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Background

Allegany County is approximately 426 square miles or 272,460 acres (Allegany County, 2001). It is roughly 40 miles wide (east to west) but only 5-20 miles long (north to south). In 2000, the population of Allegany County included 74,930 people (U.S. Census Bureau). Most of the population is located near Cumberland or in Frostburg/Georges Creek/Keyser Area (Allegany County, 2001). In 2020, the population is predicted to be 71,450, a decrease of nearly 5%. Allegany County borders Washington County to the east, Garrett County to the west, Pennsylvania to the north, and West Virginia to the south.

Much of the following background information is based on the *Allegany County Comprehensive Plan*. The majority of the County lies within the folded Appalachian Mountains section of the Ridge and Valley Province. The far western part of the County, along the Garrett County line, is in the Allegheny Mountains section of the Appalachian Plateaus Province. A small amount of limestone is present in the center of the County, but does not create a high risk for sinkhole formation (http://www.mgs.md.gov/esic/fs/fs11.html). Minerals of interest include primarily coal, sandstone, and limestone. Other extractables include sand, gravel, shale, and natural gas. Impacts from the mining activities (e.g. acid mine drainage) present opportunities for wetland and stream restoration. Wetlands may also be created on old mine sites, although the quality of these wetlands may be greatly reduced.

There are three major sources of public drinking water for County residents, one in Pennsylvania and two in Garrett County (impoundments on Piney Creek and Savage River). Wells and springs are utilized for fairly rural development, but do not have the potential to provide large quantities of water. The most pervious aquifer recharge areas occur in the middle of the County (Allegany County, 2001). There are currently no State-designated wellhead protection areas.

Greater than 50% of the land has slopes exceeding 25%. Land with slopes from 0-8% is only present in 20% of the County. This means that urban, agriculture, streams, and floodplains must compete for and share this relatively small amount of land (Allegany

County, 2001). In order to preserve agriculture in the County, wetland restoration/creation should attempt to avoid areas classified as prime farmland. According to MDP (2002 data), the majority of the land is forest, with small spots of agriculture throughout the County. Developed areas are mainly in the west: Cumberland, Frostburg, and north and south of these cities.

The land all drains into the Potomac River and then into the Chesapeake Bay. There are two State-designated 6-digit watersheds and nine 8-digit watersheds in this County. These are the Upper Potomac River (021405), which includes Potomac River (02140508), Sideling Creek (02140510), Fifteen Mile Creek (02140511), and Town Creek (02140512) and the North Branch Potomac River (021410), which includes Potomac River Lower North Branch (02141001), Evitts Creek (02141002), Wills Creek (02141003), Georges Creek (02141004), and a small portion of Potomac River Upper North Branch (02141005).

Streams

The streams in the Appalachian Plateau are rocky streams with steep gradients or meandering streams along floodplains. Streams in the Ridge and Valley Province have steep gradients in the ridges and more moderate gradients in the valleys.

The Maryland Tributary Strategies document *Maryland Upper Potomac River Final Version for 1985-2002 Data: January 29, 2004* describes the success of BMPs in the Upper Potomac River Watershed (an area containing all of Allegany and Washington, and part of Frederick, Carroll, Montgomery, and Garrett) 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.

The Maryland Tributary Strategies 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,

Cumberland, Celanese, Georges Creek, Upper Potomac River Commission, and Westvaco Corporation-Luke, contributing roughly 35% of the total nitrogen and 37% of the total phosphorus load in the Upper Potomac River basin. Cumberland and Upper Potomac River Commission contributed the most. All tributary stations sampled within Allegany County reported low total nitrogen and these levels had decreased between 1985 and 2002. For these same stations, total phosphorus was fair or good, but there was generally no trend. Total suspended solids were poor to good with generally no trend. Sites with status of poor for suspended solids were Georges Creek (Franklin), Keyser (MD Rte. 220), Pinto, Braddock Run, and Oldtown.

MBSS sampling between 1994 and 1997 of nitrate/nitrites found mostly 0.10-0.99 mg/L, with all samples under 5 mg/L. Highest readings were found around Cumberland.

Wetlands

There are fewer mapped wetlands in Allegany County than in any other County. The wetlands are usually associated with narrow stream valleys.

Wetland Classifications

According to Tiner and Burke (1995), in 1981-1982 there were 617 acres of wetlands (0.1% of the State's total). The wetland types were Palustrine (612 acres) and Riverine (5 acres). Comparisons of this 1981-1982 wetland acreage with historic wetland acreage (based on hydric soils) represents a 92%, or 6,683 acre, loss (MDE, 2002).

The following wetland plant community descriptions are based on Tiner and Burke (1995).

- 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, shagbark hickory, and hemlock.
    - 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.

The document *Wetlands of Maryland's Allegheny Plateau* evaluates 148 wetlands in far western Allegany County and Garrett County. The summary is as follows: Many of the wetland types in this region are unique for Maryland. Examples include bogs and fens of the Greenbrier limestone deposit or wetlands on alluvium. Many of these wetlands also contain rare species. Many wetlands were degraded from past and present impacts including livestock grazing, logging, peat mining, ditching, and impounding. These degraded wetland sites occasionally still contain rare species and may provide flood control, water quality improvements, and habitat for common species. Other wetlands are fairly healthy and should be protected from mining. Most of the wetlands are peatlands. Of these, some sites are acidic and nutrient-poor, with the main water source being the atmosphere. Other sites receive water from groundwater or surface water, are nutrient-rich, and have a pH near neutral (circumneutral pH). The remaining peatland sites have characteristics between these two.

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 to urban sprawl.

The 148 wetlands surveyed were given a rank according to ecological significance. 24 were classified as Extremely Significant, 26 were classified as Highly Significant, 34 were classified as Moderately Significant, and 64 were classified as Other. Some of these wetlands are designated at Nontidal Wetlands of Special State Concern. This document also summarizes factors impacting the wetland and management recommendations. For these reasons, it may be useful to target some Extremely Significant sites for preservation and restore sites that may have lower ecological integrity.

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.

Lack of stormwater management and increased discharges from historic mining has resulted in numerous flood events from moderate storms in Allegany County. 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. There has been an increase in efforts to buy out property owners in repeatedly flooded areas

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 transformation, removal and retention
- Retention of heavy metals
- Retention of suspended sediments from surface waters

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).

Many of the wetlands exhibit bog-like conditions, and are characteristically nutrient poor systems. Addition of nutrients may alter the distinctive plant life adapted to bog habitats. Limited nutrient cycling occurs due to continuously saturated conditions. Retention times in floodplain wetlands may be too limited to allow for highly effective nutrient cycling. However, floodplain wetlands that do flood regular pulses may be most effective and retaining, transforming, and slowly releasing nutrients downstream.

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 Allegany County also aid in providing shade to maintain cool temperatures for aquatic species such as trout.

Nontidal Wetlands of Special State Concern

There are a few State-designated Nontidal Wetlands of Special State Concern (WSSC) scattered throughout the County. These are described in the section for the individual watersheds.

Wetland Restoration Considerations

Hydric soils suggest where wetlands are currently or were historically. There are some hydric soils that are not mapped wetlands (based on NRCS SSURGO GIS data and NWI/DNR wetlands), mostly along waterways. Hydric soils that are not currently wetlands may be good potential sites for wetland restoration.

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 steam 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.

It may be desirable to retore/preserve wetlands as part of a stream valley park system, especially within populated areas. This could provide ecotourism benefits.

Sensitive Resources

Sensitive areas requiring special consideration according to the 1992 Planning Act include: streams and their buffers, 100-year floodplain, threatened and endangered species habitats, and steep slopes. These areas should be preserved, especially outside of the proposed 2020 development areas (Allegany County, 2001). As mentioned in the Comprehensive Plan, a large percentage of the land area has steep slopes. Steep slopes have the potential to yield high amounts of sediment and pollutants to the streams. During times of heavy rainfall, they conduct water very quickly to the streams, resulting in streambank flooding, loss of property, and possible loss of life. Additional sensitive areas, as addressed by the Comprehensive Plan, include:

- *Prime agricultural land*. Limit large-lot development to preserve this land for agriculture. Encourage preserving farmland outside of the proposed development areas through the State Land Preservation Program. Encourage agricultural Best Management Practices (BMPs).
- *Forest*. Preserve forest in areas of steep slopes (especially slopes >25%). Protect productive forest land.
- *Open space*. It is desirable to preserve sensitive areas adjacent to these protected open spaces.
- *Greenways*. It is desirable to purchase land on steep slopes, stream buffers, or floodplains to act as greenways under the Maryland Greenways program. Develop greenways to link urban areas to open spaces.
- *Poor soils*.
- *Public water supplies/Aquifer recharge areas*. Limit development in aquifer recharge areas.

- *Scenic overlooks*. Preserve existing scenic overlooks and develop new overlooks on public land near roads.
- *Wetlands/Caves*. Encourage State purchase of these lands.
- *Historical/archeological sites*.

The 1998 *Allegany County Land Preservation and Recreation Plan* suggests:

- Encouraging wetland and floodplain easements outside of development areas
- Purchasing certain flood-prone land.
- Establishing recreation facility parks in urban areas and sensitive resources oriented parks outside of these areas.
- Developing trails to connect urban areas with open space.

Floodplains

The 100-year floodplain is widest around portions of the Potomac River, but is present in narrower strips along most waterways. There is little developable land: land with slopes <25% and outside of the floodplain. Therefore, wetland restoration is most desirable in the floodplains, land that is undesirable for new development.

Other Relevant Programs

Green Infrastructure and Greenways

Green Infrastructure hubs cover most of the County. Main areas not included in the hubs are around Cumberland and the far western portion of the County, including a north-south corridor from Frostburg to Westernport. Areas within the Green Infrastructure 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 the section on the individual watershed.

Rural Legacy

There are currently no designated Rural Legacy areas within Allegany County.

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, intented 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 several State-designated Natural Heritage Areas (NHA) located in the eastern portion of the County and within DNR-owned land. 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.

Priority Funding Areas

The Priority Funding Areas (PFAs) for this County are focusing development mainly west of Cumberland. There are development corridors running north from Cumberland to Pennsylvania and south from Cumberland along the Maryland/West Virginia border (Rt. 53 and 220). Another smaller development area is running from Frostburg south (along Route 36), nearly to Westernport/Luke.

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

The largest open space is in the eastern part of the County, Green Ridge State Forest. Other large protected lands include: Rocky Gap State Park, Warrior Mountain Wildlife Management Area, Dans Mountain Wildlife Management Area, and the C&O Canal National Historical Park.

Agricultural easements are also present. 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

Allegany County lies in the Upper Potomac River Sub-Basin (021405) and The North Branch Potomac River (021410). Information on the individual basins within these larger sub-basins is as follows:

Potomac River – Hancock to North Branch (02140508)

Background

There are 19,482 land acres in the Allegany County portion of this watershed. Most of this is forest (93%), with the remaining being agriculture (6%) and development (1%) (MDP, 2002). Much of the forest cover is located in Green Ridge State Forest. This watershed is located within the Ridge and Valley Province. The main waterway is the Potomac River.

Outdoor Club Shale Barrens and Kasecamp Shale Barrens are State-designated Natural Heritage Areas. 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. This area is protected by Green Ridge State Forest. The 2034-acre Potomac Bends Wildland is part of the Maryland Wildland Preservation System. To be in this program, the Maryland General Assembly must designate this area as a Wildland, land that 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
    - 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 categorized by Sub-Basin and are given a “designated use” in the Code of Maryland Regulations 26.08.02.08. The Potomac River and 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 did not classify this watershed as a Category 1 or Category 3 watershed, suggesting the watershed is currently in pretty good shape. There

is a high percent of headwater streams occurring in Interior Forest (63%), and 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. There is also a 32.2-acre Blairs Valley Lake located in this watershed.

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.

The Maryland Biological Stream Survey (MBSS) samples found fish index of biotic integrity (FIBI) of very poor and benthic index of biotic integrity (BIBI) of fair to poor.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration. There may be some opportunities along the Potomac River.

Almost all of this watershed is within the Green Infrastructure network (DNR, 2000-2003). A large portion of the Green Infrastructure hub is protected by Green Ridge State Forest and the C&O Canal National Historical Park. There are still some unprotected Green Infrastructure areas along the Potomac River that should be high priority for protection. According to the 2000 Maryland Greenways Commission document, there are several existing greenways including:

- *C&O Canal National Historical Park*. This trail runs from Cumberland east, along the Potomac River.
- *Western Maryland Rail Trail*. This trail runs from Tonoloway to Spring Gap and parallels the C&O Canal.
- *Green Ridge Trail*. This trail runs through Green Ridge State Forest, Belle Grove Management Area, and Billmeyer Wildlife Management Area, connecting the Potomac River to Pennsylvania.

There are two State-designated Nontidal Wetlands of Special State Concern in this watershed and one potential WSSC. Information about the specific sites, as summarized from the document *Far Western Maryland's Nontidal Wetlands of Special State Concern*, is as follows:

- *Potomac Bends Wildland (DNR's name: Bevans Bends Barrens)*. Located east of Paw Paw on the Potomac River, this floodplain forest includes shale barren habitat, native oak and pine forests, and rare species. Although this area is adjacent to the Potomac River, it was not impacted by the C&O Canal since it was bypassed. This area is currently protected by the Green Ridge State Forest and the C&O Canal National Historical Park. Protection of this floodplain area and its buffer should continue.
- *West Fairplay*. Located west of Paw Paw on the Potomac River. This is the buffer for a shale barren habitat, providing wildlife habitat. Both the wetland and the adjacent shale barren are protected by the C&O National Historical Park. Maintaining a wide buffer around this wetland is important.
- *Potential WSSC*. There is a potential WSSC along the Potomac River, south of Green Ridge. It is protected by Green Ridge State Forest.

Existing Recommendations for Restoration:

- Restore "gaps" in Green Infrastructure to natural vegetation.
- Restore wetlands and streams within the headwaters.

Existing Recommendations for Preservation:

- Protection should be highest priority.
- Protect WSSC and buffers.
- Protect headwater stream/wetland complexes and a buffer area.

<u>Sideling Creek (02140510)</u>

Background

There are 8,814 land acres in the Allegany portion of this watershed (the eastern part of the watershed is in Washington County). The majority is forest (74%), over a fifth is agriculture (22%), and a small percentage is developed (4%) (MDP, 2002).

This watershed is completely within the Ridge and Valley Province. The main waterway is Sideling Hill Creek. The entire watershed drains 66,682 acres of land, with 77% of this in Pennsylvania. Land use for the overall watershed (including Pennsylvania) is similar to that found in the Allegany portion: forest (75%), agriculture (23%), and development (2%). Pennsylvania Department of Natural Protection classifies this as an "Exceptional Value" stream (Western Pennsylvania Conservancy). Some of this watershed is in Washington County. For detailed information on the watershed portion within Washington, 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 species of freshwater sponge, a rare tiger beetle, a rare fish species, and four rare mussel species (Western Pennsylvania Conservancy,). The shale barrens are important, providing upland habitat for many rare species adapted to these special dry rocky conditions.

Sideling Hill Creek is a State-designated Natural Heritage Area. To get this designation, an area must contain threatened or endangered species and be the best Statewide example. It is protected by the Sideling Hill WMA. The 922-acre Sideling Hill Wildland (partially located in Washington County) is part of the Maryland Wildland Preservation System. To be in this program, the Maryland General Assembly must designate this area as a Wildland, land that 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 categorized by Sub-Basin and are given a "designated use" in the Code of Maryland Regulations 26.08.02.08. Sideling Hill Creek and 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%), and 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 $\leq$ 4) fails to fully support all designated uses due to a poor biological community due to 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.

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.

MBSS fish IBI and benthic IBI ranged from good to very poor, with the worst benthic IBI samples being just below I-68 and the worst fish IBI being at Belle Grove WMA.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration. There is a fairly large site along Stottlemeyer Road that is not currently mapped wetland.

Most of this watershed is within the Green Infrastructure network (DNR, 2000-2003). Protected Green Infrastructure areas in Allegany County include Green Ridge State Forest, Belle Grove WMA, and The Nature Conservancy properties. Large unprotected portions of the Green Infrastructure remain along Sideling Hill Creek itself. These areas should be high priority for preservation due to the pristine nature of this waterway and the many RTE species that reside there. Important gaps in the Green Infrastructure, currently in agriculture, are along Sideling Hill Creek. These gaps should be restored to natural vegetation. According to the Maryland Greenways Commission, the greenway Green Ridge Trail runs through Green Ridge State Forest, Belle Grove Management

Area, and Billmeyer Wildlife Management Area, connecting the Potomac River to Pennsylvania.

Sideling Hill Creek, named Sideling Hill Creek Macrosite, is a Nontidal Wetlands of Special State Concern. This macrosite includes the high-quality stream and surrounding shale barrens, forests and adjacent habitat. It has the most diverse population of freshwater mussel in the State, 41 fish species, and nine species ranked S1-S3 (plants: four S1, one S3; invertebrates: three S1, one S3). It has globally rare plants, animals and natural communities, and is one of the most pristine in the Potomac River watershed. For these reasons, the Nature Conservancy considers it a high priority for protection. It is partially protected by Sideling Hill Wildlife Management Area, Lillian Aaron Straus Boy Scout Camp, and the Nature Conservancy. Threats include sediment from roads and fords, highway salt, invasion by non-native plants, and residential development within the watershed (Hotopp and DNR, 1998). Currently unprotected areas should be protected.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation, especially along Sideling Hill Creek and tributaries.
- Restore wetlands and streams within the headwaters.

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along Sideling Hill Creek.
- Protect WSSC and buffers.
- Protect additional wetland areas designated as Ecologically Significant Areas.
- Protect headwater stream/wetland complexes and a buffer area.

<u>Fifteen Mile Creek (02140511)</u>

Background

There are 33,147 land acres in this watershed. Most is forest (93%), with the remaining being agriculture (5%) and development (2%) (MDP, 2002). This watershed has one of the top two highest amounts of forest in the County, largely due to the large amount of forested land in Green Ridge State Forest. This watershed is completely within the Ridge and Valley Province. The main waterway is Fifteenmile Creek, with main tributaries including Sulphur Run and Little Pine Lick Hollow.

Kasecamp Shale Barrens is a State-designated Natural Heritage Area. To get this designation, an area must contain threatened or endangered species and be the best Statewide examples. The 1260-acre Deep Run Wildland is part of the Maryland Wildland Preservation System. To be in this program, the Maryland General Assembly must designate this area as a Wildland, land that 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
    - Scrub shrub: <1 acre
    - Forested: 3 acres
    - Unconsolidated bottom: 22 acres
    - Unconsolidated shore: 5 acres
- Total: 31 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 categorized by Sub-Basin and are given a "designated use" in the Code of Maryland Regulations 26.08.02.08. Fifteen Mile Creek and 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. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, high percent of headwater streams occurring in Interior Forest (78%), a high percent of the watershed that is forested (93%), and 1,326 State-designated Wildland Acres.

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

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:

- *Deep Run* (021405110134); poor biological community.
- *White Sulfur Run* (021405110136); poor biological community.
- *Unnamed tributary to FifteenMile Creek* (021405110144); poor biological community. A portion of this waterway has been removed from the 2004 303d list.
- *Terrapin Run* (021405110140); poor biological community.
- *Unnamed tributary to Fifteenmile Creek* (021405110141); poor biological community.

Development of TMDLs for these waterways is a low priority.

MBSS samples found benthic IBI ranging from good to poor, with most being good and fair. Fish IBI ranged from good to very poor. 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 for this watershed as "good." It had healthy fish and invertebrate populations, a high percentage forest land use, a large proportion of riparian buffers, few exotics plant species, and a low amount of stream pollution.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration. Possible sites are along most of the waterways.

This watershed is almost entirely within the Green Infrastructure network (DNR, 2000-2003). A large portion of the Green Infrastructure hub in the south is protected by Green Ridge State Forest. There are some unprotected Green Infrastructure areas in the northern part of the watershed. According to the Maryland Greenways Commission, the greenway Green Ridge Trail runs through Green Ridge State Forest, Belle Grove Management Area, and Billmeyer Wildlife Management Area, connecting the Potomac River to Pennsylvania.

There are two State-designated Nontidal Wetlands of Special State Concern in this watershed. Information about the specific sites, as summarized from the document Far Western Maryland's Nontidal Wetlands of Special State Concern, is as follows:

- *Fifteenmile Creek Macrosite (DNR now combines with Long Pond WSSC)*. This site includes populations of a federally endangered plant species. Threats include sedimentation and erosion caused by the nearby roads, resulting in a destabilized streambed. This site is partially protected by the Green Ridge State Forest. An unprotected section of campground and field are located on the upstream portion.
- *Long Pond*. This site has rare plants, a mature high-quality forested floodplain, flood channel wetland, and adjacent shale barren habitat. Threats include streambank destabilization from the upstream ford, a road, soil compaction and woody debris loss from camping and mountain biking within the area. Protection of this area and its buffer is recommended. This pond is protected by the Green Ridge State Forest.

Existing Recommendations for Restoration:

- Restore "gaps" in Green Infrastructure to natural vegetation.
- Restore wetlands and streams within the headwaters.

Existing Preservation Recommendations:

- Protection should be highest priority.

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect WSSC and buffers.
- Protect additional wetland areas within State-designated Ecologically Significant Areas.
- Protect headwater stream/wetland complexes and a buffer area.

Town Creek (02140512)

Background

This watershed has 43,366 land acres in Maryland (55% of the watershed is in Pennsylvania) (Western Pennsylvania Conservancy). Within the Maryland portion, the majority is forested (78%), roughly a fifth is agriculture (19%), and a small amount is developed (2%) (MDP, 2002). This watershed is dominated by a farming and forestry community (Western Pennsylvania Conservancy). The watershed is completely within the Ridge and Valley Province, and is in the Appalachian Mountain rain shadow. Soils are well-drained and shaley. This watershed originates in Pennsylvania, with the major waterway being Town Creek and main tributaries including Maple Run and Murley Branch. This watershed is environmentally healthier than it was a decade ago (Western Pennsylvania Conservancy).

Maple Run is a State-designated Natural Heritage Area. To get this designation, an area must contain threatened or endangered species and be the best Statewide example. The 2760-acre Maple Run Wildland is part of the Maryland Wildland Preservation System. To be in this program, the Maryland General Assembly must designate this area as a Wildland, land that 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
    - Aquatic bed: <1 acre
    - Emergent: 1 acre
    - Scrub shrub: 2 acres
    - Forested: 3 acres
    - Unconsolidated bottom: 37 acres
- Riverine unconsolidated shore: 14 acres
- Total: 57 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, within this watershed, there has been a small amount of permanent wetland impact (Walbeck, 2005).

Basin code	Permanent Impacts (acres)	Permittee Mitigation (acres)	Programmatic Gains (acres)	Other Gains (acres)	Net Change (acres)
02140512	-0.25	0	0	0	-0.25

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. For this watershed, they are as follows:

- Town Creek tributaries: Use III-P, natural trout waters and public water supply.
- Town Creek: Use IV-P, recreational trout waters and public water supply.

Water Quality

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. This watershed was also a "Selected" Category 3, a pristine or sensitive watershed that needs the most protection. Failed indicators included high soil erodibility (0.28), and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, a high amount of wetland-dependent species, being a water supply for fish hatcheries, a high percent of headwater streams occurring in Interior Forest (57%), a high percent of the watershed that is forested (83%), and 2,766 State-designated Wildland Acres.

According to the *2002 Maryland Section 305(b) Water Quality Report*, the mainstem of Town Creek does fully support all designated uses. A portion of the wadeable tributary to Town Creek (stream order ≤ 4) fails to fully support all designated uses due to a poor biological community from siltation. According to the 2000 305(b) Water Quality Report, the wadeable streams also had low oxygen and altered hydrology.

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:

- *Town Creek*; nutrients and suspended sediments.
- *Town Creek* (021405120128); poor biological community.
- *Town Creek* (021405120129); poor biological community.
- *Town Creek Unnamed tributary 1* (021405120124); poor biological community.
- *Town Creek Unnamed tributary 2* (021405120129); poor biological community.
- *Sawpit Run* (021405120123); poor biological community.
- *Sawpit Run unnamed tributary 1* (021405120123); poor biological community.
- *Maple Run* (021405120127); poor biological community.
- *Sugar Hollow Run* (021405120124); poor biological community.
- *Bear Hollow* (021405120128); poor biological.
- *Burnt House Hollow* (021405120128); poor biological community.

- *Lick Run* (021405120128); poor biological community.
- *Indian Lick* (021405120129); poor biological community.
- *Murley Branch* (021405120130); poor biological community.
- *Murley Branch Unnamed Tributary 1* (021405120130); poor biological community.

Development of TMDLs for these waterways is a low priority.

MBSS samples ranged from good to very poor. For fish IBI, the headwaters had higher rankings than sites closer to the mainstem (which were often ranked very poor). Benthic IBI was ranked higher than fish IBI, with the worst samples being from the very southern portion of the watershed.

The following information is summarized from the document entitled *Town Creek Watershed: A Profile of Watershed Health*. This watershed contains a diverse assemblage of species, including 49 species of special concern. It also provides a high recreational value. Based on data from the Ridge and Valley Streamkeepers, Maryland Department of Natural Resources, and Western Pennsylvania Conservancy, this watershed is generally healthy in terms of dissolved oxygen (with a few exceptions during the severe drought period), pH and alkalinity (with the exception of three sites having pH near or below 5 due and low alkalinity from a lack of buffering capacity from limestone bedrock), turbidity, and nitrate. However, other measured parameters did not rate the streams as healthy. Macroinvertebrate data shows that half of the samples resulted in ratings of "good" and the remaining half resulted in ratings of "fair" or "worse." Mussel data shows that streams are currently dominated by only a few species, with two historical species being absent. The Indiana University of Pennsylvania found that the Pennsylvania portion of the watershed had healthy amphibian populations. The population of Northern hog sucker, a fish indicator species of healthy streams, are fairly healthy. The Breeding Bird Atlas programs in Pennsylvania and Maryland, the North American Breeding Bird Survey, and local residents have reported healthy populations of the indicator species Louisiana waterthrush. Since this species requires healthy aquatic and surrounding forested environments to thrive, it is a good indicator bird of healthy watershed conditions. Overall, this watershed is currently in good health, but is vulnerable to climatic or human impacts.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration. These include: along Sawpit Run, Maple Run, Town Creek, and Amerino Branch.

Most of this watershed is within the Green Infrastructure network (DNR, 2000-2003). Although a large section of the Green Infrastructure area is protected by Green Ridge State Forest, The Nature Conservancy (Selinger Marsh Preserve), a Maryland

Environmental Trust easement, and the County, large unprotected portions of the Green Infrastructure remain.

There are two State-designated Nontidal Wetlands of Special State Concern in this watershed. Information about the specific sites, as summarized from the document *Far Western Maryland's Nontidal Wetlands of Special State Concern*, is as follows:

- *Murley Branch Spring*. This area is dominated by two springs, one containing an uncommon aquatic snail (ranked S3). It also contains a vertebrate species ranked S1. This area occurs on limestone deposits and provides water for a State aquaculture facility. Threats include livestock grazing and dumping of trash into an adjacent sinkhole (concentrating pollution in the recharge areas). Development within limestone areas should be avoided due to increased problems including sewage pollution and drawdown of groundwater. This wetland is not protected.
- *Selinger Marsh*. This site contains a very good population of a rare plant (ranked S2) and is fed by at least one spring. Impacts include Town Creek Road to the east, non-native plants, succession to forest habitat, and heavy deer grazing. Protection of this area and the buffer is recommended. Most of this wetland is protected by the Nature Conservancy.

Existing Restoration Recommendations:

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

Existing Preservation Recommendations:

- Protection should be highest priority
- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect WSSC and buffers.
- Protect additional wetland areas within State-designated Ecologically Significant Areas.
- Protect headwater stream/wetland complexes and a buffer area.

<u>Potomac River Lower North Branch (02141001)</u>

Background

This watershed is within the Ridge and Valley Province. There are 72,100 land acres. The majority is forested (75%), with the remaining in agriculture (12%), and development (13%) (MDP 2002). Development is highest around Cumberland and along the transportation network (Route 53 and 220). The eastern portion of this watershed is within the Ridge and Valley Province while a small section in the western portion is within the Appalachian Plateaus Province. The major waterway is the Potomac River, with main tributaries including Seven Springs Run and Mill Run. There are three major point source discharges within this watershed: two Waste Water Treatment Plants (WWTPs) discharging into the Potomac River, one near Brady and one in Cumberland,

and an industrial source near Westernport. There is a surface water community water supply drawing from Mill Run (called Rawling Heights).

Like other watersheds in this region, there are few mapped wetlands (based on DNR and NWI GIS data). These are small and are located mainly along waterways and small ponds. One of the pond complexes appearing as a wetland, along the Potomac River, is part of a bread manufacturing process, and may not have good water quality. While these GIS layers may identify larger wetlands, the scale of the data has resulted in some wetlands being excluded. For instance, there may be additional narrow wetlands along the C&O Canal that are not depicted on these maps. 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: 16 acres
    - Scrub shrub: 20 acres
    - Forested: 44 acres
    - Unconsolidated bottom: 140 acres
    - Unconsolidated shore: <1 acre
- Riverine unconsolidated shore: 14 acres
- Total: 236 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 (acres)	Permittee Mitigation (acres)	Programmatic Gains (acres)	Other Gains (acres)	Net Change (acres)
02141001	-4.70	6.56	0	0.05	1.91

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. For this watershed, they are as follows:

- All of North Branch Potomac River mainstem: Use I-P, water contact recreation, protection of aquatic life, and public water supply.
- All tributaries to the North Branch Potomac River except those listed as Use I-P or Use IV-P: Use III-P, natural trout waters and public water supply.

Water Quality

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. This watershed was also classified as a "Selected" Category 3, a pristine or

sensitive watershed that needs the most protection. Failed indicators included high phosphorus, low non-tidal fish index of biotic integrity, high soil erodibility (0.28), and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, a high number of trout spawning areas (10), a high percent of headwater streams occurring in Interior Forest (53%), a high percent of the watershed that is forested (82%), and a drinking water intake.

According to the *2002 Maryland Section 305(b) Water Quality Report*, the mainstem of the Lower North Branch Potomac River fails to fully support all designated uses due to bacteria from industrial and municipal discharges, upstream sources, urban runoff, natural sources, and combined sewage overflow. The wadeable tributaries to Fifteen Mile Creek (stream order ≤ 4) also fail to fully support all designated uses due to a poor biological community from habitat alteration and 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:

- *North Branch Potomac River*; cadmium, nutrients, pH, and suspended sediments.
- *North Branch Potomac River* (mouth to Spring Gap); fecal coliform.
- *North Branch Potomac River* (Fort Hill to Georges Creek); fecal coliform.
- *North Branch Potomac River* (Wills Creek to Fort Hill); fecal coliform.
- *Unnamed tributary to the Potomac River* (021410010054); poor biological community.
- *Unnamed tributary to the Potomac River* (021410010057); poor biological community.
- *Unnamed tributary to the Potomac River* (021410010058); poor biological community.
- *Warrior Run* (021410010059); poor biological community.
- *Collier Run* (021410010062); poor biological community.
- *Collier Run* (021410010065); poor biological community.
- *Dry Run* (021410010053); poor biological community.
- *Mill Run* (021410010068); poor biological community.
- *Mill Run* (021410010067); poor biological community.
- *Seven Springs Run* (021410010070); poor biological community.
- *Trading Run* (021410010071); poor biological community.

A Draft Water Quality Analysis was completed in 2005 for low pH in the Lower North Branch Potomac River. There are three active coal mining point sources within this watershed. This study found that the required criteria for pH are being met in the Lower North Branch Potomac River. Therefore, this study recommends the removal of the 8-digit watershed from the 303(d) List of water quality impairment from low pH.

MBSS samples ranked benthic IBI mostly fair (a very poor ranking was near Triple Lakes). Fish IBI were ranked lower, with many more samples ranked poor and very poor, scattered throughout.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration, including along Seven Springs Run, Mill Run, Trading Run, Collier Run, and along the Potomac River.

A large portion of this watershed is within the Green Infrastructure network, with the main exception being Cumberland (DNR, 2000-2003). Part of the Green Infrastructure hub is protected by Warrior Mountain Wildlife Management Area, Dans Mountain Wildlife Management Area, the C&O canal, Nature Conservancy properties (Fort Hill Preserve and Oldtown Romney Glade) and several County-owned properties, but large unprotected areas still remain. Unprotected areas along the Potomac River should be high priority for protection. There are some gaps in the Green Infrastructure network along the Potomac River, currently in agriculture. These areas should be high priority for restoration to natural vegetation. According to the 2000 Maryland Greenways Commission document, there are several existing greenways including:

- *C&O Canal National Historical Park*. This trail runs from Cumberland east, along the Potomac River.
- *Dan's Mountain*. This trail is in the western portion of the watershed, following the ridge of Dans Mountain. This trail may be connected with the Big Savage hiking trail in Garrett County.
- *Western Maryland Rail Trail*. This trail runs from Tonoloway to Spring Gap and parallels the C&O Canal.

Potential greenways include:

- *Potomac River Greenway*. This corridor is owned by the National Park Service. It would connect the C&O Canal to Garrett County.

In addition to these existing and proposed greenways, the 1998 *Allegany County Land Preservation and Recreation Plan* suggests:

- Adding to fairgrounds property (near Cumberland)
- Developing a trail connecting Dans Mountain WMA to the Savage River State Forest (west of Lonaconing) and the Potomac River (near Dawson).

There are three State-designated Nontidal Wetlands of Special State Concern in this watershed. The name, location, and protection status are as follows:

- *North Branch Bottomland.* This mature floodplain forest between an industrial water treatment facility and the Potomac River contains a rare plant species (ranked S2). Impacts include sedimentation from the developed land and non-native plant species. This area is not protected.
- *Pinto Marsh.* This is an apparently natural pond surrounded by a hayfield with unusual migratory birds. This pond generally contains water. Impacts are minimal and include annual mowing and a road to the far south. Conservation of this area

and its buffer, including limiting sedimentation into the pond, is desirable. This area is not protected.
- *Spring Gap Bottomland.* This site contains diverse floodplain habitat. Located along the Potomac River. Threats include changes in hydrology of its West Virginia watershed, non-native plant invasions. This area is protected by the C&O Canal National Historical Park.

Existing Restoration Recommendations:
- Restore gaps within Green Infrastructure to natural vegetation, especially along the waterways.
- Restore wetlands and streams within the headwaters.

Existing Preservation Recommendations:
- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect WSSC and buffers.
- Protect additional wetland areas within State-designated Ecologically Significant Areas.
- Protect headwater stream/wetland complexes and a buffer area.

Evitts Creek (02141002)

Background

This watershed starts in Pennsylvania and drains into Allegany County, southeast of Cumberland. Headwaters are within steep slopes. This watershed is within the Ridge and Valley physiographic province (MDE, 2005a).

There are 19,641 land acres in this watershed. The dominant land use is forest (68%), followed by developed (18%) and agriculture (14%) (MDP, 2002). The main areas of development are around Cumberland. This watershed is completely within the Ridge and Valley Province. The main waterway is Evitts Creek. Lake Habeeb (209 acres) is located in this watershed.

Estimates of wetland acreage for the entire Maryland portion of the watershed, based on DNR mapped wetlands, are as follows:
- Lacustrine unconsolidated shore: 2 acres
- Palustrine
    - Emergent: <1 acre
    - Scrub shrub: 1 acre
    - Forested: <1 acres
    - Unconsolidated bottom: 21 acres
- Riverine unconsolidated shore: <1 acre
- Total: 25 acres

The 943-acre Rocky Gap Wildland is part of the Maryland Wildland Preservation System. To be in this program, the Maryland General Assembly must designate this area as a Wildland, land that retained its wilderness character, and it must be owned by DNR.

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, there has been a slight gain in wetlands for this watershed (Walbeck, 2005).

Basin code	Permanent Impacts (acres)	Permittee Mitigation (acres)	Programmatic Gains (acres)	Other Gains (acres)	Net Change (acres)
02141002	-1.40	1.55	0	2.40	2.55

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. For this watershed, they are as follows:

- All tributaries to the North Branch Potomac River except those listed as Use IV-P below: Use III-P, natural trout waters and public water supply.
- Evitts Creek mainstem: Use IV-P, recreational trout waters and public water supply.

Water Quality

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. This watershed was also classified as a "Selected" Category 3, a pristine or sensitive watershed that needs the most protection. Failed indicators included high soil erodibility (0.29) and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, a high number of trout spawning areas (6), a high percent of the watershed that is forested (77%), a drinking water intake, and 930 State-designated Wildland Acres.

According to the *2002 Maryland Section 305(b) Water Quality Report*, the wadeable tributaries to Evitts Creek (stream order ≤ 4) fully support all designated uses. The 208.5-acre Lake Habeeb fails to support all designated uses due to nutrients and low dissolved oxygen from agricultural runoff, natural, upstream, and non-point sources.

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:

- *Evitts Creek*; nutrients, pH, and suspended sediments.
- *Lake Habeeb*; impaired for nutrients, but has a TMDL completed.

There was a Total Maximum Daily Load for phosphorus entering Lake Habeeb submitted to EPA in 1999. The following information is from this document. Lake Habeeb is owned by the Maryland Department of Natural Resources and is surrounded by Rocky Gap State Park and recreational areas on the south side (a resort, conference center, and golf course). The drainage area consists of 80% forest/herbaceous, 9% developed land, 7% agriculture, and 4% water. This waterway is designated Use III-P, but low dissolved oxygen has led to water quality impairment. High phosphorus levels encourage high algae growth, which when dies leads to low dissolved oxygen. There are no point sources in this drainage, so the source of phosphorus is all non-point. This TMDL requires a 24% reduction in phosphorus from non-point sources.

A Draft TMDL was completed in 2005 for low pH in Evitts Creek. No coal mining facilities are located in this watershed. For the overall basin, pH levels are within criteria for the designated use, with the exception of a localized impairment on Rocky Gap Run (stations RKG0023 and RKG0041) and Elk Lick Run (station ELL0008). Therefore, this study recommends the removal of the 8-digit watershed from the 303(d) List for water quality impairment due to low pH.

MBSS samples ranked fish IBI as good and benthic IBI as fair to poor.

The following information is summarized from the1998 document entitled *Lake Koon and Lake Gordon Watershed Management Plan*. Lake Koon (268 acres) and Lake Gordon (120 acres) are located entirely within Pennsylvania. However, they provide the main water supply for the City of Cumberland and drain into Evitts Creek, so are important for Maryland. Watershed land use is mainly forest (60%), followed by agriculture (35%), and developed (5%). This land use is not likely to change much in the next decade. Surrounding the lakes are mainly forest owned by the City of Cumberland. Evitts Creek (in PA) and Growden Run are tributaries to the Lake Koon, and Oster Run is the main tributary to Lake Gordon. Lake Koon drains into Lake Gordon, so acts as a sediment trap for Lake Gordon. For this reason, Lake Koon has a higher amount of phosphorus and is considered eutrophic while Lake Gordon is considered mesotrophic. Evitts Creek outflow has better water quality than the lakes, since they are acting as pollutant sinks. Both lakes have problems with sedimentation, algae, and low dissolved oxygen (especially with depth). The lakes were good for warm-water species but were not as good for cold-water species due to low dissolved oxygen at the bottom of the lakes. The highest amounts of suspended sediments, nutrients, and fecal coliform enter the lakes during storm events. These water quality issues result in additional water treatment requirements for the City of Cumberland and an impact to recreational lake use. Based on water quality monitoring in 1994, 1995, and 1997, several recommendations were made for these subwatersheds. Some of these recommendations are as follows:

- *Soils should be managed for erosion*. Soils had moderate to high erodibility. Land immediately surrounding the lakes has fairly flat topography, but Wills and Evitts mountains have steep slopes and may be very susceptible to erosion.
- *Control nitrogen and phosphorus.* Phosphorus is the limiting nutrient in both lakes, and modeling suggests that phosphorus should be reduced by 29% in Lake Koon and by 21% in Lake Gordon.

- *Encourage agricultural best management practices (BMPs).* Some examples include nutrient management plans, stream fencing to keep out livestock, and created wetlands to treat runoff.
- *Manage forestry operations.*
- *Develop a watershed management group to manage this watershed.*
- *Stabilize eroding stream channels.*
- *Create wetlands to treat agricultural stormwater runoff.*
- *Create pond/wetland system where streams enter Lake Gordon.* Oster Run and unnamed tributary at Pine Ridge Road.
- *Evaluate and manage failing septic systems.*
- *Address impervious surface runoff.* Create stormwater facilities to treat runoff. Reduce stormwater runoff in future by decreasing impervious surface and preserving open space.
- *Protect and enhance stream buffers.*
- *Education.*
- *Continued monitoring.*
- *Bottom water aeration.* This is predicted to increase cold-water species and decrease nutrient release from bottom sediments.
- *Modify drinking water intake structure.*
- *Dredging in localized areas.*
- *Lake shoreline stabilization.* Eastern side of Lake Gordon (below Lake Koon dam) and Southeastern side of Lake Gordon (north of City of Cumberland WWTP).

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration, including near Allegany College and along Christie and Jefferies Roads:

A large portion of this watershed is designated Green Infrastructure, with main exceptions being Cumberland and the center of the watershed (DNR, 2000-2003). Part of the Green Infrastructure hub is protected by Rocky Gap State Park, Maryland Environmental Trust easements, and the small State-owned parcel of Evitts Creek Pond Fish Management Area, but large unprotected areas still remain. According to the Maryland Greenways Commission, there is a designated greenways within Rocky Gap State Park. There is some County-protected land in Cumberland.

There is one State-designated Nontidal Wetlands of Special State Concern in this watershed, Little Knob Seep. This is a seep in limestone within the Elk Lick Run drainage area. It is on the side of a field adjacent to a recently logged forest. This area contains three uncommon aquatic invertebrates. Since this area is on limestone deposits, development in this region has a greater chance of leading to groundwater contamination

and rapid groundwater drawdown (Hotopp and DNR, 1998). This wetland is not protected.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation, especially along waterways.
- Restore/create wetlands designed to remove nitrogen and phosphorus to Lake Koon and Lake Gordon.
- Restore/create wetlands designed to remove phosphorus before entering Lake Habeeb.
- Restore wetlands and streams within the headwaters.

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect WSSC and buffers.
- Protect additional wetland areas within State-designated Ecologically Significant Areas.
- Protect headwater stream/wetland complexes and a buffer area.

Wills Creek (02141003)

Background

The headwaters for Wills Creek are within Pennsylvania and it flows south to the Potomac River (near Cumberland). Two main tributaries are Jennings Run and Braddock Run. A portion of this watershed is also in Garrett County. This watershed is within the Appalachian Plateaus and the Ridge and Valley Provinces. This region has significant amounts of coal, and has had water quality problems associated with coal mining production (MDE, 2005c).

There are 37,745 land acres in this watershed. The majority is forest (74%), with the next most common land use being development (17%), followed by agriculture (9%) (MDP, 2002). The main areas of development are around Cumberland, Frostburg, and the main transportation networks. The eastern portion of this watershed is within the Ridge and Valley Province while the western portion is within the Appalachian Plateaus Province. The major waterway is Wills Creek, with main tributaries including Jennings Run and Braddock Run.

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

- Palustrine
    - Emergent: 2 acres
    - Scrub shrub: 5 acres
    - Unconsolidated bottom: 36 acres
- Riverine unconsolidated shore: 1 acre

- Total: 44 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 (acres)	Permittee Mitigation (acres)	Programmatic Gains (acres)	Other Gains (acres)	Net Change (acres)
02141003	-0.74	0.42	0	0	-0.32

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. For this watershed, they are as follows:

- All tributaries to the North Branch Potomac River except those listed as Use IV-P below: Use III-P, natural trout waters and public water supply.
- Wills Creek mainstem. Use IV-P, recreational trout waters and public water supply.

Water Quality

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. This watershed was also classified as a Category 3, a pristine or sensitive watershed that needs protection. Failed indicators included low non-tidal benthic and fish indexes of biotic integrity, high soil erodibility (0.28) and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high number of trout spawning areas (8), a high percent of headwater streams occurring in Interior Forest (54%), and a high percent of the watershed that is forested (84%).

According to the *2002 Maryland Section 305(b) Water Quality Report*, the mainstem of Wills Creek fully supports all designated uses. The wadeable tributaries to Wills Creek (stream order ≤ 4) fail to fully support all designated uses due to high nutrients and low dissolved oxygen from agricultural runoff and non-point, upstream, and natural sources.

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:

- *Wills Creek*; fecal coliform, nutrients, low pH, suspended sediments, and cyanide.
- *Wills Creek* (mouth to PA line); fecal coliform.
- *Braddock Run* (mouth to La Vale); fecal coliform.
- *Braddock Run* (021410030096); poor biological community.
- *Jennings Run* (021410030100); low pH.
- *Unnamed tributary to Jennings Run* (021410030099); low pH due to acid mine drainage.

- *North Branch of Jennings Run* (021410030102); poor biological community.
- *Unnamed tributary to Wills Creek* (021410030103); poor biological community.

A Draft Water Quality Analysis was completed in 2005 for low pH in Wills Creek. Of the five regulated point source discharges into this watershed, two are active mining sources. This study found that the required criteria for pH are being met in the Wills Creek 8-digit basin and Jennings Run subwatershed 021410030100, but are not being met at two unnamed tributaries to Jennings Run and another subwatershed of Jennings Run (subwatersheds 021410030099 and 021410030098). Therefore, this study recommends the removal of the 8-digit Wills Creek basin and Jennings Run subwatershed 021410030100 from the 303(d) List of water quality impairment.

MBSS samples found fish IBI of poor to very poor (with samples of very poor being confined to the northern portion) and benthic IBI of fair to very poor.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration. These areas are generally along waterways and include: along Jennings Run, Braddock Run, and Wills Creek.

A large portion of this watershed is designated as Green Infrastructure (DNR, 2000-2003), but the only protected Green Infrastructure land is Wills Mountain State Park and several small County properties. According to the 2000 Maryland Greenways Commission document, an existing greenway is the Allegany Highlands Trail. This was an old Railroad connecting the C&O Canal in Cumberland, running through Frostburg, and ending in Confluence, Pennsylvania (Allegheny Highland Trail Study).

The *1998 Allegany County Land Preservation and Recreation Plan* suggests:

- Developing a trail along Wills Mountain to connect The Narrows Scenic Park to State game lands in Pennsylvania.
- Converting the railroad to a trail from the Narrows north to Ellerslie.
- Converting the railroad from the Allegheny Highland Trail to LaVale District Park.
- Acquiring flood-prone properties along Wills Creek to develop into local greenways.

There are no State-designated Nontidal Wetlands of Special State Concern within this watershed, but there is one potential WSSC near Barrelville.

Braddock Run Stream Corridor Assessment Survey
A Stream Corridor Assessment was conducted for Braddock Run watershed within Wills Creek. In 2001, of the 75 stream miles surveyed, 303 problems were reported at 271 sites.

These included: fish passage barriers (29 sites; with 59% ranked severe or worse), channelization (59 sites; with 42% ranked severe or worse), poor buffers (37 sites), flood prone structures (18 sites), pipe outfalls (59 sites), and stream erosion (55 sites, with 60% ranked severe or worse). These problems were spread throughout the watershed, rather than being concentrated in one area. The overall habitat assessment score for the 57 representative sites surveyed was suboptimal.

Environmental Assessment of Braddock Run Watershed
The following information is based on the 2003 preliminary watershed plan for Braddock Run. Braddock Run flows through LaVale before entering Wills Creek. DNR State-listed threatened or endangered species include the following: Tall larkspur (endangered), Cherrydrop snail (in need of conservation), Mountain pimpernel (threatened), Arbor-vitae (threatened), and Eastern spotted skunk (highly rare). There is a reproducing native brook trout population present. Other indicators of good water quality include the species long-nose dace. However, water quality does appear to be impacted, possibly from Acid Mine Drainage, as seen by the poor macroinvertebrate population. The Braddock Run watershed is 11,174 acres and includes 69% forest, 23% development, 5% mining, and 3% hay/pasture. The main problems in this waterway include flooding (urban areas), stream bank erosion, sedimentation, and poor water quality/aquatic habitat. There are few wetlands in this watershed, and about 2% of the soils are hydric (with half of this being urban). Some of the soils have fragipans and slow permeability. The average slope in this watershed is >25%.

The stream erosion in the watershed has been caused by changes in land use, road crossings, and encroachment into the floodplain. Wetlands in the area are palustrine forested and are being impacted by erosion and sedimentation during flood events. A large part of the stream base flow is from the Hoffman Drainage Tunnel (a coal mine drainage tunnel near Clarysville). This tunnel discharges iron and manganese into the waterway, which inhibits water quality and aquatic habitat. Poor storm water management from surrounding development also allows pollutants to enter the waterway.

This document also identifies the main environmental concerns for this County. Flooding is identified as the primary concern. Other major identified concerns include channelization, fish blockages, stream erosion, and iron precipitate. To address these concerns, they have proposed projects including stream restoration, iron precipitate ponds, storm water management, infiltration trenches, and urban water quality improvements.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation, especially along waterways.
- Restore wetlands within the floodplain.
- Restore/create wetlands within Braddock Run watershed.
- Restore wetlands and streams within the headwaters.

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect areas within the floodplain.
- Protect WSSC and buffers.
- Protect additional wetland areas within State-designated Ecologically Significant Areas.
- Protect wetlands within Braddock Run watershed.
- Protect headwater stream/wetland complexes and a buffer area.

Georges Creek (02141004)

Background

There are 47,700 acres in Allegany and Garrett County, with roughly 31,959 land acres in Allegany (67%) (DNR, 2001). According to the Maryland Department of Planning 2002 Land Use GIS data, the main land use is forest (68%), followed by development (18%) and agriculture (13%). Of the entire Maryland portion of the watershed (Allegany and Garrett Counties), only 1% of the agriculture is prime farmland. The main areas of development are around Frostburg, Westernport/Luke, and along the transportation corridors. Development is focused around Georges Creek and tributaries due to limitations of the surrounding steep topography. Slopes are steepest around the southern waterways. Since these developed areas have high impervious surface and are often within the floodplain, flooding a large problem. Other problems include sewage overflow and acid mining discharge that contribute to waterway degradation. Although future development is predicted to replace forest, this amount will not be significant (Shanks, 2001). Based on Maryland Department of Planning 2020 estimates, the resulting impervious surface is expected to increase from 4.7% (in 1997) to 4.9% (in 2020). The eastern portion of this watershed is within the Ridge and Valley Province while the western portion is within the Appalachian Plateaus Province. The main waterway is Georges Creek. Dans Mountain is on the Eastern border and Big Savage Mountain is on the western border. There are three surface water community water supplies including two drinking water reservoirs: Midland-Gilmore Reservoir, and Charlestown Reservoir (Lonaconing Reservoir), and one drawing from Woodland Creek (Klondike Water Company). Although the watersheds for these reservoirs are zoned conservation, they are not completely protected (Shanks, 2001).

In 2000, the 100-year Georges Creek floodplain was remapped (Neff Run Watershed Restoration Work Group, 2000).

The following soil information is based on the Natural Soil Groups and summarized by the WRAS Watershed Characterization. The majority of the soil is stony (86%), followed by shallow, acidic soil (8%), and wet, clayey soils (2%). The remaining soil are other types. Prime agricultural soils are located in small spots along the northern section of Georges Creek floodplain.

There are roughly 447 acres of wetlands in this entire watershed (Allegany and Garrett Counties). Wetlands generally include forested, scrub-shrub, and emergent. 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
  - Emergent: 1 acre
  - Scrub shrub: <1 acre
  - Forested: 8 acres
  - Unconsolidated bottom: 67 acres
  - Unconsolidated shore: 2 acres
- Riverine unconsolidated shore: 1 acre
- Total: 80 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 (acres)	Permittee Mitigation (acres)	Programmatic Gains (acres)	Other Gains (acres)	Net Change (acres)
02141004	-0.80	0.53	0	0	-0.26

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. For this watershed, they are as follows:

- Georges Creek mainstem: Use I-P, water contact recreation, protection of aquatic life, and public water supply.
- All tributaries to the North Branch Potomac River except those listed as Use I-P: Use III-P, natural trout waters and public water supply.

Water Quality

The source water assessment for Lonaconing Reservoir reports that fecal coliform bacteria and sediment turbidity is the main concern for drinking water. Additionally, iron and manganese exceed the recommended drinking water limit in Georges Creek watershed (Shanks, 2001).

The *1998 Clean Water Action Plan* classified the 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 one of the 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 most in need of protection. Failed indicators included low non-tidal benthic and fish indexes of biotic integrity, a high amount of impervious surface (10.2%), a high

soil erodibility (0.31), and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, a high percent of headwater streams occurring in Interior Forest (53%), a high percent of the watershed that is forested (82%), 272 State-designated Wildland Acres, and six drinking water intakes.

According to the *2002 Maryland Section 305(b) Water Quality Report*, there are sections of mainstem Georges Creek that do not fully supports all designated uses due to bacteria from sewage systems, urban runoff, and natural sources. The wadeable tributaries to Georges Creek (stream order ≤ 4) fail to fully support all designated uses due to poor biological community likely affected by low pH and siltation from mining and habitat alteration.

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:

- *Georges Creek*; fecal coliform, pH, sedimentation.
- *Georges Creek* (021410040087 – Allegany County); sedimentation.
- *Georges Creek* (021410040088 – Allegany County); poor biological community
- *Unnamed tributary to Georges Creek* (021410040088– Allegany County); low pH (due to acid mine drainage).
- *Sand Spring Run* (021410040094 – Allegany County); poor biological community.
- *Unnamed tributary to Sand Spring Run* (021410040094– Allegany County); low pH (due to acid mine drainage).
- *Staub Run* (021410040092 – Allegany County); low pH (due to acid mine drainage).

The following information is summarized from the 2001 MDE document entitled *Total Maximum Daily Loads of Carbonaceous Biochemical Oxygen Demand (CBOD) and Nitrogenous Biochemical Oxygen Demand (NBOD) for Georges Creek in Allegany and Garrett Counties, Maryland*. They found that nutrients and dissolved oxygen were currently better than that required of Use I-P waterways. However, future increases of CBOD and NBOD, from nonpoint and point sources, must be limited in order to maintain high dissolved oxygen levels.

Based on the 1996 Maryland Biological Stream Survey (MBSS), Fish and Benthic Indexes of Biotic Integrity (IBI) were poor to very poor, while physical habitat ranged from good to very poor. Additional fish sampling found that fish population varied locally.

Water Restoration Action Strategy Characterization
A Watershed Restoration Action Strategy (WRAS) was conducted for Georges Creek in 2001. As part of this WRAS process, a watershed characterization was completed by DNR and is summarized below:

The largest problem found to degrade stream water quality (a third of the streams) was acid mine drainage leading to low pH (some <3.0 pH) and high metal concentrations (i.e., iron, aluminum, manganese, etc.). Streams degraded by acid mine drainage include Georges Creek and the downstream portions of Franklin Run, Michael's Run, Mills Run, Potomac Mill Run, Moores Run, Hill Run, Neff Run, Woodland Creek, Staub Creek, Winebrenner Run, and Sand Spring Run. Mine discharge impacts are from mine runoff, coal tipples (coal related facilities), mine waste, and sediment. As related to drinking water, the shallow Monongahela Formation, located roughly in the center of the watershed, is the only area affected by mining. The aquifer stratigraphically below this one, the Conemaugh Formation, is mostly unaffected by the mining activities and is used by Midlothian and Hoffman as drinking water. Areas south of Barton have poor surface water quality due to very low pH values and high sulfates and other metals, and limit use as a water supply. Frostburg uses the Pocono Formation for drinking water, which is unaffected by the mining activities. A Frostburg State 1995 baseline study in Mill Run found severe stream degradation due to acid mine drainage in Michaels Run and Mill Run (from Michaels Run to Georges Creek). They identified five acid mine drainage sites, including four major ones. There are changes in hydrology due to dewatering from past mining, including drier streams, drops in the water table, and strip mining. One example is the Hoffman Tunnel that drains 14 sq. miles from Georges Creek watershed, including groundwater, into Braddock Run (in Wills Creek).

Some headwater streams have excellent water quality while other streams have very poor water quality. Additional fish sampling data found that naturally reproducing trout populations were present in the headwater portions of Mill Run (completely in Garrett County), Laurel Run (partially in Garrett County), Koontz Run (partially in Garrett County), Elk Lick Run, and Neff Run. They were not present in areas with acid mine drainage. However, within acid mine drainage stream segments, there are some stocked trout fishing areas (Georges Creek mainstem from the mouth to Koontz Run and the tributary Laurel Run from the confluence with Georges Creek to near the Garrett County line). Based on a 1999 fish survey in Mill Run, limestone applications alleviate symptoms of Acid Mine Drainage (AMD) resulted in the range expansion of certain fish species (Shanks, 2001).

Stream Corridor Assessment
A Stream Corridor Assessment was conducted for Georges Creek in 2001/2002. A Stream Corridor Assessment was also conducted for Neff Run in 2000. These results were included in the Stream Corridor Assessment Report for Georges Creek, as summarized below:

Of the 108 miles of stream surveyed and 1,058 reported problems, the most common problems found were pipe outfalls (225 sites). Many sites had high erosion (156 sites), with the most being in Neff Run (22 sites), Mill Run (13 sites), and Potomac Hill (11 sites). Areas with inadequate riparian buffer (129 sites) were most common on Georges Creek mainstem (29 sites), followed by Koontx Run (17 sites), Neff Run (13 sites), Sand Spring Run (12 sites), and Hill Run (10 sites). Another common problem was channel alteration (111 sites). Fish barriers were found at 102 sites, with nearly half of these being

located in the upper portion of the watershed and two very severe fish barriers located on Neff Run (road crossings with a 12-inch drop and an 18-inch drop). The Midland-Gilmore Reservoir on Elk Lick run also had a very severe fish barrier with an 84-inch drop. Another fish barrier rated as very severe was a dam on Georges Creek mainstem with a 48-inch drop. Flood-vulnerable structures, structures located within 50-feet of the waterway, were most common on Georges Creek mainstem and Jackson Run. 47 sites had visible signs of acid mine drainage (AMD). Most of these sites were located in Georges Creek mainstem (12 sites), Koontz Run (5 sites), Neff Run (4 sites), and Winebrenner Run (4 sites). Since this study did not evaluate severity of AMD, streams with higher observations of AMD may not necessarily be the most impacted.

Neff Run Watershed Restoration Plan
The following information is based on the 2000 document entitled *Neff Run Watershed Restoration Plan: Allegany County*. Neff Run drains into Georges Creek and has a drainage area of roughly 5.6 miles square. There are two active coal mines. Land use is dominated by forest (72%), agriculture (16%), extractive (7%), and developed (5%). Conservation zoning is in 6% of the area.

Issues of concern include poor water quality due to acid mine drainage and flooding. Goals include reducing flooding and acid mine drainage, and improving water quality, fish habitat, recreation, open space, and environmental education. The 1999 Neff Run Stream Corridor Assessment surveyed over 8 miles of stream. They noted several types of problems at 152 sites. The most common problems included: pipe outfalls (35 sites), erosion (29 sites), poor stream buffers (16 sites), channelization (15 sites – most associated with roads), and fish blockages (24 sites). An area of severe erosion was located on the lower section of Neff Run (above and below Dan's Rock tributary) and the middle section of Neff Run (by the mouth of Matthews Run). In some of cases, the erosion is affected by excessive debris/deposition, caused by modified hydrology and land use changes, and upstream channelization. There were also 7 sites with acid mine drainage. Some sections of Neff Run watershed have severe downcutting. Stream habitat is fairly good in the upper tributaries and poorer in the lower tributaries.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. While the amount of hydric soil in this watershed is low in comparison to other parts of Maryland, there are still some hydric soils that are not mapped wetlands (based on Natural Soil Groups MPD GIS data and NWI/DNR wetlands). Hydric soils that are not currently wetlands may be good potential sites for wetland restoration. These include: along Georges Creek, Mill Run, Moores Run, Butcher Run, Laurel Run, Elklick Run, Neff Run, and around Frostburg.

The Neff Run Watershed Plan also made some restoration recommendations for specific sites identified in the stream corridor assessment (SCA). These projects should be considered in any targeted restoration effort. Additionally, they recommend establishing recreational greenways in the floodplains and increasing stream access.

The workgroup prioritized the watershed concerns. Some of the specific recommendations include:

- *Stream stabilization and flood reduction*:
  - Neff Run mainstem
  - Neff Run (near Stonewall Street)
  - Matthews Run confluence with Neff Run (Ocean Hill Road to Miller Farm). Conduct demonstration project to stabilize stream.
  - Neff Run tributaries (especially along Dan's Rock Road): stream stabilization.
- *Acid Mine Drainage*:
  - Matthew Run (100 m upstream for Route 36)
  - Abandoned well (site 301317) draining into Neff Run
  - Additional AMD sites
- *Inadequate buffers*
- *Wetland creation*
  - Upper Neff Run (sites 302305 and 302309)
  - To reduce flooding
- *Fish habitat improvement*
  - Throughout
  - North Branch (Site 302310)
- *Fish blockages*: provide long-term solution
- *Address exposed pipes and pipe outfall issues*
- *Monitoring*
- *Recreation*
  - Greenway establishment in floodplain
  - Stream access for fishing
- *Education*

The Watershed Restoration Action Strategies Plan was completed in 2002. This document States that the two main problems are poor water quality and unstable stream banks. Specific problems and/or some of the relevant recommendations include:

- *Flooding*
  - *Acquire flood-prone properties* (especially repetitive loss properties)
  - *Repair floodwalls*: Jackson Run, Neff Run, Kootnz Run, and Georges Creek
- *Dewatering*: This process has aggravated past severe drought conditions.
  - From Georges Creek due to past mining activities: between Midland and Woodland Creek (deep mines), between Sand Spring Run and Rat 936 (deep mines), south of Borden Shaft (Hoffman Drainage Tunnel). The Hoffman Drainage tunnel diverts water from the top third of Georges Creek watershed into the Wills Creek watershed.
  - Tributaries losing water: Squirrel Neck Run (downstream section), Vale Run, Woodland Creek (lower and middle portions), and Staub Run.
- *Acid Mine Drainage*
  - Remediation

    - Wetland creation: Mill Run (Deshong Property)
- *Combined Sewer Overflow* (in the upper watershed)
- *Habitat*
    - Fish blockages: Find a long-term solution
    - Fish habitat improvement
    - Increasing vegetation along the streambanks
- *Channelization, erosion, debris*: must address together
- *Exposed pipes/pipe outfalls*
- *Inadequate buffers*
- *Trash*

Potential wetland restoration sites include sites on hydric soils that are not currently in natural vegetation. Many of these are located in the upper section of Georges Creek, with some being within the floodplain or near existing wetlands. There are also many stream segments that are unbuffered. The WRAS characterization document also lists many construction projects ranging from Acid Mine Drainage mitigation, stream stabilization, storm water retrofits, flood controls, and fish habitat improvements (Shanks, 2001).

In response to these Stream Corridor Assessments and Watershed Assessments, several projects have been planned and/or completed. Some examples are as follows:

- *Dan's Rock Run*: Acid Mine Drainage (BOM)
- *Georges Creek*:
    - Stream restoration (e.g. Barton, Grahamtown, Lonaconing)
    - Acquire properties within the floodplain (e.g. Lonaconing and throughout watershed)
    - Improve sewage treatment
    - Stormwater retrofit (e.g. Grahamtown)
    - Repair flood walls (e.g. Barton, Westernport)
    - Acid Mine Drainage (e.g. Coney, Oakhill)
- *Matthews Run*: Acid mine drainage (BOM)
- *Mill Run watershed*:
    - Acid mine drainage (Canaan Valley Institute plans to mitigate the largest AMD discharge and MDE/BOM plans to mitigate the smaller AMD discharges).
    - Riparian buffer establishment
    - Habitat enhancement
    - Improve geomorphologic conditions.
    - Acquire property
    - Wetland creation (for water quality improvement)
- *Neff Run watershed*:
    - Acid mine drainage (BOM)
    - Stream stabilization
    - Improving fish habitat
    - Riparian buffer planting.
- *Potomac Hill Run*: Acid Mine Drainage

Roughly half of this watershed is designated Green Infrastructure (DNR, 2000-2003). Although part of the Green Infrastructure hub is protected by Dans Mountain Wildlife Management Area, most is unprotected. According to the 2000 Maryland Greenways Commission document, Dan's Mountain is a designated greenway. This trail follows the ridge of Dans Mountain and may be connected with the Big Savage hiking trail in Garrett County. Based on this same document, a potential George's Creek greenway is a rails to trails project which would link Westernport to Frostburg and the proposed Allegany Highlands Trail. The *1998 Allegany County Land Preservation and Recreation Plan* suggests developing a trail to connect Dans Mountain WMA to the Savage River State Forest (west of Lonaconing) and the Potomac River (near Dawson). This Plan also suggests acquiring flood prone properties along Georges Creek and establishing these as local greenways.

There are no State-designated Nontidal Wetlands of Special State Concern within this watershed. There is one Ecologically Sensitive Area in Dans Mountain Wildlife Management Area.

The three reservoirs used for drinking water have watersheds that are only partially protected (Shanks, 2001), but should be high priority for protection.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation especially along waterways.
- Restore wetlands within the floodplain.
- Create/restore wetlands along Mill Run and Upper Neff Run, as recommended in the SCAs and watershed assessments.
- Create/restore wetlands designed for flood function.
- Restore/enhance the waterways through stream stabilization, habitat enhancement, and acid mine drainage reclamation.
- Restore wetlands and streams within the headwaters.

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect areas within the floodplain.
- Protect headwater stream/wetland complexes and a buffer area.

<u>Potomac River Upper North Branch (02141005)</u>

Background

There are only 352 land acres in the Allegany portion of this watershed. Of this, roughly two-thirds is forested (66%) and one-third is developed (34%) (MDP, 2002). This watershed is within the Appalachian Plateaus Province. The major waterway is the Potomac River. Major industrial point source discharges are from the Westvaco, Corp. in Luke. William Jennings Randolph Reservoir (952 acres) in located in this watershed.

There is also a community surface water supply located in Luke, withdrawing from the Potomac River.

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

- Lacustrine unconsolidated shore: 4 acres
- Palustrine
    - Aquatic bed: 1 acre
    - Emergent: 153 acres
    - Scrub shrub: 117 acres
    - Forested: 68 acres
    - Unconsolidated bottom: 116 acres
    - Unconsolidated shore: 1 acre
- Riverine unconsolidated shore: 44 acres
- Total: 503 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 (acres)	Permittee Mitigation (acres)	Programmatic Gains (acres)	Other Gains (acres)	Net Change (acres)
02141005	-0.25	0.22	0	4.20	4.17

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. For this watershed, they are as follows:

- All of North Branch Potomac River mainstem: Use I-P, water contact recreation, protection of aquatic life, and public water supply.
- All tributaries to the North Branch Potomac River except those listed as Use I-P: Use III-P, natural trout waters and public water supply.

Water Quality

Based on the source water assessment, the water supply for the Town of Luke/Westvaco (withdrawing from the Potomac River), is susceptible to natural organic matter, disinfection by-product precursors, Cryptosporidium oocysts, Giardia cysts, sediment, algae, and fecal coliform.

The *1998 Clean Water Action Plan* classified the 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 one of the 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 most in need of protection. Failed indicators included low non-tidal benthic and fish indexes of biotic integrity, a high soil erodibility (0.31), and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a trout spawning areas (8), a high percent of headwater streams occurring in Interior Forest (52%), a high percent of the watershed that is forested (83%), and four drinking water intakes.

According to the *2002 Maryland Section 305(b) Water Quality Report*, the mainstem Potomac River does fully support all designated uses. Roughly a third of the wadeable tributaries to the Potomac River (stream order ≤ 4) fail to fully support all designated uses due to poor biological community likely affected by low pH and siltation from mining and habitat alteration.

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*; sulfates (due to acid mine drainage), nutrients, metals, and suspended sediments.
- *Lostland Run* (021410050046 – Garrett County); poor biological community, sediments.
- *Lostland Run* (021410050047 – Garrett County); poor biological community.
- *North Prong Lostland Run* (021410050046 – Garrett County); poor biological community.
- *South Prong Lostland Run Unnamed Tributary 1* (021410050046 – Garrett County); poor biological community.
- *Three Forks Run* (021410050048 – Garrett County); poor biological community, low pH (due to acid mine drainage).
- *Glade Run* (021410050043 – Garrett County); poor biological community.
- *Laurel Run* (021410050045 – Garrett County); poor biological community.
- *North Fork of Sand Run* (021410050040 – Garrett County); poor biological community.
- *Folly Run* (021410050049 – Garrett County); poor biological community.
- *Elk Lick Run* (021410050049 – Garrett County); poor biological community.
- *Spring Gap*; Methylmercury in fish tissue.

Restoration/Preservation

Most of this watershed is designated Green Infrastructure (DNR, 2000-2003), with little of it being protected. According to a 2000 Maryland Greenways Commission document, there is potential for a greenway along the Potomac River that would connect the C&O canal with Garrett County and the Monongahela National Forest in West Virginia. This rail corridor is owned by the National Park Service.

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