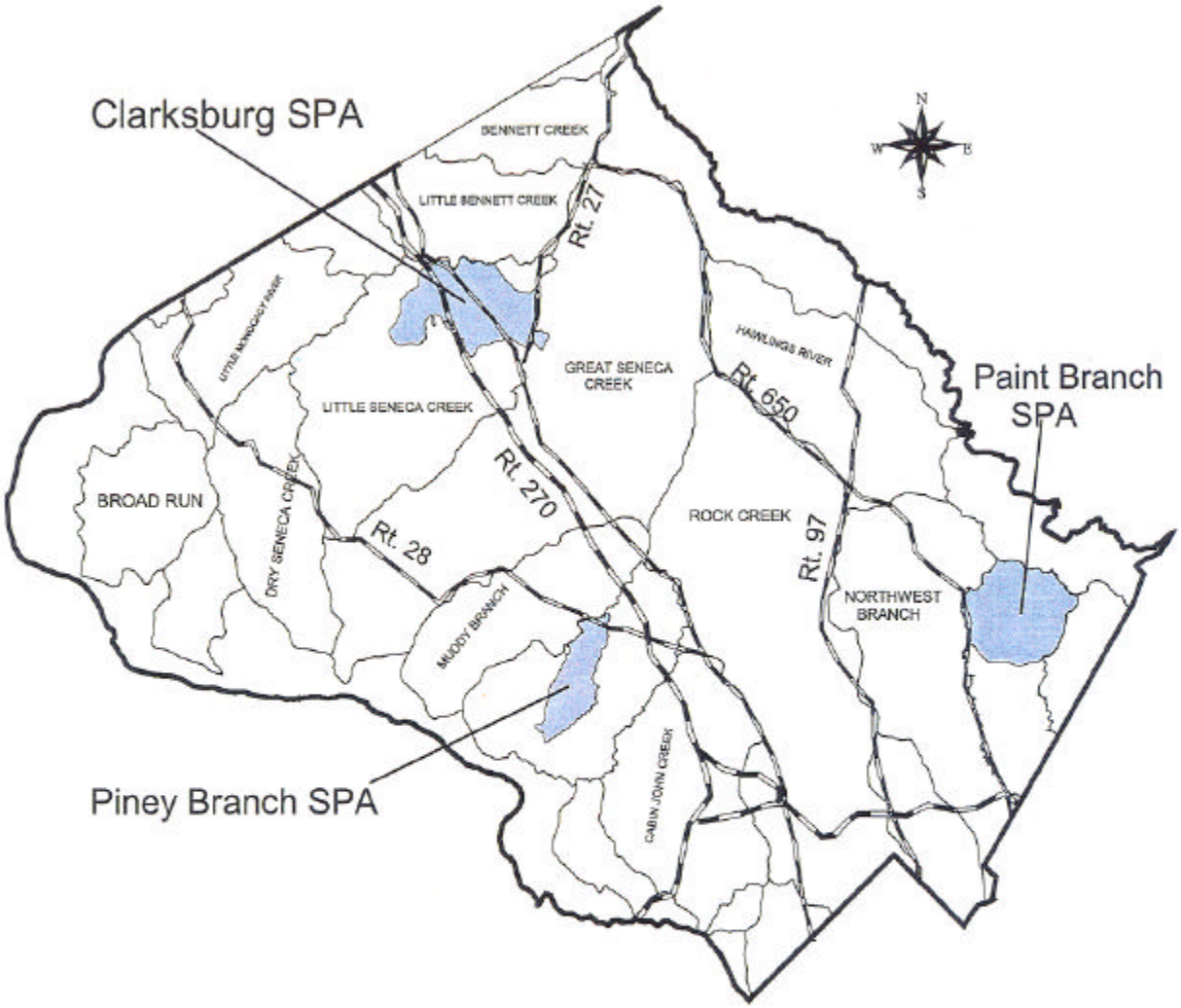
Montgomery County Special Protection Area
Annual Report - May 1999



Prepared by:

Department of Environmental Protection

Department of Permitting Services

In cooperation with

Maryland-National Capital Park and Planning Commission

1999 Special Protection Area Program Annual Report

Executive Summary

Purpose of the Report: In accordance with the procedures authorized in the Montgomery County Code Chapter 19, Article V, entitled "Water Quality Review-Special Protection Areas, Section 19-67, the implementing regulations, Executive Regulation 29-95, Water Quality Review for Development in Designated Special Protection Areas requires an Annual Report be prepared summarizing and analyzing available results of stream and BMP monitoring data conducted within SPA's. The Report is to be submitted to the County Executive and County Council with a copy to the Planning Board.

This is the third report on the program. The first report covered the time period 1994 through 1995. The second covered the time period 1996 through 1997. This report covers the 1998 reporting time period. Thus far, the level of development activity and best management practices (BMP's) construction has resulted in insufficient data on BMP's to allow for analysis of their effectiveness in protecting high quality water resources. As more data are collected and development projects implement their approved SPA water quality plans over time, future reports will contain additional technical analysis on how well the SPA process is able to protect the high quality streams in County SPA's.

Existing SPA's: To date, the County Council has designated three areas within Montgomery County as high quality stream systems which are in need of measures beyond current standards to assure that they are protected to the greatest extent possible from the impact of master planned development activities. These areas are: the Clarksburg Master Plan SPA, the Upper Paint Branch Watershed SPA, and the Piney Branch Watershed SPA.

SPA Development Review Process: The SPA program requires the Montgomery County Department of Permitting Services (DPS) , the Department of Environmental Protection (DEP) and the Maryland-National Capital Park and Planning Commission (M-NCPPC) to work closely with project developers and address, at the outset of the regulatory review process, to minimize possible impacts to the existing SPA stream conditions. SPA permitting requirements guide the development of related concept plans for site layout, environmental buffers, forest conservation, site imperviousness, stormwater management, and sediment control. A pre-application meeting presents the project developer with those critical natural resource parameters that need to be maintained in order to protect the existing high level of stream condition. Protection of these natural resource parameters is guided by the performance goals developed for each development project. Successful incorporation of the performance goals into the site design process requires innovation and close coordination between the project's design team and environmental regulatory and planning agencies.

Status of the Stream Monitoring Program: DEP has been monitoring the streams in all three existing SPA's since 1995. Presently, DEP is collecting monitoring data at a total of 34 baseline SPA monitoring stations, and established 13 development related monitoring stations. These

stations include twenty (20) stations in the Clarksburg SPA within the Little Seneca Creek and Ten Mile Creek watersheds, seventeen (17) stations in the Upper Paint Branch SPA, and ten (10) stations in the Piney Branch SPA. Baseline stations are monitored for the cumulative health of the stream by assessing changes in the structure and function of the fish and benthic macroinvertebrate communities and comparing these changes to changes in the physical habitat of the stream. Analysis of the monitoring data has allowed the development of baseline conditions in the three SPA's based on four years of data collection. In general the biological communities in these streams are indicative of extremely high quality stream conditions, largely unimpacted by flow, sediment, or pollutant stressors. The stream channels are stable, with an abundance of quality habitat features necessary to maintain the biological community.

Status of SPA Conservation Plans: Conservation Plans for Upper Paint Branch and Piney Branch SPA's are now available. The Conservation Plan for Clarksburg SPA is now being prepared and will be available for review in December 1999. These plans are based on the results of the stream monitoring conducted by DEP, and on other credible stream monitoring data. SPA conservation plans identify those natural resource parameters that must be protected within each SPA subwatershed to achieve and maintain a high level of water quality. The Plans will provide additional technical guidance to assist in the preparation of site specific performance goals for new development or redevelopment projects.

Status of BMP Monitoring Plans: A development project is required to implement a plan for monitoring the effectiveness of best management practices (BMPs) for stormwater management and water quality protection that are approved as part of the project's SPA water quality plan. BMP monitoring plans have been approved as a part of preliminary and final water quality plans in each of the three SPAs. Flow, temperature, and ground water monitoring has begun on seven (7) projects to determine baseline conditions prior to development. Almost all BMP monitoring to date has been pre-construction monitoring. A limited amount of construction monitoring is in progress. No stormwater management monitoring has begun. There is not enough data yet to make meaningful determinations for the efficiency of sediment control and stormwater BMP's as little during and post-construction monitoring has occurred. This is expected to change as approved subdivision and site plans within the SPA's proceed to construction.

Supplemental Habitat Restoration and Stormwater Retrofit Measures: DEP is pursuing separate capital project initiatives in the Upper Paint Branch and the Piney Branch SPA's to improve the management of runoff from previously developed areas and mitigate isolated pockets of habitat damage that had occurred before the SPA program was established. These projects are intended to supplement improvements in watershed management achieved through the SPA permit process. In the Upper Paint Branch watershed, DEP has worked closely with the M-NCPPC and other agencies to inventory some 75 potential stream habitat restoration, wetlands creation, and stormwater retrofit project opportunities. Some of these are capital projects. Others involve small habitat restoration and wetlands and tree plantings that can be partially implemented by volunteers. DEP has actively involved the public in reviewing these projects and expects to have 12 or more under design by the summer, 1998. In the Piney Branch SPA, DEP has inventoried a limited number of project opportunities for small wetlands creation, habitat

restoration and stormwater retrofit projects located on the site of the Life Sciences Center in the uppermost portion of the watershed.

Next Steps: Since 1995, Montgomery County's regulatory and planning agencies have worked to fully implement the different provisions of the Special Area Program, and to effectively educate the public and the development community on the requirements this program has for the existing Special Protection Areas. Future activities will involve continuing coordination and cooperation with all involved in the development of these SPA's, continuation of development specific stream monitoring activities, and evaluation of BMP effectiveness from the analysis of BMP monitoring data.

It is still too early to definitively assess the success and problems of the SPA program in incorporating adequate protection measures into new development. However, some informal observations by DEP, DPS and M-NCPPC staffs indicate some preliminary benefits of the SPA program:

- In development project proposals initiated after the SPA program was implemented, excluding development from environmental buffers has become an important design objective.

- In several project proposals that have gone through agency review and approval, applicants are establishing forested planting areas earlier in the development stages of the projects.

- Minimizing impervious surfaces has become an important design objective in development projects, especially in the Upper Paint Branch SPA, where a specific imperviousness cap is a regulation.

SPECIAL PROTECTION AREA PROGRAM
1999 ANNUAL REPORT

1.0 EXPLANATION OF THE SPECIAL PROTECTION AREA PROGRAM

1.1 Purpose of Special Protection Areas

Article V of the Montgomery County Code defines Special Protection Areas (SPA's) as geographic areas which may be designated by the County Council where: "...1) existing water resources or other environmental features directly relating to those water resources are of high quality or unusually sensitive; and 2) proposed land uses would threaten the quality or preservation of those resources or features in the absence of special water quality protection measures which are closely coordinated with appropriate land use controls...."

SPA program purposes specified in Article V are to:

> *1) establish coordinated procedures, performance goals, criteria, and requirements for development in SPA's that will mitigate adverse impacts on water resources during and after construction or other land disturbing activities; and,*
>
> *2) provide a focused, coordinated approach for water quality protection and monitoring in SPA's.*

1.2 Designated Special Protection Areas

To date, the County Council has designated three areas within the County as high quality stream systems which are in need of measures beyond current standards to assure that they are protected to the greatest extent possible from the impact of master planned development activities (Figure 1). In chronological order of their designation these SPA's are: the Clarksburg Master Plan SPA; the Upper Paint Branch Watershed SPA; and the Piney Branch Watershed SPA. Once Special Protection Areas are designated all subsequently approved plans for development, except for those with a valid record plat recorded prior to October 31, 1994, are required to comply with Executive Regulation 29-95, Water Quality Review for Development in Designated Special Protection Areas.

1.3 Water Quality Plan Review Process

The SPA program requires the Montgomery County agencies and M-NCPPC to work closely with project developers to pro-actively address possible impacts to the existing stream conditions and to guide the development of related concept plans for site layout, environmental buffers, forest conservation, site imperviousness, stormwater management, and sediment control earlier in the regulatory review process. Outside of SPA's, County and M-NCPPC staffs generally are able to review a project only ***after*** a plan is formally submitted by an applicant showing a proposed site's conceptual layout and stormwater management designs. This review typically

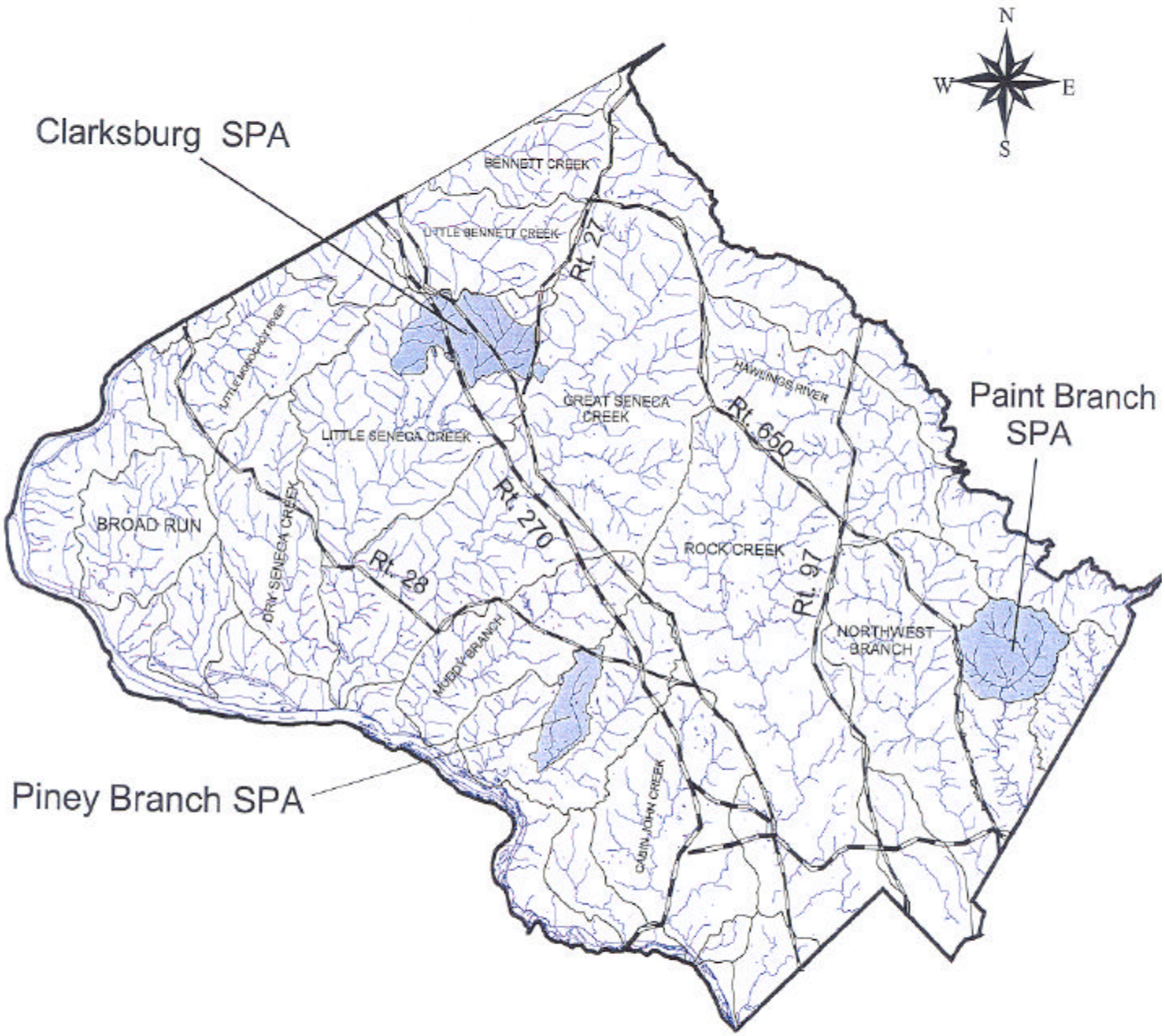


Figure 1. Location of Special Protection Areas in Montgomery County

occurs for the preliminary plan of subdivision. (Review of a proposed project's conformance to environmental protection requirements and guidelines may also occur with a site plan, special exception application, mandatory referral, or zoning application). This sequencing of plan review requires a reactive response by County and M-NCPPC staffs to approve projects in the development review process. This often necessitates major modifications to development plans when County staff or M-NCPPC staff find that environmental protection measures proposed by the applicant are inadequate.

Within SPA's, County and M-NCPPC staffs are now able to convey environmental protection goals, objectives, and concerns to the applicant of a proposed development project ***before*** the applicant designs the initial site layout concept for the project. The SPA program is designed to put the environmental issues up front in planning for land development within the SPA's. This proactive approach reduces the potential for negative environmental impacts by requiring the County and the M-NCPPC to provide detailed environmental information and guidance on enhanced protection measures to the applicant prior to the concept plan design stage and before the formal development review process begins. Applicants are then able to design projects which take into account current available information on stream conditions, forest conditions, types of soils, site topography, and other environmental features, to address identified environmental constraints, and to incorporate enhanced BMP's before concept plans are submitted.

Under the SPA program, most applications for new development projects in SPAs are required to submit water quality plans which will provide a more comprehensive package of information to the County than is required as part of the more typical (i.e., non-SPA) development review process.

In addition to evaluating the stream conditions, the SPA review process includes site visits, analysis of subwatershed environmental characteristics, investigation of existing environmental problems, avoidance and/or minimization of the long term impacts of the development, and implementation of BMP monitoring plans.

1.4 Public Input

A water quality plan is a document submitted by a permit applicant that demonstrates how a new development project within a SPA proposes to meet certain site-specific, watershed protection goals. It is required for most development projects within SPA's. Typically, permit applicants must prepare both a preliminary and a final water quality plan.

After submission of a preliminary water quality plan, a SPA public information meeting will be held if requested in accordance with Executive Regulation 29-95. At these meetings developers present technical and site design information and methods to the public which show how the water quality plan will meet the performance goals for the SPA as specified in the SPA Conservation Plan. These meetings produce useful dialogue between the public, the County, M-NCPPC, and project developers regarding site design, environmental sensitivity, and BMP selection.

After considering input obtained at an informal public information meeting, the DPS, in coordination with DEP, acts on those aspects of the water quality plan in which the two agencies have lead agency responsibility (see Section 1.5 below for summary of lead agency responsibility in water quality plan review).

In addition, the Planning Board holds a public hearing for a water quality plan. as either part of, or in conjunction with a public hearing for the proposed development project itself. The Planning Board is required to review and act on those aspects of the water quality plan in which the M-NCPPC has lead agency responsibility (see also Section 1.5 below).

1.5 Agency Review and Approval of Water Quality Plans

The SPA law requires that water quality plans for a project be approved by DPS, in coordination with DEP, and the Planning Board before the project can proceed. Each agency has lead role responsibility for different components of a water quality plan. M-NCPPC has lead agency responsibility for site imperviousness requirements and guidelines, environmental buffers, and forest conservation. Lead agency responsibility for DPS, in conjunction with DEP, covers stormwater management controls, sediment and erosion controls, and performance monitoring for best management practices. DEP has lead agency responsibility for carrying out and reporting the results from the SPA stream monitoring program, and for preparing SPA conservation plans.

2.0 CURRENT STATUS OF THE SPA PROGRAM

2.1 Status of Stream Monitoring Program

In the Fall of 1994, DEP began SPA baseline stream monitoring in Little Seneca Creek and Ten Mile Creek within the Clarksburg Master Plan SPA. In the Spring of 1995, in anticipation of SPA designation, DEP initiated further SPA baseline stream monitoring in the Upper Paint Branch and Piney Branch Special Protection Areas.

Presently, DEP is collecting monitoring data at a total of 34 baseline SPA monitoring stations, and established 13 development related monitoring stations. These stations include twenty (20) stations in the Clarksburg SPA within the Little Seneca Creek and Ten Mile Creek watersheds, seventeen (17) stations in the Upper Paint Branch SPA, and ten (10) stations in the Piney Branch SPA. Six (6) baseline stations were dropped from 1998 monitoring to allow time for additional development related monitoring. Sufficient data exists from these six (6) stations to establish baseline stream condition at these locations.

Monitoring at each station consists of the collection and identification of benthic macroinvertebrates, the collection and identification of stream fish, the collection of stream channel and flow measurements, the assessment of stream habitat and the collection of physiochemical water quality data in conjunction with the macroinvertebrate and fish collections. Water quality data collected includes dissolved oxygen, temperature, pH, and conductivity.

2.1.1 Stream Monitoring Methods and Procedures

The Department of Environmental Protection established a Biological Monitoring Work (BMW) Group consisting of local and state environmental agency personnel, consultants, environmental organizations and citizens. One of the BMW Group's initial functions was to peer review and evaluate County stream monitoring protocols developed by DEP. These stream monitoring protocols are used for all County stream monitoring efforts, including SPA baseline monitoring.

Current stream conditions within the designated SPA's are being assessed by comparing the biological communities (i.e., stream fish and benthic macroinvertebrates) and habitat conditions found at SPA baseline stations to the biological communities and habitat conditions found at reference stations located on "least impaired" streams throughout the County.

Measurements of stream habitat, water temperature and channel morphology assess the quality and stability of the habitat and its degree of impairment. Long-term monitoring of these parameters will allow DEP to determine if changes to channel morpholgy are a result of natural variability or from development induced stressors. Understanding current habitat and channel conditions will also help to plan and mitigate development related changes.

2.2 Status of SPA Conservation Plans

Conservation Plans for Upper Paint Branch and Piney Branch SPA’s are now available. The Conservation Plan for Clarksburg SPA is now being prepared and will be available for review in December 1999. These Conservation Plans detail findings from three years of monitoring in the SPA’s and identify critical natural resource parameters that need to be protected if a high quality stream ecosystem is to be maintained. Performance goals for the protection of critical natural resources are established for the whole SPA. The Conservation Plans are intended to provide guidance for developers in establishing performance goals for individual projects as required in the water quality plan.

2.3 Status of BMP Monitoring

The design and monitoring of BMP's must be coordinated with the specific protection goals of the SPA and appropriate site design and site density considerations. BMP design and monitoring is unique to each development project based on location within the SPA, the proposed type of development, and the expected environmental impacts. Based on the specific characteristics of each development project, the BMP design and monitoring requirements may vary. BMP monitoring data, to date, is summarized in tables 2, 4 and 6.

Monitoring plans have been approved as a part of preliminary and final water quality plans in each of the three SPAs. Flow, temperature, and ground water monitoring has begun on seven (7) projects to determine baseline conditions prior to development. A limited amount of construction monitoring is in progress. However, there is not enough data yet to make meaningful determinations for the efficiency of sediment control and other construction related BMPs. No stormwater management monitoring has begun.

There is limited published research on the performance of BMP's to mitigate impacts to a streams existing pattern of storm flow, baseflow, temperature, and sediment loadings. At the same time, there is ample evidence that these kinds of impacts are particularly damaging to the County's smaller, fragile headwater streams and to their resident biological communities. Therefore, most BMP monitoring requirements being required for development projects within SPA's are designed to assess how well County required SPA BMP's mitigate changes to these cited stream characteristics. The stream monitoring program is designed to assess the related impacts on stream habitat.

Conversely, there is already ample published data on the pollution removal performance of many BMP's. This data shows that BMP's, when used alone, may have limitations for long-term removal of some urban non-point source pollutants discharged to streams. Therefore, in order to improve pollution removal effectiveness the use of multiple BMP's in series or linked systems is often being required in SPA's. An example of a linked system is shown on Figure 2.

2.3.1 BMP Monitoring Methods and Procedures

To insure consistency and accuracy of monitoring techniques, DEP and DPS established the BMP Monitoring Work Group. This group, which consists of water quality professionals from the public sector and private industry, has established protocols for most types of monitoring being used to determine the effectiveness of BMPs. (*Montgomery County Department of Environmental Protection Best Management Practice Monitoring Protocols*, June 1997)

3.0 STATUS OF INDIVIDUAL SPECIAL PROTECTION AREAS

3.1 Clarksburg Master Plan Special Protection Area

3.1.1 SPA Designation History for the Clarksburg Master Plan SPA

The Clarksburg Area Master Plan, adopted in June of 1994, authorized relatively intensive development in some areas. Based on the environmental analysis for the Clarksburg Master Plan, and guidance provided from the Maryland Department of the Environment and Maryland Department of Natural Resources, portions of Little Seneca Creek, Ten Mile Creek, Wildcat Branch, and Cabin Branch were designated as SPA's (Figure 3) in order to protect the fragile aquatic systems located there.

3.1.2 Description of the Clarksburg Master Plan SPA

The Clarksburg Master Plan Special Protection Area encompasses portions of four subwatersheds, Little Seneca Creek, Ten Mile Creek, Cabin Branch, and Wildcat Branch (Figure 3). The Little Seneca SPA subwatershed encompasses approximately 6100 acres of land. Little Seneca Creek in this location is designated by the state of Maryland as a Use IV-P stream (i.e. protection of put-and-take trout and public water supply).

The Ten Mile Creek subwatershed is approximately 3600 acres of land. The SPA includes all land in the subwatershed which is east of the Ten Mile Creek mainstem and north of West Old

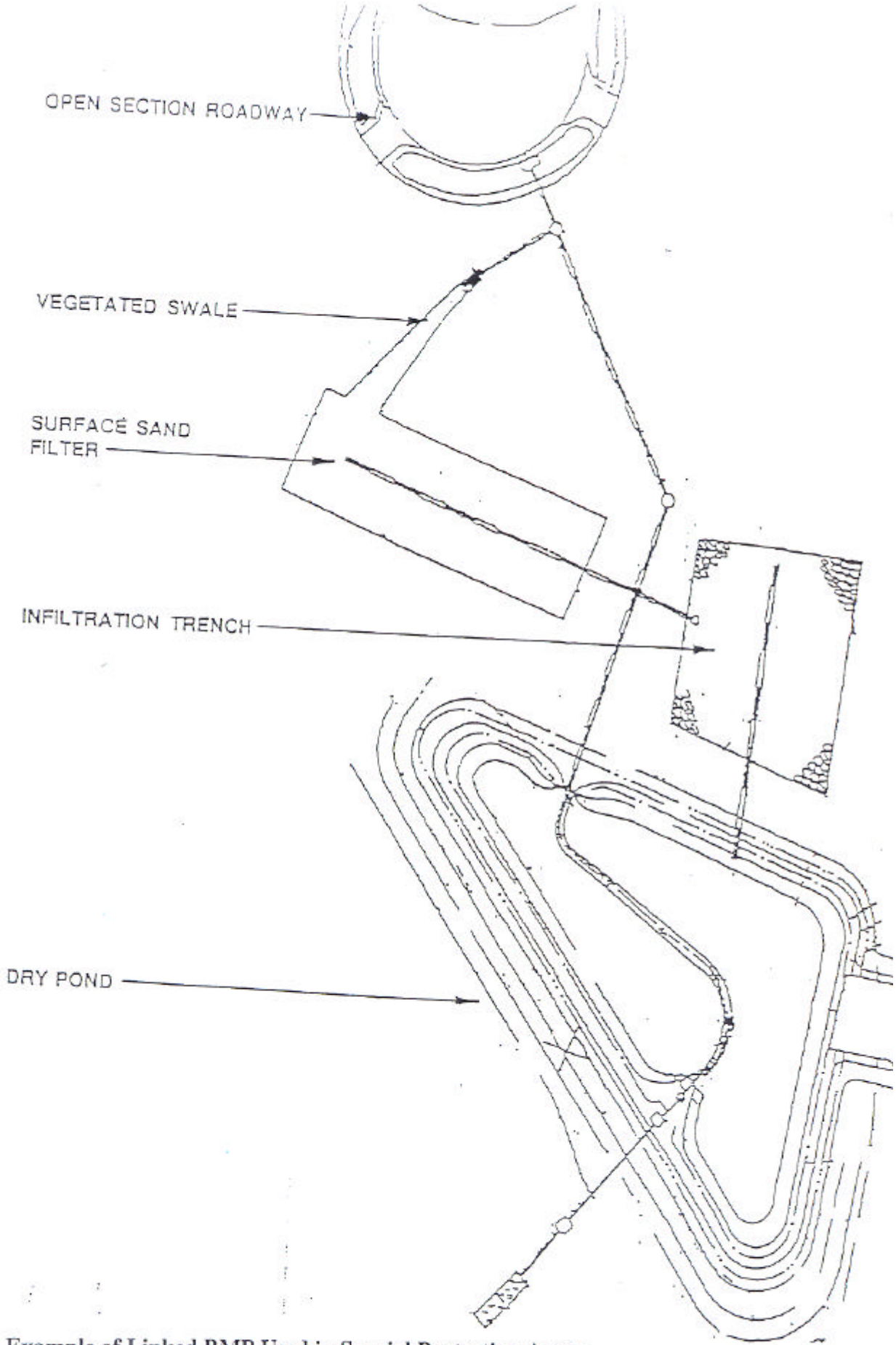
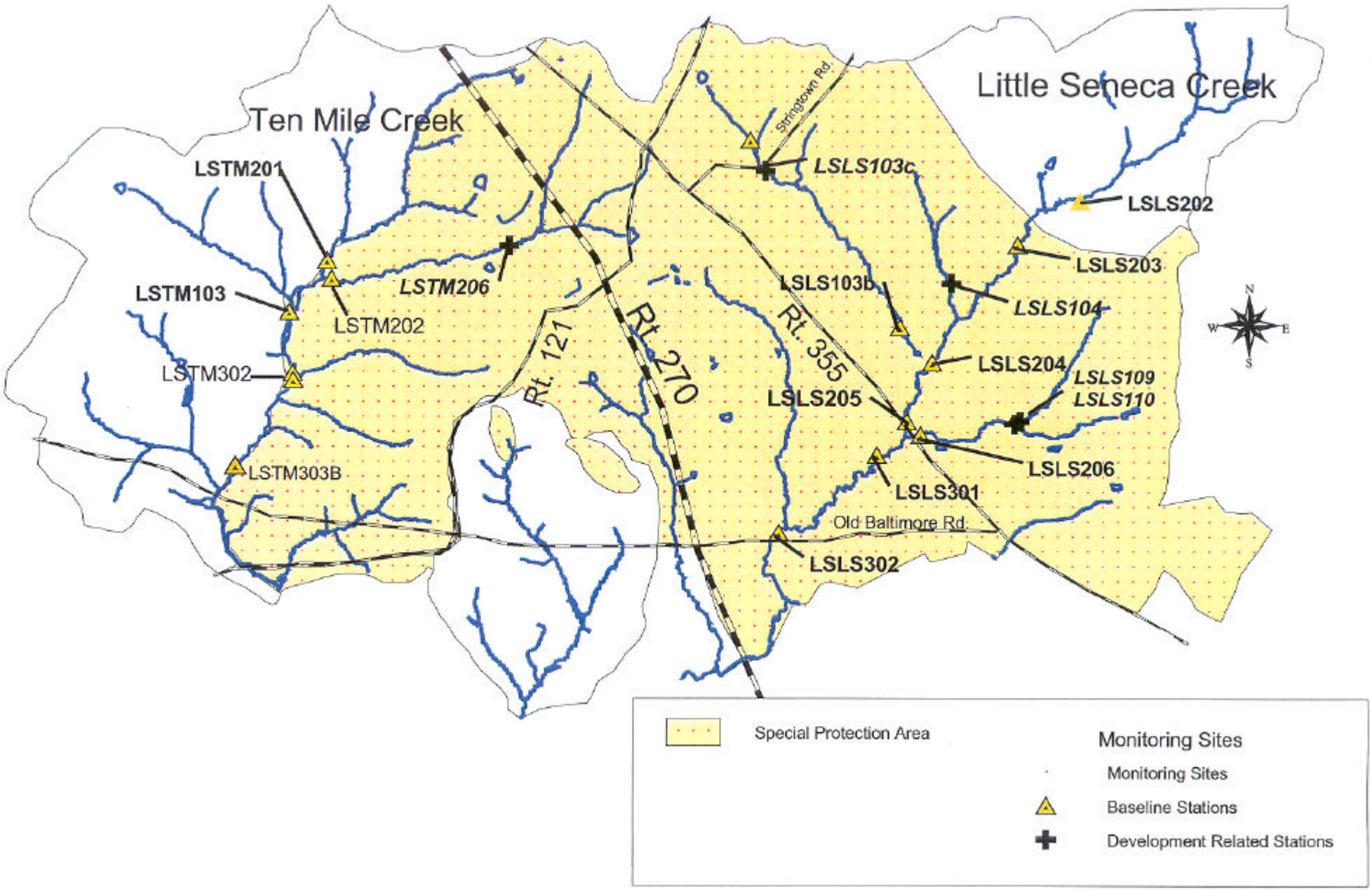


Figure 2. Example of Linked BMP Used in Special Protection Areas



igure 3. Map of Clarksburg Special Protection Area

Baltimore Road. Ten Mile Creek is designated by the state of Maryland as a Use I-P stream (i.e. protection of water contact recreation, aquatic life and drinking water supply).

Only two small portions of the Cabin Branch subwatershed are included in the SPA. These areas are identified as being outside projected 100' wide stream buffers and having a higher potential for groundwater contamination than the surrounding areas.

The inclusion of a small portion of the Wildcat Branch subwatershed is due to the potential for adverse impacts to the stream from anticipated development along Brink Road and the construction of Mid-County Highway. The Wildcat Branch portion of the SPA consists of any tributaries in the Clarksburg planning area that receive stormwater runoff from the Brink Road area and the future Mid-County Highway extension. The Wildcat Branch is designated by the state of Maryland as a Use III stream (protection of naturally reproducing trout populations).

3.1.3 Status of Development in the Clarksburg Master Plan SPA as of February, 1999

With the construction of the trunk sewer extensions into the Clarksburg Town Center area, development activity is picking up within this SPA. Until recently, forest and farmland were the dominant land use with scattered low density single family homes. New residential subdivisions have been approved; some of these subdivisions are under construction (as of February 1999). However, existing impervious surface coverage in this SPA is currently relatively low (less than ten percent using 1990 County GIS planimetric data). Development of the Town Center, which has site plan and final water quality plan approvals for the first phase (as of February 1998), will increase the impervious surface coverage of the Town Center tributary subwatershed of this SPA.

Several mixed use and residential subdivisions in proximity of the existing village of Clarksburg are in various permitting stages of the development approval process. One of the more notable and largest of these proposed developments is the Newcut Village (Clarksburg Village) site. Although this project is still in the early stages of the development process, this site is proposing 660 acres of mixed use development. Also, construction (site grading) is under way for the Montgomery County detention center. Table 1 lists development projects which are active in the Clarksburg SPA. The table covers the time period from 1995 to February 1999. Table 1 is intended to provide the reader with a general idea of the locations, types, intensity, and stage of review or development of land development projects. In addition, DPS is starting to receive inquiries from other landowners and developers in the area about the SPA process including what they should be doing to prepare for project planning. BMP baseline monitoring is currently being performed for the Town Center development and for the detention center.

The projects in Table 1 are in various stages of plan review. Approval of these projects will include some requirements for the preservation and planting of forest and protection of environmental buffers. More specific information on actual quantities preserved and planted in these areas will be included in future annual reports.

Table 1. Clarksburg SPA Development Projects (1995 to February 1999)

PROJECT LOCATION	SPA LOCATION	DEVELOPMENT SIZE, TYPE	STATUS
Clark Meadow, Phase I	Clarksburg, Little Seneca Subwatershed	37 acres, R-200	Subdivision plan approved before SPA designation. Under construction.
Clarksburg Heights	Clarksburg, Little Seneca Subwatershed	54 acres, R-200	Subdivision plan approved prior to SPA designation. Under construction.
Clarksburg Town Center -	Clarksburg, Little Seneca Subwatershed	269 acres, RMX-2, RDT	Preliminary water quality plan for entire site approved. Final water quality plan for 120 acres approved.
Highlands of Clarksburg	Clarksburg, Little Seneca Subwatershed	16 acres, RMX-2 (high density)	Preliminary/Final water quality plan approved.
Funt Property	Town Center Subwatershed	27 acres, Residential	Preliminary environmental information provided to applicant.
Catawba Manor	Clarksburg, Little Seneca Subwatershed	10.9 acres (4.5 in SPA), RMX-2,R-200	Final water quality plan approved.
Cellular Phone Antenna Site Ferguson Farm	Clarksburg, Little Seneca Creek Subwatershed	0.6 acres - RDT Communication tower and access drive	Exempt from water quality plan requirements. Sediment control permit issued. Stormwater management provided. As-built approved 2/23/98.
Nana Property	Clarksburg, Little Seneca Subwatershed	4 acres, R-200	Subdivision plan predated SPA designation. Sediment control permit issued. Under construction.
Newcut Village	Clarksburg, Little Seneca Subwatershed	660 acres, mixed use	Preliminary water quality plan submitted
Clarksburg Detention Facility	Clarksburg, Ten Mile Creek Subwatershed	34 acres	Preliminary/final water quality plan approved. Under construction.
Catholic Cemetery - Germantown	Wildcat Branch	166 acres - RDT	Preapplication meeting held

3.1.4 Summary of the Environmental Review of Phase I for the Clarksburg Town Center Plan

Town Center property consists of a 198 acre site located at the headwaters of one of the main branches of Little Seneca Creek. This site contains three headwater tributaries which meet in confluence at the southwestern edge of the property just before flowing under existing Stringtown Road. The main tributary flows from the existing King's Pond on park land north of the site and bisects the property roughly northwest to southeast. The two remaining tributaries flow from the west along the southern edge of the property and from the north down to the confluence, respectively. On-site topography slopes significantly from plateaus on either side of the main tributary down to the main tributary and each of the secondary tributaries. The stream valleys are moderately steep (15-25%); slopes tend to be gentler near the heads of the tributaries and are quite steep in some portions of the east and main tributaries.

The approved site plan includes 768 of the approximately 1300 units anticipated for the town center site with associated infrastructure. It also includes grading for the future commercial/office/retail portion of the site.

3.1.4a Conformance to the Clarksburg Master Plan

The Clarksburg Master Plan objectives for development within the Little Seneca Creek watershed include continuously forested stream buffers, protection and enhancement of wetland systems, water quality monitoring, environmentally sensitive design and construction of development and infrastructure, and maintenance of the environmental qualities of headwaters. The site plan attempts to address these by providing enhanced reforestation in stream valleys and complying with the more rigorous stormwater management and water quality standards of the SPA.

3.1.4b Final Water Quality Plan

The Final Water Quality Plan for the town center addresses the Performance Goals established during pre-application review, outlines the strategies that will be employed to meet these goals, and includes a detailed plan for water quality monitoring of the streams before, during and after construction. The following is a brief summary of the performance goals and strategies:

GOAL: Protect the stream/aquatic habitat - restore habitat which promotes natural recovery toward a Use IV stream habitat.

STRATEGY: Address the three components of aquatic habitat. Chemical component - Water quality BMP'S; Physical component - reforestation of stream buffer, stream valley improvements, stringent erosion and sediment controls, stormwater management controls, conversion of agricultural fields; Temperature - retention/replanting of forest within stream valleys, BMPs including sand filters, bioretention, clean water recharge and cool water infiltration and recharge.

GOAL: Maintain natural on-site stream channels: through effective upland site planning,

stormwater controls, and sediment and erosion control, protect stream habitat features vulnerable to anticipated development impacts.

STRATEGY: *Redundant sediment control, water quality BMPs, stormwater management quantity controls, reforestation along stream channels, stream channel improvements, protection of existing stream valley forest and wetlands.*

GOAL: Minimize stormflow runoff increases - Through stormwater management, decrease duration and frequency of bankfull discharge to preconstruction levels.

STRATEGY: *Control first 1" of runoff from proposed impervious surfaces to mimic existing conditions during a two year storm.*

GOAL: To identify and protect stream banks prone to erosion and slumping - Identify the most erosion prone stream bank areas and stabilize them with a combination of structural and bioengineered solutions to anticipate the altered flow regime resulting from development.

STRATEGY: *Stream valley improvement*

GOAL: To minimize increases to ambient water temperature to 3.5 percent of existing baseflow conditions.

STRATEGY: *Water quality BMPs which infiltrate stormwater runoff and mix it with cooler groundwater, shading of stream valley through retention/planting of forest.*

GOAL: To minimize sediment loading - minimize sediment loading and reduce stream embeddedness by 80 percent.

STRATEGY: *Reforesting stream buffer, stream stabilization, stringent erosion and sediment control, stormwater management controls, conversion of agricultural fields.*

GOAL: Maintain stream baseflow - Limit the post-development reduction of base flow in streams to 0 percent.

STRATEGY: *Partial (80%) maintenance through infiltration BMPs.*

GOAL: Protect springs, seeps, and wetlands - Protect natural recharge areas of perennial seeps and springs that provide cold water to streams where feasible.

STRATEGY: *Minimize disturbance, infiltration BMPs, stream valley open spaces.*

3.1.4c SPA Environmental Guidelines

The Planning Board has adopted guidelines for Park and Planning Department review of projects within SPA's. These guidelines focus on expanding wetland buffers, expanding and accelerating forest conservation opportunities, and limiting site imperviousness levels. They were addressed in the Clarksburg Town Center site plan in the following manner:

BUFFERS - The Planning Board decided expanded wetland buffers would not apply in the town center. The majority of the wetlands, seeps and springs on the property are physically protected within the stream valleys. Measures have been taken to minimize

even temporary disturbance of the wetlands, and where unavoidable disturbance will occur (road crossings and sewer installation), 2:1 wetland mitigation will be provided. To reduce the more critical impacts on hydrology for the wetland areas, the site plan proposes several stormwater management BMP's designed to encourage infiltration and groundwater recharge.

FORESTATION - The site plan will include reforestation of all unforested stream buffer areas using at least whip size planting stock to minimize the time to canopy closure. A 5-year maintenance program will be required to better ensure survival of the forest plantings.

IMPERVIOUSNESS - Planned levels of imperviousness within the town center will impact the stream condition given the sensitive nature of headwater streams such as the Town Center Tributary which will carry all runoff from Clarksburg Town Center. However, given the nature of the land use and site design this cannot be avoided. Attempts were made to minimize impervious surfaces by use of on-street parallel parking, tighter curb radii, and minimizing the amount of parking spaces in excess of minimum standards.

Efforts to reduce impacts of the Town Center impervious surfaces on this watershed will focus on providing extraordinary stormwater management facilities and BMP's for all runoff from these surfaces.

3.1.4d Stream Protection Measures

In response to guidance provided by the Final Water Quality Plan and SPA Environmental guidelines, stream buffers between 125-150 wide and high priority forest conservation areas were protected, with the exception of unavoidable intrusions for road grading and crossings, stormwater management facilities, and sewer installation. Road grading will be done only in unforested portions of the stream valley and will be reforested. None of the impervious road surface will be within the buffer. The road crossings have to conform to the county guidelines for environmentally sensitive road crossings which encourage reduction of the crossing footprint and maintenance of the stream channel. Stormwater management facilities require some forest clearing, but will be reforested to the extent possible. The sewer easements avoid the most sensitive areas and will be reforested. In all instances, intrusions into the stream buffers were minimized.

Another danger to streams and stream buffers on this site is the large area and amount of grading that will be done within the development area. As protection, phasing and extraordinary and redundant sediment and erosion control measures are required during construction. To ensure that these measures are adequate, effective, and in good working order, an independent inspector funded by the applicant will be retained by MCDPS to monitor the sediment control devices and deal with potential problems.

3.1.4e Stormwater Management

Stormwater management is provided by several on-site water quantity and quality facilities. Water quality control will be provided by an extensive series of Best Management Practices (BMP's) including; sand filters, bioretention, and clean water recharge areas. These facilities are linked together with the quantity control facilities which consist of a dry pond within the western stream valley and a wet pond located within the development area on the east side of the property. The wet pond will be designed with as many features as possible to reduce the temperature of water entering the stream from the pond outfall. The stormwater management facilities are linked together so that they provide extraordinary and redundant stormwater management controls.

3.1.4f Forest Conservation

The site plan meets all applicable requirements of Chapter 22A regarding forest conservation. Forest Conservation requirements for this phase of the development have been met by the preservation of approximately 16 acres of existing forest, with additional planting of approximately 8 acres.

Most of the forest retention and planting areas are within stream valleys that will be dedicated as park land. A Category I Conservation easement will be placed over the forest conservation and buffer areas outside of park dedication as shown on the Forest Conservation Plan.

3.1.5 Summary of Stream Monitoring in the Clarksburg Master Plan SPA

Baseline SPA stream monitoring began in the Fall of 1994 at seventeen (17) stations throughout the Clarksburg SPA (Figure 3). Monitoring in 1998 added three (3) new stations in Little Seneca and two (2) in Ten Mile Creek. These new stations are development related and are located in such a way as to monitor impacts from new development planned for the area.

3.1.5.a Biological monitoring

Little Seneca

The benthic macroinvertebrate community has been monitored throughout Little Seneca in 1995, 1996, 1997 and 1998. The fish community monitoring was done in 1994, 1995, 1997 and 1998.

Results of monitoring the fish community in Little Seneca indicate good / excellent stream conditions exist throughout the watershed (Figure 4). In addition, the temporal variability is very small indicating stability in the fish community even though weather conditions varied greatly over the four year period.

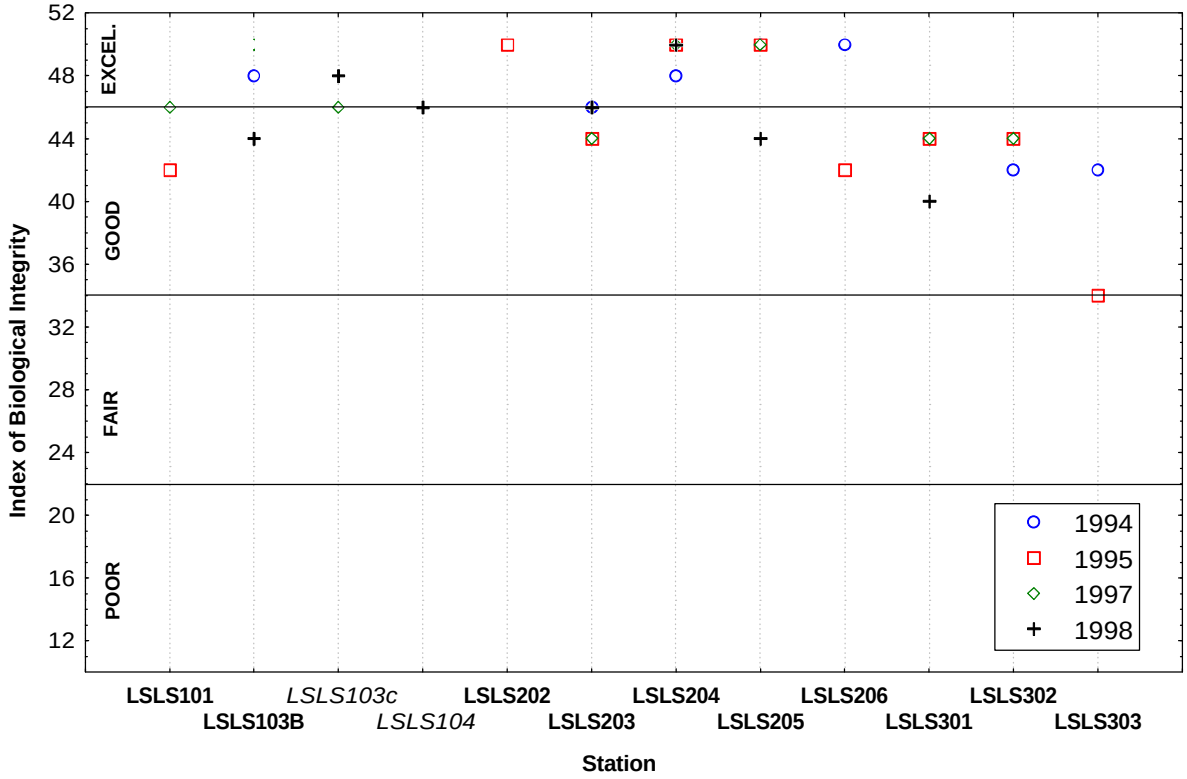


Figure 4. Results of Monitoring the Fish Community in Little Seneca Creek (Stations in Bold are Baseline Stations, Those in Italics are Development related)

Results from monitoring the benthic macroinvertebrate community also indicate a good / excellent stream condition throughout Little Seneca (figure 5). However, there does appear to be more variability in the benthic macroinvertebrate community. This variability is attributed to changing weather conditions over the three year period and consequently changes to the flow regime. Benthic macroinvertebrates generally will show more response to changes in flow regime, particularly high flow events, because they can not escape or seek refuge along the banks as fish can. Their habitat is primarily the riffles in a stream and if a high flow event is enough to move the rocks making up the riffle then much of the community is swept away. The stream habitat and biological community will recover from such events provided the flow regime allows it .

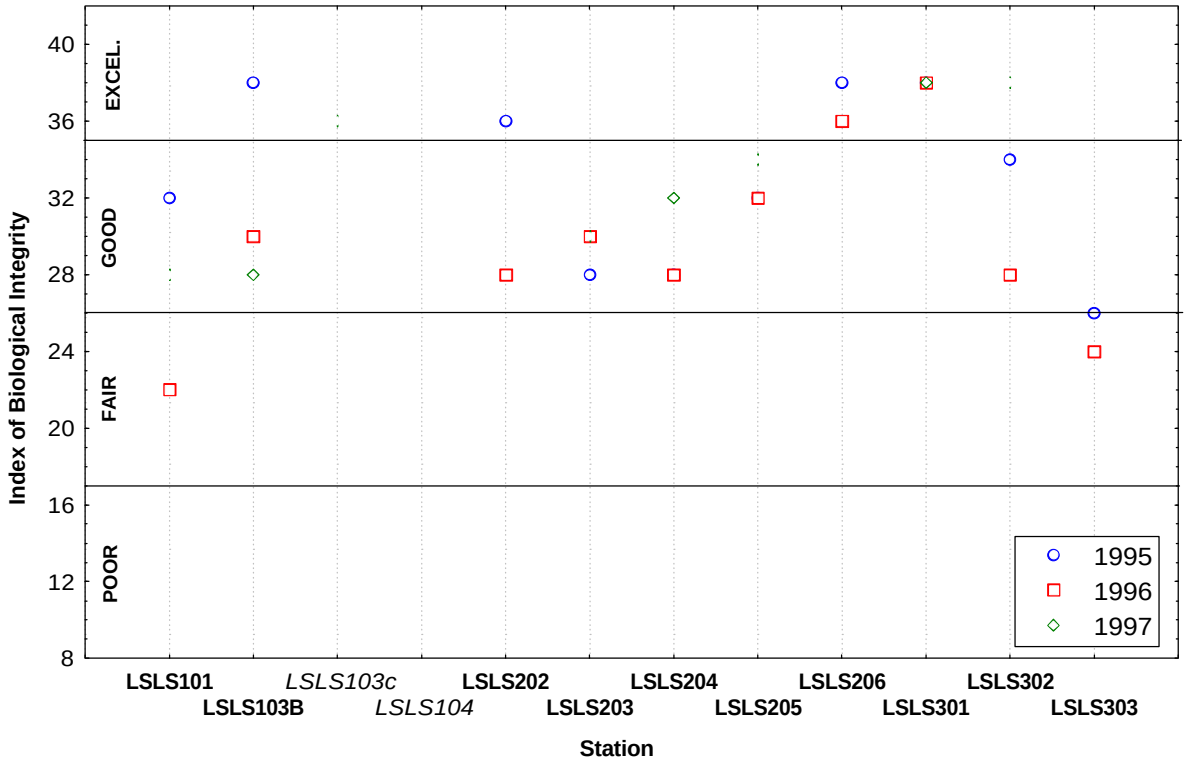


Figure 5. Results of Monitoring the Benthic Macroinvertebrate Community in Little Seneca Creek (Stations in Bold are Baseline and Those in Italics are Development Related)
*note - 1998 benthic macroinvertebrate data not available for this report

In summary, monitoring the biological community in Little Seneca Creek over the past four years has provided us with a good deal of understanding of current stream condition and the degree of natural variability. Understanding the degree of natural variability before development occurs will be important when determining development related impact in the near future.

Ten Mile

Biological monitoring was completed at five (5) stations in Ten Mile Creek SPA during 1998. One (1) station was added in 1997 (LSTM206) to monitor for impacts from the Clarksburg Detention Center.

Results from four years of monitoring the fish community indicate a good / excellent stream condition exists throughout Ten Mile Creek SPA (Figure 6). However, there is more temporal variability in Ten Mile Creek then in Little Seneca Creek. This could be attributed to the flow regime in Ten Mile Creek. Baseflows during dry periods tend to be lower in Ten Mile Creek then those observed in Little Seneca and consequently less available fish habitat.

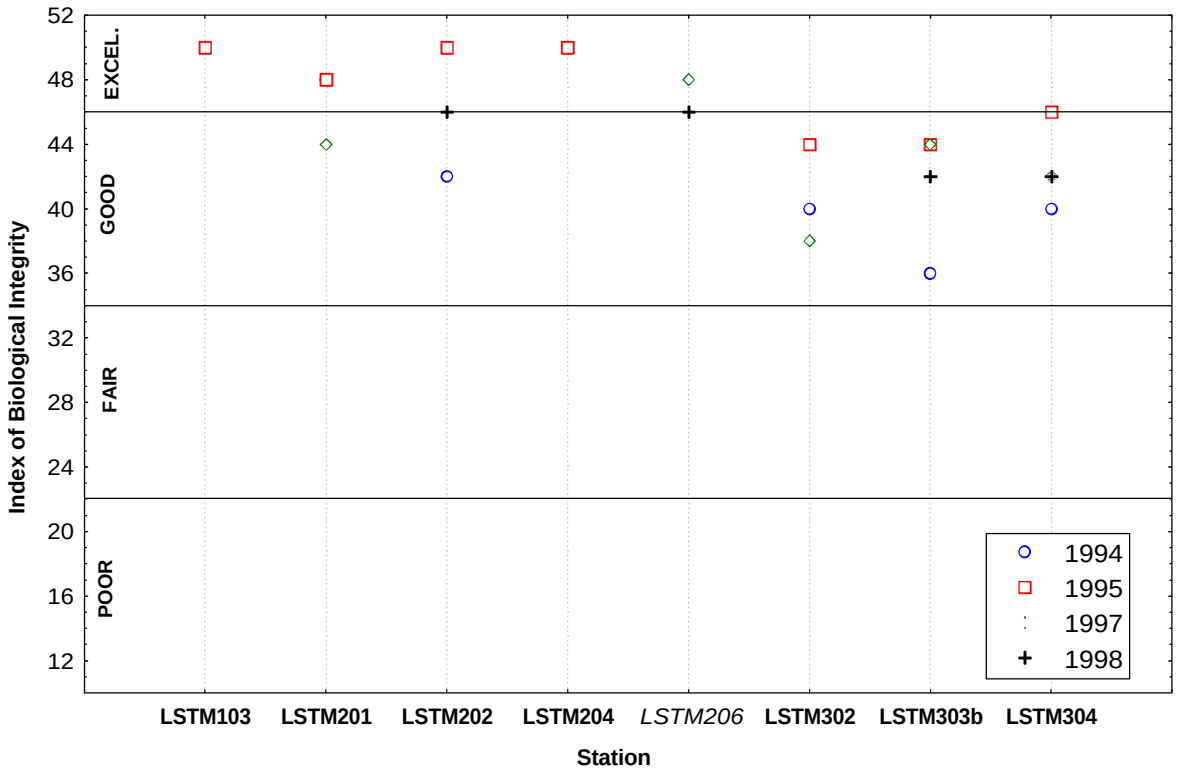


Figure 6. Results of Monitoring the Fish Community in Ten Mile Creek (Stations in Bold are Baseline, Those in Italics are Development Related)

Results from three years of monitoring the benthic macroinvertebrate community also indicate a good /excellent stream condition exists throughout Ten Mile Creek (figure 7). The temporal variability seen in Ten Mile Creek is consistent with that seen in Little Seneca Creek. This natural variability is largely attributable to weather conditions.

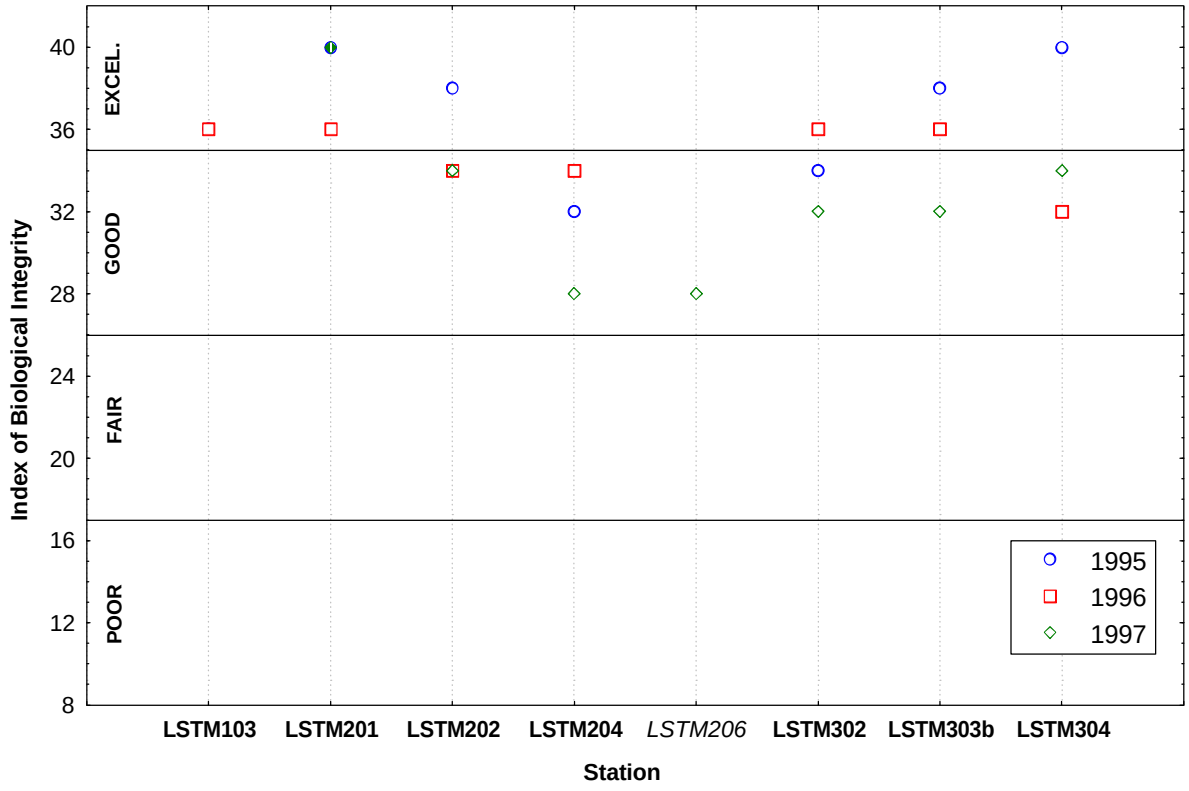


Figure 7. Results of Monitoring the Benthic Macroinvertebrate Community in Ten Mile Creek (Stations in Bold are Baseline, Those in italics are Development Related)
* note - 1998 benthic macroinvertebrate data not available for this report

In summary, biological monitoring over the last four years indicate that a healthy high quality ecosystem exists throughout Ten Mile Creek. As in Little Seneca Creek, some natural variability is seen in the data. We feel we have a good understanding of the extent of natural variability in the biological community residing in Ten Mile Creek.

Wildcat Branch

The entire Wildcat Branch watershed was monitored during 1997 as part of the County's baseline monitoring program and stream condition was found to be excellent. The Wildcat Branch watershed contains a naturally reproducing brown trout population and is a coldwater stream system classified as a Use III-P watershed by Maryland. Wildcat Branch has an excellent overall stream condition and is within the Watershed Protection (Special) management category in the Countywide Stream Protection Strategy (Rowe et al, 1998)

3.1.5.b Habitat monitoring

Qualitative habitat assessment

A rapid habitat assessment is conducted whenever biological monitoring is done. This is a qualitative habitat assessment evaluating 10 habitat parameters. The scores for each parameter are summed and the score is used to assign a narrative habitat condition of either optimal, sub-optimal, marginal, or poor at each monitoring station. The rapid habitat assessment score is also used to determine if stream habitat is the primary source of impairment to the biological community, limiting the ability of the community (fish, benthic macroinvertebrates) to maintain or improve their condition.

Little Seneca Creek

Habitat assessments conducted between 1994 and 1998 indicate all stations in Little Seneca ranked in the optimal to suboptimal ranges, there were several individual habitat parameters that were observed to be in the marginal to poor ranges. Existing fine sediment loads in the pools and riffle areas are high enough to warrant special concern during any construction activity in the watershed. Stream buffers in several areas privately owned by development interests are also lacking or very small. As future SPA Water Quality Plans are reviewed, consideration should be given to improving these stream buffer areas now while the properties are undeveloped and leased for farming so that high quality buffers are in place as areas are developed.

Ten Mile Creek

Habitat condition in the Ten Mile Creek SPA also ranked in the optimal to suboptimal range at all stations during the 1994 to 1998 time period. An examination of all assessments done over the four year revealed no single habitat parameter in the marginal to poor range throughout the watershed.

Stream channel morphology assessment

Little Seneca Creek

Monitoring stream channel cross section was conducted at all Little Seneca baseline stations and in three (3) new development related stations during 1998. This completed the third year of monitoring at most stations and gives a good indication of channel stability. Most channel cross sections have remained unchanged over the three year period (Figure 8).

At station LSLS206 significant changes to stream channel width occurred between 1996 and 1997 and were identified in the1998 SPA Annual Report. Monitoring in 1998 revealed no further change in channel cross section (figure 9).

The stream channel throughout most of Little Seneca Creek SPA is not downcut into the stream valley (entrenched) to the degree of preventing the stream access to the floodplain during floods.

This access is critical in maintaining high quality channel conditions.

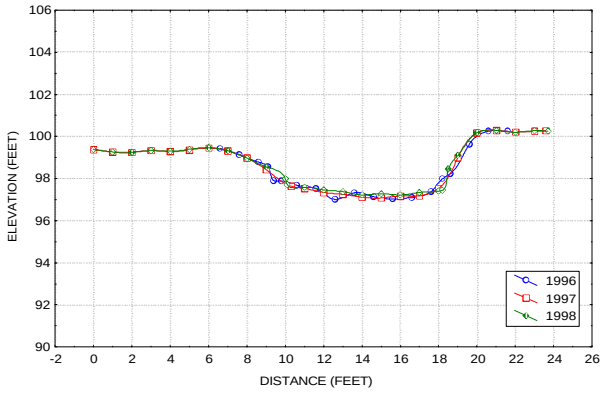


Figure 8. Channel Cross Section at LSLS203

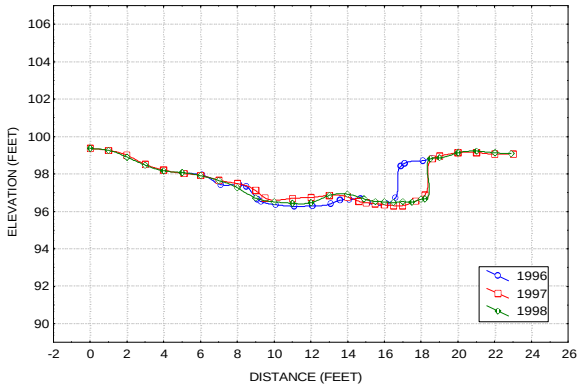


Figure 9. Channel Cross Section at LSLS206

Ten Mile Creek

Monitoring in Ten Mile Creek during 1998 revealed very little change to channel morphology in most areas as illustrated in figure 10. The lower reaches of the tributary which originates in Clarksburg, identified in the 1998 SPA Annual Report as exhibiting moderate shifting and movement of streambed material, continued to show moderate change in 1998 (figure 11). Much of the change seen in 1998 can be attributed to a large tree fall immediately downstream of the cross section and caused some buildup of the left bank. Further up this tributary at station LSTM206 the stream channel showed no change between 1997 and 1998.

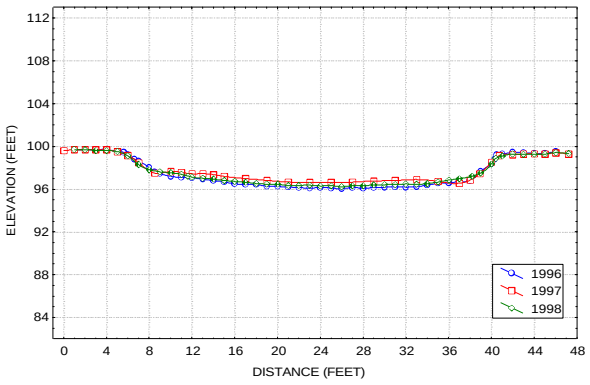


Figure 10. Channel Cross Section at LSTM303B

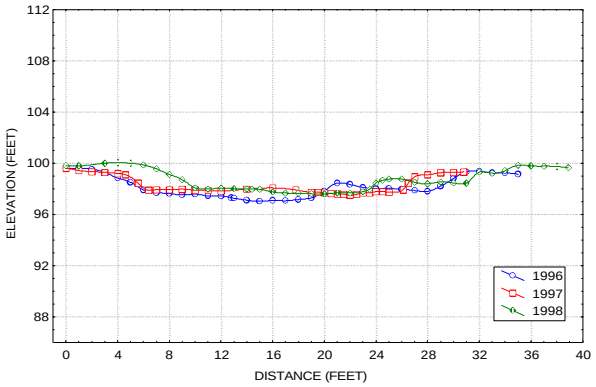


Figure 11. Channel Cross section at LSTM202

Most of the stream channels throughout Ten Mile Creek are not entrenched. Therefore, the stream has access to the flood plain during flood events which is important in mitigating the potential downstream impacts of erosive flows from storm events.

3.1.5.c Stream temperature monitoring

Stream temperature monitoring was conducted at three (3) of the new development related stations in Little Seneca Creek during the summer of 1998 (figure 12). All three of these stations were found to maintain water temperatures well below the criteria for Use IV streams in Maryland (24^0C) regardless of the fact that 1998 was a warmer and dryer year then normal.

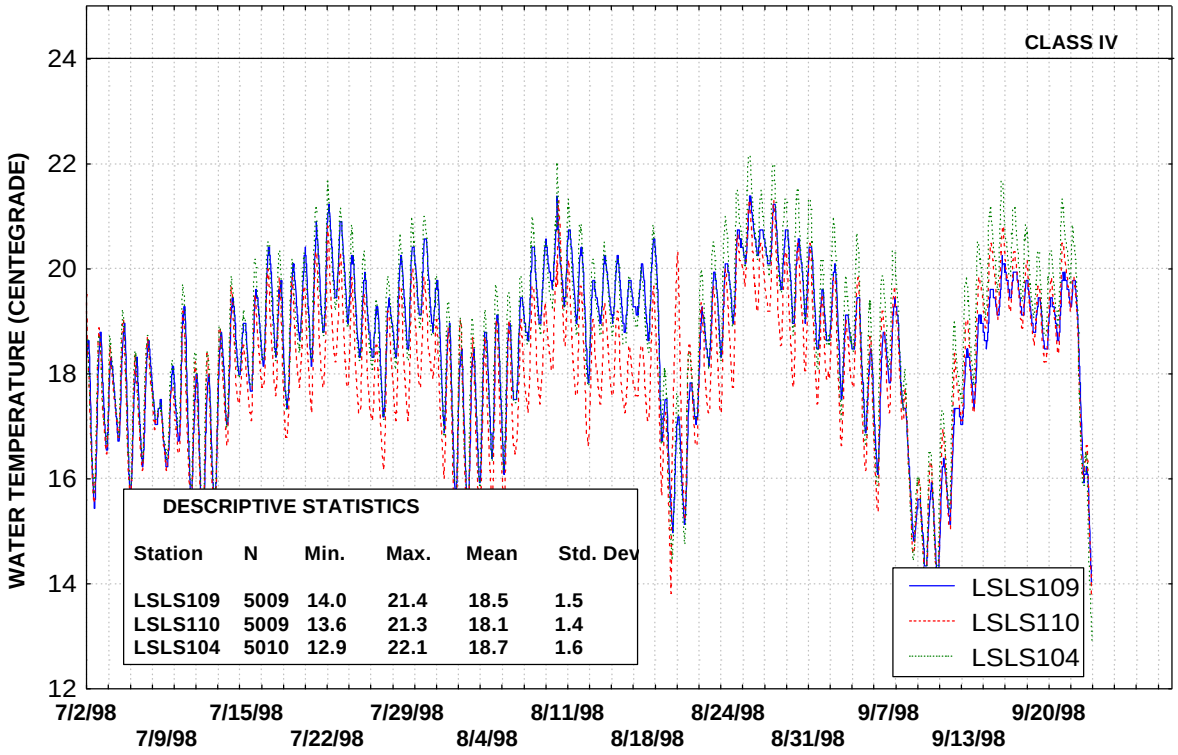


Figure 12. 1998 Water Temperatures in Tributaries of Little Seneca Creek

Temperature monitoring was conducted at four locations in Ten Mile Creek and were also found to stay below the Use IV limit during the summer of 1998. Two locations were monitored in the East Tributary at station LSTM206 and LSTM202 (figure 13). Temperatures were similar at both stations until late August when station LSTM202 began to show large daily temperature ranges. We attribute this to the pool in which the temperature logger was deployed getting low enough to expose the logger to air temperatures.

Two stations were monitored on the mainstem of Ten Mile, one in the headwaters area (LSTM201) and the other lower down on the mainstem (LSTM303B). Water temperatures remained below the Use IV limit at both of these stations throughout the summer of 1998 (figure 14).

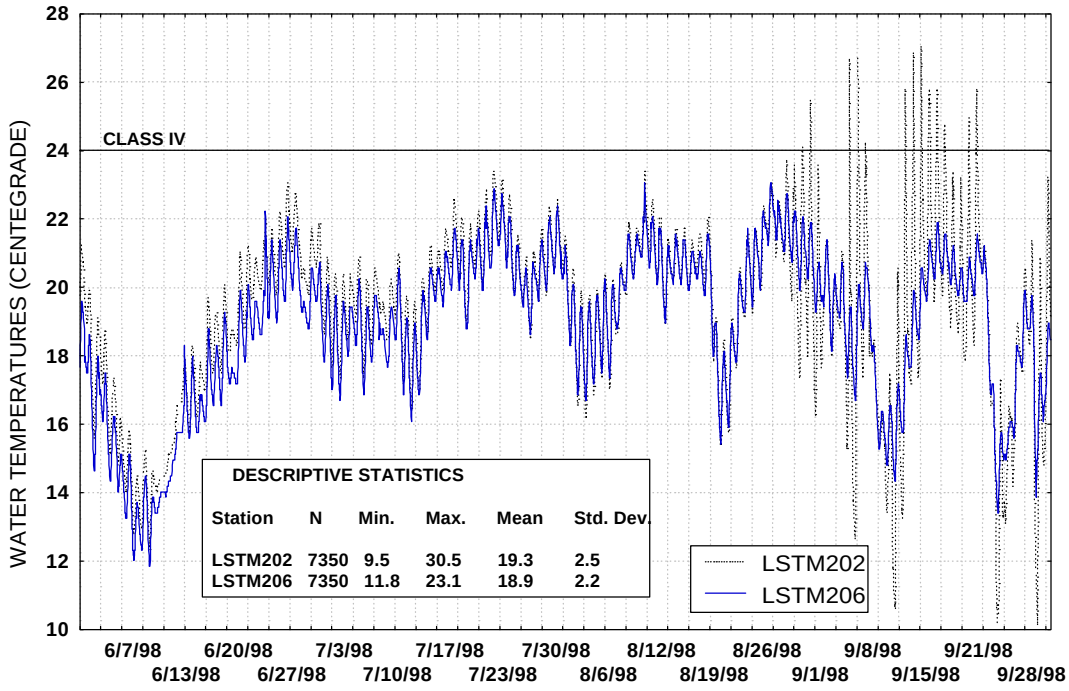


Figure 13. 1998 Water Temperatures in the East Tributary of Ten Mile Creek.

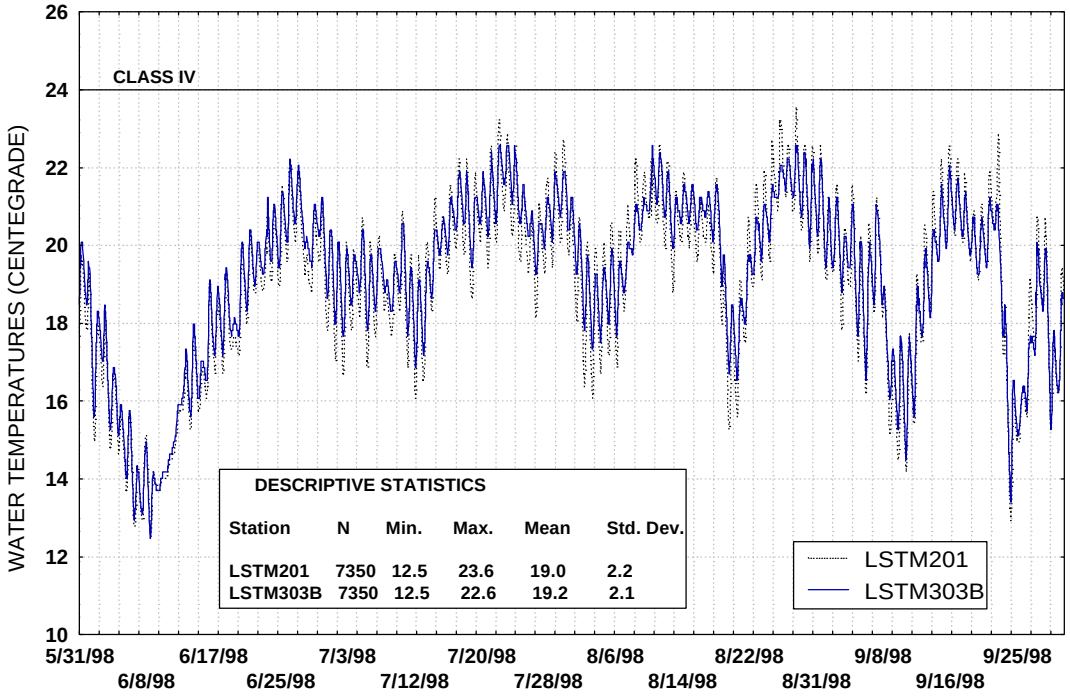


Figure 14. 1998 Water Temperatures in the Mainstem of Ten Mile Creek

3.1.6 Status of BMP Monitoring in the Clarksburg Master Plan SPA

Currently, the only sites where baseline data is being collected to support future BMP monitoring are the Clarksburg Town Center and the Clarksburg Detention Center. Monitoring parameters along with the dates of when the data was collected are presented in table 2. Monitoring requirements for any given development are based on the nature of the development (e.g. residential, commercial, industrial) and the performance goals for the development established at the pre-application meeting.

Table 2. BMP Monitoring Data From Little Seneca Special Protection Area

PROJECT NAME & CONSULTANT CONDUCTING THE MONITORING	REQUIRED BMP MONITORING	REQUIRED TIME FRAME FOR BMP MONITORING	DATA SUBMITTED THUS FAR
Clarksburg Detention Center / Chester Engineers	**3 groundwater wells** *Ammonia, Total Phosphorus, Total Nitrogen, Specific Conductance, Nitrate, pH, Ortho-Phosphorus* **1 rainfall logger** - *along with the flow logger* **1 flow logger (SWM pond discharge rate)** **1 continuous temperature logger**	**pre-development monitoring:** 6 months **during-construction monitoring:** until site is stabilized and sediment control ponds converted to stormwater management ponds **post-construction monitoring:** 3 years	**groundwater data:** 1/98 - 2/99 **rainfall data:** 1/98 - 2/99 **flow data:** 1/98 - 2/99 **temperature data:** 1/98 - 2/99
Clarksburg Town Center / Biohabitats	**1 continuous flow logger** **1 rainfall logger -** along with flow logger **3 continuous temperature logging stations** **4 surface water quality stations:** *VOC, Oil and Grease, Herbicides & Pesticides, NO2, NO3, TN, TP, TSS, Metals, pH, DO, Conductivity*	**pre-development monitoring:** 1 year **during-construction monitoring**: until all infrastructure is installed, site stabilized and 50% of lots developed **post-construction monitoring**: 5 years	**flow and rainfall data:** 4/97 - 3/98 **temperature data:** June - September 1997 **surface water quality:** 4/97 & 6/97

Most of the BMP monitoring data listed in table 2 is pre-construction or baseline data that is used to establish conditions before construction begins. The during and post-construction data will be compared to pre-construction data and thus allow for the evaluation of both site design and BMP structures in meeting the performance goals for the site.

3.2 UPPER PAINT BRANCH SPECIAL PROTECTION AREA

3.2.1 SPA Designation History for the Upper Paint Branch SPA

The Paint Branch watershed is a high quality stream designated by the state of Maryland as Use III waters in the portion north of I-495. Paint Branch supports a naturally reproducing brown trout population. Previous long term biological and habitat monitoring results had indicated that certain portions of the watershed are experiencing considerable stress from land development activities. In order to protect this watershed and its delicate natural resource, the County Council designated the Upper Paint Branch watershed above Fairland Road a Special Protection Area on July 11, 1995. Included in this designation is a requirement for a ten percent impervious area cap on all new development in the SPA portion of the watershed (originally recommended by the 1981 Eastern Montgomery County Master Plan). Upper Paint Branch is currently the only SPA which has a specific limit on site imperviousness for new development throughout the SPA.

The SPA requirements, criteria, and guidelines are applied to all proposed land-disturbing activities. Unlike the other SPAs, there are no exemptions from SPA provisions related to a proposed project's size or land use. These specific requirements to the Upper Paint Branch SPA are strictly applied to all new development and most redevelopment within the SPA (Table 3). However, if a hardship condition is determined, the Planning Board or DPS, as applicable, may waive any or all of the SPA requirements, criteria, and guidelines for a project as a part of the water quality plan review and approval.

To provide additional environmental protection, the County Council approved an environmental overlay zone for the Upper Paint Branch SPA in July, 1997. The overlay establishes the ten percent site imperviousness cap as a regulation, prohibits certain land uses, requires special land management practices for certain special exceptions, and establishes very limited provisions for grandfathering, exempting, and waiving specific, existing uses from the site imperviousness cap.

DEP is pursuing separate capital project initiatives in the Upper Paint Branch SPA to improve the management of runoff from previously developed areas and mitigate isolated pockets of habitat damage that had occurred before the SPA program was established. As of April 1999 a total of seventeen (17) projects are in the design phase, ten (10) in the Good Hope subwatershed, three (3) in the Gum Springs subwatershed, two (2) in the Right Fork subwatershed and two (2) in the Left Fork subwatershed. Three (3) of these projects are scheduled to start construction during the summer of 1999. These projects are intended to supplement improvements in watershed management achieved through the SPA permit process. DEP has worked closely with the M-NCPPC and other agencies to inventory some 75 potential stream habitat restoration, wetlands creation, and stormwater retrofit project opportunities. Some of these are capital projects. Others involve small habitat restoration and wetlands and tree plantings that can be partially implemented by volunteers.

3.2.2 Description of the Watershed Within the Upper Paint Branch SPA

Paint Branch is recognized as a unique County resource due to its ability to support a naturally

reproducing trout population in a suburban setting. The Upper Paint Branch SPA encompasses the entire watershed above Fairland Road (Figure 15) and is divided into five (5) subwatersheds; the Left Fork, the Right Fork, Gum Springs tributary, Good Hope tributary, and the Paint Branch mainstem.

Numerous studies have generally found that the Good Hope tributary is the primary trout spawning and nursery area for the Paint Branch system. This tributary consistently produces the highest percentage of young-of-year trout within the entire Paint Branch watershed. Gum Springs and the Right Fork subwatersheds supply water of excellent quality and also trout spawning habitat. Similarly, the Left Fork provides high water quality and acceptable habitat for trout, but is not consistently used as a spawning and nursery area. Each of these subwatersheds is important in maintaining the water quality, in-stream habitat and overall ecological health within the Paint Branch mainstem.

3.2.3 Status of Development in the Upper Paint Branch SPA as of February 1999

The majority of proposed development projects within the Upper Paint Branch SPA have been for residential use (Table 3). Exceptions are the proposed Safeway store in Cloverly (sediment control permit pending), the Fairland Community Recreation Center (under construction), the Good Hope Union United Methodist Church (under construction), the Cedar Ridge Community Church (under construction), and the Spencerville Post Office (under construction).

Conformance to the ten percent site imperviousness cap is an important part of the development projects listed in Table 3. Of the non-residential projects that have obtained Planning Board approval (and Planning Board and DPS approval of the water quality plans), two projects were either granted a waiver of the 10 percent impervious cap or will acquire land (known as pervious area reserve land) outside the projects' original boundaries to maintain pervious and vegetative cover and achieve the specified site imperviousness limit. The Fairland Community Recreation Center meets the ten percent cap with additional land to be purchased off-site (but within the SPA) and placed in conservation easement; the Good Hope Union United Methodist Church project reduced its imperviousness from 32.7 percent to 17.8 percent through the purchase of pervious area reserve land, and the Planning Board approved a waiver of the remaining impervious area over the ten percent cap in recognition of the church's long-standing ties to the Good Hope community and the hardship involved. The Planning Board approved a waiver of the 10 percent impervious cap for the Cloverly Safeway project based on the community benefits of this development (including the creation of a new store that is greatly desired by the community, and the creation of stormwater management facilities on a commercial site that currently has no stormwater controls). Additionally, the Planning Board determined that the impervious cover was reduced as much as possible (originally proposed 75% cover and ultimately reduced to 68% cover), while meeting all of the other development requirements.

Development projects that have been approved by the Planning Board incorporate forest preservation and planting areas and protection of environmental stream buffers. Some of these projects involve the creation of parkland to provide the needed protection for environmentally-sensitive areas. These new areas of parkland are consistent with the proposed park

Figure 15. Map of Upper Paint Branch Special Protection Area

recommendations of the Cloverly Master Plan, Fairland Master Plan, and the 1995 Limited Amendment to the 1981 Eastern Montgomery County Master Plan. Specific acreages of parkland acquisition and conservation easements obtained to protect environmentally sensitive areas will be reported in future annual reports.

Of the 26 active projects listed in Table 3, a total of 17 final water quality plans have been approved as of February 1999. Several of the projects are in the path of the proposed InterCounty Connector alternative routes. The Maryland State Highway Administration placed one site (Allnut/Peach Orchard Estates), which was under construction, in reservation pending decisions on Inter-County Connector (ICC) alignment alternatives. Most of the approved projects are for residential development and consist of small subdivisions of 10 lots or less. Since there are no exemptions for smaller projects within this SPA, each of these projects and similar ones being proposed must comply with SPA regulations. However, several of the projects listed did not need to get a plan of subdivision and therefore were not required to submit a water quality plan. These projects must submit a water quality inventory and meet all of the requirements of the environmental overlay zone.

To comply with the overlay zone requirements, DPS requires proof that each application for building permit not part of a Planning Board- approved project or not requiring Planning Board approval, will not exceed a ten percent impervious cap. Imperviousness limits set as part of a Planning Board approval of a project are enforced through a written agreement between the Board and the applicant.

Table 3. Upper Paint Branch SPA Development Projects (1995 to February 1999)

PROJECT NAME	SPA LOCATION	DEVELOPMENT SIZE, TYPE	STATUS
Allnutt/Peach Orchard Estates	Right Fork Tributary	141 acres, 130 lots, RE-1 cluster option adjoining 2 subdivisions were concurrently reviewed. Includes parkland dedication.	Preliminary and final water quality plans approved. Sediment control permit issued. Project construction started; however, site is now in reservation due to its location in an alternative ICC route.
Baldi Property	Right Fork	58.15 acres, 56 lots proposed	Preliminary/Final water quality plans approved.
Calvin Williams Subdivision	Good Hope Tributary	1.0 acre	No plan of subdivision. Sediment control permit issued. Overlay zone requirements conditionally waived due to long driveway created by flag lot. Onsite stormwater management to be provided.
Cloverly Safeway	Good Hope Tributary	2.6 acres, C-1 Renovation	Preliminary/Final water quality plans approved. Sediment control permit pending.
Colesville Heights	Left Fork Tributary	0.5 acres, RE-1, 1 lot	Preliminary and final water quality plans approved. Sediment control permit issued.
Davila Residence, Ethel Lee Pell property	Left Fork	2.0 acres, RE-1 1 lot	No plan of subdivision. Meets overlay zone requirements. Construction complete.
Drayton Farms	Left Fork Tributary	63.5 acres, RE-1 cluster option	Preliminary and final water quality plans approved. Application made for sediment control permit. Located in a proposed ICC alternative route.
Fairland, Freedmans Addition to	Upper Paint Branch, Mainstem	0.4 Acres	No plan of subdivision. Sediment control permit issued. Overlay zone requirements met.
Fairland Gardens	Right Fork Tributary	5.9 acres, R-200, 5 lots previously approved, with 3 new lots proposed)	Preliminary and final water quality plans approved. Sediment control permit issued for 1 lot.
Fairland Community Recreation Center	Right Fork	9.8 acres	Preliminary and final water quality plans approved. Under construction.
Good Hope Estates	Left Fork Tributary	3.9 acres, RE-1 3 lots	Preliminary and final water quality plans approved. Sediment control permit pending.
Harding Subdivision	Upper Paint Branch, Mainstem	2.6 acres, R-200	Preliminary/Final water quality plans approved.

Table 3. (continued)

PROJECT NAME	SPA LOCATION	DEVELOPMENT SIZE, TYPE	STATUS
Harding's Subdivision, Lot 16	Upper Paint Branch, Mainstem	0.7 acre	Not a plan of subdivision. Sediment control permit issued. Overlay zone requirements waived with conditions due to lot setback requirements in an established neighborhood.
Hunt Property - Lions Den	Right Fork	78.7 acres, RE-1	Preliminary water quality plan submitted. Review on hold.
Hunt Property - Miles Tract	Right Fork	48.2 acres, PD-2	Preliminary water quality plan submitted. Review on hold.
Good Hope Union United Methodist Church	Good Hope Tributary	7.7 acres proposed church	Preliminary and final water quality plans approved, as revised. Sediment control permit issued. Under construction.
Kaplan Property	Right Fork Tributary	2.17 acres, R-200, 2 lots	Preliminary and final water quality plans approved
Bailey Thompson Property	Left Fork Tributary	9.8 acres, RE-1 cluster option, proposed 5 lots includes parkland dedication and acquisition.	Preliminary and final water quality plans approved. Sediment control permit issued. Under construction.
Snowdens Manor, Enlarged P572	Good Hope Tributary	1.0 acre	No plan of subdivision. Sediment control permit issued. Overlay zone requirements met.
Spencer Farm - Cedar Ridge Community Church	Right Fork	12.3 acres, Proposed church	Preliminary and final water quality plans approved. Sediment control permit issued. Under construction.
Spencerville Post Office	Right Fork	3.9 acres, RE-1 Proposed U.S. post office	Preliminary and final water quality plans approved but are currently being revised. Sediment control permit issued by MDE. Currently under construction.
Cloverly Town Center	Good Hope Tributary	3.13 acres, C-1 (0.57 acres in SPA)	Preapplication meeting held
Fairland Acres	Upper Paint Branch Mainstem	3.7 acres, R-200	Preliminary / final water quality plans approved. Sediment control permit pending
Hardings Subdivision - Parcel 135	Upper Paint Branch Mainstem	1.0 acres, R-200	Preliminary / final water quality plans approved
LaRoe Property	Left Fork	14.4 acres, RE-1 (9.4 acres in SPA)	Preliminary water quality plan under review
Old Columbia Pike Pedesrian Improvements	Upper Paint Branch	0.75 acres, Roadway / Sidewalk	Preliminary / final water quality plans approved

3.2.4 Status of BMP Monitoring in the Upper Paint Branch SPA

Currently, two projects (Peach Orchard/Allnut Estates and Briarcliff Manor) are conducting pre-development monitoring . However, construction has been halted at Peach Orchard / Allnut pending a decision on ICC alternative routes. Both projects are located in the Right Fork subwatershed and have been approved as medium density residential subdivision. A summary of BMP monitoring requirements and data received is presented in table 4 .

Table 4. Summary of BMP Monitoring in Paint Branch

PROJECT NAME & CONSULTANT CONDUCTING THE MONITORING	REQUIRED BMP MONITORING	REQUIRED TIME FRAME FOR BMP MONITORING	DATA SUBMITTED THUS FAR
Peach Orchard-Allnut / Biohabitats	**4 groundwater observation wells** *water level* **2 stream flow loggers** **1 rainfall logger** *along with one of the flow loggers* **2 continuous temperature loggers** **surface water quality** *pH, Conductivity, Dissolved Oxygen* **embeddedness**	**pre-development monitoring:** 1 year **during construction monitoring:** until entire project is stabilized and all sediment control measures are removed **post-construction monitoring:** 2 years	**groundwater data:** 7/96 -1/98 **stream flow data:** 7/96 - 1/98 **rainfall data:** same as flow data **temperature data:** 7/96 - 1/98 **surface water quality data:** 7/96 - 1/98 **Embeddedness data:** 7/96 - 1/98
Briarcliff Manor West (formerly Baldi Property) / Environmental Systems Analysis, Inc.	**1 groundwater observation well** **2 surface water quality stations:** *pH, Conductivity, Dissolved Oxygen, Turbidity* **4 continuous water temperature loggers** **2 embeddedness stations** **channel cross section** **1 stream flow logger**	**pre-development monitoring :** 1 year **during-construction monitoring:** until site is stabilized with functioning stormwater management facilities **post-construction monitoring:** 1 year	**groundwater data:** 9/98, 11/98, 12/98 **surface water quality data:** 9/98, 11/98 **temperature data:** 9/98 - 11/98 **embeddedness data:** 9/98 **channel cross section data:** 9/98 **stream flow data:** 11/98 - 1/99

BMP monitoring data listed in table 4 is pre-construction or baseline data that is used to establish conditions before construction begins. The during and post-construction data will be compared to pre-construction data and thus allow for the evaluation of both site design and BMP structures in meeting the performance goals for the site.

3.2.5 Summary of Stream Monitoring in the Upper Paint Branch SPA

DEP has been monitoring stream condition in the Paint Branch Special Protection Area for five years beginning in 1994. In 1998 DEP monitored fourteen (14) stations located throughout the SPA. Three new stations were monitored in the Right Fork during 1998 in anticipation of new development planned for this area.

3.2.5.a Biological Monitoring Results for Paint Branch

Results from five years of biological monitoring are presented in Figure 16 and illustrate the fish and benthic macroinvertebrate community condition (as expressed by interim IBI scores) at all monitoring stations in the Upper Paint Branch SPA.

Right Fork

Biological monitoring in the Right Fork during 1998 revealed no significant change in community composition for either fish of benthic macroinvertebrates. Three new stations were monitored in 1998 in order to pick up and isolate any impacts coming off new development planned for this area. Stations PBAT101 and PBLD101 are located on tributaries that are too small to support a stable fish community. Therefore, only the benthic macroinvertebrates are monitored at these two stations. Results from these two stations are indicative of good / excellent stream condition.

The other new station (PBRF206) monitored in 1998 is located in the lower portion of the Right Fork. Both fish and benthic macroinvertebrates were sampled here and found to be indicative of excellent stream condition.

Brown trout young-of-year were found at all Right Fork stations that were fished in 1998, indicating that the mainstem of the Right Fork continues to provide excellent water quality necessary to support successful spawning of this species.

Left Fork

Due to the fact that there is no significant land disturbance that either has occurred or will occur in the near future within the Left Fork subwatershed, biological monitoring was scaled back in 1998. Benthic macroinvertebrate sampling was done at station PBLF203 because of the high degree of temporal variability seen at this station in previous years. Results from 1998 indicate a good benthic macroinvertebrate community present (Figure16). This is a considerable improvement from 1996 and 1997 when the benthic macroinvertebrate community was found to be of poor/fair quality. A possible cause of the impairment in 1996 and 1997 is the work that was done to the stormwater pond at Rainbow Drive during this period. Sediments were removed from the pond and a baseflow by-pass was installed to mitigate thermal impacts. This disturbance may have resulted in enough sediment entering the stream to cause impacts to the benthic macroinvertebrate community downstream at station PBLF203. Thermal impacts may also play a role here. Water temperature monitoring during 1998 has shown that temperatures briefly reach higher levels during storm events at station PBLF203 (Figure 22).

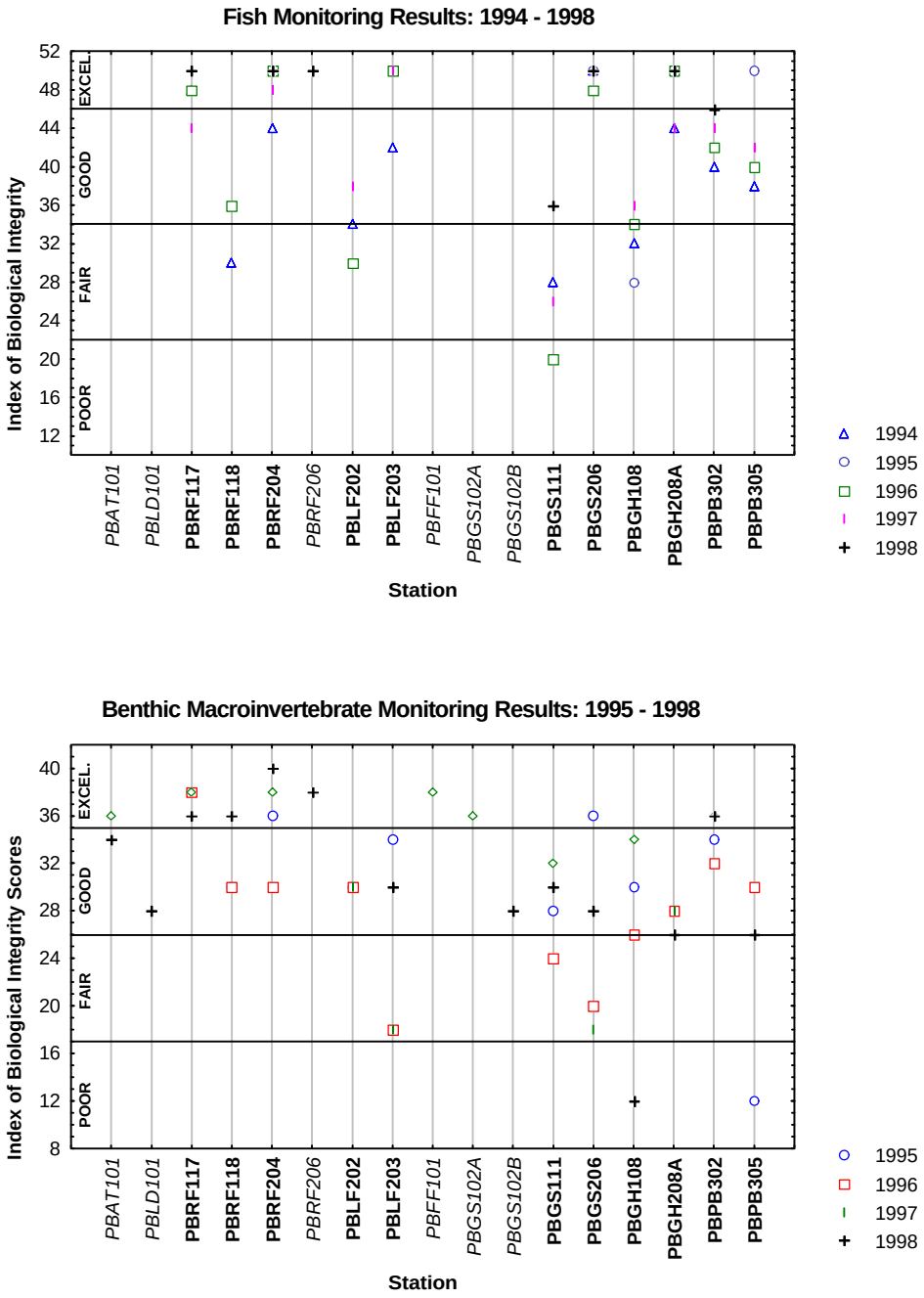


Figure 16. Results of Biological Monitoring in Paint Branch for the Period 1994 - 1998 (Stations in Bold are Baseline Stations, Those in Italics are Development Related Stations)

Gum Springs

Biological monitoring was conducted at three stations in the Gum Springs subwatershed during 1998. Fish and benthic macroinvertebrates were sampled at stations PBGS111 and PBGS206. The stream at station PBGS102B is too small to support a stable fish community, therefore only benthic macroinvertebrate monitoring is done at this station.

Results from monitoring the fish community since 1994 indicate a higher degree of temporal variability at station PBGS111. This is due to slow recovery from several acute impacts that occurred between 1994 and 1996. The fish community is slow to recover due to the location of this station approximately 1 mile upstream from the mouth of Gum Springs. It has taken several years for some fish species (particularly brown trout) to re-colonize this area of Gum Springs. Results from 1998 fish monitoring show a significant improvement at station PBGS111 due mostly to the presence of adult brown trout.

Downstream at station PBGS206 the fish re-colonize faster following disturbances due to the close proximity of this station to the Paint Branch mainstem. Results from 1998 monitoring show that this area of Gum Springs continues to support a diverse high quality fish community.

Benthic macroinvertebrate monitoring since 1994 has shown a high degree of temporal variability in lower Gum Springs at station PBGS206 and less variability upstream at stations PBGS111 and PBGS102B. The higher variability seen in lower Gum Springs is possibly the result of cumulative impacts from throughout this subwatershed. The benthic macroinvertebrates are much less mobile then fish and can not move in and out of an impaired area as fast. If water quality conditions degrade enough many of the taxa making up the benthic community will release and drift downstream to escape poor water quality or die. Once water quality improves the benthic macroinvertebrate community re-colonizes in two ways: 1)drift from upstream sources and 2) egg deposition by adult forms. It generally will take one year for re-colonization to occur. This re-colonization is occurring in lower Gum Springs (PBGS206) as indicated by 1998 sampling results.

Results of benthic macroinvertebrate sampling at the other Gum Springs stations (PBGS111 and PBGS102B) in 1998 indicate that community condition is unchanged from that found in1997.

Good Hope Tributary

Biological monitoring was conducted at two stations in the Good Hope subwatershed in 1998. Both faunal groups were sampled at station PBGH208A and benthic macroinvertebrates were sampled at PBGH108.

Monitoring results from station PBGH208A for both the fish and benthic macroinvertebrates indicate that stream condition remains in the good/excellent range with little change from 1997.

Results from monitoring the benthic macroinvertebrate community at station PBGH108 indicate a disturbance has occurred in this area. The IBI rating went from good in 1997 to poor in 1998. This is very troubling and represents a sudden drop in community condition that indicates severe water

quality impairment. Early indications from monitoring in the spring of 1999 suggest that this was a short term impact. Both fish and benthic macroinvertebrates will be sampled in 1999 at this station to verify recovery. If results from 1999 monitoring show no recovery then DEP will begin an investigation to locate the source of impairment.

Paint Branch mainstem

Biological monitoring was conducted at two mainstem stations in 1998 and reflect the overall cumulative impacts from the entire upper Paint Branch watershed. Results of monitoring just above Briggs Chaney Road (at PBPB302) indicate an overall good stream condition and that both the fish and benthic macroinvertebrate communities remain stable. Results from sampling the benthic macroinvertebrate community above Fairland Road (at PBPB305) indicate this area is maintaining a good stream condition as well.

3.2.4.b Habitat Monitoring

Qualitative Habitat Assessment Results

In Upper Paint Branch, the overall habitat condition has remained optimal/suboptimal among all monitoring stations during all years of monitoring as determined from the results of the rapid habitat assessments performed in this watershed during 1994 to1998. There is one exception to this trend. The headwaters of the Left Fork subwatershed, above Maydale Nature Center (station PBLF202), has remained in marginal/suboptimal condition since 1994. The causes for the lower habitat rating in this area include the lack of a forested stream buffer, poor bank stability and lack of instream cover for fish. Since M-NCPPC owns the land adjacent to the stream in this area, enforcement of encroachment laws and reforesting the riparian zone would be very beneficial to the stream.

Within the stream segments rated as optimal/suboptimal, there have been some localized habitat problems observed in the watershed. These include lack of an adequate forested buffer in portions of the Gum Springs subwatershed, eroding banks on the mainstem above Fairland Road, and sediment deposition in both the Good Hope and Right Fork subwatersheds. These problems are being addressed through stream restoration projects which are implemented by the Capital Improvements Program. The strategy to deal with these problems is to first get stormwater control in those areas that currently have none and second to stabilize eroding stream banks. Projects have also been identified to address thermal impacts in the Good Hope and Gum Springs subwatersheds.

Stream Channel Morphology Assessment

Cross sectional measurements of the stream channel were taken annually at all stations in Upper Paint Branch SPA during the period 1994 - 1998. Results of this monitoring indicate very little change in channel morphology at most stations. Stream channels are generally stable, with little or no active widening or downcutting of the stream channel during the four years of record. The stream channel

at station PBPB302 (Figure 17) for example, has remained virtually unchanged in cross sectional area.

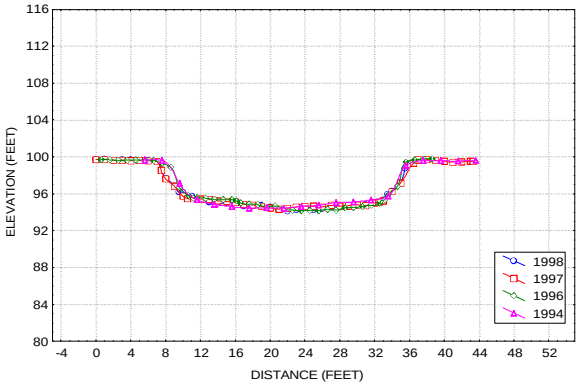


Figure 17. Channel Cross Section at PBPB302

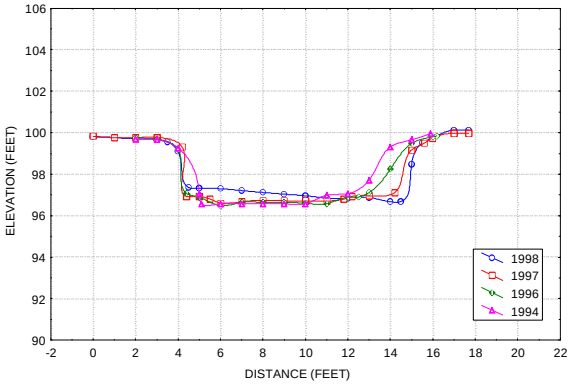


Figure 18. Channel Cross Section at PBLF202

Monitoring channel morphology has identified several areas in Paint Branch were the channel is actively eroding. These areas include the Left Fork at station PBLF202 (Figure 18), Right Fork at station PBRF118 (Figure19), and upper Good Hope at station PBGH108 (Figure 20).

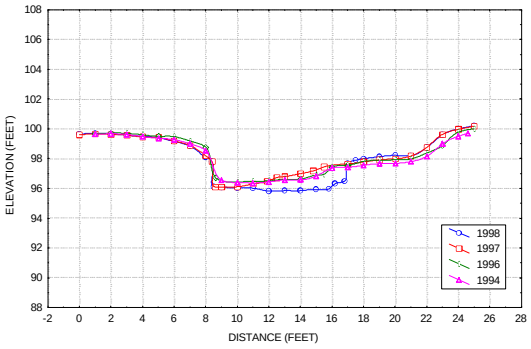


Figure 19. Channel Cross Section at PBRF118

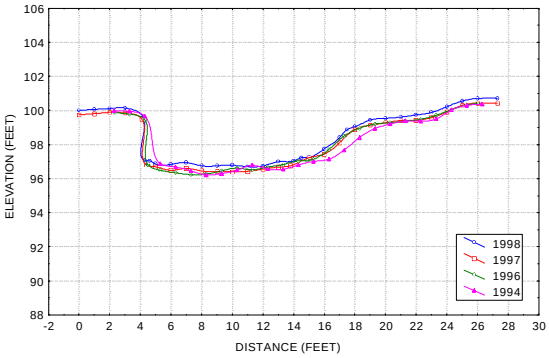


Figure 20. Channel Cross Section at PBGH108

In addition to monitoring changes in the channel morphology, cross sectional measurements allow DEP to determine the degree of channel entrenchment. Several areas in upper Paint Branch are entrenched. These include areas on the Right Fork, upper Left Fork, upper Good Hope tributary, lower Gum Springs tributary, and areas of the mainstem. Two of these areas, (upper Left Fork and upper Good Hope), are severely entrenched. The channel at these two locations is vulnerable to further degradation as flood flows are unable to get out of the channel. The degree of entrenchment is an important channel characteristic to maintain or improve. The degree of entrenchment is a measure of the ability of the stream flow to reach the floodprone areas during relatively frequent storm events. The stream flow velocity decreases as the flow spreads out over the floodprone area and excess sediments are deposited onto the floodprone areas during these events. With increased levels of entrenchment, erosive storm flow velocities are confined to the stream channel and thus are not dissipated.

3.2.4.c Stream Temperature Monitoring

Temperature loggers were deployed at five stations in Paint Branch during 1998 including two Right Fork stations (PBRF117 and PBRF204), one Left Fork station (PBLF203), one Good hope station(PBGH108) and one mainstem station (PBPB305). Results from the two Right Fork stations are presented in figure 21 and indicate no thermal impacts in the upper portions of this subwatershed.

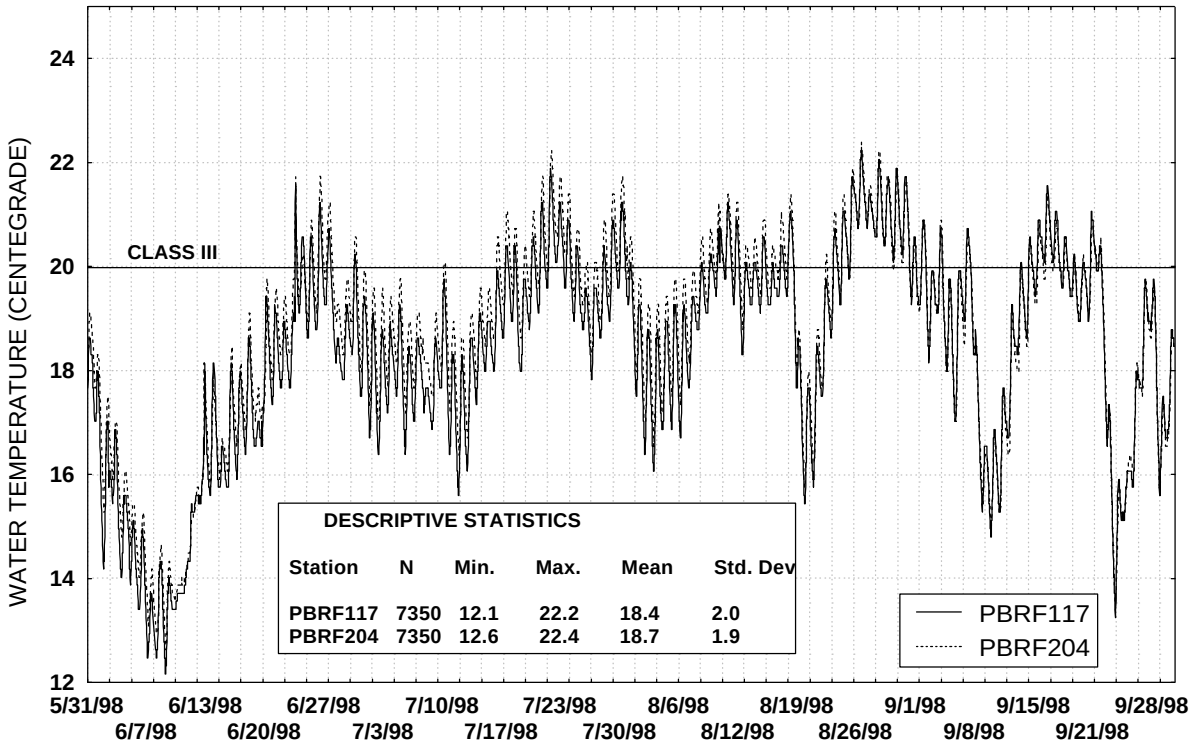


Figure 21. 1998 Water Temperature Data From Two Right Fork Stations

Results from the other three stations are presented in figure 22 and indicate a possible thermal impact in the Left Fork. Dates of the three temperature spikes seen in the Left Fork all correspond with storm events. Therefore the impact is related to either stormwater runoff from heated road surfaces or from the flushing out of warm pond water from either the stormwater management pond at Rainbow Dr. or the ponds at Maydale Nature Center. Although these temperature spikes are brief they may be high enough to have an impact on the biological community in the Left Fork. DEP will put more temperature loggers in this area of the Left Fork in 1999 to isolate the cause of these temperature spikes.

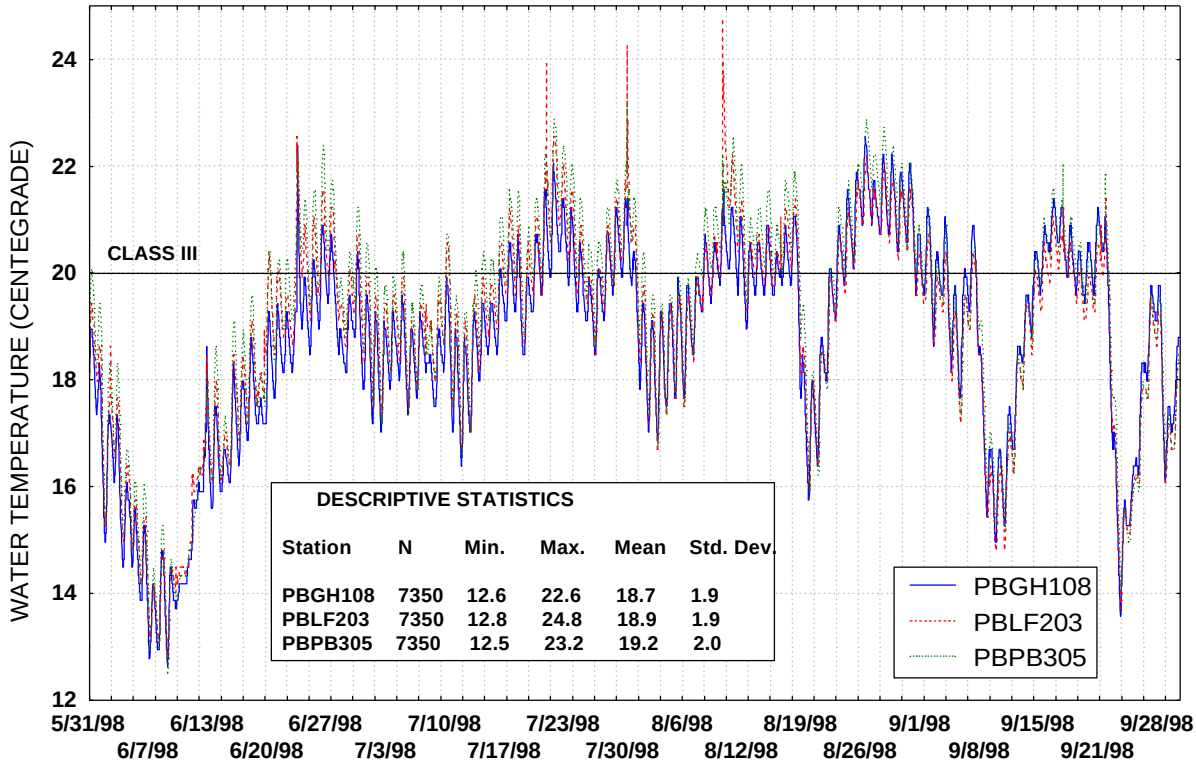


Figure 22. 1998 Water Temperature Data From Three Paint Branch Stations

3.3 PINEY BRANCH SPECIAL PROTECTION AREA

3.3.1 SPA Designation History for the Piney Branch SPA

The Piney Branch watershed was designated as an SPA by County Council resolution on October 24, 1995. This stream system has been previously identified as being a "high quality" Use I watershed supporting general aquatic life. While there has been a great deal of effort over the past few years to protect this valuable natural resource, the SPA designation will provide a higher level of protection to help mitigate impacts from approved master plan development in the watershed.

3.3.2 Description of the Piney Branch SPA Watershed

The Piney Branch watershed, a subwatershed of Watts Branch, is located in south-central Montgomery County just west of the city of Rockville. Piney Branch originates just to the north of Md Route 28 east of Travilah Road (Figure 23). From its headwaters, Piney Branch flows to the

Figure 23. Map of Piney Branch Special Protection Area

south entering Watts Branch just south of Glen Road. The Piney Branch watershed encompasses approximately 2400 acres of land. The SPA occupies the entire Piney Branch watershed, including all its tributaries.

Prior to 1990, the Piney Branch watershed consisted mainly of a mix of agricultural land uses and large lot (1-2 acre) single family homes with some commercial and office development. In early 1993, residential construction began in the headwaters area of Piney Branch on the Willows of Potomac and Piney Glen Village, two large residential subdivisions. No SPA requirements were placed on these projects since they predated the SPA designation. In mid 1994, construction began in the Piney Branch stream valley on a sanitary sewer line from the Watts Branch up to the headwaters of Piney Branch.

3.3.3 Status of Development in Piney Branch SPA

Ten final water quality plans have been approved for this SPA (Table 5). And, there are many other projects in various stages of the planning process (Table 5). Also, a significant amount of development had been approved prior to SPA designation. There is much potential for adverse change to Piney Branch due to the cumulative impacts of these projects. This is being mitigated on projects currently under construction by strict adherence to approved standards and by innovative stormwater management techniques. All new development will have to adhere to more stringent SPA requirements.

As a separate initiative, DEP is also investigating other opportunities for improving existing stormwater management controls in the watershed through the Montgomery County Stormwater Management Capital Improvement Program (CIP). DEP has completed a study of the drainage area on the University of Maryland Shady Grove campus. This study investigated possible improvements to the existing SWM pond and stream valley upstream of the pond. These improvements consist of combinations of wetland enhancements, reforestation, and bank stabilization. Results of the study are now being reviewed by DEP. Staff from DEP have met with the property owner who has agreed to participate in improvements on the property.

DEP has also worked cooperatively with the M-NCPPC to evaluate stream conditions and erosion problem areas throughout the Watts Branch watershed including Piney Branch. Over the next three years DEP will be identifying other potential stormwater retrofit and stream restoration projects within Watts Branch that may include additional projects to help protect Piney Branch.

Table 5. Piney Branch SPA Development Projects (1995 to February 1999)

PROJECT NAME	SPA LOCATION	DEVELOPMENT SIZE, TYPE	STATUS
Avon Glen	Piney Branch - middle reach	39.6 acres, RE-1 28 lots and sewer pumping station	Subdivision approval predated SPA designation. Sediment control plan approved with monitoring requirements. Under construction.
Boverman Property	Piney Branch - Lower Reach	13.8 acres, RE-1	Preliminary/Final water quality plans approved. Sediment control permit pending.
Cavanaugh Property	Piney Branch - middle reach	18.1 acres, RE-1 Cluster, 18 lots proposed	Final water quality plan approved. Sediment control permit pending.
Charles Duvall Farm	Piney Branch	0.5 acres, R-200 1 lot	Exempt from SPA Water Quality Plan Requirements.
Grupenfoff Residence	Piney Branch	2 acres, 1 lot	Exempt from SPA Water Quality Plan Requirements.
Lakewood Glen	Piney Branch	5.2 acres, RE-1 5 lots proposed	Exempt from water quality plan requirements.
New Life Christian Fellowship Church	Piney Branch - Headwater area	1.2 acres, Proposed church	Preapplication meeting held.
Peters Property	Piney Branch - Lower reach	RE-1, Cluster Option	Preliminary/Final water quality plans approved. Sediment control permit pending.
Piney Glen Village	Piney Branch - middle reach	188 acres, Mixed residential	Some of the project predates SPA requirements. Sediment control permits issued. Under construction.
Piney Meetinghouse Road Site - Fling Property	Piney Branch - Middle reach	6.4 acres, RE-2, proposed mulching/ landscape operation	Preliminary and final water quality plans approved. Pending special exception.

Table 5. (continued)

PROJECT NAME	SPA LOCATION	DEVELOPMENT SIZE, TYPE	STATUS
Potomac Glen South	Piney Branch	15.3 acres, RE-1 8 lots proposed	Exempt from water quality plan requirements due to low imperviousness. Stormwater management concept approved. Sediment control permit issued. Under construction.
Shady Grove Life Sciences Center - Life Technologies Inc.	Piney Branch - Headwaters	18.1 acres - R & D	Preliminary plan approved prior to SPA designation; however, voluntary compliance. Water quality plans approved. Initial construction complete.
Shady Grove Road	Piney Branch - Headwaters	8 acres, Road extension	Preliminary and final water quality plan approved. Sediment control permit issued. Site under construction.
Temple Beth Ami	Piney Branch - Headwaters	7.9 acres, R-200 TDR Church	Preliminary and final water quality plans approved. Sediment control permit issued. Site under construction and nearing completion.
Tenny Property	Piney Branch	2.5 acres, R-200 5 lots	Exempt from water quality plan requirements.
Unger Durham Property	Piney Branch - Lower Reach	14.3 acres, RE-1 11 lots proposed	Preliminary/final water quality plan approved. Sediment control permit issued.
Willows of Potomac	Piney Branch - middle reach	245 acres, mixed residential	Subdivision approvals predate SPA requirements. Sediment control permits issued. Site under construction.
Traville	Piney Branch - Headwaters	192 acres, MXN	Preliminary water quality plan approved. A final water quality plan for a portion of the site will be submitted soon.
Bruck Property	Piney Branch - Lower Reach	16 acres, RE-1	Preliminary / final water quality plans approved
Ostuka America Pharmaceutical, Inc.	Piney Branch - Headwaters	4.7 acres, R&D	Preliminary / final water quality plans approved. Under construction
Snider Property	Piney Branch - Lower Reach	21.9 acres, RE-1C	Preapplication meeting held

3.3.4 Status of BMP Monitoring in the Piney Branch SPA

To date, the only BMP monitoring required through the SPA process is being done in the upper Piney Branch by the developers of the Traville property and the Shady Grove Life Sciences Center-Life Technologies, Inc (Table 6). Other stream monitoring in the watershed is being done by the developers of the preSPA approved Piney Glen Village and Willows of Potomac subdivisions as a requirement of state wetlands permits.

Table 6. Summary of BMP Monitoring in Piney Branch

PROJECT NAME & CONSULTANT CONDUCTING THE MONITORING	REQUIRED BMP MONITORING	REQUIRED TIME FRAME FOR BMP MONITORING	DATA SUBMITTED THUS FAR
Shady Grove Road / Loiderman Assoc.	**4 turbidity stations** **4 embeddedness stations**	**pre-development monitoring:** 1 year **during-development monitoring:** until site is stabilized and sediment control structures converted to water quality **post-development monitoring:** min. 3 years	**turbidity data:** 4/97 - 3/99 **embeddedness data:** 4/97 - 3/99
Traville / Loiderman Assoc.	**2 continuous temperature loggers** **groundwater monitoring wells** *water level* **1 continuous flow logger**	**pre-development monitoring:** 1 year **during-development monitoring:** until site is stabilized and sediment control structures converted to water quality **post-development monitoring:** to be determined at final site plan approval.	**temperature data:** 6/97 - 9/97, 6/98 - 9/98 **groundwater data:** none submitted **flow data:** none submitted
Life Sciences Center / Schnabel Engineering	**3 groundwater monitoring wells** *Water Level, Conductivity, pH*	total of 5 years beginning October 1997	**groundwater data:** 10/97 - 1/98

Although most of the BMP monitoring data listed in table 6 is pre-construction data, we are beginning to receive during-construction data from the Shady Grove Road project. Comparing the pre and during-construction data suggest some impact from sedimentation is occurring as embeddedness levels are somewhat higher for the during-construction period (figure 24).

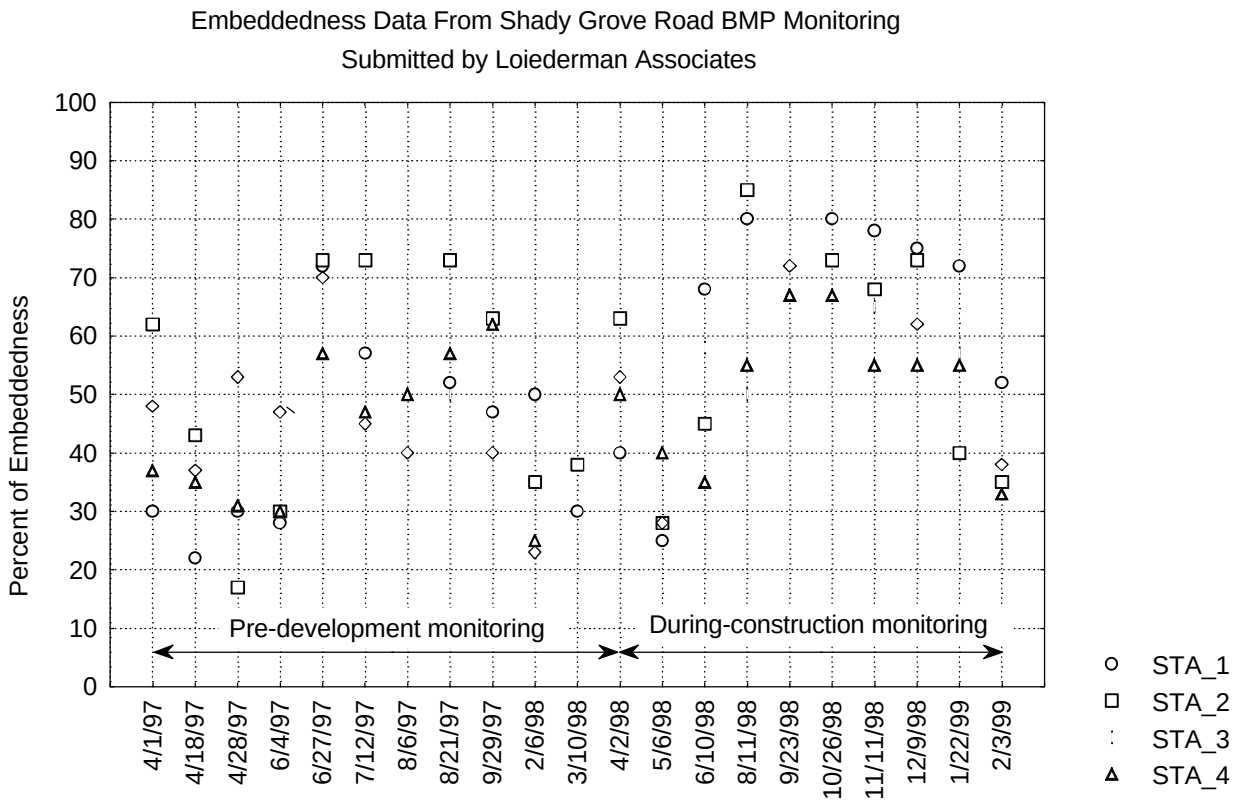


Figure 24. Embeddedness data from the Shady Grove Road project

3.3.5 Summary of Water Quality Monitoring in the Piney Branch SPA

Baseline stream monitoring in the Piney Branch SPA was initiated in the spring of 1995 at six sampling stations. In 1997, four additional sampling stations were added to define existing conditions in the areas were development is to or already has occurred. In 1998, all ten stations were monitored.

3.3.5a Biological Monitoring

More explanation of the trends observed in Piney Branch is necessary because stream conditions have proven to be more variable here than in the other SPA watersheds. The high degree of variability is due to a combination of natural stressors (weather conditions) and man made stressors (preSPA development already in place or currently under construction). Two monitoring stations, one located in the headwaters area above current development activity (WBPB201) and the other on a western tributary (station WBPB101) serve as controls in evaluating development impacts in portions of the watershed undergoing development. These two stations are not, at this time, subject to development impacts but are subject to the same natural stressors that impact the rest of Piney Branch.

Three years of monitoring the fish community (1995, 1997 and 1998) have provided some insight as to where in the watershed this faunal group is most impacted by development related activities. The areas of the watershed where we are seeing most of the yearly variability in the fish community are stations WBPB201, WBPB202 and WBPB203 (figure 25), all located in the headwater areas in or just below the Willows of Potomac and Piney Glenn Village developments. This is expected as these stations are vulnerable to very low baseflows during dry periods thus reducing habitat availability, particularly in the riffle areas of the stream where most of the intolerant fish species are found. In other words, the further upstream into the headwaters the greater the vulnerability to very low baseflows and thus more year to year variability in the fish community. However, the year to year variability is greater at stations WBPB202 and WBPB203 then at WBPB201. This unexpected trend is likely due to the addition of preSPA development related impacts at stations WBPB202 and WBPB203 coming from the Willows and Piney Glenn Village developments which amplify the natural stressors. Of these impacts the most damaging to the fish community is sediment which fills in the riffle habitat further limiting the habitat availability for several fish species.

All stations downstream of WBPB203 consistently support fish communities that are indicative of excellent stream condition. This suggests that the impacts seen upstream are buffered out below station WBPB203. This is primarily due to better baseflow conditions during dry periods in the middle and lower portions of Piney Branch.

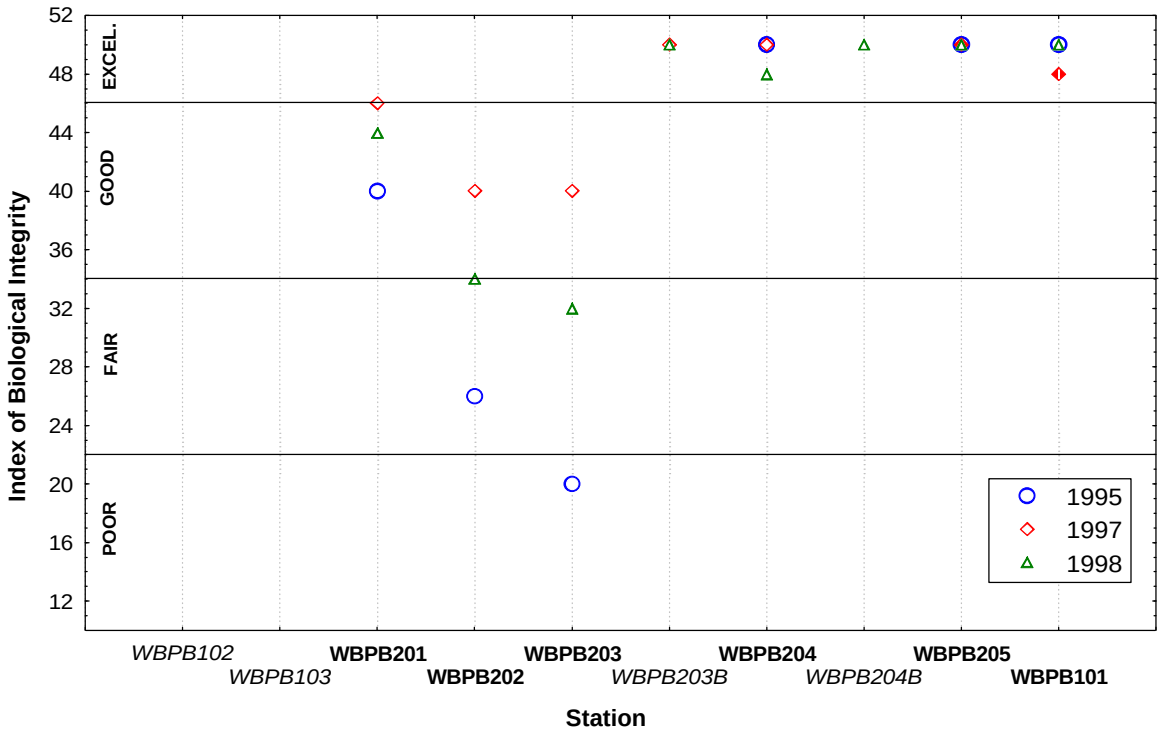


Figure 25. Results of Monitoring the Fish Community for the Period 1995 - 1998 (Stations in Bold are Baseline Stations, Those in Italics are Development Related)

Monitoring results from 1998 show a continuation of trends seen in previous years. Stations WBPB201, WBPB202 and WBPB203 showed some decline in fish IBI scores from 1997. This decline is likely due to lower then normal baseflows during the summer 1998. The decline at stations WBPB202 and WBPB203 was greater then that seen at WBPB201. Again, this difference is due to development impacts amplifying the impact of natural stressors. All stations down stream of WBPB203 continue to support stable fish communities of excellent quality.

Monitoring the benthic macroinvertebrate community over four years (1995, 1996, 1997 and 1998) has revealed different trends from those seen with the fish. This is possibly due to the different time of year that the benthic macroinvertebrates are sampled and to differences in the way this faunal group responds to stressors . For example, elevated stream water temperatures can have more impact on the benthic macroinvertebrate community then on the fish community. Also, the benthic community is prone to scouring impacts from high flow events in such a way that if the high flow events are severe enough the benthic macroinvertebrates can by physically removed from the rock substrate on the stream bottom. This kind of impact was observed in 1996 when there was a watershed wide (all stations) decline in quality of the benthic macroinvertebrate community in response to the extremely high flow events that occurred over the winter of 1995-96.

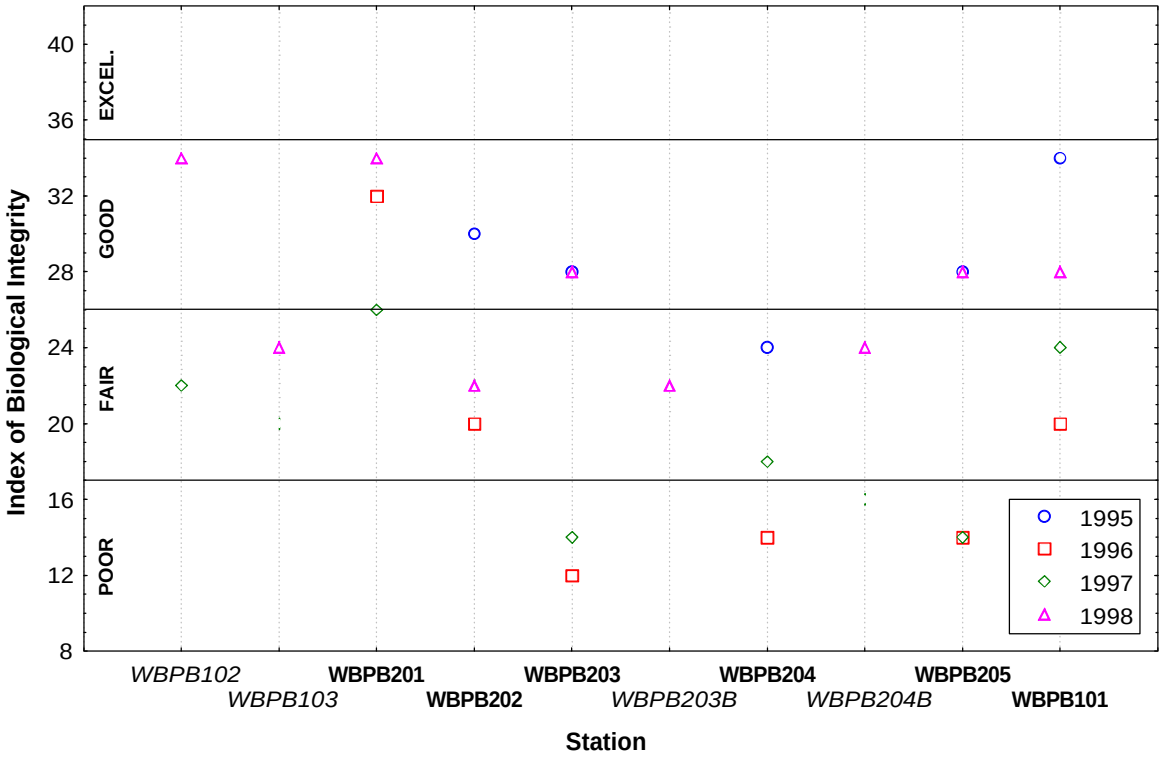


Figure 26. Results of Monitoring the Benthic Macroinvertebrate Community (Stations in Bold are Baseline Stations, Those in Italics are Development Related)

The overall trend that has emerged from four years of benthic macroinvertebrate monitoring is that the community is indicative of good stream condition in the headwater areas and that the stream condition tends to decline progressively in a downstream manner except at the furthest downstream station (WBPB205) where there is some improvement in community condition (figure 26). This trend mirrors the trend we are seeing in stream water temperatures in that temperatures are warmer downstream until station WBPB205 where temperatures are cooler. This suggests that water temperature is a factor in the decline of community condition seen in the middle portion of Piney Branch. The two new stations in the headwaters (WBPB102 and WBPB103) are showing similar responses to water temperature. At station WBPB102 where water temperatures are lower (figure 29) the benthic macroinvertebrate community is of higher quality.

Monitoring results from 1998 are consistent with the above described trends.

In summary, the biological monitoring has provided much insight to how the stream ecosystem is responding to various stressors, both man-made and natural, and to where in the watershed these impacts are most felt. For example, the benthic macroinvertebrate community is most impacted in the middle portions of Piney Branch where water temperatures are highest and the fish community is most impacted in the upper reaches where very low baseflows occur during dry periods.

3.3.5b Habitat Monitoring

Both qualitative habitat and quantitative habitat information has been collected at each sampling station in the Piney Branch watershed (Figure 23). The total qualitative habitat assessment scores (summing 10 individual habitat parameters) for all stations in the watershed were in the suboptimal range. Several single parameters; bank stability, bank vegetation, and sediment deposition, scored in the marginal range at several monitoring stations (WBPB202 and WBPB203) indicating a level of stream channel impairment that could become a future concern in these areas.

Quantitative habitat monitoring over a four year period has shown only small changes in channel cross sections throughout the watershed. Two stations, WBPB204 (figure 27) and WBPB205 (figure 28), do show changes in cross section between 1997 and 1998. These changes are attributed to log/debris jams immediately upstream or downstream of the cross section. Overall, the quantitative habitat data indicates relatively good channel stability. Channel entrenchment is moderate in some areas of Piney Branch including WBPB101, WBPB203B and WBPB205. This means that the stream is less accessible to its floodplain in these areas which could lead to further channel erosion as frequent stormflows are confined to the channel. Planning to maintain or improve channel entrenchment in relation to access to the floodprone area needs to be fully incorporated into future SPA water quality plans.

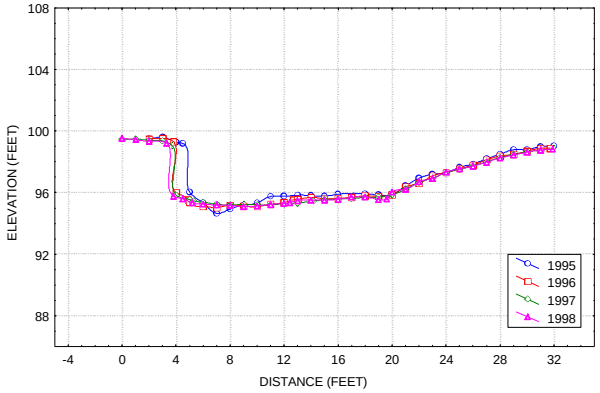


Figure 27. Channel Cross Section at WBPB204

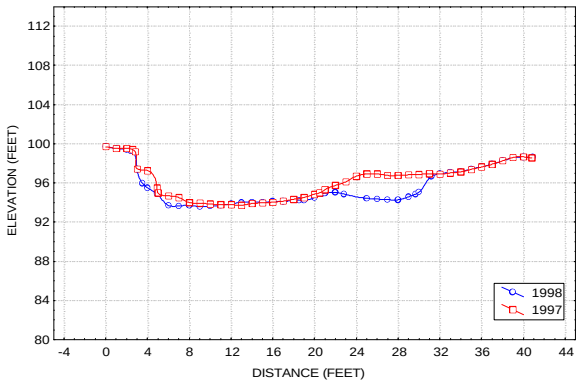


Figure 28. Channel Cross Section at WBPB205

Water Temperature Monitoring

Stream temperatures throughout the summer are available during the years 1995 - 1998. The Piney Branch is currently classified as a Use I stream. The temperature criteria for Use I streams in Maryland is 90° F (32° C). This temperature is too warm for most fish and benthic macroinvertebrate species. Piney Branch is spring fed and has good riparian tree cover supporting a cool water fish community. Accordingly, a cool water temperature criteria was selected for comparison. The Use IV temperature critieria (75^0F, 24^0C) is representative of a cool water stream.

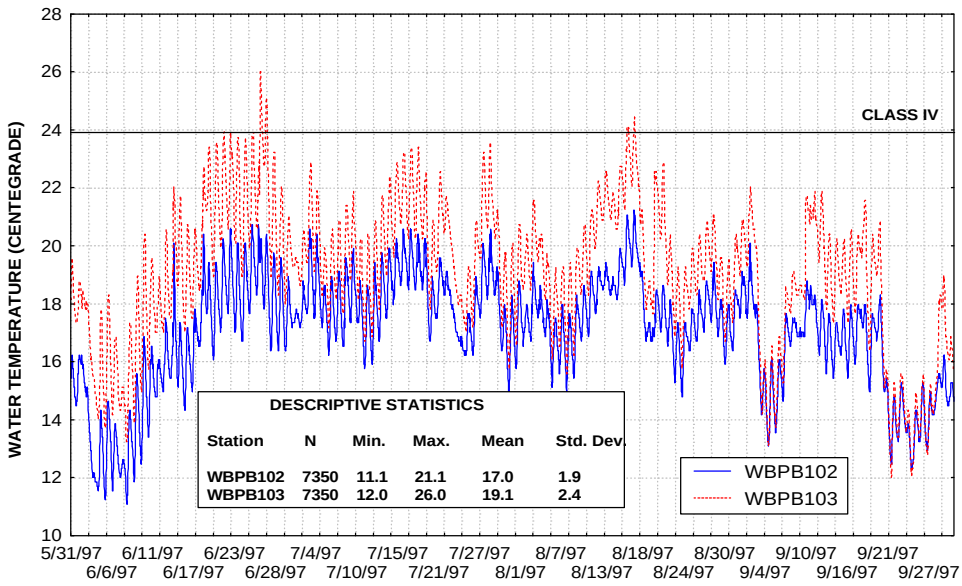


Figure 29. 1997 Water Temperatures in the Headwaters of Piney Branch

Monitoring stream water temperature throughout Piney Branch has shown that temperatures are highest in the middle portions of Piney Branch at stations WBPB204 and WBPB204B (figure 30). Water temperatures then decline somewhat further downstream at station WBPB205 (figure 31). This decline is likely due to the input of relatively cool water from the western tributary (WBPB101) and better riparian tree cover between stations WBPB204B and WBPB205.

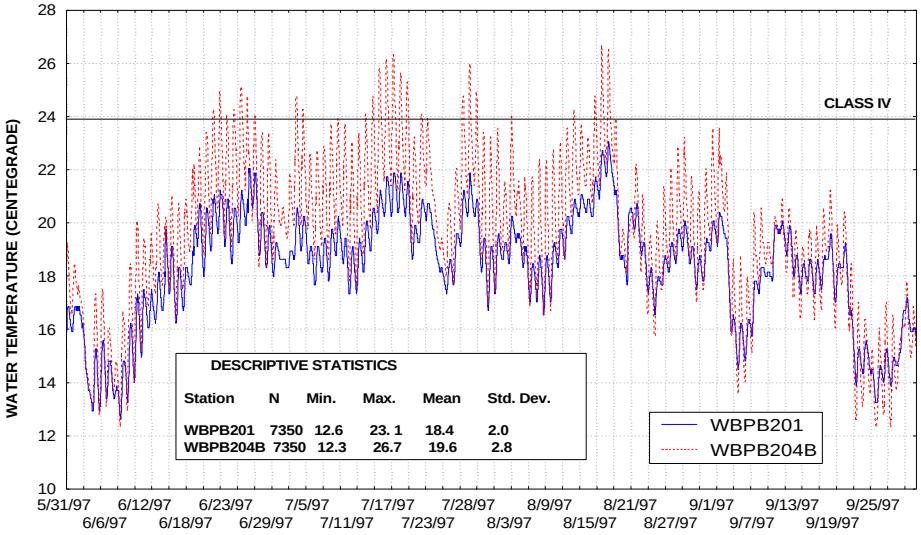


Figure 30. 1997 Water Temperatures in Upper and Middle Piney Branch

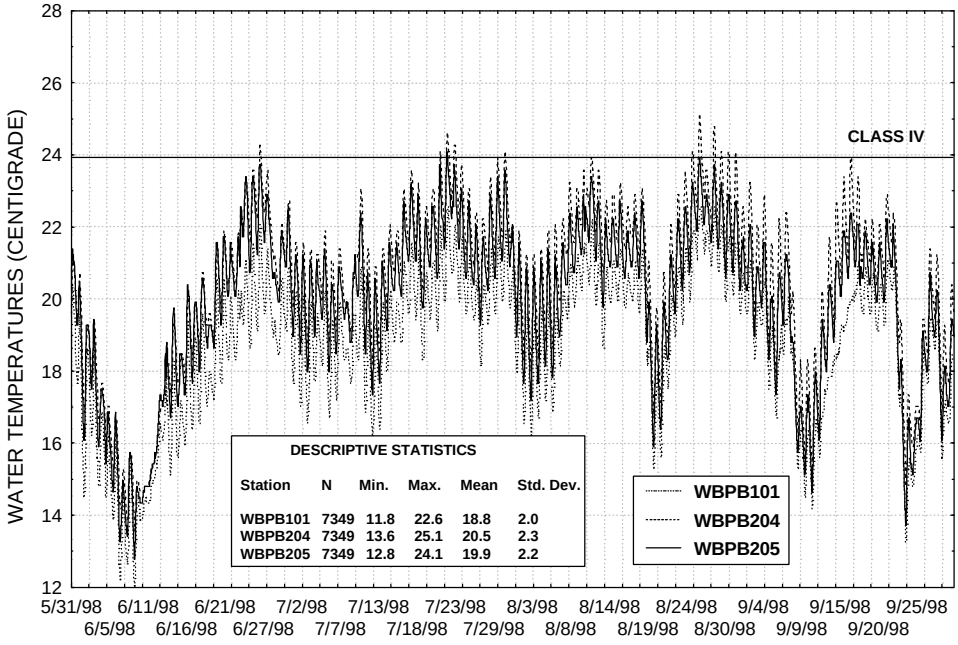


Figure 31. 1998 Water Temperatures From Middle and Lower Piney Branch

4.0 CURRENT CONCLUSIONS and NEXT STEPS

4.1 PROGRAM EFFECTIVENESS AT MAINTAINING AND IMPROVING WATER QUALITY

4.1.1 SPA Development Review Process

The SPA development review process requires a more intensive degree of concept plan review in the early stages of regulatory review process. It requires preliminary guidance and staff input into the design of site specific protection measures including placement and minimization of impervious surfaces, sediment and erosion control, stormwater concept plans, enhanced forest conservation measures, and establishment of environmental buffers early in the concept plan design stage. The SPA review process also includes on-site field investigations by DPS, DEP, and M-NCPPC staff. These investigations often reveal important information about site conditions and features that are often otherwise overlooked and may be helpful in the site layout, BMP design, and in locating monitoring stations specific to the development for the stream monitoring program.

The interdisciplinary dialogue between project developers, plan reviewers, and stream monitoring/assessment staff that occurs through the required pre-application meeting has proven to be highly beneficial. This dialogue provides a full discussion of the critical natural resoure parameters that need to be protected in order to maintain the existing high level of stream conditions, performance goals for the site to protect and maintain the critical natural resource parameters, and possible approaches for meeting them. Project applicant's are asked to devise resourceful site plans and stormwater concept plans and explain how these plans effectively address the performance goals and are responsive to the specific protection needs on the site. Development specific infrastructure location and mitigation is also discussed and planned for during this process. The more intensive and interactive plan review process should produce better development plans which reflect more environmentally-sensitive placement of developable areas, impervious surfaces, and stormwater management controls on the development site, use of more innovative BMP control measures, enhanced management and protection of environmental buffers, implementation of accelerated forest conservation measures, and greater use of linked BMP control systems to improve overall BMP effectiveness. Finally, the stream water quality monitoring program administered by DEP and required as part of the SPA development is expected to contribute measurably to the establishment of rational and achievable water quality performance goals that are based on science.

4.1.2 SPA Monitoring and Data Evaluation

In previous years (1994 - 1997) much of DEP's monitoring work in the SPA's has concentrated on locating, collecting, and evaluating data from baseline stations. This Monitoring has provided the data necessary for the development of Conservation Plans for the three SPA's. Conservation Plans will identify critical natural resource parameters that must be maintained in order to preserve and protect existing high quality stream condition in SPA watersheds, and also present performance goals that should be used to preserve and protect critical natural resource parameters. Conservation Plans for Upper Paint Branch and Piney Branch will be finalized by June of 1999. This baseline data will also

enable the tracking of development impacts and overall program effectiveness once construction activity in the SPA's begin.

DEP has since added monitoring stations in all three SPA's in order to pick up and isolate impacts from new development projects. Twelve (12) new development related monitoring stations were established and monitored in 1998 within all three SPA's. It is anticipated that new stations will be added in 1999 as new development projects come in for review.

In addition, DEP is beginning to receive BMP monitoring data from developers as required by the SPA regulations. Much of this is pre-development data at this time and will be used to establish baseline condition. This data will be used to evaluate the effectiveness of BMP's in mitigating development impacts to stream habitat and biological integrity. It is important to distinguish between 'during construction' and 'post construction' impacts. Typically the 'during construction' impacts are more sediment related and usually will result in a rapid decline in both habitat quality and biological integrity in a stream. These impacts are relatively short term. Once the development site is stabilized and sediment control ponds are converted water quality/quantity ponds, stream condition improves. In order to evaluate the effectiveness of a specific development in meeting the performance goals several years of 'post construction' monitoring is required.

Thus far, most SPA projects are only in the site plan approval process or in the initial construction stages. Insufficient data is presently available to permit a meaningful analysis of development project impacts and BMP effectiveness in mitigating cumulative development impacts to stream habitat and the biological community.

This document may be downloaded from the Montgomery County Department of Environmental Protection web site at: ***http://www.co.mo.md.us/services/dep/Watersheds/Biomon/biomon.htm***