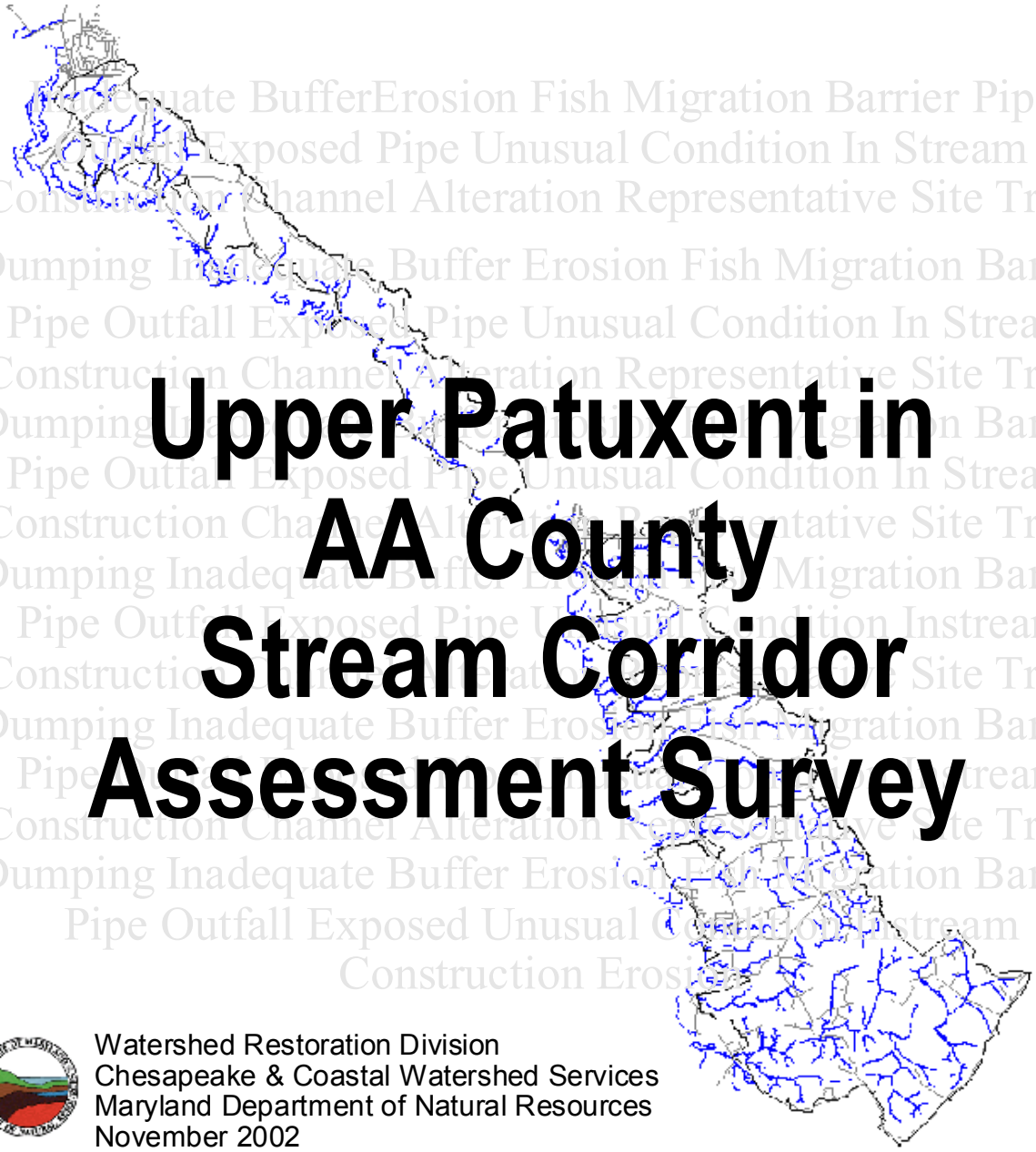

Upper Patuxent in AA County Stream Corridor Assessment Survey

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

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UPPER PATUXENT IN ANNE ARUNDEL CO. STREAM CORRIDOR ASSESSMENT SURVEY

AUTHORS

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PREPARED BY

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

November 2002

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SUMMARY

The Upper Patuxent River Watershed encompasses 56,399 acres (88 square miles). Most of the watershed lies in Anne Arundel and Prince George's Counties with a small portion (3 %) of the watershed extending into Howard and Montgomery Counties**.** In 1998, the Maryland Clean Water Action Plan identified the Upper Patuxent River as one of the State's water bodies that did not meet water quality requirements. In 2002, the Maryland Department of Natural Resources formed a partnership with Anne Arundel and Prince George's Counties to develop a Watershed Restoration Action Strategy for the Upper Patuxent Watershed. One of the first steps in developing a Watershed Restoration Action Strategy is to perform an overall assessment of environmental conditions in the watershed. One of the tools that has been developed by DNR to help assess the present environmental condition of the stream network in a watershed is the Stream Corridor Assessment survey. This report presents the results of the Stream Corridor Assessment survey that was done in the Anne Arundel portion of the Upper Patuxent River Watershed. A separate report will present the results of another Stream Corridor Assessment survey that was done in the Prince George's portion of the watershed.

The Stream Corridor Assessment survey was developed by the Watershed Restoration Division of DNR as a watershed management tool. The survey is not intended to be a detailed scientific evaluation of the watershed. Instead, the Upper 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 Upper Patuxent Watershed to develop a Watershed Restoration Action Strategy.

Anne Arundel County encompasses approximately 39 % (22,244 acres) of the Upper Patuxent Watershed. Between April and July, 2002 over 50 miles of stream in selected sub-basins in the Upper Patuxent Watershed were surveyed. A total of 166 potential environmental problems were identified. The most common environmental concern seen during the SCA survey was stream bank erosion, which was reported at 41 sites. Other potential environmental problems recorded during the survey include: 31 pipe outfalls sites, 28 sites with inadequately vegetated stream buffers, 17 fish migration barriers, 17 trash dumping sites, 12 channel alteration sites, 12 unusual condition sites, 5 exposed pipes, and 3 in/near construction sites.

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 30 representative sites that were spaced at approximately ½ to 1 mile intervals along the stream.

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 important to note that all the problems identified 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. Results from the present survey will be combined with other information about the area to develop a Watershed Restoration Action Strategy (WRAS) for the Upper Patuxent River Watershed.

ACKNOWLEDGEMENTS

Without the hard work and dedication of the Chesapeake Bay Crew of the Maryland Conservation Corps, this survey would not have been possible. The crew chief during the survey was Tina Stevens. The crewmembers were Carrie Downing, Ivy Huo, April Rorke, Frank Simmons, Zach Smith, Susannah Storch, and John Toniolo.

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INTRODUCTION

In 1998, Maryland's Clean Water Action Plan identified bodies of water that failed to meet water quality related requirements. One of the water bodies identified in the report was the Upper Patuxent River. A map showing the location of the Upper Patuxent River Watershed is presented in Figure 1. The watershed encompasses 56,399 acres and lies entirely within Maryland's Coastal Plain. While most of the watershed is in Anne Arundel (22,244 acres) and Prince George's Counties (32,410 acres), a small portion of the watershed also extends into both Howard and Montgomery Counties (1,745 acres). In response to the findings of the Maryland Clean Water Action Plan, the Maryland Department of Natural Resources has formed a partnership with Anne Arundel and Prince George's Counties to work together to assess and improve environmental conditions in the Upper Patuxent Watershed. The main goals of this partnership are to develop and implement a Watershed Restoration Action Strategy (WRAS) for the Upper Patuxent Watershed.

The first step in developing a Restoration Action Strategy for the Upper Patuxent Watershed is to do an overall assessment of the condition of the watershed and the streams within it. This initial step is being accomplished using two approaches. First, a watershed characterization is being done that compiles and analyzes existing water quality, land use, and living resources data about the Upper Patuxent Watershed. While the watershed characterization provides good overall information on environmental conditions within the Upper Patuxent Watershed, for the most part, information on the location of specific environmental problems is limited. To provide specific information on the location of environmental problems and restoration opportunities, a Stream Corridor Assessment (SCA) survey of the Upper Patuxent River Watershed was also done.

The Stream Corridor Assessment survey is a new survey that has been developed by DNR's Watershed Restoration Division as a watershed management tool to identify environmental problems and helps prioritize restoration opportunities on a watershed basis. As part of the survey, specially trained personnel walk portions of the watershed's stream network and record information on a variety of environmental problems that can be easily observed within the stream corridor**.**

This report presents results of the Stream Corridor Assessment survey that was done on the Anne Arundel County side of the watershed. Results of the Stream Corridor Assessment survey on the Prince George's County side of the watershed will be presented in a separate report. The Anne Arundel County portion of the watershed encompasses 40% of the total watershed area and there are over 50 miles of stream within the watershed. Field surveys were done from April 2002 through August 2002.

The Anne Arundel County portion of the Upper Patuxent River Watershed encompasses 22,244 acres (34.7 square miles)**.** Approximately 16% of this portion of the watershed is in urban land use and includes the communities of Laurel, Odenton, South River, Davidsonville and Harwood. Figure 1 shows the geographic location of the watershed targeted in this survey. Figure 1a shows the Anne Arundel portion of the watershed. A digital orthophoto map of the

Upper 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. Due to budget and time constraints Stream Corridor Assessment surveys on the Anne Arundel portion of the watershed was limited to 50 miles of streams. Figure 4 shows the areas in the Anne Arundel portion of the Upper Patuxent Watershed where the SCA survey was done.

As mentioned earlier the Maryland Department of Natural Resources is working with Anne Arundel and Prince George's Counties to develop a Watershed Restoration Action Strategy (WRAS) of the Upper Patuxent River Watershed. As part of this process, data collected during the SCA survey will be used to help define present environmental conditions, as well as possible restoration opportunities in the watershed. This information combined with the watershed characterization and other local knowledge of the watershed, will be used to develop and Action Strategy for the Upper Patuxent River Watershed. The Watershed Restoration Action Strategy in turn, will help guide future restoration efforts with the ultimate goals of restoring the areas natural resources and meeting State water quality standards.

Upper Patuxent Watershed
Anne Arundel and Prince George's Counties, Maryland

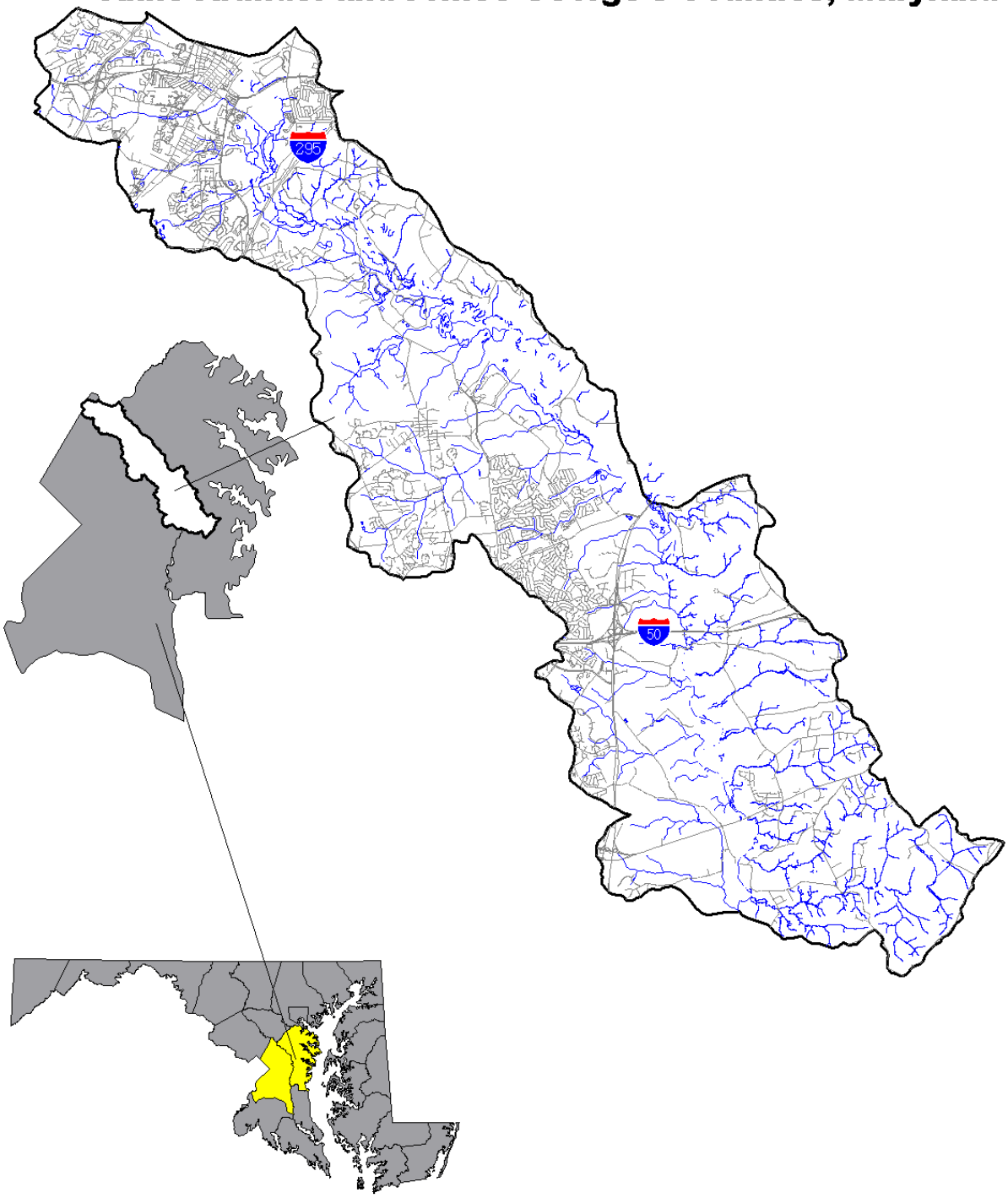


Figure 1

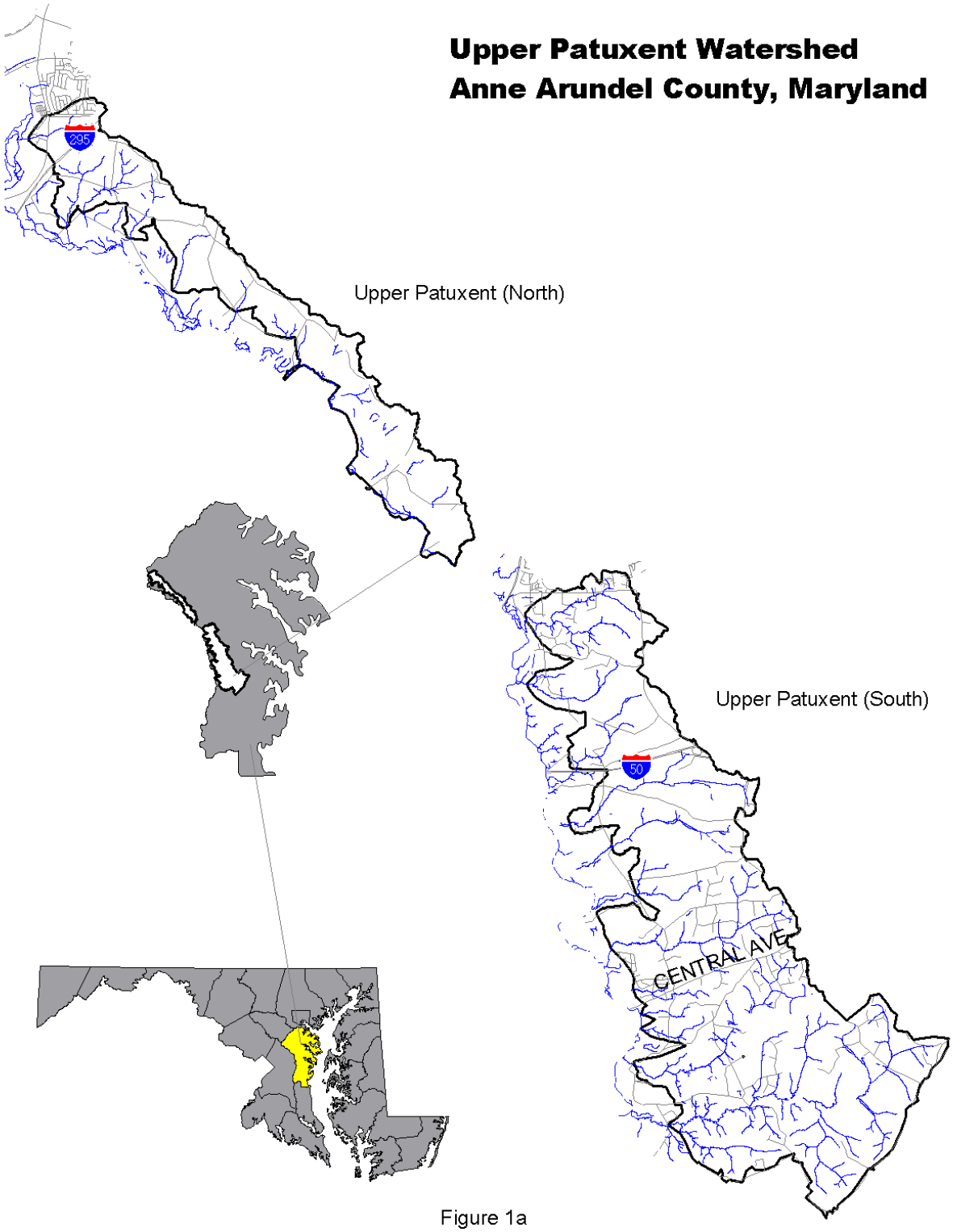

Upper Patuxent Watershed
Anne Arundel County, Maryland
Upper Patuxent (North)
Upper Patuxent (South)
295
50
CENTRAL AVE

Figure 1a

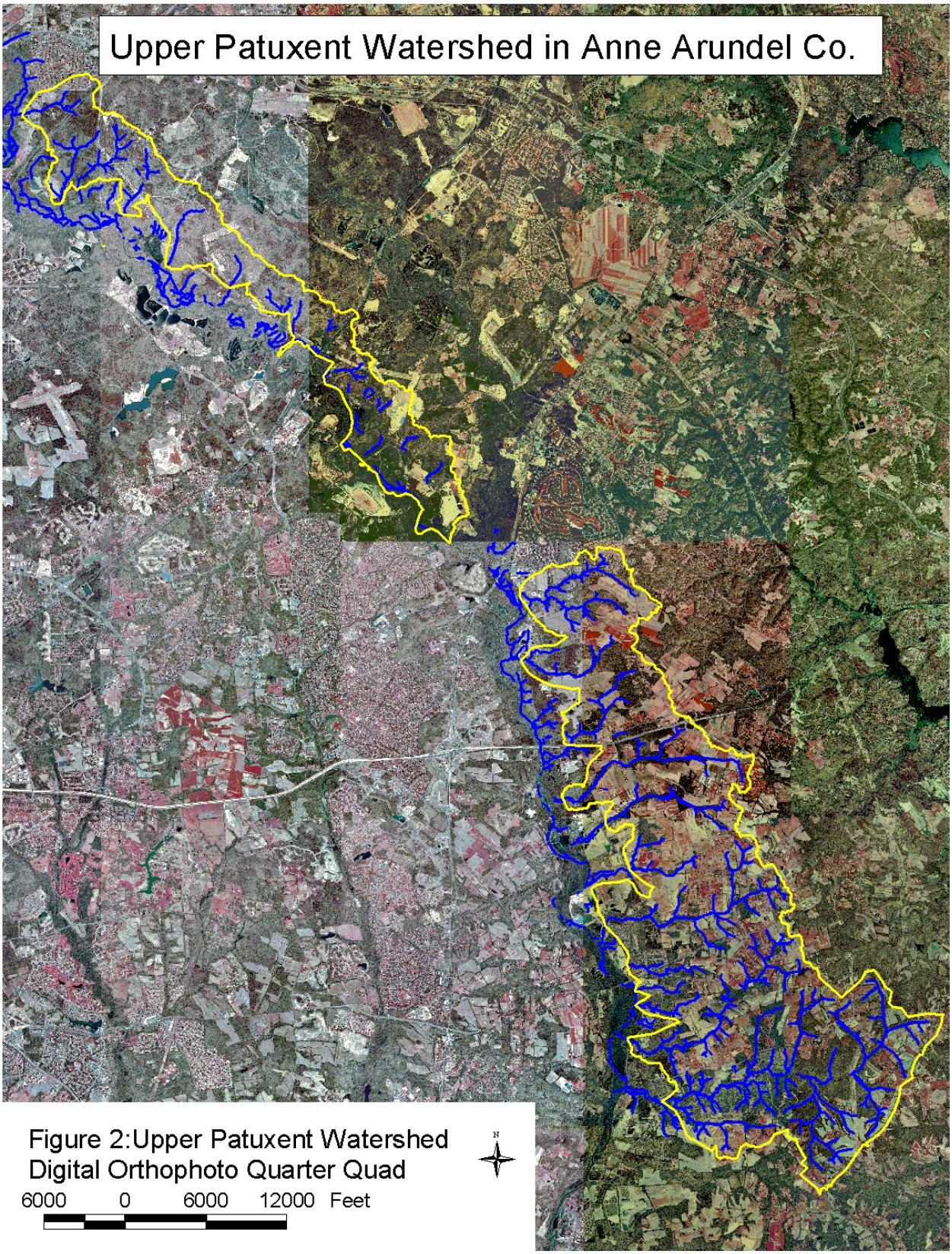


Figure 2:Upper Patuxent Watershed
Digital Orthophoto Quarter Quad

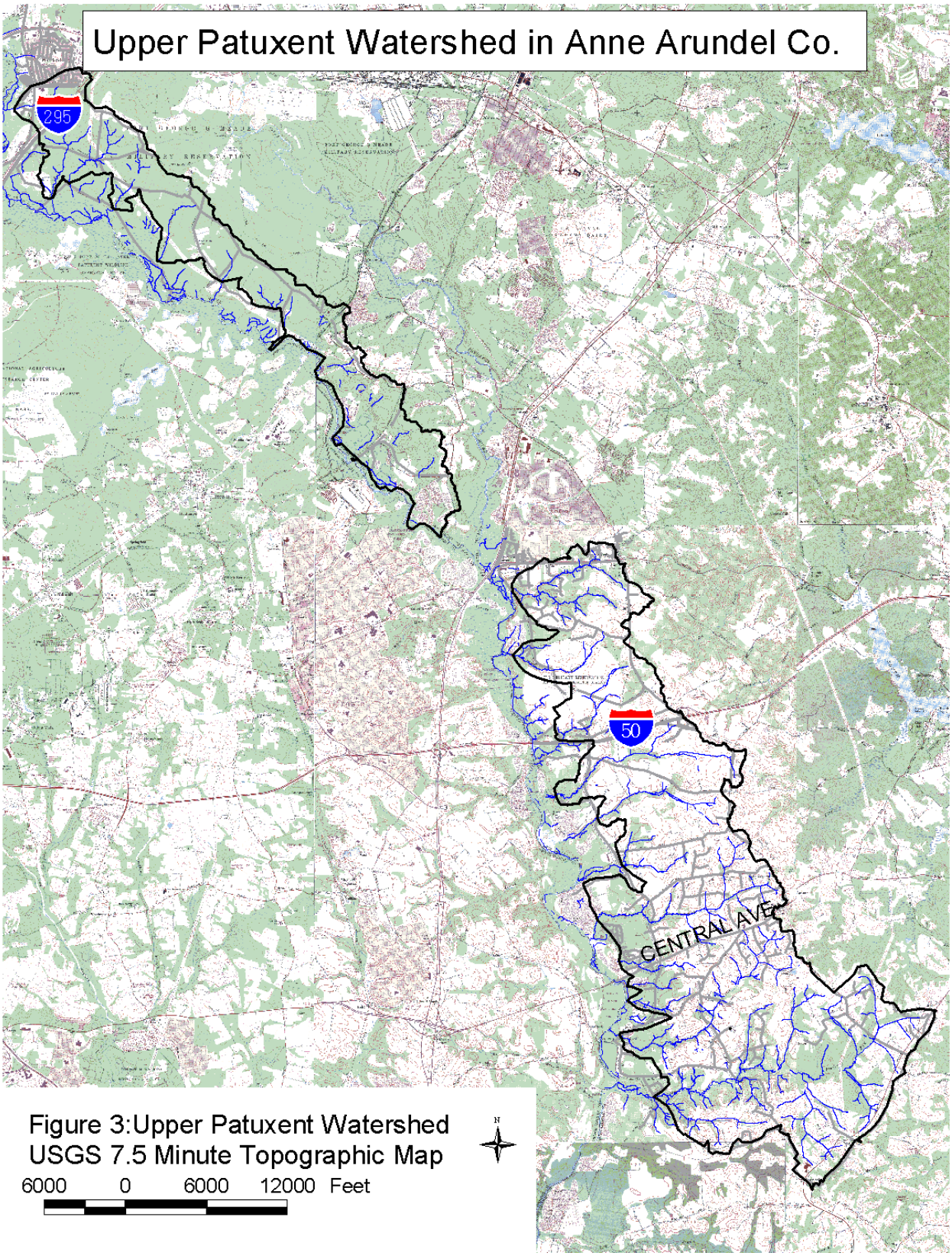


Figure 3:Upper Patuxent Watershed
USGS 7.5 Minute Topographic Map

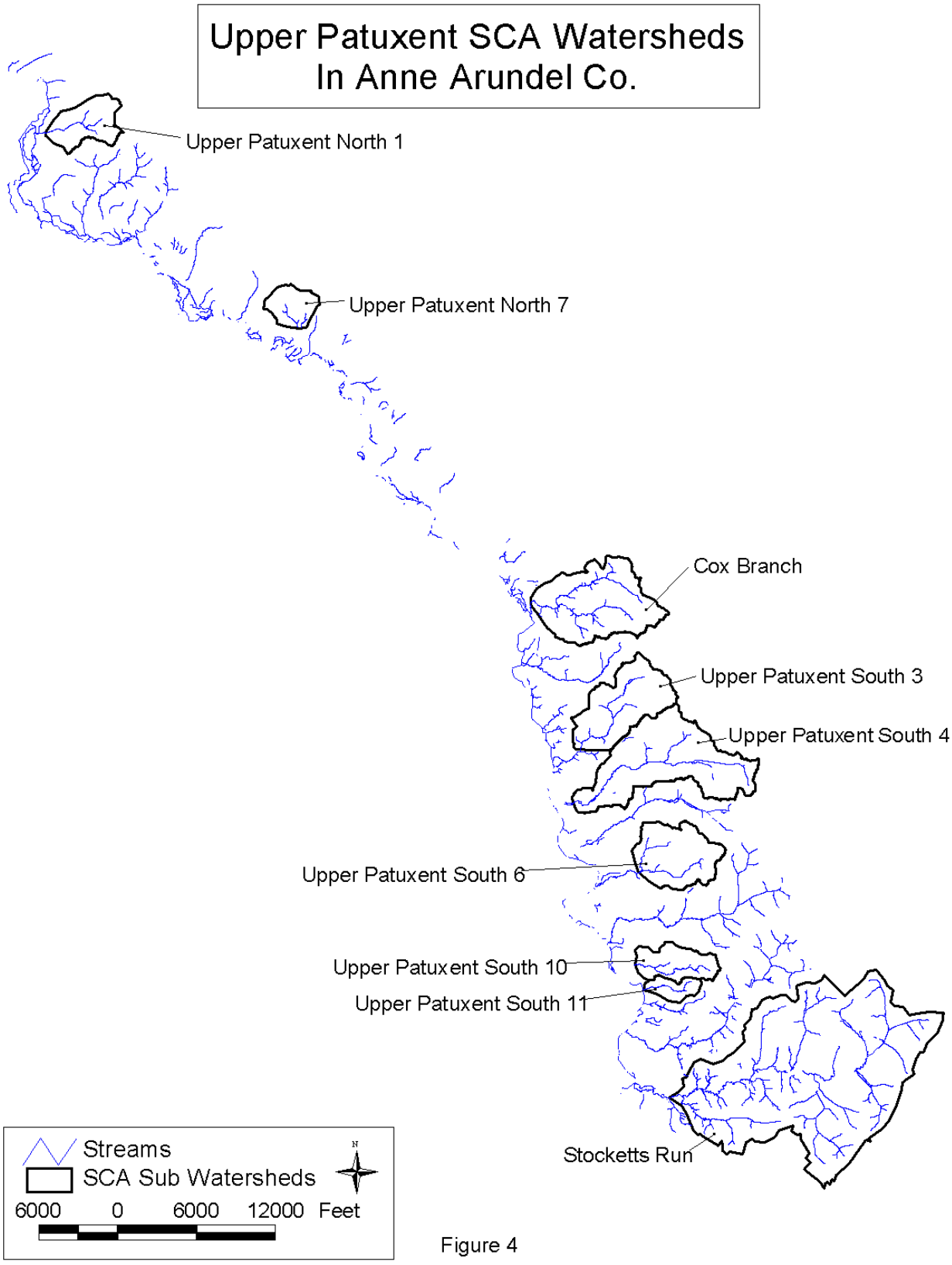

Upper Patuxent SCA Watersheds
In Anne Arundel Co.
Upper Patuxent North 1
Upper Patuxent North 7
Cox Branch
Upper Patuxent South 3
Upper Patuxent South 4
Upper Patuxent South 6
Upper Patuxent South 10
Upper Patuxent South 11
Stocketts Run
Streams
SCA Sub Watersheds
6000 0 6000 12000 Feet

Figure 4

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 Upper 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 being 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 Upper Patuxent River Watershed began in April 2002 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 very severe rating 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 moderate severity rating 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 minor severity rating 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, 231 photographs were taken during the survey were labeled and organized by site number in a binder so they can be easily worked with. 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 data collected during the survey was incorporated into an ArcView Geographical Information System (GIS). A final copy of the ArcView files were given to Anne Arundel County for their use in developing a Watershed Action Strategy for the Upper Patuxent Watershed.

RESULTS

A total of 166 problem data sheets, and 30 representative data sheets, were filled out during the survey. Included in the problem data sheets were 41 erosion sites, 31 pipe outfalls sites, 28 sites with inadequately vegetated stream buffers, 17 fish migration barriers, 17 trash dumping sites, 12 channel alterations, 12 unusual condition sites, 5 exposed pipes, and 3 in/near construction sites. Four comment data sheets were also completed during the survey to provide additional information about specific problems.

An overall summary of survey results is presented in Table 1, while Table 2 summarizes the data by major stream segments. All 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 northing and easting 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.

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

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Erosion Site	**41**	**42,535 feet (8.0miles)**	2	2	18	9	10
Pipe Outfalls	**31**	**NA**	-	-	5	4	22
Inadequate Buffers	**28**	**25,350 feet (4.8miles)**	-	3	9	8	8
Fish Barriers	**17**	**NA**	-	1	6	5	5
Trash Dumping	**17**	**NA**	-	4	5	5	3
Channel Alterations	**12**	**5,798 feet (1.1miles)**	-	-	2	1	9
Unusual Conditions	**12**	**NA**	1	1	6	1	3
Exposed Pipes	**5**	**53 feet**	-	-	1	1	3
In/Near Stream Construction	**3**	**NA**	-	-	2	-	1
TOTAL	**166**		**3**	**11**	**54**	**34**	**64**
Comments	**4**						
Representative Sites	**30**						

Table 2. Summary of survey results by major stream segments

Stream Segment	Channel Alteration	Construction	Erosion	Exposed Pipes	Fish Barrier	Inadequate Buffer	Pipe Outfall	Representative Sites	Trash Dumping	Unusual Conditions	Total
Cox Branch	6	1	8	2	7	5	13	5	6	3	56
Stocketts Run	2		8	1	3	4	2	14	1	2	37
UPN1			3		1	2	3	1	1	2	13
UPN7								1			1
UPS10	1	1	3	1	2	2	6	1	2	3	22
UPS11			7		1	2	1	1	3		15
UPS3			2					2			4
UPS4	3		5	1	2	9	4	3	2	1	30
UPS6		1	5		1	4	2	2	2	1	18

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 Upper Patuxent watershed, 3.1**%** of the landscape surface is impervious (Conn, personal communication). 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 41 sites during the survey (Figure 5a). Figure 5c shows the locations of the sites found in the North Patuxent 1 watershed. 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 10 feet in some areas, to other areas where up to 5,000 feet of stream was found to have an erosion problem (Appendix B). Overall, results indicate approximately 8.0 miles of unstable eroding banks in the Upper Patuxent watershed. Figure 5b shows the frequency of the severity rating given to erosion sites. Only two sites received a very severe rating.

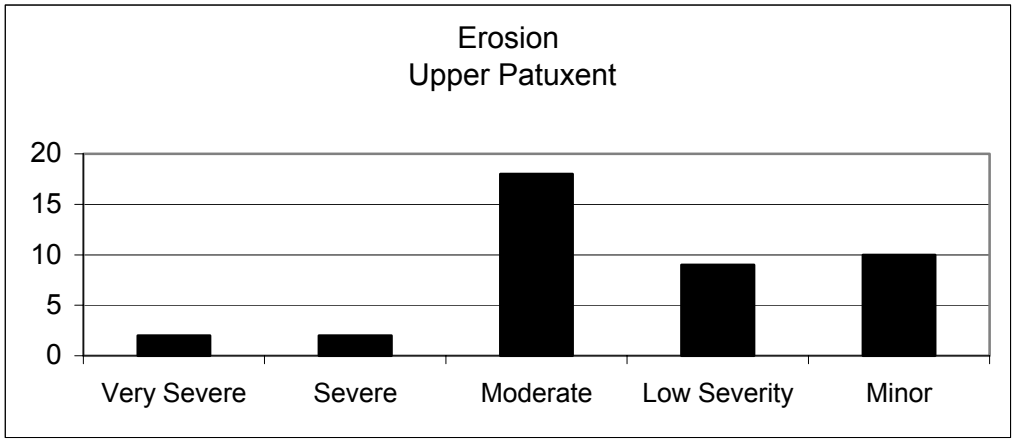


Figure 5b Histograph showing the frequency of severity ratings given to erosion sites during Upper Patuxent River SCA survey.

Erosion Sites

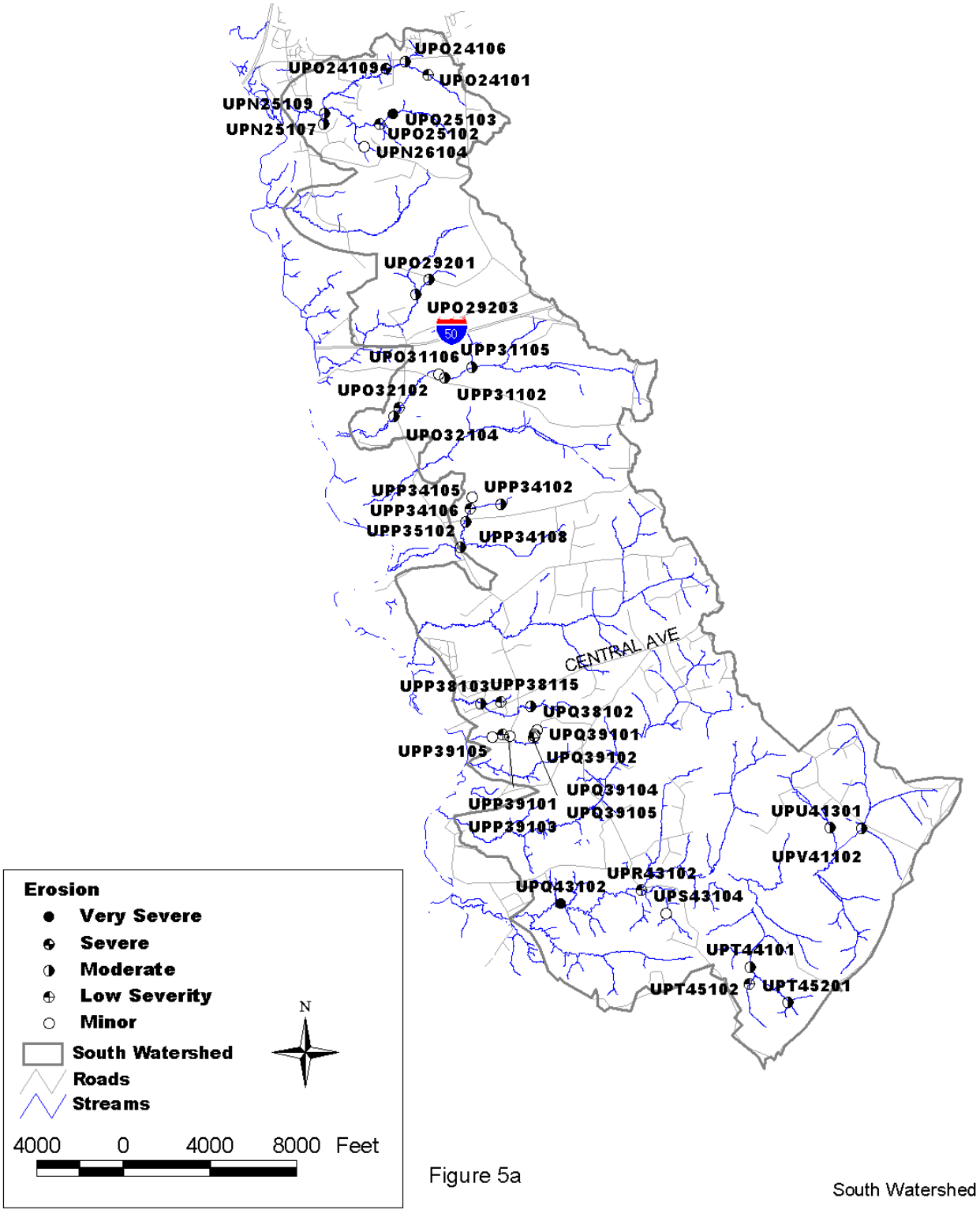
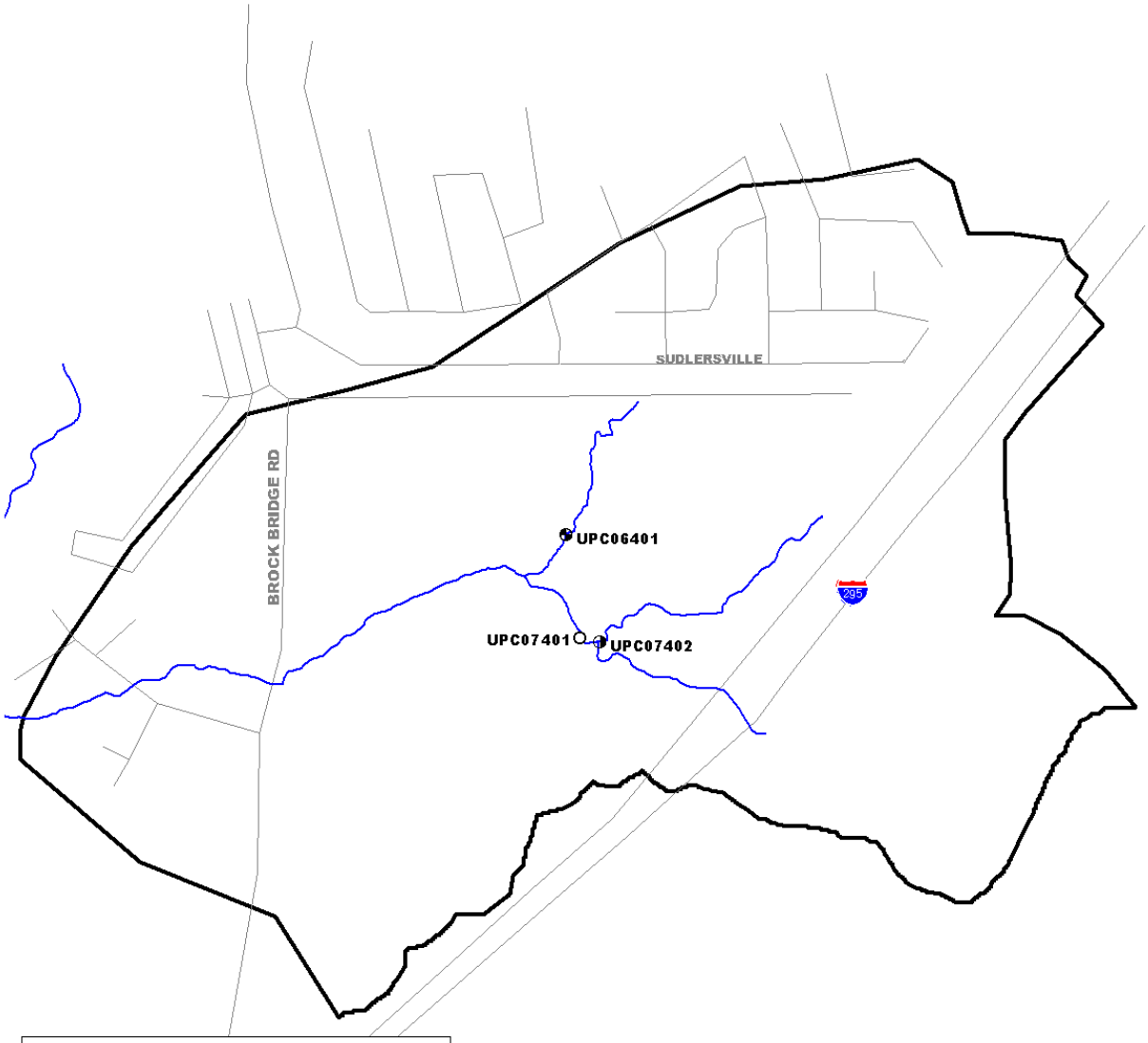


Figure 5a

South Watershed

Erosion Sites



Erosion
- Severe
- Moderate
- Minor

Streams
Roads
Watershed

500 0 500 1000 Feet

Figure 5c

UPN1

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 and nutrients to a stream system. A total of 28 pipe outfalls were identified during the survey (Figure 6a). The locations of pipe outfalls in the southern watersheds are shown in Figure 6a. Figure 6c shows the locations of the sites found in the North Patuxent 1 watershed. As expected, most of the pipe outfalls are located in the more urbanized portion of the watershed.

Sixteen percent or 5 of the 31 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). At Site UP032204 the survey crew reported the discharge had a rotten egg odor. 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 6b 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 to minor severity rating.

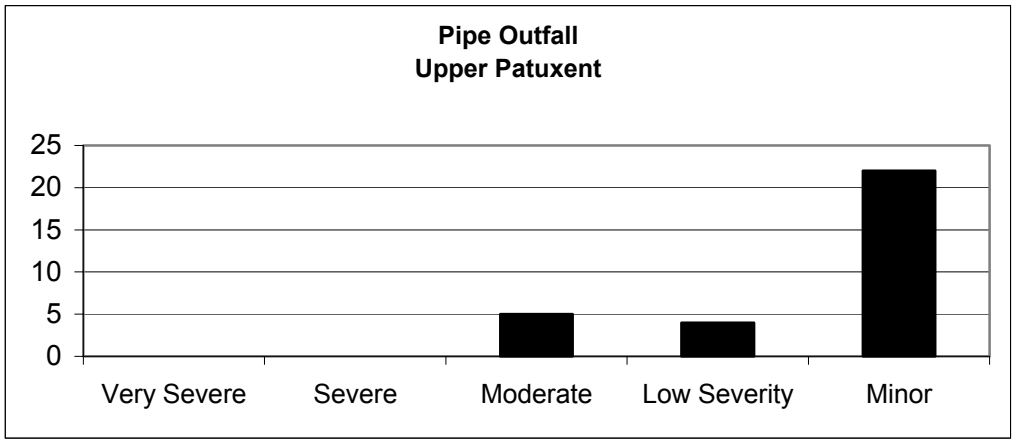


Figure 6b Histograph showing the frequency of severity ratings given to pipe outfall sites during Upper Patuxent River SCA survey.

Pipe Outfalls

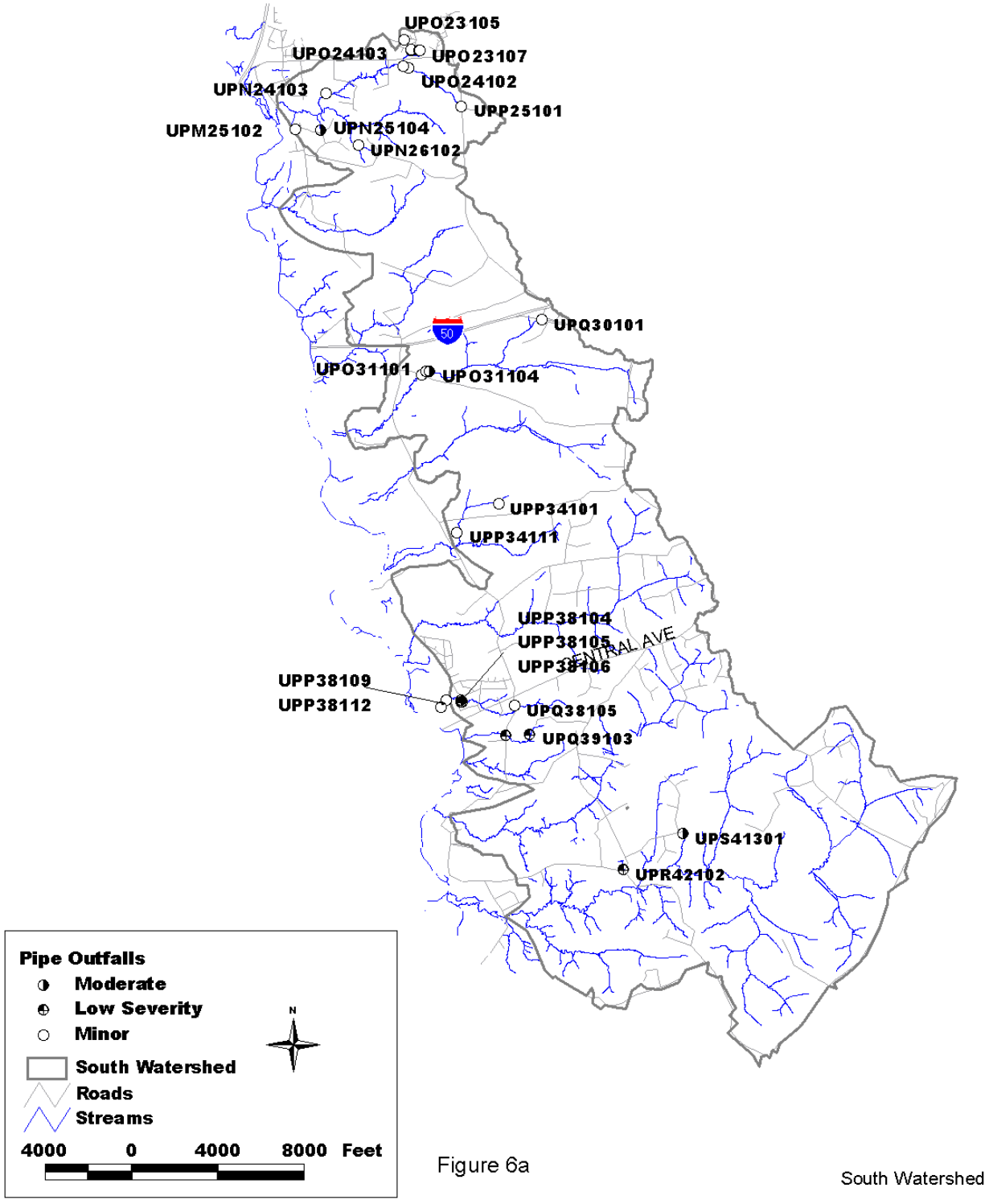


Figure 6a

South Watershed

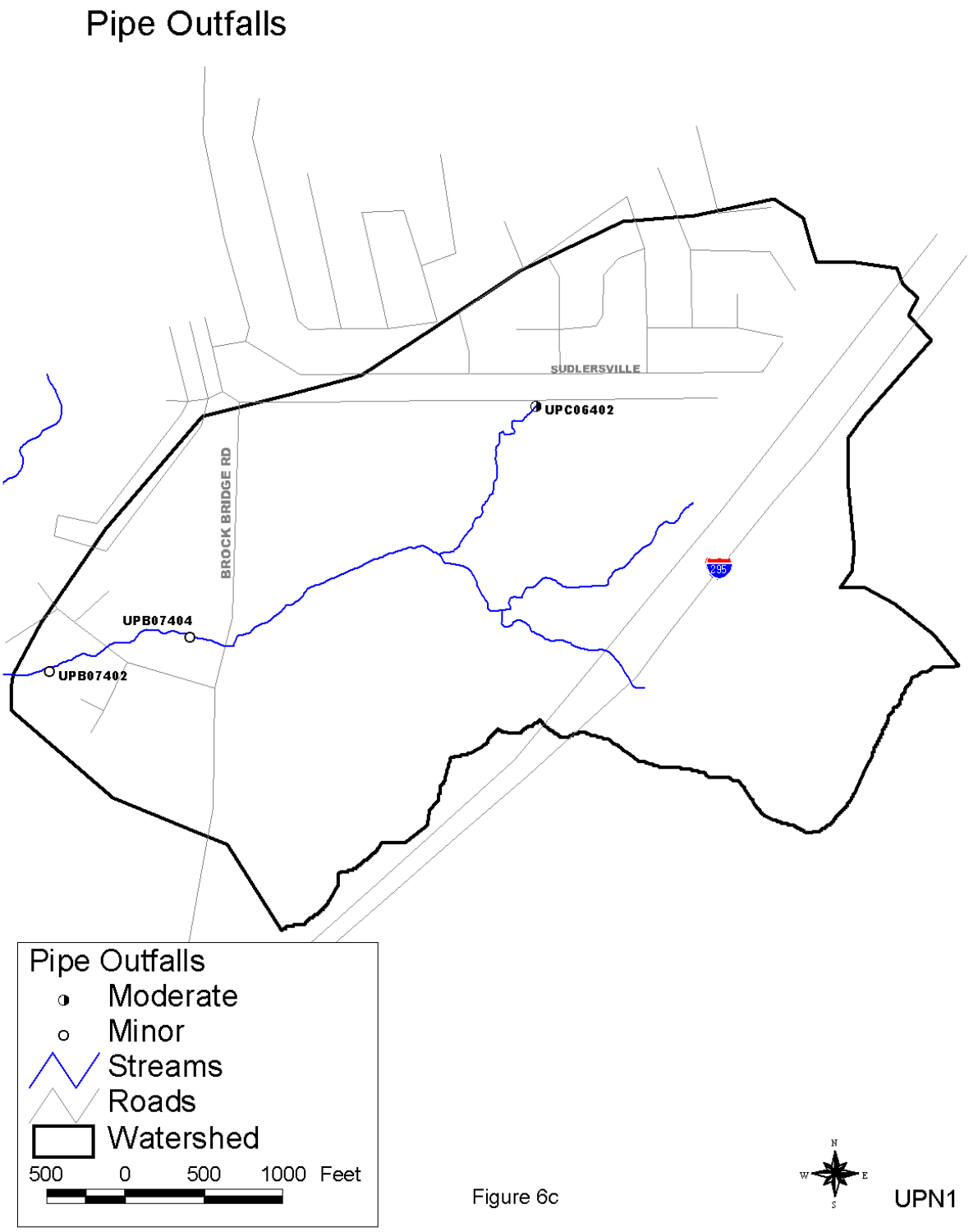


Figure 6c

UPN1

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.

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 28 sites during the survey as shown in Figure 7a and Figure 7c. The field crew provided a rough estimate of the length of the inadequate stream buffer at all sites (Appendix B). Based on the data that was collected, there are approximately 25,350 feet (4.8 miles) of inadequate buffer in the areas where the survey was done. Field teams found inadequate buffers ranging in distance from 100 feet to 3,200 feet. This survey was done in a mostly rural area, with shrubs and small trees reported as the dominant adjacent land use at inadequate buffer sites, accompanied by a moderate amount of agricultural land (pasture). Most sites received a moderate to minor severity rating (Figure 7b). 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. At two of the sites (UPQ30102 & UPQ31104) that received a severe rating the present land use was reported to be crop fields. These areas could qualify for inclusion into the Maryland Conservation Reserve Program which provides farmers with financial assistance to establish forested buffers along stream on their property.

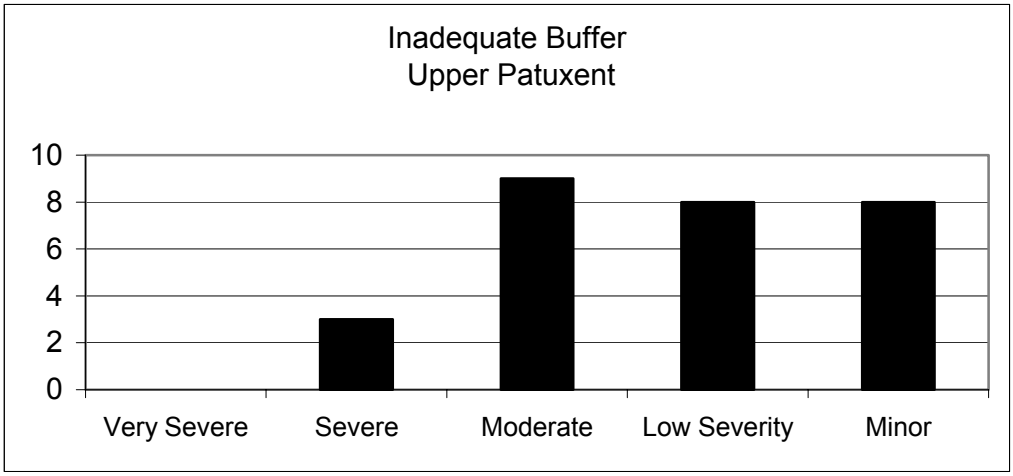


Figure 7b Histograph showing the frequency of severity ratings given to Inadequate buffer sites during Upper Patuxent River SCA survey.

Inadequate Buffers

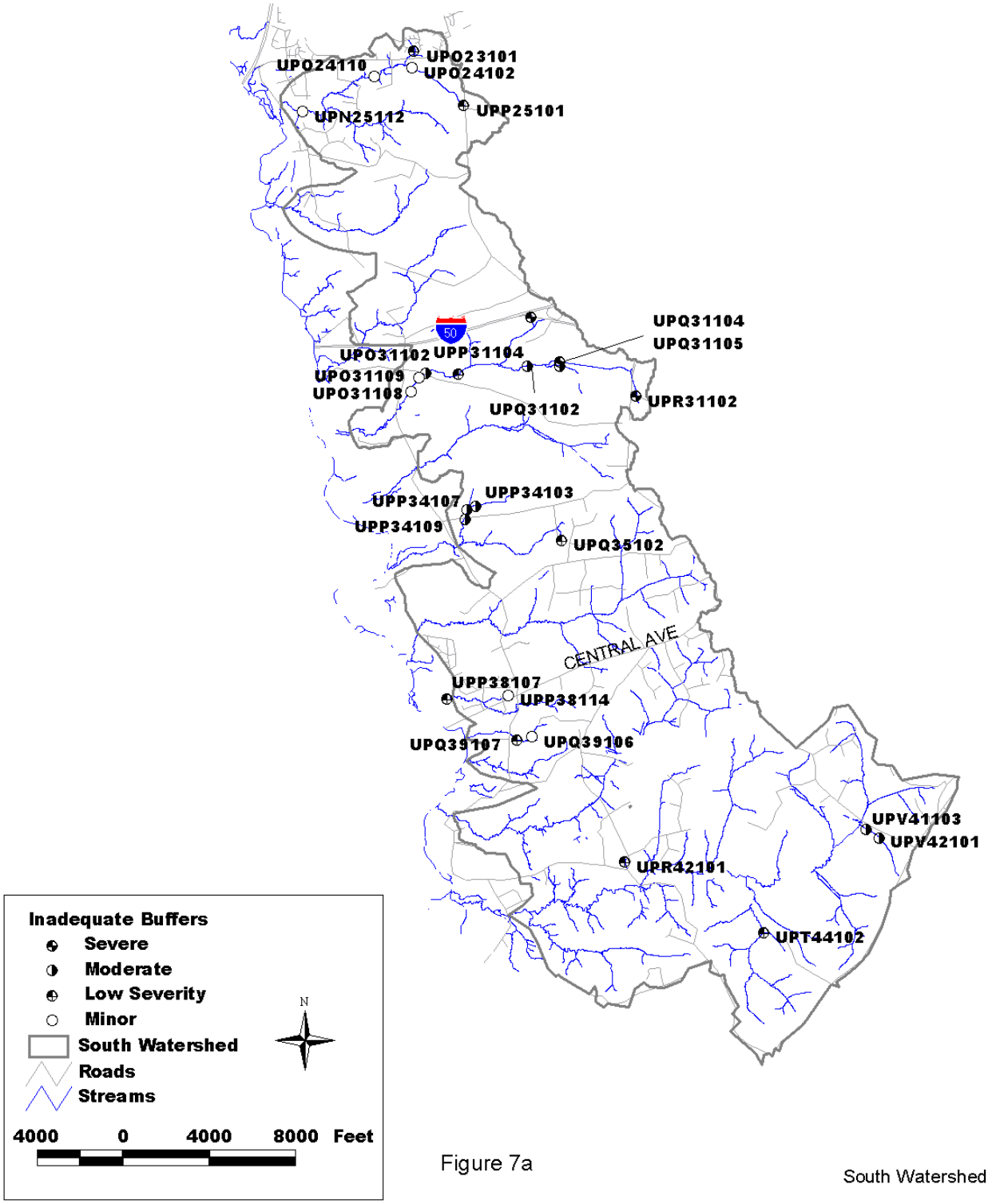


Figure 7a

South Watershed

Inadequate Buffers

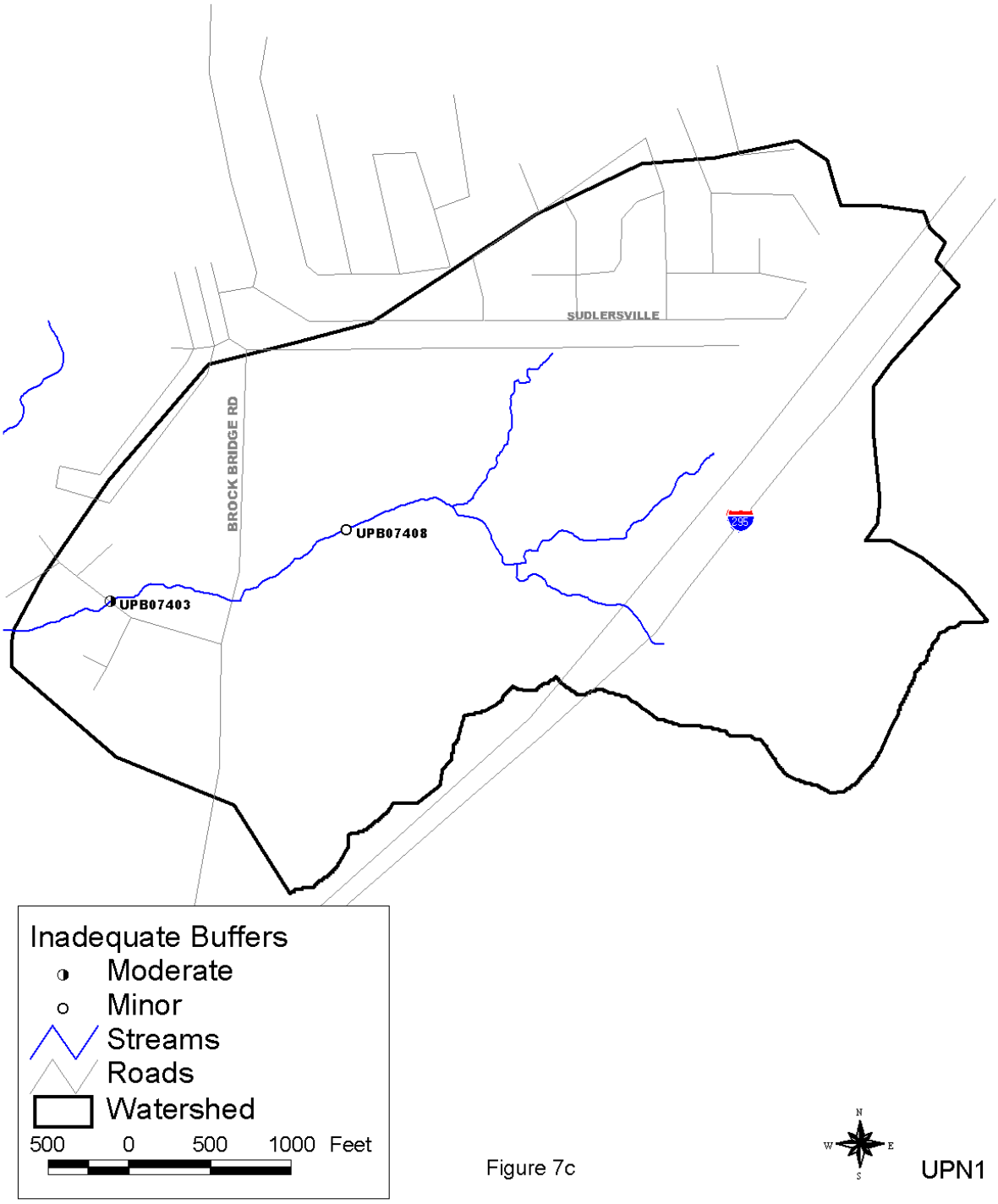


Figure 7c

UPN1

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.

Seventeen fish migration barriers were reported during the survey. The locations of fish migration blockages are shown in Figure 8a and Figure 8c. The blockages were due to a number of reasons including road crossings (11), channelized stream sections (2), and natural falls (4). All of the sites were given moderate to minor severity ratings (Figure 8b).

A number of anadromous fish including, alewife, river herring, yellow perch, white perch, American shad and hickory shad spawn in the Upper Patuxent River Watershed. Site UPO32103 is on UPS4 at the point where Patuxent River Road crosses the stream. There is an 18-inch drop at the end of the perched culvert that may be a blockage to river herring and yellow perch runs. The removal of the barrier at this site could open up as much as 4 miles of spawning habitat. This site was given the only severe rating, and should be further investigated. Other sites where barriers isolate tributaries from the mainstem, such as Sites UPP35101, and UPP38111 and barriers that isolate significant portions of the upper reaches of a tributary, such as Sites UPP38101, UPQ31103, UPV41101 were given moderate severity ratings.

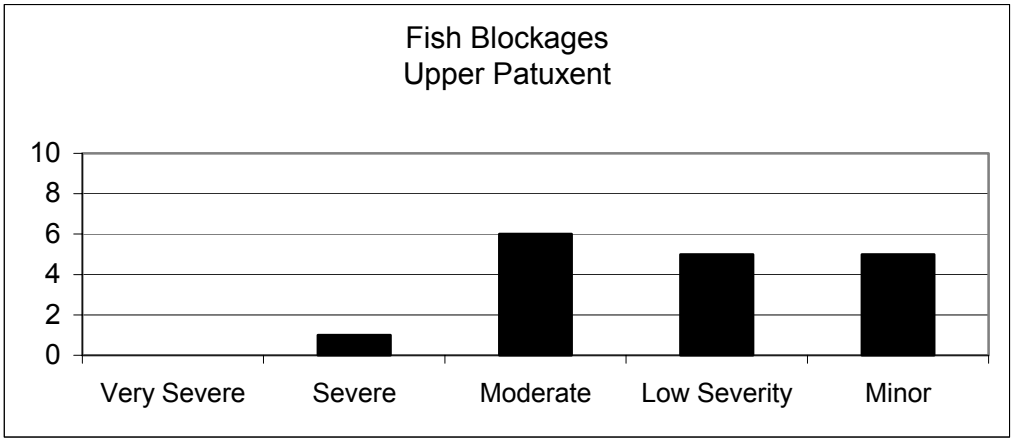


Figure 8b Histograph showing the frequency of severity ratings given to fish blockage sites during Upper Patuxent River SCA survey.

Fish Barriers

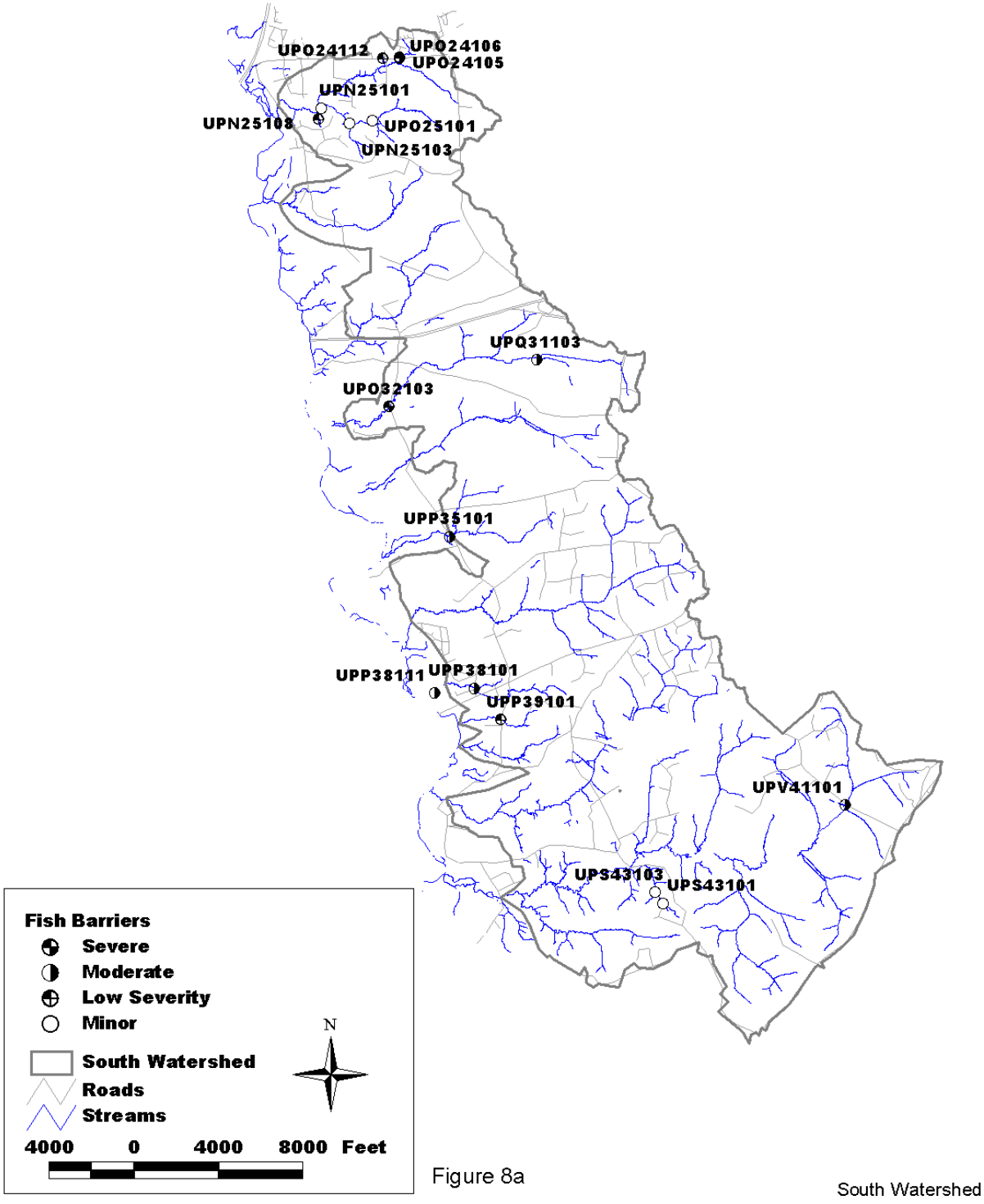


Figure 8a

South Watershed

Fish Barriers

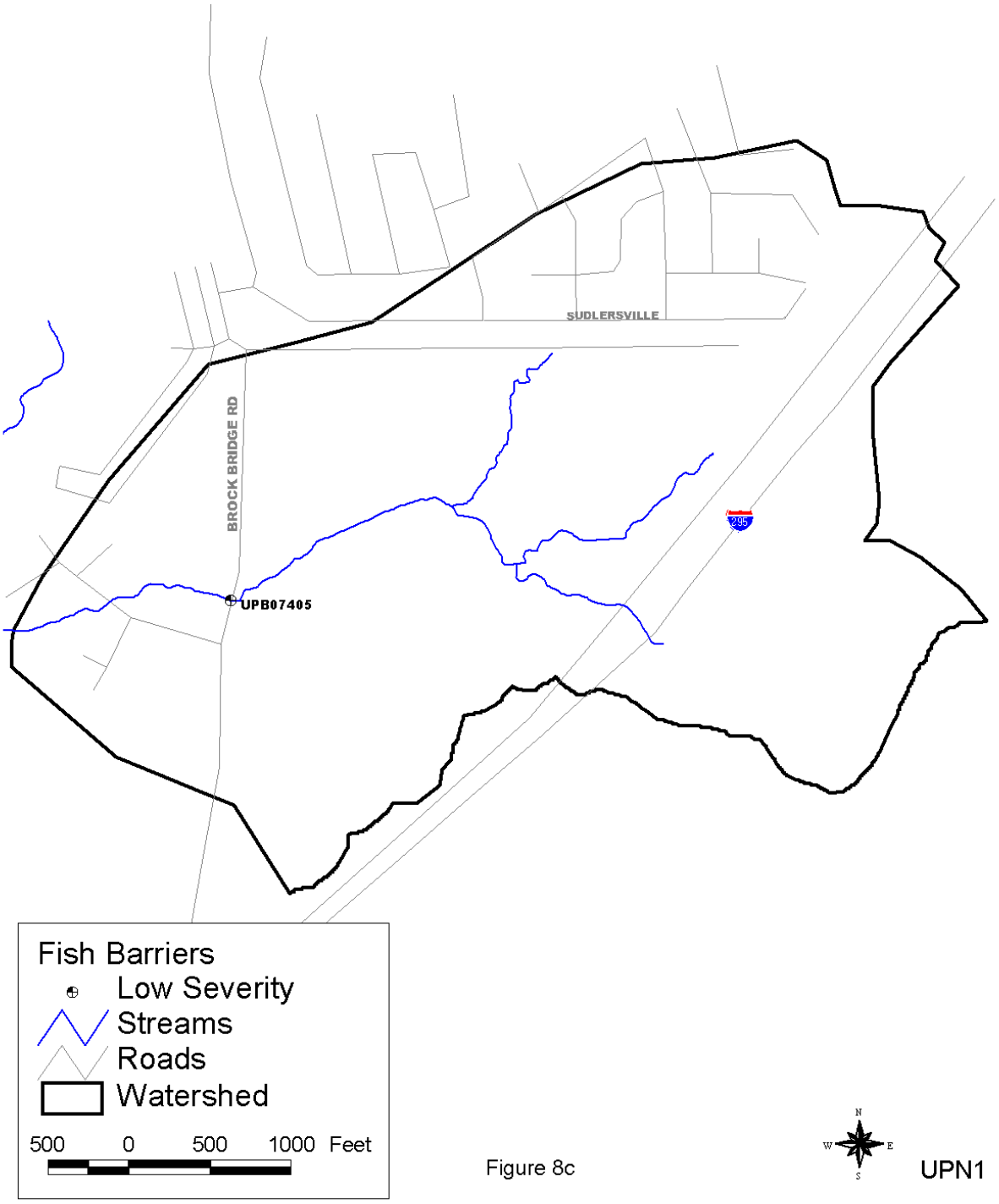


Figure 8c

UPN1

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 seventeen sites where there was excessive trash and their locations are shown in Figure 9a and Figure9c. Four sites were reported as severe. The sites had mixed types of trash. The trash ranged from recyclables to appliances and engines. Site UPP39104 had large piles of sand along with various old machinery. The sites were estimated to have 20 to 50 pickup truckloads. Six sites were recorded as having yard waste, four had residential waste and one was recorded as newspapers. These sites were given severity ratings ranging from moderate to minor (Figure 9b).

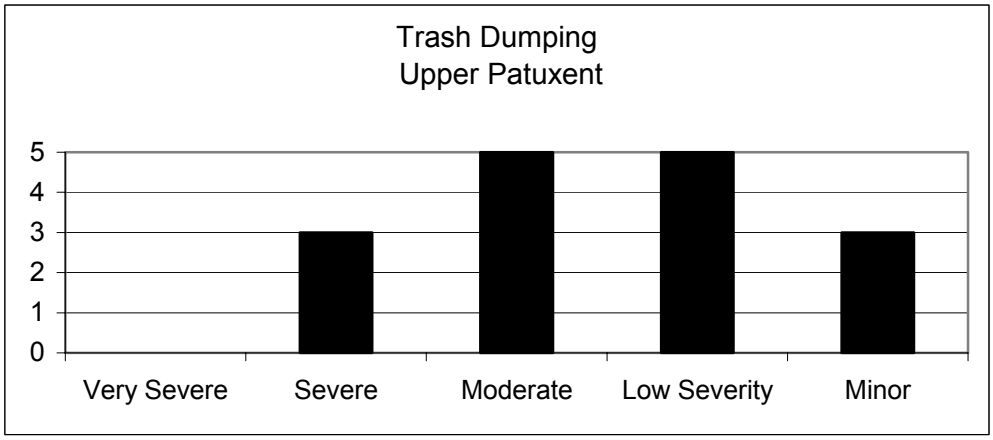


Figure 9b Histograph showing the frequency of severity ratings given to trash dumping sites during Upper Patuxent River SCA survey.

Trash Dumping Sites

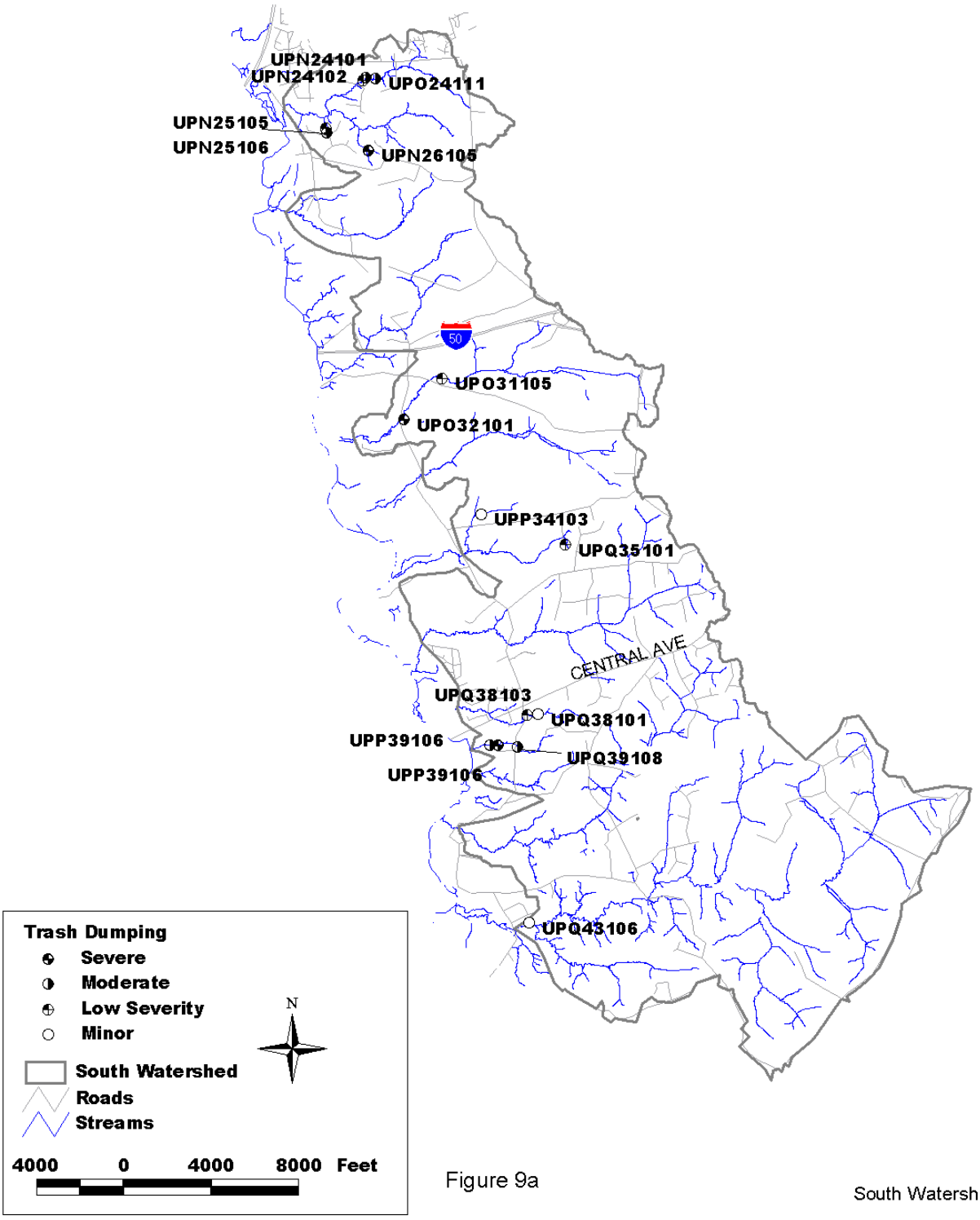


Figure 9a

South Watershed

Trash Dumping

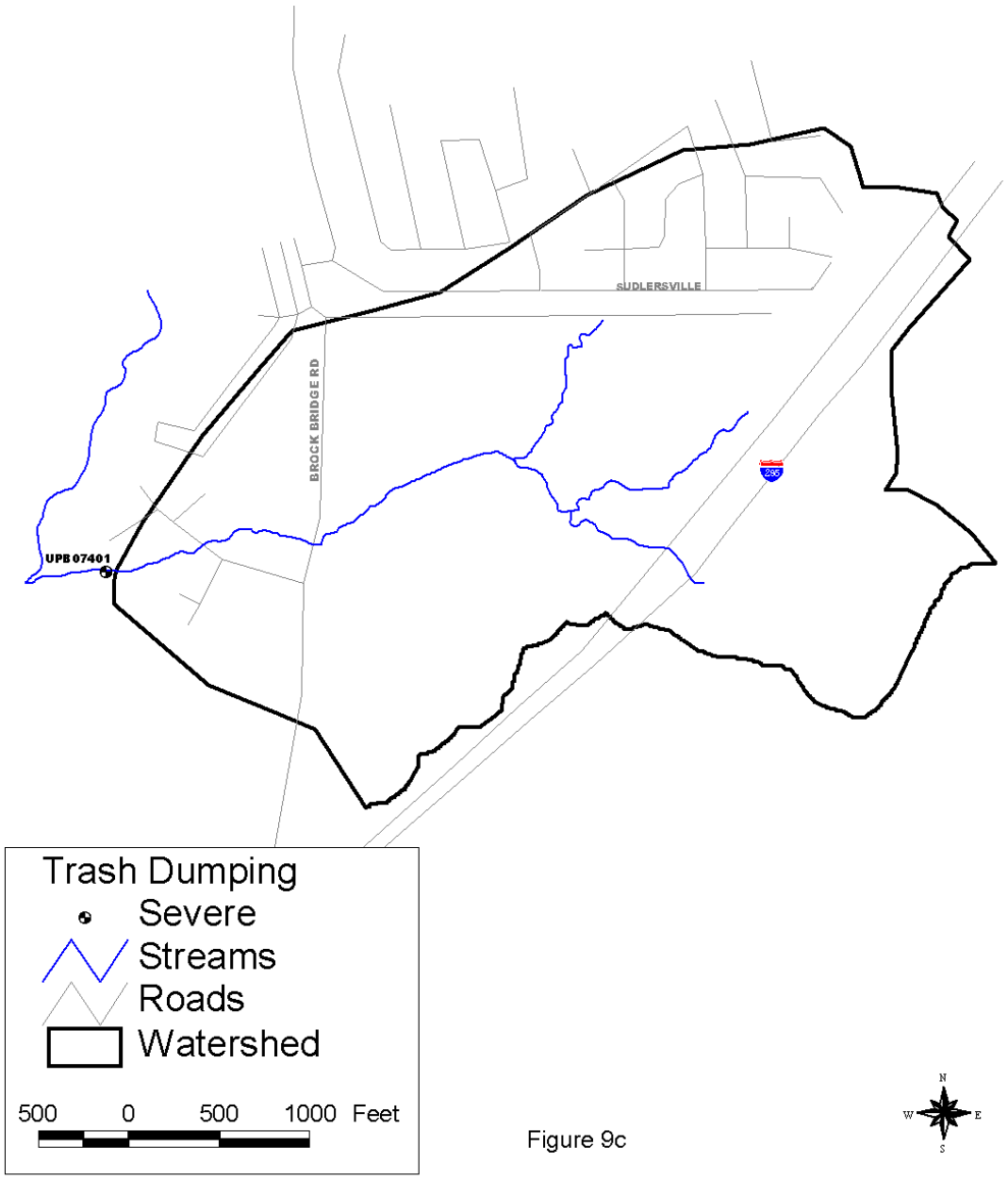


Figure 9c

UPN1

Channel Alterations

Channel alteration is 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 12 areas and their locations are shown in Figure 10a. The total length of stream affected by channelization was estimated to be 5,798 feet or about 1.1 miles. All sites were given a moderate to minor severity rating (Figure 10b). The sites identified were on small channels. Six were earthen channels, five were armored with rip-rap, and four channels were lined with gabion baskets and one was reported to be channelized with wood. All sites were given moderate to minor severity ratings (Figure 10b).

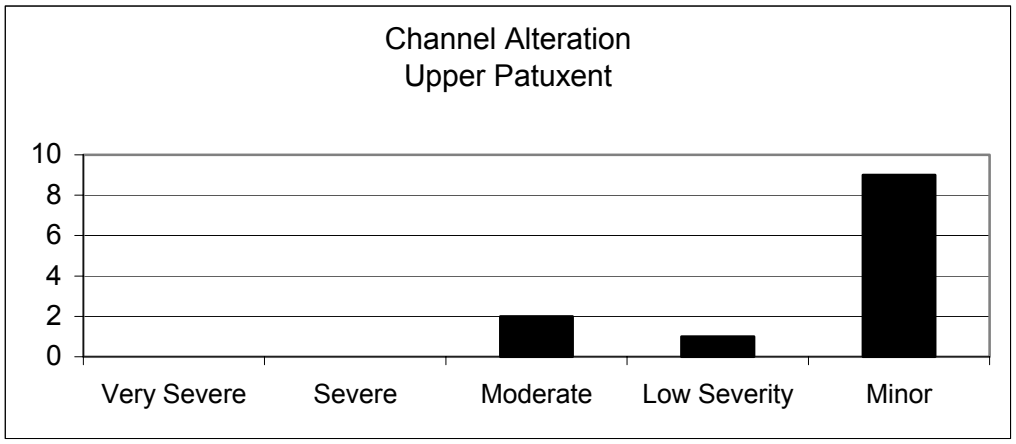


Figure 10b Histograph showing the frequency of severity ratings given to channel alteration sites during Upper Patuxent River SCA survey.

Channel Alteration

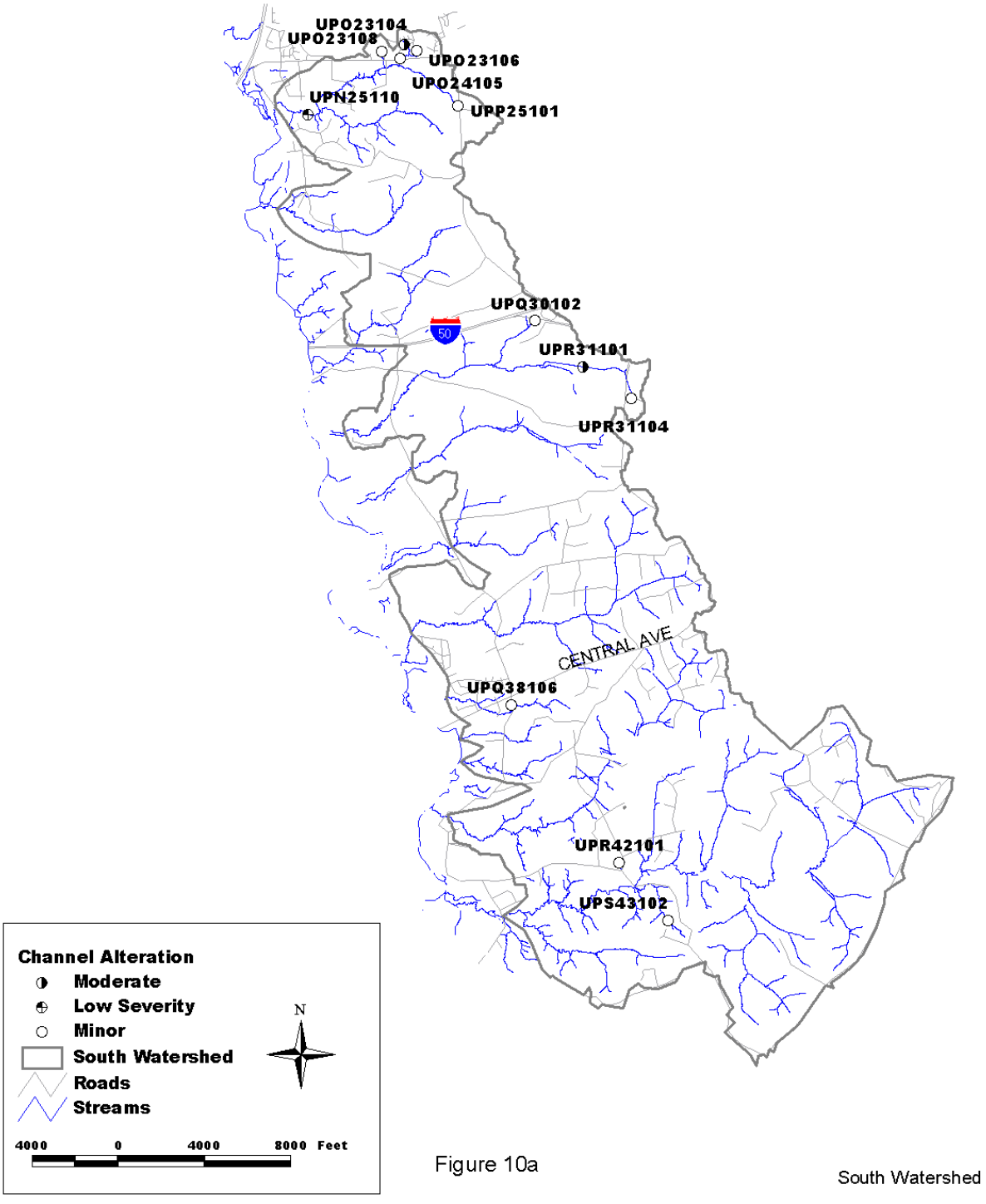


Figure 10a

South Watershed

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. Twelve unusual condition sites were found during the Upper Patuxent survey (Figure 11a and Figure11c). Only one site received a very severe rating. At site UPB07406 Brock Bridge Rd is being undermined by the stream. One site received a severe rating. At site UPR31101, the whole stream is being diverted to pond. For site UPM25101 the road culvert pipe is collapsing. At site UPQ43104 water is being pumped from the stream for a swimming pool and a garden. At site UPP39101 the road crossing is filling with sediment. At site UPN26103 the stream is piped, perhaps for a future road or driveway. The rest of the sites report red flock. These sites were give lower severity ratings (Figure 11b).

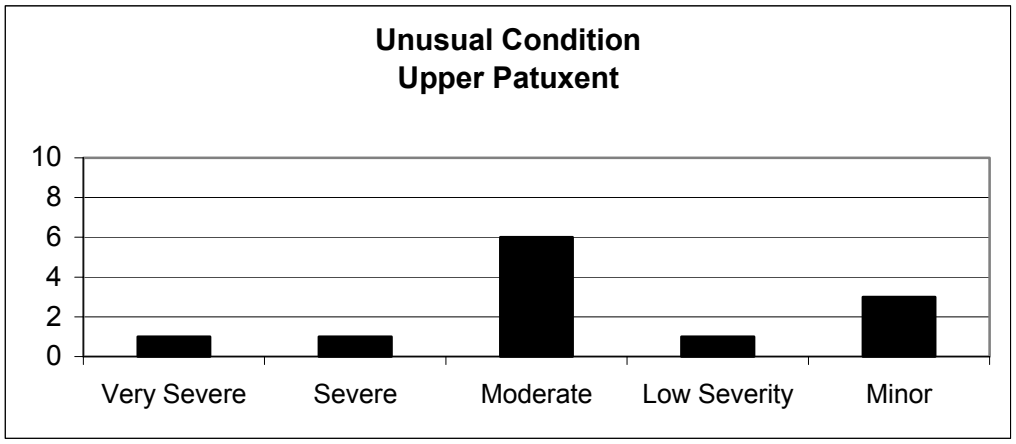


Figure 11b Histograph showing the frequency of severity ratings given to unusual condition sites during Upper Patuxent River SCA survey.

Unusual Conditions

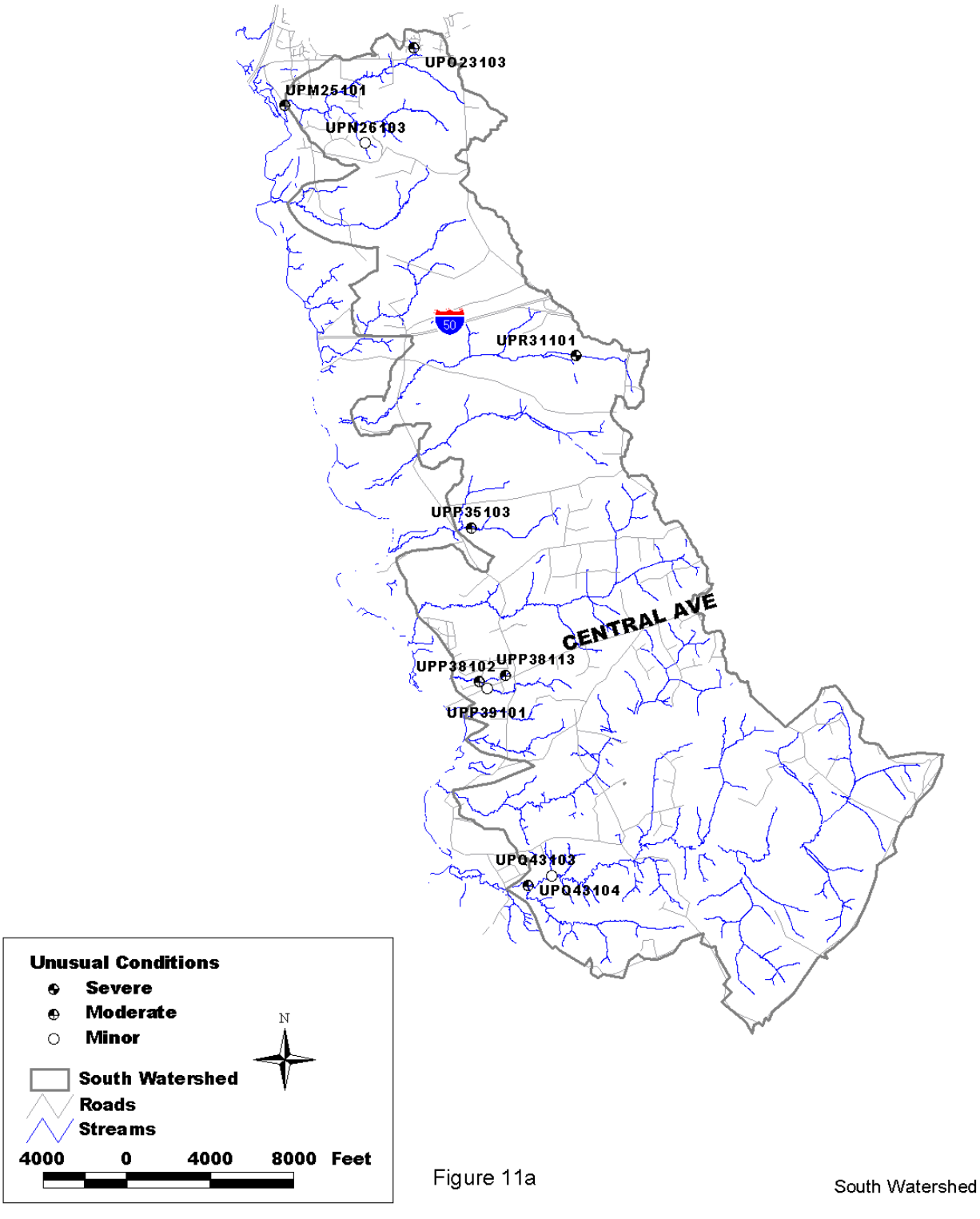


Figure 11a

South Watershed

Unusual Conditions

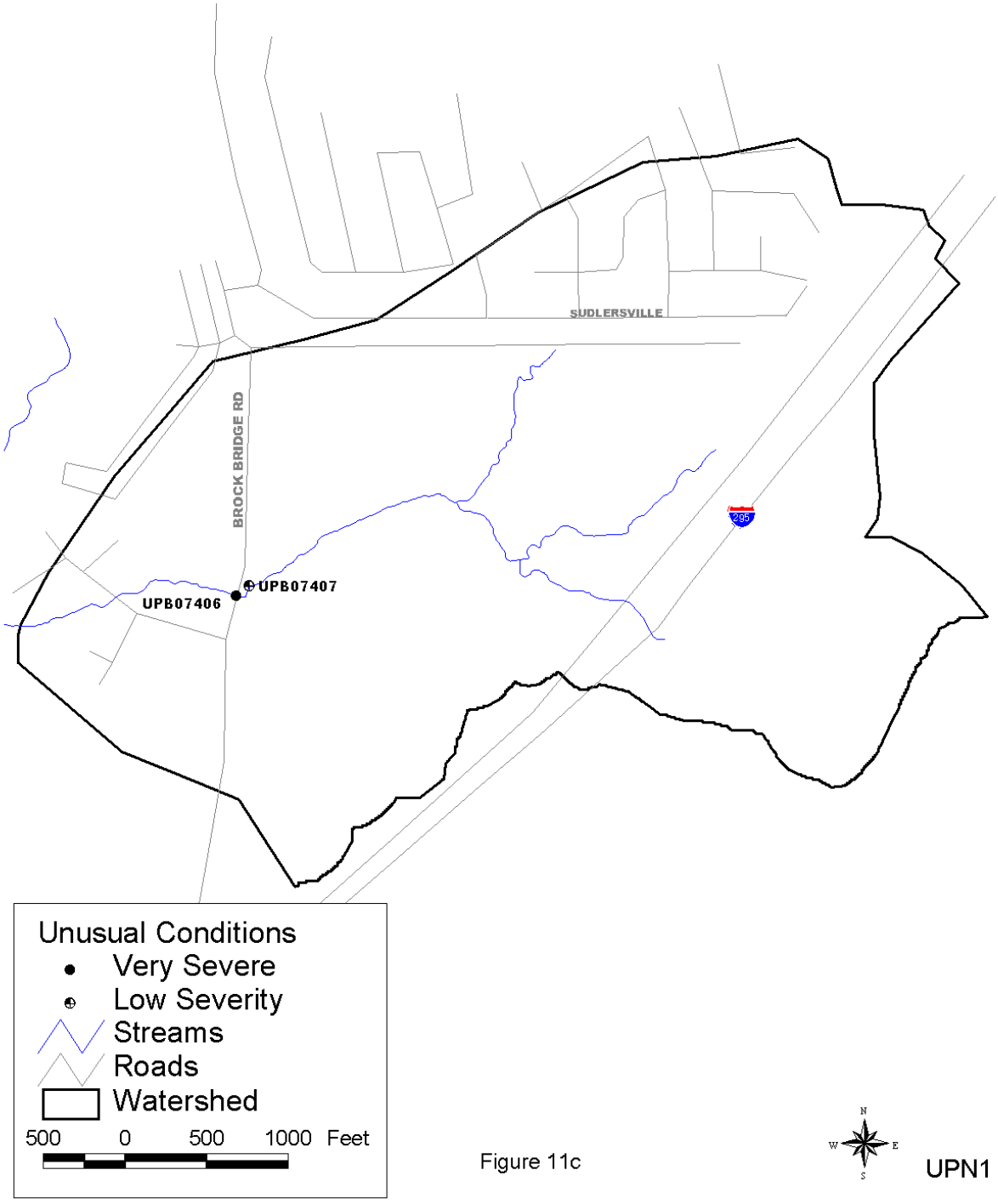


Figure 11c

UPN1

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 five sites during the survey. Locations of these sites are shown in Figure 12. One of the pipes crossing the bottom of the stream had been exposed, one was exposed along the edge of the stream channel, two were above the stream, and the other was an exposed "manhole".

Only one pipe was reported to be discharging at the time of the survey. The discharge at Site UPT45103 was reported to be clear with no odor. At Site UPO24108 was a manhole was found to be present in the middle of the stream. The survey crew reported that there was a sewage odor but there wasn't evidence of any leakage. The site was given a moderate severity rating. The other sites received low and minor severity ratings. The exposed pipe photos should be reviewed by public works officials and follow-up visits should be done based on their evaluations.

Exposed Pipes

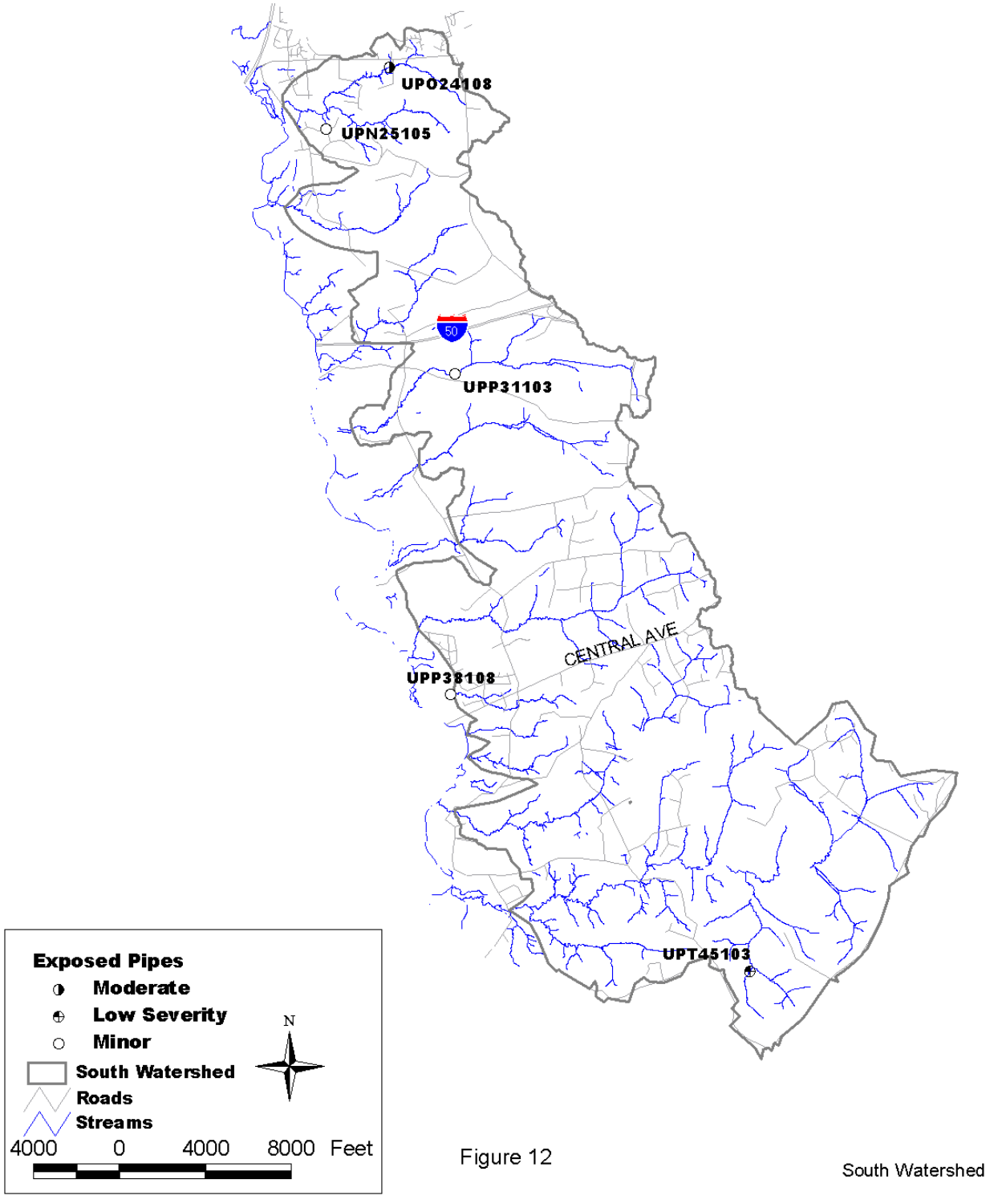


Figure 12

South Watershed

In/Near Stream Construction Sites

In or near stream construction data sheets are used to document the locations where major disturbances are occurring inside or near the stream corridor at the time of the survey. Survey teams report evidence of inadequate sediment control measures or if sediment pollution from the site has affected the stream. In or near stream construction was reported at three sites during the survey (Figure 13). Site UPO25104 and UPP38110 were reported to have inadequate sediment measures and site UPO25104 had excess sediment in the stream channel.

In/Near Stream Construction

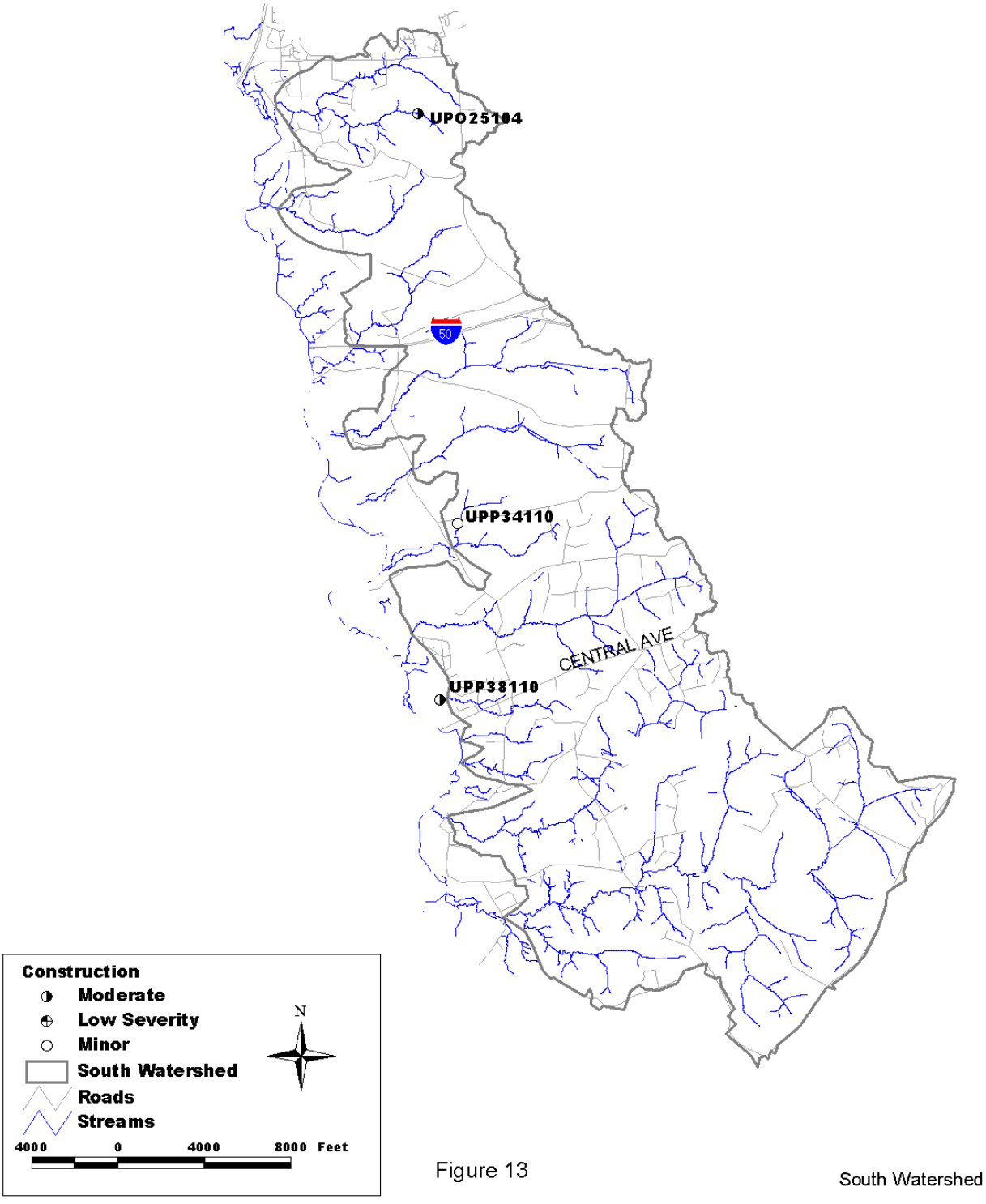


Figure 13

South Watershed

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. Twenty-nine representative data sheets were filled out during this survey. Locations of representative sites are shown in Figure 14 and the data is presented in Appendix B.

Eight out of the nine tributaries of the Upper Patuxent were evaluated. The tributaries were all impacted. The bank condition was either marginal or suboptimal for all of them. The streams were also heavily embedded in most of the same areas. The riparian vegetation was poor for only one site, meaning the areas evaluated had some width of forest buffering the stream.

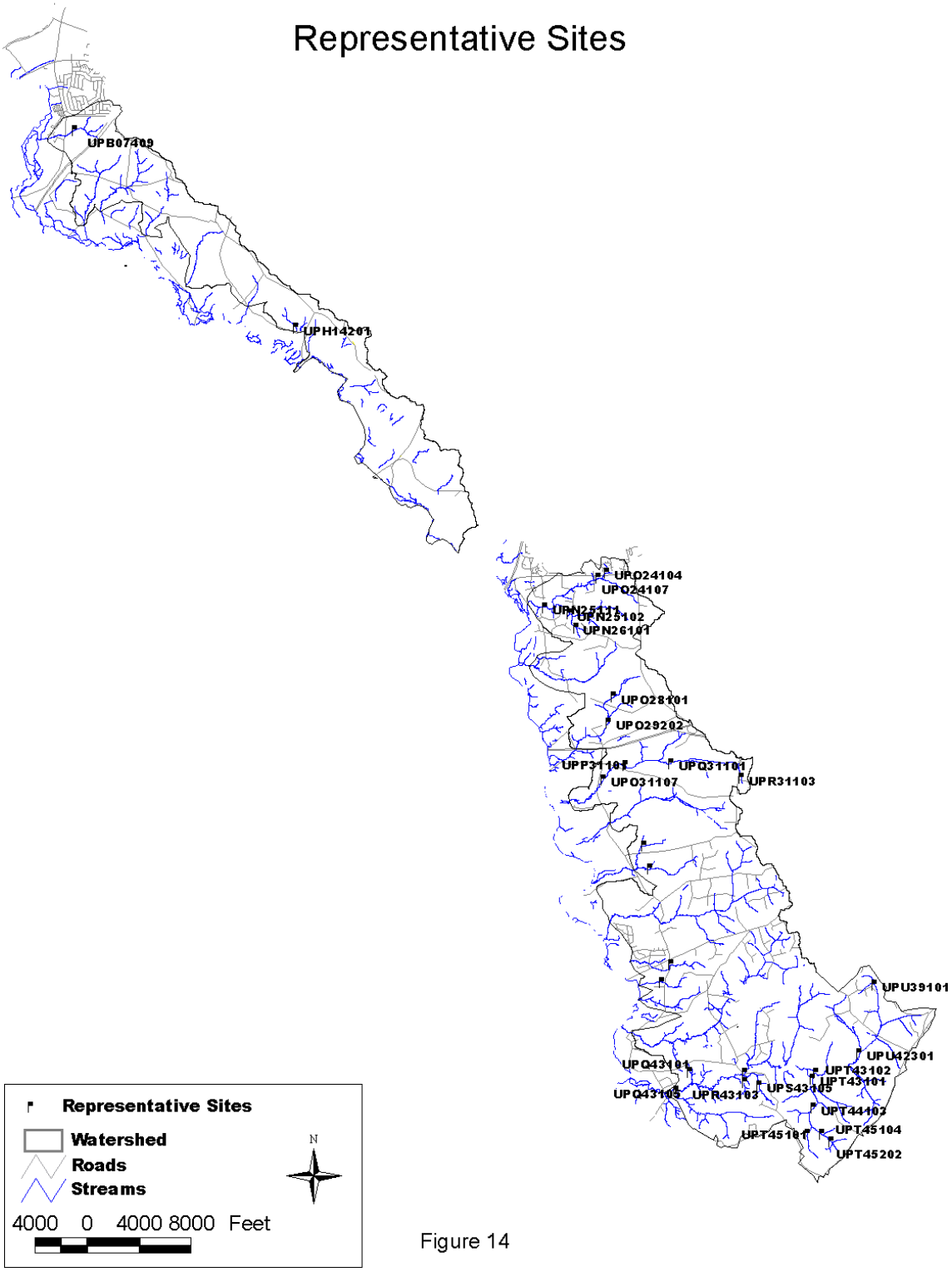

Representative Sites
UPB07409
UPH14201
UPO24104
UPO24107
UPN25111
UPN25102
UPN26101
UPO28101
UPO29202
UPP31101
UPQ31101
UPO31107
UPR31103
UPU39101
UPU42301
UPQ43101
UPT43102
UPT43101
UPQ43105
UPR43103
UPS43105
UPT44102
UPT45104
UPT45101
UPT45202
Representative Sites
Watershed
Roads
Streams
N
4000 0 4000 8000 Feet

Figure 14

DISCUSSION

One of the main objectives of the Upper 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 Spring/Summer of 2002 and over 50 miles of stream were walked. During the SCA survey**,** 166 potential environmental problems were identified. The most common environmental concern seen during the SCA survey was erosion, which were reported at 41 sites. Other potential environmental problems recorded during the survey include: 31 pipe outfalls sites, 28 sites with inadequately vegetated stream buffers, 17 fish migration barriers, 17 trash dumping sites, 12 channel alterations, 12 unusual condition sites, 5 exposed pipes, and 3 in/near construction 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, which will help Anne Arundel County to establish priorities for the types and location of restoration projects that will be pursued in the Upper Patuxent River Watershed in the future.

Results of the Stream Corridor Assessment survey indicate that there are a number of stream segments that could be enhanced by restoration projects. As mentioned earlier, the Maryland Dept. of Natural Resources has formed a partnership with Anne Arundel County to develop a Watershed Restoration Action Strategy (WRAS) for the Anne Arundel County portion of the Upper Patuxent River Watershed. Results from this survey will be combined with other information about the area to help establish priorities for the types and location of restoration projects that will be pursued in the Upper Patuxent River Watershed.

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 Upper 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- Upper Patuxent in Anne Arundel

Site	Problem	Severity	Correctablity	Access	Northing	Easting	Stream
UPB07401	Trash Dumping	2	3	4	157376.99690	414860.78500	UPN1
UPB07402	Pipe Outfall	5	1	2	157383.95880	414950.12936	UPN1
UPB07403	Inadequate Buffer	3	3	1	157432.69209	415060.35941	UPN1
UPB07404	Pipe Outfall	5	1	2	157448.93652	415218.16243	UPN1
UPB07405	Fish Barrier	4	4	1	157433.11936	415284.46068	UPN1
UPB07406	Unusual Condition	1	3	1	157433.07730	415284.97208	UPN1
UPB07407	Unusual Condition	4	3	2	157451.87736	415308.95284	UPN1
UPB07408	Inadequate Buffer	5	2	3	157564.96815	415497.79866	UPN1
UPB07409	Representative				157572.29863	415513.28915	UPN1
UPC06401	Erosion	2	4	3	157674.29901	415759.93790	UPN1
UPC06402	Pipe Outfall	3	3	2	157888.69640	415876.06178	UPN1
UPC07401	Erosion	5	2	4	157507.03190	415783.12707	UPN1
UPC07402	Erosion	3	3	4	157501.02035	415814.38710	UPN1
UPH14201	Representative				152953.21862	420684.10490	UPN7
UPM25101	Unusual Condition	3	4	1	146512.68708	426065.95469	Cox Branch
UPM25102	Pipe Outfall	5	1	1	146207.45780	426321.55319	Cox Branch
UPN24101	Trash Dumping	3	4	4	146953.84154	427217.05344	Cox Branch
UPN24102	Trash Dumping	4	1	1	146917.85814	427173.66169	Cox Branch
UPN24103	Pipe Outfall	5	1	3	146707.24938	426751.38584	Cox Branch
UPN25101	Fish Barrier	5	2	3	146469.78570	426693.25040	Cox Branch
UPN25102	Representative				146306.77524	427046.60852	Cox Branch
UPN25103	Fish Barrier	5	2	4	146246.23845	427102.48863	Cox Branch
UPN25104	Pipe Outfall	3	2	1	146189.19417	426688.04446	Cox Branch
UPN25105	Exposed Pipe	5	1	2	146195.01502	426678.73111	Cox Branch
UPN25105	Trash Dumping	3	1	2	146196.17919	426677.56694	Cox Branch
UPN25106	Trash Dumping	4	1	3	146257.88014	426667.08942	Cox Branch
UPN25107	Erosion	3	4	3	146279.99935	426667.08942	Cox Branch
UPN25108	Fish Barrier	4	4	3	146306.77524	426656.61190	Cox Branch
UPN25109	Erosion	3	3	4	146430.17716	426681.05945	Cox Branch
UPN25110	Channel Alteration	4	1	4	146412.71462	426540.19500	Cox Branch
UPN25111	Representative				146451.13220	426468.01652	Cox Branch
UPN25112	Inadequate Buffer	5	2	4	146449.96803	426377.21134	Cox Branch
UPN26101	Representative				145977.31541	427194.45798	Cox Branch
UPN26102	Pipe Outfall	5	1	3	145978.47958	427217.74136	Cox Branch
UPN26103	Unusual Condition	5	3	3	145968.00206	427231.71139	Cox Branch
UPN26104	Erosion	5	1	4	145958.68871	427238.69640	Cox Branch
UPN26105	Comment				145950.53953	427256.15894	Cox Branch
UPN26105	Trash Dumping	2	1	1	145950.53953	427256.15894	Cox Branch
UPO23101	Inadequate Buffer	4	2	3	147303.20769	427949.61078	Cox Branch
UPO23101	Pipe Outfall	5	2	2	147309.55770	427951.72745	Cox Branch
UPO23102	Pipe Outfall	5	1	3	147329.66607	427947.49410	Cox Branch
UPO23103	Unusual Condition	3	3	3	147346.59944	427940.08576	Cox Branch
UPO23104	Channel Alteration	3	3	2	147400.57455	427898.81067	Cox Branch
UPO23105	Pipe Outfall	5	2	2	147454.54966	427857.53559	Cox Branch
UPO23106	Channel Alteration	5	1	1	147306.38269	428068.14435	Cox Branch
UPO23106	Pipe Outfall	5	1	1	147315.90771	428068.14435	Cox Branch
UPO23107	Pipe Outfall	5	1	1	147309.55770	428071.31935	Cox Branch
UPO23108	Channel Alteration	5	1	2	147296.32851	427572.03637	Cox Branch
UPO24101	Erosion	4	3	3	146972.08098	428135.20313	Cox Branch
UPO24102	Inadequate Buffer	5	3	3	147066.51096	427919.03811	Cox Branch

Appendix A- Upper Patuxent in Anne Arundel

Site	Problem	Severity	Correctablity	Access	Northing	Easting	Stream
UPO24102	Pipe Outfall	5	1	3	147068.78638	427917.90040	Cox Branch
UPO24103	Comment				147092.67830	427839.39837	Cox Branch
UPO24103	Pipe Outfall	5	1	3	147091.54059	427839.39837	Cox Branch
UPO24104	Representative				147248.54466	427915.62498	Cox Branch
UPO24105	Channel Alteration	5	2	1	147197.34768	427830.29668	Cox Branch
UPO24105	Fish Barrier	4	5	5	147196.20997	427830.29668	Cox Branch
UPO24106	Erosion	3	3	2	147158.66552	427817.78187	Cox Branch
UPO24106	Fish Barrier	3	2	1	147185.97058	427829.15897	Cox Branch
UPO24107	Representative				147117.70794	427714.25020	Cox Branch
UPO24108	Exposed Pipe	3	3	1	147064.23554	427590.23974	Cox Branch
UPO24109	Erosion	2	3	3	147056.27156	427544.73132	Cox Branch
UPO24110	Inadequate Buffer	5	2	3	146939.08737	427382.03870	Cox Branch
UPO24111	Trash Dumping	3	4	4	146943.63821	427346.76967	Cox Branch
UPO24112	Comment				147181.41973	427586.82661	Cox Branch
UPO24112	Fish Barrier	4	4	1	147180.28202	427586.82661	Cox Branch
UPO25101	Fish Barrier	5	1	3	146283.76606	427434.37339	Cox Branch
UPO25102	Erosion	4	2	4	146275.80208	427463.95386	Cox Branch
UPO25103	Erosion	1	4	4	146413.46507	427644.84985	Cox Branch
UPO25104	Construction	3			146428.25530	428073.76675	Cox Branch
UPO28101	Representative				144364.51317	428082.20498	UPS3
UPO29201	Erosion	3	4	3	144093.67312	428154.54421	UPS3
UPO29202	Representative				143761.46162	427963.40882	UPS3
UPO29203	Erosion	3	3	3	143882.05894	427958.85798	UPS3
UPO31101	Pipe Outfall	5	1	1	142753.45001	428094.24555	UPS4
UPO31102	Inadequate Buffer	3	3	2	142765.96483	428111.31120	UPS4
UPO31103	Pipe Outfall	5	1	2	142800.09614	428167.05902	UPS4
UPO31104	Pipe Outfall	3	3	2	142805.78470	428215.98058	UPS4
UPO31105	Trash Dumping	4	1	3	142778.47964	428274.00382	UPS4
UPO31106	Erosion	5	2	3	142773.92880	428292.20719	UPS4
UPO31107	Representative				142436.02875	427835.98523	UPS4
UPO31108	Inadequate Buffer	5	1	3	142500.87825	427897.42161	UPS4
UPO31109	Inadequate Buffer	5	3	3	142699.97761	428016.88122	UPS4
UPO32101	Trash Dumping	2	4	3	142206.21120	427746.10610	UPS4
UPO32102	Erosion	4	3	3	142300.64118	427735.86670	UPS4
UPO32103	Fish Barrier	3	5	1	142182.31928	427675.56804	UPS4
UPO32104	Erosion	3	4	1	142175.49301	427657.36467	UPS4
UPP25101	Channel Alteration	5	3	3	146534.04317	428645.93335	Cox Branch
UPP25101	Inadequate Buffer	4	3	2	146535.18088	428643.65793	Cox Branch
UPP25101	Pipe Outfall	5	1	2	146528.35462	428652.75961	Cox Branch
UPP31101	Representative				142769.72242	428355.17425	UPS4
UPP31102	Erosion	3	3	4	142717.61011	428370.06348	UPS4
UPP31103	Exposed Pipe	5	2	1	142718.85088	428505.30735	UPS4
UPP31104	Inadequate Buffer	4	3	3	142746.14780	428573.54966	UPS4
UPP31105	Erosion	3	3	4	142868.98398	428742.29430	UPS4
UPP34101	Pipe Outfall	5	1	1	140948.27293	429166.63744	UPS6
UPP34102	Erosion	3	3	1	140948.27293	429144.30359	UPS6
UPP34103	Inadequate Buffer	3	1	1	140899.88293	428809.29585	UPS6
UPP34103	Trash Dumping	5	1	1	140901.12370	428804.33277	UPS6
UPP34104	Representative				140897.40139	428783.23969	UPS6
UPP34105	Erosion	4	2	2	140894.91985	428713.75661	UPS6

Appendix A- Upper Patuxent in Anne Arundel

Site	Problem	Severity	Correctablity	Access	Northing	Easting	Stream
UPP34106	Erosion	5	2	3	141040.08987	428744.77584	UPS6
UPP34107	Inadequate Buffer	3	1	1	140851.49292	428701.34891	UPS6
UPP34108	Erosion	3	3	3	140711.28598	428670.32968	UPS6
UPP34109	Inadequate Buffer	3	3	2	140716.24906	428676.53352	UPS6
UPP34110	Construction	5			140677.78520	428630.62506	UPS6
UPP34111	Pipe Outfall	5	1	1	140546.26365	428594.64274	UPS6
UPP35101	Fish Barrier	3	3	1	140325.85144	428542.29456	UPS6
UPP35102	Erosion	3	3	2	140345.19252	428596.90467	UPS6
UPP35103	Unusual Condition	3	3	3	140387.28781	428757.32187	UPS6
UPP35104	Representative				140362.25818	428917.73906	UPS6
UPP38101	Fish Barrier	3	2	1	138145.99790	428892.70943	UPS10
UPP38102	Unusual Condition	3	1	1	138150.54874	428879.05690	UPS10
UPP38103	Erosion	3	2	3	138160.78813	428867.67980	UPS10
UPP38104	Pipe Outfall	5	1	3	138161.92584	428665.16731	UPS10
UPP38105	Pipe Outfall	4	2	3	138163.06355	428659.47875	UPS10
UPP38106	Pipe Outfall	3	3	3	138188.09319	428661.75418	UPS10
UPP38107	Inadequate Buffer	4	3	3	138184.68006	428408.04471	UPS10
UPP38108	Exposed Pipe	5	5	1	138192.64403	428446.72687	UPS10
UPP38109	Pipe Outfall	5	1	1	138191.50632	428447.86458	UPS10
UPP38110	Construction	3			138197.19487	428390.97905	UPS10
UPP38111	Fish Barrier	3	3	1	138145.99790	428372.77568	UPS10
UPP38112	Pipe Outfall	5	1	3	138089.11236	428369.36255	UPS10
UPP38113	Unusual Condition	3	3	2	138243.84101	429260.18996	UPS10
UPP38114	Inadequate Buffer	5	4	2	138241.56559	429255.63912	UPS10
UPP38115	Erosion	4	2	2	138185.81777	429148.69432	UPS10
UPP39101	Erosion	5	2	1	137698.87762	429270.42936	UPS11
UPP39101	Fish Barrier	4	3	1	137697.73991	429270.42936	UPS11
UPP39101	Pipe Outfall	4	2	1	137698.87762	429270.42936	UPS11
UPP39101	Unusual Condition	5	4	1	138057.25647	428986.00170	UPS10
UPP39102	Representative				137713.66786	429195.34045	UPS11
UPP39103	Erosion	4	4	3	137719.35641	429177.13709	UPS11
UPP39104	Trash Dumping	2	3	3	137696.60220	429041.74952	UPS11
UPP39105	Erosion	5	3	3	137694.32678	429028.09699	UPS11
UPP39106	Trash Dumping	3	3	3	137687.50052	428924.56533	UPS11
UPQ30101	Pipe Outfall	5	1	2	143523.79804	429777.45669	UPS4
UPQ30102	Channel Alteration	5	2	3	143509.00780	429720.57116	UPS4
UPQ30102	Inadequate Buffer	2	2	2	143553.37851	429585.18360	UPS4
UPQ31101	Representative				142818.41745	429413.38930	UPS4
UPQ31102	Inadequate Buffer	3	3	4	142860.51275	429539.67517	UPS4
UPQ31103	Fish Barrier	3	3	1	142857.09961	429787.69609	UPS4
UPQ31104	Inadequate Buffer	2	4	3	142919.67370	429990.20858	UPS4
UPQ31105	Inadequate Buffer	3	4	3	142865.06359	429985.65774	UPS4
UPQ35101	Trash Dumping	4	1	2	140480.42213	429974.28063	UPS6
UPQ35102	Inadequate Buffer	4	5	2	140424.67431	430012.96279	UPS6
UPQ38101	Trash Dumping	5	1	3	138119.67260	429594.28528	UPS10
UPQ38102	Erosion	3	4	3	138119.67260	429570.39336	UPS10
UPQ38103	Trash Dumping	4	2	3	138118.53489	429450.93375	UPS10
UPQ38104	Representative				138115.12176	429424.76640	UPS10
UPQ38105	Pipe Outfall	5	1	1	138115.12176	429392.91050	UPS10
UPQ38106	Channel Alteration	5	2	1	138110.57092	429387.22195	UPS10

Appendix A- Upper Patuxent in Anne Arundel

Site	Problem	Severity	Correctablity	Access	Northing	Easting	Stream
UPQ39101	Comment				137999.07528	429313.27076	UPS10
UPQ39101	Erosion	5	3	2	137795.42508	429657.99708	UPS11
UPQ39102	Erosion	5	3	2	137731.71328	429623.86576	UPS11
UPQ39103	Pipe Outfall	4	1	4	137710.09678	429614.76407	Cox Branch
UPQ39104	Erosion	5	3	2	137708.95907	429613.62636	UPS11
UPQ39105	Erosion	4	3	3	137677.10317	429603.38697	UPS11
UPQ39106	Inadequate Buffer	5	1	3	137653.21125	429595.42299	UPS11
UPQ39107	Inadequate Buffer	4	3	3	137611.11596	429384.94653	UPS11
UPQ39108	Trash Dumping	3	2	2	137664.58836	429308.71992	UPS11
UPQ43101	Representative				135610.92499	429861.64886	Stocketts Run
UPQ43102	Erosion	1	4	4	135349.25154	429991.34787	Stocketts Run
UPQ43103	Unusual Condition	5	3	4	135332.18588	429923.08523	Stocketts Run
UPQ43104	Unusual Condition	3	1	3	135188.83435	429589.73602	Stocketts Run
UPQ43105	Representative				135185.42121	429535.12591	Stocketts Run
UPQ43106	Trash Dumping	5	1	1	135222.96566	429472.55183	Stocketts Run
UPR31101	Channel Alteration	3	2	3	142864.18085	430392.45942	UPS4
UPR31101	Unusual Condition	2	2	3	142876.69567	430283.23920	UPS4
UPR31102	Inadequate Buffer	2	2	2	142440.95250	431065.98410	UPS4
UPR31103	Representative				142465.98214	431068.25952	Stocketts Run
UPR31104	Channel Alteration	5	2	1	142410.23432	431067.12181	UPS4
UPR42101	Channel Alteration	5	2	2	135898.30062	430900.39523	Stocketts Run
UPR42101	Inadequate Buffer	4	1	2	135889.19893	430901.53294	Stocketts Run
UPR42102	Pipe Outfall	4	2	1	135806.14606	430926.56257	Stocketts Run
UPR43101	Representative				135589.35927	431134.57179	Stocketts Run
UPR43102	Erosion	4	3	3	135538.71792	431125.36427	Stocketts Run
UPR43103	Representative				135376.43540	431129.96803	Stocketts Run
UPS41301	Pipe Outfall	3	3	3	136315.14330	431768.53247	Stocketts Run
UPS43101	Fish Barrier	5	3	2	135054.52158	431603.51013	Stocketts Run
UPS43102	Channel Alteration	5	2	2	135081.81851	431589.86167	Stocketts Run
UPS43103	Fish Barrier	5	3	2	135209.61775	431484.39627	Stocketts Run
UPS43104	Erosion	5	3	3	135220.78468	431470.74781	Stocketts Run
UPS43105	Representative				135293.99007	431468.26627	Stocketts Run
UPT43101	Representative				135457.77164	432720.20260	Stocketts Run
UPT43102	Representative				135585.57089	432804.57492	Stocketts Run
UPT44101	Erosion	3	3	4	134461.43380	432645.75644	Stocketts Run
UPT44102	Inadequate Buffer	4	3	2	134898.18463	432862.89108	Stocketts Run
UPT44103	Representative				134779.07077	432741.29568	Stocketts Run
UPT45101	Representative				134166.35583	432599.13467	Stocketts Run
UPT45102	Erosion	4	4	5	134229.45908	432640.80663	Stocketts Run
UPT45103	Exposed Pipe	4	3	4	134280.65606	432675.33482	Stocketts Run
UPT45104	Representative				134168.73709	432934.89160	Stocketts Run
UPT45201	Erosion	3	5	4	133966.33043	433171.82645	Stocketts Run
UPT45202	Representative				133979.42733	433164.68268	Stocketts Run
UPU39101	Representative				137657.92384	434161.97665	Stocketts Run
UPU41301	Erosion	3	3	5	136413.43212	433773.61583	Stocketts Run
UPU42301	Representative				136047.92540	433817.95320	Stocketts Run
UPV41101	Fish Barrier	3	4	1	136464.42890	434224.98097	Stocketts Run
UPV41102	Erosion	3	4	4	136408.97109	434211.89929	Stocketts Run
UPV41103	Inadequate Buffer	3	2	2	136351.60343	434309.36325	Stocketts Run
UPV42101	Inadequate Buffer	3	2	2	136222.38067	434495.63029	Stocketts Run

Appendix B

Listing of sites by problem category

Erosion- Upper Patuxent AA County

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	UPO25103	Widening	Unknown	5000	8	Small Trees	Small Trees	No		1	4	4
Erosion	UPQ43102	Widening	Bend at steep slope	3600	8	Forest	Forest	No		1	4	4
Erosion	UPC06401	Downcutting	Unknown	800	8	Forest	Forest	No		2	4	3
Erosion	UPO24109	Widening	Bend at steep slope	4800	8	Small Trees	Small Trees	No		2	3	3
Erosion	UPC07402	Headcutting	Unknown	1400	8	Forest	Forest	No		3	3	4
Erosion	UPN25107	Widening	Bend at steep slope	400	3	Forest	Forest	No		3	4	3
Erosion	UPN25109	Widening	Bend at steep slope	500	4	Forest	Forest	No		3	3	4
Erosion	UPO24106	Downcutting	Below road crossing	900	3	Small Trees	Small Trees	No		3	3	2
Erosion	UPO29201	Downcutting	Bend at steep slope	1000	4	Forest	Forest	No		3	4	3
Erosion	UPO29203	Downcutting	Bend at steep slope	1400	6	Small Trees	Small Trees	No		3	3	3
Erosion	UPO32104	Widening	Below road crossing	300	10	Forest	Forest	No		3	4	1
Erosion	UPP31102	Widening	Unknown	2200	4	Forest	Forest	No		3	3	4
Erosion	UPP31105	Widening	Bend at steep slope	2500	4	Forest	Forest	No		3	3	4
Erosion	UPP34102	Widening	Bend at steep slope	2000	5	Pasture	Small Trees	No		3	3	1
Erosion	UPP34108	Downcutting	Below road crossing	1600	8	Small Trees	Small Trees	No		3	3	3
Erosion	UPP35102	Widening	Bend at steep slope	1800	5	Small Trees	Lawn	No		3	3	2
Erosion	UPP38103	Widening	Bend at steep slope	700	3	Small Trees	Small Trees	No		3	2	3
Erosion	UPQ38102	Widening	Bend at steep slope	1000	10	Forest	Forest	No		3	4	3
Erosion	UPT44101	Downcutting	Bend at steep slope	400	5	Forest	Forest	No		3	3	4
Erosion	UPT45201	Downcutting	Unknown	1000	5	Forest	Forest	No		3	5	4
Erosion	UPU41301	Widening	Bend at steep slope	2000	4	Forest	Forest	No		3	3	5
Erosion	UPV41102	Widening	Below road crossing	2400	5	Small Trees	Small Trees	No		3	4	4
Erosion	UPO24101	Downcutting	Unknown	700	2	Small Trees	Small Trees	No		4	3	3
Erosion	UPO25102	Widening	Unknown	300	10	Small Trees	Small Trees	No		4	2	4
Erosion	UPO32102	Widening	Bend at steep slope	400	3	Small Trees	Pasture	No		4	3	3
Erosion	UPP34105	Widening	Bend at steep slope	600	3	Small Trees	Small Trees	No		4	2	2
Erosion	UPP38115	Widening	Below road crossing	400	3	Forest	Forest	No		4	2	2
Erosion	UPP39103	Widening	Bend at steep slope	100	10	Forest	Forest	No		4	4	3
Erosion	UPQ39105	Widening	Bend at steep slope	100	20	Lawn	Forest	No		4	3	3
Erosion	UPR43102	Widening	Bend at steep slope	400	4	Forest	Forest	No		4	3	3
Erosion	UPT45102	Widening	Bend at steep slope	400	5	Small Trees	Small Trees	No		4	4	5
Erosion	UPC07401	Widening	Bend at steep slope	600	2	Forest	Forest	No		5	2	4

Erosion- Upper Patuxent AA County

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	UPN26104	Downcutting	Below channelization	200	2	Forest	Forest	No		5	1	4
Erosion	UPO31106	Widening	Bend at steep slope	20	10	Pasture	Pasture	No		5	2	3
Erosion	UPP34106	Headcutting	Unknown	20	8	Small Trees	Small Trees	No		5	2	3
Erosion	UPP39101	Headcutting	Pipe outfall	10	5	Forest	Forest	No		5	2	1
Erosion	UPP39105	Headcutting	Unknown	300	2	Forest	Forest	No		5	3	3
Erosion	UPQ39101	Headcutting	Land use change upstream	15	8	Forest	Forest	No		5	3	2
Erosion	UPQ39102	Headcutting	Unknown	40	5	Forest	Forest	No		5	3	2
Erosion	UPQ39104	Headcutting	Pipe outfall	30	5	Forest	Forest	No		5	3	2
Erosion	UPS43104	Widening	Below road crossing	200	3	Forest	Forest	No		5	3	3

Pipe Outfalls- Upper Patuxent AA County

Problem	Site	Outfall Type	Pipe Type	Location of Pipe	Diameter (in)	Channel Width	Discharge	Color	Odor	Severity	Correctability	Access
Pipe Outfall	UPC06402	Stormwater	Corrugated Metal	Head of stream	36		Yes	Clear	None	3	3	2
Pipe Outfall	UPN25104	Stormwater	Corrugated Metal	Head of stream	24		Yes	Clear	None	3	2	1
Pipe Outfall	UPO31104	Agricultural	Concrete Pipe	Right bank	18		Yes	Clear	Rotten eggs	3	3	2
Pipe Outfall	UPP38106	Stormwater	Corrugated Metal	Right bank	36		Yes	Clear	None	3	3	3
Pipe Outfall	UPS41301	Stormwater	Smooth Metal Pipe	Head of stream	24		Yes	Clear	None	3	3	3
Pipe Outfall	UPP38105	Stormwater	Concrete Pipe	Left bank	12		No			4	2	3
Pipe Outfall	UPP39101	Stormwater	Concrete Channel	Left bank		2	No			4	2	1
Pipe Outfall	UPQ39103	Stormwater	Corrugated Metal	Right bank	12		No			4	1	4
Pipe Outfall	UPR42102	Stormwater	Corrugated Metal	Left bank	18		No			4	2	1
Pipe Outfall	UPB07402	Stormwater	Corrugated Metal	Left bank	12		No			5	1	2
Pipe Outfall	UPB07404	Stormwater	Concrete Pipe	Left bank	12		No			5	1	2
Pipe Outfall	UPM25102	Stormwater	Corrugated Metal	Head of stream	12		No			5	1	1
Pipe Outfall	UPN24103	Stormwater	Corrugated Metal	Left bank	12		No			5	1	3
Pipe Outfall	UPN26102	Stormwater	Plastic	Left bank	12		No			5	1	3
Pipe Outfall	UPO23101	Stormwater	Plastic	Left bank	4		No			5	2	2
Pipe Outfall	UPO23102	Stormwater	Plastic	Right bank	6		No			5	1	3
Pipe Outfall	UPO23105	Stormwater	Plastic	Left bank	4		No			5	2	2
Pipe Outfall	UPO23106	Stormwater	Concrete Pipe	Head of stream	36		No			5	1	1
Pipe Outfall	UPO23107	Stormwater	Concrete Pipe	Head of stream	12		No			5	1	1
Pipe Outfall	UPO24102	Unknown	Plastic	Right bank	8		No			5	1	3
Pipe Outfall	UPO24103	Stormwater	Corrugated Metal	Right bank	36		No			5	1	3
Pipe Outfall	UPO31101	Stormwater	Corrugated Metal	Right bank	24		No			5	1	1
Pipe Outfall	UPO31103	Agricultural	Plastic	Right bank	6		No			5	1	2
Pipe Outfall	UPP25101	Stormwater	Concrete Pipe	Left bank	24		No			5	1	2
Pipe Outfall	UPP34101	Unknown	Plastic	Left bank	4		No			5	1	1
Pipe Outfall	UPP34111	Stormwater	Plastic	Right bank	4		No			5	1	1
Pipe Outfall	UPP38104	Unknown	Plastic	Left bank	18		No			5	1	3
Pipe Outfall	UPP38109	Unknown	Plastic	Right bank	6		No			5	1	1
Pipe Outfall	UPP38112	Unknown	Plastic	Left bank	4		No			5	1	3
Pipe Outfall	UPQ30101	Stormwater	Concrete Pipe	Head of stream	24		No			5	1	2
Pipe Outfall	UPQ38105	Stormwater	Earth Channel	Right bank		3	No			5	1	1

Inadequate Buffer- Upper Patuxent AA County

Problem	Site	Inadequate on	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	LandUseRight	LandUseLeft	Recent Buffer?	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	UPQ30102	Both	Both	5	5	3000	3000	Crop field	Crop field	No	No	2	2	2	1
Inadequate Buffer	UPQ31104	Both	Neither	5	5	3200	3200	Crop field	Crop field	No	Horses	2	4	3	3
Inadequate Buffer	UPR31102	Both	Neither	0	0	800	800	Lawn	Lawn	No	No	2	2	2	3
Inadequate Buffer	UPB07403	Both	Neither	5	5	900	400	Shrubs/Small trees	Lawn	No	No	3	3	1	2
Inadequate Buffer	UPO31102	Both	Neither	5	5	1200	1000	Pasture	Pasture	No	Horses	3	3	2	3
Inadequate Buffer	UPP34103	Both	Neither	0	0	500	500	Lawn	Lawn	No	No	3	1	1	5
Inadequate Buffer	UPP34107	Both	Neither	0	0	100	500	Shrubs/Small trees	Shrubs/Small trees	No	No	3	1	1	5
Inadequate Buffer	UPP34109	Both	Neither	0	0	100	1000	Shrubs/Small trees	Lawn	No	No	3	3	2	5
Inadequate Buffer	UPQ31102	Right	Neither		0		1200	Lawn	Forest	No	No	3	3	4	3
Inadequate Buffer	UPQ31105	Right	Neither		5		1000	Shrubs/Small trees	Forest	No	Horses	3	4	3	3
Inadequate Buffer	UPV41103	Left	Neither	0		2700		Forest	Lawn	No	No	3	2	2	4
Inadequate Buffer	UPV42101	Right	Neither		0		2000	Lawn	Lawn	No	No	3	2	2	3
Inadequate Buffer	UPO23101	Both	Right	10	0	200	200	Shrubs/Small trees	Lawn	No	No	4	2	3	2
Inadequate Buffer	UPP25101	Left	Left	0		450		Shrubs/Small trees	Shrubs/Small trees	No	No	4	3	2	2
Inadequate Buffer	UPP31104	Both	Neither	20	20	400	400	Pasture	Pasture	No	Cattle	4	3	3	3
Inadequate Buffer	UPP38107	Both	Both	0	0	300	300	Shrubs/Small trees	Shrubs/Small trees	No	No	4	3	3	2
Inadequate Buffer	UPQ35102	Left	Neither	20		1200		Lawn	Paved	No	No	4	5	2	3
Inadequate Buffer	UPQ39107	Left	Neither	5		500		Forest	Lawn	No	No	4	3	3	5
Inadequate Buffer	UPR42101	Both	Neither	5	5	600	600	Pasture	Pasture	No	No	4	1	2	1
Inadequate Buffer	UPT44102	Both	Neither	10	10	1400	1400	Crop field	Crop field	No	No	4	3	2	4
Inadequate Buffer	UPB07408	Right	Neither		10		400	Shrubs/Small trees	Forest	No	No	5	2	3	2
Inadequate Buffer	UPN25112	Right	Right		0		400	Shrubs/Small trees	Forest	No	No	5	2	4	1
Inadequate Buffer	UPO24102	Right	Right		0		200	Shrubs/Small trees	Shrubs/Small trees	No	No	5	3	3	5
Inadequate Buffer	UPO24110	Right	Neither		0		200	Shrubs/Small trees	Shrubs/Small trees	No	No	5	2	3	3
Inadequate Buffer	UPO31108	Right	Neither		5		200	Lawn	Forest	No	No	5	1	3	4
Inadequate Buffer	UPO31109	Left	Neither	15		400		Forest	Lawn	No	No	5	3	3	4
Inadequate Buffer	UPP38114	Both	Neither	10	10	200	200	Lawn	Pasture	No	No	5	4	2	5
Inadequate Buffer	UPQ39106	Right	Neither		30		300	Pasture	Forest	No	No	5	1	3	5

Fish Barrier- Upper Patuxent AA County

Problem	Site	Blockage	Type	Reason	Drop(In)	Depth(In)	Severity	Correctability	Access
Fish Barrier	UPO32103	Total	Road crossing	Too high	18		2	5	1
Fish Barrier	UPO24106	Total	Road crossing	Too shallow		1	3	2	1
Fish Barrier	UPP35101	Total	Road crossing	Too shallow		1	3	3	1
Fish Barrier	UPP38101	Partial	Road crossing	Too high	12		3	2	1
Fish Barrier	UPP38111	Total	Road crossing	Too shallow		0.25	3	3	1
Fish Barrier	UPQ31103	Total	Road crossing	Too high	6		3	3	1
Fish Barrier	UPV41101	Total	Road crossing	Too shallow		0.25	3	4	1
Fish Barrier	UPB07405	Partial	Road crossing	Too shallow		0.25	4	4	1
Fish Barrier	UPN25108	Total	Natural falls	Too high	120		4	4	3
Fish Barrier	UPO24105	Total	Channelized	Too shallow		1	4	5	5
Fish Barrier	UPO24112	Total	Road crossing	Too shallow		0.25	4	4	1
Fish Barrier	UPP39101	Total	Road crossing	Too high	12		4	3	1
Fish Barrier	UPN25101	Partial	Natural falls	Too high	5		5	2	3
Fish Barrier	UPN25103	Total	Natural falls	Too high	36		5	2	4
Fish Barrier	UPO25101	Total	Natural falls	Too high	24		5	1	3
Fish Barrier	UPS43101	Total	Channelized	Too shallow			5	3	2
Fish Barrier	UPS43103	Total	Road crossing	Too high	18		5	3	2

Trash Dumping- Upper Patuxent AA County

Problem	Site	Type	Truckloads	Other measure	Extent	Volunteer Project?	Owner Type	Owner Name	Severity	Correctability	Access
Trash Dumping	UPB07401	Mixed-Appliances, scrapmetal	25		Large Area	Yes	Unknown		2	3	4
Trash Dumping	UPN26105	Mixed-Appliances,recyclables	20		Large Area	Yes	Private		2	1	1
Trash Dumping	UPO32101	Mixed- Industrial, Residential	50		Large Area	No	Private		2	4	3
Trash Dumping	UPP39104	Mixed-Sand,machines	20		Single Site	No	Private	GE Frisco	2	3	3
Trash Dumping	UPN24101	Residential	2		Single Site	Yes	Private		3	4	4
Trash Dumping	UPN25105	Yard waste	8		Single Site	Yes	Private		3	1	2
Trash Dumping	UPO24111	Residential	3		Large Area	Yes	Private		3	4	4
Trash Dumping	UPP39106	Mixed- Trailer, Appliances	4		Single Site	No	Private		3	3	3
Trash Dumping	UPQ39108	Yard waste	10		Single Site	Yes	Private		3	2	2
Trash Dumping	UPN24102	Residential	1		Single Site	Yes	Unknown		4	1	1
Trash Dumping	UPN25106	Yard waste	5		Single Site	Yes	Private		4	1	3
Trash Dumping	UPO31105	Residential	2		Single Site	Yes	Private		4	1	3
Trash Dumping	UPQ35101	Yard waste	5		Single Site	Yes	Private		4	1	2
Trash Dumping	UPQ38103	Scrap metal &Plastic	10		Single Site	Yes	Private		4	2	3
Trash Dumping	UPP34103	Yard waste	3		Single Site	Yes	Private		5	1	1
Trash Dumping	UPQ38101	Newspapers	1		Single Site	Yes	Private		5	1	3
Trash Dumping	UPQ43106	Yard waste	4		Single Site	Yes	Private		5	1	1

Channel Alteration- Upper Patuxent AA County

Problem	Site	Type	BottomWidth(in)	Length(ft)	Perennial Flow	Sedimentation	Veg in Channel	Road Crossing	LengthAbove(ft)	LengthBelow(ft)	Severity	Correctability	Access
Channel Alteration	UPO23104	Rip-rap	60	300	Yes	Yes	No	No			3	3	2
Channel Alteration	UPR31101	Earth channel	54	2200	Yes	Yes	No	No			3	2	3
Channel Alteration	UPN25110	Wood	60	300	Yes	Yes	Yes	No			4	1	4
Channel Alteration	UPO23106	Rip-rap	96	6	Yes	No	No	No			5	1	1
Channel Alteration	UPO23108	Rip-rap	36	30	No	No	Yes	No			5	1	2
Channel Alteration	UPO24105	Earth channel	24	20	No	No	No	No			5	2	1
Channel Alteration	UPP25101	Earth channel	72	400	No	No	Yes	No			5	3	3
Channel Alteration	UPQ30102	Earth channel	24	1400	No	Yes	Yes	No			5	2	3
Channel Alteration	UPQ38106	Rip-rap	60	12	Yes	Yes	No	Above	12		5	2	1
Channel Alteration	UPR31104	Earth channel	36	500	No	Yes	Yes	No			5	2	1
Channel Alteration	UPR42101	Earth channel	72	600	No	No	Yes	No			5	2	2
Channel Alteration	UPS43102	Rip-rap	24	30	Yes	Yes	Yes	No			5	2	2

Unusual Conditions/Comments- Upper Patuxent AA County

Problem	Site	Describe	Description	Potential Cause	Severity	Correctability	Access
Unusual Condition	UPB07406		Road being undermined by stream at road crossing; Excessive sediment behind causing blockage		1	3	1
Unusual Condition	UPR31101		Whole stream being diverted to pond		2	2	3
Unusual Condition	UPM25101		Road Culvert Pipe Collapsing	Erosion	3	4	1
Unusual Condition	UPO23103	Scum	Cloudy water,scummy		3	3	3
Unusual Condition	UPP35103	Red Flock	Whole Stream covered in red flock		3	3	3
Unusual Condition	UPP38102	Red Flock	Red flock and orangish residue		3	1	1
Unusual Condition	UPP38113	Red Flock	Stream overcome w/red flock after going through pipe behind building(Screen Design?)	Stream going through pipe	3	3	2
Unusual Condition	UPQ43104		Pumped water from stream for swimming pool and garden		3	1	3
Unusual Condition	UPB07407		Stream has exposed dirt trail crossing		4	3	2
Unusual Condition	UPN26103	Piped Stream	Piped Stream	future driveway/access road?	5	3	3
Unusual Condition	UPP39101		Road crossing filling with sediment	road crossing	5	4	1
Unusual Condition	UPQ43103	Red Flock	4 Stagnant Pools (10ftx1ft; 10ftx2ft; 10ftx2ft; 20ftx3ft)		5	3	4
Comment	UPN26105		Trash Dumping over a large area;Excessive amout of recycleables; extends for about 500 ft. Trash has been dumped over a long period in the past.				
Comment	UPO24112		Stream disappears near road crossing. Pipe not visible.				
Comment	UPQ39101		Dammed off stream. Creates pond behind	Dam			
Comment	UPO24103	Red Flock	Red flock near pipe outfall				

Exposed Pipes- Upper Patuxent AA County

Problem	Site	Location of Pipe	Type	Diameter(in)	Length(ft)	Purpose	Discharge	Color	Odor	Severity	Correctability	Access
Exposed Pipe	UPO24108	Exposed manhole	concrete	48	4	unknown	No		Sewage	3	3	1
Exposed Pipe	UPT45103	Exposed across bottom of stream	metal	24	1	unknown	Yes	clear	none	4	3	4
Exposed Pipe	UPN25105	Exposed along stream bank	concrete	36	3	water supply	No			5	1	2
Exposed Pipe	UPP31103	Above stream	metal	2	25	unknown	No			5	2	1
Exposed Pipe	UPP38108	Above stream	metal	16	20	unknown	No			5	5	1

In/Near Stream Construction- Upper Patuxent AA County

Problem	Site	Type of Activity	Sediment Control	Why, if inadequate	Excess Sediment?	Length	Company	Location	Severity
Construction	UPO25104	Logging	Inadequate	No sediment control(i.e. silt fence)	Yes	400			3
Construction	UPP38110	Unknown	Inadequate	No silt fence	No				3
Construction	UPP34110	Residential development	Adequate		No				5

Representative Sites A- Upper Patuxent AA County

Problem	Site	Substrate	Embeddedness	Shelter for Fish	Channel Alteration	Sediment Deposition	Velocity/Depth	Flow	Vegetation	Bank Condition	Riparian Vegetation
Cox Branch											
Representative Site	UPN25102	Marginal	Marginal	Suboptimal	Optimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Marginal	Optimal
Representative Site	UPN25111	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Marginal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Optimal
Representative Site	UPN26101	Marginal	Marginal	Optimal	Optimal	Suboptimal	Poor	Poor	Optimal	Optimal	Optimal
Representative Site	UPO24104	Marginal	Marginal	Marginal	Optimal	Optimal	Poor	Marginal	Optimal	Optimal	Suboptimal
Representative Site	UPO24107	Marginal	Marginal	Optimal	Optimal	Suboptimal	Marginal	Marginal	Marginal	Marginal	Suboptimal
Average		**Marginal**	**Marginal**	**Suboptimal**	**Optimal**	**Suboptimal**	**Marginal**	**Marginal**	**Suboptimal**	**Suboptimal**	**Optimal**
Green Branch											
Representative Site	UPO31107	Optimal	Suboptimal	Optimal	Optimal	Marginal	Optimal	Suboptimal	Optimal	Marginal	Optimal
Representative Site	UPP31101	Suboptimal	Suboptimal	Optimal	Suboptimal	Marginal	Suboptimal	Optimal	Optimal	Suboptimal	Marginal
Representative Site	UPQ31101	Optimal	Marginal	Suboptimal	Optimal	Marginal	Suboptimal	Optimal	Optimal	Marginal	Optimal
Average		**Optimal**	**Suboptimal**	**Optimal**	**Optimal**	**Marginal**	**Suboptimal**	**Suboptimal**	**Optimal**	**Marginal**	**Suboptimal**
Stocketts Run											
Representative Site	UPQ43101	Suboptimal	Poor	Poor	Optimal	Poor	Poor	Marginal	Suboptimal	Marginal	Suboptimal
Representative Site	UPQ43105	Suboptimal	Marginal	Optimal	Optimal	Marginal	Marginal	Marginal	Optimal	Poor	Optimal
Representative Site	UPR31103	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Optimal	Optimal	Poor
Representative Site	UPR43101	Suboptimal	Suboptimal	Suboptimal	Optimal	Marginal	Suboptimal	Marginal	Suboptimal	Suboptimal	Optimal
Representative Site	UPR43103	Marginal	Marginal	Suboptimal	Optimal	Optimal	Poor	Marginal	Marginal	Marginal	Optimal
Representative Site	UPS43105	Marginal	Marginal	Suboptimal	Suboptimal	Marginal	Poor	Poor	Suboptimal	Marginal	Optimal
Representative Site	UPT43101	Suboptimal	Marginal	Marginal	Marginal	Poor	Marginal	Poor	Marginal	Marginal	Marginal
Representative Site	UPT43102	Marginal	Poor	Poor	Marginal	Poor	Poor	Poor	Marginal	Marginal	Marginal
Representative Site	UPT44103	Marginal	Marginal	Marginal	Marginal	Poor	Poor	Poor	Marginal	Marginal	Marginal
Representative Site	UPT45101	Marginal	Marginal	Poor	Marginal	Suboptimal	Marginal	Marginal	Suboptimal	Suboptimal	Suboptimal
Representative Site	UPT45104	Marginal	Marginal	Marginal	Poor	Poor	Marginal	Marginal	Suboptimal	Suboptimal	Suboptimal
Representative Site	UPT45202	Marginal	Poor	Poor	Optimal	Poor	Dry	Dry	Suboptimal	Marginal	Optimal
Representative Site	UPU39101	Marginal	Marginal	Marginal	Suboptimal	Optimal	Poor	Suboptimal	Suboptimal	Suboptimal	Suboptimal
Representative Site	UPU42301	Poor	Poor	Marginal	Optimal	Poor	Poor	Marginal	Poor	Poor	Optimal
Average		**Marginal**	**Marginal**	**Marginal**	**Suboptimal**	**Marginal**	**Poor**	**Marginal**	**Suboptimal**	**Marginal**	**Suboptimal**

Representative Sites A- Upper Patuxent AA County

Problem	Site	Substrate	Embeddedness	Shelter for Fish	Channel Alteration	Sediment Deposition	Velocity/Depth	Flow	Vegetation	Bank Condition	Riparian Vegetation
UPN1											
Representative Site	UPB07409	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Suboptimal
UPN7											
Representative Site	UPH14201	Marginal	Marginal	Suboptimal	Suboptimal	Marginal	Marginal	Poor	Suboptimal	Suboptimal	Suboptimal
UPS10											
Representative Site	UPQ38104	Suboptimal	Suboptimal	Marginal	Optimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Marginal	Optimal
UPS11											
Representative Site	UPP39102	Poor	Poor	Poor	Optimal	Optimal	DRY	DRY	Poor	Marginal	Optimal
UPS3											
Representative Site	UPO28101	Poor	Poor	Marginal	Optimal	Suboptimal	Marginal	Optimal	Suboptimal	Suboptimal	Optimal
Representative Site	UPO29202	Poor	Poor	Marginal	Suboptimal	Suboptimal	Marginal	Suboptimal	Marginal	Marginal	Suboptimal
Average		**Poor**	**Poor**	**Marginal**	**Optimal**	**Suboptimal**	**Marginal**	**Optimal**	**Suboptimal**	**Suboptimal**	**Optimal**
UPS6											
Representative Site	UPP34104	Marginal	Poor	Suboptimal	Optimal	Suboptimal	Marginal	Suboptimal	Suboptimal	Marginal	Suboptimal
Representative Site	UPP35104	Optimal	Marginal	Optimal	Optimal	Marginal	Suboptimal	Marginal	Optimal	Marginal	Optimal
Average		**Suboptimal**	**Marginal**	**Optimal**	**Optimal**	**Suboptimal**	**Suboptimal**	**Suboptimal**	**Optimal**	**Marginal**	**Optimal**

Representative Sites B- Upper Patuxent AA County

Problem	Site	Width Riffle	Width Run	Width Pool	Depth Riffle	Depth Run	Depth Pool	Bottom Type
Cox Branch								
Representative Site	UPN25102	24	24	36	2	3	6	Gravel
Representative Site	UPN25111	36	48	24	0.5	3	18	Sand
Representative Site	UPN26101			24			2	Sand
Representative Site	UPO24104		8	36		2	3	Silt
Representative Site	UPO24107	48	24	84	1	3	5	Sand
UPS4								
Representative Site	UPO31107	60	36	36	2	4	6	Gravel
Representative Site	UPP31101	48	60	36	2	4	30	Sand
Representative Site	UPQ31101	60	48	36	1	4	18	Gravel
Stocketts Run								
Representative Site	UPQ43101	4	2	8	0.5	0.5	2	Silt
Representative Site	UPQ43105			84			12	Gravel
Representative Site	UPR31103		12			1		Silt
Representative Site	UPR43101	24	48	18	1	3	4	Gravel
Representative Site	UPR43103		36			6		Silt
Representative Site	UPS43105	4	12	3	0.25	0.5	2	Silt
Representative Site	UPT43101	8	6	2	4	2	2	Cobble
Representative Site	UPT43102	8	6	2	0.25	2	2	Sand
Representative Site	UPT44103	8	6	4	0.5	8	6	Gravel
Representative Site	UPT45101	6	4	12	0.25	12	6	Gravel
Representative Site	UPT45104	4	6	2	0.5	4	2	Silt
Representative Site	UPT45202							Sand
Representative Site	UPU39101		6			1		Silt
Representative Site	UPU42301		24	36		4	12	Silt

Representative Sites B- Upper Patuxent AA County

Problem	Site	Width Riffle	Width Run	Width Pool	Depth Riffle	Depth Run	Depth Pool	Bottom Type
UPN1								
Representative Site	UPB07409	24	30	36	1	2	12	Gravel
UPN7								
Representative Site	UPH14201		24	6		24	6	Silt
UPS10								
Representative Site	UPQ38104	8	12	36	1	3	8	Gravel
UPS11								
Representative Site	UPP39102			24			3	Silt
UPS3								
Representative Site	UPO28101	6	12		0.25	1		Silt
Representative Site	UPO29202	6	24		1	2		Silt
UPS6								
Representative Site	UPP34104	30	24	48	1	2	3	Gravel
Representative Site	UPP35104	48	36	60	1	5	10	Gravel