GARRETT COUNTY 2

GARRETT COUNTY

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Background

This County contains 423,680 acres or 662 square miles (YSWRLAB and DNR, 1996). In 2000, according to the U.S. Census, the population in Garrett County was 29,846 people. The population in 2020 is estimated to reach 32,150 people. This County is the western-most County in Maryland, and is bordered by Allegany County to the east, Pennsylvania to the north, and West Virginia to the south and west. This County is completely within the Allegheny Mountain Section of the Appalachian Plateaus Province. Although there are small pockets of limestone deposits and some cave-formations, sinkholes are not as significant a problem as in Frederick and Washington Counties.

This County includes three State forests: 8,000-acre Garrett State Forest, 11,461-acre Potomac State Forest, and >54,000-acre Savage River State Forest (containing >12,000 acres Wildlands). Land use includes mainly forest (67%), with agriculture (22%) spread throughout the County. There are also areas of open water (1%), developed land (9%), and wetlands (<1%) (MDP, 2002). Deep Creek Lake is in the center of the County.

Priority funding areas are relatively small and include areas around Oakland, Deer Park, Deep Creek Lake, Accident, Savage River State Park, Grantsville, and Kittzmiller.

Soils were described in the 1974 Garrett County Soil Survey as follows:

> Some of the gently sloping to moderately sloping summits are occupied mainly by moderately deep, well-drained, non-stony soils that are highly useful in farming. In the valleys are soils on flood plains and terraces that are also useful in farming, but which are limited in capability by wetness and are used mostly for forage crops and pasture. In most of the County, however, the soils are steep, very stony, or both, and are better suited to woodland, wildlife habitat, and recreational uses than they are to farming.

There are only a few spots of soils classified as prime farmland (based on MDP Natural Soil Groups GIS data). In order to preserve agriculture in the County, wetland restoration/creation should attempt to avoid areas classified as prime farmland. There are several properties protected under agriculture easements and agriculture districts. While these areas may contain desirable farmland, these property owners should not be excluded from the opportunity to conduct voluntary wetland restoration on their property (Nelson, 2006). Land classified in the Garrett County Subdivision Ordinance as "Agricultural Resource" is located around Oakland, Friendsville, along I-495 (north of Deep Creek lake area) and along I-68 (east of Grantsville).

Garrett County produces more coal than any other County in Maryland. Other products include natural gas, limestone, sandstone, sand, clay, dimension stone, and common borrow (Garrett County and Urban Research and Development Corp, 1995).

The southeastern portion of this County drains into the Potomac River (which drains into the Chesapeake Bay) and the northwestern portion drains into the Youghiogheny River. There are two State-designated 6-digit watersheds and seven 8-digit watersheds in this County. The subbasin North Branch Potomac River (021410) includes the western portion of Georges Creek (02141004), a portion of the Upper North Branch (02141005), and Savage River (02141006). The subbasin Youghiogheny River (050202) contains the Youghiogheny River (05020201) to the far west, Little Youghiogheny River (05020202), Deep Creek Lake (05020203), and Casselman River (05020204).

Streams

The Appalachian Plateau has mainly rocky streams of which may have steep slopes down mountainsides, or may meander along floodplains. Community water systems withdraw from surface water, wells, and springs.

The following information is based on the Maryland Tributary Strategies 2004 document entitled *Maryland Upper Potomac River: Final Version for 1985-2002 Data*. Maryland's Upper Potomac River basin includes all of Allegany and Washington, and part of Frederick, Carroll, Montgomery, and Garrett Counties. It reports that water quality in the Upper Potomac River Basin is variable, with some waterways being healthy trout streams

and others being nearly lifeless due to acid mine drainage. The eastern portion of the basin (Piedmont and Great Valley areas east of Allegany County) contribute high amounts of nutrients and sediment from development and agriculture. The middle portion of the basin is fairly forested, so does not contribute excessive pollutants. The western portion of the basin (the Appalachian Plateau) contributes pollution from agriculture and development, but also contributes acid mine drainage. In 2002, the main nitrogen, phosphorus, and sediment sources within the Upper Potomac River basin were from agriculture (56%, 59%, and 80% respectively). All tributary stations sampled within Garrett County reported low total nitrogen, total phosphorus, and total suspended solids. This document describes the success of BMPs in the Upper Potomac River watershed like this:

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

Wetlands

Small mapped wetlands (based on DNR and NWI GIS data) are scattered throughout the County. Wetlands are associated with valley floodplains, springs, man-made ponds and reservoirs, and broad flat areas in the Appalachian plateau. According to Tiner and Burke (1995), in 1981-1982 there were 7,082 acres of wetlands (1.2% of the State's total). The wetland types were Palustrine (7,068 acres), Riverine (4 acres), and Lacustrine (10 acres). Comparisons of this 1981-1982 wetland acreage with historic wetland (based on hydric soils) acreage represents a 90%, or 61,788 acre, loss (MDE, 2002a). Major wetland losses have resulted from strip mining and conversion to agriculture or open water (Berdine et al., 1991?).

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, and shagbark hickory, and hemlock. Rhododendron may also be common. Cranesville Pine Swamp contains many more northern species, including larch. Tiner and Burke gave some examples of vegetative community (tables).

- 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.
- Lacustrine wetlands are associated with deepwater habitat (e.g. freshwater lakes, deep ponds, and reservoirs). They can be classified into lacustrine aquatic beds (wetlands are located in the shallow water) and lacustrine emergent wetlands (wetlands are located along the shoreline).

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

Dominant	Associates			
	Trees	Shrubs	Herbaceous	Other
hemlock	red maple, yellow birch	rhododendron, alder, highbush blueberry, red chokeberry, swamp azalea	wild calla, cinnamon fern, skunk cabbage, jewelweed, manna grass, touch-me-not, joe-pye-weed, Canada mayflower	
hemlock (Savage River State Forest)	rhododendron, red maple, yellow birch, witch hazel			
hemlock-red maple	yellow birch	rhododendron, shadbush	grass, skunk cabbage	Partridge-berry
hemlock-yellow birch-red maple-alder	red spruce, witch hazel	rhododendron, winterberry, mountain laurel, spicebush	jewelweed, skunk cabbage, aster, cinnamon fern	Partridge-berry
red maple-hemlock		alder, highbush blueberry, rhododendron, red chokeberry, arrowwood	wild calla, cinnamon fern, skunk cabbage	
yellow birch-hemlock	red maple	swamp azalea	jewelweed, manna grass, marsh fern, bee balm, wood reed, dock, violet, wood sorrel, touch-me-not, sedge, buttercup, Canada mayflower, meadow-rue, skunk cabbage, joe-pye-weed	

Table 2. Examples of temporarily flooded palustrine forested wetlands in Garrett County (Tiner and Burke, 1995).

Dominant	Associates			
	Trees	Shrubs	Herbaceous	Other
black cherry	red maple, swamp white oak	arrowwood, winterberry, hawthorn	bluejoint, cinnamon fern, jewelweed, long sedge	swamp dewberry
black cherry (Little Yough. River)	ash	hawthorn, shadbush	jewelweed, meadow-rue, white avens, wild rye grass, goldenrod	
red maple	tulip poplar, green ash	spicebush, winterberry, arrowwood, multiflora rose	jewelweed, false nettle, white avens, white grass, Virginia knotweed, clearweed, may apple, enchanter's nightshade	poison ivy, Virginia creeper, greenbrier
red maple	ash		white grass, jewelweed, Virginia knotweed, clearweed, Jack-in-the-pulpit	

The document *The Wetlands of Maryland's Allegheny Plateau* (Berdine et al., 1991) evaluates 148 wetlands in Garrett and far western Allegany Counties. 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, having 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 of 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 as Nontidal Wetlands of Special State Concern. This document also summarizes factors disturbing 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.

The following information is based on the 1984 document entitled *The Peatlands of Western Maryland*. Most peatlands in Maryland receive water from sources beyond just precipitation. The Glades, Maryland largest bog, receives water only from precipitation and is more like bogs found in New England. Beavers may be a threat to the maintenance of some peatlands. Bogs, while often containing some Sphagnum and Polytrichum mosses, may have several community types. Plant diversity is higher in late summer and autumn. Peatland shrub swamps have lower diversity. A large threat to the peatlands is coal mining. It is estimated that a large amount of Garrett County peatlands have already been destroyed by coal mining. If the wetlands are not directly destroyed by the mining, adjacent strip mining and shaft mining may severely impact the hydrology and increase pollution entering the wetland. Peat mining is confined to The Glades due to the economic limitations at the other sites. In this 1984 document, they predicted that The Glades may be completely destroyed by peat mining. Other peatlands are in forested valleys where clear-cutting could cause severe sedimentation in the wetlands. Livestock grazing on peatlands may lead to changes in hydrology, altered vegetation, and compaction. Damming of peatlands, by beavers or humans, can destroy the peatlands. For instance, Thayerville Bog was destroyed by flooding to create Deep Creek Lake. Of the roughly 50% of Maryland's peatlands still remaining, many have been negatively impacted. Based on this 1984 document, the top priority for preservation is The Glades (within Casselman River watershed). This is followed by Hammel Glade (Deep Creek Lake watershed), then Wolf Swamp (Casselman River watershed), Piney Run bog (Youghiogheny River watershed), and Meadow Mountain Bog (Deep Creek Lake watershed). After these, Callahan Swamp (Savage River watershed), Kempton Bog (Potomac River watershed), sections of Cherry Creek (Deep Creek Lake watershed), Cunningham Swamp (Casselman River watershed), Pine Swamp (Savage River watershed), Altamont (Little Youghiogheny River watershed), Boiling Springs (Little Youghiogheny River watershed), and White Rock Glade (Youghiogheny River watershed) should also be preserved.

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

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

Nutrient Cycling: Addition, Removal and Transformation

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

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

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

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

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

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

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

Nontidal Wetlands of Special State Concern

There are more State-designated Nontidal Wetlands of Special State Concern (73) in Garrett County than any other County. Sites designated as Nontidal Wetlands of Special State Concern generally have rare species and high-quality habitats rarely found in Maryland. Of the 365 Nontidal Wetlands of Special State Concern in Maryland, 76 are in Garrett County. Information about individual sites can be found within the individual watershed description. Rare and uncommon species that are found in the wetland are given a S rank, with S1 including species with 1-5 occurrences in the State, S2 including species with 6-20 occurrences in the State, and S3 including species with 21-100 occurrences in the State. With so many important wetlands within this County, efforts should focus on preservation of these areas.

Wetland Restoration Considerations

Hydric soils suggest where wetlands are currently or were historically. There are some fairly large spots of hydric soils that are not currently mapped wetlands (based on NRCS SSURGO GIS data and NWI/DNR wetlands). 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 adjacent to Scenic Rivers and around all tributaries of waterways used for drinking water (COMAR Use P) should also be ranked higher.

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

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

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

Sensitive Resources

Garrett County Development Plan
The 1995 Garrett County Development Plan identified sensitive areas requiring special consideration:

- *Streams and their buffers*: There are roughly 1,200 miles of streams and rivers in the County. To protect streams, they recommend establishing stream buffers of 25 feet per side in the Growth Areas and 50 feet per side in the non-Growth Areas. These stream buffers should be larger when they are adjacent to steep slopes.
- *100-year floodplains*.
- *Threatened and endangered species habitats*.
- *Steep slopes*: Steep slopes are located along the Savage River State Forest, North Branch Potomac River (in the eastern section of the County), Youghiogheny River and reservoir (in northwest section of the County), and Bear Creek (North and South Branches). Areas with slopes >30% should be protected through open space. Development should be limited on areas having slopes 25%-30%.
- *Groundwater*: Over half of the County's water supply withdraws from groundwater. The groundwater quality is good, but must be protected. Until more detailed wellhead protection areas are established, a 100-foot buffer around community wells should be protected as open space.
- *Erodible soils*.
- *Public access to waterways*.
- *Agricultural Best Management Practices*: Agricultural areas should have a stream buffer and livestock should be restricted from the waterways.
- *Scenic viewsheds*. 19 scenic vistas were identified in the plan.

In the development plan, the County divided the land into seven land use classifications to guide future development: Rural Resource, Agricultural Resource, Lake Residential, Recreation and Open Space, Special Water Resource, and Remaining Rural Areas.

Areas adjacent to protected public land and popular recreational areas (such as the Savage River) are more susceptible to development. To protect these natural resource areas, some are zoned Rural Resource Areas. The following areas were designated by the County as Rural Resource Areas:

- *Youghiogheny River – from West Virginia border to Millers Run*: 500-foot wide buffer along both sides.
- *Savage River State Forest*: Private inholdings and surrounding 500 feet.
- *Potomac River North Branch, north of Jennings Randolph Lake*: scenic viewshed.
- *Potomac State Forest and Jennings Randolph Lake*: 500-foot wide buffer.
- *Potomac River North Branch, from Bloomington to Gorman*: 500-foot wide buffer. Development in these areas should be limited to 1 unit per three acres (except when clustering).

The County also designated some areas as Recreation and Open Space Areas. These areas are owned by public, semi-public, or private and include parks, forests, schools, golf courses, fire stations, etc.

Agricultural areas considered priority for preservation are designated Agricultural Resource Areas and include areas on prime farmland soils and farms located in an area that is predominantly agriculture. Development should be limited in these areas to one unit per three acres (except through clustering). According to the Garrett County Development Plan, the most important farming areas include:

- *West of Friendsville*
- *Accident area* (within and adjacent to)
- *Grantsville area* (within and adjacent to)
- *Finzel and Piney Grove interchange area* (within and adjacent to)
- *Oakland/Mt. Lake Park and Deer Park* (north, east and south)
- *West of Gorman*

The County recommends further protection (through acquisition and easements) of the areas designated Rural Resource Areas, Recreation and Open Space Areas, and Agricultural Resource Areas. They suggest limiting public acquisitions and instead encouraging easements.

Garrett County has classified the future land use in the Deep Creek Lake area as Lake Residential Area. Development should be limited to one unit per acre to maintain high recreational value, preserve water quality, and control siltation.

Areas designated as Special Water Resource Areas are as follows:

- *Deep Creek Lake* (and adjacent Penelec land). The lake is 3,518 acres.
- *Jennings Randolph Lake* (and adjacent Army Corp of Engineers land). Formed by the Bloomington Dam on the North Branch Potomac River.
- *Youghiogheny River Reservoir* (and adjacent Army Corp of Engineers land). The dam is in Pennsylvania, but the pooled water extends three miles into Garret County.
- *Piney Reservoir* (and adjacent City of Frostburg land).
- *Broadford Lake* (and adjacent City of Oakland land)
- *Savage River Reservoir.* The lake is 360 acres.
- *Youghiogheny River* (Wild and Scenic corridor)

Land not designated by one of the previous classifications were called Remaining Rural Lands.

Other
The 100-year floodplain is as expected, being present along most waterways. Areas that have a wider floodplain and may be of interest include the Little Youghiogheny River between Mountain Lake Park and Loch Lynn Heights, Cranesville and Pine Swamp (on the West Virginia border), and some other less-populated locations.

A WRAS was completed by DNR for Georges Creek, mainly for the Allegany County portion.

Other Relevant Programs

Green Infrastructure
A large amount of this County is designated Green Infrastructure hub. Areas within the Green Infrastructure network that are currently unprotected should be protected. 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. Since this County has so much unprotected land designated as Green Infrastructure hub, protection of this land should be higher priority than restoration. For more detailed information, refer to the individual watershed sections.

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 two State-designated Natural Heritage Areas within this County, both within DNR-owned land. They are called High Rock (Savage River/Georges Creek watersheds), located in the Savage River State Forest and Toliver Run (Youghiogheny River watershed) in Garrett State Forest. 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.

Wildlands
There are 11,135 acres of State-designated Wildlands located in Savage River State Forest. These are areas that have a wilderness character and may include rare species or unique features. These include: 2,691-acre Savage Mountain, 1,517-acre Bear Pen, 1,916-

acre Middle Fork, 650-acre High Rock, 2,427-acre Savage Ravines, and 1,934-acre South Savage.

Rural Legacy
Land within the Youghiogheny River watershed was designated as Rural Legacy. For detailed information about this program, refer to that individual watershed section.

Priority Funding Areas
Priority Funding Areas (PFAs) are small and scattered, mostly located adjacent to existing municipalities. PFAs not associated with current municipalities include around Deep Creek Lake, and around both intersections of 219 and interstate 68.

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 protected area is in the eastern part of the County, Savage River State Forest. Other large protected lands include: Potomac State Forest (in the southern portion of the County), Garrett State Forest (in the western portion of the County), Mt. Nebo Wildlife Management Area, and Deep Creek Lake State Park.

Estimates of protected land in the County based on Maryland Department of Natural Resources GIS data are as follows: 3,765 acres Federal, 83,581 acres DNR, 408 acres County, 389 acres MET, 2,591 acres private conservation (including The Nature Conservancy), and 8,131 acres agricultural easements.

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

Information on individual State-designated 8-digit watershed basins is as follows.

Georges Creek (02141004)

Background

There are 15,642 total land acres in the Garrett County portion of this watershed. Of this land, the majority is forested (78%), with smaller amounts of agriculture (11%) and developed land (10%) (MDP, 2002 GIS). This watershed is within the Appalachian Plateaus Province. The main waterway is Georges Creek. There is a surface-drawn community water supply at Koontz Reservoir. Of the entire Maryland portion of the watershed (Allegany and Garrett Counties), only 1% of the agriculture is prime farmland (Shanks, 2001). The main areas of development are around Frostburg, Westerport/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 percentage impervious surface and are often within the floodplain, flooding a large problem. Other problems include sewage overflow and acid mining discharge that contributes to waterway degradation. Although future development is predicted to replace forest, this amount will not be significant. 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) (Shanks, 2001). 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. The Koontz Reservoir is located in the Garrett County portion of this watershed.

There is a State-designated Natural Heritage Areas within this County, within DNR-owned land. It is called High Rock (Savage River/Georges Creek watersheds) and is located in the Savage River State Forest. 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.

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 soil (2%). The remaining soils are other types. Prime agricultural soils are located in small spots along the northern section of Georges Creek floodplain.

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. This watershed is designated as follows:

- All of North Branch Potomac River mainstem: Use I-P, water contact recreation, protection of aquatic life, and public water supply.
- 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 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* indicates that the mainstem of Georges Creek does not fully support all designated uses due to bacteria

from sewage, urban runoff, and natural sources. A portion of the wadeable tributary to Georges Creek (stream order ≤ 4) fails to fully support all designated uses due to a poor biological community due to low pH and siltation from mining and changes in habitat (the other half of the wadeable stream miles had inconclusive results).

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.

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:

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 and 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, Laurel Run (partially in Allegany County), Koontz Run (partially in Allegany County), Elk Lick Run (in Allegany County), and Neff Run (in Allegany County). 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 AMD resulted in the range expansion of certain fish species.

After years of improving stream conditions in Georges Creek, it appears that conditions have declined recently due to acid mine drainage (McKewen, 2006).

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.

Potential wetland restoration sites include sites on hydric soils that are not currently in natural vegetation. Many of there 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. This document also lists many construction projects ranging from Acid Mine Drainage mitigation, stream stabilization, storm water retrofits, flood controls, and fish habitat improvements.

Restoration/Preservation

Stream Corridor Assessment
A Stream Corridor Assessment was conducted for Georges Creek in 2001/2002. Results are summarized below. Since the Garrett County portion of this watershed is much smaller than that of Allegany County, there were fewer problems found within Garrett County. This does not necessarily mean Garrett County streams are in better condition.

Of the 108 miles of stream surveyed in Allegany and Garrett Counties, there were 1058 reported problems. The most common problems found were pipe outfalls (225 sites total for both Counties, with 10 sites in Garrett County), high erosion (156 sites total with 27 in Garrett County), inadequate riparian buffer (129 sites total with 8 in Garrett County), channel alteration (111 sites total with 7 sites in Garrett County), and fish barriers (102 sites total with 21 in Garrett County). There were also 47 sites having visible signs of acid mine drainage (with 7 in Garrett County). Some of these sites were located in Georges Creek mainstem (12 sites), Koontz Run (partially in Allegany County), and Winebrenner Run (partially in Allegany County). This study did not evaluate severity of

AMD. It is important to note that many problems occurred along Georges Creek mainstem. While this creek is not in Garrett County itself, some of the headwaters are in Garrett County, so it is impacted from land use practices in Garrett County.

A Stream Corridor Assessment was also conducted for Neff Run in 2000 (in Allegany County) and is discussed in the Allegany County section of this document.

Watershed Restoration Action Strategies Plan
The Georges Creek 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 Rte. 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*

A Watershed Assessment was also completed for Neff Run in Allegany County. For a summary of this report, refer to the Allegany section of this document.

To protect the natural resource areas, some are zoned Rural Resource Areas. The Savage River State Forest: Private inholdings and surrounding 500 feet was designated by the County as Rural Resource Area (Garrett County and Urban Research and Development Corp, 1995).

In response to the Georges Creek and Neff Run 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

A large Green Infrastructure hub is located on the western portion of this watershed. Most of this is protected by DNR-owned land (Savage River State Forest).

There are no State-designated Nontidal Wetlands of Special State Concern in this watershed, but there is one potential WSSC next to Savage River State Forest (north of Russell Road). This site is unprotected. This site, and other small nearby wetlands, are identified as DNR-designated Ecologically Significant Areas since they have State-listed species.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation.
- Restore/enhance streams based on findings from the Georges Creek/Neff Run stream corridor assessments, including projects for acid mine drainage, improved fish/habitat, wetland creation, and stream stabilization.
- Restore wetlands in the floodplain.
- Restore wetlands and streams within the headwaters.

Existing Preservation Recommendations:

- Protect DNR-designated Ecologically Significant Areas that are not already protected.
- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect areas within the floodplain.
- Protect wetlands and streams within the headwaters.
- Protect wetlands within 500 feet around the Savage River State Forest.

Potomac River Upper North Branch (02141005)

Background

There are 66,694 land acres in the Garrett County portion of this watershed. Of this, the majority is forest (75%), followed by agriculture (15%), and development (10%) (MDP, 2002 GIS). This watershed is within the Appalachian Plateaus Province. The major waterway is the Potomac River. Jennings Randolph Reservoir (952 acres) is located in this watershed. There are two surface water community water supplies including an intake for Bloomington on the Savage River and an intake for Kitzmiller on Wolfden Run.

There are some historic and active mines that degrade the water quality from Acid Mine Drainage (Garrett County and Urban Research and Development Corp, 1995).

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. This watershed is designated 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

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 Upper North Branch Potomac River fully supports all designated uses. A portion of the wadeable tributaries to Upper North Branch Potomac River (stream order $\leq$ 4) fail to fully support all designated uses (~20 miles) due to a poor biological community, low pH and siltation from mining and changes in habitat. A portion of the wadeable streams does fully support all designated uses (~40 miles) and some areas had inconclusive results (~40 miles).

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.

Major point sources include from the Westvaco Corp in the town of Luke, draining into the Potomac River.

The fish population on the North Branch Potomac River has been negatively impacted by acid mine drainage (Lee et al., 1984). MBSS sampling found fish and benthic IBI ranging from good to very poor, being scattered throughout the watershed.

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:

- The headwaters of Glade Run
- Along the Potomac River and Steyer Run
- Confluence of Trout Run and Laurel Run
- Crooked Run
- Around Left Prong Three Forks Run
- Along the Potomac River, east of Jennings Randolph Lake

An area designated as Special Water Resource Area is Jennings Randolph Lake (and adjacent Army Corp of Engineers land). Formed by the Bloomington Dam on the North Branch Potomac River Agricultural areas considered priority for preservation are designated Agricultural Resource Areas and include areas on prime farmland soils and farms located in an area that is predominantly agriculture. Development should be limited in these areas to one unit per three acres (except through clustering). An important farming area is west of Gorman (Garrett County and Urban Research and Development Corp, 1995).

To protect certain natural resource areas within this watershed, some are zoned Rural Resource Areas:

- *Potomac River North Branch, north of Jennings Randolph Lake*: scenic viewshed.
- *Potomac State Forest and Jennings Randolph Lake*: 500-foot wide buffer.
- *Potomac River North Branch, from Bloomington to Gorman*: 500-foot wide buffer. Development in these areas should be limited to 1 unit per three acres (except when clustering).
- *Savage River State Forest*: Private inholdings and surrounding 500 feet.

The majority of this watershed are designated Green Infrastructure, but relatively little is protected (some DNR and federal land). Unprotected areas along the Potomac should be high priority for protection. According to the Maryland Greenways Commission, existing or proposed greenways are:

- *Savage River Greenway.* This existing ecological greenway runs through Savage River State Forest, Potomac River State Forest, Big Run State Park, New Germany State Park, and Finzel Swamp Reserve.
- *Potomac River Greenway*. This is a proposed ecological greenway that would follow the Potomac River and connect with the C&O Canal National Historical Park (in Allegany County) making it a 180-mile trail.

The County suggested some additional greenway trails in the 1995 development plan:

- *Indian War Trail*: The historic trail known as the Great Warrior Path/McCullough' Trail, from Groman to Cranesville.
- *Preston Railroad*: Would link Monongahela National Forest in West Virginia.

A current restoration project is for a deep mine drainage site in Kempton. The following information was based on the *Potomac Basin Reporter* (v 59(6)). Approximately 100,000 gallons of groundwater infiltrates into the Kempton Mine elevator shaft each day, where it becomes contaminated with acid from the mine. It then combines with other polluted water and results in 2.5-million gallons of polluted water flowing into Laurel Run daily. Laurel Run is then treated with lime dosers. The Kempton Mine reclamation project will use fly ash to form a seal to stop groundwater from flowing into the Kempton mine shaft. This will reduce the contaminated water flowing into Laurel Run by 100,000 gallons daily and provide this water to a nearby relatively healthy wetland. This project will also create two ponds downstream of the Laurel Run lime dosers that will aerate the contaminated water and allow sedimentation of byproducts, thereby improving the neutralizing process. The drainage from this site is adversely affecting the wetlands and streams in the area (Matt Radcliffe, MDE). It may be desirable to create some wetlands near this mitigation project.

Protected areas include Potomac State Forest, Jennings Randolph Lake U.S. Reservation (on the Potomac River), the State-owned North Branch Potomac Fish Management Area (on the Potomac River), and one agricultural easement.

There are several State-designated Nontidal Wetlands of Special State Concern in this watershed. As summarized from the document *Far Western Maryland's Nontidal Wetlands of Special State Concern*, general recommendations for these sites include protecting the wetland and its buffer from livestock access, logging, mining, new road construction, and changes in hydrology from development. Where powerline right-of-ways are within the wetland, it is recommended that herbicide applications be avoided. Since over-grazing from white-tailed deer is a problem in many wetlands, reducing deer populations is also recommended. Revegetation of disturbed areas and increasing forest cover in the drainage area is also desirable. General management of the rare species and site hydrology is also recommended. Information about the specific sites, including additional recommendations, is as follows:

- *Kearney Bog.* This 10-acre wetland is fed by seeps and has five uncommon plant species ranked as S1-S3 (one S1, two S2, and two S3). This wetland is still recovering from past logging and cattle grazing. This wetland is currently unprotected.
- *Kempton Marsh.* This is a 150-acre wetland along the North Branch of the Potomac River. Past mining and railroad activities have degraded this system, but some areas are recovering and now include ten S1-S3 species (one S1 plant species, four S2 plant species, four S3 plant species, and one S2 vertebrate species) and several different habitats. The area has experienced wetland loss due to sedimentation and soil compaction from mining and railroad activities. There is a 5-acre section of wetland north of the railroad that is currently impounded. Off-road vehicles are also impacting the wetland. This wetland is currently unprotected. Management should include protecting these areas to allow them to recover and restoring wetland and upland around the coal tipple and railroad. Based on this 1984 document, the top priority for preservation is The Glades (within Casselman watershed). Kempton Bog should be a high priority for restoration (Fenwick and Boone, 1984).
- *Kempton Ponds.* This wetland is along a tributary to the North Branch of the Potomac River and includes several ponds with adjacent open marsh. It contains 14 species ranked S1-S3 (four S1 plant species, two S3 plant species, one S1 invertebrate species, one S2 invertebrate species, one S3 invertebrate species, one S1 vertebrate species, three S2 vertebrate species, and 1 S3 vertebrate species). The upland areas have been negatively impacted by logging, agriculture, and excessive browsing by white-tailed deer. This wetland is currently unprotected.
- *Laurel Run Bog.* This wetland is an Eastern Hemlock forest along Laurel Run. It is fed by seeps and contains two wetland plant species ranked S1. There is currently an access road and slurry pipeline that may impact the site. This wetland is currently unprotected.
- *Laurel Springs (DNR name: North Kempton Ponds Woods).* This wetland is fed by healthy seeps and includes some sphagnum moss and five plant species ranked S2-S3 (one S2 species and four S3 species). This wetland is currently unprotected. Recommendations include preservation of the forest adjacent to the seeps.
- *North Laurel Run Swamp (DNR combined with Laurel Run Bog).* See Laurel Run Bog for description since they are connected. This wetland is currently unprotected.
- *Pheasant Ridge Swamp.* This seepage-fed forested wetland is the highest bog in the State. This site includes four plant species ranked S1-S3 (two S1, one S2, and one S3 species). This wetland is currently unprotected.
- *Red Oak Run Swamp.* This wetland contains four species ranked S1-S3 (three S3 plant species and one S1 vertebrate species). This wetland is surrounded by land negatively impacted by mining and logging. This wetland is currently unprotected. Recommendations include protection of the wetland from sedimentation, mainly from mine sites and spoil piles.
- *Short Run Vernal Ponds.* These wetlands are fairly undisturbed, seasonal pools with a drainage area that is forested. They provide good habitat for herbs and invertebrates. This wetland is currently unprotected. Recommendations include

protecting the forest buffer and ground water, in addition to the wetlands themselves.

- *South Prong (DNR name: Lostland Run).* This wetland contains one plant species with an S2 rank. Lostland Run has been negatively impacted by acid mine drainage, and currently has a lime doser to reduce acidity. Although this wetland is mostly protected by the Potomac State Forest, sedimentation into the wetland should be controlled and the forest buffer should be restored.
- *Upperman Road Bog.* This wetland contains several good-quality habitats, including a few acres of old-growth forest. There are three species with a S2 ranking (one plant species and two invertebrate species). There was mining on the eastern side of the wetland and logging in the upland. The wetland is mostly protected by the Potomac State Forest. Recommendations include increasing the buffer on the east side.
- *White Cemetery Bog.* There are five plant species ranked S2-S3 (one S2 and two S3). There is a small amount of livestock grazing in portions of this wetland. To the east there had been past mining and to the north there was recent clearcutting. This wetland is not currently protected.
- *Potential WSSC.* There is one potential WSSC following Laurel Run, which is unprotected.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation, especially along the waterways.
- Restore wetlands and streams within the headwaters.
- Create wetlands around the Laurel Run acid mine restoration projects.

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect wetlands and streams within the headwaters.
- Protect WSSC and buffers, with special emphasis on Kempton Marsh.
- Protect areas zoned Rural Resource Areas:
    - *Potomac River North Branch, north of Jennings Randolph Lake*: scenic viewshed.
    - *Potomac State Forest and Jennings Randolph Lake*: 500-foot wide buffer.
    - *Potomac River North Branch, from Bloomington to Gorman*: 500-foot wide buffer.
    - *Savage River State Forest*: Private inholdings and surrounding 500 feet.
- Protect additional DNR-designated Ecologically Significant Areas that are not already protected.
    - Along North Fork Sand Run – a State-listed species.
    - Along Laurel Run – a species or natural community of concern to DNR, but with no official status.
    - Near Lonesome Pines Drive – a State-listed species.
    - Along South Prong Lost Land Run – a State-listed species.
    - Headwaters of Wolfden Run – a State-listed species.

- Near Moreland Drive and King Wildesen Road – a species or natural community of concern to DNR, but with no official status.

Savage River (02141006)

Background

There are 74,205 land acres in this watershed. The majority of this land is forest (82%), with the remaining land in agriculture (14%) and a small amount in development (4%) (MDP 2002 GIS). This watershed has the smallest amount of development among the watersheds in this County. There is a State-delineated wellhead protection area for Frostburg water supply, located on the west side of Big Savage Mountain. New Germany Lake (13 acres) and Savage River Reservoir (360 acres) are located in this watershed. Westernport intakes from the Savage River Reservoir.

There is a State-designated Natural Heritage Areas within this County, within DNR-owned land. It is called High Rock (Savage River/Georges Creek watersheds), located in the Savage River State Forest. 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. There are 11,135 acres of State-designated Wildlands located in Savage River State Forest. These are areas that have a wilderness character and may include rare species or unique features. These include: 2,691-acre Savage Mountain, 1,517-acre Bear Pen, 1,916-acre Middle Fork, 650-acre High Rock, 2,427-acre Savage Ravines, and 1,934-acre South Savage.

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: 93 acres
  - Scrub shrub: 55 acres
  - Forested: 127 acres
  - Unconsolidated bottom: 63 acres
- Riverine unconsolidated shore: 4 acres
- Total: 343 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)
02141006	-0.63	0	0	0.55	-0.08

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. This watershed is designated 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. It was also classified as "Selected" Category 3, a pristine or sensitive watershed most in need of protection. Failed indicators included being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high instream non-tidal habitat index, a high imperiled aquatic species indicator, trout spawning areas (9), a high percent of headwater streams occurring in Interior Forest (63%), a high percent of the watershed that is forested (88%), 3,932 State-designated Wildland Acres, and a drinking water intake.

According to the *2002 Maryland Section 305(b) Water Quality Report*, the Savage River fully supports all designated uses. The wadeable tributaries to Savage River Potomac (stream order ≤ 4) also fully support all designated uses, as does Savage River Reservoir, and New Germany Lake. A portion of the wadeable streams does fully support all designated uses (~40 miles) and some areas had inconclusive results (~40 miles).

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:

- *Savage River*; sediments.
- *Savage River Impoundment*; A TMDL has been completed for methylmercury (in fish tissue).
- *Aarons Run* (021410060075); low pH (acid mine drainage).
- *Christley Run* (021410060083); poor biological community.
- *Mudlick Run* (021410060083); poor biological community.

In 2002, the document entitled *Total Maximum Daily Loads of Mercury for Savage River Reservoir Garrett County, Maryland: Draft* was submitted to EPA. The following information is from this document. The Savage River Reservoir is located on the Savage River, with a watershed containing Savage River State Forest, Big Run State Park, and recreational areas. It provides water to Westernport and the City of Piedmont in West Virginia. Although the reservoir is designated Use III-P, MDE issued a fish consumption advisory due to high levels of mercury in fish tissue. There is only one point source in this drainage area, New Germany State Park WWTP, which is not considered a significant source of mercury. Most of the mercury is from atmospheric deposition, mainly from out-of-state coal-fired electric power plants. For this reason, programs in the Federal Clean Air Act will be required to reduce these emissions.

The document entitled *Water Quality Analysis of Eutrophication of the Savage River, Garrett County, Maryland* was completed in 2001 and recommended that the Savage River be removed from the 303(d)List for eutrophication.

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." The MBSS surveys found the majority of fish and benthic IBI scores to be fair to good. A few exceptions were ranked poor (all outside of the park area). Overall, this watershed was one of the best for FIBI and BIBI in the County.

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 a few 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. The largest of these are in the headwaters of the Savage River (West Branch Blue Lick Run, Savage River near Finzel and Avilton).

To protect important natural resource areas, some are zoned Rural Resource Areas, including Savage River State Forest: Private inholdings and surrounding 500 feet. An area designated as Special Water Resource Areas is the 360-acre Savage River Reservoir (Garrett County and Urban Research and Development Corp, 1995).

The majority of this watershed is designated Green Infrastructure hub and is largely protected by DNR-owned Savage River SF. According to the Maryland Greenways Commission, an existing greenway is Savage River Greenway. This ecological greenway runs through Savage River State Forest, Potomac River State Forest, Big Run State Park, New Germany State Park, and Finzel Swamp Reserve.

There are several State-designated Nontidal Wetlands of Special State Concern in this watershed. As summarized from the document *Far Western Maryland's Nontidal Wetlands of Special State Concern*, general recommendations for these sites include protecting the wetland and its buffer from livestock access, logging, mining, new road construction, and changes in hydrology from development. Where powerline right-of-ways are within the wetland, it is recommended that herbicide applications be avoided. Since over-grazing from white-tailed deer is a problem in many wetlands, reducing deer populations is also recommended. Revegetation of disturbed areas and increasing forest cover in the drainage area is also desirable. General management of the rare species and site hydrology is also recommended. Information about the specific sites, including additional recommendations, is as follows:

- *Callahan Swamp.* This wetland is one of the largest mountain peatlands in Western Maryland and is in the Little Savage River headwaters. It includes 16 species ranked S1-S3 (plants: three S1, four S2, six S3; invertebrates: one S2, one

S3; vertebrates: one S2). This wetland has been impacted by grazing, logging, a road, fill, and buildings. This wetland is not currently protected. This site should be high priority for preservation (Fenwick and Boone, 1984).

- *Christley Run Woods (DNR name: Christley Run).* This wetland was formed by a series of beaver ponds following a stream. It also contains seeps. It contains five plant species ranked S1-S3 (one S1, one S2, and three S3). This wetland was impacted by past logging and road fill. Although adjacent to the Savage River State Forest, this wetland is not currently protected. Recommendations include protecting the wetland from further degradation.
- *Finzel Swamp.* This peatland wetland is located in the headwaters of the Savage River. The eastern upland area contains an uncommon bird species. This wetland contains 26 species ranked S1-S3 (plants: five S1, three S2, six S3; invertebrates: two S1, one S3; vertebrates: five S1, two S2, and two S3). The northern portion of the wetland is protected by the Nature Conservancy. Audubon Maryland-DC identified this preserve during the Important Bird Areas Program. This wetland was also identified by Maryland Department of State Planning as an area of critical State concern that needs to be protected through private acquisition of the swamp and adjacent watershed and limits to surrounding development (MDP, 1981). This wetland used to be called Cranberry Swamp since people picked cranberries there (1984 Peatlands).
- *Mudlick Run.* This is a forested and shrub wetland following Mudlick Run. It includes six plant species ranked S1-S3 (one S1, three S2, one S3, and one historic species). There is livestock grazing in the northern portion of the wetland. The majority of this wetland is unprotected.
- *Pine Swamp East.* This is a high elevation peatland that provides water to Pine Swamp Run, which enters Savage River Reservoir (a public water supply and recreational area). This wetland has ten species ranked S1-S3 (plants: two S1, five S3; vertebrates: two S2, one S3). This wetland is negatively impacted by livestock grazing, logging, placement of road fill, and other agricultural activities, with impacts being more severe in the southern portion. Recommendations include removing current and potential impacts to this wetland and buffer to allow recovery. This site should be high priority for preservation (Fenwick and Boone, 1984).
- *Poplar Lick Swamp.* This wetland is a hemlock and great laurel swamp with beaver ponds in the southern end. There are seven species ranked S2-S3 (plants: two S2, two S3; invertebrates: one S2, one S3; vertebrates: one S2). Impacts include past deer-browsing (possibly in recovery), small roads, and selective logging. Some farms that are privately owned have been flooded by beaver activity. The northern portion of this wetland is protected by Savage River State Forest while the southern portion is protected by New Germany State Park. The middle section is currently unprotected.
- *Wilson Swamp (DNR name: Caroline Wilson Sanctuary Site).* This is a shrub wetland that contains three species ranked S2-S3 (plants: one S2, one S3; vertebrates: one S2). The Baltimore and Ohio Railroad is adjacent to the south. Impacts to the wetland include past livestock grazing resulting in soil disturbance and a cattail invasion. This wetland is currently unprotected.

There is one wetland, called Highest Bog, which is a candidate for State-designation of Nontidal Wetlands of Special State Concern as summarized from the document Far Western Maryland's Nontidal Wetlands of Special State Concern (Garrett and Allegany Counties). Highest Bog is an open wetland within a mature forest. It is spring fed and contains ten plant species ranked S2-S3 (three S2, five S3). There is a high-quality section of forest in the uplands to the east. Impacts include logging to the east and off-road vehicles to the north and east. This site is located on University of Maryland Western Maryland 4-H Center.

Existing Restoration Recommendations:

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

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect wetlands and streams within the headwaters.
- Protect wetlands within 500 feet around the Savage River State Forest.
- Protect WSSC and buffers, with special emphasis on Callahan Swamp and Pine Swamp East.
- Protect wetlands within DNR-designated Ecologically Significant Areas that are not already protected. For example:.
    - Headwaters of Toms Spring Run – a State-listed species.
    - Along the Little Savage River (around the Little Brown Lake Road dam) – a State-listed species.
    - Along Christley Run (upstream of Christley Run Woods WSSC) – a State-listed species.
    - Upstream of Callahan Swamp WSSC – a State-listed species.

<u>Youghiogheny River (05020201)</u>

Background

We are basing our calculations on the most recent DNR 8-digit watershed delineation, having different borders for this watershed than the previous version.

There are roughly 794 acres of water and 140,302 acres of land in the Garrett County portion of this watershed. The dominant land type is forest 93,902 acres (67%), roughly a fourth is agriculture 35,021 (25%), and a smaller amount of development 10,095 acres (7%). There are also 744 acres wetland (1%) and 440 acres barren land (<1%) (MDP, 2002 GIS). Since estimates of wetland acreage based on Maryland Department of Planning data is often largely underestimated, more accurate wetland estimates based on DNR wetland gis data is presented below.

Youghiogheny River Lake (on PA line with 593 acres in MD) and Herrington Lake (41.5 acres) are located in this watershed. There are two surface water community water supplies including an intake for Friendsville on the Youghiogheny River and an intake for Oakland from the Bradley intake. The Deep Creek Lake dam affects this river by releasing water even during summer low flow conditions.

The Youghiogheny River flows north from Maryland, to West Virginia, back to Maryland, and then to Pennsylvania. In Pennsylvania, it enters the Mononghela River and then the Ohio River. It is a fast moving River, with steep slopes and a rocky bottom. The Youghiogheny River contains excellent whitewater conditions. Of the 125 miles total of the River, 44 miles are in Maryland (MDE, 2001c). The entire length of the Youghiogheny River is a State-designated "scenic" river and a portion of this river (from Millers Run to the southern limit of Friendsville) is the only State-designated "wild" river. Swallow Falls State Park contains Muddy Creek Falls, the largest waterfall in Maryland. Fishing is popular within Swallow Falls State Park (YSWRLAB, 1996).

There is a State-designated Natural Heritage Area within this watershed, within DNR-owned land. It is called Toliver Run in Garrett State Forest. To get this designation, an area must contain threatened or endangered species and be the best Statewide examples.

The 100-year floodplain is as expected, being present along most waterways. An area that has a wider floodplain and may be of interest are Cranesville and Pine Swamp (on the West Virginia border).

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

- Lacustrine unconsolidated shore: 1 acre
- Palustrine
    - Aquatic bed: <1 acre
    - Emergent: 435 acre
    - Scrub shrub: 799 acres
    - Forested: 468 acres
    - Unconsolidated bottom: 269 acres
- Riverine unconsolidated shore: 5 acres
- Total: 1977 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)
05020201	-0.80	0.16	0	0	-0.64

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. This watershed is designated Use III-P, natural trout waters and public water supply.

Water Quality

A major municipal point sources within this watershed is near Oakland (discharging into the Youghiogheny River).

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. It was also classified as "Selected" Category 3, a pristine or sensitive watershed most in need of protection. Failed indicators included a 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 instream non-tidal habitat index, a high imperiled aquatic species indicator, trout spawning areas (8), a high percent of headwater streams occurring in Interior Forest (38%), a high percent of the watershed that is forested (74%), and two drinking water intakes.

According to the *2002 Maryland Section 305(b) Water Quality Report*, the Youghiogheny River has some sections that fully supports all designated uses (11 miles), some that do not support all designated uses (~16 miles, due to low pH from mining, and urban and agricultural runoff), and some that had inconclusive results (~9 miles). The Youghiogheny River had sections of high bacteria and high stream temperatures(2000). Of the wadeable tributaries to Youghiogheny River (stream order $\leq$ 4) some sections fully support all designated uses (~91 miles) while some do not (~114 miles, due to poor biological community and low pH due to mining, runoff, and unhealthy habitat). According to the 2000 Maryland Section 305(b) Water Quality Report, subbasins not supporting all designated uses included Snowy Creek, Herrington Run, Salt Block Run, Bear Creek, Buffalo Creek, and Mill Run. Herrington Lake does fully support all designated uses while Youghiogheny River Lake does not (due to metals from atmospheric 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:

- *Youghiogheny River*; pH, suspended sediments
- *Youghiogheny River Impoundment*; A TMDL was completed for methylmercury (in fish tissue).
- *Youghiogheny River Unnamed Tributary* (050202010005); poor biological community.
- *Snowy Creek* (050202010005); poor biological community
- *Cherry Creek* (050202010002); poor biological community
- *Cherry Creek* (050202010019); poor biological community
- *Herrington Run* (050202010009); poor biological community

- *Bull Glade Run* (050202010009); poor biological community
- *Murley Run* (050202010009); poor biological community
- *South Branch Bear Creek Unnamed Tributary* (050202010015); poor biological community
- *Unnamed tributary to Bear Creek* (050202010015); poor biological community
- *Salt Block Run* (050202010011); sedimentation
- *Laurel Run* (050202010017); poor biological community

The following information is based on the 2002 MDE document entitled *Total Maximum Dailey Loads of Mercury for Big Piney Run Reservoir (a.k.a. Frostburg Reservoir) Garrett County, Maryland: Draft*. Big Piney Run Reservoir is owned by the City of Frostburg. The land cover is 57% forest/herbaceous, 37% agriculture, 5% developed, and 1% water. This is a Use III-P waterway, but MDE has issued a fish consumption advisory due to the high mercury in fish tissue. Like the other waterways with high levels of mercury, much of this mercury is from atmospheric deposition. Coal-fired electric power plants, many of which are out-of-state, are thought to be the main source. There should be a reduction in this pollutant when the Clean Air Act laws reduce the atmospheric deposition from these sources.

There was also a water quality analysis completed for eutrophication of the Youghiogheny River (main stem). This analysis provided information to remove the Youghiogheny River from the 303(d) list for nutrients, since nutrients and dissolved oxygen levels are acceptable.

MBSS found BIBI of mostly good to fair, with some sites of poor to very poor. FIBI rankings were generally worse, being more evenly divided between good to very poor, with many poor and very poor sites scattered throughout.

As summarized by Lee et al. (1984), the Youghiogheny River is missing certain fish species that are found in the downstream Pennsylvania portion. This may be due to acid mine drainage killing the fish in the area and a dam preventing recolonization from downstream fish colonies.

Maryland Scenic and Wild Rivers: The Youghiogheny
The following information is based on the 1996 document entitled *Maryland Scenic and Wild Rivers: The Youghiogheny*. To maintain the integrity of this river, protection boundaries were established in buffers of the “wild” and “scenic” sections. In the “wild” section (from Millers Run to the southern limit of Friendsville), the protection boundary is called a “scenic corridor” and generally includes the buffer area visible from the river or adjacent shore. DNR manages this “scenic corridor” and is trying to acquire properties within this boundary from willing landowners. In the section not considered “wild” (the remaining portion of the river within Maryland) but still designated as “scenic,” the protection boundary is called the “study area.” This “study area” is a 1000-foot setback from the stream center and is managed by the County.

Most of the forest in this area was logged in the distant past (except Swallow Falls area) and has recovered. Some harvesting still occurs. There are over 31 sites within the river corridor containing species listed as rare, threatened, endangered, or in need of conservation. There are some naturally reproducing populations of Brown and Rainbow trout in the tributaries to the Youghiogheny River. The Youghiogheny River contains one of two rivers with native smallmouth bass within Maryland (Casselman River is the other). Acid mine drainage, sewage, and sediment (from agriculture and logging) had impacted fish populations in the past. Two areas were classified as Sensitive Management Areas: Round Glade Run to the Power Plant (except the Swallow Falls State Park day use area) due to sensitive species habitat and scenic quality and Gap Run to Laurel Run due to the undeveloped nature, sensitive species habitat, and scenic quality. The latter section should also be considered for the State-designation of "Wildland."

Water quality is generally good. The *MDE Maryland Water Quality Report 1987-1989* found that some sections of the river were impacted by Acid Mine Drainage, nutrients, sediment, sewage, and low dissolved oxygen. A large amount of nutrients and sediment enter the river from agriculture. New sewage treatment plants in Oakland (in 1988) and Crellin (in 1990) have reduced point source loads. To increase dissolved oxygen in water discharged from Deep Creek Lake, Pennsylvania Electric Company (Penelec) installed a weir below the dam (in 1994). Improvements to the Garrett County landfill, including a new landfill and treatment of leachate, were also completed to reduce pollution entering the river. Maryland Bureau of Mines found two areas where AMD was resulting in a pH of 5 or less: Laurel and Snowy Creeks (near Crellin, with discharge from West Virginia) and White Rock Run, Laurel Run, and Trap Run (south and southwest of Friendsville).

There is a lack of recreational facilities (i.e. bathrooms), loading/unloading areas for boats, and public access for fisherman. In 1976, DNR banned commercial activities within the corridor that might negatively impact the "wild" river.

Some of the goals specified by the plan are as follows:

- *Maintain/enhance water quality*
- *Protect the scenic and wild nature of the Youghiogheny River*
- *Protect agriculture*
- *Allow recreational use of the river corridor*
- *Protect rights of private property owners*
- *Protect natural, cultural, recreational areas*

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. The largest sections are around Pleasant Valley, including along the Youghiogheny River, White Meadow Run, Cherry Creek,

Camp Run, Ambrose Run, and Clark Run. Other smaller sections are along Bear Creek and around Rte. 40 (near Pine Springs).

Areas designated as Special Water Resource Areas are as follows:

- *Youghiogheny River Reservoir* (and adjacent Army Corp of Engineers land). The dam is in Pennsylvania, but the pooled water extends three miles into Garret County.
- *Youghiogheny River* (Wild and Scenic corridor)

Agricultural areas considered priority for preservation are designated Agricultural Resource Areas and include areas on prime farmland soils and farms located in an area that is predominantly agriculture. Development should be limited in these areas to one unit per three acres (except through clustering). According to the Garrett County Development Plan, important farming areas include:

- *West of Friendsville*
- *Accident area* (within and adjacent to)

To protect the natural resource areas, some are zoned Rural Resource Areas:

- The Youghiogheny River – from West Virginia border to Millers Run (500-foot wide buffer along both sides)
- Savage River State Forest: Private inholdings and surrounding 500 feet (Garrett County and Urban Research and Development Corp, 1995).

There is a large Green Infrastructure hub in the middle of this watershed. Some of this hub is protected by DNR and TNC, but large portions remain unprotected. Other hubs exist in the northern regions, also partially protected. According to the Maryland Greenways Commission, there are several existing and proposed greenways including:

- *Youghiogheny Scenic and Wild River.* This is an existing ecological greenway and water trail mainly owned by DNR. There is potential for the continuation of the existing ecological greenway and water trail.
- *Swallow Falls Greenway.* This is an existing recreational trail system.
- *Garrett State Forest Greenway.* This is an existing ecological greenway through Garrett State Forest, Swallow Falls SF, and Herrington Manor SP and a proposed greenway to connect the Northern Garrett State Forest Greenway with the isolated southern portion of the park.

The County suggested some additional greenway trails in the 1995 development plan:

- *Southern branch of Bear Creek*: From Accident to Friendsville, along an old railroad.
- *Youghiogheny Bikeway*: West of Oakland along the old B&O Railroad to connect with the Youghiogheny River Corridor.
- *Indian War Trail*: The historic trail known as the Great Warrior Path/McCullough' Trail, from Groman to Cranesville.

The following information is based on the document *Rural Legacy FY 2003: Applications and State Agency Review*. Approximately 31,437 acres in the northwestern portion of Garrett County, including the town of Accident, are designated as Rural Legacy area. This area includes many productive farms, State Forest, Cove Scenic Overlook, Bear Creek Fish Hatchery, and timberland. This area was chosen in order to protect productive

agriculture, forested land, view sheds, natural habitats, and waterways. This area is considered high risk for development since Deep Creek Lake is to the south and Keyser's Ridge/Interstate 68 are to the north, both expected to experience rapid development. There are 14,000 acres designated prime agricultural land, also designated "Agricultural Resource" so the potential lot size is regulated. The Youghiogheny River is on the western border. This is a State-designated "Wild and Scenic River," so this program will also improve the water quality and view shed. This Rural Legacy area also contains a lot of unprotected Green Infrastructure land. The sponsors are Garrett County Commissioners. The goal is to protect 7,500 acres through this program, which would equate to a third of this watershed being protected when State-owned land was included. The report also includes a list of property owners who are interested in selling an easement and the priority of acquiring these easements. Generally the intent of the Rural Legacy Program is to focus preservation efforts around historic and scenic roads, develop greenbelts, and add to large areas of already-protected lands. Since the Rural Legacy Program funds are not adequate enough to support all of these requests, other programs should consider preservation of these sites.

There is a project underway at Crelin Elementary School to mitigate for a mine seep (Mills, 2005). It will direct the seep water through a treatment wetland. The school also hopes to enlarge this wetland area and use it for educational purposes. Additionally, there is a nearby stream embankment that could use stabilization.

Protected lands include Savage River State Forest (in the north), Garrett State Forest (in the center), Mt. Nebo Wildlife Management Area, several smaller State-owned properties, two Nature Conservancy properties (Cranesville Swamp Preserve and John Friend Cave Preserve), several agricultural easements (throughout), a small County property, federally-owned Youghiogheny Reservoir (on the PA line), and three Maryland Environmental Trust properties.

There are several State-designated Nontidal Wetlands of Special State Concern in this watershed. As summarized from the document *Far Western Maryland's Nontidal Wetlands of Special State Concern*, general recommendations for these sites include protecting the wetland and its buffer from livestock access, logging, mining, new road construction, and changes in hydrology from development. Where powerline right-of-ways are within the wetland, it is recommended that herbicide applications be avoided. Since over-grazing from white-tailed deer is a problem in many wetlands, reducing deer populations is also recommended. Revegetation of disturbed areas and increasing forest cover in the drainage area is also desirable. General management of the rare species and site hydrology is also recommended. Beaver activity is to be encouraged. Information about the specific sites, including additional recommendations, is as follows:

- *Bear Creek North.* This roughly 20-acre wetland contains forested seeps on the eastern portion and six plant species ranked S1-S3 (one S1, one S2, four S3). This wetland supplies water to a State fish hatchery. Impacts include past grazing, past logging, and road fill. The northern portion of this wetland is within an agricultural easement, while the southern portion is completely unprotected.

- *Bear Creek South.* This wetland contains some bog vegetation and several seeps, including one large spring in the southern portion. It contains five plant species ranked S1-S3 (one S1, four S3). The northern portion is impacted by severe livestock grazing. There was logging in the past and herbicides are sprayed in a part of the wetland that is a powerline right-of-way. This area is currently unprotected. It is recommended that the wetland be protected, including the bog and southern seeps.
- *Buffalo Run Marsh.* This wetland contains species requiring circumneutral soil and has five plant species ranked S1-S3 (three S1, two S3). This area is underlain by limestone. Impacts include the large population of deer, past road maintenance and mowing, past livestock access, and a powerline right-of-way. It is protected by the Youghiogheny River Reservoir. It is recommended that the rare species be managed. Additional management should include control of the increasing cattail population.
- *Bull Glade Run (DNR combined with Murley Run).* Refer to the description for Murley Run, since these wetlands are contiguous.
- *Chisolm Run Swamps.* This wetland contains circumneutral soil and is located on agricultural land. It has three plant species ranked S2. The eastern side of the wetland is impacted by pasture drainage and livestock access and the northern side is impacted by a railroad. There is a small northwestern section that is protected by the State, otherwise it is unprotected. Recommendations include protecting invertebrate habitat.
- *Cranesville Swamp.* This wetland is on the western border of Maryland and has over half of the drainage area in West Virginia. It is rated as the best wetland in western Maryland. It is the largest wetland in the area, supports many good-quality habitats, and has over 26 species ranked S1-S3 (plants: three S1, five S2, six S3; invertebrates: three S1, two S3; vertebrates: one S1, five S2, one S3). There are also several interesting mammals in the wetland, including black bear, bobcat, and fisher. Impacts include past logging, livestock access, road fill, upland pasture and hay fields, a powerline right-of-way through the wetland, and heavy deer-browsing. Most of the wetland is protected by the Nature Conservancy, with small unprotected areas being a northeastern section and a southern section of this wetland. Recommendations include adding a southern portion of the swamp to the State-designated Nontidal Wetlands of Special State Concern list. Most of this southern swamp is protected by the Nature Conservancy, but this new State-designation would give the wetland additional regulatory protection.
- *Herrington Creek Headwaters Swamp.* This wetland is on the Maryland/West Virginia border. It contains seeps and areas of uncommon habitat, including sphagnum bogs. There are 14 species ranked S1-S3 (plants: two S1, three S2, six S3; invertebrates: one S3; vertebrates: two S2). Impacts include livestock access especially in the south, deer browsing in the western uplands, residential development and man-made ponds. This wetland is currently unprotected.
- *Herrington Lake South Tributary.* This is a forested wetland along a stream. There are six species ranked S1-S3 (plants: two S1, one S2, two S3; vertebrates: one S2). Impacts include heavy deer browse. This wetland is protected by the Herrington Manor State Park.

- *Herrington Lake Wetlands North.* This 63-acre site consisting of emergent, shrub, and forested wetland, is located on the edge of Herrington Lake Reservoir. There are five species ranked S1-S3 (plants: one S1, two S2, one S3; invertebrates: one S3). Impacts to the surrounding uplands include logging (there are several conifer plantations in the watershed), past agriculture, and a nearby road. This wetland is protected by Herrington Lake State Park. Recommendations include preserving the wetland habitat by restricting motorboats and reducing water level fluctuations.
- *Herrington Run.* This wetland is along an unnamed tributary to Herrington Run that contains beaver meadows, springs with circumneutral pH important to some species, and eight species ranked S1-S3 (plants: two S1, two S2, two S3; invertebrates: two S2). Impacts to the wetland include heavy deer browsing, past logging (with a Pine plantation in the eastern part of the tributary), and road fill. This wetland is protected by the Garrett State Forest. Recommendations include preserving the springs, rare species, and drainage area. Game management activities should be restricted in the wetland and buffer.
- *Hutton Switch Bog.* This wetland consists of small good-quality bog areas within the forest. There are seven plant species ranked S2-S3 (one S2, six S3). Impacts to the wetland include heavy deer browse and an abandoned road. This wetland is on the border of Garrett State Forest. Recommendations include increasing the already wide mature forested buffer and maintaining the hydrology.
- *Mount Nebo Wetlands.* This wetland consists of meadow and shrub thickets surrounding an abandoned beaver pond. There are 22 species ranked S1-S3 (plants: six S1, six S2, eight S3; vertebrates: two S2). Additionally, there are uncommon sphagnum mosses. Impacts include logging (in the uplands), fields, roads, holes blow in wetland with dynamite (to create open water habitat), a waterfowl impoundment to the south, and a powerline right-of-way. This wetland is protected by the Mount Nebo Wildlife Management Area. Recommendations include studying the hydrologic impacts of the waterfowl impoundment.
- *Murley Run.* This site consists of open wetland surrounding a stream and beaver ponds. There are 14 species ranked S1-S3 (plants: two S1, six S3; invertebrates: one S1, one S2, one S3; vertebrates: two S1, one S2). Impacts include road fill, removal of beaver dams, an old mine (only affecting a small portion) and stream channelization. Some springs along Bull Glade Run are impacted by agriculture and the uplands are impacted by logging. This wetland is mostly protected by Garrett State Forest. Recommendations include protecting the drainage area and restricting game management projects.
- *North Chisholm Run.* This six-acre seepage fed wetland contains six species ranked S1-S3 (plants: two S1, one S2; invertebrates: one S1, one S3; vertebrates: one S2). There is also a rare isopod in the adjacent spring. Impact to this wetland includes sedimentation from the B&O Railroad to the south and past upland logging. This wetland is protected by Maryland Department of Natural Resources. Recommendations include protecting the groundwater and avoiding development.
- *Piney Run Bog.* This 73-acre shrub wetland provides many high-quality habitats. It is at a high elevation and is surrounded by forest. It contains 11 species ranked S1-S3 (plants: one S2, five S3; invertebrates: one S3; vertebrates: two S1, one S2,

one S3) and provides habitat for black bear. Impacts include a powerline right-of-way and logging in the northeast. Some of this wetland and much of its forested drainage is protected by Garrett State Forest. This site should be one of the highest priority within this watershed for preservation (Fenwick and Boone, 1984).

- *Pronghorn Swamp.* This six-acre shrub and emergent graminoid wetland contains four species ranked S1-S3 (plants: one S2, one S3; invertebrates: one S3; vertebrates: one S2). Impacts include heavy deer browse and an old road in the eastern section of the drainage area currently used for recreation. This wetland is currently protected by Garrett State Forest.
- *Puzzley Run.* This forested riparian wetland on the Pennsylvania border is a State-designated Wildland. It contains several rare species and unusual habitat. This wetland is protected by the Savage River State Forest.
- *South Dunkard Lick.* This is a good-quality acidic forested wetland adjacent to a stream. This site includes three species ranked S2-S3 (plants: one S3; invertebrates: one S2, one S3). The drainage is mostly forested. Impacts include limited residential development in the uplands and past logging. Recommendations include protecting the drainage forest cover.
- *Swallow Falls Spring (DNR name: Lower Deep Creek Complex).* This is a spring-fed wetland containing four species ranked S1-S3 (plants: one S1; invertebrates: one S1, two S2). This site is mostly protected by Maryland Department of Natural Resources. Recommendations include protection of the spring.
- *The Little Mountain North Woods.* This high-elevation beaver pond wetland contains a healthy population of a very rare plant. The wetland is surrounded by forest and has been impacted by logging. This wetland is not protected.
- *Toliver Run NHA.* This peatland and forested wetland is in the headwaters of Toliver Run. It contains 10 species ranked S1-S3 (plants: one S1, five S3; invertebrates: one S2, one S3; vertebrates; one S2, one unknown). Impacts include an old road. This wetland is protected by the Toliver Run Natural Heritage Area.
- *Upper Salt Block Run.* This 40-acre emergent wetland contains four plant species ranked S2-S3 (one S2, three S3). Although these populations are of poor quality, they may be able to recover. Impacts include livestock access, logging, non-native plant species, changes in stream morphology, and soil compaction. This wetland is unprotected.
- *Upper Youghiogheny (DNR name: Youghiogheny Reservoir).* This floodplain wetland contains six species ranked S1-S3 (plants: two S1, one S2, two S3; vertebrates: one S1) and high-quality circumneutral spring habitat. Impacts include past logging and railroad fill on the western side. Impacts of fill on the eastern side of the wetland have destroyed the rare populations there. This wetland is not protected.
- *West Piney Run.* This is a high elevation forested wetland containing good-quality habitat and six species ranked S1-S3 (plants: one S1, two S3; vertebrates: one S1, one S2, one S3). This site is part of a large forested zone, which provides habitat for black bear and bobcat. Impacts include gravel roads and hunter campsites. This wetland is protected by Garrett State Forest.

- *Whale Swamp.* This 11-acre forested wetland and beaver ponds contains one S2-ranked vertebrate species. The drainage area is completely forested. Impacts include past logging and deer browsing. This wetland is protected by Garrett State Forest.
- *White Rock Glade.* This 23-acre linear bog, shrub, and forested wetland is the steepest-sided wetland in the area. It contains nine plant species ranked S2-S3 (one S2, eight S3). It borders West Virginia. Impacts include logging (most importantly in the headwaters), past mining in the northern section, an old road adjacent to the wetland used by off-road vehicles. This wetland is unprotected. Recommendations include restoring the wetland bottom and closing the adjacent road. This site should be high priority for preservation (Fenwick and Boone, 1984).
- *Youghiogheny River-Sang Run.* This riparian wetland contains the healthiest population of a plant species ranked S1. There is a narrow forested wetland buffer. Impacts include the recreation area and parking lots in the drainage. This area is currently unprotected. Recommendations include increasing the forest buffer.
- *Potential WSSC.* There are five potential WSSC located: within Garrett State Forest, two within the Youghiogheny River NEA, one north of Asher Glade (unprotected), and one within Savage River State Forest.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation, especially along the waterways.
- Restore wetlands and streams within the headwaters.
- Restore/create wetlands around the scenic and wild Youghiogheny River and around the Youghiogheny River Reservoir.

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways and within the large hub around Garrett State Forest.
- Protect wetlands and streams within the headwaters.
- Protect wetlands within 500 feet around the Savage River State Forest.
- Protect WSSC and buffers, especially White Rock Glade and Piney Run Bog.
- Protect additional wetlands within DNR-designated Ecologically Significant Areas that are not already protected. For example:
    - Wetlands along Glade Run (near Glade Road) – a State-listed species.
    - Wetlands along Glade Run and Buffalo Road – a State-listed species.
    - Along Mill Run (near Pine Springs) – a State-listed species.
    - Along Bear Creek – species or natural community of concern to DNR, but with no official status.
    - Near the intersection of Blooming Rose Road and Noah Frazee Road – species or natural community of concern to DNR, but with no official status.
    - Along White Rock Glade and White Rock Run – a State-listed species.
    - Along Salt Block Run – a State-listed species.

    - Adjacent to Herrington Creek Headwaters Swamp – a State-listed species.
    - Along Clark Run and the confluence with Cherry Creek – a State-listed species.
    - Along the Youghiogheny River (in the southern portion of the County) – species or natural community of concern to DNR, but with no official status.
    - Along Cherry Creek, near the confluence with Ambrose Run) – a State-listed species.
- Protect wetlands around the scenic and wild Youghiogheny River.
- Protect wetlands around the Youghiogheny River Reservoir.
- Protect land within the designated Rural Legacy Area.

Little Youghiogheny River (05020202)

Background

We are basing our calculations on the most recent DNR 8-digit watershed delineation, having different borders for this watershed than the previous version. This watershed has 205 acres of water and 26,009 acres of land. Of this land, the most dominant land uses are forest 11,302 acres (43%), and agriculture 10,064 acres (39%), with a smaller amount of developed 4,626 acres (18%). There is also a small amount of wetlands (<1%) (MDP 2002 GIS). Since estimates of wetland acreage based on Maryland Department of Planning data is often largely underestimated, more accurate wetland estimates based on DNR wetland gis data is presented below. This watershed is one of the lowest two watersheds in this County for forest cover. Lake Broadford (138 acres) is located in this watershed.

The 100-year floodplain is as expected, being present along most waterways. An areas that has a wider floodplain and may be of interest is the Little Youghiogheny River between Mountain Lake Park and Loch Lynn Heights.

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

- Palustrine
    - Emergent: 148 acre
    - Scrub shrub: 145 acres
    - Forested: 37 acres
    - Unconsolidated bottom: 134 acres
- Total: 464 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)
05020202	-1.49	1.52	0	0	0.03

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. This watershed is designated as follows:

- Broad Ford Run and all tributaries above dam: Use I-P, water contact recreation, protection of aquatic life, and public water supply.
- Youghiogheny River and all tributaries connected to this river: Use III-P, natural trout waters and public water supply.

Water Quality

There is one surface water community water supply, withdrawing from Broadford Lake for Oakland. There is a major water discharge between Mountain Lake Park and Loch Lynn Heights (discharging into the Little Youghiogheny River).

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. It was also classified as Category 3, a watershed in need of protection. Failed indicators included a low non-tidal instream habitat index, high amount unforested stream buffer (67%), and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included trout spawning areas (8), a high percent of headwater streams occurring in Interior Forest (65%), and a drinking water intake. According to the 2000 305(b) Water Quality Report, Lake Broadford does not fully support all designated uses due to seasonally low oxygen in the deeper areas.

According to the *2002 Maryland Section 305(b) Water Quality Report*, the Little Youghiogheny River fails to fully supports all designated uses due to bacteria from urban runoff and natural sources. The wadeable tributaries to the Little Youghiogheny River (stream order ≤ 4) does fully support all designated uses. Lake Broadford fails to support all designated uses due to high nutrients and low oxygen from nonpoint, upstream and natural sources, and high sediment oxygen demand. According to the 2000 Maryland Section 305(b) Water Quality Report, subbasins not supporting all designated uses included

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

- *Little Youghiogheny River* (mouth to Mountain Lake); fecal coliform.
- *Little Youghiogheny River*; suspended sediments. A TMDL has been completed for nutrients.
- *Little Youghiogheny River* (050202020025); poor biological community.

- *Unnamed tributary to Ford Run* (050202020026); poor biological community.
- *Broadford Lake*; methylmercury in fish tissue from atmospheric deposition. A TMDL has been completed for nutrients.
- *Unnamed tributary to the Little Youghiogheny* (050202020004); poor biological community
- *Trout Run* (050202010003); poor biological community

The following information is based on the 1999 MDE document entitled *Total Maximum Daily Loads of Phosphorus to Broadford Lake, Garrett County, MD*. Broadford Lake provides drinking water to Oakland and recreation (swimming and picnic areas). This lake is located on Broadford Run and drains into Mountain Lake and then into the Little Youghiogheny River. The lake watershed is mostly forest/herbaceous cover (63%), followed by agriculture (25%), development (9%), and water (3%) (based on Maryland Department of Planning data). A water quality study found low dissolved oxygen levels and nuisance algae associated with elevated phosphorus. The TMDL recommended a 38% reduction in phosphorus loads entering Broadford Lake. Since there are no point sources in this drainage area, this reduction must come from non-point sources.

The 2003 MDE document entitled *Water Quality Analysis for Broadford Lake in Garrett County, Maryland DRAFT* suggested the removal of Broadford Lake from the 303(d) List for Mercury impairment.

The following information is summarized from the 2000 MDE document entitled *Total Maximum Daily Loads of Carbonaceous Biochemical Oxygen Demand (CBOD) and Nitrogenous Biochemical Oxygen Demand (NBOD) for the Little Youghiogheny River*. This waterway was designated as Use III-P, but low levels of dissolved oxygen impaired this waterway. The source of this low dissolved oxygen was originally thought to be nutrients. Upon closer inspection, Biochemical Oxygen Demand (including CBOD and NBOD) was found to be the main impairing pollutant. There are two point sources that contribute large amounts of nutrients and BOD to this system, Trout Run WWTP and Deer Park Spring Water discharge. In the future, the National Pollutant Discharge Elimination System (NPDES) should set stricter permit limits on these point sources. Some of the BOD also comes from non-point sources. Best Management Practices, like those used to reduce nutrients, should also be used to reduce BOD from non-point sources.

All MBSS samples within this watershed were ranked good to fair for BIBI and good to poor for FIBI.

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 around the developed areas of Mountain Lake Park and Loch Lynn Heights (e.g. Trout Run and other waterways).

Agricultural areas considered priority for preservation are designated Agricultural Resource Areas and include areas on prime farmland soils and farms located in an area that is predominantly agriculture. Development should be limited in these areas to one unit per three acres (except through clustering). According to the Garrett County Development Plan, an important farming areas is Oakland/Mt. Lake Park and Deer Park (north, east and south). An area designated as Special Water Resource Areas is Broadford Lake (and adjacent City of Oakland land) (Garrett County and Urban Research and Development Corp, 1995).

This watershed has part of a Green Infrastructure hub on the side of Boone Mountain and another hub near Broadford Lake, both mostly unprotected.

Protected land includes County-owned Broadford Lake, small portions of Mt. Nebo Wildlife Management Area and Potomac State Forest, a private conservation property, and several agricultural easements.

There are several State-designated Nontidal Wetlands of Special State Concern in this watershed. As summarized from the document *Far Western Maryland's Nontidal Wetlands of Special State Concern*, general recommendations for these sites include protecting the wetland and its buffer from livestock access, logging, mining, new road construction, and changes in hydrology from development. Where powerline right-of-ways are within the wetland, it is recommended that herbicide applications be avoided. Since over-grazing from white-tailed deer is a problem in many wetlands, reducing deer populations is also recommended. Revegetation of disturbed areas and increasing forest cover in the drainage area is also desirable. General management of the rare species and site hydrology is also recommended. Beaver activity is to be encouraged. Information about the specific sites, including additional recommendations, is as follows:

- *Altamont Swamp.* This 30-acre semi-open wetland has several good-quality seeps and springs and contains seven species ranked S1-S3 (plants: one S1, two S2, three S3; vertebrates: one S2). Impacts include a past pasture and non-native species in the northeastern section and past logging in the wetland as a whole. The northern section of this wetland is protected by the Maryland Ornithological Society. Recommendations include protecting the springs, seeps, and current forest cover. This site should be high priority for preservation (Fenwick and Boone, 1984).
- *Boiling Springs Woods.* This forested wetland contains circumneutral pH springs 13 species ranked S1-S3 (plants: three S1, four S2, four S3; vertebrates: one S1, one S2). A portion is old-growth forest. Impacts include past logging and old roads. This wetland is not protected. Recommendations include protecting the springs and forest. This site should be high priority for preservation (Fenwick and Boone, 1984).
- *West Deer Park Meadow.* This 10-acre shrub wetland is located west of Deer Park, an area with high development pressure. It contains one plant species ranked

S2. Impacts include past farming, past logging, and new residential development. This wetland is not protected.

Existing Restoration Recommendations:

- Restore gaps within Green Infrastructure to natural vegetation, especially along waterways.
- Restore wetlands and streams within the headwaters.
- Create/restore wetlands designed to reduce BOD within the Little Youghioheny River.
- Create/restore wetlands designed to reduce phosphorus entering Broadford Lake.

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect wetlands and streams within the headwaters.
- Protect WSSC and buffers, with special emphasis on Boiling Springs Woods and Altamont Swamp.
- Protect wetlands associated with Broadford Lake.
- Protect DNR-designated Ecologically Significant Areas that are not already protected, for example:
    - Along Broadford Run – species or natural community of concern to DNR, but with no official status.
    - Along Block Run – species or natural community of concern to DNR, but with no official status.
    - Within Pleasant Valley – a State-listed species.

<u>Deep Creek Lake (05020203)</u>

Background

There are 37,242 land acres in this watershed. Roughly half the land is in forest (57%), a fifth of the land is agriculture (22%) and development (21%) (MDP, 2002 GIS). This watershed is one of the lowest two watersheds in this County for forest cover and the highest watershed for development. The 3,518-acre Deep Creek Lake 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: 1 acre
- Palustrine
    - Emergent: 479 acres
    - Scrub shrub: 595 acres
    - Forested: 547 acres
    - Unconsolidated bottom: 71 acres
- Total: 1692 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)
05020203	-0.19	0	0	0	-0.19

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. This watershed is designated Use III-P, natural trout waters and public water supply.

Water Quality

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 Category 3, a watershed in need of protection. Failed indicators included low non-tidal fish and benthic indexes of biotic integrity, low instream habitat index, and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high imperiled aquatic species indicator, trout spawning areas (8), a high percent of headwater streams occurring in Interior Forest (31%), and a high percent of forest (76%). According to the 2000 305(b) Water Quality Report, Deep Creek Lake does not fully support all designated uses due to seasonally low oxygen in the deeper areas.

According to the *2002 Maryland Section 305(b) Water Quality Report*, Cherry Creek fails to fully support all designated uses due to low pH and low oxygen from mining and natural sources (i.e. peat drainage). Roughly two-thirds of the wadeable tributaries (stream order ≤ 4) fail to fully support all designated uses due to poor biological community from mining and poor habitat. The remaining wadeable tributaries miles had inconclusive results. Deep Creek Lake fails to fully support all designated uses due to high nutrients, low oxygen, and high metal concentration from nonpoint sources and, atmospheric deposition. Since the majority of water discharge from Deep Creek Lake passes through the hydroelectric plant, stream flow below the dam is very low[2000].

The 2004 303(d) List contains basins and subbasins that have measured water quality impairment. The basin/subbasin name, subbasin number (if applicable), type of impairment, and possible causes (if known) are as follows.

- *Deep Creek Lake*; fecal coliform, nutrients. A TMDL has been completed for methylmercury in fish tissue (due to atmospheric deposition)
- *North Glade Run* (050202030027); poor biological community

- *Unnamed tributary to Deep Creek Lake* (050202030027); poor biological community
- *Cherry Creek*; A TMDL has been completed for low pH due to acid mine drainage

A Total Maximum Daily Load for Mercury in Deep Creek Lake was submitted in 2002. Information from this document is as follows. Deep Creek Lake is designated a Use III-P water. However, MDE issued a public fish consumption advisory due to the high mercury levels in fish tissue. This high mercury is mainly due to atmospheric deposition from coal-fired electric power plants out-of-state. This pollutant should be less than the total maximum daily loads when current and proposed Clean Air Act laws are established.

The following information is based on the 2002 MDE document entitled *Total Maximum Daily Loads to Address Low pH in Cherry Creek in the Deep Creek Watershed*. This watershed is 7,900 acres and consists of 69% forest, 10% agriculture, 12% wetlands, and 9% urban (based on 2000 MDP data). The upper reaches of this creek are naturally acidic, low gradient, and shallow while the lower reaches are high gradient. In the early 1900s, naturally reproducing brook trout populations existed here. However, in 1957 there was a reported fish kill caused by low pH. DNR monitoring after that time showed poor of fish and benthic macroinvertebrates populations. Aquatic life is improving recently due to lime dosing. Use III-P waterways require pH between 6.5 and 8.5. Cherry Creek has pH values below these levels. Some of this low pH is due to natural causes in the watershed, including the presence of natural peat bogs and the lack of acid-neutralizing limestone geology. However, some areas of Cherry Creek watershed are impacted due to acid mine drainage and acid deposition. Although there are no active mines, past activities need to be mitigated to reduce the acidity concentrations.

Deep Creek Lake Recreation and Land Use Plan
The following information is based on the 2001 document entitled *Deep Creek Lake Recreation and Land Use Plan*. The area now occupied by Deep Creek Lake was historically quality habitat that included wetland, bog, and conifer-lined streams. Deep Creek Lake was created in 1925 as a hydroelectric project. Maryland Department of Natural Resources currently owns and manages (with the help of the Deep Creek Lake Policy and Review Board) the lake and surrounding buffer area. This lake should be managed for power supply and lake recreation within the Deep Creek area, and aquatic resources and whitewater recreation where it discharges into the Youghiogheny River. Deep Creek Lake has a surface area of 3,900 acres and 65 miles of shoreline. As mentioned, DNR owns a buffer around the lake of varying width that is managed for resource conservation. Some permitted uses are allowed in this buffer, including boat docks and improvements (e.g. walkways and temporary structures). There is some problem with the illegal removal of natural vegetation within this buffer by adjacent property owners. 90% of this shoreline has been impacted. Shoreline erosion is a concern and is thought to have increased in recent years (although not verified). Many homes in this area are vacation or second homes. There is interest in determining the social carrying capacity (i.e. the number of people that can use the lake at one time without reducing the recreational enjoyment by feeling too crowded) versus the physical carrying

capacity (i.e. the number of people that the region can support). In an effort to reduce the recreational use in the lake itself, the plan encourages developing recreational opportunities on land. The lake is underlain by Greenbrier Limestone, which helps to buffer the lake from acidity. Soils in the region have many limitations with the most common being highly erodibility and stoniness.

Based on 1989 through 1991 baseline DNR water quality data, the lake generally has soft water, low nutrients, and low levels of phytoplankton and zooplankton. For these reasons, this lake was classified as being oligotrophic or a young lake (where eutrophication was not yet a problem). More localized regions of the lake, receiving more runoff, may have different water quality. Low dissolved oxygen was found in the deeper portions of the lake. In order to preserve water quality and fish/wildlife resources, some of the issues that need to be addressed are as follows:

- *New development*. This will be the largest future impact.
- *Shoreline erosion*. Caused by natural conditions and boat wakes, this process results in the loss of valuable buffer and adds sediment to the lake.
- *Vegetative buffers along shoreline and streams*. Maintain existing forested buffers and encourage voluntary restoration of forested buffers. This will help maintain water quality and reduce habitat fragmentation and loss.
- *Failing septic systems*.
- *Best Management Practices*. Use BMPs for activities that may affect the water.
- *Discharge permits*. When issuing permits for discharge, carefully consider all possible impacts.
- *Chemical Pollution*. (e.g. lawn, household, vehicle chemicals).
- *Acid Mine Drainage*. Continue State and private projects to mitigate for damage caused by mining activities.
- *Flow characteristics of Lower Deep Creek*. Restore flow characteristics as much as possible.
- *Rare, threatened, and endangered species*.
- *Monitoring*. Monitor water quality and fish population.
- *Education*.

In some areas, accumulation of sediment and submerged aquatic vegetation (SAV) within the lake limits recreation use. In these cases, permits may be issued for dredging of channels and dock areas, and mechanical clipping of SAV. Areas of dense SAV are mainly located in the southern coves: Green Glade, Hoop Pole, Beckman's, Holy Cross, North Glade, and Pawn Run. Some coves may be completely clogged with SAVs in the peak summer growth period: Crescent Shores, Hickory Ridge, Green Glade, Paradise Ridge.

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:

- Smaller sites adjacent to Deep Creek Lake (which may already be developed).
- Large areas in the northern section of the watershed, around The Glades and Cherry Creek.

Deep Creek Lake (and adjacent Penelec land) is designated as Special Water Resource Area (Garrett County and Urban Research and Development Corp, 1995). Development should be limited to one unit per acre to maintain high recreational value, preserve water quality, and control siltation.

There is a large amount of Green Infrastructure hub in the northern portion of this watershed, largely unprotected (except some DNR-owned Deep Creek Lake SP and TNC land). Since this region is at high risk for development, protecting this hub should be high priority. According to the Maryland Greenways Commission, an existing greenway is Deep Creek Lake State Park/Meadow Mountain. This is a recreational trail system on the northeast side of Deep Creek Lake.

Protected areas are mainly Deep Creek State Park in the center of the watershed, two Nature Conservancy properties (Hammel Glade Preserve and the Glades Preserve), several agricultural easements, and one Maryland Environmental Trust property.

There are several State-designated Nontidal Wetlands of Special State Concern in this watershed. As summarized from the document *Far Western Maryland's Nontidal Wetlands of Special State Concern*, general recommendations for these sites include protecting the wetland and its buffer from livestock access, logging, mining, new road construction, and changes in hydrology from development. Where powerline right-of-ways are within the wetland, it is recommended that herbicide applications be avoided. Since over-grazing from white-tailed deer is a problem in many wetlands, reducing deer populations is also recommended. Revegetation of disturbed areas and increasing forest cover in the drainage area is also desirable. General management of the rare species and site hydrology is also recommended. Beaver activity is to be encouraged. Information about the specific sites, including additional recommendations, is as follows:

- *Anvil Bog.* This 43-acre mostly open site contains beaver dam pools, sedge meadows, oligotrophic peatland, and forest, with some areas being high-quality and others being degraded by mining activities. It also contains 15 species ranked S1-S3 (plants: three S2, eight S3; invertebrates: one S1, one S3; vertebrates: two S2). This wetland was once part of a large wetland complex on upper Cherry Creek. Impacts include mining, livestock grazing, and a White Pine plantation in the eastern portion and north of Mosser Road. There is an acid seep affecting the bog and poor vegetative density in upland sections. This wetland is not protected. Recommendations include protecting the western portion of the site.
- *Cross Camp Cove (DNR combined with Potato Farm Coves).* This 14-acre wetland, located on Deep Creek Lake, contains fairly alkaline pH soils and three plants species ranked S2. Impacts include development, agriculture, and roads.

This wetland has a buffer but neither the wetland nor the buffer are protected. Recommendations include reducing sedimentation and habitat loss.

- *The Glades (the portion within this watershed is now called Rock Lodge Macrosite by DNR).* This 137-acre wetland in the headwaters of North Branch Casselman River includes habitats of sphagnum, sedge and graminoid meadows, shrub and forest. It contains 19 species ranked S1-S3 (plants: on S1, five S2, six S3; invertebrates: two S1, one S3; vertebrates: two S2, two S3). There is a former peat mine converted to a lake in the northern end and drainage ditches throughout the wetland. Other impacts include past logging and livestock grazing, and old roads. The southern section of this wetland is protected by the Nature Conservancy. According the 1984 document entitled "The Peatlands of Western Maryland," this site contains Maryland's largest bog (at 70-acres) (1984, Peatlands). Although a few springs contribute water, it is largely precipitation-fed. Fire is a natural part of this system's ecology. As Maryland's only peat-mining facility, much of the eastern section was destroyed by it. Within this watershed, this site should be the highest priority for preservation (Fenwick and Boone, 1984). While the peat mining destroyed one type of habitat, it created valuable lake habitat for large numbers of waterfowl (Nelson, 2006).
- *Hammel Glade.* This 216-acre wetland is located along part of Red Run. It contains many diverse high-quality habitats including forest, shrub, bog, and circumneutral springs. It also contains more State endangered plant species than any other Western Maryland wetland and 19 species ranked S1-S3 (plants: five S1, six S2, five S3; invertebrates: one S3; vertebrates: one S1, one S2). It is impacted by logging, livestock access (currently in the northern section), deer browse, commercial development along Rte. 219, and residential development in the other areas (especially Foster Road). The southwestern section of this wetland is protected by the Nature Conservancy, who uses beaver baffles to reduce flooding on adjacent fields. The remaining portion is not protected. Within this watershed, this site should be the highest priority for preservation (Fenwick and Boone, 1984).
- *Keystone Swamp.* This 16-acre mostly shrub wetland is just north of Hammel Glade. It contains a bog with five species ranked S2-S3 (plants: one S2, three S3; vertebrates: one S2). Impacts include logging and mining in the uplands and stream sedimentation from crushing of limestone. This wetland is not protected. Recommendations include protecting the groundwater.
- *McHenry Wetland South.* This wetland consists of high-quality forest and open wetland within an upland forest. It contains many springs and seeps and 12 species ranked S2-S3 (plants: two S2, eight S3; invertebrates: one S2; vertebrates: one S3). Impacts include widespread past logging, spots of current logging, several logging roads. This wetland is not protected. Recommendations include protecting the hydrology, rare species, and remote nature.
- *Meadow Mountain Run Swamp.* This 46-acre sedge and grass wetland contain acidic and neutral water, and six species ranked S1-S3 (plants: one S2, two S3; invertebrates: one S3; vertebrates: one S1, one S2). Impacts include white pine plantations in the uplands, heavy deer browse, and past livestock access (with a small amount of livestock grazing still occurring). Only a small western section of

this wetland is protected by Deep Creek Lake State Park. The remaining area is not protected. Within this watershed, this site should be the second highest priority for preservation (Fenwick and Boone, 1984).

- *Negro Mountain Powerline Bog.* This 11-acre wetland contains three plants species ranked S3. There is a powerline crossing the wetland at a bog location. There are large adjacent areas of forest and several other wetlands in the area. Impacts include past logging and livestock access on a small amount of the wetland. This wetland is not protected.
- *North Cherry Creek Bog.* This 154-acre diverse wetland has 24 species ranked S1-S3 (plants: one S1, four S2, twelve S3; invertebrates: one S1, one S3; vertebrates: one S1, three S2, one S3). Impacts include sedimentation in the north portion from a strip mine (with some toxic seeps), mining on the south side, logging in the uplands, livestock grazing, and cattail invasions in some bogs. This wetland is not protected. Recommendations include protecting of the soil and hydrology and restoring the buffer. Within this watershed, this site should be the third highest priority for preservation (Fenwick and Boone, 1984).
- *Potato Farm Cove.* Refer to description for Cross Camp Cove, since they are connected.
- *Rock House Bog.* This 13-acre acidic high-quality forest and bog wetland contains six plant species ranked S1-S3 (one S1, five S3). Impacts include a road dissecting the wetland, past and recent logging of uplands, smaller roads, toxic seeps in the upland, and residential development in the northern and western sections. This wetland is not protected. Recommendations include protecting the water.
- *Rock Lodge Macrosite (The majority of this site is now called Meadow Mountain Bog North by DNR).* This 545-acre wetland contains 18 species ranked S1-S3 (plants: two S1, three S2, eight S3; invertebrates: two S2, one S3; vertebrates: one S1, one S3). This diverse wetland provides habitat for black bear and bobcat. Impacts include logging in the uplands, logging roads, reclaimed mines, red pine plantations, mining fill and seep, livestock access (near Rock Lodge Road). The southern portion of the wetland has only one private owner while the northern section is protected by the Nature Conservancy.

Existing Restoration Recommendations:

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

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways.
- Protect wetlands and streams within the headwaters.
- Protect WSSC and buffers, especially Hammel Glade, Meadow Mountain Run Swamp, and North Cherry Creek Bog.
- Protect additional wetlands within DNR-designated Ecologically Significant Areas that are not already protected.
- Protect wetlands associated with Deep Creek Lake.

Casselman River (05020204)

Background

There are 58,207 land acres in this watershed. The main land use is forest (68%), followed by agriculture (24%) and development (7%) (MDP, 2002 GIS). Cunningham Lake (20 acres) is located in this watershed.

This river flows north and is in the Monongahela River Watershed. There are roughly 20 miles from the Maryland headwaters to the Pennsylvania line. This river is a slow, meandering river with some riffles. This river is one of only two rivers supporting native smallmouth bass in Maryland (YSWRLAB, 1996). The watershed contains no active mines, but there historically were deep mines and strip mines, some of which have been reclaimed (MDE, 2000b).

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: 302 acre
    - Scrub shrub: 335 acres
    - Forested: 183 acres
    - Unconsolidated bottom: 169 acres
- Riverine unconsolidated shore: 3 acres
- Total: 994 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)
05020204	-0.90	0.39	0	0.40	-0.11

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. This watershed is designated as follows:

- Piney Creek and all tributaries upstream of Church Creek: Use I-P, water contact recreation, protection of aquatic life, and public water supply.
- South Branch of Casselman River (upstream of confluence with North Branch Casselman River), Piney Creek and all tributaries from PA line to Church Creek (including Church Creek): Use III, natural trout water.

Water Quality

A drinking water intake for Frostburg withdraws from the Piney Reservoir.

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. It was also classified as a "Selected" Category 3, a pristine or sensitive watershed most in need of protection. Failed indicators included high soil erodibility (0.30) and being on the 303d List for water quality impairment. Indicators suggesting need for preservation included a high non-tidal instream habitat index, a high non-tidal fish index of biotic integrity, a high imperiled aquatic species indicator, trout spawning areas (8), a high percent of headwater streams occurring in Interior Forest (35%), a high percent of forest (75%), and a drinking water intake. According to the 2000 305(b) Water Quality Report, Cunningham Lake does not fully support all designated uses due to low pH, possibly due to acid deposition.

According to the *2002 Maryland Section 305(b) Water Quality Report*, Casselman River fully supports all designated uses. The wadeable tributaries (stream order ≤ 4) fail to fully support all designated uses due to poor biological community from poor habitat and changes in hydrology. Roughly 11 miles of the wadeable tributaries miles had inconclusive results. Cunningham Lake fails to fully support all designated uses due to low pH from atmospheric deposition. Big Piney Reservoir (Frostburg Reservoir) fails to fully support all designated uses due to metal partially from atmospheric deposition.

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

- *Casselman River*; pH.
- *Casselman River* (050202040034); poor biological community.
- *Casselman River Unnamed Tributary* (050202040034); poor biological community.
- *North Branch of Casselman River* (050202040030); poor biological community.
- *South Branch of Casselman River* (050202040033); poor biological community.
- *South Branch of Casselman River* (050202040031); poor biological community.
- *Little Shade Run* (050202040034); poor biological community.
- *Little Laurel Run* (050202040033); poor biological community.
- *Big Piney Reservoir*; Methylmercury (in fish tissue).

A water quality assessment of eutrophication was conducted for the Casselman River. Information from the resulting document is as follows. It is designated a III-P river, which means dissolved oxygen values should never drop below 5.0 mg/l and should not drop below 6.0 mg/l during the day (except due to natural causes). This river does not show signs of eutrophication and nutrients are not an impairment at this time. Therefore, this River was taken off the 303(d) List for nutrient related impairment.

MBSS samples found fish and benthic IBI of mostly fair, but ranged from good to very poor.

Restoration/Preservation

Hydric soils suggest where wetlands are currently or were historically. Areas with hydric soils that are no longer wetlands may be good potential sites for wetland restoration. While the amount of hydric soils in this watershed is low in comparison to other parts of Maryland, opportunities for wetland restoration still exists (based on MDP Natural Soils Groups GIS data and NWI/DNR wetlands data). Many of these sites are located along waterways (e.g. Twomile Run, Piney Creek, confluence of South Branch Casselman and Little Laurel Run). Larger areas with hydric soils that are not mapped wetlands include:

- Meadow Run
- confluence of Shade Run, Spiker Run, and North Branch Casselman River
- around Bittinger
- at the southernmost portion of the watershed (around Pleasant Valley 4-H Center), including around the Glades and the headwaters of South Branch Casselman River.

An area designated as Special Water Resource Area is Piney Reservoir (and adjacent City of Frostburg land). Agricultural areas considered priority for preservation are designated Agricultural Resource Areas and include areas on prime farmland soils and farms located in an area that is predominantly agriculture. Development should be limited in these areas to one unit per three acres (except through clustering). According to the Garrett County Development Plan, an important farming area is the Grantsville area (within and adjacent to). To protect natural resource areas, some are zoned Rural Resource Areas, including Savage River State Forest: Private inholdings and surrounding 500 feet (Garrett County and Urban Research and Development Corp, 1995).

This watershed has designated Green Infrastructure hubs in more than half of the watershed, with larger hubs around the outer edges and smaller hubs and corridors near Grantsville. Large sections of GI hub on the southeast and west are protected but there is little protected land in the rest of the watershed. Some southern GI hubs have “gaps” of agricultural land, presenting opportunities to restore natural vegetation. According to the Maryland Greenways Commission, an existing greenway is Savage River Greenway. This ecological greenway runs through Savage River State Forest, Potomac River State Forest, Big Run State Park, New Germany State Park, and Finzel Swamp Reserve. The County suggested an additional greenway trail in the 1995 development plan. Casselman Railroad would be a 7-mile rail-to-trail conversion from Little Crossings and Route 40 intersection to the Pennsylvania border, and development of a heritage center in Little Crossings

There is a project underway to mitigate for acid mine drainage in the Casselman River (Lyons, pers. Comm.).

Protected areas include: Savage River State Forest (on the east and west sides of the watershed), two Nature Conservancy properties (Wolf Swamp Preserve and a portion of the Glades Preserve), a Maryland Environmental Trust property, and several agricultural easements.

There are several 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:

- *Amish Road Swamp (DNR combined with Negro Mountain Bog Complex).* This 38-acre wetland has several habitat types including high-quality bog, stream, beaver dams, shrub, and forest. It also contains seven plant species ranked S1-S3 (one S2, six S3). Impacts include past fires, logging, off-road vehicles (in the northern section), non-native plant species (i.e. white spruce escaped from an eastern plantation), and heavy deer browse. This wetland is not protected but is surrounded on three sides by the Savage River State Forest. Recommendations include protecting the wetland and invertebrate habitat.
- *Big Laurel Run Swamp.* This 10-acre linear wetland contains two species ranked S2-S3 (plants: one S2; vertebrates: one S3). Impacts include acid mine drainage (especially from the upstream section), logging in the uplands, and a powerline right-of-way through the wetland. This wetland is mostly protected by Savage River State Forest.
- *Brenneman Hill Swamp.* This 4-acre wetland consists of communities of forest, shrub, bog, and sedge. This wetland also contains several seeps and seven plant species ranked S2-S3 (two S2, five S3). Impacts include past logging, past agriculture, a field on the western side, and a roadbed on the southern side. This wetland is not protected.
- *Casselman River Macrosite (DNR name: Casselman River – Grantsville).* This linear wetland contains seeps, springs, floodplain habitats, and several uncommon species. Impacts include logging, new roads, new residential development, agriculture, mining (in the drainage), off-road vehicles (on the east side), and a sewage treatment plant downstream. This site is not protected.
- *Crab Run Floodplain (DNR name: Casselman River – Grantsville).* This nutrient-rich wetland is fed by circumneutral pH springs and contains a high diversity of species, including on plant species ranked S3. Impacts include livestock grazing and logging. This wetland is not protected.
- *Cunningham Lake South (DNR combined with Cunningham Swamp).* This wetland contains one bird species ranked S1. Impacts include off-road vehicles in the buffer and heavy deer browsing. This wetland is within the University of Maryland Pleasant Valley 4-H Center.
- *Cunningham Swamp.* This 134-acre shrub wetland contains 14 species ranked S1-S3 (plants: two S1, two S2, eight S3; vertebrates: two S2). Impacts include logging, livestock grazing, and mining in the uplands, an acid seep, and cattail invasion (in the southern section). This wetland is also with the University of Maryland Pleasant Valley 4-H Center. Within this watershed, this site should be the third highest priority for preservation (Fenwick and Boone, 1984).

- *East Negro Mountain Bog.* This small wetland contains one invertebrate species ranked S2. This wetland is on the North Branch of the Casselman River and is not protected.
- *Negro Mountain Bog (DNR combined with Negro Mountain Bog Complex).* This 14-acre wetland contains several high-elevation acid-loving plants and nine species ranked S2-S3 (plants: one S2, seven S3; vertebrates: one S2). Impacts include logging in the uplands. This wetland is not protected.
- *Negro Mountain Bog-Accident (DNR name: Negro Mountain Bog Complex).* This 46-acre high-elevation wetland contains 12 species ranked S2-S3 (plants: one S2, eight S3; vertebrates: two S2, one S3). It also contains habitat for black bear and bobcat. Impacts include past logging of uplands and heavy deer browsing. This wetland relatively remote and is protected by Savage River State Forest.
- *Piney Creek Swamp (DNR name: Piney Creek).* This small spring-fed wetland contains three plant species ranked S2-S3 (one S2, two S3). Impacts include livestock grazing and past logging. This wetland is not protected.
- *The Glades.* This 137-acre wetland in the headwaters of North Branch Casselman River includes habitats of sphagnum, sedge and graminoid meadows, shrub and forest. It contains 19 species ranked S1-S3 (plants: on S1, five S2, six S3; invertebrates: two S1, one S3; vertebrates: two S2, two S3). There is a former peat mine converted to a lake in the northern end and drainage ditches throughout the wetland. Other impacts include past logging and livestock grazing, and old roads. The southern section of this wetland is protected by the Nature Conservancy. According the 1984 document entitled "The Peatlands of Western Maryland," this site contains Maryland's largest bog (at 70-acres) (1984, Peatlands). Although a few springs contribute water, it is largely precipitation-fed. Fire is a natural part of this system's ecology. As Maryland's only peat-mining facility, much of the eastern section was destroyed by it. Within this watershed, this site should be the highest priority for preservation (Fenwick and Boone, 1984). While the peat mining destroyed one type of habitat, it created valuable lake habitat for large numbers of waterfowl (Nelson, 2006).
- *Wolf Swamp.* This 83-acre emergent, shrub, and forest wetland contains high-elevation species and 29 species ranked S1-S3 (plants: four S1, four S2, six S3, one possibly extinct; invertebrates: two S1, one S2, three S3; vertebrates: three S1, five S2). This wetland is associated with Red Run. Impacts include past logging, deer browse, abandoned farms and homes (in the uplands), and a powerline crossing (at the southern edge). The northern and southern tips of this wetland are protected by Savage River State Forest, but the center is not protected. The site also contains uncommon and rare nesting birds (1984, Peatlands). Within this watershed, this site should be the second highest priority for preservation (Fenwick and Boone, 1984).
- *Potential WSSC.* There is one potential WSSC located just west of Savage River State Forest (along the South Branch Casselman River). This site is unprotected.

One wetland, called Amish Road Swamp, is a candidate for State-designation of Nontidal Wetlands of Special State Concern as summarized from the document Far Western Maryland's Nontidal Wetlands of Special State Concern (Garrett and Allegany Counties).

Amish Road Bog is a linear wetland that is contiguous to the Nontidal Wetlands of Special State Concern named Amish Road Swamp. It contains six plant species ranked S3. Impacts include past logging, heavy deer browsing, an old logging road on the western side (possibly encouraging non-native plant invasion). The drainage for this wetland is forested. This site is protected by the Savage River State Forest.

Existing Restoration Recommendations:

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

Existing Preservation Recommendations:

- Protect portions of Green Infrastructure that are not currently protected, especially along waterways and the large hubs.
- Protect wetlands and streams within the headwaters.
- Protect wetlands within 500 feet around the Savage River State Forest.
- Protect the designated Special Water Resource Area of Piney Reservoir
- Protect WSSC and buffers, especially Cunningham Swamp, The Glades, and Wolf Swamp. Areas near Deep Creek Lake will be under high development pressure, so may be especially vulnerable.
- Protect additional wetlands within DNR-designated Ecologically Significant Areas that are not already protected, for example:
    - Around Piney Reservoir, Piney Creek, and Twomile Run – a State-listed species.
    - Along Meadow Run and Red Run – a State-listed species.
    - Along the headwaters of the South Branch Casselman River – a State-listed species.
    - Along North Branch Casselman River (near Legeer Road) – species or natural community of concern to DNR, but with no official status.
    - Near the intersection of Rock Lodge Road and Accident Bittinger Roads – a State-listed species.
    - Near Negro Mountain Bog – a State-listed species.