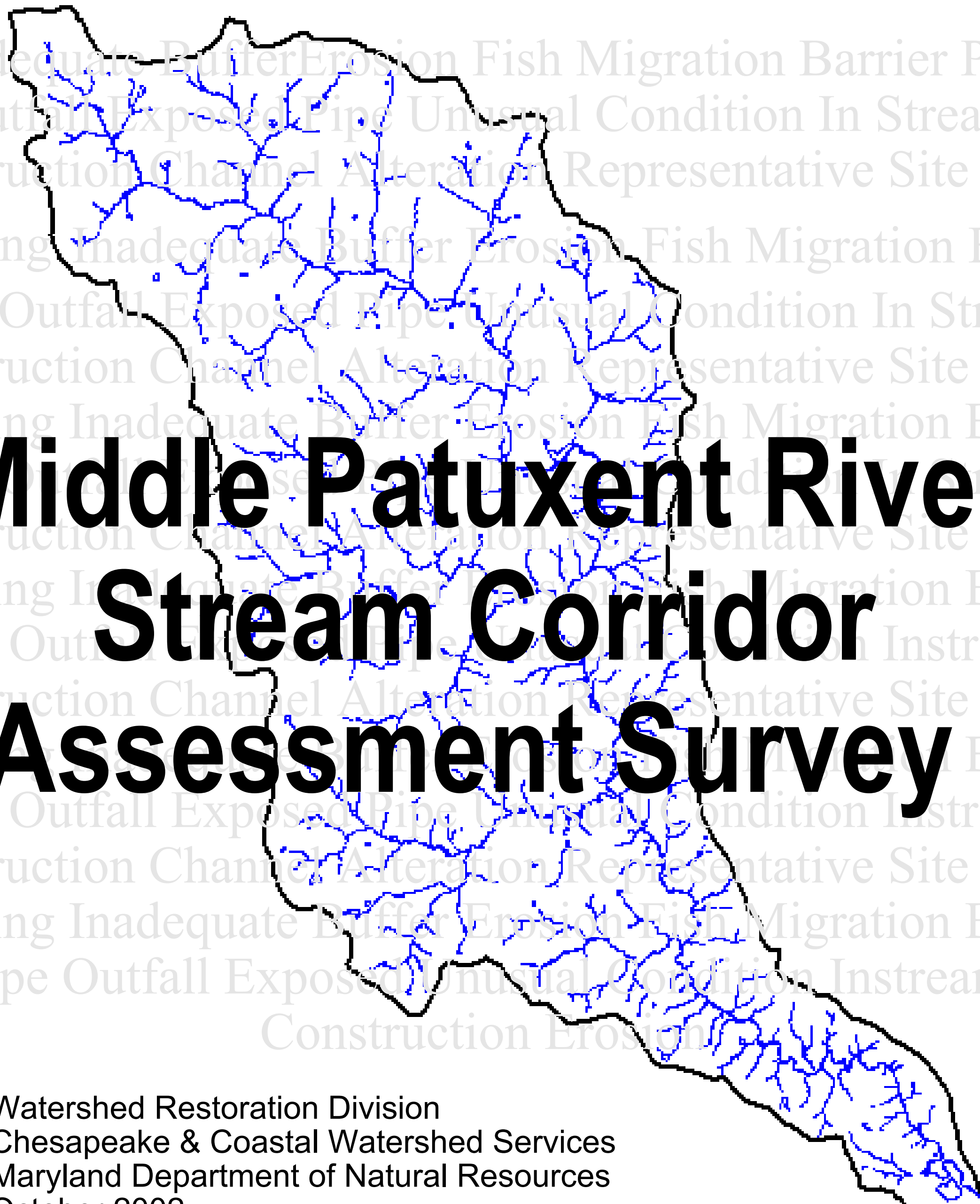
Middle Patuxent River Stream Corridor Assessment Survey



Watershed Restoration Division
Chesapeake & Coastal Watershed Services
Maryland Department of Natural Resources
October 2002

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Maryland Department of Natural Resources
Tawes State Office Building
580 Taylor Avenue
Annapolis, Maryland 21401

Toll free in Maryland: 1-(877) 620-8DNR (ext. 8796)
Out of state call: 410-260-8796
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MIDDLE PATUXENT RIVER STREAM CORRIDOR ASSESSMENT SURVEY

AUTHORS

Robin Pellicano
&
Kenneth Yetman

PREPARED BY

WATERSHED RESTORATION DIVISION
CHESAPEAKE AND COASTAL WATERSHED SERVICES
MARYLAND DEPARTMENT OF NATURAL RESOURCES
ANNAPOLIS, MARYLAND

FOR

STORM WATER MANAGEMENT DIVISION
BUREAU OF WASTE MANAGEMENT
HOWARD COUNTY DEPARTMENT OF PUBLIC WORKS
COLUMBIA, MARYLAND

October 2002

SUMMARY

The Middle Patuxent River watershed encompasses over 37,000 acres in Howard County. The Maryland Department of Natural Resources and the Howard County Department of Public Works formed a partnership to do a Stream Corridor Assessment (SCA) survey of the Howard County portion of the Middle Patuxent River Watershed. In 2000/2001 a Stream Corridor Assessment of the Middle Patuxent stream network was performed. This survey is not intended to be a detailed scientific evaluation of the watershed. Instead, the Middle Patuxent SCA survey was designed to provide a rapid overview of the entire stream network to determine where potential environmental problems are located and to collect some basic information about the stream. Results for this survey will be combined with other information on the Middle Patuxent Watershed and will be used to guide future restoration efforts.

Over 180 miles of stream in the Middle Patuxent Watershed were surveyed and 322 potential environmental problems were identified. The most common environmental concern seen during the SCA survey was erosion, which were reported at 106 sites. Other potential environmental problems recorded during the survey include: 93 sites with inadequately vegetated stream buffers, 64 fish migration blockages, 18 channelized stream sections, 18 pipe outfalls, 10 unusual condition sites, 7 trash dumping, and 2 exposed pipe sites. The survey also recorded information on 1 pond site and 4 tree blockages.

At each site, data was collected about each problem, its location noted, and photographs taken to document existing conditions. To aid in prioritizing future restoration work, field crews rated all problem sites on a scale of 1 to 5 in three categories. They were: 1) the severity of the problem; 2) how correctable the specific problem was; and 3) how accessible the site was. In addition, field teams also collected information on both in and near stream habitat condition at 49 representative sites that were spaced at approximately ½ to 1-mile intervals along the stream.

This SCA survey has been developed by the Maryland Department of Natural Resources (DNR) Watershed Restoration Division as a watershed management tool. One of the main goals of the SCA survey is to compile a list of observable environmental problems so that future restoration efforts can be better targeted. It is hoped that once a list of environmental problems has been compiled, a dialog can be initiated among resource managers on the goals and targets of future environmental restoration efforts in the Middle Patuxent Watershed. It is important to note that all of the problems identified as part of the Middle Patuxent Stream Corridor Assessment survey can be addressed through existing State or Local government programs. The value of the present survey is that it can help to place the problems in a watershed context, and can be used by a variety of resource managers to plan future restoration work.

ACKNOWLEDGMENTS

Without the hard work and dedication of the Chesapeake Bay Restoration Crew of the Maryland Conservation Corps, this survey would not have been possible. The crew chief and assistant crew chief during the survey were Tina Stevens and Kathryn Samuel. The crewmembers were Courtney Bryan, Galen Frazer, Steve Czwartacki, Jason Vogt, Darnell Queen, and Gerald Kell.

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INTRODUCTION

The Middle Patuxent River is a tributary to the Patuxent River, which in turn flows into the Chesapeake Bay. The watershed encompasses over 37,000 acres and is contained completely with in Howard County. In 2000, the Maryland Department of Natural Resources formed a partnership with Howard County to work together to assess environmental conditions in the Middle Patuxent Watershed. The main goal of this partnership was to conduct a stream corridor assessment survey of the all streams in the Middle Patuxent Watershed.

The Stream Corridor Assessment survey has been developed by DNR's Watershed Restoration Division as a watershed management tool to identify environmental problems and help prioritize restoration opportunities on a watershed basis. As part of the survey, specially trained personnel walk the watershed's entire stream network and record information on a variety of environmental problems that can be easily observed within the stream corridor. Initial field surveys were done from November 2000 through April 2001.

The Middle Patuxent Watershed lies within the Piedmont Plateau Province. The Piedmont Plateau is characterized by rolling terrain and low ridges. The Middle Patuxent Watershed encompasses 37,058 acres (57.9 square miles), with over 184 miles of stream within the watershed. This watershed also lies within the Baltimore-Washington Metropolitan Corridor. Approximately 26% of the watershed is in urban land use and includes the communities of Columbia, Cooksville, West Friendship, and Clarksville (Watershed Profiles-Middle Patuxent River). Figure 1 shows the geographic location of the watershed targeted in this survey. A digital orthophoto map of the Middle Patuxent watershed is shown in Figure 2. The map is based on aerial photographs taken in April 1993. Figure 3 shows the same watershed boundaries superimposed on a seven and ½ minute USGS topographic quadrangle map.

As mentioned earlier the purpose of the survey was to determine the type and location of environmental problems along the streams in the Middle Patuxent River watershed. Results of the survey will be used by Howard County to help guide its future restoration work in the watershed.

Middle Patuxent Watershed
Howard County, Maryland

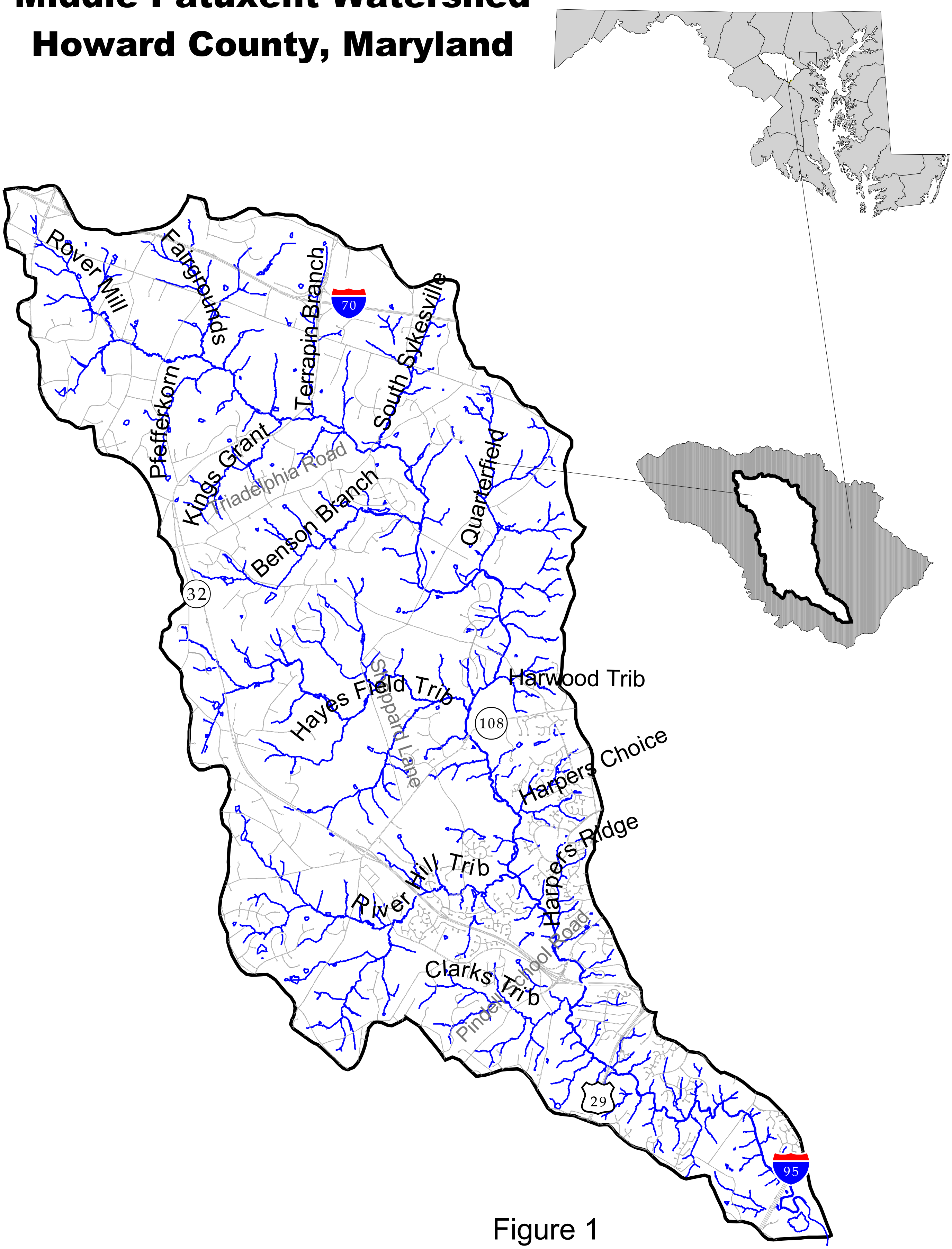


Figure 1

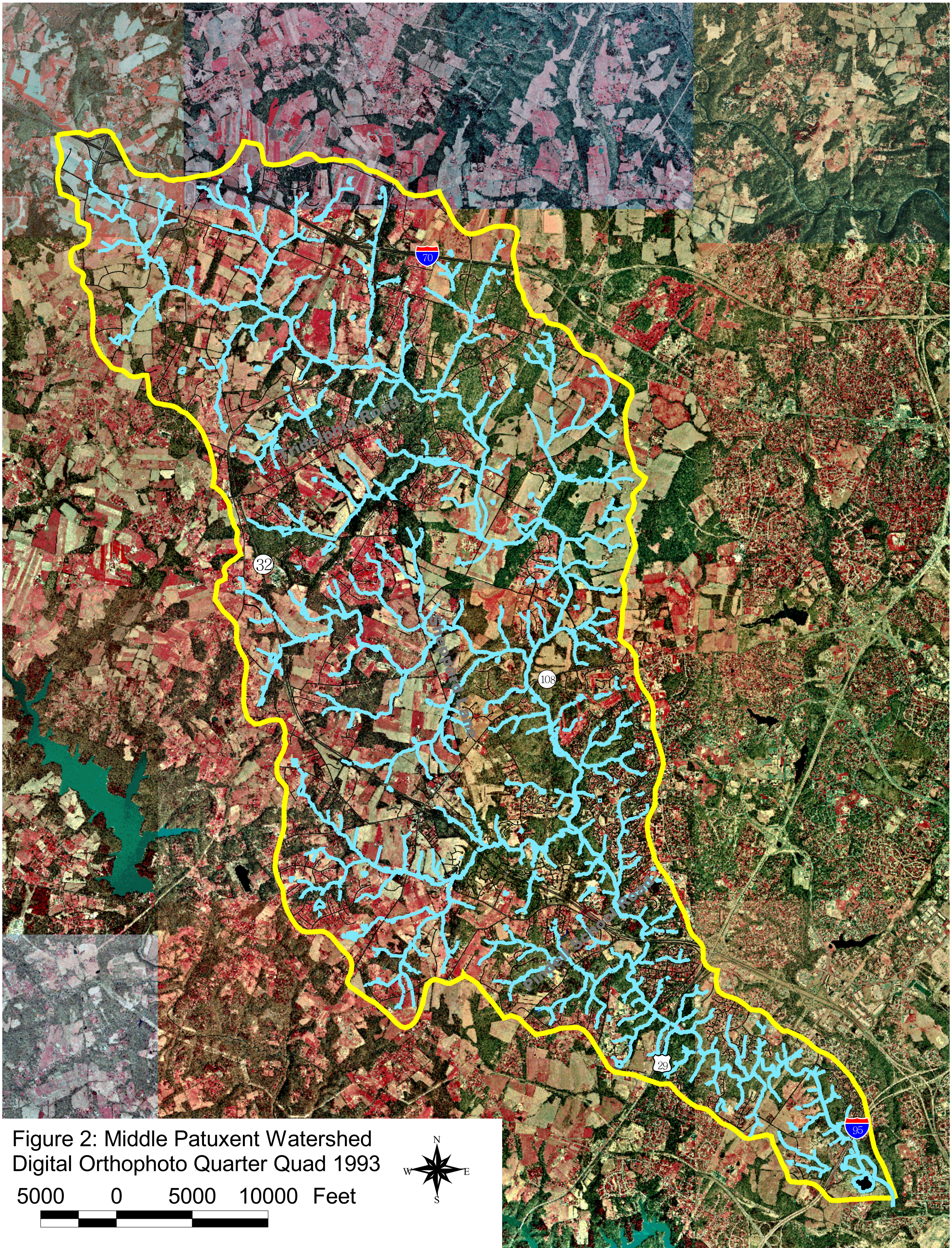


Figure 2: Middle Patuxent Watershed
Digital Orthophoto Quarter Quad 1993

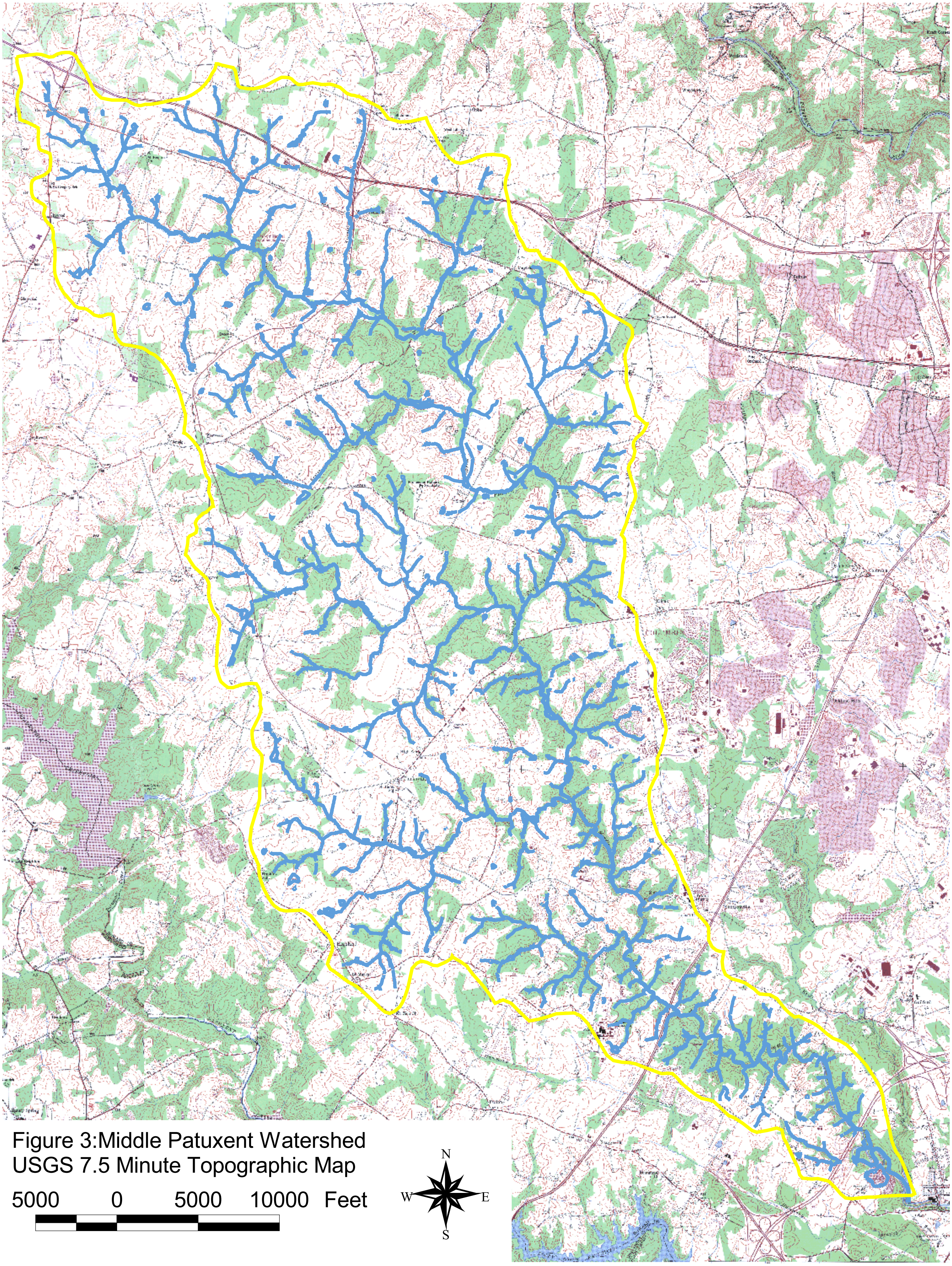


Figure 3:Middle Patuxent Watershed
USGS 7.5 Minute Topographic Map

5000 0 5000 10000 Feet

METHODS

To help identify some of the common problems that affect streams in a rapid and cost effective manner, the Watershed Restoration Division of the Maryland Department of Natural Resource has been working for the last several years to develop the Stream Corridor Assessment (SCA) survey. The four main objectives of the survey are:

1. To provide a list of observable environmental problems present within a stream system and along its riparian corridor.

2. To provide sufficient information on each problem so that a preliminary determination of both the severity and correctability of a problem can be made.

3. To provide sufficient information so that restoration efforts can be prioritized.

4. To provide a quick assessment of both in- and near-stream habitat conditions so that comparative assessments can be made of the condition of different stream segments.

It is important to note that the SCA survey is not intended to be a detailed scientific survey, nor will it replace the more traditional chemical and biological surveys. Instead, the SCA survey provides a rapid method of examining an entire drainage network so that future monitoring, management and/or conservation efforts can be better targeted. One advantage of the SCA survey over chemical and biological surveys is that the SCA survey can be done on a watershed basis both quickly and at relatively low cost.

Maryland's SCA survey is really not a new concept but a refinement of an old approach, which in its simplest form is often referred to as a stream walk survey. Many of the common environmental problems affecting streams, such as excessive stream bank erosion or blockages to fish migration, are fairly easy to identify by an individual walking along a stream. Furthermore, an advanced degree in forestry is not needed to identify a stream segment that doesn't have any trees along its banks, nor does one need a degree in sanitary engineering to see that a sewage pipeline has been exposed by stream bank erosion and is leaking sewage into the stream. With a limited amount of training, most people can correctly identify these common environmental problems.

As mentioned earlier, a walking survey of stream systems is not a new concept and there have been several attempts to standardize this approach over the years. Many earlier approaches such as EPA's, "Streamwalk Manual" (EPA, 1992), Maryland Save our Stream's "Conducting a Stream Survey," (SOS, 1970) and Maryland Public Interest Research Foundation "Streamwalk Manual" (Hosmer, 1988) were designed to be done by citizen volunteers with little or no training. While these surveys can be a good guide for citizens that are interested in looking at their community streams, the data collected during these surveys can vary significantly based on the background of the surveyor. In the Maryland Save our Stream "Stream Survey," for example, citizen groups are given some guidance on how to organize a survey and are provided a slide show explaining how to do the survey. After approximately one hour of training, citizen volunteers are then sent out in groups to walk designated stream segments. During the survey, volunteers usually walk their assigned stream segment in a couple of hours and return their data sheets to the survey organizers to be analyzed. While these surveys can help make communities more aware of the problems present in their local stream, citizen groups normally do not have the expertise or resources to properly analyze or fully interpret the information collected. In addition, the data collected is usually only enough to indicate that a potential environmental problem exists at a specific location, but does not provide sufficient information to judge the severity of the problem.

Other visual stream surveys, such as the National Resources Conservation Service's "Stream Visual Assessment Protocols" (NRCS, 1998), are designed to be done by trained professionals looking at a very specific stream reach, such as at a stream passing through an individual farmer's property. While this survey can provide useful information on a specific stream segment, it is usually not done on a watershed basis.

The Maryland SCA survey has been designed to bridge the gap between these two approaches. The survey is designed to be done by a small group of well-trained individuals that walk the entire stream network in a watershed. While the individuals doing the survey are usually not professional natural resource managers, they do receive several days of training in both stream ecology and SCA survey methods.

While almost any group of dedicated volunteers can be trained to do a SCA survey, the Maryland Conservation Corps (MCC) has proven to be an ideal group to do this work in Maryland. The Maryland Conservation Corps is part of the AmeriCorps Program, which was started to promote greater involvement of young volunteers in their communities and the environment. The MCC program is managed by DNR's Forest and Park Service. Volunteers with the MCC are 17-25 years old and can have educational backgrounds ranging from high school to graduate degrees. With the proper training and supervision, these young, intelligent and motivated volunteers are able to significantly contribute to the State's efforts to inventory and evaluate water quality and habitat problems from a watershed perspective. For more information on the Maryland Conservation Corps call their main office in Annapolis at (410) 260-8166 or visit their web site at: www.dnr.state.md.us/mcc.

Prior to the start of the Middle Patuxent SCA Survey, the members of the MCC's Chesapeake Bay Crew received several days of training. As part of this training, crewmembers learn how to identify common problems observable within the stream corridor, how to record problem locations on survey maps and how to fill out data sheets for specific problem. Procedures for documenting general stream conditions at reference sites were also reviewed during training. Reference sites are located at approximately 1/2-mile intervals along the stream. In addition to filling out a half page data sheet, field crews took photographs at all problem and reference sites to help document existing conditions. Detail information on the procedures used in the Maryland SCA survey can be found in, "Stream Corridor Assessment Survey – Survey Protocols" (Yetman, 2001). A copy of the survey protocols can found on DNR's web site at http://www.dnr.state.md.us/streams/pubs/other.html . Copies of the protocols can also be obtained by contacting the Watershed Restoration Division of the Maryland Department of

Natural Resources in Annapolis, MD.

Several weeks prior to the beginning of the survey, letters were sent out to individual that own land along the stream. The letter was used to inform property owners that the survey was going to be done and gave them a phone number to call if they did not want MCC crews surveying the stream on their property. In addition, survey crews were instructed not to cross fence lines or enter any areas that are marked "No Trespassing" unless they have specific permission from the property owner.

Field surveys of the Middle Patuxent River Watershed began in November 2000, and over the next several months, the survey teams walked much of the area's drainage network collecting information on potential environmental problems. Potential environmental problems commonly identified during the SCA Survey include: channelized stream sections, inadequate stream buffers, fish migration blockages, excessive bank erosion, near stream construction, trash dumping sites, unusual conditions, and pipe outfalls. In addition, the survey records information on the location of potential wetlands creation sites and collects data on the general condition of in-stream and riparian habitats.

It is not unusual for an SCA survey to identify large number of problems in each problem category. For example, in an earlier survey of the Swan Creek Watershed in Harford County, a total of 453 potential environmental problems were identified along 96 miles of stream. The most frequently reported problem during the survey was stream bank erosion, which was reported at 179 different locations (Yetman et. al., 1996). Follow up surveys found that while stream bank erosion was a common problem throughout the watershed, the severity of the erosion problem varied substantially among the sites and that the erosion problems at many sites were fairly minor. Based on this experience the SCA survey has field crews evaluate and score all problems on a scale of 1 to 5 in three separate areas: problem severity, correctability, and accessibility. A major part of the crews training is devoted to how to properly rate the different problems identified during the survey.

While the ratings are subjective, they have proven to be very valuable in providing a starting point for more detailed follow-up evaluations. This is because in many cases, resource professionals such as fisheries biologists, foresters, hydrologists and engineers do not have the time to walk hundreds of miles of streams to determine where the problems are. What the SCA survey does is train the MCC and other groups to walk streams for them and collect some very basic information about commonly seen problems. Once the SCA survey has been completed, the data collected can then be used by different resource professionals to help target future restoration efforts. A regional forester for example can use data collected on inadequate stream buffers to help target future riparian buffer plantings, while the local fishery biologist can use the data on fish blockages to help target future fish passage projects to reestablish spawning runs. The inclusion of a rating system in the survey gives resource professional an idea of which sites the field crew believed were the most severe, easiest to correct and easiest to access. This information combined with photographs of the site can help resource managers focus their own follow up evaluations and fieldwork at the most important sites.

A general description of the rating system is given below. More specific information on the criteria used to rate each problem category is provided in the SCA – Survey Protocols (Yetman, 2000). It is important to note that the rating system is designed to contrast problems within a specific problem category. When assigning a severity rating to a site with an inadequate stream buffer for example, the rating is only intended to compare the site to other in the State with inadequate stream buffers. The rating is not intended to be applied across categories. A trash dumping site with a very severe rating may not necessarily be a more significant environmental problem than a stream bank erosion site that received a moderate severity rating.

The **problem severity** rating has generally been found to be the most useful rating and indicates how bad a specific problem is relative to others in the same problem category. The severity rating is used to answer questions such as, where are the worst stream bank erosion sites in the watershed, or where is the largest section of stream with an inadequate buffer. The scoring is based on the overall impression of the survey team of the severity of the problem at the time of the survey.

* A <u>very severe rating</u> of 1 is used to identify problems that have a direct and wide reaching impact on the stream's aquatic resources. Within a specific problem category, a very severe rating indicates that the problem is among the worst that the field teams have seen or would expect to see. Examples would include a discharge from a pipe that was discoloring the water over a long stream reach (greater than 1000 feet) or a long section of stream (greater than 1000 feet) with high raw vertical banks that appear to be unstable and eroding at a fast rate.

* A <u>moderate severity rating</u> of 3 is used to identify problems that appear to be having some adverse environmental impacts but the severity and/or length of stream affected is fairly limited. While a moderate severity rating would indicate that field crews did believe it was a significant problem, it also indicates that they have seen or would expect to see much worse problems in that specific problem category. Examples would include: a small fish blockage that was passable by strong swimming fish like trout, but a barrier to resident species such as sculpins; or a site where several hundred feet of stream had an inadequate forest buffer.

* A <u>minor severity rating</u> of 5 is given to problems that do not appear to be having a significant impact on stream and aquatic resources. A minor rating indicates that a problem was present but compared to other problems in the same category it would be considered minor. Examples would include: an outfall pipe from a storm water management structure that is not discharging during dry weather and does not have any erosion problem either at the outfall or immediately downstream, or a section of stream that has stable banks and some trees along both banks but the forest buffer is less than 50 feet.

The **correctability rating** provides a relative measure on how easily the field teams believe the problem can be corrected. The correctability rating can be helpful in determining which problems can be easily dealt with when developing a restoration plan for a drainage basin.

One restoration strategy would initially target the severest problems that are the easiest to fix. The correctability rating can also be useful in identifying simple projects that can be done by volunteers, as opposed to projects that require more significant planning and engineering efforts.

* A minor correctability rating of 1 is assigned to problems that can be corrected quickly and easily using hand labor, with a minimum amount of planning. These types of projects would usually not need any Federal, State or local government permits. It is a job that small group of volunteers (10 people or less) could fix in a day or two without using heavy equipment. Examples would be removing debris from a blocked culvert pipe, removing less than two pickup truck loads of trash from an easily accessible area or planting trees along a short stretch of stream.

* A moderate correctability rating of 3 is given to sites that may require a small piece of equipment, such as a backhoe, and some planning to correct the problem. This would not be the type of project that volunteers would usually do by themselves, although volunteers could assist in some aspects of the project, such as final landscaping. This type of project would usually require a week or more to complete. The project may require some local, State or Federal government notification or permits, however, environmental disturbance would be small and approval should be easy to obtain.

* A very difficult correctability rating of 5 is given to problems that would require a large expensive effort to correct. These projects would usually require heavy equipment, significant amount of funding ($100,000 or more), and construction could take a month or more. The amount of disturbance would be large and the project would need to obtain a variety of Federal, State and/or local permits. Examples would include a potential restoration area where the stream has deeply incised several feet over a long distance (i.e., several thousand feet) or a fish blockage at a large dam.

The **accessibility rating** is used to provide a relative measure of how difficult it is to reach a specific problem site. The rating is made at the site by the field survey team, using their field map and field observations. While factors such as land ownership and surrounding land use can enter into the field judgments of accessibility, the rating assumes that access to the site could be obtained if requested from the property owner.

* A very easy accessibility rating of 1 is assigned to sites that are readily accessible both by car and on foot. Examples would include a problem in an open area inside a public park where there is sufficient room to park safely near the site.

* A moderate accessibility rating of 3 is assigned to sites that are easily accessible by foot but not easily accessible by a vehicle. Examples would include a stream section that could be reached by crossing a large field or a site that was accessible only by 4-wheel drive vehicles.

* A very difficult accessibility rating of 5 is assigned to sites that are difficult to reach both on foot and by a vehicle. Examples would include a site where there are no roads or trails

nearby. To reach the site it would be necessary to hike at least a mile. If equipment were needed to do the restoration work, an access road would need to be built through rough terrain.

Following the completion of the survey, information from the field data sheets were entered into a Microsoft Access database and verified by the field teams. In addition, 391 photographs taken during the survey were labeled and organized by site number in binders. The photographs were also digitized using a flat bed scanner and placed on a photo CD so they can be distributed to interested parties. Finally, all of the data was incorporated into an ArcView GIS system to be used in future planning activities.

RESULTS

A total of 322 problem data sheets, 49 representative data sheets, and 1 pond site data sheet were filled out during the survey. Included in the problem data sheets were 106 erosion sites, 93 sites with inadequately vegetated stream buffers, 64 fish migration blockages, 18 channelized stream sections, 18 pipe outfalls, 10 unusual condition sites, 7 trash dumping, and 2 exposed pipe sites. A summary of survey results is presented in Table 1 and the data collected during the survey is presented in Appendices A and B. Appendix A provides a listing of information by problem number along with its location, using latitude and longitude coordinates. Information in this format is useful when working with maps showing the location of problem sites to determine what problems may be present along a specific stream reach. In Appendix B, the data is presented by problem type, with more detailed information about each problem. Presenting the data by problem type allows the reader to see which problems the field crews rated the most severe or easiest to fix within each category. Finally, Table 2 shows what problems were found along the streams mainstem and in each of the River's major tributaries.

Table 1. Summary of results from Middle Patuxent River SCA Survey.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Erosion Site	**106**	**28,230 feet (5.35 miles)**	-	3	28	32	43
Inadequate Buffers	**93**	**47,410 feet (8.97 miles)**	7	12	53	18	3
Fish Barriers	**64**	**NA**	-	-	4	26	34
Pipe Outfalls	**18**	**NA**	-	-	14	-	4
Channel Alterations	**14**	**2,345 feet (0.44 miles)**	-	-	1	5	8
Unusual Conditions	**14**	**NA**	-	1	8	2	3
Trash Dumping	**7**	**NA**	2	-	3	1	1
Tree Blockages	**4**	**NA**	Na	Na	Na	Na	Na
Exposed Pipes	**2**	**7 feet (0.0013 miles)**	-	-	1	1	-
TOTAL	**322**		**9**	**16**	**112**	**85**	**96**
Pond Sites	**1**						
Representative Sites	**49**						

Table 2: Summary of results by major stream segment

Stream Segment	Channel Alteratiom	Erosion	Exposed Pipes	Fish Barrier	Inadequate Buffer	Pipe Outfall	Pond Sites	Representatinne Sites	Trash Dumping	Tree Blockages	Unusual Conditions	Total
Benson Branch		1			4			2				7
Clarks Tributary		13		14	7	5		1	1		2	43
Fairgrounds Tributary	1	3		3	4			1	1		1	14
Harpers Choice Tributary	1	14		9	2	2						28
Harpers Ridge Tributary	1	2		3	1	1		2				10
Hayes Field Tributary	1	10		5	20	3	1	4	1	1	1	47
Homewood Tributary			1									1
Kings Grant Tributary		3		1	2			1		2		9
Lower Middle Patuxent	3	18	1	12	11	1		21	1		8	76
Pfefferkorn Tributary					1							1
Quarterfield Tributary	1	2			2			3				8
River Hill Tributary	3	15		11	21	3		9	2			64
Rover Mill Tributary		2		1	2			1			1	7
South Sykesville Tributary	2	2		1	3			1				9
Terrapin Branch	1	6			4	2						13
Upper Middle Patuxent		15		4	9	1		3	1	1	1	35

Erosion Sites

Erosion is a natural process and necessary to maintain good aquatic habitat in a stream. Too much erosion, however, can have the opposite effect, destabilizing stream banks, destroying in-stream habitat and causing significant sediment pollution problems downstream. Severe erosion problems occur when either a stream's hydrology and/or sediment supply have been significantly altered. This often occurs when land use in a watershed changes. As a watershed becomes more urbanized, forest and agricultural fields are developed into residential housing complexes and commercial properties. As a result, the amount of impervious surfaces in a drainage basin increase, which then causes the amount of runoff entering a stream to also increase. In the Middle Patuxent watershed, it has been estimated at approximately 9% of the landscape surface is impervious (Watershed Profiles-Middle Patuxent River). The stream channel will, over time, adjust to the new flows by eroding the streambed and banks to increase its size. This channel readjustment can extend over decades, during which time excessive amounts of sediment from unstable eroding stream banks can have very detrimental impacts on the stream's aquatic resources.

Unstable eroding streams are areas where the stream banks are almost vertical and the roots from the vegetation along the stream's banks are unable to hold the soil on the banks. Unstable eroding stream banks were reported at 106 sites during the survey (Figure 4a). The majority of the erosion sites showed moderate to minor erosion that extended over long distances. The lengths of stream segments that were recorded as having unstable banks varied from 5 feet in some areas, to other areas where up to 1500 feet of stream was found to have an erosion problem (Appendix B). Overall, results indicate approximately 5.35 miles of unstable eroding banks in the Middle Patuxent watershed. Figure 4b shows the frequency of the severity rating given to erosion sites**.** Most sites were given a moderate to minor rating. Only three sites (MP173102, MP213101 & MP219101) received a severe rating.

While erosion problems were found throughout the Middle Patuxent River watershed, the Harpers Choice Tributary had a number of severe and moderate rated erosion problems clustered together in a small area. It appears that this area is going through a significant channel readjustment possible caused by residential and commercial development in the upper part of the watershed. Follow up evaluations to determine if this area would be a suitable site for a stream restoration effort should be considered.

The survey also found many erosion sites at or directly downstream of inadequate buffer sites. In some cases, riparian buffer plantings could help reduce erosion over time at some of these sites. In areas where streams are going through major readjustments, however, tree planting alone will usually not solve the problem.

Head cuts were also reported at several sites during the survey. Head cuts are areas where the streambed drops suddenly and indicate continuing readjustment of the stream channel. An example of an active head cut can be seen at Site MP157101. It is sometimes possible to stabilize a head cut and prevent the channel incision from moving further up stream creating a worse erosion problem. Areas where head cuts were identified should be targeted for follow up evaluations to determine if stabilization sites where a head cut was identified is feasible.

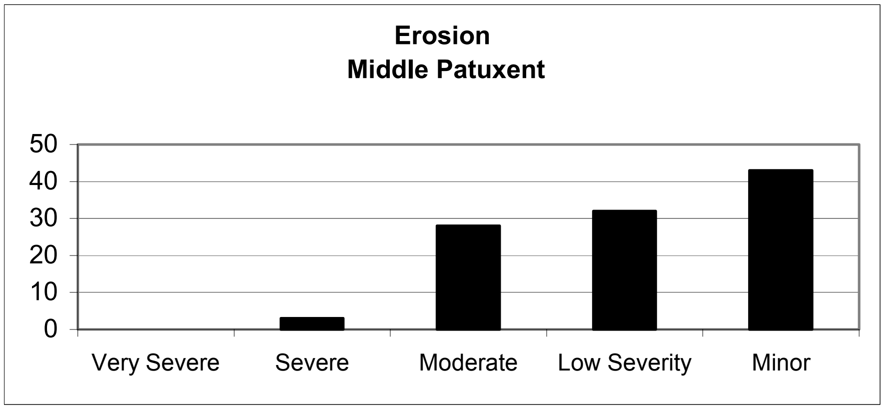
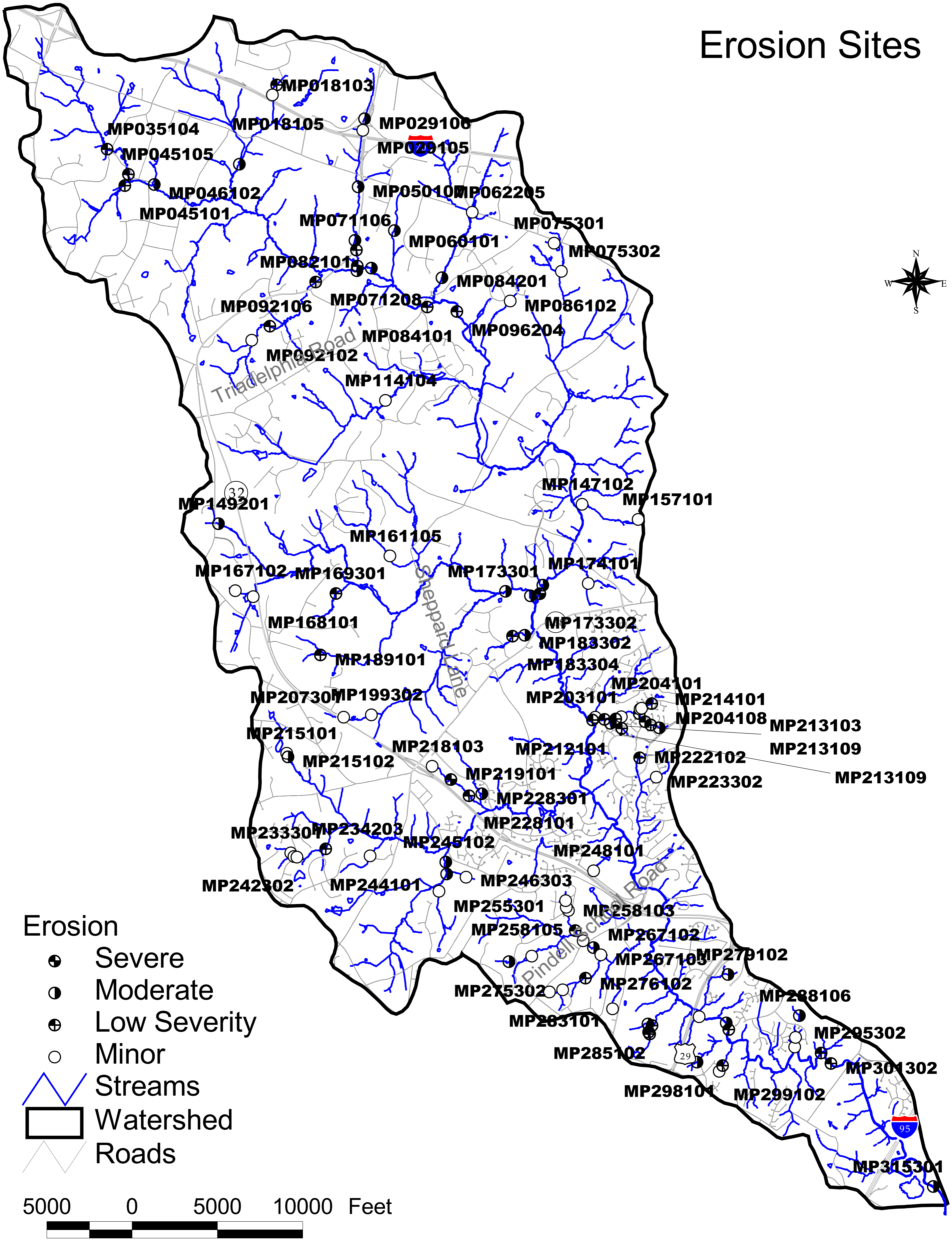


Figure 4b. Histograph showing the frequency of severity ratings given to inadequate buffer sites during Middle Patuxent River SCA survey.


Erosion Sites
MP018103
MP035104
MP018105
MP029106
MP045105
MP029105
MP046102
MP045101
MP050107
MP062205
MP071106
MP075301
MP060101
MP075302
MP082101
MP084201
MP092106
MP071208
MP086102
MP096204
MP084101
Triadelphia Road
MP092102
MP114104
MP147102
MP157101
MP149201
MP161105
MP167102
MP169301
MP173301
MP174101
Sheppard Lane
MP168101
MP173302
MP183302
MP189101
MP183304
MP204101
MP207301
MP199302
MP203101
MP214101
MP204108
MP213103
MP215101
MP218103
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MP213109
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MP219101
MP223302
MP213109
MP228301
MP228101
MP233301
MP234203
MP245102
MP248101
MP242302
MP244101
MP246303
MP255301
MP258103
MP258105
Pindell School Road
MP267102
MP267105
MP279102
MP275302
MP276102
MP283101
MP288106
MP285102
MP295302
MP301302
MP298101
MP299102
MP315301
Erosion
Severe
Moderate
Low Severity
Minor
Streams
Watershed
Roads
5000
0
5000
10000
Feet

Figure 4a

Inadequate Buffers

Forested stream buffers are very important for maintaining healthy Maryland streams. They help shade the stream to prevent excessive solar heating and their roots stabilize the streams banks. Forest buffers also help remove nutrients, sediment and other pollutants from runoff and the leaves from trees are a major component of the stream's food web. Because of the importance of stream buffers not only in maintaining healthy streams, but also in reducing nutrient loadings to the Chesapeake Bay, Maryland is committed to recreating forest buffers along streams wherever it is practical.

While there is no single minimum standard for how wide a stream buffer should be in Maryland, for the purposes of this study a buffer is generally considered inadequate if it is less than 50 feet wide, measured from the edge of the stream. Inadequate buffers were reported at 93 sites during the survey and the locations are shown in Figure 5a. The field crew provided a rough estimate of the length of the inadequate stream buffer at all sites and the data is presented in Appendix B. Based on the data that was collected, there are approximately 47,410 feet (8.97 miles) of inadequate buffer in the Middle Patuxent watershed. Field teams found inadequate buffers ranging in distance from 40 feet to 4,400 feet. This survey was done in a urbanized area, with mowed lawn reported as the dominant adjacent land use at inadequate buffer sites, accompanied by a moderate amount of agricultural land (pasture). While a large number of inadequate buffer sites were identified, most sites received a moderate or low severity rating (Figure 5b). This would indicate that most of the stream reaches with inadequate buffers were not very long or some trees were already present at many of the sites.

Survey results indicate that there are several possible locations where forested buffers could be reestablished. Five out of the seven very severe sites were in pastures. In Maryland there are incentive programs aimed at recreating stream buffers on land that is presently in agricultural use. Landowners should be contacted to determine if they had an interest in participating any of these programs. In some locations, including Site MP288102, paths come close to the stream and there may be opportunities to plant trees on either side of the path and the stream to allow for larger buffers in these areas.

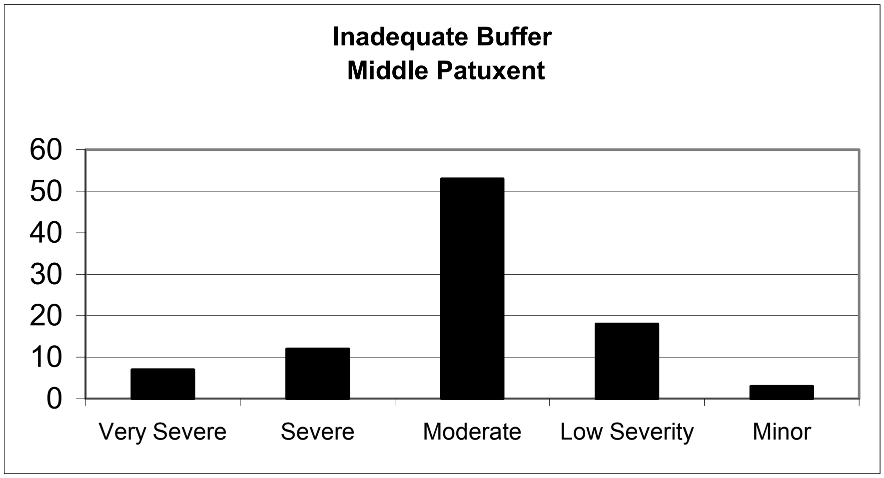


Figure 5b. Histograph showing the frequency of severity ratings given to inadequate buffer sites during Middle Patuxent River SCA survey.

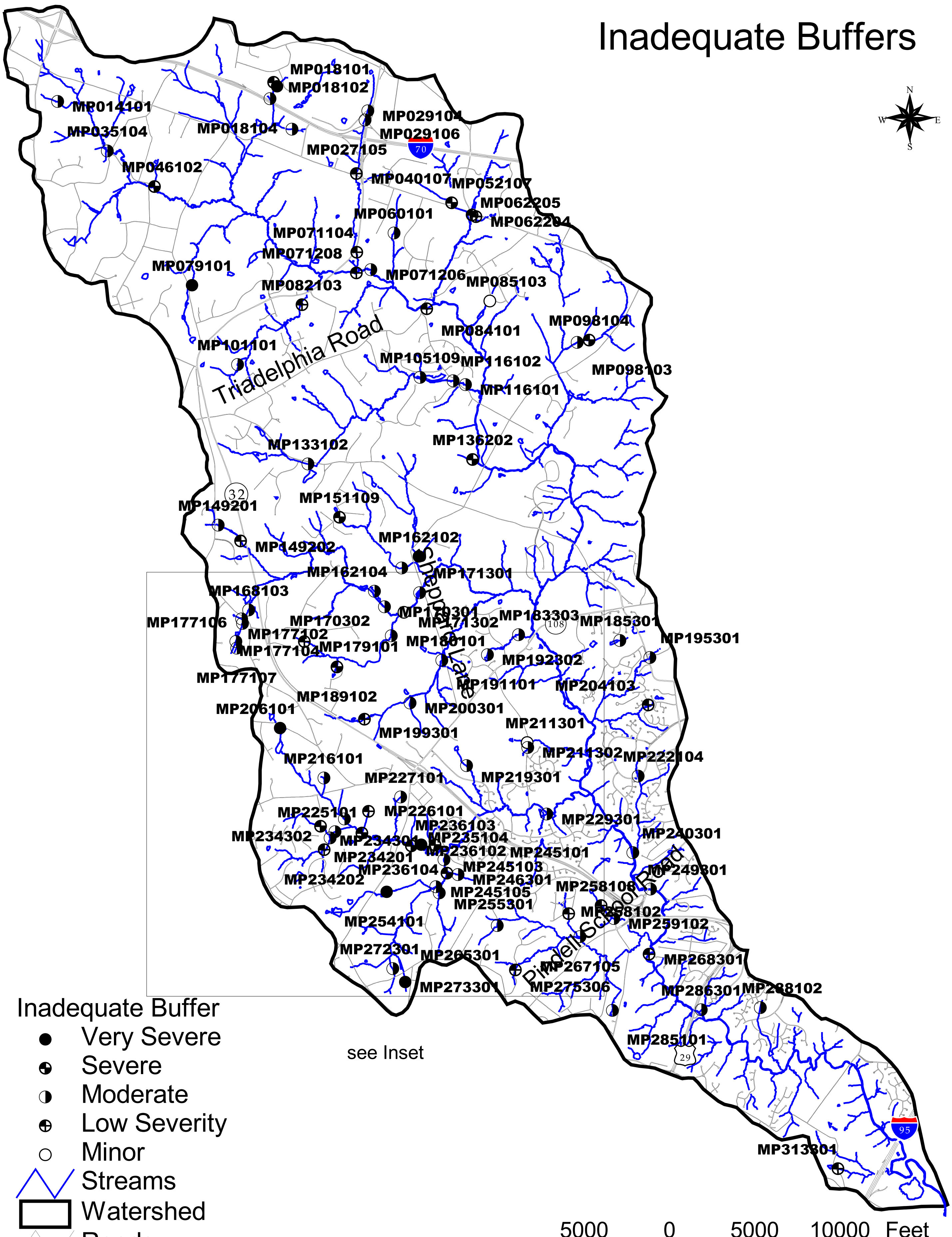

Inadequate Buffers
N
S
E
W
Triadelphia Road
Sheppard Lane
Pindell School Road
70
95
32
108
29
MP014101
MP018101
MP018102
MP018104
MP029104
MP029106
MP035104
MP027105
MP046102
MP040107
MP052107
MP062205
MP062204
MP060101
MP071104
MP071208
MP071206
MP079101
MP082103
MP085103
MP084101
MP098104
MP098103
MP101101
MP105109
MP116102
MP116101
MP133102
MP136202
MP149201
MP151109
MP149202
MP162102
MP162104
MP171301
MP168103
MP177106
MP170302
MP170301
MP171302
MP183303
MP185301
MP177102
MP177104
MP179101
MP180101
MP195301
MP192302
MP177107
MP191101
MP204103
MP189102
MP206101
MP200301
MP211301
MP199301
MP211302
MP222104
MP216101
MP227101
MP219301
MP225101
MP226101
MP236103
MP229301
MP234302
MP234301
MP235104
MP240301
MP234201
MP236102
MP245101
MP236104
MP245103
MP249301
MP234202
MP246301
MP258108
MP245105
MP255301
MP258102
MP254101
MP259102
MP272301
MP265301
MP267105
MP268301
MP273301
MP275306
MP286301
MP288102
MP285101
MP313301
Inadequate Buffer
Very Severe
Severe
Moderate
Low Severity
Minor
Streams
Watershed
Roads
see Inset
5000
0
5000
10000
Feet

Figure 5a

Inadequate Buffers (inset)

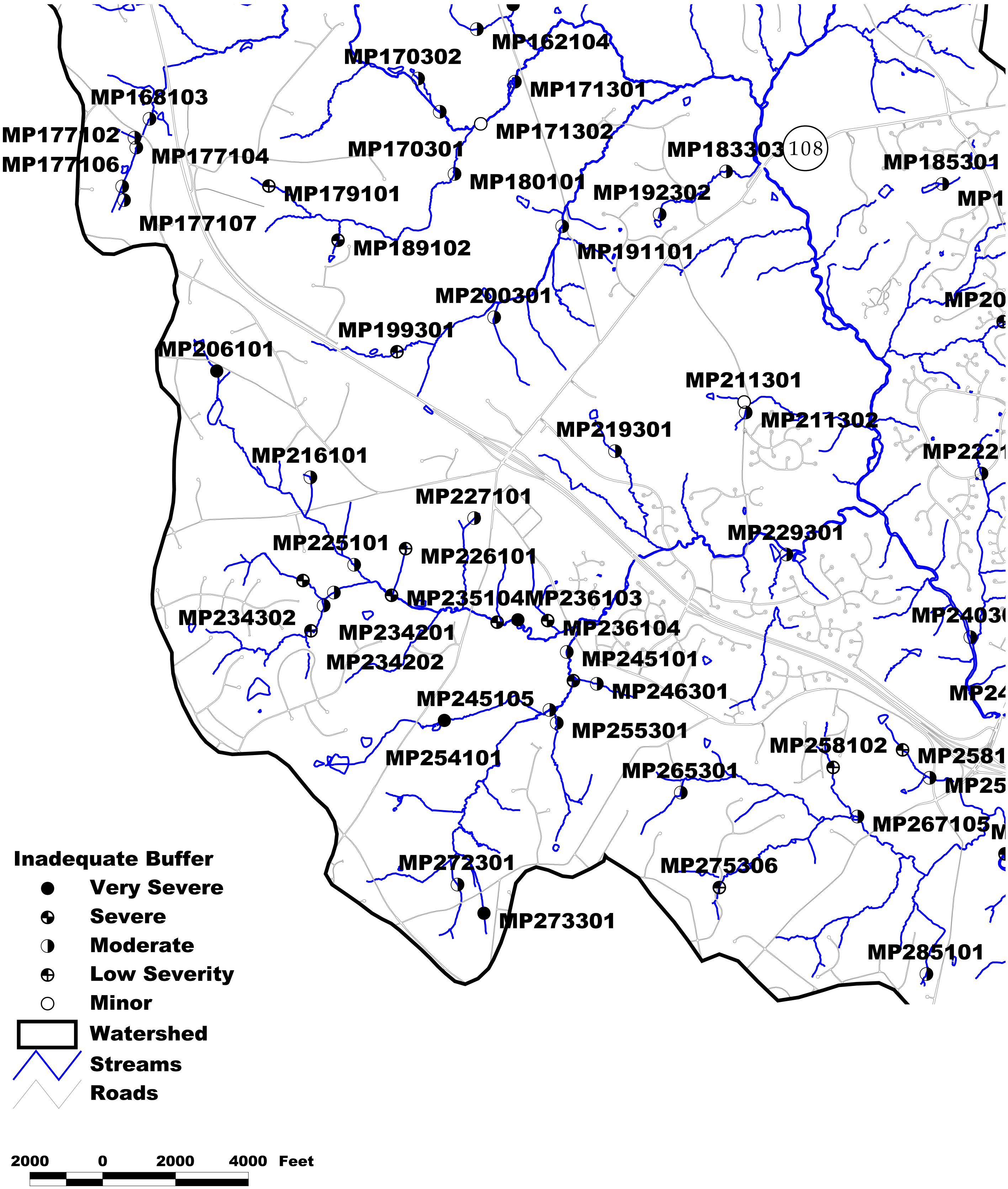


Figure 5c

Fish Migration Barriers

Fish migration barriers are anything in the stream that significantly interferes with the free movement of fish upstream. Unimpeded fish passage is especially important for anadromous fish that live much of their lives in tidal waters but must move into non-tidal rivers and streams to spawn. Unimpeded upstream movement is also important for resident fish species, many of which also move both up and down stream during different parts of their life cycle. Without free fish passage, some of the sections in a stream network can become isolated. If a disturbance occurs in an isolated stretch of stream, such as a sewage line break that discharges a large amount of raw sewage into a small tributary, some or all fish species may be eliminated from that isolated section of stream. With a fish blockage present and no natural way for a fish to repopulate the isolated stream section the diversity of the fish community in an area will be reduced and the remaining biological community may be out of natural balance.

Fish blockages can be caused by man-made structures such as dams or road culverts, and by natural features such as waterfalls or beaver dams. Fish blockages occur for three main reasons. First, a vertical water drop such as a dam can be too high for fish to jump or swim over the obstacle. A vertical drop of 6 inches may cause a fish passage problem for some resident fish species, while anadromous fish can usually move through water drops of up to 1 foot, providing there is sufficient flow and water depth. The second reason a structure may be a fish passage problem is because the water is too shallow. This can often occur in channelized stream sections or at road crossing where the water from a small stream has been spread over a large flat area and the water is not deep enough for fish to swim through. Finally, a structure may be a fish blockage if the water is moving too fast through it for fish to swim through. This can occur at road crossings where the culvert pipe has been placed at a steep angle and the water moving through the pipe has a velocity that is higher than a fish's swimming ability.

Sixty-four fish migration barriers were reported during the survey. The locations of fish migration blockages are shown in Figure 6a. The blockages were due to a number of reasons including beaver dams (5), dams (3), road crossings (7), channelized stream sections (3), natural falls (24), and debris dams (22). All of the sites were given moderate to minor severity ratings (Figure 6b). Overall, the mainstem of the Middle Patuxent River is relatively barrier free. The only barriers are MP046105 and MP2933901. Both are beaver dams and considered temporary blockages.

Any strategy to remove fish migration barriers in the Middle Patuxent River should first attempt to keep the mainstem of the river as barrier free as possible. In addition, barriers that isolate large sections of tributaries from the mainstem, such as Site MP082102**,** which is at a road crossing for Route 32**,** and barriers that isolate significant portions of the upper portion of a tributary, such as Site MP267101, a road crossing, a small dam at MP152106 should also be targeted.

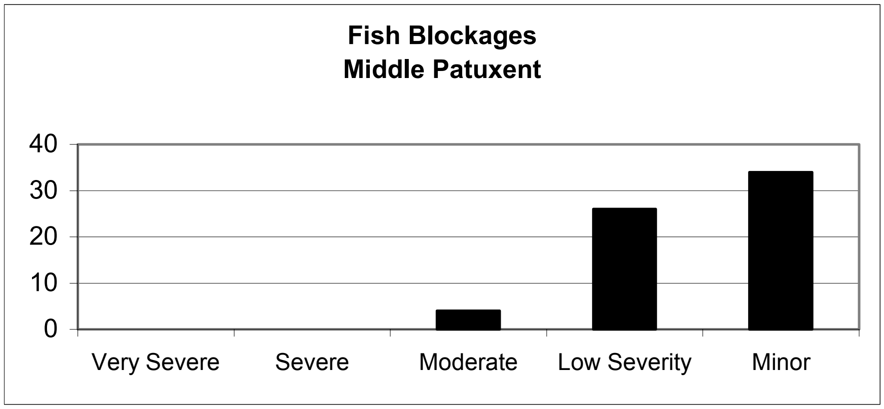


Figure 6b. Histograph showing the frequency of severity ratings given to fish blockage sites during Middle Patuxent River SCA survey.

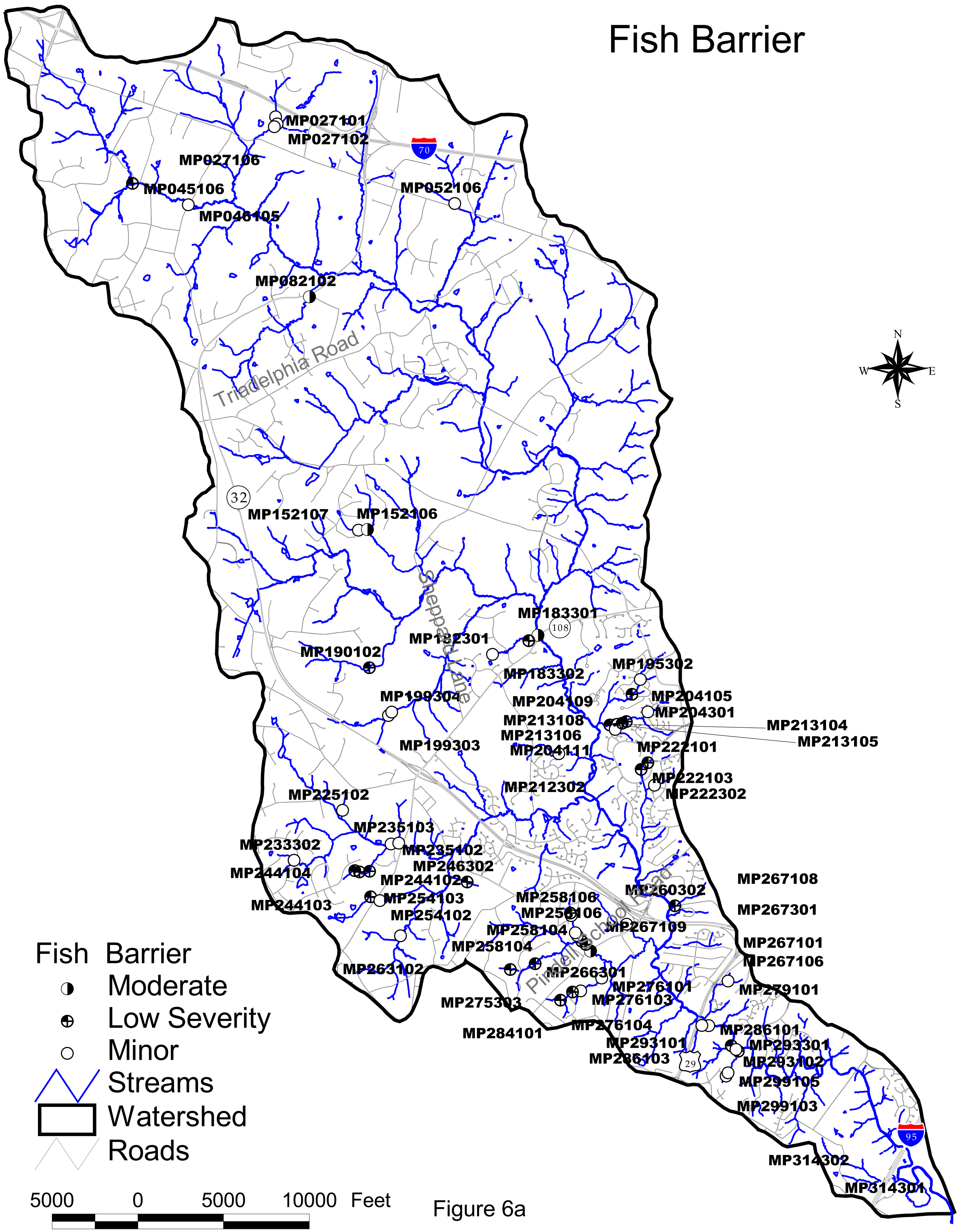

Fish Barrier
MP027101
MP027102
70
MP027106
MP045106
MP046105
MP052106
MP082102
Triadelphia Road
N
W
E
S
32
MP152107
MP152106
Sheppard Lane
MP183301
108
MP182301
MP190102
MP195302
MP183302
MP204105
MP199304
MP204109
MP204301
MP213108
MP213104
MP213106
MP213105
MP199303
MP204111
MP222101
MP222103
MP212302
MP222302
MP225102
MP235103
MP233302
MP235102
MP246302
MP244104
MP244102
MP254103
MP244103
MP254102
MP258106
MP260302
MP267108
MP267301
MP258104
MP267109
Pindell School Road
MP267101
MP267106
MP263102
MP266301
MP276101
MP279101
MP275303
MP276103
MP276104
MP286101
MP284101
MP293101
MP293301
MP293102
29
MP299105
MP299103
95
MP314302
MP314301
Fish Barrier
Moderate
Low Severity
Minor
Streams
Watershed
Roads
5000
0
5000
10000
Feet

Figure 6a

Pipe Outfalls

Pipe outfalls include any pipes or small man made channels that discharge into the stream through the stream corridor. Pipe outfalls are considered a potential environmental problem in the survey because they can carry uncontrolled runoff and pollutants such as oil, heavy metals, toxics and nutrients to a stream system. A total of 18 pipe outfalls were identified during the survey (Figure 7a). The locations of pipe outfalls are shown in Figure 7a. As expected, most of the pipe outfalls are located in the more urbanized portion of the watershed.

Seventy-eight percent or 14 of the 18 outfall pipes observed during the survey were found to have some type of discharge coming out of them. Of these, only one was reported to have a discharge that had some coloration or smell associated with it (Appendix B). No immediate follow up actions were taken as part of this study to determine the source of the color or smell coming from the pipe. In some cases, coloration or smell from a storm drainpipe may be a sporadic occurrence. This is especially true in areas where there is no stormwater management system present. The remaining discharges were recorded as clear with no odor. There weren't any estimates of the amount of fluid coming from the pipes.

Figure 7b shows the frequency of the severity rating given to pipe outfalls during the survey. As can be seen from the graph, the pipe outfalls were given either a moderate or minor severity rating.

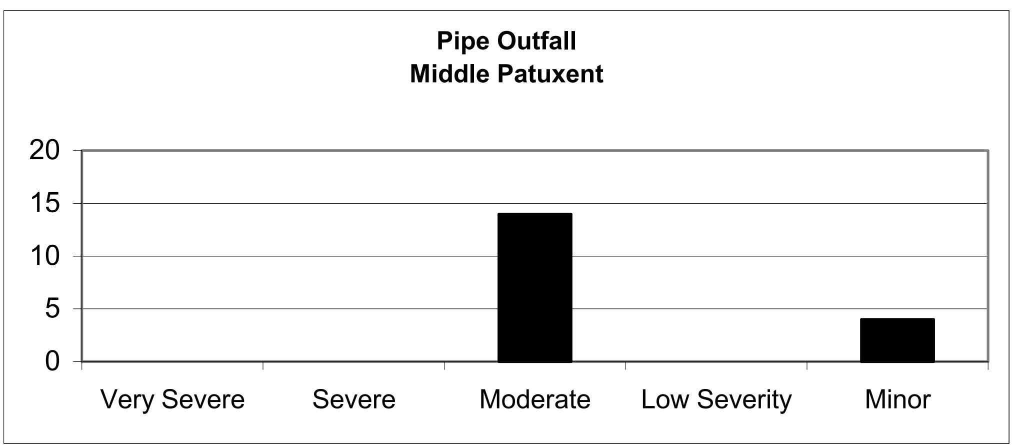


Figure 7b. Histograph showing the frequency of severity ratings given to pipe outfall sites during Middle Patuxent River SCA survey.

Pipe Outfalls

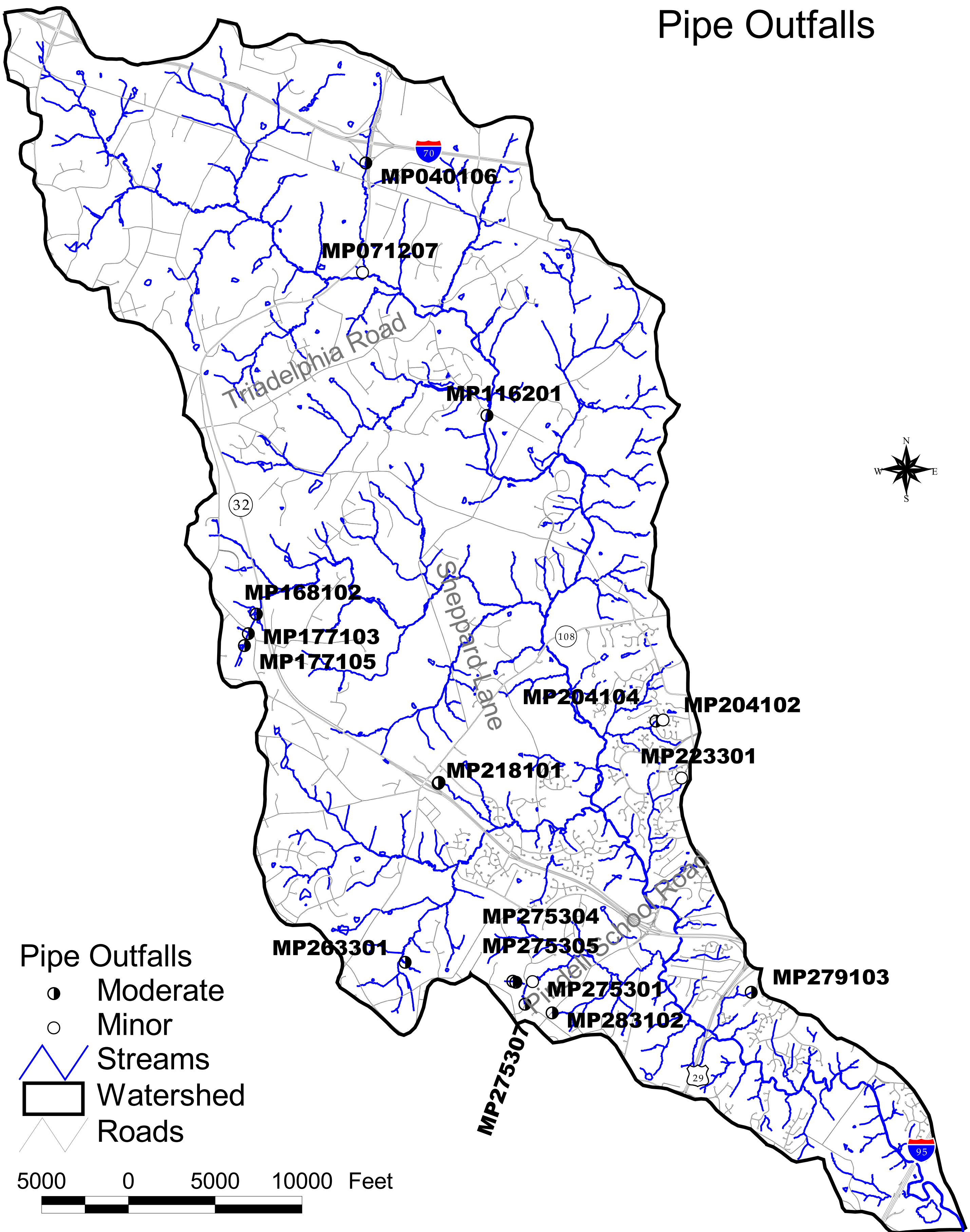


Figure 7a

Channel Alterations

Channel alterations are found in stream sections where the stream's banks and channel have been significantly altered from a natural condition. This includes areas where the stream may have been straightened and/or where the stream banks have been hardened using rock, gabion baskets or concrete over a significant length (usually 100 feet or more). It does not include road crossings unless a significant portion of the stream above or below the road has also been channelized. In addition, places where a small section of only one side of the stream's banks may have been stabilized to reduce erosion were not reported as channel alterations. For the purposes of this survey, channel alteration also does not include tributaries where storm drains were placed in the stream channel and the entire tributary is now piped underground. While these stream sections have been significantly altered, it is not possible to tell by walking the stream corridor precisely where this was done.

Results of this survey indicate that the stream has been recognizably altered in 14 areas and their locations are shown in Figure 8a. The total length of stream affected by channelization was estimated to be 2,345 feet or about 0.44 miles. There were no major system wide channelizations reported in the survey. The sites where some channel alteration was reported were given moderate to minor severity ratings (Figure 8b). Most of the sites identified were also on small channels. Six sites were channelized using concrete, one was an earthen channel, one was armored with rip-rap, and four channels were lined with gabion baskets. The correctability rating given for most of these sites were high because of the difficulty and expense of removing the structures.

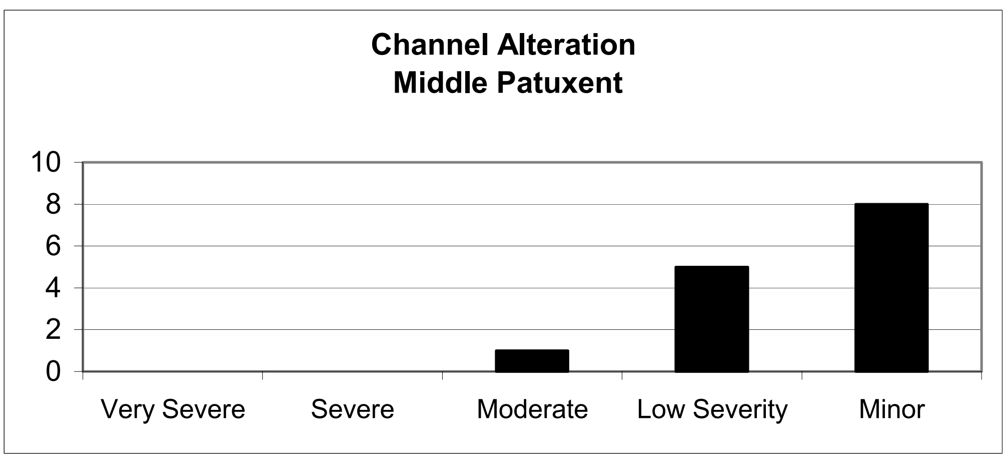


Figure 8b. Histograph showing the frequency of severity ratings given to channel alteration sites during Middle Patuxent River SCA survey.

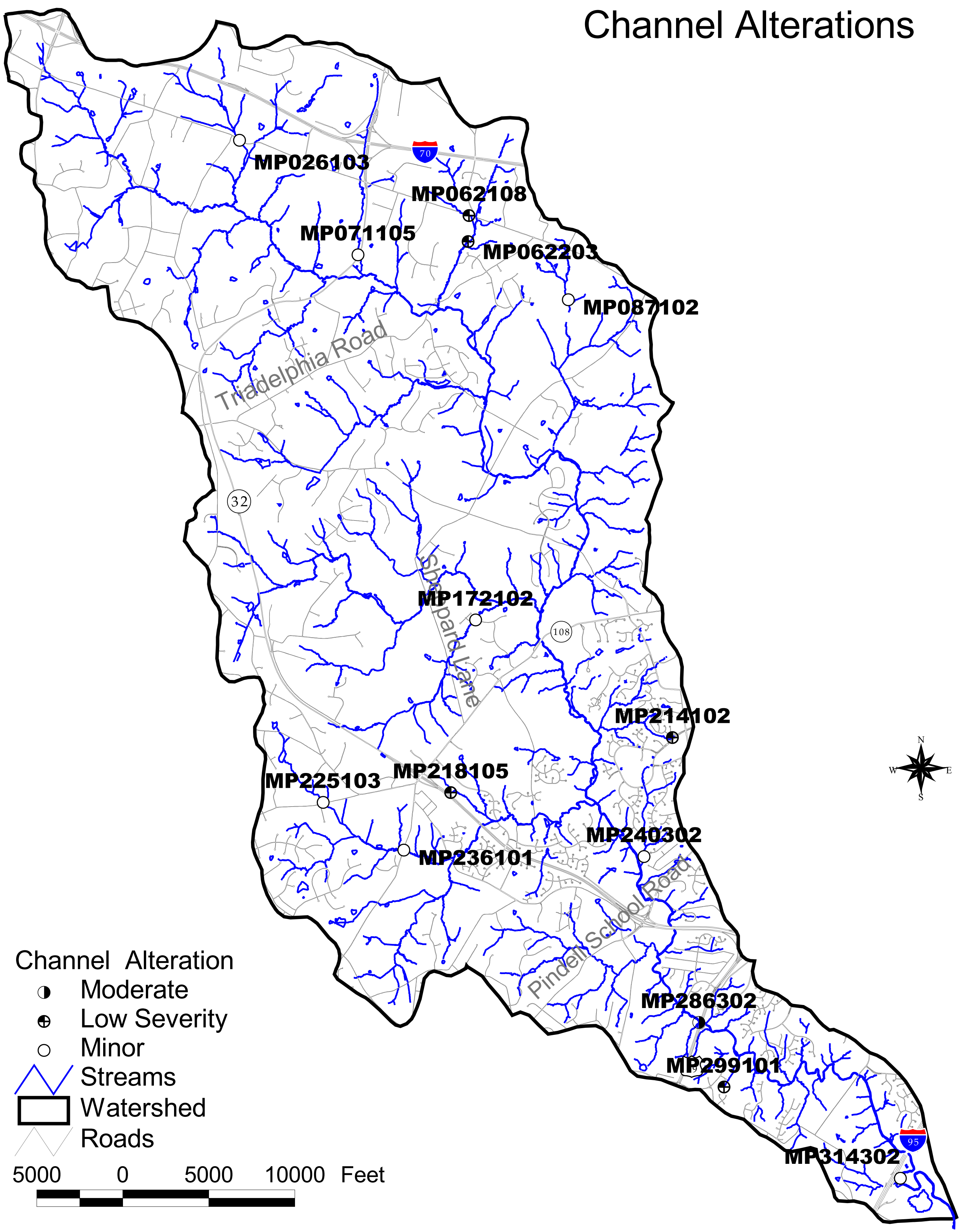

Channel Alterations
MP026103
MP062108
MP071105
MP062203
MP087102
Tradelphia Road
32
Sheppard Lane
MP172102
108
MP214102
MP225103
MP218105
MP240302
MP236101
Pindell School Road
MP286302
MP299101
MP314302
70
95
N
S
E
W
Channel Alteration
Moderate
Low Severity
Minor
Streams
Watershed
Roads
5000
0
5000
10000
Feet

Figure 8a

Unusual Conditions/Comments

The unusual condition/comment data sheets are used by survey teams to record the location of anything out of the ordinary seen during the survey or to provide some additional written comments on a specific problem. Fourteen unusual condition sites were found during the Middle Patuxent survey (Figure 9a). Four were places were a small stream had been piped underground for a short distance. The other frequently reported item was the presence of red flock. Red flock in this area is an indication of mobilized iron in the ground water. These sites were give lower severity ratings (Figure 9b).

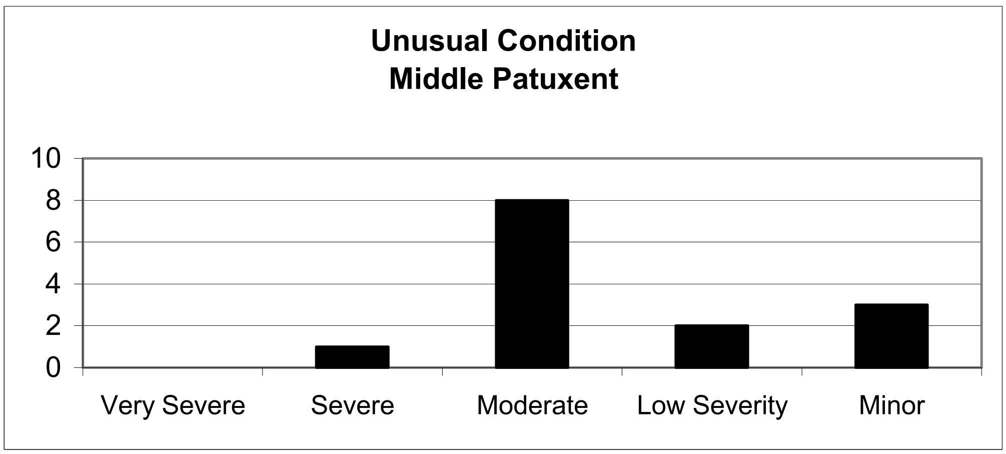
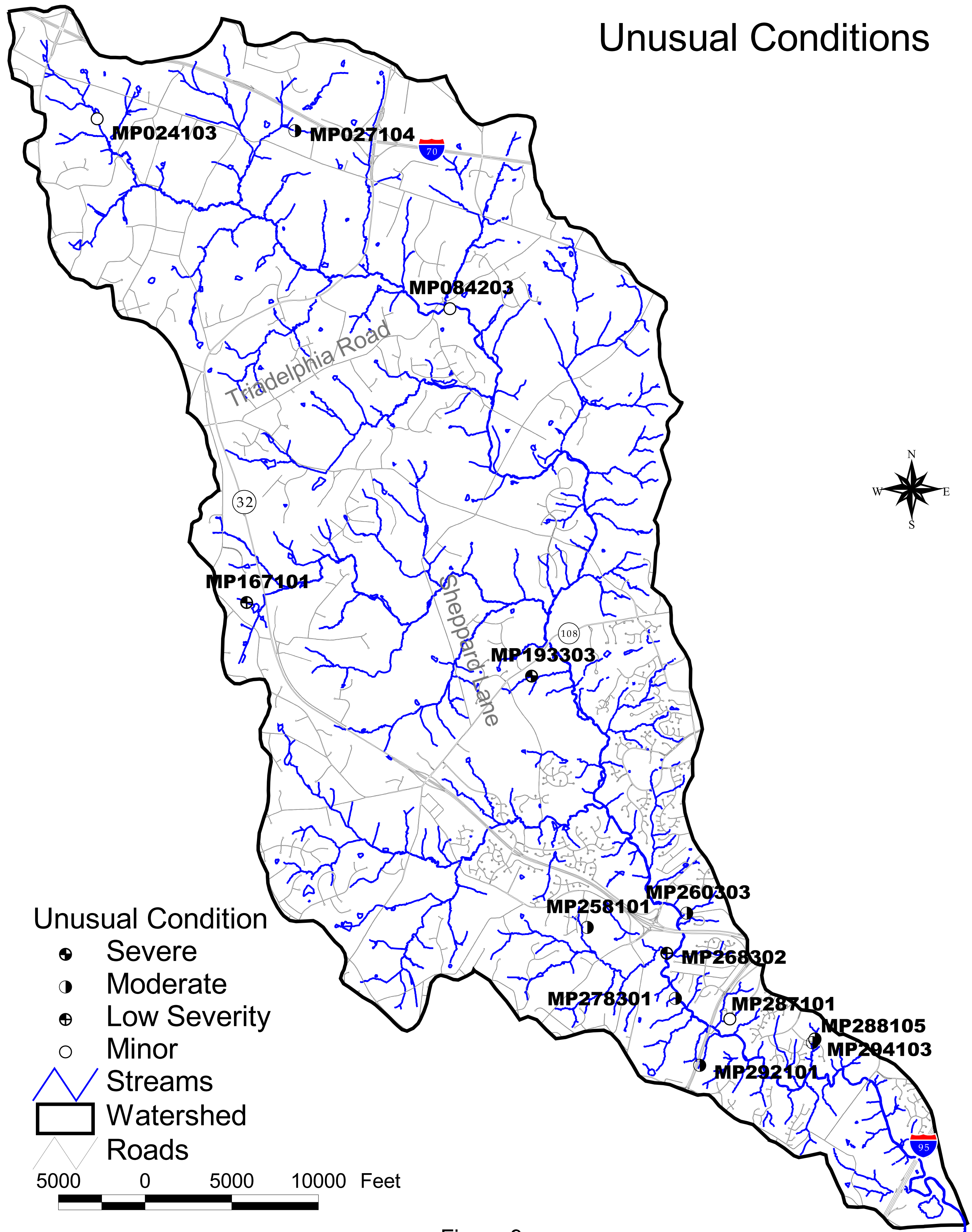


Figure 9b. Histograph showing the frequency of severity ratings given to unusual condition sites during Middle Patuxent River SCA survey.



Unusual Conditions
MP024103
MP027104
70
MP084203
Triadelphia Road
32
MP167101
Sheppard Lane
108
MP193303
MP260303
MP258101
MP268302
MP278301
MP287101
MP288105
MP294103
MP292101
95
N
W
E
S
Unusual Condition
Severe
Moderate
Low Severity
Minor
Streams
Watershed
Roads
5000
0
5000
10000
Feet

Figure 9a

Trash Dumping Sites

The trash dumping data sheets are used to record the location of places where large amounts of trash has been dumped inside the stream corridor or to note places where trash tends to accumulate. The field survey crew found seven sites where there was excessive trash and their locations are shown in Figure 10a**.** Two sites, MP255302 and MP256301, were reported as very severe and both these sites were junkyards. Estimated truckloads to remove all the trash were not recorded for these sites. Two sites were recorded as having yard waste, one had residential waste and one was recorded as a large pipe. These sites were given severity ratings ranging from moderate to minor (Figure 10b).

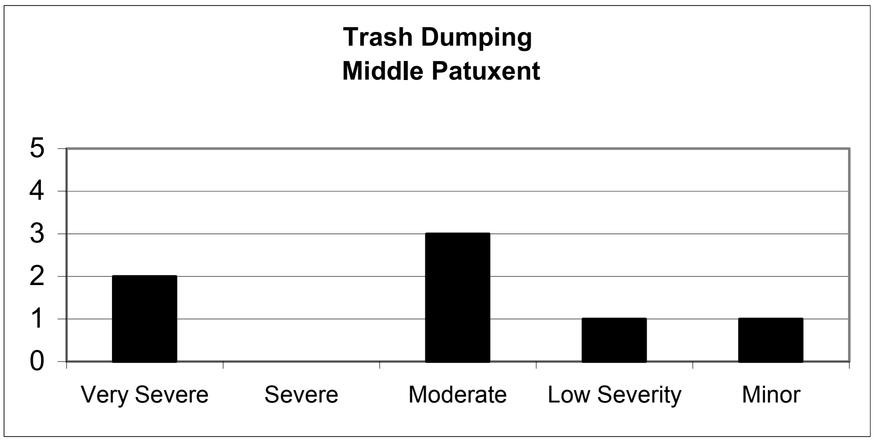
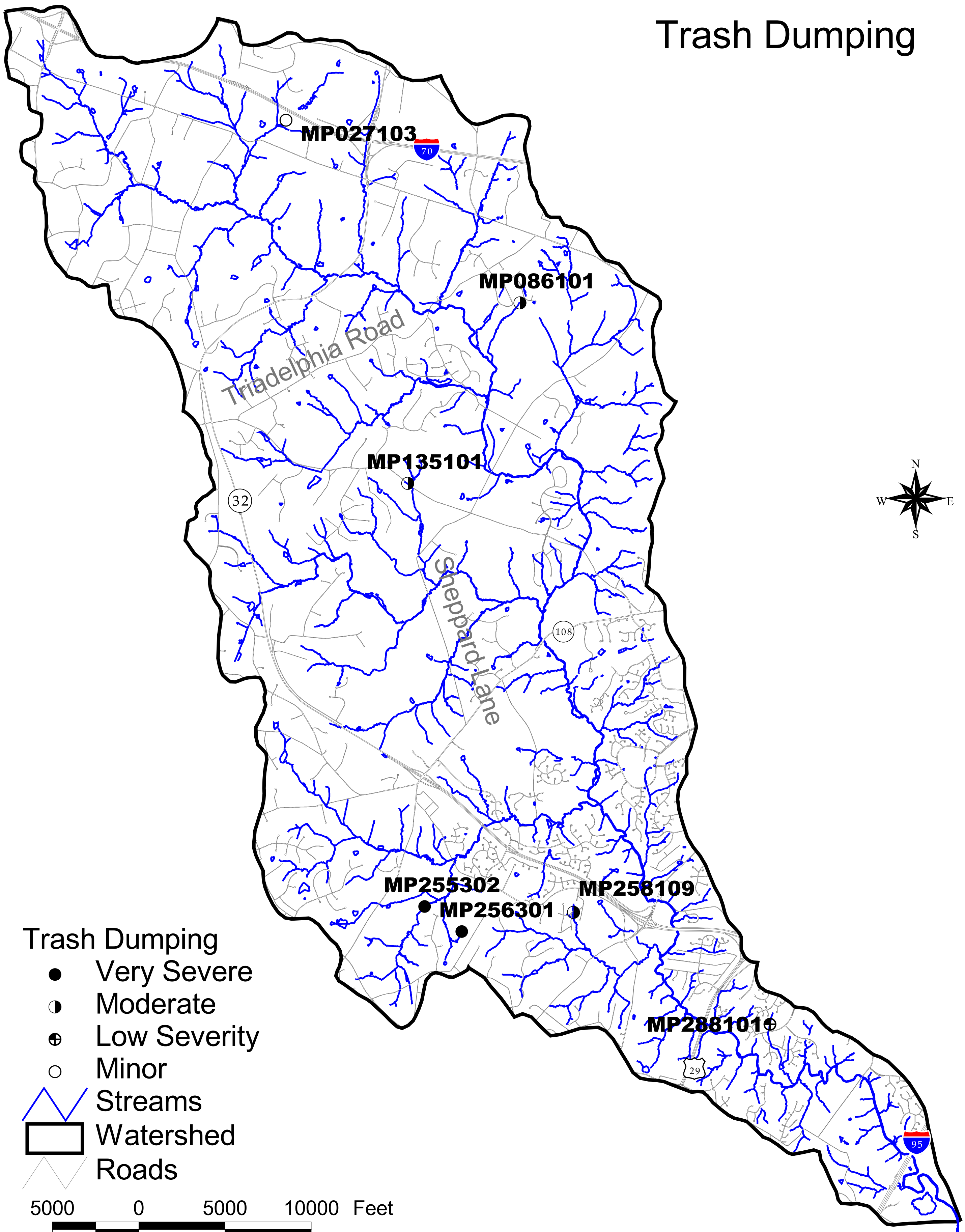


Figure 10b. Histograph showing the frequency of severity ratings given to trash dumping sites during Middle Patuxent River SCA survey.



Trash Dumping
MP027103
MP086101
MP135101
MP255302
MP256301
MP258109
MP288101
Triadelphia Road
Sheppard Lane
32
108
29
70
95
N
W
E
S
Trash Dumping
Very Severe
Moderate
Low Severity
Minor
Streams
Watershed
Roads
5000 0 5000 10000 Feet

Figure 10a

Tree Blockages

The locations of tree blockages were recorded as part of the Middle Patuxent SCA survey at the request of Howard County. While fallen trees can provide a refuge for fish and other animals, large blockages can also trap debris, creating a temporary dam and causing flooding of adjacent land. In a high water event, a breach of a debris dam could also cause extensive damage downstream. If a blockage occurs at or near a road crossing, an increase in flow could overtop the road. Debris clogging of road culverts is one of the main causes of road failure during large rain events. Proximity of tree blockages to road crossings, the amount of the channel effected by the blockage, and the surrounding land use were noted during the field survey (Appendix B).

The survey crew recorded four tree blockage sites. The locations of tree blockages are shown in Figure 11. Severity was recorded as “bad” at 1 site, and “moderate” at 3 sites. This severity rating is based to the size of the blockage and the amount of debris present at a site. The tree blockage sites were all located in the upper portion of the watershed.

Tree Blockages

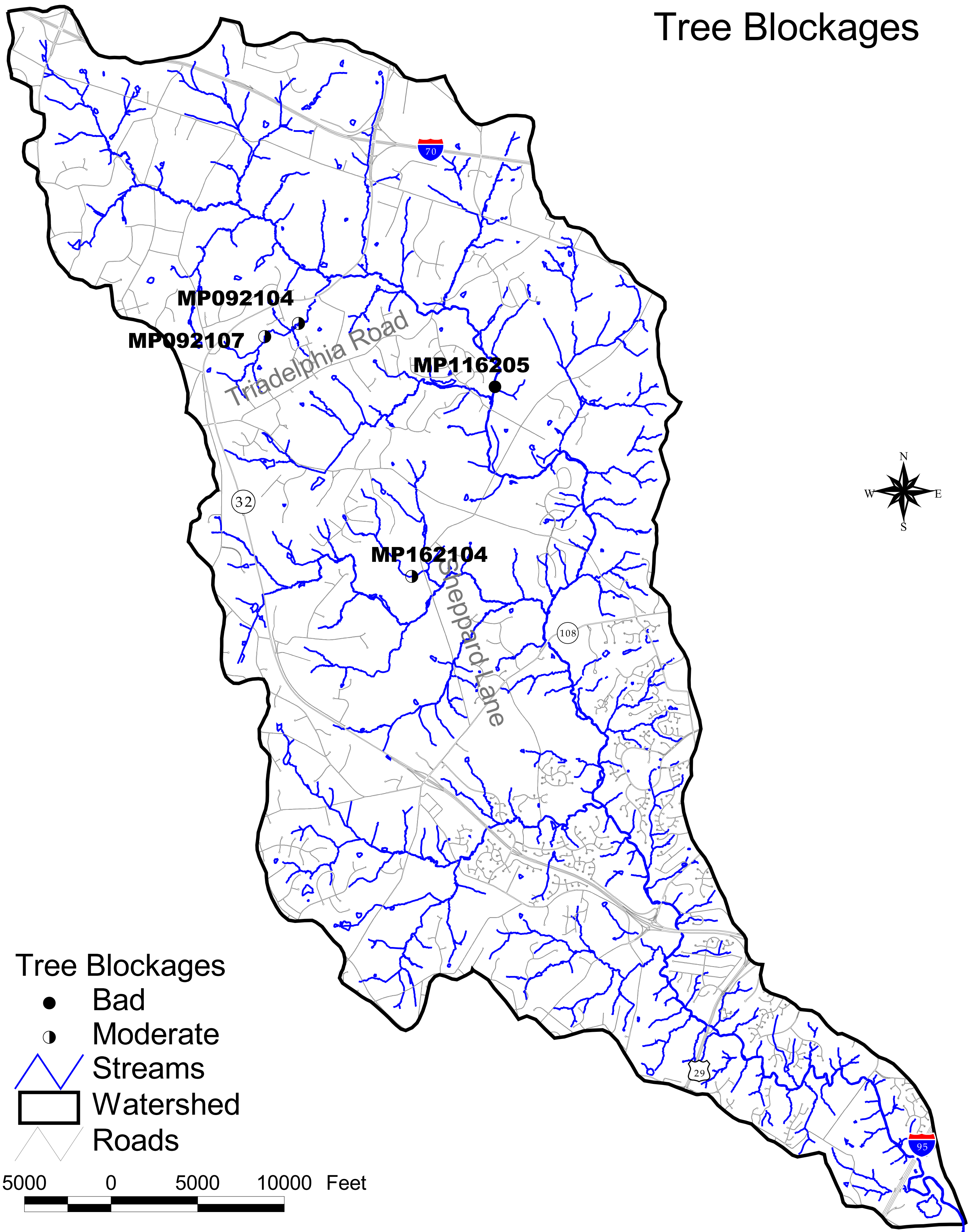


Figure 11

Exposed Pipes

Exposed pipes are any pipes that are in the stream or along the stream's immediate banks that could be damaged by a high flow event. It does not include pipe outfalls where only the open end of the pipe is exposed. Exposed pipes do include: 1) manhole stacks in or along the edge of the stream channel, 2) pipes that are exposed along the stream banks, 3) pipes that run under the stream's bed and have been exposed by stream down-cutting, and 4) pipes that are built over a stream but are low enough that they could be affected by frequent high storm flows.

In urban areas, it is very common for pipelines and other utilities to be located in the stream corridor. This is especially true for gravity sewage lines that depend on the continuous downward slope of the pipeline to move sewage to a pumping station or treatment plant. Since streams are located at the lowest points of the local landscape, engineers often build sewage lines paralleling streams to collect sewage from adjacent neighborhoods. While the pipelines are stationary, streams can migrate and over time can expose previously buried pipelines. When this occurs, the pipeline becomes vulnerable to being punctured by debris in the stream. Fluids in the pipelines can be discharged into the stream, causing a serious water quality problem.

Exposed pipes were reported at two sites during the survey. Locations of these sites are shown in Figure 12. At Site MP177101, a white plastic pipe crossed the bottom of the stream and at Site MP 192301, a smooth metal pipe was seen along the stream's bank. Crews did not observe any discharge coming from the pipe at the time of the survey and the sites were give a moderate and low severity rating, respectively. Both exposed pipe photos should be reviewed by public works officials and follow-up visits done based on their evaluations.

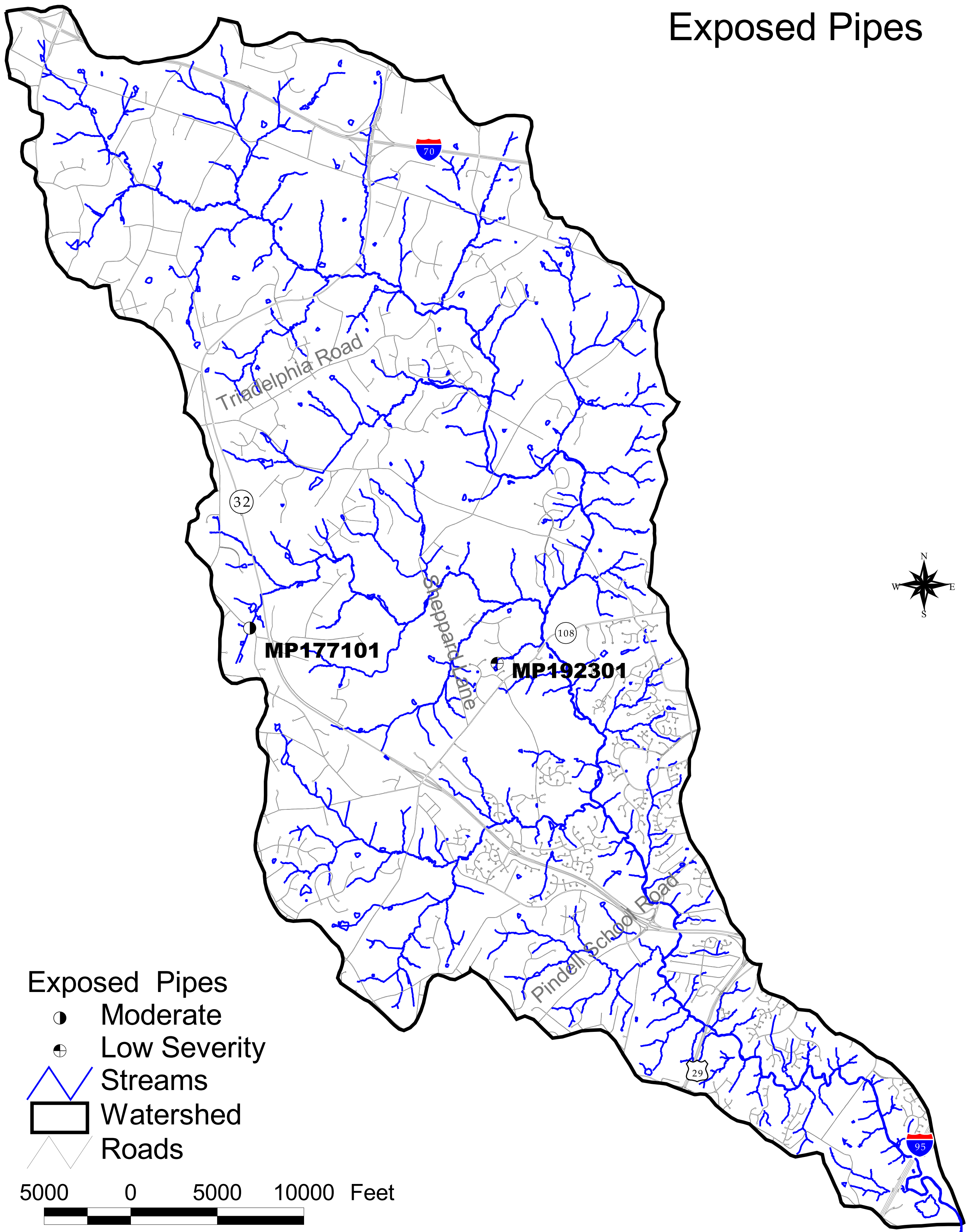

Exposed Pipes
70
Triadelphia Road
32
Sheppard Lane
108
MP177101
MP192301
Pindell School Road
29
95
N
W
E
S
Exposed Pipes
Moderate
Low Severity
Streams
Watershed
Roads
5000 0 5000 10000 Feet

Figure 12

Representative Sites

Representative sites are used to document the general condition of both in-stream habitat and the adjacent riparian (stream bank) corridor. The representative site evaluations procedures used during the survey are very similar to the habitat evaluations done as part of the Maryland Save-Our-Stream's Heartbeat Program and are based on the habitat assessment procedures outlined in EPA's rapid bioassessment protocols (Plafkin, et. al., 1989). At each representative site, data was collected on 10 separate parameters. Habitat parameters that were evaluated include:

* Attachment Sites for Macroinvertebrates
* Shelter for Fish
* Sediment Deposition
* Channel Flow Status
* Condition of Banks
* Embeddedness
* Channel Alteration
* Stream Velocity and Depth
* Bank Vegetation Protection
* Riparian Vegetative Zone Width

For each of the above habitat parameters, a rating of optimal, sub-optimal, marginal or poor was assigned based on the grading criteria developed for each parameter. In addition to the habitat ratings, data was collected on the stream's wetted width and pool depths at both runs and riffles at each representative site. Depth measurements were taken along the stream thalweg (main flow path). At representative sites, field crews also indicated whether the bottom sediments in the area were primarily silts, sands, gravel, cobble, boulders, or bedrock.

Representative site evaluations were done at approximately ½ mile intervals along the stream. Eighty-nine representative data sheets were filled out during this survey. Locations of representative sites are shown in Figure 13 and the data is presented in Appendix C.

Results indicate that the main stem of the Middle Patuxent River is in fairly good condition, with average ratings of optimal and suboptimal in all categories except for embeddedness. Many stream segments had a bottom substrate that consisted of gravel or cobble.

Harpers Ridge tributary is in an urban section of the watershed, it was the only tributary to receive a rating of suboptimal for channel alteration, while the other tributaries were all optimal. Rover Mill and South Sykesville are both mostly agricultural lands and it is not surprising that they both received marginal ratings for riparian vegetation. Embeddedness and sediment deposition were rated as marginal in nearly all of the tributaries.

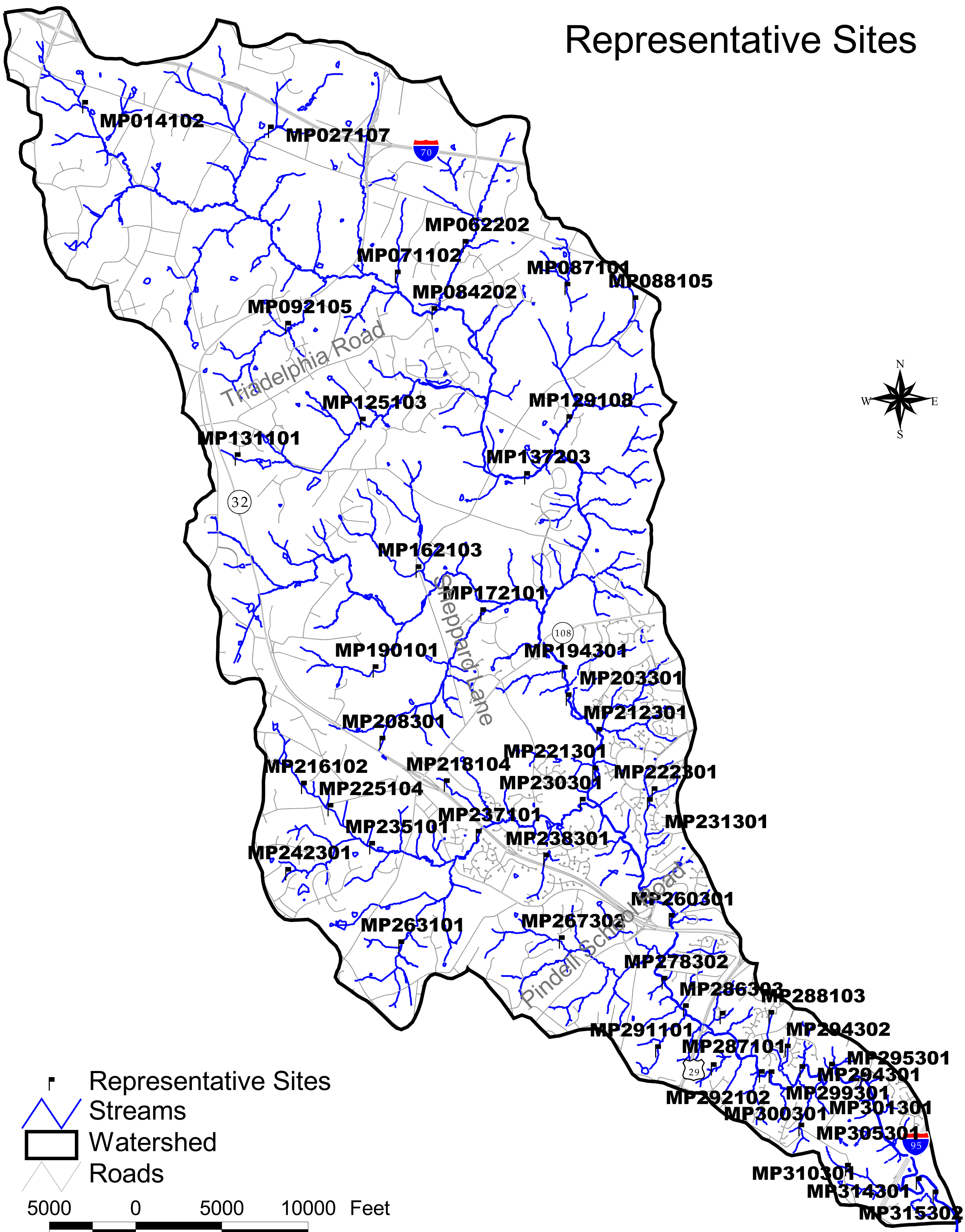

Representative Sites
MP014102
MP027107
70
MP062202
MP071102
MP087101
MP088105
MP084202
MP092105
Triadelphia Road
MP125103
MP129108
MP131101
MP137203
32
MP162103
Sheppard Lane
MP172101
108
MP190101
MP194301
MP203301
MP212301
MP208301
MP221301
MP216102
MP218104
MP222301
MP230301
MP225104
MP231301
MP237101
MP235101
MP238301
MP242301
MP260301
Pindell School Road
MP267302
MP263101
MP278302
MP286303
MP288103
MP291101
MP294302
MP287101
29
MP295301
MP294301
MP299301
MP292102
MP301301
MP300301
MP305301
95
MP310301
MP314301
MP315302
N
W
E
S
Representative Sites
Streams
Watershed
Roads
5000
0
5000
10000
Feet

Figure 13

Pond Sites

This category was added at the request of Howard County to records information on the general condition of ponds observed during the survey. Since survey teams walk only along the stream corridor during the survey, any ponds located outside of the stream corridor, such as storm water management ponds inside of housing developments away from the stream would not be included in this survey. As part of the survey, field survey crew looked at whether or not eutrophic conditions were apparent and if routine maintenance was being performed on the embankment. This involved looking to see if the embankment is regularly mowed to prevent large trees from growing on it. Tree roots create weak spots that could lead to a possible breach. If large trees or animal burrows were present on the embankment, the field survey crews also record this information.

One pond site was recorded during this survey, and its location is shown in Figure 14. It was found to be maintained and without trees or animal borrows on the embankment.

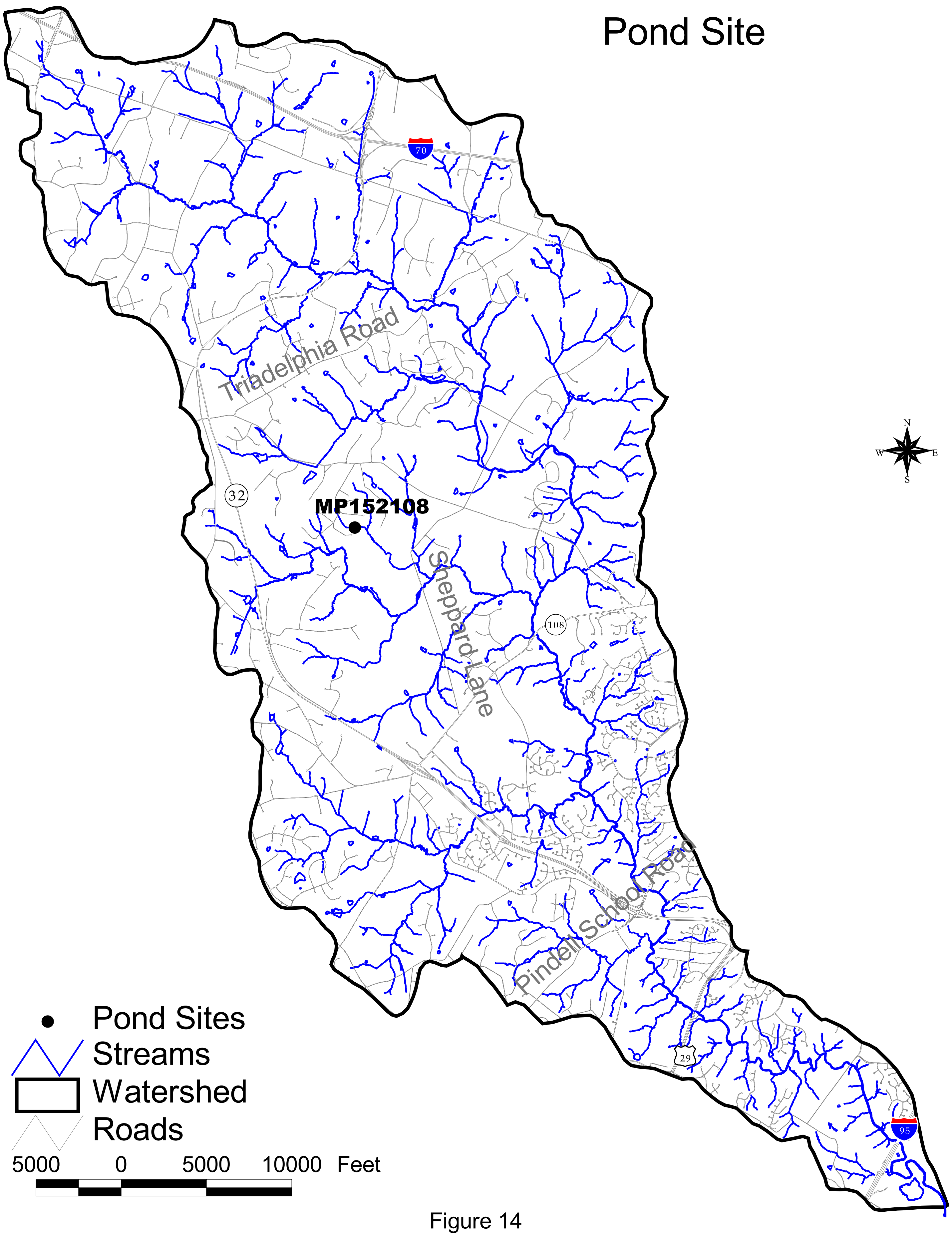

Pond Site
70
Triadelphia Road
32
MP152108
Sheppard Lane
108
Pindell School Road
29
95
N
S
E
W
Pond Sites
Streams
Watershed
Roads
5000 0 5000 10000 Feet

Figure 14

DISCUSSION

One of the main objectives of the Middle Patuxent Stream Corridor Assessment survey was to walk the stream network quickly in order to identify potential environmental problems in or along the edge of the stream. The survey was completed in the Winter/Spring of 2000 and over 180 miles of stream were walked. During the SCA survey, 322 potential environmental problem sites were identified. The most common environmental problem seen during the SCA survey was erosion, which were reported at 106 sites. Other potential environmental problems recorded during the survey include: 93 sites with inadequately vegetated stream buffers, 64 fish migration blockages, 18 channelized stream sections, 18 pipe outfalls, 10 unusual condition sites, 7 trash dumping, and 2 exposed pipe sites.

Results of the Stream Corridor Assessment survey indicate a variety of environmental problems in the Middle Patuxent River Watershed. It is anticipated that results from this survey will be combined with other information about the area will help Howard County to establish priorities for the types and location of restoration projects that will be pursued in the Middle Patuxent River Watershed in the future.

The SCA survey has been developed by DNR's Watershed Restoration Division as a watershed management tool to both quickly assess the general condition of a stream corridor and to provide a list of potential environmental problems present within the corridor. One of the main goals of the SCA survey is to provide some basic information about each problem so that future restoration efforts can be better targeted. It is hoped that now that a SCA survey has been completed for the Middle Patuxent watershed, a dialog can continue among resource managers on the goals and targets of future restoration efforts in the watershed. It is important to note that all of the problems identified in this survey can be addressed through existing State and Local Government programs. The value of the survey is that it can help place the problems in a watershed context and can be used by a variety of resource managers to plan future restoration work.

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Appendix A

Listing of sites by site number

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP014101	Inadequate Buffer	3	2	4	77:00:58	39:18:53	Rover Mill Tributary
MP014102	Representative Site				77:00:38	39:18:52	Rover Mill Tributary
MP018101	Inadequate Buffer	1	3	1	76:58:14	39:19:02	Fairgrounds Tributary
MP018102	Inadequate Buffer	2	3	1	76:58:16	39:19:04	Fairgrounds Tributary
MP018103	Erosion	4	2	1	76:58:14	39:19:02	Fairgrounds Tributary
MP018104	Inadequate Buffer	3	3	1	76:58:19	39:18:55	Fairgrounds Tributary
MP018105	Erosion	5	1	1	76:58:17	39:18:56	Fairgrounds Tributary
MP024103	Unusual Condition	5	3	4	77:00:32	39:18:44	Rover Mill Tributary
MP026103	Channel Alteration	5	1	1	76:58:44	39:18:33	Fairgrounds Tributary
MP027101	Fish Barrier	5	2	3	76:58:17	39:18:45	Fairgrounds Tributary
MP027102	Fish Barrier	5	2	3	76:58:16	39:18:41	Fairgrounds Tributary
MP027103	Trash Dumping	5	1	1	76:58:10	39:18:43	Fairgrounds Tributary
MP027104	Unusual Condition	3	3	1	76:56:13	39:16:56	Fairgrounds Tributary
MP027105	Inadequate Buffer	3	1	1	76:58:03	39:18:37	Fairgrounds Tributary
MP027106	Fish Barrier	5	2	4	76:58:18	39:18:39	Fairgrounds Tributary
MP027107	Representative Site				76:58:21	39:18:38	Fairgrounds Tributary
MP029104	Inadequate Buffer	3	5	1	76:57:06	39:18:48	Terrapin Branch
MP029105	Erosion	5	1	1	76:57:10	39:18:35	Terrapin Branch
MP029106	Erosion	3	4	1	76:57:09	39:18:42	Terrapin Branch
MP029106	Inadequate Buffer	3	5	1	76:57:08	39:18:42	Terrapin Branch
MP035104	Erosion	4	2	1	77:00:20	39:18:25	Rover Mill Tributary
MP035104	Inadequate Buffer	3	3	1	77:00:20	39:18:25	Rover Mill Tributary
MP037104	Erosion	3	2	4	76:58:42	39:18:16	Fairgrounds Tributary
MP040106	Pipe Outfall	3	1	1	76:57:13	39:18:20	Terrapin Branch
MP040107	Inadequate Buffer	4	5	1	76:57:15	39:18:12	Terrapin Branch
MP045101	Erosion	4	3	3	77:00:07	39:18:04	Upper Middle Patuxent
MP045105	Erosion	4	3	3	77:00:05	39:18:10	Rover Mill Tributary
MP045106	Fish Barrier	4	3	3	77:00:03	39:18:06	Rover Mill Tributary
MP046102	Erosion	3	2	3	76:59:45	39:18:04	Upper Middle Patuxent
MP046102	Inadequate Buffer	2	3	3	76:59:45	39:18:04	Upper Middle Patuxent
MP046105	Fish Barrier	5	3	1	76:59:22	39:17:54	Upper Middle Patuxent
MP050107	Erosion	3	3	1	76:57:13	39:18:03	Terrapin Branch
MP052106	Fish Barrier	5	2	2	76:56:04	39:17:55	South Sykesville Tributary
MP052107	Inadequate Buffer	2	3	1	76:56:04	39:17:55	South Sykesville Tributary
MP060101	Erosion	3	2	1	76:56:46	39:17:37	Upper Middle Patuxent
MP060101	Inadequate Buffer	3	2	1	76:56:47	39:17:37	Upper Middle Patuxent
MP062108	Channel Alteration	4	4	1	76:55:54	39:17:50	South Sykesville Tributary
MP062202	Representative Site				76:55:58	39:17:32	South Sykesville Tributary
MP062203	Channel Alteration	4	3	1	76:55:55	39:17:35	South Sykesville Tributary
MP062204	Inadequate Buffer	4	2	1	76:55:45	39:17:47	South Sykesville Tributary
MP062205	Erosion	5	2	1	76:55:48	39:17:48	South Sykesville Tributary
MP062205	Inadequate Buffer	4	2	1	76:55:48	39:17:48	South Sykesville Tributary
MP071102	Representative Site				76:56:48	39:17:15	Upper Middle Patuxent
MP071103	Erosion	4	3	1	76:57:14	39:17:17	Terrapin Branch
MP071104	Erosion	4	2	1	76:57:15	39:17:26	Terrapin Branch
MP071104	Inadequate Buffer	4	2	1	76:57:14	39:17:26	Terrapin Branch
MP071105	Channel Alteration	5	3	1	76:57:16	39:17:27	Terrapin Branch
MP071106	Erosion	3	3	1	76:57:16	39:17:32	Terrapin Branch
MP071206	Erosion	3	4	1	76:57:03	39:17:16	Upper Middle Patuxent
MP071206	Inadequate Buffer	3	2	1	76:57:04	39:17:16	Upper Middle Patuxent
MP071207	Pipe Outfall	5	1	1	76:57:15	39:17:18	Terrapin Branch

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP071208	Erosion	3	2	1	76:57:14	39:17:14	Upper Middle Patuxent
MP071208	Inadequate Buffer	4	2	1	76:57:15	39:17:14	Upper Middle Patuxent
MP075301	Erosion	5	1	1	76:54:47	39:17:30	Quarterfield Tributary
MP075302	Erosion	5	2	4	76:54:42	39:17:14	Quarterfield Tributary
MP079101	Inadequate Buffer	1	3	1	76:59:17	39:17:07	Pfefferkorn Tributary
MP082101	Erosion	4	4	1	76:57:45	39:17:08	Kings Grant Tributary
MP082102	Fish Barrier	3	5	1	76:57:52	39:17:01	Kings Grant Tributary
MP082103	Inadequate Buffer	4	3	2	76:57:55	39:16:56	Kings Grant Tributary
MP084101	Erosion	4	2	1	76:56:22	39:16:53	Upper Middle Patuxent
MP084101	Inadequate Buffer	4	2	1	76:56:22	39:16:53	Upper Middle Patuxent
MP084201	Erosion	3	2	4	76:56:11	39:17:10	South Sykesville Tributary
MP084202	Representative Site				76:56:21	39:16:54	Upper Middle Patuxent
MP084203	Unusual Condition	5	2	2	76:58:43	39:14:08	Upper Middle Patuxent
MP085103	Inadequate Buffer	5	2	1	76:55:35	39:16:58	Upper Middle Patuxent
MP086101	Trash Dumping	3	3	2	76:55:18	39:16:59	Upper Middle Patuxent
MP086102	Erosion	5	1	2	76:55:20	39:16:57	Upper Middle Patuxent
MP087101	Representative Site				76:54:43	39:17:08	Quarterfield Tributary
MP087102	Channel Alteration	5	1	2	76:54:41	39:17:01	Quarterfield Tributary
MP088105	Representative Site				76:53:53	39:17:00	Quarterfield Tributary
MP092102	Erosion	5	1	3	76:58:33	39:16:34	Kings Grant Tributary
MP092104	Tree Blockage				76:58:28	39:16:40	Kings Grant Tributary
MP092105	Representative Site				76:58:08	39:16:45	Kings Grant Tributary
MP092106	Erosion	4	1	3	76:58:19	39:16:42	Kings Grant Tributary
MP092107	Tree Blockage				76:58:04	39:16:47	Kings Grant Tributary
MP096204	Erosion	4	4	4	76:56:00	39:16:51	Upper Middle Patuxent
MP098103	Inadequate Buffer	3	1	1	76:54:30	39:16:34	Quarterfield Tributary
MP098104	Inadequate Buffer	2	3	1	76:54:21	39:16:35	Quarterfield Tributary
MP101101	Inadequate Buffer	3	2	2	76:58:43	39:16:21	Kings Grant Tributary
MP105109	Inadequate Buffer	3	2	1	76:56:27	39:16:13	Benson Branch
MP114104	Erosion	5	3	4	76:56:53	39:15:59	Benson Branch
MP116101	Inadequate Buffer	3	2	1	76:55:53	39:16:09	Benson Branch
MP116102	Inadequate Buffer	3	2	1	76:56:02	39:16:11	Benson Branch
MP116201	Pipe Outfall	3	1	1	76:55:44	39:15:56	Upper Middle Patuxent
MP116205	Tree Blockage				76:55:39	39:16:11	Upper Middle Patuxent
MP125103	Representative Site				76:57:13	39:15:51	Benson Branch
MP129108	Representative Site				76:54:41	39:15:52	Quarterfield Tributary
MP131101	Representative Site				76:58:46	39:15:30	Benson Branch
MP133102	Inadequate Buffer	3	3	1	76:57:51	39:15:23	Benson Branch
MP135101	Trash Dumping	3	3	2	76:56:41	39:15:15	Hayes Field Tributary
MP136202	Inadequate Buffer	2	3	1	76:55:48	39:15:26	Upper Middle Patuxent
MP137203	Representative Site				76:55:12	39:15:19	Upper Middle Patuxent
MP147102	Erosion	5	1	3	76:54:27	39:14:59	Upper Middle Patuxent
MP149201	Erosion	3	2	1	76:58:58	39:14:48	Hayes Field Tributary
MP149201	Inadequate Buffer	3	2	1	76:58:58	39:14:48	Hayes Field Tributary
MP149202	Inadequate Buffer	4	2	1	76:58:41	39:14:39	Hayes Field Tributary
MP151109	Inadequate Buffer	2	3	1	76:57:27	39:14:52	Hayes Field Tributary
MP152106	Fish Barrier	3	3	1	76:57:09	39:14:47	Hayes Field Tributary
MP152107	Fish Barrier	5	5	2	76:57:15	39:14:47	Hayes Field Tributary
MP152108	Pond Site				76:57:16	39:14:47	Hayes Field Tributary
MP157101	Erosion	5	1	1	76:53:45	39:14:50	Upper Middle Patuxent
MP161105	Erosion	5	1	2	76:56:50	39:14:29	Hayes Field Tributary

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP162102	Inadequate Buffer	1	4	1	76:56:28	39:14:30	Hayes Field Tributary
MP162103	Representative Site				76:56:33	39:14:26	Hayes Field Tributary
MP162104	Inadequate Buffer	3	3	2	76:56:41	39:14:23	Hayes Field Tributary
MP162104	Tree Blockage				76:56:41	39:14:23	Hayes Field Tributary
MP167101	Unusual Condition	4	3	1	76:54:33	39:11:03	Hayes Field Tributary
MP167102	Erosion	5	4	2	76:58:45	39:14:09	Hayes Field Tributary
MP168101	Erosion	5	4	3	76:58:32	39:14:05	Hayes Field Tributary
MP168102	Pipe Outfall	3	3	3	76:58:33	39:14:03	Hayes Field Tributary
MP168103	Inadequate Buffer	3	1	1	76:58:35	39:13:59	Hayes Field Tributary
MP169301	Erosion	4	3	1	76:57:30	39:14:07	Hayes Field Tributary
MP170301	Inadequate Buffer	3	1	1	76:56:54	39:14:00	Hayes Field Tributary
MP170302	Inadequate Buffer	3	1	1	76:57:01	39:14:09	Hayes Field Tributary
MP171301	Inadequate Buffer	3	1	1	76:56:28	39:14:09	Hayes Field Tributary
MP171302	Inadequate Buffer	5	1	1	76:56:40	39:13:57	Hayes Field Tributary
MP172101	Representative Site				76:55:45	39:14:01	Hayes Field Tributary
MP172102	Channel Alteration	5	5	1	76:55:50	39:13:57	Hayes Field Tributary
MP173101	Erosion	3	4	4	76:54:56	39:14:12	Upper Middle Patuxent
MP173102	Erosion	1	5	2	76:54:58	39:14:07	Upper Middle Patuxent
MP173301	Erosion	3	4	2	76:55:24	39:14:08	Upper Middle Patuxent
MP173302	Erosion	3	4	3	76:55:05	39:14:06	Hayes Field Tributary
MP174101	Erosion	5	4	4	76:54:22	39:14:13	Hayes Field Tributary
MP177101	Exposed Pipe	3	3	2	76:58:38	39:13:53	Homwwood Tributary
MP177102	Inadequate Buffer	3	1	1	76:58:40	39:13:53	Hayes Field Tributary
MP177103	Pipe Outfall	3	3	2	76:58:42	39:13:45	Hayes Field Tributary
MP177104	Inadequate Buffer	3	2	2	76:58:40	39:13:51	Hayes Field Tributary
MP177105	Pipe Outfall	3	3	3	76:58:39	39:13:52	Hayes Field Tributary
MP177106	Inadequate Buffer	3	2	2	76:58:45	39:13:40	Hayes Field Tributary
MP177107	Inadequate Buffer	3	1	1	76:58:44	39:13:36	Hayes Field Tributary
MP179101	Inadequate Buffer	4	2	2	76:57:54	39:13:40	Hayes Field Tributary
MP180101	Inadequate Buffer	3	2	5	76:56:49	39:13:44	Hayes Field Tributary
MP182301	Fish Barrier	5	2	2	76:55:36	39:13:35	Upper Middle Patuxent
MP183301	Fish Barrier	3	3	1	76:55:03	39:13:46	Upper Middle Patuxent
MP183302	Erosion	3	3	3	76:55:09	39:13:43	Upper Middle Patuxent
MP183302	Fish Barrier	4	4	2	76:55:09	39:13:43	Upper Middle Patuxent
MP183303	Inadequate Buffer	3	2	1	76:55:14	39:13:44	Upper Middle Patuxent
MP183304	Erosion	4	3	3	76:55:18	39:13:42	Upper Middle Patuxent
MP185301	Inadequate Buffer	3	4	1	76:53:58	39:13:41	Upper Middle Patuxent
MP189101	Erosion	4	1	2	76:57:42	39:13:32	Hayes Field Tributary
MP189102	Inadequate Buffer	2	2	3	76:57:29	39:13:26	Hayes Field Tributary
MP190101	Representative Site				76:57:04	39:13:29	Hayes Field Tributary
MP190102	Fish Barrier	4	1	5	76:57:07	39:13:27	Hayes Field Tributary
MP191101	Inadequate Buffer	3	1	1	76:56:11	39:13:29	Hayes Field Tributary
MP192301	Exposed Pipe	4	1	1	76:55:37	39:13:33	Lower Middle Patuxent
MP192302	Inadequate Buffer	3	1	1	76:55:37	39:13:33	Lower Middle Patuxent
MP193303	Unusual Condition	2	4	1	76:53:35	39:10:48	Lower Middle Patuxent
MP194301	Representative Site				76:54:45	39:13:28	Lower Middle Patuxent
MP195301	Inadequate Buffer	3	2	1	76:53:36	39:13:31	Harpers Choice Tributary
MP195302	Fish Barrier	5	1	1	76:53:47	39:13:20	Harpers Choice Tributary
MP199301	Inadequate Buffer	4	1	1	76:57:09	39:12:55	Hayes Field Tributary
MP199302	Erosion	5	4	3	76:57:04	39:12:57	Hayes Field Tributary
MP199303	Fish Barrier	5	2	1	76:56:53	39:13:00	Hayes Field Tributary

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP199304	Fish Barrier	5	4	2	76:56:51	39:13:02	Hayes Field Tributary
MP200301	Inadequate Buffer	3	2	2	76:56:35	39:13:05	Hayes Field Tributary
MP203101	Erosion	5	5	5	76:54:17	39:12:55	Harpers Choice Tributary
MP203301	Representative Site				76:54:42	39:13:13	Lower Middle Patuxent
MP204101	Erosion	4	3	1	76:53:35	39:13:03	Harpers Choice Tributary
MP204102	Pipe Outfall	5	3	2	76:53:41	39:13:02	Harpers Choice Tributary
MP204103	Inadequate Buffer	4	1	2	76:53:37	39:13:03	Harpers Choice Tributary
MP204104	Pipe Outfall	3	5	2	76:53:35	39:13:03	Harpers Choice Tributary
MP204105	Fish Barrier	5	4	2	76:53:41	39:13:02	Harpers Choice Tributary
MP204106	Erosion	5	4	2	76:53:42	39:13:01	Harpers Choice Tributary
MP204107	Erosion	5	4	2	76:53:43	39:13:00	Harpers Choice Tributary
MP204108	Erosion	4	4	2	76:53:44	39:12:57	Harpers Choice Tributary
MP204109	Fish Barrier	4	4	3	76:53:57	39:12:56	Harpers Choice Tributary
MP204110	Erosion	5	4	3	76:53:58	39:12:56	Harpers Choice Tributary
MP204111	Fish Barrier	4	3	3	76:54:00	39:12:55	Harpers Choice Tributary
MP204301	Fish Barrier	4	2	3	76:53:53	39:13:12	Harpers Choice Tributary
MP206101	Inadequate Buffer	1	1	1	76:58:12	39:12:50	River Hill Tributary
MP207301	Erosion	5	3	1	76:57:24	39:12:56	Hayes Field Tributary
MP208301	Representative Site				76:56:59	39:12:48	Hayes Field Tributary
MP211301	Inadequate Buffer	5	2	1	76:55:08	39:12:42	Lower Middle Patuxent
MP211302	Inadequate Buffer	3	4	1	76:55:07	39:12:39	Lower Middle Patuxent
MP212101	Erosion	4	4	4	76:54:19	39:12:54	Harpers Choice Tributary
MP212301	Representative Site				76:54:19	39:12:53	Lower Middle Patuxent
MP212302	Fish Barrier	5	1	2	76:54:47	39:12:38	Lower Middle Patuxent
MP213101	Erosion	1	4	2	76:53:40	39:12:53	Harpers Choice Tributary
MP213102	Erosion	4	3	2	76:53:36	39:12:51	Harpers Choice Tributary
MP213103	Erosion	4	3	3	76:54:02	39:12:54	Harpers Choice Tributary
MP213104	Fish Barrier	5	2	3	76:54:04	39:12:55	Harpers Choice Tributary
MP213105	Fish Barrier	4	4	3	76:54:05	39:12:55	Harpers Choice Tributary
MP213106	Fish Barrier	4	3	3	76:54:09	39:12:54	Harpers Choice Tributary
MP213107	Erosion	3	3	3	76:54:06	39:12:52	Harpers Choice Tributary
MP213108	Fish Barrier	5	3	3	76:54:05	39:12:52	Harpers Choice Tributary
MP213109	Erosion	4	4	3	76:53:57	39:12:49	Harpers Choice Tributary
MP213110	Erosion	4	4	5	76:54:10	39:12:54	Harpers Choice Tributary
MP214101	Erosion	3	3	2	76:53:29	39:12:49	Harpers Choice Tributary
MP214102	Channel Alteration	4	3	1	76:53:24	39:12:50	Harpers Choice Tributary
MP215101	Erosion	5	2	2	76:58:07	39:12:35	River Hill Tributary
MP215102	Erosion	3	2	2	76:58:06	39:12:33	River Hill Tributary
MP216101	Inadequate Buffer	3	2	1	76:57:39	39:12:21	River Hill Tributary
MP216102	Representative Site				76:57:57	39:12:22	River Hill Tributary
MP218101	Pipe Outfall	3	2	2	76:56:20	39:12:27	River Hill Tributary
MP218102	Pipe Outfall	3	2	2	76:56:19	39:12:27	River Hill Tributary
MP218103	Erosion	5	1	2	76:56:18	39:12:27	River Hill Tributary
MP218104	Representative Site				76:56:12	39:12:23	River Hill Tributary
MP218105	Channel Alteration	4	5	1	76:56:08	39:12:18	River Hill Tributary
MP219101	Erosion	1	4	2	76:56:04	39:12:19	River Hill Tributary
MP219301	Inadequate Buffer	3	1	1	76:55:53	39:12:28	River Hill Tributary
MP221301	Representative Site				76:54:22	39:12:31	Lower Middle Patuxent
MP222101	Fish Barrier	4	4	1	76:53:41	39:12:33	Harpers Ridge Tributary
MP222102	Erosion	4	4	2	76:53:44	39:12:32	Harpers Ridge Tributary
MP222103	Fish Barrier	4	2	3	76:53:46	39:12:29	Harpers Ridge Tributary

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP222104	Inadequate Buffer	3	1	1	76:53:45	39:12:22	Harpers Ridge Tributary
MP222301	Representative Site				76:53:39	39:12:19	Harpers Ridge Tributary
MP222302	Fish Barrier	5	1	2	76:53:36	39:12:20	Harpers Ridge Tributary
MP223301	Pipe Outfall	5	1	1	76:53:22	39:12:30	Harpers Ridge Tributary
MP223302	Erosion	5	1	2	76:53:32	39:12:21	Harpers Ridge Tributary
MP225101	Inadequate Buffer	3	2	2	76:57:24	39:11 57	River Hill Tributary
MP225102	Fish Barrier	5	1	3	76:57:27	39:12:05	River Hill Tributary
MP225103	Channel Alteration	5	5	1	76:57:42	39:12:12	River Hill Tributary
MP225104	Representative Site				76:57:37	39:12:09	River Hill Tributary
MP226101	Inadequate Buffer	4	3	3	76:57:06	39:12:02	River Hill Tributary
MP227101	Inadequate Buffer	3	3	2	76:56:42	39:12:10	River Hill Tributary
MP228101	Erosion	4	2	3	76:55:51	39:12:10	River Hill Tributary
MP228301	Erosion	3	3	2	76:55:41	39:12:11	River Hill Tributary
MP229301	Inadequate Buffer	3	1	1	76:54:53	39:12:00	River Hill Tributary
MP230301	Representative Site				76:54:32	39:12:13	River Hill Tributary
MP231301	Representative Site				76:53:42	39:12:13	Harpers Ridge Tributary
MP233301	Erosion	5	3	2	76:58:04	39:11:37	River Hill Tributary
MP233302	Fish Barrier	5	2	2	76:58:03	39:11:36	River Hill Tributary
MP234201	Inadequate Buffer	3	3	2	76:57:34	39:11:46	Lower Middle Patuxent
MP234202	Inadequate Buffer	4	2	2	76:57:39	39:11:40	Lower Middle Patuxent
MP234203	Erosion	4	3	2	76:57:38	39:11:39	River Hill Tributary
MP234301	Inadequate Buffer	3	1	1	76:57:31	39:11:50	River Hill Tributary
MP234302	Inadequate Buffer	2	1	1	76:57:42	39:11:53	River Hill Tributary
MP235101	Representative Site				76:57:07	39:11:48	River Hill Tributary
MP235102	Fish Barrier	5	2	2	76:56:51	39:11:46	River Hill Tributary
MP235103	Fish Barrier	5	2	2	76:56:46	39:11:46	River Hill Tributary
MP235104	Inadequate Buffer	2	3	2	76:57:11	39:11:49	River Hill Tributary
MP236101	Channel Alteration	5	4	1	76:56:43	39:11:45	River Hill Tributary
MP236102	Inadequate Buffer	2	2	2	76:56:34	39:11:42	River Hill Tributary
MP236103	Inadequate Buffer	1	2	2	76:56:27	39:11:42	River Hill Tributary
MP236104	Inadequate Buffer	2	2	1	76:56:16	39:11:42	River Hill Tributary
MP237101	Representative Site				76:55:48	39:11:54	River Hill Tributary
MP238301	Representative Site				76:54:58	39:11:41	River Hill Tributary
MP240301	Inadequate Buffer	3	1	4	76:53:49	39:11:38	Lower Middle Patuxent
MP240302	Channel Alteration	5	5	1	76:53:45	39:11:41	Harpers Ridge Tributary
MP242301	Representative Site				76:58:08	39:11:33	River Hill Tributary
MP242302	Erosion	5	3	4	76:58:01	39:11:35	River Hill Tributary
MP243301	Erosion	5	3	2	76:57:59	39:11:35	River Hill Tributary
MP244101	Erosion	5	3	1	76:57:05	39:11:35	River Hill Tributary
MP244102	Fish Barrier	4	2	2	76:57:07	39:11:30	River Hill Tributary
MP244103	Fish Barrier	4	4	2	76:57:15	39:11:30	River Hill Tributary
MP244104	Fish Barrier	4	4	1	76:57:18	39:11:31	River Hill Tributary
MP245101	Inadequate Buffer	3	1	1	76:56:10	39:11:34	River Hill Tributary
MP245102	Erosion	3	2	2	76:56:08	39:11:32	River Hill Tributary
MP245103	Inadequate Buffer	2	2	2	76:56:07	39:11:26	River Hill Tributary
MP245104	Erosion	3	2	2	76:56:08	39:11:25	River Hill Tributary
MP245105	Inadequate Buffer	3	2	2	76:56:16	39:11:18	River Hill Tributary
MP246301	Inadequate Buffer	3	1	1	76:55:59	39:11:25	River Hill Tributary
MP246302	Fish Barrier	4	1	1	76:55:55	39:11:24	River Hill Tributary
MP246303	Erosion	5	4	3	76:55:53	39:11:23	River Hill Tributary
MP248101	Erosion	5	1	3	76:54:18	39:11:26	Lower Middle Patuxent

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP249301	Inadequate Buffer	3	5	1	76:53:36	39:11:17	Lower Middle Patuxent
MP254101	Inadequate Buffer	1	2	2	76:56:52	39:11:15	River Hill Tributary
MP254102	Fish Barrier	5	2	2	76:57:00	39:11:13	River Hill Tributary
MP254103	Fish Barrier	4	4	2	76:57:07	39:11:15	River Hill Tributary
MP255301	Erosion	5	1	2	76:56:13	39:11:15	River Hill Tributary
MP255301	Inadequate Buffer	3	1	1	76:56:13	39:11:15	River Hill Tributary
MP255302	Trash Dumping	1	5	1	76:56:29	39:11:13	River Hill Tributary
MP256301	Trash Dumping	1	5	1	76:56:01	39:10:59	River Hill Tributary
MP258101	Unusual Condition	3	3	1	76:52:49	39:10:10	Clarks Tributary
MP258102	Inadequate Buffer	4	1	1	76:54:37	39:11:02	Clarks Tributary
MP258103	Erosion	5	3	3	76:54:37	39:11:04	Clarks Tributary
MP258104	Fish Barrier	5	3	2	76:54:38	39:11:04	Clarks Tributary
MP258105	Erosion	5	3	3	76:54:39	39:11:05	Clarks Tributary
MP258106	Fish Barrier	4	2	2	76:54:39	39:11:06	Clarks Tributary
MP258107	Erosion	5	2	2	76:54:39	39:11:09	Clarks Tributary
MP258108	Inadequate Buffer	4	1	1	76:54:13	39:11:07	Clarks Tributary
MP258109	Trash Dumping	3	2	1	76:54:39	39:11:10	Clarks Tributary
MP259101	Fish Barrier	5	3	4	76:53:57	39:10:59	Clarks Tributary
MP259102	Inadequate Buffer	3	1	1	76:54:03	39:11:00	Clarks Tributary
MP260301	Representative Site				76:53:26	39:11:06	Lower Middle Patuxent
MP260302	Fish Barrier	4	4	1	76:53:21	39:11:10	Lower Middle Patuxent
MP260303	Unusual Condition	3	3	1	76:51:46	39:09:59	Lower Middle Patuxent
MP263101	Representative Site				76:56:45	39:10:51	River Hill Tributary
MP263102	Fish Barrier	5	1	5	76:56:45	39:10:53	River Hill Tributary
MP263301	Pipe Outfall	3	3	2	76:56:44	39:10:45	River Hill Tributary
MP265301	Inadequate Buffer	3	2	1	76:55:30	39:10:56	Clarks Tributary
MP266301	Fish Barrier	4	5	4	76:55:05	39:10:37	Clarks Tributary
MP266302	Erosion	5	3	3	76:55:04	39:10:37	Clarks Tributary
MP267101	Fish Barrier	3	5	1	76:54:24	39:10:44	Clarks Tributary
MP267102	Erosion	3	3	2	76:54:19	39:10:42	Clarks Tributary
MP267103	Erosion	5	2	2	76:54:13	39:10:38	Clarks Tributary
MP267104	Erosion	5	4	2	76:54:26	39:10:46	Clarks Tributary
MP267105	Inadequate Buffer	3	2	2	76:54:28	39:10:49	Clarks Tributary
MP267106	Fish Barrier	4	4	2	76:54:30	39:10:50	Clarks Tributary
MP267107	Erosion	4	4	2	76:54:32	39:10:52	Clarks Tributary
MP267108	Fish Barrier	5	4	2	76:54:34	39:10:53	Clarks Tributary
MP267109	Fish Barrier	5	3	2	76:54:35	39:10:55	Clarks Tributary
MP267301	Fish Barrier	4	1	1	76:54:27	39:10:48	Clarks Tributary
MP267302	Representative Site				76:54:47	39:10:54	Clarks Tributary
MP268301	Inadequate Buffer	4	1	1	76:53:37	39:10:39	Lower Middle Patuxent
MP268302	Unusual Condition	4	3	1	76:53:11	39:09:44	Clarks Tributary
MP272301	Inadequate Buffer	3	2	2	76:56:48	39:10:31	River Hill Tributary
MP273301	Inadequate Buffer	1	1	1	76:56:39	39:10:23	River Hill Tributary
MP275301	Pipe Outfall	5	5	2	76:55:11	39:10:34	Clarks Tributary
MP275302	Erosion	3	3	1	76:55:21	39:10:34	Clarks Tributary
MP275303	Fish Barrier	4	2	1	76:55:23	39:10:33	Clarks Tributary
MP275304	Pipe Outfall	3	2	1	76:55:23	39:10:34	Clarks Tributary
MP275305	Pipe Outfall	3	2	2	76:55:26	39:10:34	Clarks Tributary
MP275306	Inadequate Buffer	4	1	1	76:55:16	39:10:30	Clarks Tributary
MP275307	Pipe Outfall	3	4	2	76:55:17	39:10:21	Clarks Tributary
MP276101	Fish Barrier	5	2	4	76:54:16	39:10:28	Clarks Tributary

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP276102	Erosion	4	3	4	76:54:24	39:10:24	Clarks Tributary
MP276103	Fish Barrier	5	2	1	76:54:31	39:10:21	Clarks Tributary
MP276104	Fish Barrier	4	3	2	76:54:37	39:10:20	Clarks Tributary
MP276105	Erosion	5	1	2	76:54:41	39:10:18	Clarks Tributary
MP278301	Unusual Condition	3	3	5	76:51:48	39:09:57	Lower Middle Patuxent
MP278302	Representative Site				76:53:32	39:10:30	Lower Middle Patuxent
MP279101	Fish Barrier	5	3	2	76:52:42	39:10:27	Lower Middle Patuxent
MP279102	Erosion	3	4	3	76:52:38	39:10:26	Lower Middle Patuxent
MP279103	Pipe Outfall	3	2	3	76:52:31	39:10:28	Lower Middle Patuxent
MP283101	Erosion	5	2	2	76:54:51	39:10:16	Clarks Tributary
MP283102	Pipe Outfall	3	2	1	76:54:57	39:10:16	Clarks Tributary
MP284101	Fish Barrier	4	2	2	76:54:46	39:10:16	Clarks Tributary
MP285101	Erosion	5	3	2	76:54:04	39:10:06	Clarks Tributary
MP285101	Inadequate Buffer	3	2	3	76:54:04	39:10:06	Clarks Tributary
MP285102	Erosion	3	4	5	76:53:38	39:09:58	Lower Middle Patuxent
MP286101	Fish Barrier	5	4	2	76:52:56	39:10:01	Lower Middle Patuxent
MP286102	Erosion	5	4	2	76:53:00	39:10:02	Lower Middle Patuxent
MP286103	Fish Barrier	5	3	2	76:53:02	39:10:01	Lower Middle Patuxent
MP286301	Inadequate Buffer	3	5	1	76:52:58	39:10:07	Lower Middle Patuxent
MP286302	Channel Alteration	3	3	1	76:53:05	39:10:06	Lower Middle Patuxent
MP286303	Representative Site				76:53:16	39:10:15	Lower Middle Patuxent
MP287101	Representative Site				76:52:49	39:10:10	Lower Middle Patuxent
MP287101	Unusual Condition	5	5	4	76:55:14	39:13:26	Lower Middle Patuxent
MP287301	Erosion	3	4	4	76:52:40	39:09:58	Lower Middle Patuxent
MP288101	Trash Dumping	4	1	1	76:52:15	39:10:06	Lower Middle Patuxent
MP288102	Inadequate Buffer	3	4	1	76:52:14	39:10:08	Lower Middle Patuxent
MP288103	Representative Site				76:52:13	39:10:11	Lower Middle Patuxent
MP288104	Unusual Condition	3	5	1	76:58:07	39:18:37	Lower Middle Patuxent
MP288105	Unusual Condition	3	5	1	76:53:20	39:11:11	Lower Middle Patuxent
MP288106	Erosion	3	2	2	76:51:45	39:10:02	Lower Middle Patuxent
MP291101	Representative Site				76:53:36	39:09:51	Lower Middle Patuxent
MP291102	Erosion	4	4	3	76:53:37	39:09:52	Lower Middle Patuxent
MP291103	Erosion	4	4	3	76:53:37	39:09:53	Lower Middle Patuxent
MP291104	Erosion	4	4	5	76:53:35	39:09:57	Lower Middle Patuxent
MP292101	Unusual Condition	3	3	1	76:53:28	39:10:22	Lower Middle Patuxent
MP292102	Representative Site				76:52:56	39:09:41	Lower Middle Patuxent
MP293101	Fish Barrier	4	5	3	76:52:40	39:09:49	Lower Middle Patuxent
MP293102	Fish Barrier	4	3	2	76:52:35	39:09:46	Lower Middle Patuxent
MP293301	Fish Barrier	5	5	1	76:52:36	39:09:47	Lower Middle Patuxent
MP293302	Erosion	4	5	3	76:52:38	39:09:54	Lower Middle Patuxent
MP294101	Erosion	5	3	2	76:51:49	39:09:44	Lower Middle Patuxent
MP294102	Erosion	5	2	3	76:51:48	39:09:50	Lower Middle Patuxent
MP294103	Unusual Condition	3	3	2	76:51:46	39:09:58	Lower Middle Patuxent
MP294301	Representative Site				76:52:01	39:09:51	Lower Middle Patuxent
MP294302	Representative Site				76:51:50	39:09:40	Lower Middle Patuxent
MP295301	Representative Site				76:51:28	39:09:41	Lower Middle Patuxent
MP295302	Erosion	4	5	5	76:51:29	39:09:41	Lower Middle Patuxent
MP298101	Erosion	3	5	3	76:53:01	39:09:36	Lower Middle Patuxent
MP299101	Channel Alteration	4	3	1	76:52:46	39:09:28	Lower Middle Patuxent
MP299102	Erosion	5	2	3	76:52:45	39:09:30	Lower Middle Patuxent
MP299103	Fish Barrier	5	5	3	76:52:44	39:09:32	Lower Middle Patuxent

Appendix A- Middle Patuxent

Site Number	Problem	Severity	Correctability	Access	Latitude	Longitude	Stream Segment
MP299104	Erosion	4	2	2	76:52:42	39:09:34	Lower Middle Patuxent
MP299105	Fish Barrier	5	2	2	76:52:42	39:09:34	Lower Middle Patuxent
MP299301	Representative Site				76:52:13	39:09:37	Lower Middle Patuxent
MP300301	Representative Site				76:51:05	39:09:35	Lower Middle Patuxent
MP301301	Representative Site				76:51:51	39:09:06	Lower Middle Patuxent
MP301302	Erosion	4	5	5	76:51:22	39:09:35	Lower Middle Patuxent
MP305301	Representative Site				76:50:25	39:08:35	Lower Middle Patuxent
MP310301	Representative Site				76:50:12	39:08:28	Lower Middle Patuxent
MP313301	Inadequate Buffer	4	3	2	76:51:16	39:08:34	Lower Middle Patuxent
MP314101	Fish Barrier	5	4	4	76:50:52	39:08:32	Lower Middle Patuxent
MP314102	Fish Barrier	5	4	4	76:50:57	39:08:34	Lower Middle Patuxent
MP314301	Representative Site				76:52:20	39:09:37	Lower Middle Patuxent
MP314302	Channel Alteration	5	5	3	76:50:36	39:08:36	Lower Middle Patuxent
MP315301	Erosion	3	4	4	76:50:06	39:08:23	Lower Middle Patuxent
MP315302	Representative Site				76:51:17	39:08:43	Lower Middle Patuxent

Appendix B

Listing of sites by problem category

Erosion

Problem	Site Number	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	MP173102	Widening	Land use change upstream	1000	6	Shrubs & Small Trees	Shrubs & Small Trees	No		2	5	2
Erosion	MP213101	Widening	Bend at steep slope	1000	5	Shrubs & Small Trees	Forest	No		2	4	2
Erosion	MP219101	Widening	Bend at steep slope	1000	7	Shrubs & Small Trees	Shrubs & Small Trees	No		2	4	2
Erosion	MP029106	Widening		400	4	Paved	Forest	Yes	Undercut guard rail	3	4	1
Erosion	MP037104	Widening	Bend at steep slope	250	4	Forest	Forest	No		3	2	4
Erosion	MP046102	Widening	Livestock	800	3	Pasture	Pasture	No		3	2	3
Erosion	MP050107	Widening	Bend at steep slope	150	10	Pasture	Pasture	No		3	3	1
Erosion	MP060101	Widening	Bend at steep slope	250	4	Lawn	Lawn	No		3	2	1
Erosion	MP071106	Widening		200	5	Pasture	Lawn	No		3	3	1
Erosion	MP071206	Widening	Bend at steep slope	400	7	Lawn	Forest	No		3	4	1
Erosion	MP071208	Widening	Bend at steep slope	200	6	Pasture	Forest	No		3	2	1
Erosion	MP084201	Widening	Bend at steep slope	35	5	Forest	Forest	No		3	2	4
Erosion	MP149201	Widening	Bend at steep slope	450	4	Lawn	Lawn	No		3	2	1
Erosion	MP173101	Widening	Bend at steep slope	450	4	Shrubs & Small Trees	Shrubs & Small Trees	No		3	4	4
Erosion	MP173301	Widening	Bend at steep slope	400	4	Lawn	Shrubs & Small Trees	No		3	4	2
Erosion	MP173302	Widening	Bend at steep slope	500	4	Shrubs & Small Trees	Shrubs & Small Trees	No		3	4	3
Erosion	MP183302	Widening	Bend at steep slope	250	3	Forest	Forest	Yes	Threatening channelized area	3	3	3
Erosion	MP213107	Widening	Bend at steep slope	500	3	Forest	Forest	No		3	3	3
Erosion	MP214101	Widening	Bend at steep slope	1500	4	Forest	Forest	No		3	3	2
Erosion	MP215102	Widening	Bend at steep slope	800	3.5	Shrubs & Small Trees	Shrubs & Small Trees	No		3	2	2
Erosion	MP228301	Widening	Bend at steep slope	50	12	Forest	Forest	Yes	Road on right bank	3	3	2
Erosion	MP245102	Widening	Bend at steep slope	500	4	Pasture	Pasture	No		3	2	2
Erosion	MP245104	Widening	Bend at steep slope	700	4	Pasture	Shrubs & Small Trees	No		3	2	2
Erosion	MP267102	Downcutting	Below road crossing	1400	3	Shrubs & Small Trees	Shrubs & Small Trees	No		3	3	2
Erosion	MP275302	Widening	Bend at steep slope	550	4	Forest	Forest	No		3	3	1
Erosion	MP279102	Downcutting	Pipe outfall	600	3	Forest	Forest	No		3	4	3
Erosion	MP285102	Widening		600	3	Forest	Forest	No		3	4	5
Erosion	MP287301	Widening		100	6	Forest	Forest	No		3	4	4
Erosion	MP288106	Widening	Bend at steep slope	250	5	Forest	Forest	No		3	2	2
Erosion	MP298101	Widening	Bend at steep slope	500	4	Forest	Forest	No		3	5	3
Erosion	MP315301	Downcutting	Bend at steep slope	130	12	Shrubs & Small Trees	Shrubs & Small Trees	No		3	4	4
Erosion	MP018103	Headcutting		300	3	Lawn	Lawn	No		4	2	1
Erosion	MP035104	Widening	Bend at steep slope	400	3	Pasture	Pasture	No		4	2	1
Erosion	MP045101	Widening	Bend at steep slope	100	5	Forest	Crop field	No		4	3	3
Erosion	MP045105	Widening	Bend at steep slope	250	5	Forest	Pasture	No		4	3	3

Erosion

Problem	Site Number	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	MP071103	Widening	Bend at steep slope	60	6	Lawn	Lawn	No		4	3	1
Erosion	MP071104	Widening	Below road crossing	100	5	Lawn	Lawn	No		4	2	1
Erosion	MP082101	Widening	Bend at steep slope	150	5	Shrubs & Small Trees	Forest	No		4	4	1
Erosion	MP084101	Widening	Bend at steep slope	200	5	Lawn	Forest	No		4	2	1
Erosion	MP092106	Widening	Bend at steep slope	100	4	Forest	Lawn	No		4	1	3
Erosion	MP096204	Widening	Bend at steep slope	50	8	Forest	Forest	No		4	4	4
Erosion	MP169301	Widening	Bend at steep slope	200	4	Forest	Pasture	No		4	3	1
Erosion	MP183304	Widening	Bend at steep slope	150	3.5	Shrubs & Small Trees	Shrubs & Small Trees	No		4	3	3
Erosion	MP189101	Downcutting	Bend at steep slope	100	4	Shrubs & Small Trees	Shrubs & Small Trees	No		4	1	2
Erosion	MP204101	widening	Bend at steep slope	600	2	Forest	Lawn	No		4	3	1
Erosion	MP204108	Widening	Bend at steep slope	500	2	Forest	Forest	No		4	4	2
Erosion	MP212101	Widening		75	4	Forest	Forest	No		4	4	4
Erosion	MP213102	Widening	Bend at steep slope	200	5	Lawn	Forest	No		4	3	2
Erosion	MP213103	Widening	Bend at steep slope	100	5	Forest	Forest	No		4	3	3
Erosion	MP213109	Widening	Bend at steep slope	1000	2	Forest	Lawn	No		4	4	3
Erosion	MP213110	Widening		160	3	Forest	Forest	No		4	4	5
Erosion	MP222102	Widening		600	2	Forest	Forest	No		4	4	2
Erosion	MP228101	Downcutting	Bend at steep slope	300	5	Shrubs & Small Trees	Shrubs & Small Trees	No		4	2	3
Erosion	MP234203	Widening		300	4	Forest	Pasture	No		4	3	2
Erosion	MP267107	Widening		500	1.5	Forest	Forest	No		4	4	2
Erosion	MP276102	Widening	Bend at steep slope	120	5	Forest	Forest	No		4	3	4
Erosion	MP291102	Widening		100	5	Forest	Forest	No		4	4	3
Erosion	MP291103	Headcutting		100	6.5	Forest	Forest	No		4	4	3
Erosion	MP291104	Widening		75	5	Forest	Forest	No		4	4	5
Erosion	MP293302	Widening		100	5	Forest	Forest	No		4	5	3
Erosion	MP295302	Downcutting		200	5	Forest	Forest	No		4	5	5
Erosion	MP299104	Widening	Below channelization	275	3.5	Forest	Lawn	No		4	2	2
Erosion	MP301302	Widening		100	6	Forest	Forest	No		4	5	5
Erosion	MP018105	Widening	Bend at steep slope	100	3	Lawn	Lawn	No		5	1	1
Erosion	MP029105	Headcutting	Pipe outfall	10	2	Forest	Paved	No		5	1	1
Erosion	MP062205	Widening	Bend at steep slope	25	4	Lawn	Lawn	Yes	driveway	5	2	1
Erosion	MP075301	Headcutting		25	2	Forest	Forest	No		5	1	1
Erosion	MP075302	Headcutting		200	3	Forest	Forest	No		5	2	4
Erosion	MP086102	Headcutting		200	2	Lawn	Shrubs & Small Trees	No		5	1	2
Erosion	MP092102	Widening	Bend at steep slope	50	4	Shrubs &small trees	Forest	No		5	1	3

Erosion

Problem	Site Number	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	MP114104	Widening	Bend at steep slope	60	5	Forest	Forest	No		5	3	4
Erosion	MP147102	Headcutting	Land use change upstream	25	4	Forest	Forest	No		5	1	3
Erosion	MP157101	Headcutting	Land use change upstream	20	4	Forest	Forest	No		5	1	1
Erosion	MP161105	Widening	Bend at steep slope	200	4	Shrubs & small trees	Crop field	No		5	1	2
Erosion	MP167102	Widening		200	2	Crop field	Crop field	No		5	4	2
Erosion	MP168101	Widening		150	3	Forest	Shrubs & Small Trees	No		5	4	3
Erosion	MP174101	Widening		50	2	Forest	Forest	No		5	4	4
Erosion	MP199302	Widening	Bend at steep slope	25	9	Crop field	Shrubs & Small Trees	No		5	4	3
Erosion	MP203101	Widening	Bend at steep slope	45	2	Forest	Forest	No		5	5	5
Erosion	MP204106	Widening	Bend at steep slope	50	5	Lawn	Forest	No		5	4	2
Erosion	MP204107	Widening	Bend at steep slope	50	5	Lawn	Forest	No		5	4	2
Erosion	MP204110	Widening	Bend at steep slope	200	2	Forest	Forest	No		5	4	3
Erosion	MP207301	Headcutting		5	6	Pasture	Forest	No		5	3	1
Erosion	MP215101	Widening	Bend at steep slope	50	3	Lawn	Shrubs & Small Trees	No		5	2	2
Erosion	MP218103	Widening	Pipe outfall	200	3.5	Shrubs & Small Trees	Paved	No		5	1	2
Erosion	MP223302	Widening	Bend at steep slope	50	5	Shrubs & Small Trees	Shrubs & Small Trees	No		5	1	2
Erosion	MP233301	Widening	Bend at steep slope	25	6	Forest	Forest	No		5	3	2
Erosion	MP242302	Widening		75	3	Forest	Forest	No		5	3	4
Erosion	MP243301	Widening	Bend at steep slope	35	6	Forest	Forest	No		5	3	2
Erosion	MP244101	Downcutting	Bend at steep slope	100	3.5	Shrubs & Small Trees	Shrubs & Small Trees	No		5	3	1
Erosion	MP246303	Headcutting	Bend at steep slope	20	6	Forest	Lawn	No		5	4	3
Erosion	MP248101	Widening		175	3	Forest	Forest	No		5	1	3
Erosion	MP255301	Widening		200	2.5	Lawn	Lawn	No		5	1	2
Erosion	MP258103	Widening	Bend at steep slope	50	4	Forest	Forest	No		5	3	3
Erosion	MP258105	Widening	Bend at steep slope	50	5	Forest	Forest	No		5	3	3
Erosion	MP258107	Widening	Below channelization	200	3	Shrubs & Small Trees	Shrubs & Small Trees	No		5	2	2
Erosion	MP266302	Headcutting		100	3	Forest	Forest	No		5	3	3
Erosion	MP267103	Widening	Bend at steep slope	30	5	Forest	Lawn	No		5	2	2
Erosion	MP267104	Widening		300	2	Forest	Forest	No		5	4	2
Erosion	MP276105	Widening	Bend at steep slope	50	4	Lawn	Lawn	No		5	1	2
Erosion	MP283101	Widening	Bend at steep slope	50	6	Forest	Forest	No		5	2	2
Erosion	MP285101	Downcutting	Pipe outfall	600	2	Shrubs & Small Trees	Lawn	No		5	3	2
Erosion	MP286102	Widening	Bend at steep slope	200	3	Forest	Forest	No		5	4	2
Erosion	MP294101	Downcutting	Bend at steep slope	200	3	Shrubs & Small Trees	Shrubs & Small Trees	No		5	3	2
Erosion	MP294102	Widening	Bend at steep slope	100	4	Forest	Forest	No		5	2	3

Erosion

Problem	Site Number	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	MP299102	Widening	Bend at steep slope	200	3	Forest	Shrubs & Small Trees	No		5	2	3

Inadequate Buffer

Problem	Site Number	Sides	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	LandUseRight	LandUseLeft	Recently established	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	MP018101	Both	Neither	0	0	1000	1000	Lawn	Lawn	No		1	3	1	4
Inadequate Buffer	MP079101	Both	Both	0	0	1300	1300	Pasture	Pasture	No	Cattle	1	3	1	1
Inadequate Buffer	MP162102	Both	Both	0	0	2000	2000	Pasture	Pasture	No	Horses	1	4	1	1
Inadequate Buffer	MP206101	Both	Both	0	0	1000	1000	Lawn	Lawn	No		1	1	1	3
Inadequate Buffer	MP236103	Both	Both	0	0	1200	500	Pasture	Pasture	No		1	2	2	1
Inadequate Buffer	MP254101	Both	Both	0	0	1000	1000	Pasture	Pasture	No		1	2	2	1
Inadequate Buffer	MP273301	Both	Both	0	0	1200	1200	Pasture	Pasture	No		1	1	1	4
Inadequate Buffer	MP018102	Both	Both	0	0	600	600	Lawn	Lawn	No		2	3	1	5
Inadequate Buffer	MP046102	Both	Both	0	0	800	800	Pasture	Pasture	No	Horses	2	3	3	5
Inadequate Buffer	MP052107	Both	Left	0	0	750	750	Lawn	Lawn	No		2	3	1	3
Inadequate Buffer	MP098104	Both	Neither	10	10	4400	4400	Pasture	Pasture	No	Horses	2	3	1	5
Inadequate Buffer	MP136202	Both	Both	0	0	800	800	Crop field	Crop field	No		2	3	1	4
Inadequate Buffer	MP151109	Both	Both	5	5	600	600	Lawn	Pasture	No	Horses	2	3	1	3
Inadequate Buffer	MP189102	Both	Both	0	0	800	500	Lawn	Lawn	No		2	2	3	2
Inadequate Buffer	MP234302	Both	Neither	5	5	1500	1500	Lawn	Lawn	No		2	1	1	3
Inadequate Buffer	MP235104	Both	Both	0	0	600	600	Lawn	Lawn	No		2	3	2	1
Inadequate Buffer	MP236102	Both	Both	0	0	600	600	Pasture	Pasture	No		2	2	2	4
Inadequate Buffer	MP236104	Right	Both	0	0	500	1000	Pasture	Pasture	No		2	2	1	4
Inadequate Buffer	MP245103	Both	Both	20	0	1000	1000	Pasture	Trees	No		2	2	2	2
Inadequate Buffer	MP014101	Right	Left	25	0	400	400	Pasture	Pasture	No		3	2	4	5
Inadequate Buffer	MP018104	Both	Both	0	0	500	500	Lawn	Lawn	No		3	3	1	4
Inadequate Buffer	MP027105	Both	Neither	10	0	600	600	Lawn	Lawn	No		3	1	1	2
Inadequate Buffer	MP029104	Left	Neither	0	50	1000		Pasture	Paved	No		3	5	1	5
Inadequate Buffer	MP029106	Left	Left	0	50	400		Paved	Forest	No		3	5	1	5
Inadequate Buffer	MP035104	Both	Both	0	0	400	400	Pasture	Pasture	No		3	3	1	5
Inadequate Buffer	MP060101	Both	Both	0	0	250	250	Lawn	Lawn	No		3	2	1	3
Inadequate Buffer	MP071206	Right	Neither	100	0	300		Lawn	Forest	No		3	2	1	5
Inadequate Buffer	MP098103	Right	Right	20	0		600	Crop field	Trees	No		3	1	1	4
Inadequate Buffer	MP101101	Left	Left	0	50	800	1000	Forest	Pasture	No		3	2	2	5
Inadequate Buffer	MP105109	Left	Neither	0	50	800		Lawn	Forest	No		3	2	1	5
Inadequate Buffer	MP116101	Left	Neither	10	30	800	600	Lawn	Lawn	No		3	2	1	2
Inadequate Buffer	MP116102	Both	Neither	10	10	500	600	Lawn	Lawn	No		3	2	1	1

Inadequate Buffer

Problem	Site Number	Sides	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	LandUseRight	LandUseLeft	Recently established	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	MP133102	Left	Left	0	100	850		Forest	Pasture	No		3	3	1	5
Inadequate Buffer	MP149201	Both	Both	0	0	400	500	Lawn	Lawn	No		3	2	1	4
Inadequate Buffer	MP162104	Right	Right	50	3		300	Crop Field	forest	No		3	3	2	3
Inadequate Buffer	MP168103	Right	Right	50	0		300	Trees	lawn	No		3	1	1	3
Inadequate Buffer	MP170301	Left	Neither	0	50	600		Trees	Pasture	No		3	1	1	2
Inadequate Buffer	MP170302	Both	Both	0	0	400	400	Pasture	Pasture	No		3	1	1	1
Inadequate Buffer	MP171301	Right	Neither	0	50	500		Pasture	Pasture	No		3	1	1	3
Inadequate Buffer	MP177102	Both	Both	0	0	500	500	lawn	lawn	No		3	1	1	3
Inadequate Buffer	MP177104	Both	Both	0	0	600	50	pasture	forest	No	Cows	3	2	2	2
Inadequate Buffer	MP177106	Right	Right	50	0		1000	Trees	pasture	No		3	2	2	3
Inadequate Buffer	MP177107	Both	Both	0	0	500	200	lawn	lawn	No		3	1	1	2
Inadequate Buffer	MP180101	Both	Both	10	15	1000	1000	pasture	crop field	No		3	2	5	2
Inadequate Buffer	MP183303	Right	Right	300	0		300	Lawn	Trees	No		3	2	1	2
Inadequate Buffer	MP185301	Both	Both	0	0	200	200	lawn	lawn	No		3	4	1	2
Inadequate Buffer	MP191101	Left	Left	0	50	600		Pasture	Pasture	No		3	1	1	5
Inadequate Buffer	MP192302	Both	Both	0	0	500	500	Pasture	Pasture	No		3	1	1	2
Inadequate Buffer	MP195301	Both	Both	0	0	400	400	lawn	lawn	No		3	2	1	3
Inadequate Buffer	MP200301	Right	Neither	50	5		500	Crop field	Pasture	No		3	2	2	4
Inadequate Buffer	MP211302	Both	Both	0	0	300	300	Paved	Lawn	No		3	4	1	2
Inadequate Buffer	MP216101	Both	Both	0	0	300	300	Lawn	Lawn	No		3	2	1	1
Inadequate Buffer	MP219301	Right	Neither	50	0		1000	Lawn	Forest	No		3	1	1	4
Inadequate Buffer	MP222104	Both	Both	0	0	300	300	Trees	Trees	No		3	1	1	3
Inadequate Buffer	MP225101	Both	Both	0	0	700	300	Pasture	Crop field	No		3	2	2	2
Inadequate Buffer	MP227101	Both	Both	0	0	450	450	Crop field	Crop field	No		3	3	2	4
Inadequate Buffer	MP229301	Left	Neither	0	50	300		Forest	Pasture	No		3	1	1	4
Inadequate Buffer	MP234201	Both		0	0	350	350	Pasture	Pasture	No		3	3	2	3
Inadequate Buffer	MP234301	Both	Both	0	15	500	500	Crop field	Pasture	No		3	1	1	4
Inadequate Buffer	MP240301	Left	Neither	6	50	450		Forest	Lawn	No		3	1	4	3
Inadequate Buffer	MP245101	Both	Both	10	10	700	1000	Pasture	Lawn	No		3	1	1	4
Inadequate Buffer	MP245105	Left	Left	0	50	400		Trees	Lawn	No		3	2	2	4
Inadequate Buffer	MP246301	Both	Both	5	5	350	1000	Lawn	Lawn	No		3	1	1	3
Inadequate Buffer	MP249301	Left	Neither	12	50	300		Forest	Paved	No		3	5	1	5

Inadequate Buffer

Problem	Site Number	Sides	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	LandUseRight	LandUseLeft	Recently established	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	MP255301	Both	Both	0	0	500	500	Lawn	Lawn	No		3	1	1	4
Inadequate Buffer	MP259102	Both	Both	0	0	300	300	lawn	lawn	No		3	1	1	2
Inadequate Buffer	MP265301	Both	Both	0	0	500	500	Lawn	Lawn	No		3	2	1	4
Inadequate Buffer	MP267105	Both	Both	0	0	300	300	lawn	lawn	No		3	2	2	3
Inadequate Buffer	MP272301	Right	Right	50	0		1500	lawn	Forest	No		3	2	2	4
Inadequate Buffer	MP285101	Left	Left	0	50	300		Trees	Lawn	No		3	2	3	2
Inadequate Buffer	MP286301	Left	Left	0	50	1000		Forest	Paved	No		3	5	1	5
Inadequate Buffer	MP288102	Both	Both	0	0	600	600	paved	paved	No		3	4	1	2
Inadequate Buffer	MP040107	Both	Both	10	10	200	200	Lawn	Lawn	No		4	5	1	4
Inadequate Buffer	MP062204	Both	Both	0	0	45	100	Lawn	Lawn	No		4	2	1	3
Inadequate Buffer	MP062205	Both	Both	0	0	40	40	Lawn	Lawn	No		4	2	1	3
Inadequate Buffer	MP071104	Left	Neither	0	100	100		Forest	Lawn	No		4	2	1	4
Inadequate Buffer	MP071208	Right	Both	100	0		200	Pasture	Forest	No	Yes	4	2	1	5
Inadequate Buffer	MP082103	Both	Both	0	0	150	150	Lawn	Pasture	No	Horses	4	3	2	5
Inadequate Buffer	MP084101	Right	Right	0	0		200	Lawn	Forest	No		4	2	1	5
Inadequate Buffer	MP149202	Both	Both	0	0	100	100	Lawn	Lawn	No		4	2	1	2
Inadequate Buffer	MP179101	Left	Left	0	100	200		Trees	Lawn	No		4	2	2	2
Inadequate Buffer	MP199301	Both	neither	15	5	300	100	Crop field	Pasture	No		4	1	1	2
Inadequate Buffer	MP204103	Right	Right	100	0		100	forest	lawn	No		4	1	2	4
Inadequate Buffer	MP226101	Both	Both	0	0	100	300	Pasture	Pasture	No		4	3	3	4
Inadequate Buffer	MP234202	Left	Left	8	50	250		Forest	Pasture	No		4	2	2	3
Inadequate Buffer	MP258102	Left	Left	0	50	100		lawn	Trees	No		4	1	1	3
Inadequate Buffer	MP258108	Both	Both	0	0	200	200	pasture	pasture	No	Horses	4	1	1	4
Inadequate Buffer	MP268301	Right	Right	50	0		100	Lawn	Paved	No		4	1	1	5
Inadequate Buffer	MP275306	Left	Left	10	50	700		Forest	Paved	No		4	1	1	4
Inadequate Buffer	MP313301	Both	Both	0	0	150	150	lawn	lawn	No		4	3	2	4
Inadequate Buffer	MP085103	Left	Neither	5	100	250		Forest	Lawn	No		5	2	1	4
Inadequate Buffer	MP171302	Left	Neither	15	50	500		Trees	Pasture	No		5	1	1	3
Inadequate Buffer	MP211301	Both	Both	0	0	75	75	Lawn	Lawn	No		5	2	1	1

Fish Barrier

Problem	Site Number	Blockage	Type	Reason	Drop(In)	Depth(In)	Severity	Correctability	Access
Fish Barrier	MP082102	Total	Road crossing	Too high	18		3	5	1
Fish Barrier	MP152106	Total	Dam	Too high	24		3	3	1
Fish Barrier	MP183301	Total	Channelized	Too high	3		3	3	1
Fish Barrier	MP267101	Total	Road crossing	Too high	8		3	5	1
Fish Barrier	MP045106	Temporary	Beaver dam	Too shallow		2	4	3	3
Fish Barrier	MP183302	Total	Natural falls	Too high	16		4	4	2
Fish Barrier	MP190102	Total	Natural falls	Too high	12		4	1	5
Fish Barrier	MP204109	Partial	Natural falls	Too high	8		4	4	3
Fish Barrier	MP204111	Total	Natural falls	Too high	8		4	3	3
Fish Barrier	MP204301	Total	Natural falls	Too high	6		4	2	3
Fish Barrier	MP213105	Total	Natural falls	Too high	24		4	4	3
Fish Barrier	MP213106	Total	Natural falls	Too high	8		4	3	3
Fish Barrier	MP222101	Total	Dam	Too high	14		4	4	1
Fish Barrier	MP222103	Temporary	Debris Dam	Too Shallow		0.5	4	2	3
Fish Barrier	MP244102	Temporary	Debris Dam	Too high	6		4	2	2
Fish Barrier	MP244103	Total	Road crossing	Too high	8		4	4	2
Fish Barrier	MP244104	Total	Road crossing	Too high	4		4	4	1
Fish Barrier	MP246302	Partial	Natural falls	Too high	10		4	1	1
Fish Barrier	MP254103	Total	Road crossing	Too high	12		4	4	2
Fish Barrier	MP258106	Total	Dam	Too high	10		4	2	2
Fish Barrier	MP260302	Total	road crossing	Too high	36		4	4	1
Fish Barrier	MP266301	Total	Natural falls	Too high	36		4	5	4
Fish Barrier	MP267106	Total	Natural falls	Too high	16		4	4	2
Fish Barrier	MP267301	Total	Natural falls	Too high	8		4	1	1
Fish Barrier	MP275303	Total	Natural falls	Too high	18		4	2	1
Fish Barrier	MP276104	Partial	Road crossing	Too high	6		4	3	2
Fish Barrier	MP284101	Temporary	Debris Dam	Too high	24		4	2	2
Fish Barrier	MP293101	Total	Natural falls	Too high	12		4	5	3
Fish Barrier	MP293102	Total	Natural falls	Too high	12		4	3	2
Fish Barrier	MP027101	Temporary	Debris dam	Too shallow		2	5	2	3
Fish Barrier	MP027102	Temporary	Debris Dam	Too shallow		3	5	2	3
Fish Barrier	MP027106	Temporary	Debris Dam	Too shallow		2	5	2	4
Fish Barrier	MP046105	Temporary	Beaver dam	Too high	60		5	3	1
Fish Barrier	MP052106	Temporary	Debris Dam	Too Shallow		2	5	2	2

Fish Barrier

Problem	Site Number	Blockage	Type	Reason	Drop(In)	Depth(In)	Severity	Correctability	Access
Fish Barrier	MP152107	Temporary	Debris Dam	Too high	8		5	5	2
Fish Barrier	MP182301	Temporary	Debris Dam	Too high	18		5	2	2
Fish Barrier	MP195302	Total	Natural falls	Too high	11		5	1	1
Fish Barrier	MP199303	Total	Debris Dam	Too high	12		5	2	1
Fish Barrier	MP199304	Total	Natural falls	Too high	8		5	4	2
Fish Barrier	MP204105	Total	Natural falls	Too high	6		5	4	2
Fish Barrier	MP212302	Temporary	Debris Dam	Too high	12		5	1	2
Fish Barrier	MP213104	Total	Natural falls	Too high	48		5	2	3
Fish Barrier	MP213108	Total	Natural falls	Too high	6		5	3	3
Fish Barrier	MP222302	Temporary	Debris Dam	Too high	8		5	1	2
Fish Barrier	MP225102	Temporary	Debris Dam	Too high	3		5	1	3
Fish Barrier	MP233302	Temporary	Debris Dam	Too high	10		5	2	2
Fish Barrier	MP235102	Temporary	Debris Dam	Too high	8		5	2	2
Fish Barrier	MP235103	Temporary	Beaver dam	Too high	24		5	2	2
Fish Barrier	MP254102	Total	Natural falls	Too high	36		5	2	2
Fish Barrier	MP258104	Temporary	Debris Dam	Too high	24		5	3	2
Fish Barrier	MP259101	Temporary	Debris Dam	Too high	10		5	3	4
Fish Barrier	MP263102	Temporary	Debris Dam	Too Shallow		0.5	5	1	5
Fish Barrier	MP267108	Total	Natural falls	Too high	18		5	4	2
Fish Barrier	MP267109	Total	Debris Dam	Too Shallow		0.5	5	3	2
Fish Barrier	MP276101	Temporary	Beaver dam	Too high	8		5	2	4
Fish Barrier	MP276103	Temporary	Debris Dam	Too high	3		5	2	1
Fish Barrier	MP279101	Total	Channelized	Too high	10		5	3	2
Fish Barrier	MP286101	Total	Natural falls	Too high	18		5	4	2
Fish Barrier	MP286103	Temporary	Debris Dam	Too high	18		5	3	2
Fish Barrier	MP293301	Partial	Beaver dam	Too high	24		5	5	1
Fish Barrier	MP299103	Total	Channelized	Too Shallow		1	5	5	3
Fish Barrier	MP299105	Temporary	Debris Dam	Too high	12		5	2	2
Fish Barrier	MP314101	Total	Natural falls	Too high	24		5	4	4
Fish Barrier	MP314102	Total	Natural falls	Too high	36		5	4	4

Pipe Outfall

Problem	Site Number	Outfall Type	Pipe Type	Location of Pipe	Diameter (in)	Channel Width	Purpose	Discharge	Color	Odor	Severity	Correctability	Acc
Pipe Outfall	MP040106	Stormwater	Concrete Pipe	Left bank	36		Stormwater	Yes	Clear	None	3	1	1
Pipe Outfall	MP116201	Stormwater	Corrugated Metal	Right bank	8		Stormwater	Yes	Clear	None	3	1	1
Pipe Outfall	MP168102	Stormwater	Plastic	Left bank	4		Stormwater	Yes	Clear	None	3	3	3
Pipe Outfall	MP177103	Stormwater	Plastic	Right bank	4		Stormwater	Yes	Clear	None	3	3	2
Pipe Outfall	MP177105	Stormwater	Corrugated Metal		8		Stormwater	Yes	Clear	None	3	3	3
Pipe Outfall	MP204104	Stormwater	Corrugated Metal		18		Stormwater	Yes	Clear	None	3	5	2
Pipe Outfall	MP218101	Stormwater	Plastic	Head of stream	24		Stormwater	Yes	Clear	None	3	2	2
Pipe Outfall	MP218102	Stormwater	Concrete Pipe	Left bank	24		Stormwater	Yes	Clear	None	3	2	2
Pipe Outfall	MP263301	Stormwater	Corrugated Metal		8		Stormwater	Yes	Clear	None	3	3	2
Pipe Outfall	MP275304	Pond Overflow	Corrugated Metal	Head of stream	8		Pond Overflow	Yes	Brown	Musky	3	2	1
Pipe Outfall	MP275305	Unknown	Plastic		4		Unknown	Yes	Clear	None	3	2	2
Pipe Outfall	MP275307	Stormwater	Concrete Pipe	Head of stream	24		Stormwater	Yes	Clear	None	3	4	2
Pipe Outfall	MP279103	Stormwater	Concrete Pipe	Head of stream	36		Stormwater	Yes	Clear	None	3	2	3
Pipe Outfall	MP283102	Stormwater	Corrugated Metal	Head of stream	24		Stormwater	Yes	Clear	None	3	2	1
Pipe Outfall	MP071207	Unknown	Plastic	Right bank	6		Unknown	No			5	1	1
Pipe Outfall	MP204102	Unknown	Plastic		4		Unknown	No			5	3	2
Pipe Outfall	MP223301	Stormwater	Concrete Pipe	Head of stream	24		Stormwater	No			5	1	1
Pipe Outfall	MP275301	Unknown	Corrugated Metal		12		Unknown	No			5	5	2

Channel Alteration

Problem	Site Number	Type	BottomWidth(in)	Length(ft)	Perennial Flow	Sedimentation	Vegetation in Channel	Road Crossing	LengthAbove(ft)	LengthBelow(ft)	Severity	Correctability	Access
Channel Alteration	MP286302	Concrete	48	500	No	No	No	no			3	3	1
Channel Alteration	MP062108	Gabion	24	25	Yes	No	Yes	Below		25	4	4	1
Channel Alteration	MP062203	Concrete	24	25	Yes	No	No	Both	4	4	4	3	1
Channel Alteration	MP214102	Concrete	24	250	No	Yes	Yes	no			4	3	1
Channel Alteration	MP218105	Concrete	240	300	Yes	Yes	No	below		50	4	5	1
Channel Alteration	MP299101	Gabion	60	100	Yes	Yes	Yes	no			4	3	1
Channel Alteration	MP026103	Earth Channel	120	100	Yes	Yes	Yes	No			5	1	1
Channel Alteration	MP071105	Gabion	120	50	Yes	Yes	Yes	Above	50		5	3	1
Channel Alteration	MP087102		36	40	Yes	No	No	Both	20	20	5	1	2
Channel Alteration	MP172102	Concrete	48	150	Yes	Yes	Yes				5	5	1
Channel Alteration	MP225103	Gabion	70	45	Yes	Yes	No	below		45	5	5	1
Channel Alteration	MP236101	Concrete	240	60	Yes	Yes	Yes	no			5	4	1
Channel Alteration	MP240302	corrigated metal	48	100	Yes	No	No	below		100	5	5	1
Channel Alteration	MP314302	Rip-Rap	360	600	Yes	Yes	No	no			5	5	3

Unusual Conditon/Comment

Problem	Site Number	Type	Description	Potential Cause	Severity	Correctability	Access
Unusual Condition	MP193303		several conditions,gabion baskets,standing water,silt fencing	County storm mgmt. area)	2	4	1
Unusual Condition	MP027104	Piped Stream	Stream Piped for 45 feet		3	3	1
Unusual Condition	MP258101	Oil	oil slick and red flock present for about 500+ ft of stream	unknown	3	3	1
Unusual Condition	MP260303	Piped Stream	Stream Piped for 30 feet		3	3	1
Unusual Condition	MP278301	Piped Stream	Stream Piped For 30 feet		3	3	5
Unusual Condition	MP288104	Piped Stream	Stream Piped for 200 feet	Pond Outflow	3	5	1
Unusual Condition	MP288105		storm mgmt. pond w/ all of the above conditions except sewage	road construction downstream	3	5	1
Unusual Condition	MP292101	red flock	significant length of stream filled w/ red flock 500+ft	?near stream construction?	3	3	1
Unusual Condition	MP294103	red flock	red flock		3	3	2
Unusual Condition	MP167101		near/in stream construction-drainage pipes?		4	3	1
Unusual Condition	MP268302	red flock	red colored discharge from pipe draining into trib		4	3	1
Unusual Condition	MP024103		pipes and generator in stream near greenhouses	irrigation	5	3	4
Unusual Condition	MP084203	Scum	scum with odor; oily in appearance, sitting three feet from right bank	unknown	5	2	2
Unusual Condition	MP287101		series of natural falls of bedrock		5	5	4

Trash Dumping

Problem	Site Number	Type	Truckloads	Other measure	Extent	Volunteer Project?	Owner Type	Owner Name	Severity	Correctability	Access
Trash Dumping	MP255302	Vehicles		LARGE waste (junkyard)	Large Area	No	junkyard		1	5	1
Trash Dumping	MP256301	Vehicles		LARGE waste (junkyard)	Large Area	No	junkyard		1	5	1
Trash Dumping	MP086101		3		Single site	No	Private		3	3	2
Trash Dumping	MP135101	Pipe	1	Pipe-larger than pick-up truck	Single site	No	Private		3	3	2
Trash Dumping	MP258109	Yard waste	20			Yes	Private	Boris	3	2	1
Trash Dumping	MP288101	Yard waste	1		Single site	Yes	Public	Eden Brook Community	4	1	1
Trash Dumping	MP027103	Residential	1		Single site	Yes	Public	Howard County Fairgrounds	5	1	1

Tree Blockages

Problem	Site Number	Extent	Severity	Tree Size	Location	Orientation To Flow	Composition	Debris Collection	Impacts	Nearest Bridge/Culvert	Surrounding Land Use
Tree Blockage	MP092104	More Than Half	Moderate	Medium	Wholly	Angle	Trunk	Some	No Impact	Within 1/2 mile	Partially Developed
Tree Blockage	MP092107	Complete	Moderate	Medium	Wholly	Perpendicular	Trunk	Some	No Impact	More Than 1/2 mile	Partially Developed
Tree Blockage	MP116205	Complete	Bad	Large	Wholly	Perpendicular	Trunk	Lots	Both Banks	Within 1/2 mile	Natural
Tree Blockage	MP162104	More than Half	Moderate	Medium	Wholly	Perpendicular	Branches	Lots	Bed	Within 1/2 mile	Partially Developed

Exposed Pipe

Problem	Site Number	Location of Pipe	Type	Diameter(in)	Length(ft)	Purpose	Discharge	Color	Odor	Severity	Correctability	Access
Exposed Pipe	MP177101	Exposed across bottom of stream	plastic	4	4	unknown	No			3	3	2
Exposed Pipe	MP192301	Exposed along stream bank	smooth metal	4	3	unknown	No			4	1	1

Pond Sites

Problem	Site Number	Type	Primary Use	Pond on Map?	Maintained?	Maintenance:	Eutrophication?	Trees/Animals
Pond Site	MP152108	Wet	Farm	No	Yes		Yes	No

Representative Sites A

Problem	Site Number	Substrate	Embeddedness	Shelter for Fish	Channel Alteration	Sediment Deposition	Velocity/Depth	Flow	Vegetation	Bank Condition	Riparian Vegetation
Upper Middle Patuxent											
Representative Site	MP071102	Suboptimal	Suboptimal	Marginal	Optimal	Optimal	Marginal	Optimal	Suboptimal	Suboptimal	Marginal
Representative Site	MP084202	Suboptimal	Suboptimal	Optimal	Optimal	Marginal	Marginal	Marginal	Optimal	Marginal	Optimal
Representative Site	MP125103	Suboptimal	Poor	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	MP137203	Suboptimal	Marginal	Optimal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal
Average		**Suboptimal**	**Marginal**	**Optimal**	**Optimal**	**Suboptimal**	**Suboptimal**	**Suboptimal**	**Optimal**	**Suboptimal**	**Optimal**
Benson Branch											
Representative Site	MP131101	Marginal	Marginal	Suboptimal	Optimal	Marginal	Suboptimal	Optimal	Optimal	Optimal	Optimal
Rover Mill Tributary											
Representative Site	MP014102	Suboptimal	Marginal	Optimal	Optimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Marginal
Fairgrounds Tributary											
Representative Site	MP027107	Marginal	Marginal	Suboptimal	Optimal	Poor	Suboptimal	Optimal	Optimal	Marginal	Optimal
South Sykesville Tributary											
Representative Site	MP062202	Optimal	Marginal	Suboptimal	Optimal	Marginal	Optimal	Suboptimal	Optimal	Suboptimal	Marginal
Quarterfield Tributary											
Representative Site	MP087101	Suboptimal	Marginal	Suboptimal	Optimal	Marginal	Optimal	Marginal	Optimal	Marginal	Suboptimal
Representative Site	MP088105	Suboptimal	Marginal	Optimal	Optimal	Marginal	Suboptimal	Suboptimal	Poor	Suboptimal	Poor
Representative Site	MP129108	Optimal	Suboptimal	Suboptimal	Optimal	Marginal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal
Average		**Suboptimal**	**Marginal**	**Suboptimal**	**Optimal**	**Marginal**	**Optimal**	**Suboptimal**	**Suboptimal**	**Suboptimal**	**Suboptimal**
Kings Grant Tributary											
Representative Site	MP092105	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Marginal

Representative Sites A

Problem	Site Number	Substrate	Embeddedness	Shelter for Fish	Channel Alteration	Sediment Deposition	Velocity/Depth	Flow	Vegetation	Bank Condition	Riparian Vegetation
Hayes Field Tributary											
Representative Site	MP162103	Optimal	Suboptimal	Suboptimal	Optimal	Marginal	Optimal	Suboptimal	Marginal	Suboptimal	Poor
Representative Site	MP172101	Marginal	Marginal	Optimal	Optimal	Marginal	Optimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	MP190101	Marginal	Marginal	Suboptimal	Optimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Optimal
Representative Site	MP208301	Marginal	Marginal	Marginal	Marginal	Marginal	Suboptimal	Optimal	Optimal	Optimal	Optimal
Average		**Marginal**	**Marginal**	**Suboptimal**	**Optimal**	**Marginal**	**Optimal**	**Optimal**	**Optimal**	**Suboptimal**	**Suboptimal**
River Hill Tributary											
Representative Site	MP216102	Suboptimal	Optimal	Marginal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	MP218104	Suboptimal	Marginal	Poor	Optimal	Poor	Marginal	Marginal	Suboptimal	Marginal	Suboptimal
Representative Site	MP225104	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	MP230301	Suboptimal	Marginal	Marginal	Suboptimal	Marginal	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP235101	Suboptimal	Marginal	Marginal	Suboptimal	Marginal	Suboptimal	Optimal	Poor	Suboptimal	Poor
Representative Site	MP237101	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	MP238301	Suboptimal	Marginal	Marginal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP242301	Suboptimal	Suboptimal	Marginal	Optimal	Marginal	Optimal	Suboptimal	Optimal	Optimal	Optimal
Representative Site	MP263101	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Optimal
Average		**Suboptimal**	**Suboptimal**	**Marginal**	**Optimal**	**Suboptimal**	**Suboptimal**	**Optimal**	**Optimal**	**Suboptimal**	**Optimal**
Clarks Tributary											
Representative Site	MP267302	Suboptimal	Marginal	Suboptimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal
Harpers Ridge Tributary											
Representative Site	MP222301	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Marginal	Marginal	Suboptimal	Optimal	Suboptimal	Suboptimal
Representative Site	MP231301	Suboptimal	Suboptimal	Marginal	Suboptimal	Suboptimal	Marginal	Suboptimal	Suboptimal	Marginal	Marginal
Average		**Suboptimal**	**Suboptimal**	**Suboptimal**	**Suboptimal**	**Suboptimal**	**Marginal**	**Suboptimal**	**Optimal**	**Suboptimal**	**Suboptimal**

Representative Sites A

Problem	Site Number	Substrate	Embeddedness	Shelter for Fish	Channel Alteration	Sediment Deposition	Velocity/Depth	Flow	Vegetation	Bank Condition	Riparian Vegetation
Lower Middle Patuxent											
Representative Site	MP194301	Marginal	Poor	Suboptimal	Optimal	Poor	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP203301	Poor	Poor	Poor	Optimal	Poor	Poor	Optimal	Optimal	Optimal	Optimal
Representative Site	MP212301	Suboptimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP221301	Poor	Poor	Optimal	Optimal	Poor	Marginal	Suboptimal	Optimal	Optimal	Optimal
Representative Site	MP260301	Optimal	Suboptimal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP278302	Suboptimal	Suboptimal	Optimal	Optimal	Marginal	Optimal	Suboptimal	Optimal	Optimal	Optimal
Representative Site	MP286303	Suboptimal	Marginal	Suboptimal	Optimal	Marginal	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP287101	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP288103	Suboptimal	Poor	Optimal	Poor	Poor	Poor	Poor	Suboptimal	Suboptimal	Marginal
Representative Site	MP291101	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal	Optimal	Optimal
Representative Site	MP292102	Suboptimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP294301	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel
Representative Site	MP294302	Suboptimal	Marginal	Marginal	Suboptimal	Marginal	Marginal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP295301	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel
Representative Site	MP299301	Suboptimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	MP300301	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel
Representative Site	MP301301	Marginal	Marginal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Suboptimal	Optimal
Representative Site	MP305301	Marginal	Marginal	Marginal	Suboptimal	Marginal	Marginal	Optimal	Optimal	Optimal	Suboptimal
Representative Site	MP310301	Suboptimal	Marginal	Poor	Marginal	Marginal	Poor	Suboptimal	Optimal	Optimal	Optimal
Representative Site	MP314301	Suboptimal	Poor	Marginal	Optimal	Marginal	Optimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	MP315302	Optimal	Suboptimal	Marginal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal
Average		**Suboptimal**	**Marginal**	**Suboptimal**	**Optimal**	**Marginal**	**Suboptimal**	**Optimal**	**Optimal**	**Optimal**	**Optimal**

Representative Sites B

Problem	Site Number	Width Riffle	Width Run	Width Pool	Depth Riffle	Depth Run	Depth Pool	Bottom Type
Upper Middle Patuxent								
Representative Site	MP071102	60	36	60	2	4	5	Gravel
Representative Site	MP084202	180	180	180	3	4	18	Cobble
Representative Site	MP125103	120	120	70	3	5	6	Cobble
Representative Site	MP137203	240	300	540	10	12	60	Cobble
Benson Branch								
Representative Site	MP131101	60	36	120	4	1	48	Cobble
Rover Mill Tributary								
Representative Site	MP014102	42	42	70	2	3	6	Cobble
Fairgrounds Tributary								
Representative Site	MP027107	60	96	120	3	3	7	Cobble
South Sykesville Tributary								
Representative Site	MP062202	84	84	60	2	10	16	Cobble
Quarterfield Tributary								
Representative Site	MP087101	48	45	72	3	6	24	Gravel
Representative Site	MP088105	12	24	24	3	4	6	Sand
Representative Site	MP129108	96	180	72	3	12	36	Gravel

Representative Sites B

Problem	Site Number	Width Riffle	Width Run	Width Pool	Depth Riffle	Depth Run	Depth Pool	Bottom Type
Kings Grant Tributary								
Representative Site	MP092105	36	72	72	2	4	6	Cobble
Hayes Field Tributary								
Representative Site	MP162103	42	42	72	2	3	12	Cobble
Representative Site	MP172101	120	360	840	4	8	18	silt
Representative Site	MP190101	36	48	36	4	8	12	silt
Representative Site	MP208301	24	36	48	8	24	24	cobble
River Hill Tributary								
Representative Site	MP216102	48	12	60	2	3	18	sand
Representative Site	MP218104	24	24	24	1	2	6	silt
Representative Site	MP225104	6	18	36	2	3	12	silt
Representative Site	MP230301	168	144	36	8	20	18	cobble
Representative Site	MP235101	48	66	72	5	11	20	silt
Representative Site	MP237101	60	120	36	1	8	24	Gravel
Representative Site	MP238301	64	64	18	2	6	8	gravel
Representative Site	MP242301	36	48	36	12	36	12	cobble
Representative Site	MP263101	60	60	120	3	6	8	cobble
Clarks Tributary								
Representative Site	MP267302	60	96	96	3	5	12	cobble
Harpers Ridge Tributary								
Representative Site	MP222301	3	36	60	1	5	8	cobble
Representative Site	MP231301	60	60	72	3	5	6	boulder

Representative Sites B

Problem	Site Number	Width Riffle	Width Run	Width Pool	Depth Riffle	Depth Run	Depth Pool	Bottom Type
Lower Middle Patuxent								
Representative Site	MP194301	192	420	72	6	12	36	sand
Representative Site	MP203301	0	300	144	0	12	32	sand
Representative Site	MP212301	360	300	120	6	24	36	cobble
Representative Site	MP221301	0	360	0	0	24	0	silt
Representative Site	MP260301	36	20	12	0	0	0	gravel
Representative Site	MP278302	240	360	144	24	0	24	gravel
Representative Site	MP286303	96	48	144	0	0	0	cobble
Representative Site	MP287101	16	16	36	0.25	1	0	bedrock
Representative Site	MP288103	12	18	18	1	2	3	silt
Representative Site	MP291101	36	18	36	0.5	2	4	bedrock
Representative Site	MP292102	16	18	36	1	2	8	bedrock
Representative Site	MP294301	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	
Representative Site	MP294302	24	36	36	5	2	6	cobble
Representative Site	MP295301	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	
Representative Site	MP299301	300	72	72	8	10	30	cobble
Representative Site	MP300301	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	Dry Channel	
Representative Site	MP301301	144	120	96	6	10	30	cobble
Representative Site	MP305301	36	24	36	3	3	6	sand
Representative Site	MP310301	12	12	72	3	2	6	cobble
Representative Site	MP314301	554	664	120	12	8	36	sand
Representative Site	MP315302	384	384	96	12	24	42	cobble