MCPB
ITEM #19
09/06/07

MEMORANDUM

DATE:	August 31, 2007
TO:	Montgomery County Planning Board
VIA:	Gwen Wright, Acting Director, Planning Department Mary Dolan, Acting Chief, Countywide Planning Division Rose Krasnow, Chief, Development Review Ralph Wilson, Acting Zoning Supervisor, Development Review
FROM:	Greg Russ, Zoning Coordinator, Development Review Stephen Federline & Candy Bunnag, Environmental Planning
PURPOSE:	To amend the Zoning Ordinance to revise the development standards in the Environmental Overlay Zone for the Upper Paint Branch Special Protection Area

TEXT AMENDMENT:	No. 07-11
REVIEW BASIS:	Advisory to the County Council sitting as the District Council, Chapter 59, the Zoning Ordinance
INTRODUCED BY:	Council President Praisner and Councilmembers Trachtenberg, Andrews, and Elrich
INTRODUCED DATE:	July 31, 2007

PLANNING BOARD REVIEW:	September 6, 2007
PUBLIC HEARING:	September 11, 2007; 1:30 p.m.

STAFF RECOMMENDATION: APPROVAL of Zoning Text Amendment # 7-11.

Staff believes that the proposed modification to the Environmental Overlay Zone in the Upper Paint Branch Special Protection Area (reducing the imperviousness cap from 10% to 8%) meets and is consistent with the recommendations of the Upper Paint Branch Technical Work Group for protecting water quality in this watershed (June, 2006).

Staff has noted other considerations not directly related to the current proposed amendment, but which the Board may want to consider addressing in the context of the current proposal.

BACKGROUND

The upper Paint Branch watershed is a natural resource of longstanding and particular importance to Montgomery County and the state of Maryland. The

aquatic resource is designated as Use III waters, which is the state's highest water quality rating. The historical characteristics of its streams, with water temperature, base flow, recharge, aquatic habitat of the highest quality, in combination with the upland resources of topography, soils, and extensive forest cover, have enabled the natural system to sustain a naturally-reproducing, environmentally-sensitive brown trout population. The natural aquatic system has been monitored since the early 1970's by the State of Maryland (Maryland Department of Natural Resources, or DNR). Monitoring has continued to the present day with both State and County participation. The continuous monitoring and periodic studies of the system have documented the health of the watershed's natural resources over time and problems of the watershed's health.

In 1981, M-NCPPC conducted a detailed study of the watershed as part of the 1981 Eastern Montgomery County Master Plan. The study and master plan formulated protection measures for the watershed's natural resources. This resulted in rezoning of land in the watershed to lower densities. This effort also established performance criteria intended to be applied as development applications were reviewed by the Planning Board and Department of Environmental Protection (DEP).

In 1984, 1987, and 1991, the watershed was part of interjursidictional efforts to restore and protect the Anacostia River. These efforts included the formation of a multi-agency group -, the Upper Paint Branch Work Group - a subcommittee of the Anacostia Watershed Restoration Committee.

In 1994, the Planning Board appointed a group of technical experts from regional, state, and local agencies - the Paint Branch Technical Work Group - to review problems of the natural system's health in detail and recommend possible measures to restore and protect it. The work group's recommendations resulted in the following watershed protection measures:

1) a limited master plan amendment that significantly expanded the park acquisition program;

2) designation of the watershed as a Special Protection Area, affording the application of stringent review criteria on new land development projects;

3) creation of an Environmental Overlay Zone to limit impervious surfaces in new developments and to restrict the creation of specific land uses that have high potential for significant water resource impacts; and

4) strengthening the stormwater management program applied to this area.

In November 2002, Councilmember Marilyn Praisner reconvened the Upper Paint Branch Technical Work Group in response to observations and concerns by various environmental groups and County and State agencies over the

continuing decline in water quality of the stream system. As directed in the November 12, 2002 memo from Ms. Praisner to then-Executive Duncan and then-Planning Board Chairman Berlage, the group was tasked to:

1) assess the current condition of the resource;
2) assess current impacts affecting the resource;
3) identify future impacts affecting the resource; and
4) recommend appropriate mitigation measures.

This reconvened group included representatives with expertise in watershed protection and land use in this watershed from the Council of Governments (COG), State, and County, plus representation and participation from interested organizations including the Eyes of Paint Branch and the Audubon Naturalist Society. These representatives also participated in earlier work groups that focused on the protection of the Upper Paint Branch Watershed.

MNCPPC was represented by John Hench (Co-Chair of the Technical Work Group) and Doug Redmond, Park Planning and Resource Analysis; Bill Barron, Community Based Planning (Team Leader for the Upper Paint Branch area); and Candy Bunnag, Countywide Environmental Planning. The Technical Work Group submitted its findings and recommendations to Ms. Praisner in June, 2006.

The Planning Board has received copies of the report, which addresses more comprehensively the full breadth of measures that need to be improved, strengthened, or expanded in order to halt the trend of declining health of the natural resource. This current Zoning Text Amendment addresses only one part of the larger recommendations. Staff who were involved in the Technical Work Group can prepare a full and separate briefing on the major recommendations, if the Board chooses.

ANALYSIS OF AMENDMENT PROPOSAL

One of the Work Group's recommendations involves applying more stringent impervious surface limitations on new development in the watershed. The change to the Upper Paint Branch Special Protection Area (SPA) Environmental Overlay Zone proposed by ZTA 7-11 to reduce the existing imperviousness cap from 10% to 8% would be consistent with the work group's recommendation.

The reduction in the Upper Paint Branch SPA imperviousness cap would reduce by 20% the imperviousness allowed for all new private and public development projects within the SPA which are subject to Chapter 59-C-18.15 and Chapter 19.60 of the Montgomery County Code (the SPA law). The projects affected by this legislation do not change with this amendment. Grandfathering provisions are updated to July 31, 2007 for lawfully existing uses, and building permits already submitted by that date.

The Technical Work Group's recommendation to lower the imperviousness cap from 10% to 8% is based on observations and conclusions that ongoing land development activities in the watershed have resulted in continued problems in the stream system. Development in the Right Fork Tributary, which involves recent construction activities, has been tied through monitored observations to reduction in the overall stream quality and habitat. The Good Hope Tributary, which historically has been the most productive and important trout-spawning stream of the Upper Paint Branch system, has been noted by both DNR and county biologists as having more sediment and silt deposits. Such deposits, typically caused by erosive stream flows and/or sediment-laden surface water runoff from unstable, upland sites (i.e., typically sites undergoing land development activities), significantly lower the quality of habitat present in the Good Hope Tributary.

Since impervious cover is a general indicator of the degree of adverse impacts of land use and land cover changes on water resources, and the Work Group identified problems related to land development activities that continue to exist within the stream system, the Work Group recommended that impervious cover for new development be lowered as one of many measures to halt the continued decline of the aquatic resource. The Work Group recommended a change from 10% to 8% impervious limit in part because the 8% limit was already being used in the Environmental Overlay Zone in the Upper Rock Creek Special Protection Area. The part of the Upper Rock Creek watershed where the impervious limit applies has roughly similar zoning categories (mainly RE-1, R-200, RE-2C) as are found in the Upper Paint Branch watershed. An additional justification is to recognize the impacts of unrestricted increases in impervious levels which occur after initial construction, dubbed "imperviousness creep".

IMPACT ON PROPOSED DEVELOPMENT

Using information dated November 2005 from the Technical Task Force Report, roughly 430 acres remained undeveloped or underdeveloped within the Upper Paint Branch Special Protection Area (SPA). Under the current 10% criterion, roughly 43 acres of imperviousness would be added in the SPA. Under the proposed 8% criterion, about 35 acres impervious area would be added, or about 8 acres less than under the existing overlay zone.

OTHER CONSIDERATIONS

It must be noted that the current Zoning Text Amendment does not address some important topics related to the impervious issue – particularly in terms of how the need to reduce imperviousness can be balanced with other critical public interests. This is an ongoing challenge, even with the existing 10% cap, and it deserves additional discussion and consideration. The Board may want to

1.) raise this issue and the need for this discussion in their testimony, or
2.) use a separate transmittal to address the concern, or
3.) not raise this in the context of the current legislation as it is an ongoing issue.

Transportation facilities, which inherently are well above either the 10% or the 8% criteria, present the greatest challenges. For example, an open section primary in a 70' wide right of way creates approximately 34% imperviousness. However, this inherent problem has been satisfactorily addressed for small projects such as sidewalks through use of creative solutions (e.g., removal of existing impervious area elsewhere in the watershed) and no transportation projects have been denied to date due to the impervious caps. Similarly, the new Fire and Rescue Service requirements for access will further tighten the ability to build on lots in the area, probably resulting in pressure for more creative solutions to fire access as well.

The emphasis on minimizing new imperviousness, or reducing impervious surface has always been the priority measure for protecting the watershed, and maintaining the dynamic that forces creative solutions to the challenge of balancing various public interests has been proven to work over time. However, with increased fire access requirements and several new road projects planned, the solutions are going to need to become even more creative.

Finally, as a separate point, MNCPPC staff has had extensive experience in implementing the Environmental Overlay Zone (EOZ) since July 1997. Based on this experience, MNCPPC staff has noted the need for clarifications/minor changes in language to make the Environmental Overlay Zone more transparent and understandable. The issues identified as needing change are identified in Attachment 4dated 5/23/07. Although the current Zoning Text Amendment does not address these clarifications, the Board may wish to raise them.

GR:SF:CB:ss

Attachments

1. ZTA No. 07-11 for the Upper Paint Special Protection Area Overlay Zone
2. Final Report of the Technical Work Group (June, 2006)
3. Memorandum from the Transportation Planning staff August 29, 2007
4. Environmental Planning/Community Based Planning suggested Revisions for Consideration (5/23/07)

Attachment 1

AGENDA ITEM #14
July 31, 2007

Introduction

MEMORANDUM

July 27, 2007

TO: County Council

FROM: Jeffrey L. Zyontz, Legislative Attorney

SUBJECT: Introduction – Zoning Text Amendment 07-11, Upper Paint Branch Standards

Zoning Text Amendment (ZTA) 07-11 is being sponsored by Council President Praisner and Councilmembers Trachtenberg, Andrews, and Elrich. ZTA 07-11 would amend the development standards in the Upper Paint Branch Special Protection Area Overlay Zone by reducing the allowable impervious surface of new development from 10 percent to 8 percent. This change was recommended by the Upper Paint Branch Special Protection Area Working Group to protect water quality. Existing development that exceeds that amount of impervious surface would be allowed to maintain and reconstruct existing impervious surfaces.

A public hearing on ZTA 07-11 is scheduled for September 11, 2007.

Zoning Text Amendment No: 07-11
Concerning: Upper Paint Branch- standards
Draft No. & Date: 2 – 7/20/07
Introduced: July 31, 2007
Public Hearing:
Adopted:
Effective:
Ordinance No:

COUNTY COUNCIL FOR MONTGOMERY COUNTY, MARYLAND SITTING AS THE DISTRICT COUNCIL FOR THAT PORTION OF THE MARYLAND-WASHINGTON REGIONAL DISTRICT WITHIN MONTGOMERY COUNTY, MARYLAND

By: Council President Praisner and Councilmembers Trachtenberg, Andrews, and Elrich

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AN AMENDMENT to the Montgomery County Zoning Ordinance to:

- amend the development standards in the Overlay zone for the Upper Paint Branch Special Protection Area; and
- generally amend the Overlay zone for the Upper Paint Branch Special Protection Area.

By amending the following section of the Montgomery County Zoning Ordinance, Chapter 59 of the Montgomery County Code:

DIVISION 59-C-18	"OVERLAY ZONES"
Section 59-C-18.152	"Regulations"

EXPLANATION: ***Boldface*** *indicates a heading or a defined term.*
Underlining indicates text that is added to existing laws by the original text amendment.
[Single boldface brackets] indicate text that is deleted from existing law by the original text amendment.
Double underlining indicates text that is added to the text amendment by amendment.
[[Double boldface brackets]] indicate text that is deleted from the text amendment by amendment.
** * * indicates existing law unaffected by the text amendment.*

ORDINANCE

The County Council for Montgomery County, Maryland, sitting as the District Council for that portion of the Maryland-Washington Regional District in Montgomery County, Maryland, approves the following ordinance:

Sec. 1. DIVISION 59-C-18 is amended as follows:

DIVISION 59-C-18. OVERLAY ZONES.

* * *

59-C-18.15. Environmental Overlay Zone for the Upper Paint Branch Special Protection Area.

59-C-18.151. Purpose.

It is the purpose of this overlay zone to:

(a) Protect the water quality and quantity of the Upper Paint Branch Watershed and its tributaries, as well as the biodiversity situated in these resources. The resources consist of the headwater tributary areas–Good Hope, Gum Springs, Right Fork and Left Fork–and the segment of the main stem of the Paint Branch north of Fairland Road.

(b) Regulate the amount and location of impervious surfaces in order to maintain levels of groundwater, control erosion, and allow the ground to filter water naturally and control temperature.

(c) Regulate land uses that could adversely affect this very high quality, cold water stream system resource that is afforded the highest order of resource protection (Use III Waters) under the State of Maryland's watershed classification system.

59-C-18.152. Regulations.

(a) **Development standards**. The development standards of the underlying zone apply except as modified by the requirements of this overlay zone.

(1) **Restriction on Impervious Surface**. Any development must not result in more than [10] 8 percent impervious surface of the total area under application for development.

(A) Any impervious surface lawfully existing pursuant to a building permit issued before July 31, [1997] 2007 that exceeds the [10] 8 percent restriction, may continue or be reconstructed under the development standards in effect when the building permit was issued.

(B) Any impervious surface which results from construction pursuant to a building permit application pending before the Department of Permitting Services on July 31, [1997] 2007, may continue or be reconstructed under the development standards in effect when the building permit was issued.

(C) Any expansion of an impervious surface above the [10] 8 percent restriction is not allowed, except in accordance with the waiver provisions of Subsection (a)(2) or as provided under Subsection (a)(1)(D).

(D) Any impervious surface resulting from an addition or accessory structure to an existing one-family residential dwelling must not be counted against any calculation of the [10] 8 percent impervious surface restriction.

(2) **Waiver.** The Director may grant a waiver from the [10] 8 percent impervious surface restriction subject to the following standards and procedures:

(A) **Written Request**. An applicant may apply for a waiver from the [10] 8 percent impervious surface restriction if enforcement would result in undue hardship to the applicant. The request must be in writing to the Director.

(B) **Review and action.** The Director may grant a waiver from the [10] 8 percent impervious surface restriction if the applicant shows by clear and convincing evidence that:

(i) the [10] 8 percent impervious limitation would result in undue hardship to the applicant because of events or circumstances not caused or facilitated by the applicant;

(ii) the applicant complies with all applicable federal, state, and county water quality standards; and

(iii) the relief sought is the minimum needed to prevent the hardship and the Director must consider alternative techniques.

* * *

Sec. 2. Effective date. This ordinance takes effect immediately upon Council adoption.

This is a correct copy of Council action.

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Linda M. Lauer, Clerk of the Council

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Resolution No:
Introduced: July 31, 2007
Adopted:

COUNTY COUNCIL FOR MONTGOMERY COUNTY, MARYLAND
SITTING AS A DISTRICT COUNCIL FOR THAT PORTION
OF THE MARYLAND-WASHINGTON REGIONAL DISTRICT
WITHIN MONTGOMERY COUNTY, MARYLAND

By: District Council

Subject: Notice of Public Hearing on Zoning Text Amendment 07-11

Background

1. Section 59-H-9.3 of the Montgomery County Ordinance requires that, within thirty days of introduction of any text amendment, the Council act by resolution to set a date and time for public hearing on the proposed amendment.

2. Zoning Text Amendment No. 07-11, which would amend the Zoning Ordinance to amend the development standards in the Overlay zone for the Upper Paint Branch Special Protection Area; and generally amend the Overlay zone for the Upper Paint Branch Special Protection Area, was introduced on July 31, 2007.

Action

The County Council for Montgomery County, Maryland, sitting as the District Council for that portion of the Maryland-Washington Regional District in Montgomery County, Maryland approves the following resolution:

> Legal notice will be given of the public hearing to be held on September 11, 2007 at 1:30 p.m., in the Council Hearing Room, Stella Werner Council Office Building, Rockville, Maryland, for the purpose of giving the public an opportunity to comment on the proposed amendment.

This is a correct copy of Council action.

Linda M. Lauer, Clerk of the Council

Attachment 2

Final Report of the Reconvened Upper Paint Branch Technical Work Group

Prepared at the request of
Councilmember Marilyn J. Praisner

June 2006

Table of Contents

Upper Paint Branch Technical Work Group
November 2002 – January 2006

Members

Bill Barron
Eastern County Team Leader
Montgomery County Department of Park and Planning

Rick Brush
Manager, Water Resources Plan Review
Montgomery County Department of Permitting Services

Candy Bunnag
Environmental Planner
Montgomery County Department of Park and Planning

Leo M. Galanko
Senior Permitting Services Specialist/
Special Protection Area Coordinator
Montgomery County Department of Permitting Services

John Galli
Anacostia Restoration Program Manager
Metropolitan Washington Council of Governments

Greg Golden
Natural Resources Planner
Environmental Review
Maryland Department of Natural Resources

Charles R. Gougeon
Central Region Manager/
Inland Fisheries
Maryland Department of Natural Resources

John E. Hench, Ph.D., Supervisor *
Park Planning and Resource Analysis
Montgomery County Department of Park and Planning

Doug Marshall
Aquatic Biologist
Montgomery County Department of Environmental Protection

Michael Reahl
Manager
Montgomery County Department of Permitting Services

Doug Redmond
Principal Natural Resources Specialist
Montgomery County Department of Park and Planning

Keith Van Ness *
Senior Aquatic Ecologist
Montgomery County Department of Environmental Protection

* *Co-Chair, Upper Paint Branch Technical Work Group*

Representatives of Organizations

David Dunmire
Eyes of Paint Branch

Dolores Milmoe
Conservation Advocate
Audubon Naturalist Society

Staff Support
Claire Iseli
Legislative Senior Aide to
Councilmember Marilyn Praisner

MONTGOMERY COUNTY COUNCIL
ROCKVILLE, MARYLAND

MARILYN J. PRAISNER
DISTRICT 4

MEMORANDUM
November 12, 2002

To: Douglas M. Duncan, County Executive
Derick Berlage, Chair, Montgomery County Planning Board

From: Marilyn J. Praisner

Subject: Upper Paint Branch Technical Work Group

Over the past two years I have met several times with representatives of various environmental groups and County and State agencies to discuss a number of problems in the Upper Paint Branch Special Protection Area. After listening to their comments and assessing the complexity of the issues, I reached the conclusion that there is a need to reconvene a Technical Work Group. Subsequently, I asked Charlie Loehr, Director of Planning, and Jim Caldwell, Director of DEP, to recommend people to serve on the work group. Based on their recommendations, the co-chairs of the group will be Keith Van Ness of DEP and John Hench of M-NCPPC. The attached list provides the names of others who have been invited to be members of the group; others with an interest in watershed protection also may attend and participate. Although in its formative stages, I believe the group plans to meet once a month unless events warrant meeting more frequently. I have agreed to sponsor the group and hope to attend most of the meetings.

I realize that DEP provides an excellent overview in its annual report on special protection areas, including the Upper Paint Branch. However, given the money spent on land acquisition in the Upper Paint Branch, its singular status as the only special protection area with a 10% cap on imperviousness, continuing public and private development in the watershed, and evidence of a decline in water quality, I would like to take a closer look at the resource. I have asked the group to review the impacts of changes in impervious cover; to examine the effectiveness of ongoing stormwater and sediment control policies and programs; to discuss the effects of stream restoration projects; to identify problem areas; to provide an inventory of parcels acquired as parkland and parcels that are vacant and developable; and to advise me on the current status of the resource and what steps can be taken to protect it, now and in the future.

I appreciate your support for this effort and will be glad to respond to any questions or concerns you may have.

100 MARYLAND AVENUE • ROCKVILLE, MARYLAND 20850
240/777-7968 TTY 240/777-7914 FAX 240/777-7989 E-MAIL: M.PRAISNER@CO.MG.MD.US

Executive Summary

This report summarizes the issues discussed by the reconvened Upper Paint Branch Technical Work Group (UPBTWG). The Group's primary function was to serve in an advisory capacity to Councilmember Marilyn Praisner to evaluate whether existing protective measures are sufficient to protect the Upper Paint Branch. The group focused its efforts on the following general tasks: 1) assess the current condition of the resource; 2) assess current impacts affecting the resource; and 3) identify future impacts to the resource and recommend appropriate mitigation. Throughout the meetings, the group tried to reach consensus on issues while recognizing that the UPBTWG did not have to have a commonality of views. Varying viewpoints, reflections, suggestions, and thoughts were expressed on all of the following topics as requested by Mrs. Praisner, and are presented in this report:

- The differences between and the interdependence of the various subwatersheds; the characteristics and challenges in each;
- Data collection issues (in a general sense) – what needs to be done, whether there are policies and/or issues related to data collection;
- Whether anything needs to be done to change or strengthen the regulatory process and/or the way agencies to work together;
- The likely impact of continued development and the two major road projects, Route 198 and the ICC – not whether or not these projects should move forward but what effects they will have on the watershed;
- What role Legacy Open Space might play; whether we need to look at additional land acquisition;
- Ways to educate the general public about the Special Protection Area and its stewardship responsibilities.

Highlights of the work group's conclusions and recommendations follow. They reflect the personal views of the members and not necessarily those of their respective agencies or organizations.

- The Upper Paint Branch stream system has been a nationally recognized coldwater fisheries resource for decades. The presence of brown trout makes it unique – it is the only suburban stream system in Montgomery County with a proven, consistent, long-term self-sustaining brown trout population.
- Maintenance of the wild trout population is a key indicator for maintaining high water quality.
- Years of monitoring by the Maryland Department of Natural Resources, Montgomery County Department of Environmental Protection, and others strongly suggest that there are ongoing processes affecting the brown trout population that have not been fully offset by the land acquisition, stormwater retrofit, and stream restoration actions that have taken place since the establishment of the Special Protection Area in 1995.
- For purposes of managing and protecting the Upper Paint Branch, the ecosystem has been divided into 6 subwatersheds which have both distinct and overlapping characteristics. Each of these subwatersheds needs to be managed individually so that these parts can continue to function together as a robust, diverse, and resilient system. Natural resource

problems in one subwatershed cannot be corrected by implementing mitigation projects in another subwatershed. For example, parkland acquisition and/or stormwater retrofitting in the Good Hope or Gum Springs tributaries will neither protect remaining sensitive areas in the Left or Right Fork tributaries from future development, nor restore their flow regimes. Conversely, similar actions in the Left or Right Fork will not benefit the Good Hope or Gum Springs.

- The degree to which a watershed is covered in impervious surfaces is a widely accepted general indicator of the health of a watershed's natural resources (streams, wetlands, forests, etc.) – the more impervious surface, the higher the likelihood of degradation. High levels of imperviousness severely degrade aquatic resources. The location of impervious surfaces in a watershed is important in determining how severely the impervious land cover will adversely affect a stream system. Road projects are generally more detrimental than subdivisions.
- There has been general agreement previously among environmental professionals that degradation begins to occur when imperviousness exceeds a range of 10 – 15%. Based on more recent data from the Upper Paint Branch, there is a need to revise the impervious cap downward from 10% to 8% in the Special Protection Area. There is also a need to acquire additional land as pervious reserve.
- Regular inspection and maintenance of stormwater management facilities in the Upper Paint Branch watershed is critical for safeguarding high water quality. The consensus of the work group is that more can and should be done in this area.
- To minimize the impact of private and public development, the work group recommends that the County Council raise the fines for sediment and erosion control violations. It also recommends establishing a protocol for major sediment spill events, sewer line breaks, and other pollutant spills so that the response is quick and effective.
- Road projects need to be recognized as a particular problem. Potential watershed impacts occur from construction processes, road runoff after construction, and from vehicles utilizing the roadways. There was consensus that full mitigation isn't possible – for example, there is no way to replace hydric soils that are displaced because they take years and years to develop; furthermore, road projects seem to alter the natural hydrology of streams, and stormwater management systems can only go so far toward replicating natural conditions. The ICC as currently planned will negatively impact the Paint Branch even if all mitigation and stewardship activities are carried out to their fullest extent.
- The County needs to strengthen its identification and enforcement of conservation and scenic easements. Currently, easements are enforced only through the construction phase of a project; after that, inspections are generally made only if a potential violation is reported. This is a problem because the easements are in place to protect the most sensitive parts of properties.
- Encroachments are another management problem in the Paint Branch watershed, where private landowners adjacent to streams sometimes mow, dump yard waste, or build sheds or other structures on publicly owned and managed land near or within the stream buffers. Addressing the problem requires accurate delineation of park property lines and better staffing to identify and resolve encroachment issues.

Final Report

Report of the Upper Paint Branch Technical Work Group (UPBTWG)

Introduction

This report summarizes the issues discussed by the reconvened UPBTWG, brought together by Councilmember Marilyn Praisner to advise her on the current status and future prospects of the Upper Paint Branch Special Protection Area. The following topics, as requested by Mrs. Praisner, are presented in this report:

- The differences between and the interdependence of the various subwatersheds; the characteristics and challenges in each;
- Data collection issues (in a general sense) – what needs to be done, whether there are policies and/or issues related to data collection;
- The likely impact of continued development and the two major road projects, Route 198 and the ICC – not whether or not these projects should move forward but what effects they will have on the watershed;
- Whether anything needs to be done to change or strengthen the regulatory process and/or the way agencies to work together;
- What role Legacy Open Space might play; whether we need to look at additional land acquisition;
- Ways to educate the general public about the Special Protection Area and its stewardship responsibilities.

Minutes of the first meeting of the group follow this section. Charged with advising whether existing protective measures are sufficient to protect the Upper Paint Branch, the work group agreed to focus its efforts on the following general tasks: 1) assess the current condition of the resource; 2) assess current impacts affecting the resource; and 3) identify future impacts to the resource and recommend appropriate mitigation. In meeting this charge, the work group understood that it was important to consider whether or not the existing measures are sufficient to protect the resource under the "worst circumstances, not the best." These issues were examined in an organized, logical manner by focusing at the subwatershed level (*i.e.*, Good Hope, Gum Springs, Left Fork, and Right Fork).

Throughout the meetings, the group tried to reach consensus on issues but recognized that the UPBTWG did not have to have a commonality of views. Varying viewpoints, reflections, suggestions, and thoughts were expressed on all of the topics. The opinions and statements on issues reflect the personal views of the members and not necessarily those of the respective agency or organization. The group met between October 2002 and December 2004. Agendas were distributed in advance of every meeting, identifying the major topics to be discussed. If the members present at a regularly scheduled meeting reached consensus on a topic scheduled to be discussed, the minutes of that meeting recorded that the work group had reached consensus on that issue. The minutes were also sent out to all members and for review, discussion, and approved at the next scheduled meeting. Members of the work group were asked to have an assigned alternate so they would be represented at all meetings. The work group

followed a procedural rule of "absent/abide." This rule was made to maintain the momentum and progress of the group in trying to reach consensus on issues and coming to resolution on topics of concern. Drafts of the work group report were circulated in 2005 for review and comment by work group members.

The pages that follow are arranged into sections beginning with "problem statements," followed by background discussions, data where available, analysis, and consensus items and recommendations. The "boxes" that appear occasionally present the views of work group members who were not in agreement with the majority view.

Problem Statement: What is the current status of the Upper Paint Branch resources?

Background: Defining the Resource and Describing its Current Status

There was group consensus to define the resource in much the same way as it was defined in the first Technical Work Group report: The Upper Paint Branch Special Protection Area (SPA) (Figure 1) has been a nationally recognized coldwater fisheries resource for decades. The presence of brown trout in the stream system makes it unique – it is the only suburban stream system in Montgomery County with a *proven, consistent, long-term self-sustaining* trout population. The tributaries comprising the system are the Good Hope, the Gum Springs, the Right Fork, the Left Fork, and the Mainstem above Fairland Road. Maintenance of the wild trout population is a key indicator for maintaining high water quality. Land use decisions should be considered based on an assessment of all of the parameters that are necessary for continued support of the trout. These parameters include: cold and clean base flow; cold water temperatures; control of stormwater runoff; clean gravel/ cobble substrate in the riffles;

Figure 1. The Upper Paint Branch Special Protection Area, including stream monitoring stations, and major roads.

spawning, young-of-year, and adult trout habitat; and food for the young and adult trout.

Indicators of increased stress in the watershed include, but are not limited to the following: 1) subwatershed imperviousness levels (i.e., the amount of roads, parking lots, roof

tops and other impermeable surfaces preventing the natural infiltration of rainwater) which exceed 10 percent; 2) reduction in forest and meadow/old field coverage, accompanied by higher and more frequent stormwater runoff discharges; 3) accelerated stream channel erosion, resulting in widening and/or deepening of stream cross-sections; 4) increased sedimentation (primarily by sand-sized particles) in pool, riffle and run habitats; 5) reduction of or loss of appropriately-sized riffle gravels needed by spawning trout for both the construction of redds (nests) and the incubation of eggs; 6) reduction of or loss of shallow-rooted, instream aquatic plant species; 7) higher average and maximum summer stream temperatures; 8) decreased water quality, as measured through the use of various chemical and bacteriological parameters; 9) decreased numbers of and/or diversity of representative sensitive macroinvertebrate species (e.g., stoneflies, mayflies, and cased caddisflies); and 10) decreased numbers of and/or decreased physical condition in adult and young-of-year trout populations.

Years of monitoring by the Maryland Department of Natural Resources (MD DNR), the Montgomery County Department of Environmental Protection (MCDEP) and others strongly suggest that there are ongoing processes affecting the brown trout population that have not been fully mitigated by the land acquisition, stormwater retrofit and stream restoration actions that have taken place since both the establishment of the SPA in 1995 and the adoption of the 1996 Amendment for Limited Park Acquisition. Indeed, it may not be possible to fully mitigate these processes. Specifically, the adult and young-of-year trout populations in the Good Hope tributary (the watershed's principal trout spawning/nursery stream) have markedly declined over the past five years. This has occurred in spite of the fact that both major land acquisition and stormwater retrofitting have taken place, and that there has been relatively little additional development in this subwatershed for the past 10 years. DEP attributes this decline primarily to severe drought conditions and associated impacts to the stream including reduced stream flow and habitat availability, elevated water temperature and low dissolved oxygen content. However, many in the work group believe that while legacy effects from past agricultural uses and the two recent droughts of record may still be felt, it is far more likely that the cumulative hydrologic, sediment, water chemistry and thermal regime impacts associated with watershed urbanization (i.e., the construction of new roads, houses, shopping centers, maintenance facilities and other related infrastructure) are at play in this highly sensitive tributary. Similar to the changes associated with the gradual conversion of forest to agricultural uses, gradual urbanization-related impacts may take years, if not decades to fully manifest themselves, and an equal amount of time for the associated stream system to reach its new equilibrium. For example, in the 1994 Anacostia Watershed Restoration Committee report the AWRC observed the following for the Good Hope Tributary subwatershed:

> "Of great concern is the fact that the ecologically fragile Good Hope Tributary is already exhibiting signs of severe stress at the current 9% imperviousness level... An imperviousness level cap far lower than the 13.8% envisioned in the current Master Plan build out scenario is recommended, preferably at or near existing imperviousness levels."

Monitoring Data

The current status of these resources is summarized from monitoring data available from the SPA monitoring program, in collaboration with the Department of Natural Resources,

Freshwater Fisheries Division. Further information is presented in Appendix A (DEP monitoring report) and Appendix B (DNR- Freshwater Fisheries monitoring report).

SPA stream monitoring in Paint Branch began during 1994 and has been done annually since then. DNR stream monitoring began in 1979 and also continues on an annual basis. Presently there are fifteen DEP fixed monitoring stations from which biological (fish and benthic macroinvertebrate), habitat, and water quality data are collected (Figure 1, below). While most of the stations were established in 1994, they have not all been monitored every year. For example, not all stations were monitored in 1999 and 2002 because these were drought years. Some stations are not monitored for fish but are monitored for benthic macroinvertebrates because the station is located in a stream too small to support a fish community. County monitoring is also carefully coordinated with the DNR as there is no need to monitor the same area twice. During 2005 stream monitoring was conducted at twelve monitoring stations. Benthic macroinvertebrate sampling was completed at all twelve stations and fish were sampled from nine stations.

Habitat

- Overall stream habitat conditions in the Upper Paint Branch are adequate to support a diverse and healthy biological community. Stream habitat is not rated "excellent" so there are some habitat parameters that can be improved. Stream bank stability, sediment deposition and forest cover along stream corridors are the main parameters identified that could be improved through restoration activities.

- Results of stream channel surveys indicate that channels became slightly bigger between 1997 and 2005 in the Right Fork and Good Hope tributaries. Results from Gum Springs and the mainstem of Paint Branch indicate that these channels became smaller.

- Results from 2003 indicate very little change in substrate composition has occurred over the past seven years. For those monitoring stations that did exhibit change, the shift was towards slightly larger sediment size.

Fish Community

- Results of fish sampling during 2005 show little change in overall community integrity. Most fish species found during the first year of DEP's monitoring (1994) continue to thrive in Paint Branch in numbers similar to those of 1994.

- The exception is the brown trout population. 2005 results show brown trout continued to have lower numbers as compared to pre-2002 population data. DEP attributes this decline primarily to severe drought conditions that occurred during 1999 and 2002 and associated impacts to the stream including reduced stream flow and habitat availability, elevated water temperature and low dissolved oxygen content.

- It will take several years to determine if the downward trend becomes permanent, or is a temporary reaction to severe, though natural, events.

Brown Trout Population

- Successful recruitment and adult holding habitat in the headwaters of Paint Branch have been key to the continued survival and maintenance of the naturalized brown trout population throughout the watershed that extends to the Capital Beltway (Rt. 495) and beyond. The headwaters of greatest importance are contained upstream of Fairland Road and correspond to Montgomery County's Special Protection Area (SPA).

- Numbers of adult trout in Good Hope Tributary have fallen well below historical performance levels. A twenty-seven year record shows five of the last six years performed below the lowest numbers observed in all prior years, dating back to 1979.

- A short-term reduction in numbers of adult brown trout was anticipated over the prolonged drought (late 1998 through 2002); however, numbers have failed to recover to pre-drought levels, despite two high water years (2003 and 2004).

- Natural reproduction in the Good Hope Tributary has fallen far below historical performance levels. Two of the last three years performed below the lowest numbers observed in all prior years of available data, dating back to 1979.

- Gum Springs tributary, the second most productive spawning and nursery area in the Paint Branch, has failed to perform up to that standard in recent years; however, it continues to support very limited natural reproduction in most years.

- Development in the Right Fork tributary over the last ten-year period has reduced the overall stream quality and habitat. The results of the trout surveys conducted after 1998 were very poor. Only one young-of-year (yoy) has been observed in the survey years following 1998, and a grand total of three adult trout have been collected for the years 2000 (1 adult) and 2002 (2 adults).

- Monitoring results at Main Stem locations between the Capital Beltway and Fairland Road vary annually, however, adults continue to reside throughout the main stem in low densities, and these areas frequently produce the largest brown trout adults observed in the entire watershed. Successful natural reproduction continues to be insignificant and inconsistent during most years in the Paint Branch main stem.

- Trout nests (redds) have been counted by MD DNR biologists in the Good Hope Tributary from the mouth upstream to a point just upstream of Hobbs Drive. Recent redd counts have shown the majority of redds have been observed in the lower reach of the tributary, close to the mouth. Casual observations made by MD DNR biologists show decidedly fewer high quality gravel deposits in the Good Hope tributary between Landfare tributary and Hobbs Drive. Clean, sediment/silt free gravel is critical to successful spawning and hatching. Many locations along the Good Hope tributary that historically have had suitable spawning gravel now have unsuitable sand and/or large cobble or boulder substrate.

- The self-sustaining portions of Paint Branch upstream of Fairland Road have degraded significantly in the last ten years to the point where long-term survival of the brown trout population is very questionable.

Benthic Macroinvertebrate Community

- Some impact to the benthic macroinvertebrate community has occurred at several monitoring stations, especially at the Right Fork stations. Although 2004 IBI scores were within the range of scores from previous years, many stations were near the lower end of that range and one station (PBRF204) was lower then any other year.

- Lower than normal benthic IBI scores during 2004 throughout most of the Paint Branch SPA are also likely to be a result of stressful drought conditions that occurred during 1999 and 2002 and spring high water events during 2003 and 2004.

Water Temperature

- Water temperatures during the summer of 2004 were generally cooler than 2002 throughout Paint Branch. Water temperatures remain within the range conducive to maintaining brown trout populations.

More information is contained in Appendix B and in the 2004 SPA Annual Report.

UPBTWG Consensus Items and Recommendations

- The presence of a proven, consistent, long-term, self-sustaining brown trout population in the Upper Paint Branch stream system makes it unique – it is the only one in the suburban stream system in Montgomery County. It is the group's consensus that maintenance of the wild trout population is a key indicator for maintaining high water quality because their continued presence indicates that all of the physical, biological and chemical parameters necessary for the populations' survival are still present in sufficient quality and quantity. The work group recommends that land use decisions should be made based on an assessment of all of the parameters that are necessary for continued support of a high-quality Use III stream.

- The many streams and habitats of Upper Paint Branch are interdependent and, taken together, form a high-quality ecosystem. For purposes of managing and protecting the Upper Paint Branch, this ecosystem has been divided into 6 subwatersheds which have both distinct and overlapping characteristics. Each of these subwatersheds needs to be managed individually so that these parts can continue to function together as a robust, diverse, and resilient system. Natural resource problems in one subwatershed cannot be corrected by implementing mitigation projects in another subwatershed. For example, parkland acquisition and/or stormwater retrofitting in the Good Hope or Gum Springs tributaries will neither protect remaining sensitive areas in the Left or Right Fork tributaries from future development, nor restore their flow regimes. Conversely, similar actions in the Left or Right Fork will not benefit the Good Hope or Gum Springs.

- The resource would have been lost if not for the ambitious acquisition program laid out in the 1996 Limited Amendment for Park Acquisition. However, despite acquisition of a significant amount of acreage in the Good Hope and Gum Springs subwatersheds, the Upper Paint Branch continues to show signs of stress, and impervious levels in the watershed as a whole continue to rise. The changes resulting from land development may not have been offset by retrofits or through land acquisition. Indications are that further development will create conditions that may make it unlikely that the stream system will be able to sustain the trout population.

Problem Statement: What are the current imperviousness levels in the Upper Paint Branch, how effective is the imperviousness cap, and what are the impacts from the impervious surfaces?

Background: Effects of Watershed Imperviousness

The impervious cover of a watershed is an easily quantified, planning-level measure of land development impacts on natural resource systems in the watershed, including its stream system. The degree to which a watershed is covered in impervious surfaces is a widely accepted general indicator of how severely degraded a watershed's natural resources are (streams, wetlands, forests, etc.).

In addition to the amount of impervious cover, the location of impervious surfaces in the watershed is important in determining how severely such land cover will adversely impact a stream system. For example, paved surfaces located 50 feet from a stream will have greater adverse affects on the stream and associated natural resources than the same surfaces located 500 feet from the stream. As another example, paved surfaces in the headwaters of a stream system will create greater adverse impacts on the system than the same surfaces located further down in the watershed; this is because small headwater streams have less water flow and stream channel resiliency to counter the effects of impervious cover than larger streams. In 1994, the Anacostia Watershed Restoration Committee's Upper Paint Branch Work Group referenced a range of upper limits for watershed imperviousness between 10 and 15 percent beyond which Maryland's coldwater stream systems (i.e., those that support trout and related organisms) become severely degraded or are destroyed.

In general, the greater the proportion of a watershed covered in impervious surfaces, the lower the quality and health of its stream system. A watershed's imperviousness levels should be used with other indicators to define and assess the health of the watershed's natural resources. It is best used as a preliminary indicator to identify possible watersheds with high quality and unique natural resources that should be protected. Imperviousness levels can also be used to let watershed planners and managers know when and where high quality natural resource conditions may be at risk and watershed protection measures may need to be put in place, refined, or strengthened.

There is no single imperviousness level that defines when a stream system is damaged or degraded. This is because many variables affect how well a stream system can tolerate and counter the adverse impacts of land development activities. These factors include the soils, geology, and topography of the watershed; the size and configuration of streams; extent, location, and type of vegetation cover in the watershed; groundwater patterns and contributions to the stream system; extent, types, and locations of stormwater management controls and other measures that reduce the adverse impacts of land development activities; extent and locations of land development with respect to natural resource features of the watershed.

Rule-of-thumb, *upper* limits for watershed imperviousness levels beyond which coldwater stream systems in Maryland become severely degraded have been identified in various

studies as generally falling within 10 to 15 percent. In its 1994 study, the Anacostia Watershed Restoration Committee (AWRC) Upper Paint Branch Work Group recognized that specific watershed imperviousness levels cannot be used to set "thresholds" that define when the various streams of Upper Paint Branch will become irreversibly degraded and damaged. For example, the AWRC report recommends the following for the Good Hope Tributary subwatershed:

> "Of great concern is the fact that the ecologically fragile Good Hope Tributary is already exhibiting signs of severe stress at the current 9% imperviousness level... An imperviousness level cap far lower than the 13.8% envisioned in the current Master Plan build out scenario is recommended, preferably at or near existing imperviousness levels."

Calculating Existing and Future Levels of Watershed Imperviousness

All data, except for the Paint Branch mainstem within the Upper Paint Branch SPA, are from the "Upper Paint Branch Watershed Planning Study," M-NCPPC, October 1995. This study measured all paved surfaces and building rooftops for each subwatershed. The actual measure of impervious surface provided an accurate measure of imperviousness for current conditions. Imperviousness from driveways and sidewalks was calculated through additional GIS analysis. An approximate count was made of the number of buildings served by a driveway. This number was multiplied by an estimated average area for a driveway. Sidewalk imperviousness area was calculated by determining the total length of sidewalks and multiplying the length by an average width of four feet. Imperviousness contributions of other surfaces such as forest, pasture, and crop fields were also calculated. Projected subwatershed imperviousness was calculated by zoning categories for currently undeveloped but developable parcels. The tables on pages 15-18, developed by the MNCPPC, provide projected imperviousness levels by subwatershed according to various development scenarios.

Results and Analysis

These tables allow the reader to review the changing imperviousness levels in the different subwatersheds if all developable land was built out, if the Route 198 project is completed, and if the ICC master plan alignment is built. For example, the tables show that existing imperviousness in the Good Hope subwatershed is about 10.4%. The projected ultimate impervious cover (if all developable land is built out at 10% impervious limit) would be 10.7%. If the ICC is built on the master plan alignment, its six-lane, 300-foot-wide right-of-way will convert 15 acres of existing mature hardwood forest in the Good Hope Tributary to impervious road surfaces. In addition to the expected construction-related environmental consequences, this road project will raise the ultimate imperviousness level in the Good Hope to 12.2%, a 17% increase over existing levels. It is important to note that this projected level is significantly higher than the 10% maximum imperviousness generally recommended by environmental experts for the protection and support of coldwater, non-brook trout streams. We do not know whether the Paint Branch trout fishery can survive the higher impervious levels.

These tables show that current and projected land development activities will add significant imperviousness levels to all of the subwatersheds. In Left Fork, Right Fork, and Fairland Farms subwatersheds, much of the increases in imperviousness are due to new

subdivisions; the Route 198 widening project is anticipated also to add significant imperviousness to the Left Fork and Right Fork subwatersheds. In the Good Hope, Gum Springs, and Mainstem subwatersheds, the large increases in impervious surfaces are due to the ICC.

One element that is not captured in these tables is the small, but cumulative and significant increases in impervious surfaces due to additions or expansions by individual property owners to existing buildings, driveways, etc.

Also, the tables do not portray the location of existing and future impervious surfaces with respect to the streams and other natural features of the watershed. The closer the impervious surfaces are to the streams and other natural features, the more detrimental they are. Generally, impervious surfaces associated with subdivision development lie outside defined stream buffers. However, for some road projects there is less flexibility in locating impervious surfaces because of pre-defined rights-of-way. This is true of both the master plan ICC and Route 198. The ICC will create impervious surfaces that go through several streams, wetlands, floodplains, and forest in the Good Hope, Gum Springs, and Mainstem subwatersheds.

UPBTWG Consensus Items and Recommendations

- High levels of imperviousness severely degrade aquatic resources. There has been general agreement previously among environmental professionals that this begins to occur when imperviousness exceeds a range of 10% to 15%.
- Based on more recent data, there is a need to revise the impervious cap downward from 10% to 8% in the Upper Paint Branch Special Protection Area to allow room for impervious "creep" – imperviousness that is added to private homes after the development is complete.
- There is a need to acquire additional land in the Special Protection Area as pervious reserve. The Work Group recommends a review of vacant parcels that considers their location relative to the streams in the various subwatersheds, developing "locator coefficient" that would identify parcels in order of their importance. Pervious reserve areas created in one subwatershed should be used only to offset impervious surfaces in that subwatershed. Pervious reserves in one subwatershed cannot be used to mitigate added imperviousness in another subwatershed.
- There should be annual updates of impervious levels in the Upper Paint Branch watershed, either through aerial surveillance or by calculations of known addition to existing levels.

The work group also notes that the only way to reduce or minimize impacts of imperviousness in already developed areas is to remove specific structures or, if the structures can not be removed, retrofit SWM controls for the structures. Among the facilities now existing in the Upper Paint Branch watershed are:

- County owned and operated facilities – the library and recreation center on Old Columbia Pike; the fire station at the corner of Briggs Chaney and Old Columbia Pike; the Colesville Depot on Cape May Road;

- County Parkland –parking lots, athletic and utility courts, buildings, paved trails, and other impervious areas within the County park system;
- MCPS schools within the watershed (Drew ES; Paint Branch HS (partial); Banneker MS; Cloverly ES; Briggs Chaney MS);
- Private lands –shopping centers (Cloverly Safeway), commercial areas (Cloverly), and religious institutions;
- Residential subdivisions.

The removal of most of these structures to reduce imperviousness is not a feasible option. However, a detailed review of other ways to partially mitigate the effects of existing imperviousness should be pursued. For example, facilities with parking lots and other impervious areas could be retrofitted with a system of filtration facilities (rain gardens, biofiltration in parking lot islands and other areas, sand filters, etc); County, park, and MCPS buildings could be retrofitted with green roofs; and future road widths could be reduced. Finally, there are existing impervious surfaces in the watershed – old parking lots, old paths, etc. – that are underutilized or not needed. They should be identified and removed.

There is one structure on the list of County-owned facilities – the Colesville Depot – that several members of the work group believe should be relocated to a site outside of the Upper Paint Branch Special Protection Area. It is highly impervious and located very close to the Good Hope Tributary.

DEP has conducted temperature, biological, habitat, and water quality monitoring of the Colesville Depot Tributary since 1995. A summary of the monitoring is presented in Appendix C. Monitoring also included stations in the Good Hope immediately above and below the confluence of the Good Hope Tributary with the Depot Tributary. The discharge from the Colesville Depot has elevated water temperatures above Class III criteria but is rapidly diminished as the stream flows through an extensive spring/seep wetland. The stream is well within Class III limits upon reaching the confluence with the Forester Pond. This monitoring has not documented any biological or thermal impairment to the Good Hope Tributary as a result of the Colesville Maintenance Depot.

Monitoring continued through the 1997/1998 retrofit of the Depot's stormwater management structures. Temperature monitoring identified the Forester Pond (downstream of the Depot) as the primary source of elevated water temperatures in the Depot Tributary. DEP lowered the pond elevation and planted shrubs and trees to shade the pond. Temperature monitoring in 2004 documents only a 1^{0} F. average difference above and below the retrofitted Forester Pond. Temperatures above and below the Forester Pond are within Class III criteria. Temperatures in the Good Hope above and below the confluence of the Depot Tributary have not shown any differences throughout this entire 10 year monitoring period.

The millions that it would cost to relocate the Depot would be far better spent evaluating other publicly owned high impervious areas to determine their respective impacts to the Upper Paint Branch and to develop remedial actions to minimize these impacts.

Impervious Cover in the Upper Paint Branch Special Protection Area

	Size of Subshed (acres)	Impervious Cover as of 1990 [1]		Impervious Cover as of 2004 [2]		Impervious Cover – 2004 + Approved but unbuilt projects		Developable Land as of Nov. 2005	Projected Ultimate Impervious Cover [3] (if all developable land built out at 10% impervious limit)		Projected Ultimate Impervious Cover + Rte. 198 Widening	
		acres	%	acres	%	acres	%	acres	acres	%	acres	%
Good Hope	986 ac.	97 ac.	9.8 %	103 ac.	10.4 %	105 ac.	10.6 %	14 ac.	106 ac.	10.8 %	106 ac.	10.8 %
Gum Springs	624 ac.	97 ac.	15.6 %	97 ac.	15.6 %	97 ac.	15.6 %	0 ac.	97 ac.	15.6 %	97 ac.	15.6 %
Left Fork	1400 ac.	169 ac.	12.1 %	185 ac.	13.2 %	186 ac.	13.3 %	287 ac.	216 ac.	15.4 %	223 ac./ 221 ac. [4]	15.9 % / 15.8 % [4]
Right Fork	941 ac.	90 ac.	9.6 %	119 ac.	12.6 %	134 ac.	14.3 %	61 ac.	140 ac.	14.9 %	150 ac./ 148 ac. [4]	15.9 % / 15.7 % [4]
Fairland Farms	198 ac.	23 ac.	11.8 %	29 ac.	14.5 %	29 ac.	14.5 %	27 ac.	31 ac.	15.9 %	31 ac.	15.9 %
Mainstem (w/in SPA)	652 ac.	80 ac.	12.2 %	85 ac.	13.0 %	85 ac.	13.0 %	44 ac.	90 ac.	13.8 %	90 ac.	13.8 %
Total in SPA	4801 ac.	556 ac.	11.6 %	618 ac.	12.9 %	636 ac.	13.2 %	433 ac.	680 ac.	14.2 %	696 ac./ 692 ac. [4]	14.5 % / 14.4 % [4]

[1] All data, except for mainstem within SPA, are from "Upper Paint Branch Watershed Planning Study", M-NCPPC, October, 1995. Data for mainstem within SPA derived from M-NCPPC staff GIS analysis of 1990 planimetric data and 3/2000 planimetric and 1998 orthophoto data.

[2] Data based on GIS analysis of 3/2000 planimetric and 1998 orthophoto data, supplemented by M-NCPPC staff field evaluation and estimates from approved and constructed land development projects; data represents conditions as of end of 2004.

[3] 2004 conditions + Approved but unbuilt projects + Developable land. *Does not include any future or proposed road projects (i.e., this column does not include Rte. 198 widening or ICC.)*

Other notes:

- "Approved but unbuilt projects" include approved preliminary plans for the Peach Orchard and Allnutt properties (Right Fork subshed).
- "Developable land" excludes the Peach Orchard and Allnutt properties.
- These calculations exclude construction between mid-2000 and the present on *individual lots created before 1997.*

Impervious Cover in the Upper Paint Branch Special Protection Area

	Size of Subshed (acres)	Impervious Cover as of 1990 [1]		Impervious Cover as of 2004 [2]		Impervious Cover – 2004 + Approved but unbuilt projects		Impervious Cover due to Existing Roads [3] (as of Jan. 2002)	
		acres	%	acres	%	acres	%	acres	%
Good Hope	986 ac.	97 ac.	9.8 %	103 ac.	10.4 %	105 ac.	10.6 %	31 ac.	3.1 %
Gum Springs	624 ac.	97 ac.	15.6 %	97 ac.	15.6 %	97 ac.	15.6 %	32 ac.	5.1 %
Left Fork	1400 ac.	169 ac.	12.1 %	185 ac.	13.3 %	186 ac.	13.3 %	52 ac.	3.7 %
Right Fork	941 ac.	90 ac.	9.6 %	119 ac.	12.6 %	134 ac.	14.3 %	26 ac.	2.8 %
Fairland Farms	196 ac.	23 ac.	11.8 %	29 ac.	14.5 %	29 ac.	14.5 %	6 ac.	4.5 %
Mainstem (w/in SPA)	652 ac.	80 ac.	12.2 %	85 ac.	13.0 %	85 ac.	13.0 %	25 ac.	3.8 %
Total in SPA	4801 ac.	556 ac.	11.6 %	618 ac.	12.9 %	636 ac.	13.2 %	172 ac.	3.6 %

[1] All data, except for mainstem within SPA, are from "Upper Paint Branch Watershed Planning Study", M-NCPPC, October, 1995. Data for mainstem within SPA derived from M-NCPPC staff GIS analysis of 1990 planimetric data and 3/2000 planimetric and 1998 orthophoto data.

[2] Data based on GIS analysis of 3/2000 planimetric and 1998 orthophoto data, supplemented by M-NCPPC staff field evaluation and estimates from approved and constructed land development projects; data represents conditions as of end of 2004.

[3] "Existing roads" include County and State roads only. This category does not include driveways, private roads, or parking lots. (This category is a subset of "Impervious Cover as of 2004").

	Size of Subshed (acres)	Developable Land as of Nov. 2005	Projected Ultimate Impervious Cover [1] (if all developable land built out at 10% impervious limit)		Projected Ultimate Impervious Cover + Rte. 198 Widening only [2]		Projected Ultimate Impervious Cover + 6-lane Master Plan ICC only [3]		Projected Ultimate Impervious Cover + 6-lane Drayton Edgewood ICC only [4]	
	acres	acres	acres	%	acres	%	acres	%	acres	%
Good Hope	986 ac.	14 ac.	106 ac.	10.8 %	No change		124 ac.	12.6 %	No change	
Gum Springs	624 ac.	0 ac.	97 ac.	15.6 %	No change		103 ac.	16.5 %	No change	
Left Fork	1400 ac.	287 ac.	216 ac.	15.4 %	223 ac./ 221 ac. [4]	15.9 % / 15.8 % [4]	No change		231 ac.	16.5 %
Right Fork	941 ac.	61 ac.	140 ac.	14.9 %	150 ac./ 148 ac. [4]	15.9 % / 15.7 % [4]	No change		152 ac.	16.2 %
Fairland Farms	198 ac.	27 ac.	31 ac.	15.9 %	No change		No change		No change	
Mainstem (w/in SPA)	652 ac.	44 ac.	90 ac.	13.8 %	No change		103 ac.	15.7 %	No change	
Total in SPA	4801 ac.	433 ac.	680 ac.	14.2 %	697 ac./ 693 ac. [4]	14.6 % / 14.4 % [4]	717 ac.	14.9 %	707 ac.	14.7 %

[1] 2004 conditions + Approved but unbuilt projects + Developable land. *Does not include any future or proposed road projects (i.e., this column does not include Rte. 198 widening or ICC.)*

[2] First number is based on rough estimates by M-NCPPC staff, which shows Rte. 198 widening would add about 17 acres of new impervious surfaces, with 10 acres in Right Fork and 7 ac. in Left Fork; this uses a 92-ft. wide impervious surface cross-section. Second number is based on SHA estimate for Alternate 3, Master Plan Features, which shows Rte. 198 would add about 13 acres of new impervious surfaces, with roughly 8 acres in Right Fork and 5 acres in Left Fork.

[3] ICC estimates from ICC Preliminary Final EIS, Volume 2 (SHA, August 3, 2005).

[4] Impervious calculations for the Drayton Edgewood Option ICC uses the following estimates: Using the SHA 10/9/03 "Very Draft" IAWG Sub-group Field Study Areas Map, staff estimates 6480 linear ft. of Drayton Edgewood Option ICC in the Left Fork subwatershed and 5040 linear feet in the Right Fork. Also, staff assumes a 100-ft. wide impervious surface cross-section.

	Size of Subshed	Projected Ultimate Impervious Cover (from previous table) + Rte. 198 Widening +			
		+ 6-lane Master Plan ICC		+ 6-lane Drayton Edgewood Option ICC	
	acres	acres	%	acres	%
Good Hope	986 ac.	124 ac.	12.6 %	106 ac.	10.8 %
Gum Springs	624 ac.	103 ac.	16.5 %	97 ac.	15.6 %
Left Fork	1400 ac.	223 ac./ 221 ac.	15.9 % / 15.8 %	238 ac. / 236 ac.	17.0 % / 16.9 %
Right Fork	941 ac.	150 ac. / 148 ac.	15.9 % / 15.7 %	162 ac. / 160 ac.	17.2 % / 17.0 %
Fairland Farms	198 ac.	31 ac.	15.9 %	31 ac.	15.9 %
Mainstem (w/in SPA)	652 ac.	103 ac.	15.7 %	90 ac.	13.8 %
	4801 ac.	734 ac. / 730 ac.	15.3 % / 15.2 %	724 ac. / 720 ac.	15.1 % / 15.0 %

Problem Statement: What are the effects of the stormwater management practices in the watershed? How are they being monitored?

Background: Stormwater Management Facilities

There are several different generations of stormwater management (SWM) structures within the Upper Paint Branch watershed reflecting "Best Management Practices" (BMPs). Maintenance of these facilities is critical to their continued effective function.

SWM facilities can be designed to provide control for different sized storms with different periods of release. The current SPA SWM provides for controls of frequent storms consistent with the State SWM design manual. By law, all County-approved BMPs have to be designed in accordance with the Maryland SWM design manual. SPA controls also provide redundancy not required in the State manual through the use of "treatment trains" that process runoff in more than one structure. The stream monitoring done by State, County, and volunteer groups can document the effects these different controls have on the stream resources as changes to baseflow, stormwater runoff and water quality will effect the biological community through changes in habitat.

The SPA BMP monitoring looks at the effectiveness of the SPA BMPs. Pre-, during- and post-construction monitoring results will be shared by DEP as soon as they are available for projects. Post construction monitoring results will become available after sediment control devices have been converted over to SWM structures, the converted structures approved as built for SWM control and monitoring been completed. Some information is becoming available now; a better range of data will be available in 2 – 3 years. Available monitoring results from the stations located at the Briarcliff Manor residential subdivision (Baldi), the Fairland Community Center, and the Hunt/Lions Den residential subdivision, though very preliminary, indicate that sediment is still getting into the streams during the construction phase of the projects. However, preliminary results do not indicate any thermal changes, changes in the water table, or changes in channel dimension. Although we are not seeing observable changes from each individual construction project, we are seeing changes in the biological communities throughout the watershed. This is most likely because changes in the biological communities reflect cumulative impacts. Cumulative impacts come not only from recent construction processes, but from ongoing changes to the watershed due to existing development and land use as well as natural stressors such as drought.

A lot of development occurred in the Upper Paint Branch SPA prior to the adoption of requirements for modern stormwater management controls. In these areas, DEP and its partners have found numerous opportunities for either new SWM controls or retrofits that will help remediate the adverse effects of uncontrolled runoff. Thus far, DEP has constructed or planned for 6 projects which will provide stormwater controls for 249 acres in the upper watershed and has restored or planned for 0.79 miles of stream habitat. These projects will help to remediate the adverse effects of uncontrolled runoff from older development. After these are completed it will become challenging to find additional sites for new SWM controls or retrofits of existing ones.

Most of the installed retrofit and stream restoration controls are just becoming operational and have had insufficient time to induce positive stream habitat and biological response. However, there is one that has been operational for a while. The Gum Springs bypass pipe was designed to transfer heated runoff from the Gum Springs to the larger Paint Branch mainstem. It has improved water temperatures in the Gum Springs Tributary while at the same time not raising temperatures in the Paint Branch main stem. This project has improved the water temperatures of the lower Gum Springs for trout spawning again. Today, although Gum Springs tributary continues to perform as a nursery and spawning tributary, it has not demonstrated the ability to produce consistent or significant annual brown trout recruitment comparable to 1994 or earlier. This is because adult trout habitat in the lower Gum Springs tributary is currently suboptimal and has suffered greatly from the consequences of development, especially those from the construction of the Oak Springs development in the middle 1980's. Development impacts are manifested as channel scour; sediment deposition and channel widening that resulted in the loss of undercut banks and reduced depth of quality pools. Sediment impacts have subjected adult trout to higher predation (especially larger adult trout) and have impaired reproductive success.

Retrofits and New Stormwater Management	Total Costs	Drainage Area (Acres)
Upper Paint Br (GS-8)	$400,000	122
Upper Paint Br. (GH-5) Peachwood III	$89,404	28
Upper Paint Br. (GH-2) Peachwood II	$37,383	17
Upper Paint Br. (GH-9) Great Hope	$31,810	6
Upper Paint Br (GS-12) Peachwood I	$72,000	24
Colesville Health Center LID	$216,000	
Upper Paint Br (LF-5) Fairland Acres	$156,000	52
Totals	$1,002,597	249
Stream Restoration		Miles
Upper Paint Branch Watershed Study	$82,530	
Gum Springs Bypass	$377,000	0.32
Upper Paint Br. (GH-6)	$25,596	0.05
Upper Paint Br. (GH-10)	$31,556	0.17
Upper Paint Br. (GH-1), 3a, b)	$51,777	0.12
Upper Paint Br. (GH-14)	$32,000	0.13
Totals	$600,459	0.79
Grand Total	$1,603,056	

Table 1. Watershed Restoration Projects in the Upper Paint Branch Watershed.

DEP's expenditures for remedial capital projects in the Upper Paint Branch watershed exceed $1.6 million thus far. The impacts of increases in watershed impervious area accompanying new master planned development are being offset, to a degree, by the new runoff controls being added to existing developments and by stream restoration projects to improve existing habitat and supported biological communities. New development activity is also being

accompanied by more modern stormwater controls expected to be more effective in mitigating runoff impacts than controls required under earlier standards.

Monitoring data collected as part of the county's NPDES permit requirements identified and documented the Forester Pond as a source of elevated water temperatures to the Good Hope Tributary as opposed to the Colesville Depot as first thought. The county retrofitted the Forester Pond in 2000 to reduce the elevated water temperatures. The Colesville Depot was retrofitted by DPWT in 1997 - 1998.

UPBTWG Consensus Items and Recommendations

- Continued support should be given to the stormwater retrofits already planned by DEP and Park & Planning. Additional stormwater retrofitting projects need to be identified, looking comprehensively at the entire drainage system and identifying places where we can get more effective controls in place. Each restoration project must be monitored (temperature, flow, etc.); this is particularly important at the already completed Piping Rock retrofit, which may be the most critical one in the entire watershed.

- We need to continue to monitor and evaluate current stormwater management design and performance standards with a goal of eliminating development impacts. This includes an increased emphasis on monitoring.

- Sediment impacts during construction continue to be a problem, especially with the amount of development that is occurring. Although sediment control measures are stringently enforced, they do not totally eliminate sediment discharges to receiving streams. Therefore, when several development projects are active at the same time stream degradation is more likely. DPS should continue to research and look for improved design and construction standards.

- For the past 25 years, it has been widely acknowledged that the regular inspection and maintenance of stormwater management (SWM) facilities in the Paint Branch watershed are critical components necessary for safeguarding the trout resource. Because there are several complex state-of-the-art facilities located in this environmentally sensitive watershed (e.g., off-line extended detention wetlands, peat sand filters, sand filters, linked treatment systems with infiltration trenches and more), inspection and maintenance demands have generally increased. Because of past maintenance shortcomings, many of these facilities have not provided optimal water quantity and quality control. With the recent signing of the 2004 MCDEP/M-NCPPC SWM Maintenance MOU in which MCDEP assumes major structural maintenance responsibilities, conditions are expected to improve.

- Furthermore, some of the work group recommends that "keystone" SWM facilities such as Piping Rock Drive, Colesville Maintenance Depot, Fairland Ridge and others need to be inspected and, if warranted, maintained after *every* significant rainfall event. Several of these facilities have warranted additional physical, chemical and biological monitoring to further define their actual design performance. This monitoring, managed by DEP, has been going on for some time.

Problem Statement: Development of the landscape can and does have impacts to the receiving streams within the Paint Branch watershed. Can these impacts be minimized or eliminated?

Background: Current Development in the Subwatersheds

Development in the Good Hope Tributary has been largely completed with relatively small amounts of land still available for land use conversion (approximately 20 acres as of 2002). Gum Springs Tributary is also largely developed; however, there is still a large parcel in the headwaters above Good Hope Road, totaling 21 acres. The majority of the large parcels available for development are found in the Left and Right Forks.

Site Plan Review Process

Before filing a subdivision plan, applicants are required to provide a Natural Resource Inventory and Forest Stand Delineation for review by Park & Planning's Environmental Planning Division. This shows existing features. A pre-application meeting is held, and staff reviews the 10% impervious cap requirement with the applicant/developer, identifies any environmental features that must be buffered or may be acquired by Park & Planning, and delineates forest conservation areas. DPS also requires a pre-application meeting on a water quality plan, so that staff can identify stormwater management control and monitoring goals. Once the preliminary reviews are completed by Park & Planning and DPS, the subdivision plan is scheduled for the Development Review Committee. This brings together the applicants and representatives of the various reviewing agencies – DPS, DPWT, DEP, Park & Planning, public participants, etc. The next step is preparation of a report by Park & Planning development review staff for presentation to the Planning Board for action.

Minimization of Impacts

Private developers are required to have redundant controls in the Upper Paint Branch Special Protection Area. Some projects have several sediment traps in a row, dewatered to each other. And they are often oversized, probably 50% larger in the Upper Paint Branch.

County public projects are controlled the same way, but State and federal projects do not have to comply with County regulations. Instead, they are asked to voluntarily comply with County regulations. Even though they go through the mandatory referral process, they can choose to disregard County recommendations. For example, there was initial resistance to recommended controls for the Spencerville Post Office site, but eventually they did comply. Because they are not held to the same standards as private developers, State and federal projects pose greater problems.

Furthermore, despite staff's best efforts to build adequate environmental protection into the plans for private projects, developers have been known to take advantage of the rules. For example, in one particular case, a developer brought forward a plan at the 10% impervious limit

– he worked with Planning staff to limit the size of the driveways, then he told the homeowners that as soon as the houses were occupied they could enlarge the driveways, and several did so.

Purchasers are required to sign a disclosure that they are buying in a Special Protection Area, although not all people remember doing so because of the large number of papers they are signing at settlement. There is a provision in current SPA law that excludes existing homeowners from the 10% impervious cap. Since it is likely that some will add decks, expand driveways, and otherwise increase impervious levels on their property, there is a need to encourage projects to come in under the 10% limit at the time of subdivision.

In-Stream Impacts

Relatively few developments have been built under the SPA program. Most of these parcels have been in the Right Fork. There have been short term impacts to the benthic macroinvertebrate community as a result of these developments although the benthic macroinvertebrate community has returned to pre-development levels. These impacts have come from very fine suspended sediment entering the streams. Sediment control structures are never 100% effective; it is difficult to prevent some fine suspended sediment from entering the streams during construction. Now that these developments have been completed and the sediment control structures converted to SWM, monitoring will be able to track long term changes in the biological communities in the receiving streams.

Sedimentation and erosion are potentially serious problems during the construction process and are related to the amount of time that a site is "open" and the size of the area involved. There are a number of requirements in the SPA designed to minimize these problems. For example, super silt fences are required, as well as phasing projects so that not everything is open at once. Super silt fence is one of several best management practices that can be used on a construction site. The determination for requirement is between the design engineer that is developing the site plans and the DPS plan reviewer. Also, when ditch lines (swales) are used instead of pipes to convey runoff to the traps, they must be stabilized quickly. There are frequent inspections by DPS, but the construction industry is hard to regulate – you are dealing not only with developers who may not understand or appreciate the SPA requirements but also with subcontractors who may or may not listen to what is passed along to them from the developers. The most common enforcement procedure in DPS for sediment control violations is the policy that was adopted in July 1, 2000. A notice of violation is issued and if the violation is not corrected within 48 hours a stop work order will be issued. The stop work order affects all construction activity on the site. If the violations are severe, higher levels of enforcement are taken such as immediate stop work orders and fines. Additional enforcement action can also be undertaken by the Maryland Department of the Environment. Our fines are Class A violations.

When the Baldi property (now Briarcliff Manor North) was built out, the site was rough graded in phases and each phase was stabilized before moving to the next. This sequence of construction was established during sediment control review. After the construction process began there were frequent inspections. Despite all of this, the Right Fork in the vicinity of the areas under construction (Baldi and the Fairland Recreation Center) did show signs of degradation during the sediment control phase.

UPBTWG Consensus Items and Recommendations

- Review the design guidelines for roads, sidewalks, and parking lots and consider modifying the standards for projects located in the SPA.

- Publicize the "hot line" number so that residents can report observed problems to DPS. One way to do this would be to post signs along the perimeter of construction sites.

- When sites are not in full conformance with their sediment and erosion control plans, or when maintenance and/or repairs are not made in a timely manner, DPS has found that issuing Notices of Violation and stop-work orders can serve as effective incentives for sites to be maintained according to plan. The work group recommends that developers be notified early in the process that they will face fines and/or stop-work orders for being in non-compliance with approved sediment and erosion control plans. The work group also recommends that the fines for sediment and erosion control violations be raised. The current fines are categorized as Class A violations, usually assessed as a civil penalty with a maximum initial fine of $500 and a repeat offense fined $750. This amount does little to serve as a deterrent that would encourage permittees to maintain their sediment and erosion control structures. County Council action would be required to raise the fine for sediment and erosion control violations.

- Establish a protocol for major sediment spill events, sewer line breaks, and other pollutant spills so that the response is quick and effective. A list of contractors needs to be made available as needed, a generic clean up plan needs to be prepared, and a list of agencies that need to be contacted and coordinated with should be available on request.

- Manage the transport of hazardous materials through the SPA (this could be done in conjunction with the placement of road signs at the entrance points).

- Develop a statement of the importance of the SPA and the need for both public and private development to adhere to the conditions of plan approval or recommendations outlined in mandatory referral reports. The statement needs to be disseminated not only to developers but also to County and State agencies each time a project in the SPA comes in for approval or mandatory referral.

- Review Chapter 19 (Erosion, Sediment Control, and Stormwater Management) and the Executive Regulations to see whether they need to be revised and/or strengthened.

Problem Statement: There are several road projects in various stages of planning and design that will either drain to the streams in this watershed or will cross them. Potential impacts will occur from construction processes, road runoff after construction, and from vehicles utilizing the roadways.

UPBTWG Consensus Items and Recommendations

- Even though the SPA program is a local one, State and Federal agencies should be asked to comply voluntarily with the local standards. The mandatory referral process is the County's chance to work actively toward gaining compliance from the State and Federal agencies. We should take full advantage of that opportunity. However, it is also of critical importance that MDE, SHA, Parking and Planning, and County DEP, DPS, and DPWT get together early in the process to discuss the issues and work out solutions before plans are put on paper. For those projects already under way and following federal guidelines, our agencies should continue the dialogue toward achieving mutually beneficial goals.

- There was consensus that full mitigation isn't possible; for example, there is no way to replace hydric soils because they take years and years to develop. Also, stormwater management facilities are typically 60 – 90% effective – road projects seem to alter the natural hydrology of streams and stormwater management systems can go only so far toward replicating the natural conditions. Also, the systems will fail after an extended period of time unless they are properly maintained.

- If Route 198 is widened, the group believes that locating the stormwater management ponds south of 198 near the Left and Right Fork headwaters is not a desirable alternative. As much as possible these facilities should be located on the north side of 198 but still in the Upper Paint Branch watershed. These locations would have far less impact.

- Open-section and other types of environmentally sensitive road designs and BMPs should be provided in the SPA, except as noted below, consistent with the Cloverly and Fairland Master Plans, but within a design framework that allows for reduced imperviousness even if it requires deviating from some of the design standards. Closed section should be used only in those sections where there is not sufficient right-of-way for open section (for example in the section of the MD 198 project passing through Spencerville and passing by Union Cemetery).

- There is group consensus that we need to set very high standards for SWM and sediment and erosion control with a goal of having as close to zero impact as possible.

> The realty is that SWM and sediment and erosion control is not 100% effective. There will be some unavoidable impact to receiving streams from the development of any construction project.

- The ICC, as currently planned, will negatively impact the Paint Branch even if all mitigation and stewardship activities are carried out to their fullest extent.

- The amount of imperviousness added to the watershed will be nearly impossible to fully mitigate, even with the planned infiltration facilities, since facilities of the type planned will require extensive maintenance, and even if properly maintained, are likely to eventually fail.

- Sediment impacts during construction are almost certain to occur during a project the size of the ICC. Sediment control devices cannot practically be sized for the maximum possible storm, and even during storms that are within design parameters, sediment control devices are never 100% effective. Given the number of catastrophic failures of sediment control that has occurred during construction projects in the County within the last few years, it likely that at least one serious failure would occur during ICC construction.

- Not all stream crossings will be bridged, and those that are bridged will, for the most part, not bridge the entire flood plain, which will result in negative impacts to hydrology, the movement of fish and other vertebrates, and possible to groundwater inputs to the stream system.

Problem Statement: There are conservation and scenic easements on private property and on individual parcels along the riparian areas of Upper Paint Branch. These easements are not easily mapped as they are largely found in paper data sources as opposed to digital map layers. They are not regularly inspected so their current condition may not be known.

Background

Easements are enforced through the construction phase, but once a project is completed and the forest conservation plan is met, inspections are generally made only if a potential violation is reported. There is a manpower problem associated with any efforts to conduct regular field inspections, although some volunteer groups such as the Eyes of Paint Branch might be willing to do these.

M-NCPPC maintains a GIS database layer of conservation easements for the county. However, because of other work programs, making the database complete, up-to-date, and accurate has not been identified as a priority. Older conservation and scenic easement information remain in paper form (record plats, deeds). Recently created easements are in digital form, but the information has not been consistently and routinely transferred into the GIS database layer.

There needs to be a better and less field intensive system in place for monitoring compliance, much of which could be done through the use of aerial photography. A digital coverage of the boundaries of easements in the Upper Paint Branch would be helpful. The coverage can be compared to digital orthophoto coverages to detect changes in the easement over time. The coverage could also be linked to a database so that yearly reminders to property owners about maintaining the easement could be sent out.

UPBTWG Consensus Items and Recommendations

- M-NCPPC needs funding and staffing to allow completion and continued maintenance of an accurate and up-to-date countywide GIS database for conservation and scenic easements. All easements should be identified and mapped on the GIS system, and all landowners where easements are located should be notified of their existence and the compliance standards.

- Permanent signage to delineate conservation and scenic easements should be posted by the agency managing the easements. The inspection and enforcement process needs to be improved.

- The enforcement program needs to be strengthened through adequate staffing and training for pro-active inspections and enforcement of easement areas as well as accurate and timely tracking of enforcement cases.

- A consistent process should be developed to handle violations of terms of conservation and scenic easements.

Problem Statement: There are numerous encroachments of publicly owned and managed lands within the Upper Paint Branch. These encroachments are often immediately adjacent to streams as a result of property owners mowing to the stream edge or dumping yard waste onto the stream bank. Other encroachments can include illegally appropriating water from the streams or placing sheds, bridges, or other structures within the stream buffer. Encroachments can increase sedimentation into the streams or eliminate a shaded buffer strip to maintain cold water temperatures.

Background

Encroachments have long been a management problem in the Paint Branch watershed. Encroachments within the stream buffers in the Good Hope and Gum Springs tributaries eliminate needed shade and bank vegetation necessary for these tributaries to function as spawning/nursery streams. Most of the encroachment problems involve mowing into parkland, clearing out underbrush, or building sheds on park property.

The problem is exacerbated by the lack of park property markers on many of the park boundaries, either because they were never placed or because residents have removed them. Another problem results from the fact that park surveyors are not licensed, so that property markers are normally offset into park property to lessen the likelihood of placing them on private property.

The process for dealing with encroachments is to send a letter from the Parks Administration office warning the property owner, followed by a second letter, and then a citation as a last resort. The process can take a very long time and citations can often be rescinded. The M-NCPPC legal department has staff to deal with the encroachment issues, but the Park Operations Division does not have sufficient staff to conduct field inspections. Another problem in the past has been the lack of political will on the part of local government to uphold enforcement actions against the residents who encroach on parkland.

To resolve the parkland encroachment issue, M-NCPPC should hire licensed surveyors who can accurately place park property markers, hire additional inspectors to locate and deal with encroachments, and ensure that all encroachments are tracked and resolved. M-NCPPC should periodically report back to the County Council on progress toward resolving this issue.

UPBTWG Consensus Items and Recommendations

- Encroachments need to be actively enforced and controlled by agencies managing the public resource.
- Plan and implement an education program to increase public and private awareness of the special requirements for living in and building in the SPA. This could include producing informative brochures, providing interpretive signs along trails, posting signs along all public roads at the SPA entrance points, developing programs for presentation in the public schools, getting newspaper coverage, and using the GIS system to get the addresses of property

owners abutting parkland and sending letters reminding them to stop mowing, clearing, and/or building beyond their property lines.

Problem Statement: What is the current status of the park acquisition program in the Upper Paint Branch?

Background

The 1981 Eastern County Master Plan recognized the importance of the Paint Branch as a critical resource in the County. It recommended a park acquisition program of approximately 400 acres in the watershed. The 1996 Limited Amendment to Expand Park Acquisition for Resource Management and Protection of the Paint Branch Watershed recommended that an additional 247 acres of parkland be added to the Paint Branch Stream Valley system in the Good Hope and Gum Springs subwatersheds. The 1997 White Oak and Cloverly Master Plans recommended acquisition of the 104-acre Forester Property and an additional 121 acres of parkland in the Right and Left Fork tributaries of the Paint Branch. The numbers in the master plans were estimates. In many cases, the actual amount of parkland dedication through the subdivision process was much larger. To date, approximately 856 acres of land have been purchased or dedicated for parkland in the Upper Paint Branch Stream Valley Park. An additional 79 acres of dedicated parkland has not been recorded pending a final decision on the ICC. Approximately 127 acres, recommended as parkland in various master plans since 1981, remains to be acquired.

Montgomery County acquires parkland in a number of different ways and through a number of different funding sources. Acquisition through dedication in the subdivision process is becoming increasingly important. Funding sources for outright acquisition include County Bonds, Program Open Space (POS) and Legacy Open Space (LOS). The County also acquires some parkland through gifts and, in rare cases, eminent domain.

Recent Actions

The *Legacy Open Space Functional Master Plan* indicates that the Upper Paint Branch aquatic system is considered a significant natural resource that meets the Legacy Open Space criteria. *As a result, any proposed parkland that has been previously designated in land use master plans qualifies for protection with Legacy Open Space funding.*

The Upper Paint Branch Technical Work Group (UPBTWG) nominated five sites to the Legacy Open Space program for consideration:

- Anselmo property, Left Fork of Upper Paint Branch, Briggs Chaney Road (approximately 42 acres).
- Lechlider property, Good Hope Tributary of Upper Paint Branch, Cape May Road and New Hampshire Avenue (approximately 4 acres). This property is currently under construction for single-family detached housing.
- Mitchell property, Left Fork of Upper Paint Branch, Thompson and Peach Orchard Roads (approximately 36 acres). A preliminary plan of subdivision has been filed on this property. The Planning Board has not acted on it.

- Left Fork Headwaters, Good Hope and Spencerville Roads (approximately 58 acres). A preliminary plan of subdivision has been filed on these properties. The Planning Board has not acted it.

- Peach Orchard/Allnutt Subdivision, Right Fork of Upper Paint Branch, Peach Orchard and Spencerville Roads (approximately 142 acres).

Of these five, two sites were considered by Legacy Open Space staff to be significant enough natural resources to be added to the Legacy program. They are the Left Fork Headwaters and the Mitchell properties. The Planning Board acted on June 17, 2004, to add these two properties to the Legacy Open Space program, and they were approved by the County Council in 2005 for Class I status within the Legacy Open Space program. The only difference between Class I and Class II properties is whether one tool will be available for the protection of the site: the use of involuntary reservation is provided for Class I sites but not for Class II sites through the Legacy Master Plan. In all other respects, the same tools are available for preservation efforts for both Class I and Class II properties.

The Planning Board deferred action on a third site (Peach Orchard/Allnutt Subdivision), which was purchased by the State Highway Administration (SHA) as a possible route for the ICC northern alignment. Pending approval of the master plan alignment of the ICC, this parcel has been proposed for dedication to parkland in its entirety as an ICC mitigation site.

UPBTWG Consensus Items and Recommendations

- The Right Fork headwaters and stream valley, located on the property identified as the Peach Orchard/Allnutt subdivision, should be protected and maintained in their natural state. SHA has included the parcel in its mitigation package for the ICC. Because of the significant environmental features on the site and its value as pervious reserve, the County should takes steps to ensure that it is acquired in its entirety by whatever means available when SHA releases it from reservation status.

- The Southern Adventist site is located at the southeast corner of the intersection of Route 198 and Good Hope Roads and is listed in the Legacy Open Space appendix. The work group supports the Planning Board recommendation to include this property and the adjacent property (also known as the Left Fork Headwaters) as Class I properties in the Legacy Open Space program.

- The work group supports protection of the Mitchell property for inclusion as a Class I Legacy Open Space property. Its proximity to Maydale Nature Center and the Upper Paint Branch Stream Valley Park increase its value as a recharge area.

- The Technical Work Group would like to emphasize that while each remaining developable property may not rise to the standards of the Legacy Open Space program, the Upper Paint Branch watershed does. Therefore, all remaining developable properties should be considered for their potential value for springhead protection or as recharge areas, including

but not limited to the Anselmo, Lechlider, Kenel, and Harding properties. This is particularly important because of the expected environmental impacts of future road projects through the watershed.

Two members of the work group did not agree that all remaining developable properties should be considered for Legacy Open Space, including Anselmo, Lechlider, Kenel, and Harding properties. They recommend that:

"The following properties should be recommended as FIRST PRIORITY for parkland acquisition. These properties were recommended as parkland in either the 1981 Eastern County Master Plan, 1996 Limited Amendment, or 1997 Cloverly Master Plan.

McNeill Property	36.15 acres
South Asia Advent. Church Property	7.75 acres or more
Erwin Property	51.72 acres
Bd. of Ed. Property (Briggs Chaney Middle School site)	20.96 acres
Morgan Property	4.75 acres
Former Campbell Property	1.00 acres
Gross Property	2.00 acres
Former Nuwame Property	1.00 acres
Weinel Property	1.50 acres
Total	126.83 acres

Summary of Action Items

- The work group recommends that land use decisions be made based on an assessment of all of the parameters that are necessary for continued support of a high-quality Use III stream.

- Each of subwatersheds in the Upper Paint Branch SPA needs to be managed individually so that they can continue to function together as a robust, diverse, and resilient system.

- Based on more recent data, there is a need to revise the impervious cap downward from 10% to 8% in the Upper Paint Branch Special Protection Area to allow room for impervious "creep" – imperviousness that is added to private homes after the development is complete.

- There is a need to acquire additional land in the Special Protection Area as pervious reserve.

- Park & Planning should provide annual updates of impervious levels in the Upper Paint Branch watershed, either through aerial surveillance or by calculations of known additions to existing levels.

- DPS, DEP, and Park & Planning should pursue a detailed review of ways to partially mitigate the effects of existing imperviousness. For example, public facilities with parking lots and other impervious areas could be retrofitted with a system of filtration facilities (rain gardens, biofiltration in parking lot islands and other areas, sand filters, etc); County, park, and MCPS buildings could be retrofitted with green roofs; and future road widths could be reduced; and existing impervious surfaces in the watershed – old parking lots, old paths, etc. – that are underutilized or not needed should be identified and removed.

- The County Council should continue to support the stormwater retrofits already planned by DEP and Park & Planning. DEP needs to pursue additional stormwater retrofitting projects by looking comprehensively at the entire drainage system and then identifying places where more effective controls can be built. Each restoration project must be monitored according to its design goals (temperature, flow, etc.).

- DPS and DEP should continue to research and look for improved sediment control design and construction standards through the evaluation of the SPA BMP monitoring data.

- Some of the work group members recommend that "keystone" SWM facilities such as Piping Rock Drive, Colesville Maintenance Depot, Fairland Ridge and others should be inspected and, if warranted, maintained after *every* significant rainfall event. The appropriate agencies should meet to discuss this recommendation in greater detail.

- DPS, DEP, DPWT, and Park & Planning should review the design guidelines for roads, sidewalks, and parking lots and consider modifying the standards for projects located in the SPA.

- DPS should publicize the "hot line" number so that residents can report observed problems. One way to do this would be to post signs along the perimeter of construction sites.

- DPS should notify developers early in the process that they will face fines, Notices-of-Violations, and/or Stop-Work Orders for being in non-compliance with approved sediment and erosion control plans. However, the amount of the fines – Class A violations, usually assessed as a civil penalty with a maximum initial fine of $500 and a repeat offense fine of $750 – does little to serve as a deterrent that would encourage permittees to maintain their sediment and erosion control structures. County Council should raise them.

- DEP, working with other agencies, should establish a protocol for major sediment spill events, sewer line breaks, and other pollutant spills so that the response is quick and effective.

- The County should manage the transport of hazardous materials through the SPA (this could be done in conjunction with the placement of road signs at the entrance points).

- Agencies need to work together to develop a statement of the importance of the SPA and the need for both public and private development to adhere to the conditions of plan approval or recommendations outlined in mandatory referral reports. The statement needs to be disseminated not only to developers but also to County and State agencies each time a project in the SPA comes in for approval or mandatory referral.

- DPS and DEP should review Chapter 19 (Erosion, Sediment Control, and Stormwater Management) and the Executive Regulations to see whether they need to be revised and/or strengthened.

- Even though the SPA program is a local one, State and Federal agencies should be asked to comply voluntarily with the local standards. The mandatory referral process should be used to work actively toward gaining compliance from the State and Federal agencies. It is also of critical importance that MDE, SHA, Parking and Planning, and County DEP, DPS, and DPWT get together early in the process to discuss the issues and work out solutions before plans are put on paper. For those projects already under way and following federal guidelines, our agencies should continue the dialogue toward achieving mutually beneficial goals.

- If Route 198 is widened, the stormwater management ponds should be located on the north side of 198 to avoid impacts on the Left and Right Fork headwaters. Open-section and other types of environmentally sensitive road designs and BMPs should be provided throughout the SPA, except as noted below, consistent with the Cloverly and Fairland Master Plans, but within a design framework that allows for reduced imperviousness even if it requires deviating from some of the design standards. Closed section should be used only in those sections where there is not sufficient right-of-way for open section (for example in the section of the MD 198 project passing through Spencerville and passing by Union Cemetery).

- M-NCPPC needs funding and staffing to allow completion and continued maintenance of an accurate and up-to-date countywide GIS database for conservation and scenic easements. All easements should be identified and mapped on the GIS system, and all landowners where easements are located should be notified of their existence and the compliance standards.

- Permanent signage to delineate conservation and scenic easements should be posted by the agency managing the easements. The inspection and enforcement process needs to be improved through adequate staffing and training and accurate and timely tracking of enforcement cases.

- M-NCPPC needs to implement a consistent process to handle violations of terms of conservation and scenic easements.

- Park & Planning needs to develop an effective policy for the prevention and elimination of encroachments by private property owners into parkland in the SPA.

- Interagency cooperation is needed to plan and implement an education program to increase public and private awareness of the special requirements for living in and building in the SPA. This could include producing informative brochures, providing interpretive signs along trails, posting signs along all public roads at the SPA entrance points, developing programs for presentation in the public schools, getting newspaper coverage, and using the GIS system to get the addresses of property owners abutting parkland and sending letters reminding them to stop mowing, clearing, and/or building beyond their property lines.

- Acquisition of additional vacant parcels for pervious reserve in the SPA is necessary to offset the detrimental effects of continued development throughout the watershed.

- **Appendix A**

Summary of Stream Monitoring in the Paint Branch SPA

Stream monitoring in Paint Branch began in 1994 and has been done annually at most monitoring stations since. Presently there are fourteen fixed monitoring stations (PBAT101 not sampled routinely) from which biological (fish and benthic macroinvertebrate), habitat, and water quality data are collected (Figure 1). During 2004 stream monitoring was conducted at ten monitoring stations. Benthic macroinvertebrate sampling was completed at ten stations and fish were sampled from eight stations.

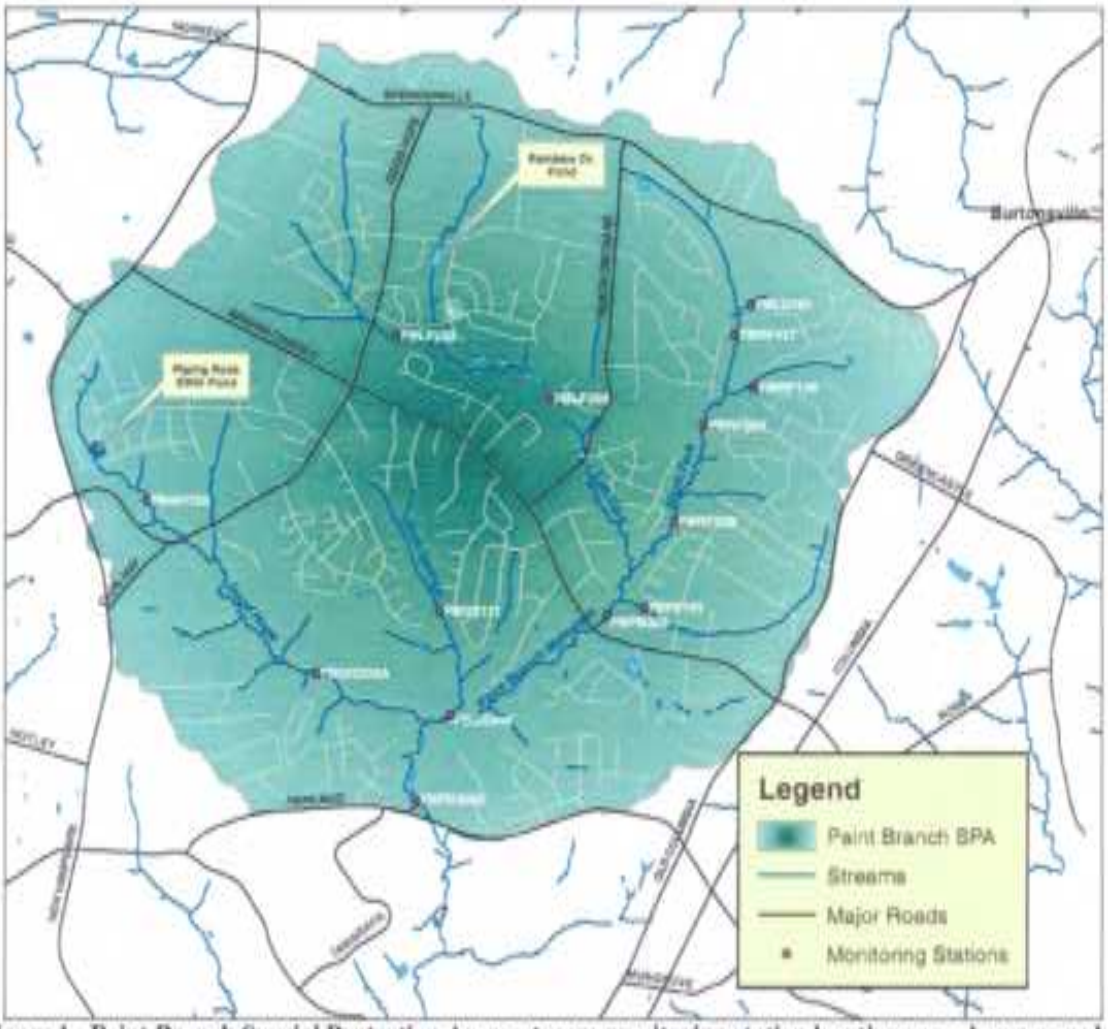


Figure 1. Paint Branch Special Protection Area - stream monitoring station locations are shown as red dots.

Temperature loggers were deployed during the summer of 2004 in four areas, 1) upper Good Hope – upstream of the Piping Rock Road SWM pond 2) lower Good Hope at PBGH208A 3) Rainbow pond tributary and 4) Paint Branch mainstem at Fairland Road (PBPB305C).

Biological Monitoring Results

Results of biological monitoring in 2004 are mixed. Fish sampling results show little change in the overall community health while benthic macroinvertebrate results produced low IBI scores at most monitoring stations. All fish species found during the first year of monitoring (1994) continue to exist in Paint Branch. The number of Brown trout, however, reached a new low in 2003 with only five adults found in samples collected from eight monitoring stations (**Table 1**). During 2004 the number improved to fourteen trout (four adults and ten young-of-year) found in samples from seven monitoring stations.

Table 1 Brown Trout Data From Paint Branch SPA

Station		1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
PBRF117 *(Right Fork)*	No. of Adult trout	1	N/S	0	2	6	N/S	0	0	0	0	N/S	0
	No. of YOY trout	0	N/S	2	9	5	N/S	0	2	0	0	N/S	0
PBRF204 *(Right Fork)*	No. of Adult trout	5	N/S	2	3	8	2	0	0	2	0	0	0
	No. of YOY trout	5	N/S	2	7	4	1	0	0	0	0	0	0
PBRF206 *(Right Fork)*	No. of Adult trout	N/S	N/S	N/S	N/S	2	N/S	0	0	N/S	N/S	0	0
	No. of YOY trout	N/S	N/S	N/S	N/S	3	N/S	0	0	N/S	N/S	0	0
PBLF202 *(Left Fork)*	No. of Adult trout	0	N/S	0	0	N/S	0	0	0	N/S	0	0	0
	No. of YOY trout	0	N/S	0	0	N/S	0	0	0	N/S	0	0	0
PBLF203 *(Left Fork)*	No. of Adult trout	2	N/S	0	0	N/S	0	0	0	N/S	0	N/S	0
	No. of YOY trout	0	N/S	1	0	N/S	0	0	0	N/S	0	N/S	0
PBGS111 *(GumSprings)*	No. of Adult trout	7	N/S	0	0	2	1	1	0	2	N/S	N/S	3
	No. of YOY trout	41	N/S	0	1	0	0	0	8	0	N/S	N/S	0
PBGS206 *(GumSprings)*	No. of Adult trout	10	2	4	0	2	N/S	0	0	1	1	0	0
	No. of YOY trout	21	0	0	2	1	N/S	0	21	1	0	0	0
PBGH108 *(Good Hope)*	No. of Adult trout	2	2	1	0	N/S	0	0	N/S	N/S	N/S	N/S	0
	No. of YOY trout	2	0	2	25	N/S	0	1	N/S	N/S	N/S	N/S	0
PBGH208A *(Good Hope)*	No. of Adult trout	25	17	16	15	10	14	3	6	3	3	4	5
	No. of YOY trout	21	0	0	18	10	18	8	12	7	0	3	3
PBPB302 *(Mainstem)*	No. of Adult trout	2	N/S	1	2	6	1	1	N/S	N/S	0	0	3
	No. of YOY trout	0	N/S	0	16	1	3	0	N/S	N/S	0	3	0
PBPB305 *(Mainstem)*	No. of Adult trout	19	8	0	3	N/S	N/S	2	0	N/S	1	0	3
	No. of YOY trout	6	0	0	5	N/S	N/S	0	8	N/S	0	4	8
TOTALS	No. of Adult trout	**73**	**29**	**24**	**25**	**36**	**18**	**7**	**6**	**8**	**5**	**4**	**14**
	No. of YOY trout	**96**	**0**	**7**	**83**	**24**	**22**	**9**	**51**	**8**	**0**	**10**	**11**

(N/S = Not Sampled) (YOY = Young-of-Year)

The primary cause of the low number of trout during 2003 was the record drought that hit the region during 2002. Reduced stream flow during the drought resulted in extremely stressful conditions such as: elevated water temperature, low dissolved oxygen and reduced habitat availability. Stream flows improved during 2003 and 2004 allowing the few remaining adult trout to successfully spawn producing higher numbers of young-of-year in 2004. It is expected that with continued favorable stream flow conditions the numbers of both young-of-year and adult Brown trout will continue to increase in 2005.

The rest of the fish community also exhibited some response to drought conditions, mostly by reduced numbers of individuals. However, the diversity of the community (number of species) remained intact which is why IBI scores during 2003 and 2004, after the drought, are similar to previous years at most monitoring stations (Figure 2).

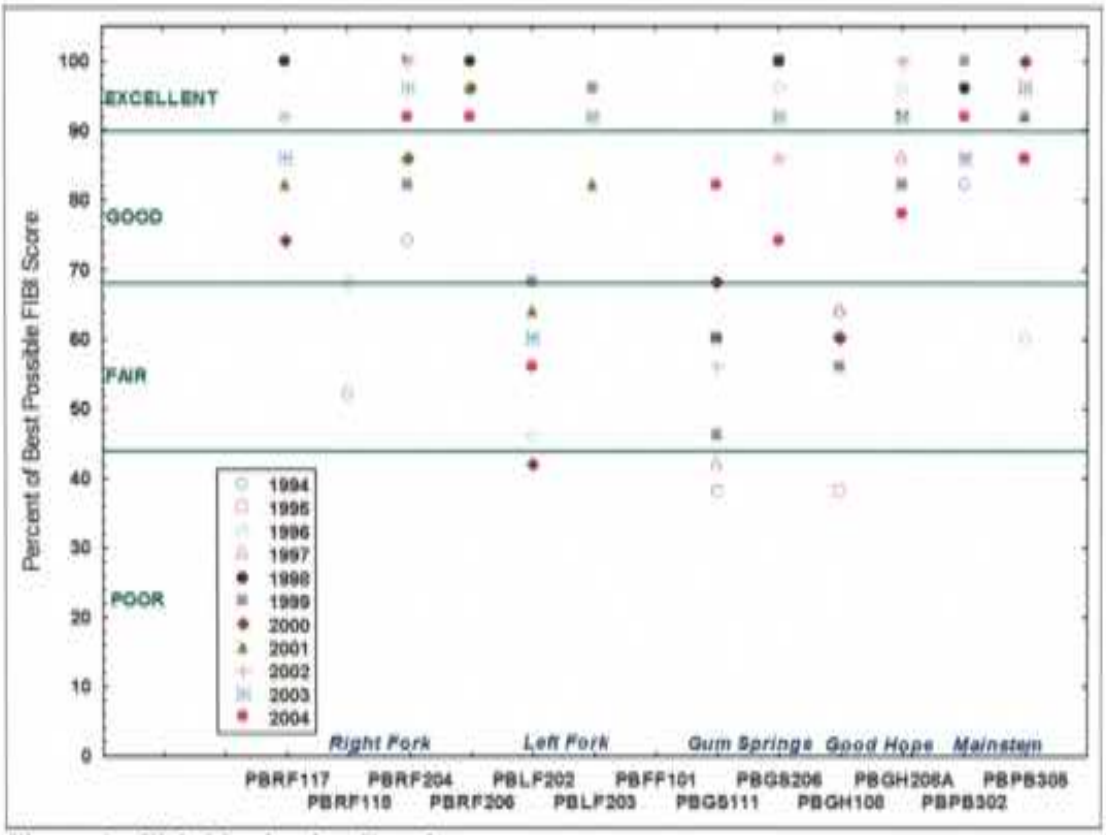


Figure 2. Fish Monitoring Results

Results from monitoring station PBGS111, located in the Gum Springs tributary – near Bart Dr., show improved community health in 2004. The fish species Blue ridge sculpin, never before found at PBGS111, was present in relatively high number in 2004. This species is found throughout Paint Branch but was never before observed in the upper reaches of Gum Springs tributary. Because Blue ridge sculpins are pollution intolerant their presence bolstered the IBI score considerably from previous years. The changes in Gum Springs allowing this species access to upper reaches of the tributary are not known. One possibility is that higher than normal stream flows during 2003 and 2004 allowed this species to expand its range farther up Gum Springs tributary.

Results from lower Gum Springs (PBGS206) show a decrease in community health in 2004. An increase in the proportion of tolerant fish species within the overall community is the cause of a lower IBI score. This sort of variation in the community composition is normal and should not be cause for alarm, particularly since all species present during previous years were found in 2004.

Results of benthic macroinvertebrate sampling, during 2004, show community health at a low level throughout Paint Branch. Results from all monitoring stations along the Right Fork and

mainstem are at the lowest point since monitoring began in 1994 (Figure 3). In the Good Hope tributary community health appears to have improved slightly at both monitoring stations between 2003 and 2004. Results from lower Gum Springs (PBGS206) show community health declined between 2003 and 2004 but are still within the range of IBI scores from previous years.

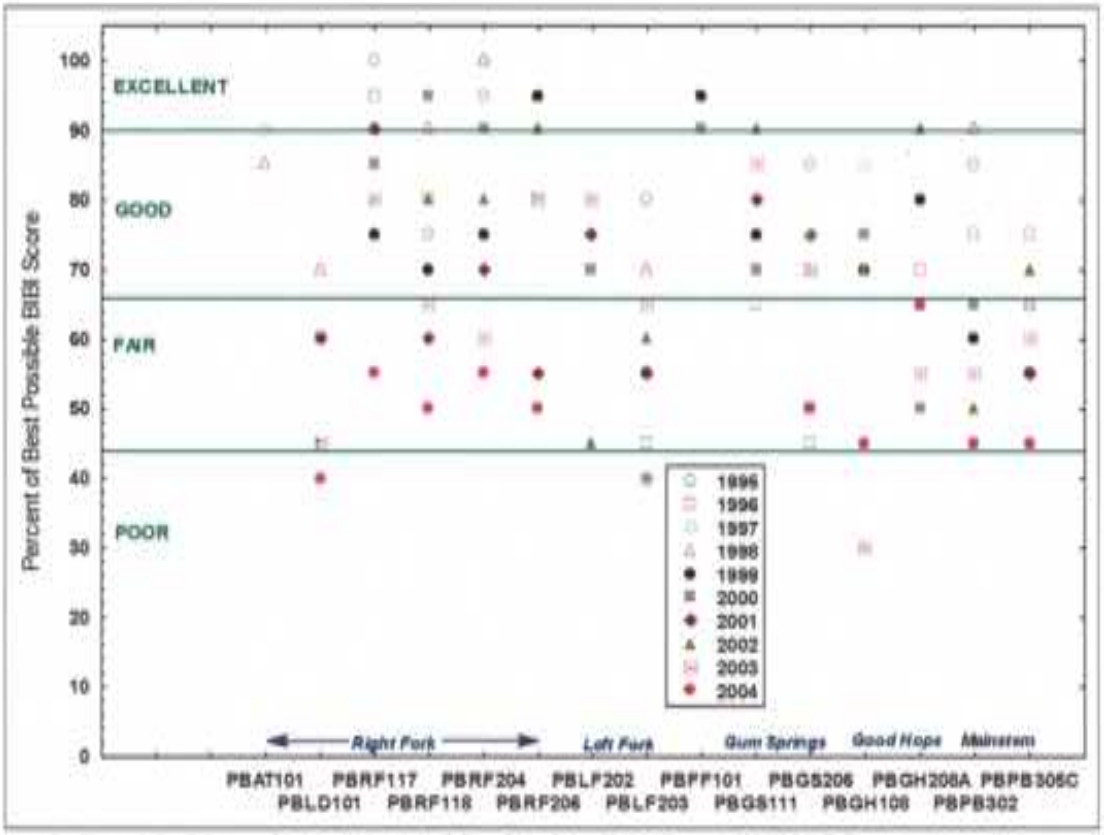


Figure 3 Benthic Macroinvertebrate Monitoring Results - All BIBI Scores

Most new development projects in the Paint Branch SPA have been within the Right Fork sub-watershed. To date there are five development projects, two have been completed, two are still under construction and one was halted. All five of these development projects cover 36% of the total drainage area in the Right Fork sub-watershed (Figure 4). Sediment washed off these construction projects may by the cause of degraded biological health in the Right Fork. The stream is often very turbid after rain events and a light coating of fine sediment is present on the stream substrate (Figure 5). This may be enough to impact the benthic macroinvertebrate community in the Right Fork and the mainstem of Paint Branch.

Figure 4. Aerial Photo of Right Fork - New Development Projects Are Labeled. (2004)

Figure 5. Stream Bottom at PBRF117 in the Right Fork.

Monitoring results from three stations (PBRF117, PBRF118 and PBRF204), which go back to1995, show biological health has degraded from good/excellent during the years 1995 – 2000 to fair in 2004 (Figure 6). It is hoped that after construction projects are complete and the land stabilized impacts to the Right Fork will diminish and the biological health of the stream will

recover to pre-construction levels. It should be noted that new development does not exceed ten percent imperviousness so impacts from stormwater runoff should be minimal.

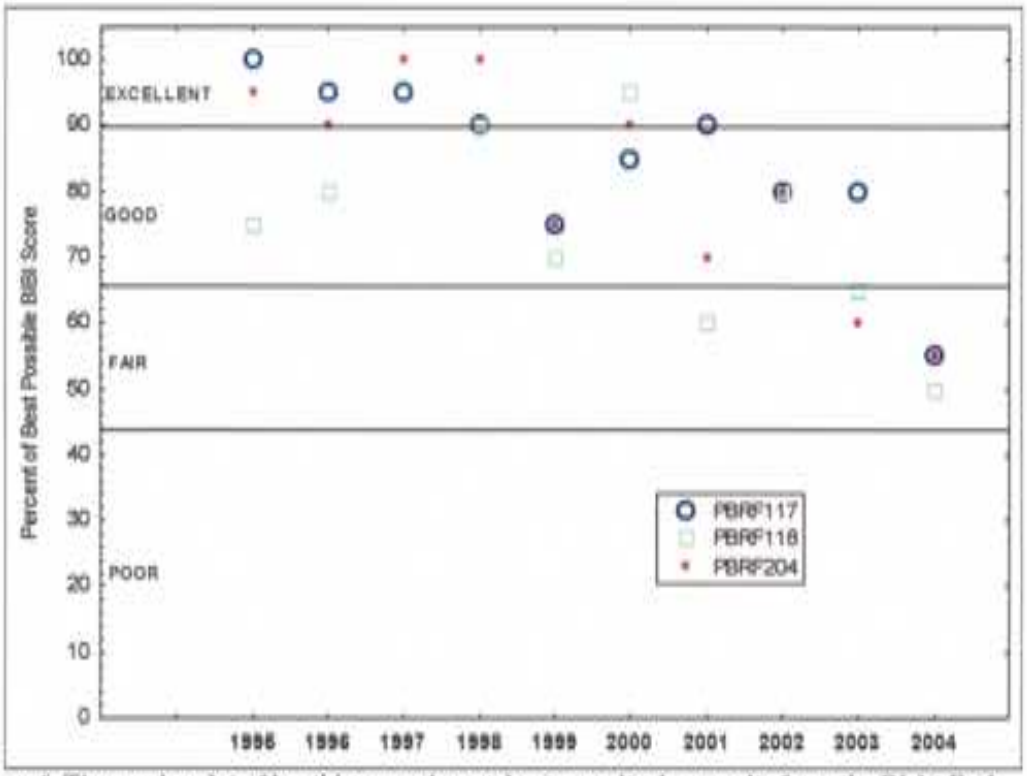


Figure 6 Time series plot of benthic macroinvertebrate monitoring results from the Right Fork

Habitat Monitoring

Rapid Habitat Assessment

Rapid habitat assessments are completed along with biological monitoring. A visual assessment of ten different parameters or habitat features in the stream, they provide information about habitat quality in the stream and provide a means for qualitatively tracking habitat quality over time. Some of the habitat parameters that are assessed include stream bank vegetative cover, amount of sediment deposited in the stream, amount and quality of cover in the stream for fish, salamanders, aquatic insects, etc. (e.g. logs, rocks, root mats, undercut areas along the bank) and amount of shading provided by trees and shrubs on the stream bank. All habitat parameters are summed for an overall habitat score. Results of all habitat assessments completed in Paint Branch are summarized in (Figure 7). Median habitat scores are in the sub-optimal range at all monitoring stations. This means that overall stream habitat conditions in the Upper Paint Branch are adequate to support a diverse and healthy biological community. This also means that there are problems with stream habitat which have been documented. Stream bank stability, sediment deposition and forest cover along stream corridors are the main problems identified (SPA Annual Reports for 2001 and 2002).

Results of habitat assessments completed in 2004 show scores at most stations are within the range of scores from previous years.

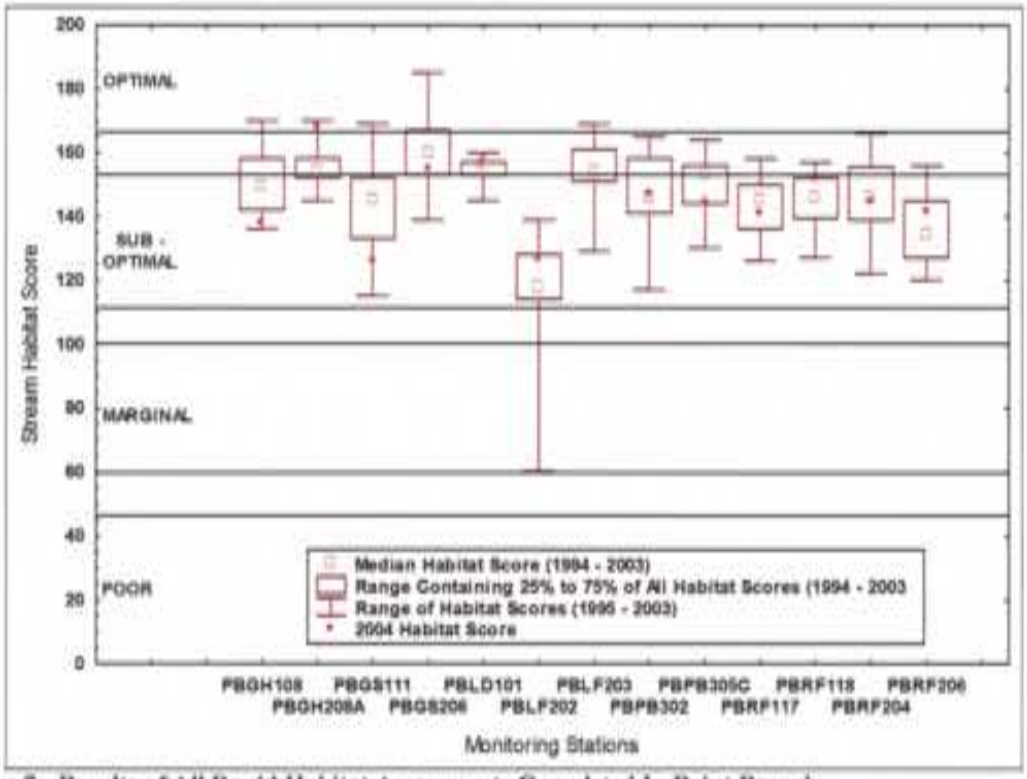


Figure 7. Results of All Rapid Habitat Assessments Completed In Paint Branch

Stream Temperature Monitoring

Continuous water temperature loggers were deployed at seven locations in Paint Branch during the summer of 2004. Two loggers were placed upstream of the new Piping Rock Road stormwater management pond to isolate the source of thermal impacts detected during 2003 monitoring. Three loggers were placed in the Rainbow pond tributary of the Left Fork to determine the source of temperature spikes detected during 1998 (SPA Annual Report, June 2000). One temperature logger was placed in the Good Hope (PBGH208A) and one in the mainstem of Paint Branch (PBPB305C) at Fairland Road. Average air temperature during the summer of 2004 (72.2^0 F) was near the historic average of 72.0^0 F (June 1 – September 30 from Dulles National Airport).

Good Hope Tributary Upstream of Piping Rock Road SWM Pond

The Piping Rock Road stormwater management pond, installed by DEP with CIP funds in 2001, controls storm flow for all storms up to the 1-year event (2.6 inches of rain in 24 hours).
This facility is located in the upper Good Hope subwatershed and provides stormwater management for 166 acres where none had previously existed. The pond has two small permanent pools located near the inlet and outlet (Figure 8). The area in between is

Figure 8. Piping Rock SWM Pond

vegetated with various wetland plants. Because of the small permanent wet pools there were concerns of thermal impact in the Good Hope as warm water from these pools is flushed out during storm events.

Results from the summer of 2003 show no thermal impact on the Good Hope tributary from the SWM pond. Stream water temperature was actually cooler downstream of the pond. Additionally, there were temperature spikes upstream of the pond, that were considerably lower downstream. The temperature spikes correlated with afternoon summer rain storms that caused a pulse of warm water runoff from heated surfaces such as roads and rooftops.

During the summer of 2004 temperature loggers were placed at two locations in the Good Hope tributary upstream of the Piping Rock SWM pond (Figure 9). One logger was placed just downstream of Southview Avenue, the other just upstream of Piping Rock SWM pond. Results show no thermal spikes downstream of Southview Avenue and many spikes at Piping Rock SWM pond, all correlating with rain events (Figure 10).

Figure 9. Upper Good Hope Tributary - Locations of Temperature Logger Deployment During 2004 Are Shown As Orange Dots. M-NCPPC Property is Delineated With Yellow Lines.

These results indicate the source warm water runoff is not Southview Avenue but rather an unknown source downstream. The stream buffer between Southview Ave. and Piping Rock Rd. is poor, which may allow some warming due to a lack of shading but this would not cause the large temperature spikes. However, because much of this stream length is in public land this would be a good opportunity for stream buffer improvement. DEP plans to walk this stretch of stream during 2005 and look for stormwater outfalls that may be causing the thermal spikes.

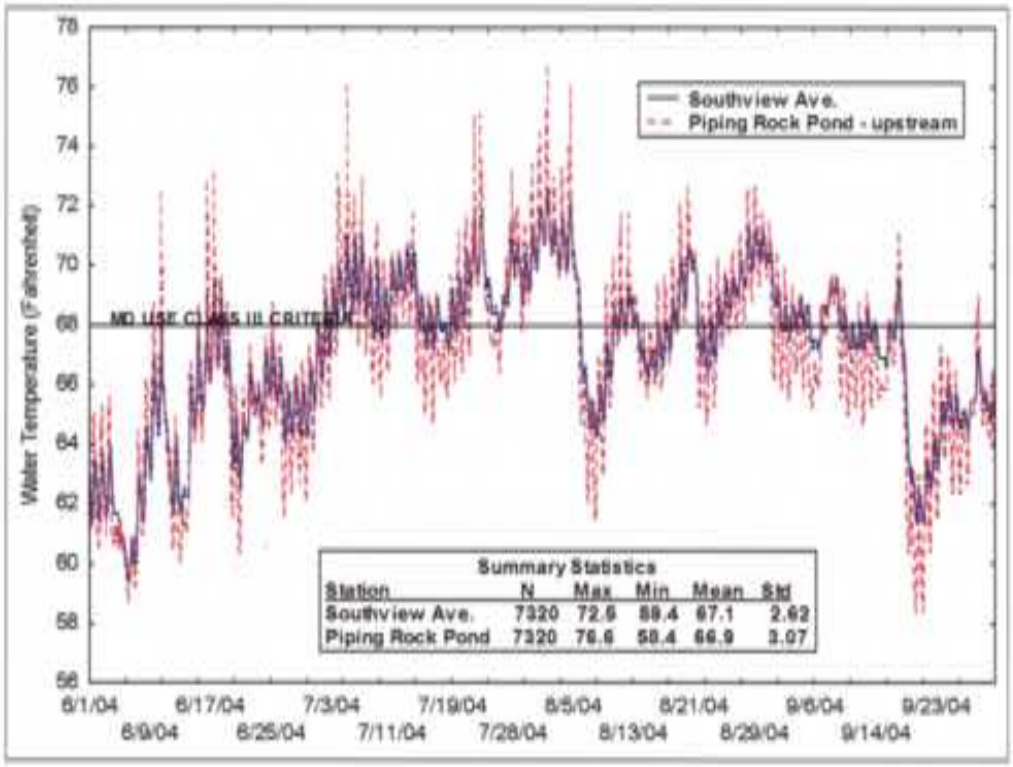


Figure 10. Stream temperature data from upper Good Hope at Southview Avenue and Piping Rock SWM pond.

Lower Good Hope Tributary Near Hobbs Drive

One temperature logger was placed in lower Good Hope at monitoring station PBGH208A. Results show water temperature is considerably cooler than upper Good Hope at Piping Rock Rd (Figure 11). Maryland's Use class III criteria of 68^0 F was exceeded nine percent of the time at PBGH208A during the summer of 2004 while upstream at Piping Rock Road stream water temperature criteria was exceeded thirty eight percent of the time. Groundwater input to the Good Hope between these two locations cools stream temperature significantly. However, if water temperature could be lowered in the headwater areas by planting trees in the riparian zone this would lower temperature throughout the Good Hope and consequently provide stream conditions more favorable to brown trout.

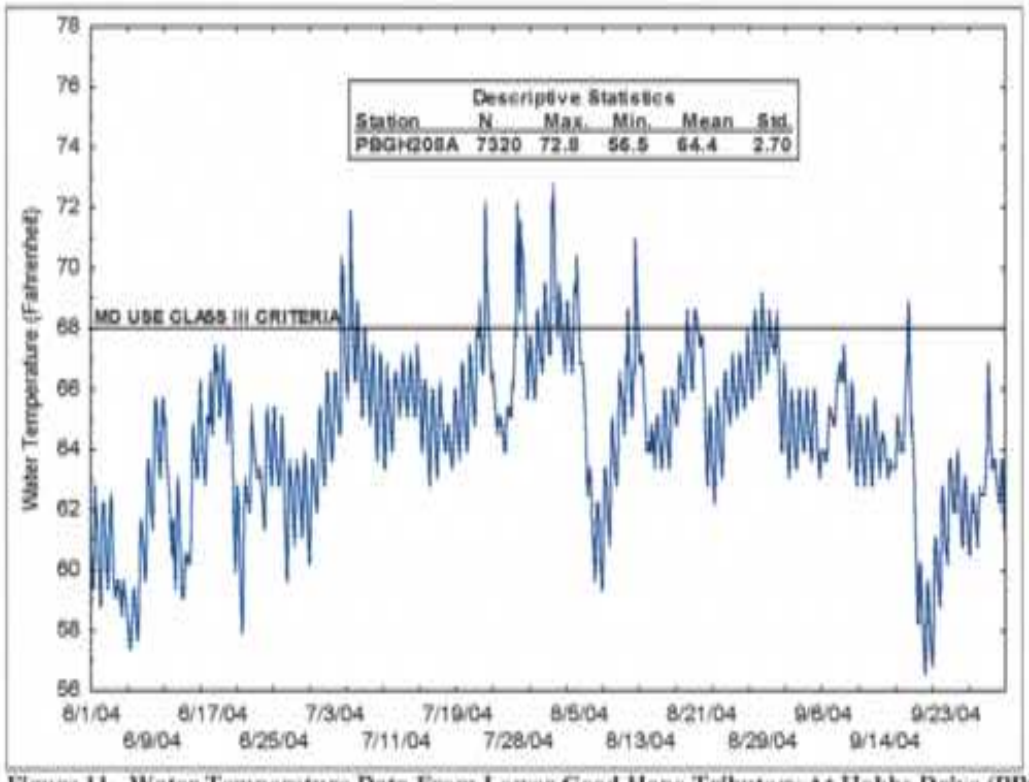


Figure 11. Water Temperature Data From Lower Good Hope Tributary At Hobbs Drive (PBGH208A).

Rainbow Pond Tributary

From previous monitoring efforts DEP had identified the Rainbow Pond tributary as a source of thermal spikes during summer rain events. In 2004 temperature loggers were placed at three locations along the Rainbow Pond tributary to isolate the source of thermal spikes (Figure 12). The storm water management pond at Rainbow Drive was modified in 1997 with a base flow by-pass to prevent downstream thermal impact during base flow periods. However it was thought that this large in-line wet pond could still be releasing warm water during summer rain events.

Figure 12. Rainbow Pond Tributary - Location Of Temperature Logger Deployment During 2004 Are Shown As Orange Dots.

Results show that, on average, stream water temperature is only slightly warmer downstream of Rainbow pond (**Figure 13**) indicating that the base flow by-pass is working to mitigate thermal

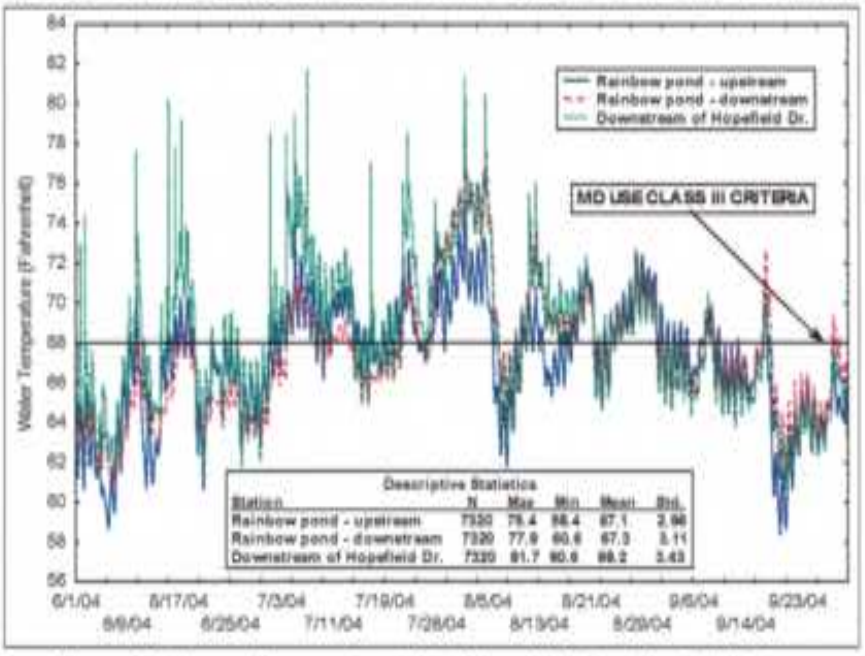


Figure 13 Stream Temperature Data From Rainbow Pond Tributary

impact from the pond. Additionally, there are relatively few thermal spikes downstream of the pond. However, the logger placed downstream of Hopefield Rd. recorded many thermal spikes

indicating that storm water runoff from heated surfaces frequently entered the stream at Hopefield Rd.

As a result of temperature monitoring in the Rainbow Pond tributary it was determined that thermal impact from the Rainbow Drive SWM pond does exist but is minimal. The more significant impact is caused from storm water runoff from Hopefield Road. It should be noted that storm water is conveyed from the surrounding streets to the stream at Hopefield Rd. via curb and gutter.

Paint Branch Mainstem

One temperature logger was deployed in the Paint Branch mainstem during the summer of 2004 just upstream of Fairland Road at PBPB305C (Figure 14). Results are consistent with previous years.

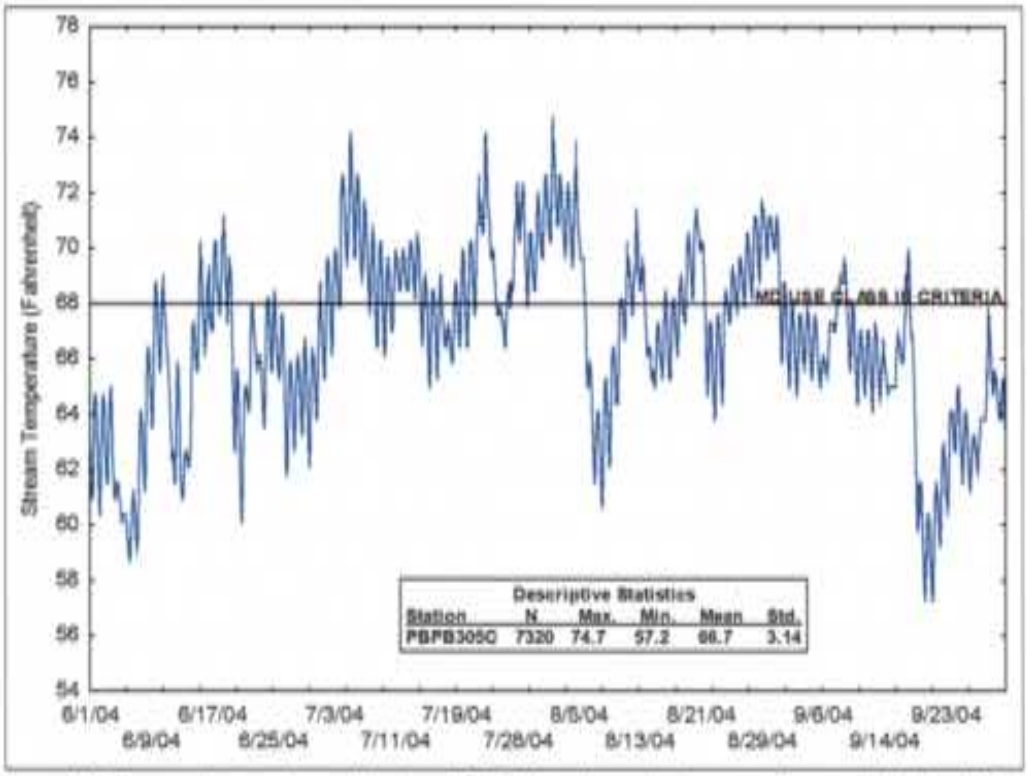


Figure 14 Stream temperature data from Paint Branch mainstem - upstream of Fairland Road

Appendix B

MEMO

TO: **Record**

FROM: **Charles R. Gougeon, Maryland DNR Fisheries Service**

SUBJECT: **Review of Upper Paint Branch Technical Work Group – Final Draft Report Additions**

DATE: **November 28, 2005**

MD DNR Fisheries Service has conducted brown trout population electrofishing assessments in the Good Hope Tributary at Hobbs Drive annually for the last twenty-seven years (1979-2005). DNR Fisheries has concluded that the Good Hope Tributary is the best spawning/nursery and adult holding stream reach in the entire watershed. Over the last two decades, numerous consulting experts and consulting firms conducting biological assessments in the Paint Branch watershed in reference to building an ICC, have concurred with the findings of DNR concerning the importance of the Good Hope Tributary. The following summary comments have been analyzed and prepared by Charles R. Gougeon who represents the Maryland Department of Natural Resources, Inland Fisheries Service. The summary has been prepared for inclusion into a second generation Upper Paint Branch Technical Work Group (UPBWG) document. The last UPBWG document was finalized in 1995.

Good Hope Tributary

Brown trout population estimates and analysis conducted on the Good Hope tributary at Hobbs Drive by MD DNR Fisheries biologists since 1979, show the adult brown trout population declined sharply in 2000 and has remained low each of the following years through 2005. Figure 1 shows the twenty-seven year historical record of estimated numbers of adult and yoy brown trout from the Hobbs Drive station. The Hobbs Drive survey site is 295 feet long as measured along the centerline of the stream, referred to as the thalweg. Historical comparisons of adult trout numbers (Table 1) collected at the Hobbs Drive survey site through 1999 show double-digit performance that is consistent with all prior years, the exceptions being 1983 (7), 1988 (7) and 1992 (9). However, all of the last six years since 2000, have shown single-digit numbers of adult brown trout. Five of the last six years performed below the lowest numbers observed in all prior years, dating back to when the survey was begun in 1979. The one exception was 2001, when eight (8) adults were collected, which exceeded the historical lows observed prior to that date by one fish, as observed in 1983 (7 adults) and 1988 (7 adults). The twenty-seven year average number of brown trout adults collected from the Hobbs Drive survey site is thirteen (13). The numbers of adult brown trout for the twenty-seven year period of study have ranged from low of (4) adults in 2002 and 2003 to a high of (27) in 1997. The average number of adults collected

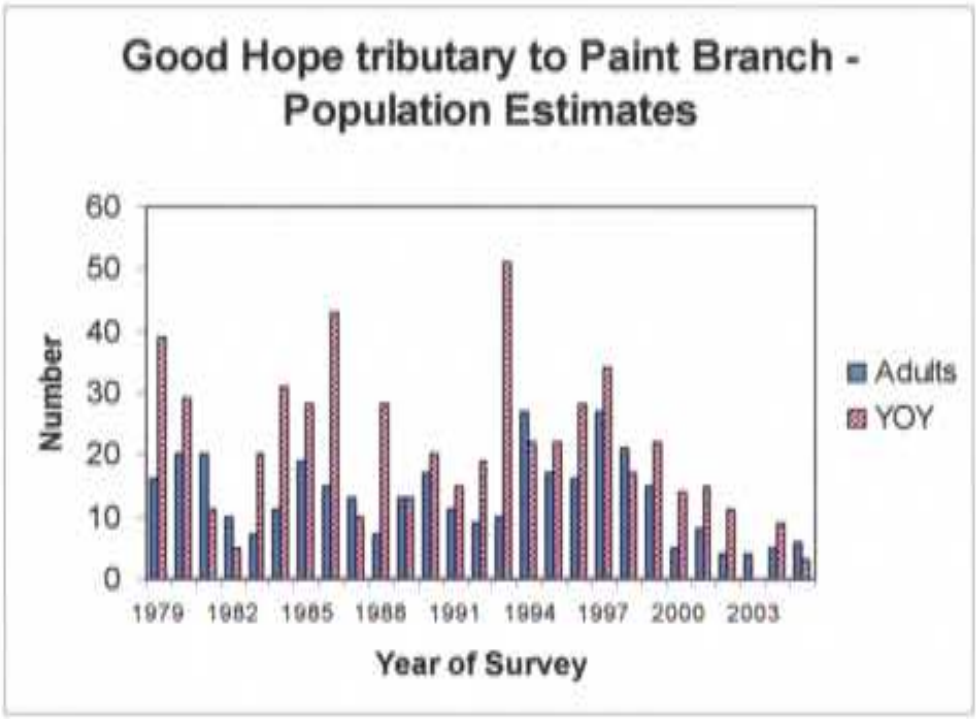


Figure 1. Population estimates for adult and young-of-the-year brown trout in the Good Hope tributary of Paint Branch at Hobbs Drive station, 1979-2005.

during the first seventeen-year period of study (1979 through 1995), averaged 14.1 adults. The ten-year period following 1995 to 2005 averaged 11.1 adult trout. The data show there has been a downward trend in the numbers of adult trout residing in the reach of Good Hope tributary at Hobbs Drive since 1995.

Brown trout young-of-the-year (yoy) includes fish that are less than one year of age. Historical comparisons of brown trout yoy numbers collected at the Hobbs Drive survey site through 2002 (Table 1) show double-digit performance that is consistent with all prior years, the only exception is 1982 (5). However, all of the last three years since 2003, have shown single-digit numbers of yoy brown trout or none, as observed in 2003. Two of the last three years performed below the lowest numbers observed in all prior years, dating back to when the survey was started in 1979. The one exception was 2004, when nine (9) yoy were collected, which exceeded the historical low of five (5) in 1982 by four yoy. The twenty-seven year average number of brown trout yoy collected from the Hobbs Drive survey site is twenty (20). The numbers of yoy brown trout for the twenty-seven year period of study have ranged from a low of (0) yoy in 2003 to a high of (50) in 1993. The average number of yoy brown trout collected during the first seventeen-year period of study (1979 through 1995), averaged 22.9. The ten-year period following 1995 to 2005 averaged 9.7 yoy brown trout.

Clearly, there has been a significant downward trend in the numbers of yoy brown trout residing in the reach of Good Hope tributary at Hobbs Drive since 1995. Although numbers of adult and yoy brown trout were expected to show a decline in numbers during the drought

Table 1. Actual number of brown trout collected by MD DNR Inland Fisheries in the Good Hope tributary at Hobbs Drive station from 1979 through 2005

Good Hope at Hobbs Drive - brown trout		
Year	**Adults**	**yoy**
1979	16	36
1980	20	24
1981	20	11
1982	10	5
1983	7	20
1984	11	30
1985	19	28
1986	15	38
1987	13	10
1988	7	28
1989	13	13
1990	17	20
1991	11	15
1992	9	19
1993	10	50
1994	25	21
1995	17	22
1996	16	28
1997	27	34
1998	21	17
1999	15	22
2000	5	14
2001	8	15
2002	4	11
2003	4	0
2004	5	9
2005	6	3
Average	13	20

period from late 1998 through 2002, both 2003 and 2004 were wet years and numbers should have rebounded, yet did not. The 2005-year was considered an average to wet year through July. Dry conditions extending beyond this point in 2005 would not have been expected to depress the numbers of yoy as observed, further confirming that a problem has developed in the Good Hope tributary concerning its ability to successfully recruit double-digit numbers of yoy as observed prior to 2000.

In addition to showing actual numbers of yoy and adult brown trout (Table 1), we have calculated a population estimate (Table 2) for each age group of trout using a multiple pass (two or three pass survey) regression analysis as described by Zippin (1958). In all but a few cases, the estimate compared exactly to the actual number of trout collected from each age group. Slightly higher estimates occurred during years of high abundance.

Table 2. Estimated number of brown trout collected by MD DNR Inland Fisheries in the Good Hope tributary at Hobbs Drive station from 1979 through 2005

Good Hope at Hobbs Drive - brown trout		
Year	Adults	yoy
1979	16	39
1980	20	29
1981	20	11
1982	10	5
1983	7	20
1984	11	31
1985	19	28
1986	15	43
1987	13	10
1988	7	28
1989	13	13
1990	17	20
1991	11	15
1992	9	19
1993	10	51
1994	27	22
1995	17	22
1996	16	28
1997	27	34
1998	21	17
1999	15	22
2000	5	14
2001	8	15
2002	4	11
2003	4	0
2004	5	9
2005	6	3
Average	13	21

Gum Spring Tributary

Brown trout population assessments and analysis have been conducted on the Gum Springs tributary by MD DNR Fisheries biologists for most years between 1989 and 2005 (Table 3). Two years (1999 and 2000) were not sampled in order to minimize stress to the trout during the drought and to allow time for surveys to be conducted at other locations in the watershed. The Gum Springs survey site is 518 feet long as measured along the centerline of the stream, referred to as the thalweg. Historical comparisons of numbers of adult trout (Table 4) collected over fifteen years in the lower Gum Springs tributary, show single-digit numbers in all but one year (1994). Four of the fifteen years of sampling showed no adult trout. Two of those years having no adult trout occurred within the last five-year period (2001-2005). In summary, the lower Gum Springs tributary does not maintain significant numbers of adult trout. It is our assessment that adult trout habitat in the lower Gum Springs tributary is currently suboptimal and has suffered greatly from the consequences of development,

Table 3. Total number of brown trout redds (nests) counted by Maryland Department of Natural Resources Inland Fisheries Service in the Good Hope tributary, 1978-2004.

Year	Redds
1978	24
1979	25
1980	29
1981	26
1982	12
1983	25
1984	48
1985	35
1986	18
1987	22
1988	24
1989	19
1990	19
1991	14
1992	16
1993	24
1994	25
1995	16
1996	5
1997	28
1998	16
1999	5
2000	18
2001	6
2002	5
2003	7
2004	19
Average	20

especially those from the construction of the Oak Springs development in the middle 1980's. Significant off site sediment transport from that development, set off a chain of events that eventually resulted in major channel degradation that extends from a point just upstream of Bart Drive and extends downstream to the mouth. Impacts were manifested as channel scour, sediment deposition and channel widening that resulted in the loss of undercut banks and reduced depth of quality pools. Sediment impacts have subjected adult trout to higher predation (especially larger adult trout) and have impaired reproductive success.

The Oak Springs development required the construction of a stormwater management facility. The facility is located on Twigg Lane and was constructed with a wetland marsh design, which pooled water and directed pond surface discharge into Gum Springs tributary. The pond design promoted thermal impact to that portion of Gum Springs tributary below the discharge point. In 2001, a parallel pipe conveyance system (approximately 2,200 feet in length) was constructed along and parallel to Gum Springs tributary with the objective to transport surface discharge from the Oak Springs storm water management pond into the main stem of Paint Branch. The project, constructed by the U.S. Army Corps of Engineers in cooperation with M-NCPPC, MCDEP, received technical direction from state and local

government officials. The parallel pipe empties immediately downstream of the mouth of Gum Springs tributary. Experts determined that the anticipated thermal impact from the storm water management pond would be better mitigated there than in the smaller, higher quality Gum Springs tributary.

Once considered the second most productive spawning and nursery area in the Paint Branch watershed, Gum Springs tributary has failed to perform up to that standard in recent years, however, it continues to support very limited natural reproduction in most years. Only four years (1991, 1993, 1994 and 2001) of the last fifteen surveyed (Table 4) have recruited yoy brown trout similar to Good Hope Tributary. Nine of the fifteen years have produced single-digit numbers of yoy and were considered poor recruitment years (Table 4). Two years produced no yoy and only one year (2001) demonstrated recruitment equivalent to that of Good Hope tributary. Strong natural reproductive success has not consistently occurred in Gum Springs tributary since the years preceding 1994 (Table 4).

In summary, Gum Springs tributary continues to perform as a nursery and spawning tributary, however, it has not demonstrated the ability to produce consistent or significant annual brown trout recruitment comparable to 1994 or earlier.

Right Fork Tributary

The Right Fork has historically been found to have the highest water quality of any of the Paint Branch sub watersheds. An overall lack of quality adult habitat (especially in the lower 1/3 of the Right Fork) has prevented it from reaching the spawning and nursery status of Good Hope and Gum Springs tributaries. Development in the Right Fork tributary over the last ten-year period has reduced the overall stream quality and habitat. Electrofishing survey responsibilities throughout the Paint Branch watershed have been shared with M-NCPPC and MCDEP staffs. A select number of survey stations are considered key to supporting historical data collected by DNR biologists. MD DNR biologists and the local government biologists previously listed cooperatively sample those selected sites.

An established DNR electrofishing site located at Timberlake and Seibel Drive was surveyed in 1997, 1998, 2000, 2002, and 2003. The results of the trout surveys conducted after 1998 were very poor. No yoy have been observed in the three survey years following 1998 and a grand total of three adult trout have been collected for the years 2000 (1 adult) and 2002 (2 adults). At some point after 1998, the stream appears to have sustained a significant setback. The numbers of adult and yoy trout were significantly better in 1997 (10 adults; 20 yoy) and 1998 (17 adults; 13 yoy). Frequent and sustained sediment transport to the Right Fork tributary immediately upstream of this survey station was observed entering from the new housing development during construction. The combined stress of prolonged drought and sedimentation during the housing development upstream of Timberlake and Seibel Drive on the Right Fork is believed to have been the primary cause promoting the decline of the Right Fork brown trout population.

Paint Branch Main Stem

Electrofishing and assessments of the trout population in the main stem reaches of Paint Branch have been very limited over the past ten years. Historically, very low brown trout densities have been found to reside in the main stem that are considered to be under a high

stress level due to impacts resulting from high watershed imperviousness. Electrofishing and handling may cause unnecessary harm to stressed trout populations and associated stream fish when conducted during the warmest months of the year. Therefore, State and Local biologists have minimized main stem electrofishing work in recent years. Most survey work has been conducted to assess the effectiveness of large-scale stream improvement projects conducted by local and federal agencies. Generally, numbers of adult and yoy brown trout decrease sharply as distance increases below Fairland Road. DNR biologists last surveyed Paint Branch below the capital beltway (Route 495) in 1996. A very sparse population was observed below the beltway on the property of Beltsville Agricultural Research Center property in 1996 (1 adult), 1997 (1 adult), and 1998 (2 adults). Surveys conducted there in 1999, 2000 and 2001, failed to find any trout. The absence of trout during these years is likely the combined result of low stream discharge and high summer water temperatures brought about by persistent drought conditions.

Electrofishing results at other main stem locations between the Capital Beltway and Fairland Road vary annually, however, adults continue to reside throughout the main stem in low densities, and these areas frequently produce the largest brown trout adults in the entire watershed. Successful natural reproduction continues to be insignificant and inconsistent during most years in the Paint Branch main stem. Rarely have yoy been observed much below Route 29, while numbers and the frequency of yoy observed improve as you approach Fairland Road.

Redd Counts

Trout nests (Redds) have been counted in the fall of each year by MD DNR biologists in the Good Hope Tributary between 1979 and 2004 from the mouth to a point just upstream of Hobbs Drive (Table 3). The counts are conducted in order to get a qualitative assessment of spawning effort and to identify portions of the stream that are used for spawning purposes. The effort expended for the annual count has not been standardized. Weather conditions, staff obligations to other projects and intermittent high water events during the spawning period can affect the final redd count each year. For these reasons, the redd count should be treated as a qualitative tool only, and should not be used for direct annual comparisons. Biologists use the data to evaluate spawning effort and trends.

Drought Impacts

A severe drought persisted throughout Maryland from August of 1998 through the end of 2002. Low flow throughout the Paint Branch watershed during the drought promoted higher than average mortalities of yoy and adult brown trout. Adult trout in particular sustained the greatest impact. Small yoy are better adapted to surviving low flow than adults. Low flow conditions in the Paint Branch watershed had the greatest impact upon the smallest tributaries by reducing them to isolated pools, particularly during the peak of the drought (late summer of 2002). High water quality promoted gin clear water during the drought. Combinations of gin clear water, shallow pools containing little instream habitat features and limited undercut banks, subjected yoy and adult brown trout to unusually high predation. Despite the drought, water temperature monitoring by MD DNR, MCDEP and others, indicate water temperature alone (maximums or general thermal regime) was not limiting, and does not explain the past five year downward trend of brown trout numbers (Good Hope/Hobbs Drive).

Summary

Successful recruitment and adult holding habitat in the headwaters of Paint Branch have been key to the continued survival and maintenance of the naturalized brown trout population throughout the watershed that extends to the Capital Beltway (Rt. 495) and beyond. The headwaters of greatest importance are contained upstream of Fairland Road and correspond to Montgomery County's Special Protection Area (SPA).

- In general, imperviousness and impervious creep appear to be the biggest threat to the maintenance of biological conditions in the Paint Branch watershed and has significantly impacted the physical character of the high quality headwater tributaries accordingly. Uncontrolled stormwater runoff has remained a consequence of high imperviousness that has yet to be adequately mitigated to the point where the sub-watersheds demonstrate stability and begin to improve.

- Numbers of adult trout in Good Hope Tributary have fallen well below historical performance levels. A twenty-seven year record shows five of the last six years performed below the lowest numbers observed in all prior years, dating back to 1979.

- A short-term reduction in numbers of adult brown trout was anticipated over the prolonged drought (late 1998 through 2002); however, numbers have failed to recover to pre-drought levels, despite two high water years (2003 and 2004).

- Natural reproduction in the Good Hope Tributary has fallen far below historical performance levels. Two of the last three years performed below the lowest numbers observed in all prior years of available data, dating back to 1979. The average number of yoy brown trout collected during the first seventeen-year period of study (1979 through 1995), averaged 22.9. The ten-year period following 1995 to 2005 averaged 9.7 yoy brown trout.

- Once considered the second most productive spawning and nursery area in the Paint Branch watershed, Gum Springs tributary has failed to perform up to that standard in recent years, however, it continues to support very limited natural reproduction in most years.

- Gum Springs tributary continues to perform as a nursery and spawning tributary, however, it has not demonstrated the ability to produce consistent or significant annual brown trout recruitment comparable to 1994 or earlier.

- Development in the Right Fork tributary over the last ten-year period has reduced the overall stream quality and habitat. The results of the trout surveys conducted after 1998 were very poor. No yoy have been observed in the three survey years following 1998, and a grand total of three adult trout have been collected for the years 2000 (1 adult) and 2002 (2 adults).

- Electrofishing results at main stem locations between the capital beltway and Fairland Road vary annually, however, adults continue to reside throughout the

main stem in low densities, and these areas frequently produce the largest brown trout adults observed in the entire watershed. Successful natural reproduction continues to be insignificant and inconsistent during most years in the Paint Branch main stem.

- Trout nests have been counted by MD DNR biologists in the Good Hope Tributary from the mouth upstream to a point just upstream of Hobbs Drive. Recent redd counts have shown the majority of redds have been observed in the lower reach of the tributary, close to the mouth. Casual observations made by MD DNR biologists show decidedly fewer high quality gravel deposits in the Good Hope tributary between Landfare tributary and Hobbs Drive. Clean, sediment/silt free gravel is critical to successful spawning and hatching. Many locations along Good Hope tributary that historically have had suitable spawning gravel have been replaced with unsuitable sand and or large cobble or boulder substrate.

- The self-sustaining portions of Paint Branch upstream of Fairland Road have degraded significantly in the last ten years to the point where long-term survival of the brown trout population is very questionable. Good Hope tributary is showing clear signs of stress. Numbers of adult trout have failed to recover to levels observed prior to 2000 and yoy production during the last three years has either failed or produced record to near record lows. Reproductive recovery of the Good Hope tributary remains uncertain and currently hangs in the balance. The future of Good Hope tributary appears threatened and at a point where it is not expected to respond with the resiliency of the past to future environmental insults. Gum Springs tributary continues to produce yoy trout; however, the numbers are extremely low and are not expected to improve in the near future. Gum Springs tributary adult population is extremely sparse and appears to be suffering from the impact of development and suboptimal adult habitat. Right Fork has suffered similar impacts. Adult numbers have declined sharply since 1998 and natural reproduction has not been observed during the last three surveys. Left Fork has long been known to hold occasional adults. Its greatest attribute is to serve as a seasonal refuge for trout and to supply downstream reaches of Paint Branch with additional flow. Natural reproduction in the Left Fork is unreliable and generally produces highly sporadic, insignificant trout hatches.

Appendix C Colesville Depot Stream Condition Study

1.1 Overview

Montgomery County Department of Environmental Protection (MCDEP) monitored the Colesville Depot Tributary since 1995 as part of our NPDES monitoring. It was originally thought that that the Depot itself could be a cause of impairment to the Good Hope Tributary. The Colesvillle Depot Tributary is located just south of Cape May Road. Figure 1 shows the Colesville Depot facility, surrounding watershed, and associated monitoring stations. The Depot outfall discharges from approximately 12 acres of mostly impervious area including administrative buildings, parking lots, vehicle maintenance and repair areas, two road salt storage facilities, and a fueling station. The 654 acres that drain to the instream Good Hope Tributary station just below the confluence with the Depot Tributary includes 540 acres of medium-density residential, 3 acres of commercial, 12 acres of industrial (the Colesville Depot), and 99 acres of county-owned parkland. There are about 398 acres of wooded area in the watershed, with a total percent impervious of about 10%. During the monitoring period, an additional 64 acres of developed land upstream of the instream station received new or enhanced stormwater control.

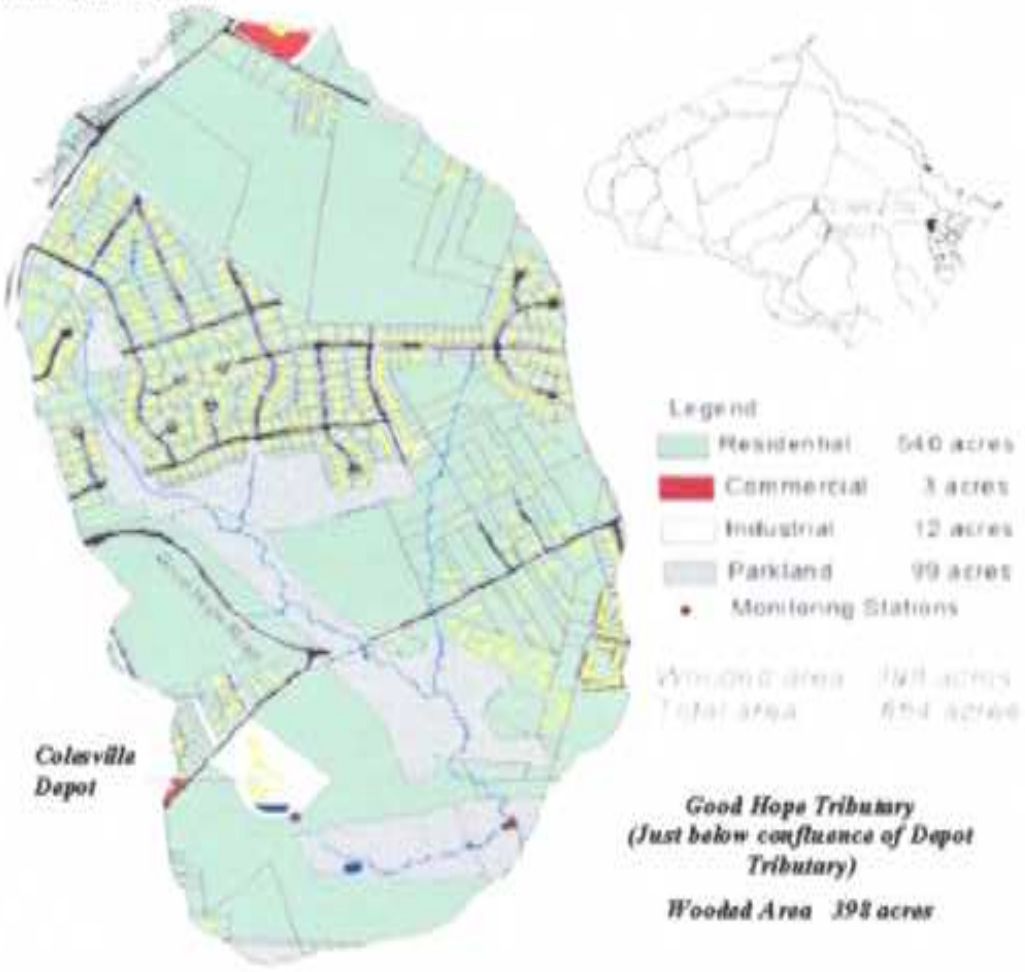


Figure 1. Overall Map of the Good Hope Watershed and the Location of the Colesville Depot

1.2 Monitoring Summary

The Colesville Depot Tributary has had extensive monitoring conducted on it to determine the source(s) of any stressors to the Depot Tributary and the degree of impact to the Good Hope Tributary (Figure 2). Biological monitoring and rapid habitat assessments were conducted in 1996, 1999, and 2000. MCDEP contracted Versar, Inc. to collect water chemistry using an autosampler from 1996 through 2000. Water temperature monitoring throughout this tributary and in the Good Hope Mainstem (above and below the tributary) was logged during the summer months in 1995, 1996, 1999, 2000, 2001, and 2004. In 2004, MCDEP contract RK&K to conduct a botanical monitoring at the Forester Pond to determine the survivability and sustainability of the new plantings around the pond. Also in 2004, State Highway Services (SHA) and Coastal Resources deployed temperature loggers in the Colesville Depot Tributary.

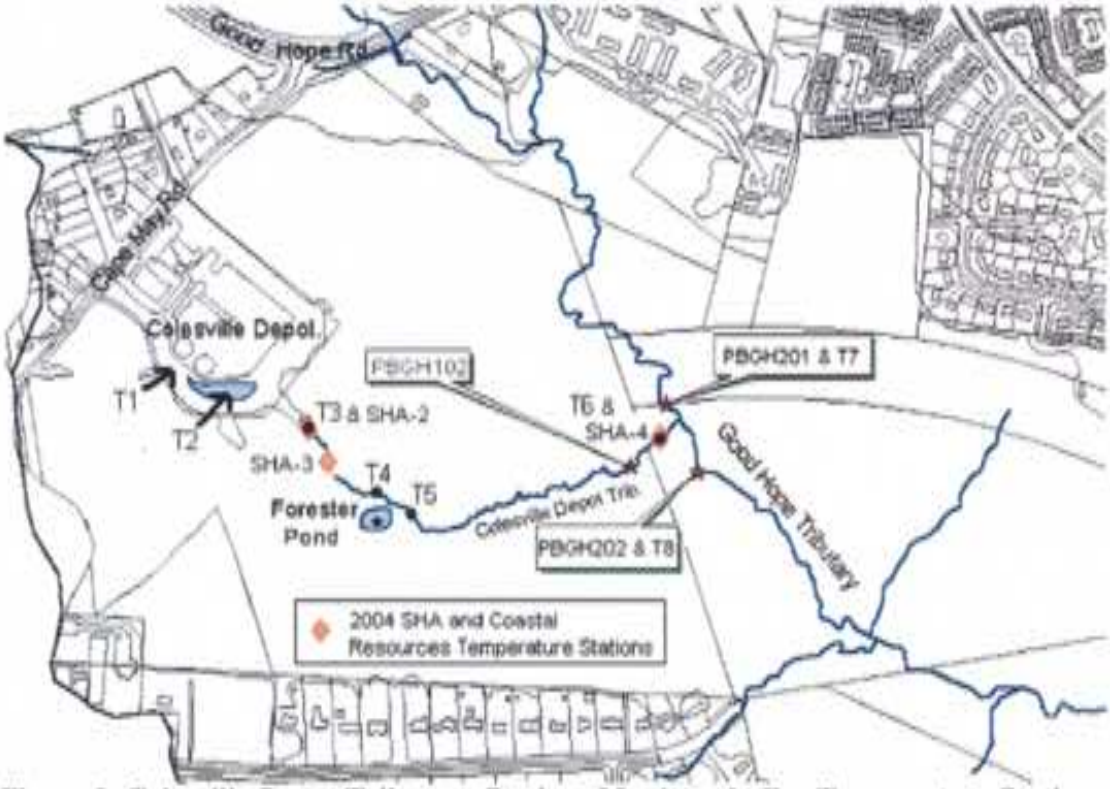


Figure 2. Colesville Depot Tributary Stations Monitored. For Temperature Stations: Within the Oil/Grit Separator at the Depot (T1), within the Stormwater Pond also at the Depot (T2), below the Stormwater Pond (T3), above the Forester Pond (T4), within the Forester Pond, below the Forester Pond (T5), on the Colesville Tributary just above the Confluence with Good Hope (T6), and on the Good Hope Tributary above and below the confluence of the Colesville Depot Tributary (T7 & T8 respectively). In 2004 SHA and Coastal Resources monitored water temperatures also in the Colesville Depot Tributary; below the Stormwater Pond (SHA-2), just downstream of SHA-2 in the wetlands (SHA-3), and on the Colesville Tributary just above the Confluence with Good Hope (SHA-4). The three biological Monitoring Stations are located on the Colesville Depot Tributary (PBGH102) and two on the Good Hope Tributary, one above (PBGH201) and one below (PBGH202) the confluence of Colesville Depot Tributary's to the Good Hope Tributary.

1.3 Summary of Infrastructure Improvements in the Colesville Depot Tributary (in response to the monitoring results conducted in 1996).

In 1995, the Montgomery County Department of Environmental Protection (MCDEP) began monitoring the Colesville Road Maintenance Depot's Tributary and the Good Hope Tributary (above and below the Depot Tributary) to fulfill the County's NPDES Municipal Separate Storm Sewer System (MS4) permit requirement for long-term discharge characterization. The Depot facility was identified for stormwater management retrofits and improvements; those site upgrades and retrofits began in September 1997 and were completed in April of 1998. The improvements to the Colesville depot facility was funded by Montgomery County Department of Public Works and Transportation and included: improved stormwater management pond with wetland plantings, additional oil-grit separator, installation of a sand filter, and additional water quality improvement structures. In 1999 a truck wash facility was also installed at the Colesville Depot.

After analyzing the 1995 and 1996 temperature data, MCDEP identified the Forester Pond (located on the Depot Tributary) the main source of the thermal impact in the Depot Tributary. In 2000, MCDEP implemented a restoration project designed to reduce or eliminate this thermal impact to the Depot Tributary by the Forester Pond. The project breached the pond which lowered the surface elevation, reduced the pond volume and residency time. Because the pond is spring fed water is continuously flowing through. The idea behind lowering the ponds water surface is to reduce the time water is retained and warmed by ambient air temperature and solar radiation while at the same time maintaining habitat for amphibians and fish. The area around the pond was planted with various wetland trees, shrubs and grasses to increase shade cover.

1.4 Biological Monitoring (extracted from MCDEP's NPDES Report 2004)

In 1997, MCDEP established three monitoring stations to document any changes in the biological community that could be linked to the Depot retrofit. Station PBGH102 was in the Depot tributary close to its confluence with the Upper Good Hope. Station PBGH201 was in the Upper Good Hope above the Depot tributary and Station PBGH202 was in the Upper Good Hope below the Depot tributary. Biological monitoring and habitat assessments were planned so that baseline sampling was completed in 1997, before retrofit construction began. No monitoring was done in 1998 during retrofit construction. Biological monitoring and physical habitat assessments were repeated in 1999 and in 2000 to evaluate any changes in these conditions due to the retrofits implemented at the Depot.

The biological community was evaluated through an Index of Biological Integrity (IBI) developed from separate parameters (metrics) that represent the composition and function of the community. Stations with a greater diversity and greater number of individuals will score higher than stations with only great numbers of a few types of organisms or few numbers of any organisms. There were no significant differences in the bug IBI's above and below the Colesville Depot Tributary; however, the station above the Colesville Depot Tributary seemed to have a larger decline in the bug community structure than the station below the Depot Tributary. From 1997 through 2000 there was a gradual decline in the taxa richness and pollutant sensitive bug EPT taxa (ephemeroptera, plecoptera, and tricoptera) in the station above the Colesville Depot Tributary (PBGH201). In examining the station below the Colesville Depot Tributary (PBGH202), there is an increase in EPT taxa from 1997 to 1999 and then a decline in 2000. The Colesville Depot had no real community structure changes throughout any of the years even after

the Colesville Depot retrofit. The proportion of pollution-intolerant organisms found in the post-retrofit sampling was similar to that in the pre-retrofit sample. One possible encouraging sign, however, was that the post-retrofit community in the Depot Tributary remained stable and even improved slightly compared to the pre-retrofit community.

The pre-retrofit monitoring during 1997 indicated that both upstream and downstream of the Colesville Depot Tributary showed a good benthic biological community and optimal habitat Figure 3. The good benthic community at the downstream station even though elevated conductivity had been documented for months after all road salt/sand mixing had ceased at the Depot. There was a fair benthic community in the Colesville Depot Tributary, which may have reflected habitat limitation due to the smaller stream size and associated lower seasonal baseflow, or it may have represented some actual impairment in water quality conditions.

During 1999, both stations in the Good Hope Tributary showed a good benthic community, with the upstream station slightly lower than the downstream station. There were not enough organisms (69) in the sample from the Depot tributary to use in the DEP rating system, although the types of organisms found were comparable to those found at the upstream station. Results from the year 2000 indicated an apparent decline in the benthic community at both stations in the Upper Good Hope tributary. This decline reflects a response to extreme drought conditions experienced throughout the region during the summer of 1999. Despite the drought, there was an improvement in the benthic community in the Depot tributary compared to that before the retrofit.

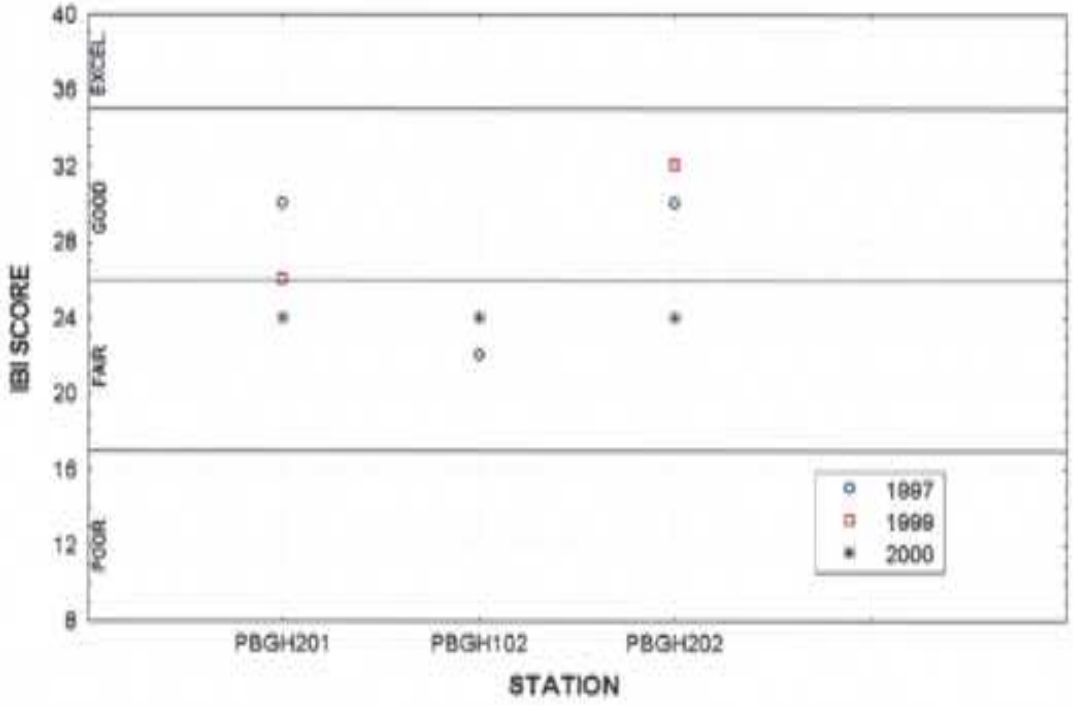


Figure 3. IBI Scores for Benthic Macroinvertebrate Community in the Colesville Depot Tributary (PBGH102), Above the Tributary (PBGH201), and Below the Tributary (PBGH202) in the Good Hope Tributary.

1.5 Rapid Habitat Assessment (extracted from MCDEP's NPDES Report 2004)

Rapid habitat assessments were conducted in conjunction with the biological monitoring at all three stations to determine excellent, good, fair, or poor conditions. The habitat scores were used to determine if stream habitat conditions were limiting the biological community. In addition, individual parameters that made up the assessment were examined to evaluate which particular problems were contributing to these limitations. Stream habitat remained unchanged in the Depot Tributary and the Upper Good Hope after the retrofit was complete. Although stream habitat condition did not appear to be a limiting factor to the biological community, sediment deposition did show an apparent increase in 2000(approximately 30 to 50% affected with sediment) and could become a limiting factor if the trend continues within, above, and below the Colesville Tributary.

Habitat scores remained in the sub-optimal range at all stations throughout the study period (Figure 4). This range covers over all habitat conditions that are adequate to support a diverse biological community and are therefore not considered to be limiting. However, the habitat scores from the year 2000 are the lowest of the three years, due to apparently increased sediment deposition at all three stations. Since the station above and below the Colesville Depot tributary showed the same increased sedimentation, activities in the Colesville Depot Tributary (including the Depot itself) were not affecting the Good Hope Tributary. The most likely source is stream bank erosion from heavy storms in the area during the summer and fall of 1999, including Hurricane Floyd.

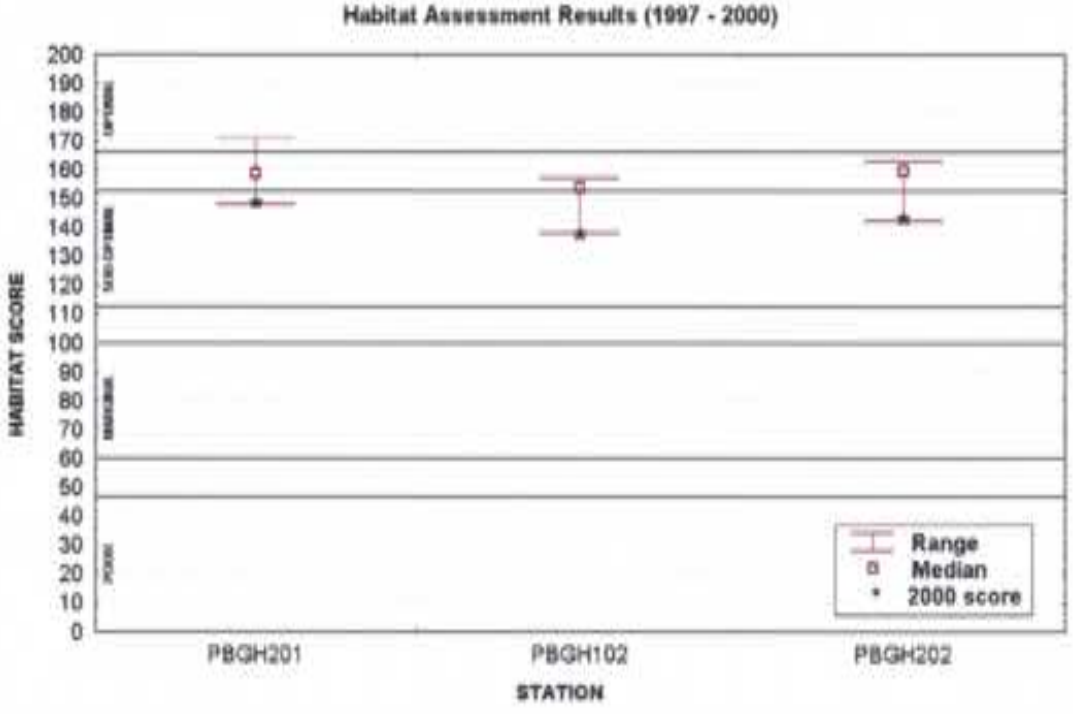


Figure 4. Habitat Scores for the Colesville Depot Tributary (PBGH102), Above (PBGH201), and Below (PBGH202) in the Good Hope Tributary.

1.6 Chemical Monitoring (extracted from MCDEP's NPDES Report 2004)

Montgomery County's water chemistry monitoring program has incorporated all elements required in the permit for frequency, number, distribution through the storm event, and parameters for the chemical sampling. The required parameters, abbreviations used in this report, methods, and detection limits used for the County's chemical sampling are shown in Table 1. From 1996-2000, Versar, Inc. provided the contract services for the field services and laboratory analyses at the required two automated stations

Table 1. Parameters, methods, and detection limits for Montgomery County's NPDES permit monitoring for discharge characterization.

PARAMETER	CODE	*METHOD*	REQUIRED DETECTION LIMIT
Biochemical Oxygen Demand, 5-Day	BOD5	EPA 405.1	1 mg/l
Total Kjeldahl Nitrogen	TKN	EPA 351.2	1.0 mg/l
Nitrate+Nitrite	NO32	Nitrate: EPA 353.2 Nitrite: EPA 354.1	0.01 mg/l 0.01 mg/l
Total Phosphorus	TP	EPA 365.4	0.06 mg/l
Total Suspended Solids	TSS	EPA 160.2	1 mg/l
Total Cadmium, Furnace	CD	EPA 213.2	20 ppb
Total Copper, Furnace	CU	EPA 220.2	2 ppb
Total Lead, Furnace	PB	EPA 239.2	1 ppb
Total Zinc, Furnace	ZN	EPA 289.2	10 ppb
Oil and Grease	O&G	EPA 413.1	0.2 mg/l
Bacteria, Fecal Coliform	FCOLI	SM 922D	1/100 MPN
PH	pH	Orion 720 or Hydrolab Surveyor II	---

The goals of the water chemistry monitoring were to evaluate 1) impacts of runoff from the Depot facility on the Good Hope tributary and 2) water quality improvements associated with stormwater management retrofits on the site. There were no consistent differences in monitoring results between types of flow (baseflow vs storm event), between stations, or pre- vs post-retrofit periods. However, the post-retrofit monitoring did seem to show lower pollutant means for both baseflow and stormwater discharges from the Depot retrofit project.

The only parameter which showed a clear connection between outfall discharges and instream water quality was conductivity, Figure 5. The seasonal increases in conductivity reflected road salt storage and mixing at the Depot and did not seem to be controlled by the retrofit. The pattern of high winter concentrations continued after retrofit, although there was a significant reduction during baseflow at both stations and during storm events at the outfall station which may reflect more diligent management practices or milder winters with fewer opportunities for mixing and spilling of road salt at the Depot.

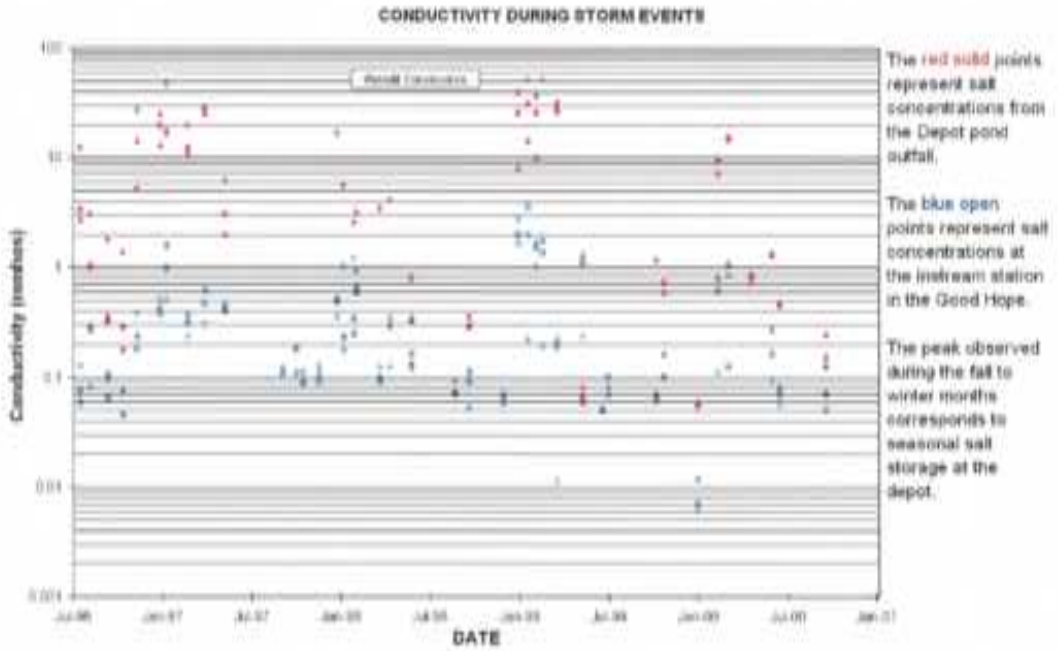


Figure 5. Conductivity Values for the Colesville Depot Tributary

1.7 Water Temperature Loggers

Timeline on Temperature Monitoring Conducted by Agencies in the Colesville Depot Tributary (Refer to Table 2 and 3 for Average Temperatures, Attachment 1 for Temperature Graphs, and Figure 6 & 7 for Overall Locations of Monitoring)

In 1995 temperature data was collected in various locations in and around the Colesville Depot to determine if there were any impacts caused by the depot. Temperature loggers were deployed on the Colesville Depot Property – one in an Oil/Grit separator (T1) and the other in the storm water management pond (T2), Figure 6 and Attachment 1 – Figure A. They were also deployed directly below the Colesville Depot BMP (T3), above (T4) and below (T5) the Forester Pond, on the Depot Tributary above confluence of mainstem (T6), and on the Good Hope Tributary above (T7) and below (T8) where the Colesville Depot Tributary joins the Good Hope (Figure 6 & Attachment 1 - Figures B, C, & D respectively).

In 1996 loggers were redeployed directly below the Colesville Depot BMP (T3), above (T4) and below (T5) the Forester Pond, on the Depot Tributary above confluence of mainstem (T6), and on the Good Hope Tributary above (T7) and below (T8) where the Colesville Depot Tributary joins the Good Hope (Figure 6 & Attachment 1 - Figures E, F, & G respectively).

In 1999 and 2000 temperature was collected for the Colesville Depot Tributary by MCDEP above (T4) and below (T5) the Forester Pond, and on the Depot Tributary above confluence of mainstem (T6) (Figure 6 & Attachment 1 - Figures H & I respectively). Using the 1999 and 2000 data, it was clear that the Forester Pond on the Colesville Depot Tributary was the primary source of the increased water temperature within the Colesville Depot Tributary though it should no effect on the Good Hope Tributary.

In 2001, MCDEP Deployed temperature loggers on the Colesville Depot Tributary to examine the thermal impacts related to the Forester Pond by examining temperature stations above (T4) and below (T5) the Forester Pond, and on the Depot Tributary above confluence of mainstem (T6) (Figure 6 & Attachment 1 - Figure J).

In 2004, MCDEP contracted RK&K to deploy temperature loggers above (T4), below (T5) and inside the forester pond to examine whether the Forester pond project was a success (Figure 6 & Attachment 1 - Figure K).

Also in 2004, Maryland State Highway Administration (SHA) and Coastal Resources deployed loggers in this tributary. They installed their loggers directly below the Colesville Depot BMP (SHA-2) near or at MCDEP's T2 station, just downstream of SHA-2 in the wetlands (SHA-3), and on the Colesville Tributary just above the Confluence with Good Hope (SHA-4) near or at MCDEP's T6 station. (Figure 7 & Attachment 1 - Figure L).

Table 2. Average Water Temperatures (°F) in the Colesville Depot Tributary (6/1 - 9/30).

	Upstream Most Point ----------^----------> Downstream Most Point Pond Enters Here							
	In Oil/Grit Separator at depot	In Pond at Depot	Directly Below Depot BMP (T3)	In Tributary at Spring Seeps (SHA-3)	Above Forester Pond (T4)	In Forester Pond	Below Forester Pond (T5)	Depot Tributary above confluence of mainstem (T6)
1995	73.6	86.7	71.9	No Data	61.4	No Data	67.2	67.3
1996	No Data	No Data	70.4	No Data	56.4	No Data	65.1	64.3
1999	No Data	No Data	No Data	No Data	62.6	No Data	67.2	66.4
2000	No Data	No Data	No Data	No Data	62.2	No Data	65.3	64.9
2001	No Data	No Data	No Data	No Data	60.8	No Data	66.9	65.5
2004 (MCDEP)	No Data	No Data	71.1*	69*	64.7	64.0	65.6	65.3*

*** SHA & Coastal Resources Data**

Table 3. Average Water Temperatures (°F) in the Good Hope Tributary Above and Below the Colesville Depot Tributary.

	Above Colesville Depot Tributary's Confluence to Good Hope, PBGH201 (T7)	Below Colesville Depot Tributary's Confluence to Good Hope, PBGH202 (T8)
1995	65.3	65.4
1996	63.0	61.5
1999	No Data	No Data
2000	No Data	No Data
2001	No Data	No Data
2004 (MCDEP)	No Data	No Data

Temperature Graphs (See Attachment 1)

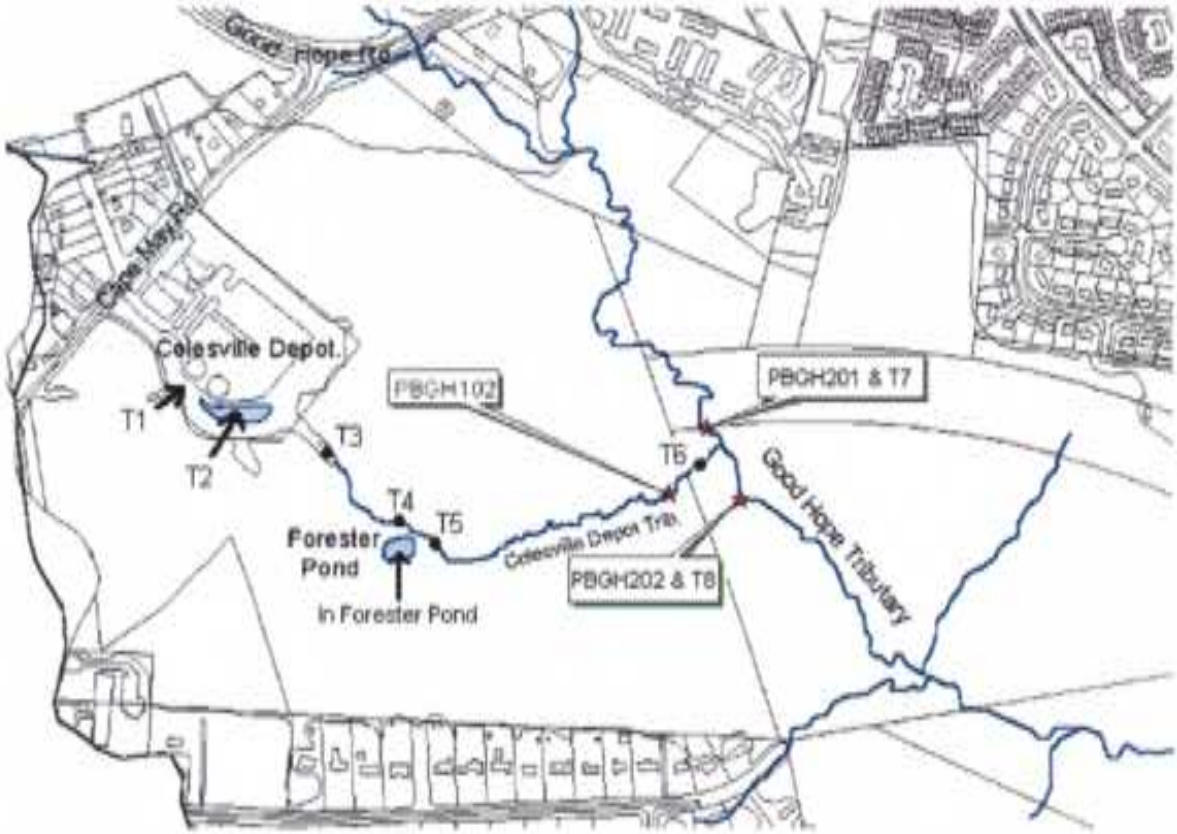


Figure 6. Montgomery County Department of Environmental Protection's Temperature sites for 1995, 1996, 1999, 2000, 2001, and 2004 (not all sites used each year – see Table 2 and 3).

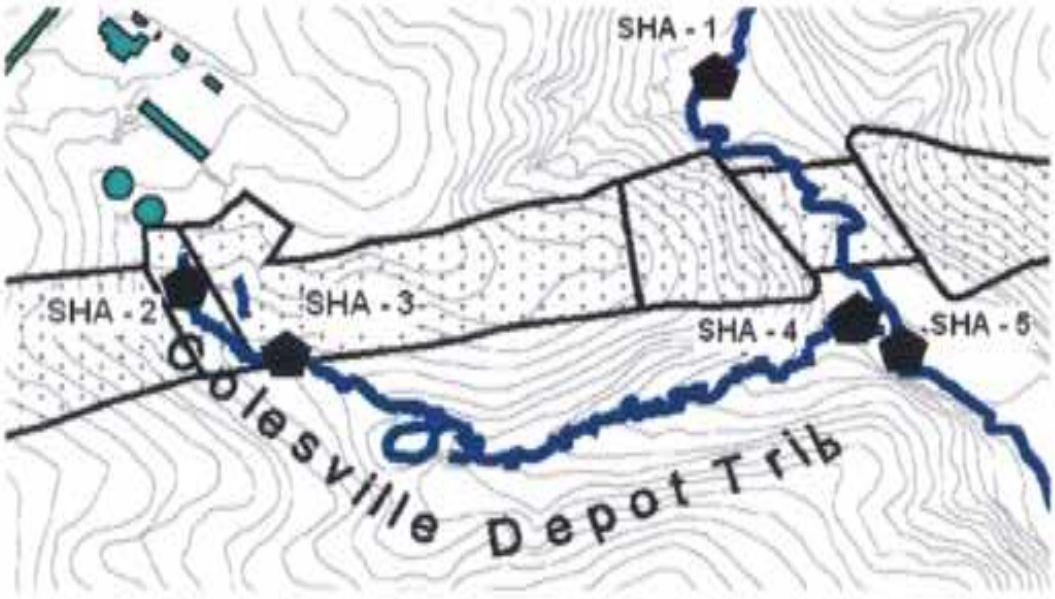


Figure 7. Extracted from Maryland State Highway Administration (SHA) and Coastal Resources – "Upper Paint Branch Baseflow and Temperature Monitoring.

Temperature Evaluation

By compiling all temperature data in the Colesville Depot Tributary, the data suggests that the Colesville Depot pond discharges elevated temperatures, but by the time the water passes through the spring seeps and arrives at the temperature station (T4) above the Forester Pond (approximately 950 feet downstream of the Depot's Outfall) the average temperature drops about 6 degrees Fahrenheit (Average 64.7 °F using the 2004 data). Below the Forester pond at the temperature station (T5) the average water temperature increased by about a degree and remains around the same temperature (T6) until reaching the mainstem of the Good Hope Tributary, Figure 3. Even though there is an elevated temperature at the upper end of the Colesville Depot Tributary, the temperatures decline most likely due to the ground water seeps above the Forester Pond before entering into the mainstem of Good Hope subwatershed. From the Forester Pond and below, the 1 degree average temperature difference (2004 data) between the pond and its confluence with the depot tributary may be explained by the breach of the pond to allow for upper water column release. The Good Hope Tributary does not show any thermal impairment from the Colesville Depot Tributary when comparing the temperature stations located on the Good Hope Tributary above (T7) and below (T8) the Colesville Depot Tributary.

1.8 Botanical Monitoring on the Forester Pond (Contracted to RK&K)

In the summer of 2004, MCDEP contracted RK&K to conduct a botanical monitoring survey at the Forester Pond to determine the success rate of the restoration plantings surrounding the pond. The percentage of the site containing acceptable trees was calculated for the Forester Pond. The restoration plans for the pond indicated a total of 70 plants were installed and out of those RK&K plotted out 12 4-foot radii. Of those plots, RK&K monitored only 4 plots that had acceptable trees or shrubs (33% supporting trees and shrubs). They wrote, "In general, the trees on the slope of the pond above the water line are doing well but the trees in the broad planted area at the rear (away from the outfall) of the pond are not surviving. The soil here appears too wet for these shrubs and most of the shrubs were found dead". This may have increased the likelihood that the pond is not shaded and the sun may be increasing the upper water column of the pond which ultimately will be the first layer to be discharged from breaching of the pond during the restoration project.

1.9 Conclusion

The biology, water chemistry, and temperature data do not support a conclusion that the Colesville Depot Tributary is impairing the Good Hope Tributary. The Colesville Depot was built in the 1970's and since 1997 when MCDEP first conducted biological monitoring in the Good Hope, the IBI ratings immediately above and below the confluence with the Colesville Depot Tributary have remained in the Good to Fair range indicating that the Depot's runoff is not impairing the Good Hope Tributary. The water temperature released from the Depot's Pond has elevated water temperatures; however, the ground water seeps above the Forester pond cool the water before arriving at the Forester Pond (~950 feet). The Forester pond may increase the Colesville Tributary's water temperature slightly but do not increase the water temperature beyond a Maryland State Use Class III temperature standards (68°F). Most likely the elevated water temperature below the pond's outfall is due to the pond's upper "warmer" surface water being released into the Colesville Tributary due too the pond breach in 2000. Neither the retrofitted Colesville Depot Pond nor the retrofitted Forester Pond is impacting the mainstem of the Good Hope Tributary. Groundwater seeps throughout this tributary provides cool water to maintain the stream's temperatures (on average) below the Use Class III temperature standards. It is essential that these ground water seeps be protected if changes occur in the drainage area of the Good Hope Tributary and/or the

Colesville Depot Tributary. If those spring seeps degrade and lose their cooling affect, than the Colesville Depot Tributary may have an impact on the Good Hope Tributary. MCDEP will continue to monitor the water temperatures in this area.

1.10 MCDEP's Recommendations for monitoring and managing the Colesville Depot Tributary

The recommendations for the Colesville Depot Tributary include the following:

- The ground water seeps between the Colesville Depot Pond and the Forester Pond's outfall are very crucial for water temperature buffering. It is imperative to maintain and protect those ground water seeps.
- Biological monitoring of MCDEP's stations should be repeated in 2006 to determine whether the Forester Pond's Restoration Project has maintained or improved the biological diversity in the Colesville Depot Tributary to a comparable condition with the Good Hope Tributary.
- There should be another year of water temperature monitoring. Also included in this monitoring should be temperature loggers deployed on the Forester Pond's upper water column, the bottom of the pond, and in its outfall channel leading to the Colesville Tributary.
- It is apparent that other means/plants are required to successfully shade the Forester Pond based on the botanical monitoring results.
- Other possible solutions to decrease water temperature of the Colesville Depot's Pond may be warranted.
- Since the environmental impacts due to the Colesville depot do not show significant impacts to the Good Hope Tributary, the costs related to the removal and relocation of the Colesville Depot (approximately $3 to $4 million) is not necessary as long as the ground water wetlands/seeps are protected.

Attachment 1

1995

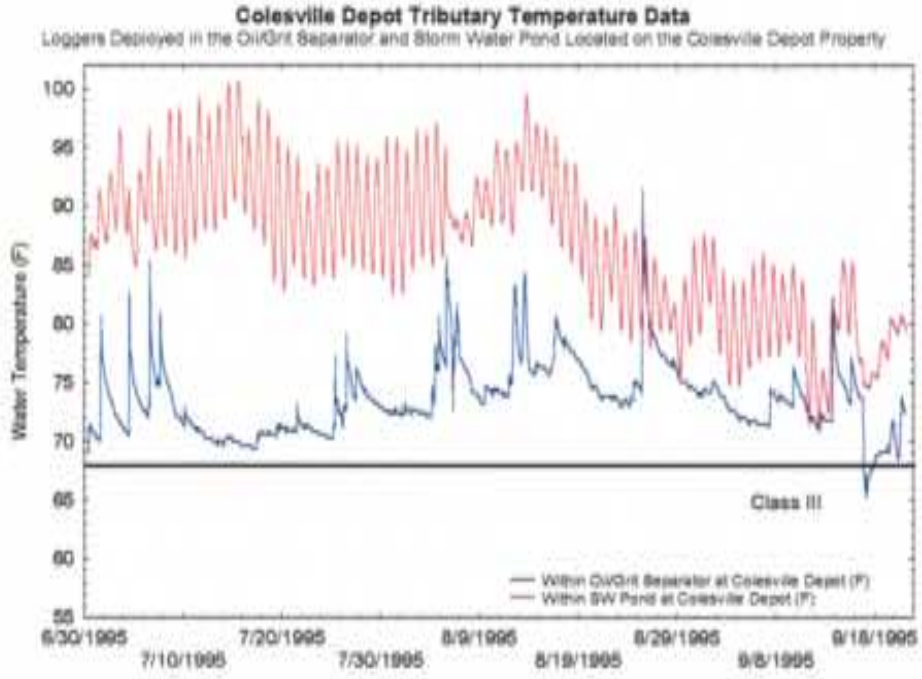


Figure A. 1995 Temperature Data (°F) from MCDEP depicting water temperatures within the Oil/Grit Separator and the Stormwater Pond on the Colesville Depot's Property.

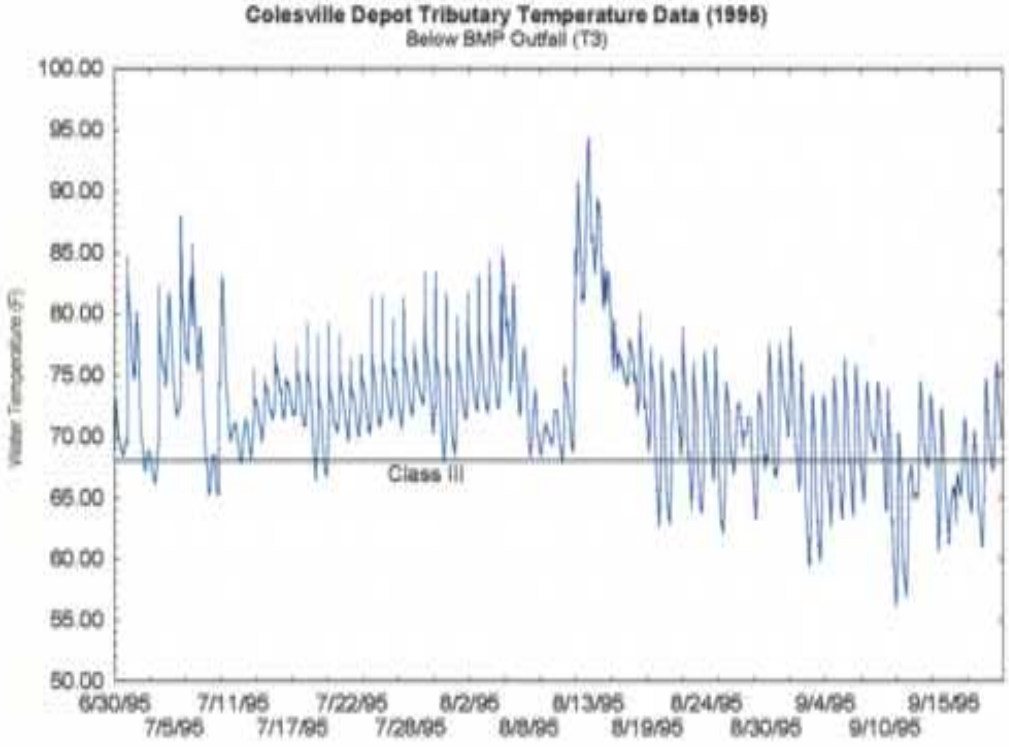


Figure B. 1996 Temperature Data from MCDEP depicting water temperatures (°F) directly below the Colesville Depot Outfall (T3).

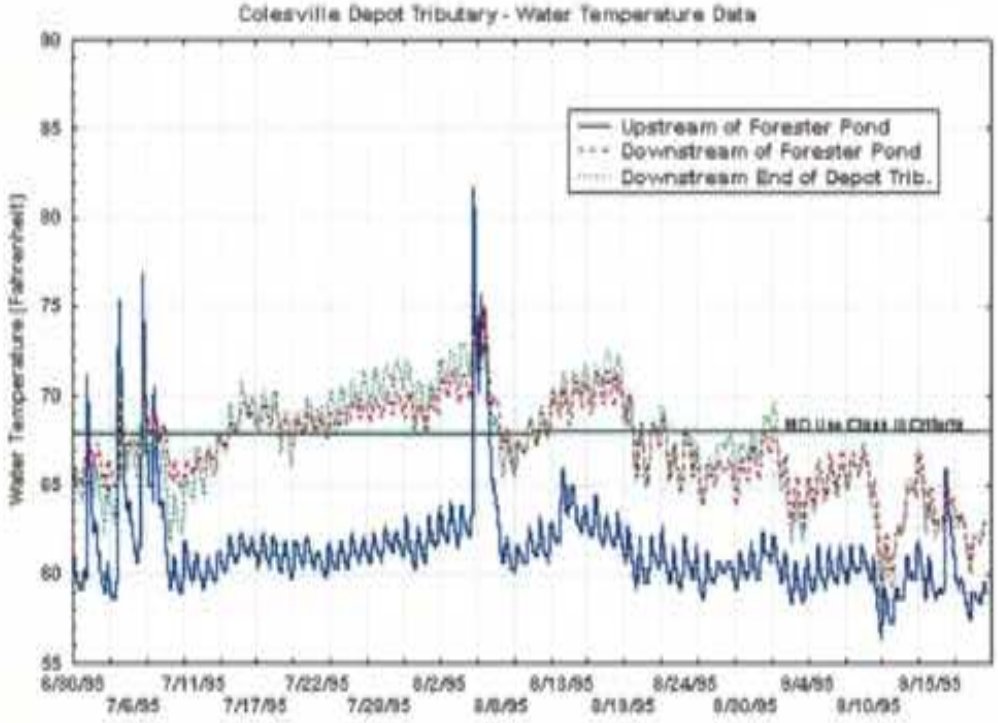


Figure C. 1995 Temperature Data (°F) from MCDEP depicting water temperatures above (T4) and below (T5) the Forester Pond and on the Colesville Depot Tributary above the Confluence with the Good Hope (T6).

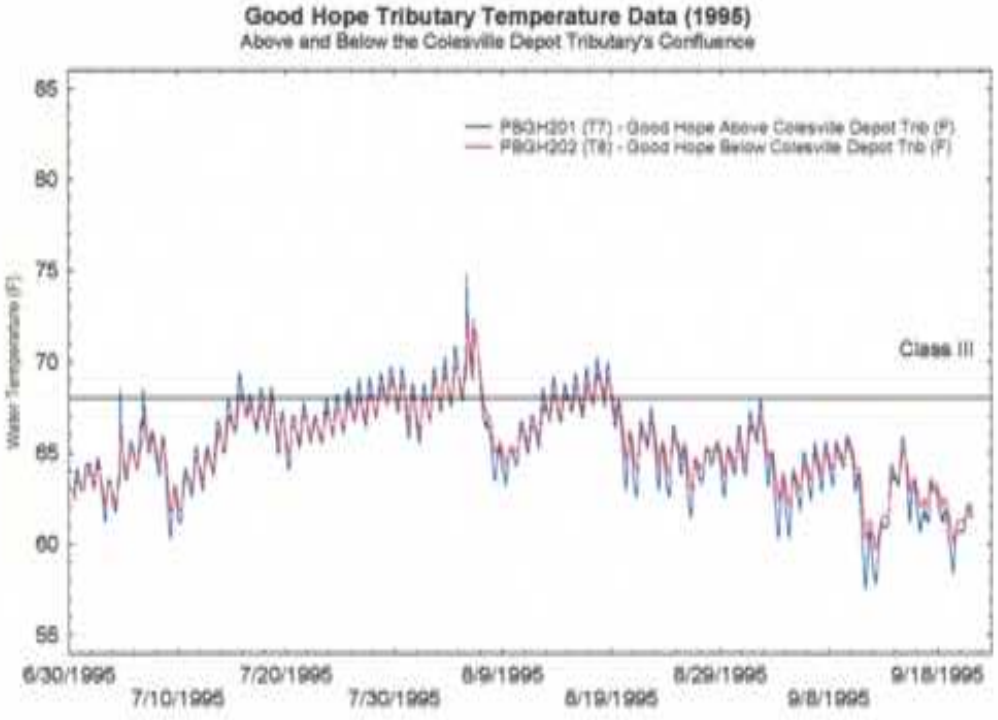


Figure D. 1995 Temperature Data (°F) from MCDEP depicting water temperatures on the Good Hope Tributary above (PBGH201 – T7) and below (PBGH202 – T8) the Confluence of the Colesville Depot Tributary.

1996

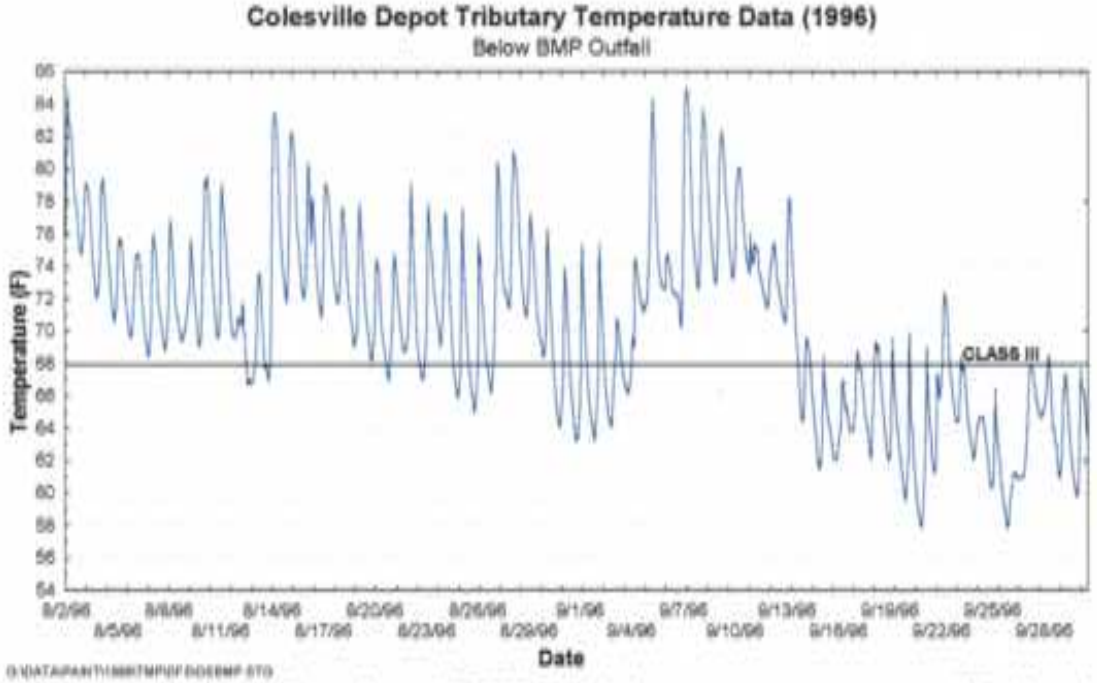


Figure E. 1996 Temperature Data from MCDEP depicting water temperatures (°F) directly below the Colesville Depot Outfall (T3).

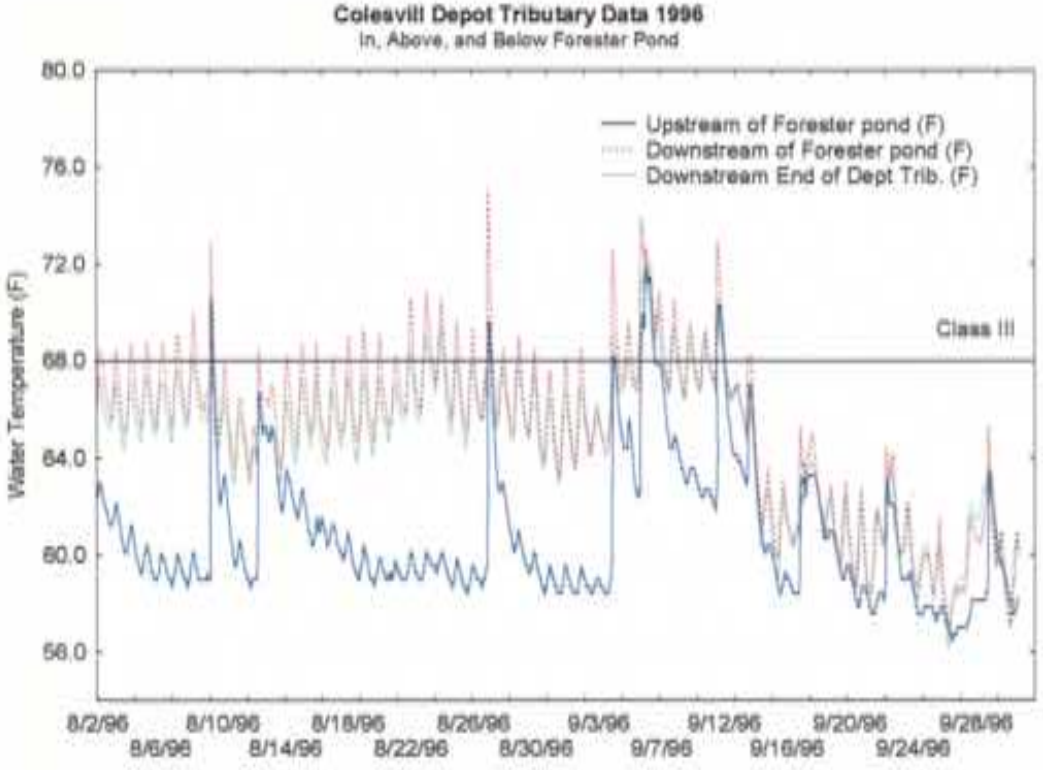


Figure F. 1996 Temperature Data from MCDEP depicting water temperatures (°F) above (T4) and below (T5) the Forester Pond, and on the Colesville Depot Tributary above the Confluence with the Good Hope (T6).

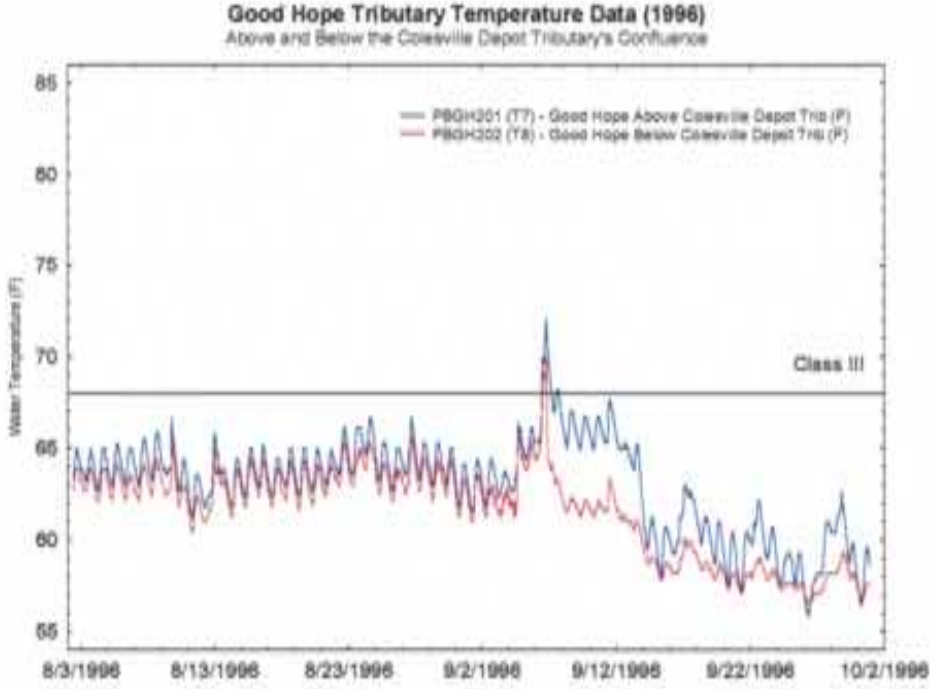


Figure G. 1996 Temperature Data (°F) from MCDEP depicting water temperatures on the Good Hope Tributary above (PBGH201 – T7) and below (PBGH202 – T8) the Confluence of the Colesville Depot Tributary.

1999

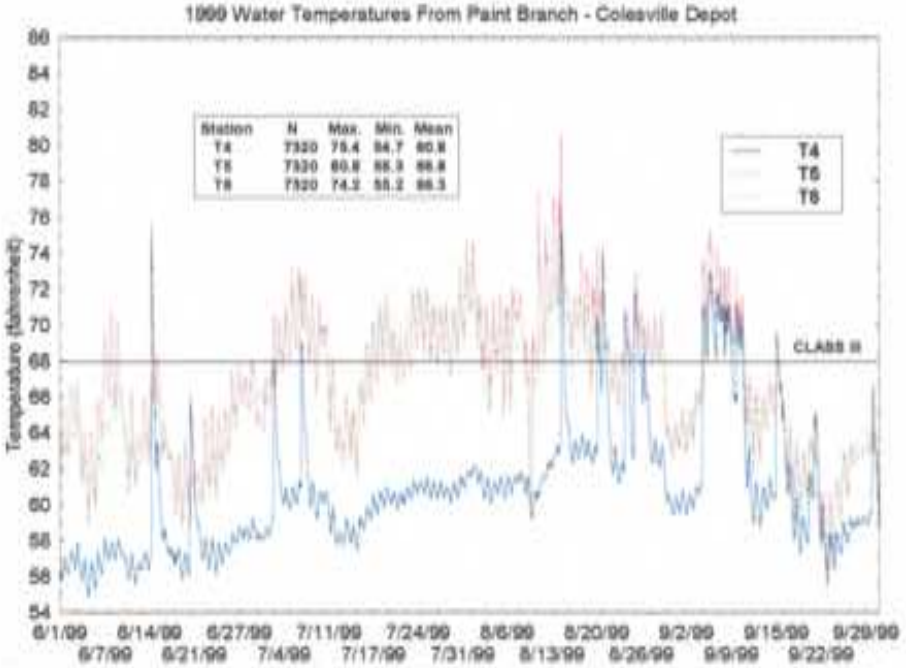


Figure H. 1999 Temperature Data from MCDEP depicting water temperatures (°F) above (T4) and below (T5) the Forester Pond, and on the Colesville Depot Tributary above the Confluence with the Good Hope (T6).

2000

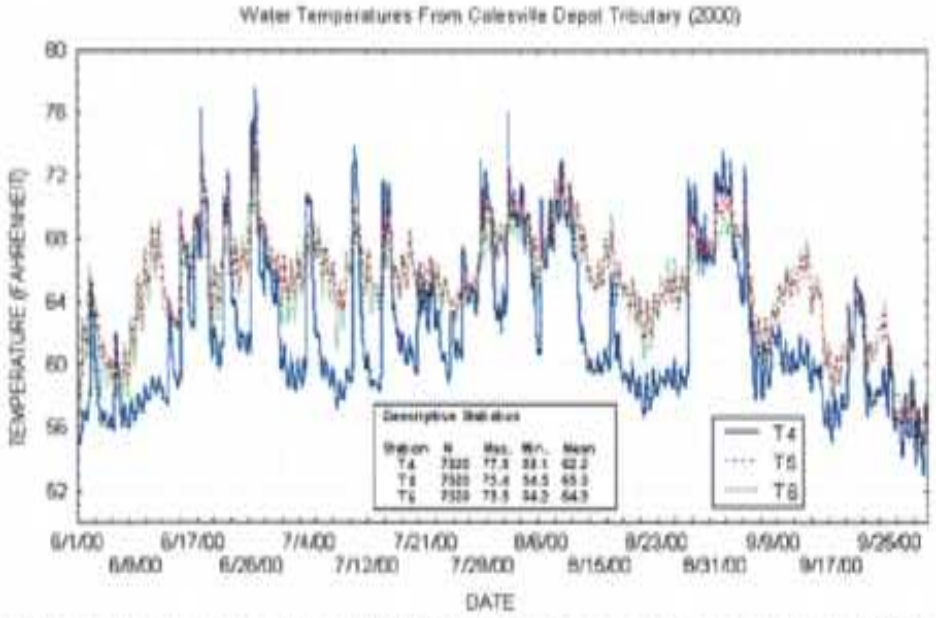


Figure I. 2000 Temperature Data from MCDEP depicting water temperatures (°F) above (T4) and below (T5) the Forester Pond, and on the Colesville Depot Tributary above the Confluence with the Good Hope (T6).

2001

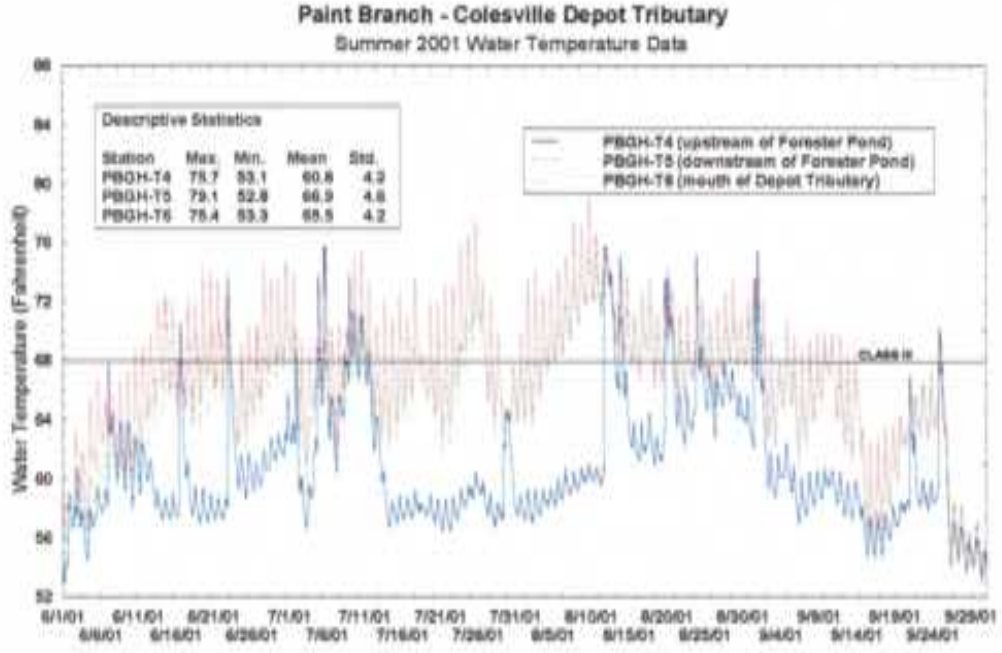


Figure J. 2001 Temperature Data from MCDEP depicting water temperatures (°F) above (T4) and below (T5) the Forester Pond, and on the Colesville Depot Tributary above the Confluence with the Good Hope (T6).

2004

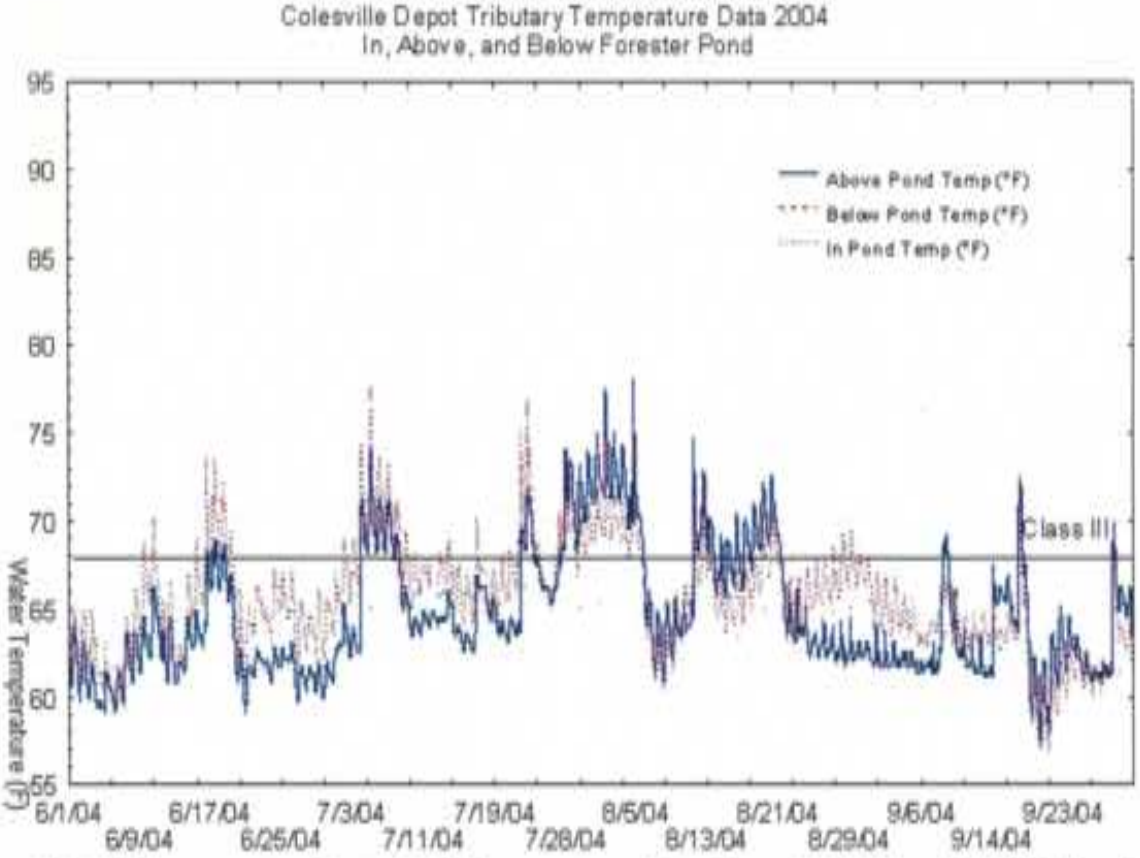
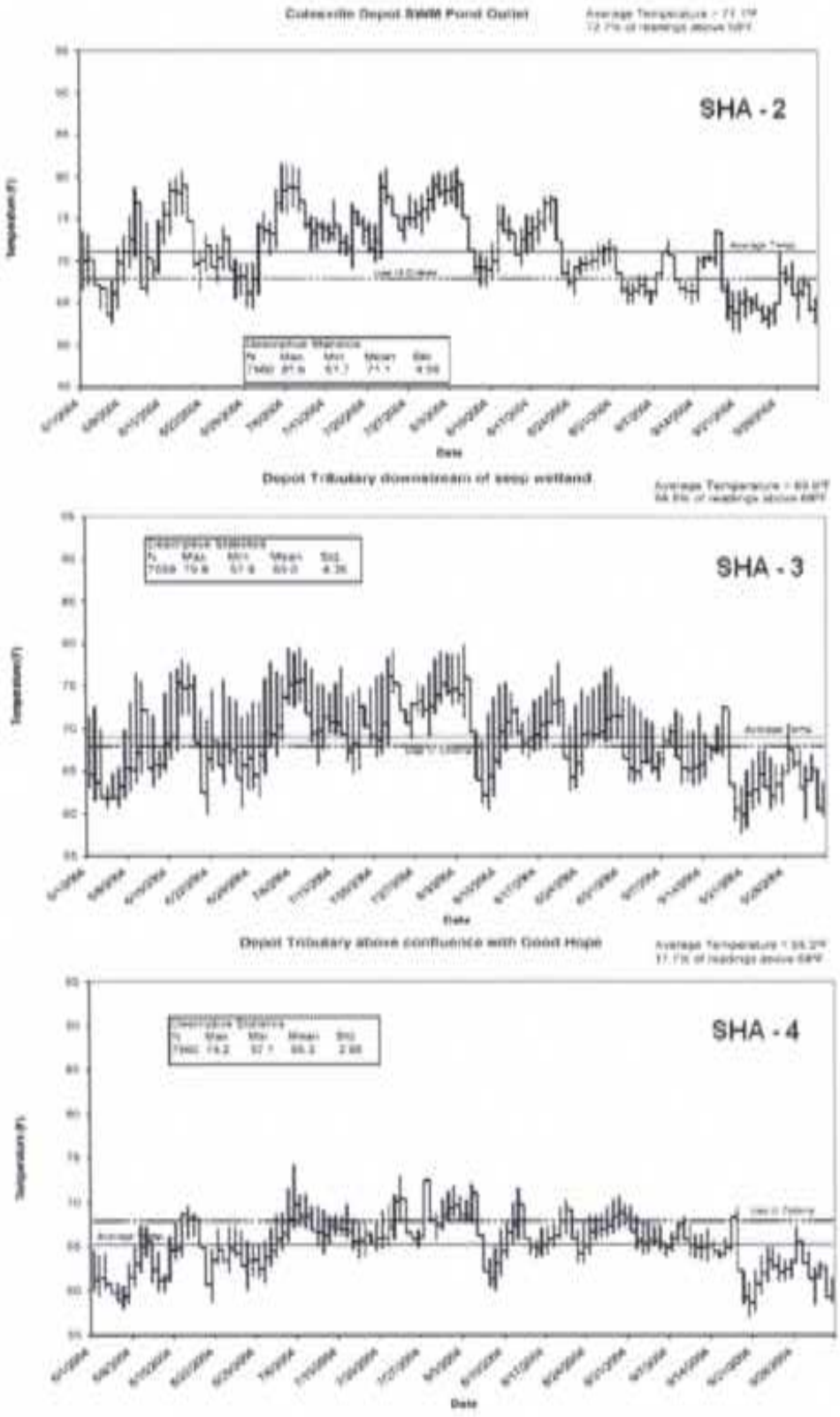


Figure K. 2004 Temperature Data 2004 Temperature Data from MCDEP and RK&K depicting water temperatures (°F) Inside, Above (T4), and Below the Forester Pond (T5).

Figure L. 2004 Temperature Data (°F) from SHA and Coastal Resources "Study Summary (2004)



Attachment 3

MONTGOMERY COUNTY PLANNING DEPARTMENT
THE MARYLAND-NATIONAL CAPITAL PARK AND PLANNING COMMISSION

August 27, 2007

MEMORANDUM

TO: Steve Federline, Supervisor
Development Review Division

VIA: Richard Hawthorne, Chief RCH
Transportation Planning

FROM: Dan Hardy, Supervisor DKH
Transportation Planning
301-495-4530

SUBJECT: Zoning Text Amendment No: ZTA 07-11
Upper Paint Branch standards

Transportation Planning staff is concerned that the specification of an impervious cap is not adequately defined in County law as it relates to linear projects in the public right-of-way such as sidewalks, bicycle paths, and roadways. Our current design standards for the typical section of an open-section, primary residential road without sidewalks (MC 212.03) includes 24 feet of pavement within a 70-foot wide right-of-way, indicating that the standard roadway design might be approximately 34% impervious surface.

Other roadway classifications have even greater percent impervious ratios, particularly where sidewalks and bike paths are desired. The review of design standards in the current Road Code amendment process provides an opportunity to consider narrower paved surfaces or alternative surface treatments in Special Protection Areas (SPA). The discussions to date, however, suggest that any changes would result in only a few percentage points of difference from current standards.

Therefore, neither the 10% existing cap nor the 8% proposed cap provides a reasonable expectation for the ratio between the impervious surface and the right-of-way in a typical section. Further, the Section 59-C-18 definitions of "impervious surface of the total area under application" do not readily apply to transportation projects.

We have, with DPWT and SHA, aggressively and creatively explored alternative means for interpreting these requirements on recent transportation projects such as the Briggs Chaney Road / Old Columbia Pike intersection and the Old Columbia Pike sidewalk. Case history

demonstrates that both staff and the Planning Board have generally interpreted the law as "avoid adding net new impervious surface, and minimize the impervious-to-total-area ratio if avoidance is not feasible". An avoidance strategy might be achieved on smaller projects by removing an equivalent amount of impervious surface elsewhere in the SPA. The minimization strategy primarily includes seeking opportunities to reduce design without compromising safety, although the impervious-to-total-area ratio can also be affected by incorporating additional pervious property, such as new parkland, into the definition of total area.

This ZTA would appear to provide an opportunity to clarify realistic expectations for transportation projects, either regarding realistic numeric expectations for impervious ratios or guidance that more specifically addresses the application of the SPA law to public transportation projects.

The master plans covering the Upper Paint Branch SPA contain recommendations to implement several new (or widened) roadways and bicycle paths. We expect the Intercounty Connector to be the next public project for which an ad-hoc interpretation of the law will be required. In the absence of clearer guidance regarding either more realistic numeric targets for transportation or definitions for applications within public rights-of-way, we will continue to pursue the case-by-case consideration of "avoid, then minimize" described above.

DH:RH:tc

ATTACHMENT 4

Revise/Add language to the Environmental Overlay Zone for the Upper Paint Branch SPA to address the following issues (5/23/07):

1. Add to the Environmental Overlay Zone the County Council's directive and language in the approved Upper Paint Branch SPA Resolution (approved 7/11/95) requiring **all projects proposing any land disturbing activity (as defined in Chapter 19 of the county code)** be subject to water quality plan or water quality inventory review.

2. Revise 59-C-18.152:

   - Section 59-C-18.152(a)(1)(A) should be modified as follows: "Any **land use and** impervious surface lawfully existing pursuant to a building permit issued before September, 2007.....".
   - **Add a new section to allow grandfathering for projects with a SPA Water Quality Plan either approved by the Planning Board or the DPS Director** to allow a project that has an approved water quality plan to proceed to construction in conformance with the approved water quality plan. The project may exceed the 8 percent impervious surface restriction but cannot exceed the imperviousness restriction set by the approved water quality plan. If the project exceeds the 8 percent imperviousness cap, but conforms to the imperviousness limit set by the approved water quality plan, the project does not need to go through the waiver process for the excess over the 8 percent cap.

3. Revise the Waiver provision in the Environmental Overlay Zone (Section 59-C-18.152(a)(2) to mirror the waiver provisions in the SPA Law (Section 19-66(e)). The two waiver provisions currently do not match.

   - Section 19-66(e) includes the following language: "After consulting reviewing agencies and holding a public hearing, the Planning Board or the DPS Director, as applicable, may waive any requirement if the applicant shows by clear and convincing evidence that...." Add this language to the Environmental Overlay Zone waiver provision.

   - Revise the Waiver provision to confirm that a waiver may be granted by either the Director of the Dept. of Permitting Services or the Planning Board, as applicable.

- Possible language changes (the following does not contain all the language changes that are recommended) could be:

  Waiver. The Director **or Planning Board, as applicable**, may grant a waiver from the **development standards set forth in Section 59-C-18.152(a)(1),** subject to the following standards and procedures:

  (A) Written Request. An applicant may apply for a waiver from the **development standards set forth in Section 59-C-18.152(a)(1),** if enforcement would result in undue hardship to the applicant. The request must be in writing to the Director **or Planning Board, as applicable,**

  (B) Review and action. The Director **or Planning Board, as applicable,** may grant a waiver from the **development standards set forth in Section 59-C-18.152(a)(1)** if the applicant shows by clear and convincing evidence that:
  (i) the **development standards set forth in Section 59-C-18.152(a)(1)** would result in undue hardship .....