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Background

Washington County is 298,851 acres and has over 100 miles of Potomac shoreline (Washington County, 2002). This County shares a border with Pennsylvania to the north, and Virginia and West Virginia to the south. Neighboring Maryland Counties are Frederick to the east and Allegany County to the west. The eastern part of the County, along South Mountain, lies in the Blue Ridge Province. The middle area is in the Great Valley (or Hagerstown Valley). The western part, from Clear Spring to Allegany County, is in the Ridge and Valley Province.

Slopes of >15% cover roughly a third of the land. The majority of the Hagerstown Valley is gently rolling hills. Roughly half of the land is agriculture (48% in 1997) (Washington County, 2002). Agriculture is mainly in the Hagerstown Valley, from South Mountain to Clear Spring. This area is also dominated by soils considered to be prime farmland (USDA, 2001). In order to preserve agriculture in the County, wetland

restoration/creation should attempt to avoid areas classified as prime farmland. Additional areas along some of the waterways are classified as “prime farmland when drained” (based on NRCS SSURGO GIS data). While it may not be desirable to exclude all soils classified as “prime farmland when drained” from consideration, these additional areas should be lower priority for wetland restoration/creation than soils not classified as prime farmland. Forest comprises over a third of the land and is mainly focused in the steeper areas, west of Clear Spring and on South Mountain. There are eight quarries, extracting limestone, clay, and shale. In the 2000 U.S. Census, Washington County had 131,923 people. According to State predictions, the County will have 145,400 people by 2020.

There are eleven State-designated watersheds in this County including: Potomac River – Monocacy River to Shenandoah River (02140301), Potomac River – Shenandoah River to Hancock (02140501), Antietam Creek (02140502), Marsh Run (02140503), Conococheague Creek (02140504), Little Conococheague Creek (02140505), Licking Creek (02140506), Tonoloway Creek (02140507), Potomac River – Hancock to North Branch (02140508), Little Tonoloway (02140509), and Sideling Hill Creek (02140510). The Washington County Comprehensive Plan lists Israel Creek as a watershed, instead of including it in the State-designated Potomac River watershed (02140301). All these watersheds flow directly into the Potomac River.

Streams

Streams in the Ridge and Valley Province and the Blue Ridge Province have steep gradients in the mountains and moderate gradients in the valleys. Valley streams have bottoms composed of gravel to boulder-sized material. Streams in the Great Valley have low gradients and highly meandering stream channels.

The Potomac River was one of the first federally designated American Heritage Rivers. This designation comes with the potential to be funded for federal projects. The Potomac River provides drinking water for the areas of Hagerstown, Sharpsburg, Funkstown, Smithsburg, and Williamsport (Washington County, 2002). Wells and springs provide water for the remaining areas. The geologic deposits in the Hagerstown Valley Area have the potential to provide a lot of water, but since they are limestone, also have a high risk of contamination. In the western part of the County, the geologic deposits do not provide a high amount of water, but provide enough for the current low population. Surface water is sometimes high in fecal coliform and is alkaline. Ground water sometimes has high iron and hardness (Washington County, 2002).

The following information is based on the Maryland Tributary Strategies 2004 document entitled *Maryland Upper Potomac River*: Maryland’s Upper Potomac River basin includes all of Allegany and Washington, and part of Frederick, Carroll, Montgomery, and Garrett Counties. It reports that water quality in the Upper Potomac River Basin is variable, with some waterways being healthy trout streams and others being nearly lifeless due to acid mine drainage. The eastern portion of the basin (Piedmont and Great Valley areas east of Allegany County) contribute high amounts of nutrients and sediment

from development and agriculture. The middle portion of the basin is fairly forested, so does not contribute excessive pollutants. The western portion of the basin (the Appalachian Plateau) contributes pollution from agriculture and development, but also contributes acid mine drainage. In 2002, the main nitrogen, phosphorus, and sediment sources within the Upper Potomac River basin were agriculture (56%, 59%, and 80% respectively). There are five major wastewater treatment plants in this County, Conococheague, Garden State Tanning, Hagerstown, Maryland Correctional Institute, and Winebrenner, contributing roughly 25% of the total nitrogen and 21% of the total phosphorus load in the Upper Potomac River basin. Of the stations sampled along Conococheague Creek and Antietam Creek, all sites had high total nitrogen and high total phosphorus. Total suspended solids were ranked fair to poor. Poor sites were located along the upper Antietam Creek and the lower Conococheague Creek. This document describes the success of BMPs in the Upper Potomac River Watershed like this:

A series of Best Management Practices (BMPs) have been planned in the basin to help reduce non-point source pollution. As of 1998, the implementation of these practices varies from having exceeded the goal to not having made any progress. Implementation of BMPs for animal waste management, conservation tillage, cover crops, and stream buffers have made good progress towards Tributary Strategy goals. Unfortunately, there has been no progress in forest harvesting BMPs, which consist of regulatory and voluntary measures applied to timber harvests, including erosion and sediment control and streamside management. Others, such as nutrient management and stream protections have exceeded the goals.

MBSS samples for nitrate/nitrite found that the western portion of the County had the lowest values (mostly 0.10-0.99 mg/L, with all being below 5 mg/L), the central portion including Conococheague Creek and Hagerstown Valley had the highest values (5-9.99 mg/L), and the eastern portion had middle values (1-4.99 mg/L).

Wetlands

Wetland Classification

According to Tiner and Burke (1995), in 1981-1982 there were 2,110 acres of wetlands (0.4% of the State's total). The wetland types were Palustrine (2,101 acres) and Riverine (9 acres). Comparisons of this 1981-1982 wetland acreage with historic wetland acreage (based on hydric soils) represent a 60%, or 3,161 acre, loss (MDE, 2002a).

The following wetland plant community descriptions are based on Tiner and Burke (1995), with examples of some wetland communities within Washington County (Table 1).

- Palustrine wetlands can be classified into four major groups depending on the dominant vegetation type: forested, scrub-shrub, emergent, and aquatic. These wetlands were described for the Appalachian Highlands (including the Blue Ridge, Appalachian Plateau, and the Valley and Ridge provinces).

- Palustrine forested wetlands can be categorized into two main types. Both seasonally and temporarily flooded palustrine forested wetlands are flooded for some period during the spring, but seasonally flooded forested wetlands are flooded more frequently and for longer periods (e.g. greater than two weeks) than temporarily flooded forested wetlands (e.g. a week or less). Common tree species include red maple, yellow birch, American elm, sycamore, ash, black cherry, and shagbark hickory, and hemlock. Tiner and Burke gave several examples of temporarily flooded palustrine forested wetlands found within Washington County (table).
- Palustrine scrub-shrub wetlands contain shrubs and tree saplings. There are two types of scrub-shrub wetlands in western Maryland: wet thickets and shrub bogs.
 - Wet thickets are by far the more abundant of the two types. Some common dominant shrubs include highbush blueberry, alder, meadowsweet, and arrowwood. Herbaceous species may also be present.
 - Shrub bogs are not very common. They contain a high amount of peat and may have fewer shrubs than wet thickets.
- Palustrine emergent wetlands within western Maryland are mainly seasonally-flooded wet meadows and marshes.
 - Wet meadow would naturally be forested wetlands, but were cleared. Many have high plant diversity.
 - Marshes may be dominated by cattail, spatterdock, rice cutgrass, and bur-reed.
 - Bogs may contain high amounts of peat and many uncommon species.
- Palustrine aquatic beds are small ponds with partial or total vegetative cover.
- Riverine wetlands are found within the channel and include nonpersistent vegetation.

Table 1. Examples of temporarily flooded palustrine forested wetlands in Washington County (Tiner and Burke, 1995).

Dominant	Associates			
	Trees	Shrubs	Herbaceous	Other
ash	black willow, silver maple, box elder, red maple		cocklebur, wingstem, goldenrod	
ash	American elm, black walnut	redbud, mulberry		
hackberry (Sharman's Branch)	bitternut hickory, shagbark hickory, sycamore, dogwood, witch hazel, white ash, swamp white oak	spicebush, black haw, redbud	Virginia knotweed, moonseed, Jack-in-the-pulpit	Japanese honeysuckle, Virginia creeper, greenbrier
red maple (Mt. Briar Wetland Preserve)	American elm, ashes, black cherry, tulip poplar, red oak	multiflora rose, spicebush, arrowwood	white grass, white avens, yellow wood sorrel, Jack-in-the-pulpit, heal-all, lobelia	
silver maple-box elder-sycamore (Potomac River)	cottonwood	pawpaw, spicebush	wood nettle, white grass, garlic mustard, smartweed, avens, touch-me-not, goldenrod	

As part of an ongoing project to classify the vegetative communities in Maryland, DNR Heritage Program described circumneutral seepage wetlands within the Blue Ridge and Northern Piedmont Province. These near-neutral pH systems are important since they “serve valuable ecosystem functions, furnish habitat to numerous taxonomic groups, are generally rare, and are often habitat for numerous rare, threatened, and endangered plant and animal species.” These wetlands are restricted in Maryland to areas with specific geology (e.g. greenstone, limestone, ultramafic bedrock), many of which often are at high risk of urban sprawl.

Wetland Functions

Stormwater and Flood Control

Wetlands are often credited with providing natural stormwater and flood control benefits. Inland wetlands adjacent to rivers, streams and creeks hold excess discharge and runoff during periods of increased precipitation such as tropical storms and hurricanes and during periods of rapid snow-melt in mountainous regions.

Several factors influence the effectiveness of a wetland in reducing adverse effects of stormwater and floods. Factors include the characteristics of the wetland, local land conditions, and landscape features in the surrounding larger watershed, as well as the type of storm itself. The physical structure of many wetlands, with dense vegetation, fallen trees, topography (hummocks, depressions), and complexity of stream channel systems serve as resistance features to slow flow of surface water from floods and surface runoff, the height of peak floods, and delay the timing of the flood crest. Wetlands are typically in topographically low position, which provides a natural basin for water storage. The depth of the basin and soil characteristics affect the wetland's storage capacity at surface and subsurface levels. Water is released more slowly from the wetlands, thereby reducing both erosion and damage to property and structures farther downstream. In the surrounding areas, the ability of the land to also reduce runoff may aid the wetland in its flow retention/reduction function. At the landscape level, the position of the wetland in the watershed and the ratio of size of the wetland to the size of the watershed also affect the function. Wetlands higher in the landscape and of large in size in relation to the watershed are most effective. While wetlands retain surface flows that enter the wetlands at a gradual rate, they are considered to be more effective at reducing damages from short duration storms.

Also, some water will be removed from the wetland through ground water recharge, soil retention and evapotranspiration.

The flood attenuation function of wetlands would be limited where the floodplain is narrow, the vegetation has been removed, and/or the channel is downcut. Stream restoration is often a challenge due to the location of infrastructure in the floodplain. Stream restoration can be technically difficult due to the need to accommodate existing infrastructure.

Groundwater Recharge and Discharge

Functions

Wetlands facilitate the flow of water between the ground water system and surface water system. Wetlands periodically perform different functions, depending on the gradient of the groundwater table and the topography of the land surface. The relationship of the groundwater table and the land surface dictates which function - groundwater recharge or discharge - a wetland performs.

Nearly all of Maryland's wetlands are ground water discharge areas, at least for some portion of the year (Fugro East, Inc., 1995). Variations in the depth of the ground water table, resulting from seasonal changes in climate, dictate which of these functions - discharge or recharge - a wetland will perform at a given time.

Values

Ground water discharge helps maintain a wetland's water balance and water chemistry. This wetland function is also critical to the formation of hydric soils and the maintenance of ecosystem habitats in different types of wetlands.

Ground water recharge is the primary mechanism for aquifer replenishment which ensures future sources of groundwater for commercial and residential use.

Wetlands often exist as springs and seeps in the County, providing important base flow to streams and associated wetlands.

Modification of Water Quality

Water Quality Improvement

Wetlands are valued for their ability to maintain or improve quality of adjacent surface waters. This ability is primarily accomplished by the following processes:

- Nutrient removal, transformation, and retention
- Retention of toxic materials
- Storage of the sediment transported by runoff or floods.

Hydrophytic vegetation (adapted to live in water) and microbial activity in soils help remove toxic substances and excess nutrients from surface water. Dissolved solids and other constituents may be removed or degraded, such that they become inactive, or incorporated into biomass. This occurs through adsorption and absorption by soil particles, uptake by vegetation and loss to the atmosphere through decomposition and exchange between atmosphere and water.

Nutrient Cycling: Addition, Removal and Transformation

Nutrients are carried into wetlands by hydrologic pathways of precipitation, river flooding, tides, and surface and ground water inflows. Outflows of nutrients are controlled primarily by outflow pathways of waters. The inflow and outflow of water and nutrients are important processes that effect wetland productivity.

Wetland biological and chemical processes remove suspended and dissolved solids and nutrients from surface and ground water and convert them into other forms, such as plant or animal biomass or gases. Debris and suspended solids (fine sediment or organic matter) may be removed by physical processes, such as filtering and sedimentation.

Soil characteristics, landscape position, and hydrology all contribute to the relative ability of a wetland to perform nutrient removal and transformation. Sufficient organic matter must be present for microorganisms in the soil to consume or transform the nutrients. Wetlands are often depressions in the landscape that hold water, transported sediment, and attached or dissolved nutrients for a longer period of time than a sloping area or areas with relatively higher elevations. A longer retention time allows for chemical interactions and plant uptake to occur.

Nitrogen undergoes some chemical transformations and may be taken up in soluble form, absorbed by plants through their roots, or consumed by anaerobic microorganisms that convert the nitrogen to organic matter (Mitsch and Gosselink, 2000). Anaerobic microbes may also convert the nitrogen from a nitrate form to nitrogen gas. Phosphorus is often bound to clay particles, and these fine sediments are transported into wetlands by riparian flooding and tidal action. Phosphorus may be stored in a wetland attached to the clay particles, however, phosphorus becomes available for plant uptake in its soluble form

after flooding, saturation and anaerobic conditions typical of a wetland occur. Nutrient processes vary seasonally. Cooler temperatures slow microbial activity and plant uptake while higher flows of water transport more materials out of non-isolated wetland systems. The transported organic material is critical for downstream food chain support.

Wetlands are most effective at nutrient transformation and uptake when there are seasonal fluctuations in water levels (Tiner and Burke, 1995). Wetlands that are temporarily flooded (saturated or inundated for brief periods early in the growing season) and those that are permanently inundated would generally be less effective than seasonally wet areas (saturated or inundated for longer periods during the early-mid growing season but are drier by the end of the growing season).

Toxics Retention

Retention of heavy metals has been reported most often in studies of tidal wetlands, though most wetlands are believed to serve as sinks for heavy metals. Accumulation is primarily in soils, with plants playing a more limited role (Mitsch and Gosselink, 2000). Plants such as cattails, bulrushes, and *Phragmites* are among the more effective and commonly used plants for uptake of toxic materials such as metals. As is the case for nutrient transformation and sediment retention, soil characteristics, landscape position, vegetation, and hydrology all contribute the relative ability of a wetland to retain toxic materials. The longer the duration that water and transported materials remain in the wetland, the greater the likelihood that the materials will be retained. Many wetlands have been constructed as part of stormwater management facilities to treat surface runoff.

Sediment Reduction

Wetlands along rivers, streams and coastal areas are important for removing sediment from surface and tidal waters. During large flood events, rivers frequently overtop their banks and water flows through adjacent floodplains and wetlands. Flood waters carry large volumes of suspended sediment, mostly fine sand, silt and clay. Because floodplains and wetlands provide resistance to flow - from dense vegetation, microtopography, and woody debris - the flow of water is slowed and sediment is deposited and stored in these areas. Similarly, coastal marshes and estuaries retain sediment brought in by tides and residual suspended sediment from rivers.

Lack of dense vegetation in some floodplains, and narrow width of floodplains, would reduce the ability of wetlands to slow velocities of floodwaters and allow settling of transported sediments.

Wildlife Habitat/Biodiversity

Wetlands provide important habitat for fish, wildlife, and plant species, including rare species. Wetlands adjacent to coldwater streams in Washington County also aid in providing shade to maintain cool temperatures for aquatic species such as trout.

Nontidal Wetlands of Special State Concern

The largest Wetland of Special State Concern, also designated as a Natural Heritage Area, is along Sideling Hill Creek. There are several other Nontidal Wetlands of Special State Concern in the County, mainly located in the Eastern section. Specific locations are described in the section for each individual watershed.

Wetland Restoration Considerations

Hydric soils suggest where wetlands are currently or were historically. There are some spots of hydric soil that is not mapped wetlands (based on NRCS SSURGO GIS data and NWI/DNR wetlands) mostly occurring along waterways. This soil is classified as “poorly drained” and “very poorly drained.” Hydric soils that are not currently wetlands may be good potential sites for wetland restoration. While not classified as hydric soil, there are many additional “somewhat poorly drained” soils that may be good areas for wetland creation.

Vegetated stream buffers have the potential to intercept and remove nutrients, sediments, and other pollutants. Peterson et al. (2001) found that the smallest headwater streams, which are often found in association with springs and groundwater discharge wetlands, have the most rapid uptake and transformation of inorganic nitrogen (ammonium and nitrate) in comparison with other surface waters. The authors believed that the large surface to volume ratio in small streams resulted in rapid nitrogen uptake and processing. An excess of discharges to overload these systems would result in nitrogen being transported farther down the drainage systems to rivers and estuaries. Forested stream buffers can also improve down stream biodiversity by contributing organic matter to the food web, providing woody debris which increases diversity of physical habitat, and reducing stream temperature. Headwater streams are thought to be the most beneficial at these processes. Therefore, wetlands adjacent to streams should be high priority for restoration/preservation, with emphasis on headwater stream systems. Wetlands around all tributaries of waterways used for drinking water (COMAR Use P) should also be ranked higher.

DNR assessed the development risk for all land within Maryland. Wetlands within areas of high development risk should be higher priority for preservation.

In order to maintain water quality of surface water reservoirs, wetlands within the watersheds of surface water reservoirs should be higher priority for preservation.

Wetland restoration may be more desirable in land uses that contribute high pollution, currently provide relatively low amounts of biodiversity, and are easy to convert to wetlands. As a general rule, agriculture fits these criteria more than other land use types. Forested land is generally not as high of a pollutant source and it also provides better habitat for plants and wildlife. For these reasons, converting upland forest to wetland may provide fewer benefits than converting agriculture to wetlands. However, projects that have converted artificially drained forest to wetland have resulted in beautiful wetlands with diverse ecology. Additionally, wetlands may be built in urban land use, but they are

generally much smaller and sometimes more costly. Urban areas may provide good potential for wetlands designed for storm water management.

Sensitive Resources

Sensitive areas requiring special consideration according to the 1992 Planning Act includes: streams and their buffers, 100-year floodplains, threatened and endangered species habitats, and steep slopes. Additionally, in the Comprehensive Plan, Washington County designated other areas as “sensitive areas” including some specific areas in Antietam Creek watershed and stream valley open space in designated growth areas.

Nearly half of this County, including the majority of Hagerstown Valley and in some Ridge and Valley areas, is underlain by Limestone. These carbonate areas are important because they have a potential for sinkhole formation and direct pollution of the groundwater. Designs for wetland restoration/creation within these areas should take this into account. These areas are located in the watersheds: Potomac River Washington (02140501), Little Conococheague Creek, Conococheague Creek, Antietam Creek, and Marsh Run.

Other Relevant Programs

Green Infrastructure and Greenways

There are several large Green Infrastructure hubs, near the Allegany County border, around Indian Springs, along the Frederick County border, and along the Potomac River (DNR, 2000-2003). Areas within the GI network that are currently unprotected should be protected. There are small areas designated as vegetated Green Infrastructure corridors, located mainly in the central and western parts of the County. There are also small sections of Green Infrastructure considered to be “gaps,” currently in development, agriculture, or barren land. It is desirable to restore these areas back to natural vegetation, as they can provide a wildlife corridor, a protective buffer, and may be especially important along the waterways. For more detailed information, refer to section on the individual watershed.

Washington County government recommends using trails, buffers, and floodplain corridors to connect Hagerstown and the growth area.

The Washington County Comprehensive Plan suggested developing additional non-motorized boat access points along the smaller waterways. Alternate U.S. 40 (East of Hagerstown) and U.S. 40 (West of Hagerstown) are being considered for a National Scenic Road Designation.

Ecologically Significant Areas

DNR designates areas that contain habitat for rare, threatened and endangered species and rare natural community types. These areas are buffered to create the “sensitive species project review areas” GIS layer, intended to assist in assessing environmental impacts and reviewing potential development changes. This layer generally includes

designated Natural Heritage Areas, Wetlands of Special State Concern, Colonial Waterbird Colonies, and Habitat Protection Areas.

Natural Heritage Areas

There are State-designated Natural Heritage Areas (NHA) called Sideling Hill Creek NHA. These areas 1) Contain species considered to be threatened, endangered, or in need of conservation; 2) Have unique geology, hydrology, climate or biology; and 3) Are among the best Statewide examples.

Rural Legacy Program

Designated Rural Legacy land is located in the Sharpsburg-Keedysville area, watersheds of Antietam Creek, Potomac River (02140501 and 02140301), and Marsh Run (a small amount). Wetland preservation/enhancement may be desirable in these areas. For detailed information on that program, refer to the individual watersheds.

Priority Funding Areas

The largest Priority Funding Area (PFA) is around Hagerstown, connecting Hagerstown with Funkstown and Williamsport. Other PFAs are mainly scattered through Hagerstown Valley, with a few small ones in other areas of the County. County-designated growth areas comprise 16% of the land, with “urban growth areas” including Hagerstown, Funkstown, and Williamsport, and “town growth areas” including Boonsboro, Smithburg, Hancock, and Clear Spring (Washington County, 2002). Wetland restoration/creation may not be as desirable in these designated areas.

Stakeholders in wetland management may have conflicting goals for wetlands in Priority Funding Areas. Some may advocate preserving wetlands in these areas as greenways, for aesthetics, or as unique communities in a developing area. Other interests may seek flexibility and expedited review of proposals to impact wetlands due to other goals for growth and economic development in a designated area. There may be benefits to protecting and restoring wetlands for water quality in a growth area, particularly as an offset against future or existing TMDLs. Preservation of biodiversity may be more of a challenge due to possible increases in nonpoint source pollution and fragmentation. Stormwater management associated with growth may also reduce certain nonpoint source impacts to wetlands in PFAs.

Protected Areas

Estimates of protected land in the County based on Maryland Department of Natural Resources GIS data are as follows: 9,513 acres Federal, 22,148 acres DNR, 3,765 acres County, 3,060 acres MET, 819 acres private conservation, and 28,270 acres agricultural easements. These are distributed throughout most of the County and are discussed in further detail in the watershed information section.

Some properties are within agricultural easements. Some are permanent and some are shorter-term. There is some controversy about conducting wetland restoration within agricultural easements. Most would agree that it is desirable to preserve good farmland. However, properties within these easements may also contain spots of soil with lower

productivity due to wetness. These low productivity spots may be a hassle to the farmer and may be good areas for wetland restoration. First, the property owner may be able to benefit from an additional program for that low productivity area, resulting in the owner getting more money for the land and utilizing the land to its full extent. Since these property owners are already involved in a preservation program, they may be more likely to consider additional programs. Second, since some of these agricultural easements are temporary, after the agricultural easement expires, the land owner may decide to get out of agriculture, and a wetland program could help to preserve some of the land from development.

Watershed Information

Washington County lies within the Upper Potomac River Sub-Basin (021405) with the exception of Potomac River east of the Shenandoah River, which is the Middle Potomac River Sub-Basin (021403). Information on individual basins within the larger sub-basin is as follows:

Potomac River – Monocacy to Shenandoah River (02140301)

Background

There are roughly 9,431 land acres in the Washington County portion of this watershed. Over half of this land is forest (60%), a quarter is agriculture (25%), and a small portion is urban (15%) (MDP, 2002). This watershed is in the Blue Ridge Province. Israel Creek is the main tributary.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Emergent: 191 acres
 - Scrub shrub: 102 acres
 - Forested: 715 acres
 - Unconsolidated bottom: 89 acres
 - Farmed: 86 acres
- Riverine unconsolidated shore: 2 acres
- Total: 1,185 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. Based on data for the time period of January 1, 1991 through December 31, 2004, for this watershed, there has been a slight loss in wetlands (Walbeck, 2005).

Basin code	Permanent Impacts	Permittee Mitigation	Programmatic Gains	Other Gains	Net Change
02140301	-0.33	0	0	0	-0.33

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. The Potomac River are all tributaries within this watershed are designated Use I-P, water contact recreation, protection of aquatic life, and public water supply.

Water Quality

A source water assessment was completed for Sharpsburg Water Treatment Plant, along the Potomac River. This assessment found that the water supply was susceptible to natural organic matter, disinfection by-product precursors, Cryptosporidium oocysts, Giardia cysts, taste and odor causing compounds, sediment, algae, fecal coliform, and pollutant spills.

The 1998 Clean Water Action Plan classified the watershed as Category 1, a watershed not meeting clean water and other natural resource goals and therefore needing restoration. Failing indicators include poor non-tidal benthic index of biotic integrity (BIBI) and a high percent unforested stream buffer (79%).

The 2002 Maryland Section 305(b) Water Quality Report suggests the portion of the Potomac River between the Monocacy River and the Shenandoah River supports all designated uses, but wadeable streams (stream order ≤ 4) do not support all designated uses due to a poor biological community. The 2000 Maryland Section 305(b) Water Quality Report States that Israel Creek (in Washington County) and Tuscarora Creek (in Frederick County) do not support all designated uses. Possible pollutant sources include habitat degradation from siltation, poor bank stability, and channelization.

List of Impaired Surface Waters [303(d) List]

The 2004 303(d) List contains basins and subbasins that have measured water quality impairment and may require a Total Maximum Daily Load (TMDL). The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Israel Creek* (021403010207 – in Washington County); poor biological community.
- *Unknown tributary to Little Catoclin Creek* (021403010208); poor biological community.
- *Tuscarora Creek* (021403010211); sedimentation.
- *Unknown tributary to Tuscarora Creek* (021403010211); sedimentation.

MBSS found BIBI of poor and FIBI of fair.

Restoration/Preservation

Large areas of protected land in the Washington County portion of this watershed includes Harpers Ferry National Historical Park, C&O Canal National Historical Park, and DNR-owned South Mountain Natural Environmental Area and Gathland State Park. There are also several agricultural easements, Maryland Environmental Trust Easements, and a small County-owned property.

This watershed contains Green Infrastructure hubs along South Mountain, the Potomac River, and Elk Ridge, and corridors connecting the South Mountain and Elk Ridge hubs (DNR, 2000-2003). These hubs are partially protected by Harpers Ferry National Historical Park, C&O Canal National Historical Park, and DNR-owned land but there are still large unprotected areas north of Harpers Ferry. According to the Maryland Greenways Commission, there are three designated existing or potential greenways within this watershed:

- *C&O Canal National Historical Park*
- *Appalachian Trail/South Mountain Greenway*
- *Weverton-Roxbury Rail Corridor*. This is an existing ecological greenway that potentially may also serve as a recreational trail.

In the Comprehensive Plan, in addition to some of the more general “sensitive areas” mentioned in the introduction, Washington County has designated the Appalachian Trail Corridor as being a “sensitive area.”

There are no Nontidal Wetlands of Special State Concern in the Washington County portion of this watershed, but there is one potential WSSC along the Potomac River (within Harpers Ferry).

The following information is summarized from the document *Rural Legacy FY 2003: Applications and State Agency Review*. Generally the intent of the Rural Legacy Program is to focus preservation efforts around historic and scenic roads, develop greenbelts, and add to large areas of already-protected lands. Rural Legacy areas are in the southern-most section of the County, encompassing the watersheds Potomac River, Antietam Creek, and a small part of Marsh Run. This area is approximately 37,500 acres, including over 6,000 acres of prime farmland, and is mostly undeveloped (91%). This area was chosen in order to protect properties around Antietam National Battlefield, South Mountain, and Red Hill. In addition to protecting Antietam National Battlefield, it is also intended to preserve the agricultural economy and preserve the natural resources including prime farmland, sensitive areas, endangered species, historic properties, and viewsheds. The goal of the sponsor (the Board of County Commissioners of Washington County) is to protect roughly 21,330 acres (57%) from development. A total of 12,580 acres have already been protected through various methods, with roughly 75% being protected as agriculture and 25% being protected as forest. When preserving the land, emphasis has been placed on protecting the stream buffers, including creating 50-100 foot buffers on Potomac River tributaries, and protecting important species. This Rural Legacy document provides a list of property owners within the Rural Legacy area who are interested in putting their land into an easement, all located within the Eastern portion of the area, and the priority of acquiring these easements. Since funds through the Rural Legacy Program are not adequate enough to support all of these requests, sites ranked as high priority may be potential protection sites for other programs.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.

- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along waterways.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect portions of Green Infrastructure that are not currently protected.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.
- Protect land within the designated Rural Legacy Area.

Potomac River (02140501) Shenandoah River to Hancock

Background

This watershed has roughly 54,165 land acres. Approximately 50% of the land is forested, over one-third is agriculture (36%), and a smaller amount is urban (14%) (MD, 2002). The cities of Hancock and Williamsport are partially located within this watershed. This watershed is in the Blue Ridge, Hagerstown Valley, and Ridge and Valley Provinces. Big Pool Lake (92 acres) is located in this watershed. There are two surface water community water supplies withdrawing from the Potomac River, one for Hagerstown and one for Sharpsburg (MDE, 2003b).

Carbonate rock is located in a large portion of this watershed, basically underlying most of the watershed east of Big Spring. These carbonate areas are important because they have a potential for sinkhole formation and groundwater contamination. Designs for wetland restoration/creation in these areas should take this into account.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Aquatic bed: 2 acres
 - Emergent: 7 acres
 - Scrub shrub: 15 acres
 - Forested: 135 acres
 - Unconsolidated bottom: 84 acres
 - Farmed: 7 acres
- Riverine unconsolidated shore: 43 acres
- Total: 292 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. Based on data for the time period of January 1, 1991 through December 31, 2004, for this watershed, there has been a slight loss in wetlands (Walbeck, 2005).

Basin code	Permanent Impacts	Permittee Mitigation	Programmatic Gains	Other Gains	Net Change
02140501	-1.48	0.13	0	0	-1.35

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. The Potomac River and all tributaries within this watershed are designated Use I-P, water contact recreation, protection of aquatic life, and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as Category 1, a watershed not meeting clean water and other natural resource goals and therefore needing restoration. Failing indicators included poor benthic index of biotic integrity, poor instream habitat, and being on the 303d List for impaired water quality. Although this watershed was not listed as a Category 3 watershed, a pristine or sensitive watershed in need of protection, indicators suggesting need for preservation included a high imperiled aquatic species indicator and two drinking water intakes.

According to the 2002 Maryland Section 305(b) Water Quality Report, the Potomac River does not support all designated uses in a small section of the water (1.0 miles out of 67.6 miles) due to PCBs. The wadeable streams (stream order ≤ 4) fail to support all designated uses due to poor biological community.

The 2004 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Potomac River*; suspended sediment and nutrients from point, non-point, and natural sources.
- *Downey Branch* (021405010165); poor biological community.
- *Camp Spring Run* (021405010163); poor biological community.
- *Green Spring Run* (021405010162); poor biological community
- *Green Spring Run Unnamed Tributary* (021405010162); poor biological community
- *Potomac River Unnamed tributary* (021405010158); poor biological community.
- *Potomac River Unnamed tributary* (021405010155); poor biological community.
- *Potomac River Dam #4*; methylmercury in fish tissue from atmospheric deposition.

MBSS found FIBI of mostly very poor. BIBI was generally fair in the far west and poor to very poor in the remaining portion.

Restoration/Preservation

There is a fair amount of Green Infrastructure in this watershed, with the largest hubs being along the Potomac River, connected with the Indian Springs hub, and along Elk Ridge. There are several protected parcels (Fort Frederick State Park, C&O Canal National Historical Park, and Harpers Ferry National Historical Park, and METs) but

large areas along the Potomac River and the other hubs still remain unprotected. There are also some GI “gaps along the Potomac River that may be ideal locations for restoration to natural vegetation. According to the Maryland Greenways Commission, there are four designated existing or potential greenways within this watershed:

- *Indian Springs Greenway.*
- *Western Maryland Rail Trail.*
- *C&O Canal National Historical Park.*
- *Licking Creek Greenway.* This is a proposed recreational greenway that would connect Camp Harding County Park and the Western Maryland Rail Trail.

The Western Maryland Rail Trail Study and Master Plan 1993

The Western Maryland Rail Trail is located along the upper limits of the Potomac River floodplain, with 46% of the trail located on the 100-year FEMA floodplain and/or floodway. This trail starts just west of Fort Frederick State Park and continues, parallel to the Potomac River and the C&O Canal, past Hancock, to Tonoloway Ridge (east of Sideling Hill). Two waterways, Tonoloway Creek and Licking Creek, pass under the trail. Since some sections of the trail are fairly wet and this area could potentially buffer the C&O Canal and the Potomac River, this property may provide opportunities for restoration or mitigation. Also in this property are the popular fishing spots Big Pool and Little Pool. Although a species survey of this specific corridor has not been conducted, there are many rare threatened and endangered species in the area. This trail is near sensitive areas at Roundtop.

Fort Frederick State Park Land Unit Plan 2002

In 2002, a management plan was developed for Fort Frederick State Park to address environmental impacts of recreational use in this historic site. This park is located along the Potomac River and Big Pool. Several recreational areas (e.g. camping and picnic areas) are being relocated due to environmental degradation at these sites. At least one of these areas (the family campground), is currently in the floodplain. Depending on the elevations, this may present an opportunity for restoration. Although it is desirable to create a direct link to the Western Maryland Rail Trail, this is currently not feasible since it would run through several properties or along an active railroad.

The following information is summarized from the document *Rural Legacy FY 2003: Applications and State Agency Review*. Generally the intent of the Rural Legacy Program is to focus preservation efforts around historic and scenic roads, develop greenbelts, and add to large areas of already-protected lands. Rural Legacy areas are in the southern-most section of the County, encompassing the watersheds Potomac River, Antietam Creek, and a small part of Marsh Run. This area is approximately 37,500 acres, including over 6,000 acres of prime farmland, and is mostly undeveloped (91%). This area was chosen in order to protect properties around Antietam National Battlefield, South Mountain, and Red Hill. In addition to protecting Antietam National Battlefield, it is also intended to preserve the agricultural economy and preserve the natural resources including prime farmland, sensitive areas, endangered species, historic properties, and viewsheds. The goal of the sponsor (the Board of County Commissioners of Washington County) is to protect roughly 21,330 acres (57%) from development. A total of 12,580 acres have

already been protected through various methods, with roughly 75% being protected as agriculture and 25% being protected as forest. When preserving the land, emphasis has been placed on protecting the stream buffers, including creating 50-100 foot buffers on Potomac River tributaries, and protecting important species. This Rural Legacy document provides a list of property owners within the Rural Legacy area who are interested in putting their land into an easement, all located within the Eastern portion of the area, and the priority of acquiring these easements. Since funds through the Rural Legacy Program are not adequate enough to support all of these requests, sites ranked as high priority may be potential protection sites for other programs.

There are two Nontidal Wetlands of Special State Concern and three potential WSSC within this watershed. Site descriptions are based on the 2003 WSSC document:

- *Ernstville Stream*. This site is located along on a stream below the C&O towpath, near Big Pool, and is surrounded by fields, development, and railroads. It contains two rare species and a locally uncommon plant species. Non-native plant species and excessive deer populations should be controlled. Other threats include changes in hydrology and increased pollution (including from runoff and bank erosion). The wetland buffer should be protected from development, logging, and agriculture. Since the current forested buffer is inadequate protection, property owners should be encouraged to increase this forested buffer. The site itself is mostly protected by C&O Canal National Historical Park.
- *Boyd Mountain Pond*. This seasonal limestone sink pond and seepage bog is located on a tributary to Green Spring Run, downhill of U.S. 40. It contains an endangered plant species and habitat for frogs and salamanders. Since this pond is small, it is quite vulnerable to disturbance, including from logging and development. The existing cattail should be monitored, and if necessary, measures should be taken to control its spread. The forested buffer should be maintained. This site is currently unprotected.
- *Potential WSSC*. These are located along the Potomac River: around Byrnes Island, near Cedar Grove, and near Indian Springs.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along waterways.
- Possible restoration or mitigation: on portions of the Western Maryland Rail, since some sections of the trail are fairly wet and this area could potentially buffer the C&O Canal and the Potomac River.
- Possible restoration in Fort Frederick State Park: within the floodplain in the family campground.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect WSSC and buffers.
- Protect portions of Green Infrastructure that are not currently protected, especially along the waterways.

- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.
- Protect land within the designated Rural Legacy Area.

Antietam Creek (02140502)

Background

This watershed has approximately 118,363 land acres. Nearly half is agriculture (48%), and the rest is forest (29%) and urban (23%) (MDP, 2002). This is one of the highest three watersheds in the County for urban cover and one of the lowest three for forest cover. This watershed has high urban cover partly because it contains the majority of Hagerstown, Smithsburg, Boonsboro, Keedysville, and Sharpsburg. The eastern portion of this watershed (South Mountain) is in the Blue Ridge Province and the remaining portion (the majority) is in the Hagerstown Valley Province. Main tributaries include Little Antietam Creek, Beaver Creek, and Marsh Run.

Steep slopes are on the Eastern border with Frederick County (Washington County, 2002).

The majority of this watershed is carbonate rock with the exception of the area around South Mountain and Elk Ridge. These carbonate areas are important because they have a potential for sinkhole formation and groundwater contamination. Designs for wetland restoration/creation in these areas should take this into account.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Aquatic bed: 2 acres
 - Emergent: 132 acres
 - Scrub shrub: 46 acres
 - Forested: 208 acres
 - Unconsolidated bottom: 191 acres
 - Unconsolidated shore: <1 acres
 - Farmed: 67 acres
- Riverine unconsolidated shore: <1 acres
- Total: 647 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. Based on data for the time period of January 1, 1991 through December 31, 2004, for this watershed, there has been a slight gain in wetlands (Walbeck, 2005).

Basin code	Permanent Impacts	Permittee Mitigation	Programmatic Gains	Other Gains	Net Change
02140502	-0.45	0	1.00	0	0.55

Code of Maryland Regulations

All Maryland stream segments are categorized by Sub-Basin and are given a “designated use” in the Code of Maryland Regulations 26.08.02.08. The waterways are designated as follows:

- Beaver Creek and tributaries, Marsh Run and tributaries, Little Antietam Creek and tributaries: Use III-P, natural trout waters and potable water supply.
- Antietam Creek and tributaries except those listed above: Use IV-P, recreational trout waters and potable water supply.

There is a MDE-designated wellhead protection area for Boonsboro-Keedysville. Greenbrier Lake (27 acres) is located in this watershed. The only surface water community water supply is Edgemont Reservoir, providing water for Hagerstown (MDE, 2003b).

Water Quality

The 1998 Clean Water Action Plan classified this watershed as “Priority” Category 1, a watershed not meeting clean water and other natural resource goals and therefore needing restoration. Since it is a “Priority” watershed, this watershed was selected as being most in need of restoration within the next two years since it failed to meet at least half of the goals. It was also classified as “Selected” Category 3, a pristine or sensitive watershed that needs the most protection. Failing indicators included high nitrogen and phosphorus, poor benthic index of biotic integrity, high percent unforested stream buffer (79%), high soil erodibility (0.29), and being on the 303d List for impaired water quality. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, a high number of wetland-dependent species, presence of trout spawning area, and a fish hatchery water supply.

According to the 2002 Maryland Section 305(b) Water Quality Report, Antietam Creek mainstem fails to support all designated uses for portions of the waterway due to bacteria from agricultural and urban runoff, natural, and upstream sources. Wadeable streams (stream order ≤ 4) fail to support all designated uses in a small percentage of the water due to poor biological community from a high pH. Sources of this degradation include poor habitat, changes in hydrology, and natural sources. Water samples were taken for the 5.2 acre City Park Lake, but water quality results were inconclusive. Greenbrier Lake does not support designated uses due to nutrients from nonpoint, natural, and unknown sources. The 2000 Maryland Section 305(b) Water Quality Report States that Greenbrier Lake did not fully support all designated uses due to seasonally low oxygen.

The 2004 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Antietam Creek*; fecal coliform, sedimentation impairment.
- *Black Rock Creek* (021405020193); poor biological community
- *Greenbriar Lake*; nutrients.

MDE completed a TMDL in 2001 for Carbonaceous Biochemical Oxygen Demand (CBOD) and Nitrogenous Biochemical Oxygen Demand (NBOD) to Antietam Creek. The information is as follows. Main point sources are the Hagerstown Fiber Limited Partnership WWTP, Hagerstown Water Pollution Control Facility WWTP, Funkstown WWTP, Maryland Correctional Institution WWTP, and Antietam WWTP. This is a Use IV-P waterway, which means the DO must stay above 5.0 mg/l. The dissolved oxygen (DO) levels were measured to be above 5mg/l. However, the DO is predicted to decrease if the CBOD and NBOD increase. These pollutants are from point and nonpoint sources. A reduction of the point source discharges will be achieved through the NPDES permits.

A water quality analysis was completed for eutrophication within Greenbrier Lake (MDE, 2005). This report recommends the removal of Greenbrier Lake for nutrients in the 303(d) List.

The proposal for Maryland's Nonpoint Source Program FFY2004 Section 319(h) is entitled Antietam Creek Targeted Watershed Project. The following information is summarized from this proposal. Antietam Creek water quality issues include fecal coliform, high amounts of sediment, low dissolved oxygen, high temperatures for certain fish, and high nutrients due to point and nonpoint sources from agricultural and urban sources. Ground water problems include high levels of fecal coliform and nutrients. According to the 1996 Maryland Water Quality Inventory, this Creek is eighth in potential nutrient load to the Chesapeake Bay. Additionally, according to the Potomac River Basin National Water Quality Assessment, there are detectable amounts of atrazine, simazine, prometon, and metolachlor. The County plans to target best management practices to reduce agricultural erosion and nutrient runoff, with emphasis on use of riparian buffers, stream fencing, and animal waste management. One focus of this plan is to preserve existing stream buffers and create more riparian buffer in the watershed of Beaver Creek. To reduce loads from urban pollutants, an educational program has been established.

The following information is summarized from the Washington County Soil Conservation District Business Plan (2002-2007). Important issues in the area include soil erosion, water quality, and rural/urban natural resource education. Antietam Creek watershed has been targeted with funding through the EPA Section 319 of the Clean Water Act. The Board of Supervisors of the District chose Beaver Creek watershed to be the focus of restoration activities. The Beaver Creek Initiative aims at identifying, prioritizing, and implementing stream restoration opportunities for the Beaver Creek watershed. Important issues include reduction of soil erosion, improving water quality, and education on rural and urban natural resources.

MBSS found FIBI and BIBI ranging from good to very poor. Some of the worst scores were found around Hagerstown, north of Smithsburg, and at A.M. Powell Fish Management Area.

Restoration/Preservation

The *Greenbrier State Park Trail Management Plan 1998* addresses environmental impacts from hiking/biking/equestrian trails in the park. To this end, some trails will be realigned or managed differently, bringing up small opportunities for wetland restoration or mitigation.

In addition to the “sensitive areas” mentioned in the overall County background section, the Comprehensive Plan also designated Edgemont and Smithsburg Reservoir Watersheds, Appalachian Trail Corridor, and Upper Beaver Creek Basin and Beaver Creek Trout Hatchery as “sensitive areas.” Washington County proposes to protect the stream corridors, especially around Hagerstown Growth Area, Marsh Run, Hamilton Run, and Antietam Creek (Washington County, 2003 draft). This will partially be done through preservation easements. They also recommend protecting land around Pen Mar Park and the Appalachian Trail and connecting Kirk Woods with Widmyer Park.

There have been several restoration efforts in the subwatershed Beaver Creek, partially due to the active watershed association there.

Significant areas of protected land are along South Mountain, including DNR-owned South Mountain Natural Environmental Area, Greenbrier State Park, and Hagerstown Watershed Area (which includes Edgemont Reservoir). Antietam National Battlefield is in the Southwestern part. There are numerous Maryland Environmental Trust easements, (mainly adjacent to Antietam National Battlefield), agricultural easements, County-owned properties, and one private conservation area. Fort Ritchie is in the northeast corner. The 30-acre Mt. Briar Wetland Preserve is in the southern section of the watershed.

Green Infrastructure hubs are located along South Mountain (on Frederick County border) and southeast of Sharpsburg and a corridor is located follows Antietam Creek (DNR, 2000-2003). Much of the South Mountain hub is protected, but the southern hub and Antietam corridor are mostly unprotected. The corridor also contains some GI “gaps” that may be ideal locations for restoration of natural vegetation.

There is an existing greenway along the Appalachian Trail. According to the Maryland Greenways Commission, there is a potential rail-to-trail conversion along the Weverton-Roxbury Rail. The County comprehensive plan mapped four potential railroad trails leading in different directions from Hagerstown, one north to the PA line, one east through Smithsburg before turning north to PA, one south connecting with the Weverton-Roxbury Rail, and one west to Williamsport and the Potomac River. There are potential or existing connectors to these trails around the Hagerstown Growth Area. The Maryland Greenways Commission mapped a proposed water trail following Antietam Creek, ending at the Weverton-Roxbury Rail. The County showed this proposed greenway extending into Hagerstown and also branching into Beaver Creek and Black Rock Creek. The Washington County *Draft Land Preservation and Recreation Plan* recommends creating park for recreation and open space next to Schafer Park in Boonsboro.

The following information is summarized from the document *Rural Legacy FY 2003: Applications and State Agency Review*. Generally the intent of the Rural Legacy Program is to focus preservation efforts around historic and scenic roads, develop greenbelts, and add to large areas of already-protected lands. Rural Legacy areas are in the southern-most section of the County, encompassing the watersheds Potomac River, Antietam Creek, and a small part of Marsh Run. This area is approximately 37,500 acres, including over 6,000 acres of prime farmland, and is mostly undeveloped (91%). This area was chosen in order to protect properties around Antietam National Battlefield, South Mountain, and Red Hill. In addition to protecting Antietam National Battlefield, it is also intended to preserve the agricultural economy and preserve the natural resources including prime farmland, sensitive areas, endangered species, historic properties, and viewsheds. The goal of the sponsor (the Board of County Commissioners of Washington County) is to protect roughly 21,330 acres (57%) from development. A total of 12,580 acres have already been protected through various methods, with roughly 75% being protected as agriculture and 25% being protected as forest. When preserving the land, emphasis has been placed on protecting the stream buffers, including creating 50-100 foot buffers on Potomac River tributaries, and protecting important species. This Rural Legacy document provides a list of property owners within the Rural Legacy area who are interested in putting their land into an easement, all located within the Eastern portion of the area, and the priority of acquiring these easements. Since funds through the Rural Legacy Program are not adequate enough to support all of these requests, sites ranked as high priority may be potential protection sites for other programs.

There are several Nontidal Wetlands of Special State Concern. Site descriptions are based on the 2003 WSSC document:

- *Quirauk Mountain Stream*. This site is located along High Rock Road. It has a “unique combination of acidic woodland ravine and ephemeral stream” that is habitat for a species in need of conservation. There are also vernal seepage areas and an uncommon species outside of the boundary. The site is surrounded by the Appalachian Trail, other trails, and old logging roads. Main threats include alteration of hydrology and pollution. Non-native plant species should be monitored and controlled. No development or logging should be allowed within the wetlands buffer. Although adjacent trail use is not currently impacting the sensitive habitat, future impacts should be monitored. The wetland is protected by South Mountain Natural Environmental Area.
- *Little Antietam Creek*. This site is located along Little Antietam Creek near Smithsburg Pike and is surrounded by agriculture. It contains a highly rare fish species requiring good water quality. Major threats include degradation of the water quality from runoff (e.g. from the road crossing, surrounding agriculture, or upstream sources). The wetland buffer should be protected from logging, agriculture, and development. The forested buffer should be increased. This site is currently unprotected.
- *Beaver Creek Headwaters*. This site is located along Beaver Creek, near Smithsburg, and is protected by South Mountain Natural Environmental Area. In 2002, DNR proposed that this wetland be removed from the list of WSSC.

- *Beaver Creek*. This site is located along Beaver Creek, near I-70. This is a relatively pristine healthy spring feeding into Beaver Creek. The site itself is within the State-owned A.M. Powell Hatchery Fish Management Area, and the water is partly used for that operation. The site contains three State-designated RTE or “watch list” species, including one species that is also globally rare. Two of the species are dependent upon the high amount of organic debris in the system. The spring is surrounded by steeply vegetated slopes, lawn, rip-rap, and a cement wall. Main threats include changes to the hydrology and increases in pollution. There are some non-native plant species present (e.g. watercress), which should be monitored.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along waterways.
- Restore wetlands designed to improve water quality entering Antietam Creek.
- Small potential wetland restoration or mitigation sites within Greenbrier State Park.
- The Antietam Creek Targeted Watershed Project: BMPs to reduce agricultural erosion and nutrient runoff, (e.g. riparian buffers, stream fencing, and animal waste management), with some focus to preserving/increasing stream buffers in the Beaver Creek watershed.
- The Beaver Creek Initiative aims at identifying, prioritizing, and implementing stream restoration opportunities for the Beaver Creek watershed. Important issues include reduction of soil erosion, improving water quality, and education on rural and urban natural resources.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect WSSC and buffers.
- Protect portions of Green Infrastructure that are not currently protected.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.
- Protect wetlands that provide water quality improvement functions to Antietam Creek.
- Protect land within the designated Rural Legacy Area.
- Protect Edgemont and Smithsburg Reservoir Watersheds, Appalachian Trail Corridor, and Upper Beaver Creek Basin and Beaver Creek Trout Hatchery as “sensitive areas.”
- Protect stream corridors, especially around Hagerstown Growth Area, Marsh Run, Hamilton Run, and Antietam Creek (Washington County, 2003 draft
- Protect land around Pen Mar Park and the Appalachian Trail and connecting Kirk Woods with Widmyer Park.

Marsh Run (02140503)

Background

There are 13,445 land acres in this watershed. Over half is agriculture (58%), a quarter is urban (23%), and a fifth is forest (20%) (MDP, 2002). This is one of the highest three watersheds in the County for urban cover and one of the lowest three for forest cover. It also has the highest percentage agriculture of any Washington County watersheds. The City of Hagerstown is partially in the northern section of this watershed. This watershed is completely within the Hagerstown Valley Province. St. James Run is the main tributary.

This entire watershed is underlain by carbonate rock. These carbonate areas are important because they have a potential for sinkhole formation and groundwater contamination. Designs for wetland restoration/creation in these areas should take this into account.

Estimates of wetland acreage for the entire watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Aquatic bed: <1 acres
 - Emergent: 18 acres
 - Scrub shrub: 3 acres
 - Forested: 5 acres
 - Unconsolidated bottom: 19 acres
 - Unconsolidated shore: <1 acres
 - Farmed: 2 acres
- Total: 47 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. Based on data for the time period of January 1, 1991 through December 31, 2004, for this watershed, there has been a slight loss in wetlands (Walbeck, 2005).

Basin code	Permanent Impacts	Permittee Mitigation	Programmatic Gains	Other Gains	Net Change
02140503	-0.11	0	0	0	-0.11

Code of Maryland Regulations Designated Use

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. Potomac River tributaries in this watershed are designated Use I-P, water contact recreation, protection of aquatic life, and public water supply.

There is a MDE-designated wellhead protection area for St. James School.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as Category 1, a watershed not meeting clean water and other natural resource goals and therefore needing restoration. It was also classified as Category 3, a pristine or sensitive watershed that needs protection. Failing indicators included high phosphorus, high percent unforested stream buffer (81%), and high soil erodibility (0.29). Indicators suggesting need for preservation included a high imperiled aquatic species indicator and a high number of wetland-dependent species.

According to the 2002 Maryland Section 305(b) Water Quality Report, wadeable streams (stream order ≤ 4) fail to support all designated uses due to a poor biological community.

The 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Marsh Run* (021405030185); poor biological community.

MBSS samples found BIBI ranging from fair to very poor and FIBI ranging from fair to poor.

Restoration/Preservation

Protected land includes some small County properties and numerous agricultural easements. There is no designated Green Infrastructure within this watershed (DNR, 2000-2003).

The following information is summarized from the document *Rural Legacy FY 2003: Applications and State Agency Review*. Generally the intent of the Rural Legacy Program is to focus preservation efforts around historic and scenic roads, develop greenbelts, and add to large areas of already-protected lands. Rural Legacy areas are in the southern-most section of the County, encompassing the watersheds Potomac River, Antietam Creek, and a small part of Marsh Run. This area is approximately 37,500 acres, including over 6,000 acres of prime farmland, and is mostly undeveloped (91%). This area was chosen in order to protect properties around Antietam National Battlefield, South Mountain, and Red Hill. In addition to protecting Antietam National Battlefield, it is also intended to preserve the agricultural economy and preserve the natural resources including prime farmland, sensitive areas, endangered species, historic properties, and viewsheds. The goal of the sponsor (the Board of County Commissioners of Washington County) is to protect roughly 21,330 acres (57%) from development. A total of 12,580 acres have already been protected through various methods, with roughly 75% being protected as agriculture and 25% being protected as forest. When preserving the land, emphasis has been placed on protecting the stream buffers, including creating 50-100 foot buffers on Potomac River tributaries, and protecting important species. This Rural Legacy document provides a list of property owners within the Rural Legacy area who are interested in putting their land into an easement, all located within the Eastern portion of the area, and the priority of acquiring these easements. Since funds through the Rural Legacy Program

are not adequate enough to support all of these requests, sites ranked as high priority may be potential protection sites for other programs.

Washington County government recommends acquiring land for parks and greenways in the Hagerstown area (Washington County, 2003).

There are no Nontidal Wetlands of Special State Concern within this watershed.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect land within the designated Rural Legacy Area.

Conococheague Creek (02140504)

Background

There are 41,263 land acres within this watershed. Over half is agriculture (55%), a fourth is urban (25%) and a fifth is forest (20%) (MDP, 2002). This is one of the highest three watersheds in the County for urban cover and one of the lowest three for forest cover. Urban area is high because a small portion of the City of Hagerstown is in the eastern part of the watershed and Williamsport is in the south. This watershed is in the Hagerstown Valley Province. Conococheague Creek is 80 miles total, with 22 miles in Maryland and the remaining portion in Pennsylvania. Main Maryland tributaries include: Meadow Brook and Rockdale Run. It has a moderate streambed gradient and a rocky bottom.

Roughly two-thirds of this watershed is underlain by carbonate rock, with the main exception being in the central watershed around Conococheague Creek. These carbonate areas are important because they have a potential for sinkhole formation and groundwater contamination.

Designs for wetland restoration/creation in these areas should take this into account.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Aquatic bed: 2 acres
 - Emergent: 21 acres
 - Scrub shrub: 7 acres
 - Forested: 146 acres
 - Unconsolidated bottom: 53 acres
- Riverine unconsolidated shore: <1 acres
- Total: 230 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. Based on data for the time period of January 1, 1991 through December 31, 2004, for this watershed, there has been a slight loss in wetlands (Walbeck, 2005).

Basin code	Permanent Impacts	Permittee Mitigation	Programmatic Gains	Other Gains	Net Change
02140504	-1.11	0.97	0	0	-0.14

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. Conococheague Creek and all tributaries were designated Use IV-P, recreational trout waters and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as “Priority” Category 1, a watershed not meeting clean water and other natural resource goals and therefore needing restoration. Since it is a “Priority” watershed, this watershed was selected as being most in need of restoration within the next two years since it failed to meet at least half of the goals. It was also classified as Category 3, a pristine or sensitive watershed that needs protection. Failing indicators included high nitrogen and phosphorus, poor benthic index of biotic integrity, high percent unforested stream buffer (81%), high soil erodibility (0.28), and being on the 303d List for impaired water quality. Indicators suggesting need for preservation included a high number of wetland-dependent species and one fish hatchery water supply.

According to the 2002 Maryland Section 305(b) Water Quality Report, Conococheague Creek fails to support all designated uses due to bacteria from agricultural runoff, natural, and upstream sources. Wadeable streams (stream order ≤ 4) fully support all designated uses for some of the tributaries.

The 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Conococheague Creek*; fecal coliform, high pH, and suspended sediments.
- *Conococheague Creek Unnamed Tributary* (021405040177); poor biological community.
- *Conococheague Creek Unnamed Tributary* (021405040178); poor biological community.
- *Rush Run* (021405040181); poor biological community.
- *Troupe Run* (021405040181); poor biological community.
- *Meadow Branch* (021405040180); poor biological community.

A TMDL was conducted for Biochemical Oxygen Demand (BOD) in Conococheague Creek in 2000. For Use IV-P waterways, dissolved oxygen must remain above 5.0 mg/l. Measured dissolved oxygen (DO) levels were above 5.0 mg/l, but future increases in

BOD (CBOD and NBOD) could reduce DO levels below this threshold. Sources of this BOD include point (mainly Conococheague WWTP, with smaller amounts from Broadfording Brethren Church WWTP and Resh Road Sanitary Landfill) and nonpoint sources in Maryland and Pennsylvania.

Based on the draft document entitled *Upper Potomac: Draft Basin Overview May 2003*, the Maryland Biological Stream Survey ranked the mean combined index of biotic integrity as “very poor.” This biological index score ranked this watershed as the lowest compared to all 8-digit watersheds in the Upper Potomac basin, a basin containing Allegany, Washington, and portions of Frederick, Garrett, and Carroll Counties. This low score was attributed to impacts from agriculture. Recommendations include increasing riparian buffers and limiting livestock access to streams.

MBSS found FIBI of fair to poor and BIBI of good to fair.

Restoration/Preservation

Protected lands include some County-owned properties, Maryland Environmental Trust Easements, and several agricultural easements. This watershed has relatively little Green Infrastructure (DNR, 2000-2003). There is a small portion of the large Indian Springs hub in the west and a corridor along Conococheague Creek. Very little of this GI land is protected. The corridor along Conococheague Creek contains many GI “gaps” that may be ideal locations for restoration to natural vegetation. According to the Maryland Greenways Commission, there is a proposed water trail along Conococheague Creek. The County comprehensive plan shows this trail as extending all the way to Pennsylvania. The County also mapped a potential rail trail leading from Williamsport to Hagerstown.

Washington County government recommends acquiring land for parks and greenways in the Hagerstown area (Washington County, 2003).

There are no Nontidal Wetlands of Special State Concern within this watershed, but there is one potential WSSC, located north of Williamsport (unprotected).

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along Conococheague Creek and other waterways.
- Restore wetlands designed to improve water quality in Conococheague Creek.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect portions of Green Infrastructure that are not currently protected, especially along Conococheague Creek and large GI hubs.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.
- Protect wetlands that provide water quality improvement functions in Conococheague Creek.

Little Conococheague Creek (02140505)

Background

This watershed has roughly 10,684 land acres, including half agriculture (48%), slightly less forest (41%), and a smaller amount urban (11%) (MDP, 2002). The eastern part of this watershed is in the Hagerstown Valley Province and the western part is in the Ridge and Valley Province. There are steep slopes along Little Conococheague Creek (Washington County, 2002).

The southeastern half of this watershed is underlain by carbonate rock. These carbonate areas are important because they have a potential for sinkhole formation and groundwater contamination. Designs for wetland restoration/creation in these areas should take this into account.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Emergent: 7 acres
 - Forested: 5 acres
 - Unconsolidated bottom: 8 acres
 - Farmed: <1 acres
- Total: 20 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. For the time period of January 1, 1991 through December 31, 2004, there has been no regulated activity in this watershed (Walbeck, 2005).

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. Potomac River tributaries in this watershed are designated Use I-P, water contact recreation, protection of aquatic life, and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as Category 1, a watershed not meeting clean water and other natural resource goals and therefore needing restoration. It was also classified as Category 3, a pristine or sensitive watershed that needs protection. Failing indicators included high phosphorus, high percent unforested stream buffer (63%), and high soil erodibility (0.30). Indicators suggesting need for preservation included a high imperiled aquatic species indicator, a high number of wetland-dependent species and a high percent of headwater streams occurring in Interior Forest (27%).

According to the 2002 Maryland Section 305(b) Water Quality Report, the wadeable streams (stream order ≤ 4) of Little Conococheague Creek fully supports all designated uses for half of the stream miles.

The 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Little Conococheague Creek* (021405050176); poor biological community.

MBSS found FIBI of good to fair and BIBI of good to very poor. The very poor site was found on Little Conococheague Creek, just below the dam.

Restoration/Preservation

Part of the large Indian Springs Green Infrastructure hub is north of Clear Spring (DNR, 2000-2003). There is also a corridor connecting this hub with the Potomac River. The hub is partially protected by Indian Springs WMA, but the hub still has large unprotected areas and the corridor is completely unprotected. The Maryland Greenways Commission designated this hub as part of the existing Indian Springs Greenway. The County comprehensive plan mapped a proposed greenway along Little Conococheague Creek.

There are no Nontidal Wetlands of Special State Concern in this watershed. Protected lands include Indian Springs Wildlife Management Area in the northwestern portion and several agricultural easements in the east.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along waterways.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect portions of Green Infrastructure that are not currently protected, especially along the Little Conococheague Creek and the large GI hub in the northern portion of the watershed.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.

Licking Creek (02140506)

Background

This watershed has roughly 17,667 acres. The majority is forest (79%), with smaller amounts of agriculture (18%) and urban (4%) (MDP, 2002). This is one of the three lowest watersheds in the County for urban cover and one of the highest three for forest cover. Forest acreage is so high mainly because Indian Springs Wildlife Management

Area is in this watershed. This watershed is in the Ridge and Valley Province. Main tributaries include Lanes Run and Rattle Run.

There are steep slopes along Licking Creek (Washington County, 2002).

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Aquatic bed: <1 acres
 - Emergent: 4 acres
 - Forested: 12 acres
 - Unconsolidated bottom: 27 acres
- Riverine unconsolidated shore: 2 acres
- Total: 45 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. For the time period of January 1, 1991 through December 31, 2004, there has been no regulated activity in this watershed (Walbeck, 2005).

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. Licking Creek and all tributaries are designated Use IV-P, recreational trout waters and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as Category 3, a pristine or sensitive watershed that needs protection. Indicators suggesting need for preservation included five trout spawning areas, a high percent of headwater streams occurring in Interior Forest (48%), and a high percent of the watershed that is forested (80%).

According to the 2002 Maryland Section 305(b) Water Quality Report, Licking Creek fully supports all designated uses. Portions of the wadeable streams (stream order < 4) do not support all designated uses due to a poor biological community from acid deposition leading to low pH .

The 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Rabble Run* (021405060171); poor biological community.

The one MBSS sample taken in this watershed found FIBI of very poor and BIBI of poor.

Restoration/Preservation

At least half of this watershed is designated as Green Infrastructure, with a good portion being protected by Indian Springs WMA (DNR, 2000-2003). Large unprotected areas still remain around Indian Spring WMA. According to the Maryland Greenways Commission, there are three designated existing or potential greenways within this watershed:

- *Indian Springs Greenway.*
- *Western Maryland Rail Trail.*
- *Licking Creek Greenway.* This is a proposed recreational greenway that would connect Camp Harding County Park and the Western Maryland Rail Trail.

There are no Nontidal Wetlands of Special State Concern in this watershed, but two potential WSSCs are located within and near Indian Springs WMA. Protected lands include Indian Springs Wildlife Management Area, a few agricultural easements, and a County-owned property.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along waterways.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect portions of Green Infrastructure that are not currently protected, especially along the waterways and within large GI hubs.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.

Tonoloway Creek (02140507)

Background

This watershed has roughly 1,320 land acres and is the smallest watershed in the County. Forest dominates (65%), followed by agriculture (19%) and urban (16%) (MDP, 2002). The western portion of this watershed contains the city of Hancock. There is also a municipal landfill. This watershed is in the Ridge and Valley Province.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Aquatic bed: 1 acre
 - Unconsolidated bottom: 11 acres
- Riverine unconsolidated shore: <1 acres
- Total: 13 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. Based on data for the time period of January 1, 1991 through

Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland.
May 18, 2006 - Maryland Department of the Environment

December 31, 2004, for this watershed, there has been a slight loss in wetlands (Walbeck, 2005).

Basin code	Permanent Impacts	Permittee Mitigation	Programmatic Gains	Other Gains	Net Change
02140507	-0.03	0	1.00	0	-0.03

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. Tonoloway Creek and all tributaries are designated Use IV-P, recreational trout waters and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as Category 1, a watershed not meeting clean water and other natural resource goals and therefore needing restoration. It was also classified as “Selected” Category 3, a pristine or sensitive watershed that needs the most protection. Failing indicators included high nitrogen and phosphorus. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, a high number of wetland-dependent species, a high percent of headwater streams occurring in Interior Forest (45%), and a high percent of the watershed that is forested (71%). This is not on the 303(d) List for impaired waters.

No waterway within this watershed is on The 2004 303(d) List.

Restoration/Preservation

There is no designated Green Infrastructure within this watershed (DNR, 2000-2003). The Maryland Greenways Commission designated the Western Maryland Rail Trail as a recreational greenway.

There are no Nontidal Wetlands of Special State Concern or protected lands in this watershed.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.

Potomac River (02140508) Hancock to North Branch

Background

There are roughly 11,131 land acres. Forest is the most dominant (79%), with a relatively small amount of agriculture (18%) and urban (3%) (MDP 2002). This is one of the lowest watershed for urban cover and highest for forest cover. There is also a 32.2 acres Blairs Valley Lake.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Aquatic bed: 2 acres
 - Emergent: 5 acres
 - Scrub shrub: 7 acres
 - Forested: 23 acres
 - Unconsolidated bottom: 96 acres
- Riverine unconsolidated shore: 50 acres
- Total: 182 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. For the time period of January 1, 1991 through December 31, 2004, there has been no regulated activity in this watershed (Walbeck, 2005).

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. The Potomac River and tributaries within this watershed are designated Use I-P, water contact recreation, protection of aquatic life, and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed Category 3, a pristine or sensitive watershed that needs protection. Indicators suggesting need for preservation included a high percent of headwater streams occurring in Interior Forest (63%), a high percent of the watershed that is forested (91%), and 2,217 State-designated Wildland Acres.

According to the 2002 Maryland Section 305(b) Water Quality Report, the Potomac River fails to support all designated uses due to low pH and low oxygen from natural and upstream sources. A portion of the wadeable streams (stream order ≤ 4) does support all designated uses.

The 2004 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Long Hollow* (021405080120 - in Washington County); poor biological community. TMDL development is a medium priority.

MBSS samples found FIBI of poor (only one sample taken) and BIBI of good and fair.

Restoration/Preservation

The document entitled: *The Western Maryland Rail Trail Study and Master Plan 1993* describes the Western Maryland Rail Trail as being located along the upper limits of the Potomac River floodplain, with 46% of the trail located on the 100-year FEMA floodplain and/or floodway. This trail starts just west of Fort Frederick State Park and continues, parallel to the Potomac River and the C&O Canal, past Hancock, to Tonoloway Ridge (east of Sideling Hill). Two waterways, Tonoloway Creek and Licking Creek, pass under the trail. Since some sections of the trail are fairly wet and this area could potentially buffer the C&O Canal and the Potomac River, this property may provide opportunities for restoration or mitigation. Also in this property are the popular fishing spots Big Pool and Little Pool. Although a species survey of this specific corridor has not been conducted, there are many rare threatened and endangered species in the area. This trail is near sensitive areas at Roundtop.

The streams and cave pools of Roundtop Hill contain interesting rare and endangered cave-species (Western MD Rail Trail, 1993). Although Roundtop Hill is protected by DNR, management to reduce disturbance should include restricting public access.

The largest State-owned protected lands in this area are Woodmont Natural Resource Management Area and Sideling Hill Wildlife Management Area. There is also the C&O Canal National Historical Park along the Potomac River and two other small State-owned properties.

Much of this watershed is designated Green Infrastructure hub (DNR, 2000-2003) and is protected Sideling Hill WMA, Woodmont NRMA, and Roundtop NHCP. Large unprotected areas still exist north and east of Woodmont NRMA and along the Potomac River. There are a few GI “gaps” along the Potomac that may be desirable sites for restoration to natural vegetation. According to the Maryland Greenways Commission, there are three designated existing greenways within this watershed:

- *Sidling Hill Creek* (connecting Sideling Hill WMA).
- *Western Maryland Rail Trail* paralleling the C&O canal (from Big Pool to the southern edge of Tonoloway Ridge).
- *C&O Canal National Historical Park*.

There are no Nontidal Wetlands of Special State Concern in this watershed.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along waterways.
- The Western Maryland Rail Trail Plan describes potential wetland restoration/creation along wet sections of the trail, that could buffer the C&O Canal and the Potomac River.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect portions of Green Infrastructure that are not currently protected, especially along waterways and within large GI hubs.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.

Little Tonoloway Creek (02140509)

Background

There are roughly 9,833 land acres. Forest dominates (67%), followed by agriculture (24%), and urban (8%) (MDP 2002). This watershed is completely within the Ridge and Valley Province. The Little Tonoloway Creek flows through Hancock before entering the Potomac River.

There are steep slopes along Little Tonoloway Creek (Washington County, 2002).

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Emergent: 3 acres
 - Scrub shrub: 1 acres
 - Forested: 1 acres
 - Unconsolidated bottom: 52 acres
 - Unconsolidated shore: 1 acre
- Total: 58 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. For the time period of January 1, 1991 through December 31, 2004, there has been no regulated activity in this watershed (Walbeck, 2005).

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. Potomac River tributaries in this watershed are designated Use I-P, water contact recreation, protection of aquatic life, and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as Category 3, a pristine or sensitive watershed that needs protection. Indicators suggesting need for preservation included a high percent of headwater streams occurring in Interior Forest (26%) and a high percent of the watershed that is forested (69%).

According to the 2002 Maryland Section 305(b) Water Quality Report, the wadeable streams (stream order ≤ 4) fail to support all designated uses due to a poor biological community.

The 2004 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Little Tonoloway Creek* (021405090153); poor biological community.
- *Little Tonoloway Creek Unnamed Tributary* (021405090154); poor biological community.
- *Little Tonoloway Creek Unnamed Tributary* (021405090153); poor biological community.
- *Munson Spring Branch* (021405090153); poor biological community.
- *Sawmill Hollow* (021405090153); poor biological community.

MBSS found BIBI ranging from good to very poor, with worse samples generally in the western portion (furthest from Hancock). FIBI ranged from fair to very poor.

Restoration/Preservation

Protected land includes the Woodmont Natural Resource Management Area and small County-owned properties in Hancock. There is some land designated Green Infrastructure hub in the western half of the watershed (DNR, 2000-2003). A small amount of this is protected by the Woodmont NRMA, but the rest is unprotected. The Maryland Greenways Commission designated the Western Maryland Rail Trail (from Big Pool to Tonoloway) as a recreation greenway.

There are no Nontidal Wetlands of Special State Concern in the watershed.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along waterways.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect portions of Green Infrastructure that are not currently protected, especially along waterways and larger GI hubs.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.

Sideling Hill Creek (02140510)

Background

There are roughly 5,292 land acres. The majority is forested (88%), with a relatively small amount of agriculture (10%) and urban (1%) (MDP, 2002). This is the lowest watershed for urban and agricultural cover and highest for forest cover. This watershed is completely within the Ridge and Valley Province.

The entire watershed drains 66,682 acres of land, with roughly three-quarters of this in Pennsylvania. Land use for the overall watershed is similar to that in the Allegheny portion: forest (75%), agriculture (23%), and development (2%). Pennsylvania Department of Natural Protection classifies this as an “Exceptional Value” stream (Western PA Conservancy). Some of this watershed is in Allegheny County. For detailed information on the watershed portion within Allegheny, refer to that individual County description.

There are 37 plant and animal species of special concern within this watershed (including the Pennsylvania portion) Some important species include: Tennessee pondweed, semi-aquatic harperella, golden club, a type of freshwater sponge, a rare tiger beetle, a rare fish species, and four rare mussel species (Western PA Conservancy). The shale barrens located within this watershed provide upland habitat for many rare species adapted to these special dry rocky conditions.

There are steep slopes along Sideling Hill Creek (Washington County, 2002).

There are two State-designated Natural Heritage Areas adjacent to Sideling Hill Creek. To get this designation, an area must 1) Contain species considered to be threatened, endangered, or in need of conservation; 2) Have unique geology, hydrology, climate or biology; and 3) Be among the best Statewide examples. These two areas are protected by the State. There is one area in the County that is part of the Maryland Wildland Preservation System: the 922-acre Sideling Hill Wildland (partly in Allegheny County). To be in this program, the Maryland General Assembly must designate the area as a Wildland, land that has retained its wilderness character, and it must be owned by DNR.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:

- Palustrine
 - Emergent: <1 acre
 - Forested: 16 acres
 - Unconsolidated bottom: 7 acres
 - Unconsolidated shore: <1 acre
- Riverine unconsolidated shore: 14 acres
- Total: 38 acres

MDE tracks all regulated nontidal wetland activity in Maryland, including regulated wetland impacts and gains. For the time period of January 1, 1991 through December 31, 2004, there has been no regulated activity in this watershed (Walbeck, 2005).

Code of Maryland Regulations

All Maryland stream segments are given a “designated use” in the code of Maryland Regulations (COMAR) 26.08.02.08. Sideling Hill Creek and all tributaries are designated Use IV-P, recreational trout waters and public water supply.

Water Quality

The 1998 Clean Water Action Plan classified this watershed as a “Selected” Category 3, a pristine or sensitive watershed that needs the most protection. Although this watershed was not classified as a Category 1, a watershed in need of restoration, failing indicators included a poor benthic index of biotic integrity. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, high percent of headwater streams occurring in Interior Forest (48%), a high percent of the watershed that is forested (79%), and 964 State-designated Wildland Acres.

According to the 2002 Maryland Section 305(b) Water Quality Report, Sideling Hill Creek fully supports all designated uses. A portion of the wadeable streams (stream order ≤ 4) fails to fully support all designated uses due to a poor biological community from changes in hydrology and acid deposition causing low pH.

The 2004 303(d) List contains basins and subbasins that have measured water quality impairment and may require a TMDL. The basin/subbasin name, subbasin number (if applicable), and type of impairment are as follows:

- *Unnamed tributary to Sidling Hill Creek* (021405100152 – in Washington County); poor biological community. TMDL development is a medium priority.
- *Bear Creek* (021405100152 – in Washington County); poor biological community. TMDL development is a medium priority.

MBSS found FIBI of fair to good and BIBI of good to fair (with worse reading just below I-68 and north of I-68).

The following information was summarized from the document entitled *Sideling Hill Creek: A Profile of Watershed Health*. The Ridge and Valley Streamkeepers (RVS) collected water quality data from the entire watershed and found that pH ranged from 5.0 to 6.5, dissolved oxygen was generally good, nitrates were generally low (<1.0 mg/L), and turbidity was generally low. Based on macroinvertebrate presence, the Stream Waders Program rated the Maryland stream portion as “good” to “fair,” with only 7% of the sites being rated as “poor.” The Western Pennsylvania Conservancy (WPC) rated the freshwater mussel population in the Pennsylvania portion of the watershed to be in fair to poor condition. The Indiana University of Pennsylvania (funded by Wild Resource Conservation Fund), found that in the Pennsylvania portion of the watershed, the amphibian populations are generally healthy. The Northern hog sucker, a fish fairly sensitive to habitat disturbance, are thought to be in good condition in this watershed. The breeding bird atlas project found that the Louisiana waterthrush, a bird sensitive to impacts in the aquatic and surrounding forested habitat, has a healthy population in both the Maryland and Pennsylvania portions of this watershed. These results show good overall health, with some room for improvement. Some current issues and threats to the

watershed include some areas within the watershed having inadequate riparian buffer, illegal dumping, and development.

Restoration/Preservation

This watershed is covered in Green Infrastructure, much of which is protected by Sidling Hill WMA, Lillie-Aaron Strauss Boy Scout Camp, Woodmont NRMA, and TNC (Sidling Hill Creek Preserve). There are still large parcels along Sidling Hill Creek (around I-68) that are unprotected. These should be top priority for protection. According to the Maryland Greenways Commission, an existing ecological greenway is within Sideling Hill WMA. There is also a proposed extension to the current greenway along Sideling Hill Creek, which may provide possible restoration/preservation opportunities.

Sideling Hill Creek is a designated Nontidal Wetland of Special State Concern (WSSC). The following information is based on the 2003 DNR WSSC document. This is one of Maryland most pristine systems. The wetland contains 29 RTE or uncommon species, including one federally endangered plant species. Two important communities are found within this system, both on alluvial soils: basic mesic forest and montane alluvial forest. Other significant communities include a healthy aquatic system and scour/deposition bars. The wetland is surrounding by other rare habitats (e.g. shale barrens), containing over 50 RTE species in all. The creek itself has 41 fish species. Main threats include sedimentation (from dirt roads and agriculture), non-native plant invasion, and excessive deer browse. Even the occasional recreational use (e.g. camping, fishing, etc.) has some negative impacts to the site since some areas are very vulnerable. Road salt and runoff may also pollute the sensitive system. No development, logging, or agriculture should be allowed within the buffer. All development should utilize BMPs. It is recommended that all unprotected parcels be purchased by a conservation group or get a conservation easement established.

The Nature Conservancy considers Sideling Creek area as a high priority for preservation. It is partially protected by Sideling Hill Wildlife Management Area, Lillian Aaron Straus Boy Scout Camp, and the Nature Conservancy. Areas that are unprotected include west of the Boy Scout Camp, around Interstate 68, and near the Pennsylvania border. These remaining areas should be preserved. Other protected lands in the watershed include Woodmont Natural Resource Management Area and an agricultural easement.

Specific recommendations for restoration:

- Restore wetlands and streams within the headwaters.
- Restore “gaps” in the Green Infrastructure network to natural vegetation, especially along Sideling Hill Creek area.

Specific recommendations for protection:

- Protect wetlands and streams within the headwaters.
- Protect Sideling Creek WSSC and buffer.

Prioritizing Sites for Wetland Restoration, Mitigation, and Preservation in Maryland.
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- Protect portions of Green Infrastructure that are not currently protected, especially along Sideling Hill Creek.
- Protect additional DNR-designated Ecologically Significant Areas containing wetlands that are not already protected.