Stream Corridor Assessment Survey for the Prettyboy Reservoir Watershed, Baltimore County, Maryland

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Table of Contents

List of Figures

List of Tables

EXECUTIVE SUMMARY

In 1998, the Maryland Clean Water Action Plan identified the Prettyboy Reservoir watershed as one of the State's water bodies that did not meet water quality requirements. In response to this finding, the Maryland Department of Environment (MDE) and Baltimore County formed a partnership to develop a Watershed Restoration Action Strategy (WRAS) for the Prettyboy Reservoir 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.

SCA survey fieldwork for the Prettyboy Reservoir began in May 2005 and was completed by June 2005. There were approximately 137 miles of streams in the watershed that were available to have been walked using the field maps given by Baltimore County. The field crews were given permission for and walked approximately 85 miles (62%) of the watershed. Survey teams did not have access to all the watershed's streams and did not survey the mainstem of the reservoir.

Over the streams assessed, survey teams identified 162 potential environmental problem sites. At the time of the survey, the most frequently observed potential problem sites were inadequately forested stream buffers, reported at 71 sites. Other potential environmental problems recorded during the survey included: 41 erosion sites, 23 pipe outfalls, 17 fish barriers, 3 channel alterations, 3 trash dumping sites, 2 exposed pipes, 1 construction site, and one unusual condition (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 14 representative sites.

The Stream Corridor Assessment Survey is a rapid overview of the entire 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 Prettyboy Reservoir Watershed WRAS committee, which is developing a Watershed Restoration Action Strategy for the Prettyboy Reservoir. Information on the Prettyboy Reservoir Watershed Action Strategy can be found on the Department of Natural Resources' website (www.dnr.maryland.gov/watersheds/wras).

INTRODUCTION

In 1998, Maryland's Clean Water Action Plan identified bodies of water that failed to meet water quality requirements or other natural resource goals. One of the areas identified in the report was the Prettyboy Reservoir watershed. The Maryland Department of Environment formed a partnership with Baltimore County to assess and improve environmental conditions in the Prettyboy Reservoir Watershed. The main goal of this partnership is to develop and implement a Watershed Restoration Action Strategy (WRAS) for the Prettyboy Reservoir.

Located in Baltimore and Carroll County, the watershed covers approximately 46,000 acres of land and water (72 square miles) with 26,240 acres (57%) in Baltimore County. (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.

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 is usually completed that compiles and analyzes existing water quality, land use, and living resource data about the watershed. Secondly, a synoptic water quality survey was conducted at selected stations throughout the Prettyboy Reservoir watershed 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 Prettyboy Reservoir Stream Corridor Assessment Survey and highlights potential restoration opportunities within the watershed based on the survey.

Survey teams walked approximately 85 miles in the Prettyboy Reservoir stream network. (Compass Run, Georges Run, Grave Run, Murphy Run, Peggys Run, Poplar Run, Prettyboy Branch, Silver Run, Walker Run) The survey began May 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.

One of the main goals of the Prettyboy Reservoir 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 Prettyboy Reservoir 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 Baltimore County to develop a Watershed Restoration Action Strategy (WRAS) of the Prettyboy Reservoir 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 Prettyboy Reservoir. 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.

Prettyboy Reservoir
Baltimore County, Maryland

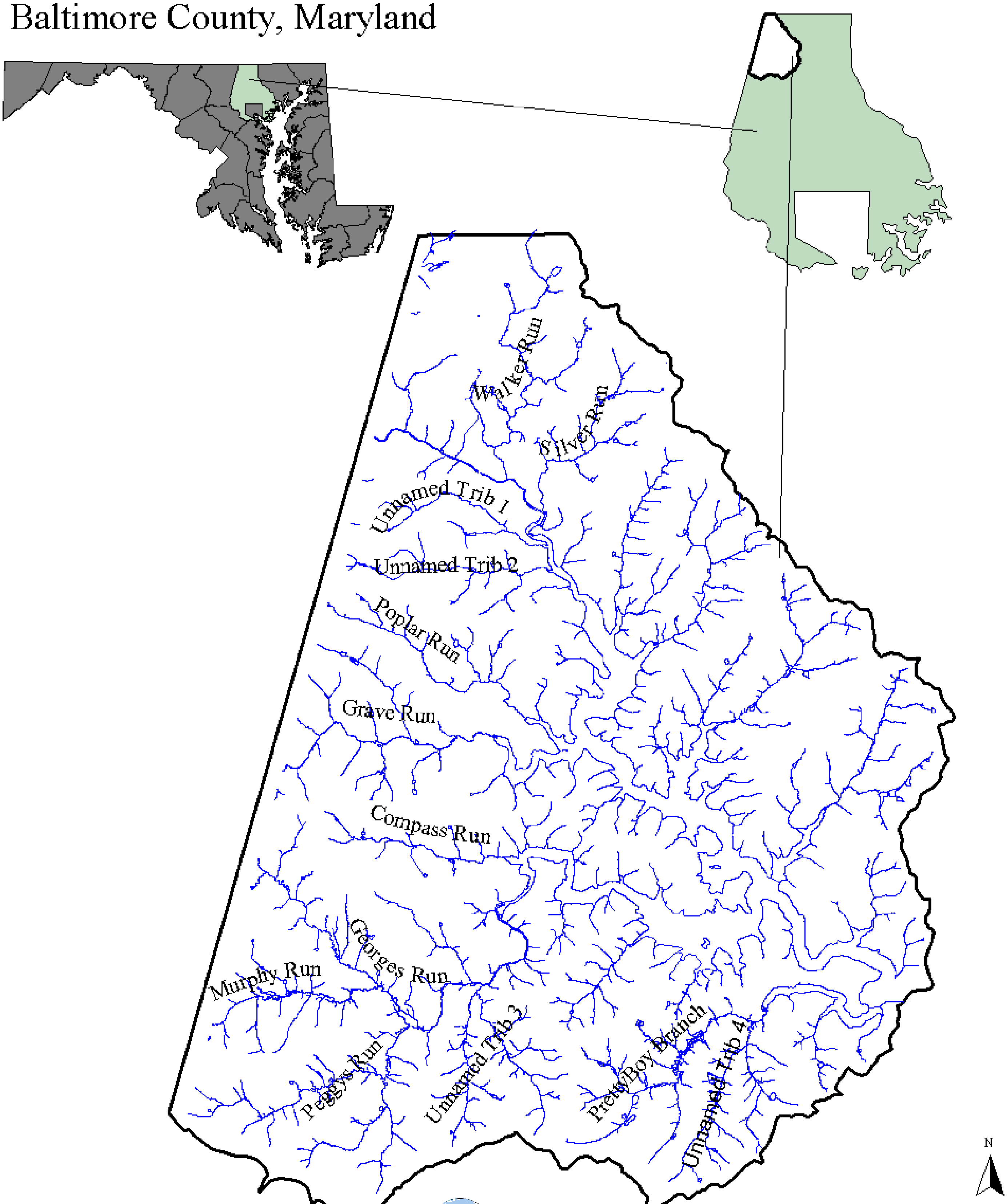

Figure 1: Map showing the location of the Prettyboy Reservoir in Maryland

MDE

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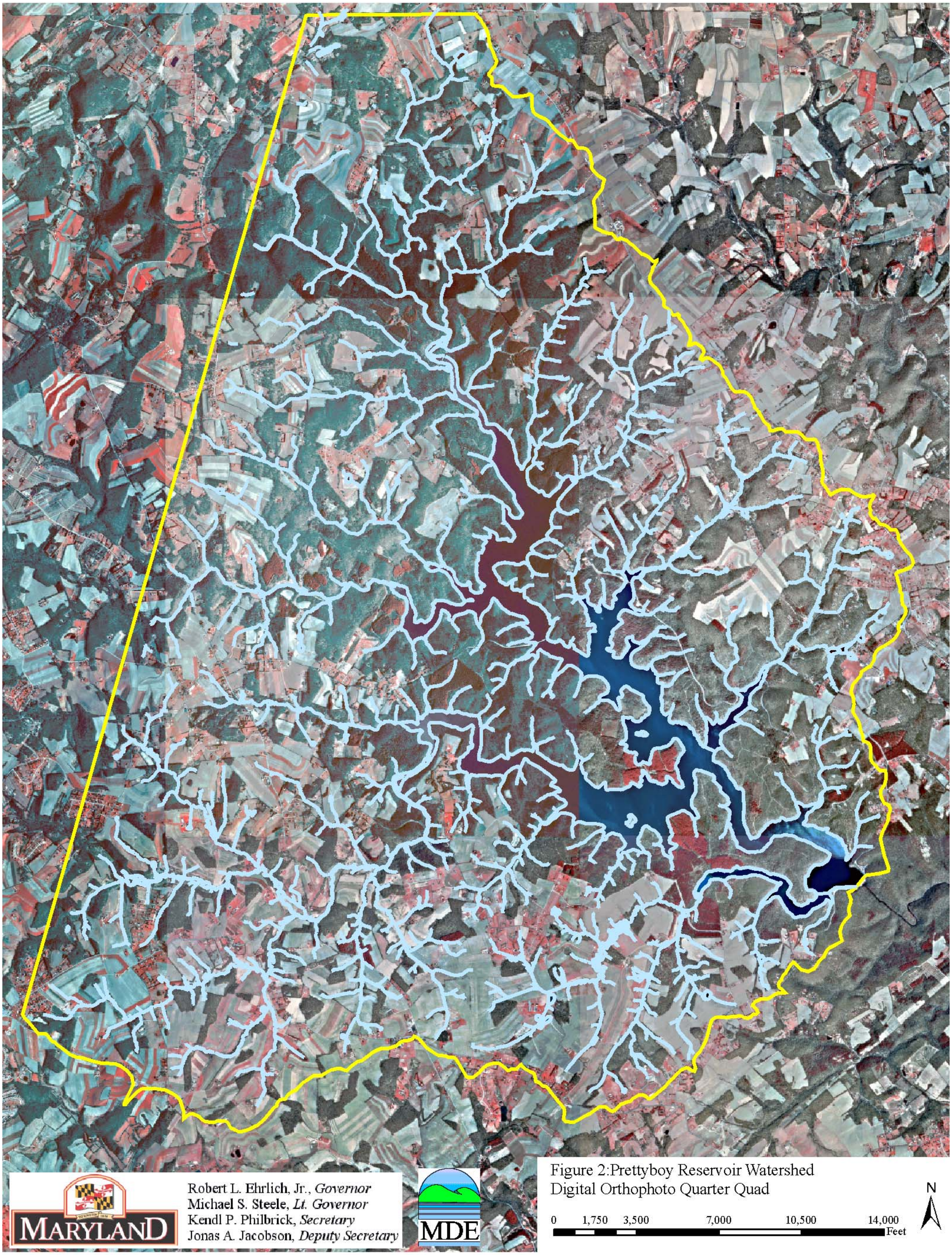

Figure 2:Prettyboy Reservoir Watershed
Digital Orthophoto Quarter Quad

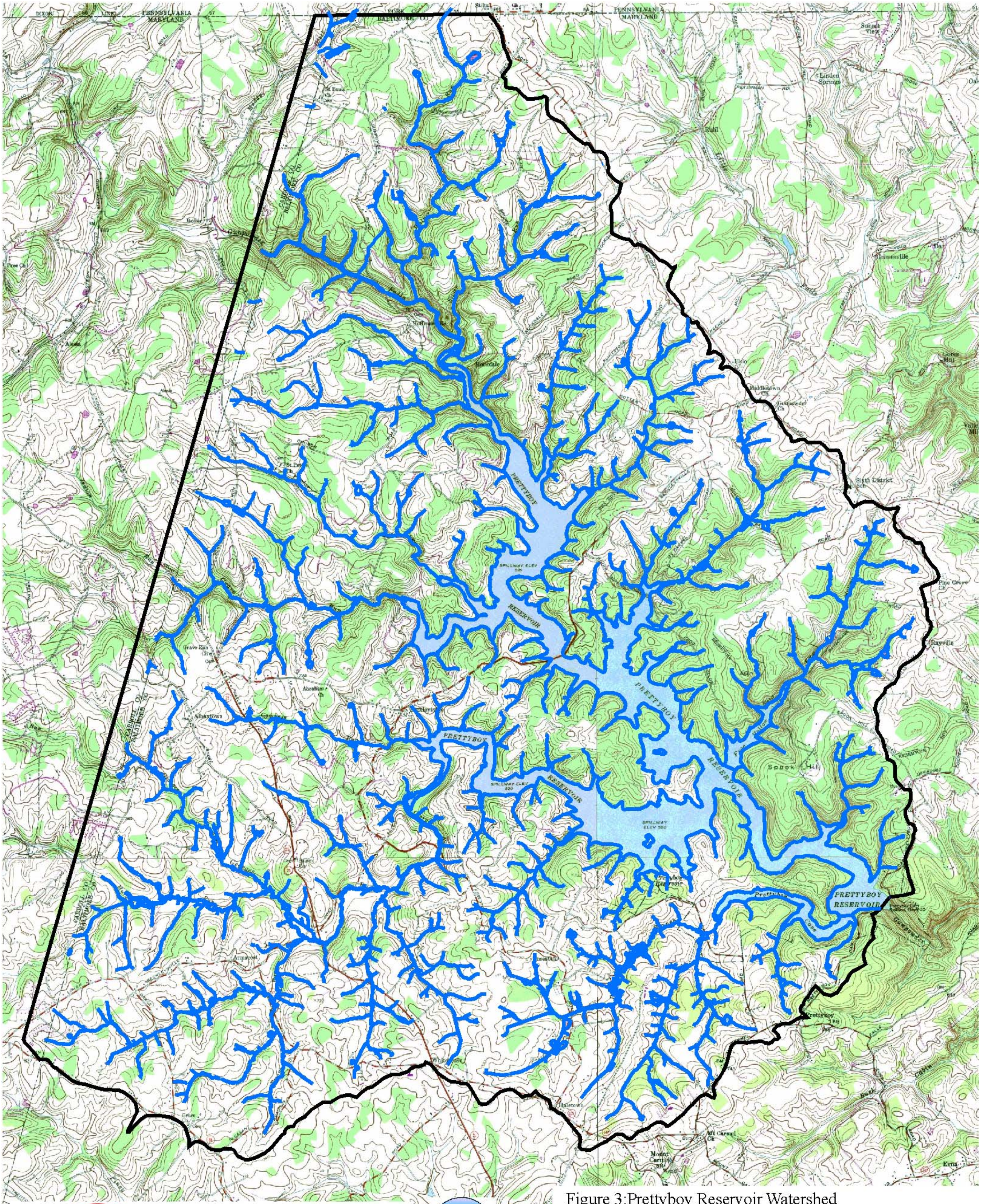

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Figure 3: Prettyboy Reservoir Watershed
7.5 Minute USGS Topographic Map

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0 1,750 3,500 7,000 10,500 14,000 Feet

METHODS

Goals of the SCA Survey

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

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

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

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 Prettyboy Reservoir 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, the MCC's Bay Crew received guidelines for taking photographs at all problem and reference sites.

Several weeks prior to the beginning of the survey, property owners along the stream reach received letters informing them of what the survey is and when it was to be completed. This letter also provided a phone number to call if individuals 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 Prettyboy Reservoir Watershed from May 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. In addition, the survey recorded information on the general condition of in-stream and riparian habitats and the location of potential wetland creation sites.

More detailed information on the procedures used in the Maryland SCA survey can be found in, "Stream Corridor Assessment Survey – Survey Protocols" (Yetman, 2001). A copy of the survey protocols can found on DNR's web site at http://www.dnr.maryland.gov/streams/pubs/other.html. Hard copies of the protocols also can be obtained by contacting the Watershed Services Unit of the Maryland Department of Natural Resources, Annapolis, MD.

Overall Ranking System

The SCA survey field crews evaluate and score all problems on a scale of 1 to 5 in three separate areas: problem severity, correctability, and accessibility. A major part of the crew's training on survey methods is devoted to properly rating the different problems identified during the survey. This ranking system developed from an earlier survey that found 453 potential environmental problems along 96 miles of stream of the Swan Creek Watershed in Harford County. The most frequently reported problem during the survey was stream bank erosion, reported at 179 different locations (Yetman et. al., 1996). Follow-up surveys found that while stream bank erosion was a common problem throughout the watershed, the severity of the erosion problem varied substantially among the sites and that the erosion problems at many sites were minor in severity. Based on this experience and its goal of helping to prioritize restoration work, the SCA survey rates the severity, correctibility, and access of each problem site.

While the ratings are subjective, they have proven to be very valuable in providing a starting point for more detailed follow-up evaluations. 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 Protocol*s (Yetman, 2000). It is important to note that the rating system is designed to contrast problems within a specific problem category and is not intended to be applied across categories. When assigning a severity rating to a site with an inadequate stream buffer for example, the rating is only intended to compare the site to other in the State with inadequate stream buffers. A trash dumping site with a very severe rating may not necessarily be a more significant environmental problem than a stream bank erosion site that received a moderate severity rating.

The **severity** rating indicates how bad a specific problem is relative to others in the same problem category. It is often the most useful rating because it answers questions such as: where are the worst stream bank erosion sites in the watershed, or where is the largest section of stream with an inadequate buffer? The scoring is based on the overall impression of the survey team of the severity of the problem at the time of the survey, based on the established criteria for each problem category (Yetman, 2000).

* A <u>very severe rating</u> of 1 is used to identify problems that have a direct and wide reaching impact on the stream's aquatic resources. Within a specific problem category, a very severe rating indicates that the problem is among the worst that the field teams have seen or would expect to see. Examples 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 <u>moderate severity rating</u> 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 <u>minor severity rating</u> 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 <u>minor correctability rating</u> of 1 indicates problems that can be corrected quickly and easily using hand labor, with a minimal amount of planning. These types of projects would usually not need any Federal, State or local government permits. It is a job that small group of volunteers (10 people or less) could fix in a day or two without using heavy equipment. Examples include removing debris from a blocked culvert pipe, removing less than two pickup truck loads of trash from an easily accessible area or planting trees along a short stretch of stream.

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

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

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

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

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

A very difficult accessibility rating of 5 is assigned to sites that are difficult to reach both on foot and by a vehicle. To reach the site it would be necessary to hike at least a mile, and if equipment were needed to do the restoration work, an access road would need to be built through rough terrain. Examples include a site where there are no roads or trails nearby.

Data Analysis and Presentation

Following the completion of the survey, crews entered and information from the field data sheets into a Microsoft Access database and verified the accuracy of the data. Field crews 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 Baltimore County Planning Department for their use in developing a Watershed Action Strategy for the Prettyboy Reservoir Watershed.

RESULTS

The Stream Corridor Assessment Survey identified 162 potential environmental problems within the stream corridor (Table 1 At the time of the survey, the most frequently observed potential problem sites were inadequately forested stream buffers, reported at 71 sites. Other potential environmental problems recorded during the survey included: 41 erosion sites, 23 pipe outfalls, 17 fish barriers, 3 channel alterations, 3 trash dumping sites, 2 exposed pipes, 1 construction site, and one unusual condition. Additionally, crews recorded descriptive habitat condition data at 14 representative sites.

Table 1 presents a summary of survey results and Table 2 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 Prettyboy Reservoir SCA Survey.

Potential Problems Identified	Number	Estimated Length	Very Severe	Severe	Moderate	Low Severity	Minor
Inadequate Buffer	71	144,500 ft (27.3 miles)	36	9	15	8	4
Erosion	41	61,900 ft (11.7 miles)	-	4	30	6	1
Pipe Outfall	23		-	-	18	1	4
Fish Barrier	17		-	-	5	6	6
Channel Alteration	3	4,700 ft (0.9 miles)	-	-	3	-	-
Trash Dumping	3		-	-	3	-	-
Exposed Pipe	2	19 ft (0.0036 miles)	-	-	1	-	1
Construction	1		-	-	-	1	
Unusual Condition	1		-	-	1	-	-
Total	**162**		**36**	**13**	**76**	**22**	**16**
Comments	3						
Representative Sites	14						

Table 2. Summary of results by major stream reach.

Stream Segment	Channel Alteration	Erosion	Exposed Pipe	Fish Barrier	Inadequate Buffer	In/Near Stream Construction	Pipe Outfall	Trash Dumping	Unusual Condition	Representative Site	Comment	Total
Compass Run		2			4		2			1		9
Georges Run		7		1	8		4	1		3	1	25
Grave Run		3	1	5	6	1	4			2		22
Murphy Run		2		1	3							6
Peggys Run	1	11	1		11		3			1	2	30
Poplar Run		1		1	2							4
Prettyboy Branch	2	3		1	11		1	1		2		21
Silver Run				1	2							3
Unnamed Trib 1				1	2							3
Unnamed Trib 2		2			2		1			1		6
Unnamed Trib 3		7		4	10		3			2		26
Unnamed Trib 4		1			7		2					10
Walker Run		2		2	3		3	1	1	2		14

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. For streams on the Eastern Shore there is also the consideration of whether or not the channel is a drainage ditch. Drainage ditched 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 71 inadequate buffer sites with a total length of 144,500 feet (27.3 miles), or approximately 32 percent of the 85 miles streams surveyed. The severity and location of inadequate buffer sites is shown in Figure 4b. Forty-five of these sites are ranked as very severe or severe, while the other twenty-six sites are moderate, of low severity, or minor (Figure 4a). Land use along the stream at inadequate buffer sites, was found to be nearly equally distributed between cropfields, lawns, 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.

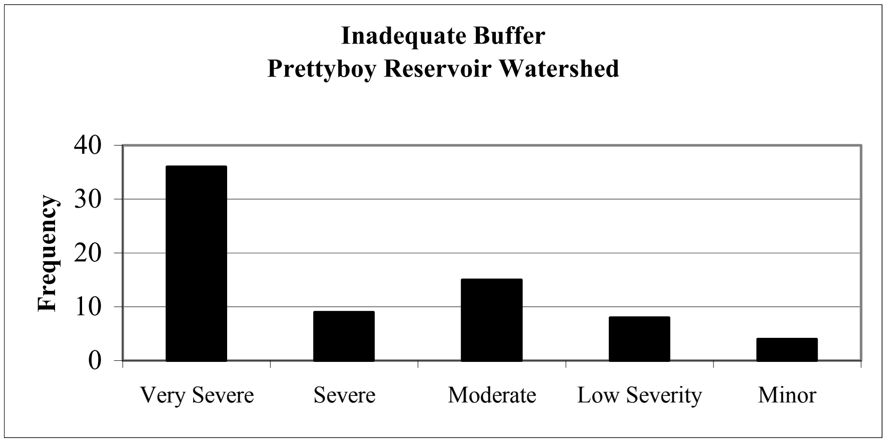

Figure 4a. Histograph showing the frequency of severity ratings given to inadequate buffer sites during the Prettyboy Reservoir SCA survey.

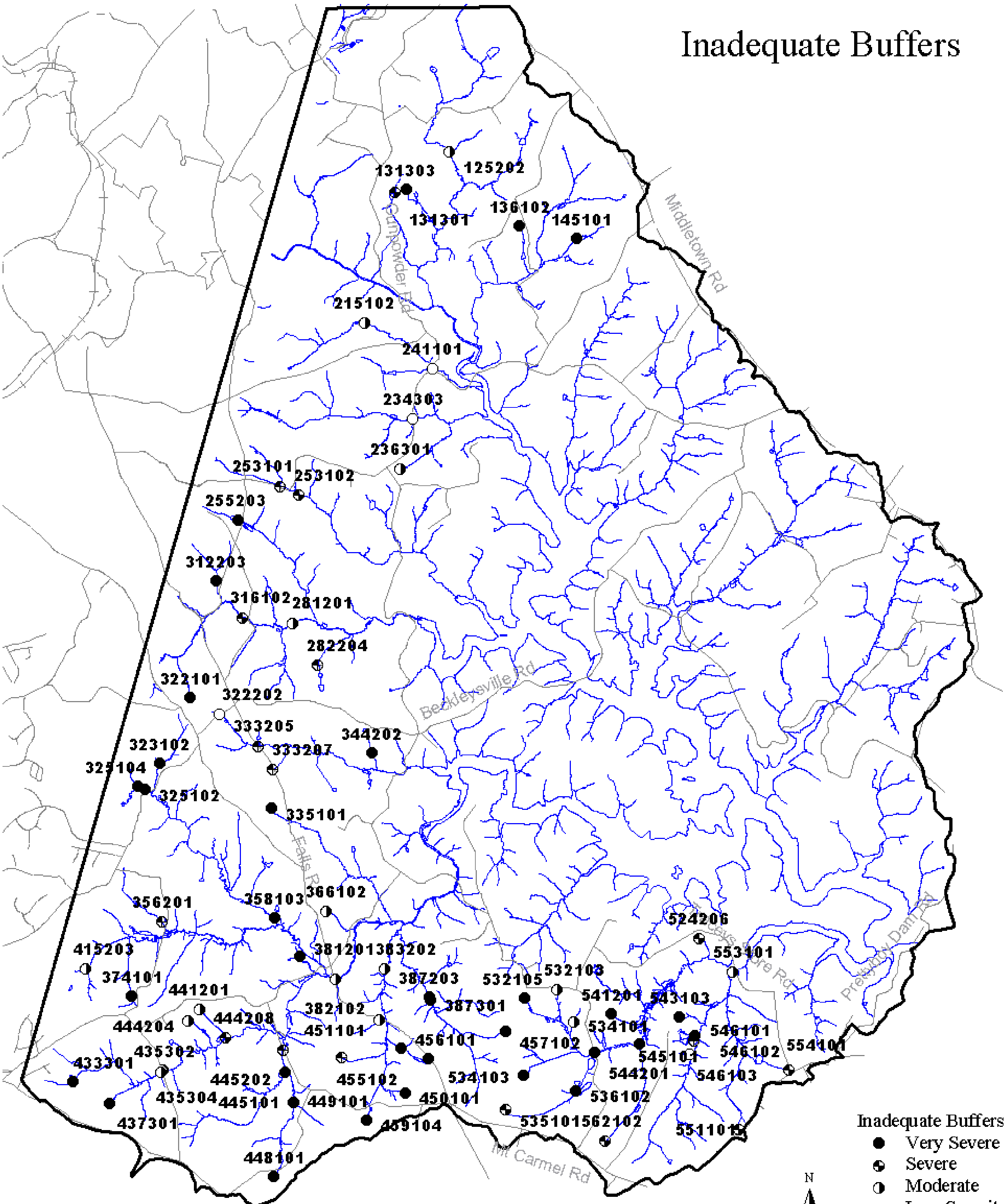

Figure 4b: Map showing the locations of the Inadequate Buffers in the Prettyboy Reservoir

5000 0 5000 Feet

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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 41 eroding stream banks over the length of 61,900 feet (11.7 miles) of stream, or about 14 percent of the 85 miles streams surveyed. The severity and location of erosion sites is shown in Figure 5b. Four of the sites are ranked as severe (Figure 5a). (Appendix B).

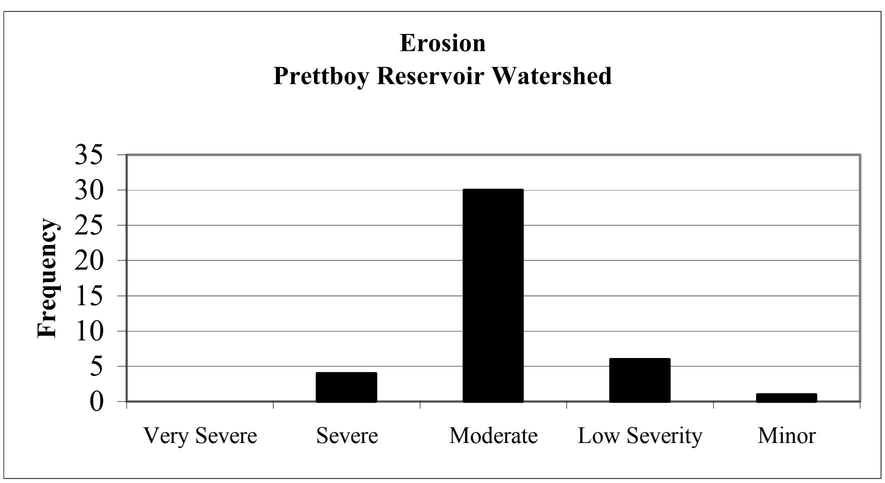

Figure 5a. Histograph showing the frequency of severity ratings given to erosion sites during the Prettyboy Reservoir SCA survey.

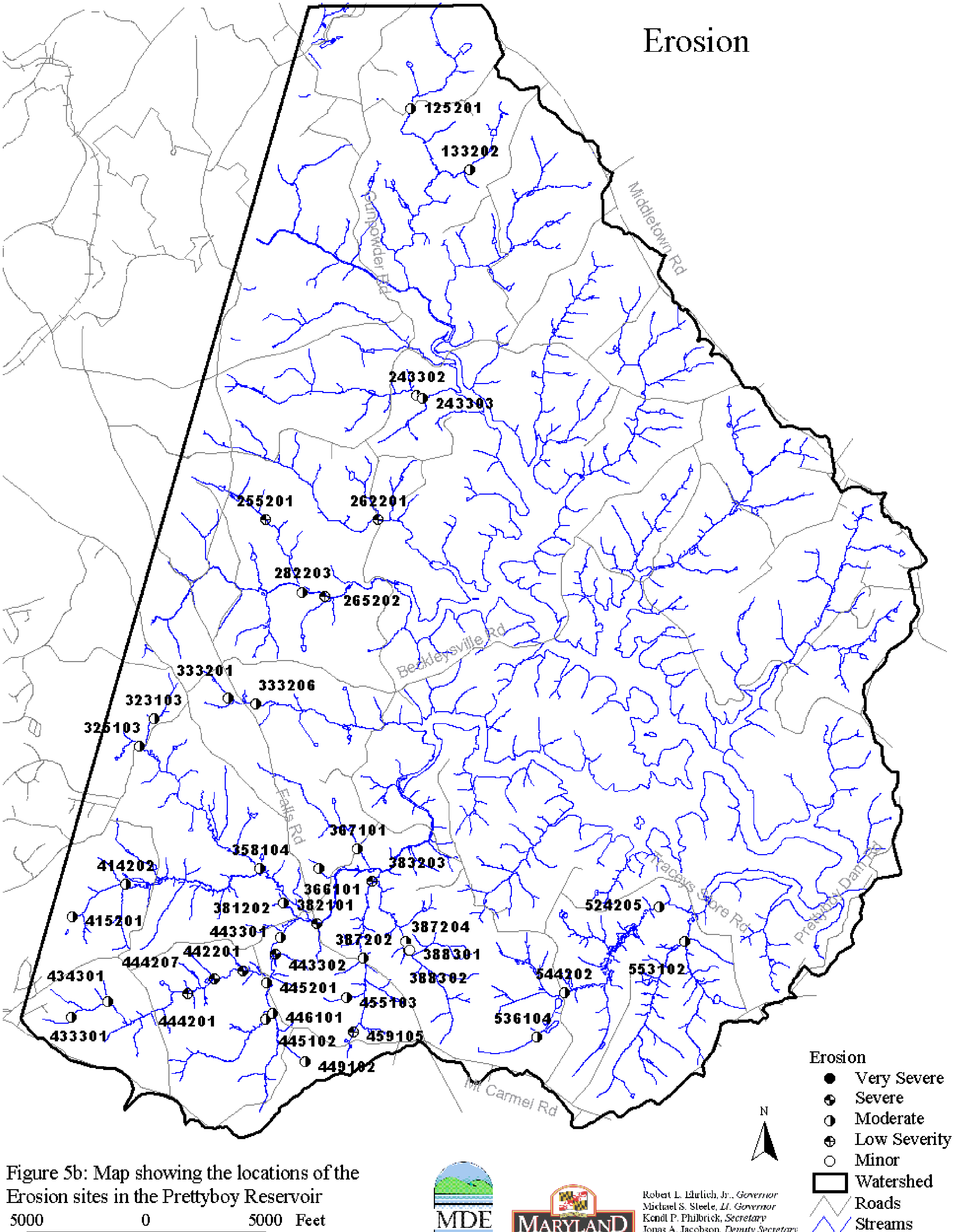

Figure 5b: Map showing the locations of the Erosion sites in the Prettyboy Reservoir

5000 0 5000 Feet

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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 23 pipe outfalls. The severity and location of pipe outfall sites is shown in Figure 6b. Eighteen of the pipes had a discharge. All except one pipe was reported to have a discharge of clear with no odor. The pipes were rated as moderate. The remaining pipes did not have any discharge. (Appendix B)

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.

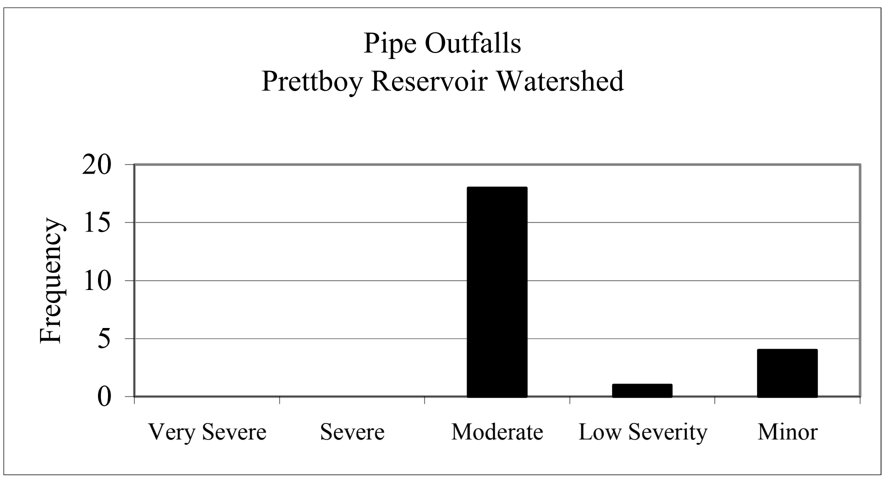

Figure 6a. Histograph showing the frequency of severity ratings given to pipe outfalls sites during the Prettyboy Reservoir SCA survey.

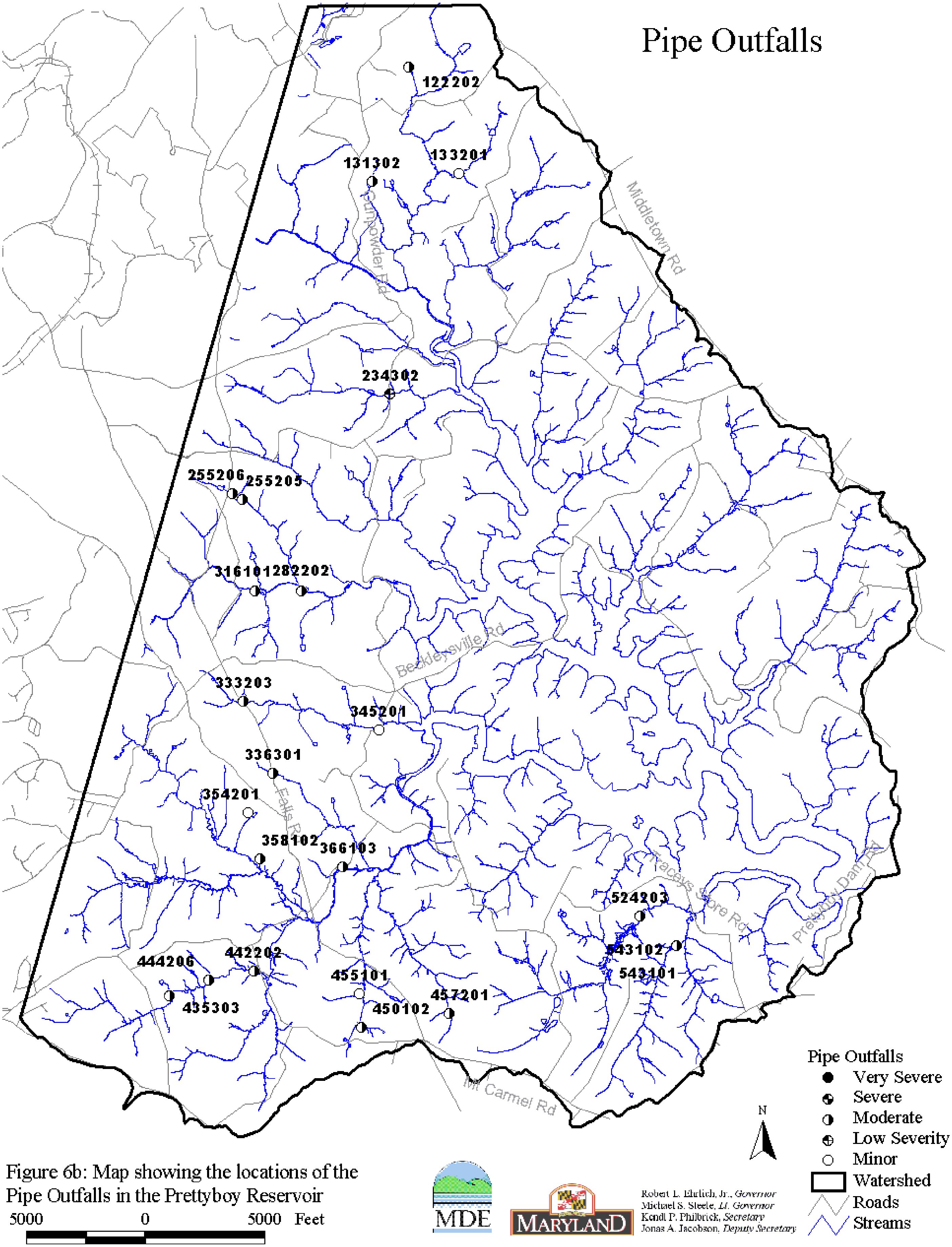

Figure 6b: Map showing the locations of the Pipe Outfalls in the Prettyboy Reservoir

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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 Prettyboy Reservoir SCA survey found 17 fish migration barriers. The locations of fish blockages are shown in Figure 7b. Fish barriers in this watershed are due natural falls (2), road crossings (10), dams (2), and debris dams (2). Five of these sites received a moderate rating. They were all at road crossings.

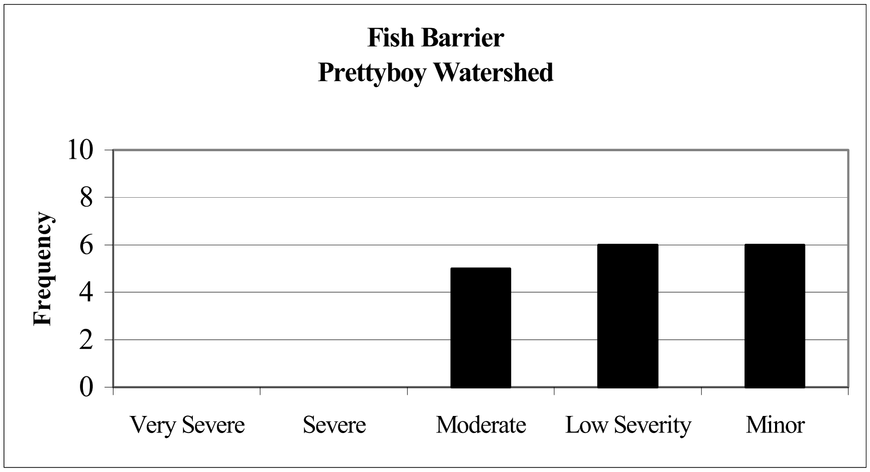

Figure 7a. Histograph showing the frequency of severity ratings given to fish barrier sites during the Prettyboy Reservoir SCA survey.

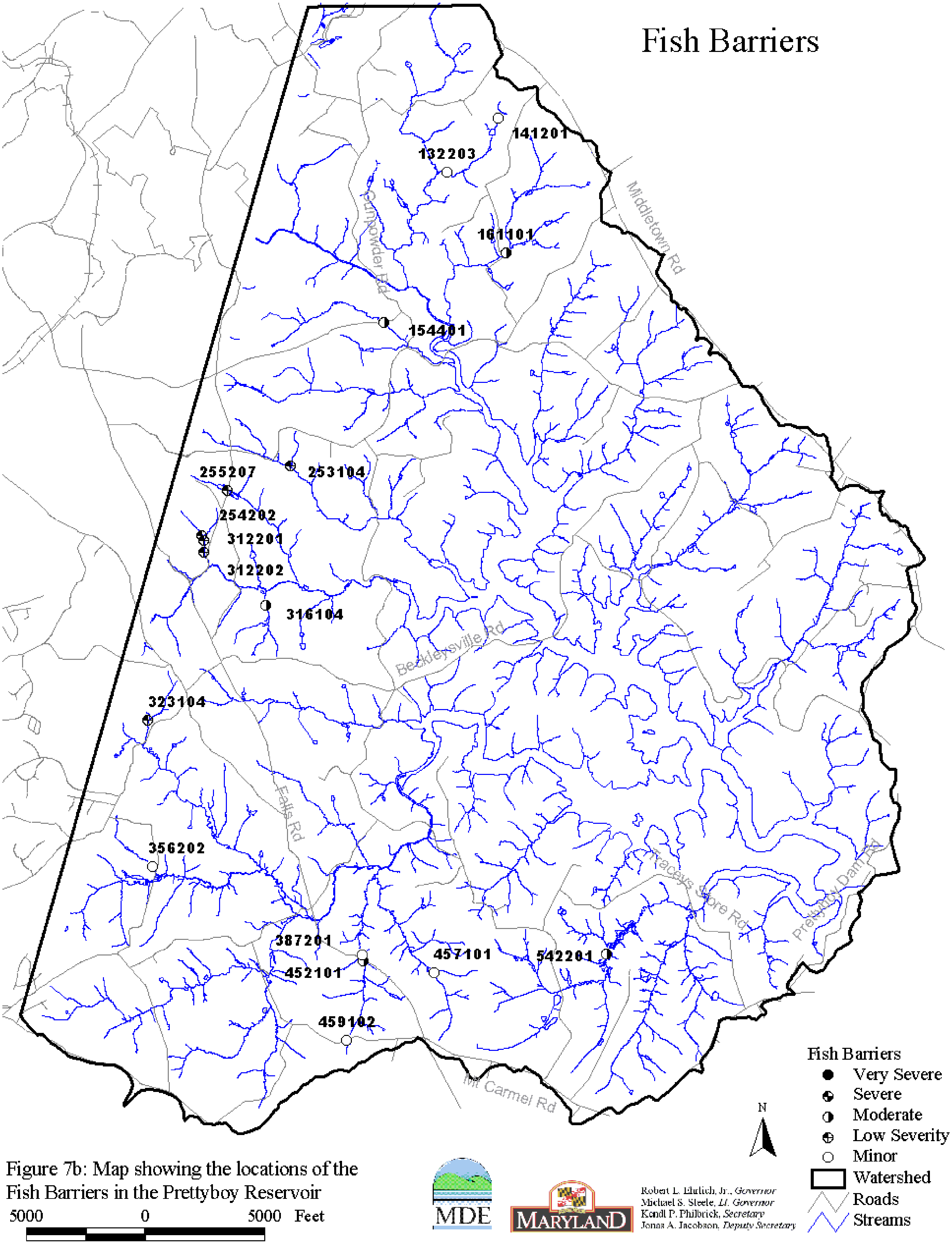

Figure 7b: Map showing the locations of the Fish Barriers in the Prettyboy Reservoir

5000 0 5000 Feet

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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 three 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. Lastly, the survey does not report places where a small section of only one side of the stream bank is stabilized to reduce erosion.

Results of this survey show recognizably altered stream channels at 3 sites. The severity and location of channel alteration sites is shown in Figure 8. The total length of stream affected by channelization is estimated to be 4,700 feet (0.9 miles). All the sites rated moderate in severity.

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.

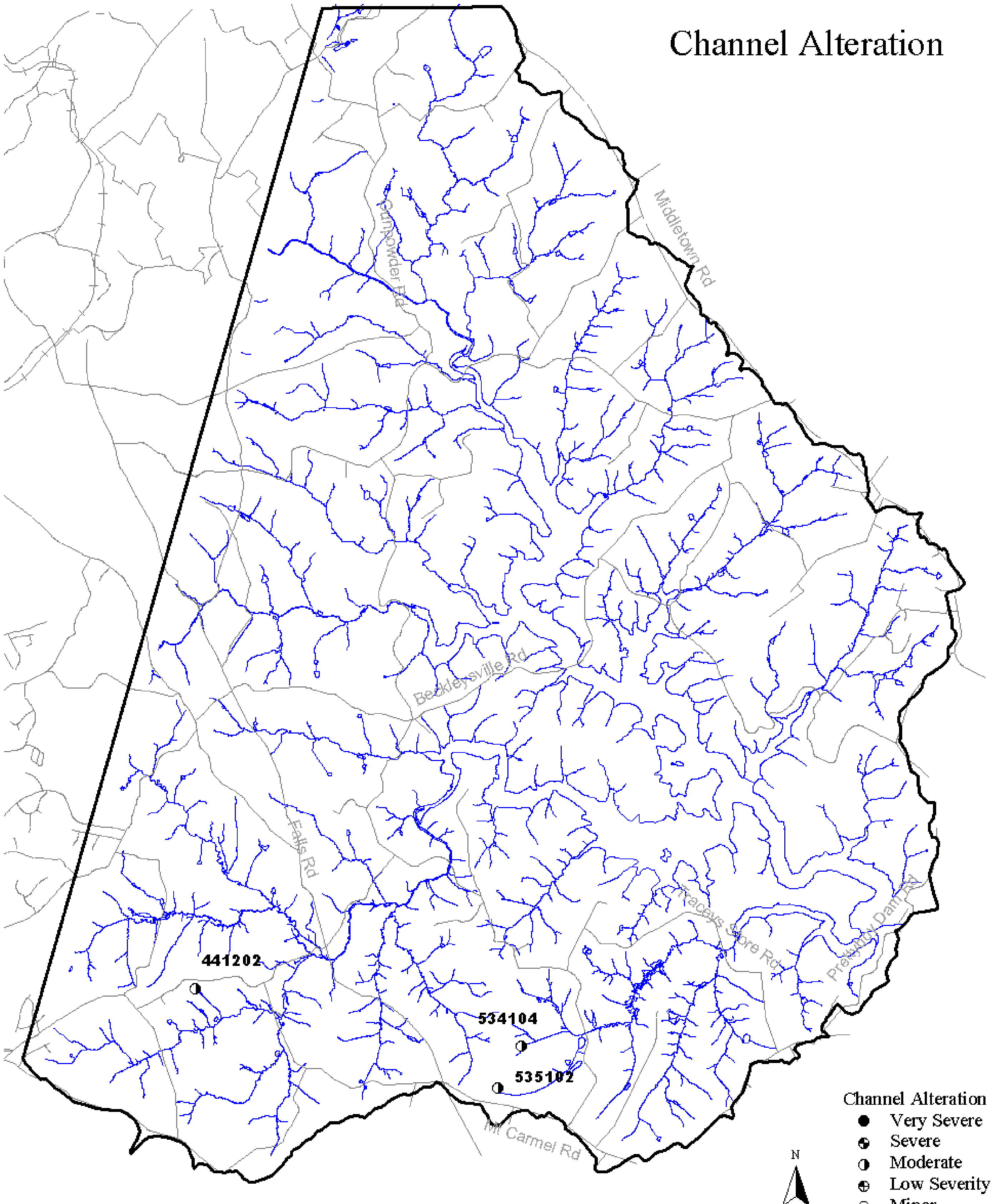

Figure 8: Map showing the locations of the Channel Alterations in the Prettyboy Reservoir

5000 0 5000 Feet

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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 three trash dumping sites (Figure 9). Site 132201 was an area where vehicles and other trash had been dumped. Sites 323101 and 536105 were areas where residential trash had been dumped. All were given moderate severity ratings.

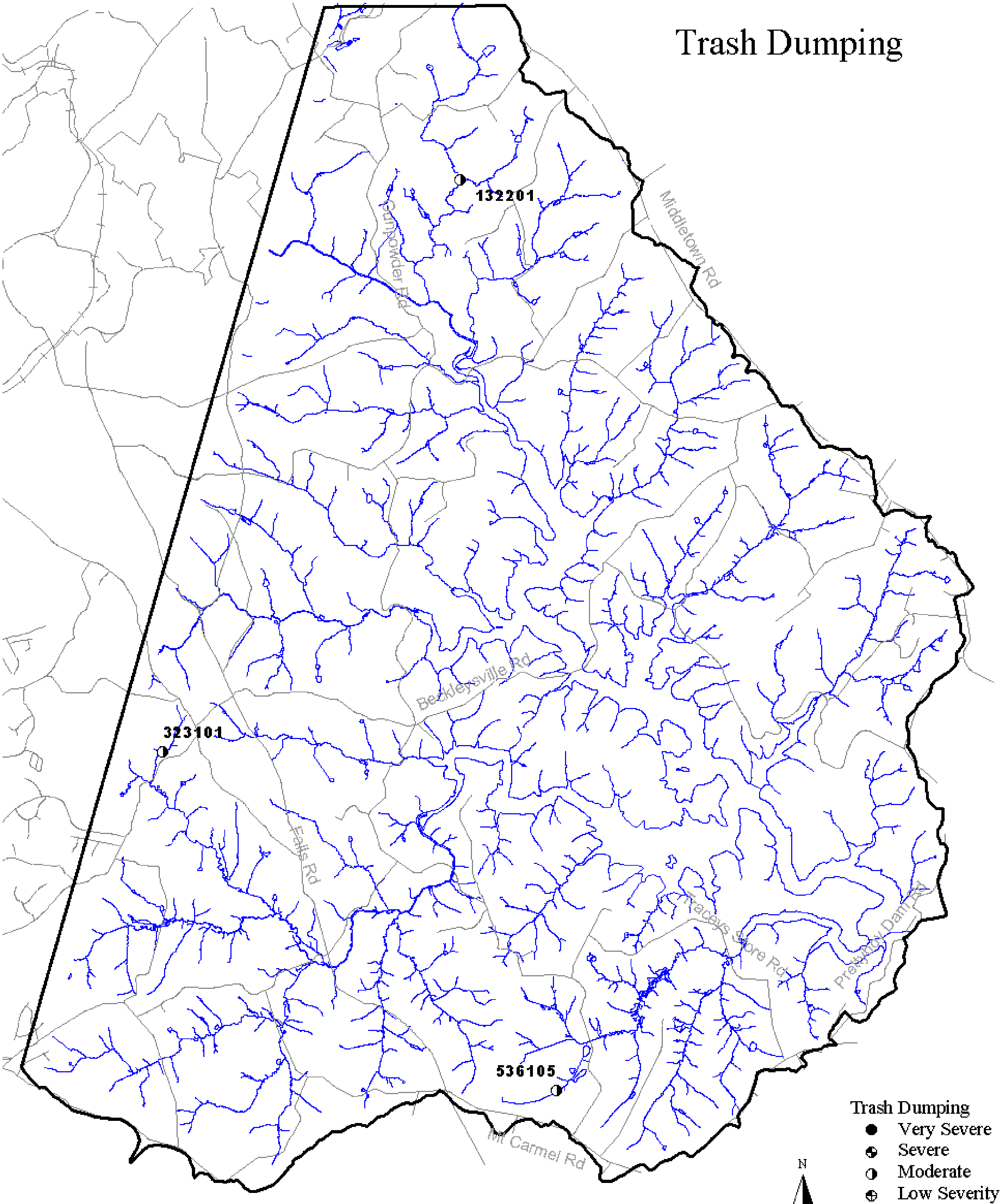

Figure 9: Map showing the locations of the Trash Dumping in the Prettyboy Reservoir

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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 streambed.

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. Site 255208 was rated moderate and site 437302 was rated minor in severity. A pipe will generally be rated as moderate because it is located along the stream or along the bottom where it may be damaged by debris. None of the pipes were reported to have any discharge at the time of the survey. Locations of these sites are shown in Figure 10.

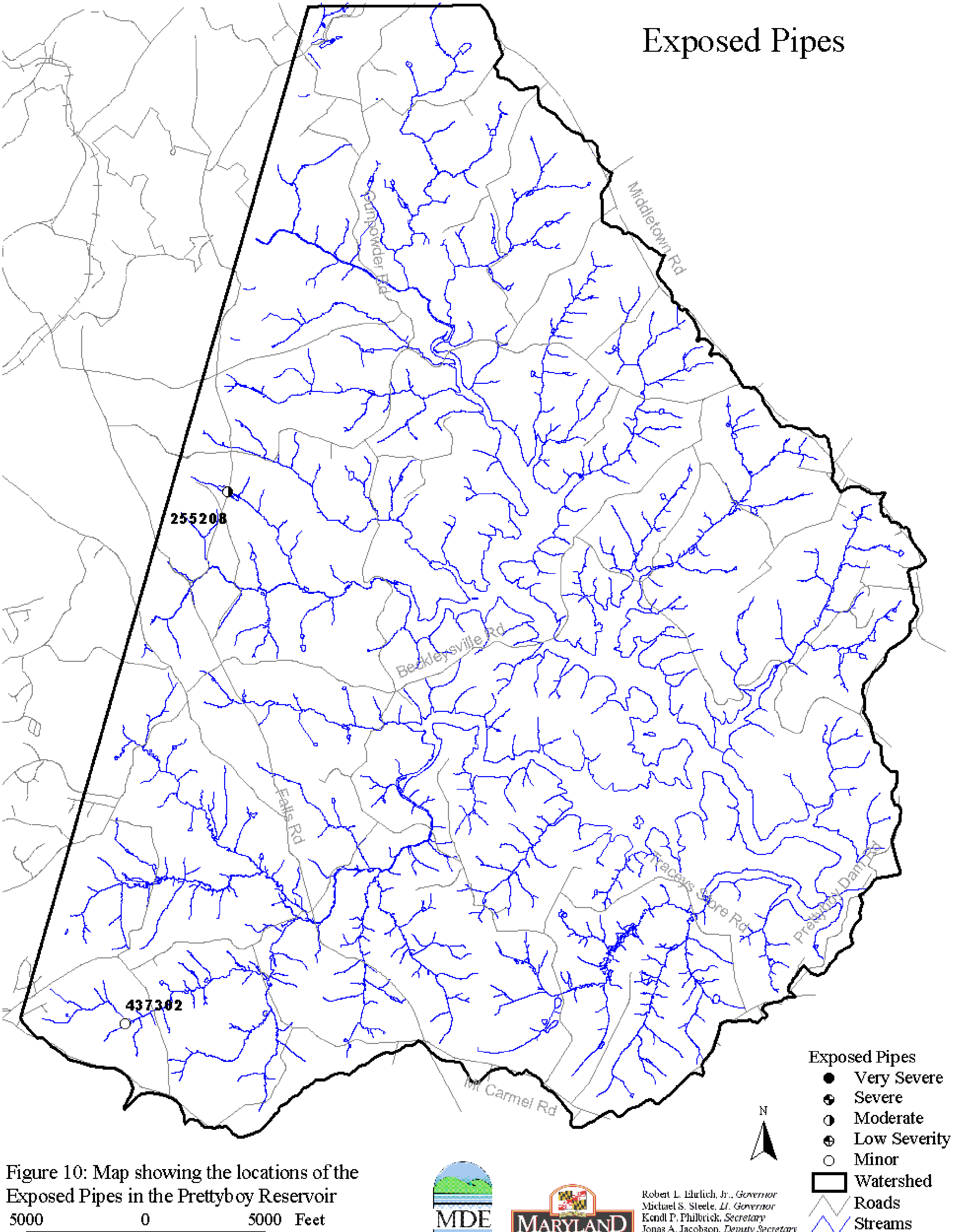

Figure 10: Map showing the locations of the Exposed Pipes in the Prettyboy Reservoir

In/Near Stream Construction Sites

If in or near stream construction projects cause major disturbances inside or near the stream corridor at the time of the survey, field teams note their location and record any effect on the stream corridor. Survey teams report evidence of inadequate sediment control measures and any sediment pollution from the site affecting the stream.

One construction site affected a nearby stream during the time of the survey. It appeared the site was part of road construction. (Appendix B). Location of in- or near-stream construction site is shown in Figure 11.

Figure 11: Map showing the locations of the Construction sites in the Prettyboy Reservoir Watershed

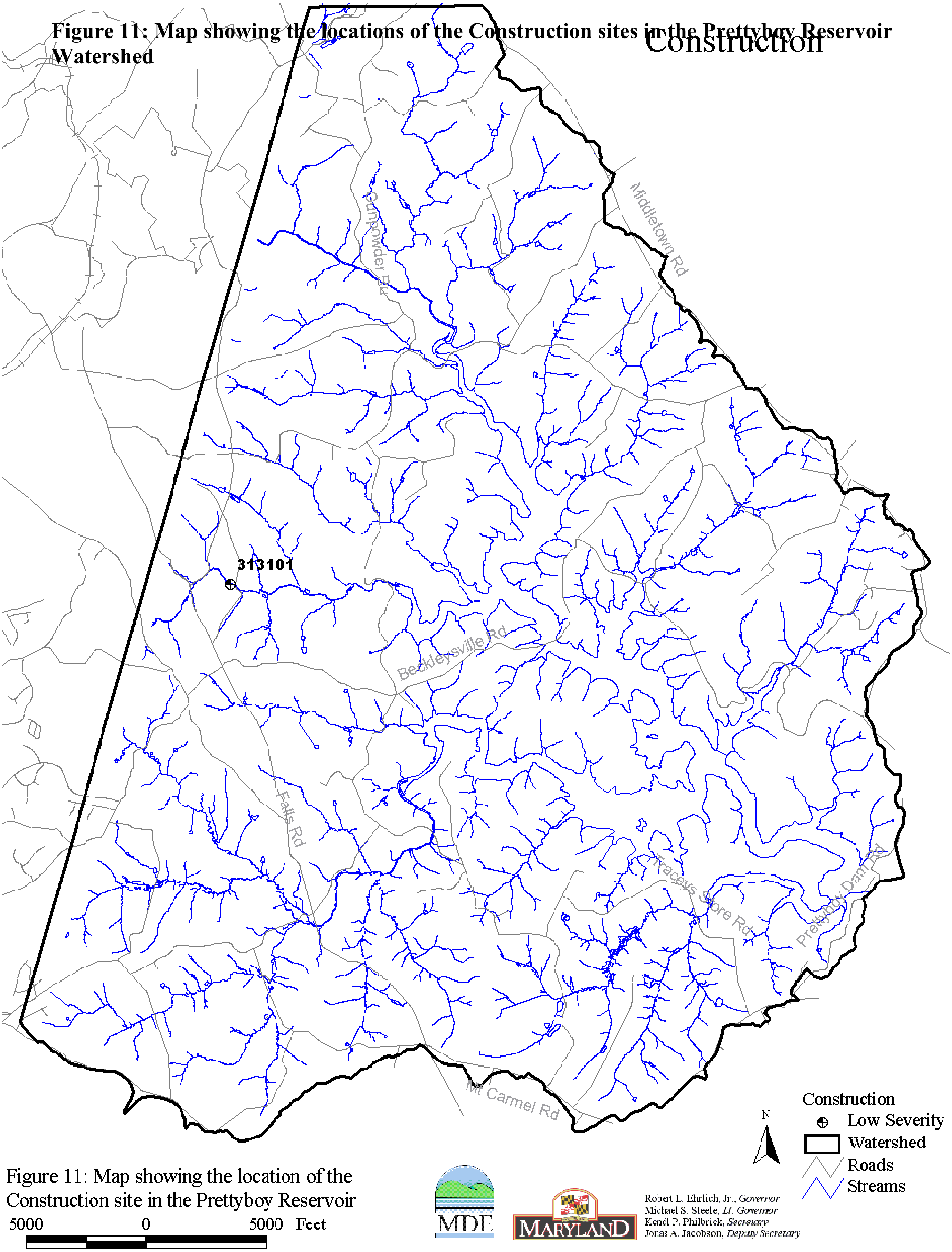

Figure 11: Map showing the location of the Construction site in the Prettyboy Reservoir

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 1 unusual condition and 3 comments throughout the Prettyboy Reservoir watershed. The severity and location of the unusual condition site is shown in Figure 12. Site 133203 was where livestock were found in the stream. This site was given a moderate severity rating.

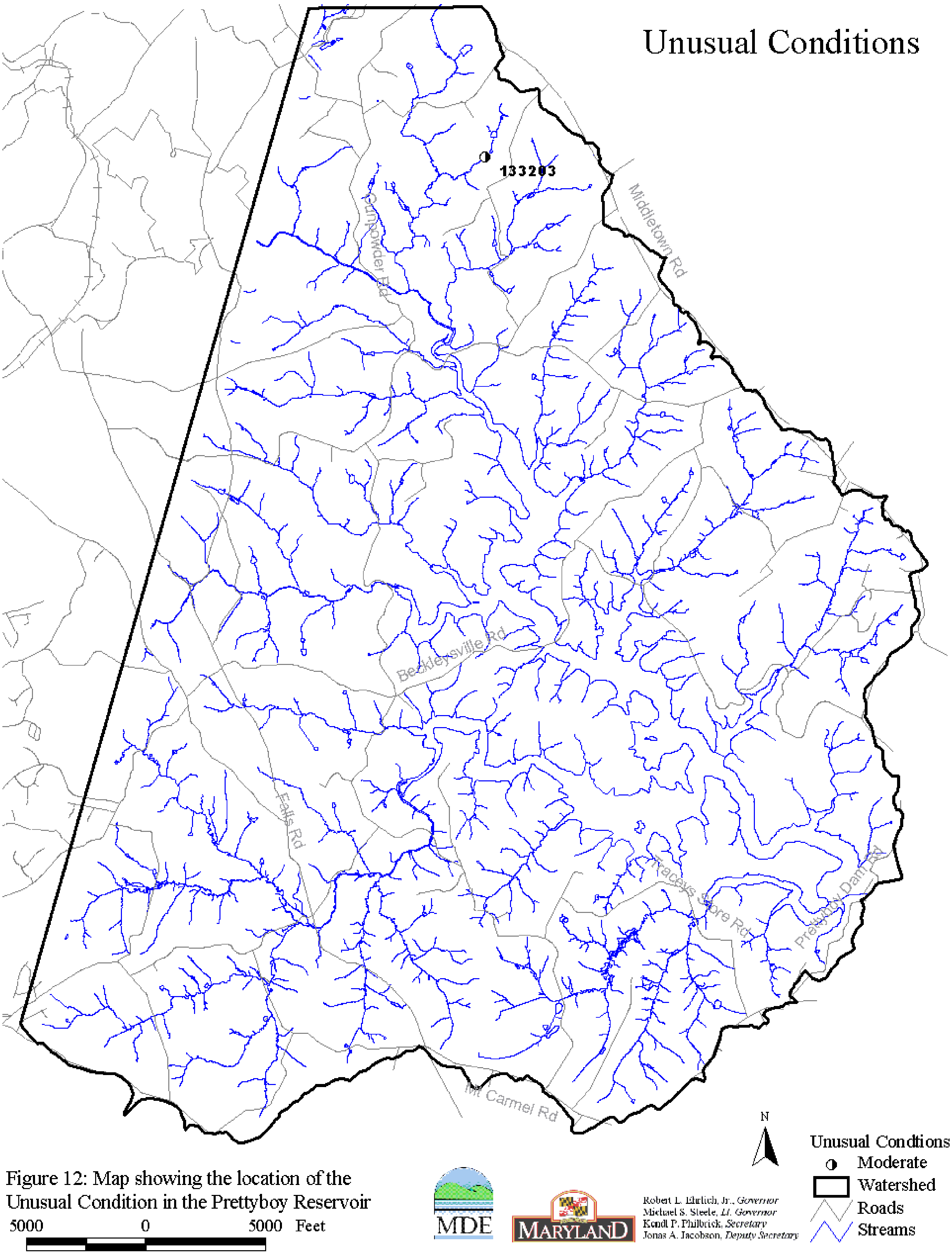

Figure 12: Map showing the location of the Unusual Condition in the Prettyboy Reservoir

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 35 representative sites in the Prettyboy Reservoir watershed.

Attachment sites for macroinvertebrates rated mostly optimal or suboptimal. There were some gravel riffles for the macroinvertebrates. Embeddedness was averaged to be suboptimal. The bottom of the streams were mostly gravel with some silt. Shelter for fish varied from stream to stream. Channel Alteration rates the amount of man-made changes to the stream channel. A few of the representative sites indicate that there was some alteration to the channel. The channel had been altered at some point in the past and seems to be no longer maintained. 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 mostly optimal or suboptimal. This indicates in the spots where the representative sites were, the areas were forested. There was one area where the rating was poor. (Appendix B)

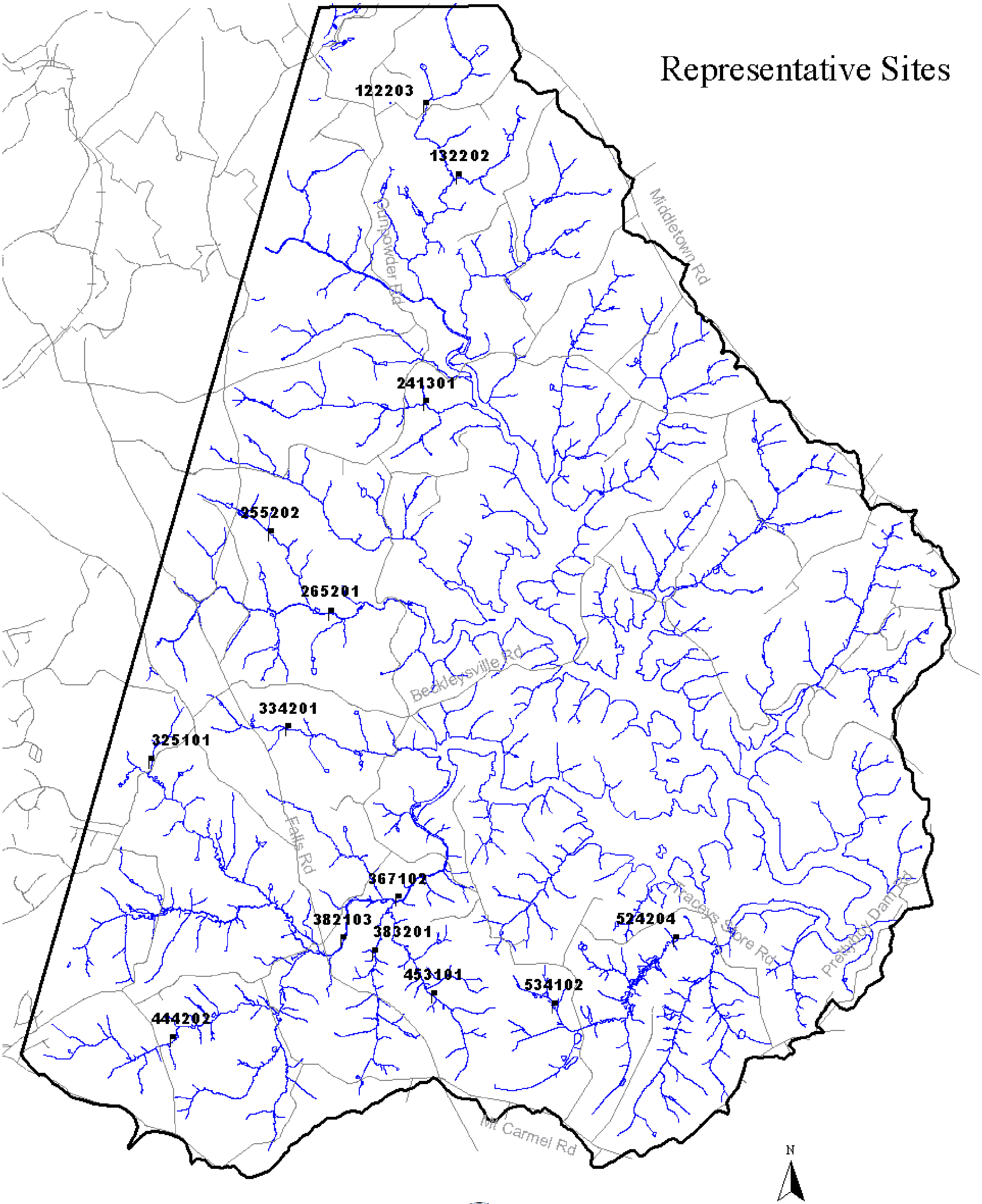

Figure 13: Map showing the locations of the Representative Sites in the Prettyboy Reservoir

5000 0 5000 Feet

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DISCUSSION

The results of the Prettyboy Reservoir 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, correctibility, 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 Baltimore County to develop a Watershed Restoration Action Strategy (WRAS) for the Prettyboy Reservoir 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 Prettyboy Reservoir Watershed WRAS committee, which is developing a Watershed Restoration Action Strategy for the Prettyboy Reservoir. Information on the Prettyboy Reservoir Watershed Action Strategy can be found on the Department of Natural Resources' website (www.dnr.maryland.gov/wras).

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ACKNOWLEDGEMENTS

Without the hard work and dedication of the Maryland Conservation Corps, this survey would not have been possible. The crew chief during the survey was Tina Stevens. The crewmembers were James Quinn, Dorothy Vauls, Chrissy Parenteau, Jamie Hennessey, Justin Klingler, and Alex DeWire.

Appendix A: Listing of sites by site number

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
122202	Pipe Outfall	3	3	2	419238.63471	227257.02607	Walker Run
122203	Representative Site				419264.71915	226802.95961	Walker Run
125201	Erosion	3	3	4	419243.98412	226729.28651	Walker Run
125202	Inadequate Buffer	3	3	2	419429.92929	226298.80851	Walker Run
131301	Inadequate Buffer	2	3	2	418767.93097	225812.24452	Walker Run
131302	Pipe Outfall	3	3	2	418766.76603	225802.95214	Walker Run
131303	Inadequate Buffer	1	3	3	418914.99247	225839.15719	Walker Run
132201	Trash Dumping	3	4	5	419596.47841	225930.88254	Walker Run
132202	Representative Site				419667.58429	225931.95432	Walker Run
132203	Fish Barrier	5	2	4	419721.82608	225919.24294	Walker Run
133201	Pipe Outfall	5	1	2	419869.66228	225904.51859	Walker Run
133202	Erosion	3	3	3	419994.25509	225952.46371	Walker Run
133203	Unusual Condition	3	2	2	420185.44956	226135.53631	Walker Run
136102	Inadequate Buffer	1	3	3	420257.23643	225394.26848	Silver Run
141201	Fish Barrier	5	3	3	420372.30208	226609.15171	Walker Run
145101	Inadequate Buffer	1	3	2	420945.09261	225250.41772	Silver Run
154401	Fish Barrier	3	4	1	418927.17270	223988.30723	Unnamed Trib 1
161101	Fish Barrier	3	4	1	420465.99341	224882.10264	Silver Run
215102	Inadequate Buffer	3	2	2	418405.05043	224241.84003	Unnamed Trib 1
234302	Pipe Outfall	4	1	1	418999.69619	223080.76032	Unnamed Trib 2
234303	Inadequate Buffer	5	3	1	418989.10684	223082.53241	Unnamed Trib 2
236301	Inadequate Buffer	3	1	2	418838.27037	222475.46074	Unnamed Trib 2
241101	Inadequate Buffer	5	1	2	419220.19703	223682.45351	Unnamed Trib 1
241301	Representative Site				419261.88551	223130.89997	Unnamed Trib 2
243302	Erosion	3	3	5	419331.56097	223071.16887	Unnamed Trib 2
243303	Erosion	3	3	5	419401.82758	223028.14753	Unnamed Trib 2
253101	Inadequate Buffer	4	1	1	417385.32352	222272.89459	Poplar Run
253102	Inadequate Buffer	2	2	2	417613.49166	222171.85783	Poplar Run
253104	Fish Barrier	4	2	3	417727.88171	222155.83041	Poplar Run
254202	Fish Barrier	4	1	2	416599.87897	221256.03377	Grave Run
255201	Erosion	4	4	3	417397.18221	221487.33397	Grave Run
255202	Representative Site				417347.17655	221529.87848	Grave Run
255203	Inadequate Buffer	1	3	2	416880.26828	221857.70430	Grave Run
255205	Pipe Outfall	3	3	1	417107.03230	221742.36023	Grave Run
255206	Pipe Outfall	3	3	1	416983.75627	221817.17679	Grave Run
255207	Fish Barrier	4	2	1	416924.06686	221844.30393	Grave Run
255208	Exposed Pipe	3	3	1	416924.91004	221844.53228	Grave Run
262201	Erosion	4	3	3	418839.45734	221481.21343	Poplar Run
265201	Representative Site				418090.00143	220556.95538	Grave Run
265202	Erosion	4	4	2	418157.90778	220524.60583	Grave Run
281201	Inadequate Buffer	3	2	2	417538.59898	220634.43173	Grave Run
282202	Pipe Outfall	3	3	1	417863.27548	220587.48637	Grave Run
282203	Erosion	3	3	2	417867.32600	220571.88971	Grave Run
282204	Inadequate Buffer	4	1	3	417845.66083	220124.96680	Grave Run
312201	Fish Barrier	4	3	1	416618.79741	221201.75588	Grave Run
312202	Fish Barrier	4	3	1	416624.79160	221050.96253	Grave Run
312203	Inadequate Buffer	1	3	1	416618.86389	221118.02910	Grave Run
313101	Construction	4			416954.67424	220689.52186	Grave Run
316101	Pipe Outfall	3	3	3	417271.03805	220585.88693	Grave Run
316102	Inadequate Buffer	2	1	2	416938.06670	220691.71926	Grave Run
316104	Fish Barrier	3	3	4	417418.93645	220376.94525	Grave Run

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
322101	Inadequate Buffer	1	3	2	416310.92650	219731.89242	Grave Run
322202	Inadequate Buffer	5	1	2	416655.12096	219533.00571	Compass Run
323101	Trash Dumping	3	3	1	415992.38731	218974.84992	Georges Run
323102	Inadequate Buffer	1	3	1	415941.07481	218938.26276	Georges Run
323103	Erosion	3	2	1	415976.73074	218959.62359	Georges Run
323104	Fish Barrier	4	3	1	415910.66289	218903.12307	Georges Run
325101	Representative Site				415882.86352	218735.08458	Georges Run
325102	Inadequate Buffer	1	3	1	415770.71554	218618.29968	Georges Run
325103	Erosion	3	3	1	415797.48553	218612.92414	Georges Run
325104	Inadequate Buffer	1	3	1	415676.72900	218662.14397	Georges Run
333201	Erosion	3	3	3	416925.91858	219218.01707	Compass Run
333203	Pipe Outfall	3	3	2	417127.62165	219168.66528	Compass Run
333205	Inadequate Buffer	4	3	2	417118.41745	219154.21021	Compass Run
333206	Erosion	3	3	4	417280.45438	219144.95991	Compass Run
333207	Inadequate Buffer	4	3	3	417304.08210	218874.97152	Compass Run
334201	Representative Site				417569.17483	219132.12321	Compass Run
335101	Inadequate Buffer	1	3	3	417287.94326	218390.67180	Georges Run
336301	Pipe Outfall	3	3	1	417505.38100	218251.80277	Georges Run
344202	Inadequate Buffer	1	3	2	418493.65542	219061.62294	Compass Run
345201	Pipe Outfall	5	1	1	418855.96847	218808.78703	Compass Run
354201	Pipe Outfall	5	1	4	417192.03461	217746.76297	Georges Run
356201	Inadequate Buffer	4	3	1	415970.79496	217029.54286	Murphy Run
356202	Fish Barrier	5	4	1	415970.79496	217029.54286	Murphy Run
358102	Pipe Outfall	3	3	2	417336.10691	217162.89957	Georges Run
358102	Comment				417337.00743	217164.76353	Georges Run
358103	Inadequate Buffer	1	4	3	417322.29623	217071.53820	Georges Run
358104	Erosion	3	4	2	417328.08062	217041.67284	Georges Run
366101	Erosion	3	3	1	418080.73333	217051.22371	Georges Run
366102	Inadequate Buffer	3	2	1	417937.17271	217157.09336	Georges Run
366103	Pipe Outfall	3	3	1	418394.45240	217065.36978	Georges Run
367101	Erosion	3	3	3	418575.99692	217301.67039	Georges Run
367102	Representative Site				418920.58331	217032.15613	Georges Run
374101	Inadequate Buffer	1	2	2	415606.57009	216127.65879	Murphy Run
381201	Inadequate Buffer	1	2	2	417623.11086	216603.38588	Georges Run
381202	Erosion	3	3	2	417623.11086	216603.38588	Georges Run
382101	Erosion	2	2	2	418056.56481	216344.91098	Georges Run
382102	Inadequate Buffer	3	3	2	418056.56481	216344.91098	Georges Run
382103	Representative Site				418237.70575	216526.30783	Georges Run
383201	Representative Site				418636.94989	216371.79627	Unnamed Trib 3
383202	Inadequate Buffer	3	2	3	418652.08304	216472.54344	Unnamed Trib 3
383203	Erosion	4	3	3	418762.50945	216883.87571	Unnamed Trib 3
387201	Fish Barrier	5	1	1	418648.46301	215907.21263	Unnamed Trib 3
387202	Erosion	3	3	2	418646.71329	215908.48496	Unnamed Trib 3
387203	Inadequate Buffer	1	3	2	419183.21232	216113.14501	Unnamed Trib 3
387204	Erosion	3	2	2	419183.21232	216113.14501	Unnamed Trib 3
387301	Inadequate Buffer	1	4	2	419201.24632	216079.78816	Unnamed Trib 3
388301	Erosion	5	3	3	419232.88884	216004.03194	Unnamed Trib 3
388302	Erosion	3	3	2	419226.64094	216008.95246	Unnamed Trib 3
414202	Erosion	3	4	2	415615.10253	216843.11298	Murphy Run
415201	Erosion	3	2	2	414935.49513	216434.04544	Murphy Run
415203	Inadequate Buffer	3	3	3	415050.38462	216469.87986	Murphy Run

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
433301	Inadequate Buffer	1	5	1	414893.65581	215094.91728	Peggys Run
433301	Erosion	3	3	2	414923.10412	215151.10866	Peggys Run
433301	Comment			4	414932.84165	215163.99728	Peggys Run
434301	Erosion	3	2	3	415395.41659	215355.09258	Peggys Run
434302	Comment				415403.60887	215334.81724	Peggys Run
435302	Inadequate Buffer	1	3	1	415986.14987	215233.60764	Peggys Run
435303	Pipe Outfall	3	5	2	416182.35564	215410.81604	Peggys Run
435304	Inadequate Buffer	3	4	1	415954.29281	215226.86076	Peggys Run
437301	Inadequate Buffer	1	3	1	415338.92860	214834.09209	Peggys Run
437302	Exposed Pipe	5	1	3	415613.31965	215059.11211	Peggys Run
441201	Inadequate Buffer	3	3	2	416415.70442	215977.13784	Peggys Run
441202	Channel Alteration	3	3	1	416401.53636	215989.68822	Peggys Run
442201	Erosion	2	3	3	417115.86604	215738.34899	Peggys Run
442202	Pipe Outfall	3	3	3	417259.01368	215727.18644	Peggys Run
443301	Erosion	3	4	5	417590.93308	216170.90275	Peggys Run
443302	Erosion	2	3	3	417525.89686	215953.50935	Peggys Run
444201	Erosion	4	3	3	416401.57118	215445.63552	Peggys Run
444202	Representative Site				416145.49994	215298.58487	Peggys Run
444204	Inadequate Buffer	3	3	2	416281.42625	215834.35349	Peggys Run
444206	Pipe Outfall	3	3	3	416689.44594	215608.72631	Peggys Run
444207	Erosion	2	3	2	416742.42477	215642.61411	Peggys Run
444208	Inadequate Buffer	2	3	3	416739.69665	215641.16386	Peggys Run
445101	Inadequate Buffer	1	3	1	417448.85753	215212.64239	Peggys Run
445102	Erosion	3	3	1	417396.82848	215126.85540	Peggys Run
445201	Erosion	3	3	4	417412.22977	215583.94733	Peggys Run
445202	Inadequate Buffer	4	2	1	417425.57874	215492.37750	Peggys Run
446101	Erosion	3	2	1	417494.51303	215199.59416	Peggys Run
448101	Inadequate Buffer	1	3	1	417315.09213	213959.63748	Peggys Run
449101	Inadequate Buffer	1	3	1	417551.73267	214845.75200	Peggys Run
449102	Erosion	3	2	1	417908.44333	214577.90374	Peggys Run
450101	Inadequate Buffer	1	3	3	418897.11053	214960.99387	Unnamed Trib 3
450102	Pipe Outfall	3	3	3	418638.49631	215005.07495	Unnamed Trib 3
451101	Inadequate Buffer	3	2	2	418584.49648	215856.31923	Unnamed Trib 3
452101	Fish Barrier	3	4	2	418663.32598	215833.59237	Unnamed Trib 3
453101	Representative Site				419357.51061	215839.48023	Unnamed Trib 3
455101	Pipe Outfall	5	1	4	418612.20252	215439.05226	Unnamed Trib 3
455102	Inadequate Buffer	4	1	2	418128.24044	215395.09287	Unnamed Trib 3
455103	Erosion	3	2	3	418427.92330	215396.03754	Unnamed Trib 3
456101	Inadequate Buffer	1	3	3	419180.14590	215375.08775	Unnamed Trib 3
456102	Inadequate Buffer	1	3	3	418852.79528	215499.08157	Unnamed Trib 3
457101	Fish Barrier	5	3	3	419570.40070	215680.89766	Unnamed Trib 3
457102	Inadequate Buffer	1	3	3	420096.71802	215706.38336	Unnamed Trib 3
457201	Pipe Outfall	3	3	1	419758.11236	215183.05654	Unnamed Trib 3
459102	Fish Barrier	5	3	2	418450.67933	214812.18226	Unnamed Trib 3
459104	Inadequate Buffer	1	3	3	418437.02825	214638.70926	Unnamed Trib 3
459105	Erosion	4	2	2	418519.05351	214965.37233	Unnamed Trib 3
524203	Pipe Outfall	3	3	3	422174.81656	216428.13882	Pretty Boy Branch
524204	Representative Site				422325.63544	216535.68091	Pretty Boy Branch
524205	Erosion	3	3	3	422407.73550	216562.51212	Pretty Boy Branch
524206	Inadequate Buffer	2	3	1	422414.47667	216838.31650	Pretty Boy Branch
532103	Inadequate Buffer	3	2	2	420705.15801	216221.08365	Pretty Boy Branch

Appendix A

Site	Problem	Severity	Correctability	Access	X_COORD	Y_COORD	Stream
532105	Inadequate Buffer	1	3	2	420318.99179	216104.61577	Pretty Boy Branch
534101	Inadequate Buffer	3	2	2	420910.57790	215829.89421	Pretty Boy Branch
534102	Representative Site				420829.58602	215716.08834	Pretty Boy Branch
534103	Inadequate Buffer	1	3	2	420304.81066	215174.43560	Pretty Boy Branch
534104	Channel Alteration	3	2	2	420386.09024	215290.25371	Pretty Boy Branch
535101	Inadequate Buffer	2	3	3	420093.97201	214765.72508	Pretty Boy Branch
535102	Channel Alteration	3	3	2	420093.97201	214765.72508	Pretty Boy Branch
536102	Inadequate Buffer	1	3	1	420939.25285	214989.19569	Pretty Boy Branch
536104	Erosion	3	2	1	420842.64855	214896.54321	Pretty Boy Branch
536105	Trash Dumping	3	3	3	420762.13163	214847.83641	Pretty Boy Branch
541201	Inadequate Buffer	1	3	3	421367.11110	215915.76368	Pretty Boy Branch
542201	Fish Barrier	3	3	3	421756.54005	215916.47981	Pretty Boy Branch
543101	Pipe Outfall	3	3	1	422640.51361	216054.06937	Unnamed Trib 4
543102	Pipe Outfall	3	3	1	422640.51361	216054.06937	Unnamed Trib 4
543103	Inadequate Buffer	1	3	3	422186.40954	215873.69550	Unnamed Trib 4
544201	Inadequate Buffer	1	3	1	421161.61449	215447.90409	Pretty Boy Branch
544202	Erosion	3	3	2	421194.88023	215462.02123	Pretty Boy Branch
545101	Inadequate Buffer	1	3	3	421697.98017	215557.20071	Pretty Boy Branch
546101	Inadequate Buffer	1	4	4	422373.12272	215648.15206	Unnamed Trib 4
546102	Inadequate Buffer	4	2	3	422353.09972	215605.90974	Unnamed Trib 4
546103	Inadequate Buffer	5	2	2	422302.43681	215441.62595	Unnamed Trib 4
551101	Inadequate Buffer	2	3	3	422894.50371	214538.14809	Unnamed Trib 4
553101	Inadequate Buffer	3	3	1	422817.27056	216432.13980	Unnamed Trib 4
553102	Erosion	3	2	1	422738.49144	216121.19901	Unnamed Trib 4
554101	Inadequate Buffer	2	3	1	423498.06043	215251.07625	Unnamed Trib 4
562102	Inadequate Buffer	2	3	4	421293.17428	214388.58839	Pretty Boy Branch

Appendix B: Listing of sites by problem category

Inadequate Buffers

Problem	Site	Sides	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	LandUseLeft	LandUseRight	Recentlyestablished	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	131303	Both	Both	0	0	1100	1700	Lawn	Lawn	No	No	1	3	3	1
Inadequate Buffer	136102	Both	Both	0	0	1000	1000	Lawn	Lawn	No	No	1	3	3	3
Inadequate Buffer	145101	Both	Both	0	0	1000	1000	Pasture	Pasture	No	No	1	3	2	2
Inadequate Buffer	255203	Both	Both	0	0	4000	4000	Crop field	Crop field	No	No	1	3	2	2
Inadequate Buffer	312203	Both	Both	0	0	2500	2500	Lawn	Lawn	No	Other	1	3	1	2
Inadequate Buffer	322101	Both	Both	0	0	1000	1000	Crop field	Crop field	No	No	1	3	2	2
Inadequate Buffer	323102	Both	Both	0	0	5200	5200	Shrubs/small trees	Shrubs/small trees	No	No	1	3	1	1
Inadequate Buffer	325102	Both	Both	0	0	1000	1000	Pasture	Pasture	No	Horses	1	3	1	1
Inadequate Buffer	325104	Both	Both	0	0	1500	1500	Pasture	Pasture	No	Other	1	3	1	2
Inadequate Buffer	335101	Both	Both	0	0	1600	1600	Crop field	Crop field	No	No	1	3	3	1
Inadequate Buffer	344202	Both	Neither	0	0	1300	1500	Pasture	Pasture	No	No	1	3	2	2
Inadequate Buffer	358103	Both	Both	0	0	3000	3000	Lawn	Lawn	No	No	1	4	3	2
Inadequate Buffer	374101	Both	Both	0	0	4000	4000	Crop field	Crop field	No	No	1	2	2	1
Inadequate Buffer	381201	Both	Both	0	0	1800	1800	Shrubs/small trees	Shrubs/small trees	No	No	1	2	2	3
Inadequate Buffer	387203	Both	Both	0	0	4500	4500	Shrubs/small trees	Lawn	No	No	1	3	2	3
Inadequate Buffer	387301	Both	Both	0	0	8100	8100	Lawn/Cropfield	Crop field	No	No	1	4	2	3
Inadequate Buffer	433301	Both	Both	0	0	3700	3700	Pasture	Pasture	No	Horses	1	5	1	3
Inadequate Buffer	435302	Both	Both	0	0	3300	3300	Lawn	Lawn	No	No	1	3	1	4
Inadequate Buffer	437301	Both	Both	0	0	3300	3300	Crop field	Crop field	No	Cattle	1	3	1	5
Inadequate Buffer	445101	Both	Both	0	0	4000	5600	Pasture	Pasture	No	Horses	1	3	1	5
Inadequate Buffer	448101	Both	Both	0	0	6200	6200	Pasture	Pasture	No	No	1	3	1	3
Inadequate Buffer	449101	Both	Both	0	0	1600	1600	Pasture	Pasture	No	Cattle	1	3	1	4
Inadequate Buffer	450101	Both	Both	0	0	2000	2000	Pasture	Pasture	No	Horses	1	3	3	3
Inadequate Buffer	456101	Both	Both	0	0	1400	1400	Crop field	Lawn	No	No	1	3	3	4
Inadequate Buffer	456102	Both	Both	0	0	1200	1200	Lawn	Lawn	No	No	1	3	3	3
Inadequate Buffer	457102	Both	Both	0	0	2000	2000	Pasture/Cropfield	Pasture/Cropfield	No	Horses	1	3	3	4
Inadequate Buffer	459104	Both	Both	0	0	2500	2500	Lawn	Lawn	No	No	1	3	3	2
Inadequate Buffer	532105	Both	Both	0	0	1500	1500	Pasture	Pasture	No	No	1	3	2	1
Inadequate Buffer	534103	Both	Both	0	0	4500	4500	Crop field	Crop field	No	No	1	3	2	3
Inadequate Buffer	536102	Both	Both	0	0	1500	1500	Lawn	Lawn	No	No	1	3	1	2
Inadequate Buffer	541201	Both	Both	0	0	1100	1100	Pasture	Pasture	No	No	1	3	3	1
Inadequate Buffer	543103	Both	Both	0	0	1300	1300	Crop field	Crop field	No	No	1	3	3	2
Inadequate Buffer	544201	Both	Both	0	0	4400	4400	Pasture	Pasture	No	No	1	3	1	3
Inadequate Buffer	545101	Both	Both	0	0	2000	2000	Crop field	Crop field	No	No	1	3	3	2
Inadequate Buffer	546101	Both	Both	0	0	2500	2500	Crop field	Crop field	No	No	1	4	4	2
Inadequate Buffer	131301	Both	Both	0	0	800	800	Lawn	Lawn	No	No	2	3	2	2
Inadequate Buffer	253102	Both	Both	0	0	900	900	Pasture	Pasture	No	Horses	2	2	2	2

Inadequate Buffers

Problem	Site	Sides	Unshaded	WidthLeft(ft)	WidthRight(ft)	LengthLeft(ft)	LengthRight(ft)	LandUseLeft	LandUseRight	Recentlyestablished	Livestock	Severity	Correctability	Access	Wetland
Inadequate Buffer	316102	Right	Right		0		2000	Forest	Lawn	No	No	2	1	2	3
Inadequate Buffer	444208	Both	Neither	5	5	3200	2000	Pasture/Lawn	Pasture	No	Horses	2	3	3	3
Inadequate Buffer	524206	Both	Both	0	0	800	800	Pasture	Pasture	No	Cattle	2	3	1	3
Inadequate Buffer	535101	Both	Both	0	0	2300	2300	Pasture	Pasture	No	No	2	3	3	3
Inadequate Buffer	551101	Both	Both	0	0	2000	2000	Crop field	Crop field	No	No	2	3	3	3
Inadequate Buffer	554101	Both	Neither	0	0	2000	2000	Crop field	Crop field	No	No	2	3	1	3
Inadequate Buffer	562102	Both	Both	0	0	2000	2000	Crop field	Crop field	No	No	2	3	4	2
Inadequate Buffer	125202	Right	Right		0		800	Forest	Shrubs/small trees	No	No	3	3	2	4
Inadequate Buffer	215102	Both	Both	0	0	500	500	Lawn	Lawn	No	No	3	2	2	2
Inadequate Buffer	236301	Both	Neither	5	5	1000	1000	Pasture	Pasture	No	Horses	3	1	2	4
Inadequate Buffer	281201	Left	Left	0		1900		Pasture	Forest	No	No	3	2	2	2
Inadequate Buffer	366102	Both	Both	0	0	500	1200	Crop field	Crop field	No	No	3	2	1	3
Inadequate Buffer	382102	Both	Neither	10	10	4800	2000	Pasture	Forest/Cropfield	No	Horses	3	3	2	3
Inadequate Buffer	383202	Left	Left	0		2600		Crop field	Forest	No	No	3	2	3	5
Inadequate Buffer	415203	Both	Neither	10	10	1600	1600	Crop field	Crop field	No	No	3	3	3	1
Inadequate Buffer	435304	Left	Left	0		2000		Crop field	Forest	No	No	3	4	1	5
Inadequate Buffer	441201	Right	Neither		0		1500	Forest	Pasture	No	Horses	3	3	2	5
Inadequate Buffer	444204	Both	Neither	5	5	2000	2000	Lawn	Crop field	No	No	3	3	2	5
Inadequate Buffer	451101	Both	Both	0	0	400	600	Shrubs/small trees	Shrubs/small trees	No	No	3	2	2	4
Inadequate Buffer	532103	Both	Left	10	25	1500	1500	Lawn	Pasture	No	Cattle	3	2	2	4
Inadequate Buffer	534101	Both	Both	10	10	2000	2000	Crop field	Crop field	No	No	3	2	2	3
Inadequate Buffer	553101	Left	Neither	0		2200		Lawn	Forest	No	No	3	3	1	2
Inadequate Buffer	253101	Left	Left	0		400		Lawn	Forest	No	No	4	1	1	3
Inadequate Buffer	282204	Both	Neither	10	10	850	850	Lawn	Lawn	No	No	4	1	3	3
Inadequate Buffer	333205	Both	Both	10	10	500	500	Pasture	Lawn	No	No	4	3	2	1
Inadequate Buffer	333207	Both	Neither	10	10	850	850	Crop field	Crop field	No	No	4	3	3	2
Inadequate Buffer	356201	Both	Both	0	0	400	400	Shrubs/small trees	Lawn	No	No	4	3	1	2
Inadequate Buffer	445202	Both	Both	0	0	300	300	Lawn	Lawn	No	Horses	4	2	1	3
Inadequate Buffer	455102	Both	Both	20	0	1800	1800	Shrubs/small trees	Lawn	No	No	4	1	2	4
Inadequate Buffer	546102	Both	Both	5	5	600	600	Lawn	Lawn	No	No	4	2	3	2
Inadequate Buffer	234303	Both	Both	0	5	250	250	Lawn	Shrubs/small trees	No	No	5	3	1	3
Inadequate Buffer	241101	Both	Both	0	0	250	250	Lawn	Lawn	No	No	5	1	2	3
Inadequate Buffer	322202	Both	Neither	15	15	1600	1600	Lawn	Crop field	No	No	5	1	2	2
Inadequate Buffer	546103	Both	Both	0	0	700	700	Pasture	Pasture	No	No	5	2	2	2

Erosion

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	382101	Widening	Bend at steep slope	10500	5	Forest	Shrubs/Small Trees	No		2	2	2
Erosion	442201	Widening	Bend at steep slope	900	10	Pasture	Pasture	No		2	3	3
Erosion	443302	Headcutting	Land use change	200	12	Forest	Forest	No		2	3	3
Erosion	444207	Downcutting	Bend at steep slope	1000	8	Forest	Shrubs/Small Trees	Yes	Small footbridge w	2	3	2
Erosion	125201	Widening	Bend at steep slope	4200	3	Forest	Forest	No		3	3	4
Erosion	133202	Widening	Bend at steep slope	1300	3	Forest	Forest	No		3	3	3
Erosion	243302	Widening	Bend at steep slope	1700	4	Forest	Forest	No		3	3	5
Erosion	243303	Widening	Bend at steep slope	3000	4	Forest	Forest	No		3	3	5
Erosion	282203	Widening	Unknown	1800	4	Forest	Pasture	No		3	3	2
Erosion	323103	Widening	Unknown	1300	3	Shrubs/Small Trees	Shrubs/Small Trees	No		3	2	1
Erosion	325103	Widening	Unknown	1850	4	Pasture	Pasture	No		3	3	1
Erosion	333201	Widening	Land use change	1500	3.5	Forest	Forest	No		3	3	3
Erosion	333206	Widening	Land use change	750	5	Forest	Forest	No		3	3	4
Erosion	358104	Unknown	Bend at steep slope	600	4	Forest	Lawn	No		3	4	2
Erosion	366101	Downcutting	Land use change	500	3.5	Crop field	Forest	No		3	3	1
Erosion	367101	Widening	Land use change	1300	3	Shrubs/Small Trees	Shrubs/Small Trees	No		3	3	3
Erosion	381202	Downcutting	Land use change	2000	4	Shrubs/Small Trees	Shrubs/Small Trees	No		3	3	2
Erosion	387202	Widening	Bend at steep slope	2200	4	Forest	Forest	No		3	3	2
Erosion	387204	Widening	Bend at steep slope	1700	3	Lawn	Forest	No		3	2	2
Erosion	388302	Widening	Unknown	1800	3	Crop field	Shrubs/Small Trees	No		3	3	2
Erosion	414202	Widening	Land use change	2000	4	Forest	Forest	No		3	4	2
Erosion	415201	Widening	Land use change	1600	3	Crop field	Crop field	No		3	2	2
Erosion	433301	Widening	Livestock	500	4	Pasture	Pasture			3	3	2
Erosion	434301	Widening	Livestock	1600	4	Crop field	Pasture	No		3	2	3
Erosion	443301	Widening	Bend at steep slope	1550	6	Forest	Forest	No		3	4	5
Erosion	445102	Downcutting	Livestock	1400	3	Pasture	Pasture	No		3	3	1
Erosion	445201	Downcutting	Bend at steep slope	900	4	Forest	Forest	No		3	3	4
Erosion	446101	Widening	Land use change	2000	3	Pasture	Pasture	No		3	2	1
Erosion	449102	Downcutting	Unknown	1200	4	Crop field	Pasture	No		3	2	1
Erosion	455103	Widening	Land use change	650	3	Lawn	Shrubs/Small Trees	No		3	2	3
Erosion	524205	Widening	Unknown	2000	3	Pasture	Pasture	No		3	3	3
Erosion	536104	Widening	Bend at steep slope	400	5	Lawn	Lawn	No		3	2	1
Erosion	544202	Widening	Unknown	2400	4	Pasture	Pasture	No		3	3	2
Erosion	553102	Widening	Land use change	1400	3	Forest	Lawn	Yes	Fence	3	2	1
Erosion	255201	Widening	Land use change	300	5	Forest	Forest	No		4	4	3

Erosion

Problem	Site	Type	Possible Cause	Length(ft)	Height(ft)	Landuseright	Landuseleft	Infrastructure Threatened?	Describe	Severity	Correctability	Access
Erosion	262201	Widening	Land use change	700	2	Forest	Forest	No		4	3	3
Erosion	265202	Widening	Bend at steep slope	300	5	Forest	Forest	No		4	4	2
Erosion	383203	Widening	Bend at steep slope	100	6	Forest	Crop field	No		4	3	3
Erosion	444201	Widening	Bend at steep slope	100	4	Forest	Forest	No		4	3	3
Erosion	459105	Widening	Land use change	500	3	Shrubs/Small Trees	Lawn	No		4	2	2
Erosion	388301	Headcutting	Unknown	200	3	Lawn	Lawn	No		5	3	3

Pipe Outfalls

Problem	Site	Outfall Type	Pipe Type	Location of Pipe	Diameter (in)	Channel Width	Discharge	Color	Odor	Severity	Correctability	Access
Pipe Outfall	122202	Pond Discharge	Plastic	Head of stream	12		Yes	Green	None	3	3	2
Pipe Outfall	131302	Pond Discharge	Plastic	Right bank	6		Yes	Clear	None	3	3	2
Pipe Outfall	255205	Pond Discharge	Smooth Metal Pipe	Right bank	6		Yes	Clear	None	3	3	1
Pipe Outfall	255206	Agricultural	Plastic	Left bank	3		Yes	Clear	None	3	3	1
Pipe Outfall	282202	Agricultural	Plastic	Left bank	5		Yes	Clear	other	3	3	1
Pipe Outfall	316101	Unknown	Plastic	Right bank	5		Yes	clear	None	3	3	3
Pipe Outfall	333203	Pond Discharge	Concrete Pipe	Left bank	8		Yes	Clear	None	3	3	2
Pipe Outfall	336301	Unknown	Plastic	Right bank	5		Yes	Clear	None	3	3	1
Pipe Outfall	358102	Pond Discharge	Corrugated Metal	Head of stream	12		Yes	Clear	None	3	3	2
Pipe Outfall	366103	Stormwater	Corrugated Metal	Left bank	8		Yes	Clear	None	3	3	1
Pipe Outfall	435303	Unknown	Concrete Pipe	Left bank	4		Yes	Clear	None	3	5	2
Pipe Outfall	442202	Unknown	Plastic	Left bank	5		Yes	Clear	None	3	3	3
Pipe Outfall	444206	Pond Discharge	Smooth Metal Pipe	Left bank	12		Yes	Clear	None	3	3	3
Pipe Outfall	450102	Unknown	Plastic	Left bank	4		Yes	Clear	None	3	3	3
Pipe Outfall	457201	Unknown	Plastic	Left bank	6		Yes	Clear	None	3	3	1
Pipe Outfall	524203	Unknown	Plastic	Left bank	8		Yes	Clear	None	3	3	3
Pipe Outfall	543101	Pond Discharge	Metal	Left bank	24		Yes	Clear	None	3	3	1
Pipe Outfall	543102	Pond Discharge	Corrugated Metal	Left bank	12		Yes	Clear	None	3	3	1
Pipe Outfall	234302	Stormwater	Plastic	Left bank	4		No			4	1	1
Pipe Outfall	133201	Stormwater	Plastic	Left bank	4		No			5	1	2
Pipe Outfall	345201	Stormwater	Corrugated Metal	Left bank	14		No			5	1	1
Pipe Outfall	354201	Pond Discharge	smooth metal	Head of stream	8		No			5	1	4
Pipe Outfall	455101	Unknown	Plastic	Right bank	43		No			5	1	4

Fish Barriers

Problem	Site	Blockage	Type	Reason	Drop(In)	Depth(In)	Severity	Correctability	Access
Fish Barrier	154401	Total	Road crossing	Too high	18		3	4	1
Fish Barrier	161101	Total	Road crossing	Too high	6		3	4	1
Fish Barrier	316104	Total	Dirt Road Crossing	Too high	18		3	3	4
Fish Barrier	452101	Total	Road crossing	Too high	24		3	4	2
Fish Barrier	542201	Partial	Dirt Road Crossing	Too high	4		3	3	3
Fish Barrier	253104	Total	Old Road Crossing	Too high	12		4	2	3
Fish Barrier	254202	Total	Dam	Too high	8		4	1	2
Fish Barrier	255207	Total	Road crossing	Too high	20		4	2	1
Fish Barrier	312201	Total	Dam	Too high	12		4	3	1
Fish Barrier	312202	Total	Road crossing	Too high	4		4	3	1
Fish Barrier	323104	Total	Dirt Road Crossing	Too high	8		4	3	1
Fish Barrier	132203	Total	Natural falls	Too high	12		5	2	4
Fish Barrier	141201	Total	Natural falls	Too high	20		5	3	3
Fish Barrier	356202	Temporary	Debris Dam	Too high	12		5	4	1
Fish Barrier	387201	Temporary	Debris Dam	Too high	17		5	1	1
Fish Barrier	457101	Total	Dirt Road Crossing	Too high	36		5	3	3
Fish Barrier	459102	Total	Road crossing	Too high	12		5	3	2

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	441202	Earth channel	24	1600	Yes	No	No	No			3	3	1
Channel Alteration	534104	Earth channel	36	1900	Yes	Yes	Yes	No			3	2	2
Channel Alteration	535102	Earth channel	30	1200	Yes	Yes	Yes	No			3	3	2

Trash Dumping

Problem	Site	Date	Type	Truckloads	Other measure	Extent	Volunteer Project?	Owner Type	Owner Name	Severity	Correctability	Access
Trash Dumping	132201	06/02/2005	Vehicles	7		Large Area	No	Private		3	4	5
Trash Dumping	323101	05/18/2005	Residential	6		Single Site	No	Private		3	3	1
Trash Dumping	536105	05/26/2005	Residential	10		Single Site	Yes	Private		3	3	3

Exposed Pipes

Problem	Site	Location of Pipe	Type	Diameter(in)	Length(ft)	Purpose	Discharge	Color	Odor	Severity	Correctability	Access
Exposed Pipe	255208	Along stream bank	Smooth metal	6	15	unknown	No			3	3	1
Exposed Pipe	437302	Across Bottom	Smooth metal	5	4	unknown	No			5	1	3

In/Near Stream Construction

Problem	Site	Type of Activity	Sediment Control	Why, if inadequate	Excess Sediment?	Length	Company	Location	Severity
Construction	313101	Road crossing	Adequate		No	100	Six M Highway Contractor 717 456 7602	Resh Mill Road Crossing	4

Unusual Conditions

Problem	Site	Describe	Description	Potential Cause	Severity	Correctability	Access
Unusual Condition	133203	Livestock	Fenced off area. Livestock in stream.		3	2	2
Comment	358102		Water from pipe outfall creating foam in stream				
Comment	433301	Livestock	Possible erosion due to horses in stream. Area was inaccessible due to horses and fencing photo goes along with IB site 043301	Horses			4
Comment	434302	Livestock	Cows in stream				

Representative Sites A

Problem	Site	Date	Substrate	Embeddedness	Shelter for Fish	Channel Alteration	Sediment Deposition	Velocity/Depth	Flow	Vegetation	Bank Condition	Riparian Vegetation
Compass Run												
Representative Site	334201	6/1/2005	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal
Georges Run												
Representative Site	325101	5/18/2005	Suboptimal	Suboptimal	Marginal	Suboptimal	Suboptimal	Marginal	Optimal	Poor	Poor	Poor
Representative Site	367102	5/25/2005	Marginal	Marginal	Suboptimal	Optimal	Marginal	Optimal	Optimal	Suboptimal	Suboptimal	Optimal
Representative Site	382103	5/15/2005	Optimal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Suboptimal	Suboptimal	Suboptimal
Grave Run												
Representative Site	255202	5/31/2005	Marginal	Marginal	Suboptimal	Suboptimal	Marginal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	265201	6/13/2005	Optimal	Optimal	Optimal	Optimal	Marginal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal
Peggys Run												
Representative Site	444202	5/17/2005	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Optimal
Pretty Boy Branch												
Representative Site	524204	5/26/2005	Marginal	Marginal	Suboptimal	Suboptimal	Marginal	Suboptimal	Suboptimal	Marginal	Marginal	Suboptimal
Representative Site	534102	5/26/2005	Suboptimal	Marginal	Optimal	Suboptimal	Suboptimal	Suboptimal	Suboptimal	Optimal	Suboptimal	Suboptimal
Unnamed Trib 2												
Representative Site	241301	6/2/2005	Optimal	Optimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal
Unnamed Trib 3												
Representative Site	383201	5/16/2005	Optimal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal	Optimal	Suboptimal	Optimal
Representative Site	453101	5/16/2005	Suboptimal	Suboptimal	Suboptimal	Optimal	Marginal	Optimal	Optimal	Marginal	Marginal	Suboptimal
Walker Run												
Representative Site	122203	6/2/2005	Optimal	Optimal	Suboptimal	Optimal	Suboptimal	Optimal	Optimal	Optimal	Optimal	Optimal
Representative Site	132202	6/2/2005	Optimal	Optimal	Optimal	Optimal	Suboptimal	Suboptimal	Optimal	Optimal	Optimal	Optimal

Representative Sites B

Problem	Site	Width Riffle	Width Run	Width Pool	Depth Riffle	Depth Run	Depth Pool	Bottom Type
Compass Run								
Representative Site	334201	48	72	36	2	5	12	Silt
Georges Run								
Representative Site	325101	14	18	36	2	3	8	Silt
Representative Site	367102	240	300	360	8	16	30	Silt
Representative Site	382103	156	240	120	10	18	24	Gravel
Grave Run								
Representative Site	255202	24	36	36	4	7	8	Silt
Representative Site	265201	72	36	20	2	5	24	Cobble
Peggys Run								
Representative Site	444202	34	43	96	3	4	13	Cobble
Pretty Boy Branch								
Representative Site	524204	36	60	60	4	12	18	Silt
Representative Site	534102	48	48	36	3	6	36	Gravel
Unnamed Trib 2								
Representative Site	241301	60	96	96	3	4	6	Cobble
Unnamed Trib 3								
Representative Site	383201	60	24	33	2	5	12	Gravel
Representative Site	453101	72	60	84	3	6	12	Gravel
Walker Run								
Representative Site	122203	24	20	12	1	4	5	Gravel/cobble
Representative Site	132202	24	24	24	3	5	6	Cobble