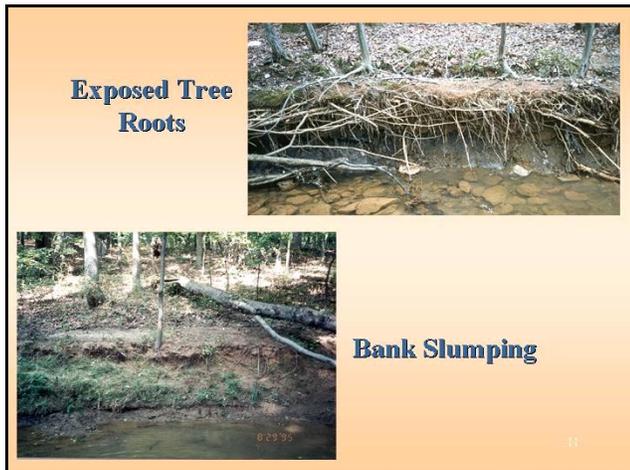




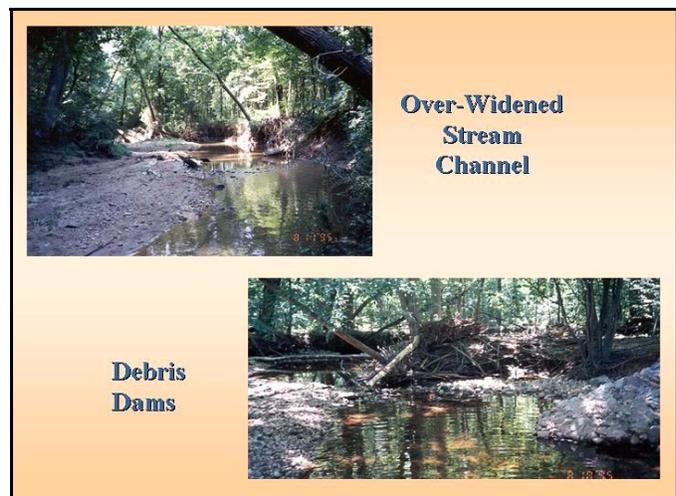
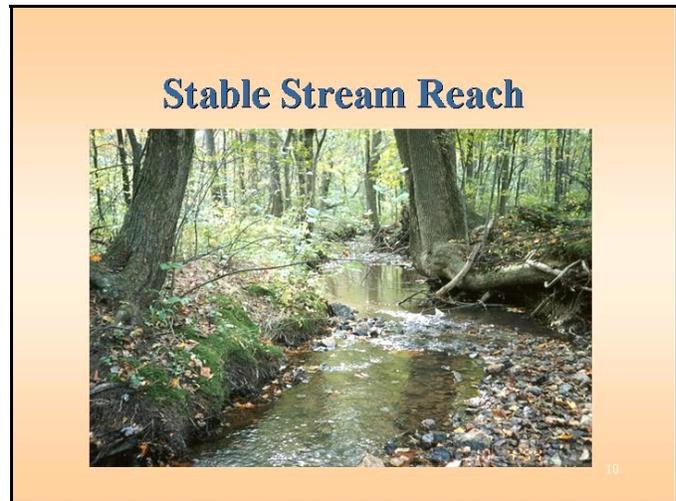
May, 2003

Montgomery County's Commitment to Anacostia Watershed Restoration

Increases in stormwater runoff associated with watershed development have had a significant impact on stream erosion, habitat loss, and sedimentation damages in the Anacostia watershed. These impacts started with the clearing of land hundreds of years ago for timber and agricultural purposes, and have continued as the nature of watershed development shifted to residential and commercial uses to accommodate population growth and regional economic development needs. In the recent past, the shift in watershed densities and increases in impervious areas to accommodate urban and suburban land uses was not accompanied by stormwater controls to mitigate the effects of increased peak runoff



flows and reduced replenishment of groundwater to support stream base flows. The result has been sometimes devastating to aquatic life. Accelerated stream channel erosion and resultant sediment damages severely degraded stream habitat formerly able to support higher levels of biological diversity.



The accompanying illustrations track the progression of stream impacts from a stable channel through the increasing impacts of channel widening and down-cutting as streams readjust to accommodate the radical changes in hydrology that can accompany major watershed development changes

Erosion from Damaged Storm Drainage Systems



Lamberton Tributary of Northwest Branch

It has been estimated that up to 75% of sediment loadings from developed urban and suburban areas are caused by accelerated stream channel erosion rather than by upland overland sources, as traditionally thought. Nutrients attached to eroded channel sediments can also contribute to nutrient loadings impacting downstream waterways.

Montgomery County employs proactive and comprehensive interagency programs which address and help mitigate effects that changes in watershed development have had on natural stream systems, including its

tributaries to the Anacostia watershed. Since 1927, a comprehensive park acquisition and subdivision review program administered by the Maryland National Capital Park and Planning Commission (MNCPPC) has purchased parkland or reserved conservation easements to add protective stream buffers for Anacostia tributaries that have undergone development change. These buffer areas help filter pollutants in runoff and provide habitat cover for fish and wildlife. In carrying out its land use master planning and development review responsibilities, the MNCPPC also applies strict environmental guidelines in development project review to protect floodplain areas, wetlands, and forest resources important to water quality protection. The MNCPPC also encourages subdivision plan designs that limit impervious area impacts in watersheds.

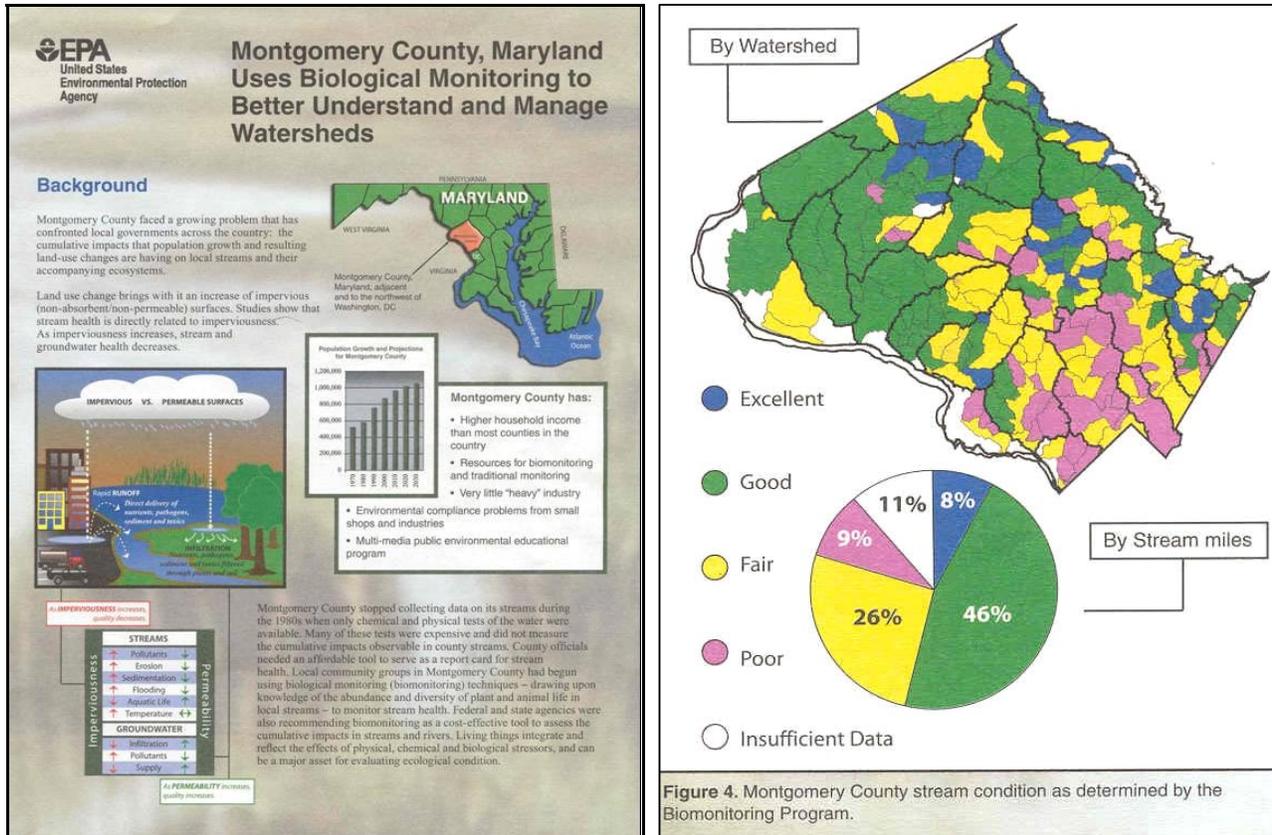
Erosion Impacts Stream Quality and Public Infrastructure



As new development occurs, the County's Department of Permitting Services (DPS) requires installation of sediment controls to limit sediment losses from storms when natural soil cover is disturbed by construction activity. As new development projects are completed, DPS requires accompanying stormwater infiltration and detention controls to help mitigate impacts of impervious area increases on stream hydrology, habitat, and resident aquatic communities. These controls capture and treat runoff to address peak flow quantity impacts on streams and to reduce pollutant loadings contained in the runoff.

Since 1988, Montgomery County's Department of Environmental Protection has also been implementing proactive measures to address runoff impacts and degraded stream conditions in Anacostia tributaries. Thus far, these efforts have focused primarily on older, established areas of the watershed, which developed before runoff controls were required and where physical damages to natural stream habitat have been the greatest. Priorities for these efforts are guided by findings on stream conditions and remedial approaches outlined in DEP's award-winning *Countywide Stream Protection Strategy (CSPS - Feb, 1998)*. The CSPS employs a program of biological, habitat, and stream chemistry monitoring to

evaluate and rank stream conditions and set priorities for remediation in Montgomery County's 1500 miles of streams. The County implements remedial capital projects and operating programs to restore damaged streams based upon priority subwatersheds identified through the CSPS. Montgomery County's comprehensive approach to stream protection through the CSPS has recently received recognition by the U. S. Environmental Protection Agency as a national model for other jurisdictions to fol-



low in evaluating watershed conditions and management needs, and in implementing related protection and restoration programs.

The table below quantifies the extent of Montgomery County's recent efforts to build stormwater retrofit projects and stream restoration projects which stabilize stream channel erosion, reduce sedimentation damages, and restore stream habitat and biological resource support in Anacostia tributaries.

Montgomery County's Anacostia Restoration Projects

Project Type	Completed or Under Construction	Under Final Design
Stormwater Retrofit	2, 318 acres (14 projects, \$4.33 million)	661 acres (7 projects, \$2.02 million)
Stream Restoration	11.0 miles (16 projects, \$4.16 million)	6.3 miles (25 projects, \$4.35 million)
Watershed Study	38 square miles, Upper Paint Branch (\$1.04 million)	10 square miles, Lower Paint Branch, (\$0.25 million)

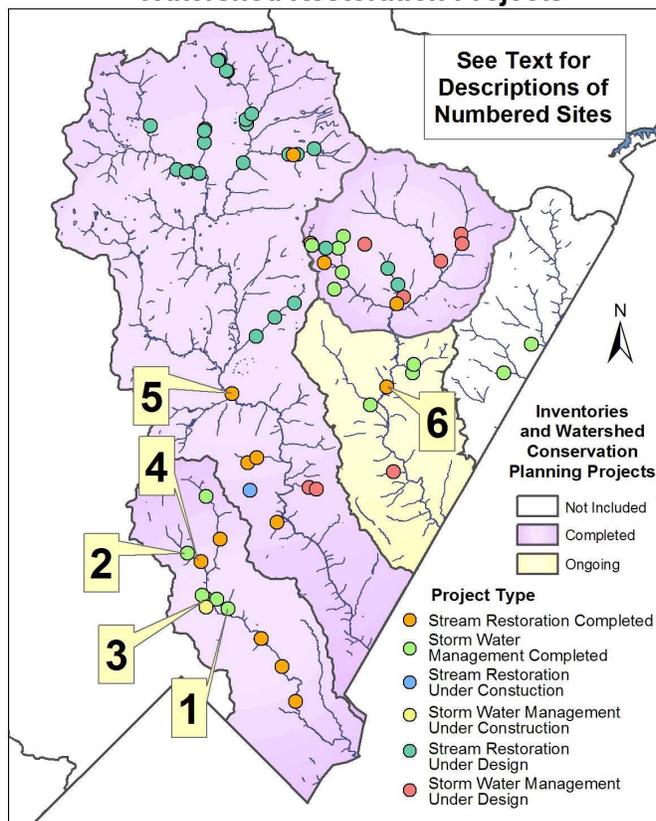
Montgomery County's Capital Improvements Program for Anacostia Watershed Restoration:

DEP funds capital improvement projects to design and construct stormwater retrofit projects to reduce peak stormwater flow and pollutant loading impacts on downstream areas from watersheds that lack adequate stormwater controls. DEP's stream restoration projects attempt to stabilize and adjust stream channel habitat features to accept changes in watershed hydrology, while retaining a more natural sequence of riffles, pools needed for the sustenance of more diverse biological communities.

Opportunities for these remedial projects are identified and prioritized through watershed feasibility planning studies funded and managed by Montgomery County. The map below illustrates the number and types of remedial stormwater retrofit and stream restoration projects completed, under construction, or currently under design in Montgomery County's portion of the Anacostia watershed. These studies have identified many opportunities for retrofitting stormwater controls and restoring degraded sections of damaged streams. These results form the basis for watershed actions plans which establish goals and implementation schedules for specific projects, and identify other activities planned to address watershed protection needs and priorities. Thus far, the County has an inventory of over 240 potential projects to add runoff controls and restore damaged sections of stream in Montgomery County's portion of the Anacostia. Presently 30 projects have been built or are under construction, and 32 are under design. The County is constantly seeking grant funding to pursue these projects, thereby leveraging the effectiveness of County funds.

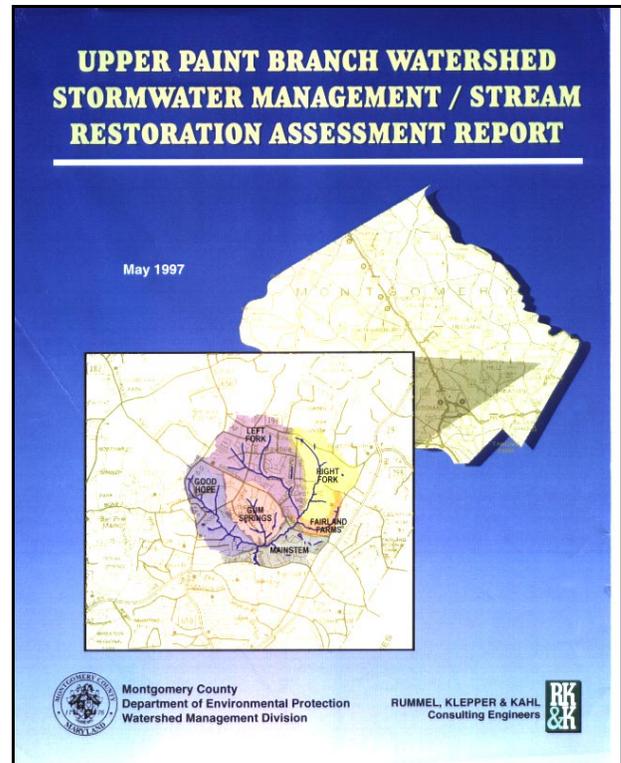
Watershed Management Studies: The Upper Paint Branch watershed management study prepared for DEP identified 67 project opportunities for potential stormwater retrofit and stream restoration projects. Thus far, Montgomery County has funded and constructed 8 of these. A watershed study for Montgomery County's portion of the Northwest Branch was completed for the County by the Corps of Engineers. This study identified 175 separate project opportunities for stormwater retrofit and stream restoration projects to improve runoff management and restore degraded habitat in critical reaches of the Northwest Branch. To date, 3 have been built and another 26 are under design and funded for construction. In Sligo Creek, a dozen projects were identified through individual design studies following a cooperative interagency assessment of watershed needs initiated through the Metropolitan Washington Council of Governments. All of these projects been built through the cooperative interagency efforts of COG, the Corps, DEP, and the MNCPPC. Montgomery County has built two remedial projects in its portion of

Montgomery County's Anacostia Watershed Restoration Projects



the Little Paint Branch watershed, and participated in the State's watershed assessment led by the Maryland Department of Natural Resources

Stream Restoration-Nature and Purpose: During stream restoration, heavy equipment is used to regrade stream bank slopes and restore floodplain access where feasible. Carefully placed boulders, logs, and native woody vegetation are used to stabilize eroding stream banks, recreate habitat for fish, aquatic insects, birds, and other wildlife, and provide shading to help maintain cool stream temperatures. The general goal of these habitat improvements is to "raise the bar" to enable streams in already developed and impacted watersheds to support more diverse and vibrant biological communities than possible under currently degraded conditions. These watershed improvements also contribute to the environmental quality of life in County neighborhoods and to the Anacostia's overall watershed restoration effort. Reduction of stream channel erosion to reduce excessive sediment transport and damages to downstream areas is another important objective common to all projects. A few projects are also being pursued primarily to protect vulnerable properties from excessive stream bank erosion.



To date, most of these projects have been constructed within stream reaches protected by stream valley parkland and conservation easements reserved by the MNCPPC. Some projects have involved partnership efforts in design and construction with the U.S. Army Corps of Engineers, the Metropolitan Washington Council of Governments, and the MNCPPC. Many projects have also received cost-share grant assistance from the Maryland Department of the Environment, Maryland Department of Natural Resources, or the Corps of Engineers.

Examples of Watershed Restoration Projects: The following descriptions and illustrations provide examples of some of the stream restoration and stormwater retrofit projects constructed thus far in Montgomery County's Anacostia watershed drainage. For geographic reference, the number introducing each example project is keyed to the map of Montgomery County' projects on the previous page.

(1) New Stormwater Runoff Control Pond – Sligo Golf Course: This slide on the top of the next page illustrates efforts to retrofit stormwater controls to areas of the Sligo Creek watershed which developed before modern stormwater controls were legally required. Improving the control of runoff from upstream areas reduces the impacts of peak stormwater flow volumes and velocities downstream. This, in turn, facilitates installation of effective stream habitat restoration improvements in downstream areas of Sligo Creek. The Sligo Golf Course stormwater pond controls runoff from about

Add Upstream Runoff Controls

9th Hole Fairway - Sligo Golf Course



New pond controls runoff from 70 acre developed drainage area, including 1 mile of the Capital Beltway

Urban Stream Restoration

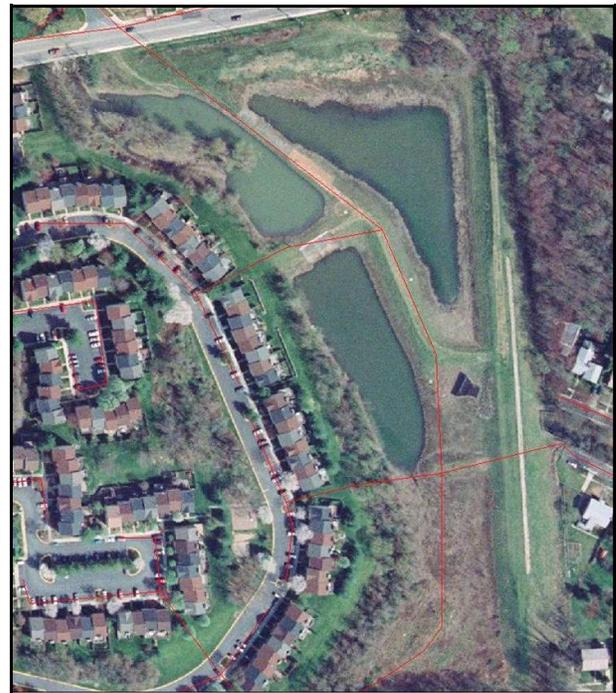
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70 acres of developed residential drainage upstream of the golf course. The pond's drainage area also captures and cleanses polluted runoff from a mile-long portion of the heavily trafficked Capital Beltway, which is located immediately upstream.

(2) Wheaton Branch Stormwater Retrofit Project: The below picture is an aerial photo of the Wheaton Branch stormwater management facility. This project significantly improved stormwater control to over 800 acres of

developed drainage in the headwaters of Sligo Creek. It controls runoff from a large shopping mall and commercial complex in the Wheaton Central Business district, and other commercial and residential

development between Wheaton and Dennis Avenue along the intensively developed Georgia Avenue corridor. The three-celled pond design was used to protect the existing sanitary sewer lines (shown in red) that traversed the original flood control facility site. The pond improvements control runoff from small, frequently occurring storms and larger storms that occur every 1-2 years. Runoff from these storms is detained for a period of 24-40 hours and released slowly, to minimize erosion damages downstream in the Wheaton Branch tributary of Sligo Creek. This project contributes substantially to the success of stream restoration measures installed immediately downstream on the Wheaton Branch of Sligo Creek and on the Sligo Creek main channel.



(3) Sligo Creek Constructed Wetlands: This slide on the next page illustrates projects undertaken to intercept, detain, and cleanse runoff carried by storm drain outfalls which previously discharged directly into Sligo Creek. The projects create depressions in existing floodplains to capture storm drain flows and release the discharges through a weir that maintains water levels to support a wetlands habitat. These constructed wetlands were designed to recreate lost habitat for frogs, salamanders, and turtles which had been long absent in developed portions of much of the Sligo Creek watershed. Amphibians used this habitat as a refuge during the

1999 and 2002 droughts, when parts of Sligo Creek dried up and became segmented due to a lack of rainfall and supplementing groundwater inflows. The wetlands also provide habitat for ducks and birds.

(4) **Wheaton Branch Tributary Stream Restoration:** The below slide illustrates the condition of the Wheaton Branch tributary to Sligo Creek before the Wheaton Branch stormwater retrofit facility, described earlier, was built. The picture under the 1990 caption illustrates a severely eroded and blown out stream channel that, surprisingly, measured 85 feet across at its widest point. The

Intercept Storm Drains Before Storm Drain Outfall Discharges
to improve stormwater control and create new wetlands habitat

Sligo Creek Parkway at Forest Glen Road *Sligo Creek Parkway at the Beltway*

Urban Stream Restoration 19

Stream Restoration Downstream of New Wheaton Branch Stormwater Control

Devastation - 1990 *Restoration - 1992* *Nature's Healing - 1999*

Restoration at Wheaton Branch of Sligo Creek

Urban Stream Restoration 21

center picture shows the restored stream condition and plantings immediately after completing the restoration project in 1992. Regrading and stabilization of the eroded channel restored riffle and pool habitat to the stream channel and reduced stream width to about 10 feet.

The picture under the 1999 caption shows the growth of trees and other vegetation now providing additional habitat and shading to help cool the stream. This picture was taken from the fore-

ground shoreline area shown in the center slide. The healing vegetation had grown dense enough to entirely cover the view of the storm drain outfall on the other side of the creek.

(5) Northwest Branch Stream Restoration: This slide illustrates the restoration of a 3/4 mile section of the Northwest Branch Tributary of the Anacostia south of Randolph Road. This stream had become highly eroded, overly widened, and deeply down cut. The stream was adjusting to increased and largely unmanaged stormwater discharges from upstream watershed development in the Glenmont area. The “before” and “after” shots show the restoration of stream meanders, flow depths, and deep pool habitat areas. They also illustrate the restoration of access to floodplain areas within the overly widened channel.



(6) Paint Branch Stream Restoration: The accompanying slide shows work on a two-mile section of the Paint Branch downstream of Fairland Road. This project was constructed for DEP by the U.S. Army Corps of Engineers under a cooperative cost-share agreement.



The “before” and “after” pictures illustrate efforts to stabilize and restore habitat within the highly eroded stream channel. The “lunkers” shown on the pictures on the right of the slide were wooden structures built and installed under the stream bank to provide habitat for the sensitive, naturally propagating brown trout in Paint Branch.

Environmentally Sensitive Construction Practices: This slide shows some of the environmentally friendly practices DEP endeavors to use in the construction of its stream restoration projects. Examples shown include the use of pallets, mulched access roads, and rubber tracked vehicles to minimize compaction of streamside soils by heavy equipment. Avoidance of excessive compaction damages is especially important in and around floodplain areas, where rainfall infiltration into the soil profile is important for groundwater replenishment and flood control

The slide also illustrates how barricades are installed around mature trees to minimize impacts of accidental equipment contact.



Summary of Montgomery County’s Anacostia Watershed Restoration Projects: To date, DEP has built, or has under final design, 21 stormwater retrofit facilities that control runoff from nearly 3,000 acres of Anacostia drainage area that had been previously uncontrolled or inadequately controlled. Forty-one new stream restoration projects are being pursued. These have restored over 11 miles of Anacostia tributaries, with another 6.3 miles under design. Watersheds where projects have been constructed or are presently under design include Sligo Creek, Northwest Branch, Paint Branch, and the Little Paint Branch. Some of the restoration projects also included the implementation of new wetlands at the end of storm drain outfalls, to mitigate water quality impacts and recreate lost habitat for frogs and salamanders.

The restoration activities in the Sligo Creek watershed represent the most extensive Anacostia watershed restoration work Montgomery County has completed thus far. Six stormwater retrofit projects were built to add new runoff controls to 1,359 acres of upper watershed drainage, and 5 miles of streams were restored to arrest channel erosion and add back in a riffle and pool structure to improve channel habitat. DEP and its partner agencies conduct biological and habitat monitoring, and measure changes in stream channel geomorphology to evaluate the success of stream restoration efforts. Monitoring underway since 1989 indicates that upper reaches of Sligo Creek are now able to support 11 native fish species, where degraded habitat conditions in the past were only able to support two species. Benthic community diversity has also improved.

Volunteer and Interagency Support: Many independently pursued volunteer projects have also been implemented over the years to add sheltering tree cover to critical stretches of stream channel. These projects help reduce erosion and provide shade to reduce stream temperatures. The adjacent slide indicates the work of the “Eyes of Paint Branch” on a stream side planting of also the Gum Springs tributary of Paint Branch.

The slide below illustrates a page from the website developed by the very active “Friends of Sligo Creek” to help marshal the forces of watershed residents in pursuing the “Friend’s” stream stewardship initiatives. These and other watershed-based citizen groups also work on public outreach initiatives to make watershed residents and businesses more aware of impacts their day-to-day activities can have on streams. They

recruit volunteers to monitor stream conditions, to conduct periodic stream cleanups to remove discouraging and unsightly accumulations of trash, and to help remove invasive species of vegetation that impair natural growth and replenishment of more desirable, native stream-side vegetation.

Eyes of Paint Branch & COG Volunteer Tree Planting

- Public Education and Outreach
- Non-Structural Measures
- Urban Trash in Streams
- Pollution Prevention



Gum Springs Project – Fall 2000

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Friends of Sligo Creek

Community Events: Sweep the Creek Day 2002

Sweep the Creek Day - September 14, 2002
Page 1 of 1



Sweep the Creek Day 2002

Click to Enlarge with Captions











Sweeping
South of
NH
Avenue

Source: Friends of Sligo Creek Website

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Interagency coordination has also improved to integrate stream protection considerations into road design, and to reduce unnecessary mowing of stream buffer areas. DEP and its watershed partner agencies also conduct public outreach programs to educate and involve the public in personal stewardship responsibilities critical to the success of long-term watershed protection.

Collectively, the projects undertaken in support of the *Countywide Stream Protection Strategy* are significantly improving habitat support for aquatic life, and reducing sediment loadings from excessive stream channel erosion stimulated by uncontrolled, or

inadequately controlled, stormwater runoff. The increased biological diversity supported through restored stream habitat can also help uptake nutrient loadings that would otherwise be delivered downstream, further stressing the Anacostia River, the Potomac River and, ultimately, the Chesapeake Bay. Other projects have also diverted storm flows, or taken other measures to reduce stream temperature impacts associated with watershed development. These latter efforts have focused on protecting fragile headwater areas of the Upper Paint Branch, where protection of the naturally propagating brown trout resource is of primary concern.

Tracking Progress: Montgomery County’s monitoring crews regularly sample upstream and downstream of restoration projects to evaluate changes in the stream channel habitat and supported biological community before and after stream restoration. The goal is to stabilize eroding stream channels to

reduce excessive sediment loadings that impair aquatic life support and reproduction, and to add back in natural sequences of stream meanders, riffles, and deep pools necessary to support diverse aquatic life.

How To Measure Success?

Ultimate goal is to improve biotic community

Pre- and Post Construction Monitoring




Biology:

- Fish populations
- Aquatic insects
- Habitat features

Geomorphic Analysis:

- BEHI for new projects
- Stream cross sections
- Visual observations and photodocumentation

Urban Stream Restoration 33

Once a stream is restored, DEP’s monitoring crews work with other agencies and volunteers to repopulate streams with native species of fish, once able to live there before changes in stream hydrology or other pollutant influences gradually removed habitat features necessary to sustain these species.

Measuring Success of Watershed Restoration in Sligo Creek: Prior to completion of the first Sligo Creek restoration project in 1990, there were only two native species of fish found in upper Sligo Creek. Other formerly resident species had not survived the harsh habitat conditions, caused by major changes to stream hydrology and pollutant loadings introduced through intensive watershed development and the piping of many feeder tributaries. Completion of the Wheaton Branch and University Boulevard stormwater retrofit projects added stormwater management controls to over 1200 acres in the upper watershed. Following completion of the first stream restoration project downstream of the Wheaton Branch facility, native species that once lived in the watershed were gradually reintroduced. Monitoring since the fish

Montgomery County Experience

Sligo Creek

- Stormwater retrofit projects, stream restoration and wetland creation projects have improved upper watershed
- Re-introduced native fish species (2 to 13 species)

Other Watersheds

- Stream restoration – 6 miles completed
- Post construction monitoring underway
- 15 miles under design; over 250 miles to go!
- Too early to measure success at these sites



Urban Stream Restoration 36

reintroductions began in 1992 indicate that 11 of the 13 species are still surviving and, apparently reproducing.

Missing species from these native fish that were reintroduced are believed to be casualties of the droughts in 1999 and 2002. The prolonged lack of rainfall and lack of replenishing groundwater inflows caused parts of Sligo Creek to dry up and become segmented into isolated pools that subjected more sensitive species to high temperature impacts and loss of protective habitat to avoid predators.

DEP's long-term goal for Sligo Creek is to continue with remedial project improvements and related monitoring, enforcement, and outreach initiatives to improve the stream condition from its present "poor" rating to a "fair" rating for biological diversity. While this is a modest goal, Montgomery County staff believe that it is an important milestone to seek as a first step in improving aquatic life diversity and natural attractiveness in a degraded urban stream for which many watershed residents had once nearly abandoned hope. As noted earlier, the independently formed "Friends of Sligo Creek", is conducting a variety of public outreach, monitoring, and cleanup efforts to help the County achieve this goal .

DEP is monitoring to track the before and after effects of its stream restoration projects as they are implemented and stabilize over time. Monitoring of some of these projects includes more detailed research on nutrient reduction and ecological effects, being conducted by the University of Maryland, College Park, in a collaborative effort with DEP. It will take collection and review of several consecutive years of stream monitoring data to evaluate the relative success of these other projects.

Other Anacostia Restoration Activities. In addition to implementing these highlighted and many other watershed restoration projects, Montgomery County continues to undertake other significant steps to address water quality management need in the watershed. Some of these are listed below:

- **Upper Paint Branch Special Protection Area:** In 1995, the County established a Special Protection Area to protect the sensitive, naturally propagating brown trout resource residing in the upper portions of the Paint Branch watershed (upstream of Fairland Road). New development projects in this SPA are subject to a 10% impervious area cap, and undergo enhanced project review to establish and address performance goals designed to protect the sensitive stream environment. Performance goals usually result in more stringent requirements for stormwater best management practices (BMP's) to mitigate peak flow impacts on stream habitat. DEP conducts extra monitoring of receiving streams, and requires developer monitoring of BMP's to document pre-and post-development conditions and track the effectiveness of enhanced protection measures.
- **New Stream Buffer Investments:** The County has invested over \$15 million to purchase about 300 additional acres of stream valley parkland to protect sensitive headwater streams in the Upper Paint Branch. This investment adds to the substantial stream valley parkland holding already in place to help protect Montgomery County's tributaries to the Anacostia. Additionally, conservation easements are required to protect non-park streamside areas as new developments in the watershed are approved.
- **Colesville Maintenance Yard Improvements:** About \$230,000 in stormwater retrofits and other improvements were completed at the County's Colesville Maintenance Yard and Depot to measurably reduce stormwater pollutants discharged into the upper Paint Branch. Depot staff

have also begun to implement an enhanced pollution prevention program, to further control pollutants from all routine operations at the site.

- **Stormwater Facility Maintenance:** The County recently passed a stormwater charge to enable phasing in of public maintenance of privately owned residential stormwater management facilities and for those on county-owned parkland. The County will provide routine and consistent maintenance to ensure that these facilities continue to function as designed and constructed for stormwater runoff quantity control and pollutant reductions.
- **Toxics Management:** The County continues to work with Prince George's County and other members of the Anacostia Watershed Toxics Alliance to reduce toxics in the watershed. The County recently received an EPA grant to build and monitor four pilot Low Impact Development projects at County-owned sites in located within its Anacostia tributaries.
- **Illicit Discharges:** The County has expanded its illicit discharge detection and enforcement program to identify and eliminate this source of contaminants to county waterways. Although the exact extent of pollutants from these sources is unknown, they represent potentially controllable sources. Recent investigations have resulted in enforcement actions on illegal discharges of cooking grease from several restaurants located in the Sligo Creek and Northwest Branch watersheds. Four leaking underground fuel storage tanks were detected and removed in the Paint Branch watershed.
- **Public Outreach:** Montgomery County's public outreach programs address watershed management issues and their linkages between stream quality, groundwater, air quality, and other environmental interfaces. DEP's website, www.askDEP.com, has a wealth of valuable information on water quality issues, and the important stewardship roles that citizens and businesses can play to help protect local streams. DEP's staff also works with community associations, local schools, watershed groups, and businesses to educate and involve their members in volunteer opportunities, including tree plantings to improve stream buffers, removal of invasive species, storm drain stenciling, stream cleanups, and various other initiatives. DEP's website regularly contains information about volunteer participation in environmental protection and improvement activities within and outside of the County.

Next Steps: Montgomery County will continue designing and implementing projects to carry out an extensive stream restoration effort in its Anacostia watershed tributaries. The level of effort will remain high as long as currently budgeted and future local resource and supporting grant funds allow. The County will continue to actively participate in the regional Anacostia Watershed Restoration Committee and to help support the allied efforts of the Anacostia Watershed Toxics Alliance, the Anacostia Watershed Society, and other citizen and business-based watershed groups. DEP also plans to continue its work on the other watershed protection initiatives listed above. If resources allow, DEP also will be proposing new pilot initiatives to address stream trash issues, to increase frequencies and area coverage of street sweeping and vacuuming, and to install and monitor street runoff filters to assess their potential effectiveness in removing pollutants typically found in street runoff from highly trafficked areas.

The Metropolitan Washington Council of Governments will continue to regularly report upon the progress of Montgomery County and the other jurisdictional partners in addressing and fulfilling the outlined goals of the Anacostia Watershed Restoration Agreement.