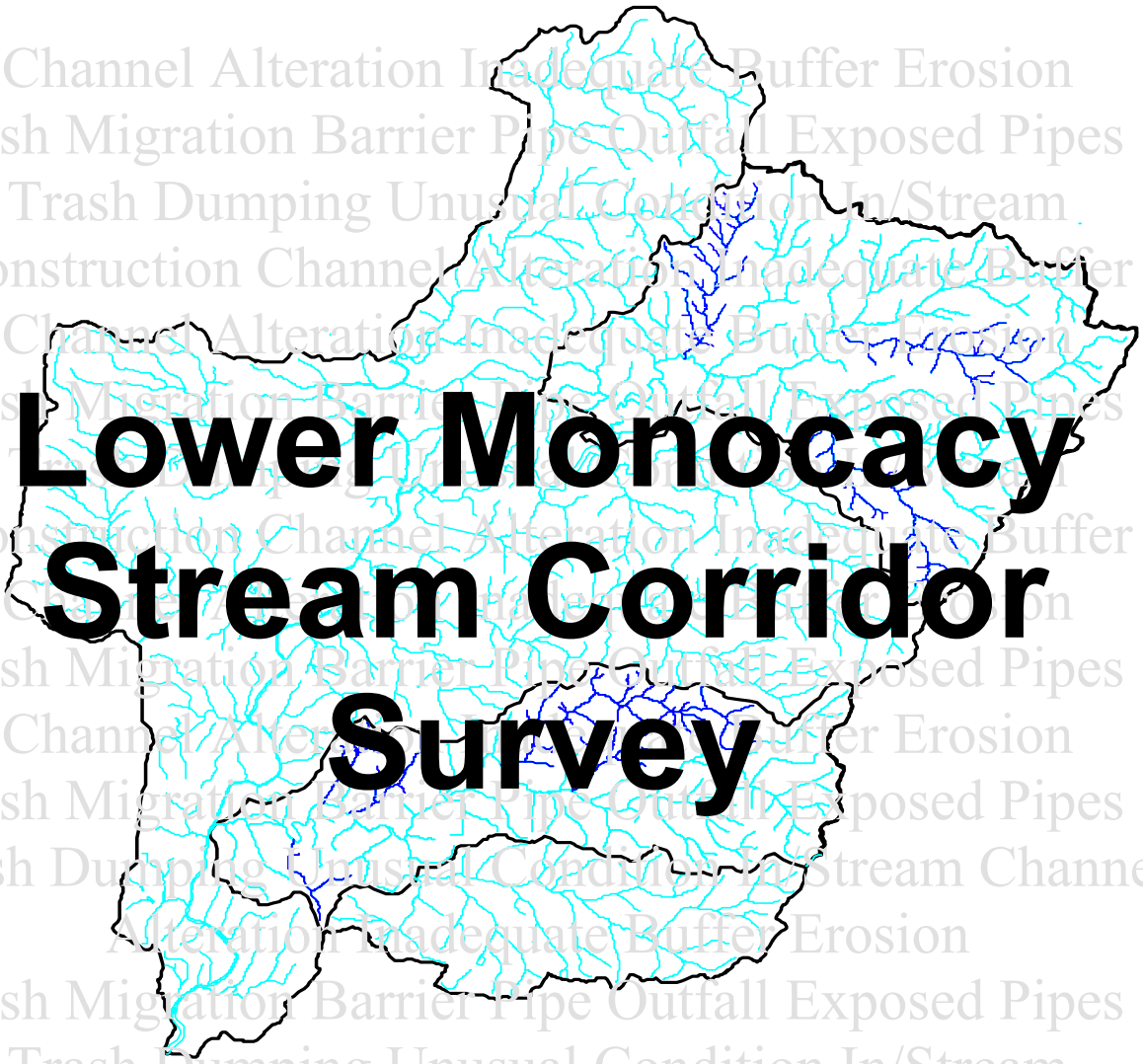

Lower Monocacy Stream Corridor Survey

Watershed Assessment and Targeting Division
Watershed Services
Maryland Department of Natural Resources
November 2004

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LOWER MONOCACY RIVER STREAM CORRIDOR ASSESSMENT

BY

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Maryland Department of Natural Resources

November 2004

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SUMMARY

In 1998, the Maryland Clean Water Action Plan identified the Lower Monocacy watershed as one of the State's water bodies that did not meet water quality requirements. In response to this finding, the Maryland Department of Natural Resources (DNR), Frederick County, and local stakeholders formed a partnership to develop a Watershed Restoration Action Strategy (WRAS) for the Lower Monocacy River watershed. The following Stream Corridor Assessment (SCA) survey is part of the WRAS development process.

The SCA provides descriptive and positional data for potential environmental problems along a watershed's non-tidal streams. Developed by DNR's Watershed Services Unit, the surveys is a watershed management tool to identify environmental problems and help prioritize restoration opportunities on a watershed basis. As part of the survey, specially trained personnel walk a watershed's streams and record data and the location for potential environmental problems that can be easily observed. Each potential problem site is also ranked on a scale of one to five for its severity, correctability, and access for restoration work.

SCA survey fieldwork for the Lower Monocacy River began in January 2003 and was completed by September 2003. To complete the survey, field crews walked over 85 miles of streams.

During the stream survey, field teams identified 359 potential environmental problem sites. The observed potential problems were: inadequately buffered stream banks (115 sites, 28 miles), erosion sites (81 sites, 29 miles), fish barriers (57 sites), pipe outfalls (45 sites), channel alterations (35 sites, 0.3 miles), unusual conditions/comments (21 sites), trash dumping sites (14 sites), and exposed pipes (1 site). Additionally, crews recorded descriptive habitat condition data at 43 representative sites.

The Stream Corridor Assessment Survey provides a rapid overview of the entire stream network in order to determine the location of potential environmental problems and to collect some basic environmental information. The value of the present survey is that it helps in placing individual problems into a watershed context so that future restoration work can be prioritized. Results of the survey have been given to the Lower Monocacy River Watershed WRAS committee, which is developing a Watershed Restoration Action Strategy for the Lower Monocacy River. Information on the Lower Monocacy River Watershed Action Strategy can be found on the Department of Natural Resources' website www.dnr.state.md.us/watersheds/surf/proj/wras.html).

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INTRODUCTION

In 1998, Maryland's Clean Water Action Plan identified bodies of water that failed to meet water quality requirements or other natural resource goals. One of the areas identified in the report was the Lower Monocacy River Watershed. The Lower Monocacy River Watershed is located in Frederick, Montgomery, and Carroll Counties, Maryland. Nearly 87% of the drainage area (264 mi^2) lies in Frederick County, and the watershed takes up approximately 40% of Frederick County (Figure 1).

In response to the findings of the Maryland Clean Water Action Plan, the Maryland Department of Natural Resources formed a partnership with Frederick County, Maryland and local stakeholders to assess and improve environmental conditions in the Lower Monocacy River Watershed. The main goal of this partnership is to develop and implement a Watershed Restoration Action Strategy (WRAS) for the Lower Monocacy River.

The Lower Monocacy River is a tributary of the Potomac River. The watershed covers approximately 194,700 acres (304 $miles^2$) of land in Frederick, Montgomery, and Carroll Counties, Maryland. According to categories established by the Maryland Department of Planning in 2000, the land use in the watershed is 47% agricultural, 30% forest, and 22% developed. Figure 2 shows a digital orthophoto map of the watershed. Figure 3 shows the same watershed boundaries superimposed on a 7.5 minute USGS topographic quadrangle maps. (Shanks, 2003)

The first step in developing a Restoration Action Strategy for this watershed is to complete an overall assessment of the condition of the watershed and the streams it contains. This initial step was accomplished using three approaches. First, a watershed characterization was completed that compiles and analyzes existing water quality, land use, and living resource data about the watersheds (Shanks, 2004). Secondly, a synoptic water quality survey, as well as surveys of the fish and macroinvertebrate communities, was conducted at selected stations throughout the Lower Monocacy watershed to provide information on the present condition of water quality and aquatic resources (Primrose, 2003). Lastly, a Stream Corridor Assessment (SCA) Survey was completed to provide specific information on the location of potential environmental problems and restoration opportunities. This report details the results of the Lower Monocacy Stream Corridor Assessment and Shoreline Surveys.

There are approximately 740 mi. of stream in the Lower Monocacy watershed. Due to budget and time constraints, the Stream Corridor Assessment survey could only be completed on a portion of the streams. Two sub-watersheds were targeted including: Bennett Creek and Upper Linganore (Figure 1). In these two sub-watersheds, over 85 miles of streams were surveyed. The areas were chosen because the WRAS committee felt that they were representative of the general conditions that would be found throughout the Lower Monocacy River Watershed.

Survey teams walked over 85 miles of the Lower Monocacy's stream network from January 2003 to September 2003. At each site during the survey, field crews collected descriptive data, recorded the location on field maps, and took a photograph to document each potential environmental problem observed. As an aid to prioritizing future restoration work, crews rated all problem sites on a scale of one to five in three categories: 1) how *severe* the

problem is compared to others in its category; 2) how *correctable* the specific problem is using current restoration techniques; and 3) how *accessible* the site is for work crews and any machinery necessary to complete restoration work. In addition, field teams collect descriptive data for both in- and near-stream habitat conditions at representative sites spaced at approximately 1-mile intervals along the stream.

One of the main goals of the Lower Monocacy SCA survey is to compile a list of observable environmental problems in this watershed to help target future restoration efforts. Once this list is compiled and distributed, county planners, resource managers, and others can initiate a dialog to cooperatively set the direction and goals for the watersheds' management and plan future restoration work at specific problem sites.

To this end, the Maryland Department of Natural Resources is working with the Frederick County and the WRAS committee to develop a Watershed Restoration Action Strategy (WRAS) of the Lower Monocacy Watershed. As part of this process, data collected during the Stream Corridor Assessment will be used to help define present environmental conditions and possible restoration opportunities in the watershed. This information, combined with the watershed characterization, synoptic water quality surveys, recent biological surveys, and local knowledge of the watershed will be used to develop a Watershed Restoration Action Strategy for the Lower Monocacy River. The Watershed Restoration Action Strategy, in turn, will help guide future restoration and preservation efforts with the ultimate goals of restoring the area's natural resources and meeting State water quality standards. Information on DNR's WRAS program and the Lower Monocacy River Watershed Restoration Action Strategy can be found online at www.dnr.state.md.us/watersheds/surf/proj/wras.html.

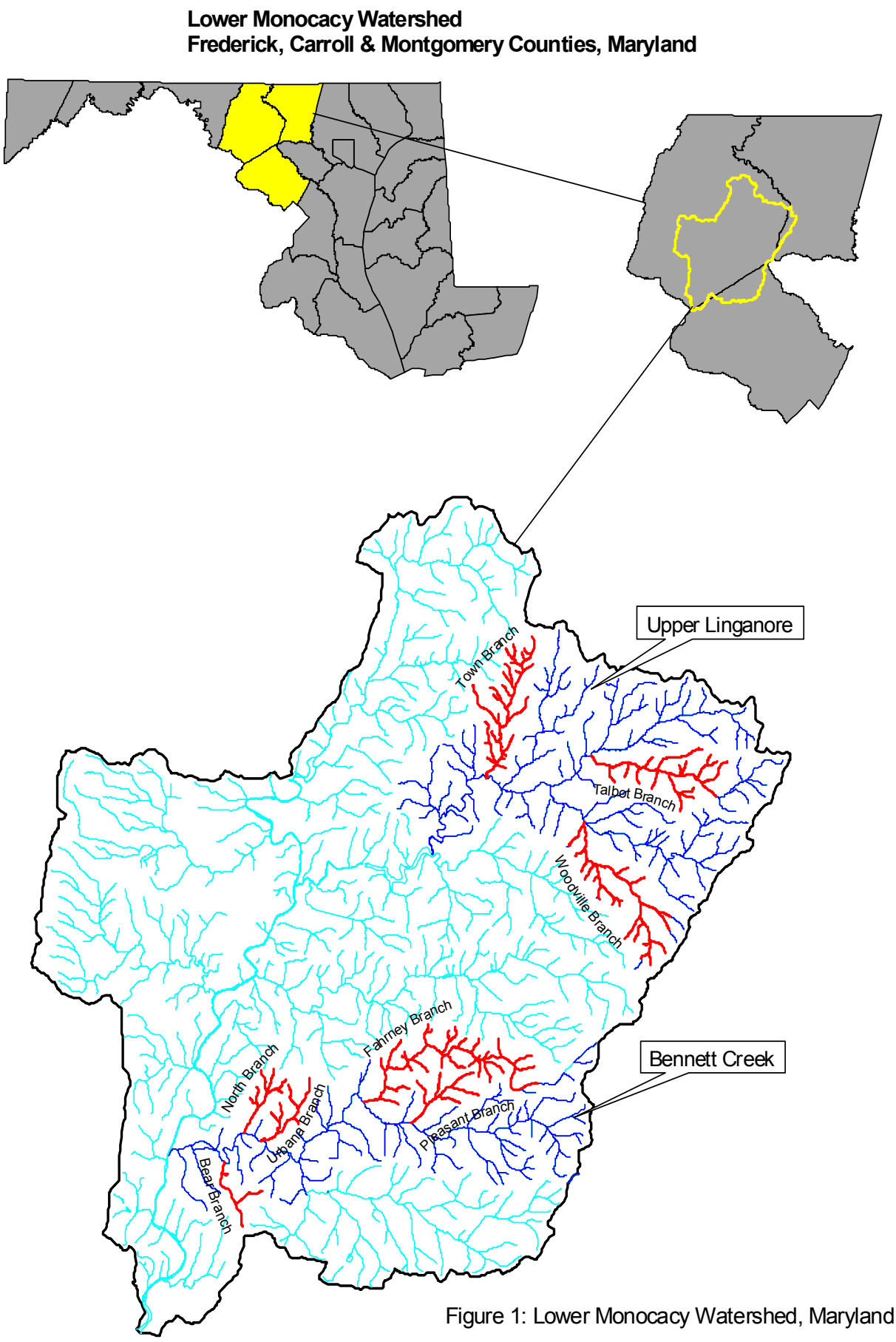
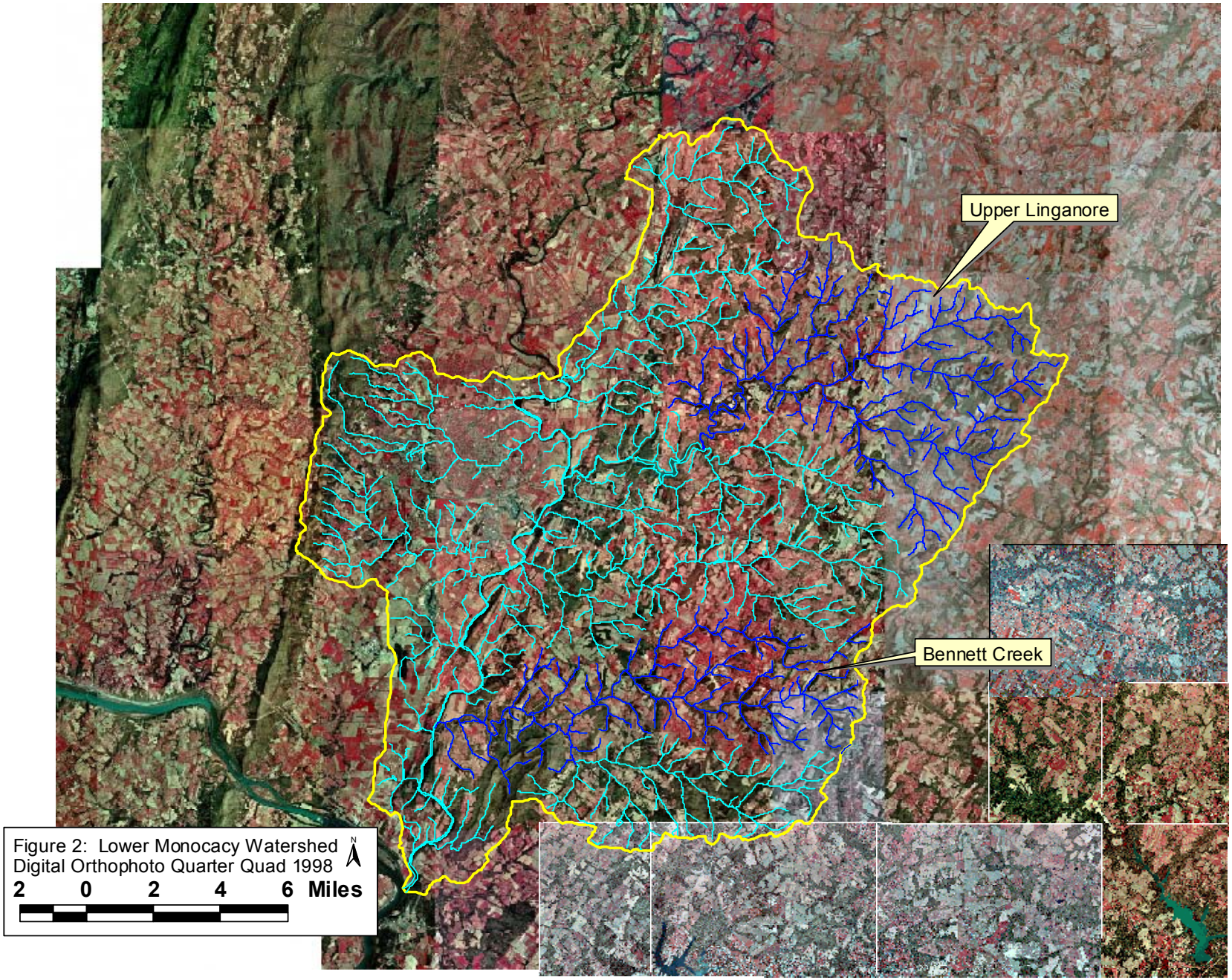


Figure 1: Lower Monocacy Watershed, Maryland


Upper Linganore
Bennett Creek
Figure 2: Lower Monocacy Watershed
Digital Orthophoto Quarter Quad 1998
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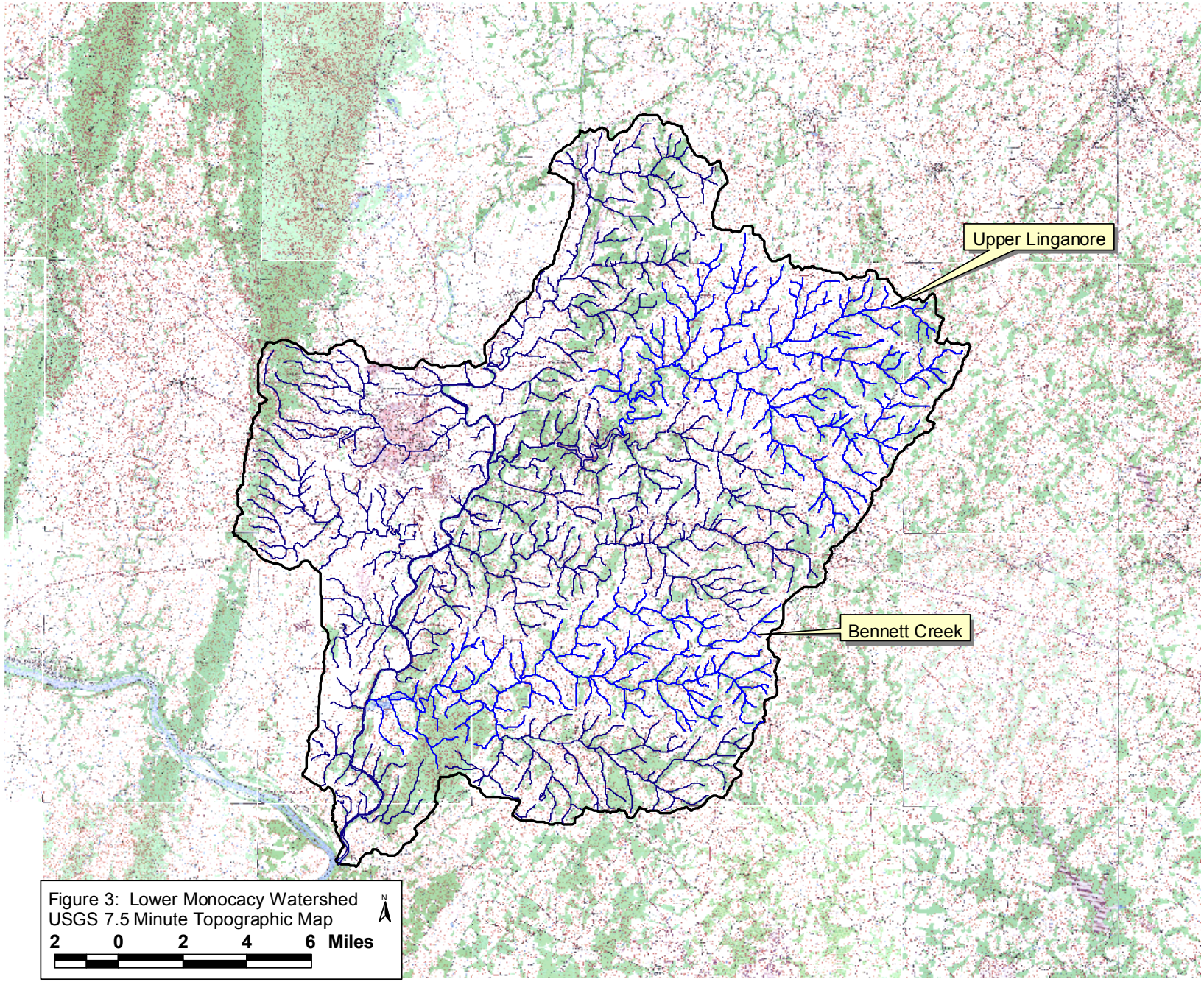

Figure 3: Lower Monocacy Watershed
USGS 7.5 Minute Topographic Map

METHODS

Goals of the SCA Survey

To help identify some of the common problems that affect streams in a rapid and cost effective manner, the Watershed Services Unit of the Maryland Department of Natural Resources developed the Stream Corridor Assessment (SCA) survey. The four main objectives of the survey are to provide:

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

2. Sufficient data on each problem in order to make a preliminary determination of both the severity and correctability of each problem.

3. Sufficient data to prioritize restoration efforts.

4. A quick assessment of both in- and near-stream habitat conditions to make comparisons among the conditions of different stream segments.

The SCA survey provides a rapid method of examining and cataloguing the observable environmental problems within an entire drainage network to better target future monitoring, management and/or conservation efforts. This survey is not a detailed scientific survey, nor will it replace chemical and biological surveys in determining overall stream conditions and health. 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 both a refinement and systematization of an old approach – the stream walk survey. Many of the common environmental problems affecting streams can be straightforward to identify by an individual walking along a stream. These include: excessive stream bank erosion, blockages to fish migration, stream segments without trees along their banks, or a sewage pipeline exposed by stream bank erosion leaking sewage into the stream. With a limited amount of training, most people can correctly identify these common environmental problems.

Over the years, many groups standardized a stream walk survey approach for their particular purpose or interest. 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), focused on utilizing citizen volunteers with little or no training. While these surveys can be a good guide for citizens interested in seeing their community's 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, training for citizen groups includes giving guidance on how to organize a survey and a slide show explaining how to complete the field work. After approximately one hour of training, citizen volunteers are sent out in groups to walk designated stream segments. During the survey, volunteers usually walk their assigned stream segment in under a few hours and return their data sheets to the survey organizers for analysis. 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 collected information. In addition, the data collected from these surveys often only indicate that a

potential environmental problem exists at a specific location, but it 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 for use by trained professionals analyzing a very specific stream reach type, 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 carried out on a watershed basis.

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

Field Training and Procedure

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, initiated 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, MCC 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.maryland.gov/mcc.

Prior to the start of Lower Monocacy SCA Survey, the members of the MCC's Frederick Crew received training in assessing both environmental problem sites and habitat conditions in and along Maryland streams. For problem sites, crewmembers learned how to identify common problems observable within the stream corridor, record problem locations on survey maps, and accurately complete data sheets for each specific problem type. For habitat conditions, the crew learned and practiced assessing stream health based on established criteria indicating both favorable conditions for macroinvertebrates and fish and healthy riparian habitat. These reference sites for habitat condition are located at approximately 1/2- to 1-mile intervals along the stream. In addition, the field crew reviewed a standard procedure for assigning site numbers based on the 3-digit map number, 1-digit team number, and 2-digit problem number for each problem and reference site during the survey. Lastly, in order to have a visual record of existing conditions at the time of the SCA survey, the MCC's Frederick Crew received guidelines for taking photographs at all problem and reference sites.

Several weeks prior to the beginning of the survey, property owners along the stream reach received letters informing them of what the survey is and when it was to be completed. This letter also provided a phone number to call if individuals did not want MCC crews surveying the stream on their property. In addition, survey crews were not to cross fence lines or enter any areas that are marked "No Trespassing" unless they had specific permission from the property owner.

The MCC crew conducted field surveys of the Lower Monocacy Watershed from January to September 2003. The survey teams walked 85 miles of the nearly 600 miles of the Lower Monocacy's drainage network, collecting information on potential environmental problems. Those commonly identified during the SCA Survey include: inadequate stream buffers, excessive bank erosion, channelized stream sections, fish migration blockages, in or near stream construction, trash dumping sites, unusual conditions, and pipe outfalls. In addition, the survey recorded information on the general condition of in-stream and riparian habitats and the location of potential wetland creation sites.

More detailed 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.maryland.gov/streams/pubs/other.html. Hard copies of the protocols also can be obtained by contacting the Watershed Services Unit of the Maryland Department of Natural Resources, Annapolis, MD.

Overall Ranking System

The SCA survey 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 crew's training on survey methods is devoted to properly rating the different problems identified during the survey. This ranking system developed from an earlier survey that found 453 potential environmental problems along 96 miles of stream of the Swan Creek Watershed in Harford County. The most frequently reported problem during the survey was stream bank erosion, 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 minor in severity. Based on this experience and its goal of helping to prioritize restoration work, the SCA survey rates the severity, correctibility, and access of each problem site.

While the ratings are subjective, they have proven to be very valuable in providing a starting point for more detailed follow-up evaluations. The collected data can be used by different resource professionals to help target future restoration efforts once the SCA survey is completed. A regional forester, for example, can use data collected on inadequate stream buffers to help plan future riparian buffer plantings, while the local fishery biologist can use the data on fish blockages to help target future fish passage projects. 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 Protocol*s (Yetman, 2000). It is important to note that the rating system is designed to contrast problems within a specific problem category and is not intended to be applied across categories. 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. 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 **severity** rating indicates how bad a specific problem is relative to others in the same problem category. It is often the most useful rating because it answers 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, based on the established criteria for each problem category (Yetman, 2000).

* 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 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 are unstable and eroding at a rapid rate.

* A moderate severity rating of 3 is identifies problems that have some adverse environmental impacts but the severity and/or length of affected stream 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 worse problems in the specific problem category. Examples include: a small fish blockage that is 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 has an inadequate forest buffer.

* A minor severity rating of 5 identifies problems that do not have a significant impact on stream and aquatic resources. A minor rating indicates that a problem is present, but compared to other problems in the same category it is considered minor. One example of a site with a minor rating is an outfall pipe from a storm water management structure that is not discharging during dry weather and does not have an erosion problem at the outfall or immediately downstream. Another example is a section of stream with stable banks that has a partial forest buffer less than 50 feet wide along both banks.

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

* A minor correctability rating of 1 indicates problems that can be corrected quickly and easily using hand labor, with a minimal 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 include 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 indicates 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 alone, 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 indicates 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 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 provides 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 a survey 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 indicates sites that are readily accessible both by car and on foot. Examples 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 indicates sites that are easily accessible by foot but not easily accessible by a vehicle. Examples would include a stream section that can be reached by crossing a large field or a site that is 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. To reach the site it would be necessary to hike at least a mile, and if equipment were needed to do the restoration work, an access road would need to be built through rough terrain. Examples include a site where there are no roads or trails nearby.

Data Analysis and Presentation

Following the completion of the survey, crews entered and information from the field data sheets into a Microsoft Access database and verified the accuracy of the data. Field crews labeled and organized the 418 photographs taken during the survey by site number and placed them in binders in both print and digital form. Members of the Department of Natural Resources' Watershed Services Unit incorporated the map location, recorded data, and digitized photographs into the ArcGIS computer software. The GIS project is an electronic geodatabase that integrates all the collected problem locations and descriptive data by site number, links photographs to each potential problem site, and produces the maps presented in this report. This data can then be used alongside of other digital geographic datasets available for features within the watersheds. A final copy of the ArcView files was given to the Frederick County Department of Public Works for their use in developing a Watershed Action Strategy for the Lower Monocacy Watershed.

RESULTS

The Stream Corridor Assessment Survey identified a total of 359 potential environmental problems along the 85 miles of stream corridor that were surveyed (Table 2). Of these, 67 are considered very severe, 62 severe, 57 moderate, 74 of low severity, and 99 minor. The most frequently observed problem sites were inadequate buffers [reported at 115 sites (or 27.99 miles of stream)], and erosion sites [reported at 81 sites (28.82 miles). Although not as numerous, fish barriers (57 sites), and pipe outfalls (45 sites) were present throughout the area surveyed. Erosion sites occur along 34% of the 85 miles of streams walked during the survey, and inadequately buffered streams occur along 33%.

Table 1 presents a summary of Lower Monocacy results from the areas surveyed; Table 2 is a summary of the Bennett Creek sub-watershed survey results; Table 3 is a summary of the Upper Linganore survey results. Appendices A and B list the data collected during the survey. Appendix A provides a listing of information by site number and location, referencing latitude and longitude. In Appendix B, the data is presented by problem type and lists the collected descriptive data. Presenting the data by problem type allows the reader to see which problems are rated as most severe or easiest to correct within each category.

Table 1: Summary of the Lower Monocacy Watershed.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Channel Alterations	35	1,592ft. (0.30 Miles)	0	0	3	8	24
Erosion Sites	81	152,145ft (28.82 Miles)	21	31	9	15	5
Exposed Pipes	1	4ft.	0	0	0	0	1
Fish Barriers	57	N/A	0	3	15	10	29
Inadequate Buffers	115	147,800ft. (27.99 Miles)	46	17	20	18	14
Pipe Outfalls	45	N/A	0	2	9	12	22
Trash Dumpings	14	N/A	0	3	2	5	4
Unusual Conditions	11	N/A	0	5	0	6	0
Total	359		67	61	58	74	99
Comments	10						
Representative Sites	43						

Table 2: Summary of the Bennett Creek Sub-watershed.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Channel Alterations	4	1,167ft. (0.22 Miles)	0	0	0	0	4
Erosion Sites	44	80,880ft (15.322 Miles)	15	13	5	9	2
Exposed Pipes	0	N/A	0	0	0	0	0
Fish Barriers	20	N/A	0	0	1	6	13
Inadequate Buffers	56	63,350ft. (12.38 Miles)	23	8	8	10	7
Pipe Outfalls	15	N/A	0	1	2	1	11
Trash Dumpings	3	N/A	0	3	0	0	0
Unusual Conditions	8	N/A	0	4	0	4	0
Total	150		38	29	16	30	37
Comments	3						
Representative Sites	22						

Table 3: Summary of the Upper Linganore Sub-watershed.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Channel Alterations	31	425ft. (0.08 Miles)	0	0	3	8	20
Erosion Sites	37	71,265ft (13.50 Miles)	6	18	4	6	3
Exposed Pipes	1	4ft.	0	0	0	0	1
Fish Barriers	37	N/A	0	3	14	4	16
Inadequate Buffers	59	82,450ft. (15.62 Miles)	23	9	12	8	7
Pipe Outfalls	30	N/A	0	1	7	11	11
Trash Dumpings	11	N/A	0	0	2	5	4
Unusual Conditions	3	N/A	0	1	0	2	0
Total	209		29	32	42	44	62
Comments	7						
Representative Sites	21						

Inadequate Buffers

Forests are an historically occurring ecosystem around Maryland streams and are very important for maintaining stream health in Maryland. Forested buffer areas along streams play a crucial role in increasing water quality, stabilizing stream banks, trapping sediment, mitigating floods, and providing the required habitat for all types of stream life, including fish. Tree roots capture and remove pollutants and excess nutrients from shallow flowing water, and their structure helps prevent erosion and slow down water flow, reducing sediment load and the risk of flooding. Shading from the tree canopy provides the cooler water temperatures necessary for most stream life, especially cold-water species like trout. In smaller streams such as those surveyed, terrestrial plant material falling into the stream is the primary source of plant food for stream life. Tree leaves provide seasonal, instant food for stream life, while fallen tree branches and trunks provide a more consistent, slow-release food source throughout the year. Tree roots and snags also provide necessary fish habitat. Maintaining healthy streams and forest buffers is important in reducing the nutrient and sediment loadings to the Chesapeake Bay.

While there is no single minimum standard for how wide a forested stream buffer should be in Maryland, for the purposes of this study a forest buffer is generally considered inadequate if it is less than 50 ft. wide, measured from the edge of the stream's banks. Inadequate buffers were the most frequently reported problem. Survey crews reported inadequate stream buffers at 115 sites in the Lower Monocacy watershed survey. The locations of the inadequate buffer sites are shown in Figures 4b and 4c.

As part of the data collected by the field crews, a rough estimate of the length of the inadequate stream buffer at each site was made. Based on this data, there is an estimated 147,800 ft. (29.99 miles) of inadequately buffered stream banks along the streams surveyed in the Bennett Creek and Upper Linganore sub-watersheds. This accounts for 35.29% of the total stream miles that were surveyed by the field crews. Most sites (55% of the total inadequate buffer sites) received severity ratings of very severe (46 sites) to severe (17 sites) Figure 4a shows the frequency of severity for the inadequate buffer sites observed during the Lower Monocacy survey. The very severe sites involve areas were the inadequately buffered area totaled over 1000 ft. of stream with no buffer on either stream bank. The severe sites were sites in which there were no buffer on either side for 500 ft. – 1000 ft. long, or sites where there was a buffer on one side and an inadequate buffer on the other for over 1000 ft.

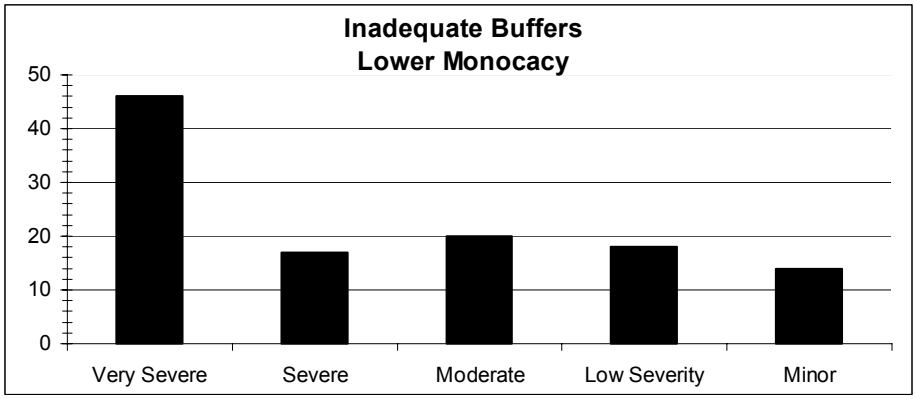

Figure 4a: Histograph showing the frequency of severity ratings given to inadequate buffers during the Lower Monocacy SCA Survey.

Bennett Creek

Fifty-six inadequate buffers were identified in the Bennett Creek sub-watershed. Of these, 23 were rated very severe. The locations of these sites can be seen in Figure 4b. Over 12 miles of inadequately buffered streams were found in the Bennett Creek surveyed areas. Forty-one sites were found to be inadequate on both the left and the right sides. Ten sites are inadequate on the left only, and 5 are inadequate on the right only. Twenty-nine sites were documented as being unshaded on both sides, while 9 are unshaded on the left, and 3 on the right. Fifteen sites have adequate shading on both sides. Land use was documented on both sides of the stream where inadequate buffer sites were found. Land use on both sides of surveyed streams included: lawn (31 sites), pasture (31 sites), crop field (15 sites), forest (9 sites), shrubs and small trees (7 sites), powerlines (6 sites), fallow (2 sites), paved (2 sites), a ballfield (1 site), a wetland (1 site), and a park (1 site). Two sites were found to have buffer restoration projects associated with them. Widths of the buffers found to be inadequate when there was any width at all ranged from 2ft. to 20ft. Lengths of inadequate buffers in the Bennett Creek sub-watershed ranged from 150 ft. to 5,300 ft. Recently established buffers were found at 7 sites. Livestock was found with access to the stream at 15 sites (10 cattle sites and 5 horse sites).

Upper Linganore

Fifty-nine inadequate buffer sites were documented in the Upper Linganore sub-watershed (Figure 4c). Twenty-three sites were rated very severe, and 9 sites were rated severe. Fifteen miles of inadequately buffered stream were identified in the Upper Linganore surveyed areas. Forty-two sites were found to be inadequate on both sides of the stream. Nine sites were documented as inadequate on the left side, and 8 sites were inadequate on the right. Thirty inadequate buffer sites were found to be unshaded on both sides, 3 sites unshaded on the left, and 3 sites unshaded on the right. Land use was documented on both sides of the stream and include: pasture (39 sites), lawn (22 sites), crop field (17 sites), forest (16 sites), shrubs and small trees (13 sites), paved (5 sites), powerlines (5 sites). Two sites were found to have buffer restoration sites alongside them. Widths of inadequate buffers ranged from no buffer to 25 ft. Lengths of inadequate buffers ranged from 50 ft. to 6,870 ft. Recently established buffers were found at 3 sites. Livestock with access to the stream were found at 15 sites (12 cattle sites and 3 horses).

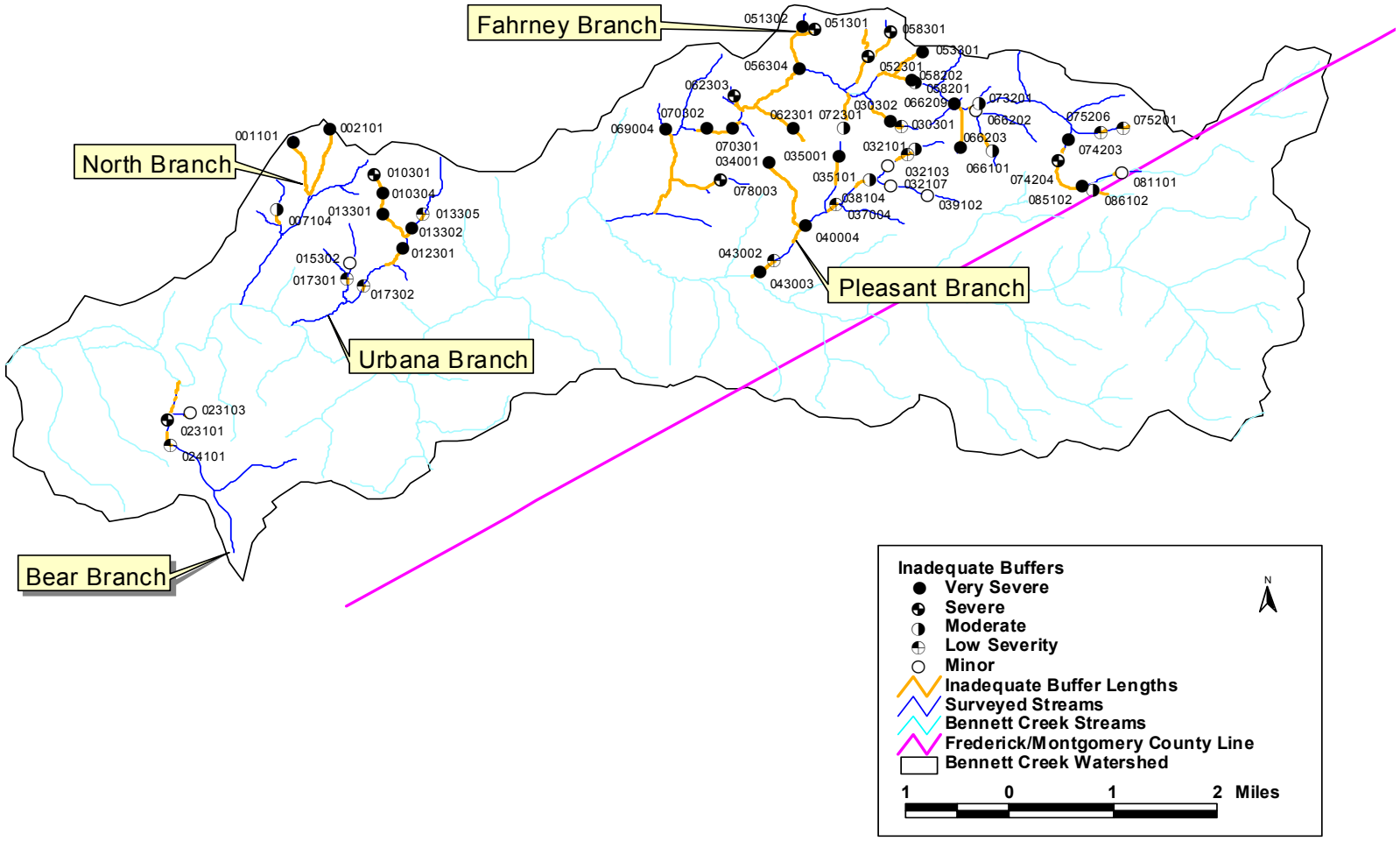

Figure 4b: Bennett Creek Inadequate Buffer Locations.

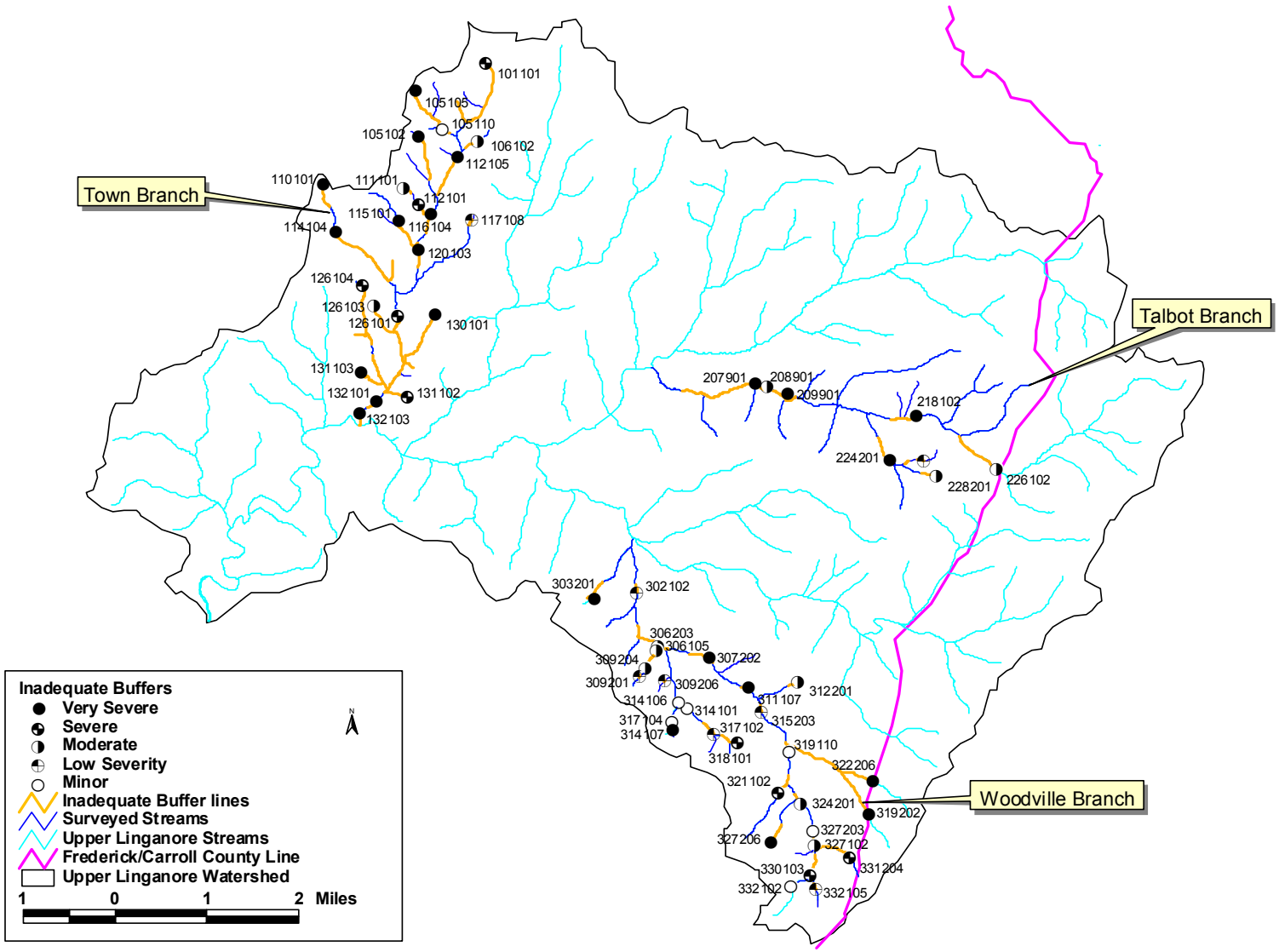

Figure 4c: Upper Linganore Inadequate Buffer Locations.

Erosion Sites

Erosion is a natural process necessary to maintain good aquatic habitat. Too much erosion, however, can have the opposite effect on the stream by destabilizing stream banks, destroying in-stream habitat, and causing significant sediment pollution problems downstream. Erosion problems occur when either a stream's hydrology and/or sediment supply are significantly altered. This often occurs below a specific alteration, such as a pipe outfall or road crossing, or when land use in a watershed changes. For example, 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 surface, or land area where rainwater cannot seep into the groundwater directly, increases in a drainage basin. This causes the amount of runoff entering a stream to increase. Over time, a stream channel will adjust to the greater rain-induced flows by eroding the streambed and banks to raise water-carrying capacity. 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 a stream's aquatic resources.

In this survey, unstable eroding streams are defined as areas where the stream banks are almost vertical, and the vegetative roots along the stream are unable to hold the soil onto the banks. While survey teams are asked to visually assess whether the stream was down-cutting, widening, or headcutting at a specific site, the only way to evaluate the full significance of the erosion processes at a specific site is to do more detailed monitoring over time.

The SCA survey found 81 eroding stream banks over the length of 154,980 ft. (29.35 miles) of stream, or about 35% of streams surveyed. The severity and location of erosion sites is shown in Figures 5b and 5c. Thirty-seven sites were found in the Lower Linganore watershed, and 44 were found in the Bennett Creek watershed. Twenty-one sites were ranked very severe (25% of sites), and 31 sites were ranked severe (38% of sites). Sixty-three percent of all erosion sites found in the Lower Monocacy surveyed areas were found to be very severe or severe in ranking. Nine sites are ranked as moderate, 15 as low severity, and 5 as minor (Figure 5a). Fifty-one of 81 sites (63% of erosion sites) are over 1,000 ft. long.

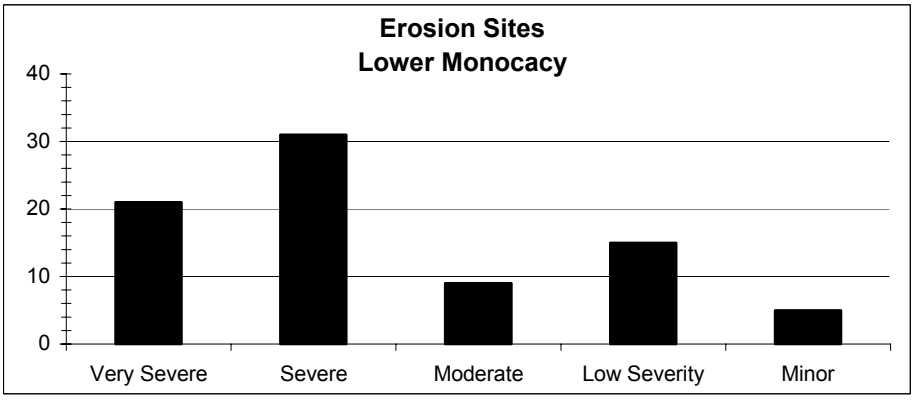

Figure 5a: Histograph showing the frequency of severity ratings given to stream bank erosion sites during the Lower Monocacy SCA Survey.

Bennett Creek

Bennett Creek contains 44 erosion sites as identified by this survey. The Bennett Creek sub-watershed had 15.3 miles of erosion (about 39% of the surveyed streams) reported during the Lower Monocacy Stream Corridor Assessment Survey. Fifteen of these erosion sites were given very severe ratings, and 13 were given severe ratings. The majority of erosion sites found in the surveyed areas of the Bennett Creek sub-watershed [24 sites (about 55%)] were reported in the Fahrney Branch. Nine erosion sites were observed in Pleasant Branch, 5 in Urbana Branch, 3 in Bear Branch, and 3 in North Branch.

Causes of the erosion sites were documented as: bend at steep slope (14 sites), land use change upstream (11 sites), unknown cause (10 sites), below a road crossing (4 sites), inadequate buffer upstream (2 sites), stormwater runoff upstream (1 site), and highly erodable material (1 site). Causes are documented as the way the appeared to the survey crews at the time of the survey. A more in-depth analysis is needed to determine what the actual causes for erosion are. Lengths of sites observed ranged from 30 ft. to 6,000 ft., and heights ranged from 2 ft. to 15 ft. Land use was documented on both the right and left sides of the stream and were recorded as: forest (41 sites), pasture (15 sites), shrubs and small trees (15 sites), lawn (9 sites), crop fields (6 sites), and pavement (2 sites).

Fifteen erosion sites were given very severe ratings, and 13 were given severe ratings. The very severe erosion sites included streams that were over 1,000 ft. long with a height of 4 or more feet. Sites 069003 and 056305 were documented as being over 1 mile long with lengths of 5,300 ft. and 6,000 ft. respectively. The severe sites were given a severe rating if the length of the erosion site was over 1,000 ft., and the height was under 4 ft. The 13 severe sites ranged from 1,450 ft. to 4,500 ft. Sites 022101 and 022102 were reported as threatening Mt. Ephram Rd., and site 023102 was threatening Stewart Hill Rd.

Upper Linganore

Thirty-seven erosion sites were found in the Upper Linganore watershed totaling 13.5 miles, or about 30% of the Upper Linganore surveyed streams. Woodville Branch's erosion sites accounted for 68% (24 sites) of erosion sites recorded in the Upper Linganore sub-watershed. Nine erosion sites were observed in Town Branch, and 4 erosion sites were recorded in Talbot Branch.

Causes of the erosion sites in the Upper Linganore sub-watershed were documented as: bend at steep slope (14 sites), unknown (12 sites), land use change upstream (6 sites), livestock (3 sites), and below channelization (2 sites). A more in-depth analysis is needed to determine what the actual causes for erosion are. Lengths of the observed erosion sites were 25 ft. to 6,550 ft. Bank heights of most recorded erosion sites ranged from 2 ft. to 5 ft., however at site 332108, stream bank height was recorded at 30 ft. Land use was recorded on both the left and right sides of each erosion site. Land uses recorded were: forest (37 sites), pasture (22 sites), shrubs and small trees (8 sites), and lawn (7 sites).

Site 112103 was cited as a threat to a road and site 332108 was cited as a threat to a railroad. Six sites in the Upper Linganore watershed were recorded as very severe. Site 110104 is a 1,930 ft. long, 4 ft. high headcut on Town Branch below a channelized stream section with lawn on the left side and forest on the right. Site 212101 is a 1,400 ft. long, 5 ft. high site on Talbot Branch with forest on both sides. Site 213101 is a 1,000 ft. long, 5 ft. high site on Talbot Branch with forest on both sides. Site 301202 is a 1,400 ft. long, 4 ft. high site on Woodville Branch with forest on both sides. Site 312205 is a 1,260 ft.

long, 5 ft. high site on Woodville Branch with forest on both sides. Site 314103 is a 2,150 ft. long, 5 ft. high site on Woodville Branch with forest on both sides. There were also 18 severe sites identified in the Upper Linganore watershed.

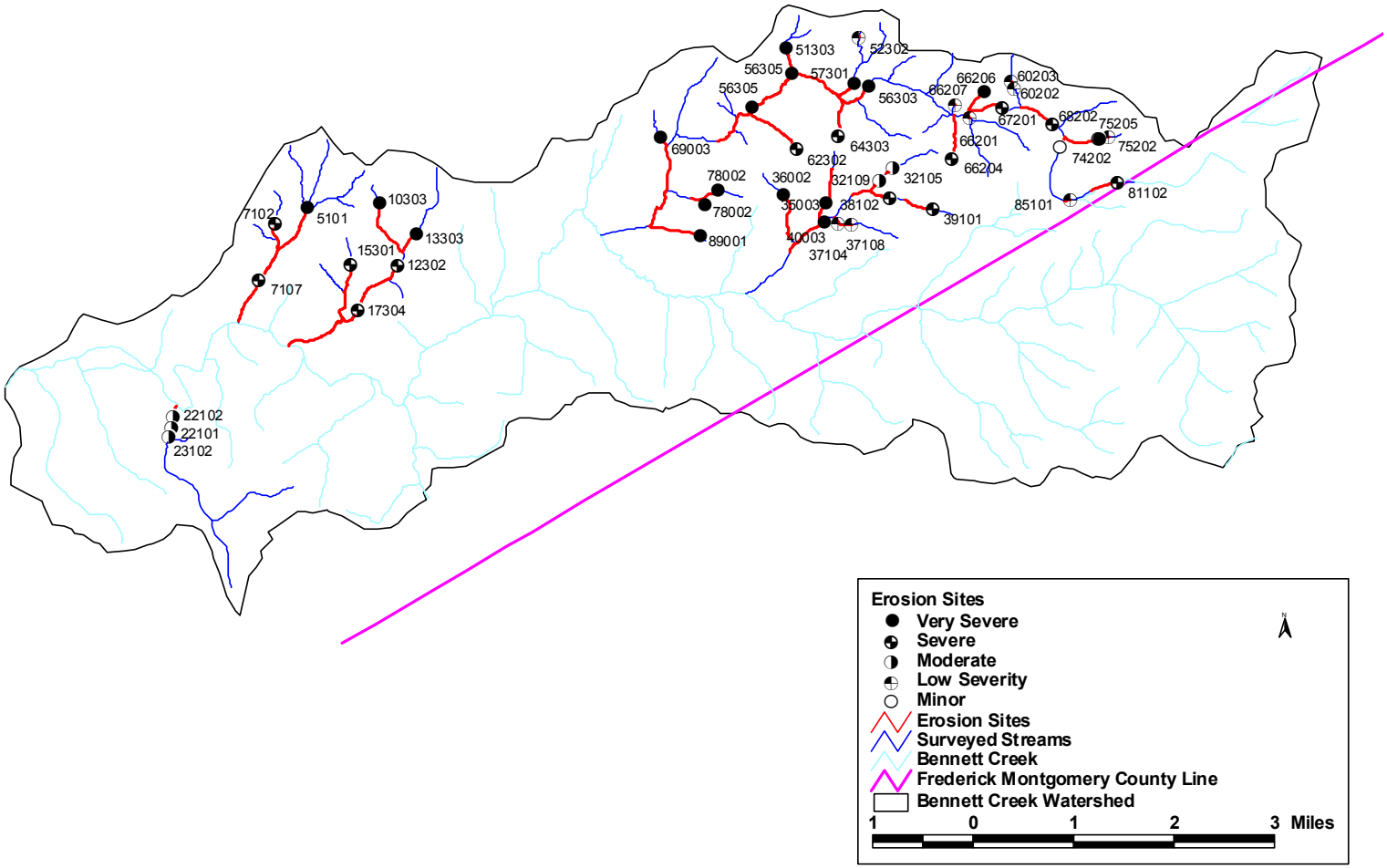

Figure 5b: Bennett Creek Erosion Site Locations.

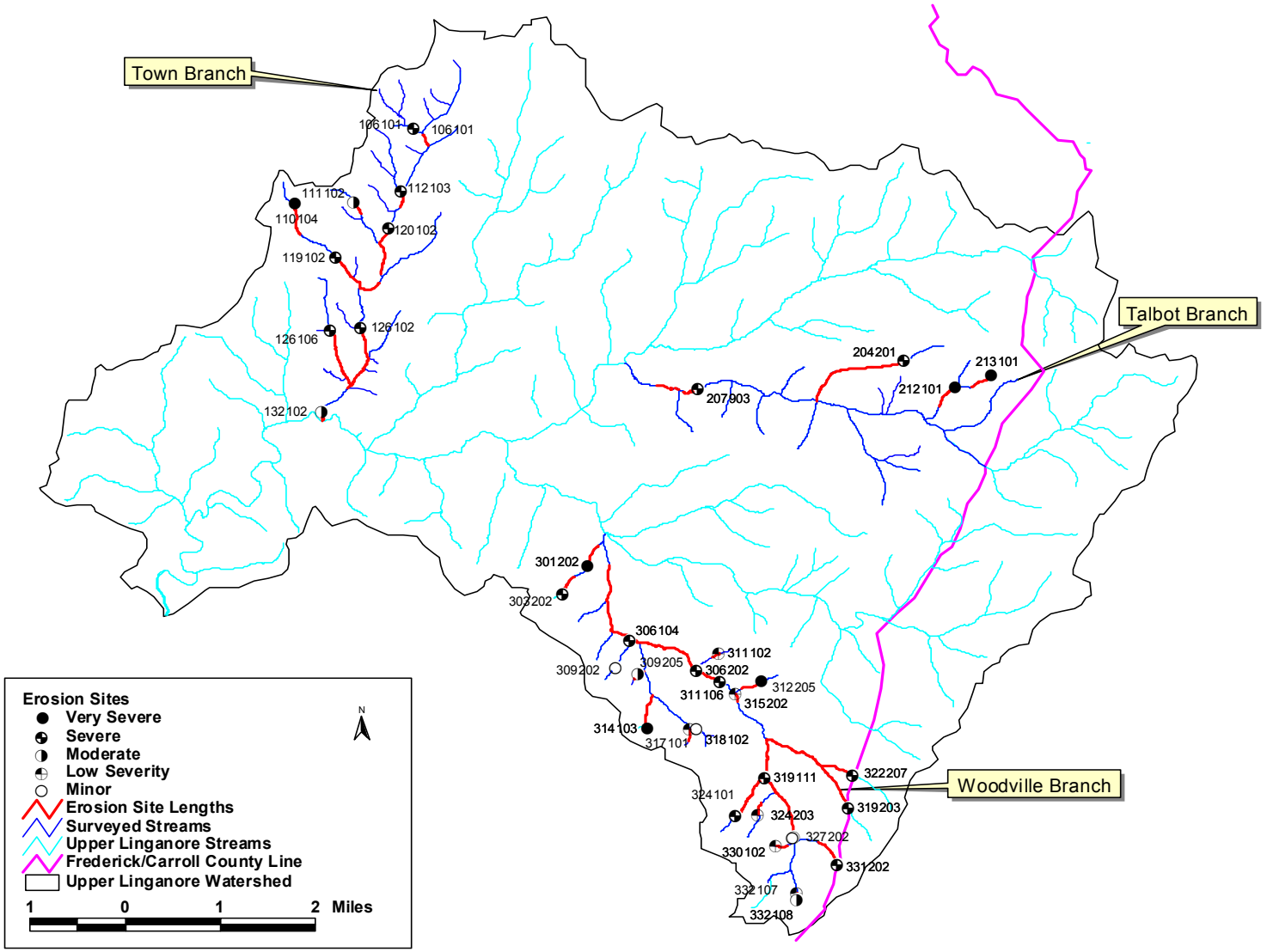

Figure 5c: Upper Linganore Erosion Site Locations.

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 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 ft., 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.

Survey crews identified 57 fish migration barriers during the survey. Fish blockages were found on the Woodville Branch (29 sites), Pleasant Branch (9 sites), Fahrney Branch (6 sites), Town Branch (6 sites), Bear Branch (2 sites), North Branch (2 sites), Talbot Branch (2 sites), and Urbana Branch (1 sites). The locations of fish migration blockages are shown in Figure 6b, and 6c. Three sites in the Lower Monocacy were rated as severe. No sites were given a very severe rating.

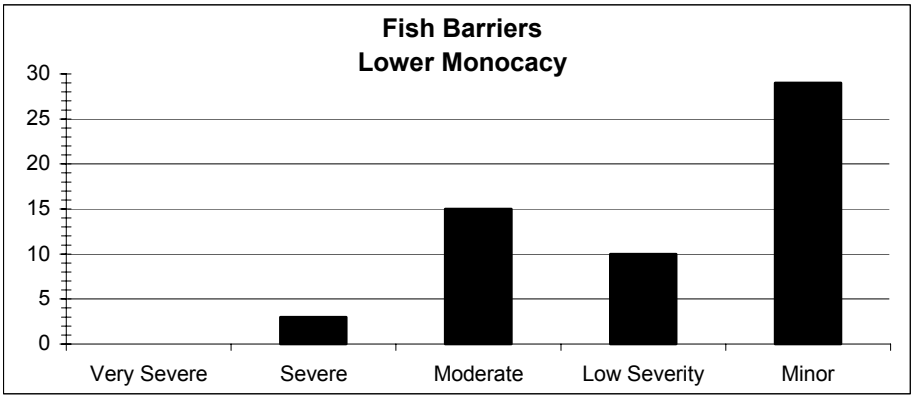

Figure 6a: Histograph showing the frequency of severity ratings given to fish barriers seen during the Lower Monocacy SCA Survey.

Bennett Creek

Twenty fish blockage sites were found in the Bennett Creek portion of the survey. Causes of fish blockages found in Bennett Creek include: road crossing (9 sites), natural falls (5 sites), instream pond (3 sites), erosion (1 site), headcutting at tree roots (1 site), and rocks across stream (1 site). Blockages were recorded as too high at all 20 sites, and height of blockages ranged from 5 in. to 50 in. Total blockages were recorded at 13 sites, partial blockages recorded at 4 sites, and temporary blockages recorded at 3 sites. No sites in the Bennett Creek sub-watershed were recorded as having very severe or severe ratings (figure 6a). One site was given a moderate rating.

Upper Linganore

Thirty-seven sites were recorded in the Upper Linganore sub-watershed. Causes of these blockages include: natural falls (8 sites), debris dam (7 sites), road crossing (7 sites), channelization (4 sites), dam (4 sites), beaver dam (3 sites), instream pond (2 sites), earth mound (1 site), and fencing (1 site). Blockages were recorded as too high at 36 sites and too shallow at 1 site. Heights of the blockages were recorded as ranging from 7 in. to 60 in. The too shallow site had a depth of less than 1in. Total blockages were found at 16 sites, temporary at 15 sites, and partial at 6 sites.

Three sites were given a severe rating during the survey. None of the fish blockage sites observed were given a very severe rating. Sites were rated as severe due to their height and location in the watershed. Site 110103 is a 36in. high total blockage on Town Branch caused by channelization. Site 314102 is a 12in. high total blockage on Woodville Branch caused by a dam. Site 327201 is a 30in. high total blockage on Woodville Branch caused by a debris dam. Debris dams a not typically given a severe rating, but due to the position of the total blockage on the Woodville Branch, the committee decided that a severe rating for site 327201 was warranted. The blockage floods an area approximately 1 mile long, and is located near the confluence of Woodville Branch and the mainstem Upper Linganore. This site essentially blocks the migration of fish into the whole Woodville Branch.

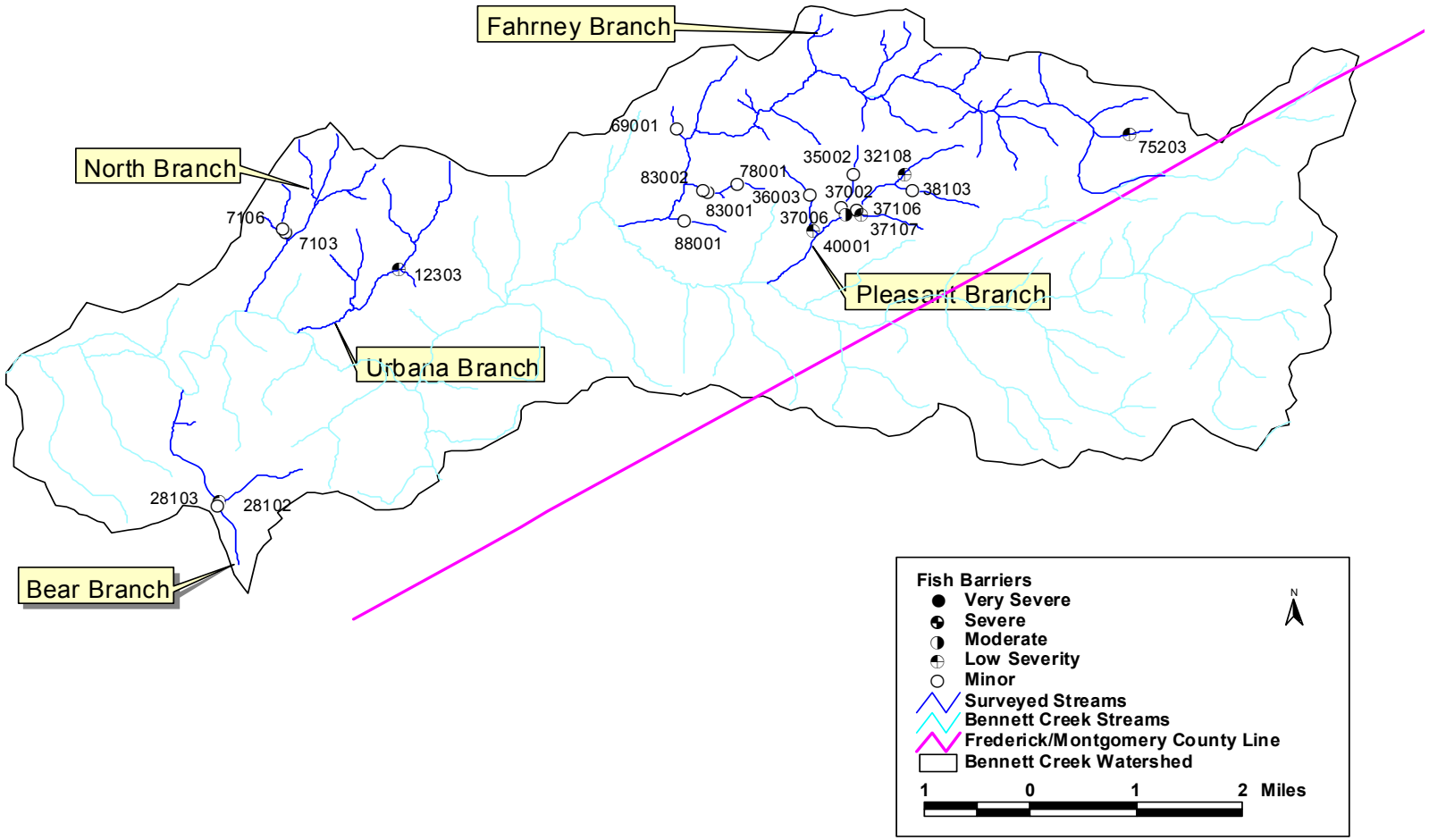

Figure 6b: Bennett Creek Fish Barrier Locations.

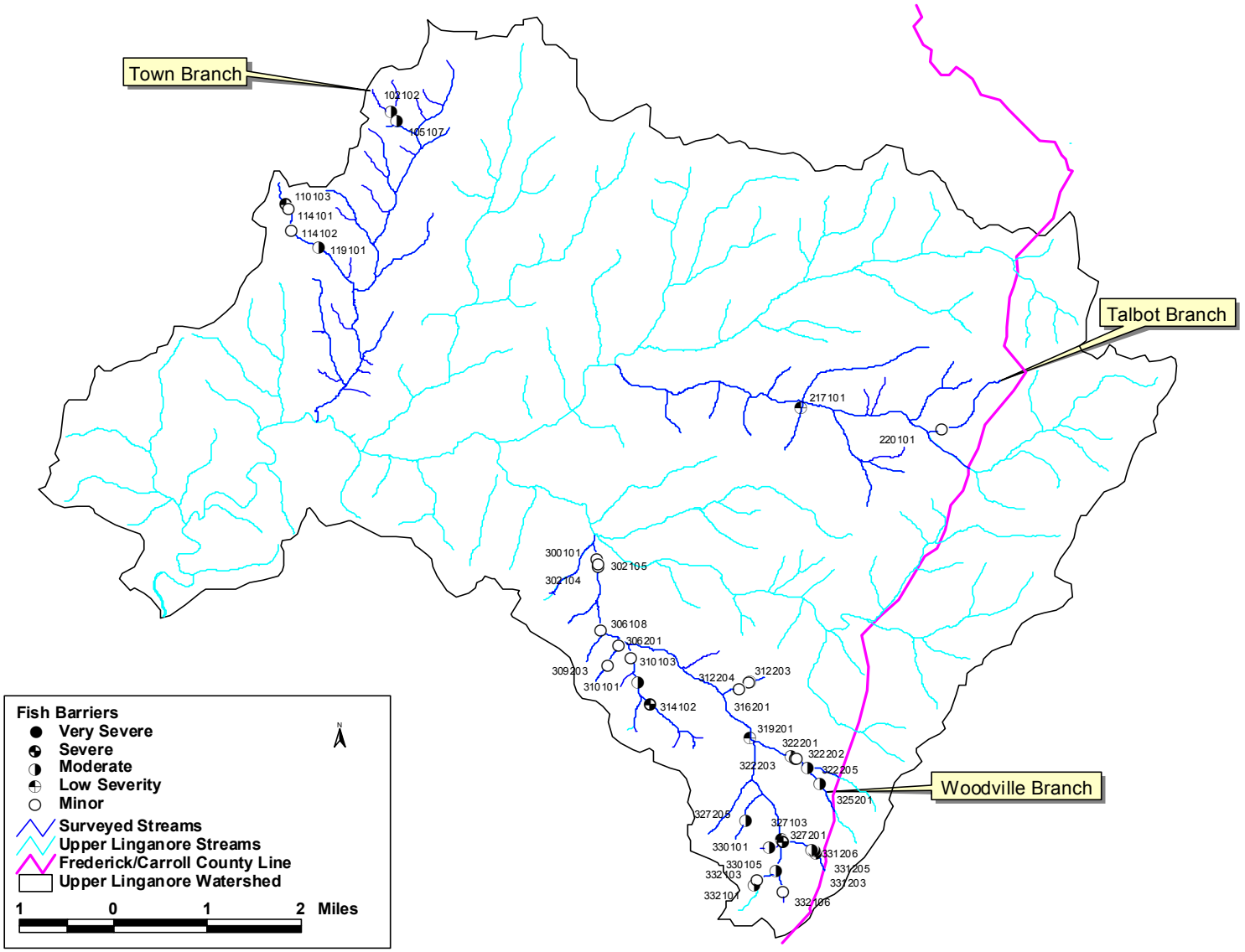

Figure 6c: Upper Linganore Fish Barrier Locations.

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. Forty-five pipe outfalls were identified during the Lower Monocacy survey. The location of these pipes can be seen in Figures 7b and 7c.

Fifty-one percent (23 pipes) of the pipe outfalls observed in the survey had a discharge coming out of them. Of these, only 2 pipes (site 075204, and site 317106) had odors associated with the outfalls. Pipe 075204 had an orange discharge with a musky smell, and pipe 317106 had a medium brown discharge with a musky smell (Appendix C). The most frequently reported type of outfall was stormwater at 26 sites. There were no estimates of the amount of fluid discharging from the pipes. No immediate follow up actions were taken as part of this study to determine the source of discharge from the pipes. 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. (Yetman, Rice, Pellicano, 2002)

Severity ratings for pipe outfalls were given based on outfall type, discharge, type of discharge, and location in the watershed of the outfall. In the Lower Monocacy SCA Survey, no pipe outfalls were given a very severe rating. Two pipes were severe, 9 moderate, 12 low severity, and 22 minor sites (Figure 7a).

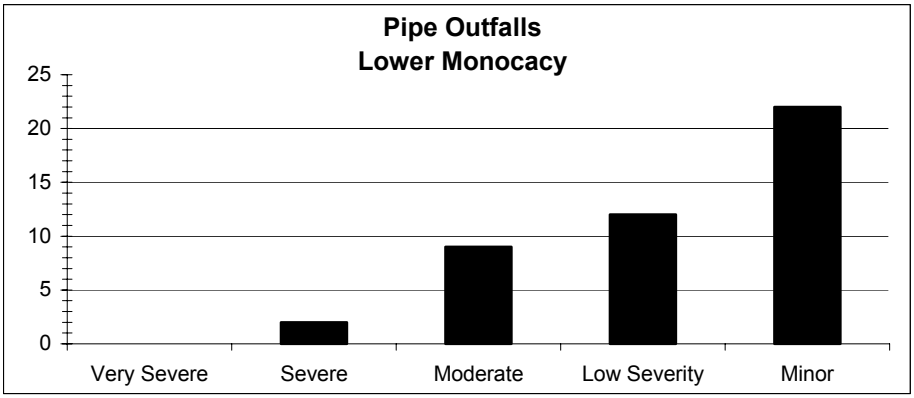

Figure 7a: Histograph showing the frequency of severity ratings given to Pipe outfall sites during the Lower Monocacy SCA survey.

Bennett Creek

The SCA survey identified 15 pipe outfalls in the Bennett Creek sub-watershed. Pipes were observed on the Fahrney Branch (5 sites), Pleasant Branch (7 sites), and on Urbana Branch (3 sites). Locations of the pipe outfalls observed during the Lower Monocacy survey can be seen in Figures 7b and 7c. One pipe was given a severe rating. No pipes in this sub-watershed were given a very severe rating (Figure 7a). Causes for the pipe outfalls were given as: stormwater (9 sites), pond overflow (4 sites), agriculture (1 site), and road runoff (1 site). Types of pipes found included corrugated metal (5 sites), rip-rap (5 sites), plastic (3 sites), concrete channel (1 site), and concrete pipe (1 site). Diameters of pipes found ranged from 2 in. to 30 in. Channels created by pipe outfalls ranged in width from 1 ft. to 60 ft. Locations of pipes observed were on the right bank (7 sites), on the left bank (4 sites), off the stream (3 sites), and the head of stream (1 site). Six sites were found to have a clear discharge, and one site had an orange discharge.

One site in the Bennett Creek sub-watershed was given a severe rating. At site 075204, a 12 in. wide concrete channel was reported to have a orange discharge with a musky smell on the right bank of the Fahrney Branch. This site was a pipe discharging road runoff.

Upper Linganore

Thirty pipe outfalls were observed in the Upper Linganore sub-watershed. These pipes were located on Town Branch (13 sites), Woodville Branch (11 sites), and the Talbot Branch (6 sites). One pipe was given a severe rating (figure 7a). None of the sites observed were given very severe ratings. Causes for the pipe outfalls observed in the Upper Linganore surveyed areas included: stormwater (12 sites), unknown (7 sites), agriculture (2 sites), sewage overflow (2 sites), overflow treatment (1 site), pond overflow (1 site), road runoff (1 site), and underground stream (1 site). Types of pipe found include: plastic (11 sites), corrugated metal pipe (10 sites), smooth metal pipe (4 sites), concrete channel (3 sites), and concrete pipe (2 sites). The pipe outfalls identified in the Upper Linganore were located on left banks (14 sites), right banks (11 sites), and at the head of streams (5 sites). Diameters of pipes found ranged from 2 in. to 24 in. Channels created by the pipe outfalls were found to be 2 ft. to 15 ft. wide. Sixteen pipes were found to have a clear discharge. Pipe 317106 had a medium brown discharge with a musky odor associated with it

One pipe was observed as a severe pipe in the Upper Linganore sub-watershed. Site 317106 is a 12 in. corrugated metal pipe with a 2 ft. wide concrete channel, found at the head of the Woodville Branch. This pipe was observed discharging orange road runoff with a musky smell. Locations of the Upper Linganore pipe outfalls are located in Figure 7c.

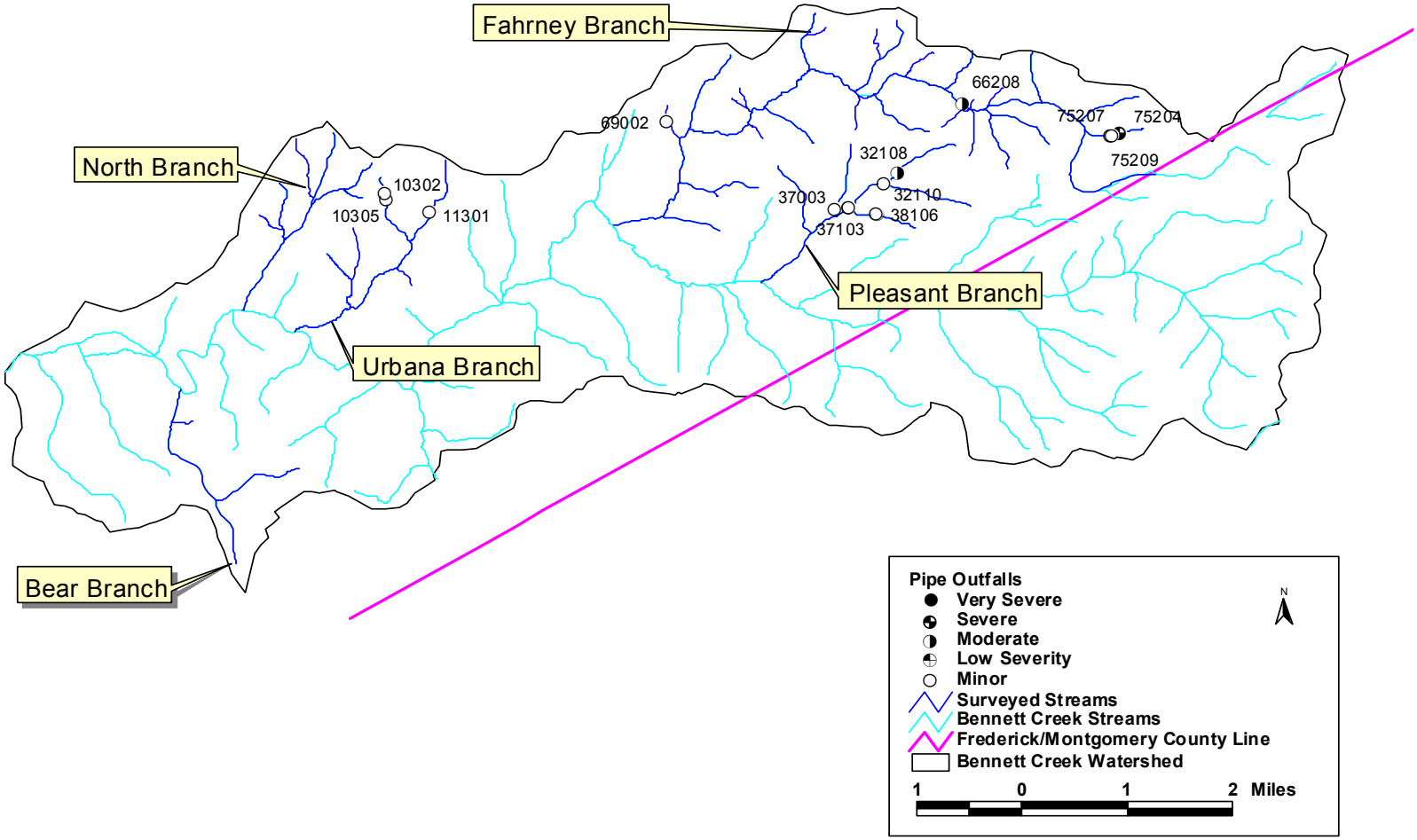

Figure 7b: Bennett Creek Pipe Outfall Locations.

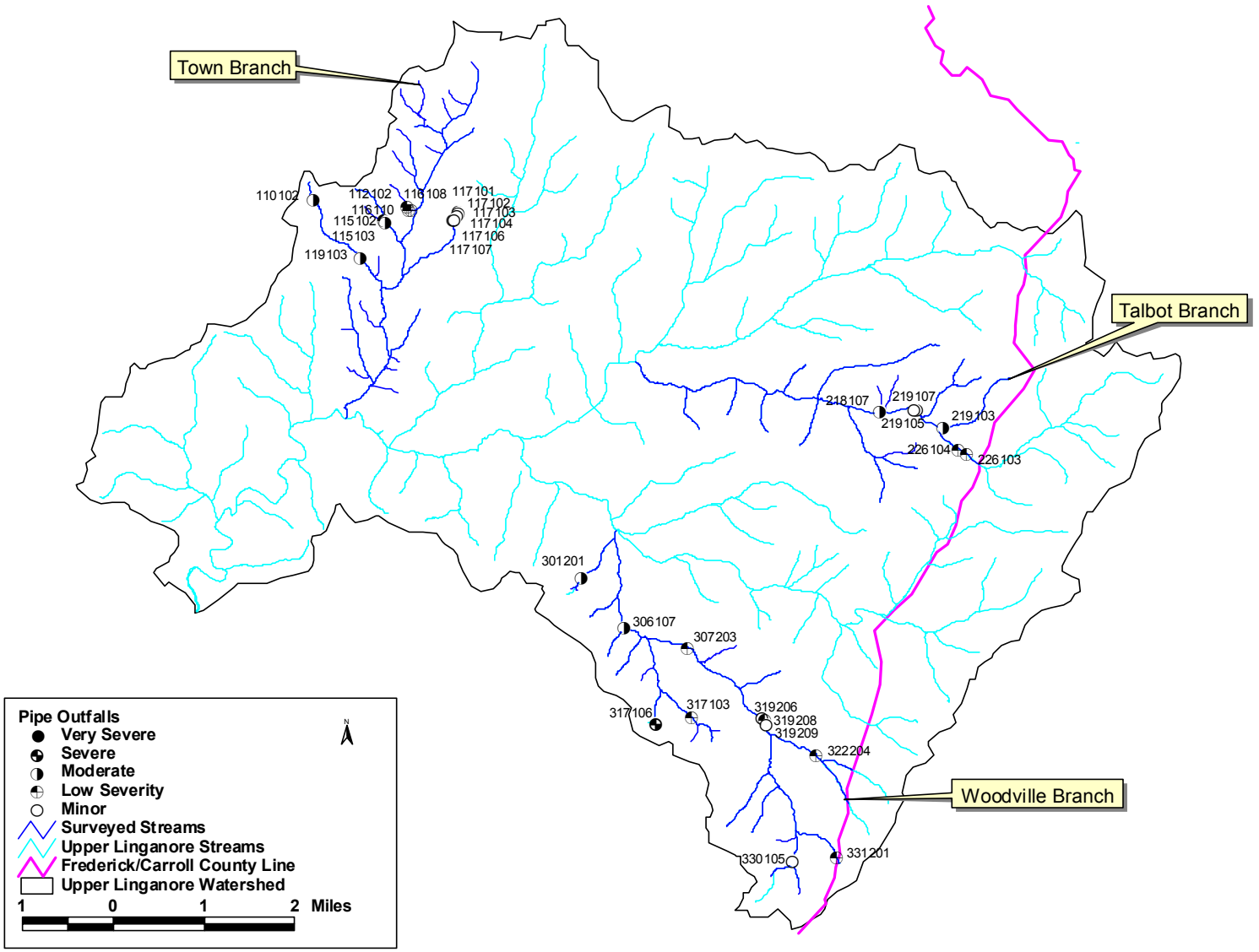

Figure 7b: Upper Linganore Pipe Outfall Locations.

Channel Alterations

Channel alteration sites are 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. 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.

In the surveyed sub-watersheds of the Lower Monocacy watershed, survey crews found 35 areas where the stream channel had been recognizably altered. Locations of channel alteration sites are shown in Figure 8b and 8c. The total length of stream affected by channelization was estimated to be 1,592 ft, or about 0.30 miles. Channel alteration sites were found in two sub-watersheds of the Upper Linganore, and two sub-watersheds of Bennett Creek. Channel alterations were reported in Town Branch (19 sites), Talbot Branch (12 sites), Pleasant Branch (3 sites), and Urbana Branch (1 site). No very severe or severe sites were reported during the Lower Monocacy survey.

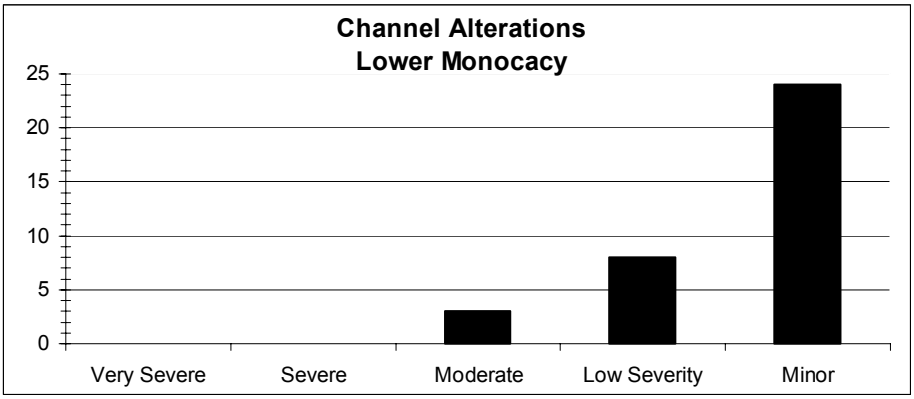

Figure 8a: Histograph showing the frequency of severity ratings given to channel alteration sites during the Lower Monocacy SCA Survey.

Bennett Creek

Four minor channel alteration sites were reported in the Bennett Creek sub-watershed. Three sites are located on Pleasant Branch, and one site was observed on the Urbana Branch. All four sites observed in Bennett Creek were made of rip-rap. Lengths of the four sites ranged from 50 ft. to 200 ft., and totaled 425 ft. Widths of the sites ranged from 24 in. to 36 in. All four sites had perennial flow. Deposition of sediment and vegetation growing in the channel were both reported at two sites. Two sites were reported below a road crossing.

All four sites reported in the Bennett Creek surveyed areas were rated as minor in severity. Site 012302 is a 24 in. wide channel with perennial flow, with no vegetation or deposition in the channel. This site is rip-rapped for 50 ft. Site 037101 is a 200 ft. long rip-rap site on the Pleasant Branch with perennial flow and vegetation in the channel. Site 037110 is a 100ft. long rip-rap site with a channel 36 in. wide. This site has perennial flow and deposition in the channel. Site 038105 is a 36 in. wide channel with perennial flow, with vegetation and deposition in the channel

Upper Linganore

Thirty-one channel alteration sites were observed in the Upper Linganore surveyed areas. These sites are located in Town Branch (19 sites), and Talbot Branch (12 sites). The majority of these sites (20 sites or 57%) were rated minor. A total of 1,167ft of channel alterations were found in the Upper Linganore surveyed areas. Types of channel alterations observed in the Upper Linganore surveyed areas included: concrete (11 sites), corrugated metal (11 sites), rip-rap (4 sites), earth channel (2 sites), gabion baskets (1 site), and steel pipe (1 site). Channel width of streams at channel alteration sites ranged from 4in. to 96in. Lengths of these sites ranged from 8ft. to 300ft. Perennial flow was found in all but two of the sites. Deposition in the channel was found in 54% (17 out of 31 sites) of the channel alteration sites. At 39% of the sites (12 out of 31 sites), vegetation was observed in the stream channel. Eight sites were part of a road crossing: 5 below a road and 3 above and below.

There were no very severe or severe sites found in the Lower Monocacy (Figure 8a). Three moderate sites were observed during the Upper Linganore survey. Site 116105 is a 200ft. long concrete channel alteration site with perennial flow, deposition and vegetation in the 4 ft. wide channel on Town Branch. Site 116109 is a 300ft. long concrete armored site with perennial flow on Town Branch, with a 24in. channel. Site 317107 is a 100ft. long, 24in. wide concrete channel alteration site with sedimentation in the channel. The locations of channel alteration sites found in the Upper Linganore sub-watershed can be found in figure 8c.

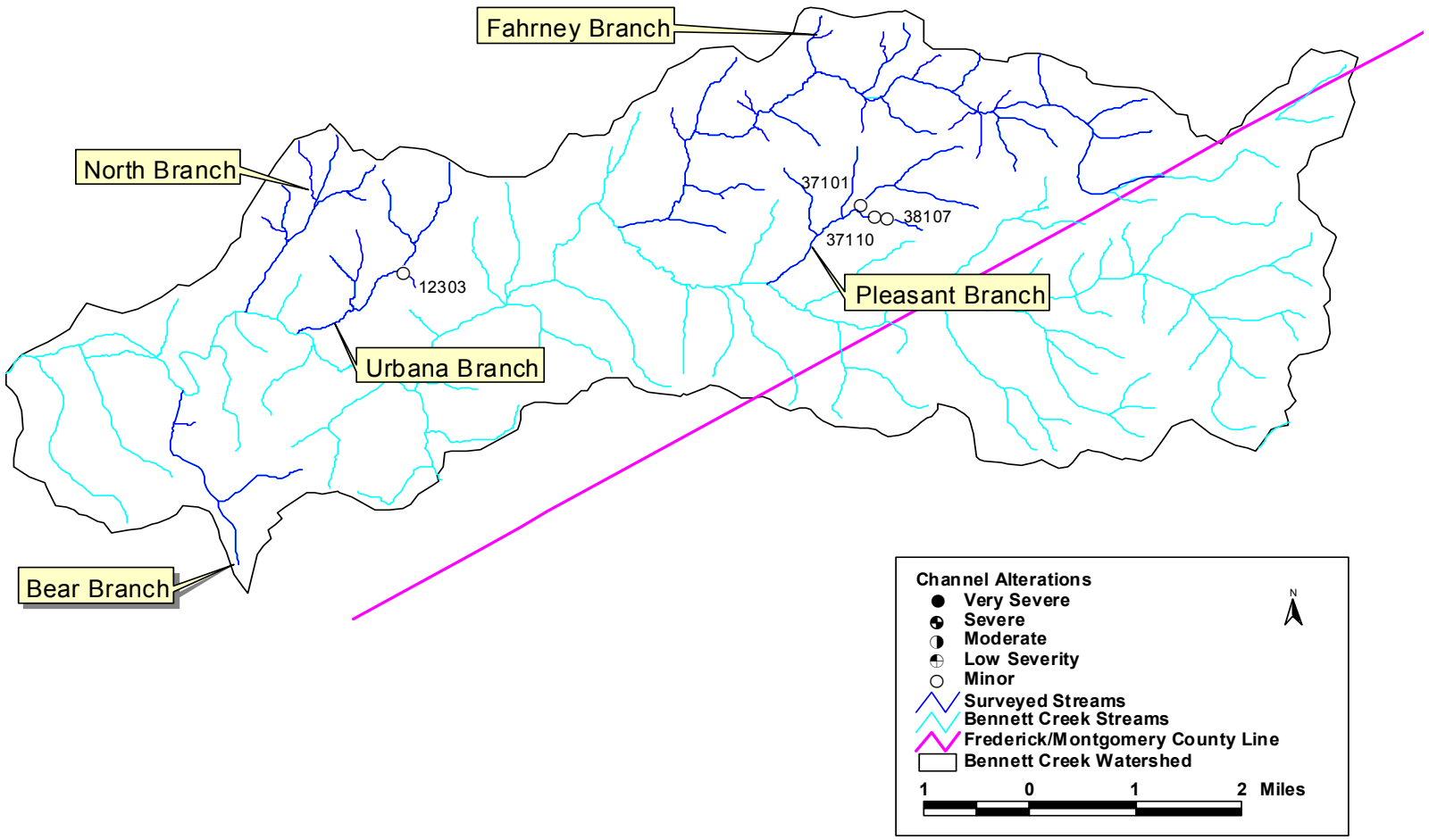

Figure 8b: Bennett Creek Channel Alteration Locations.

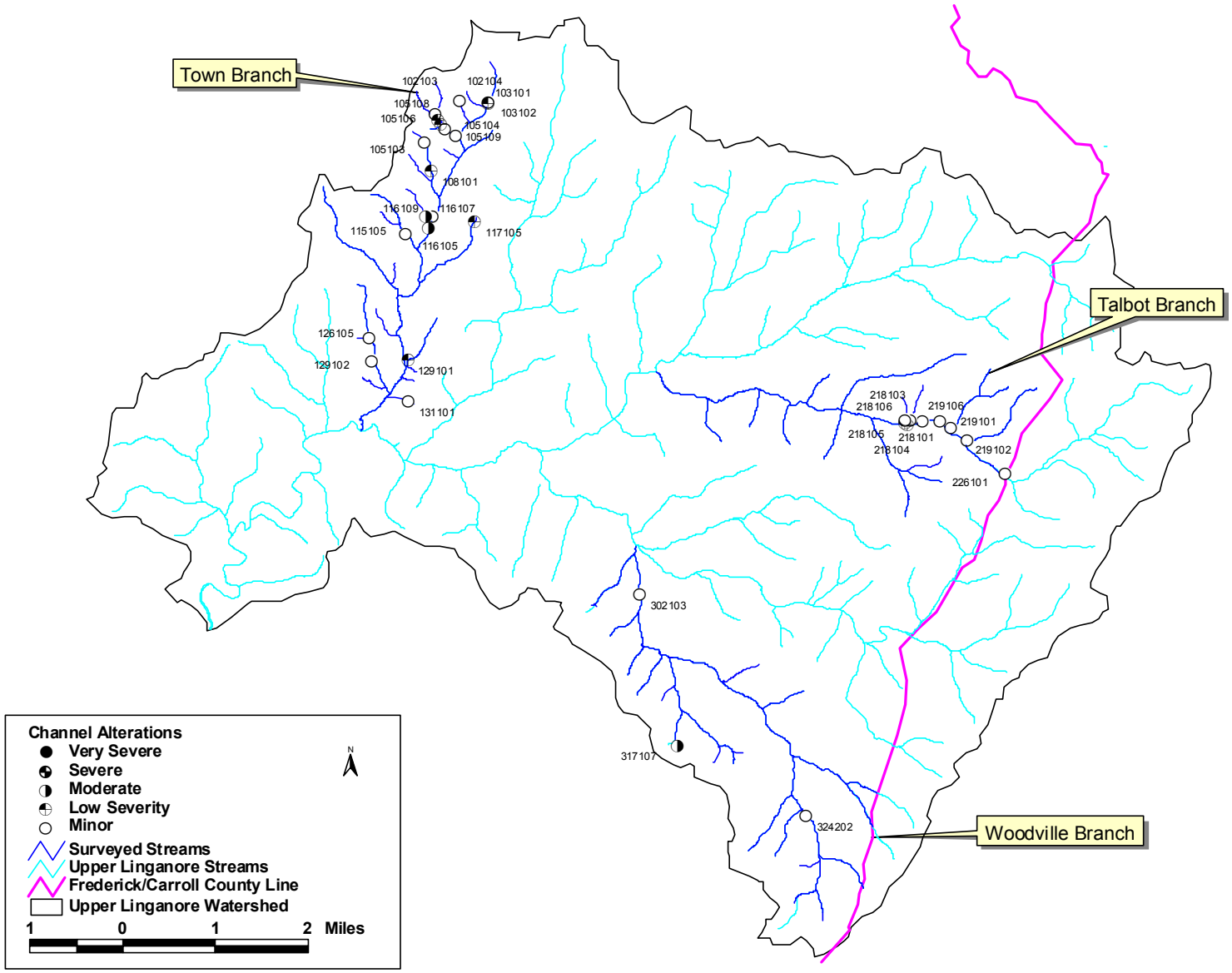

Figure 8c: Upper Linganore Channel Alteration Locations.

Trash Dumping

Trash dumping data sheets record information on places where large amounts of trash have been dumped inside the stream corridor, or to note places where trash tends to accumulate. The field survey crew found 14 sites where there was excessive trash, and these locations are shown in Figures 9b and 9c. The sites were given severity ratings based on size, contents of trash, and potential impact on the stream. Severity ratings for trash dumping sites throughout the surveyed Lower Monocacy sub-watersheds can be found in Figure 9a. Three sites were found in Bennett Creek, and the remaining 11 sites were found in the Upper Linganore sub-watersheds. Trash dumping sites were found in the Woodville Branch (5 sites), Town Branch (5 sites), Pleasant Branch (3 sites), and Talbot Branch (1 site). Most sites found were ranked as low severity to minor trash dumping sites. The three sites in Bennett Creek were all rated as severe. Field crews indicated that 12 of the sites might be good volunteer clean up opportunities.

Trash dumping sites in the Bennett Creek and Upper Linganore sub-watersheds range in size from 1 to 25 pick-up truckloads, and 1 site was estimated at 2 dump truck loads. Single site trash dumping sites were recorded at 9 sites, while large area dumping sites were recorded at 5 locations. Trash found at sites in the Lower Monocacy surveyed areas include: residential (8 sites), yard waste (5 sites), tires (3 sites), cars (1 site), floatables (1 site), and scrap metal (1 site). Thirteen trash dumping sites were found on private land. One site (330104) was found at East-West Park in the Town of Mt. Airy with 3 pick-up truckloads of residential trash and yard waste.

Three sites were given severe ratings. These sites were all found in the Bennett Creek sub-watershed of Pleasant Branch. Site 032102 is a 25 pick-up truckload residential and yard waste site. Site 032106 is a 10 pick-up truckload yard waste site. Site 036004 is estimated to have 2 dump truck loads of cars. Sites 032102 and 032106 were recorded as possible opportunities for volunteers.

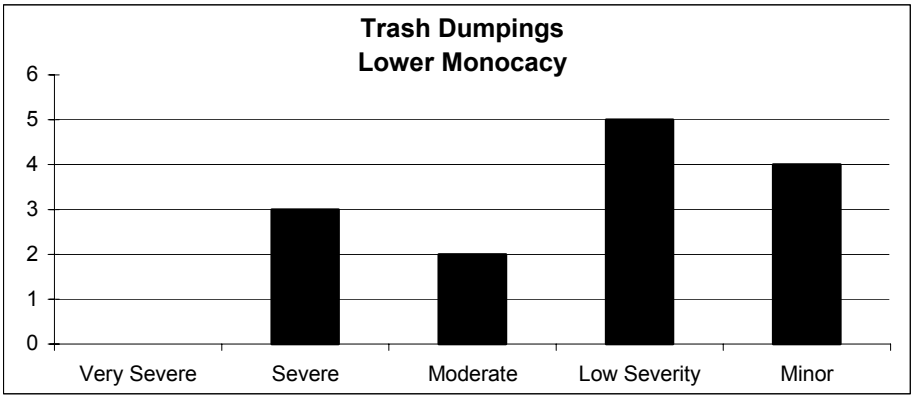

Figure 9a: Histograph showing the frequency of severity ratings given to trash dumping sites seen During the Lower Monocacy SCA survey.

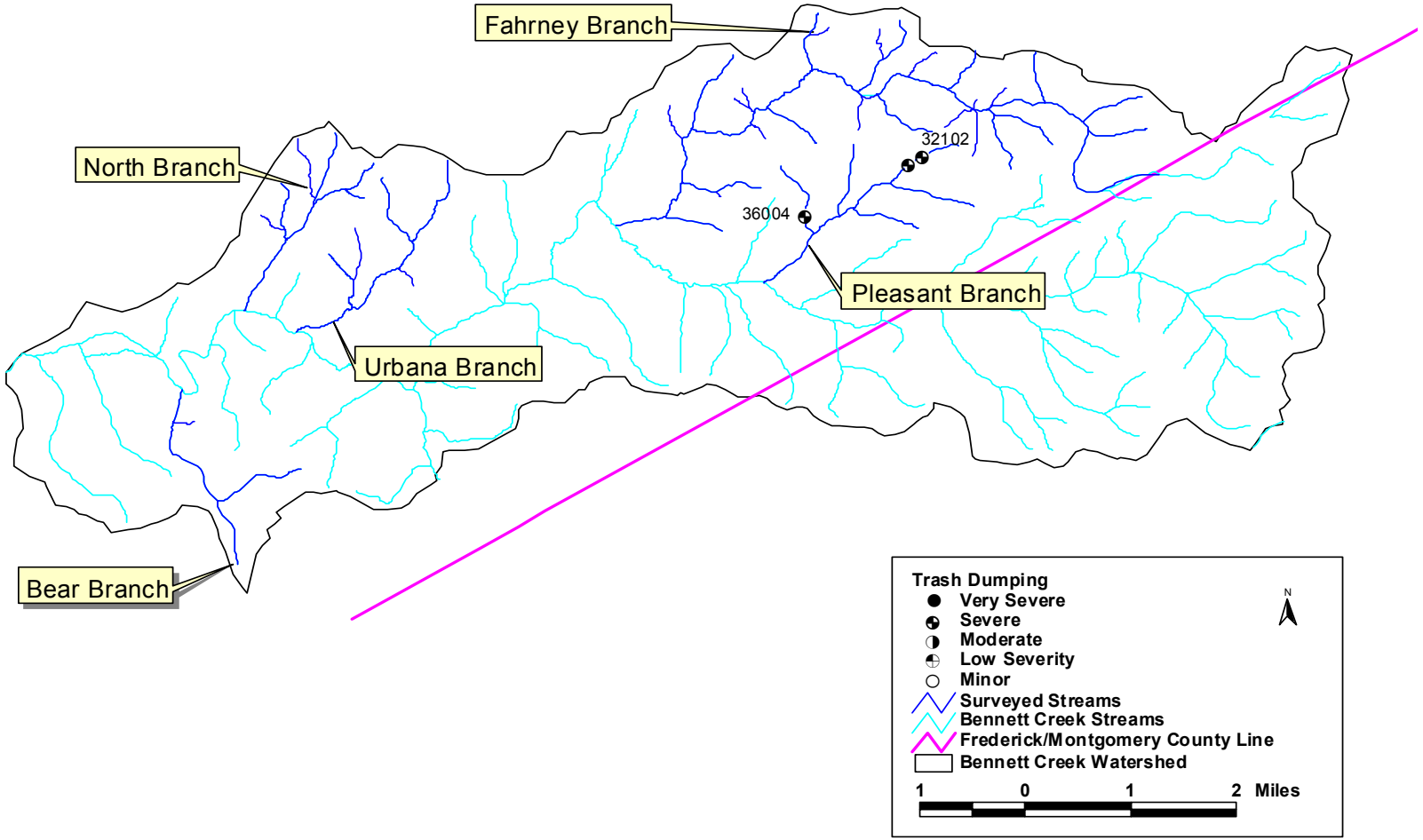

Figure 9b: Bennett Creek Trash Dumping Locations.

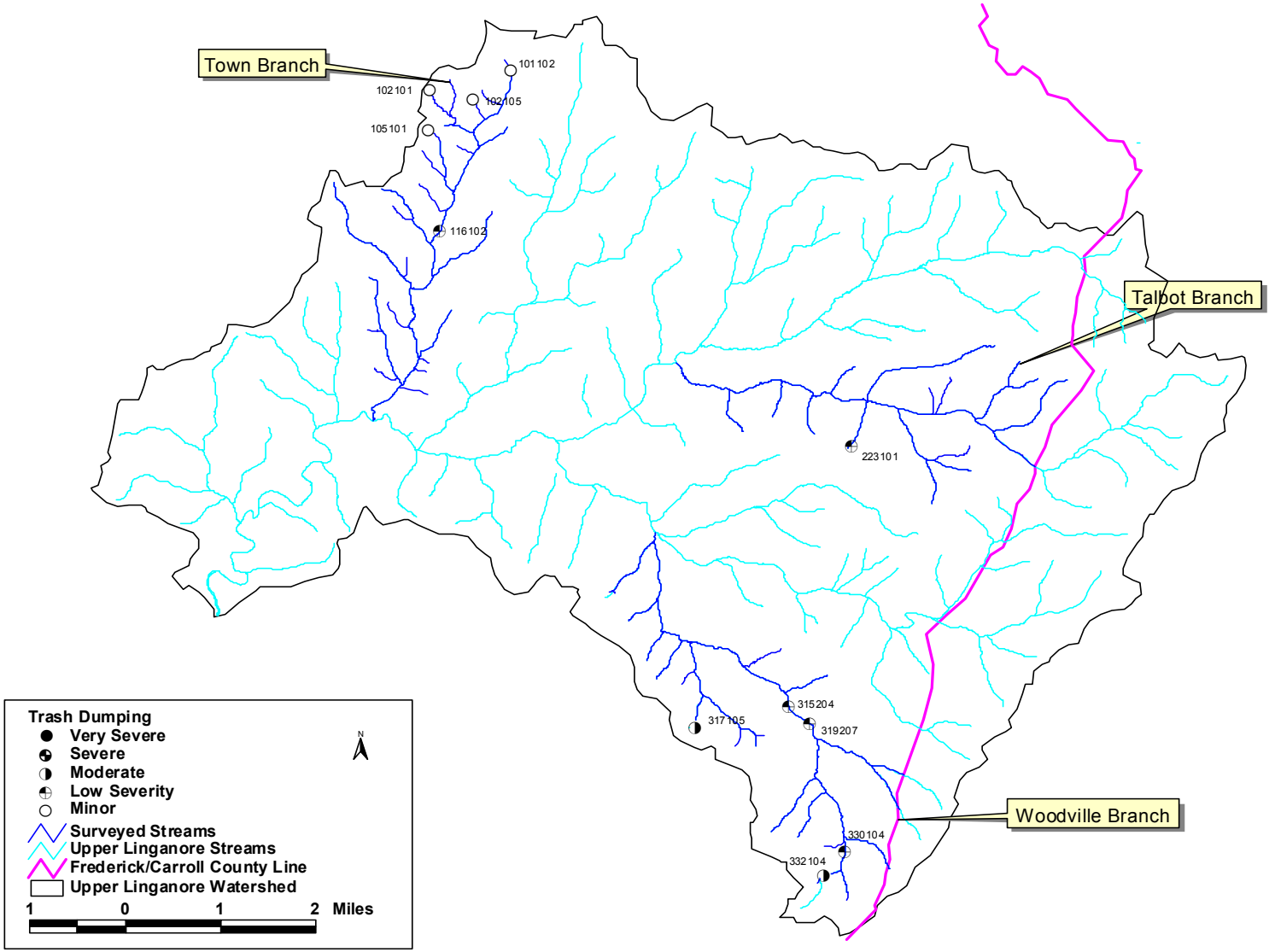

Figure 9c: Upper Linganore Trash Dumping Locations.

Unusual Conditions

The unusual condition/comment data sheets are used 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. Eleven unusual conditions were reported during the Lower Monocacy survey, and 11 additional comments were recorded. The locations of the unusual conditions and comments can be found in Figures 10b and 10c. Severities of the unusual conditions found during the Lower Monocacy survey can be seen in Figure 10a.

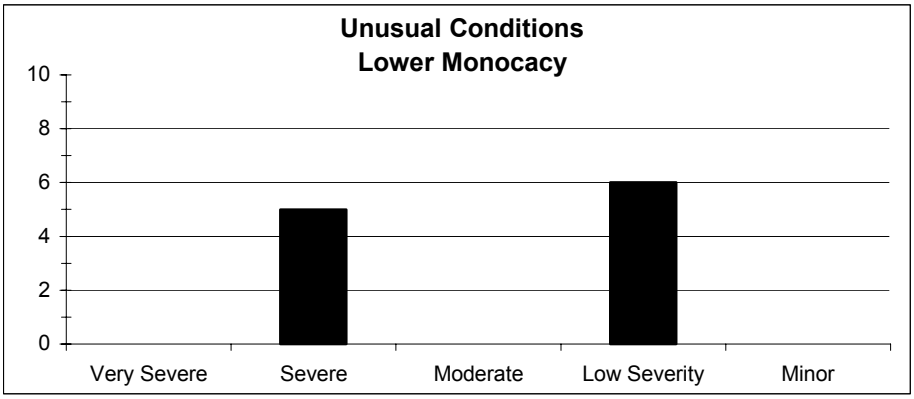

Figure 10a: Histograph showing the frequency of severity ratings given to unusual conditions seen During the Lower Monocacy SCA survey.

Bennett Creek

Eight unusual conditions were recorded in the Bennett Creek sub-watershed. Unusual condition sites in the Bennett Creek surveyed areas include red flock and livestock access to the stream. The red flock sites were all given low severity ratings, and the livestock accessing the stream sites were all given severe ratings. At site 008101, cows have access to the stream on the North Branch. Site 031201 has cows accessing the Pleasant Branch. Site 037005 is a red flock site on Pleasant Branch. Site 037105 is a red flock site that is caused by stormwater overflow upstream on Pleasant Branch. At site 040002, horses have access to Pleasant Branch. Sites 064301 and 066201 are red flock sites on the Fahrney Branch. Site 089001 has cows accessing the Fahrney Branch.

Upper Linganore

Three unusual condition sheets were recorded in the Upper Linganore sub-watershed. Two sites are red flock sites that were given low severity ratings, and one site is a livestock access to the stream site that was given a severe rating. At site 207902, cows were seen accessing Talbot Branch. Sites 306109 and 314105 are red flock sites on Woodville Branch.

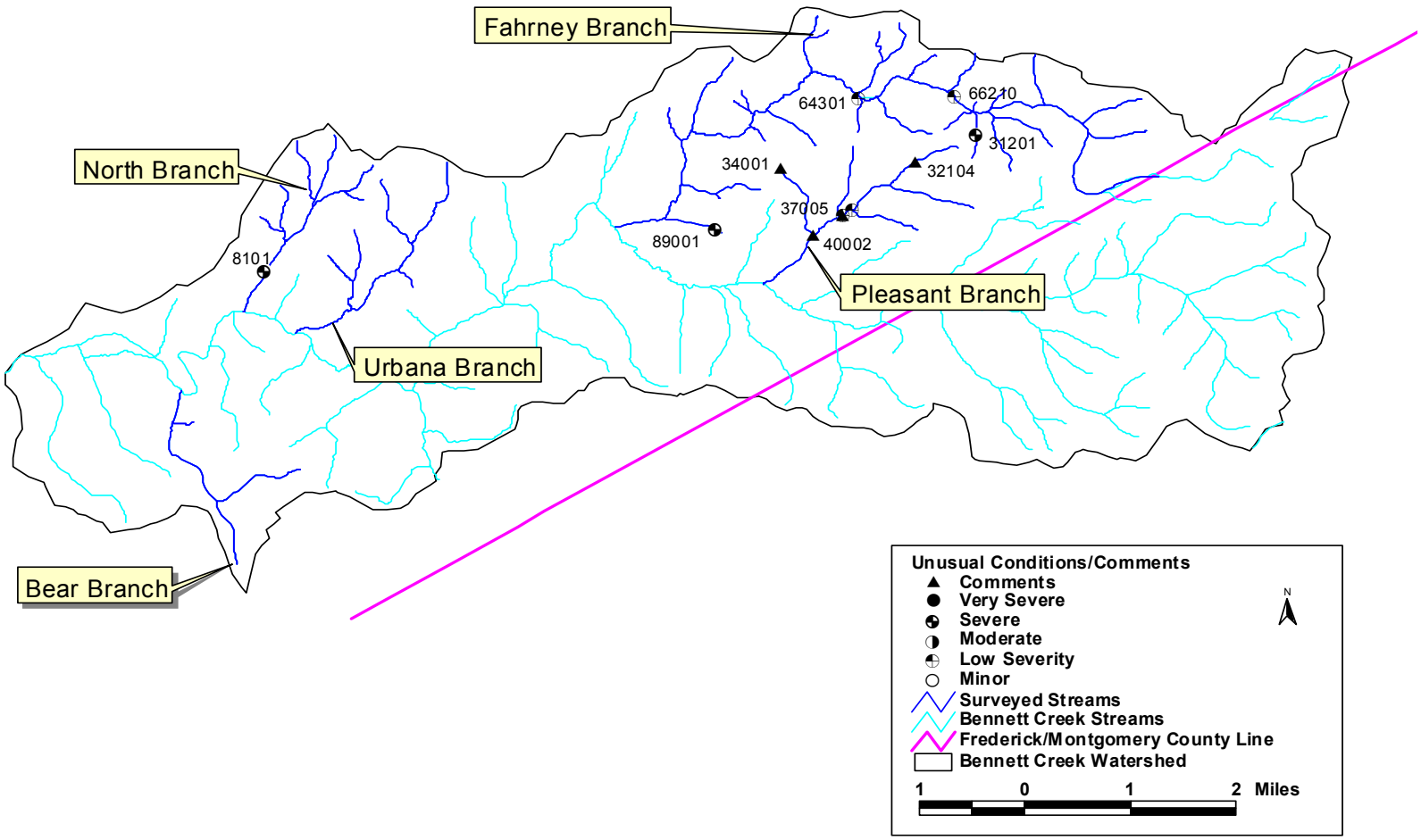

Figure 10b: Bennett Creek Unusual Conditions/Comment Locations.

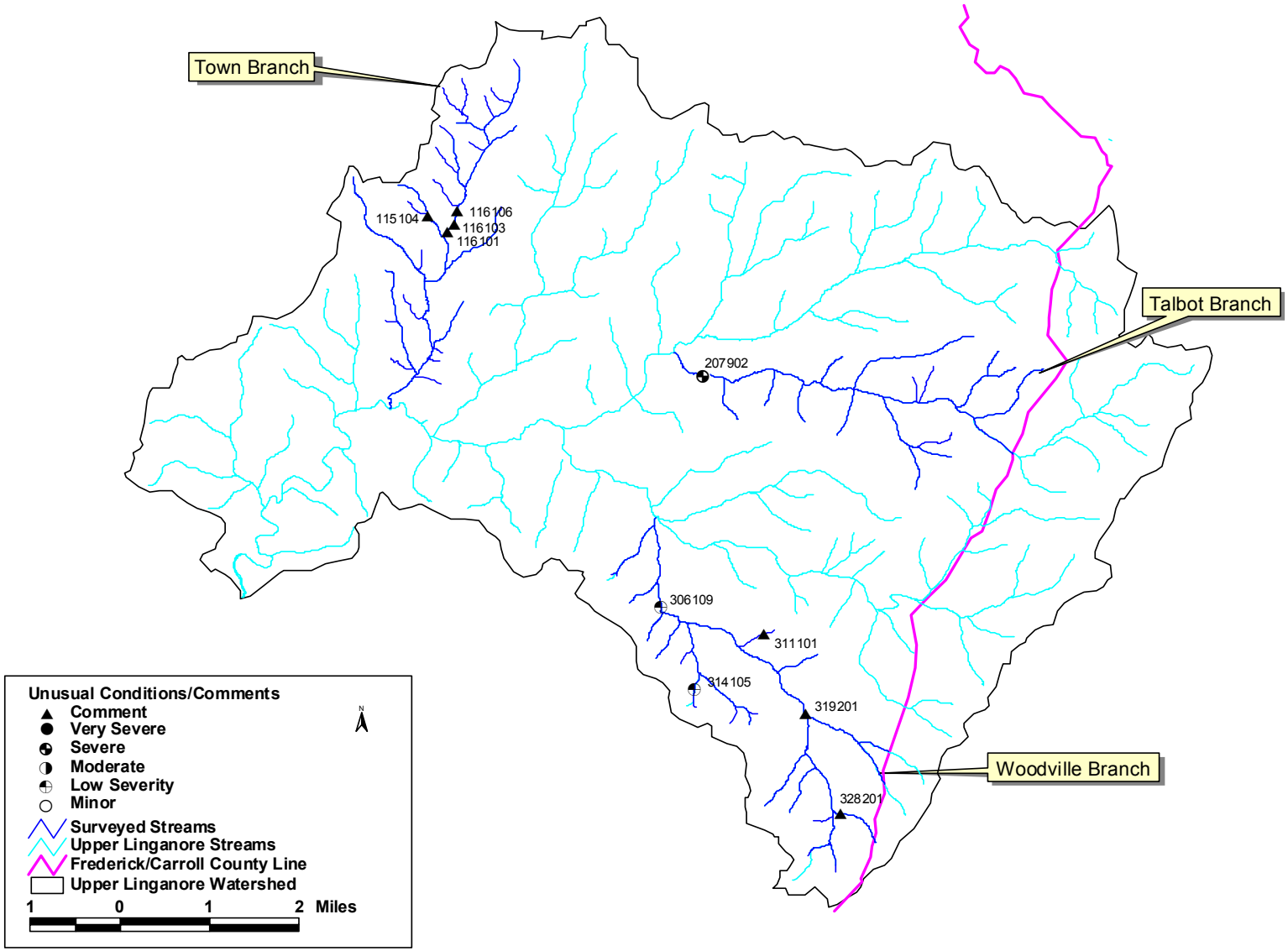

Figure 10c: Upper Linganore Unusual Conditions/Comment Locations.

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. Severity ratings were given based on how exposed the pipe is, location of the pipe, and contents inside the pipe.

Exposed pipes were reported at 1 site during the Lower Monocacy survey. The location of this site is shown in Figure 11b. Site 312202 is an 8 in. diameter smooth metal pipe exposed for 4 ft. across the bottom of Woodville Branch. The purpose of the pipe is unknown and there is no discharge.

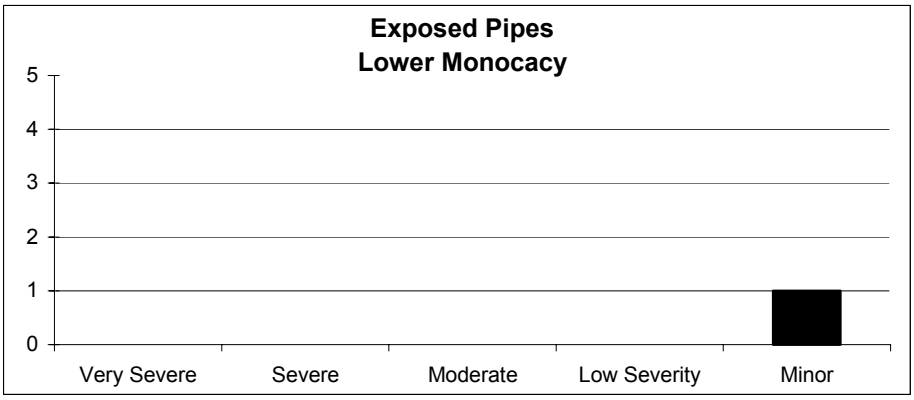

Figure 11a: Histograph showing the frequency of severity ratings of exposed pipes seen during the Liberty Reservoir SCA survey.

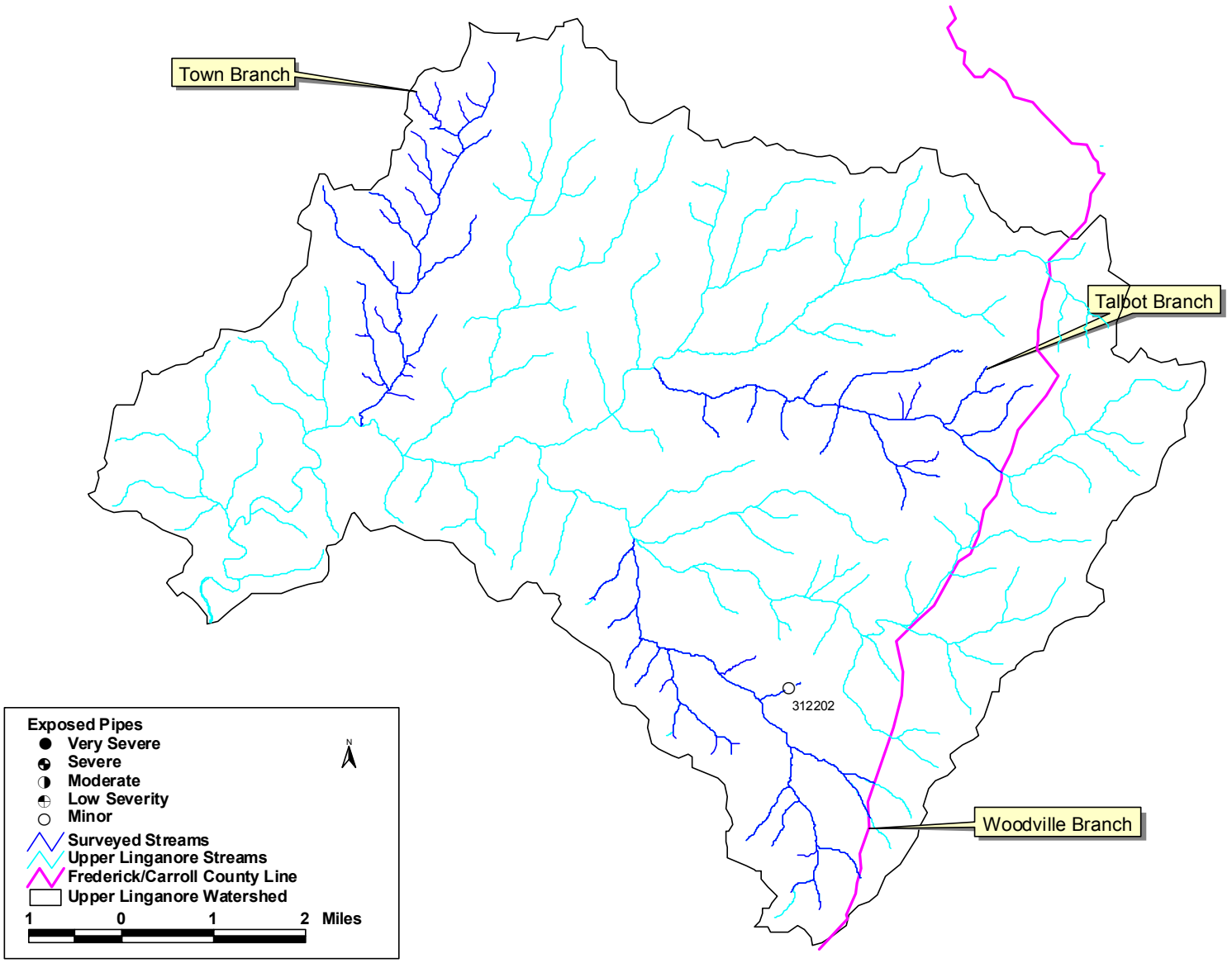

Figure 11b: Upper Linganore Exposed Pipe Locations.

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. These habitat parameters are:

* 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 catagories, 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 thalweg depths at pools, runs, and riffles at each representative site. 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. Forty-three representative data sheets were filled out during this survey. Locations of representative sites are shown in Figures 12a and 12b, and the data is presented in Appendix B.

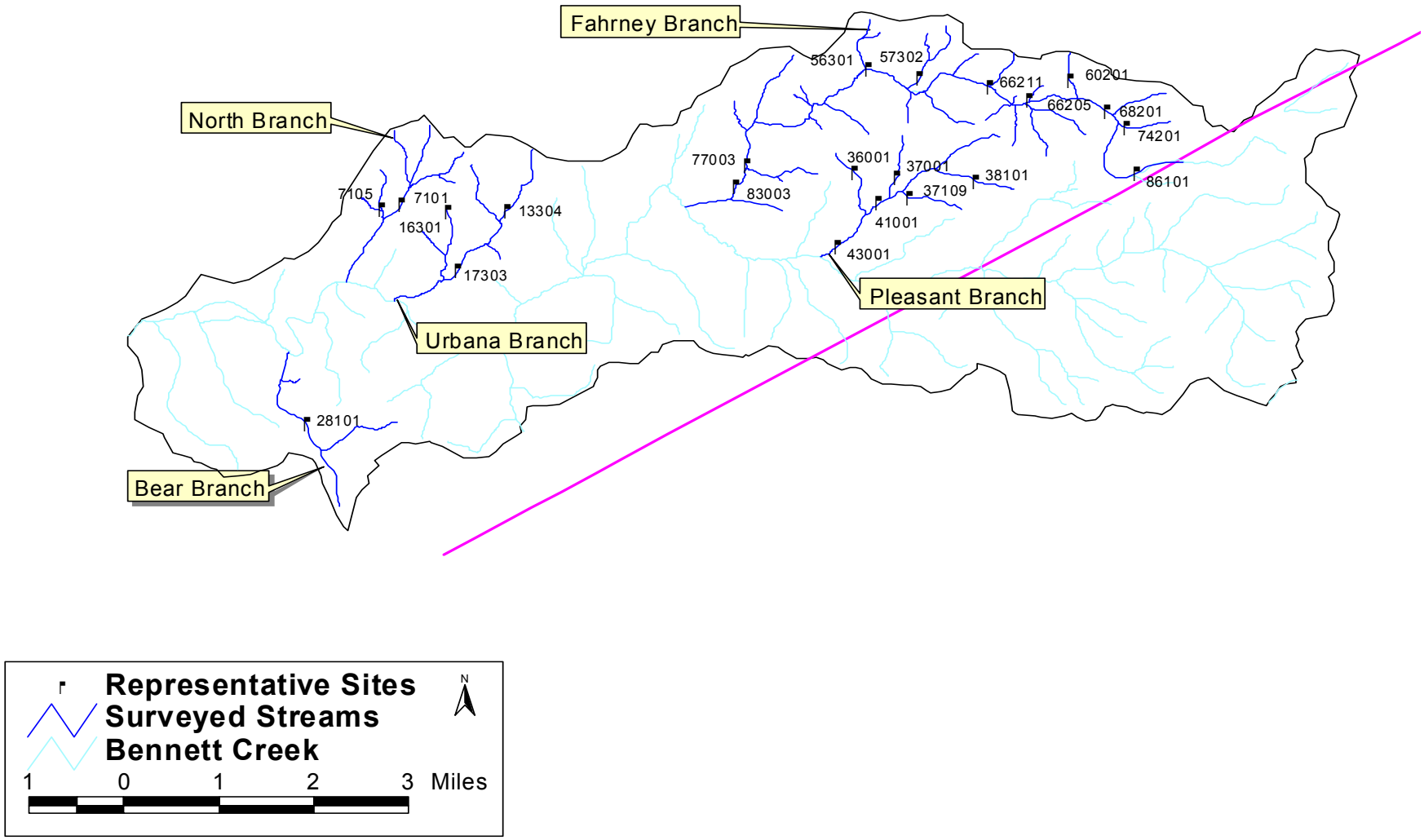

Figure 12b: Bennett Creek Representative Site Locations.

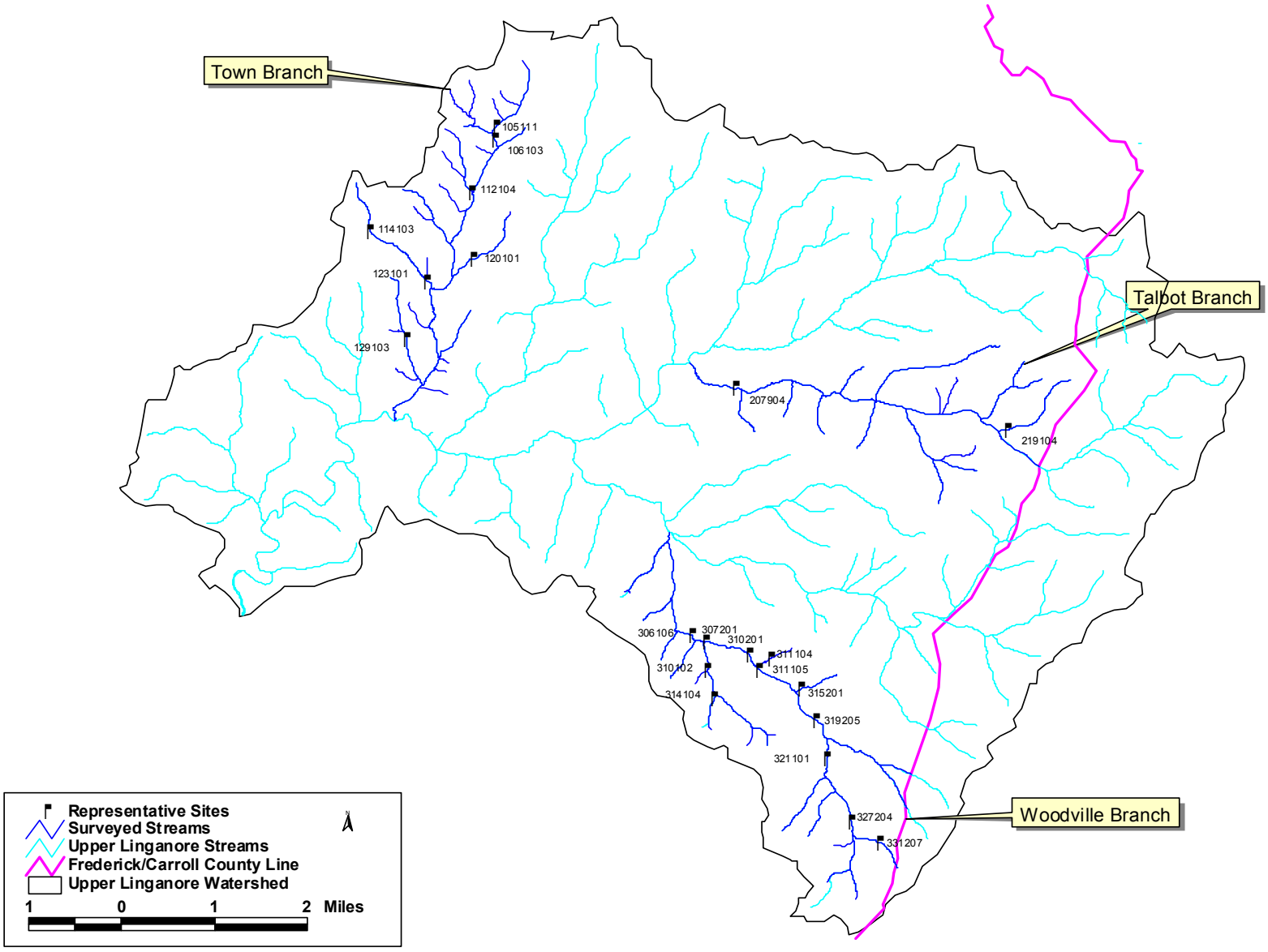

Figure 12c: Upper Linganore Representative Site Locations.

DISCUSSION

One of the main objectives of the Lower Monocacy Stream Corridor Assessment survey was to walk the stream network quickly and identify potential environmental problems in or along the edge of the streams. The survey was completed in the fall of 2003, and over 85 miles of stream were walked. During the SCA survey, 359 potential environmental problem sites were identified. These include: 115 inadequate buffer sites, 81 erosion sites, 57 fish barriers, 45 pipe outfalls, 35 channel alterations, 14 trash dumping sites, 11 unusual conditions, and 1 exposed pipe. Ten comments and 43 representative sites also were recorded.

Inadequate buffer sites were the most common problems observed in the two surveyed sub-watersheds. These sites typically ran through both agricultural areas. In the agricultural areas, inadequate buffers and livestock were present at a number of the sites. Excessive stream bank erosion was another problem common in the areas identified as having inadequate buffers. Some of the more minor erosion problems, especially in areas that also had inadequate buffers or livestock present, may be cured with buffer plantings and using fencing to limit livestock access. Some of the more severe erosion problems, however, will probably require more costly engineering solutions both to stabilize the stream's banks and to control upstream runoff, which ultimately is causing the stream to become unstable.

Pipe outfalls were also identified by survey crews to be a numerous problem throughout the surveyed sub-watersheds. Pipe outfalls can discharge harmful pollutants to the stream, especially in areas with older communities that were built before stormwater management requirements were in effect. Several pipe outfalls were identified with clear discharge, two had a color and an odor associated with the discharge. Follow up investigations should be done to determine if the discharges are a significant environmental problem.

As mentioned earlier, the Maryland Department of Natural Resources has formed a partnership with Frederick County to develop a Watershed Restoration Action Strategy (WRAS) for the Lower Monocacy 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 watershed in the future. Information on the Lower Monocacy Watershed Action Strategy can be found on DNR's website (www.dnr.state.md.us/watersheds/surf/proj/wras.html) or by contacting the Frederick County Department of Public Works in Frederick, Maryland.

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Appendix A

Listing of sites by site number

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
1101	Inadequate Buffer	1	2	1	367002.74571	184487.90458	North Branch
2101	Inadequate Buffer	1	1	1	367350.12836	184352.17315	North Branch
5101	Erosion Site	1	2	4	367135.67025	183783.57541	North Branch
7101	Representative Site				366996.81935	183394.89712	North Branch
7102	Erosion Site	2	3	5	366635.64153	183543.73395	North Branch
7103	Fish Barrier	5	4	4	366681.62261	183253.43960	North Branch
7104	Inadequate Buffer	3	2	4	366594.22197	183413.74659	North Branch
7105	Representative Site				366651.58469	183309.71847	North Branch
7106	Fish Barrier	5	4	2	366646.34151	183320.48764	North Branch
7107	Erosion Site	2	4	3	366388.15058	182626.29944	North Branch
8101	Unusual condition	2	5	3	366362.55629	182599.46192	North Branch
10301	Inadequate Buffer	2	1	2	368239.09085	183992.77256	Urbana Branch
10302	Pipe Outfall	5	5	2	368281.48231	183897.22190	Urbana Branch
10303	Erosion Site	1	4	3	368301.54124	183859.55950	Urbana Branch
10304	Inadequate Buffer	1	1	2	368290.63003	183683.87870	Urbana Branch
10305	Pipe Outfall	5	5	2	368304.41038	183792.44981	Urbana Branch
11301	Pipe Outfall	5	5	1	368986.73038	183574.20384	Urbana Branch
12301	Inadequate Buffer	1			368503.54452	182699.24971	Urbana Branch
12302	Erosion Site	2	5	4	368613.19583	182861.68107	Urbana Branch
12303	Channel Alteratiom	5	2	3	368509.57195	182579.31969	Urbana Branch
12303	Fish Barrier	4	4	3	368448.25945	182624.68600	Urbana Branch
13301	Inadequate Buffer	1	1	3	368488.59673	183258.74295	Urbana Branch
13302	Inadequate Buffer	1	1	3	368715.64010	183145.21492	Urbana Branch
13303	Erosion Site	1	3	2	368874.71736	183352.41046	Urbana Branch
13304	Representative Site				368789.71867	183277.74774	Urbana Branch
13305	Inadequate Buffer	4		2	368930.86239	183420.54681	Urbana Branch
15301	Erosion Site	2	4	4	367853.53340	182889.29842	Urbana Branch
15302	Inadequate Buffer	5	1	4	367781.50164	182596.05982	Urbana Branch
16301	Representative Site				367781.66896	183242.44004	Urbana Branch
17301	Inadequate Buffer	4	5	3	367742.09889	182331.09928	Urbana Branch
17302	Inadequate Buffer	4	5	3	367991.22053	182204.27855	Urbana Branch
17303	Representative Site				367959.18804	182144.37440	Urbana Branch
17304	Erosion Site	2	5	4	367965.43940	182156.95455	Urbana Branch
22101	Erosion Site	3	5	1	364977.41835	180230.01405	Bear Branch
22102	Erosion Site	3	4	1	365008.04861	180408.25072	Bear Branch
23101	Inadequate Buffer	2	5	1	365029.26628	180510.67842	Bear Branch
23102	Erosion Site	3	5	1	364931.73229	180089.31008	Bear Branch
23103	Inadequate Buffer	5	1	2	365202.91966	180044.06293	Bear Branch
24101	Inadequate Buffer	4	3	1	364864.66960	179602.24572	Bear Branch
28101	Representative Site				365360.46839	179244.13180	Bear Branch
28102	Fish Barrier	4	5	1	365644.67725	178737.74677	Bear Branch
28103	Fish Barrier	5	5	1	365618.11662	178673.88865	Bear Branch
30301	Inadequate Buffer	4	1	2	376462.70696	184964.84220	Fahrney Branch
30302	Inadequate Buffer	1	3	2	376221.94237	185182.35135	Fahrney Branch
31201	Unusual condition	2	2	3	377511.49147	184912.33201	Fahrney Branch
32101	Inadequate Buffer	3	1	3	376738.93118	184546.52366	Pleasant Branch
32102	Trash Dumping	2	2	3	376655.67407	184500.20169	Pleasant Branch
32103	Inadequate Buffer	4	2	3	376497.07047	184417.17417	Pleasant Branch
32104	Comment				376543.87831	184447.14425	Pleasant Branch
32105	Erosion Site	3	3	2	376525.84984	184436.43532	Pleasant Branch
32106	Trash Dumping	2	2	2	376447.31247	184377.47021	Pleasant Branch

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
32107	Inadequate Buffer	5	2	3	376326.61903	184263.17293	Pleasant Branch
32108	Fish Barrier	4	5	3	376327.58116	184234.69827	Pleasant Branch
32108	Pipe Outfall	3	5	3	376327.60042	184234.73679	Pleasant Branch
32109	Erosion Site	3	4	3	376306.53887	184236.04622	Pleasant Branch
32110	Pipe Outfall	5	5	4	376096.80490	184057.78420	Pleasant Branch
34001	Comment				374430.87964	184351.60578	Pleasant Branch
34001	Inadequate Buffer	1	1	3	374842.40386	183445.25206	Pleasant Branch
35001	Inadequate Buffer	1	1	2	375513.78081	184211.69380	Pleasant Branch
35002	Fish Barrier	5	2	2	375520.31150	184237.00545	Pleasant Branch
35003	Erosion Site	1	4	3	375441.61339	183840.58835	Pleasant Branch
35101	Inadequate Buffer	3	1	2	375923.39097	184021.80876	Pleasant Branch
36001	Representative Site				374751.18727	183989.11103	Pleasant Branch
36002	Erosion Site	1	3	3	374753.18737	183986.70055	Pleasant Branch
36003	Fish Barrier	5	1	3	374856.78129	183879.36679	Pleasant Branch
36004	Trash Dumping	2	3	4	374825.46963	183509.92118	Pleasant Branch
37001	Representative Site				375472.74713	183895.86580	Pleasant Branch
37002	Fish Barrier	5	3	2	375339.84950	183673.11765	Pleasant Branch
37003	Pipe Outfall	5	1	2	375337.72332	183629.65282	Pleasant Branch
37004	Inadequate Buffer	4	1	1	375446.33600	183576.74501	Pleasant Branch
37005	Unusual condition	4	1	2	375422.41296	183556.43085	Pleasant Branch
37006	Comment				375413.20433	183550.05616	Pleasant Branch
37006	Fish Barrier	3	3	1	375413.20329	183550.05947	Pleasant Branch
37101	Channel Alteratiom	5	5	2	375639.80595	183727.59448	Pleasant Branch
37102	Pipe Outfall	5	4	1	375552.34574	183640.55805	Pleasant Branch
37103	Pipe Outfall	5	4	1	375541.29672	183638.39440	Pleasant Branch
37104	Erosion Site	4	3	2	375646.21292	183545.48338	Pleasant Branch
37105	Unusual condition	4	4	2	375568.00152	183638.86825	Pleasant Branch
37106	Fish Barrier	5	3	3	375574.04003	183631.39811	Pleasant Branch
37107	Fish Barrier	4	5	1	375650.33603	183538.92752	Pleasant Branch
37108	Erosion Site	4	4	2	375858.42553	183516.96697	Pleasant Branch
37109	Representative Site				375677.85422	183512.42388	Pleasant Branch
37110	Channel Alteratiom	5	3	2	375857.70580	183517.02582	Pleasant Branch
38101	Representative Site				376810.66831	183840.67853	Pleasant Branch
38102	Erosion Site	2	5	4	376470.29516	183947.14093	Pleasant Branch
38103	Fish Barrier	5	2	4	376432.70926	183952.04492	Pleasant Branch
38104	Inadequate Buffer	5	1	3	376342.57454	183971.21001	Pleasant Branch
38105	Pipe Outfall	5	4	1	375975.65810	183543.50873	Pleasant Branch
38106	Pipe Outfall	4	5	1	375997.60851	183541.06935	Pleasant Branch
38107	Channel Alteratiom	5	4	1	376058.79582	183503.34468	Pleasant Branch
39101	Erosion Site	2	4	3	377160.37746	183772.35508	Pleasant Branch
39102	Inadequate Buffer	5	1	2	376947.56521	183801.11009	Pleasant Branch
40001	Fish Barrier	4	5	2	374889.75881	183291.93122	Pleasant Branch
40002	Comment				374940.31257	183209.31874	Pleasant Branch
40003	Erosion Site	1	3	3	375415.78836	183552.69423	Pleasant Branch
40004	Inadequate Buffer	1	1	3	374957.24877	183205.56772	Pleasant Branch
41001	Representative Site				375163.83334	183417.02998	Pleasant Branch
43001	Representative Site				374444.34921	182599.76232	Pleasant Branch
43002	Inadequate Buffer	4	1	3	374421.81378	182581.46148	Pleasant Branch
43003	Inadequate Buffer	1	2	2	374219.84507	182427.87696	Pleasant Branch
51301	Inadequate Buffer	2	1	2	375043.25074	186557.46084	Fahrney Branch
51302	Inadequate Buffer	1	1	2	374832.96409	186510.67047	Fahrney Branch

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
51303	Erosion Site	1		3	374800.09272	186350.01146	Fahrney Branch
52301	Inadequate Buffer	2	3	2	375914.17588	185965.53113	Fahrney Branch
52302	Erosion Site	4	3	3	375971.25676	186541.22192	Fahrney Branch
53301	Inadequate Buffer	1	2	3	376607.55657	186084.57915	Fahrney Branch
56301	Representative Site				374976.90320	185965.93143	Fahrney Branch
56303	Erosion Site	1	5	4	376114.66461	185728.57748	Fahrney Branch
56304	Inadequate Buffer	1	2	3	374043.02225	185305.19078	Fahrney Branch
56305	Erosion Site	1	4	3	374250.36265	185417.86048	Fahrney Branch
57301	Erosion Site	1	4	3	375875.65154	185776.38009	Fahrney Branch
57302	Representative Site				375860.46224	185791.92137	Fahrney Branch
58201	Inadequate Buffer	3	1	2	376779.22159	185721.46756	Fahrney Branch
58202	Inadequate Buffer	1	2	2	376442.09220	185831.81393	Fahrney Branch
58301	Inadequate Buffer	2	1	2	376250.46927	186328.60235	Fahrney Branch
60201	Representative Site				378433.02895	185743.90147	Fahrney Branch
60202	Erosion Site	4	2	3	378446.44695	185725.92789	Fahrney Branch
60203	Erosion Site	4	4	3	378416.59732	185838.18818	Fahrney Branch
62301	Inadequate Buffer	1	2	3	374643.81047	185074.23877	Fahrney Branch
62302	Erosion Site	2	4	3	374980.48676	184742.32527	Fahrney Branch
62303	Inadequate Buffer	2	3	3	373937.36485	185357.41875	Fahrney Branch
64301	Unusual condition	4	1	5	375659.62838	185541.91327	Fahrney Branch
64303	Erosion Site	2			375658.25727	184956.54720	Fahrney Branch
66101	Inadequate Buffer	3	2	4	377710.03476	185325.68703	Fahrney Branch
66201	Erosion Site	4	3	3	377752.12255	185235.01161	Fahrney Branch
66202	Inadequate Buffer	5	1	3	377744.20242	185242.97297	Fahrney Branch
66203	Inadequate Buffer	1	1	3	377501.93628	184935.27614	Fahrney Branch
66204	Erosion Site	2	5	3	377479.16483	184584.61726	Fahrney Branch
66205	Representative Site				377730.33121	185370.47652	Fahrney Branch
66206	Erosion Site	1	5	2	377965.06527	185640.63715	Fahrney Branch
66207	Erosion Site	4	5	3	377509.23616	185457.79548	Fahrney Branch
66208	Pipe Outfall	3	5	2	377329.73194	185376.64294	Fahrney Branch
66209	Inadequate Buffer	1	1	3	377354.20023	185359.29297	Fahrney Branch
66210	Unusual condition	4	1	4	377158.28461	185555.05726	Fahrney Branch
66211	Representative Site				377058.66828	185623.40225	Fahrney Branch
67201	Erosion Site	2			378276.49823	185418.19786	Fahrney Branch
68201	Representative Site				379060.20253	185165.10141	Fahrney Branch
68202	Erosion Site	2	5	4	379082.92873	185151.64002	Fahrney Branch
69001	Fish Barrier	5	3	2	372760.58698	185008.62946	Fahrney Branch
69002	Pipe Outfall	5	1	2	372707.85077	185102.72144	Fahrney Branch
69003	Erosion Site	1	4	4	372792.45811	184910.38797	Fahrney Branch
69004	Inadequate Buffer	1	2	4	372911.37465	184636.22240	Fahrney Branch
70301	Inadequate Buffer	1	5	3	373858.88789	184930.92875	Fahrney Branch
70302	Inadequate Buffer	1	2	2	373496.60696	184910.86440	Fahrney Branch
72301	Inadequate Buffer	3			375642.82975	185249.18319	Fahrney Branch
73201	Inadequate Buffer	3	1	2	377902.00772	184682.20131	Fahrney Branch
74201	Representative Site				379414.02444	184848.41308	Fahrney Branch
74202	Erosion Site	5			379202.97580	184769.44781	Fahrney Branch
74203	Inadequate Buffer	1	1	3	379195.06541	184747.45846	Fahrney Branch
74204	Inadequate Buffer	2	2	2	379026.59474	184310.60761	Fahrney Branch
75201	Inadequate Buffer	4	1	2	380098.65407	184946.63672	Fahrney Branch
75202	Erosion Site	4	3	2	379974.13414	184938.61295	Fahrney Branch
75203	Fish Barrier	4	4	1	379818.46280	184902.92357	Fahrney Branch

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
75204	Pipe Outfall	2	3	2	379811.16462	184900.77108	Fahrney Branch
75205	Erosion Site	5	5	1	379811.05571	184900.72797	Fahrney Branch
75206	Inadequate Buffer	4	1	2	379743.29231	184882.70596	Fahrney Branch
75207	Pipe Outfall	5	4	2	379660.69394	184867.40740	Fahrney Branch
75208	Erosion Site	1			379800.77226	184897.11208	Fahrney Branch
75209	Pipe Outfall	5	4	2	379690.64795	184858.65904	Fahrney Branch
77003	Representative Site				372895.57480	184155.90409	Fahrney Branch
78001	Fish Barrier	5	3	2	373713.88999	184059.68220	Fahrney Branch
78002	Erosion Site	1	4	2	373500.27179	183827.41973	Fahrney Branch
78003	Inadequate Buffer	2		2	373302.06143	183929.71592	Fahrney Branch
81101	Inadequate Buffer	5	2	2	380030.79942	184183.71283	Fahrney Branch
81102	Erosion Site	2	4	3	380110.40331	184197.44320	Fahrney Branch
83001	Fish Barrier	5	1	2	373263.48660	183943.19443	Fahrney Branch
83002	Fish Barrier	5	2	2	373191.19346	183958.07028	Fahrney Branch
83003	Representative Site				372716.69308	183743.25382	Fahrney Branch
85101	Erosion Site	4	5	4	379357.77177	183910.65231	Fahrney Branch
85102	Inadequate Buffer	1	2	2			Fahrney Branch
86101	Representative Site				379566.20595	183987.44670	Fahrney Branch
86102	Inadequate Buffer	3	1	3	379715.76551	183837.63014	Fahrney Branch
88001	Fish Barrier	5	2	3	372901.41091	183448.20113	Fahrney Branch
89001	Erosion Site	1	3	2	373413.88578	183320.53525	Fahrney Branch
89001	Unusual condition	2	5	3	373411.82360	183321.20050	Fahrney Branch
101101	Inadequate Buffer	2	5	3	380027.46917	203888.96956	Town Branch
101102	Trash Dumping	5	1	2	380185.56014	204505.17644	Town Branch
102101	Trash Dumping	5	2	3	378814.55682	204135.08490	Town Branch
102102	Fish Barrier	3	3	2	379150.98637	203764.86749	Town Branch
102103	Channel Alteratiom	5	3	2	379151.00521	203764.88004	Town Branch
102104	Channel Alteratiom	5	3	2	379562.16278	203995.75746	Town Branch
102105	Trash Dumping	5	1	2	379565.38504	203982.87990	Town Branch
103101	Channel Alteratiom	5	3	2	380068.20943	203974.48849	Town Branch
103102	Channel Alteratiom	4	3	2	380063.36222	203959.40553	Town Branch
105101	Trash Dumping	5	1	3	378803.46670	203422.31134	Town Branch
105102	Inadequate Buffer	1	4	3	378995.28515	202985.94461	Town Branch
105103	Channel Alteratiom	5	3	3	378954.34286	203280.98736	Town Branch
105104	Channel Alteratiom	5	3	1	379301.19653	203504.52997	Town Branch
105105	Inadequate Buffer	1	5	2	379036.58746	203780.29668	Town Branch
105106	Channel Alteratiom	4	3	2	379243.32107	203607.46039	Town Branch
105107	Fish Barrier	3	4	2	379243.30528	203607.44251	Town Branch
105108	Channel Alteratiom	4	3	2	379176.18123	203679.40990	Town Branch
105109	Channel Alteratiom	5	2	2	379491.88459	203391.92288	Town Branch
105110	Inadequate Buffer	5	1	1	379361.19187	203457.54283	Town Branch
105111	Representative Site				379613.09323	203494.71196	Town Branch
106101	Erosion Site	2	3	3	379406.10753	203450.47359	Town Branch
106102	Inadequate Buffer	3	2	3	379810.30459	203233.63980	Town Branch
106103	Representative Site				379588.95163	203266.83978	Town Branch
108101	Channel Alteratiom	4	1	1	379063.78337	202766.47089	Town Branch
110101	Inadequate Buffer	1	2	1	377219.71102	202283.60707	Town Branch
110102	Pipe Outfall	3	3	1	377270.12366	202169.70687	Town Branch
110103	Fish Barrier	2	4	1	377336.72486	202116.81467	Town Branch
110104	Erosion Site	1	4	3	377371.17134	202084.55752	Town Branch
111101	Inadequate Buffer	3	3	1	378688.94414	202413.44112	Town Branch

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Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
111102	Erosion Site	3	4	3	378402.57736	202140.30920	Town Branch
112101	Inadequate Buffer	2	2	1	378962.49257	202011.49343	Town Branch
112102	Pipe Outfall	4	3	1	378941.77447	202047.51159	Town Branch
112103	Erosion Site	2	3	1	379183.10083	202335.44007	Town Branch
112104	Representative Site				379195.62716	202332.44479	Town Branch
112105	Inadequate Buffer	1	2	1	379373.47557	202663.05299	Town Branch
114101	Fish Barrier	5	2	1	377382.14035	202021.44730	Town Branch
114102	Fish Barrier	5	2	1	377418.52698	201658.17578	Town Branch
114103	Representative Site				377436.74449	201610.33675	Town Branch
114104	Inadequate Buffer	1	5	3	378086.88217	201170.33013	Town Branch
115101	Inadequate Buffer	1	3	1	378704.64558	201596.01972	Town Branch
115102	Pipe Outfall	4	3	1	378521.82381	201800.12855	Town Branch
115103	Pipe Outfall	3	3	1	378540.82979	201759.12940	Town Branch
115104	Comment				378529.31609	201777.28136	Town Branch
115105	Channel Alteratiom	5	2	1	378622.23138	201680.86092	Town Branch
116101	Comment				378873.52505	201492.08065	Town Branch
116102	Trash Dumping	4	2	3	378990.90610	201616.64279	Town Branch
116103	Comment				379003.05191	201638.98855	Town Branch
116104	Inadequate Buffer	1	2	1	379043.26050	201807.25560	Town Branch
116105	Channel Alteratiom	3	4	1	379032.32077	201757.32666	Town Branch
116106	Comment				379060.46775	201871.92111	Town Branch
116107	Channel Alteratiom	5	3	1	379088.83736	201980.75234	Town Branch
116108	Pipe Outfall	4	3	1	379023.67966	201976.76625	Town Branch
116109	Channel Alteratiom	3	3	1	378983.70281	201974.32787	Town Branch
116110	Pipe Outfall	4	2	1	378964.78402	201980.53404	Town Branch
117101	Pipe Outfall	5	2	1	379849.46623	201956.87200	Town Branch
117102	Pipe Outfall	5	2	2	379849.11187	201941.82634	Town Branch
117103	Pipe Outfall	5	2	2	379848.74194	201931.60495	Town Branch
117104	Pipe Outfall	5	4	1	379823.53714	201884.17480	Town Branch
117105	Channel Alteratiom	4	5	1	379820.62532	201880.79714	Town Branch
117106	Pipe Outfall	5	4	1	379760.05434	201806.90185	Town Branch
117107	Pipe Outfall	5	4	1	379774.57103	201798.43358	Town Branch
117108	Inadequate Buffer	4	2	1	379783.63957	201842.20447	Town Branch
119101	Fish Barrier	3	5	1	377895.03296	201348.11271	Town Branch
119102	Erosion Site	2	3	2	378095.94314	201164.65486	Town Branch
119103	Pipe Outfall	3	4	2	378121.64985	201131.07504	Town Branch
120101	Representative Site				379212.28475	201127.49961	Town Branch
120102	Erosion Site	2	4	3	378987.96996	201666.41995	Town Branch
120103	Inadequate Buffer	1	3	1	378901.40763	201174.28048	Town Branch
123101	Representative Site				378424.04271	200721.25964	Town Branch
126101	Inadequate Buffer	2	2	3	378583.00159	199471.37774	Town Branch
126102	Erosion Site	2	3	2	378514.08071	199882.36630	Town Branch
126103	Inadequate Buffer	3	3	1	378231.55788	200065.70455	Town Branch
126104	Inadequate Buffer	2	5	3	378178.41714	199139.35197	Town Branch
126105	Channel Alteratiom	5	3	3	377994.33914	199830.71509	Town Branch
126106	Erosion Site	2	4	4	377984.43978	199826.61463	Town Branch
129101	Channel Alteratiom	4	3	1	378659.72938	199455.34323	Town Branch
129102	Channel Alteratiom	5	3	3	378049.02651	199424.95855	Town Branch
129103	Representative Site				378069.04661	199671.76087	Town Branch
130101	Inadequate Buffer	1	3	1	378885.93058	199625.20650	Town Branch
131101	Channel Alteratiom	5	3	1	378677.65257	198731.51231	Town Branch

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Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
131102	Inadequate Buffer	2	5	1	378489.40182	198778.93021	Town Branch
131103	Inadequate Buffer	1	3	1	378041.02590	199025.41631	Town Branch
132101	Inadequate Buffer	1	3	2	378069.03665	198571.89037	Town Branch
132102	Erosion Site	3	4	4	377845.06059	198377.07104	Town Branch
132103	Inadequate Buffer	1	2	3	377860.78213	198314.61034	Town Branch
204201	Erosion Site	2	4	4	387685.23148	199296.97370	Talbot Branch
207901	Inadequate Buffer	1	3	3	383682.60942	198809.51998	Talbot Branch
207902	Unusual condition	2	5	3	383497.23185	198837.38744	Talbot Branch
207903	Erosion Site	2	3	3	384200.75171	198795.20861	Talbot Branch
207904	Representative Site				383786.05832	198792.46683	Talbot Branch
208901	Inadequate Buffer	3	3	2	384888.59477	198874.81265	Talbot Branch
209901	Inadequate Buffer	1	3	3	385271.24486	198729.56716	Talbot Branch
212101	Erosion Site	1	3	5	388521.50663	198795.20861	Talbot Branch
213101	Erosion Site	1	3	4	389134.77507	199018.21532	Talbot Branch
217101	Fish Barrier	4	1	3	386181.33697	198470.05089	Talbot Branch
218101	Channel Alteratiom	5	5	1	387621.07882	198365.60394	Talbot Branch
218102	Inadequate Buffer	1	3	1	387571.48726	198353.13535	Talbot Branch
218103	Channel Alteratiom	5	3	1	387389.74615	198393.65820	Talbot Branch
218104	Channel Alteratiom	4	3	1	387346.23839	198336.48029	Talbot Branch
218105	Channel Alteratiom	4	3	1	387312.95013	198340.72250	Talbot Branch
218106	Channel Alteratiom	5	3	1	387313.48575	198390.79487	Talbot Branch
218107	Pipe Outfall	3	1	1	387287.93787	198335.90670	Talbot Branch
219101	Channel Alteratiom	5	5	1	388113.84117	198260.18641	Talbot Branch
219102	Channel Alteratiom	5	5	1	388377.83446	198041.58337	Talbot Branch
219103	Pipe Outfall	3	3	1	388415.47281	198044.40658	Talbot Branch
219104	Representative Site				388512.95859	198055.42366	Talbot Branch
219105	Pipe Outfall	5	2	1	387948.50967	198357.02938	Talbot Branch
219106	Channel Alteratiom	5	4	1	387912.70996	198377.31593	Talbot Branch
219107	Pipe Outfall	5	4	1	387912.70677	198377.31280	Talbot Branch
220101	Fish Barrier	5	2	3	388597.62458	198095.48793	Talbot Branch
223101	Trash Dumping	4	4	5	385944.06494	197764.33813	Talbot Branch
224201	Inadequate Buffer	1	3	1	387071.96292	197611.92824	Talbot Branch
224202	Inadequate Buffer	4	3	3	387412.45249	197564.12165	Talbot Branch
226101	Channel Alteratiom	5	5	1	389056.36870	197471.06714	Talbot Branch
226102	Inadequate Buffer	3	4	1	388629.21277	197691.07818	Talbot Branch
226103	Pipe Outfall	4	3	1	388831.11713	197584.75466	Talbot Branch
226104	Pipe Outfall	4	3	1	388692.74388	197663.63809	Talbot Branch
228201	Inadequate Buffer	3	3	4	387808.39441	197341.04089	Talbot Branch
300101	Fish Barrier	5	4	4	382662.98576	195761.64536	Woodville Branch
301201	Pipe Outfall	3	4	4	382024.42348	195341.81369	Woodville Branch
301202	Erosion Site	1	5	5	382329.03783	195600.73558	Woodville Branch
302102	Inadequate Buffer	4	2	3	382717.07722	195225.29361	Woodville Branch
302103	Channel Alteratiom	5	1	4	382688.26060	195344.78542	Talbot Branch
302104	Fish Barrier	5	3	4	382697.51972	195626.99009	Woodville Branch
302105	Fish Barrier	5	3	4	382691.35665	195670.13157	Woodville Branch
303201	Inadequate Buffer	1	3	3	381939.54862	195118.71113	Woodville Branch
303202	Erosion Site	2	3	2	381931.92483	195097.46347	Woodville Branch
306104	Erosion Site	2	3	2	383061.94193	194272.36905	Woodville Branch
306105	Inadequate Buffer	3	3	3	383066.06465	194271.45219	Woodville Branch
306106	Representative Site				383028.48534	194358.98902	Woodville Branch
306107	Pipe Outfall	3	3	3	382775.50578	194431.69875	Woodville Branch

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Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
306108	Fish Barrier	5	2	3	382740.01822	194491.89706	Woodville Branch
306109	Unusual condition	4	2	4	382735.87413	194543.53890	Woodville Branch
306201	Fish Barrier	5	5	1	383056.04778	194212.40404	Woodville Branch
306202	Erosion Site	2	4	3	384178.24360	193746.00044	Woodville Branch
306203	Inadequate Buffer	3	3	3	383056.09025	194212.56324	Woodville Branch
307201	Representative Site				383248.57060	194238.97221	Woodville Branch
307202	Inadequate Buffer	1	3	3	383957.48228	194053.41594	Woodville Branch
307203	Pipe Outfall	4	1	1	383901.85514	194074.77936	Woodville Branch
309201	Inadequate Buffer	4	5	1	382759.18220	193752.48266	Woodville Branch
309202	Erosion Site	5	1	1	382819.30703	193798.78908	Woodville Branch
309203	Fish Barrier	5	5	1	382853.99834	193870.79880	Woodville Branch
309204	Inadequate Buffer	3	3	1	382855.53413	193886.15667	Woodville Branch
309205	Erosion Site	3	3	3	383179.80020	193662.85867	Woodville Branch
309206	Inadequate Buffer	4	5	3	383200.95387	193679.36183	Woodville Branch
310101	Fish Barrier	3	3	4	383367.45882	193550.80112	Woodville Branch
310102	Representative Site				383285.41092	193726.19478	Woodville Branch
310103	Fish Barrier	5	3	4	383261.55870	193991.96819	Woodville Branch
310201	Representative Site				384012.92001	194000.73181	Woodville Branch
311101	Comment				384571.53914	194043.25282	Woodville Branch
311102	Erosion Site	4	2	3	384549.66269	194041.55098	Woodville Branch
311104	Representative Site				384394.40398	193947.79702	Woodville Branch
311105	Representative Site				384191.64814	193736.47809	Woodville Branch
311106	Erosion Site	2	3	4	384583.70876	193538.30060	Woodville Branch
311107	Inadequate Buffer	1	3	3	384635.43077	193513.91229	Woodville Branch
312201	Inadequate Buffer	3	1	2	385534.70672	193654.26715	Woodville Branch
312202	Exposed Pipe	5	1	2	385328.99473	193573.96368	Woodville Branch
312203	Fish Barrier	4	1	2	385312.25890	193566.66077	Woodville Branch
312204	Fish Barrier	5	1	2	385290.35017	193555.09783	Woodville Branch
312205	Erosion Site	1	4	2	385269.73616	193539.04709	Woodville Branch
314101	Inadequate Buffer	5	3	3	383585.72903	193172.34415	Woodville Branch
314102	Fish Barrier	2	2	3	383581.32971	193176.42300	Woodville Branch
314103	Erosion Site	1	5	4	383338.98459	192683.38739	Woodville Branch
314104	Representative Site				383410.59935	193220.30268	Woodville Branch
314105	Unusual condition	4	2	3	383325.69415	193023.34950	Woodville Branch
314106	Inadequate Buffer	5	3	4	383320.99133	192948.27736	Woodville Branch
314107	Inadequate Buffer	5	2	4	383450.46625	193278.00917	Woodville Branch
315201	Representative Site				384903.85146	193389.75278	Woodville Branch
315202	Erosion Site	4	4	3	384829.07591	193312.17499	Woodville Branch
315203	Inadequate Buffer	4	5	1	384876.43233	193113.61045	Woodville Branch
315204	Trash Dumping	4	2	1	384882.01344	193078.86979	Woodville Branch
316201	Fish Barrier	5	2	2	385103.57583	193433.74801	Woodville Branch
317101	Erosion Site	4	3	3	384062.13356	192676.33342	Woodville Branch
317102	Inadequate Buffer	4	3	3	384042.92109	192725.83038	Woodville Branch
317103	Pipe Outfall	4	2	2	383965.10677	192815.25427	Woodville Branch
317104	Inadequate Buffer	1	2	3	383310.35984	192756.72473	Woodville Branch
317105	Trash Dumping	3	3	2	383316.98852	192714.44721	Woodville Branch
317106	Pipe Outfall	2	3	1	383333.57263	192687.04737	Woodville Branch
317107	Channel Alteratiom	3	5	1	383348.52668	192676.53076	Talbot Branch
318101	Inadequate Buffer	2	3	2	384464.92627	192568.59323	Woodville Branch
318102	Erosion Site	5	3	3	384172.00390	192690.99424	Woodville Branch
319110	Inadequate Buffer	5	3	2	385368.16060	192407.79284	Woodville Branch

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Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
319111	Erosion Site	2	3	4	385332.86345	191813.47511	Woodville Branch
319201	Comment				385302.00764	192558.60778	Woodville Branch
319201	Fish Barrier	4	5	1	385302.01445	192558.60778	Woodville Branch
319202	Inadequate Buffer	1	2	1	386745.67751	191261.45268	Woodville Branch
319203	Erosion Site	2	5	1	386745.68934	191261.42902	Woodville Branch
319205	Representative Site				385169.42344	192838.69541	Woodville Branch
319206	Pipe Outfall	5	1	1	385213.79829	192799.93116	Woodville Branch
319207	Trash Dumping	4	1	1	385240.00161	192783.71447	Woodville Branch
319208	Pipe Outfall	4	1	1	385263.79621	192762.08302	Woodville Branch
319209	Pipe Outfall	5	1	1	385299.15702	192664.27650	Woodville Branch
321101	Representative Site				385366.91374	192136.61624	Woodville Branch
321102	Inadequate Buffer	2	3	4	385168.55337	191668.06188	Woodville Branch
322201	Fish Barrier	3	5	1	386005.29734	192237.40412	Woodville Branch
322202	Fish Barrier	5	1	1	386086.44744	192188.81742	Woodville Branch
322203	Fish Barrier	5	5	1	386096.65791	192185.41393	Woodville Branch
322204	Pipe Outfall	4	1	1	386176.12473	192125.48454	Woodville Branch
322205	Fish Barrier	3	5	1	386280.87173	192017.36668	Woodville Branch
322206	Inadequate Buffer	1	2	2	386816.00764	191859.20778	Woodville Branch
322207	Erosion Site	2	2	2	386815.93011	191859.14680	Woodville Branch
324101	Erosion Site	2			384835.62956	191140.26196	Woodville Branch
324201	Inadequate Buffer	3	4	5	385582.78984	191477.91311	Woodville Branch
324202	Channel Alteratiom	5	2	4	385590.95907	191469.52309	Talbot Branch
324203	Erosion Site	4	3	3	385223.42827	191144.60261	Woodville Branch
325201	Fish Barrier	3	5	1	386510.11717	191739.26464	Woodville Branch
327101	Erosion Site	5	1	2	385808.13807	190726.42543	Woodville Branch
327102	Inadequate Buffer	3	2	1	385808.14427	190726.21775	Woodville Branch
327103	Fish Barrier	4	2	1	385835.99991	190744.98847	Woodville Branch
327201	Fish Barrier	2	2	3	385865.02135	190712.91213	Woodville Branch
327202	Erosion Site	2	4	3	385828.74455	190751.09825	Woodville Branch
327203	Inadequate Buffer	5	2	4	385788.44075	190979.22653	Woodville Branch
327204	Representative Site				385781.74965	191014.83280	Woodville Branch
327205	Fish Barrier	3	1	3	385231.16440	191082.63433	Woodville Branch
327206	Inadequate Buffer	1	2	1	385037.34665	190746.72058	Woodville Branch
328201	Comment				385947.30697	190709.91673	Woodville Branch
330101	Fish Barrier	3	4	2	385635.81594	190614.68649	Woodville Branch
330102	Erosion Site	4	3	2	385520.32572	190589.34210	Woodville Branch
330103	Inadequate Buffer	2	3	2	385751.92749	190202.71240	Woodville Branch
330104	Trash Dumping	4	1	1	385826.01669	190487.18118	Woodville Branch
330105	Fish Barrier	3	5	1	385752.76319	190193.76122	Woodville Branch
330105	Pipe Outfall	5	2	1	385752.76178	190193.77430	Woodville Branch
331201	Pipe Outfall	4	3	1	386543.49015	190270.90212	Woodville Branch
331202	Erosion Site	2	4	2	386543.80362	190270.94640	Woodville Branch
331203	Fish Barrier	3	2	3	386434.38136	190495.88706	Woodville Branch
331204	Inadequate Buffer	2	5	3	386422.65486	190509.46224	Woodville Branch
331205	Fish Barrier	3	2	3	386399.96417	190534.12838	Woodville Branch
331206	Fish Barrier	3	2	3	386373.05184	190560.70610	Woodville Branch
331207	Representative Site				386281.70446	190626.22914	Woodville Branch
332101	Fish Barrier	3	5	1	385373.60522	189930.50855	Woodville Branch
332102	Inadequate Buffer	5	1	2	385405.35891	190004.31536	Woodville Branch
332103	Fish Barrier	5	5	2	385418.05592	190021.95109	Woodville Branch
332104	Trash Dumping	3	1	2	385480.31172	190076.24435	Woodville Branch

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
332105	Inadequate Buffer	4	2	2	385831.02891	189943.01448	Woodville Branch
332106	Fish Barrier	5	1	2	385863.81582	189803.29235	Woodville Branch
332107	Erosion Site	4	2	3	385868.22416	189754.82177	Woodville Branch
332108	Erosion Site	3	5	3	385867.45851	189625.42715	Woodville Branch

Appendix B

Listing of sites by problem category

Appendix B - Bennett Creek Inadequate Buffers

Problem	Site	Date	Sub-shed	Inadequate	Unshaded	Width left	Width right	Length left	Length right	Land use left	Land use right	Recently established	Livestock?	Severity	Correctability	Access	Wetland potential
Inadequate Buffer	1101	7/14/2003	NB	Both	Both	0	0	3200	3200	Lawn	Lawn			1	2	1	2
Inadequate Buffer	2101	7/14/2003	NB	Both	Both	0	0	3800	3800	GC	GC			1	1	1	2
Inadequate Buffer	10304	9/5/2003	UB	Both	Neither	0	10	700	800	Pasture	Pasture		Horses	1	1	2	4
Inadequate Buffer	12301	9/5/2003	UB	Both	Neither	0	0	1300	1300	Lawn	Lawn	Yes		1			
Inadequate Buffer	13301	9/5/2003	UB	Both	Left	0	20	1700	1700	Pasture	Pasture		Cattle	1	1	3	3
Inadequate Buffer	13302	9/5/2003	UB	Both	Both	10	0	500	500	Pasture	Pasture		Cattle	1	1	3	4
Inadequate Buffer	30302	8/28/2003	FB	Both	Both	0	0	1400	1400	Pasture	Pasture			1	3	2	2
Inadequate Buffer	34001	7/30/2003	PB	Both	Neither	10	10	1700	1700	Pasture	Pasture		Horses	1	1	3	5
Inadequate Buffer	35001	7/30/2003	PB	Both	Both	0	0	1500	1000	Lawn	Lawn			1	1	2	3
Inadequate Buffer	40004	7/30/2003	PB	Right	Neither		20		1300	Pasture	Forest		Horses	1	1	3	4
Inadequate Buffer	43003	7/30/2003	PB	Both	Both	0	0	450	450	Pasture	Pasture		Cattle	1	2	2	4
Inadequate Buffer	51302	8/14/2003	FB	Both	Both	0	0	1000	2500	Crop field	Crop field	Yes	Cattle	1	1	2	3
Inadequate Buffer	53301	8/14/2003	FB	Both	Both	0	0	2000	2000	Crop field	Crop field		Cattle	1	2	3	5
Inadequate Buffer	56304	8/28/2003	FB	Both	Both	0	0	4150	4150	Pasture	Pasture		Cattle	1	2	3	3
Inadequate Buffer	58202	8/7/2003	FB	Both	Both	0	0	1800	1800	Pasture	Pasture		Cattle	1	2	2	2
Inadequate Buffer	62301	8/28/2003	FB	Both	Neither	5	5	3200	2900	Pasture	Pasture		Cattle	1	2	3	4
Inadequate Buffer	66203	8/6/2003	FB	Left		0	0	2300	1800	Lawn	Pasture		Horses	1	1	3	3
Inadequate Buffer	66209	8/7/2003	FB	Left	Left	5		350		Lawn	Forest		Cattle	1	1	3	4
Inadequate Buffer	69004	8/6/2003	FB	Both	Both	0	0	5300	4200	Shrubs &small trees	Shrubs & small trees	Yes		1	2	4	3
Inadequate Buffer	70301	9/4/2003	FB	Both	Both	0	0	1100	1100	Powerlines	Powerlines			1	5	3	4
Inadequate Buffer	70302	9/4/2003	FB	Both	Both	0	0	1350	1350	Pasture	Pasture		Cattle	1	2	2	2
Inadequate Buffer	74203	8/4/2003	FB	Both	Both	0	0	200	200	Pasture	Pasture		Horses	1	1	3	3
Inadequate Buffer	85102	7/31/2003	FB	Both	Both	0	0	900	1200	Fallow ag. Land	Fallow ag. Land			1	2	2	1
Inadequate Buffer	10301	9/5/2003	UB	Both	Both	5	5	1100	1100	Crop field	Pasture			2	1	2	1
Inadequate Buffer	23101	7/22/2003	BB	Both	Neither	5	5	1250	1250	Paved	Paved			2	5	1	5
Inadequate Buffer	51301	8/14/2003	FB	Both	Both	5	5	1100	1100	Lawn	Lawn	Yes		2	1	2	3
Inadequate Buffer	52301	8/20/2003	FB	Both	Neither	5	5	3200	3200	Crop field	Crop field			2	3	2	3
Inadequate Buffer	58301	8/20/2003	FB	Both	Both	5	5	2000	2000	Crop field	Crop field			2	1	2	2
Inadequate Buffer	62303	9/4/2003	FB	Both	Both	10	10	1200	1200	Crop field	Crop field			2	3	3	2
Inadequate Buffer	74204	8/4/2003	FB	Right		15	15	2000	2000	Lawn	Lawn			2	2	2	3
Inadequate Buffer	78003	8/6/2003	FB	Both		0	10	3000	3000	Crop field	Crop field	Yes		2		2	4
Inadequate Buffer	7104	7/14/2003	NB	Left	Left	0		900		Pasture	Forest			3	2	4	1
Inadequate Buffer	32101	7/24/2003	PB	Left	Neither	0		500		Lawn	Shrubs & small trees			3	1	3	1
Inadequate Buffer	35101	7/30/2003	PB	Both	Left	0	5	950	850	Lawn	Crop field			3	1	2	1
Inadequate Buffer	58201	8/7/2003	FB	Both	Both	0	0	150	400	Lawn	Lawn			3	1	2	3
Inadequate Buffer	66101	8/1/2003	FB	Both	Both	0	0	600	600	Lawn	Lawn			3	2	4	3
Inadequate Buffer	72301	8/14/2003	FB	Left	Neither		5		1450		Pasture	Yes		3			
Inadequate Buffer	73201	8/6/2003	FB	Both	Both	5	5	1100	900	CREP	CREP	Yes		3	1	2	3
Inadequate Buffer	86102	7/31/2003	FB	Left	Both	15		800		Crop field	Wetland			3	1	3	2
Inadequate Buffer	13305	9/5/2003	UB	Both	Both	10	0	400	400	Pasture	Lawn			4		2	4
Inadequate Buffer	17301	9/9/2003	UB	Both	Both	0	0	250	250	Powerlines	Powerlines			4	5	3	4
Inadequate Buffer	17302	9/9/2003	UB	Both	Both	0	0	300	300	Powerlines	Powerlines			4	5	3	4
Inadequate Buffer	24101	7/22/2003	BB	Both	Neither	5	5	600	800	Pasture	Pasture			4	3	1	5
Inadequate Buffer	30301	8/28/2003	FB	Both	Neither	10	10	650	650	Shrubs &small trees	Shrubs & small trees			4	1	2	2
Inadequate Buffer	32103	7/24/2003	PB	Right	Right		5		600	Forest	Lawn			4	2	3	1
Inadequate Buffer	37004		PB	Both	Both	10	10	600	600	Lawn	Lawn			4	1	1	1
Inadequate Buffer	43002	7/30/2003	PB	Right	Right		20		850	Shrubs &small trees	Forest			4	1	3	4
Inadequate Buffer	75201	8/4/2003	FB	Both	Neither	2	2	400	500	Lawn	Lawn			4	1	2	2
Inadequate Buffer	75206	8/4/2003	FB	Right	Both		15		400	Shrubs &small trees	Park			4	1	2	3
Inadequate Buffer	15302	9/9/2003	UB	Both	Right	10	0	150	200	Lawn	Forest			5	1	4	3
Inadequate Buffer	23103	7/22/2003	BB	Left	Left	0		200		Lawn	Forest			5	1	2	5
Inadequate Buffer	32107	7/24/2003	PB	Left	Left	0		300		Lawn	Forest			5	2	3	1
Inadequate Buffer	38104	7/30/2003	PB	Left	Neither	15		275		Ballfield				5	1	3	3
Inadequate Buffer	39102	7/30/2003	PB	Both	Both	2	2	150	150	Lawn	Lawn			5	1	2	1
Inadequate Buffer	66202	8/6/2003	FB	Both	Neither	20	3	250	250	Pasture	Lawn			5	1	3	3
Inadequate Buffer	81101	7/31/2003	FB	Left	Left	0		350		Lawn	Forest			5	2	2	3

Appendix B - Upper Linganore Inadequate Buffers

Problem	Site	Date	Sub-shed	Inadequate	Unshaded	Width left	Width right	Length left	Length right	Land use left	Land use right	Recently established	Livestock?	Severity	Correctability	Access	Wetland potential
Inadequate Buffer	105102	3/13/2003	TO	Both	Both	0	0	2900	2900	Crop field	Pasture		Cattle	1	4	3	2
Inadequate Buffer	105105	3/13/2003	TO	Both	Both	0	0	2200	3200	Crop field	Crop field			1	5	2	2
Inadequate Buffer	110101	3/18/2003	TO	Both	Both	0	0	1500	1500	Lawn	Lawn			1	2	1	2
Inadequate Buffer	112105	3/14/2003	TO	Both	Both	0	0	2500	2500	Crop field	Crop field	Yes		1	2	1	1
Inadequate Buffer	114104	3/18/2003	TO	Right	Neither	0	20	5600	5600	Forest	Lawn			1	5	3	5
Inadequate Buffer	115101	3/17/2003	TO	Both	Both	0	0	2200	2200	Lawn	Paved			1	3	1	2
Inadequate Buffer	116104	3/17/2003	TO	Both	Both	0	0	1100	1100	Pasture	Lawn			1	2	1	3
Inadequate Buffer	120103	3/1/2003	TO	Both	Both	0	0	1000	400	Pasture	Pasture		Cattle	1	3	1	5
Inadequate Buffer	130101	3/18/2003	TO	Both	Both	0	0	4100	4100	Pasture	Pasture		Cattle	1	3	1	3
Inadequate Buffer	131103	3/18/2003	TO	Both	Both	0	0	1650	1650	Pasture	Pasture		Cattle	1	3	1	3
Inadequate Buffer	132101	3/19/2003	TO	Both	Both	0	0	600	600	Pasture	Pasture		Cattle	1	3	2	3
Inadequate Buffer	132103	3/19/2003	TO	Left	Left	0		700		Pasture	Forest		Cattle	1	2	3	2
Inadequate Buffer	207901	9/9/2003	TA	Both	Both	0	0	2000	2000	Pasture	Pasture		Cattle	1	3	3	3
Inadequate Buffer	209901	9/9/2003	TA	Both	Both	0	10	1600	1600	Pasture	Pasture			1	3	3	4
Inadequate Buffer	218102	6/10/2003	TA	Both	Both	0	0	1400	1400	Shrubs &small trees	Shrubs & small trees			1	3	1	2
Inadequate Buffer	224201	6/11/2003	TA	Both	Both	0	0	1200	1200	Pasture	Pasture		Cattle & Horses	1	3	1	2
Inadequate Buffer	303201	1/15/2003	WB	Both	Both	5	5	1400	1400	Pasture	Pasture		Cattle	1	3	3	3
Inadequate Buffer	307202	1/14/2003	WB	Both	Right	0	0	1500	1500	Paved	Shrubs & small trees			1	3	3	2
Inadequate Buffer	311107	1/13/2003	WB	Right	Neither		10		400	Forest	Pasture		Horses	1	3	3	3
Inadequate Buffer	317104	1/14/2003	WB	Left	Neither	20		200		Pasture	Forest		Cattle	1	2	3	4
Inadequate Buffer	319202	1/13/2003	WB	Both	Both	0	0	6870	6870	Pasture	Pasture		Cattle	1	2	1	2
Inadequate Buffer	322206	1/13/2003	WB	Both	Both	0	0	1950	1950	Pasture	Pasture		Cattle	1	2	2	4
Inadequate Buffer	327206	1/15/2003	WB	Both	Both	0	0	1300	1300	Pasture	Pasture		Horses	1	2	1	3
Inadequate Buffer	101101	3/17/2003	TO	Both	Both	10	10	5600	5600	Pasture	Pasture			2	5	3	1
Inadequate Buffer	112101	3/13/2003	TO	Both	Neither	5	10	1000	1000	CREP	CREP	Yes		2	2	1	5
Inadequate Buffer	126101	3/18/2003	TO	Both	Neither	5	10	5000	5000	Shrubs &small trees	Shrubs & small trees			2	2	3	3
Inadequate Buffer	126104	3/19/2003	TO	Both	Both	5	5	3100	6500	Crop field	Crop field			2	5	3	4
Inadequate Buffer	131102	3/18/2003	TO	Both	Left	0	25	1300	200	Paved	Crop field			2	5	1	5
Inadequate Buffer	318101	1/14/2003	WB	Right	Neither		15		1050	Lawn	Lawn			2	3	2	5
Inadequate Buffer	321102	1/15/2003	WB	Both	Both	10	10	1350	1350	Pasture	Pasture			2	3	4	2
Inadequate Buffer	330103	1/13/2003	WB	Both	Neither	10	10	1250	1250	Lawn	Lawn			2	3	2	2
Inadequate Buffer	331204	1/15/2003	WB	Both	Neither	7	10	2400	2400	Crop field	Crop field			2	5	3	3
Inadequate Buffer	106102	3/14/2003	TO	Both	Both	0	0	800	800	Crop field	Crop field			3	2	3	1
Inadequate Buffer	111101	3/13/2003	TO	Both	Both	0	0	550	500	Crop field	Crop field			3	3	1	1
Inadequate Buffer	126103	3/19/2003	TO	Left	Neither	10		2100		Pasture	Forest			3	3	1	2
Inadequate Buffer	208901	9/9/2003	TA	Right	Neither		0		800	Forest	Paved			3	3	2	4
Inadequate Buffer	226102	5/27/2003	TA	Right	Right		15		3000	Forest	Forest			3	4	1	4
Inadequate Buffer	228201	6/11/2003	TA	Both	Both	0	0	850	930	Pasture	Pasture			3	3	4	3
Inadequate Buffer	306105	1/15/2003	WB	Left	Left	15		2000		Pasture	Forest			3	3	3	1
Inadequate Buffer	306203	1/14/2003	WB	Both	Both	0	0	600	600	Pasture	Pasture			3	3	3	2
Inadequate Buffer	309204	1/14/2003	WB	Both	Both	0	0	950	950	Lawn	Shrubs & small trees			3	3	1	1

Appendix B - Upper Linganore Inadequate Buffers

Problem	Site	Date	Sub-shed	Inadequate	Unshaded	Width left	Width right	Length left	Length right	Land use left	Land use right	Recently established	Livestock?	Severity	Correctability	Access	Wetland potential
Inadequate Buffer	312201	1/13/2003	WB	Both	Both	0	0	50	700	Shrubs &small trees	Lawn			3	1	2	4
Inadequate Buffer	324201	1/15/2003	WB	Both	Neither	5	5	700	700	Crop field	Crop field			3	4	5	1
Inadequate Buffer	327102	1/15/2003	WB	Both	Neither	5	10	400	400	Lawn	Shrubs & small trees	Yes		3	2	1	3
Inadequate Buffer	117108	3/17/2003	TO	Both	Both	0	0	350	150	Lawn	Lawn			4	2	1	3
Inadequate Buffer	224202	6/11/2003	TA	Both	Neither	10	10	650	650	Shrubs &small trees	Shrubs & small trees			4	3	3	4
Inadequate Buffer	302102	1/15/2003	WB	Right	Right		5		500	Forest	Lawn			4	2	3	5
Inadequate Buffer	309201	1/14/2003	WB	Both	Both	0	0	150	150	Powerlines	Powerlines			4	5	1	4
Inadequate Buffer	309206	1/14/2003	WB	Both	Both	0	0	150	150	Powerlines	Powerlines			4	5	3	2
Inadequate Buffer	315203	1/13/2003	WB	Left	Neither	6		400		Paved	Forest			4	5	1	5
Inadequate Buffer	317102	1/14/2003	WB	Both	Neither	15	10	300	800	Lawn	Lawn			4	3	3	4
Inadequate Buffer	332105	1/13/2003	WB	Both	Neither	15	15	400	400	Shrubs &small trees	Shrubs & small trees			4	2	2	1
Inadequate Buffer	105110	3/14/2003	TO	Right	Neither		5		50	Forest	Crop field			5	1	1	1
Inadequate Buffer	314101	1/14/2003	WB	Left	Neither	10		300		Lawn	Forest			5	3	3	3
Inadequate Buffer	314106	1/14/2003	WB	Left	Neither	20		300		Lawn	Forest			5	3	4	5
Inadequate Buffer	314107	1/14/2003	WB	Right	Neither		15		200	Forest	Lawn			5	2	4	4
Inadequate Buffer	319110	1/15/2003	WB	Both	Both	10	10	300	300	Pasture	Pasture			5	3	2	1
Inadequate Buffer	327203	1/15/2003	WB	Left	Neither	10		65		Powerlines	Forest			5	2	4	2
Inadequate Buffer	332102	1/13/2003	WB	Left	Neither	15		150		Lawn	Shrubs & small trees			5	1	2	1

Appendix B - Bennett Creek Erosion Sites

Problem	Site	Date	Sub-shed	Type	Cause	Length (ft)	Height (ft)	Land use left	Land use right	Threat?	Describe	Severity	Correctability	Access
Erosion Site	5101	7/14/2003	NB	Widening	Land use change upstream	2700	4	Forest	Lawn			1	2	4
Erosion Site	10303	9/5/2003	UB	Widening	Inadequate buffer	3100	4	Pasture	Pasture			1	4	3
Erosion Site	13303	9/5/2003	UB	Widening	Land use change upstream	1200	4	Pasture	Pasture			1	3	2
Erosion Site	35003	7/30/2003	PB	Headcutting	Unknown	3200	5	Lawn	Lawn			1	4	3
Erosion Site	36002	7/30/2003	PB	Widening	Unknown	2500	4.5	Crop field	Forest			1	3	3
Erosion Site	40003	7/30/2003	PB	Widening	Unknown	2500	4.5	Pasture	Forest			1	3	3
Erosion Site	51303	8/14/2003	FB	Widening	Unknown	1300	4	Pasture	Pasture			1		3
Erosion Site	56303	8/14/2003	FB	Widening	Unknown	4800	4	Forest	Forest			1	5	4
Erosion Site	56305	8/28/2003	FB	Widening	Land use change upstream	6000	4	Pasture	Pasture			1	4	3
Erosion Site	57301	8/20/2003	FB	Widening	Land use change upstream	1100	4	Crop field	Crop field			1	4	3
Erosion Site	66206	8/7/2003	FB	Downcutting	Land use change upstream	1300	5	Shrubs & small trees	Forest			1	5	2
Erosion Site	69003	8/6/2003	FB	Widening	Unknown	5300	4	Shrubs & small trees	Shrubs & small trees			1	4	4
Erosion Site	75208	8/4/2003	FB	Widening	Bend at steep slope	1900	5	Forest	Forest			1		
Erosion Site	78002	8/6/2003	FB	Widening	B	2000	5	Pasture	Crop field			1	4	2
Erosion Site	89001	8/7/2003	FB	Widening	Unknown	2700	5	Forest	Shrubs & small trees			1	3	2
Erosion Site	7102	7/14/2003	NB	Widening	Bend at steep slope	1560	3	Forest	Forest			2	3	5
Erosion Site	7107	7/17/2003	NB	Widening	Bend at steep slope	4450	2.5	Forest	Forest			2	4	3
Erosion Site	12302	9/5/2003	UB	Widening	Land use change upstream	3100	3	Lawn	Lawn			2	5	4
Erosion Site	15301	9/9/2003	UB	Widening	Bend at steep slope	3300	3	Shrubs & small trees	Shrubs & small trees			2	4	4
Erosion Site	17304	9/9/2003	UB	Widening	Unknown	4500	3	Forest	Forest			2	5	4
Erosion Site	38102	7/30/2003	PB	Widening	Bend at steep slope	2200	3.5	Forest	Forest			2	5	4
Erosion Site	39101	7/30/2003	PB	Widening	Land use change upstream	1570	3	Shrubs & small trees	Shrubs & small trees			2	4	3
Erosion Site	62302	8/28/2003	FB	Widening	Unknown	3200	3	Pasture	Pasture			2	4	3
Erosion Site	64303	8/14/2003	FB	Widening	Unknown	1900	3	Forest	Pasture			2		
Erosion Site	66204	8/6/2003	FB	Widening	Inadequate buffer	2300	3.5	Lawn	Pasture			2	5	3
Erosion Site	67201	8/7/2003	FB	Widening	Bend at steep slope	2100		Forest	Forest			2		
Erosion Site	68202	8/6/2003	FB	Widening	Bend at steep slope	1900	3.5	Forest	Forest			2	5	4
Erosion Site	81102	7/31/2003	FB	Widening	Land use change upstream	1450	3	Lawn	Forest			2	4	3
Erosion Site	22101	7/22/2003	BB	Widening	Road crossing	50	2	Paved	Forest	Yes	Mt. Ephram Rd.	3	5	1
Erosion Site	22102	7/22/2003	BB	Widening	Bend at steep slope	900	3	Forest	Forest	Yes	Mt. Ephram Rd.	3	4	1
Erosion Site	23102	7/23/2003	BB	Widening	Road crossing	75	3	Paved	Forest	Yes	Stewart Hill Rd.	3	5	1
Erosion Site	32105	7/24/2003	PB	Downcutting	Bend at steep slope	510	5	Shrubs & small trees	Lawn			3	3	2
Erosion Site	32109	7/24/2003	PB	Widening	Land use change upstream	800	5	Shrubs & small trees	Forest			3	4	3
Erosion Site	37104	7/30/2003	PB	Downcutting	Below stormwater overflow	425	3	Shrubs & small trees	Shrubs & small trees			4	3	2
Erosion Site	37108	7/30/2003	PB	Widening	Bend at steep slope	725	3.5	Forest	Forest			4	4	2
Erosion Site	52302	8/20/2003	FB	Headcutting	Land use change upstream	125	4	Crop field	Crop field			4	3	3
Erosion Site	60202	8/6/2003	FB	Widening	Bend at steep slope	75	5	Forest	Forest			4	2	3
Erosion Site	60203	8/6/2003	FB	Headcutting	Below road crossing	200	6	Forest	Forest			4	4	3
Erosion Site	66201	8/6/2003	FB	Widening	Land use change upstream	400	3	Pasture	Lawn			4	3	3
Erosion Site	66207	8/7/2003	FB	Headcutting	Highly erodable material	60	15	Forest	Forest			4	5	3
Erosion Site	75202	8/4/2003	FB	Widening	Bend at steep slope	500	3	Shrubs & small trees	Forest			4	3	2
Erosion Site	85101	7/31/2003	FB	Widening	Bend at steep slope	300	3	Forest	Forest			4	5	4
Erosion Site	74202	8/4/2003	FB	Widening	Bend at steep slope	575		Forest	Forest			5		
Erosion Site	75205	8/4/2003	FB	Downcutting	Below road crossing	30	4	Shrubs & small trees	Shrubs & small trees			5	5	1

Appendix B - Upper Linganore Erosion Sites

Problem	Site	Date	Sub-shed	Type	Cause	Length (ft)	Height (ft)	Land use left	Land use right	Threat?	Describe	Severity	Correctability	Access
Erosion Site	110104	3/18/2003	TO	Headcutting	Below channelization	1930	4	Lawn	Forest			1	4	3
Erosion Site	212101	5/27/2003	TA	Widening	Bend at steep slope	1400	5	Forest	Forest			1	3	5
Erosion Site	213101	5/27/2003	TA	Widening	Bend at steep slope	1000	5	Forest	Forest			1	3	4
Erosion Site	301202	1/15/2003	WB	Widening	Bend at steep slope	1400	4	Forest	Forest			1	5	5
Erosion Site	312205	1/13/2003	WB	Widening	Unknown	1260	5	Forest	Forest			1	4	2
Erosion Site	314103	1/14/2003	WB	Downcutting	Bend at steep slope	2150	5	Forest	Forest			1	5	4
Erosion Site	106101	3/14/2003	TO	Downcutting	Land use change upstream	900	3	Forest	Forest			2	3	3
Erosion Site	112103	3/13/2003	TO	Downcutting	Below channelization	1115	3	Lawn	Lawn	Yes	Road Downstream	2	3	1
Erosion Site	119102	3/18/2003	TO	Widening	Livestock	3830	3	Pasture	Pasture			2	3	2
Erosion Site	120102	3/17/2003	TO	Widening	Unknown	2950	3	Pasture	Pasture			2	4	3
Erosion Site	126102	3/18/2003	TO	Widening	Unknown	4100	2	Lawn	Forest			2	3	2
Erosion Site	126106	3/19/2003	TO	Widening	Land use change upstream	3500	3	Forest	Pasture			2	4	4
Erosion Site	204201	5/27/2003	TA	Widening	Unknown	6000		Forest	Forest			2	4	4
Erosion Site	207903	9/9/2003	TA	Widening	Bend at steep slope	1800	3	Pasture	Pasture			2	3	3
Erosion Site	303202	1/15/2003	WB	Widening	Livestock	1200	3	Pasture	Pasture			2	3	2
Erosion Site	306104	1/15/2003	WB	Widening	Bend at steep slope	5320	3	Pasture	Forest			2	3	2
Erosion Site	306202	1/14/2003	WB	Widening	Unknown	4500	3	Pasture	Pasture			2	4	3
Erosion Site	311106	1/13/2003	WB	Widening	Bend at steep slope	1450	2.5	Forest	Forest			2	3	4
Erosion Site	319111	1/15/2003	WB	Widening	Bend at steep slope	2300	2	Pasture	Pasture			2	3	4
Erosion Site	319203	1/13/2003	WB	Widening	Unknown	6550	2	Lawn	Pasture			2	5	1
Erosion Site	322207	1/13/2003	WB	Widening	Livestock	1950	3	Pasture	Pasture			2	2	2
Erosion Site	324101	1/15/2003	WB	Widening	Unknown	2850		Pasture	Pasture			2		
Erosion Site	327202	1/15/2003	WB	Downcutting	Land use change upstream	3650	3	Forest	Forest			2	4	3
Erosion Site	331202	1/15/2003	WB	Downcutting	Land use change upstream	1775	3	Forest	Shrubs & small trees			2	4	2
Erosion Site	111102	3/17/2003	TO	Headcutting	Unknown	850	5	Forest	Forest			3	4	3
Erosion Site	132102	3/19/2003	TO	Widening	Bend at steep slope	710	4	Pasture	Forest			3	4	4
Erosion Site	309205	1/14/2003	WB	Headcutting	Unknown	720	5	Forest	Forest			3	3	3
Erosion Site	332108	1/13/2003	WB	Headcutting	Unknown	25	30	Shrubs & small trees	Shrubs & small trees	Yes	Railroad Tracks	3	5	3
Erosion Site	311102	1/3/2003	WB	Widening	Bend at steep slope	450	3	Forest	Forest			4	2	3
Erosion Site	315202	1/13/2003	WB	Widening	Unknown	500	3	Forest	Forest			4	4	3
Erosion Site	317101	1/14/2003	WB	Downcutting	Bend at steep slope	730	3.5	Forest	Forest			4	3	3
Erosion Site	324203	1/15/2003	WB	Downcutting	Bend at steep slope	750	3	Forest	Forest			4	3	3
Erosion Site	330102	1/13/2003	WB	Downcutting	Land use change upstream	650	3	Shrubs & small trees	Shrubs & small trees			4	3	2
Erosion Site	332107	1/13/2003	WB	Widening	Bend at steep slope	420	3	Shrubs & small trees	Shrubs & small trees			4	2	3
Erosion Site	309202	1/14/2003	WB	Widening	Unknown	230	3	Lawn	Pasture			5	1	1
Erosion Site	318102	1/14/2003	WB	Widening	Land use change upstream	200	3	Shrubs & small trees	Forest			5	3	3
Erosion Site	327101	1/13/2003	WB	Widening	Bend at steep slope	150	2	Lawn	Pasture			5	1	2

Appendix B - Bennett Creek Fish Barriers

Problem	Site	Date	Sub-shed	Blockage	Type	Because	Drop (in)		Depth (in)	Severity	Correctability	Access
Fish Barrier	37006	7/31/2003	PB	Total	Road crossing	Too high	40		3	3	1	
Fish Barrier	12303	9/5/2003	UB	Total	Instream pond	Too high	12		4	4	3	
Fish Barrier	28102	7/22/2003	BB	Total	Road crossing	Too high	12		4	5	1	
Fish Barrier	32108	7/25/2003	PB	Total	Instream pond	Too high	36		4	5	3	
Fish Barrier	37107	7/30/2003	PB	Total	Instream pond	Too high	36		4	5	1	
Fish Barrier	40001	7/30/2003	PB	Total	Road crossing	Too high	6		4	5	2	
Fish Barrier	75203	8/4/2003	FB	Total	Road crossing	Too high	36		4	4	1	
Fish Barrier	7103	7/14/2003	NB	Total	Road crossing	Too high	24		5	4	4	
Fish Barrier	7106	7/14/2003	NB	Total	Road crossing	Too high	36		5	4	2	
Fish Barrier	28103	7/22/2003	BB	Total	Road crossing	Too high	8		5	5	1	
Fish Barrier	35002	7/30/2003	PB	Total	Headcutting at tree roots	Too high	30		5	2	2	
Fish Barrier	36003	7/30/2003	PB	Partial	Rocks across stream	Too high	12		5	1	3	
Fish Barrier	37002	7/30/2003	PB	Partial	Road crossing	Too high	5		5	3	2	
Fish Barrier	37106	7/30/2003	PB	Tempoorary	Natural Falls	Too high	36		5	3	3	
Fish Barrier	38103	7/30/2003	PB	Tempoorary	Natural Falls	Too high	30		5	2	4	
Fish Barrier	69001	8/6/2003	FB	Tempoorary	Natural Falls	Too high	36		5	3	2	
Fish Barrier	78001	8/6/2003	FB	Total	Road crossing	Too high	50		5	3	2	
Fish Barrier	83001	8/6/2003	FB	Partial	Natural Falls	Too high	10		5	1	2	
Fish Barrier	83002	8/6/2003	FB	Total	Erosion	Too high	36		5	2	2	
Fish Barrier	88001	8/7/2003	FB	Partial	Natural Falls	Too high	12		5	2	3	

Appendix B - Upper Linganore Fish Barriers

Problem	Site	Date	Sub-shed	Blockage	Type	Because	Drop (in)		Depth (in)	Severity	Correctability	Access
Fish Barrier	110103	3/18/2003	TO	Total	Channelized	Too high	36		2	4	1	
Fish Barrier	314102	1/14/2003	WB	Total	Dam	Too high	12		2	2	3	
Fish Barrier	327201	1/15/2003	WB	Total	Debris dam	Too high	30		2	2	3	
Fish Barrier	102102	3/13/2003	TO	Tempoorary	Channelized	Too high	24		3	3	2	
Fish Barrier	105107	3/13/2003	TO	Partial	Channelized	Too high	12		3	4	2	
Fish Barrier	119101	3/18/2003	TO	Total	Channelized	Too high	14		3	5	1	
Fish Barrier	310101	1/14/2003	WB	Total	Road crossing	Too high	20		3	3	4	
Fish Barrier	322201	1/13/2003	WB	Total	Road crossing	Too high	10		3	5	1	
Fish Barrier	322205	1/13/2003	WB	Total	Road crossing	Too high	9		3	5	1	
Fish Barrier	325201	1/13/2003	WB	Total	Road crossing	Too high	24		3	5	1	
Fish Barrier	327205	1/15/2003	WB	Partial	Dam	Too high	14		3	1	3	
Fish Barrier	330101	1/13/2003	WB	Total	Dam	Too high	10		3	4	2	
Fish Barrier	330105	1/13/2003	WB	Total	Road crossing	Too high	12		3	5	1	
Fish Barrier	331203	1/15/2003	WB	Tempoorary	Debris dam	Too high	12		3	2	3	
Fish Barrier	331205	1/15/2003	WB	Partial	Debris dam	Too high	20		3	2	3	
Fish Barrier	331206	1/15/2003	WB	Partial	Debris dam	Too high	15		3	2	3	
Fish Barrier	332101	1/13/2003	WB	Total	Dam	Too high	42		3	5	1	
Fish Barrier	217101	6/10/2003	TA	Tempoorary	Debris dam	Too high	12		4	1	3	
Fish Barrier	312203	1/13/2003	WB	Total	Fencing	Too high	12		4	1	2	
Fish Barrier	319201	1/13/2003	WB	Total	Road crossing	Too shallow		1	4	5	1	
Fish Barrier	327103	1/13/2003	WB	Tempoorary	Earth Mound	Too high	20		4	2	1	
Fish Barrier	114101	3/18/2003	TO	Tempoorary	Natural Falls	Too high	36		5	2	1	
Fish Barrier	114102	3/18/2003	TO	Tempoorary	Natural Falls	Too high	12		5	2	1	
Fish Barrier	220101	5/27/2003	TA	Tempoorary	Natural Falls	Too high	18		5	2	3	
Fish Barrier	300101	1/15/2003	WB	Tempoorary	Beaver Dam	Too high	36		5	4	4	
Fish Barrier	302104	1/15/2003	WB	Tempoorary	Beaver Dam	Too high	36		5	3	4	
Fish Barrier	302105	1/15/2003	WB	Tempoorary	Beaver Dam	Too high	36		5	3	4	
Fish Barrier	306108	1/15/2003	WB	Tempoorary	Natural Falls	Too high	10		5	2	3	
Fish Barrier	306201	1/14/2003	WB	Total	Instream pond	Too high	48		5	5	1	
Fish Barrier	309203	1/14/2003	WB	Total	Road crossing	Too high	24		5	5	1	
Fish Barrier	310103	1/14/2003	WB	Tempoorary	Natural Falls	Too high	20		5	3	4	
Fish Barrier	312204	1/13/2003	WB	Tempoorary	Natural Falls	Too high	7		5	1	2	
Fish Barrier	316201	1/13/2003	WB	Tempoorary	Natural Falls	Too high	12		5	2	2	
Fish Barrier	322202	1/13/2003	WB	Partial	Debris dam	Too high	7		5	1	1	
Fish Barrier	322203	1/13/2003	WB	Partial	Natural Falls	Too high	24		5	5	1	
Fish Barrier	332103	1/13/2003	WB	Total	Instream pond	Too high	60		5	5	2	
Fish Barrier	332106	1/13/2003	WB	Tempoorary	Debris dam	Too high	18		5	1	2	

Appendix B - Bennett Creek Pipe Outfalls

Problem	Site	Date	Sub-shed	Outfall	Type	Location	Diameter (in)	Channel width (ft)	Discharge?	Color	Odor	Severity	Correctability	Access
Pipe Outfall	75204	8/4/2003	FB	Road runoff	Plastic	Right bank	8	8	Yes	Orange	Musky	2	3	2
Pipe Outfall	32108	7/24/2003	PB	Pond overflow	Corrugated metal	Off the stream	12	2	Yes	Clear		3	5	3
Pipe Outfall	66208	8/7/2003	FB	Pond overflow	Corrugated metal	Off the stream	18	8	Yes	Clear		3	5	2
Pipe Outfall	38106	7/30/2003	PB	Stormwater	Concrete pipe	Right bank	24		Yes	Clear		4	5	1
Pipe Outfall	10302	9/5/2003	UB	Pond overflow	Plastic	Head of stream	6	1	Yes	Clear		5	5	2
Pipe Outfall	10305	9/5/2003	UB	Pond overflow	Plastic	Left bank	8		No			5	5	2
Pipe Outfall	11301	9/5/2003	UB	Stormwater	Concrete channel	Left bank		3	No			5	5	1
Pipe Outfall	32110	7/30/2003	PB	Stormwater	Corrugated metal	Off the stream	30	7	No			5	5	4
Pipe Outfall	37003	7/30/2003	PB	Stormwater	Rip-rap	Left bank		60	No			5	1	2
Pipe Outfall	37102	7/30/2003	PB	Stormwater	Rip-rap	Right bank		2	No			5	4	1
Pipe Outfall	37103	7/30/2003	PB	Stormwater	Rip-rap	Right bank		18	No			5	4	1
Pipe Outfall	38105	7/30/2003	PB	Stormwater	Rip-rap	Right bank		3	No			5	4	1
Pipe Outfall	69002	8/6/2003	FB	Agricultural	Corrugated metal	Right bank	24	0	Yes	Clear		5	1	2
Pipe Outfall	75207	8/4/2003	FB	Stormwater	Corrugated metal	Right bank	24	10	No			5	4	2
Pipe Outfall	75209	8/4/2003	FB	Stormwater	Rip-rap	Left bank	2	2	No			5	4	2

Appendix B - Upper Linganore Pipe Outfalls

Problem	Site	Date	Sub-shed	Outfall	Type	Location	Diameter (in)	Channel width (ft)	Discharge?	Color	Odor	Severity	Correctability	Access	
Pipe Outfall	75204	8/4/2003	FB	Road runoff	Plastic	Right bank	8	8	Yes	Orange	Musky	2	3	2	
Pipe Outfall	317106	1/14/2003	WB	Road runoff	Concrete channel	Head of stream	12	2	Yes	Medium brown	Musky	2	3	1	
Pipe Outfall	32108	7/24/2003	PB	Pond overflow	Corrugated metal	Off the stream	12	2	Yes	Clear		3	5	3	
Pipe Outfall	66208	8/7/2003	FB	Pond overflow	Corrugated metal	Off the stream	18	8	Yes	Clear		3	5	2	
Pipe Outfall	110102	3/18/2003	TO	Underground stream	Corrugated metal	Head of stream	12		Yes	Clear		3	3	1	
Pipe Outfall	115103	3/17/2003	TO	Unknown	Plastic	Left bank	2	2	Yes	Clear		3	3	1	
Pipe Outfall	119103	3/18/2003	TO	Unknown	Plastic	Right bank	2	3	Yes	Clear		3	4	2	
Pipe Outfall	218107	6/10/2003	TA	Pond overflow	Plastic	Left bank	6	3	Yes	Clear		3	1	1	
Pipe Outfall	219103	5/27/2003	TA	Unknown	Smooth metal pipe	Left bank	12		Yes	Clear		3	3	1	
Pipe Outfall	301201	1/15/2003	WB	Agricultural	Smooth metal pipe	Left bank	8	5	Yes	Clear		3	4	4	
Pipe Outfall	306107	1/15/2003	WB	Agricultural	Plastic	Left bank	8		Yes	Clear		3	3	3	
Pipe Outfall	38106	7/30/2003	PB	Stormwater	Concrete pipe	Right bank	24		Yes	Clear		4	5	1	
Pipe Outfall	112102	3/13/2003	TO	Overflow basement	Plastic	Left bank	3	24	No			4	3	1	
Pipe Outfall	115102	3/17/2003	TO	Unknown	Smooth metal pipe	Right bank	4	4	No			4	3	1	
Pipe Outfall	116108	3/13/2003	TO	Stormwater	Plastic	Left bank	4	24	Yes	Clear		4	3	1	
Pipe Outfall	116110		TO	Stormwater	Smooth metal pipe	Head of stream	7	5	Yes	Clear		4	2	1	
Pipe Outfall	226103	5/27/2003	TA	Stormwater	Corrugated metal	Right bank	18	10	Yes	Clear		4	3	1	
Pipe Outfall	226104	5/27/2003	TA	Stormwater	Corrugated metal	Right bank	12	10	Yes	Clear		4	3	1	
Pipe Outfall	307203	1/14/2003	WB	Stormwater	Corrugated metal	Right bank	12		Yes	Clear		4	1	1	
Pipe Outfall	317103	1/14/2003	WB	Stormwater	Plastic	Head of stream	5	4	Yes	Clear		4	2	2	
Pipe Outfall	319208	1/13/2003	WB	Stormwater	Corrugated metal	Left bank	12		Yes	Clear		4	1	1	
Pipe Outfall	322204	1/13/2003	WB	Stormwater	Corrugated metal	Left bank	18		Yes	Clear		4	1	1	
Pipe Outfall	331201	1/15/2003	WB	Stormwater	Corrugated metal	Head of stream	24	15	Yes	Clear		4	3	1	
Pipe Outfall	10302	9/5/2003	UB	Pond overflow	Plastic	Head of stream	6	1	Yes	Clear		5	5	2	
Pipe Outfall	10305	9/5/2003	UB	Pond overflow	Plastic	Left bank	8		No			5	5	2	
Pipe Outfall	11301	9/5/2003	UB	Stormwater	Concrete channel	Left bank		3	No			5	5	1	
Pipe Outfall	32110	7/30/2003	PB	Stormwater	Corrugated metal	Off the stream	30	7	No			5	5	4	
Pipe Outfall	37003	7/30/2003	PB	Stormwater	Rip-rap	Left bank		60	No			5	1	2	
Pipe Outfall	37102	7/30/2003	PB	Stormwater	Rip-rap	Right bank		2	No			5	4	1	
Pipe Outfall	37103	7/30/2003	PB	Stormwater	Rip-rap	Right bank		18	No			5	4	1	
Pipe Outfall	38105	7/30/2003	PB	Stormwater	Rip-rap	Right bank		3	No			5	4	1	
Pipe Outfall	69002	8/6/2003	FB	Agricultural	Corrugated metal	Right bank	24	0	Yes	Clear		5	1	2	
Pipe Outfall	75207	8/4/2003	FB	Stormwater	Corrugated metal	Right bank	24	10	No			5	4	2	
Pipe Outfall	75209	8/4/2003	FB	Stormwater	Rip-rap	Left bank	2	2	No			5	4	2	
Pipe Outfall	117101	3/17/2003	TO	Unknown	Plastic	Right bank	6	3	No			5	2	1	
Pipe Outfall	117102	3/17/2003	TO	Unknown	Plastic	Left bank	6	3	No			5	2	2	
Pipe Outfall	117103	3/17/2003	TO	Unknown	Plastic	Left bank	6	2	No			5	2	2	
Pipe Outfall	117104	3/17/2003	TO	Stormwater	Concrete pipe	Right bank	20	3	No			5	4	1	

Appendix B - Upper Linganore Pipe Outfalls

Problem	Site	Date	Sub-shed	Outfall	Type	Location	Diameter (in)	Channel width (ft)	Discharge?	Color	Odor	Severity	Correctability	Access	
Pipe Outfall	117106		TO	Stormwater	Concrete channel	Left bank	24	3	No			5	4	1	
Pipe Outfall	117107	3/17/2003	TO	Stormwater	Concrete pipe	Right bank	16	3	No			5	4	1	
Pipe Outfall	219105	6/10/2003	TA	Stormwater	Corrugated metal	Right bank	24		No			5	2	1	
Pipe Outfall	219107	6/10/2003	TA	Stormwater	Plastic	Right bank	12		No			5	4	1	
Pipe Outfall	319206	1/13/2003	WB	Stormwater	Corrugated metal	Left bank	12		No			5	1	1	
Pipe Outfall	319209	1/13/2003	WB	Stormwater	Corrugated metal	Left bank	12		No			5	1	1	
Pipe Outfall	330105	1/13/2003	WB	Stormwater	Concrete channel	Right bank			No			5	2	1	

Appendix B - Bennett Creek Channel Alterations

Problem	Site	Date	Sub-shed	Type	Width (in)	Length (ft)	Perennial flow?	Deposition in channel?	Vegetation in channel?	Road crossing?	Length above (ft)	Length below (ft)	Severity	Correctability	Access
Channel Alteratiom	12303	9/5/2003	UB	Rip-rap	24	50	Yes	No	No	No			5	2	3
Channel Alteratiom	37101	7/30/2003	PB	Rip-rap		200	Yes	No	Yes	No			5	5	2
Channel Alteratiom	37110	7/30/2003	PB	Rip-rap	36	100	Yes	Yes	No	Below		100	5	3	2
Channel Alteratiom	38107	7/30/2003	PB	Rip-rap	36	75	Yes	Yes	Yes	Below		75	5	4	1

Appendix B - Upper Linganore Channel Alterations

Problem	Site	Date	Sub-shed	Type	Width (in)	Length (ft)	Perennial flow?	Deposition in channel?	Vegetation in channel?	Road crossing?	Length above (ft)	Length below (ft)	Severity	Correctability	Access
Channel Alteratiom	116105	3/17/2003	TO	Concrete	48	200	Yes	Yes	Yes	No			3	4	1
Channel Alteratiom	116109	3/13/2003	TO	Concrete	24	300	Yes	Yes	No	No			3	3	1
Channel Alteratiom	317107	1/14/2003	TA	Concrete	24	100	No	Yes	No	Both	10	10	3	5	1
Channel Alteratiom	103102	3/17/2003	TO	Earth channel	12	12	Yes	Yes	No	No			4	3	2
Channel Alteratiom	105106	3/13/2003	TO	Concrete	96		Yes	No	No	No			4	3	2
Channel Alteratiom	105108	3/13/2003	TO	Concrete	36	10	Yes	No	Yes	No			4	3	2
Channel Alteratiom	108101	3/13/2003	TO	Steel pipe	6	12	Yes	Yes	Yes	No			4	1	1
Channel Alteratiom	117105	3/17/2003	TO	Concrete	12	25	Yes	No	No	Below		10	4	5	1
Channel Alteratiom	129101	3/18/2003	TO	Concrete	36	30	Yes	Yes	Yes	No			4	3	1
Channel Alteratiom	218104	6/10/2003	TA	Concrete	34	12	Yes	No	No	No			4	3	1
Channel Alteratiom	218105	6/10/2003	TA	Concrete	21	10	Yes	No	No	No			4	3	1
Channel Alteratiom	102103	3/13/2003	TO	Other		15	Yes	No	No	No			5	3	2
Channel Alteratiom	102104	3/17/2003	TO	Earth channel	12	10	Yes	No	Yes	No			5	3	2
Channel Alteratiom	103101	3/17/2003	TO	Rip-rap	12	8	Yes	Yes	No	No			5	3	2
Channel Alteratiom	105103	3/13/2003	TO	Corrugated metal	18	15	Yes	Yes	No	No			5	3	3
Channel Alteratiom	105104	3/13/2003	TO	Corrugated metal	60	20	Yes	No	No	No			5	3	1
Channel Alteratiom	105109	3/14/2003	TO	Corrugated metal	48	15	Yes	Yes	No	No			5	2	2
Channel Alteratiom	115105	3/17/2003	TO	Rip-rap	24	30	Yes	Yes	No	Below		30	5	2	1
Channel Alteratiom	116107	3/13/2003	TO	Corrugated metal	58	10	Yes	Yes	No	Below		15	5	3	1
Channel Alteratiom	126105	3/19/2003	TO	Corrugated metal	30	13	Yes	Yes	Yes	No			5	3	3
Channel Alteratiom	129102	3/19/2003	TO	Corrugated metal	15	20	Yes	No	Yes	No			5	3	3
Channel Alteratiom	131101	3/18/2003	TO	Concrete	48	50	No	Yes	Yes	Below		75	5	3	1
Channel Alteratiom	218101	6/10/2003	TA	Corrugated metal	16	30	Yes	No	No	No			5	5	1
Channel Alteratiom	218103	6/10/2003	TA	Corrugated metal	18	25	Yes	Yes	Yes	No			5	3	1
Channel Alteratiom	218106	6/10/2003	TA	Corrugated metal	6	15	Yes	Yes	Yes	No			5	3	1
Channel Alteratiom	219101	5/27/2003	TA	Corrugated metal	24	20	Yes	No	No	Both			5	5	1
Channel Alteratiom	219102	5/27/2003	TA	Corrugated metal	36	20	Yes	No	No	Both			5	5	1
Channel Alteratiom	219106	6/10/2003	TA	Gabion baskets	36	30	Yes	No	Yes	No			5	4	1
Channel Alteratiom	226101	5/27/2003	TA	Rip-rap	10	50	Yes	Yes	Yes	Below		20	5	5	1
Channel Alteratiom	302103	1/15/2003	TA	Rip-rap		50	Yes	No	No	No			5	1	4
Channel Alteratiom	324202	1/15/2003	TA	Concrete	84	10	Yes	Yes	No	No			5	2	4

Appendix B - Bennett Creek Trash Dumping Sites

Problem	Site	Date	Sub-shed	Type	Amount in pick-up truck loads	other measure	Size	Volunteers	Ownership	Name	Severity	Correctability	Access	
Trash Dumping	32102	7/24/2003	PB	Residential/Yard waste	25		Large area	Yes	Private		2	2	3	
Trash Dumping	32106	7/24/2003	PB	Yard waste	10		Single site	Yes	Private		2	2	2	
Trash Dumping	36004	7/30/2003	PB	Cars		2 dumptrucks	Single site	N	Private		2	3	4	

Appendix B - Upper Linganore Trash Dumping Sites

Problem	Site	Date	Sub-shed	Type	Amount in pick-up truck loads	other measure	Size	Volunteers	Ownership		Name	Severity	Correctability	Access
Trash Dumping	317105	1/14/2003	WB	Tires	6		Single site	Yes	Private		3	3		2
Trash Dumping	332104	1/13/2003	WB	Yard waste	5		Single site	Yes	Private		3	1		2
Trash Dumping	116102	3/17/2003	TO	Residential	2		Large area	Yes	Private		4	2		3
Trash Dumping	223101	6/10/2003	TA	Residential/Scrap metal	4			N	Private		4	4		5
Trash Dumping	315204	1/13/2003	WB	Res./Yard waste/Flotables/Tires	3		Large area	Yes	Private		4	2		1
Trash Dumping	319207	1/13/2003	WB	Residential/tires	2		Large area	Yes	Private		4	1		1
Trash Dumping	330104	1/13/2003	WB	Residential/Yard waste	3		Single site	Yes	Public		4	1		1
Trash Dumping	101102	3/17/2003	TO	Start of CA	1		Single site	Yes	Private		5	1		2
Trash Dumping	102101	3/13/2003	TO	Residential	3		Single site	Yes	Private		5	2		3
Trash Dumping	102105	3/17/2003	TO		1		Single site	Yes	Private		5	1		2
Trash Dumping	105101	3/13/2003	TO	Residential	1		Large area	Yes	Private		5	1		3

Appendix B - Bennett Creek Unusual Conditions/Comments

Problem	Site	Date	Sub-shed	Describe	Potential cause	Severity	Correctability	Access
Unusual condition	8101	7/17/2003	NB	Livestock in stream	Cows	2	5	3
Unusual condition	31201	8/6/2003	FB	Livestock in stream	Cows	2	2	3
Unusual condition	89001		FB	Livestock in stream	Cows	2	5	3
Unusual condition	37005	7/30/2003	PB	Red flock		4	1	2
Unusual condition	37105	7/30/2003	PB	Red flock	Stormwater overflow upstream	4	4	2
Unusual condition	64301	8/14/2003	FB	Red flock	Unknown	4	1	5
Unusual condition	66210	8/7/2003	FB	Red flock	Wetland upstream	4	1	4
Comment	32104	7/24/2003	PB	Start of permanent flow				
Comment	34001	7/30/2003	PB	IB34001 alternates for 3400 ft & written as both for half the length				
Comment	37006	7/30/2003	PB	Stream goes over a concrete road crossing at depth of 1in before dropping 30in				
Comment	40002	7/30/2003	PB	Livestock in stream	Horses			

Appendix B - Upper Linganore Unusual Conditions/Comments

Problem	Site	Date	Sub-shed	Describe	Potential cause	Severity	Correctability	Access
Unusual condition	207902	9/9/2003	TA	Livestock in stream	Cows	2	5	3
Unusual condition	306109	1/15/2003	WB	Red flock	3ft by 8in flow	4	2	4
Unusual condition	314105	1/14/2003	WB	Red flock	2ft wide by 40 ft long trib. Coming out of lawn	4	2	3
Comment	115104	3/17/2003	TO	Hose in stream running for 50ft.				
Comment	116101	3/17/2003	TO	Sewage pipe manhole w/in 10ft. Of stream				
Comment	116103	3/17/2003	TO	Sewage pipe manhole w/in 10ft. Of stream				
Comment	116106	3/17/2003	TO	Sewage pipe manhole w/in 10ft. Of stream				
Comment	311101	1/13/2003	WB	Attempted bank stablization	Erosion			
Comment	319201	1/13/2003	WB	1 of 3 culverts is totally blocked				
Comment	328201	1/15/2003	WB		Large pool at the edge of stream acts as a flooding pool			

Appendix B - Upper Linganore Exposed Pipes

Problem	Site	Date	Sub-shed	Pipe is	Type	Diameter (in)	Exposed (ft)	Purpose	Evidence of discharge?	Color	Odor	Severity	Correctability	Access
Exposed Pipe	312202	1/13/2003	WB	Exposed across bottom of stream	Smooth metal	8	4	Unknown	No			5	1	2

Appendix B - Bennett Creek Representative Sites A

Problem	Site	Date	Sub-shed	Macroinvertabrate substrata	Embeddedness	Shelter for fish	Channel alteration	Sediment deposition	Velocity & depth	Channel flow	Bank vegetation	Bank condition	Riparian vegetation
Representativ	7101	7/14/2003	NB	Optimal	Suboptimal	Optimal	Optimal	Marginal	Suboptimal	Marginal	Optimal	Marginal	Optimal
Representativ	7105	7/14/2003	NB	Optimal	Suboptimal	Optimal	Optimal	Marginal	Marginal	Suboptimal	Optimal	Suboptimal	Suboptimal
Representativ	13304	9/5/2003	UB	Poor	Poor	Optimal	Optimal	Optimal	Marginal	Optimal	Marginal	Poor	Optimal
Representativ	16301	9/9/2003	UB	Optimal	Suboptimal	Marginal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Marginal
Representativ	17303	9/9/2003	UB	Marginal	Poor	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Marginal	Marginal	Optimal
Representativ	28101	7/22/2003	BB	Optimal	Optimal	Optimal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Optimal
Representativ	36001	7/30/2003	PB	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Marginal	Marginal	Suboptimal
Representativ	37001	7/30/2003	PB	Poor	Marginal	Suboptimal	Optimal	Poor	Marginal	Poor	Poor	Poor	Optimal
Representativ	37109	7/30/2003	PB	Suboptimal	Suboptimal	Optimal	Optimal	Poor	Marginal	Marginal	Suboptimal	Poor	Optimal
Representativ	38101	7/30/2003	PB	Optimal	Suboptimal	Optimal	Optimal	Marginal	Marginal	Marginal	Optimal	Suboptimal	Optimal
Representativ	41001	7/31/2003	PB	Suboptimal	Marginal	Optimal	Optimal	Marginal	Optimal	Marginal	Marginal	Poor	Optimal
Representativ	43001	7/30/2003	PB	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Poor	Suboptimal
Representativ	56301	8/14/2003	FB	Optimal	Suboptimal	Optimal	Optimal	Optimal	Suboptimal	Marginal	Marginal	Poor	Suboptimal
Representativ	57302	8/20/2003	FB	Optimal	Optimal	Marginal	Optimal	Suboptimal	Optimal	Suboptimal	Marginal	Poor	Suboptimal
Representativ	60201	8/6/2003	FB	Optimal	Optimal	Optimal	Optimal	Marginal	Marginal	Suboptimal	Optimal	Suboptimal	Optimal
Representativ	66205	8/7/2003	FB	Optimal	Optimal	Optimal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Marginal	Optimal
Representativ	66211	8/7/2003	FB	Optimal	Optimal	Optimal	Optimal	Marginal	Optimal	Marginal	Optimal	Suboptimal	Optimal
Representativ	68201	8/6/2003	FB	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal
Representativ	74201	8/4/2003	FB	Optimal	Optimal	Optimal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal	Marginal	Optimal
Representativ	77003	8/6/2003	FB	Poor	Poor	Suboptimal	Optimal	Optimal	Marginal	Optimal	Suboptimal	Marginal	Suboptimal
Representativ	83003	8/7/2003	FB	Suboptimal	Marginal	Marginal	Optimal	Suboptimal	Marginal	Optimal	Suboptimal	Poor	Marginal
Representativ	86101	7/31/2003	FB	Optimal	Optimal	Marginal	Suboptimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal

Appendix B - Upper Linganore Representative Sites A

Problem	Site	Date	Sub-shed	Macroinvertabrate substrata	Embeddedness	Shelter for fish	Channel alteration	Sediment deposition	Velocity & depth	Channel flow	Bank vegetation	Bank condition	Riparian vegetation
Representative Site	105111	3/17/2003	TO	Suboptimal	Suboptimal	Marginal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Marginal	Optimal
Representative Site	106103	3/14/2003	TO	Optimal	Suboptimal	Optimal	Suboptimal	Marginal	Optimal	Suboptimal	Optimal	Poor	Optimal
Representative Site	112104	3/13/2003	TO	Suboptimal	Poor	Poor	Suboptimal	Marginal	Suboptimal	Optimal	Optimal	Suboptimal	Poor
Representative Site	114103	3/18/2003	TO	Suboptimal	Suboptimal	Marginal	Suboptimal	Marginal	Optimal	Poor	Optimal	Marginal	Optimal
Representative Site	120101		TO	Suboptimal	Poor	Poor	Optimal	Suboptimal	Poor	Poor	Suboptimal	Optimal	Optimal
Representative Site	123101	3/18/2003	TO	Suboptimal	Suboptimal	Marginal	Optimal	Marginal	Optimal	Marginal	Optimal	Marginal	Suboptimal
Representative Site	129103	3/19/2003	TO	Suboptimal	Marginal	Optimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Marginal	Suboptimal
Representative Site	207904	9/9/2003	TA	Suboptimal	Poor	Marginal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Suboptimal	Poor
Representative Site	219104	5/27/2003	TA	Optimal	Optimal	Suboptimal	Suboptimal	Optimal	Marginal	Optimal	Optimal	Suboptimal	Suboptimal
Representative Site	306106	1/15/2003	WB	Optimal	Marginal	Suboptimal	Optimal	Poor	Optimal	Suboptimal	Suboptimal	Marginal	Marginal
Representative Site	307201	1/14/2003	WB	Optimal	Marginal	Optimal	Optimal	Marginal	Marginal	Optimal	Marginal	Marginal	Poor
Representative Site	310102	1/14/2003	WB	Optimal	Optimal	Optimal	Optimal	Poor	Optimal	Marginal	Marginal	Poor	Optimal
Representative Site	310201	1/14/2003	WB	Optimal	Optimal	Optimal	Optimal	Suboptimal	Marginal	Optimal	Marginal	Marginal	Suboptimal
Representative Site	311104	1/13/2003	WB	Optimal	Optimal	Optimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	311105	1/13/2003	WB	Optimal	Optimal	Optimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Suboptimal	Optimal
Representative Site	314104	1/14/2003	WB	Optimal	Optimal	Optimal	Optimal	Poor	Marginal	Poor	Suboptimal	Marginal	Optimal
Representative Site	315201		WB	Suboptimal	Optimal	Optimal	Optimal	Marginal	Marginal	Optimal	Poor	Poor	Optimal
Representative Site	319205	1/13/2003	WB	Marginal	Poor	Suboptimal	Optimal	Marginal	Suboptimal	Optimal	Suboptimal	Marginal	Optimal
Representative Site	321101		WB	Optimal		Suboptimal	Optimal	Suboptimal	Optimal	Suboptimal	Suboptimal	Marginal	Optimal
Representative Site	327204	1/15/2003	WB	Optimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Marginal	Marginal	Poor	Optimal
Representative Site	331207	1/15/2003	WB	Suboptimal	Suboptimal	Optimal	Marginal	Suboptimal	Suboptimal	Suboptimal	Marginal	Poor	Suboptimal

Appendix B - Bennett Creek Representative Sites B

Problem	Date	Sub-shed	Site	Riffle width (in)	Run width (in)	Pool width (in)	Riffle depth (in)	Run depth (in)	Pool depth (in)	Bottom type
Representative Site	7/14/2003	NB	7101	36	24	54	2	4	7	Cobble
Representative Site	7/14/2003	NB	7105	14	10	24	1	2	3	Gravel
Representative Site	9/5/2003	UB	13304	24	60	72	3	8	10	Sand
Representative Site	9/9/2003	UB	16301	18	24	30	2	5	8	Cobble
Representative Site	9/9/2003	UB	17303	30	40	80	3	6	20	Gravel
Representative Site	7/22/2003	BB	28101	24	18	48	2	3	10	Gravel
Representative Site	7/30/2003	PB	36001	18	36	48	1	3	8	Gravel
Representative Site	7/30/2003	PB	37001	18	30	32	1	3	8	Gravel
Representative Site	7/30/2003	PB	37109	24	18		1	3		Gravel
Representative Site	7/30/2003	PB	38101	36	8		1	3		Gravel
Representative Site	7/31/2003	PB	41001	48	60	90	2	10	30	Gravel
Representative Site	7/30/2003	PB	43001	72	72	72	2	3	12	Gravel
Representative Site	8/14/2003	FB	56301	75	85	85	6	10	20	Cobble
Representative Site	8/20/2003	FB	57302	8	90	95	2	10	24	Gravel
Representative Site	8/6/2003	FB	60201	24	10	15	1	2	6	Gravel
Representative Site	8/7/2003	FB	66205	36	10	30	1	2	7	Cobble
Representative Site	8/7/2003	FB	66211		72	48		6	18	Cobble
Representative Site	8/6/2003	FB	68201	96	30	120	3	6	24	Gravel
Representative Site	8/4/2003	FB	74201	30	4	30	2	18	10	Gravel
Representative Site	8/6/2003	FB	77003	200	150	200	12	24	37	Cobble
Representative Site	8/7/2003	FB	83003	36	240		8	12		Cobble
Representative Site	7/31/2003	FB	86101	48	18	36	4	8	12	Cobble

Appendix B - Upper Linganore Representative Sites B

Problem	Date	Sub-shed	Site	Riffle width (in)	Run width (in)	Pool width (in)	Riffle depth (in)	Run depth (in)	Pool depth (in)	Bottom type
Representative Site	3/17/2003	TO	105111	7	5	12	3	5	6	Silt
Representative Site	3/14/2003	TO	106103	60	60	36	12	10	30	Cobble
Representative Site	3/13/2003	TO	112104	72	48	48	4	3	6	Silt
Representative Site	3/18/2003	TO	114103	5	6	12	5	4	6	Cobble
Representative Site		TO	120101							Silt
Representative Site	3/18/2003	TO	123101	4	4	120	2	2	12	Sand
Representative Site	3/19/2003	TO	129103	8	12	48	4	4	12	Sand
Representative Site	9/9/2003	TA	207904	60	120	60	2	6	18	Gravel
Representative Site	5/27/2003	TA	219104	6	6	5	2	1	3	Gravel
Representative Site	1/15/2003	WB	306106	84	60	144	4	12	30	Cobble
Representative Site	1/14/2003	WB	307201	48	36	36	2	12	12	Gravel
Representative Site	1/14/2003	WB	310102	60	24	30	2	6	12	Gravel
Representative Site	1/14/2003	WB	310201	60	60	60	4	12	12	Cobble
Representative Site	1/13/2003	WB	311104	8	6	24	1	1	3	Gravel
Representative Site	1/13/2003	WB	311105	72	60	80	5	5	7	Cobble
Representative Site	1/14/2003	WB	314104	24	12		1	3		Gravel
Representative Site		WB	315201	18	24	72	3	3	5	Gravel
Representative Site	1/13/2003	WB	319205	48	240		3	7		Sand
Representative Site		WB	321101	72	48	36	4	6	5	Cobble
Representative Site	1/15/2003	WB	327204	36	12	12	3	2	72	Cobble
Representative Site	1/15/2003	WB	331207	40	24	60	2	3	24	Gravel