious surfaces (such as grass, porous pavers and concrete, tree cover) on their properties. Businesses and homeowners pay a lower fee if they are able to convert hardscapes into pervious or permeable surfaces. The lower fees received by the government are offset by less stormwater running off the property. The cost of stormwater is extensive not only for onsite treatment, but in the cost to city owned and managed infrastructure (collapsed stormwater outfalls, compromised sanitary sewer lines, and sediment from stream banks are some examples) and the ecological cost to shared water bodies that are negatively impacted by the effects of damaged infrastructure. The District is currently working on revamping its stormwater fee to reflect the restoration work needed and to make it more equitable to District property owners.

This is a group that has not been strongly targeted, but one where simple behavioral changes can go a long way. The campaign should not only focus on how to properly change oil and other automotive fluids, but also where to bring them for recycling.

While educating do-it-yourself mechanics, the District should increase the number of oil drop off locations around the city. Currently there is only one official location where mechanics can drop off transportation related fluids. By increasing the number of drop off locations, the city will help make recycling easy and convenient.

Finally, the city should consider outfitting catch basins and outfalls with oil absorbing inserts in targeted watersheds with high concentrations of auto repair facilities. These inserts contain materials much like those designed to collect oil from the bilge water of boats.

***Strategies Inside of District Boundaries – Regulatory:***

Regulatory changes for oil recycling could include encouraging spill prevention plans for all facilities storing oil and grease, increasing fines for illegal disposal of oil and grease and for those who have not properly maintained fuel and oil storage tanks, and more stringent car inspection requirements that include spot checks for major oil leaks.

Table 4: Strategies for Anacostia Oil and Grease Reduction in the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:
Continue “EE CARS” Education and Enforcement Campaign	Increased awareness and increased participation in fluid recycling by small repair shops	\$150,000 annually	Lead: DDOE	Implement: 1-2 years  Continuous for long term	Number of repair shops inspected, amount of informational materials distributed
Step up inspection of underground and above ground storage tanks	Better ability to catch problem facilities before serious problems occur	\$100,000 annually	Lead: DDOE	Implement: 1 year  Continuous for long term	Number of facilities inspected
Step up inspection of stormwater treatment facilities at service stations	Better ability to catch problem facilities before serious problems occur	\$150,000 annually	Lead: DDOE	Implement: 1 year  Continuous for long term	Number of facilities inspected
Complete oil and grease BMP on Hickey Run	Reduced oil, grease and trash to Anacostia		Lead: National Arboretum, Partner: DDOE, EPA	1 year	BMP installed, amount of trash, oil & grease removed

Table 4: continued

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:
Develop and institute an education and outreach campaign aimed at do-it-yourself mechanics	Increased awareness and increased participation in transportation fluid-related recycling efforts	Initial: \$200,000 \$100,000 annually after	Lead: DDOE, DPW, Clean City Coordinator	Implement: 1-2 years Continuous for long term	Campaign developed, amount of transportation fluid-related recycling
Develop network of free drop off locations for transportation related fluids	Increased number of transportation related fluids drop off locations	\$100,000 initial investment \$50,000 annually after	Lead: DDOE, DPW, Clean City Coordinator	Implement: 1-2 years Continuous for long term	Number of transportation fluid-related recycling drop off points
Require spill prevention plans for all facilities storing transportation related fluids	Increased awareness of how to properly contain and clean up a spill	\$100,000 annually	Lead: DDOE, Attorney General	Implement: 1-2 years Continuous for long term	New law created, Number of spill prevention plans created
Increase fines for improper disposal of transportation related fluids	Disincentive for improperly disposing of oil and grease	Net financial gain for the City	DDOE, DCMPD, DPW	Implement: 1-2 years Continuous for long term	New fine level created, amount of fines collected

## *Challenges*

Perhaps the greatest challenge in keeping the Anacostia free of oil and grease is the continued education of small auto repair shops due to constant turnover of personnel. Reaching this targeted audience, in both the District and upstream, is crucial and requires constant work. An additional challenge is maintaining constant vigilance towards the threat of contamination by keeping Hazmat teams prepared and well equipped. Finally, it is a challenge to avoid complacency towards the first major Anacostia River pollutant that the District may have succeeded in reducing to below its target load.

## **Goal: Create a River that is Boatable**

***Vision: Create an Anacostia River where it is safe to boat by reducing fecal coliform levels.***

## **Pollutants Addressed: Escherichia coli**

### *Accomplishments to date:*



Pet waste that is not picked up contributes to E. coli loads in the Anacostia.

The District of Columbia and Maryland have been concerned about the high levels of pathogens in their portions of the Anacostia River for some time. To date, many remediation activities have taken place, but the river still has a long way to go before it has safe levels of Escherichia coli and other pathogens for primary contact activities such as swimming, water-skiing, and windsurfing.

The strides taken to date have achieved levels of pathogens that often meet water quality levels safe for secondary contact recreation such as fishing and boating. There is more work that must be done so that

the river achieves these levels on a daily basis, but it is attainable in the medium term.

Highlights of the actions to reduce fecal coliform and E. coli to date include:

- ❖ The development and acceptance of the Long Term Control Plan by the District of Columbia Water and Sewer Authority (WASA). This plan is a roadmap for reducing combined sewer overflows (CSO) from the District's antiquated combined sewer system (CSS). Although these CSOs affect all District waters, they primarily affect the Anacostia River. Phase one of the Long Term Control Plan was completed in 1991 with the installation of storage devices called inflatable dams and the construction of a CSO treatment system called the Northeast Boundary Swirl Facility. These controls have already cut the volume of sewer overflows by one-third from 2,100 million gallons to 1,400 million gallons annually.

- ❖ Both the District and Maryland have developed TMDLs for pathogens for the Anacostia River. Maryland’s TMDLs were accepted by the EPA in 2003 and 2006 and the District’s two bacterial TMDLs were accepted in 2003. These regulations establish limits on the amount of pollutants that can be delivered to the Anacostia.
- ❖ In 2005 the Washington Suburban Sanitary Commission (WSSC) signed a consent decree with an over \$1 million cash penalty that requires the WSSC to protect the Anacostia waters from contamination by untreated sewage, which contains bacteria, pathogens and other harmful pollutants that seriously degrade water quality, harm aquatic life and threaten public health. In addition to the cash penalty, the WSSC must perform supplemental environmental projects worth approximately \$4.4 million dollars.
- ❖ Most recently, the Supreme Court let stand a decision by a lower federal court requiring the District’s pollutant loads to be met on a daily basis, rather than on seasonal or annual basis as had been done previously. This ruling will have the effect of tightening pollution limits beyond their earlier calculated values.



Reducing resident geese numbers is one method to reducing pathogen loads.

***Strategies Outside of District Boundaries – Voluntary:***

Although the greatest source of pathogens such as E. coli to the Anacostia is the combined sewer system of the District, the upstream counties and Maryland do have a role to play in the reduction of E. coli levels. The District should work with its upstream jurisdictions through voluntary partnerships, such as the Anacostia Watershed Restoration Partnership (AWRP). The AWRP, described previously, is engaging in a number of activities that will help. Two such additional watershed-wide voluntary efforts that could come from the AWRP are:

- ❖ An inter-jurisdictional environmental education and social marketing campaign aimed at reducing E. coli from pet waste. This effort should be multilingual, multicultural, and include opportunities for tailoring the marketing efforts to specific local needs.
- ❖ A cross-jurisdictional residential goose abatement program. Residential geese are a large and growing problem in the Anacostia. One adult Canada goose can produce up to a pound of nutrient- and coliform-rich waste each day. An abatement program in one jurisdiction may only drive the birds to another part of the watershed; therefore any effort should be a partnership effort. A residential goose abatement effort will have additional benefits in reducing nutrient pollution and improving wildlife habitat (see the wildlife section of this document for more details).

***Strategies Outside of District Boundaries – Regulatory:***

There are two regulatory levers that the District can use to reduce pathogens such as E. coli from the Maryland portion of the Anacostia watershed. The city should follow WSSC efforts and work cooperatively to ensure that it take appropriate action in a timely manner to reduce the amount of untreated sewage flowing from broken pipes, illicit connections, and aged infrastructure.

Like the District, Maryland has listed portions of the Anacostia as impaired for E. coli and pathogens. The state has also developed TMDLs for these pathogens which have been accepted by the EPA. The District must track Maryland’s TMDL implementation.

**Table 5: Strategies for Anacostia E. coli Reduction Outside of the District of Columbia**

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:
Inter-jurisdictional educational and marketing campaign for pet waste	Increased awareness and increased participation in pet waste reduction efforts, reduced E. coli from pet waste	Initial investment: \$200,000 After: \$100,000 annually	DDOE, DPW, Clean City Coordinator Partners: Montgomery and P.G. Counties, AWRP	Startup: 1-2 years  Continuous for long term	Campaign developed
Cross-jurisdictional residential goose abatement program	Reduced E. coli from residential goose populations	\$100,000 annually	DDOE Partners: USNPS, MNCPPC, Montgomery and P.G. Counties, AWRP	Startup: 2-4 years  Continuous for long term	Residential goose population
Follow WSSC efforts to ensure implementation of its consent decree.	Reduction in E. coli from WSSC pipes	Cost not known	Lead: DDOE, Attorney General	2-4 years	WSSC acts to reduce discharges from its pipes
Negotiate an enforceable E. coli implementation plan for Maryland. Ensure that Maryland implements its TMDL.	Ensures that Maryland implements its E. coli TMDL	Cost not known	Lead: DDOE, Attorney General	2-4 years	Maryland implements E. coli TMDL

### ***Strategies Inside of District Boundaries – Voluntary:***

The District should take voluntary action to reduce E. coli and other pathogens by controlling the sources of these pollutants and by controlling the delivery of these pathogens to the Anacostia. Early actions may include the type of efforts discussed in the voluntary actions outside of the District's boundaries, namely controlling resident Canada goose populations and developing a social marketing campaign to educate pet owners to cleanup their waste. Other sources of pathogens are leaking sanitary sewer pipes and illicit connections of wastewater pipes to storm sewer lines. The District Water and Sewer Authority must be proactive about finding and repairing or removing leaking pipes and illegal connections.

Beyond controlling the sources of E. coli, the District should be proactive in addressing the delivery of pathogens to the Anacostia. The predominant delivery mechanism of E. coli is stormwater that either carries bacteria laden material to the river through storm drains, or causes the combined sewer system to exceed its capacity.

The good news is that there are many voluntary methods to reduce stormwater flow, many of which the District is already actively promoting. Proven stormwater retention techniques include planting trees, reducing lawn and replacing it with water absorbent landscaping, installing green roofs, utilizing permeable pavement, disconnecting downspout connections, and installing water retention and infiltration devices such as rain barrels, cisterns, rain gardens, and dry wells. By far, the greatest opportunity for installing these techniques in the District is on homeowner property.

The city should develop a marketing and education campaign combined with incentives such as rebates aimed at homeowners to encourage them to adopt these techniques.

One final area where the District should work to make the Anacostia boatable is in creating more public access points along the river. Although boat launches, fishing piers, and canoe and kayak trails do not themselves reduce the problem of pathogen pollution, they are necessary to help District residents enjoy the river once the pollutant loads have been reduced. Furthermore, public access to the river will help build river stewards because the more contact that the public has with the river, the more it will be behind the Anacostia's restoration.

### ***Strategies Inside of District Boundaries – Regulatory:***

From the regulatory side, the primary step that the District must take to reduce its loads of E. coli flowing into the Anacostia is to fully implement the Long Term Control Plan for the combined sewer system. The Long Term Control Plan (LTCP) is estimated to cost around one billion dollars, just for controlling sewage overflows to the Anacostia watershed. We recommend that WASA work under its accelerated time schedule to reduce 13 combined sewer overflows by 98 percent and eliminate 4 CSO outfalls in the Anacostia watershed by separation and consolidation. This effort will decrease the



**A sign warning about the dangers of combined sewer overflows.**



number of Anacostia overflows from 82 to 2 events per average year. In addition to its benefits for controlling E. coli, it will also benefit wildlife and fisheries by reducing the number of days when dissolved oxygen falls below 5mg/L from 93 to 66 a year. Given the importance of the LTCP in reducing pollution from the combined sewer, the District should fully support DC WASA’s efforts to develop and implement an impervious area fee to fund the LTCP.

In addition to implementing the LTCP, the District must also carry out the actions required from its MS4 permit. The E. coli TMDL requires 91 percent load reductions from streams and storm sewers. Much of these reductions will occur through actions carried out through the revised MS4 permit, such as:

- ✓ Illicit discharge detection and disconnections;
- ✓ Low impact development retrofits;
- ✓ Stormwater management facility inspection and maintenance;
- ✓ Street sweeping and trash receptacle cleanout; and
- ✓ Public education and outreach efforts such as the “Scoop your Poop” campaign

However, additional actions will be required to reduce stormwater loads by 91 percent. Other efforts, covered in more detail in other sections of this report, should include:

- Revising building and zoning regulations to maximize policies for the treatment of runoff on all new construction and renovation; and
- Revising stormwater fees to encourage retrofits of exiting properties to reduce stormwater.

Table 6: Strategies for Anacostia E. coli Reduction in the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:	Notes:
Educational and marketing campaign for pet waste	Increased awareness and increased participation in pet waste reduction efforts, reduced E. coli from pet waste	\$200,000 initially and \$100,000 annually thereafter	DDOE, DPW, Department of Parks and Rec.	Startup: 1-2 years  Continuous for long term	Campaign developed, proper pet waste disposal rates	
Residential goose abatement program	Reduced E. coli from residential goose populations	\$100,000 annually	DDOE Partners: National Park Service, non-profit groups	Implement: 2-4 years  Continuous for long term	Residential goose population	
Detect and repair or remove leaking sewer pipes and illicit connections	Reduced E. coli from sewer infrastructure	\$2,000,000 annually	Lead: WASA, DDOE	Implement: 1-2 years  Continuous for long term	Number of sewer line leaks, number of illicit connections	

Table 6: continued

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:	Notes:
Increased stormwater retention on public lands through tree planting and LID techniques	Reduced E. coli from stormwater	\$2 million annually	Lead: DDOE, WASA, DDOT, DCPS, DCPD, DCRA, Office of Planning	Implement: 1-2 years Continuous for long term	Number of LID installed, number of trees planted	
Increased stormwater retention on homeowner property through tree planting and LID techniques	Reduced E. coli from stormwater	\$2 million annually	Lead: DDOE, DCRA, DDOT, WASA, AWC	Implement: 1-2 years Continuous for long term	Number of LID installed, number of trees planted	
Fully implement Long Term Control Plan	Reduction of E. coli loads from CSO areas of District	\$2 billion	Lead: WASA	Work underway. Completion 10-12 years	Plan implanted, E. coli loads from CSO areas	The cost for this item includes work in other District watersheds.
Work with Federal Govt. to secure funds for LTCP	Reduction in the cost borne by District rate payers.	No cost.	Lead: WASA, DDOE, Office of Legislative Affairs	Implement: 1-2 years	Amount of federal support secured for LTCP	
Implement MS4 Permit Requirements	Reduction of E. coli loads from MS4 areas of District	\$14 million annually	Lead: DDOE, WASA, DDOT, DPW	Continuous for long term.	Requirements implemented, E. coli loads from MS4 areas	
Revise building and zoning codes to maximize treatment of runoff	Stormwater loads of E. coli reduced.	No cost.	Lead: DCRA, Office of Planning, DDOE	Implement: 1-2 years	New codes and regulations in place	
Revise stormwater fees to encourage infiltration practices on all properties	Stormwater loads of E. coli reduced.	Net gain through fees.	Lead: DDOE, WASA, Office of Planning; Office of Legislative Affairs	Implement: 2-3 years	New stormwater fee structure in place.	

### ***Challenges***

Undoubtedly the greatest challenge to reducing E. coli to the Anacostia is funding. The Long Term Control Plan is estimated to cost more than two billion dollars and over one billion just for the Anacostia River. If the citizens of the District were to bear this burden alone, they would see enormous rate hikes for their water and sewer bills. A challenge to the city will be to get the federal government to pay a share of the cost of the LTCP and other reduction strategies. The District believes that the federal government bears a great deal of the burden for Anacostia cleanup efforts because the federal government was the

overseer of the city during the time that its sewer infrastructure was put in place. Furthermore, the federal government holds over 35 percent of District lands, a valuable but untaxed resource. The District has contended that it should be fairly compensated for the federal government's use of this land.

Another opportunity and challenge for reducing E. coli to the Anacostia is working with existing homeowners to encourage them to adopt stormwater retention practices on their properties. This effort offers a great opportunity because private property represents the largest portion of District lands outside of Federal land. It presents the greatest challenge for several reasons.

First, there are thousands of landowners to educate as compared with the relatively few city and federal landholders. Second, these properties are extremely varied – from large wooded lots to small row houses with postage stamp-sized yards. There is no one-size-fits-all approach possible for this group. Finally, the District's building codes are not currently written to encourage homeowners to adopt these techniques. There are permits required, fees to pay, and inspections needed for every step of installation. Although these permits and inspections do serve an important purpose, they can be a hindrance to homeowner actions that benefit the common good. If the District is serious about addressing stormwater and the many pollutants it carries and creates, it must come up with creative solutions to these challenges.

### **Goal: Create a River that Supports Fish and Wildlife**

***Vision: A river that supports fish and wildlife through the reduction of sediment loads.***

### **Pollutant addressed: Sediment (Total Suspended Solids)**

#### ***Summary of Issue:***

Approximately 92% of TSS in the Anacostia originates in Maryland from either stormwater runoff or from stream bank erosion and collapse. In order to address this source, the District and Maryland have developed a joint TMDL for the Anacostia for the sediment/TSS impairment that has been approved by the EPA. The TMDL has specific allocations for MS4 permits of both Prince George and Montgomery Counties, and the District of Columbia. With this regulatory structure in place, the upstream jurisdictions can be held accountable for this major source of TSS and will be required to have an implementation plan. The MS4 permit is the principle tool for addressing sediment because it will be held up to public review, and legal action can be taken if progress is not being made. The District must ensure that MS4 permit requirements are met. District and Maryland have developed a joint TMDL for the Anacostia for the sediment/TSS impairment and it was approved by the EPA. The TMDL has specific allocations for MS4 permits of both Prince George and Montgomery counties, and the District.

For the past two decades in the District, new development is being permitted only if required stormwater controls are included. This permitting and review function by

DDOE ensures that many BMPs are installed each year to treat TSS, in addition to other pollutants. DDOE also has funded numerous retrofit projects in schools, police stations and National Park Service lands to treat TSS, and demonstrate innovative techniques for stormwater treatment.

***Accomplishments to date:***

Suspended solids have long been a water quality problem for the Anacostia River. During Captain John Smith's time, the Anacostia was navigable by sailing vessels with deep draws all the way to Bladensburg, Maryland. Large amounts of sediment started flowing into the Anacostia when early settlers cleared the forests to create lands for crops and by 1850 the Anacostia had filled to such an extent that the port of Bladensburg could no longer be reached by large vessels (Source: AWRC).

The first sediment-related actions on the Anacostia came around the turn of the last century when the Corps of Engineers recommended dredging the river and Congress approved dredging the river to varying extents up to the District line. Although dredging did not address the source of the problem, the government recognized that there was a problem.

The first reductions in human-caused sediment came not as the result of government action, but due to demographic changes. As farming decreased and urban and suburban development expanded in the Anacostia, the watershed experienced an increase in tree canopy cover and a reduction in sediment laden stormwater.

Although sedimentation rates have declined from historical highs, they are still elevated because the high levels of impervious surfaces in the watershed have created flashy flows, which erode stream banks and disconnect streams from the land around them. In the 1980s, scientists and government officials realized that reducing sediment from stream banks requires reducing the rate at which stormwater flows off of impervious surfaces. The first stormwater laws that required quality control were enacted in the Anacostia watershed soon thereafter – in the mid 1980s. Although these laws have had a beneficial effect on sediment loads from new development, most development in the Anacostia watershed took place before stormwater controls were in place. More recently, the District has adopted new and more stringent standards for development and redevelopment in the Anacostia waterfront area. These regulations reflect the need to have stronger pollution controls to attract development to the Anacostia and are an important first step, but they do not yet apply to development throughout the Anacostia watershed.

Under current regulations, stormwater quantity control is not always required for new construction, where structural BMPs are put in for quality control. Quantity control can be costly and requires structures to retain water so that it can be released more slowly, mimicking the discharge of stormwater off of forested lands. However this cost is necessary if the Anacostia will ever attain a measure of biological health.

The evidence of the problem can be seen at any outfall to the Anacostia, where substantial sandbars have formed. At the Bladensburg marina, sand has deposited such that a previously 8 ft. deep channel is now high and dry at low tide. Sands and cobble settle out in these sandbars while finer sediment remains suspended in the water column. It is this fine suspended sediment that prevents fish from utilizing the river.

High amounts of total suspended solids also have the effect of preventing aquatic vegetation and filter feeders, such as clams, from growing in the Anacostia. Once the sediment is reduced significantly, these biological players can re-colonize the tidal portion and will have significant benefit to fish and the water quality of the Anacostia.

### ***Strategies Outside of District Boundaries – Voluntary:***

Through the Anacostia Watershed Comprehensive Plan being developed by the Corps of Engineers and the AWRP partner jurisdictions, both PG County and Montgomery County will identify stream restoration projects that are feasible and important. The District can encourage that Maryland and the Federal Government properly fund these restoration projects to help alleviate the sediment load coming from upstream. Just as importantly, the District can also actively encourage stormwater retrofits upstream that deal with the quantity of stormwater runoff. This will have the effect of lessening the sediment loads coming into the city.

In order to have true watershed restoration, targeted subwatersheds must be retrofitted and restored comprehensively across political boundaries. The three primary jurisdictions, through the AWRP, must work collaboratively to focus on specific subwatersheds in order to make measurable progress. One opportunity for cross boundary

### **Policy Changes can lead to big improvements in the Anacostia River water quality – Part III**

***Mandate minimum level of tree canopy cover in new developments:*** Local jurisdictions frequently require a minimum level of canopy coverage after major land disturbances such as mining operations. Governmental entities frequently hold a bond for five years which is refunded when the mining corporation shows that it has reestablished a minimum level of coverage at a project. An urban analogue is the situation of new development in a city where tree canopy coverage is frequently sacrificed when the old building is removed and the lot footprint cleared and graded. In order to provide proper incentives to leave room in the new building footprint for large canopy trees, DC can hold a bond that will be refunded when a reasonable percent of canopy is established. Developers will use state of the art tree planting techniques to get rapid and healthy growth of trees and a rapid return of their bond. Currently, there is no incentive for property owners to plant and maintain high quality trees on their properties.

coordination is the Watts Branch stream restoration project where Prince George's County might place resources into this stream that DC is working hard to restore.

***Strategies Outside of District Boundaries – Regulatory:***

Maryland recently accepted TMDL load allocations that, when reached, will allow the District to meet its total suspended solids TMDL. The city will need to encourage Maryland to expeditiously create its TMDL implementation plan, and aggressively follow it. Although the District contributes a significant portion of the sediment to the river, Maryland's contribution is 92 percent of the overall total. The District must work with Maryland to ensure that it succeeds in reaching the benchmarks established in the TMDL.



**Sediment laden Anacostia stormwater in Riverdale, MD**

The jurisdictions of Prince George and Montgomery Counties also have MS4 permits that require beneficial practices to address pollutants coming from streets and highways. Under the MS4 permit, jurisdictions must control this runoff to the Maximum Extent Practicable (MEP). Sediments and dust are components of this runoff. The District can encourage both upstream counties to focus their MS4 activities in the Anacostia watershed. Specific practices that have shown promise at reducing TSS loads are new vacuum assisted street sweepers. The City should encourage the counties to purchase these street sweepers and use them heavily in their portions of the Anacostia.

Table 7: Strategies for Anacostia Sediment Reduction Outside the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measures:
Work with MD to implement TSS TMDL implementation plan soon	Will lead to legally binding plan to reduce sediment loads from MD	Staff time, potentially legal counsel	DDOE with the support of OAG	2008	Development of TSS TMDL implementation plan
Encourage MD to actively participate in Comprehensive Anacostia Watershed Plan	Will lead to 30% designs of projects throughout watershed – potentially federal funding	No cost	USACE  DDOE, Prince George and Montgomery Counties	Plan complete by 2009	Comprehensive Anacostia Watershed Plan completed
Work to include the control of stormwater peak flows from redevelopment in upstream MS4 permits and MDE's stormwater regulations	Will reduce peak stormwater flows thereby curbing stream bank erosion	Staff time	DDOE	1-2 years and as permits are renewed	Measures adopted in Maryland regulatory documents
Encourage stormwater retrofits in Prince George and Montgomery Counties	Will reduce sediment loads through reduced stream bank failure	Cost to DC negligible, significant to counties	Prince George and Montgomery Counties, DDOE	Beginning in 2007, ongoing	Acres retrofitted in MD portion of Anacostia watershed
Encourage stream restoration in Prince George and Montgomery Counties	Will reduce sediment loads through reduced stream bank failure	Cost to DC negligible, significant to counties	Prince George and Montgomery Counties, DDOE	Beginning in 2007, ongoing	Numbers of miles of restored stream in MD portion of Anacostia watershed
Develop stronger Anacostia Watershed Tree Canopy goal	Will reduce TSS loads by retaining more rain in tree canopy	Some additional funds needed for tree planting, better tree boxes, better tree maintenance	Prince George and Montgomery Counties, DDOT/UFA	Reports have been completed, 2008	Percent of canopy increase in each jurisdiction
Coordinated cross-border watershed projects	Will treat subwatersheds holistically – better chance for measurable improvements	No additional cost above project costs – some time necessary for “bringing partners together”	Prince George and Montgomery Counties, DDOE	Appropriate projects have been identified	Number of cross-border projects implemented

### ***Strategies Inside of District Boundaries – Voluntary:***

DDOE has pursued stream restoration as a way to limit excess sediment from entering the Anacostia River and its tributaries. Three tributaries have been identified that have restoration potential. Pope Branch, Watts Branch, and Hickey Run have degraded and incised channels that contribute tremendous amounts of sediment to the Anacostia. DDOE is currently working on the first two projects with funding from EPA, Capital Budget and the MS4 program. Hickey Run has been extensively assessed and shows great restoration potential (*See Table 11*).

DDOE has also used EPA Section 319 (non-point source program) and Chesapeake Bay Program funding to design and construct LID retrofits in the Anacostia watershed. A grant program to work with private and public landowners has been established that shows promise to construct many LID retrofits. DDOE has also partnered with NPS to install a few demonstration projects. More projects can be installed with these grant dollars in the future.

Retaining stormwater for 24 hours or greater that will reach the separate sewer system will reduce the amount of sediment that is contributed by stream banks. Cities such as Portland, Oregon have instituted incentive programs that pay residents to disconnect their roof leaders and drain the rainwater into rain barrels, rain gardens or permeable yards. Portland has set up a mechanism to pay non-profits to install these simple structures for residents, should they not wish to do it themselves. These low cost quantity control structures can have a big impact if they are adopted widely.



**A volunteer planting a constructed wetland. Wetlands can act as sediment sinks.**

The City has created a similar incentive program aimed at District homeowners and is beginning to implement it, and in the coming years should create a similar program for large businesses and property owners. Attention to eliminating permitting hurdles is necessary for a program like this to flourish. If residents and businesses adopt these practices in significant number, local streams will benefit and sediment contributions to the Anacostia will be reduced.

Committing to increasing the tree canopy percentage can have a positive impact upon TSS levels in the Anacostia. Focusing on improving street tree canopy and street tree survival in particular will address the quantity of stormwater reaching the Anacostia tributaries. One way to empower ANC (Advisory Neighborhood Commissions) and neighborhood groups on this topic is to expand Tree and Slope Protection Overlays. Tree and Slope Protection Overlays have been identified also in the DC Comprehensive Plan. These overlays establish minimum tree canopy coverage and essentially limit tree cutting activities that will reduce the tree canopy coverage. This provides a local review of



projects that might have negative impacts upon the local environment as well as water quality.

### ***Strategies Inside of District Boundaries – Regulatory:***

#### ***LTCP, Long Term Control Plan***

As mentioned earlier in this document, the Long Term Control Plan (LTCP) is estimated to cost around 2 billion dollars just for controlling overflows to the Anacostia watershed. In addition to its benefits for E. coli, it will also reduce TSS loads to the Anacostia River. It is not known exactly how much of a reduction in TSS would be achieved through the implementation of the LTCP; however it is expected that these large storm events carry high amounts of sediment from the land and streets. We recommend that WASA work under its accelerated time schedule to reduce 13 combined sewer overflows by 98 percent and eliminate 4 CSO outfalls in the Anacostia watershed by separation and consolidation. This effort will decrease the number of Anacostia overflows from 82 to 2 per average year.

#### ***MS4 program***

EPA issued a National Pollutant Discharge Elimination System (NPDES) permit to the District on August 19, 2004, and the District and EPA agreed to a number of enhancements to this permit on November 27, 2007. The permit allows discharge from the District's Municipal separate storm sewer system (MS4) to the Potomac and Anacostia Rivers and tributaries in accordance with the conditions of the permit.

Approximately two-thirds of the District is served by an MS4 system. The additional third of the District is served by a Combined Sewer System (CSS). Wards 7 and 8 are in the District's MS4, with the exception of a small area that is within an independent CSS. Three District agencies (DDOT, DDOE, and DPW) and WASA are responsible for the District's compliance with the NPDES Permit. The range of the activities called for in the MS4 implementation plan includes enforcement programs, retrofit projects, maintenance actions, and outreach programs. The activities that have the capacity to address sediment loads are as follows (greater detail can be found in the MS4 implementation plan):



**A muddy Watts Branch eroding its stream banks.**

- ❖ **Low Impact Development (LID) Practices** - LIDs are structures such as porous pavement, bioretention ponds, and urban tree boxes that are an alternative, comprehensive approach to developing land and managing stormwater runoff in urban landscapes. The District has a pilot/demonstration project with several LIDs, and part of the program is to monitor water quality during storm events to provide data on the effectiveness of each of the LIDs installed on the property. The MS4 permit enhancement also requires the District to develop a master LID implementation list by August 2008, and to construct 17 LID projects by August 2009. Water quality catch basins for sediment removal will also now be required on all new road reconstruction projects.

- ❖ Stormwater Management Facility Preventative Maintenance Inspection – This program inspects stormwater management facilities to ensure the proper maintenance of these facilities.
- ❖ Erosion Control Program for New Construction – This program includes the inspection of new construction activities on private, federal and District property to verify compliance with specification and regulations. This program ensures that developers are aware of the District’s stormwater issues and have a plan to manage sediment and storm. The MS4 permit revision also requires the District to promulgate updated regulations for soil erosion and sediment control by June 30, 2008 that will require LID as a first option and incorporate the proposed Anacostia Waterfront Corporation Standards where feasible.
- ❖ Construction Site Operators’ Program – This program distributes videos to construction managers in the District providing guidance for the proper maintenance of water quality structures, such as sand filters (and others), a common BMP used on construction sites in the District. The revised MS4 permit also requires DDOE to promulgate by June 30, 2008 new regulations requiring construction site managers to receive erosion control training.
- ❖ Street Sweeping and Litter Receptacle Program – The Department of Public Works actively sweeps and vacuums District streets to reduce the amounts of trash solids, fallen leaves, and dirt particles that collect on the streets. This program also removes trash from public litter receptacles, which allows District citizens to properly dispose of their trash. Both activities remove tons of litter from District streets annually. As described earlier, enhancements to the District’s street sweeping program, as well as illegal dumping prevention efforts, are addressed in detail in the MS4 permit enhancement.

Table 8: Strategies for Anacostia Sediment Reduction in the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measures:
Increased street sweeping through MS4 program	Reduced sediments reaching the Anacostia River	\$200,000 annually	Lead: DPW DDOE, DDOT	Implement: Immediately  Ongoing	Numbers of blocks of swept streets/year
Develop TSS implementation plan	Legally defensible action plan for sediment reduction	Not currently known	DDOE	2-3 years	Number of projects implemented/yr
Lot scale SW detention/retention through LID/rain barrels, downspout disconnection	Reduced stormwater peaks and much less stream bank failure	\$200,000 annual incentive program	Lead: DDOE  OP, WASA	As soon as permitting issues are streamlined	Number of homes disconnected
Incorporation of LID into 25% of all DDOT projects	Reduced stormwater peaks and much less stream bank failure	Construction costs included in DDOT transportation budget \$35,000 – 100,000 annually in maintenance	Lead: DDOT  DDOE	Incorporate immediately, developed over course of normal road reconstruction	Percentage of streets with SW LID retrofits
Expand stream restoration efforts to Hickey Run	Reduction of 1,041 tons sediment per year (tons/yr) from HR	\$900,000	DDOE, USDA Nation Arboretum, Mayor's office	Apply pressure to Arboretum to allow work on property  Work with USDA to ensure their reduction of sediment loads	USDA buy in achieved
Implement Watts Branch Stream restoration	Reduction of 1251 tons/yr from Watts	\$4,000,000	DDOE	Work initiated in late 07, early 08	Project completion
Implement Pope Branch Stream restoration	Reduction of approximately 800 tons sediment/yr	1,000,000	DDOE, DPR, WASA	Designs finished in early 08, construction complete by end of 08	Project completion
Develop stronger Anacostia Watershed Tree Canopy goal	Will reduce TSS loads by retaining more rain in tree canopy	Some additional funds needed for tree planting, better tree boxes, better tree maintenance	Montgomery County, Prince George's County, DDOT/UFA	Reports have been completed, 2008	Percent of canopy increase in each jurisdiction
Coordinated cross-border watershed projects	Will treat subwatersheds holistically – better chance for measurable improvements	No additional cost above project costs – some time necessary for “bringing partners together”	Montgomery County, Prince George's County, DDOE	Appropriate projects have been identified	Number of cross-border projects implemented

### ***Challenges:***

Since the District Department of the Environment does not own the land adjacent to many of these tributaries, it is necessary to gain the permission of the landowner to take any restoration action or to implement stormwater retrofits. The DDOE has had success working with the Department of Parks and Recreation and must better work with other District agencies to increase the use of LID restoration efforts on their properties. It is difficult to estimate the damage to land and infrastructure that stormwater has done within the District. Additionally, fully one third of the land area of the District is controlled by the Federal government. The District has put forth good faith efforts to reduce stormwater pollution by providing funding and technical expertise, but because it does not control Federal lands, it is often difficult to implement pollution reducing efforts there. The District and Federal entities need to work together to develop a common vision for the reduction of stormwater pollution on Federal lands so that together we can restore the Anacostia.

Other impediments to successful implementation of stream restoration projects are persistent trash that will threaten to diminish any new work accomplished (see trash section), lack of an agency responsible for occasional trash removal from stream and rivers, broken stormwater outfalls that create stream bank failures, and general maintenance of District streams.

The actions that can be increased to better address sediment through the MS4 program are increasing the Department of Public Work's (DPW) street sweeping in Wards 7 and 8 and requiring LID installation on 25% of all of the Department of Transportation's (DDOT) road resurfacing projects. Although demonstration projects have been installed by DDOT, DDOE and WASA, implementation on the scale to make a real reduction in sediment loads to the Anacostia will require a Mayoral mandated target. With a target in place, LID installation will become "mainstreamed" into standard street construction. DDOT has recently developed new standards that include specifications for these LID and functional landscaping strategies.

There still remain maintenance and interagency coordination impediments to installing LID on public right of way property. Due to the multi-agency responsibility of the infrastructure along roadways, review of these projects can be held up at any stage by reviewers at DDOT, DPW, WASA or DDOE. A streamlined review process will be required for timely design and implementation of these new types of non-structural BMPs. Also, technical issues related to connection of these structures to catch basins prevent economical installation and pose a major barrier. Agency heads need to look at the problem and come up with solutions to the permitting problems and technical issues surrounding LID. These solutions should be clearly communicated to review staff that may have permitting authority at some point in the review.

## **Goal: Create a River that Supports Fish and Wildlife**

***Vision: Create a river that supports fish and wildlife through an increase in dissolved oxygen levels.***

### **Pollutant addressed: Low Dissolved Oxygen**

#### ***Accomplishments to date:***

Low dissolved oxygen has been a problem in the Anacostia for many years due to a history of combined sewer overflows and leaky or broken sanitary sewer infrastructure in both Maryland and DC. No significant improvement has been made in the Dissolved Oxygen (DO) levels in the tidal Anacostia, however some actions have been taken that have been positive. DC WASA has taken some steps to patch leaking sewer lines. Given the old age and poor state of the sanitary sewer pipes in both DC and Maryland, more comprehensive sewer inspection and lining is necessary on all pipes to ensure that pipes will not periodically fail.

Low dissolved oxygen impacts fish by stressing fish populations, which leads to increased fish diseases and, in severe cases, massive fish kills. In the description section of this report, the minimum standards of mg/l were described. Attaining this level of DO throughout the year will prevent major fish kills but will not allow for any improvement in the fishery. American shad and Striped bass will respond favorably to higher DO levels in the Anacostia. In the Anacostia, low DO is caused by high levels of organic material contributed as human sewage. Sewage leaks and combined sewer overflows are the two primary sources of sewage in the Anacostia.

#### ***Strategies Outside of District Boundaries – Voluntary:***

Low dissolved oxygen levels and high amounts of pathogens in the Anacostia share many of the same sources – untreated fecal matter from the District’s Combined Sewer System, leaking sewer infrastructure, illicit connections, nutrients in uncontrolled stormwater, and pet and resident waste. The greatest source for low dissolved oxygen levels from District lands to the Anacostia is high nutrient loads from the combined sewer system of the District; however the upstream counties and Maryland do share some responsibility in the reduction of nutrients. In order to address the low dissolved oxygen levels, the District must work with its upstream jurisdictions through voluntary partnerships such as the AWRP. These actions have been addressed in an earlier section on pathogens (see the section on creating a boatable Anacostia River).

#### ***Strategies Outside of District Boundaries – Regulatory:***

There are two regulatory levers that the District can use to reduce nutrient loads from the Maryland portion of the Anacostia watershed thereby reducing BOD. The first is working with the WSSC to ensure that it completes the actions outlined under a consent decree to reduce sewage (with high its high nutrient loads) to the Anacostia. These

include actions to reduce the amount of untreated sewage flowing from broken pipes, illicit connections, and aged infrastructure.

Second, Maryland has listed portions of the Anacostia as impaired for E. coli and pathogens. The state has also developed TMDLs for these pathogens which have been accepted by the EPA. Because the actions that reduce E. coli and pathogen loads also address many of the sources of high BOD, the District must work cooperatively to ensure Maryland works to meet its pathogen TMDLs.

Table 9: Strategies for Increasing Anacostia Dissolved Oxygen Levels Outside the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measures:
Watch over WSSC to make sure that sewer line repair and lining is completed in timely manner	Once all leaks are fixed, contributions from MD will be greatly reduced	Significant costs to WSSC	DDOE with the support of OAG  WSSC	Immediate	Bi-annual review of WSSC's progress
Ensure that MD's TMDLs for E. coli are met and implementation plans moving forward (also impacts nutrient loads)	Improved DO in tidal Anacostia	Costs to counties, MD	DDOE with the support of OAG  MDE	Immediate	Bi-annual review of MD's E. coli TMDL
Reduction of resident Goose populations in MD and DC	Improved DO, reduced E. coli,	\$10,000/year	MNCPP, NPS, DDOE	Immediate	Development of resident Goose management plan, attaining "tolerable" population
Develop intra-jurisdictional strategy to educate pet owners on picking up pet waste	Improved DO, reduced E. coli,	\$10,000/year	DDOE, Montgomery County, Prince George's County	Strategy developed in 1 yr, ongoing	

***Strategies Inside of District Boundaries – Voluntary***

Reducing the amount of stormwater that reaches the combined sewers during rain events greater than ½ inch will reduce the frequency of CSO overflows. Programs such as the one in Portland, Oregon (see description on page 41) serve as a model for what we can do in DC to increase dissolved oxygen.

The City has created such a program for District homeowners and is beginning to implement it. In the coming years D.C. should create a similar program for large businesses and property owners. Attention to eliminating permitting hurdles is necessary should a program like this flourish. If residents and businesses *adopt* these practices in significant number, the number of CSO events can be reduced prior to the implementation of the LTCP.

Implementing LID retrofits in the combined sewer area of the city will help improve the low DO levels found in the tidal Anacostia. As described in other sections of this report, LID retrofits retain stormwater for 24-48 hours. If implemented widely, stormwater

retention will reduce the numbers of combined sewer overflows, and thus improve DO levels in the tidal river.

### ***Strategies Inside of District Boundaries – Regulatory***

The implementation of the Long Term Control Plan will provide the greatest improvement to low DO levels in the tidal portion of the Anacostia. Rapid implementation of this plan is necessary for any substantial improvement of the fisheries in the Anacostia. In addition to its benefits for E. coli, it will also benefit wildlife and fisheries by reducing the number of days when dissolved oxygen falls below 5mg/l from 93 to 66 days per year.

Sewer leaks have been a persistent problem in many streams in the District. Aging infrastructure needs to be lined or replaced in Watts Branch, Pope Branch and Hickey Run. DDOE is working with WASA on joint stream and sewer line replacement projects in Pope Branch and Watts Branch. WASA should expedite these projects since they will prevent any future leaks in these tributaries.

In addition to the LTCP, the District must also carry out the actions required from its MS4 permit. The E. coli TMDL requires 91 percent load reductions from streams and storm sewers. Much of these reductions will occur through actions carried out through the revised MS4 permit, such as:

- Illicit discharge detection and disconnections;
- Low impact development implementation and retrofits;
- Stormwater management facility inspection and maintenance;
- Street sweeping and trash receptacle cleanout; and
- Public education and outreach efforts to manage pet waste such as the “Scoop your Poop” campaign.

Table 10: Strategies for Increasing Anacostia Dissolved Oxygen Levels in the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measures:
Rapid implementation of LTCP	Reducing CSO events from 82 to 2 will improve DO	\$2 billion	WASA, OAG	2001-2016	Meeting LTCP benchmarks
Rapid implementation of MS4 actions that control BOD	Improved MS4	MS4 funding currently exists	DDOE, DDOT, WASA, DPW	2007-2017	Progress towards meeting MS4 permit
Reduction of resident Goose populations in MD and DC	Reduced E. coli, improved DO	\$10,000/year	MNCPP, NPS, DDOE	Immediate	Development of resident Goose management plan, attaining "tolerable" population
Develop intra-jurisdictional strategy to educate pet owners on picking up pet waste	Reduced E. coli, improved DO	\$10,000/year	DDOE, Montgomery County, Prince George's County	Strategy developed in 1 yr, ongoing	
Reduce regulatory barriers to implementing small scale "disconnects"	Reduced number of CSO events if implemented widely	No cost	DDOE, DCRA, EPA	Immediately	Special permitting exemptions for preferred small scale "disconnection" projects

### ***Challenges***

The LTCP is a two billion dollar project that is not yet fully funded. A collective effort should be made to seek Federal assistance to accelerate this enormous undertaking. Furthermore, WASA is studying changing its sewer rate structure to one based on impervious and pervious surfaces at the lot level. This change should be pushed along with additional incentives for property owners to adopt technologies that encourage stormwater infiltration.

Smaller scale actions that increase infiltration of stormwater such as the Portland Oregon programs described previously have been attempted by DDOE. Significant regulatory hurdles exist that effectively prevent widespread adoption of these practices. Significant fees, timely reviews by the Department of Consumer and Regulatory Affairs (DCRA) and DDOE, and the requirement of costly engineering plans for rain gardens over 50 square feet in size, all prevent significant adoption of these practices and participation in any grant funded programs. The DDOE must work with DCRA to streamline this process and eliminate these perceived and actual barriers.



## Goal: Create a River that Supports Fish and Wildlife

*Vision: Create an Anacostia that supports fish and wildlife by increasing wetland, riparian, forest, and meadow habitat and reconnecting the river to its floodplain.*

### Problem addressed: Inadequate Habitat

#### *Accomplishments to date:*

Prior to the establishment of Washington, D.C. as the Capital of the United States, the Anacostia River was an extremely productive estuary. It is estimated that there were thousands of acres of wetlands that supported numerous fish and a healthy population of waterfowl. In the 1920s and 30s, the Anacostia was channelized and the surrounding wetlands filled by the US Army Corps of Engineers as a result of calls to make productive use of wetlands that were seen as a source of mosquitoes. Although these actions have unalterably changed the character of the Anacostia estuary, there are opportunities to bring back important wildlife and fish habitat and establish the Anacostia as the wildlife corridor of the District.



A good catch brings smiles even on the rainiest of days.

Much work has already been accomplished towards this goal.

In the early 1990s, roughly only 50 acres of tidal wetland existed in the Anacostia watershed. These wetlands were small areas that formed on depositional areas. The seawall that stretches from Poplar Point to Bladensburg prohibited flooding of bottomland forest adjacent to the river. In 1994 the Corps of Engineers and the National Park Service partnered to create the 35 acre Kenilworth Marsh in the lake that lies north of the Kenilworth landfill. In 2000, the District and US Army Corps of Engineers created the Kingman Lake wetlands. This 40 acre project utilized funding from EPA, PG County and the Corps to create tidal freshwater wetlands, a kind of wetlands highly productive and important to wildlife. Two additional projects have been created since, the River Fringe and Heritage wetland projects, 17 and 6 acre project respectively, in a joint partnership with the US Army Corps of Engineers and DDOE. Thus over a 13 year period, 50 acres of wetlands was transformed into 148 acres of habitat within the District boundaries. Other projects in Maryland that are in development or have been recently completed will bring the total up to over 175 acres of tidal wetlands in the watershed. This number, while only a fraction of pre-development acreage, brings with it the possibility of the re-establishment of lost bird species (to the District) such as Sora Rails, King Rails, and Virginia Rails and vibrant fisheries of catfish, American shad, and striped bass.

It is also important to realize that by reducing TSS and raising DO levels in the river through the suite of management actions laid out previously in this report, fish and wildlife will greatly benefit. If no additional habitat were to be created, the fish and wildlife would still benefit from improvements in water quality. However, habitat restoration can be continued in the Anacostia and should be continued in close coordination with other water quality focused actions.

### ***Strategies Inside of District Boundaries – Voluntary***



A Sora rail

The potential is high for the Anacostia to serve as a wildlife corridor and fishery in the District. Although much of the land in the watershed has been converted to neighborhoods and recreational areas, the parcels of land that are serving as park lands are primarily located adjacent to the river. The creation of Anacostia Park, the National Arboretum, and Kenilworth Park during the development of Washington, has established a corridor of green space that attracts wildlife. It is important to retain this land as parkland in some form, so that these corridors continue to buffer the river. In certain areas such as

Kenilworth Park, there are opportunities to inexpensively modify the landscape in ways that would create needed habitat.

There are many opportunities to create additional wetland and to remove fish barriers in Anacostia tributaries. Watts Branch has two major fish barriers that could be removed if specific land acquisitions were made. Pope Branch and Fort Dupont tributaries are currently piped in their lower sections but could be “daylighted” if funding for these projects were found and the National Park Service was agreeable to the projects. Additional wetlands could be created in Kingman Lake and in “fringe” sites along the main stem of the river. Portions of Kenilworth Park could be transformed into meadow that would attract priority bird species such as the Yellow-Breasted Chat, the Field Sparrow, the Bobwhite, and the Eastern Meadowlark. Table 11 is a list of potential restoration projects and their anticipated costs. The likely partners and the lead agency would depend upon how the project is to be funded, contracting ability and other project management issues.



A constructed wetland along the Anacostia River.

Table 11: Voluntary-based Habitat Improvement, Creation, and Enhancement Actions in the District of Columbia

Habitat projects:	Benefit:	Estimated cost:	District Lead & Partners:	Timeline:	Performance measures:	Notes:
Fringe wetland sites at outfall of Ft. Dupont, across from National Arboretum, Poplar Point	-25+ additional acres of wetland -Habitat connectivity between existing wetlands -Water quality benefits	\$3-4 million (if done with Corps, less if not)	DDOE US Army Corps NPS EPA	2-10 years (depending upon funding)	Project completion	Requires coordination with NPS & Corps funding
Additional wetlands in Kingman Lake	-15+ additional acres of wetland -Habitat connectivity between existing wetlands -Water Quality benefits	\$2- 2.5 million (if done with Corps, less if not)	DDOE US Army Corps NPS EPA	2-10 years (depending upon funding)	Project completion	Requires coordination with NPS & Corps funding
Stream daylighting of Pope Branch tributary	-1700 linear feet -4 acres of wetland - WQ benefits - sediment trapped from upstream - catfish/bullhead habitat - shrub habitat for birds	\$3-5 million	DDOE US Army Corps NOAA EPA	3-10 years (depending upon funding)	Project completion	Requires coordination with NPS & Corps funding
Stream restoration of Watts Branch (planned construction 2007/08)	-1.9 linear miles of natural channel stream restoration - WQ benefits - Expanded stream buffer - Improved park experience for public	\$3.5-4 million	DDOE US Fish and Wildlife Service (USFWS) Natural Resource Conservation Service (NRCS)	2008-2009	Project completion	In progress
Pope Branch Stream restoration and sewer line repair (in design)	1.1 linear miles of natural channel stream restoration and sewer line repair	\$2 million (1/2 from WASA)	DDOE WASA DPR	2008-2009	Project completion	In progress

Table 11: continued

Habitat projects:	Benefit:	Estimated cost:	District Lead & Partners:	Timeline:	Performance measures:	Notes:
Hickey Run tributaries natural channel restoration	-1250 feet of natural channel restoration - Water quality benefits (reduce major sediment loss) - aesthetic benefits	\$340,000	USDA National Arboretum DDOE USFWS	Dependent upon National Arboretum	Project completion	Requires agreement by National Arboretum
Hickey Run main stem natural channel restoration	-3900 ft. of natural channel restoration - aesthetic benefits -water quality benefits	\$975,000	USDA National Arboretum DDOE USFWS	Dependent upon National Arboretum	Project completion	Requires agreement by National Arboretum
Convert 50% of Kenilworth park into functioning meadow	-15 acres of meadow habitat - create missing habitat type in DC - expand functional buffer in this area - attraction of priority bird species	\$15,000	NPS DDOE	Immediate	Project completion	Dependent upon use of Kenilworth park area
Removal of portions of the Anacostia seawall above the Pepco Plant	-50-200 acres of functioning floodplain that would capture sediment and provide habitat - major sediment reductions through natural process - improved habitat connection between forest and river - greatly expanded forested wetland (limited habitat type in DC)	\$1,000 – 10,000	NPS DDOE US Army Corps	Analysis of flooding issues necessary	Project completion	Requires NPS coordination and flooding study

## ***Strategies Inside of District Boundaries – Regulatory***



**Kudzu growing in Pope Branch Park  
in Southeast D.C.**

### **Forest buffers and wetland setbacks:**

The District just passed a wetland and forest buffer law that protects portions of the Anacostia, but it does not cover the entire City. Buffers have been shown to be extremely effective filters of pollutants and protect aquatic resources, whether through shading stream and rivers or providing necessary upland habitat associated with wetlands. Most US states have mandatory wetland and stream buffers that ensure that development does not impair water resources. Adoption of a mandatory 50 foot wetland and forest buffer policy would have major benefits to the District waterways and wetlands.

### **Improved standards for Tree Planting in District:**

The District has been known as the city of trees for some time. However, loss of tree canopy has occurred over the past 50 years and with it, associated stormwater benefits, air quality benefits, and aesthetic benefits have also been lost. Government and non-governmental entities are working on expanding the current 35% canopy coverage, however, structural changes in how trees are built and tree boxes are constructed are needed if we are to increase urban tree canopy. Much of the District's canopy comes from large National Park Service parks. The state of the District's urban trees is not as secure. Insufficiently sized tree boxes, improper planting, and poor maintenance frequently lead to an early death of many planted trees which postpones the time until a thriving and full canopy can cover the city's streets. The District government can support these current tree planting efforts by mandating much larger tree boxes and stepping up maintenance and enforcement actions as they pertain to street trees.

### **Policy Changes can lead to big improvements in the Anacostia River water quality – Part IV**

#### ***Revise permitting to encourage homeowner stormwater Best Management Practices (BMPs):***

As mentioned in portions of this report, there are significant permitting impediments to homeowners that may wish to install lot-level stormwater BMPs on their property. Such innocuous practices such as rain barrels require formal permitting carried out by a certified plumber, the paying of fees that exceed the cost of a rain barrel, and significant investment of time in order to gain the permit. With proper review, certain lot scale stormwater BMPs such as rain gardens, rain barrels, and “Bayscaping” should be exempt from permitting requirements that are more appropriate for larger scale stormwater practices. This will allow the government to provide incentives for the adoption of these practices or at least to just allow citizens to retrofits their properties in ways that will benefit their local water bodies.

### **Prohibitions on the sale of invasive plant species:**

Many states have enacted or are in the process of enacting bans on the sale of highly invasive plant species. Certain vines such as English Ivy have escaped from yards and

have colonized most city and federal parks in the District and are the target of many volunteer removal events. Removal of these plants is extremely time consuming and laborious. However these plants can still be purchased in District nurseries and can re-colonize areas where invasives have been removed. A prudent regulation would be to ban the sale of several “bad actors” that are frequently available at local nurseries. These would be English Ivy, Invasive Bamboo, Purple Loosestrife, and other to be determined through an examination of plant nurseries in Maryland and the District.

Table 12: Regulatory-based Habitat Improvement, Creation, and Enhancement Actions in the District of Columbia

Strategy	Benefits	Estimated Cost	District Lead and agency partners	Timeline	Performance Measures
Mandatory 50 ft wetland and forest buffer	-Stormwater treatment -Wetland protection - Cooler streams	None	DDOE with the support of OAG, DCOP	Legislation to city council in 1 year	New legislation passed
Improved tree planting standards – (Larger tree boxes, expanded maintenance)	-Improved survival rate of street trees -Longer lived trees - Improved SW treatment -Aesthetic benefits of mature urban tree canopy	None	Mayor’s office DDOT, Casey Trees, DDOE	New standards adopted by DDOT within 1 year	New standards adopted for better tree survival and canopy coverage
Prohibition of sale of invasive plants	-Cost effective way of preventing larger problems with invasives -Opportunity for education	None	Mayor’s office DDOE	Problem species identified in 6 months. Legislation passed in 18 months	New legislation passed

**Challenges:**

*Needs:* Reduction of resident Canada goose numbers, long-term invasive species control

Creating habitat in an urban setting poses unique challenges that require action from multiple agencies. Wetland creation in the District has been significantly impacted by resident Canada goose herbivory. One current control practice is installing extensive goose fencing around the restored area. Unfortunately, as soon as this fencing is removed, the geese will return and destroy the wetland. Continuing to maintain fence is neither an ecologically



Resident geese have impacted created wetlands, and exacerbated nutrient and E. coli issues.

beneficial nor cost-free action. Fish and wildlife cannot access wetlands behind fences and hiring contractors to fix failed fencing is a never-ending commitment. Therefore, creating new wetlands is not wise without action by the National Park Service (NPS) to reduce these unnaturally high numbers of non-native birds. A consortium of invested agency staff (the goose group) has been urging NPS to address the issue. As of the writing of this report, NPS has held agency scoping meetings for the first stages of the NEPA process. Political pressure will need to be brought to the issue in order to convince NPS to act on a politically difficult action. However, without action, all recent wetland restoration projects will continue to be impacted and not achieve a level of sustainable success. New projects will not be initiated or funded since achieving success is unlikely.

Invasive species is another common problem in urban areas. When creating new habitat, undesirable species that have a competitive advantage over native species frequently gain a foothold. Species such as *Phragmites australis* (Common Reed) and *Lythrum salicaria* (Purple Loosestrife) are significant problems in the Kingman Lake and Kenilworth wetland restoration projects. They also may become problems in more recent River Fringe and Heritage wetland projects. In order to successfully manage these species, the District needs to form a group that has the skills, licenses, and authority from NPS to treat these problem plants.

Table 13: Primary Impediments Preventing Habitat Improvement Projects

Issue	Lead agency	Supporting agency	Needs
Resident Canada goose reduction	NPS	DDOE/FWD	Political support Minor funding for removal
Invasive species removal	DDOE	NPS	Budget for trained staff NPS buy-in

**Goal: Create a River that is Swimmable**

***Vision: Create an Anacostia River where it is safe to swim by reducing fecal coliform levels.***

**Pollutant Addressed: Escherichia coli**

**Strategies and challenges:**

Bacteria and pathogens, such as E. coli keep the Anacostia River from being safe to swim in. These are the same pollutants that keep the river from being boatable. Because the pollutants are the same, the same actions necessary to make the river safe for secondary contact activities such as boating will also aid in making the river swimmable. Although the same actions are needed to achieve both a boatable and a swimmable river, the level of work needed to reach a swimmable river is much greater because the standard is more stringent. Primary contact requires reductions in E. coli levels to approximately 126 colonies per 100 mL.

Because it is difficult to know exactly what activities will reduce the level of E. coli to a point where the river is boatable, we have included all E. coli reduction activities in that section of this report. Rather than recreate the tables of the actions necessary to reduce E. coli levels that are presented there, we refer the reader to review Table 5 (page 28) and Table 6 (page 31) to understand what activities must take place to make the Anacostia River swimmable.

### **Goal: Create a River that Supports Fish that are Safe to Eat**

*Vision: An Anacostia River where it is safe to eat the fish that live there by reducing levels of toxic metals and organic chemicals*

### **Pollutants Addressed: Toxic Metals and Organic Chemicals**

#### **Accomplishments to date:**

For almost as long as Washington, D.C. has been the capitol of our country, the Anacostia River has been the site of activities with the potential to release toxic materials. Since the early 1800's the Washington Navy Yard was the site of ship building and ship repair and in the mid-1800's its focus shifted to munitions production and other industry. This site is just one of more than half a dozen specific sites where industrial practices may have introduced toxic materials to the Anacostia. In addition to the suspected point sources for toxic pollutants, there are undoubtedly additional unknown sources, both point and non-point.



A bottle of chlordane collected at a hazardous waste collection day.

In the 1980's several studies 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, but the sources of the contaminants could not be definitively determined (Source: AWRC). As a result of these studies and others, the Anacostia was designated a "region of concern" by the Environmental Protection Agency – one of three in the mid-Atlantic region. 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 game fish (such as largemouth bass and sunfish) be consumed by an adult per week. This advisory remains in effect.



Catfish with lesions collected from the Anacostia River.

In 1999, the Anacostia Watershed Toxics Alliance (AWTA) was formed. The Alliance, a voluntary group of businesses, non-profits and government agencies has worked since that time to identify and analyze possible remedies for addressing the toxic pollutants, seek out the necessary resources to cleanup the river, and



implement the selected remedies. Their initial work included surveying sediment contamination at 15 sites throughout the watershed and developing a scope of work including developing and calibrating a sediment transport model, and identifying the location and extent of contaminant sources.

The extent of the Anacostia's toxics problem was further documented in 2002 when the Fish and Wildlife service published a survey of Anacostia brown bullhead catfish that found that sixty percent of the fish had liver tumors. These high cancer rates have been linked to toxic sediments. Currently an experiment is underway testing a "sediment cap" – a series of sediment layers consisting of six inch layer of sand over a six inch layer of phosphate-based minerals that bind with heavy metals to stop or slow the spread of contaminants. A 100x80 foot cap was placed over contaminated sediments in 2004 and is still being studied to determine its effectiveness.

## **Strategies and challenges:**

### ***Strategies Outside of District Boundaries – Voluntary:***

Working with upstream governments and other organizations to locate the sources of upstream toxics and to develop and implement plans for their reduction is crucial because without reducing the flow of toxic sediments into the District, areas where contaminants are removed or capped could become recontaminated. Therefore to comprehensively address toxics, the City must simultaneously work on its contaminated sites while also working to address upstream sources. For the upstream pollutants the District should take a two-pronged approach:

- 1) aid in efforts to determine the sources of upstream contaminants, and
- 2) provide input as Maryland develops its TMDLs and TMDL implementation plans for toxic and PCBs.

To determine where the toxic pollutants outside of the District originate, the City should work with AWTAs to fund research aimed at localizing pollutant sources.

Although this work will take place outside of the District of Columbia, it will have direct benefit to District waters and therefore the city should be prepared to help fund this research.

### ***Strategies Outside of District Boundaries – Regulatory:***

Maryland has listed its Anacostia waters as impaired for PCBs and for toxics and now must develop both TMDLs and TMDL implementation plans for these pollutants. Once Maryland has developed its toxics TMDLs, the District shall seek to ensure that the state implements the TMDLs.



**Kids fishing on the Anacostia. One day they will be able to safely eat what they catch.**

A second and faster way for the District to work with Maryland to address its toxic loads is by making sure that the state implements its sediment TMDL. Most of the toxic pollutants in the Anacostia River are inexorably tied to sediment pollution because they are hydrophobic and bind to sediment. Therefore, action to reduce sediment loads coming from Maryland will also reduce toxic pollutant loads coming to the District. The City should encourage Maryland to implement its sediment TMDL in a timely fashion, and expeditiously develop its toxics TMDLs.

Table 14: Strategies for Anacostia Toxic Pollutant Reduction Outside of the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:
Work with Maryland MDE and EPA to identify sources of upstream toxic pollutants.	Knowledge of the location of toxic pollutant sources for management and potential enforcement.	\$2-3 million	Leads: DDOE	Completed in 6-10 years	Database of locations and extent of toxic pollution sources upstream created
Ensure that Maryland develops TMDLs for its toxic pollutants	A voice in what should be the legal limits of toxic pollutants entering the District from Maryland	Cost difficult to estimate	Lead: DDOE, Office of Attorney General	Completed in 2-4 years	Toxic TMDLs for Maryland that are acceptable to the District of Columbia created
Negotiate an enforceable toxic pollutant implementation plans for Maryland. If needed apply pressure on Maryland to implement TMDLs.	Ensures Maryland develops toxics TMDL implementation plans and executes them.	Cost difficult to estimate	Lead: DDOE, Attorney General	Completed in 4-10 years	TMDL implementation plans for Maryland, created, Maryland implements toxics TMDL.
Negotiate an enforceable sediment implementation plan for Maryland. If needed apply pressure on Maryland to implement TMDL.	Ensures that Maryland implements its sediment TMDL	Cost difficult to estimate	Lead: DDOE, Attorney General	Completed in 4-6 years	Maryland implements sediment TMDL

***Strategies Inside of District Boundaries – Voluntary:***

Unfortunately, research has indicated that even by reducing 100 percent of the upstream loads of toxics, the District will continue to have persistent toxics present at levels at which it is unsafe to consume fish. From this research it is obvious that the District cannot rely solely on upstream actions to address toxic pollutants, however without reducing the flow of toxic sediments into the Anacostia, areas where contaminants are removed or capped could become recontaminated. Because of the complexities and costs associated with cleanup of toxins in the Anacostia, planning is very important to avoid expensive and hazardous missteps.



A crane placing materials as a part of a sediment capping experiment.

**Policy Changes can lead to big improvements in the Anacostia River water quality – Part V**

***Ensure proper funding for department that will maintain all new Best Management Practices (BMPs):*** New stormwater BMPs such as baysavers and low impact development require specialized maintenance. Although WASA and DPW currently own equipment that allows them to maintain standard catch basins, new equipment and new employees skilled in horticulture are required to effectively maintain these newer LID structures. Establishing clear responsibility for maintenance of these new types of BMPs is necessary for proper functioning of these technologies.

The District should begin its planning work by evaluating cleanup methods to determine their effectiveness. This should be done in cooperation with AWTA and the EPA. Out of this effort the city should craft a plan for which methods should be used in targeted locations. Not all cleanup methods are appropriate for all locations. For example, dredging in areas with a fast current may not be appropriate because it may spread polluted sediments or capping may not be appropriate in all locations because adding more sediment may make the river too shallow for navigation.

Not all sites are impacted by ongoing upstream pollution. Another step the

District should take is to identify these sites and force the responsible polluter to cleanup the location or if no responsible party can be identified, the District should step in to act. Finally, the District should prioritize the remaining hotspots so that once upstream loads are reduced, cleanup can begin on these sites.

***Strategies Inside of District Boundaries – Regulatory:***

From the regulatory side, the primary steps that the District must take to reduce its loads of toxics flowing into the Anacostia are (1) to fully implement the Long Term Control Plan for the combined sewer system, and, (2) to carry out the actions required from its MS4 permit. The Long Term Control Plan will reduce the volume CSO overflows by 97 percent, more than the 90 percent reductions required for the CSO area by the District's toxic TMDL. The toxics TMDL also requires 90 percent load reductions from streams and storm sewers. Some of these reductions will occur through actions carried out through the MS4 permit, such as:

- ✓ Street sweeping;

- ✓ Catch basin cleanout;
- ✓ Stormwater management facility inspection and maintenance;
- ✓ Erosion and sediment control inspection; and
- ✓ Low impact development installations.

Beyond these, additional actions will be required to reduce stormwater loads by 90 percent. Other regulatory efforts, covered in more detail in other sections of this report, should include:

- Revising building and zoning regulations to maximize policies for the treatment of runoff on all new construction and renovation; and
- Revising stormwater fees to encourage retrofits of exiting properties to reduce stormwater.

Furthermore, the city should work to ensure that known responsible parties cleanup their contaminated sites or pay to have sites remediated. The District should also establish a clear policy to ensure cleanup of public lands because the two known pollution sites in the Anacostia are federal facilities and several of the other suspected pollution source sites are Federal and District lands.

Table 15: Strategies for Anacostia Toxic Pollutant Reduction in the District of Columbia

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:	Notes:
Finalize cleanup methods to determine proper ones for different locations	Knowledge of most effective methods for shallow and deepwater cleanups	Cost difficult to estimate	Lead: EPA, DDOE	Complete in 3-5 years	A plan for the cleanup methods to be used to restore the different toxic hotspots created	
Finalize toxics hotspots unaffected by upstream loads	Ability to cleanup some sites before upstream loads are reduced	Cost difficult to estimate	Lead: EPA, DDOE	Complete in 1 year	Sites unaffected by upstream loads identified and targeted for early cleanup	
Identify responsible parties for cleanup of hotspots	City will be able to force identified polluters to take remediation action	Cost difficult to estimate	Lead: DDOE, EPA, Office of Attorney General	Complete: 2-3 years	Parties responsible for cleanup are identified	
Where no responsible party can be identified cleanup sites that are unaffected by upstream loads	Toxic hotspots cleaned	Cost difficult to estimate	Lead: DDOE, EPA, Office of Attorney General	Begin: 5-6 years Complete: 7-8 years	Hotspots cleaned	
Prioritize cleanup of hotspots	Ability to work on remaining hotspots in a logical order	Cost difficult to estimate	Lead: DDOE, EPA, Office of Attorney General	Complete: 3-5 years	Plan created for addressing remaining hotspots	

Table 15: continued

Strategy:	Benefit:	Estimated cost:	District Lead Agency(s) and Partners:	Timeline:	Performance Measurements:	Notes:
Fully implement Long Term Control Plan	Reduction of loads from CSO areas of District	\$2 billion	Lead: WASA	Work underway.  Completion 10-12 years	Plan implemented, E. coli loads from CSO areas	Cost includes cost for other District watersheds.
Implement MS4 Permit Requirements	Reduction of loads from MS4 areas of District	\$14 million annually	Lead: DDOE, WASA, DDOT, DPW	Continuous for long term.	Permit implemented, fecal loads	
Cleanup remaining hotspots once upstream loads are reduced	Toxic hotspots cleaned	Millions of dollars	Lead: DDOE, EPA, Office of Attorney General	Work done: 15-25 years	Final legacy sediment sites cleaned	
Seek federal funds to pay for toxics cleanup	Federal hotspots cleaned	Net gain of funds	Lead: DDOE, Office of Legislative Affairs	Work done: 5-10 years	Federal sites cleaned	
Revise building and zoning codes to maximize treatment of runoff	Stormwater loads of E. coli reduced.	No cost.	Lead: DCRA, Office of Planning, DDOE	Implement: 1-2 years	New codes and regulations in place.	
Revise stormwater fees to encourage infiltration practices on all properties	Stormwater loads of E. coli reduced.	Net gain through fees.	Lead: DDOE, WASA, Office of Planning	Implement: 2-3 years	New stormwater fee structure in place.	

**Challenges**

Unfortunately although the location and extent of toxic hotspots are well documented in the tidal Anacostia, the sources of pollutants upstream remain elusive. Part of the reason for the difficulty in determining the sources of these toxins is the cost of sampling. Testing of just one sample for one pollutant can cost more than \$500, not including the cost of collecting the sample and many samples must be taken over time from multiple locations. Therefore one of the greatest challenges to reducing toxics in the Anacostia is the first step of identifying their upstream sources.

A second challenge to addressing toxics in the Anacostia is reducing upstream toxic loads. The Anacostia River is like a conveyor belt delivering toxic laden sediment from upstream which settles out predominantly between the 11<sup>th</sup> Street Bridge and the South Capitol Street Bridge. The District must work concurrently to address upstream pollutants as it cleans up downstream toxic hotspots because without addressing pollutants from arriving from upstream new contaminants will continue to settle out and, over time, recontaminate areas that had been cleaned.

## ***IMPLEMENTATION AND TRACKING***

Any plan is only useful if it is implemented. Furthermore, in order to make this a living document, we must track its implementation and periodically review and update the tasks accomplished and outstanding, add new items as they arise, and provide new assignments to agencies while reassessing to whom old tasks were assigned.

In order to assure this plan's implementation, the action items mentioned in the document will be rolled into the DDOE's Anacostia CapStat. The CapStat is a tool created by the District government to track the performance of District agencies to the city's most pressing challenges. It is a way for the public and the executive and legislative branches of the District government to hold its bureaucracy accountable.

Furthermore, the Department of Environment has committed to set up an Environmental Management System (EMS). As the DDOE develops its EMS, the tasks working towards the restoration of the Anacostia will be folded into this system.

An EMS is a set of processes and practices that will enable the DDOE to increase our efficiency at ameliorating environmental degradation in the District. Environmental Management Systems vary, but they generally have a model of:

- Planning - Planning, including identifying environmental aspects and establishing goals;
- Doing - Implementing, including training and operational controls;
- Checking - Checking, including monitoring and corrective action; and
- Acting - Reviewing, including progress reviews and acting to make needed changes to the EMS

Although most of the action items in the plan will be lead by District agencies, some items require work outside of the City's boundaries. For items that fall into this category that are enforcement issues such as Maryland TMDLs and MS4 permits, the DDOE will work with the EPA and the Maryland Department of the Environment. For items that are legal issues, such as seeking reparations for toxics contamination, the DDOE will work with the District's Office of the Attorney General.

It is the intention of the DDOE to make this plan a living document – one that changes as new information comes to light. As this is a living document, your comments and ideas are welcome as is your help in restoring the Anacostia. We look forward to working with all interested parties in restoring the imperiled yet important resource.

## **LIST OF ACRONYMS**

AWC	Anacostia Waterfront Corporation
AWS	Anacostia Watershed Society
AWRC	Anacostia Watershed Restoration Committee
AWRP	Anacostia Watershed Restoration Partnership
AWTA	Anacostia Watershed Toxics Alliance
BOD	Biological Oxygen Demand
CBP	Chesapeake Bay Program
CBF	Chesapeake Bay Foundation
CSO	Combined Sewer Overflows
CSS	Combined Sewer System
DCMDP	District of Columbia Metropolitan Police Department
DCOP	District of Columbia Office of Planning
DCPS	District of Columbia Public Schools
DCRA	Department of Consumer and Regulatory Affairs
DDOE	District Department of the Environment
DDOT	District Department of Transportation
DDT	Dichlorodiphenyltrichloroethanes
DO	Dissolved Oxygen
DOH	Department of Health
DPR	Department of Parks and Recreation
DPW	Department of Public Works
EE-CARS	Environmental Education for the Compliance of Auto Repair Shops
EPA	Environmental Protection Agency
L	Liter
LID	Low Impact Development
LTCP	Long Term Control Plan
MG	Milligram
ML	Milliliter
MNCPPC	Maryland National Capital Parks and Planning Commission
MPN	Most Probable Number
MWCOG	Metropolitan Washington Council of Governments
MS4	Municipal Separate Storm Sewer System
NPS	Non-point Source
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conservation Service
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
PEL	Probable Effects Level
PG	Prince George's County
RFK	Robert F. Kennedy Stadium
TEL	Threshold Effects Level
TSS	Total Suspended Solids
TMDL	Total Maximum Daily Load
UG	Microgram
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFWS	United States Fish and Wildlife Service
USNPS	United States National Park Service
WASA	Washington Area Sewer Authority
WSSC	Washington Suburban Sanitary Commission

## **GLOSSARY OF TERMS**

**Best Management Practice (BMP)** - A method that has been determined to be an effective and practical means of preventing or reducing pollution from non-point sources.

**Biological Oxygen Demand (BOD)** - The amount of oxygen consumed by bacteria and protozoa as they digest the organic materials in a sample of water. BOD is an important measure because it determines the amount of oxygen available to fish and other aquatic life. Water bodies with high BOD have low levels of oxygen available to aquatic life.

**Combined Sewer Overflow (CSO)** - An event where the discharge of untreated human sewage and stormwater into local waterways occurs when the capacity of a combined sewer system is exceeded by local runoff.

**Combined Sewer System (CSS)** - A wastewater collection and treatment system where wastewater is combined with storm runoff. Although such a system does provide treatment of stormwater, in practice, the systems may not be able to handle major storm flows. As a result, untreated discharges from combined sewer overflows may occur.

**Dissolved Oxygen (DO)** - The amount of oxygen dissolved in water. Adequate concentrations of dissolved oxygen are necessary for the life of fish and other aquatic organisms.

**Long Term Control Plan (LTCP)** - A plan developed by the District of Columbia Water and Sewer Authority in which a schedule is outlined to undertake activities to reduce and eliminate combined sewer overflow discharges to the area waterways.

**Low Impact Development (LID)** - An approach to treating stormwater by using small, attractive, and cost-effective landscape design techniques that store, filter, evaporate, and infiltrate runoff close to its source.

**Most Probable Number (MPN)** - A statistically determined number which represents the number of bacteria (often E. coli) most likely present in a sample, based on test data.

**Municipal Separate Storm Sewer System (MS4)** - A city's system of conveyances designed to convey stormwater from impermeable areas to bodies of water.

**Non-point Source Pollution (NPS)** - Pollution generated by diffuse land use activities rather than from an identifiable or discrete facility. It is conveyed to waterways through natural processes, such as rainfall, storm runoff, or groundwater seepage rather than by deliberate discharge.

**Probable Effects Level (PEL)** - the level of toxic pollutants above which adverse effects to organisms are predicted to occur frequently.

**Threshold Effects Level (TEL)** - the level of toxic pollutants below which adverse effects to organisms are expected to occur rarely.

**Total Maximum Daily Load (TMDL)** - The maximum amount of a pollutant that can be discharged into a water body from all sources (point and non-point) and still maintain water quality standards. Under Clean Water Act section 303(d), TMDLs must be developed for all water bodies that do not meet water quality standards after application of technology-based controls.



## APPENDIX 1: ANACOSTIA CAPSTAT TASKLIST

Task to Clean Anacostia River	Goals Aided by Task	Responsible Party(ies)	Funds needed to Achieve Task	Funded through current monies?	Task Start Date	Task End Date	Notes
Develop Inter-jurisdictional educational and marketing campaign for trash reduction	Visually Presentable River	Lead: DPW, Clean City Coordinator Partners: Montgomery and P.G. Counties, AWRP	\$1,000,000	Yes	1/1/2008	1/1/2009	DPW is currently working on a campaign. Can reach a larger audience by pooling funds with other jurisdictions.
Implement Inter-jurisdictional educational and marketing campaign for trash reduction	Visually Presentable River	Lead: DPW, Clean City Coordinator Partners: Montgomery and P.G. Counties, AWRP	\$150,000 annually	Yes	3/1/2009	Continuous for long term.	DPW is currently working on a campaign. Can reach a larger audience by pooling funds with other jurisdictions.
Develop a campaign to seek support from businesses and non-profit organizations for Anacostia trash reduction	Visually Presentable River	Lead: DDOE Partners: Montgomery and P.G. Counties, AWRP	\$100,000 at start, but net gain of funds	Yes	1/1/2009	1/1/2010	Effort to create a new & improved type of Anacostia River Business Coalition
Seek support from businesses and non-profits for trash reduction	Visually Presentable River	Lead: DDOE Partners: Montgomery and P.G. Counties, AWRP	Net gain of funds.	Yes	1/1/2010	Continuous for long term.	Effort to create a new & improved type of Anacostia River Business Coalition

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
Investigating the cost effectiveness of different trash reduction technologies	Visually Presentable River	Lead: DDOE Partners: MDE	\$225,000	Yes	1/1/2007	1/1/2010	One study currently underway. Second RFP about to be sent out.
Investigate feasibility of regional deposit bill on recyclable containers	Visually Presentable River	Lead: Office of Legislative Affairs Partners: Montgomery and P.G. Counties, AWRP	\$100,000	Yes	3/1/2008	3/1/2009	
Institute a deposit bill on recyclable containers	Visually Presentable River	Lead: Office of Legislative Affairs Partners: Montgomery and P.G. Counties, AWRP	Revenue neutral.	Yes	9/1/2009	Continuous for long term.	Should be funded by charging additional fee for containers.
Ban the sale of Styrofoam containers in the District	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DDOE, Office of Legislative Affairs	Revenue neutral.	Yes	1/1/2009	1/1/2010	
Develop an enforceable trash reduction strategy with Maryland and ensure that Maryland to implements the trash TMDL	Visually Presentable River	DDOE	Uncertain	Yes	1/1/2007	Continuous for long term.	

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
Increased demonstration and monitoring of trash reduction technology	Visually Presentable River	Lead: WASA, DDOE, DDOT, DPW Partners: Federal agencies	\$200,000 annually	No	1/1/2007	1/1/2017	
Strengthen District litter laws	Visually Presentable River	Lead: Office of Legislative Affairs, DPW, DDOE	Revenue neutral.	Yes	6/1/2008	7/1/2009	
Increased enforcement of litter laws	Visually Presentable River	Lead: DPW, DCMPD	Net gain of funds.	Yes	7/1/2009	Continuous for long term.	Training of police force and other enforcement officials needed.
Better enforcement of trash around retail and fast food parking lots	Visually Presentable River	Lead: DPW, DCMPD	Net gain of funds.	Yes	7/1/2009	Continuous for long term.	Training of police force and other enforcement officials needed.
Strengthen anti-dumping laws	Visually Presentable River	Lead: Office of Legislative Affairs, DPW, DDOE	Revenue neutral.	Yes	6/1/2008	7/1/2009	
Better enforcement of anti-dumping laws	Visually Presentable River	Lead: DPW, DCMPD	Net gain of funds.	Yes	7/1/2009	Continuous for long term.	Training of police force and other enforcement officials needed.
Purchase materials needed for increased surveillance of dumping hot spots	Visually Presentable River	Lead: DDOE Partners: DPW, Clean City Coordinator	\$100,000	Yes	1/1/2008	1/1/2010	In MS4 Budget
Work with DPW to install surveillance cameras to assist in illegal dumping enforcement	Visually Presentable River	DDOE / DPW	Revenue neutral.	Yes	12/1/2007	8/19/2009	MS4 permit item. Funded through MS4 monies.

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
Increased surveillance of dumping hot spots	Visually Presentable River	Lead: DPW, DCMPD	\$100,000	No	1/1/2010	Continuous for long term.	Should be tested and then instituted long term if found to be effective.
Examine the District's current system of investigating illegal dumping and review best practices from other jurisdictions to reduce/eliminate the illegal dumping problem in DC	Visually Presentable River	DDOE, DPW, Office of Legislative Affairs	Revenue neutral	Yes	6/1/2007	6/1/2009	CapStat Item. Ongoing
Explore ban on plastic bags at convenience and grocery stores	Visually Presentable River	Lead: Office of Legislative Affairs, DPW, DDOE	Revenue neutral.	Yes	6/1/2008	7/1/2009	
Install 1,000 storm drain markers annually	Visually Presentable River	DDOE	\$8,000	Yes	12/1/2007	4/30/2008	ongoing
Develop small grants program for non-profits and community for volunteer cleanup efforts	Visually Presentable River	Lead: DDOE	Revenue neutral.	Yes	1/1/2008	1/1/2009	
Institute small grants program for non-profits and community for volunteer cleanup efforts	Visually Presentable River	Lead: DDOE	\$50,000	No	1/1/2009	Continuous for long term.	
Develop program to use people sentenced to community service as cleanup crews	Visually Presentable River	Lead: Department of Corrections, DPW, Clean City Coordinator	\$50,000	No	6/1/2008	6/1/2009	Model on existing programs in other jurisdictions

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
Use people sentenced to community service as cleanup crews	Visually Presentable River	Lead: Department of Corrections, DPW, Clean City Coordinator	\$50,000 annually	No	6/1/2009	Continuous for long term.	Model on existing programs in other jurisdictions
Demonstrate solar trash compactors on public trash cans	Visually Presentable River	Lead: DPW	\$300,000	No	6/1/2008	6/1/2010	
Continue installation of solar trash compactors on public trash cans if successful	Visually Presentable River	Lead: DPW	\$100,000 annually	No	6/1/2010	Continuous for long term.	
Survey litter in the District to determine sources and recommend methods of control	Visually Presentable River	Lead: DDOE Partners: DPW, Clean City Coordinator	\$125,000	Yes	1/1/2007	1/1/2009	Work currently funded and underway
Develop Trash TMDL implementation plan	Visually Presentable River	Lead: DDOE Others: WASA, DPW	\$100,000	Yes	1/1/2007	1/1/2009	Work currently funded and underway
Develop Trash TMDL	Visually Presentable River	Lead: DDOE	\$100,000	Yes	1/1/2009	1/1/2011	
Complete a Trash Survey and Trash Reduction Plan	Visually Presentable River	DDOE		Yes	12/1/2007	9/30/2009	MS4 permit item. Funded through MS4 monies.
Identify suitable location for demonstration project of one end-of-pipe litter trap	Visually Presentable River	DDOE	Revenue neutral.	Yes	12/1/2007	8/19/2009	MS4 permit item. Funded through MS4 monies.
Install litter trap demonstration project; if effective describe efforts to perform additional installations	Visually Presentable River	DDOE	\$100,000	Yes	12/1/2007	8/19/2010	MS4 permit item. Funded through MS4 monies.

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
in 2010 Implementation Plan							
Retrofit 50 catch basins for trash control	Visually Presentable River	WASA	\$50,000	Yes	12/1/2007	2/19/2009	MS4 permit item. Funded through MS4 monies.
Install a mechanical trash rack system on Kenilworth Avenue to remove trash from storm water.	Visually Presentable River	DDOT			1/1/2008	1/1/2011	
Purchase machinery and hire manpower for more street sweeping	Visually Presentable River	Lead: DPW	\$1,000,000	Yes	1/1/2008	1/1/2010	In MS4 Budget
Increased Street sweeping	Visually Presentable River	Lead: DPW	\$100,000 annually	Yes	6/1/2008	Continuous for long term.	In MS4 Budget
Develop and implement an enhanced street sweeping and fine particle removal schedule and program. Submit details on the implementation of such a program in the Upgraded Stormwater Management Plan	Visually Presentable River	DPW / DDOE		Yes	12/1/2007	2/19/2009	MS4 permit item. Funded through MS4 monies.
Develop a Pollution Prevention Program for District government workers at maintenance facilities	Visually Presentable River	DDOE	Revenue neutral.	Yes	12/1/2007	9/30/2008	MS4 permit item. Funded through MS4 monies.
Purchase machinery and hire manpower for more catch basin cleanouts	Visually Presentable River	Lead: WASA	\$1,000,000	Yes	1/1/2008	1/1/2010	In MS4 Budget

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
Increased catch basin clean outs	Visually Presentable River	Lead: WASA	\$100,000 annually	Yes	6/1/2008	Continuous for long term.	In MS4 Budget
Continue auto repair shop education and enforcement campaign	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DDOE	\$150,000 annually	Yes	1/1/2008	Continuous for long term.	Currently underway.
Step up inspection of underground and above ground storage tanks	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DDOE	\$100,000 annually	Yes	1/1/2009	Continuous for long term.	
Step up inspection of storm water treatment facilities at service stations	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DDOE	\$100,000 annually	Yes	1/1/2009	Continuous for long term.	
Develop an education and outreach campaign aimed at do-it-yourself mechanics	Visually Presentable River, Fishable River, River that Supports	Lead: DDOE, DPW, Clean City Coordinator	\$100,000	No	6/1/2008	6/1/2009	

Task to Clean Anacostia River	Goals Aided by Task	Responsible Party(ies)	Funds needed to Achieve Task	Funded through current monies?	Task Start Date	Task End Date	Notes
	Wildlife						
Institute an education and outreach campaign aimed at do-it-yourself mechanics	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DDOE, DPW, Clean City Coordinator	\$100,000 annually	No	6/1/2009		Continuous for long term.
Develop network of free drop off locations for transportation related fluids	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DPW	\$100,000 initially, \$50,000 after	Yes	1/1/2008		Continuous for long term. Currently underway.
Require spill prevention plans for all DC facilities storing transportation related fluids	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DDOE, Office of Legislative Affairs	Revenue neutral.	Yes	6/1/2008	6/1/2009	
Increase review of spill prevention plans	Visually Presentable River, Fishable River, River	Lead: DDOE	\$100,000 annually	no	6/1/2009		Continuous for long term.



Task to Clean Anacostia River	Goals Aided by Task	Responsible Party(ies)	Funds needed to Achieve Task	Funded through current monies?	Task Start Date	Task End Date	Notes
	that Supports Wildlife						
Increase fines for improper disposal of transportation related fluids	Visually Presentable River, Fishable River, River that Supports Wildlife	Lead: DDOE, Office of Legislative Affairs	Net gain of funds.	Yes	6/1/2008	6/1/2009	
Develop an inter-jurisdictional educational and marketing campaign for pet waste	Boatable and Swimmable River, River that Supports Wildlife	Lead: DPW, Clean City Coordinator Partners: Montgomery and P.G. Counties, AWRP	\$200,000	Yes	9/1/2008	3/1/2009	DDOE currently has a pet waste campaign. Can reach a larger audience by pooling funds with other jurisdictions.
Institute an inter-jurisdictional educational and marketing campaign for pet waste	Boatable and Swimmable River, River that Supports Wildlife	Lead: DPW, Clean City Coordinator Partners: Montgomery and P.G. Counties, AWRP	\$100,000 annually	Yes	3/1/2009	Continuous for long term.	DDOE currently has a pet waste campaign. Can reach a larger audience by pooling funds with other jurisdictions.
Develop a cross-jurisdictional residential goose abatement program	Boatable and Swimmable River, River that Supports Wildlife	DDOE Partners: USNPS, MNCPPC, Montgomery and P.G. Counties, AWRP	\$100,000	No	1/1/2009	1/1/2011	NPS is currently going through an EIS process on this issue.

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Institute a cross-jurisdictional residential goose abatement program	Boatable and Swimmable River, River that Supports Wildlife	DDOE Partners: USNPS, MNCPPC, Montgomery and P.G. Counties, AWRP	\$100,000 annually	No	1/1/2011	Continuous for long term.	NPS is currently going through an EIS process on this issue.
Follow WSSC's efforts to implement its consent decree, work to ensure the decree is carried out.	Boatable and Swimmable River, River that Supports Wildlife	DDOE	Revenue neutral.	Yes	6/1/2008	12/7/2020	WSSC is under a consent decree for 14 years.
Develop an enforceable E. coli implementation plan with Maryland. Ensure that Maryland implements its TMDL.	Boatable and Swimmable River, River that Supports Wildlife	DDOE	Revenue neutral.	Yes	1/1/2008	Continuous for long term.	
Detect and repair or remove leaking sewer pipes and illicit connections	Boatable and Swimmable River, River that Supports Wildlife	DDOE, WASA	\$2,000,000 annually	Yes	1/1/2008	Continuous for long term.	This effort is ongoing.
Develop a network of dog parks in the city with appropriate measures to dispose of pet waste	Boatable and Swimmable River, River that Supports Wildlife	DPR	\$1,200,000	No	1/1/2007	1/1/2011	This effort is ongoing
Install pet waste stations throughout the city	Boatable and Swimmable River, River that Supports Wildlife	DPW, DPR	\$300,000	No	6/1/2009	6/1/2011	

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Maintain pet waste stations throughout the city	Boatable and Swimmable River, River that Supports Wildlife	DPW, DPR	\$15,000 annually	No	6/1/2009	Continuous for long term.	
Install "scoop your poop" pet waste signs in targeted areas with large number of dog owners	Boatable and Swimmable River, River that Supports Wildlife	DPW, DPR	\$100,000	No	6/1/2009	6/1/2011	
Increased enforcement of pet waste laws	Boatable and Swimmable River, River that Supports Wildlife	Lead: DPW, DCMPD	Net gain of funds.	Yes	7/1/2009	Continuous for long term.	Training of police force and other enforcement officials needed.
Provide an implementation plan and strategy to reduce pet waste from entering storm drains in the Upgraded Stormwater Management Plan	Boatable and Swimmable River, River that Supports Wildlife	DDOE	Revenue neutral.	Yes	12/1/2007	2/19/2009	MS4 permit item. Funded through MS4 monies.
Mandate installation and use of marine pump out stations at all District marinas	Boatable and Swimmable River, River that Supports Wildlife	Lead: DDOE, Office of Legislative Affairs	Revenue neutral.	Yes	1/1/2009	1/1/2010	
Create a "No discharge zone" for the Anacostia River	Boatable and Swimmable River, River that Supports Wildlife	Lead: DDOE, Office of Legislative Affairs	Revenue neutral.	Yes	6/1/2007	6/1/2009	This effort is ongoing.

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Fringe wetland sites at outfall of Ft. Dupont, across from National Arboretum, Poplar Point	River that Supports Fish and Wildlife, Fishable River	DDOE, Army Corps, NPS	\$3,000,000-\$4,000,000	No	1/1/2009	1/1/2016	Cannot be undertaken until goose abatement program is underway.
Additional wetlands in Kingman Lake	River that Supports Fish and Wildlife, Fishable River	DDOE, Army Corps, NPS	\$2,000,000-\$2,500,000	No	1/1/2009	1/1/2016	Cannot be undertaken until goose abatement program is underway.
Stream daylighting of Pope Branch tributary	River that Supports Fish and Wildlife, Fishable River	DDOE	\$3,000,000-\$5,000,000	No	6/1/2009	6/1/2016	Potentially paid through CSX funds?
Begin work on the Watts Branch restoration project (i.e. installing storm drain markers)	River that Supports Fish and Wildlife, Fishable River	DDOE	Revenue neutral.	Yes	12/1/2007	4/30/2008	MS4 permit item. Funded through MS4 monies.
Stream restoration of Watts Branch	River that Supports Fish and Wildlife, Fishable River	DDOE, WASA	\$4,000,000	Yes	1/1/2006	6/1/2010	This effort is ongoing.

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Pope Branch Stream restoration and sewer line repair	River that Supports Fish and Wildlife, Fishable River	DDOE, WASA	\$2,000,000	Yes	1/1/2007	6/1/2011	This effort is ongoing.
Hickey Run tributaries natural channel restoration	River that Supports Fish and Wildlife, Fishable River	USDA National Arboretum, DDOE, USFWS	\$340,000	No	6/1/2010	6/1/2013	
Hickey Run main stem natural channel restoration	River that Supports Fish and Wildlife, Fishable River	USDA National Arboretum, DDOE, USFWS	\$1,000,000	No	6/1/2010	6/1/2013	
Convert 50% of Kenilworth park into functioning meadow	River that Supports Fish and Wildlife, Fishable River	DDOE, NPS	\$15,000	No	6/1/2009	6/1/2012	
Removal of portions of the Anacostia seawall above the Pepco Plant	River that Supports Fish and Wildlife, Fishable River	DDOE, Army Corps, NPS	\$10,000- \$100,000	No	6/1/2010	6/1/2013	Analysis of flooding issues needed.

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Mandatory 50 ft wetland and forest buffer	River that Supports Fish and Wildlife, Fishable River	DCOP, DDOE, Office of Legislative Affairs	Revenue neutral.	Yes	1/1/2008	1/1/2009	25' buffer proposed. Inadequate
Improved tree planting standards (Larger tree boxes, expanded maintenance)	River that Supports Fish and Wildlife, Fishable River	DDOE, DDOT, DPW, DCOP, Casey Trees	\$300,000 annually	No	6/1/2008	Continuous for long term.	Needed as part of MS4 plan and UTC Goal, UFA has already had some expansion of capabilities
Funding of large-scale tree planting projects	River that Supports Fish and Wildlife, Fishable River	DDOE, DDOT, DPR, NPS, Military, Casey Trees	\$100,000 annually	No	6/1/2009	Continuous for long term.	Support UTC Goal
Develop and implement a schedule to achieve an optimal tree canopy goal	River that Supports Fish and Wildlife, Fishable River	DDOE	Revenue neutral.	Yes	1/1/2008	8/19/2008	MS4 permit item. Funded through MS4 monies.
Include Tree Canopy Goal in 2009 Implementation Plan	River that Supports Fish and Wildlife, Fishable River	DDOE	Revenue neutral.	Yes	1/1/2008	8/19/2009	MS4 permit item. Funded through MS4 monies.

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Continue to plant a minimum of 4,150 trees per year in accordance with the MS4 permit.	River that Supports Fish and Wildlife, Fishable River	DDOT UFA, DDOE		Yes	1/1/2008	Continuous for long term.	MS4 permit item. Funded through MS4 monies.
Plant and maintain at least 13,500 additional trees	River that Supports Fish and Wildlife, Fishable River	DDOT UFA, DDOE		Yes	1/1/2008	Continuous for long term.	MS4 permit item. Funded through MS4 monies.
Construct the truck wash / brine manufacturing facility.	River that Supports Fish and Wildlife, Fishable River	DDOT		Yes	1/1/2008	1/1/2011	Funded with MS4 monies.
Prohibition of sale of invasive plants	River that Supports Fish and Wildlife, Fishable River	Lead: DDOE, Office of Legislative Affairs	Revenue neutral.	Yes	1/1/2009	1/1/2010	
Stock and release native fish in the Anacostia River.	River that Supports Fish and Wildlife, Fishable River	DDOE, COG, USFWS, MD DNR	\$70,000 annually	No	1/1/2007	1/1/2015	This effort is ongoing.

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Map and systematically remove barriers to fish passage on the Anacostia River and its tributaries	River that Supports Fish and Wildlife, Fishable River	DDOE, COG, USFWS, MD DNR	\$200,000 annually	No	1/1/2010	1/1/2017	
Encourage Maryland to Implement Total Suspended Solids TMDL Implementation Plan	River that Supports Fish and Wildlife, Fishable River	DDOE	Revenue neutral.	Yes	1/1/2008	Continuous for long term.	
Encourage Maryland to Participate in Comprehensive Watershed Management Plan	River that Supports Fish and Wildlife, Fishable River	USACE, DDOE, AWRP, Prince Georges and Montgomery Counties	Revenue neutral.	Yes	1/1/2008	Continuous for long term.	
Encourage Stormwater Retrofits in Prince Georges and Montgomery County	River that Supports Fish and Wildlife, Fishable River	DDOE, AWRP, Montgomery and Prince George Counties	Revenue neutral.	Yes	1/1/2008	Continuous for long term.	Cost to District negligible, cost to counties will be significant
Encourage Stream Restoration in Prince Georges and Montgomery County	River that Supports Fish and Wildlife, Fishable River	DDOE, AWRP, Montgomery and Prince George Counties	Revenue neutral.	Yes	1/1/2008	Continuous for long term.	Cost to District negligible, cost to counties will be significant



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Develop Stronger Anacostia Watershed Tree Canopy Goal	River that Supports Fish and Wildlife, Fishable River	DDOE, AWRP, Montgomery and Prince George Counties	Revenue neutral.	Yes	1/1/2009	Continuous for long term.	
Coordinate Cross-boarder Watershed Projects	River that Supports Fish and Wildlife, Fishable River	DDOE, AWRP, Montgomery and Prince George Counties	Revenue neutral.	Yes	1/1/2008	Continuous for long term.	May involve some funding to for watershed projects that are outside of the District but whose completion will benefit District waters.
Develop Total Suspended Solids Implementation Plan	River that Supports Fish and Wildlife, Fishable River	DDOE	\$100,000	Yes	6/1/2009	6/1/2011	
Develop Lot-level Storm Water Detention/retention Through Homeowner Incentive Program	All	DDOE, WASA	\$200,000	Yes	1/1/2007	6/1/2008	This effort is ongoing.
Implement Lot-level Storm Water Detention/retention Through Homeowner Incentive Program	All	DDOE	\$200,000-\$500,000 annually	No	6/1/2008	Continuous for long term.	
Incorporate LID Into 25 Percent of all DDOT Projects	All	DDOE, DDOT	Construction costs in DDOT annual budget	Yes	6/1/2008	Continuous for long term.	This effort is ongoing. Will require some extra funds for annual maintenance.

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Reduce Regulatory Barriers to Implementing Small Scale Downspout Disconnects	All	DDOE, Office of Legislative Affairs	Revenue neutral.	Yes	1/1/2007	1/1/2009	This effort is ongoing.
Separate combined sewer in approximately 14 acres near Martin Luther King Ave. and Good Hope Road.	Anacostia with Fish that are safe to eat, Swimmable River	WASA	Cost not known.	yes	1/1/2008	1/1/2011	Information provided by WASA as part of their CIP
Install a storm water relief sewer in the Henson Ridge neighborhood to alleviate flooding in the area after periods of heavy rain.	Anacostia with Fish that are safe to eat, Swimmable River	WASA	Cost not known.	yes	1/1/2008	1/1/2011	Information provided by WASA as part of their CIP
Extend the existing storm sewer at Bangor Street and Hunter Place into the adjacent alley to collect additional surface runoff.	All	WASA	Cost not known.	yes	1/1/2008	1/1/2011	Information provided by WASA as part of their CIP
Replace a damaged section of storm sewer pipe under Pennsylvania Ave. at Texas Ave.	All	WASA	Cost not known.	yes	1/1/2008	1/1/2011	Information provided by WASA as part of their CIP
Upgrade the Anacostia Pump Station on Minnesota Ave in order to increase overall capacity.	Anacostia with Fish that are safe to eat, Swimmable River	WASA	Cost not known.	yes	1/1/2008	1/1/2011	Information provided by WASA as part of their CIP
Replace a damaged section of storm sewer pipe under	All	WASA	Cost not known.	yes	1/1/2008	1/1/2011	Information provided by WASA as part of

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Rehabilitate the Main Sewage Pump Station on the Anacostia. Fall, 2008.	Anacostia with Fish that are safe to eat, Swimmable River	WASA	Cost not known.	yes	1/1/2008	1/1/2009	Currently underway their CIP
Rehabilitate the CSS fabri-dams and complete the new Eastside Anacostia Pump Station. WASA	Anacostia with Fish that are safe to eat, Swimmable River	WASA	Cost not known.	yes	1/1/2008	1/1/2011	
Fully implement Long Term Control Plan	All	WASA, Federal Government	\$2,000,000,000	No	6/1/2001	6/1/2016	This effort is ongoing.
Work with Federal Govt. to secure funds for LTCP	All	WASA, EOM, Federal Government	Revenue neutral	Yes	6/1/2001	6/1/2016	This effort is ongoing.
Craft and implement a strategy for obtaining regional coordination and funding for the river's clean-up efforts, and obtaining federal funding for the long-term control plan.	All	EOM/OPLA	Revenue neutral	Yes	6/1/2007	6/1/2009	CapStat Item. Ongoing
Implement MS4 Permit Requirements	All	DDOE, DDOT, WASA, DPW	\$3,500,000 annually	Yes	6/1/2007	Continuous for long term.	MS4 funds expected to increase under new fee structure

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Work with Maryland MDE and EPA to identify sources of upstream toxic pollutants.	Anacostia with Fish that are safe to eat, Swimmable River	DDOE, AWRP, AWTA	\$2,000,000-\$3,000,000	No	6/1/2009	6/1/2019	
Ensure that Maryland develops TMDLs for its toxic pollutants	Anacostia with Fish that are safe to eat, Swimmable River	DDOE	Revenue neutral.	Yes	6/1/2008	6/1/2012	
Develop enforceable toxic pollutant implementation plans with Maryland. Ensure that Maryland implements these plans.	Anacostia with Fish that are safe to eat, Swimmable River	DDOE	Revenue neutral.	Yes	6/1/2012	6/1/2018	
Finalize toxics cleanup methods to determine proper ones for different locations	Anacostia with Fish that are safe to eat, Swimmable River	EPA, DDOE	Costs difficult to estimate	No	6/1/2008	6/1/2013	
Finalize toxics hotspots unaffected by upstream loads	Anacostia with Fish that are safe to eat, Swimmable River	EPA, DDOE	Costs difficult to estimate	No	6/1/2008	6/1/2009	

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Identify responsible parties for cleanup of hotspots	Anacostia with Fish that are safe to eat, Swimmable River	DDOE with the support of OAG, EPA	Costs difficult to estimate	No	6/1/2008	6/1/2011	
Review of laws to assess liability of other parties for legacy pollutants in the river	Anacostia with Fish that are safe to eat, Swimmable River	DDOE with the support of OAG	Revenue neutral	Yes	6/1/2007	6/1/2009	CapStat Item. Ongoing
Where no responsible party can be identified cleanup sites that are unaffected by upstream loads	Anacostia with Fish that are safe to eat, Swimmable River	DDOE, EPA	Costs difficult to estimate	No	6/1/2013	6/1/2017	
Prioritize cleanup of hotspots	Anacostia with Fish that are safe to eat, Swimmable River	DDOE with the support of OAG, EPA	Costs difficult to estimate	No	6/1/2008	6/1/2013	
Cleanup remaining hotspots once upstream loads are reduced (continues to 2025)	Anacostia with Fish that are safe to eat, Swimmable River	DDOE, EPA	Costs difficult to estimate	No	6/1/2017	6/1/2023	

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Seek federal funds to pay for toxics cleanup	Anacostia with Fish that are safe to eat, Swimmable River	DDOE, Office of Legislative Affairs	Net gain of funds.	Yes	6/1/2013	6/1/2017	
Promulgate new stormwater regulations	All	DDOE	Revenue neutral.	Yes	12/1/2007	6/30/2008	MS4 permit item. Funded through MS4 monies.
Promulgate new erosion control training regulations	All	DDOE	Revenue neutral.	Yes	12/1/2007	6/30/2008	MS4 permit item. Funded through MS4 monies.
Present options to the Mayor for restructuring the stormwater and public space fees to provide incentives to encourage stormwater infiltration practices	All	DDOE	Revenue neutral.	Yes	6/1/2007	12/1/2008	CapStat Item. Ongoing
Work with public working groups and environmental consultants to develop sustainability guidelines for the District's updated zoning regulations.	All	OP, DCRA, DDOE	Revenue neutral	Yes	1/1/2008	1/1/2011	Ongoing
Coordinate with OP/DCRA for overhaul of DC zoning regulations and develop incentives for stormwater BMPs to maximize treatment of stormwater	All	OP, DCRA, DDOE	Revenue neutral	Yes	6/1/2007	6/1/2009	CapStat Item. Ongoing

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Review and update, in conjunction with other agencies and commissions, the District's zoning regulations to allow and encourage green building and sustainability practices.	All	DDOE, OP, DCRA	Revenue neutral.	Yes	6/1/2007	6/1/2009	CapStat Item. Ongoing
Increased storm water retention on public lands through tree planting and LID techniques	All	Lead: DDOE, WASA, DDOT, DCPS, DCPR, DCRA, Office of Planning	\$2,000,000 annually	Yes	1/1/2008	Continuous for long term.	MS4 related effort. Funds from MS4
Increased storm water retention on homeowner property through tree planting and LID techniques	All	DDOE	\$200,000 annually	Yes	1/1/2007	Continuous for long term.	If successful may need additional funds.
Revise storm water fees to encourage infiltration practices on all properties	All	DDOE, WASA, Office of Planning	Net gain of funds.	Yes	6/1/2007	6/1/2009	
Complete a Master LID Implementation List	All	DDOT	Revenue neutral.	Yes	12/1/2007	8/19/2008	MS4 permit item. Funded through MS4 monies.
Construct 17 LID Projects	All	DDOT		Yes	12/1/2007	8/19/2009	MS4 permit item. Funded through MS4 monies.
Devise a LID Plan and Schedule	All	DDOE	Revenue neutral.	Yes	12/1/2007	12/31/2014	MS4 permit item. Funded through MS4 monies.
Install approx. 50 rain gardens and 125 rain barrels, and perform 200 downspout disconnections	All	DDOE	\$200,000	Yes	12/1/2007	12/31/2009	MS4 permit item. Funded through MS4 monies.

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Reconstruct Nannie Helen Burroughs including extensive LID elements. DDOT	All	DDOT	\$1,000,000	Yes	1/1/2008	1/1/2011	Grant funded
Perform pre and post-construction monitoring to determine the effectiveness of LID elements on Nannie Helen Burroughs.	All	DDOT	\$50,000	Yes	1/1/2008	1/1/2011	Grant funded
As a part of the Capitol Space initiative, create a set of environmental objectives that will assist in park planning and operations.	All	OP, DPR, DDOT, DDOE, NCPC, and NPS			1/1/2008	1/1/2011	Ongoing
Work with the NOMA area of the District to develop a sustainability study with the goal of reducing the net environmental impact of the future development that will serve as a model for sustainable neighborhoods throughout the District.	All	OP, DDOE			1/1/2008	1/1/2011	Ongoing
Contract with a consultant to provide LID design and maintenance training to DDOT and other agency staff.	All	DDOT		No	1/1/2008	1/1/2011	
Continue to retrofit standard catch basins with water quality catch basins as part of road reconstruction projects.	All	DDOT		Yes	1/1/2008	1/1/2011	Requirement under MS4 permit
Evaluate all projects for LID opportunities and will implement	All	DDOT	Revenue neutral	Yes	1/1/2008	1/1/2011	



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LID where feasible.							
Encourage and support private developers to implement LID in right-of-way where feasible.	All	DDOT	Revenue neutral	Yes	1/1/2008	1/1/2011	
Develop and implement a storm water management plan for DDOT facilities.	All	DDOT	Revenue neutral	Yes	1/1/2008	1/1/2011	
Develop a database to track existing LID structures in the right-of-way.	All	DDOT	Revenue neutral	Yes	1/1/2008	1/1/2011	
Complete a structural assessment of all District properties maintained by OPM to determine feasibility for green roof installations	All	OPM	Revenue neutral.	Yes	12/1/2007	4/30/2009	MS4 permit item. Funded through MS4 monies.
Submit an implementation schedule for green roof installations, based on the structural assessment, in the 2009 Implementation Plan	All	OPM / DDOE	Revenue neutral.	Yes	12/1/2007	8/19/2009	MS4 permit item. Funded through MS4 monies.
Make \$500,000 available for new and retrofit green roof installations on federal, residential, commercial, and District-controlled properties	All	DDOE	\$500,000	Yes	12/1/2007	10/1/2008	MS4 permit item. Funded through MS4 monies.
Assess effectiveness of green roof incentives and modify as needed; up to \$1,000,000 annually if effective	All	DDOE	Potentially \$500,000	Yes	12/1/2007	10/1/2009	MS4 permit item. Funded through MS4 monies.

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
Implement curbside bioretention in parking spaces where traffic calming measures have been requested by community	All	DDOE; DDOT	Revenue neutral	Yes	1/1/2008	10/1/2009	Will continue if successful.
Use new building development to demonstrate curbside bioretention in tree boxes	All	DDOE; DDOT;OPM	Revenue neutral	Yes	1/1/2008	10/1/2009	Will continue if successful.
Identify and implement green alley demonstration sites	All	DDOE; DDOT	\$500,000	No	1/1/2008	10/1/2010	Will continue if successful.
Use ongoing street improvement projects to connect road and sidewalk stormwater runoff with green spaces in roadway triangles and small parks	All	DDOE; DDOT;DPR	\$10,000-50,000	No	1/1/2008	10/1/2009	Will continue if successful.
Identify and implement demonstration sites with innovative stormwater runoff harvest/reuse systems	All	DDOE	\$400,000	Yes	1/1/2007	1/1/2012	EPA Grant
Identify and implement demonstration sites with innovative stormwater runoff treatment train systems	All	DDOE	\$400,000	No	1/1/2007	1/1/2012	EPA Grant
Commit \$1 million annually for retrofitting existing catch basins with structural BMPs	All	DDOE	\$1,000,000	Yes	12/1/2007	10/1/2009	MS4 permit item. Funded through MS4 monies.
Coordinate agencies (DDOT, DPW, WASA) involved in the MS4 permit - provide a list of specific tasks by agency and a template for each agency to devise a one-	Coordination	DDOE, DDOT, DPW, WASA	Revenue neutral.	Yes	6/1/2007	6/1/2008	CapStat Item. Ongoing

<b>Task to Clean Anacostia River</b>	<b>Goals Aided by Task</b>	<b>Responsible Party(ies)</b>	<b>Funds needed to Achieve Task</b>	<b>Funded through current monies?</b>	<b>Task Start Date</b>	<b>Task End Date</b>	<b>Notes</b>
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page implementation plan.

Provide to the EOM and OCA clean-up plans (1. Army Corps plan; 2. MS-4 permit requirements) as they are completed.	Coordination	DDOE	Revenue neutral.	Yes	6/1/2007	When plans completed	CapStat Item. Ongoing. ACE plan not yet completed.
Provide to the EOM and OCA real-time monitoring information and mechanisms for reporting to the public, focusing on components and actions which will see progress in the short term as well as long-term objectives.	Public Outreach	DDOE	\$250,000	Yes	6/1/2007	6/1/2008	CapStat Item. Complete. System needs to be tested before going live.
Create a schedule of events for the Anacostia River	Public Outreach	DDOE	Revenue neutral	Yes	6/1/2007	6/1/2008	CapStat Item. Ongoing
Organize a kick-off for the clean-up of the river that includes the participation of the residential/business community in the initial phases of the River Smart program	Public Outreach	DDOE	Revenue neutral	Yes	6/1/2007	6/1/2008	CapStat Item. Ongoing

## **APPENDIX 2: SELECTED ANACOSTIA REPORTS**

Many other reports and plans have been created for the restoration of the Anacostia River. This plan is different from them in that it focuses solely and holistically on what needs to be done to clean the District's portion of the River. Although these other publications are not focused on the District, the restoration plans that they describe will impact the Washington, D.C.'s Anacostia and therefore they will be included in this document as appendices. Potential documents to be included are:

Anacostia Watershed Toxics Alliance (AWTA) and Anacostia Watershed Restoration Committee (AWRC). 2004. *Charting a Course Toward Restoration: A Toxic Chemical Management Strategy for the Anacostia River*. 73 pages.

D.C. Dept. of Consumer & Regulatory Affairs. 1997. *An existing source assessment of pollutants to the Anacostia watershed. Environmental Report*. Prepared by A. Warner, D. Shepp, K. Corish, and J. Galli of Dept. of Environmental Programs, Metropolitan Washington Council of Governments for the District of Columbia Dept. of Consumer & Regulatory Affairs. Grant No. 93a-94-WRMD01. June 1997. Four chapters paginated by chapter, plus appendices.

Md. Dept. of Natural Resources. 2003. *Draft Anacostia Tributary Exotic Invasive Plant Surveying Methodology and Indexing System*. Prepared by J. Galli, C. Vatovec, and B. Lecouteur of the Dept. of Environmental Programs, Metropolitan Washington Council of Governments for Md. Dept. of Natural Resources. September 2003. Unpaginated.

Md. Dept. of Natural Resources. 2004. *Anacostia riparian buffer plant survivability. Sites planted between 1995-2004. Technical Memorandum*. Prepared by Dept. of Environmental Programs, Metropolitan Washington Council of Governments for Md. Dept. of Natural Resources Forest Service. August 2004. 14 pages plus appendices.

Metropolitan Washington Council of Governments, Dept. of Environmental Programs. 2004. *Blueprint for the Restoration of the Anacostia Watershed, 2nd Edition*. Prepared by Dept. of Environmental Programs, Metropolitan Washington Council of Governments for the D.C. Dept. of Consumer and Regulatory Affairs and the Anacostia Watershed Restoration Committee. November 1994. 129 pages plus appendices.

Watershed Restoration Committee. 72 pages (including appendices paginated as part of main report).

Montgomery Co. Dept. of Environmental Protection. 2003. *Countywide Stream Protection Strategy 2003 Update*. Rockville, Md. 23 pages.

Montgomery Co. Dept. of Environmental Protection. 2003. *Montgomery County's Commitment to Anacostia Watershed Restoration*. May 2003. Unpaginated.

Pinkney, A.E., J.C. Harshbarger, E.B. May and W.L. Reichert. 2002. *Tumor prevalence and biomarkers of exposure and response in brown bullheads (Ameiurus nebulosus) from the Anacostia River, Washington, D.C. and Tuckahoe River, Maryland*. U.S. Fish and Wildlife Service, Chesapeake Bay Field Office, Annapolis, MD. CBFO-C02-07.

Summit Fund of Washington. 2000. *Sligo Creek Trash Reduction Plan*. Prepared by J. Galli and P. Guillozet of Dept. of Environmental Programs, Metropolitan Washington Council of Governments for The Summit Fund of Washington. January 2000. 57 pages.

Summit Fund of Washington. 2001. *Anacostia Watershed Restoration Indicators and Targets for Period 2001-2010. Draft Final Report*. Prepared by J. Galli, E. Graham, T. Murphy, P. Trieu, P. Guillozet, and D. Shepp of Dept. of Environmental Programs, Metropolitan Washington Council of Governments for The Summit Fund of Washington. June 2001. 49 pages plus appendices.

District of Columbia Water and Sewer Authority. 2002. *WASA's Recommended Combined Sewer System Long Term Control Plan Executive Summary*. DC Water and Sewer Authority, 5000 Overlook Avenue, SW Washington, DC 20032. 21 Pages.

U.S. Army Corps of Engineers. 2004. *Civil Works Strategic Plan Fiscal Year 2004 - Fiscal Year 2009*. March 2004. Accessed July 2005 at:  
[http://www.usace.army.mil/civilworks/hot\\_topics/cw\\_strat.pdf](http://www.usace.army.mil/civilworks/hot_topics/cw_strat.pdf)

J. Galli, and P. Trieu. 2006. *Anacostia Watershed Trash Reduction Strategy*. Anacostia Restoration Partnership, Metropolitan Washington Council of Governments. Prepared for the National Oceanic and Atmospheric Administration, Marine Debris Program.

P. Trieu, J. Galli, and K. Levendosky. 2006. *Technical Memorandum, Anacostia Tributary Streambank Erosion Study, Phase II-A: Upper Beaverdam and Indian Creek Subwatersheds*. Metropolitan Washington Council of Governments. Prepared for Maryland Department of the Environment.

K. Levendosky, J. Galli, P. Trieu, C. Vatovec. 2005. *Anacostia Watershed Forest Management and Protection Strategy*. Metropolitan Washington Council of Governments. Prepared for the Anacostia Watershed Restoration Committee.

P. Trieu, J. Galli, C. Vatovec and K. Levendosky. 2004. *Fort Chaplin Subwatershed Restoration: 2003 Baseline Stream Assessment Study- Physical, Chemical and Biological Conditions*. Metropolitan Washington Council of Governments. Prepared for the District of Columbia Department of Health/ Environmental Health Administration.

P. Trieu, J. Galli, K. Levendosky and C. Vatovec. 2004. *Technical Memorandum, Anacostia Tributary Streambank Erosion Pilot Study, Phase I: Upper Beaverdam Creek Subwatershed*. Metropolitan Washington Council of Governments. Prepared for Maryland Department of the Environment.

Jan Ducnuigeen, J. Cummins, P. Trieu. 2004. *Spring 2004 Anacostia Tributary Systems River Herring Monitoring/Reconnaissance and Larval Stocking Project*. Interstate Commission on the Potomac River Basin. Prepared for Potomac Crossing Consultants.

P. Trieu, J. Galli, J. Dittman and M. Smith. 2003. *Pope Branch Subwatershed: Restoration: 2002 baseline Stream Assessment Study- Physical, Chemical and Biological Conditions*. Prepared for the District of Columbia Department of Health/ Environmental health administration.

P. Trieu, J. Ducnuigeen and J. Cummins. 2002. *Spring 2002 Anacostia Tributary Systems River Herring Monitoring/Reconnaissance and Larval Stocking Project*. Interstate Commission on the Potomac River Basin. Prepared for Potomac Crossing Consultants.

P. Trieu, P. Guillozet, J. Galli, and M. Smith. 2001. *Combined Sewer Overflow Rooftop Type Analysis and Rain Barrel Demonstration Project*. Prepared for the District of Columbia Water and Sewer Authority.

P. Guillozet, P. Trieu and J. Galli. 2001. *DC-WASA Combined Sewer Overflow Anacostia River Trash Reduction Demonstration Project: Fresh Creek Netting TrashTrap System*. Prepared for the District of Columbia Water and Sewer Authority.

P. Trieu. *Anacostia Resident and Anadromous Fish Blockage Inventory Summary: 1998-2000*. Prepared for Anacostia Watershed Restoration Committee.

J. Galli and P. Trieu. 2000. *Fort Dupont Subwatershed Restoration: 1999 Baseline Stream Assessment Study – Physical, Chemical and Biological Conditions*. Prepared for U.S. geological Survey Biological Resources Division Patuxent Wildlife Research Center.

Anacostia federal facility Impact Assessment Study USACE 1997

Flood study <http://www.epa.gov/EPA-IMPACT/1999/July/Day-16/i18177.htm>