

Stream Corridor Assessment Survey for the Deer Creek Watershed, Harford County, Maryland

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EXECUTIVE SUMMARY

The Maryland Department of Environment (MDE) and Harford County Department of Planning and Zoning formed a partnership to develop a Watershed Restoration Action Strategy (WRAS) for the Deer Creek watershed. The following Stream Corridor Assessment (SCA) survey is part of the WRAS development process.

The SCA survey provides descriptive and positional data for potential environmental problems along a watershed's non-tidal stream network. Developed by DNR's Watershed Services, the survey 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 several environmental problems that can be easily observed within the stream corridor. Each potential problem site is ranked on a scale of one to five for its severity, correctability, and access for restoration work.

There were two rounds of SCA fieldwork. The second round results are in Appendix C. The first round of SCA survey fieldwork for the Deer Creek began in March 2005 and was completed by June 2005. The field crews were able to walk approximately 58 miles of the 104 miles of streams in these watersheds. The streams assigned were Big Branch and Coolbranch Run Area (Hopkins Branch, Hollands Branch, Tobacco Run, Coolbranch Run, Mill Brook, Graveyard Creek). The second round of fieldwork was in February 2006. The field crews walked approximately 15 miles. The streams were Little Deer Creek, Rock Hollow Branch, Elbow Branch, an Unnamed tributary near to Jackson Branch, and another unnamed tributary that flows under Cherry Hill Rd. Survey teams did not have access to all the watershed's streams. There were also several areas that were not surveyed because the streams were not assigned.

Over the streams assessed in the first round, survey teams identified 213 potential environmental problem sites. At the time of the survey, the most frequently observed potential problem sites were erosion sites, reported at 77 sites. Other potential environmental problems recorded during the survey included: 65 inadequately forested stream buffers, 50 fish migration barriers, 9 pipe outfalls, 4 channel alterations, 4 trash dumping sites, 2 exposed pipes, and 2 unusual conditions. (Table 1). Opportunities exist to restore potential problem sites in all categories to increase fish and wildlife habitat, other natural resources, and resource services. Additionally, crews recorded descriptive habitat condition data at 28 representative sites.

In the second round of fieldwork, survey teams identified 92 potential environmental problem sites. At the time of the survey, the most frequently observed potential problem sites were erosion sites, reported at 32 sites. Other potential environmental problems recorded during the survey included: 25 inadequately forested stream buffers, 17 fish migration barriers, 7 pipe outfalls, 2 channel alterations, 2 trash dumping sites, 1 exposed pipes, and 6 unusual conditions. Additionally, crews recorded descriptive habitat condition data at 11 representative sites.

Combining both rounds of fieldwork the total number of problems identified was 305. Erosion sites were still the most frequently reported problem with 109 sites. Inadequate forested stream buffers were found at 90 sites. Fish migration barriers were found at 67 sites. Pipe Outfalls were found at 16 sites. Unusual Conditions were found at 8 sites. Channel Alterations were found at 6 sites. Trash Dumping areas were found at 6 sites. Exposed pipes were found at 3 sites.

The Stream Corridor Assessment Survey is a rapid overview of the stream network in order to determine the location of potential environmental problems and to collect some basic habitat information about its streams. The value of the present survey is its help in placing individual stream problems into their watershed context and its potential common use among resource managers and land-use planners to cooperatively and consistently prioritize future restoration work. Results of the present survey will be given to the Deer Creek Watershed WRAS committee, which is developing a Watershed Restoration Action Strategy for the Deer Creek. Information on the Deer Creek Watershed Action Strategy can be found on the Department of Natural Resources' website (www.dnr.maryland.gov/watersheds/wras).

INTRODUCTION

The Maryland Department of Environment formed a partnership with Harford County to assess and improve environmental conditions in the Deer Creek Watershed. The main goal of this partnership is to develop and implement a Watershed Restoration Action Strategy (WRAS) for the Deer Creek.

Located in southern Harford County, the watershed covers approximately 93,000 acres of land (145 square miles) in the Piedmont of Maryland (Figure 1). Figure 2 shows a digital orthophoto map of the watershed. Figure 3 shows the same watershed boundary superimposed on a 7.5 minute USGS topographic quadrangle maps. Figure 4a shows the areas of the watershed where the Stream Corridor Assessment was performed. Figure 4b shows the Coolbranch Run Area streams.

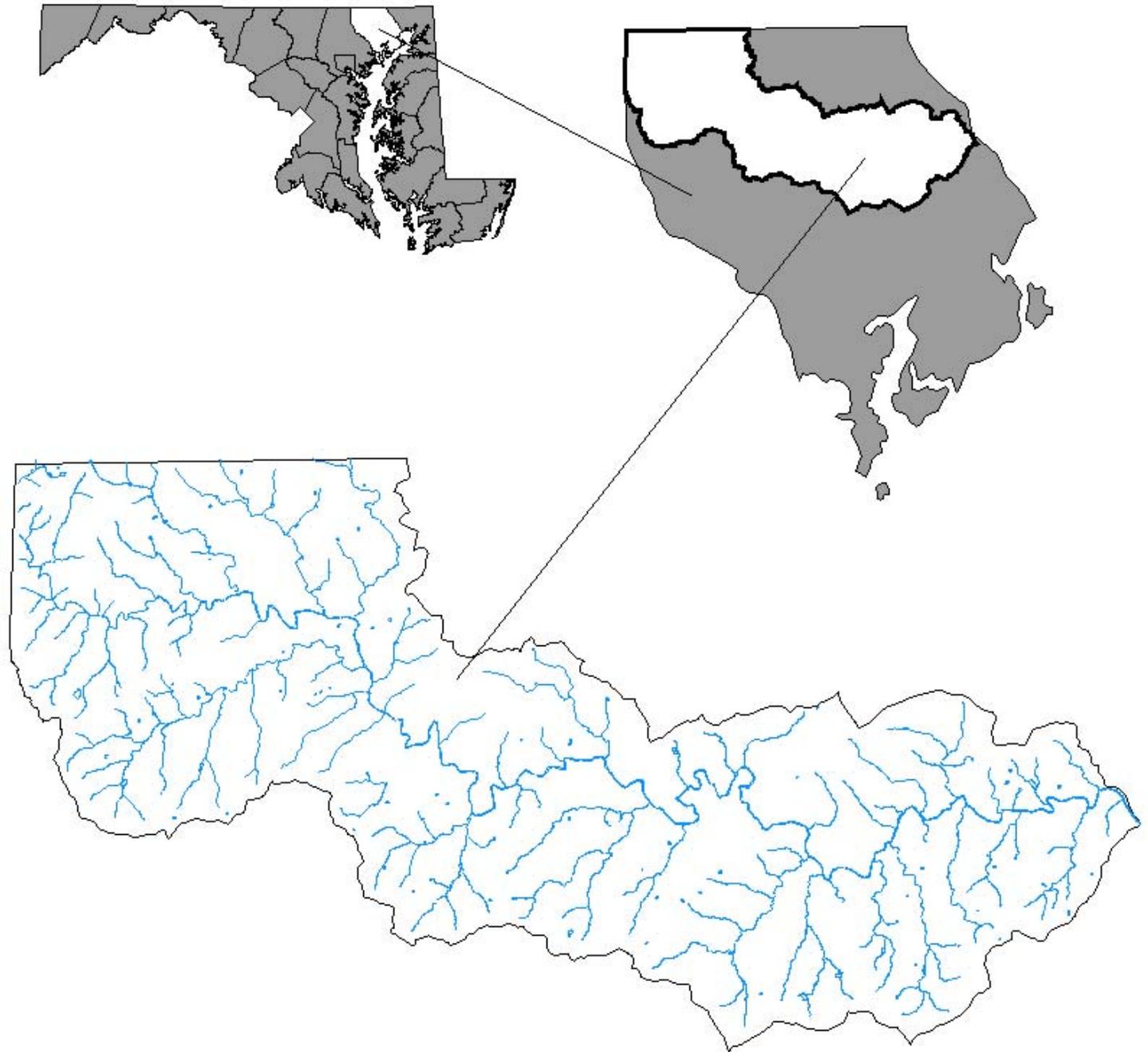
The first step in developing a Restoration Action Strategy for this watershed is to complete an overall assessment of the condition of the watershed and the streams it contains. This initial step was accomplished using three approaches. First, a watershed characterization was completed that compiles and analyzes existing water quality, land use, and living resource data about the watershed (Bruckler, Ellis, 2006). Secondly, a synoptic water quality survey, as well as surveys of the fish and macroinvertebrate communities, was conducted at selected stations throughout the Deer Creek sub-watersheds to provide information on the present condition of aquatic resources (Primrose, 2006). Lastly, a Stream Corridor Assessment (SCA) survey was completed for the watershed's non-tidal stream network to provide specific information on the present location of potential environmental problems and restoration opportunities. This report details the results of the Deer Creek Stream Corridor Assessment Survey and highlights potential restoration opportunities within the watershed based on the survey.

Survey teams walked approximately 58 miles of the 104 miles of streams in the Deer Creek Sub-watershed stream network. The survey began March 2005 and was completed by June 2005. 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 ½ to 1-mile intervals along the stream.

One of the main goals of the Deer Creek SCA survey is to compile a list of observable environmental problems in this watershed in order to most successfully 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 watershed's management and plan future restoration work at specific problem sites. All of the problems identified as part of the Deer Creek Stream Corridor Assessment survey can be addressed through existing State or Local government programs.

To this end, the Maryland Department of Environment is working with Harford County to develop a Watershed Restoration Action Strategy (WRAS) of the Deer Creek Watershed. As part of this process, data collected during the SCA survey 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 Deer Creek. The Watershed Restoration Action Strategy, in turn, will help guide future restoration efforts with the ultimate goals of restoring the area's natural resources and meeting State water quality standards.

Deer Creek Watershed Harford County, Maryland



Robert L. Ehrlich, Jr., *Governor*
Michael S. Steele, *Lt. Governor*
Kendall P. Philbrick, *Secretary*
James A. Jacobson, *Deputy Secretary*



Figure 1: Map showing the location of the Deer Creek Watershed in Harford, Maryland

Big Branch

Coolbranch Run Area

Figure 2: Deer Creek Sub-Watersheds
Digital Orthophoto Quarter Quads

0 4,550 9,100 18,200 27,300 36,400 Feet



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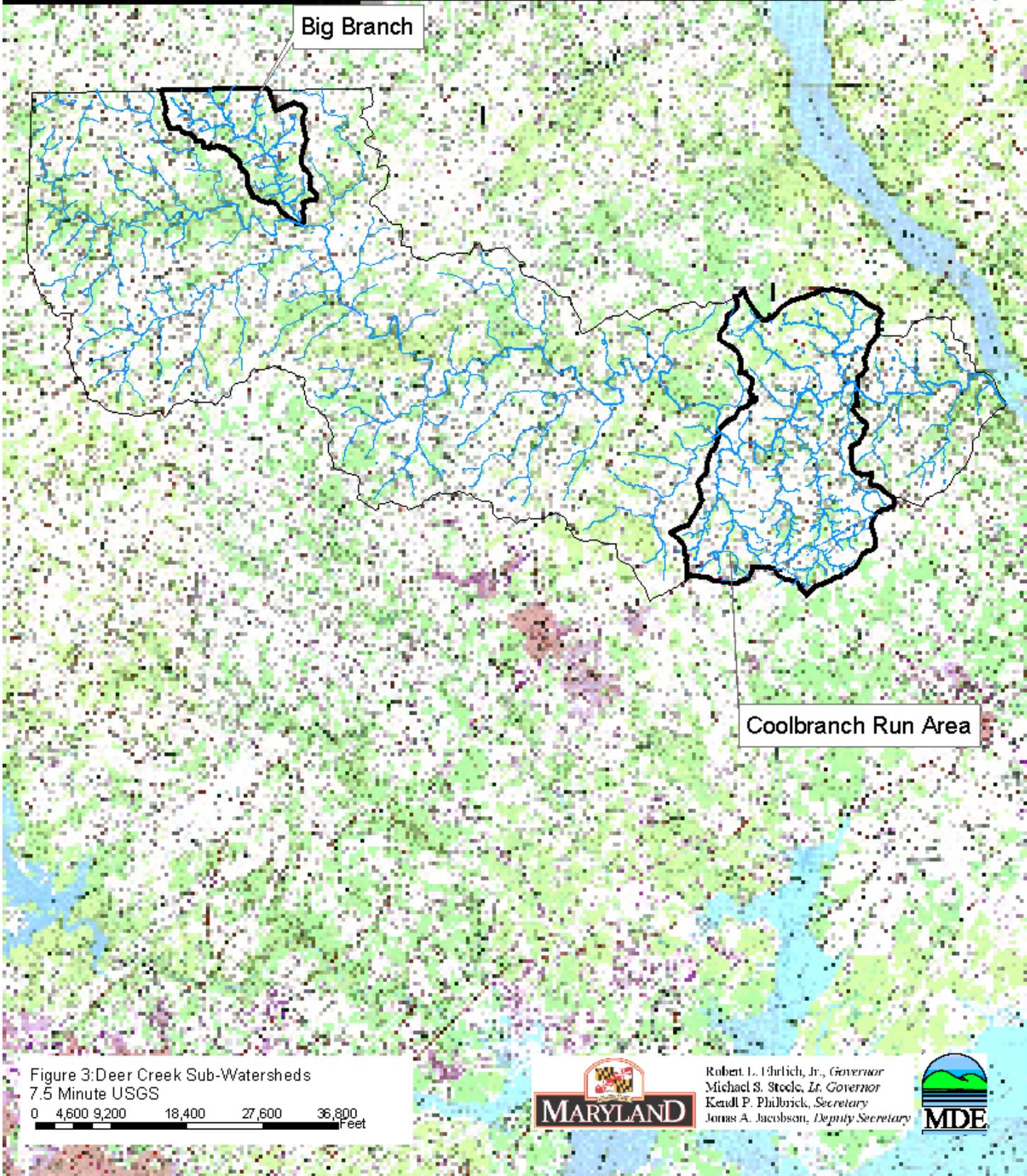


Figure 3: Deer Creek Sub-Watersheds
7.5 Minute USGS

0 4,600 9,200 18,400 27,600 36,800 Feet



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Deer Creek Sub-Watersheds Surveyed Harford County, Maryland

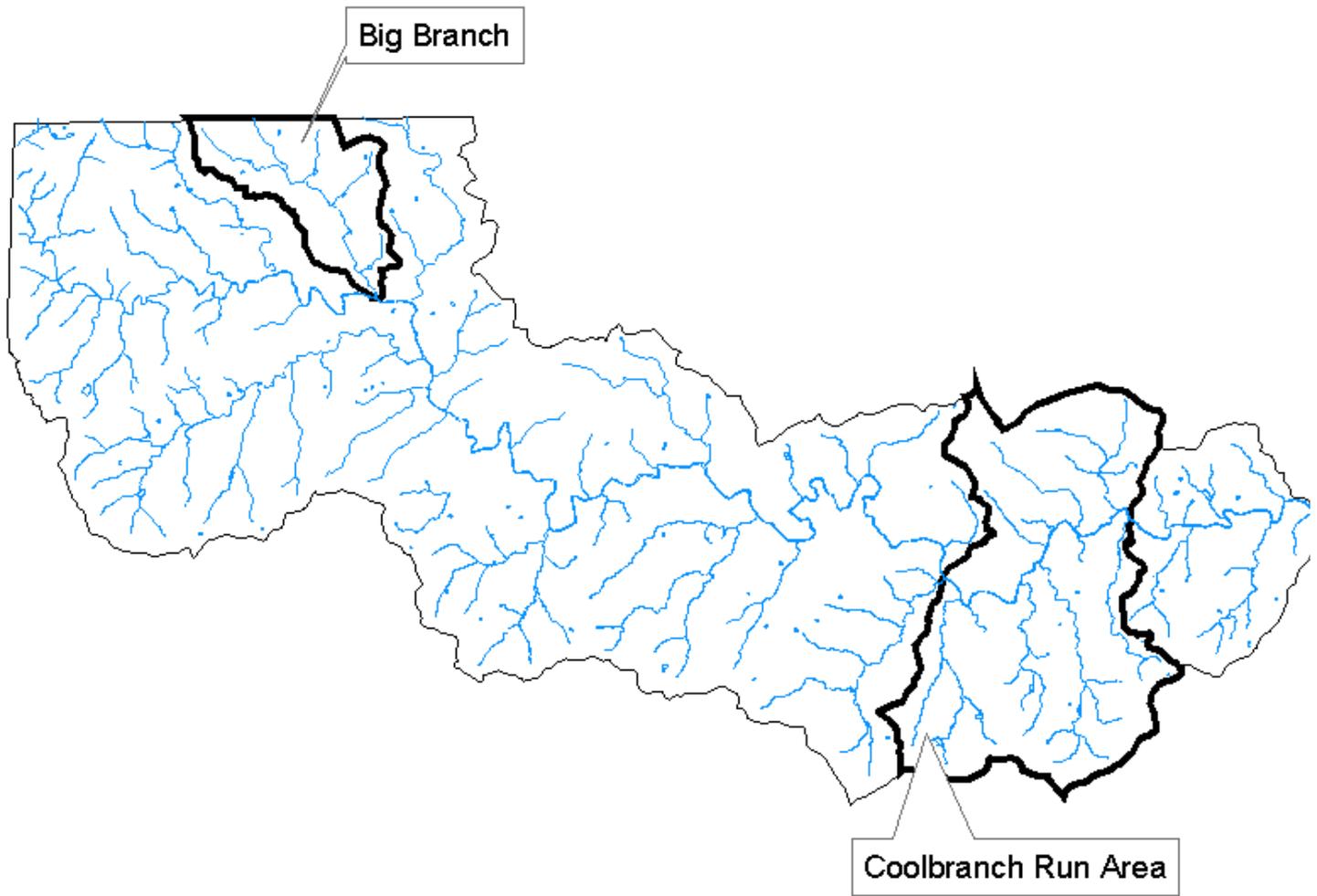


Figure 4a: Map showing the location of the Deer Creek Sub-Watersheds surveyed



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Coolbranch Run Area Streams

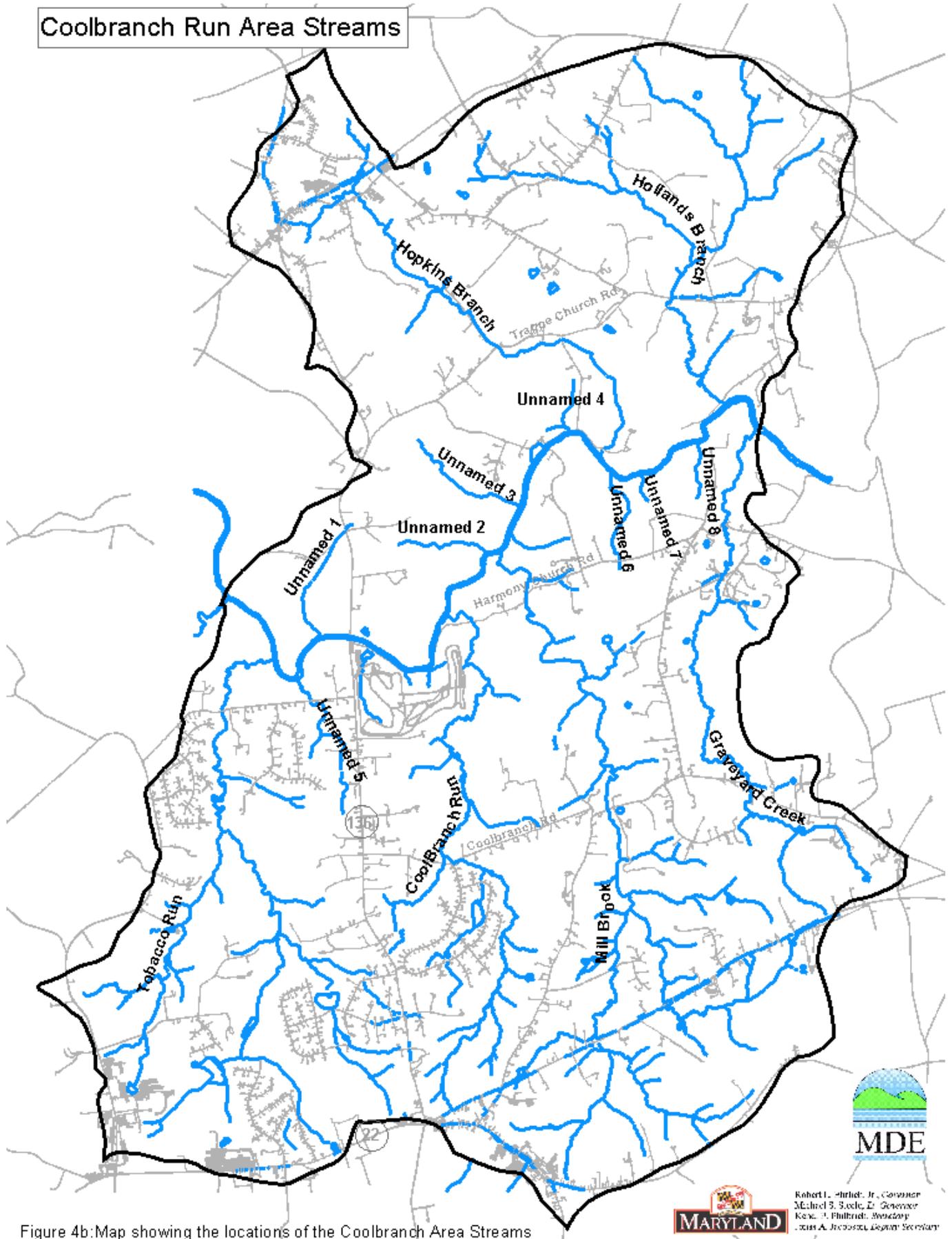


Figure 4b: Map showing the locations of the Coolbranch Area Streams

METHODOLOGY

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 indicates 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 Natural 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 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 Deer Creek SCA Survey, the members of the MCC 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, they 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 wanted more information and a

postcard stating if the crews would have permission to access the streams 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 Deer Creek Watershed from March 2005 to June 2005. The survey teams walked the river’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. During the survey, if a postcard giving permission was not received the survey team did not enter the property but may have written up a site if they could see it, for example an inadequate buffer. 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 be found on DNR’s web site at http://www.dnr.state.md.us/streams/stream_corridor.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, correctability, 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. Once the SCA survey is completed, the collected data can be used by different resource professionals to help target future restoration efforts. A regional forester, for example, can use data collected on inadequate stream buffers to help 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 the resource professional an idea of which sites the field crew believed were the most severe, easiest to correct and easiest to access. This information combined with photographs of the site can help resource managers focus their own follow up evaluations and fieldwork at the most important sites.

A general description of the rating system is given below. More specific information on the criteria used to rate each problem category is provided in the *SCA – Survey Protocols* (Yetman,

2000). It is important to note that the rating system is designed to contrast problems within a specific problem category 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 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, the information was entered from the field data sheets into a Microsoft Access database and verified the accuracy of the data. Field crews organized the photographs taken during the survey. Members of the Department of Environment's Technical and Regulatory Services Administration incorporated the map location, recorded data, and digitized photographs into the ArcGIS computer software. The GIS project is an electronic database 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 watershed. A final copy of the ArcView files was given to the Harford County Planning Department for their use in developing a Watershed Action Strategy for the Deer Creek Watershed.

RESULTS

The Stream Corridor Assessment Survey identified 213 potential environmental problem sites. At the time of the survey, the most frequently observed potential problem sites were erosion sites, reported at 77 sites. Other potential environmental problems recorded during the survey included: 65 inadequately forested stream buffers, 50 fish migration barriers, 9 pipe outfalls, 4 channel alterations, 4 trash dumping sites, 2 exposed pipes, and 2 unusual conditions. (Table 1). Opportunities exist to restore potential problem sites in all categories to increase fish and wildlife habitat, other natural resources, and resource services. Additionally, crews recorded descriptive habitat condition data at 28 representative sites.

Table 1 presents a summary of survey results, combining both sub-watersheds. Table 2 is a summary of the survey results from Big Branch. Table 3 is a summary of results from the Coolbranch Run Area. Table 4 is a summary by stream reach. Appendices A and B list the data collected during the survey. Appendix A provides a listing of information by site number and location, referenced by both tributary name and the X, Y coordinates using Maryland State Plane 83 meters. Information in this format is useful to determine what problems are present along a specific stream reach. 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. Result categories are discussed further in order of those with the greatest number of sites to those with the least.

Table 1. Summary of results from the Deer Creek SCA Survey.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Erosion Sites	77	77,228 ft (14.63 miles)	-	2	35	25	15
Inadequate Buffers	65	72,125 ft (13.66 miles)	13	5	17	9	21
Fish Barriers	50	N/A	-	-	5	9	36
Pipe Outfalls	9	N/A	-	-	6	1	2
Channel Alteration	4	240 ft (0.05 miles)	-	-	-	-	4
Trash Dumping	4	N/A	-	-	1	1	2
Exposed Pipes	2	50 ft (0.01 miles)	-	-	1	1	-
Unusual Conditions	2	N/A	-	-	2	-	-
Total	213		13	7	67	46	80
Comments	4						
Representative Sites	28						

Table 2. Summary of results from the Big Branch Sub-watershed

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Erosion Sites	28	23,125 ft (4.38 miles)	-	1	10	10	7
Inadequate Buffers	12	18,375 ft (3.49 miles)	-	-	-	3	9
Fish Barriers	24		-	-	3	3	18
Pipe Outfalls	0		-	-	-	-	-
Channel Alteration	2	110 ft (0.02 miles)	-	-	-	-	2
Trash Dumping	1		-	-	-	-	1
Exposed Pipes	0		-	-	-	-	-
Unusual Conditions	0		-	-	-	-	-
Total	67		0	1	13	16	37
Comments	1						
Representative Sites	13						

Table 3. Summary of results from the Coolbranch Run Area Sub-watershed.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Erosion Sites	49	54,103 ft (10.25 miles)	-	1	25	15	8
Inadequate Buffers	43	55,050 ft (10.43 miles)	8	3	14	6	12
Fish Barriers	26		-	-	2	6	18
Pipe Outfalls	9		-	-	6	1	2
Channel Alteration	2	130 ft (0.025 miles)	-	-	-	-	2
Trash Dumping	3		-	-	1	1	1
Exposed Pipes	2	50 ft (0.009 miles)	-	-	1	1	-
Unusual Conditions	2		-	-	2	-	-
Total	136		8	4	51	30	43
Comments	3						
Representative Sites	15						

Table 4. Summary of results by major stream reach.

Stream	Channel Alteration	Exposed Pipes	Erosion Sites	Fish Barriers	Inadequate Buffers	Pipe Outfalls	Representative Sites	Trash Dumping	Unusual Conditions	Comments	Total
Big Branch	2		28	24	22		13	1		1	91
CoolBranch Run		2	13	2	5	5				2	29
Deer Creek- Mainstem			1		3		2				6
Graveyard Creek			3	1	6		1				11
Hollands Branch			6	7	5	1	3				22
Hopkins Branch			3	3	2	1	2	1	1	1	14
Mill Brook			4		5		1				10
Tobacco Run	2		14	7	11	2	3	2			41
Unnamed Trib 1					1						1
Unnamed Trib 2			1	2	1						4
Unnamed Trib 3					1						1
Unnamed Trib 4				1	1						2
Unnamed Trib 5			2	2	1				1		6
Unnamed Trib 6			1	1	1		1				4
Unnamed Trib 7							1				1
Unnamed Trib 8			1				1				2

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 77 eroding stream banks over the length of 77,228 feet (14.63 miles) of stream. The severity and location of erosion sites is shown in Figure 5b, and 5c. Two sites are ranked as very severe (Figure 5a). These severe sites were Site 028103 and Site 073101.

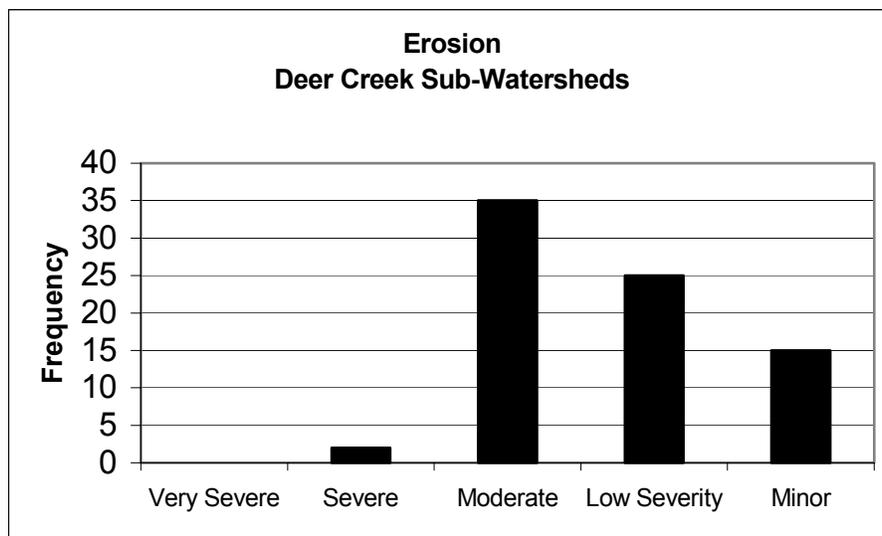
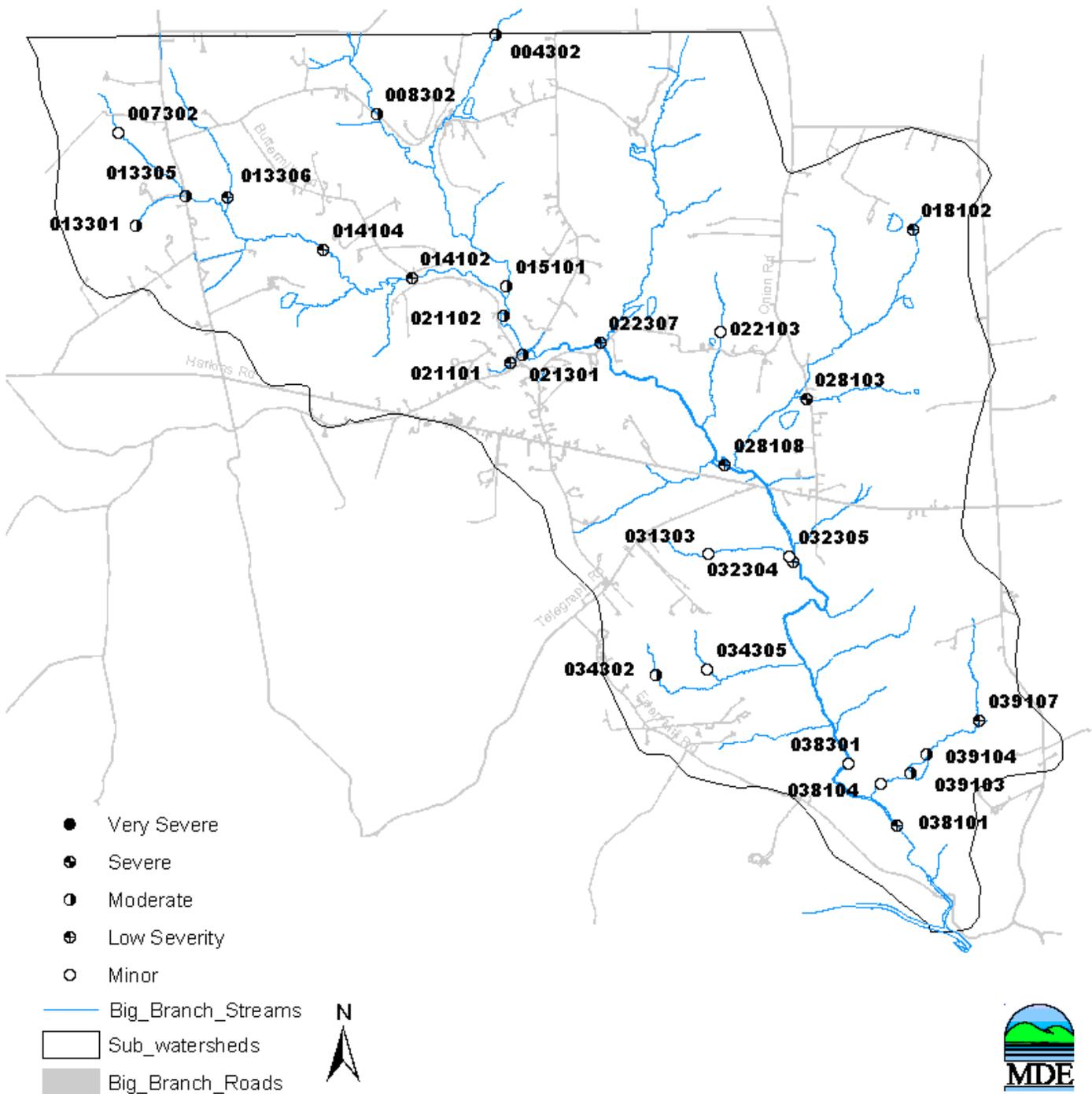


Figure 5a. Histogram showing the frequency of severity ratings given to erosion sites during the Deer Creek SCA survey.

Erosion Sites Big Branch



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Figure 5b: Map showing the locations of Erosion Sites in Big Branch

Erosion Sites CoolBranch Run Area

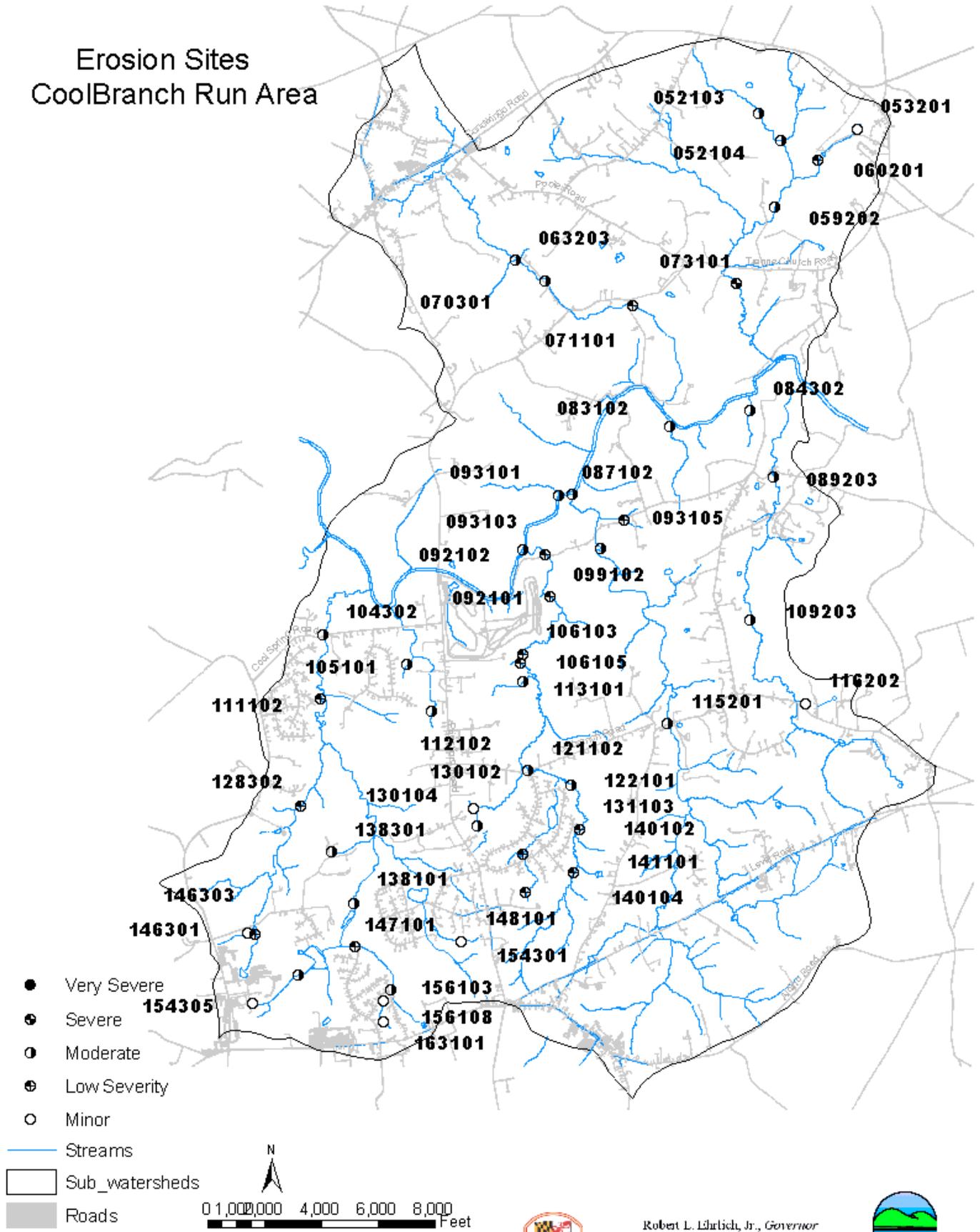


Figure 5c: Map showing the locations of Erosion Sites in Coolbranch Area



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Inadequate Buffers

Forests are the 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 are important to reducing the nutrient and sediment loadings to the Chesapeake Bay.

While there is no single minimum standard for how wide a stream buffer should be in Maryland, for the purposes of this study a forest buffer is considered inadequate if it is less than 50 feet wide, measured from the edge of the stream. The severity of inadequate forest buffers is based on both the length and width of the site. Those sites over 1,000 feet long with no forest on either side of the stream rank as the most severe. Drainage ditches with little to no water in the entire ditch is considered less severe than a ditch with water. A fourth ranking, wetland potential, rates if there is a potential of creating a wetland. The rating is based on bank height and slope of the areas.

Survey crews identified 65 inadequate buffer sites with a total length of 72,125 feet (13.66 miles). The severity and location of inadequate buffer sites is shown in Figure 6b, and 6c. Eighteen of these sites are ranked as very severe or severe, while the other sites are moderate, of low severity, or minor (Figure 6a). Land use along the stream at inadequate buffer sites, were reported as mostly shrubs and small trees, lawn and pasture.

Any inadequate buffer site would benefit from the restoration of trees along both stream banks. For sites on agricultural land, farmers also may qualify for federal and state government financial incentives for allowing 50-foot forest buffers to grow on their farmland. Those sites that may have particular natural resource value are headwater streams, or those that form gaps in existing forested buffer areas.

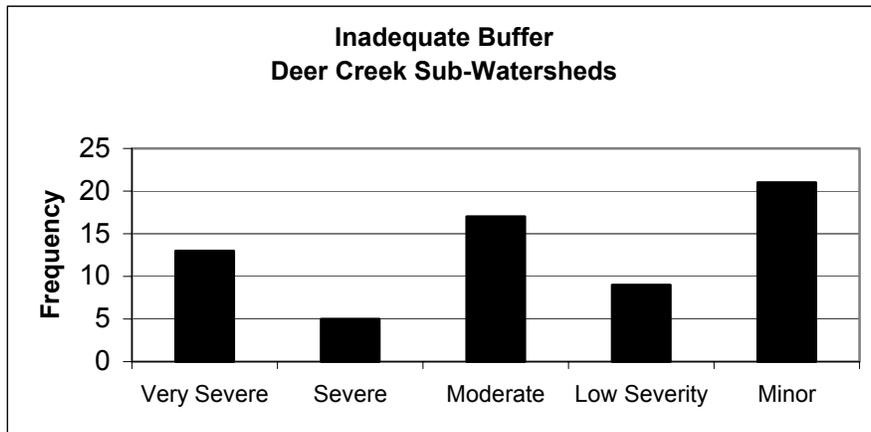


Figure 6a. Histogram showing the frequency of severity ratings given to inadequate buffer sites during the Deer Creek SCA survey.

Inadequate Buffers Big Branch

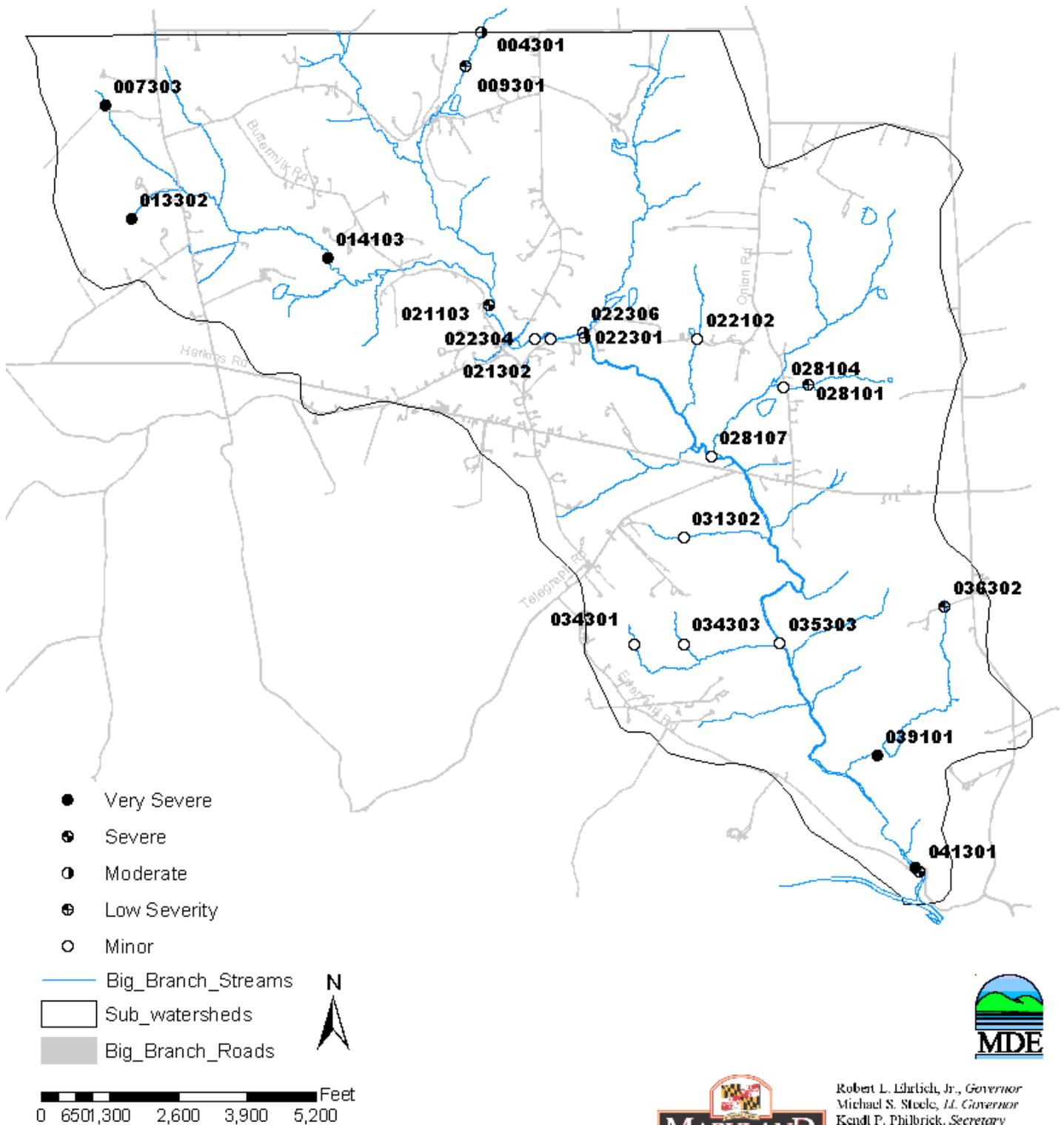


Figure 6b: Map showing the locations of Inadequate Buffers in Big Branch

Inadequate Buffers CoolBranch Run Area

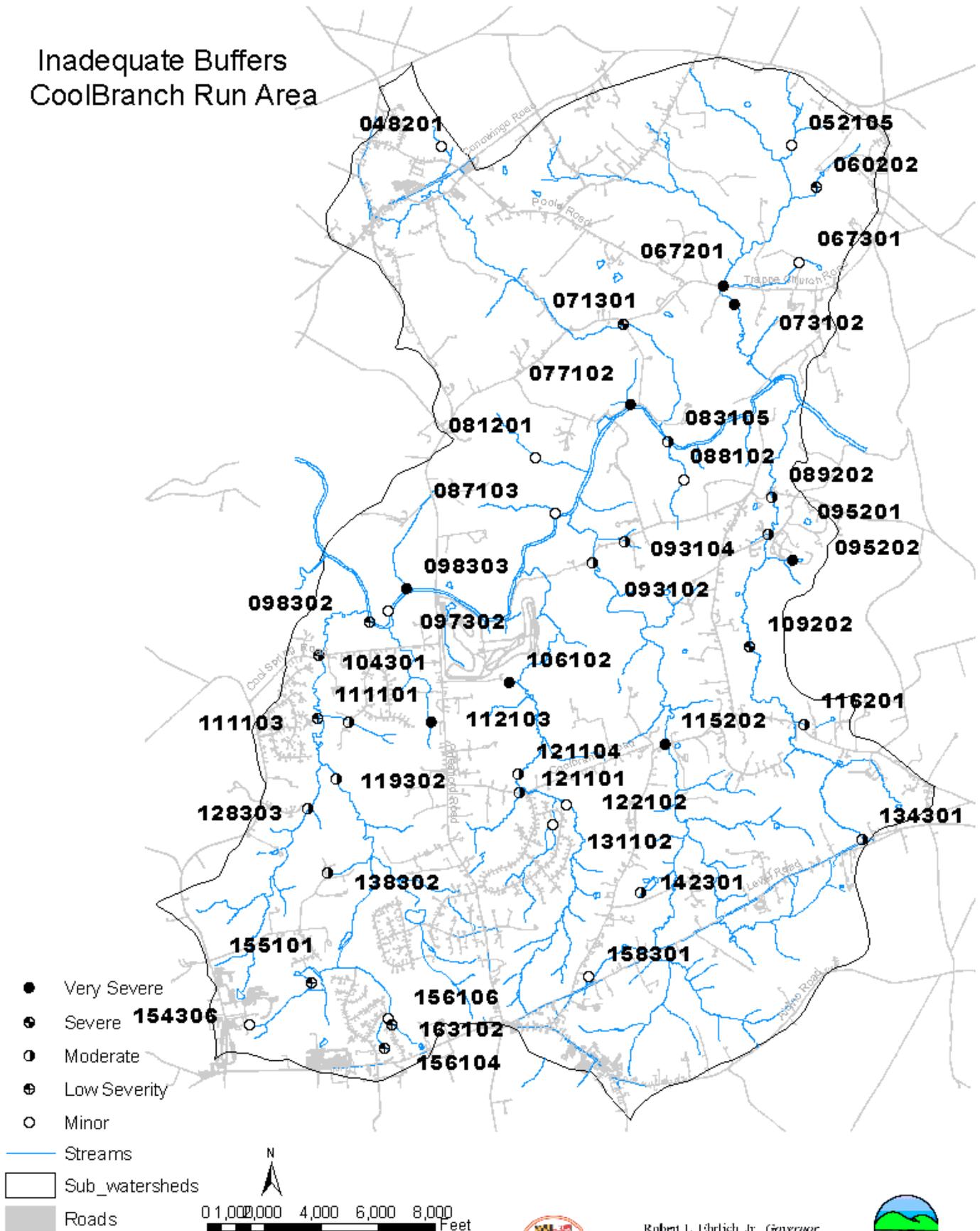


Figure 6c: Map showing the locations of Inadequate Buffers in Coolbranch Area



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Fish Migration Barriers

Fish migration barriers include anything in the stream that significantly interferes with the free, upstream movement of fish. Unimpeded fish passage is especially important for anadromous fish that live most of their lives in tidal waters but must migrate into non-tidal rivers and streams to spawn. Unobstructed upstream movement is also important for resident fish species, many of which also travel both up and down stream during different parts of their life cycle. In addition, without free fish passage, certain sections in a stream network become isolated from others. This becomes detrimental to species survival when a disturbance occurs in an isolated stretch of stream. A sediment discharge from a construction project, for example, or a sewage line break discharging into a small tributary can eliminate some or all of the fish species in an isolated stream stretch. With a fish blockage present, there is no avenue for fish to repopulate the inaccessible section. As a result, the disturbance will reduce diversity of the fish community in the area, and the remaining biological community may deviate from its natural balance and composition.

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. A structure becomes a blockage for fish if the stream water over or under it is too high, shallow, or fast. First, a vertical water drop such as a dam can be too high for fish to migrate 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 one foot, providing there is sufficient water flow and depth. Second, water too shallow for fish passage can occur in channelized stream sections or at road crossings, where the entire stream volume is spread over a large, flat area. 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 is placed at a steep angle, and the water moving through the pipe has a velocity higher than a fish's swimming ability.

In restoration work, priority is given to removing fish barriers that will yield access to the greatest quality and quantity of upstream habitat per dollar spent. The mainstem is ideally kept as barrier-free as possible, allowing anadromous fish to migrate to spawn and a source of fish species for tributaries in the event of a disturbance. Restoration planning includes targeting barriers for removal that isolate entire tributaries, those that isolate significant portions of the upper tributary, and those that isolate quality fish habitat. The best restoration sites also are far from other existing fish barriers.

The Deer Creek SCA survey found 50 fish migration barriers. The locations of fish blockages are shown in Figure 7b and 7c. Fish barriers in this watershed are due natural falls (17), road crossings (15), beaver dams (2), and debris dams (12), instream ponds (2) and other causes (2). Five of these sites received a moderate rating. In Big Branch the barriers will be to resident fish, because of the dam at Eden Mill.

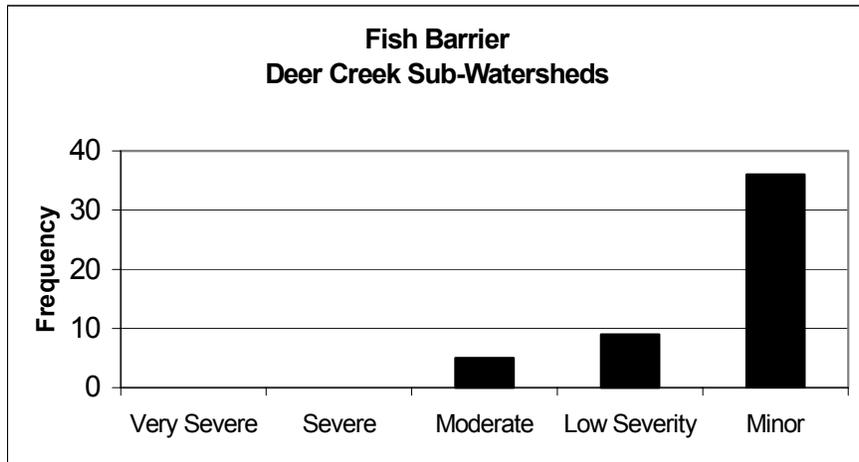


Figure 7a. Histogram showing the frequency of severity ratings given to fish barrier sites during the Deer Creek SCA survey.

Fish Barriers Big Branch

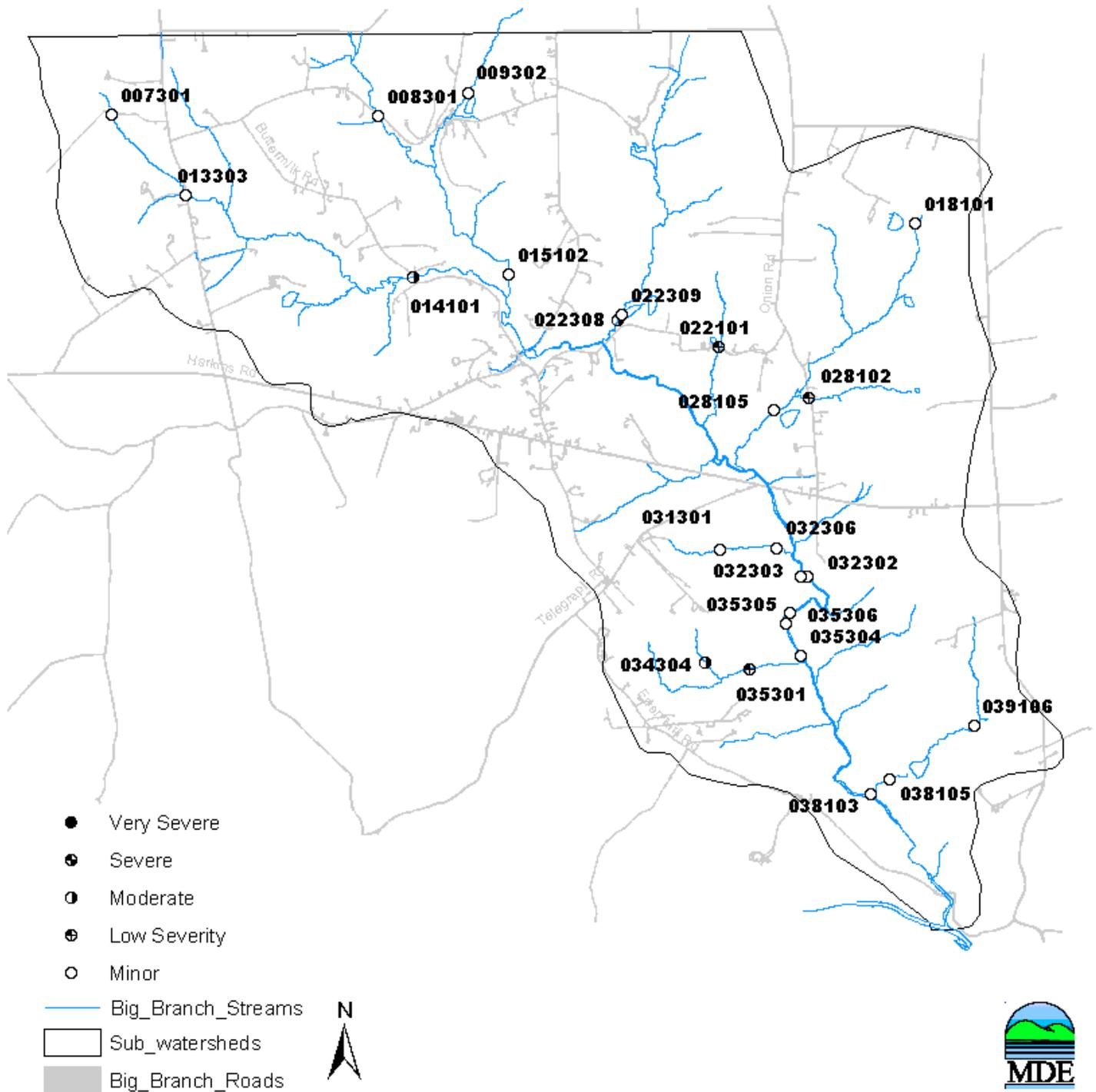


Figure 7b: Map showing the locations of Fish Barriers in Big Branch



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Fish Barriers CoolBranch Run Area

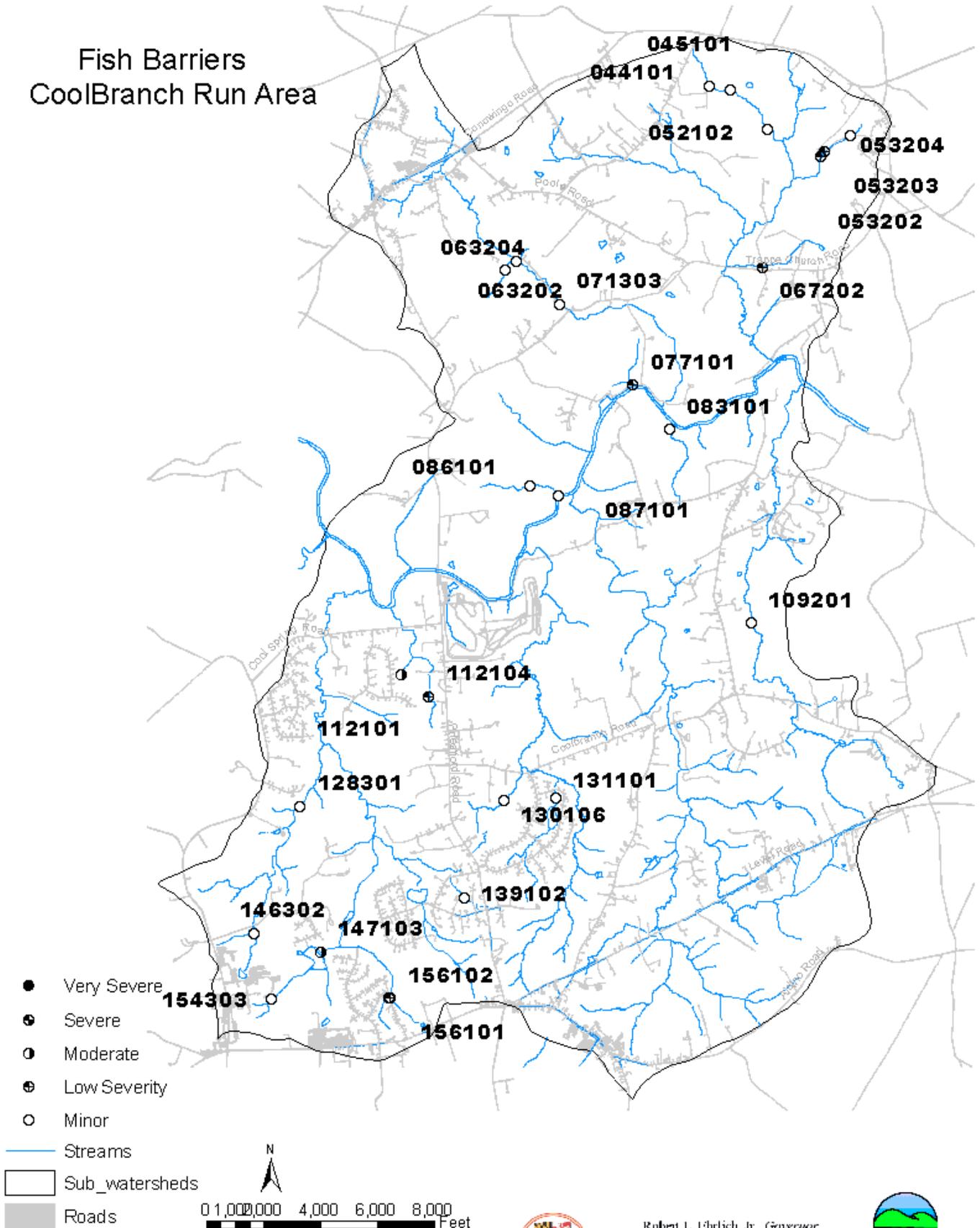


Figure 7c: Map showing the locations of Fish Barriers in Coolbranch Area



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Pipe Outfalls

Pipe outfalls include any pipes or small, constructed 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. The survey crew identified a total of 9 pipe outfalls. The severity and location of pipe outfall sites is shown in Figure 8b. All the pipe outfalls were located in the Coolbranch Run and Tobacco Run Sub-Watershed.

Six of the pipes had a discharge. All were clear with no odor. The pipes were rated as moderate. The remaining pipes did not have any discharge.

No immediate follow up actions were taken as part of this study to determine the source of the color coming from the pipe. In addition, we made no estimate of the amount of fluid released from the pipes.

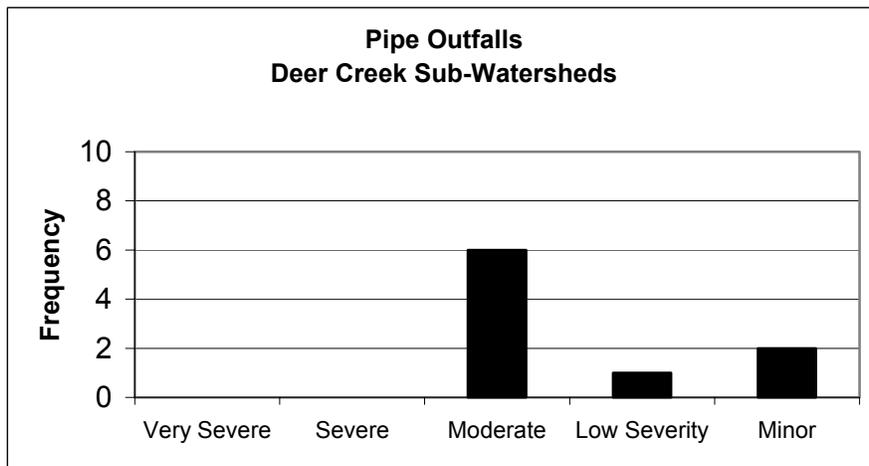


Figure 8a. Histogram showing the frequency of severity ratings given to pipe outfalls sites during the Deer Creek SCA survey.

Pipe Outfalls CoolBranch Run Area

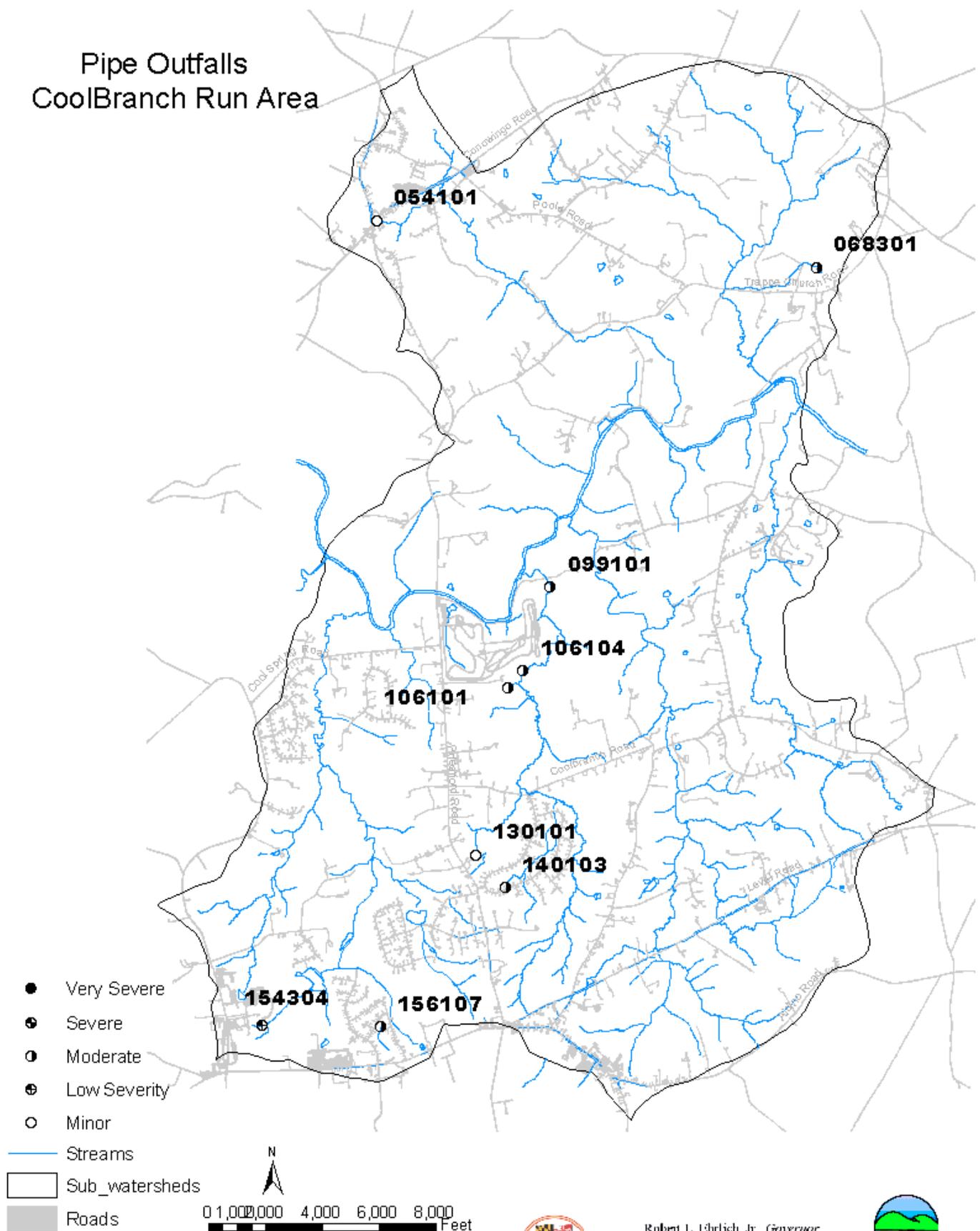


Figure 8b: Map showing the locations of Pipe Outfalls in Coolbranch Area



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Channel Alterations

Channel alterations are sections where the stream's banks or channel are significantly altered from their naturally occurring structure or condition. These channelized streams are straightened, deepened, and/or the banks hardened using rock, gabion baskets or concrete over a significant length of stream (usually 100 feet or more). Most frequently, channels are altered to decrease the likelihood of flooding by increasing the stream velocity through an area, making stream channelization more common near development or roadways. On Maryland's Eastern Shore, earth channels also are created for drainage purposes.

For the purposes of this survey, there are two types of channel alternations *not* recorded. The first are tributaries where the entire stream branch is piped underground and storm drains replace the stream channel. While these stream sections are significantly altered, it is not possible to know precisely where this was done by walking the stream corridor. Secondly, crews do not specifically record road crossings unless a significant portion of the stream above or below the road is channelized.

Results of this survey show recognizably altered stream channels at 4 sites. The severity and location of channel alteration sites is shown in Figure 9a and 9b. The total length of stream affected by channelization is estimated to be 240 feet (0.05 miles). All the sites were rated as minor.

Restoring channel alteration sites can increase fish and wildlife habitat and may allow for more time for nutrient uptake in the waterway. In its simplest form, restoration for earth channels would include allowing vegetation and/or tree roots to stabilize the sediment along the channel, causing sinuosity to re-form naturally. This sinuosity may reform within the bed of the channelization or along its banks, depending on the site and the depth of the channel alteration.

Channel Alterations Big Branch

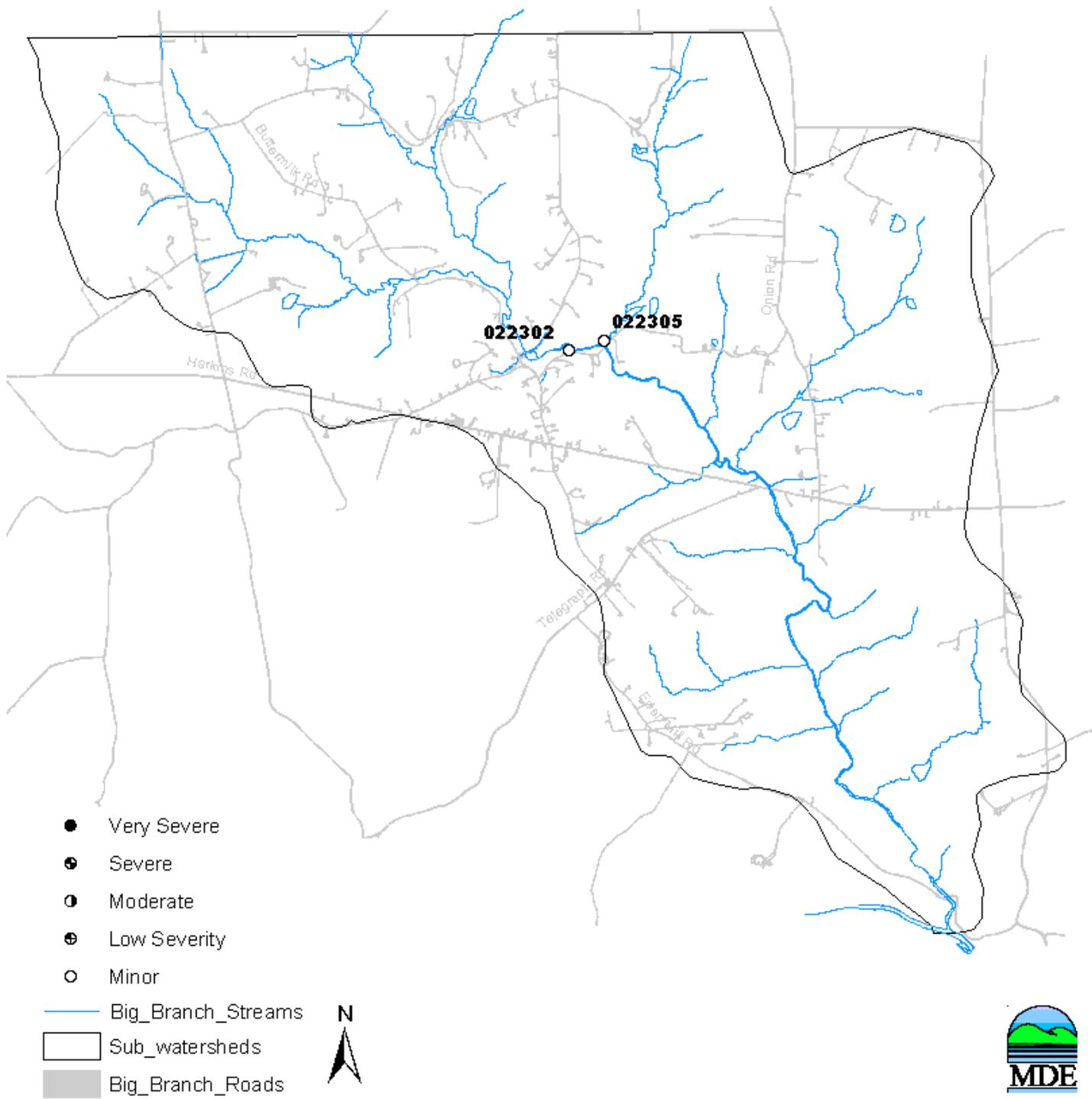


Figure 9a: Map showing the locations of Channel Alterations in Big Branch



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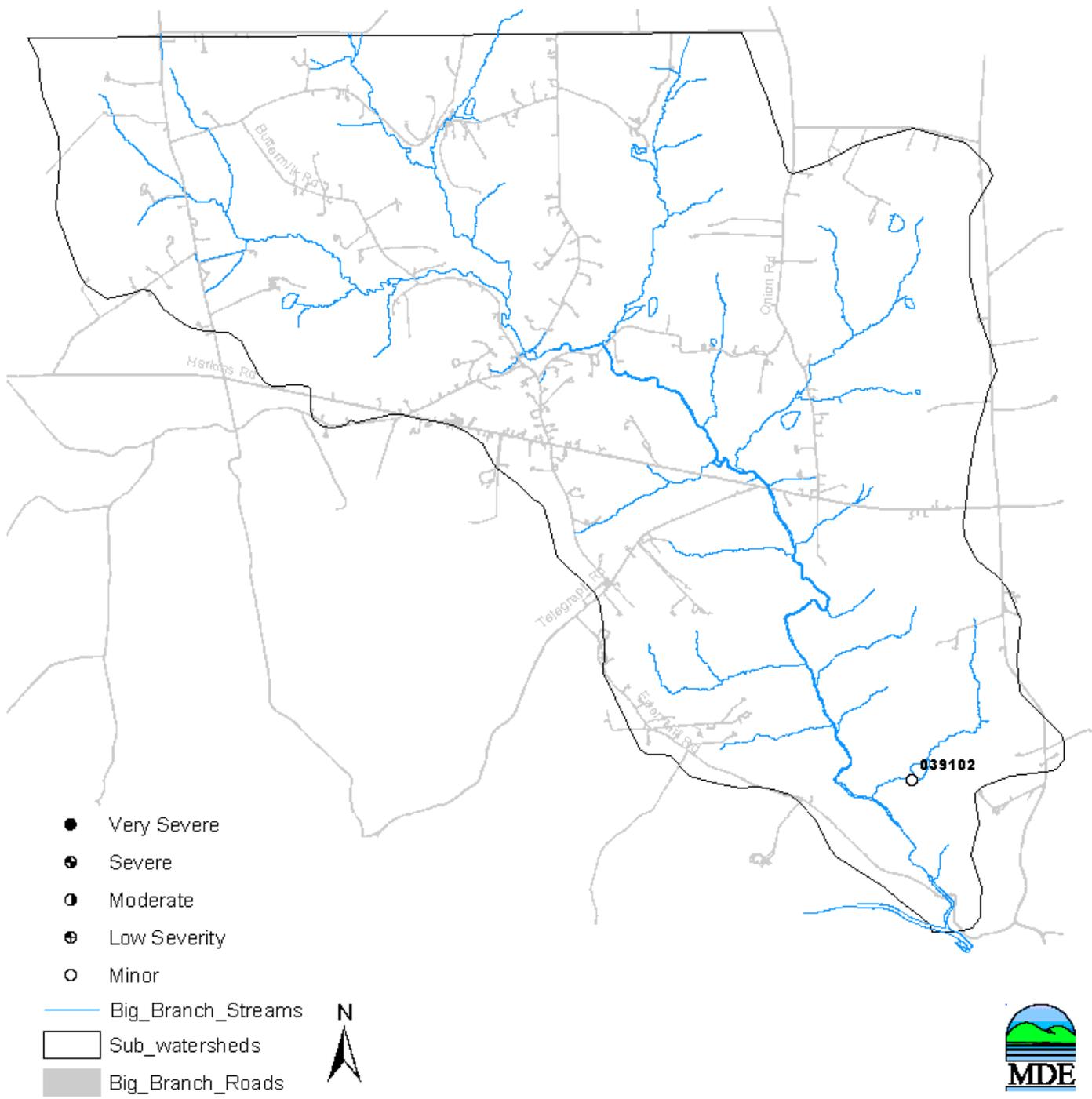


Trash Dumping

Trash dumping sites are places where large amounts of trash are inside the stream corridor; either as a site of deliberate dumping or as a place where trash tends to accumulate (often a result of storm drainage). Site severity rankings are based on size, contents of trash, and potential impact on the stream.

Survey crews found four trash dumping sites (Figure 10a, and 10b). Site 039102 was a dumping site for residential trash. It was given a minor severity rating. Site 063205 was residential trash. It was rated moderate in severity and had 5 truckloads of trash. Site 111104 was a dumping site for residential trash. It was given a low severity rating. Site 139101 had 1 truckload of metal barrels, and was given a minor severity rating.

Trash Dumping Sites Big Branch



0 650 1,300 2,600 3,900 5,200 Feet

Figure 10a: Map showing the locations of Trash Dumping Sites in Big Branch



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Trash Dumping CoolBranch Run Area

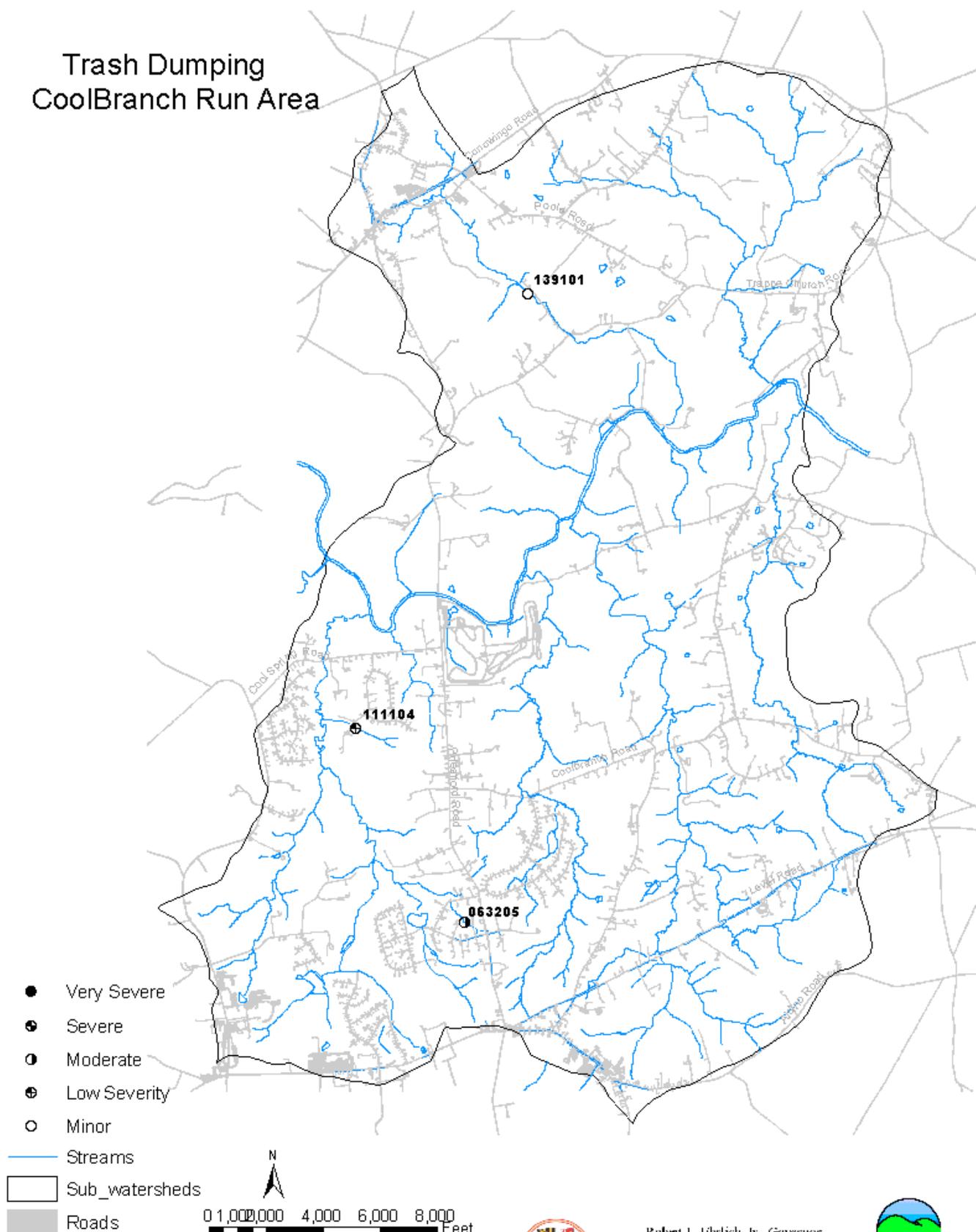


Figure 10b: Map showing the locations of Trash Dumping Sites in Coolbranch Area



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Exposed Pipes

Any pipes that are in the stream or along the stream's immediate banks that could be damaged by a high flow event are recorded as exposed pipes in the SCA survey. Exposed pipes 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 bed and were exposed by stream down-cutting, and 4) pipes built over a stream that are low enough to be affected by frequent high storm flows. Exposed pipes do not include pipe outfalls, where only the open end of the pipe is exposed to the stream bed.

In urban areas, it is very common for pipelines and other utilities to be placed in the stream corridor. This is especially true for gravity sewage lines, which depend on the continuous downward slope of the pipeline to move sewage to a pumping station or treatment plant. Since streams flow through 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 migrate to different areas within the floodplain. Over time, this variance in stream location can expose previously buried pipelines, making them vulnerable to puncture by debris in the stream. Fluids in the pipelines can be discharged into the stream, causing a serious water quality problem.

Field crews observed 2 exposed pipes during the survey. One pipe was rated moderate in severity and the other was rated low severity. Locations of these sites are shown in Figure 11.

Exposed Pipes CoolBranch Run Area

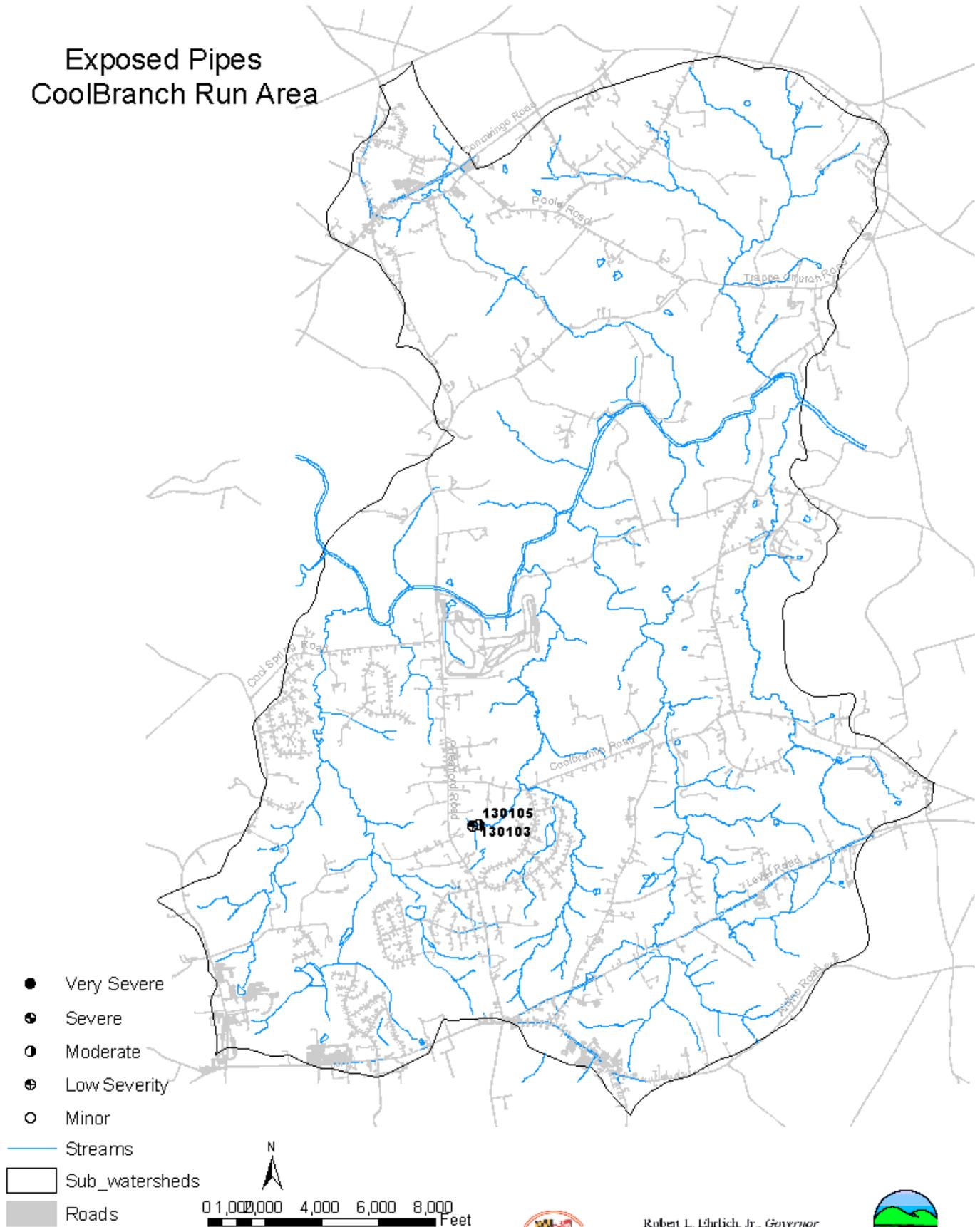


Figure 11: Map showing the locations of Exposed Pipes in Coolbranch Area



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Unusual Conditions or Comments

Survey teams record unusual conditions or comments to note the location of anything out of the ordinary observed during the survey or to provide additional written comments on a specific problem site. The survey crew identified 2 unusual conditions and 4 comments. The severity and location of unusual condition sites is shown in Figure 12.

The first unusual condition was where there was a red iron colored area of the stream. The other site was where there was excess sediment downstream of where there were ATV tracks.

Comment sites include data on places where survey crews encountered a stream dried up, pond breach created heavily eroded and unstable banks, a drainage ditch, and at the Exposed pipe Site 130105, the pipe may no longer be in use.

Unusual Conditions CoolBranch Run Area

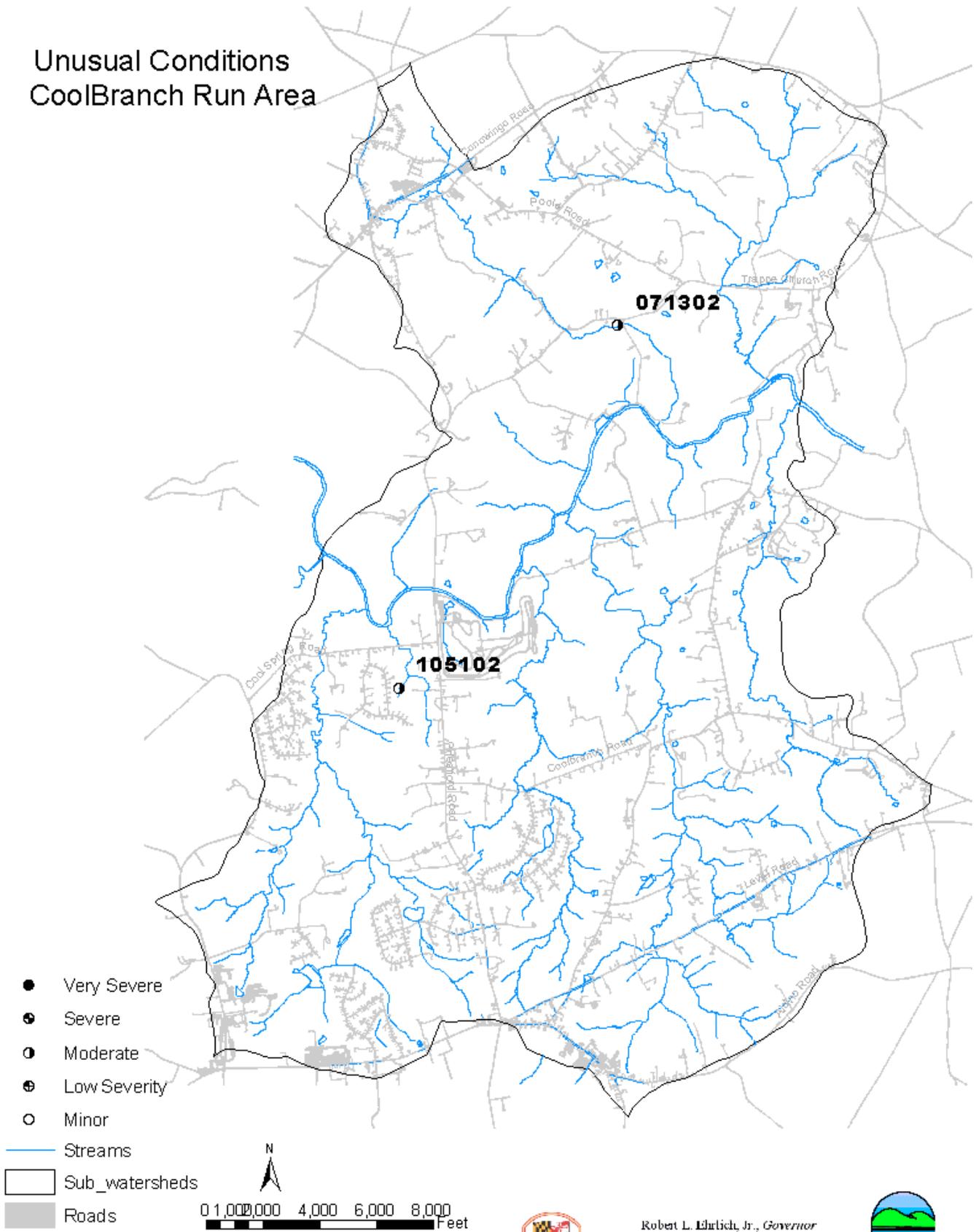


Figure 12: Map showing the locations of Unusual Conditions in Coolbranch Area



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Representative Sites

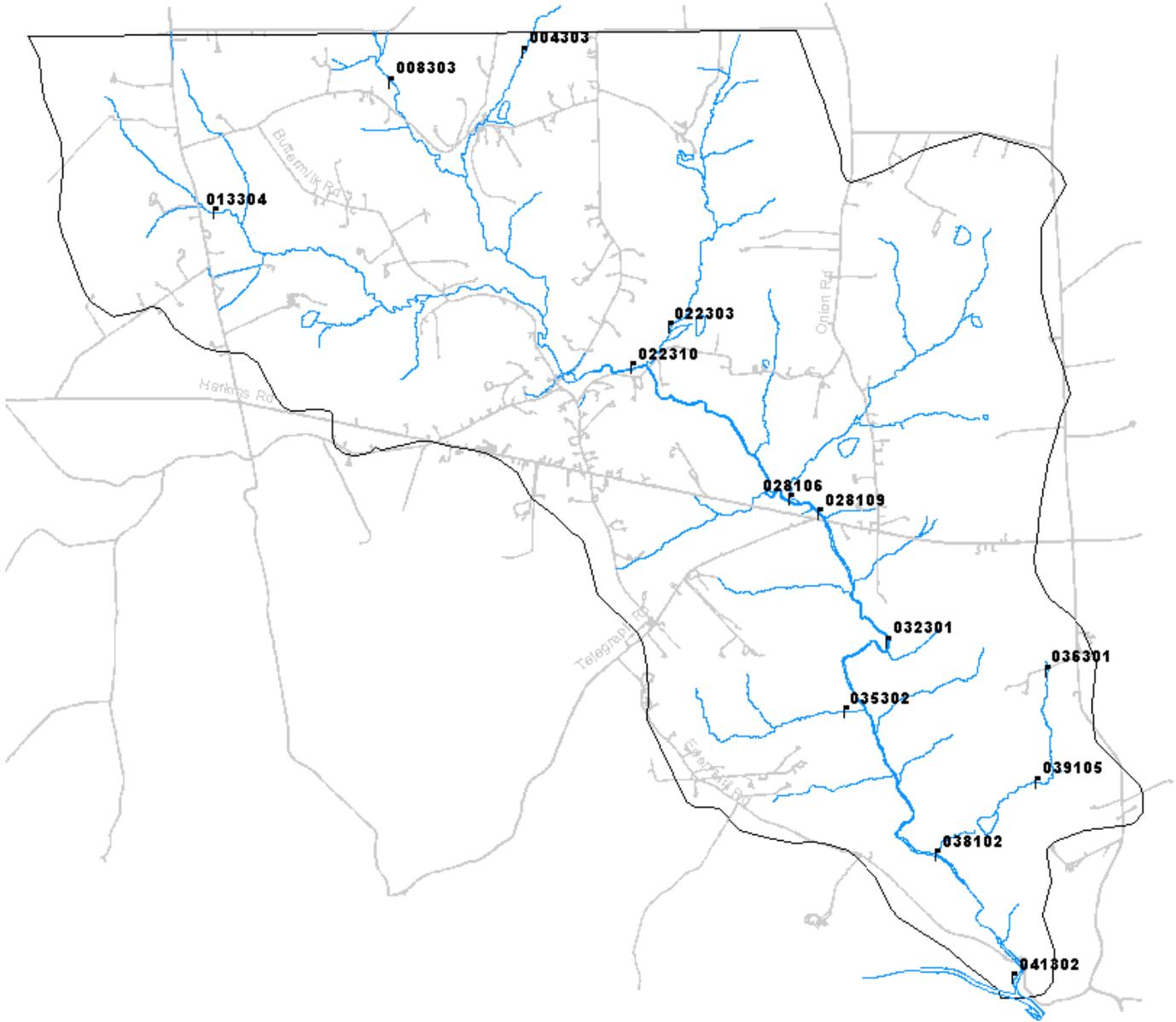
Representative sites are used to document the general condition of both in-stream habitat and the adjacent riparian corridor (including and up to 50 feet beyond the stream bank). The SCA survey's representative site evaluations are based on the habitat assessment procedures outlined in EPA's rapid bioassessment protocols (Plafkin, et. al., 1989), and they are very similar to the habitat evaluations of Maryland Save-Our-Stream's Heartbeat Program. At each representative site, the following 10 separate categories related to stream habitat health are evaluated:

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

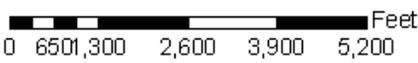
Under each category, field crews base a rating of optimal, suboptimal, marginal or poor on established grading criteria developed to reflect ideal wildlife habitat for rocky bottom streams. In addition to the habitat ratings, teams collect data on the stream's wetted width and pool depths at both runs and riffles at each representative site. Depth measurements are taken along the stream thalweg (main flow channel). At representative sites, field crews also indicate whether the bottom sediments are primarily silt, sand, gravel, cobble, boulder, or bedrock. Representative sites are located at approximately ½- to one-mile intervals along the stream. Survey crews evaluated 28 representative sites in the Deer Creek sub-watersheds.

Attachment sites for macroinvertebrates rated mostly optimal to suboptimal. Embeddedness was found to be mostly suboptimal. The bottom of some streams were covered in sand or silt. Shelter for fish was varied from stream to stream and even locations on the same stream. Channel Alteration rates the amount of man-made changes to the stream channel. Only three of the representative sites indicate that there was some alteration to the channel. There was some sediment deposition at the some of the representative sites but most were found to be optimal or suboptimal. The condition of the banks were rated to be mostly optimal or suboptimal. There were a few areas of erosion but these were small. For riparian vegetative zone width the sites were rated to be mainly optimal. This indicates in the spots where the representative sites were, the areas were forested. There were areas where the rating was marginal or poor.

Representative Sites Big Branch



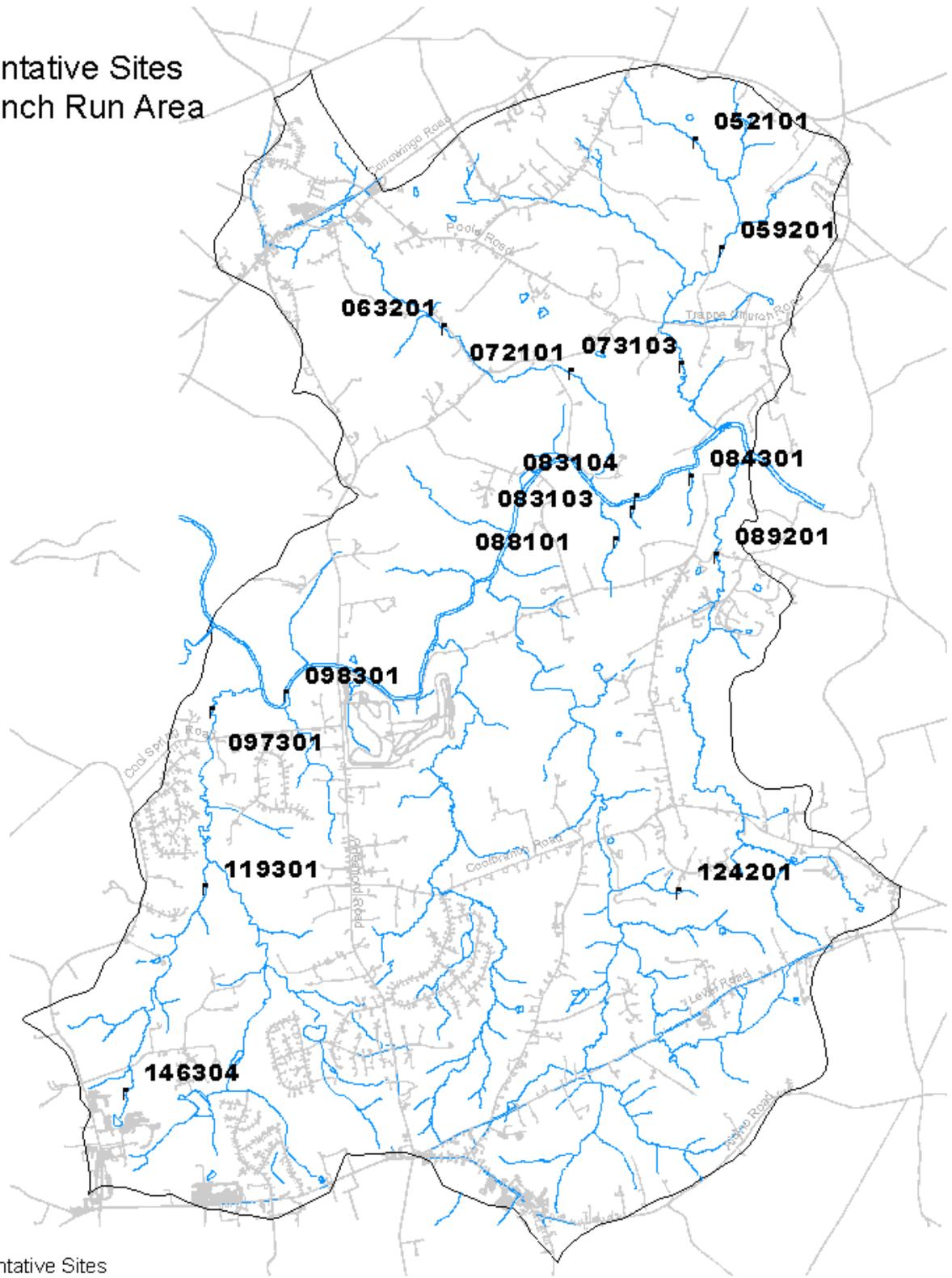
- Representative Sites
- Big_Branch_Streams
- Sub_watersheds
- Big_Branch_Roads



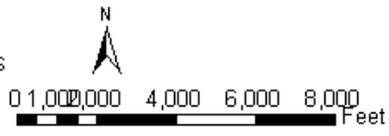
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Figure 13a: Map showing the locations of Representative Sites in Big Branch

Representative Sites CoolBranch Run Area



- ▣ Representative Sites
- Streams
- ▭ Sub_watersheds
- ▭ Roads



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Figure 13b: Map showing the locations of Representative Sites in Coolbranch Area

DISCUSSION

The results of the Deer Creek SCA survey list, summarize, and show the location of the observable environmental problems along the stream corridor network in this watershed. Each potential problem site has a corresponding ranking for severity, correctability, and access and a photograph of the site. The data from this effort can be used to target future restoration efforts. After this list of potential problem sites 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. In addition, this data can be combined with other GIS data and local information to prioritize areas for restoration.

The GIS and attribute data for the sites described in the SCA survey can be combined with other existing GIS datasets to even further prioritize areas for restoration. Projects can be further targeted to restoring areas where rare or threatened species, gaps in continuous forest or the state's Green Infrastructure, or quality fish and wildlife habitat are found. In addition, sites can be prioritized for restoration based on their location in headwater areas, streams that deposit directly into the Chesapeake Bay, areas of specific local interest, or sites where the surrounding land use is particularly suited to restoration projects.

As mentioned earlier, the Maryland Department of Environment has formed a partnership with Harford County to develop a Watershed Restoration Action Strategy (WRAS) for the Deer Creek watershed. Results from this survey will be combined with other GIS data and local 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. The value of the present survey is its help in placing individual stream problems into their watershed context and its potential common use among resource managers and land-use planners to cooperatively and consistently prioritize future restoration work. Results of the present survey will be given to the Deer Creek Watershed WRAS committee, which is developing a Watershed Restoration Action Strategy for the Deer Creek. Information on the Watershed Action Strategy can be found on the Department of Natural Resources' website (www.dnr.maryland.gov/wras).

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Appendix A: Listing of sites by site number

Appendix A- Deer Creek

Site	Problem	Severity	Correctability	Access	X-Coord	Y-Coord	Stream
004301	Inadequate Buffer	3	1	3	444299.79008	228182.69363	Big Branch
004302	Erosion	3	3	3	444299.55054	228180.86695	Big Branch
004303	Representative Site				444250.84777	228082.05564	Big Branch
007301	Fish Barrier	5	3	1	442149.88266	227727.90307	Big Branch
007302	Erosion	5	2	2	442193.92527	227627.56162	Big Branch
007303	Inadequate Buffer	1	3	3	442137.47556	227761.81302	Big Branch
008301	Fish Barrier	5	1	1	443635.88282	227721.78360	Big Branch
008302	Erosion	3	3	3	443631.72038	227732.45119	Big Branch
008303	Representative Site				443559.79270	227924.52490	Big Branch
009301	Inadequate Buffer	4	1	2	444203.78882	227991.67380	Big Branch
009302	Fish Barrier	5	1	3	444136.40120	227850.14785	Big Branch
013301	Erosion	3	2	1	442288.51255	227108.02846	Big Branch
013302	Inadequate Buffer	1	3	1	442288.51255	227108.02846	Big Branch
013303	Fish Barrier	5	3	1	442557.49504	227272.64309	Big Branch
013304	Representative Site				442647.29796	227244.15654	Big Branch
013305	Erosion	3	3	3	442564.61134	227273.97016	Big Branch
013306	Erosion	4	2	3	442802.38340	227264.33332	Big Branch
014101	Fish Barrier	3	4	1	443834.38792	226817.98873	Big Branch
014102	Erosion	4	3	3	443828.77132	226817.59357	Big Branch
014103	Inadequate Buffer	1	4	3	443419.61084	226883.04268	Big Branch
014104	Erosion	4	4	3	443335.32716	226972.51225	Big Branch
015101	Erosion	3	3	3	444357.52589	226770.92199	Big Branch
015102	Fish Barrier	5	2	3	444365.92047	226828.17324	Big Branch
018101	Fish Barrier	5	1	2	446636.17863	227118.79363	Big Branch
018102	Erosion	4	3	2	446626.81145	227089.76322	Big Branch
021101	Erosion	4	2	2	444380.71761	226339.38258	Big Branch
021102	Erosion	3	3	2	444339.93085	226609.45079	Big Branch
021103	Inadequate Buffer	2	3	2	444339.52285	226609.87436	Big Branch
021301	Erosion	3	4	3	444446.92364	226386.84802	Big Branch
021302	Inadequate Buffer	5	1	1	444602.86561	226419.55711	Big Branch
022101	Fish Barrier	4	3	2	445541.61743	226426.92992	Big Branch
022102	Inadequate Buffer	5	3	2	445539.75215	226417.67856	Big Branch
022103	Erosion	5	3	2	445553.19996	226514.16202	Big Branch
022301	Inadequate Buffer	5	5	1	444699.26212	226417.52998	Big Branch
022302	Channel Alteration	5	5	1	444699.26212	226417.52998	Big Branch
022303	Representative Site				445008.90874	226649.90169	Big Branch
022304	Inadequate Buffer	3	4	1	444891.44540	226426.95466	Big Branch
022305	Channel Alteration	5	3	1	444889.91685	226469.97709	Big Branch
022306	Inadequate Buffer	3	3	1	444880.86032	226458.22756	Big Branch
022307	Erosion	4	3	2	444880.86032	226458.22756	Big Branch
022308	Fish Barrier	3	3	1	444977.27986	226575.51363	Big Branch
022309	Fish Barrier	5	1	1	444998.24815	226607.36452	Big Branch
022310	Representative Site				444816.22836	226437.52407	Big Branch
028101	Inadequate Buffer	4	3	2	446176.29310	226153.92494	Big Branch
028102	Fish Barrier	4	5	2	446039.48954	226140.05116	Big Branch
028103	Erosion	2	4	4	446030.99441	226140.24319	Big Branch
028104	Inadequate Buffer	5	3	2	446031.89871	226140.17864	Big Branch
028105	Fish Barrier	5	2	3	445847.33050	226068.21585	Big Branch
028106	Representative Site				445637.64703	225755.50600	Big Branch
028107	Inadequate Buffer	5	2	3	445619.80571	225741.36260	Big Branch
028108	Erosion	4	3	3	445578.63590	225768.98891	Big Branch

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Site	Problem	Severity	Correctability	Access	X-Coord	Y-Coord	Stream
028109	Representative Site				445786.72708	225679.29676	Big Branch
031301	Fish Barrier	5	2	3	445542.39643	225291.16554	Big Branch
031302	Inadequate Buffer	5	2	1	445460.38366	225271.64240	Big Branch
031303	Erosion	5	2	1	445481.58002	225278.07875	Big Branch
032301	Representative Site				446139.11985	225015.17422	Big Branch
032302	Fish Barrier	5	2	4	446033.82174	225137.09048	Big Branch
032303	Fish Barrier	5	3	4	445992.96640	225137.58252	Big Branch
032304	Erosion	4	2	4	445958.35841	225230.32801	Big Branch
032305	Erosion	5	2	3	445938.38907	225257.83279	Big Branch
032306	Fish Barrier	5	3	4	445864.16465	225301.02059	Big Branch
034301	Inadequate Buffer	5	2	2	445175.93658	224659.01828	Big Branch
034302	Erosion	3	4	3	445194.98614	224597.04258	Big Branch
034303	Inadequate Buffer	5	1	2	445461.01759	224661.66302	Big Branch
034304	Fish Barrier	3	4	3	445465.18536	224654.35062	Big Branch
034305	Erosion	5	1	2	445480.33939	224630.55685	Big Branch
035301	Fish Barrier	4	2	2	445711.85472	224622.09957	Big Branch
035302	Representative Site				445918.80854	224650.07705	Big Branch
035303	Inadequate Buffer	5	1	2	446014.32481	224665.61870	Big Branch
035304	Fish Barrier	5	1	2	445997.96374	224692.76516	Big Branch
035305	Fish Barrier	5	2	4	445913.72884	224878.83889	Big Branch
035306	Fish Barrier	5	2	4	445935.87764	224935.61910	Big Branch
036301	Representative Site				446963.20619	224862.96425	Big Branch
036302	Inadequate Buffer	4	1	1	446962.74408	224875.13136	Big Branch
038101	Erosion	4	3	4	446535.08125	223758.63933	Big Branch
038102	Representative Site				446396.04084	223903.34069	Big Branch
038103	Fish Barrier	5	2	4	446388.93438	223918.67665	Big Branch
038104	Erosion	5	2	4	446450.22731	223990.10409	Big Branch
038105	Fish Barrier	5	2	4	446491.09423	224003.17918	Big Branch
038301	Erosion	5	4	4	446267.29985	224101.38051	Big Branch
039101	Inadequate Buffer	1	3	3	446573.98744	224018.16542	Big Branch
039102	Trash Dumping	5	2	3	446614.68821	224013.82270	Big Branch
039103	Comment				446614.68821	224013.82270	Big Branch
039103	Erosion	3	3	3	446615.18315	224046.96142	Big Branch
039104	Erosion	3	3	3	446705.57000	224157.51181	Big Branch
039105	Representative Site				446915.86207	224283.60716	Big Branch
039106	Fish Barrier	5	2	3	446965.60902	224302.22850	Big Branch
039107	Erosion	4	3	2	446997.99381	224342.32268	Big Branch
041101	Inadequate Buffer	1	2	1	446795.37833	223373.33114	Big Branch
041301	Inadequate Buffer	2	2	1	446815.83334	223353.28162	Big Branch
041302	Representative Site				446796.47785	223266.30565	Big Branch
044101	Fish Barrier	5	3	2	466490.73935	220231.27176	Hollands Branch
045101	Fish Barrier	5	1	3	466713.06199	220187.22711	Hollands Branch
048201	Inadequate Buffer	5	1	1	463650.00061	219791.19654	Hopkins Branch
052101	Representative Site				466971.46743	220010.71347	Hollands Branch
052102	Fish Barrier	5	3	3	467113.83474	219760.47161	Hollands Branch
052103	Erosion	3	2	3	467027.54130	219935.89855	Hollands Branch
052104	Erosion	3	3	3	467266.03495	219641.73395	Hollands Branch
052105	Inadequate Buffer	5	1	2	467396.75281	219800.62142	Hollands Branch
053201	Erosion	5	2	3	468084.97371	219771.90118	Hollands Branch
053202	Fish Barrier	5	1	1	468006.66189	219695.46146	Hollands Branch
053203	Fish Barrier	4	1	1	467730.23196	219529.09148	Hollands Branch

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Site	Problem	Severity	Correctability	Access	X-Coord	Y-Coord	Stream
053204	Fish Barrier	4	2	2	467691.90965	219475.96322	Hollands Branch
054101	Comment				462938.90859	219028.18404	Hopkins Branch
054101	Pipe Outfall	5	1	1	462939.11788	219028.43589	Hopkins Branch
059201	Representative Site				467218.94994	218968.67014	Hollands Branch
059202	Erosion	3	5	4	467193.28159	218935.26233	Hollands Branch
060201	Erosion	4	3	2	467658.38695	219432.99429	Hollands Branch
060202	Inadequate Buffer	4	3	4	467658.95522	219351.78583	Hollands Branch
063201	Representative Site				464593.04615	218227.34557	Hopkins Branch
063202	Fish Barrier	5	1	2	464421.96141	218355.33232	Hopkins Branch
063203	Erosion	3	2	2	464411.24904	218357.25791	Hopkins Branch
063204	Fish Barrier	5	2	2	464305.90267	218251.96328	Hopkins Branch
063205	Trash Dumping	3	3	3	463870.72310	211508.47712	Tobacco Run
067201	Inadequate Buffer	1	1	1	466671.39828	218301.12494	Hollands Branch
067202	Fish Barrier	4	3	1	467059.57460	218288.08482	Hollands Branch
067301	Inadequate Buffer	5	1	1	467481.85149	218550.94957	Hollands Branch
068301	Pipe Outfall	3	3	3	467655.12085	218527.13355	Hollands Branch
070301	Erosion	3	3	1	464729.57919	218143.68486	Hopkins Branch
071101	Erosion	4	2	3	465667.31277	217877.18468	Hopkins Branch
071301	Inadequate Buffer	2	2	1	465599.47896	217888.33233	Hopkins Branch
071302	Unusual Condition	3	5	1	465560.41987	217866.29864	Hopkins Branch
071303	Fish Barrier	5	1	1	464887.45059	217889.99460	Hopkins Branch
072101	Representative Site				465792.04268	217803.93013	Hopkins Branch
073101	Erosion	2	4	2	466780.54884	218108.47110	Hollands Branch
073102	Inadequate Buffer	1	3	2	466781.19913	218102.20560	Hollands Branch
073103	Representative Site				466844.18046	217876.59696	Hollands Branch
077101	Fish Barrier	4	3	2	465674.83647	217021.72943	Unnamed Trib 4
077102	Inadequate Buffer	1	2	2	465673.27741	217030.92692	Unnamed Trib 4
081201	Inadequate Buffer	5	1	2	464656.32075	216451.87260	Unnamed Trib 3
083101	Fish Barrier	5	2	3	466072.09200	216543.72959	Unnamed Trib 6
083102	Erosion	3	3	3	466075.04714	216579.63395	Unnamed Trib 6
083103	Representative Site				466373.00890	216490.71716	Unnamed Trib 7
083104	Representative Site				466413.83765	216618.70284	Deer Creek
083105	Inadequate Buffer	3	2	2	466068.47089	216629.61201	Deer Creek
084301	Representative Site				466932.99452	216800.84386	Unnamed Trib 8
084302	Erosion	3	4	4	466931.21972	216745.03053	Unnamed Trib 8
086101	Fish Barrier	5	3	2	464573.04894	215941.79283	Unnamed Trib 2
087101	Fish Barrier	5	2	3	464875.30353	215828.35328	Unnamed Trib 2
087102	Erosion	3	4	2	464873.47803	215835.31261	Unnamed Trib 2
087103	Inadequate Buffer	5	3	2	464869.85979	215852.41623	Unnamed Trib 2
088101	Representative Site				466217.43784	216200.73656	Unnamed Trib 6
088102	Inadequate Buffer	5	2	3	466242.60707	216219.69290	Unnamed Trib 6
089201	Representative Site				467169.12873	216056.18288	Graveyard Creek
089202	Inadequate Buffer	3	2	2	467182.30919	216030.45175	Graveyard Creek
089203	Erosion	3	3	2	467182.39837	216030.37325	Graveyard Creek
092101	Erosion	4	4	3	464737.99462	215202.23827	CoolBranch Run
092102	Erosion	3	4	3	464499.31787	215245.32701	Deer Creek
093101	Erosion	3	3	3	465019.62916	215845.45176	Mill Brook
093102	Inadequate Buffer	3	3	3	465263.54681	215328.56053	Mill Brook
093103	Erosion	3	4	3	465321.72978	215265.78809	Mill Brook
093104	Inadequate Buffer	3	3	2	465607.40374	215557.12024	Mill Brook
093105	Erosion	4	2	2	465584.67432	215571.31104	Mill Brook

Appendix A- Deer Creek

Site	Problem	Severity	Correctability	Access	X-Coord	Y-Coord	Stream
095201	Inadequate Buffer	3	1	1	467141.51798	215632.43801	Graveyard Creek
095202	Inadequate Buffer	1	3	1	467409.57233	215360.68299	Graveyard Creek
097301	Representative Site				462383.10504	214593.31330	Tobacco Run
097302	Inadequate Buffer	4	3	3	462884.08706	214696.52560	Deer Creek
098301	Representative Site				463088.77508	214740.65223	Deer Creek
098302	Inadequate Buffer	5	2	3	463080.87344	214815.63882	Deer Creek
098303	Inadequate Buffer	1	3	3	463282.86517	215046.50254	Unnamed Trib 1
099101	Pipe Outfall	3	1	3	464802.35350	215087.14153	CoolBranch Run
099102	Erosion	4	3	3	464782.26820	214744.76073	CoolBranch Run
104301	Inadequate Buffer	2	3	3	462342.62023	214337.82620	Tobacco Run
104302	Erosion	3	3	3	462342.62023	214337.82620	Tobacco Run
105101	Erosion	3	3	3	463249.62423	214015.20940	Unnamed Trib 5
105102	Unusual Condition	3	1	2	463207.52341	213970.04040	Unnamed Trib 5
106101	Pipe Outfall	3	3	2	464347.71678	214002.86211	CoolBranch Run
106102	Inadequate Buffer	1	2	2	464379.09704	214038.32486	CoolBranch Run
106103	Erosion	4	2	3	464487.00833	214126.53103	CoolBranch Run
106104	Pipe Outfall	3	3	2	464514.80648	214187.04927	CoolBranch Run
106105	Erosion	4	2	3	464463.87234	214026.27397	CoolBranch Run
109201	Fish Barrier	5	2	1	466942.40218	214462.85788	Graveyard Creek
109202	Inadequate Buffer	2	1	3	466948.76942	214424.09509	Graveyard Creek
109203	Erosion	3	2	3	466930.56602	214488.47541	Graveyard Creek
111101	Inadequate Buffer	4	1	3	462321.54573	213662.91608	Tobacco Run
111102	Erosion	4	2	2	462315.91171	213648.42910	Tobacco Run
111103	Inadequate Buffer	3	2	2	462660.41916	213623.20952	Tobacco Run
111104	Trash Dumping	4	1	2	462707.85308	213597.92415	Tobacco Run
112101	Fish Barrier	3	1	2	463196.65875	213908.11086	Unnamed Trib 5
112102	Erosion	3	3	2	463513.28877	213515.57103	Unnamed Trib 5
112103	Inadequate Buffer	1	2	2	463540.83108	213618.18804	Unnamed Trib 5
112104	Fish Barrier	4	1	2	463489.44402	213677.08636	Unnamed Trib 5
113101	Erosion	3	3	3	464489.39187	213830.42584	CoolBranch Run
115201	Erosion	3	3	2	466045.75547	213381.65035	Mill Brook
115202	Inadequate Buffer	1	1	1	466045.75547	213381.65035	Mill Brook
116201	Inadequate Buffer	3	1	1	467522.50546	213596.31601	Graveyard Creek
116202	Erosion	5	3	1	467522.50546	213596.31601	Graveyard Creek
119301	Representative Site				462322.87755	212901.21543	Tobacco Run
119302	Inadequate Buffer	3	3	3	462525.86973	213011.85640	Tobacco Run
121101	Inadequate Buffer	3	2	2	464480.91043	212859.15433	CoolBranch Run
121102	Erosion	3	3	2	464550.71498	212874.05007	CoolBranch Run
121104	Inadequate Buffer	3	2	2	464472.48586	213057.97469	CoolBranch Run
122101	Erosion	3	3	2	465015.00831	212723.60677	CoolBranch Run
122102	Inadequate Buffer	5	2	3	464987.35762	212734.43919	CoolBranch Run
124201	Representative Site				466810.27856	212869.50330	Mill Brook
128301	Fish Barrier	5	1	3	462113.75061	212499.78344	Tobacco Run
128302	Erosion	4	3	3	462108.50842	212494.65237	Tobacco Run
128303	Inadequate Buffer	3	1	3	462215.33481	212686.96739	Tobacco Run
130101	Pipe Outfall	5	1	3	464006.18922	212204.24081	CoolBranch Run
130102	Erosion	3	4	3	464005.91769	212278.31157	CoolBranch Run
130103	Exposed Pipe	4	3	2	463982.36744	212468.53472	CoolBranch Run
130104	Erosion	5	3	2	463963.03197	212465.83334	CoolBranch Run
130105	Comment				464038.97981	212486.14647	CoolBranch Run
130105	Exposed Pipe	3	2	2	464038.97981	212486.14647	CoolBranch Run

Appendix A- Deer Creek

Site	Problem	Severity	Correctability	Access	X-Coord	Y-Coord	Stream
130106	Fish Barrier	5	3	2	464294.79275	212565.34610	CoolBranch Run
131101	Fish Barrier	5	3	2	464848.38272	212586.18345	CoolBranch Run
131102	Inadequate Buffer	5	1	2	464842.05100	212513.71511	CoolBranch Run
131103	Erosion	4	3	2	465104.01481	212247.11914	CoolBranch Run
134301	Inadequate Buffer	3	1	3	468149.40509	212367.53465	Graveyard Creek
138101	Erosion	3	4	3	462679.30395	211466.12667	Tobacco Run
138301	Erosion	3	3	2	462434.19396	212002.39310	Tobacco Run
138302	Inadequate Buffer	3	3	3	462434.19396	212002.39310	Tobacco Run
139101	Trash Dumping	5	1	4	464542.24754	218251.27046	Hopkins Branch
139102	Fish Barrier	5	3	2	463872.26588	211507.94643	Tobacco Run
140101	Comment				463956.12432	212009.26414	CoolBranch Run
140102	Erosion	4	3	2	464490.14900	211982.56929	CoolBranch Run
140103	Pipe Outfall	3	3	1	464318.83679	211855.54231	CoolBranch Run
140104	Erosion	4	3	3	464526.19003	211571.95926	CoolBranch Run
141101	Erosion	4	3	3	465036.83593	211775.35014	CoolBranch Run
142301	Inadequate Buffer	3	1	1	465780.84814	211795.12949	Mill Brook
146301	Erosion	5	3	2	461541.72955	211123.79527	Tobacco Run
146302	Fish Barrier	5	1	1	461618.85995	211131.76949	Tobacco Run
146303	Erosion	4	2	2	461620.39286	211119.98615	Tobacco Run
146304	Representative Site				461564.08973	210959.30231	Tobacco Run
147101	Erosion	4	3	3	462696.41100	210982.60825	Tobacco Run
147102	Channel Alteration	5	3	2	462179.49144	211008.75054	Tobacco Run
147103	Fish Barrier	3	5	2	462334.70919	210936.34955	Tobacco Run
148101	Erosion	5	3	2	463836.06908	211041.09809	Tobacco Run
154301	Erosion	3	4	2	462079.53639	210673.18987	Tobacco Run
154302	Channel Alteration	5	2	3	462039.20172	210669.55455	Tobacco Run
154303	Fish Barrier	5	2	2	461800.17964	210421.09143	Tobacco Run
154304	Pipe Outfall	4	3	2	461712.96940	210372.35084	Tobacco Run
154305	Erosion	5	2	1	461590.55951	210377.39406	Tobacco Run
154306	Inadequate Buffer	5	1	1	461590.55951	210377.39406	Tobacco Run
155101	Inadequate Buffer	4	2	2	462252.72900	210825.45040	Tobacco Run
156101	Fish Barrier	5	4	1	463062.04962	210442.06656	Tobacco Run
156102	Fish Barrier	4	4	2	463081.25870	210435.98368	Tobacco Run
156103	Erosion	3	3	2	463078.98876	210525.70697	Tobacco Run
156104	Inadequate Buffer	5	2	2	463073.62727	210444.82273	Tobacco Run
156106	Inadequate Buffer	4	2	3	463124.11048	210371.97603	Tobacco Run
156107	Pipe Outfall	3	2	2	462980.79729	210354.47910	Tobacco Run
156108	Erosion	5	3	2	463002.15425	210400.60614	Tobacco Run
158301	Inadequate Buffer	5	1	3	465228.48341	210886.87680	Mill Brook
163101	Erosion	5	3	2	462995.71476	210172.46438	Tobacco Run
163102	Inadequate Buffer	4	2	2	463039.25868	210128.55751	Tobacco Run

Appendix B: Listing of sites by problem category

Erosion

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Landuseleft	Landuseright	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	028103	Widening	Bend at steep slope	2800	4	Pasture	Trees	No		2	4	4
Erosion	073101	Widening	Bend at steep slope	2000	4	Pasture	Pasture	No		2	4	2
Erosion	004302	Widening	Unknown	2000	3	Forest	Trees	No		3	3	3
Erosion	008302	Widening	Unknown	700	3	Trees	Forest	No		3	3	3
Erosion	013301	Downcutting	Livestock	1000	3	Pasture	Pasture	No		3	2	1
Erosion	013305	Widening	Unknown	1500	3	Forest	Lawn	No		3	3	3
Erosion	015101	Widening	Unknown	700	3	Forest	Crop field	No		3	3	3
Erosion	021102	Widening	Bend at steep slope	700	4	Multiflora Rose	Multiflora Rose	No		3	3	2
Erosion	021301	Widening	Unknown	3000	3	Forest	Forest	Yes	Neal Road	3	4	3
Erosion	034302	Widening	Bend at steep slope	3200	3	Forest	Forest	No		3	4	3
Erosion	039103	Downcutting	Land use change	350	6	Crop field	Pasture	No		3	3	3
Erosion	039104	Widening	Bend at steep slope	1400	3	Trees	Forest	No		3	3	3
Erosion	052103	Downcutting	Bend at steep slope	2000	2	Forest	Forest	No		3	2	3
Erosion	052104	Downcutting	Bend at steep slope	2000	1.5	Forest	Forest	No		3	3	3
Erosion	059202	Widening	Bend at steep slope	100	25	Forest	Forest	No		3	5	4
Erosion	063203	Widening	Bend at steep slope	2000	3	Forest	Forest	No		3	2	2
Erosion	070301	Downcutting	Bend at steep slope	50	20	Forest	Forest	No		3	3	1
Erosion	083102	Widening	Bend at steep slope	100	10	Forest	Forest	No		3	3	3
Erosion	084302	Widening	Bend at steep slope	1500	3	Forest	Forest	No		3	4	4
Erosion	087102	Downcutting	upstream	1000	5	Pasture	Pasture	No		3	4	2
Erosion	089203	Widening	Bend at steep slope	2250	4	Lawn	Lawn	No		3	3	2
Erosion	092102	Widening	Bend at steep slope	1900	5	Forest	Forest	No		3	4	3
Erosion	093101	Widening	Bend at steep slope	1250	5	Pasture	Pasture	No		3	3	3
Erosion	093103	Widening	Bend at steep slope	1500	4	Crop field	Trees	No		3	4	3
Erosion	104302	Unknown	Unknown	5750	3	Pasture	Pasture	No		3	3	3
Erosion	105101	Widening	Bend at steep slope	600	4	Forest	Forest	No		3	3	3
Erosion	109203	Headcutting	Bend at steep slope	500	4	Pasture	Pasture	No		3	2	3
Erosion	112102	Widening	Livestock	1750	3	Forest	Forest	No		3	3	2
Erosion	113101	Widening	Bend at steep slope	900	4	Forest	Forest	No		3	3	3
Erosion	115201	Widening	Bend at steep slope	1500	5	Trees	Lawn	No		3	3	2
Erosion	121102	Downcutting	Unknown	1500	3	Lawn	Lawn	No		3	3	2

Erosion

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Landuseleft	Landuseright	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	122101	Widening	Bend at steep slope	1000	4	Forest	Forest	No		3	3	2
Erosion	130102	Widening	Unknown	2250	3	Forest	Forest	No		3	4	3
Erosion	138101	Widening	Unknown	700	3	Forest	Forest	No		3	4	3
Erosion	138301	Widening	Unknown	1800	3	Lawn	Trees	No		3	3	2
Erosion	154301	Downcutting	Below road crossing	2250	5	Forest	Forest	No		3	4	2
Erosion	156103	Widening	Bend at steep slope	800	3	Forest	Forest	No		3	3	2
Erosion	013306	Widening	Unknown	300	4	Trees	Trees	No		4	2	3
Erosion	014102	Widening	Unknown	400	3	Forest	Forest	No		4	3	3
Erosion	014104	Widening	Unknown	500	5	Lawn	Crop field	No		4	4	3
Erosion	018102	Widening	Bend at steep slope	250	4	Pasture	Trees	No		4	3	2
Erosion	021101	Widening	Bend at steep slope	300	3	Forest	Forest	No		4	2	2
Erosion	022307	Widening	Unknown	1500	2	Paved	Multiflora Rose	Yes	Neal Rd	4	3	2
Erosion	028108	Widening	Bend at steep slope	75	5	Pasture	Trees	No		4	3	3
Erosion	032304	Widening	Unknown	100	4.5	Forest	Forest	No		4	2	4
Erosion	038101	Widening	Bend at steep slope	250	2	Forest	Forest	No		4	3	4
Erosion	039107	Downcutting	Land use change	200	4	Forest	Forest	No		4	3	2
Erosion	060201	Downcutting	Unknown	250	3	Forest	Forest	No		4	3	2
Erosion	071101	Widening	Unknown	1000	2	Forest	Forest	No		4	2	3
Erosion	092101	Widening	Bend at steep slope	900	2	Forest	Forest	No		4	4	3
Erosion	093105	Widening	Bend at steep slope	700	2	Pasture	Trees	No		4	2	2
Erosion	099102	Widening	Unknown	1200	2	Forest	Forest	No		4	3	3
Erosion	106103	Widening	Livestock	500	2	Pasture	Pasture	No		4	2	3
Erosion	106105	Widening	Unknown	500	3	Pasture	Pasture	No		4	2	3
Erosion	111102	Widening	Bend at steep slope	400	4	Lawn	Lawn	No		4	2	2
Erosion	128302	Unknown	Bend at steep slope	4000	4	Forest	Forest	No		4	3	3
Erosion	131103	Widening	Bend at steep slope	300	3	Forest	Forest	No		4	3	2
Erosion	140102	Widening	Bend at steep slope	800	2	Forest	Forest	No		4	3	2
Erosion	140104	Headcutting	Bend at steep slope	750	2	Forest	Forest	No		4	3	3
Erosion	141101	Widening	Bend at steep slope	600	3	Forest	Forest	No		4	3	3
Erosion	146303	Widening	Bend at steep slope	478	2	Forest	Forest	No		4	2	2
Erosion	147101	Widening	Bend at steep slope	500	3	Trees	Trees	No		4	3	3

Erosion

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Landuseleft	Landuseright	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	007302	Widening	Bend at steep slope	250	4	Trees	Pasture	No		5	2	2
Erosion	022103	Widening	Unknown	400	1.5	Trees	Trees	No		5	3	2
Erosion	031303	Widening	Unknown	200	3	Trees	Trees	No		5	2	1
Erosion	032305	Downcutting	Unknown	200	2	Forest	Forest	No		5	2	3
Erosion	034305	Widening	Unknown	300	1	Forest	Forest	No		5	1	2
Erosion	038104	Widening	Bend at steep slope	500	4	Forest	Forest	No		5	2	4
Erosion	038301	Widening	Bend at steep slope	50	3.5	Forest	Forest	No		5	4	4
Erosion	053201	Widening	Bend at steep slope	25	4	Forest	Forest	No		5	2	3
Erosion	116202	Unknown	Livestock	500	4	Pasture	Pasture	No		5	3	1
Erosion	130104	Widening	Unknown	250	3	Forest	Forest	No		5	3	2
Erosion	146301	Downcutting	Bend at steep slope	250	1.5	Forest	Forest	No		5	3	2
Erosion	148101	Widening	Bend at steep slope	250	5	Forest	Forest	No		5	3	2
Erosion	154305	Downcutting	Bend at steep slope	650	4	Lawn	Lawn	No		5	2	1
Erosion	156108	Widening	Bend at steep slope	250	3	Trees	Trees	No		5	3	2
Erosion	163101	Downcutting	Unknown	100	2	Trees	Trees	No		5	3	2

Inadequate Buffers

Problem	Site	Sides	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	LandUseLeft	LandUseRight	Recently Established Buffer?	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	007303	Both	Both	0	0	3000	3500	Shrubs & small trees	Pasture	No	Cattle	1	3	3	4
Inadequate Buffer	013302	Both	Both	0	0	1000	1000	Pasture	Pasture	No	Cattle	1	3	1	5
Inadequate Buffer	014103	Both	Both	0	0	4000	4000	Pasture	Pasture	No	Horses	1	4	3	3
Inadequate Buffer	039101	Both	Both	0	0	1400	1400	Shrubs & small trees	Shrubs & small trees	No	No	1	3	3	4
Inadequate Buffer	041101	Both	Both	0	0	1400	1400	Pasture	Forest	No	No	1	2	1	3
Inadequate Buffer	067201	Both	Both	0	0	3000	3000	Lawn	Lawn	No	No	1	1	1	2
Inadequate Buffer	073102	Both	Both	0	0	3000	1250	Pasture	Pasture	No	Cattle	1	3	2	4
Inadequate Buffer	077102	Both	Both	0	0	2000	2000	Pasture	Pasture	Yes	Cattle	1	2	2	3
Inadequate Buffer	095202	Both	Both	0	0	1000	1000	Lawn	Lawn	No	No	1	3	1	3
Inadequate Buffer	098303	Both	Both	0	0	4500	4750	Crop field	Crop field	No	No	1	3	3	3
Inadequate Buffer	106102	Both	Both	0	0	1500	1500	Pasture	Pasture	No	goats and cows	1	2	2	3
Inadequate Buffer	112103	Both	Both	0	0	1500	1500	Lawn	Lawn	Yes	Cattle	1	2	2	2
Inadequate Buffer	115202	Both	Both	0	0	800	1500	Shrubs & small trees	Lawn	No	Horses	1	1	1	3
Inadequate Buffer	021103	Both	Both	0	0	600	600	Lawn	Lawn	No	No	2	3	2	4
Inadequate Buffer	041301	Both	Both	0	15	600	600	Crop field	Shrubs & small trees	No	No	2	2	1	2
Inadequate Buffer	071301	Both	Both	0	0	700	700	Lawn	Lawn	No	No	2	2	1	2
Inadequate Buffer	104301	Both	Both	20	5	3500	3500	Pasture	Pasture	No	Cattle	2	3	3	3
Inadequate Buffer	109202	Both	Both	0	0	750	750	Lawn	Lawn	No	No	2	1	3	3
Inadequate Buffer	004301	Right	Right		0		500	Forest	Shrubs & small trees	No	No	3	1	3	3
Inadequate Buffer	022304	Both	Both	0	0	400	400	Lawn	Pasture	No	No	3	4	1	4
Inadequate Buffer	022306	Left	Both	5		1500		Paved	Multiflora Rose	No	No	3	3	1	4
Inadequate Buffer	083105	Both	Neither	5	10	1000	2100	Paved	Shrubs & small trees	No	No	3	2	2	4
Inadequate Buffer	089202	Both	Both	0	10	1000	1700	Lawn	Lawn	No	No	3	2	2	3
Inadequate Buffer	093102	Left	Left	0		750		Crop field	Forest	No	No	3	3	3	4
Inadequate Buffer	093104	Left	Left	0		300		Pasture	Forest	No	No	3	3	2	4
Inadequate Buffer	095201	Both	Both	0	0	500	500	Lawn	Lawn	No	No	3	1	1	3
Inadequate Buffer	111103	Both	Both	0	10	500	500	Lawn	Lawn	No	No	3	2	2	3
Inadequate Buffer	116201	Both	Both	0	0	500	500	Pasture	Pasture	No	Cattle	3	1	1	3
Inadequate Buffer	119302	Both	Both	0	10	900	200	Shrubs & small trees	Lawn	Yes	No	3	3	3	3
Inadequate Buffer	121101	Both	Both	0	0	1000	500	Lawn	Lawn	No	No	3	2	2	3
Inadequate Buffer	121104	Right	Right		0		750	Shrubs & small trees	Lawn	No	No	3	2	2	4
Inadequate Buffer	128303	Both	Both	0	0	2000	200	Shrubs & small trees	Crop field	Yes	No	3	1	3	3
Inadequate Buffer	134301	Both	Both	0	20	1000	2250	Pasture	Lawn	No	Cattle	3	1	3	2
Inadequate Buffer	138302	Left	Left	0		1000		Lawn	Forest	No	No	3	3	3	3

Inadequate Buffers

Problem	Site	Sides	Unshaded	Width Left(ft)	Width Right(ft)	Length Left(ft)	Length Right(ft)	LandUseLeft	LandUseRight	Recently Established Buffer?	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	142301	Both	Both	0	0	600	600	Lawn	Lawn	No	No	3	1	1	2
Inadequate Buffer	009301	Both	Both	0	20	900	900	Shrubs & small trees	Shrubs & small trees	No	No	4	1	2	3
Inadequate Buffer	028101	Both	Both	0	0	300	150	Lawn	Lawn	No	No	4	3	2	4
Inadequate Buffer	036302	Both	Neither	15	15	175	175	Crop field	Crop field	No	No	4	1	1	4
Inadequate Buffer	060202	Both	Neither	20	20	6000	6000	Crop field	Crop field	No	No	4	3	4	4
Inadequate Buffer	097302	Both	Both	20	5	2500	2500	Crop field	Pasture	No	Cattle	4	3	3	4
Inadequate Buffer	111101	Both	Both	10	10	500	500	Lawn	Lawn	No	No	4	1	3	3
Inadequate Buffer	155101	Both	Both	0	0	1500	1500	Lawn	Lawn	No	No	4	2	2	2
Inadequate Buffer	156106	Left	Left	0		200		Lawn	Forest	No	No	4	2	3	4
Inadequate Buffer	163102	Both	Both	0	0	200	200	Pasture	Pasture	No	No	4	2	2	1
Inadequate Buffer	021302	Left	Left	5		500		Lawn	Forest	No	No	5	1	1	4
Inadequate Buffer	022102	Both	Both	0	0	50	50	Lawn	Lawn	No	No	5	3	2	2
Inadequate Buffer	022301	Right	Neither		15		250	Forest	Paved	No	No	5	5	1	5
Inadequate Buffer	028104	Both	Neither	10	10	300	100	Shrubs & small trees	Shrubs & small trees	Yes	No	5	3	2	5
Inadequate Buffer	028107	Left	Left	0		200		Pasture	Forest	No	No	5	2	3	4
Inadequate Buffer	031302	Both	Both	20	20	100	100	Shrubs & small trees	Shrubs & small trees	No	No	5	2	1	2
Inadequate Buffer	034301	Both	Both	10	10	300	300	Multiflora Rose	Multiflora Rose	No	No	5	2	2	2
Inadequate Buffer	034303	Both	Both	0	0	100	100	Power Lines	Power Lines	No	No	5	1	2	2
Inadequate Buffer	035303	Both	Both	0	0	300	300	Power Lines	Power Lines	No	No	5	1	2	4
Inadequate Buffer	048201	Both	Neither	0	0	250	250	Lawn	Lawn	No	No	5	1	1	1
Inadequate Buffer	052105	Both	Neither	5	10	300	150	Pasture	Pasture	Yes	No	5	1	2	3
Inadequate Buffer	067301	Both	Neither	40	10	600	600	Lawn	Crop field	Yes	No	5	1	1	2
Inadequate Buffer	081201	Right	Right		10		500	Forest	Pasture	Yes	Cattle	5	1	2	4
Inadequate Buffer	087103	Both	Both	40	20	1750	1750	Pasture	Pasture	No	Cattle	5	3	2	4
Inadequate Buffer	088102	Left	Left	0		300		Pasture	Forest	No	No	5	2	3	2
Inadequate Buffer	098302	Left	Both	10		1500		Crop field	Forest	No	No	5	2	3	3
Inadequate Buffer	122102	Both	Both	0	5	200	200	Lawn	Pasture	No	Horses	5	2	3	4
Inadequate Buffer	131102	Right	Right		0		150	Shrubs & small trees	Lawn	No	No	5	1	2	4
Inadequate Buffer	154306	Both	Both	10	20	650	650	Lawn	Lawn	No	No	5	1	1	3
Inadequate Buffer	156104	Right	Right		0		100	Lawn	Lawn	No	No	5	2	2	2
Inadequate Buffer	158301	Right	Neither		10		300	Forest	Lawn	No	No	5	1	3	4

Fish Barriers

Problem	Site	Blockage	Type	Reason	Drop(In)	Depth(In)	Severity	Correctability	Access
Fish Barrier	014101	Total	Road crossing	Too high	12		3	4	1
Fish Barrier	022308	Total	Road crossing	Too high	6		3	3	1
Fish Barrier	034304	Total	Road crossing	Too high	12		3	4	3
Fish Barrier	112101	Total	Gradient Change	Too high	24		3	1	2
Fish Barrier	147103	Total	Instream pond	Too high	12		3	5	2
Fish Barrier	022101	Total	Sand Bags	Too high	12		4	3	2
Fish Barrier	028102	Total	Road crossing	Too high	8		4	5	2
Fish Barrier	035301	Total	Road crossing	Too shallow		1	4	2	2
Fish Barrier	053203	Total	Road crossing	Too high	10		4	1	1
Fish Barrier	053204	Total	Instream pond	Too high	18		4	2	2
Fish Barrier	067202	Total	Road crossing	Too high	12		4	3	1
Fish Barrier	077101	Total	Road crossing	Too high	12		4	3	2
Fish Barrier	112104	Temporary	Debris dam	Too high	36		4	1	2
Fish Barrier	156102	Total	Road crossing	Too high	30		4	4	2
Fish Barrier	007301	Total	Road crossing	Too high	5		5	3	1
Fish Barrier	008301	Temporary	Debris dam	Too high	18		5	1	1
Fish Barrier	009302	Partial	Natural falls	Too high	14		5	1	3
Fish Barrier	013303	Total	Road crossing	Too high	14		5	3	1
Fish Barrier	015102	Temporary	Beaver dam	Too high	40		5	2	3
Fish Barrier	018101	Temporary	Debris dam	Too high	8		5	1	2
Fish Barrier	022309	Temporary	Debris dam	Too high	30		5	1	1
Fish Barrier	028105	Temporary	Debris dam	Too high	12		5	2	3
Fish Barrier	031301	Partial	Natural falls	Too high	36		5	2	3
Fish Barrier	032302	Partial	Natural falls	Too high	24		5	2	4
Fish Barrier	032303	Partial	Natural falls	Too high	24		5	3	4
Fish Barrier	032306	Partial	Natural falls	Too high	24		5	3	4
Fish Barrier	035304	Temporary	Debris dam	Too high	18		5	1	2
Fish Barrier	035305	Partial	Natural falls	Too high	6		5	2	4
Fish Barrier	035306	Partial	Natural falls	Too high	18		5	2	4
Fish Barrier	038103	Total	Natural falls	Too high	8		5	2	4
Fish Barrier	038105	Total	Natural falls	Too high	6		5	2	4
Fish Barrier	039106	Total	Natural falls	Too high	12		5	2	3
Fish Barrier	044101	Total	Road crossing	Too high	6		5	3	2
Fish Barrier	045101	Temporary	Debris dam	Too high	24		5	1	3

Fish Barriers

Problem	Site	Blockage	Type	Reason	Drop(In)	Depth(In)	Severity	Correctability	Access
Fish Barrier	052102	Total	Natural falls	Too high	18		5	3	3
Fish Barrier	053202	Total	Road crossing	Too high	6		5	1	1
Fish Barrier	063202	Temporary	Debris dam	Too high	18		5	1	2
Fish Barrier	063204	Total	Natural falls	Too high	48		5	2	2
Fish Barrier	071303	Partial	Natural falls	Too high	12		5	1	1
Fish Barrier	083101	Temporary	Debris dam	Too high	12		5	2	3
Fish Barrier	086101	Total	Natural falls	Too high	24		5	3	2
Fish Barrier	087101	Total	Natural falls	Too high	12		5	2	3
Fish Barrier	109201	Temporary	Beaver dam	Too high	60		5	2	1
Fish Barrier	128301	Temporary	Debris dam	Too shallow		2	5	1	3
Fish Barrier	130106	Total	Natural falls	Too high	20		5	3	2
Fish Barrier	131101	Total	Natural falls	Too high	12		5	3	2
Fish Barrier	139102	Total	Road crossing	Too high	8		5	3	2
Fish Barrier	146302	Temporary	Debris dam	Too high	24		5	1	1
Fish Barrier	154303	Temporary	Debris dam	Too high	18		5	2	2
Fish Barrier	156101	Total	Road crossing	Too high	8		5	4	1

Pipe Outfalls

Problem	Site	Outfall Type	Pipe Type	Location of Pipe	Diameter (in)	Channel Width	Discharge	Color	Odor	Severity	Correctability	Access
Pipe Outfall	068301	Pond Drainage	Smooth Metal Pipe	Head of stream	12		Yes	Clear	None	3	3	3
Pipe Outfall	099101	Agricultural	Smooth Metal Pipe	Right bank	8		Yes	Clear	None	3	1	3
Pipe Outfall	106101	Pond Drainage	Earth Channel	Head of stream		24	Yes	Clear	None	3	3	2
Pipe Outfall	106104	Agricultural	Plastic	Left bank	4		Yes	Clear	None	3	3	2
Pipe Outfall	140103	Stormwater	Concrete Pipe	Head of stream	18		Yes	Clear	None	3	3	1
Pipe Outfall	156107	Stormwater	Plastic	Right bank	6		Yes	Clear	None	3	2	2
Pipe Outfall	154304	Unknown	Smooth Metal Pipe	Left bank	4		No			4	3	2
Pipe Outfall	054101	Stormwater	Earth Channel	Head of stream		36	No			5	1	1
Pipe Outfall	130101	Unknown	Plastic	Head of stream			No			5	1	3

Channel Alterations

Problem	Site	Type	BottomWidth(in)	Length(ft)	Perennial Flow	Sedimentation	Veg in Channel	Road Crossing	LengthAbove(ft)	LengthBelow(ft)	Severity	Correctability	Access
Channel Alteration	022302	Rip-rap	60	30	Yes	No	No	No			5	5	1
Channel Alteration	022305	Rip-rap	36	80	Yes	No	No	No			5	3	1
Channel Alteration	147102	Concrete	24	100	Yes	Yes	Yes	No			5	3	2
Channel Alteration	154302	Rip-rap	45	30	Yes	No	No	No			5	2	3

Trash Dumping

Problem	Site	Type	Truckloads	Other measure	Extent	Volunteer Project?	Owner Type	Owner Name	Severity	Correctability	Access
Trash Dumping	063205	Residential	5		Single Site	Yes	Private		3	3	3
Trash Dumping	111104	Residential	1		Large Area	Yes	Private		4	1	2
Trash Dumping	039102	Residential	2		Single Site	No	Private		5	2	3
Trash Dumping	139101	Metal Barrels	1		Single Site	Yes	Private		5	1	4

Exposed Pipes

Problem	Site	Location of Pipe	Type	Diameter(m)	Length(ft)	Purpose	Discharge	Color	Odor	Severity	Correctability	Access
Exposed Pipe	130105	Exposed across bottom	smooth metal	4	30	unknown	No			3	2	2
Exposed Pipe	130103	Above stream	smooth metal	5	20	unknown	No			4	3	2

Unusual Conditions

Problem	Site	Date	Describe	Description	Potential Cause	Severity	Correctability	Access
Unusual Condition	071302	05/03/2005	Water Color/Clarity	Red Iron-colored discharge	Runoff from barn uphill	3	5	1
Unusual Condition	105102	05/06/2005	Sediment	Excessive Sediment Deposition downstream	ATV Tracks and children's play area/fort, also some trash	3	1	2
Comment	039103	03/17/2005		Pond breach created heavily eroded and unstable banks.				
Comment	054101	05/11/2005		Drainage ditch				
Comment	130105			130105 Exposed Pipe may not be in use				
Comment	140101	05/04/2005		Stream is dried up, no water movement				

Appendix C: Results from second round of fieldwork

RESULTS -SECOND ROUND OF FIELDWORK

The Stream Corridor Assessment survey teams identified 92 potential environmental problem sites. At the time of the survey, the most frequently observed potential problem sites were erosion sites, reported at 32 sites. Other potential environmental problems recorded during the survey included: 25 inadequately forested stream buffers, 17 fish migration barriers, 7 pipe outfalls, 2 channel alterations, 2 trash dumping sites, 1 exposed pipes, and 6 unusual conditions. Additionally, crews recorded descriptive habitat condition data at 11 representative sites.

Table 5 presents a summary of survey results. Table 6 is a summary by stream reach.

Table 5. Summary of results from the second round of fieldwork for the Deer Creek Survey.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Erosion	32	23,740 feet (4.5 miles)			20	9	3
Inadequate Buffer	25	36,000 feet (6.8 miles)	11	3	6	1	4
Fish Barrier	17				3	2	12
Pipe Outfall	7				2		5
Unusual Condition	6				2	3	1
Channel Alteration	2	350 feet			1		1
Trash Dumping	2						2
Exposed Pipe	1	2 feet					1
Total	92		11	3	34	15	29
Comments	1						
Representative Sites	11						

Table 6. Summary of results from the second round of fieldwork by major stream reach.

Stream Segment	Channel Alteration	Exposed Pipes	Erosion	Fish Barriers	Inadequate Buffers	Pipe Outfalls	Representative Sites	Trash Dumping	Unusual Conditions	Comments	Total
Cherry Hill Rd trib	1		8	2	11	2			1		25
Elbow Branch	1	1	4	3	3	3	2		1		18
Little Deer Creek			11	4	7	1	5	2	3	1	34
Trib Near Jackson Branch			6	7	3		1		1		18
Rock Hollow			3	1	1	1	3				9

Erosion Sites

The survey found 32 eroding stream banks over the length of 23,740 feet (4.5 miles) of stream. The severity and location of erosion sites is shown in Figure 14b, and 14c.

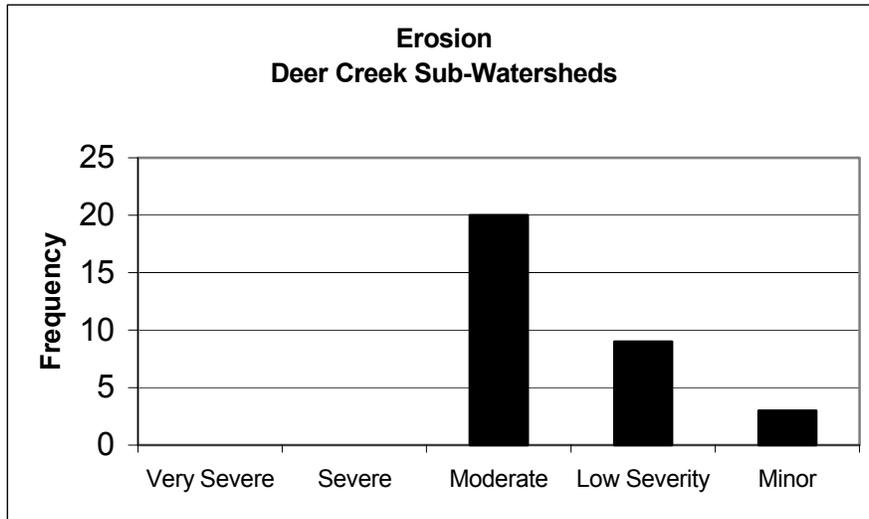


Figure 14a. Histogram showing the frequency of severity ratings given to erosion sites during the Deer Creek SCA survey.

Erosion Sites

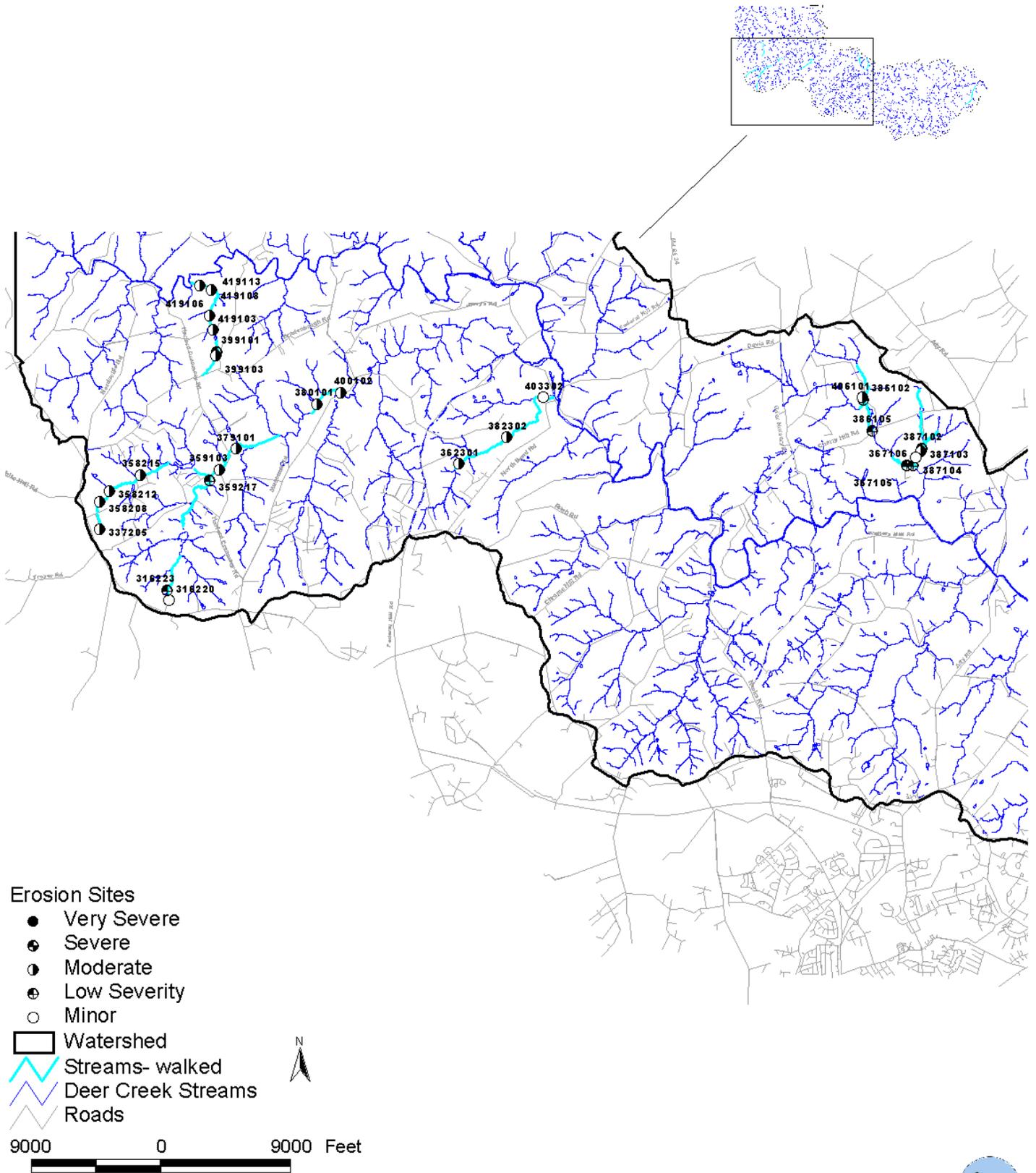


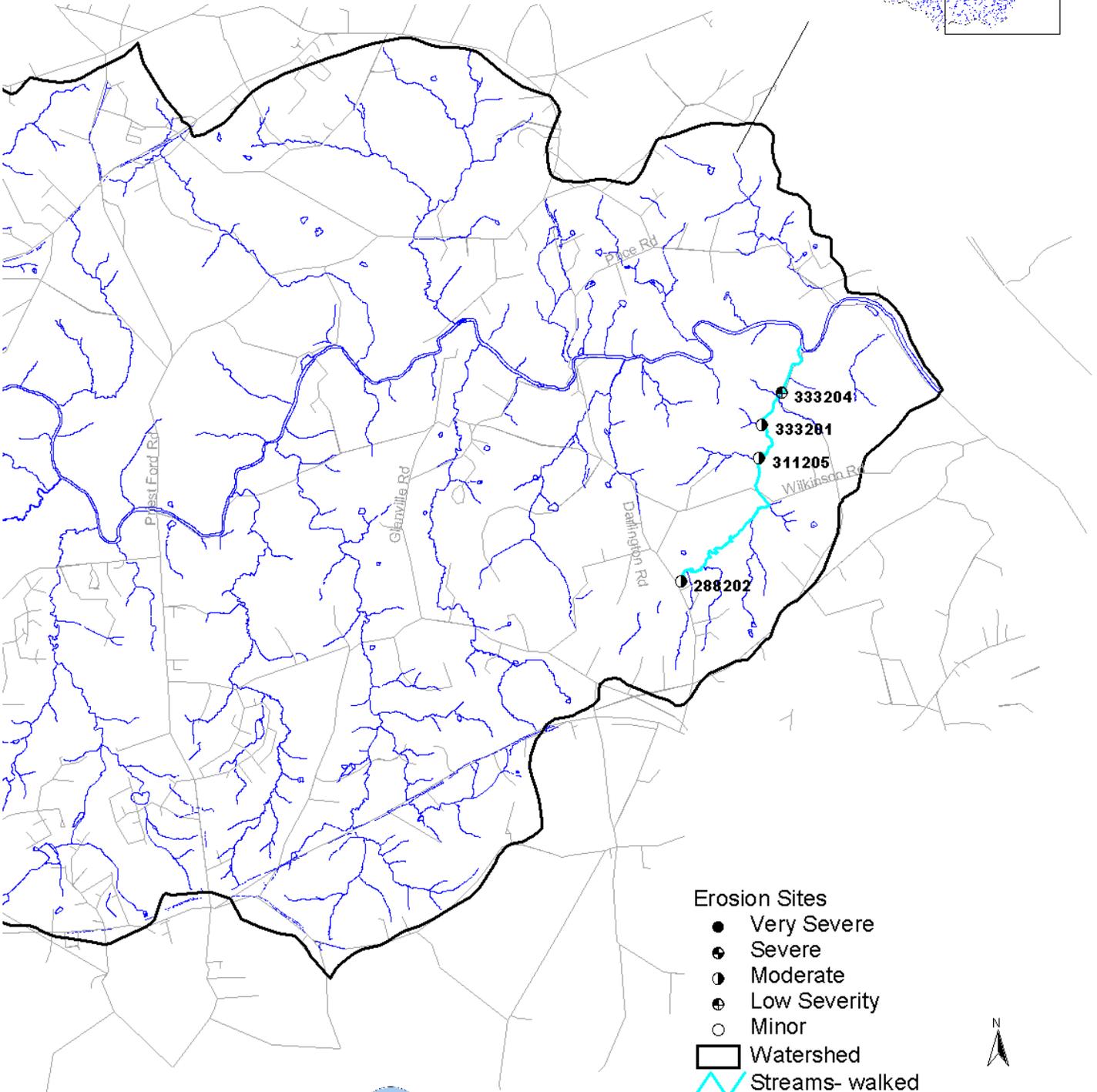
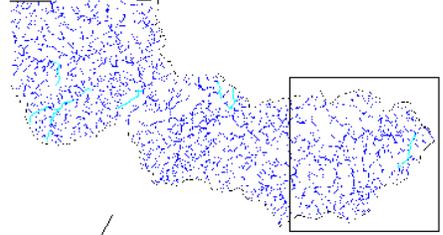
Figure 14b: Map showing the locations of the Erosion Sites in the second round of fieldwork in the Deer Creek Watershed



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Erosion Sites



- Erosion Sites**
- Very Severe
 - ⦿ Severe
 - ⦿ Moderate
 - ⦿ Low Severity
 - Minor
- Watershed
~ Streams- walked
~ Deer Creek Streams
~ Roads



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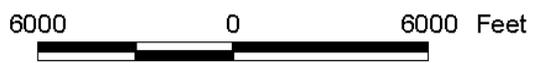


Figure 14c: Map showing the locations of the Erosion Sites in the second round of fieldwork in the Deer Creek Watershed

Inadequate Buffers

Survey crews identified 25 inadequate buffer sites with a total length of 36,000 feet (6.8 miles). The severity and location of inadequate buffer sites is shown in Figure 15b, and 15c. Fourteen of these sites are ranked as very severe or severe, while the other sites are moderate, of low severity, or minor (Figure 15a). Land use along the stream at inadequate buffer sites, were reported as mostly shrubs and small trees, lawn and pasture.

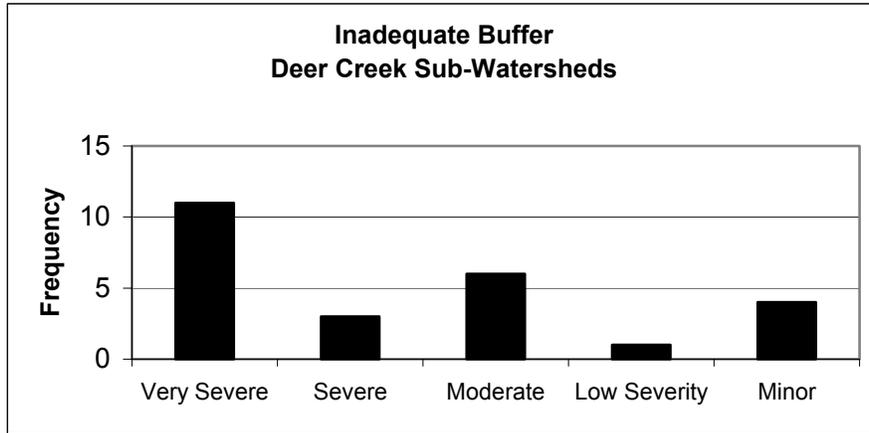
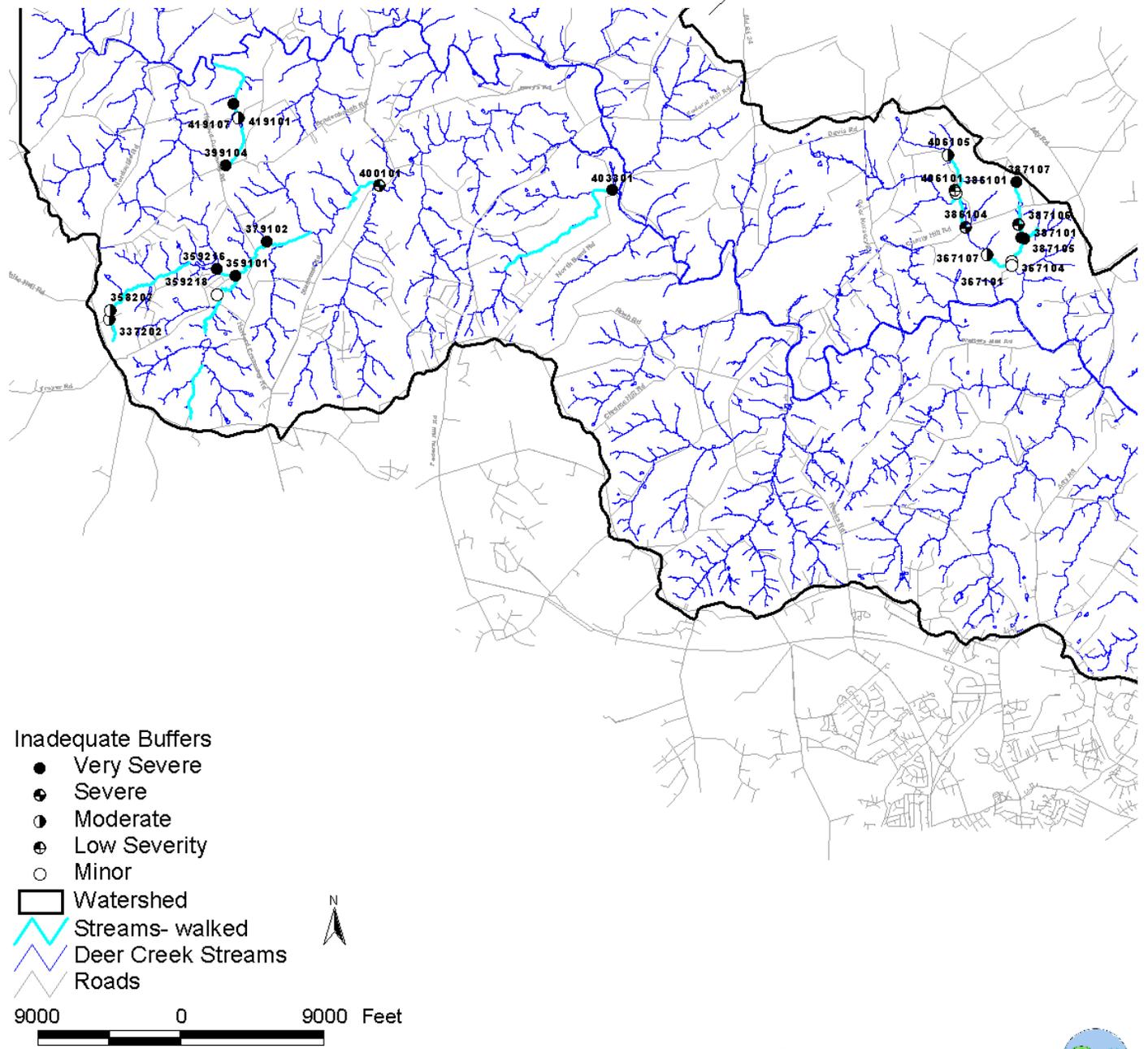
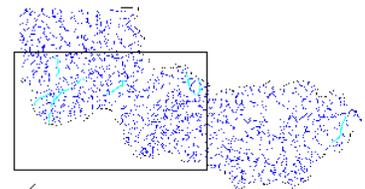


Figure 15a. Histogram showing the frequency of severity ratings given to inadequate buffer sites during the Deer Creek SCA survey.

Inadequate Buffers



Inadequate Buffers

- Very Severe
- Severe
- Moderate
- Low Severity
- Minor

- ▭ Watershed
- ▬ Streams- walked
- ▬ Deer Creek Streams
- ▬ Roads



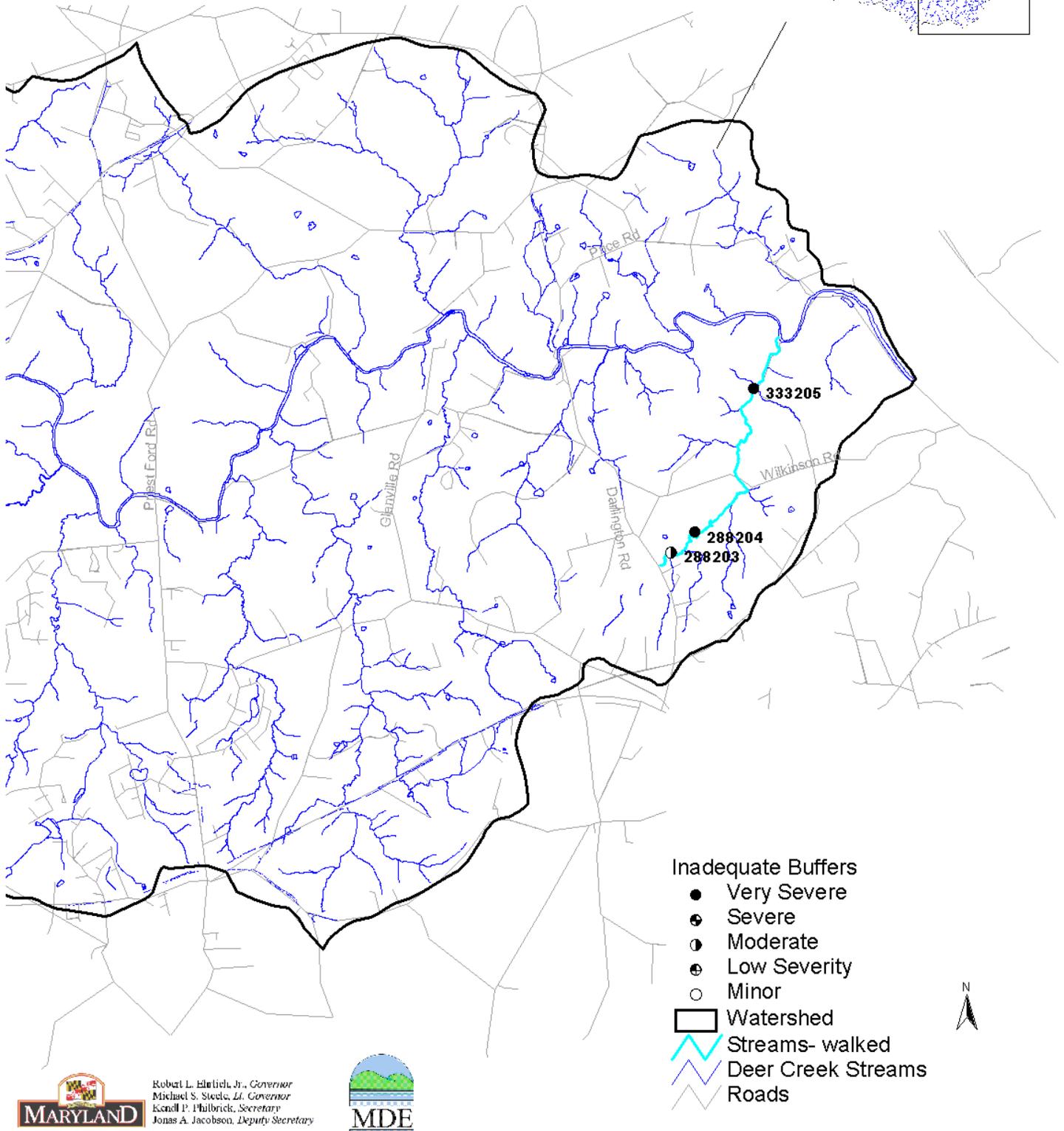
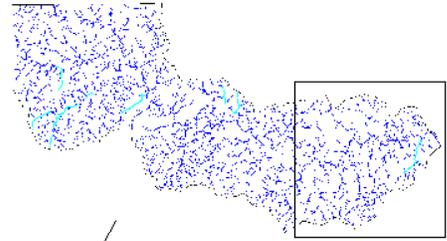
Figure 15b: Map showing the locations of the Inadequate Buffers in the second round of fieldwork in the Deer Creek Watershed



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Inadequate Buffers




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Figure 15c: Map showing the locations of the Inadequate Buffers in the second round of fieldwork in the Deer Creek Watershed

Fish Migration Barriers

The survey identified 17 fish migration barriers. The locations of fish blockages are shown in Figure 16b and 16c. Fish barriers in this watershed are due natural falls (4), road crossings (3), debris dams (8), and instream ponds (1). Three of these sites received a moderate rating.

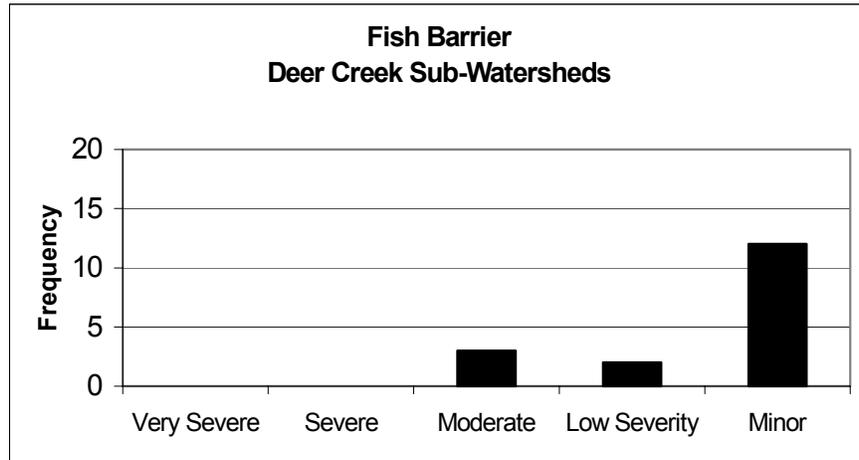


Figure 16a. Histogram showing the frequency of severity ratings given to fish barrier sites during the Deer Creek SCA survey.

Fish Barriers

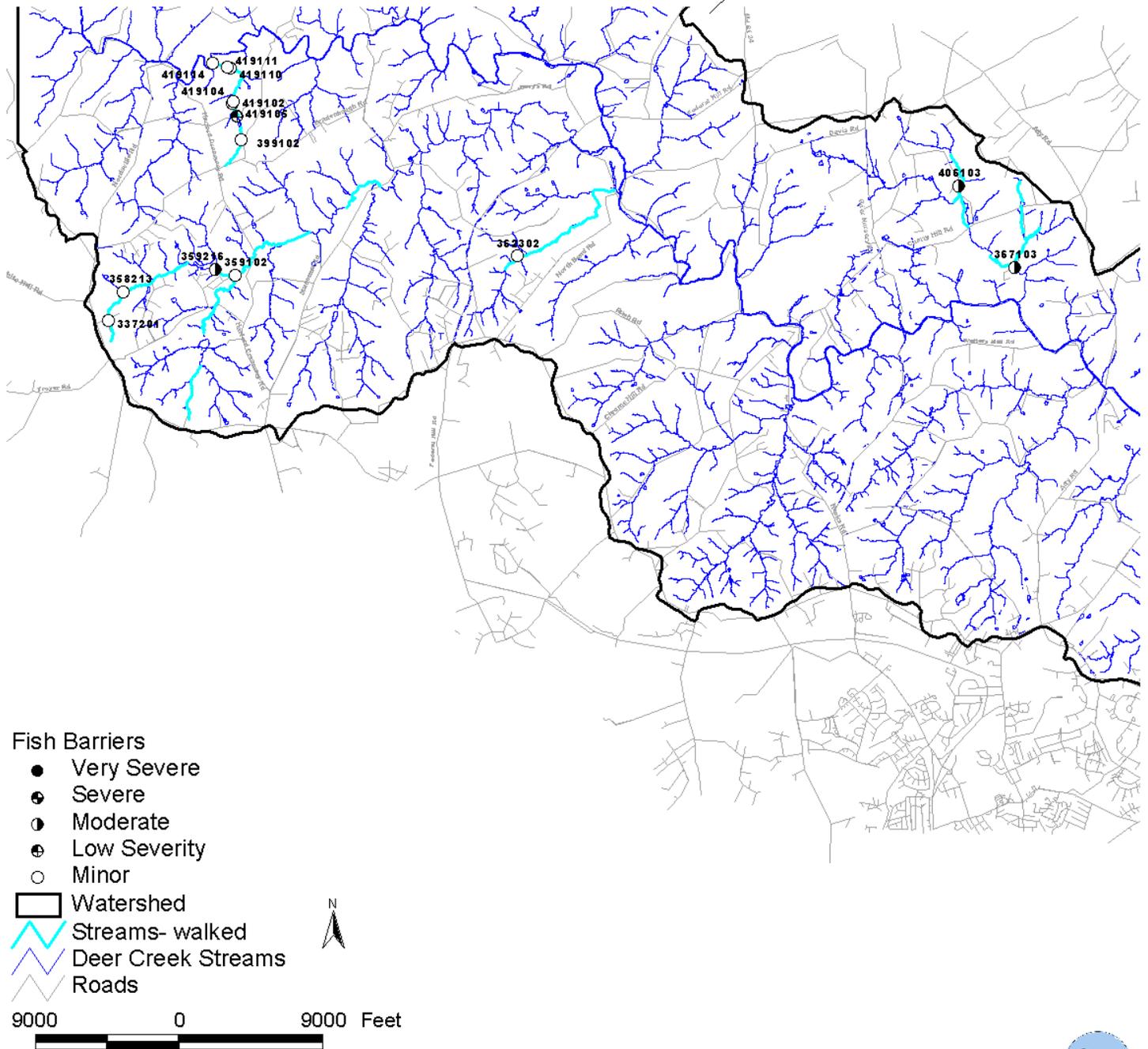
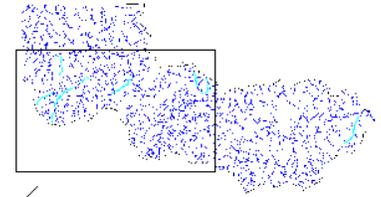


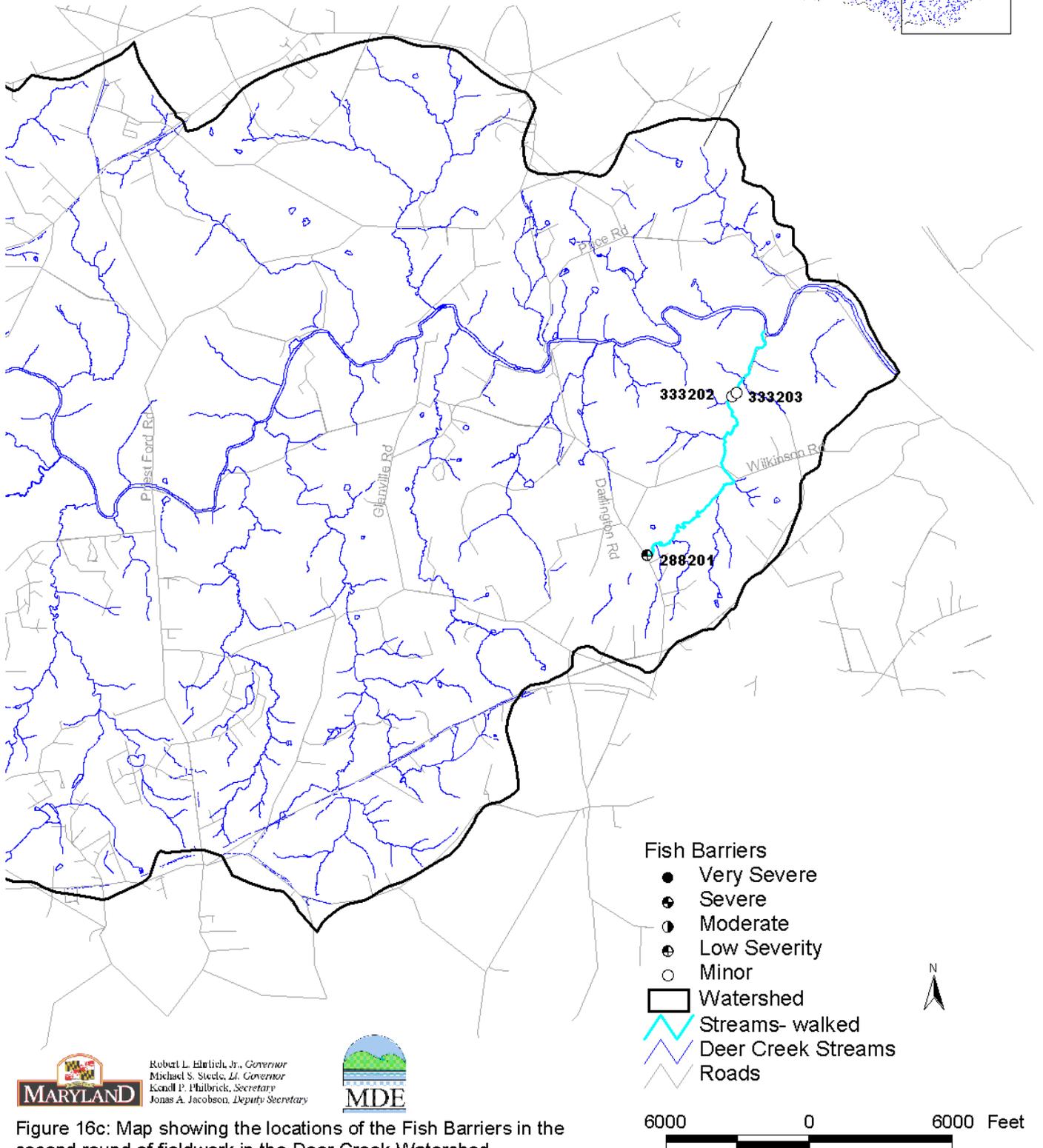
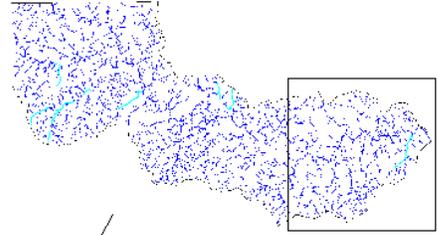
Figure 16b: Map showing the locations of the Fish Barriers in the second round of fieldwork in the Deer Creek Watershed



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Fish Barriers




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Figure 16c: Map showing the locations of the Fish Barriers in the second round of fieldwork in the Deer Creek Watershed

Pipe Outfalls

The survey crew identified a total of 7 pipe outfalls. The severity and location of pipe outfall sites is shown in Figure 17b and 17c. Two of the pipes had a discharge. Both were clear with no odor. The pipes were rated as moderate. The remaining pipes did not have any discharge.

No immediate follow up actions were taken as part of this study to determine the source of the color coming from the pipe. In addition, we made no estimate of the amount of fluid released from the pipes.

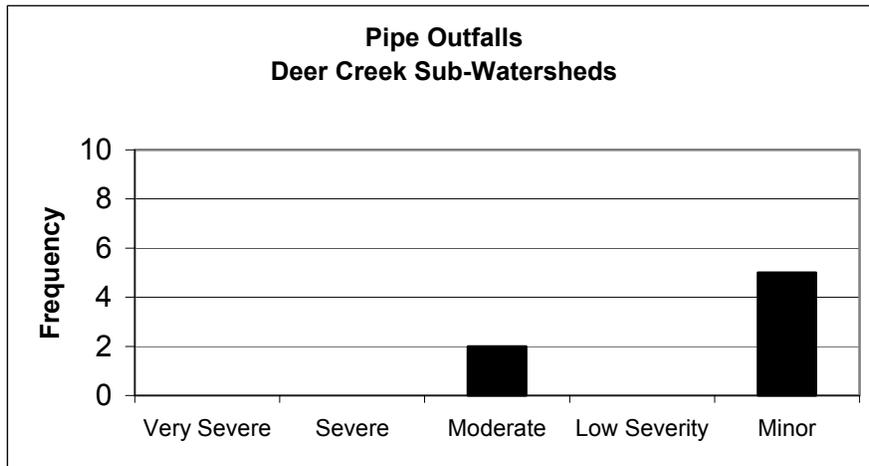


Figure 17a. Histogram showing the frequency of severity ratings given to pipe outfalls sites during the Deer Creek SCA survey.

Pipe Outfalls

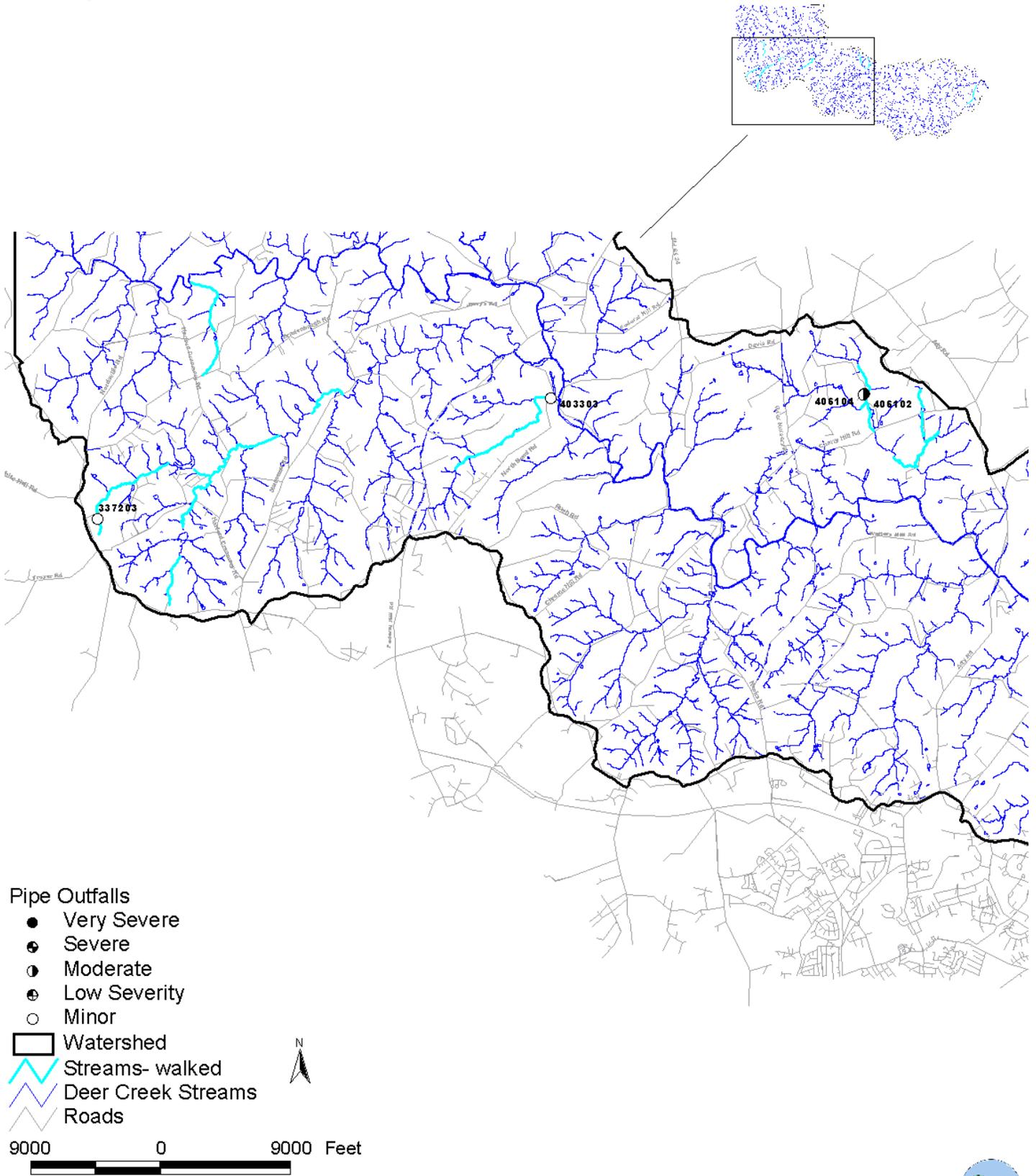


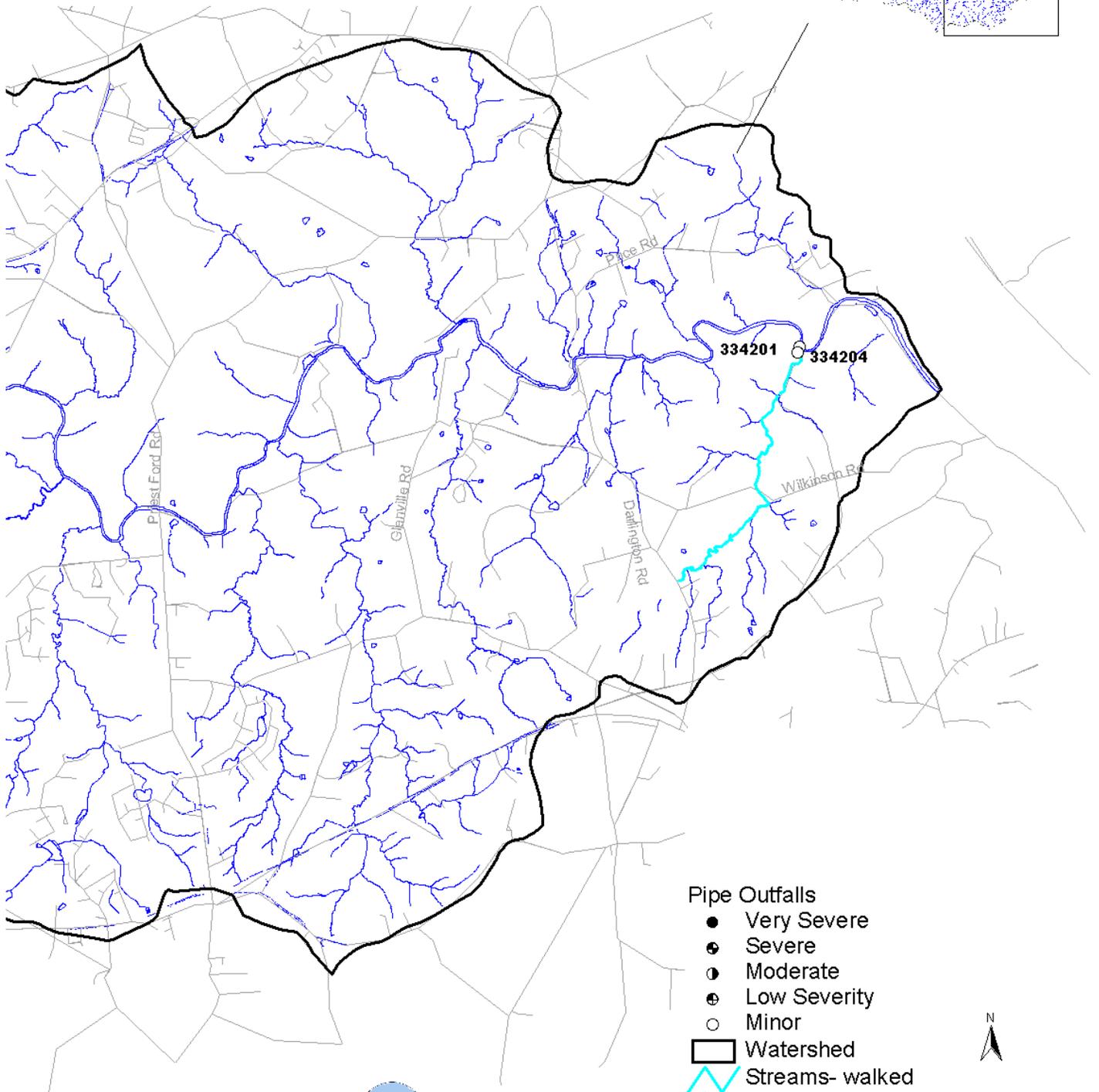
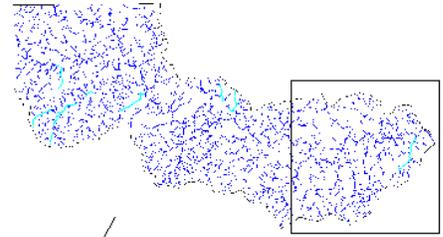
Figure 17b: Map showing the locations of the Pipe Outfalls in the second round of fieldwork in the Deer Creek Watershed



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Pipe Outfalls



Pipe Outfalls

- Very Severe
- ⊕ Severe
- ⦿ Moderate
- ⊗ Low Severity
- Minor

- ▭ Watershed
- ▬ Streams- walked
- ▬ Deer Creek Streams
- ▬ Roads



6000 0 6000 Feet



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Figure 17c: Map showing the locations of the Pipe Outfalls in the second round of fieldwork in the Deer Creek Watershed

Unusual Conditions or Comments

The survey crew identified 6 unusual conditions and 1 comment. The severity and location of unusual condition sites is shown in Figure 18b. Two unusual conditions were where there were tractor/truck stream crossings. One of which was indicated to have some sediment issues. Site 399105 was reported to have excessive algae. Site 358211 was an area where the stream has been piped. Site 386103 is a place where sand bags have been placed in the stream to enhance a stone weir to create a pond. Site 337204 is an area where rocks have been placed as bank stabilization.

The comment site indicated an area where wood had been dumped in the stream.

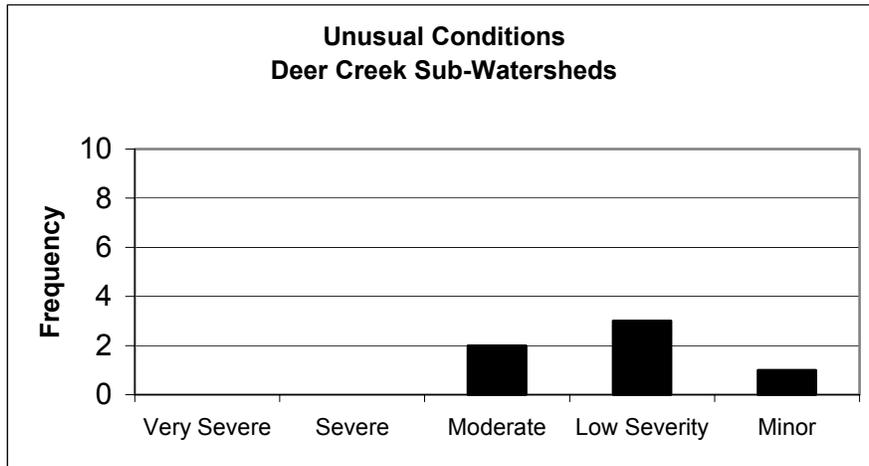
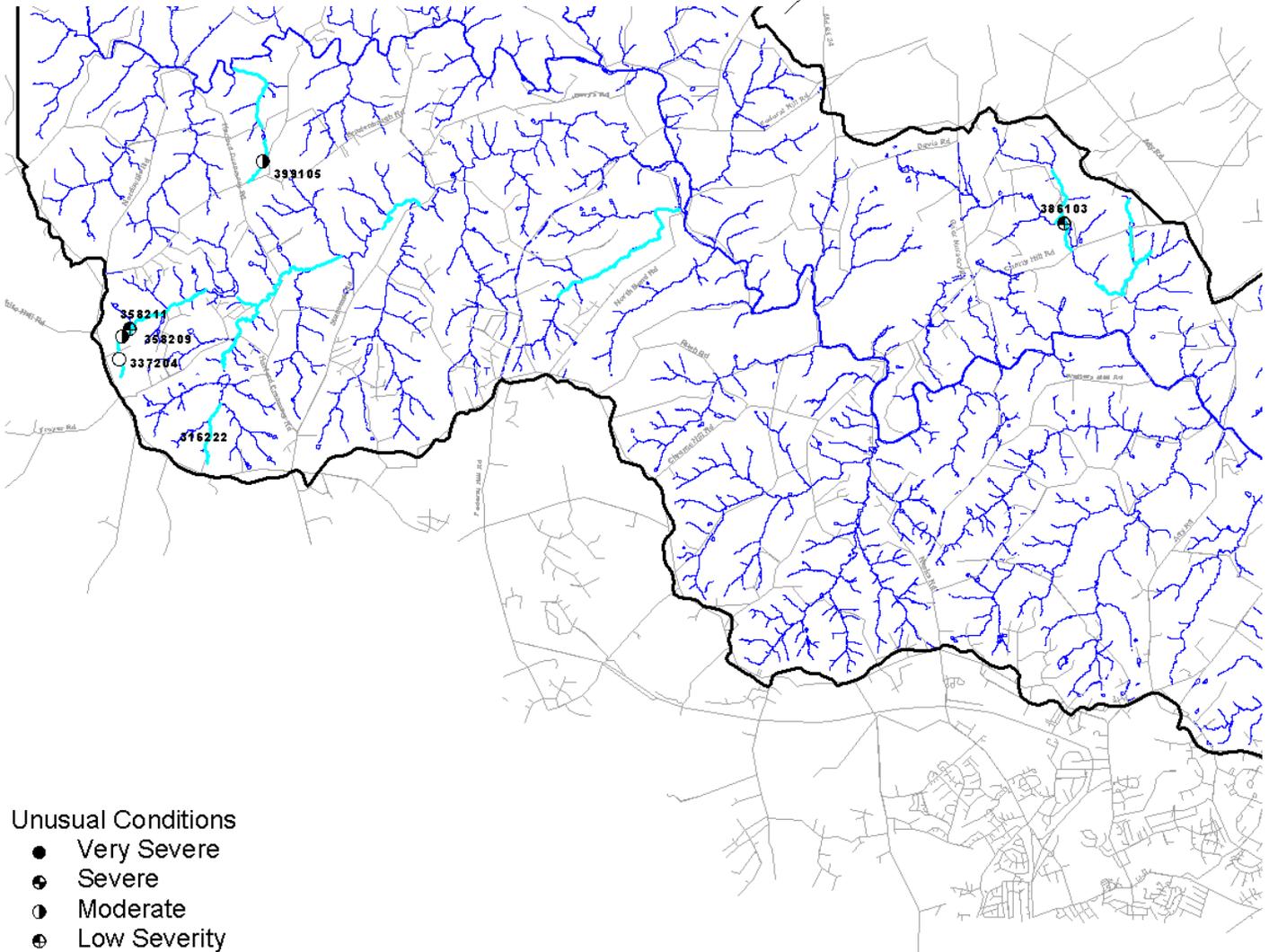
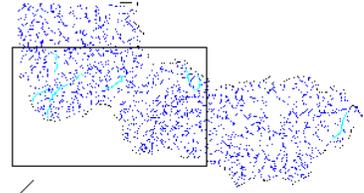


Figure 18a. Histogram showing the frequency of severity ratings given to unusual condition sites during the Deer Creek SCA survey.

Unusual Conditions



Unusual Conditions

- Very Severe
- Severe
- Moderate
- Low Severity
- Minor

- ▭ Watershed
- ▬ Streams- walked
- ▬ Deer Creek Streams
- ▬ Roads

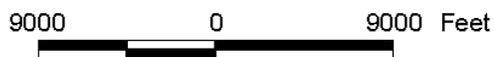


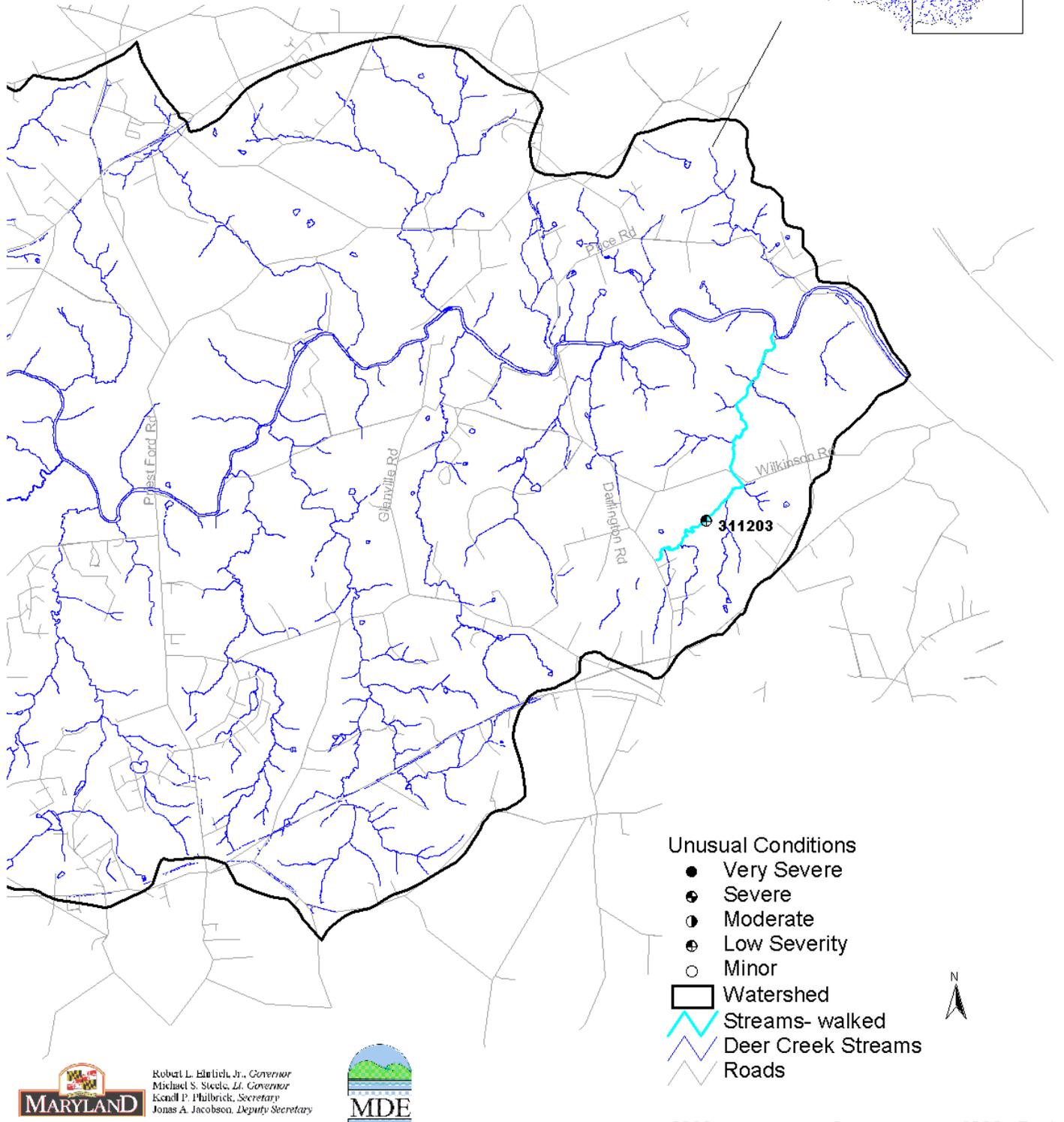
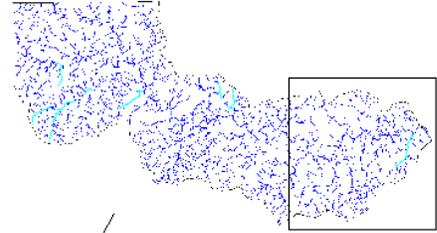
Figure 18b: Map showing the locations of the Unusual Conditions in the second round of fieldwork in the Deer Creek Watershed



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Unusual Conditions



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Figure 18c: Map showing the locations of the Unusual Conditions in the second round of fieldwork in the Deer Creek Watershed

Channel Alterations

Results of this survey show recognizably altered stream channels at 2 sites. The severity and location of channel alteration sites is shown in Figure 19a and 19b. The total length of stream affected by channelization is estimated to be 350 feet.

Restoring channel alteration sites can increase fish and wildlife habitat and may allow for more time for nutrient uptake in the waterway. In its simplest form, restoration for earth channels would include allowing vegetation and/or tree roots to stabilize the sediment along the channel, causing sinuosity to re-form naturally. This sinuosity may reform within the bed of the channelization or along its banks, depending on the site and the depth of the channel alteration.

Channel Alterations

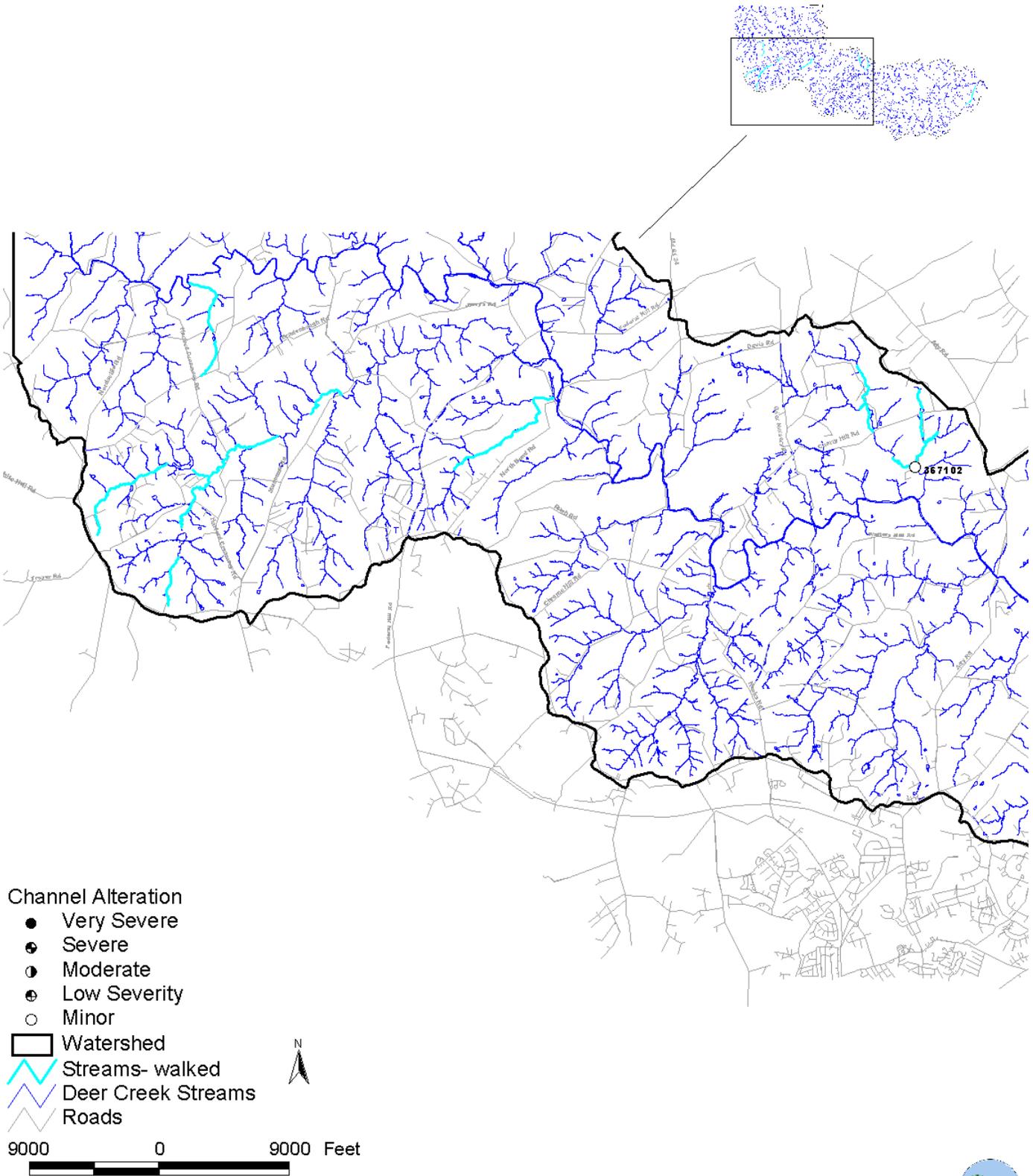


Figure 19a: Map showing the locations of the Channel Alterations in the second round of fieldwork in the Deer Creek Watershed



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Channel Alteration

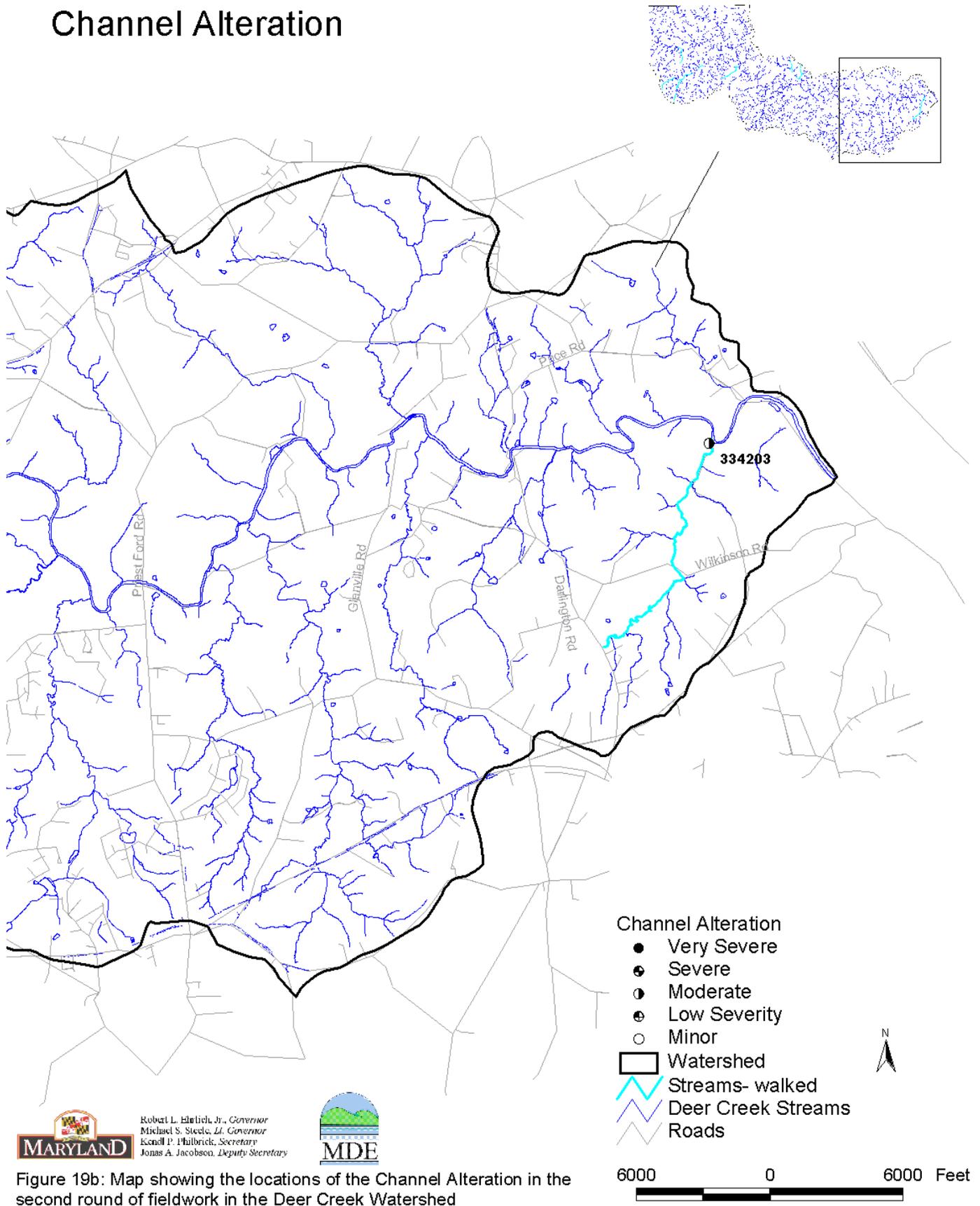


Figure 19b: Map showing the locations of the Channel Alteration in the second round of fieldwork in the Deer Creek Watershed

Trash Dumping

Survey crews found two trash dumping sites (Figure 20). At Site 316221 some construction trash had been dumped. At Site 337206 fencing had been dumped. Both sites were given minor severity ratings.

Trash Dumping

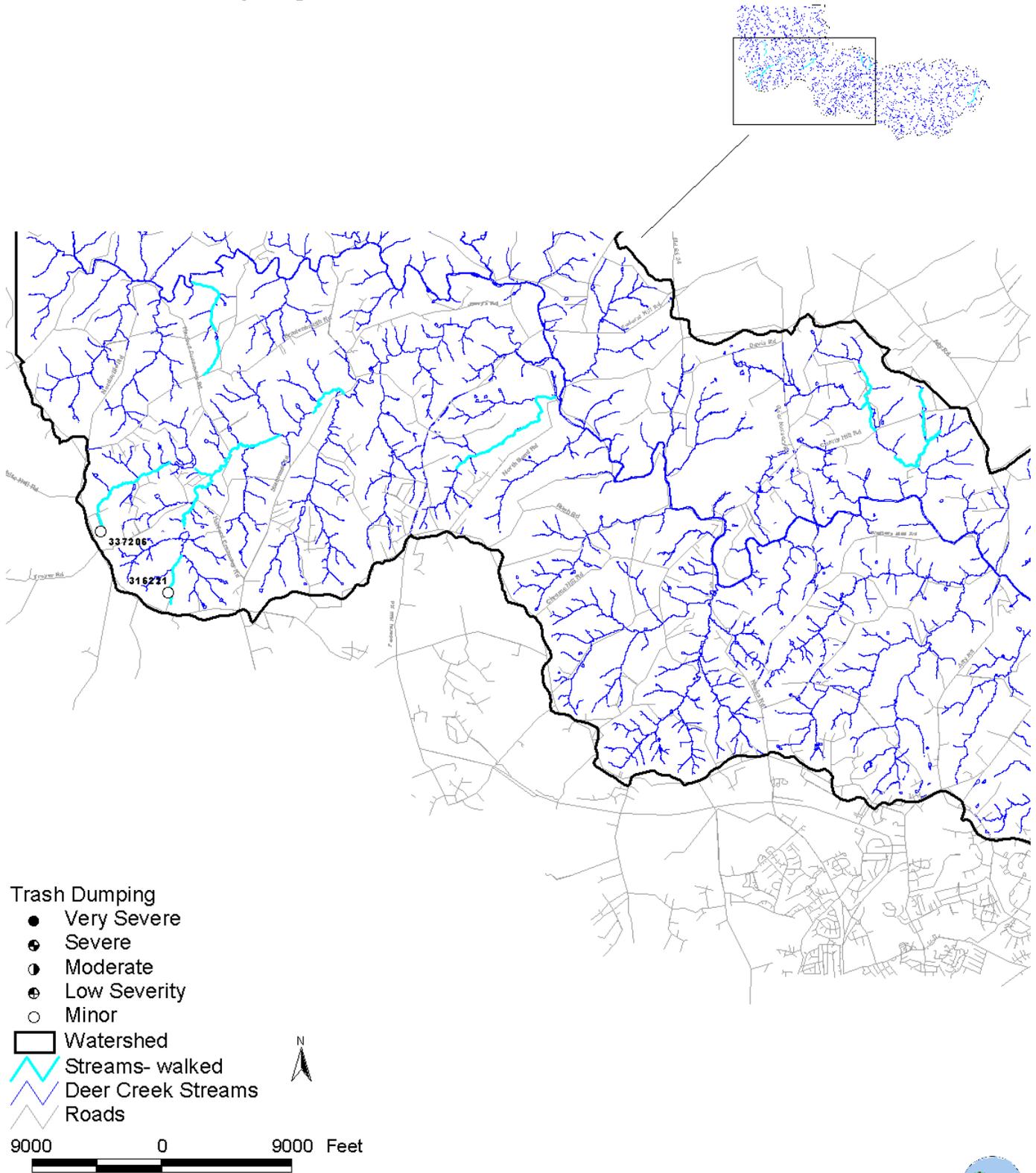


Figure 20: Map showing the locations of the Trash Dumping in the second round of fieldwork in the Deer Creek Watershed



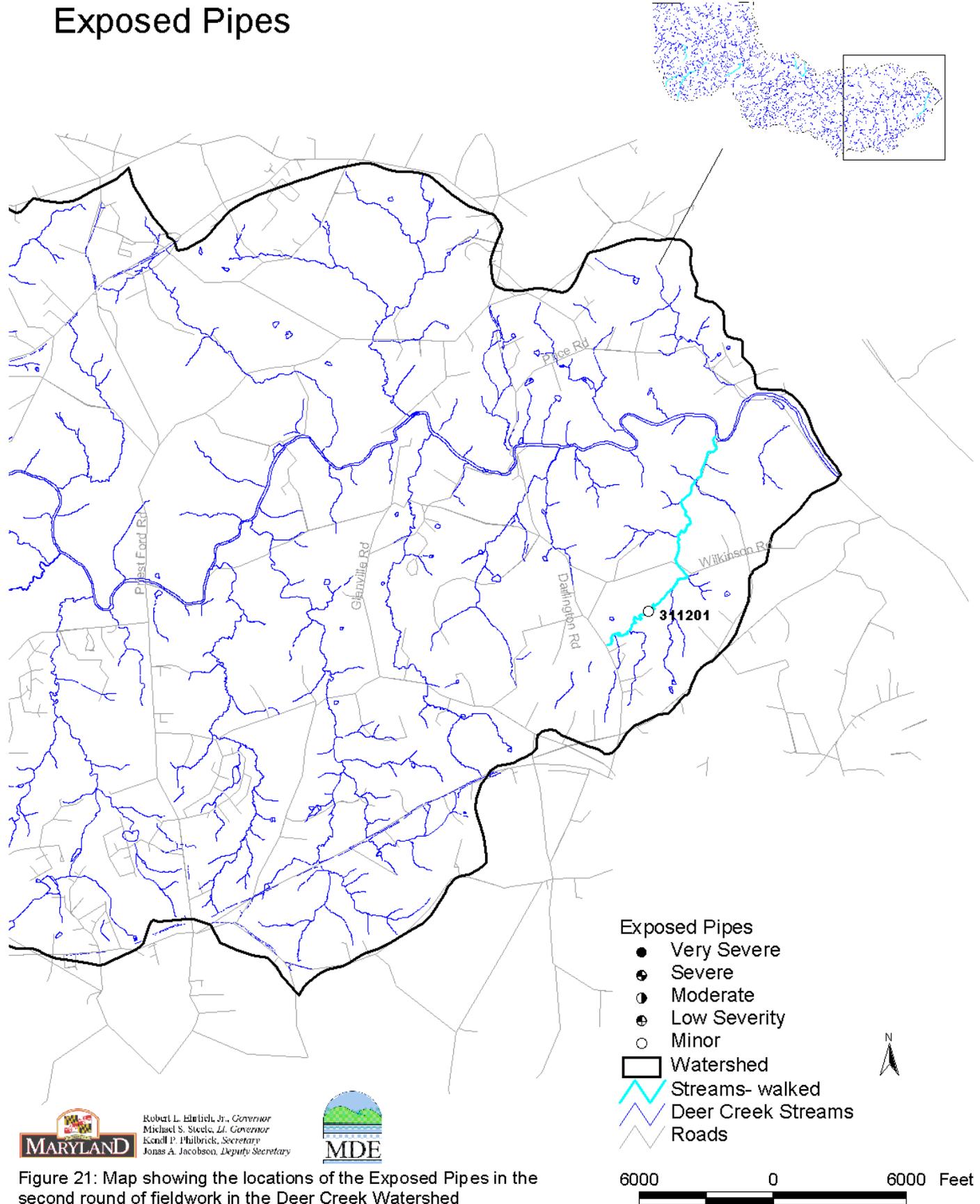
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Exposed Pipes

Field crews observed one exposed pipe during the survey. The one pipe was rated minor in severity. The pipe was reported to not have any discharge at the time of the survey. Location of this site is shown in Figure 21.

Exposed Pipes



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Figure 21: Map showing the locations of the Exposed Pipes in the second round of fieldwork in the Deer Creek Watershed

Representative Sites

Survey crews evaluated 11 representative sites in the Deer Creek streams. Attachment sites for macroinvertebrates rated mostly optimal to suboptimal. Embeddedness was found to be mostly suboptimal. The bottom of some streams were covered in sand or silt. Shelter for fish was varied from stream to stream. Channel Alteration rates the amount of man-made changes to the stream channel. Five of the representative sites indicate that there was some alteration to the channel. There was some sediment deposition at the some of the representative sites. The condition of the banks were rated to be mostly marginal or suboptimal. There were some areas of erosion. For riparian vegetative zone width the sites were rated to be mainly optimal or suboptimal. This indicates in the some spots where the representative sites were, the areas were forested. There were areas where the rating was marginal or poor.

Representative Sites

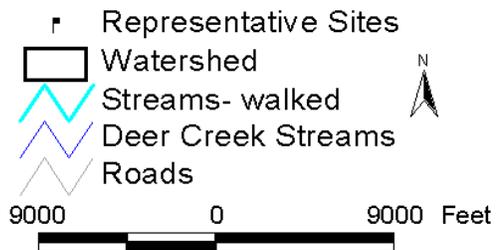
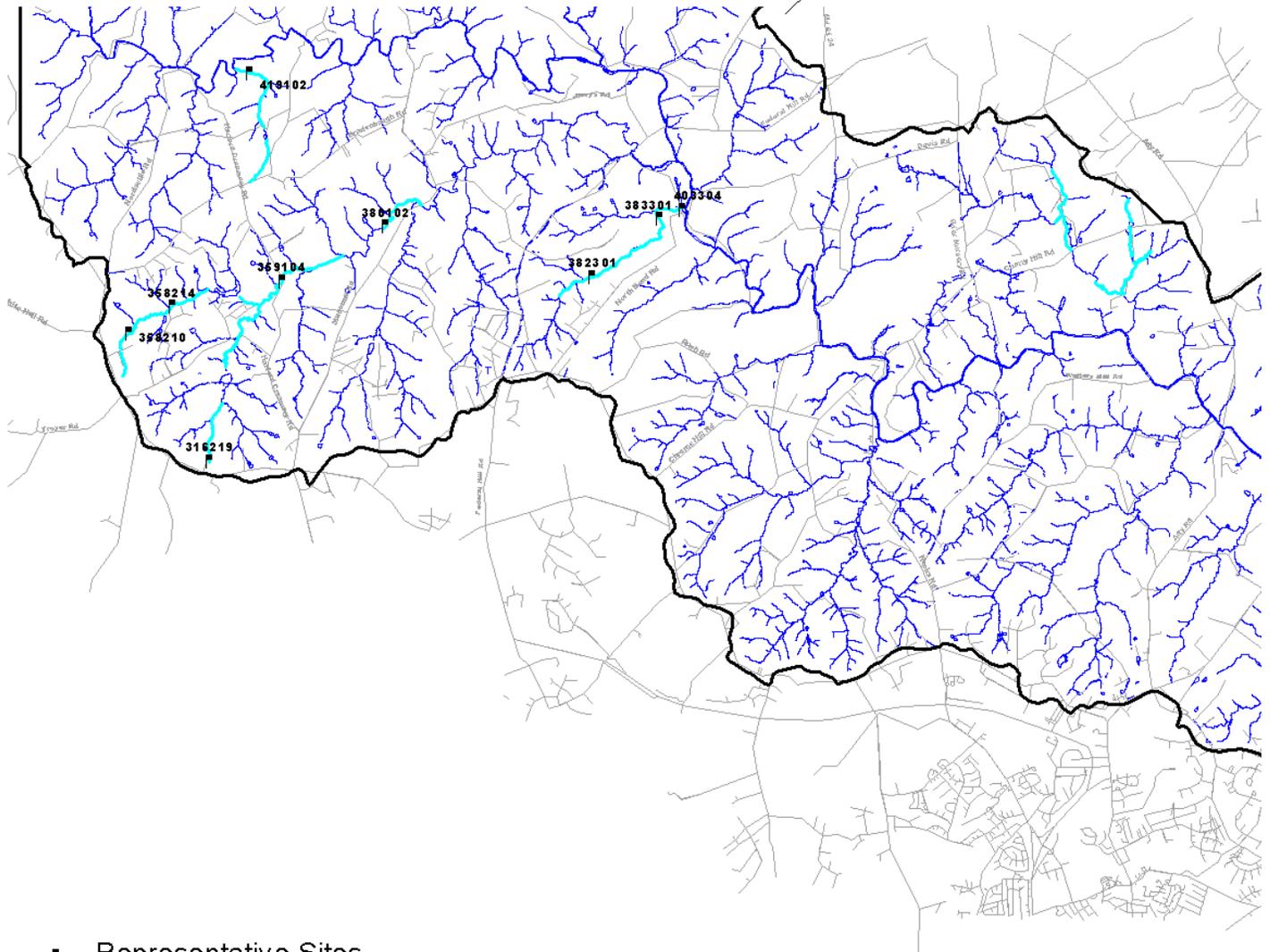
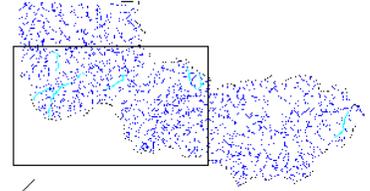


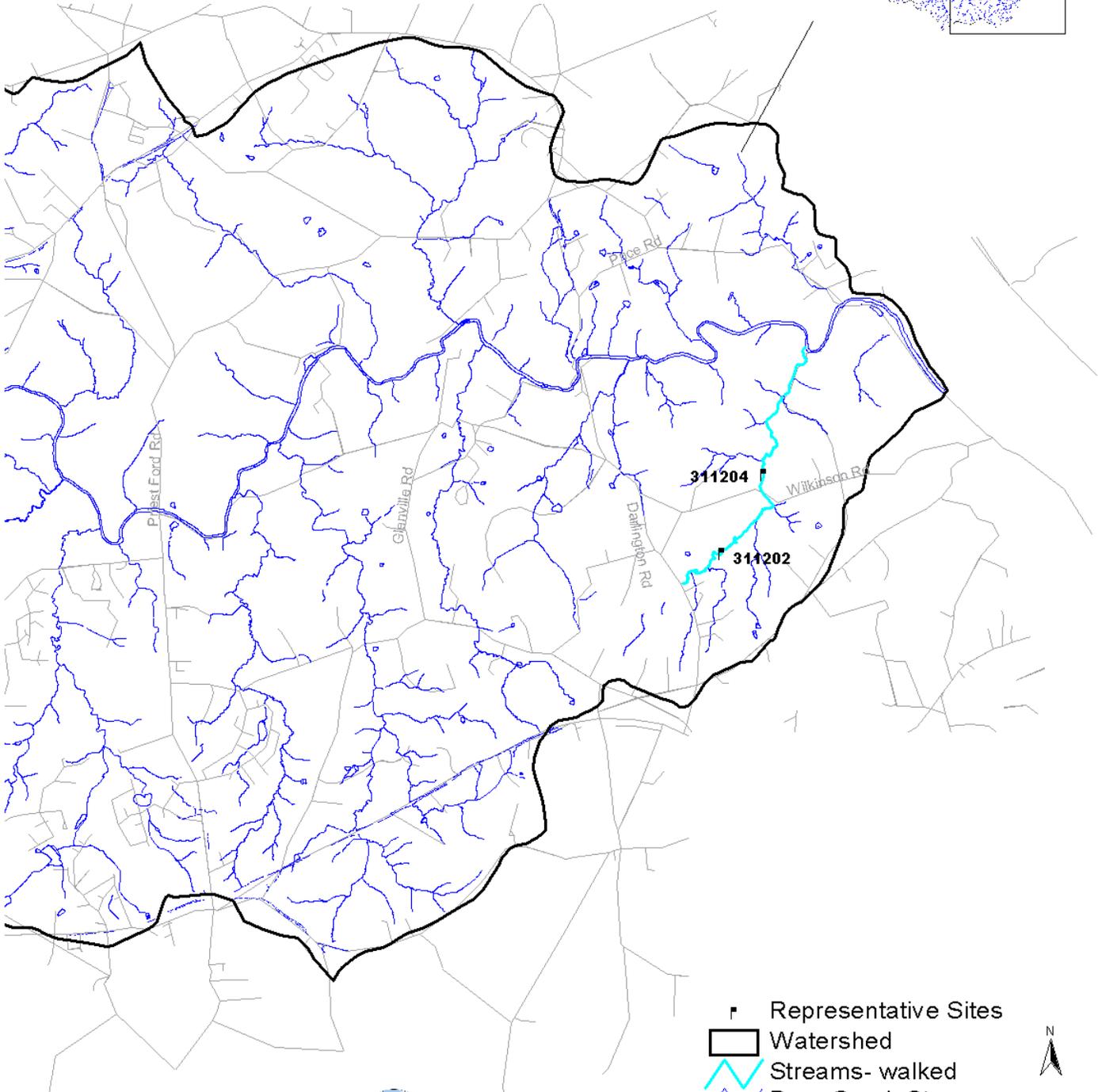
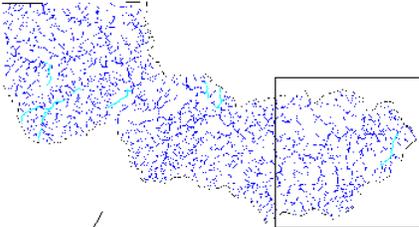
Figure 22a: Map showing the locations of the Representative Sites in the second round of fieldwork in the Deer Creek Watershed



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Representative Sites



- ▣ Representative Sites
- ▭ Watershed
- ▬ Streams- walked
- ▬ Deer Creek Streams
- ▬ Roads




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Figure 22b: Map showing the locations of the Representative Sites in the second round of fieldwork in the Deer Creek Watershed



Listing of Sites by Site Number for the second round of fieldwork

Listing of Sites By Site Number

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	STREAM
311201	Exposed Pipe	5	1	3	470436.00122	214611.29582	Elbow Branch
334203	Channel Alteration	3	4	1	471318.35966	216930.12283	Elbow Branch
367102	Channel Alteration	5	3	1	455775.07909	219248.19395	Cherry Hill
288201	Fish Barrier	4	4	1	469864.89937	214149.81396	Elbow Branch
288202	Erosion	3	3	1	469906.24831	214163.62021	Elbow Branch
288203	Inadequate Buffer	3	2	3	470016.63521	214312.55801	Elbow Branch
288204	Inadequate Buffer	1	3	3	470307.00442	214564.30470	Elbow Branch
311202	Representative Site				470329.31095	214513.43624	Elbow Branch
311203	Unusual Condition	4	4	3	470502.09723	214645.14057	Elbow Branch
311204	Representative Site				470842.95211	215459.99970	Elbow Branch
311205	Erosion	3	4	4	470855.56318	215660.74612	Elbow Branch
316219	Representative Site				440086.41898	216368.28264	Little Deer Creek
316220	Erosion	5	3	2	440083.93214	216434.24699	Little Deer Creek
316221	Trash Dumping	5	2	2	440041.86569	216590.58530	Little Deer Creek
316222	Comment				440038.25564	216598.01331	Little Deer Creek
316223	Erosion	4	3	3	440038.08890	216648.99852	Little Deer Creek
333201	Erosion	3	4	5	470889.51616	216053.65374	Elbow Branch
333202	Fish Barrier	5	3	4	470939.99726	216165.45551	Elbow Branch
333203	Fish Barrier	5	2	3	470994.97141	216213.08153	Elbow Branch
333204	Erosion	4	3	1	471121.66544	216438.67575	Elbow Branch
333205	Inadequate Buffer	1	4	1	471045.60457	216346.01453	Elbow Branch
334201	Pipe Outfall	5	1	2	471339.82309	216994.89158	Elbow Branch
334202	Pipe Outfall	5	1	2	471339.82309	216994.89158	Elbow Branch
334204	Pipe Outfall	5	1	1	471319.20242	216928.12579	Elbow Branch
337201	Fish Barrier	5	3	5	438558.10668	218216.99862	Little Deer Creek
337202	Inadequate Buffer	3	2	3	438555.85329	218238.70958	Little Deer Creek
337203	Pipe Outfall	5	2	2	438580.60005	218135.37579	Little Deer Creek
337204	Unusual Condition	5	2	2	438589.03843	218122.34434	Little Deer Creek
337205	Erosion	3	4	3	438621.97824	217932.92873	Little Deer Creek
337206	Trash Dumping	5	2	2	438614.48384	217881.61250	Little Deer Creek
358207	Inadequate Buffer	3	3	3	438558.98724	218400.77269	Little Deer Creek
358208	Erosion	3	3	3	438624.74616	218490.75743	Little Deer Creek
358209	Unusual Condition	3	4	3	438643.63434	218523.65762	Little Deer Creek
358210	Representative Site				438697.06437	218558.05252	Little Deer Creek
358211	Unusual Condition	4	3	2	438770.50790	218645.25569	Little Deer Creek
358212	Erosion	3	4	4	438824.02417	218727.43451	Little Deer Creek
358213	Fish Barrier	5	1	3	438848.38050	218756.43230	Little Deer Creek
358214	Representative Site				439436.25613	219013.75871	Little Deer Creek
358215	Erosion	3	3	4	439480.76281	219053.73178	Little Deer Creek
359101	Inadequate Buffer	1	3	3	440955.42717	219055.33138	Little Deer Creek
359102	Fish Barrier	5	2	3	440985.22691	219071.47910	Little Deer Creek
359103	Erosion	3	3	3	441139.05766	219173.04172	Little Deer Creek
359104	Representative Site				441325.21128	219451.98151	Little Deer Creek
359216	Fish Barrier	3	5	4	440597.77993	219194.44664	Little Deer Creek
359216	Inadequate Buffer	1	3	3	440597.77993	219194.44664	Little Deer Creek
359217	Erosion	4	3	5	440934.88909	218940.63887	Little Deer Creek
359218	Inadequate Buffer	5	3	3	440595.24186	218700.95556	Little Deer Creek
362301	Erosion	3	3	3	446192.28812	219291.69053	Rock Hollow
362302	Fish Barrier	5	1	3	446346.05821	219441.05289	Rock Hollow
367101	Inadequate Buffer	5	1	1	455748.27857	219328.16023	Cherry Hill

Listing of Sites By Site Number

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	STREAM
367103	Fish Barrier	3	4	1	455774.13728	219219.92065	Cherry Hill
367104	Inadequate Buffer	5	2	2	455752.20625	219271.26643	Cherry Hill
367105	Erosion	4	2	1	455737.93273	219259.98485	Cherry Hill
367106	Erosion	4	2	2	455599.81295	219262.85184	Cherry Hill
367107	Inadequate Buffer	3	2	3	455292.43283	219461.51385	Cherry Hill
379101	Erosion	3	3	3	441491.07219	219611.70740	Little Deer Creek
379102	Inadequate Buffer	1	3	3	441550.09927	219718.04715	Little Deer Creek
380101	Erosion	3	3	3	443196.13717	220554.80345	Little Deer Creek
380102	Representative Site				443105.36968	220395.09708	Little Deer Creek
382301	Representative Site				446653.70354	219526.65064	Rock Hollow
382302	Erosion	3	3	4	447186.08658	219851.32213	Rock Hollow
383301	Representative Site				447794.35001	220523.71744	Rock Hollow
386101	Inadequate Buffer	5	2	2	454691.39008	220649.35170	Cherry Hill
386102	Erosion	4	2	1	454691.39008	220649.35170	Cherry Hill
386103	Unusual Condition	4	2	2	454758.40569	220463.49069	Cherry Hill
386104	Inadequate Buffer	2	2	2	454871.77687	219990.57638	Cherry Hill
386105	Erosion	4	2	2	454871.77687	219990.57638	Cherry Hill
387101	Inadequate Buffer	1	2	3	455942.44481	219788.05923	Cherry Hill
387102	Erosion	4	3	1	455927.08346	219625.25669	Cherry Hill
387103	Erosion	3	3	1	455900.52681	219557.08713	Cherry Hill
387104	Erosion	5	3	2	455787.78319	219428.59354	Cherry Hill
387105	Inadequate Buffer	1	3	3	455997.51984	219759.58537	Cherry Hill
387106	Inadequate Buffer	2	2	1	455884.93291	220042.85913	Cherry Hill
387107	Inadequate Buffer	1	3	2	455849.98354	220859.22306	Cherry Hill
399101	Erosion	4	3	3	441093.04467	221658.85773	Near Jackson Branch
399102	Fish Barrier	5	3	2	441095.55074	221659.76632	Near Jackson Branch
399103	Erosion	3	3	3	441074.27167	221585.09415	Near Jackson Branch
399104	Inadequate Buffer	1	3	2	440766.89611	221169.29490	Near Jackson Branch
399105	Unusual Condition	3	4	3	441050.52742	221515.83703	Near Jackson Branch
400101	Inadequate Buffer	2	3	2	443710.15321	220787.01306	Little Deer Creek
400102	Erosion	3	3	3	443708.21345	220796.05314	Little Deer Creek
403301	Inadequate Buffer	1	3	1	448124.93189	220692.28864	Rock Hollow
403302	Erosion	5	3	2	447948.12222	220693.66879	Rock Hollow
403303	Pipe Outfall	5	1	2	448093.90287	220678.24954	Rock Hollow
403304	Representative Site				448193.80493	220677.71585	Rock Hollow
406101	Erosion	3	3	1	454667.87566	220692.30328	Cherry Hill
406101	Inadequate Buffer	4	3	1	454667.87566	220692.30328	Cherry Hill
406102	Pipe Outfall	3	3	1	454690.78048	220767.92888	Cherry Hill
406103	Fish Barrier	3	4	1	454715.89457	220776.22021	Cherry Hill
406104	Pipe Outfall	3	3	3	454671.13548	220751.89272	Cherry Hill
406105	Inadequate Buffer	3	3	3	454543.58313	221378.14548	Cherry Hill
419101	Inadequate Buffer	3	2	1	441012.88058	222087.69938	Near Jackson Branch
419102	Fish Barrier	4	4	1	441007.10733	222106.90179	Near Jackson Branch
419102	Representative Site				440770.37478	223042.63663	Near Jackson Branch
419103	Erosion	3	3	3	441007.44444	222114.99151	Near Jackson Branch
419104	Fish Barrier	5	3	3	440926.69454	222337.81172	Near Jackson Branch
419105	Fish Barrier	5	2	3	440933.51474	222389.38858	Near Jackson Branch
419106	Erosion	3	3	3	440933.10146	222419.52299	Near Jackson Branch
419107	Inadequate Buffer	1	3	3	440926.69454	222337.81172	Near Jackson Branch
419108	Erosion	3	3	4	440985.72710	222961.62673	Near Jackson Branch

Listing of Sites By Site Number

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	STREAM
419110	Fish Barrier	5	3	4	440876.67859	223014.03656	Near Jackson Branch
419111	Fish Barrier	5	2	5	440824.39095	223033.33442	Near Jackson Branch
419113	Erosion	3	3	5	440726.07934	223048.29861	Near Jackson Branch
419114	Fish Barrier	5	2	5	440548.07913	223104.39077	Near Jackson Branch

Listing of Sites by Problem for the second round of fieldwork

Erosion

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Land use left	Land use right	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	288202	Widening	Below road crossing	4000	4	Forest	Forest	No		3	3	1
Erosion	311205	Widening	Bend at steep slope	1500	6	Forest	Forest	No		3	4	4
Erosion	333201	Widening	Bend at steep slope	300	20	Forest	Forest	No		3	4	5
Erosion	337205	Downcutting	Bend at steep slope	100	7	Forest	Crop field	No		3	4	3
Erosion	358208	Downcutting	Bend at steep slope	800	5	Crop field	Crop field	No		3	3	3
Erosion	358212	Widening	Bend at steep slope	50	10	Crop field	Forest	No		3	4	4
Erosion	358215	Downcutting	Bend at steep slope	800	5	Shrubs/Small Trees	Shrubs/Small Trees	No		3	3	4
Erosion	359103	Widening	Bend at steep slope	1500	3	Pasture	Pasture	No		3	3	3
Erosion	362301	Widening	Bend at steep slope	1100	4.5	Forest	Forest	No		3	3	3
Erosion	379101	Widening	Bend at steep slope	1900	3	Shrubs/Small Trees	Shrubs/Small Trees	No		3	3	3
Erosion	380101	Widening	Bend at steep slope	600	3.5	Shrubs/Small Trees	Shrubs/Small Trees	No		3	3	3
Erosion	382302	Widening	Unknown	1000	4	Forest	Forest	No		3	3	4
Erosion	387103	Widening	Bend at steep slope	150	7	Shrubs/Small Trees	Lawn	No		3	3	1
Erosion	399103	Widening	Land use change upstream	1800	5	Pasture	Pasture	Yes	Fence on right	3	3	3
Erosion	400102	Widening	Bend at steep slope	900	6	Pasture	Crop field	No		3	3	3
Erosion	406101	Widening	Bend at steep slope	300	6	Shrubs/Small Trees	Lawn	No		3	3	1
Erosion	419103	Widening	Land use change upstream	500	4	Forest	Forest	No		3	3	3
Erosion	419106	Widening	Bend at steep slope	1600	4	Pasture	Pasture	No		3	3	3
Erosion	419108	Widening	Bend at steep slope	400	3	Forest	Forest	No		3	3	4
Erosion	419113	Widening	Unknown	700	3	Forest	Forest	No		3	3	5
Erosion	316223	Widening	Bend at steep slope	100	6	Shrubs/Small Trees	Forest	No		4	3	3
Erosion	333204	Widening	Bend at steep slope	200	5	Forest	Paved	Yes	Close to road	4	3	1
Erosion	359217	Widening	Bend at steep slope	200	5	Shrubs/Small Trees	Shrubs/Small Trees	No		4	3	5
Erosion	367105	Widening	Bend at steep slope	300	3	Shrubs/Small Trees	Shrubs/Small Trees	No		4	2	1
Erosion	367106	Widening	Bend at steep slope	500	3	Lawn	Forest	No		4	2	2
Erosion	386102	Widening	Bend at steep slope	200	3	Lawn	Forest	No		4	2	1
Erosion	386105	Widening	Bend at steep slope	900	2	Pasture	Pasture	No		4	2	2
Erosion	387102	Widening	Bend at steep slope	300	3	Lawn	Lawn	No		4	3	1
Erosion	399101	Widening	Bend at steep slope	300	5	Forest	Forest	No		4	3	3
Erosion	316220	Headcutting	Bend at steep slope	40	6	Forest	Shrubs/Small Trees	No		5	3	2
Erosion	387104	Widening	Bend at steep slope	100	6	Forest	Forest	No		5	3	2
Erosion	403302	Downcutting	Unknown	600	2	Pasture	Pasture	No		5	3	2

Inadequate Buffers

Problem	Site	Sides	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	Land Use Left	Land UseRight	Recentlyestablished	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	288204	Both	Both	0	0	3800	1500	Crop field	Shrubs/Small Trees	No	No	1	3	3	3
Inadequate Buffer	333205	Both	Left	0	0	700	2600	Lawn	Paved	No	No	1	4	1	4
Inadequate Buffer	359101	Both	Both	0	0	3300	3300	Pasture	Pasture	Yes	Cattle	1	3	3	2
Inadequate Buffer	359216	Both	Both	0	0	1300	1300	Pasture	Pasture	No	Cattle	1	3	3	2
Inadequate Buffer	379102	Both	Both	0	0	3600	3600	Pasture	Pasture	No	No	1	3	3	4
Inadequate Buffer	387101	Both	Both	0	0	1300	1300	Lawn	Lawn	No	Yes	1	2	3	3
Inadequate Buffer	387105	Both	Both	0	0	1500	1500	Pasture	Pasture	No	Horses	1	3	3	3
Inadequate Buffer	387107	Both	Both	0	0	2300	2300	Paved/Pasture	Lawn	No	No	1	3	2	3
Inadequate Buffer	399104	Both	Both	0	0	1200	1800	Pasture	Pasture	No	Cattle	1	3	2	3
Inadequate Buffer	403301	Both	Both	0	0	2300	2300	Pasture	Pasture	No	No	1	3	1	2
Inadequate Buffer	419107	Both	Both	0	0	1700	1700	Pasture	Pasture	No	No	1	3	3	3
Inadequate Buffer	386104	Both	Both	0	0	900	900	Pasture	Pasture	No	No	2	2	2	3
Inadequate Buffer	387106	Both	Both	0	0	600	600	Lawn	Lawn	No	No	2	2	1	2
Inadequate Buffer	400101	Both	Both	0	0	600	600	Crop field	Pasture	No	No	2	3	2	4
Inadequate Buffer	288203	Left	Left	0		1500		Shrubs/Small Trees	Forest	No	No	3	2	3	3
Inadequate Buffer	337202	Both	Left	0	20	500	500	Lawn	Lawn	No	No	3	2	3	3
Inadequate Buffer	358207	Both	Both	0	15	1200	900	Crop field	Crop field	No	No	3	3	3	3
Inadequate Buffer	367107	Left	Left	0		2000		Pasture	Forest	No	No	3	2	3	4
Inadequate Buffer	406105	Right	Right		0		1200	Forest	Crop field	No	No	3	3	3	1
Inadequate Buffer	419101	Left	Left	0		1000		Lawn	Forest	No	No	3	2	1	3
Inadequate Buffer	406101	Both	Both	0	25	300	300	Shrubs/Small Trees	Paved	No	No	4	3	1	3
Inadequate Buffer	359218	Left	Left	10		100		Crop field	Forest	No	No	5	3	3	4
Inadequate Buffer	367101	Left	Left	0		100		Lawn	Forest	No	No	5	1	1	5
Inadequate Buffer	367104	Both	Both	0	0	200	200	Lawn	Lawn	No	No	5	2	2	3
Inadequate Buffer	386101	Right	Right		0		300	Forest	Shrubs/Small Trees	No	No	5	2	2	4

Fish Barriers

Problem	Site	Date	Blockage	Type	Reason	Drop(m)	Depth(m)	Severity	Correctability	Access
Fish Barrier	359216	2/6/2006	Total	Instream pond	Too high	12		3	5	4
Fish Barrier	367103	2/3/2006	Total	Road crossing	Too high	12		3	4	1
Fish Barrier	406103	2/3/2006	Total	Road crossing	Too high	18		3	4	1
Fish Barrier	288201	2/3/2006	Total	Road crossing	Too high	24		4	4	1
Fish Barrier	419102	2/3/2006	Total	Road crossing	Too high	8		4	4	1
Fish Barrier	333202	2/3/2006	Total	Natural falls	Too high	36		5	3	4
Fish Barrier	333203	2/3/2006	Temporary	Debris dam	Too high	24		5	2	3
Fish Barrier	337201	2/6/2006	Temporary	Debris dam	Too high	36		5	3	5
Fish Barrier	358213	2/6/2006	Temporary	Debris dam	Too shallow		2	5	1	3
Fish Barrier	359102	2/10/2006	Temporary	Debris dam	Too high	18		5	2	3
Fish Barrier	362302	2/3/2006	Temporary	Debris dam	Too high	24		5	1	3
Fish Barrier	399102	2/6/2006	Total	Natural falls	Too high	24		5	3	2
Fish Barrier	419104	2/6/2006	Total	Natural falls	Too high	6		5	3	3
Fish Barrier	419105	2/6/2006	Total	Natural falls	Too high	8		5	2	3
Fish Barrier	419110	2/6/2006	Temporary	Debris dam	Too high	48		5	3	4
Fish Barrier	419111	2/6/2006	Temporary	Debris dam	Too high	12		5	2	5
Fish Barrier	419114	2/6/2006	Temporary	Debris dam	Too high	24		5	2	5

Pipe Outfalls

Problem	Site	Outfall Type	Pipe Type	Location of Pipe	Diameter (in)	Channel Width	Discharge	Color	Odor	Severity	Correctability	Access
Pipe Outfall	406102	Stormwater	Concrete Pipe	Right bank	16		Yes	Clear	None	3	3	1
Pipe Outfall	406104	Pond Overflow	Smooth Metal Pipe	Right bank	16		Yes	Clear	None	3	3	3
Pipe Outfall	334201	Pumping Station	Concrete Pipe	Left bank	144		No			5	1	2
Pipe Outfall	334202	Pumping Station	Concrete Pipe	Left bank	36		No			5	1	2
Pipe Outfall	334204	Stormwater	Concrete Pipe	Left bank	12		No			5	1	1
Pipe Outfall	337203	Unknown	Plastic	Left bank	4		No			5	2	2
Pipe Outfall	403303	Stormwater	Plastic	Right bank	4		No			5	1	2

Unusual Conditions

Problem	Site	Describe	Description	Potential Cause	Severity	Correctability	Access
Unusual Condition	358209		Ag Stream Crossing		3	4	3
Unusual Condition	399105	Excessive Algae	Algae covers bottom of stream	Livestock runoff	3	4	3
Unusual Condition	311203		Tractor/ATV Crossing Stream; Causing some sediment to enter stream		4	4	3
Unusual Condition	358211		Piped Sream		4	3	2
Unusual Condition	386103		Sand Bags enhancing stone weir to create pond		4	2	2
Unusual Condition	337204		Bank Stabilization		5	2	2
Comment	316222		wood dumped in stream bed				

Channel Alterations

Problem	Site	Type	Bottom Width (in)	Length (ft)	Perennial Flow	Sedimentation	Veg in Channel	Road Crossing	Length Above (ft)	Length Below (ft)	Severity	Correctability	Access
Channel Alteration	334203	Concrete	96	250	Yes	Yes	No	No			3	4	1
Channel Alteration	367102	Rip-rap	48	100	Yes	No	No	Below		50	5	3	1

Trash Dumping

Problem	Site	Type	Truckloads	Other measure	Extent	Volunteer Project?	Owner Type	Owner Name	Severity	Correctability	Access
Trash Dumping	316221	Construction	1		Single Site	Yes	Private		5	2	2
Trash Dumping	337206	Fencing	0.5		Single Site	Yes	Private		5	2	2

Exposed Pipes

Problem	Site	Location of Pipe	Type	Diameter(in)	Length(ft)	Purpose	Discharge	Color	Odor	Severity	Correctability	Access
Exposed Pipe	311201	Exposed manhole	Concrete	36	2	Unknown	No			5	1	3

Representative Sites A

Problem	Site	Substrate	Embeddedness	Shelter for Fish	Channel Alteration	Sediment Deposition	Velocity/Depth	Flow	Vegetation	Bank Condition	Riparian Vegetation
Elbow Branch											
Representative Site	311202	Optimal	Marginal	Marginal	Optimal	Marginal	Suboptimal	Suboptimal	Marginal	Marginal	Suboptimal
Representative Site	311204	Optimal	Suboptimal	Marginal	Optimal	Suboptimal	Optimal	Optimal	Marginal	Suboptimal	Optimal
Little Deer Creek											
Representative Site	316219	Suboptimal	Suboptimal	Poor	Suboptimal	Marginal	Marginal	Marginal	Marginal	Marginal	Suboptimal
Representative Site	358210	Marginal	Marginal	Poor	Poor	Poor	Suboptimal	Optimal	Marginal	Marginal	Poor
Representative Site	358214	Optimal	Optimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Marginal	Suboptimal
Representative Site	359104	Suboptimal	Poor	Marginal	Suboptimal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Poor
Representative Site	380102	Optimal	Suboptimal	Marginal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Suboptimal	Suboptimal
Near Jackson Branch											
Representative Site	419102	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal	Suboptimal	Optimal
Rock Hollow											
Representative Site	382301	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	383301	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	403304	Optimal	Suboptimal	Marginal	Marginal	Poor	Suboptimal	Optimal	Suboptimal	Marginal	Marginal

Representative Sites B

Problem	Site	Width Riffle	Width Run	Width Pool	Depth Riffle	Depth Run	Depth Pool	Bottom Type
Elbow Branch								
Representative Site	311202	72	120	48	2	6	24	Cobble
Representative Site	311204	180	180	22	3	12	12	Cobble
Little Deer Creek								
Representative Site	316219	60	4060					
Representative Site	358210	84	84	84	2	4	5	Sand
Representative Site	358214	96	96	96	3	6	12	Gravel
Representative Site	359104	60	72		3	6		Cobble
Representative Site	380102	120	170	60	4	8	24	Cobble
Near Jackson Branch								
Representative Site	419102	60	72	60	2	4	8	Cobble
Rock Hollow								
Representative Site	382301	120	72	120	3	9	48	Cobble
Representative Site	383301	120	78	96	5	8	18	Cobble
Representative Site	403304	78	78	78	6	12	15	Cobble