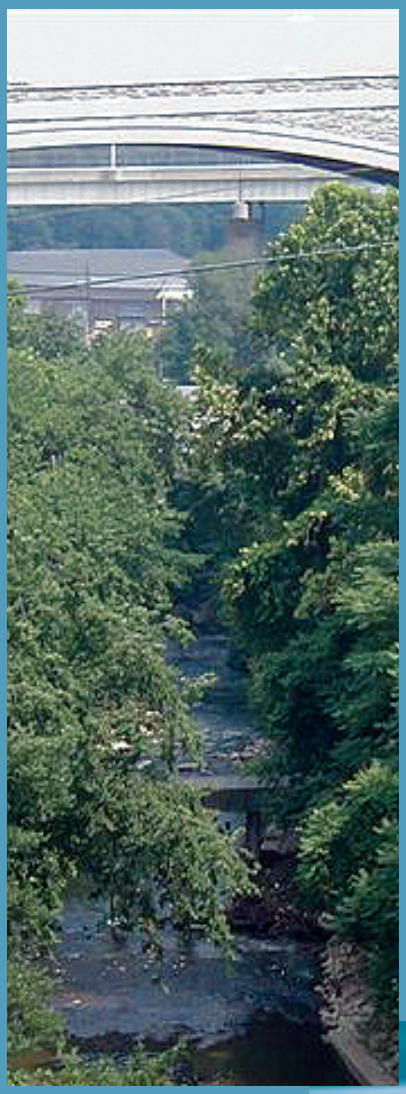
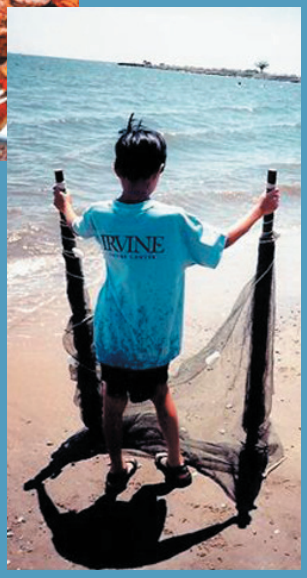


State of Our Watersheds

The 2004 watershed conference for the Baltimore region

November 20, 2004

College of Notre Dame ❧ Baltimore, Maryland



Sponsored by the Baltimore DPW and Baltimore County DEPRM

STATE OF OUR WATERSHEDS
THE BALTIMORE REGION
NOVEMBER 20, 2004

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INTRODUCTION

This report marks the second collaboration between Baltimore County Department of Environmental Protection and Resource Management (DEPRM) and Baltimore City Department of Public Works (DWP) in presenting the State of Our Watersheds. These two jurisdictions share in many ways the responsibility for the water resources in the Baltimore region. This report contains information regarding the monitoring and restoration programs managed by Baltimore City DPW and Baltimore County DEPRM.

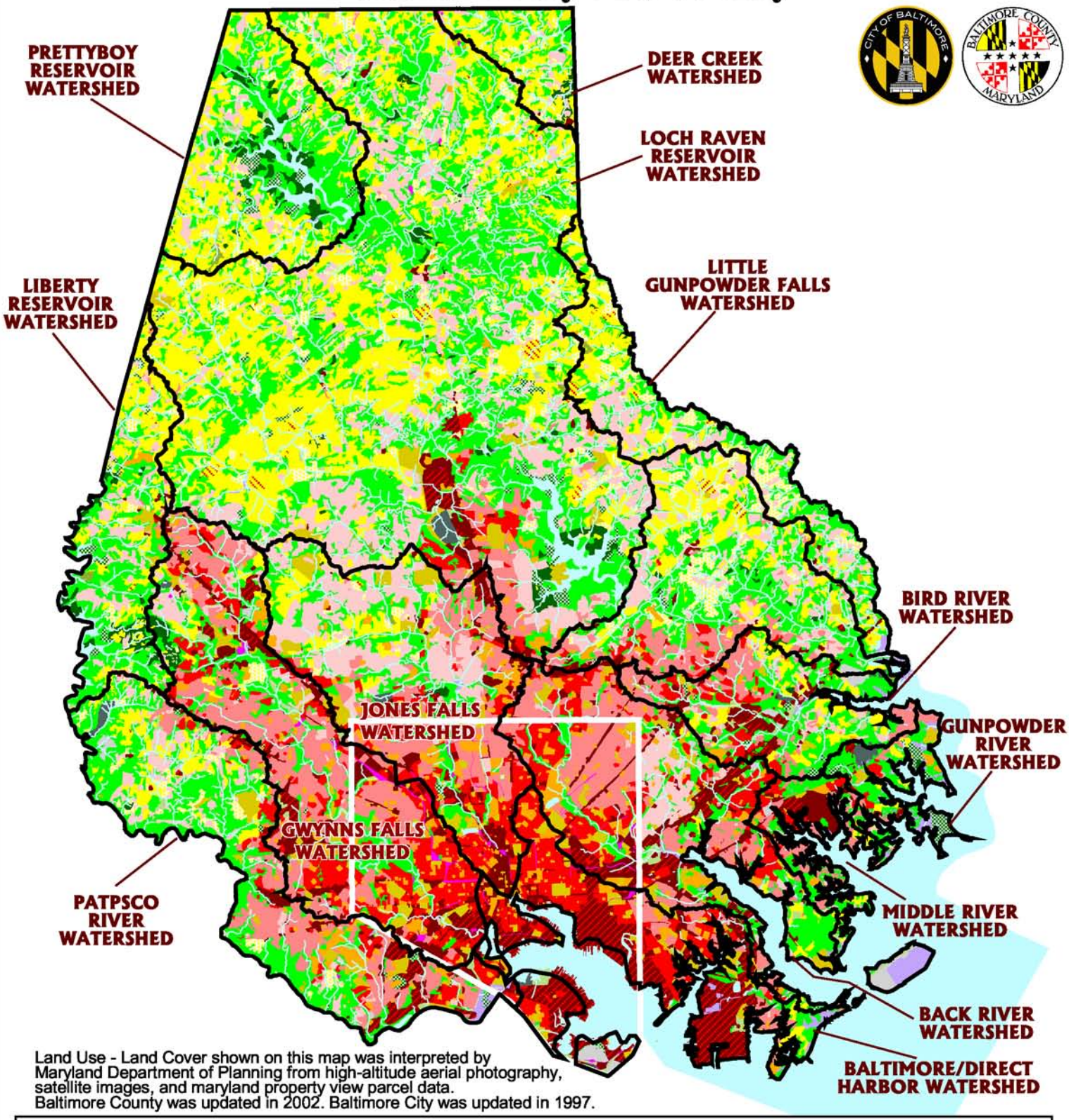
Three drinking water reservoirs, owned by Baltimore City, are located either partially or entirely within Baltimore County's jurisdiction. These reservoirs supply the drinking water requirements of 1.8 million people. Protection of these watersheds is essential to maintaining drinking water, which continually exceeds high water quality standards.

Several of the streams that empty into Baltimore's Inner Harbor, a premier visitor's destination, emanate from lands in Baltimore County. We understand the concept that everything goes downstream, but at the Inner Harbor we can see it. The accrual of all the chemical and physical degradation in these watersheds accumulates at the Inner Harbor.

Many other streams, in our urban neighborhoods, are not even visible. Urban development has buried them into piped systems that transport stormwater underground. However these streams, as do all our streams, eventually reach the Chesapeake Bay. A healthy ecosystem, thriving in the Chesapeake Bay, is one of the underlying goals throughout all of Baltimore's water quality programs.

Please use this report as a general guide in assessing the direction of water quality in the Baltimore Region. This report contains a sample of monitoring programs and restoration actions within our shared watersheds. Actions initiated at the local government and community level are extremely effective and the combined efforts will eventually result in improvement in the state of our watersheds throughout the Baltimore region.

Land Use - Land Cover
Baltimore City and County



Land Use - Land Cover shown on this map was interpreted by Maryland Department of Planning from high-altitude aerial photography, satellite images, and maryland property view parcel data.
Baltimore County was updated in 2002. Baltimore City was updated in 1997.

LEGEND

- Low Density Residential
- Medium Density Residential
- High Density Residential
- Commercial
- Industrial
- Institutional
- Urban Open Space
- Pasture
- Feeding Operation
- Agricultural Facilities
- Cropland and Row Crops
- Watersheds
- Orchard
- Brush
- Deciduous Forest
- Mixed Forest
- Evergreen Forest
- Streams
- Water
- Wetland
- Transportation Structures
- Extractive Industrial
- Bare Ground

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BALTIMORE COUNTY MONITORING PROGRAMS

Introduction

Baltimore County has developed an integrated monitoring program to meet regulatory and non-regulatory program requirements, support watershed planning efforts, and to assess the effectiveness of restoration. Chemical, physical and biological components of stream systems are monitored. These components are monitored for regulatory programs which include; the National Pollutant Discharge Elimination System (NPDES) – Municipal Stormwater Discharge Permit Program, the Total Maximum Daily Load (TMDL) Program, and stream restoration permit requirements. The non-regulatory programs include the Chesapeake Bay Tributary Strategy Program and Coastal Zone Management. A brief description of each monitoring program element is provided below.

The monitoring programs provide information on the existing condition of stream water quality and channel stability, biological resources, and to help determine trends.

NPDES Permit Monitoring

The current NPDES – Municipal Stormwater Discharge Permit is Baltimore County's second five-year permit. It runs from June 15, 2000 through June 15, 2005. The permit specifies monitoring requirements that are detailed below. Additional non-specified monitoring requirements are included in the permit in general terms, such as, monitoring Best Management Practice (BMP) for effectiveness. Our entire monitoring program addresses the non-specified monitoring requirements.

Long Term Monitoring Site – Spring Branch

Baltimore County initiated the required NPDES long-term, storm event monitoring site in the fall of 1995 at Spring Branch within the Loch Raven watershed. The monitoring at this site includes storm event and baseflow (dry weather flow), chemical, biological (both macroinvertebrate and fish assemblage), and stream geomorphology at established cross-sections. The data are used to assess the pollutant load reductions for nitrogen, phosphorus, and sediment, following stream restoration.

Stormwater Management Design Manual Effectiveness – Windlass Run

The NPDES permit requires monitoring of a subwatershed for geomorphologic impacts resulting from development utilizing the revised Stormwater Management Design Manual (effective 2000). The results of a countywide screening for a suitable location, followed by field verification led to the selection of Windlass Run as the monitoring subwatershed.

The Windlass Run subwatershed has the potential for a large area of future development. The level of imperviousness in the subwatershed is currently about 3 % and is expected to increase to over 20%. The extension of MD route 43, currently under construction, will open this area to development. The level of future development in the Windlass Run subwatershed would be expected to have a severe impact on the water quality and the channel stability without stormwater controls. Stormwater management for the development that will occur in this subwatershed will be designed in accordance

with the new Stormwater Management Design Manual. The new stormwater management requirements should be more protective of the environment. This study will determine the level of protection that is provided by the new requirements.

The geomorphic monitoring consists of a channel cross section measurement, a channel slope/profile measurement and a Wolman pebble count. Fish assemblage and macroinvertebrate monitoring sites have been established. A water level gage has been installed to measure changes in the discharge rate. Chemical monitoring will occur at the gage site to determine changes in pollutant concentrations and loads that result from the future development of the Windlass Run subwatershed.

Illicit Connection Monitoring

The County is required to screen a minimum of 200 storm drain outfalls annually for the purposes of detecting and removing unpermitted discharges to the storm drain system. The Watershed Management and Monitoring Section of DEPRM is responsible for performing the outfall screenings, reporting screening data, and coordinating remedial actions. However, specific correction measures may be the responsibility of either the Department of Public Works (DPW), DEPRM, or both, depending upon the nature and sources of detected discharges. If there are indications that existing permit limits are being exceeded or that there are unpermitted, but allowable discharges, the cases are referred to the Maryland Department of the Environment (MDE) for permitting or enforcement. Water main leaks are referred to Baltimore City Department of Public Works for correction. Because chlorine is extremely toxic to the fauna in a stream, it is of particular concern when leaks or discharges occur from the public distribution system. Sanitary sewer leaks are referred to Baltimore County Public Works for correction.

Chemical and Discharge Monitoring

Chemical monitoring provides a snapshot of the chemical condition of the streams within Baltimore County at the time of the sample. In association with the measurement of stream flow it is possible to calculate the pollutant loads for each of the measured chemicals. The chemical condition of the stream water is usually different between dry weather flow (baseflow) and storm flow. The programs described below are designed to measure water quality for both weather conditions. The data will allow a determination of current (ambient) water quality and, over time, any trends in water quality.

Baseflow Monitoring Program

Baltimore County initiated a baseflow monitoring program in 1999. The initial effort was targeted at watersheds that were undergoing, or about to undergo, Water Quality Management plan preparation. In 1999, the targeted watersheds included the Lower Gunpowder, the Little Gunpowder, the Middle River and the Baltimore Harbor watersheds. The data was used in the calibration of the SWMM pollutant load models that were included in the Water Quality Management plans. In the fall of 2000, the baseflow monitoring was shifted to the Back River, Jones Falls and Gwynns Falls watersheds. The shift was intended to address the lack of chemical monitoring information available for these watersheds. These watersheds were monitored until the spring of 2001. Insufficient staff curtailed the continuance of the baseflow monitoring program until the spring of 2003.

The baseflow monitoring program, which resumed in 2003, was also redesigned. Baseflows are monitored in the Patapsco/Back River Basin in odd-numbered years, while the Gunpowder Basin/Deer Creek will be monitored in the even-numbered years. Approximately ten sites in each of the six watersheds in the Patapsco Back River Basin were selected and monitored in 2003. During 2004, 62 sites distributed over 7 watersheds in the Gunpowder Basin/Deer Creek are being monitored. The sites are planned to be monitored from six to eight times during the sampling year.

This design will allow the County to determine ambient water quality of major portions of each watershed. The two-year sampling cycle will also allow an analysis of baseflow water quality trends for the pollutant parameters analyzed.

Chemical Trend Monitoring Program

The Chemical Trend Monitoring Program was initiated in 2003 as a pilot program. The monitoring is conducted at US Geological Survey (USGS) gage sites throughout Baltimore County. Grab water quality samples will be collected during both baseflow and storm events to represent the range of flow experienced at the gages. Twenty to thirty grab samples will be collected at each gage during the course of each calendar year. The discharge (flow) data for each gage will be obtained from USGS and the chemical monitoring results matched to the discharge based on the time and date of sampling. The data will be analyzed to determine the relationship between pollutant concentration and discharge rate at each gage for each pollutant. The equation derived from the analysis will then be applied to the annual discharge data for each gage to derive the pollutant concentrations for each fifteen-minute interval. The data will then be converted to pollutant loads to determine the annual pollutant load delivery at each gage. The yearly data will be analyzed for trends in both the pollutant concentrations and the pollutant loads.

Joint Agency Monitoring

During the past year the City of Baltimore and Baltimore County worked together to achieve benefits from cooperative opportunities. These agencies, along with Carroll County and the Maryland Department of Natural Resources met twice to exchange information and discuss ways that they could collaborate and optimize their stream monitoring efforts in the two counties and the City. This will be a continuing effort.

Also, this year City and County staff conducted two joint sampling events. Following a written protocol, staff from both agencies met at several stream locations and jointly took baseflow samples. These samples were subsequently taken to their respective laboratories for analysis. The results will allow comparison of the data collected and analyzed by the labs. The objective is to demonstrate and achieve sampling data in the future that will be comparable between the two agencies.

Finally, Baltimore County and the City of Baltimore have collaborated over the past two years to produce the November State of Our Watersheds Conference and report.

Tidal Waters Monitoring Program

Baltimore County has had a tidal recreational water monitoring program since 1990. The program is administered by the Department of Environmental Protection and Resource Management – Environmental Health Section. The program has historically

focused on fecal coliform concentrations but has recently switched to enterococci as the bacteriological indicator. The beach swimming standard of 35 MPN is used for comparison purposes to assess the general bacteriological water quality. Fecal coliform and E. coli may be measured in the event of a sewage spill/release to provide as much information as possible to characterize the potential public health threat. Starting in 2002 surface water quality samples were obtained at seven tidal water sites representing the various major tidal basins in Baltimore County.

Stream Geomorphologic Monitoring

Geomorphologic monitoring refers to the measurement of the physical characteristics of the stream (stream width, depth, various bank stability measures, etc.) The data are used to determine the physical stability of the stream channel.

Stream Stability Assessments

A component of the Water Quality Management Plans prepared for eight of the fourteen watersheds in Baltimore County is an assessment of stream stability using stream geomorphologic measurements. This monitoring allows the County to determine the miles of degraded stream channel in need of restoration. The eventual goal is to assess all the streams within the County.

Stream Restoration Geomorphologic Monitoring

The stream restoration permit requirements by the U.S. Army Corps of Engineers and the Maryland Department of the Environment include post construction monitoring of each project. Monitoring is also utilized to determine if the project met its goals. Post construction monitoring also provides feedback that enables improvement of subsequent project designs and construction approaches.

Post construction monitoring requires periodically collected field data – usually annually for 2 to 5 years and occasionally additional monitoring after large storms. In most cases, channel cross sections are monumented and surveyed at points along the project. For multi-year surveys plots are overlaid (current over prior year(s)) to detect any changes in morphology that may have occurred between these periods. Other components that may be included in the monitoring plan and report include: bed material characterization via the Wolman pebble count procedure, inspection of the condition of any riparian plantings, visual inspection of the degree of channel erosion or deposition etc., and photographing the channel and banks at key locations.

Biological Monitoring

In addition to the biological monitoring required at Spring Branch under Baltimore County's NPDES permit, the County has three additional biological monitoring programs. These programs use the biological community to assess the ecological health of the streams within the County (Probabilistic Monitoring Program), assess the effectiveness of stream restoration projects (CIP Monitoring Program), and provide data on the best streams in Baltimore County to serve as bench marks (Reference Site Monitoring Program) and a fourth volunteer based monitoring program (Stream Watch Program) will be implemented in the near future. The assessments are based on the benthic macroinvertebrate community and fish assemblage. It is widely accepted that

the biological community composition of streams is sensitive to human disturbances. By monitoring the biological community, the County can assess the amount of change due to human impacts and the benefit of stream restoration to the organisms in the streams.

Volunteer Biological Monitoring

Baltimore County has, in the past, contracted with Maryland Save Our Streams (SOS) to collect benthic macroinvertebrate samples at 144 sites throughout the County. Maryland Save Our Streams used citizen volunteers to collect samples all across the County at fixed stations using the EPA Rapid Bioassessment II Protocols. This included sampling with a kick seine, sorting a minimum of 150 organisms from a sample in the field, and identification to the taxonomic family level. The contract was completed on June 30th, 2002. The results from this program were presented at last year's conference.

Future volunteer biological monitoring opportunities will be available through the "Stream Watch Program" that is currently being developed and biological monitoring associated with the development of the Action Plans.

Probabilistic Macroinvertebrate Monitoring – 100 Random Points

The County has determined that adopting the MBSS methodologies and identification to the taxonomic genus level will result in data that is directly comparable with State generated data. This will expand upon the available data for assessing County waters. Randomly selected sites for monitoring (probabilistic monitoring) will allow statistically valid statements regarding the state of the waters.

The County has contracted with a consultant to perform the probabilistic monitoring. Each year a different basin will be sampled, the Patapsco/Back River basin will be sampled in odd numbered years, and the Gunpowder River Basin and Deer Creek watershed will be monitored in even years. One hundred sites will be selected at random for each year's sampling efforts. One hundred sites were randomly selected from the stream miles in the Patapsco/Back River Basin for sampling in 2003 and 100 sites were selected for the Gunpowder/Deer Creek Basins for 2004. The contractor samples these 100 sites for macroinvertebrates during the spring index period, March 1 to April 30, using the protocols for the Maryland Biological Stream Survey (MBSS). The County is currently in the process of randomly selecting the sites for biological sampling of the Patapsco/Back River Basins for the spring of 2005. A Benthic Index of Biotic Integrity (BIBI) has been calculated for the samples collected in 2003 that describes the condition of the biological community in the streams of the County. The 2003 results are presented later in this report.

Capital Improvement Projects Monitoring

Baltimore County has been monitoring benthic macroinvertebrates in conjunction with several capital improvement stream restoration projects. Monitoring is performed in the stream segments where the restoration will take place. The segments are monitored pre- and post-construction to document any change in the biological community. Eight sites are currently being monitored under this program.

Starting in spring of 2003 the sampling protocols were changed from kick-net sampling as per U. S. Environmental Protection Agency (USEPA) Rapid Bioassessment Protocols II (RBP II) to d-net sampling as per MBSS. Samples are taken during the

spring index period, March 1 to April 30, and are identified to genus or the lowest possible taxonomic level.

The permits for a number of stream restoration projects require biological monitoring for both benthic macroinvertebrates and fish assemblage. The current projects with these requirements are Minebank Run Phase II stream restoration, Un-named Tributary to Jones Falls near Wood Valley and East Branch Honeygo Run. The pre-construction samples have been collected.

Reference Site Monitoring

Baltimore County has been monitoring eight reference sites in the County since spring of 2001. GIS was used to identify watersheds within the County that contained greater than 50% forested land use and less than 20% urban land use. Based on the GIS data, 21 sites met the land use criteria and were selected for chemical and physical habitat analysis. These sites were then evaluated for physical habitat and chemical grab samples were taken. After the initial assessment and using criteria based on the physical habitat and chemical results, thirteen of the sites were eliminated.

The remaining eight sites were then sampled for benthic macroinvertebrates in the spring, summer and fall of 2001 and 2002. Sampling was performed according to USEPA RBP II. This sampling methodology uses a kick seine collection method with picking a minimum of 150 organisms in the field. The samples were identified in the laboratory to genus or the lowest practical taxonomic level. In the spring of 2003 sampling protocols were changed to MBSS protocols.

BALTIMORE CITY MONITORING PROGRAMS

Reservoir In-Lake Program

Goal/Purpose: 1) Monitor in-lake water quality to determine water quality problems and monitor trends related to restoration and /or perturbations (e.g., development, drought) in the watershed. 2) Better understand the environmental conditions that result in algal blooms and taste, odor problems and disinfection byproducts. 3) Determine the relationship between in-lake stations and raw water at the treatment plants.

Scale: (3) 8 digit watersheds

Approach/Description: Water chemistry and chlorophyll a

There are 11 in-lake reservoir monitoring stations distributed among the City's three reservoirs. At each of these stations, a vertical series of samples and field measurements are taken at discrete depths in the water column. Most stations, including the primary sampling stations located near the raw water withdrawal intakes, are sampled in all seasons. The primary stations are sampled more frequently than the other stations.

Loch Raven and Prettyboy Reservoirs

The samples taken at Loch Raven and Prettyboy Reservoirs are analyzed at the Water Quality Lab at Montebello. The personnel at this lab calculate percent saturation of dissolved oxygen for all the samples submitted based on the field measurement of dissolved oxygen at the same depth the sample was taken. The following parameters are measured for all samples submitted: apparent color in color units, manganese in mg/l, ammonia-nitrogen in mg/l, nitrate-nitrogen in mg/l, total phosphorus in mg/l, turbidity in ntu, and total algae count in number per milliliter.

Liberty Reservoirs

The samples taken at Liberty Reservoir are analyzed at the Water Quality Lab at Ashburton. The personnel at this lab calculate percent saturation of dissolved oxygen for all the samples submitted based on the field measurement of dissolved oxygen at the same depth the sample was taken. All of the parameters mentioned below are done for each of the samples from station NPA0042. The following pattern generally holds for the other three stations whenever they are sampled:

- The following parameters are measured for all samples submitted: dissolved solids in mg/l; ammonia-nitrogen in mg/l; nitrite-plus-nitrate-nitrogen in mg/l; total phosphorus in mg/l; and turbidity in ntu.
- The following parameters are measured for only samples from the surface at each station: chlorides in mg/l; alkalinity in mg/l; hardness in mg/l; manganese in mg/l; and iron in mg/l.
- The following parameters are measured for only samples from the surface and 10 foot below surface at each station: total algae count in number per ml.

Reservoir Tributary Program

Goal/Purpose: 1) Monitor trends in nutrient and sediment loadings and relate these to activities in the watershed (drought, development, restoration) 2) Relate tributary loadings to receiving water data 3) Identify pollutant sources.

Scale: Small watersheds

Approach/Description: Water chemistry, flow data

Water Quality Lab at Ashburton: alkalinity in mg/l; chlorides in mg/l; ammonia-nitrogen in mg/l; nitrite-nitrogen in mg/l (no longer analyzed); nitrate-nitrogen in mg/l (no longer analyzed); nitrite-plus-nitrate-nitrogen in mg/l; dissolved phosphorus in mg/l (no longer routinely done); total phosphorus in mg/l; dissolved solids in mg/l; suspended solids in mg/l; turbidity in ntu. The following parameters are calculated by personnel in the Water Quality Lab at Ashburton: dissolved oxygen percent saturation; and total solids in mg/l.

The following parameters are sometimes measured by the Water Quality Management Office personnel in their lab: suspended solids in mg/l; chlorophyll-a in μg/l; and conductivity in μmhos.

Wet weather monitoring:

The following parameters are measured by personnel in the Water Quality Management lab: conductivity in μmhos; and suspended solids in mg/l. The following parameters are measured by personnel from the Water Quality Lab at Ashburton on only those samples indicated by the Water Quality Management section: ammonia-nitrogen in mg/l; nitrite-nitrogen in mg/l (no longer analyzed); nitrate-nitrogen in mg/l (no longer analyzed); nitrite-plus-nitrate-nitrogen in mg/l; dissolved phosphorus in mg/l; and total phosphorus in mg/l.

NPDES Stormwater Program

Goal/Purpose: 1) Characterize stormwater discharges from an outfall draining a specific landuse and an associated in-stream station 2) Monitor trends in loadings and relate these to changes in the watershed (e.g., development, restoration)

Scale: Medium residential watershed

Approach/Description: water chemistry, flow

A minimum of 12 storm events are monitored per year at both stations and baseline samples are collected monthly. Automated samplers are used to collect discrete samples and samples are selected to represent the ascending ,peak and descending limbs of the storm.

Data uses: characterize runoff and impacts to receiving streams; estimate pollutant loads; calculate EMCs

NPDES Dry Weather Program

Goal/Purpose: Conduct chemical screening downstream of all major storm sewer outfalls during dry weather in order to detect and eliminate significant illicit discharges to the

streams 2) Measure changes in ambient water quality associated with changes in the watershed (e.g., restoration).

Scale: 4 large watersheds

Approach/Description: water chemistry, flow measurements

Collect monthly stream samples at 37 sites distributed amongst the 4 major watersheds in Baltimore City.

Street Sweeping Program

Goal/Purpose: Test the effectiveness of street sweeping as a BMP for pollution removal
Scale: Large watershed

Approach/Description: Chemical Analysis

Pilot watershed upstream of the NPDES Stormwater stations was selected for bi-monthly sampling. A representative solid and liquid sample is collected and analyzed for a select group of parameters.

Biological Monitoring Program

Goal/Purpose: 1) To monitor trends in macrobenthological and fish communities in City streams associated with restoration and /or environmental perturbation. 2) Measure health of living resources for targeting restoration.

Scale: entire city

Approach/Description: The approach is a probability-based stratified random sampling design using Maryland Biological Stream Survey (MBSS) guidelines. The sampling method is a multi-habitat, twenty-sweep, dip-net approach that the State uses in coastal plain and non-coastal plain regions. This is the beginning of a three-year rotation, focusing on the Jones Falls watershed during the first year.

Stream Restoration Program

Goal/Purpose: Maximize the water quality in a small watershed using efforts that are definable with measurable effects.

Scale: 3 Small sub-watersheds, 10.9 sq. mi.

Approach/Description: Watershed Restoration plans have been developed for 3 sub-watersheds, Moores Run, Stony Run and Maidens Choice.

PARAMETER DESCRIPTION AND RESULTS

Nutrients: Nitrogen & Phosphorus

Nitrogen and phosphorus are requirements for the survival of all organisms. These elements are essential components of proteins, genetic material, chlorophyll and energy transfer systems. Other elements, such as calcium, magnesium and potassium, also serve as nutrients and are required components for sustaining life, but these elements are needed in much smaller quantities and are generally not limiting.

Nitrogen cycles in a fairly complex process through inorganic and organic phases. The atmosphere, which is 78% N_2, serves as a major reservoir of inorganic nitrogen. Nitrogen in this form is not directly usable by the majority of organisms. There are some forms of bacteria and cyanobacteria (blue-green algae) that are able to fix the inorganic nitrogen to form nitrate (NO_3^-). Lightning can also convert atmospheric nitrogen to nitrate. Nitrate is then available for incorporation into plant and bacterial tissues. Other bacteria associated with plants, such as legumes, are able to convert atmospheric nitrogen directly to organic compounds.

Another nutrient essential for life is phosphorus. Phosphorus is required for the energy transfer system in organisms (ADP, ATP), nucleic acids (DNA, RNA) and other organic compounds. Unlike nitrogen, there is no atmospheric reservoir of phosphorus. The main natural source of phosphorus is from the decomposition of bedrock to form soil. Thus, much of the phosphorus may be bound in minerals and unobtainable by organisms. Through acidification, and under anaerobic conditions, the bound phosphorus may be converted to soluble phosphorus in the form of PO_4 (ortho-phosphorus).

Either of these nutrients can be the limiting nutrient for plant growth. Nitrogen is typically the limiting nutrient in natural terrestrial ecosystems. In freshwater ecosystems, phosphorus is typically the limiting nutrient. In estuarine systems, either nitrogen or phosphorus may be limiting, depending on the conditions. Nitrogen is limiting for marine systems. In any system other factors may also be limiting for plant growth including precipitation and other trace nutrients.

In natural ecosystems there generally is a balance between the cycling of nutrients among reservoirs with little loss from the system, particularly for limiting nutrients. With disruptions of the natural system and increased inputs of nutrients into the system, the natural cycling of nutrients within reservoirs has been disrupted. In some cases the systems have become saturated and leak nutrients to other system components. Such as air-borne nitrogen may deposit into streams or directly into reservoirs.

Numerous studies have demonstrated increased nutrient concentrations in streams from agricultural activities and urban areas. The major human inputs of phosphorus have been traditionally associated with crop fertilization, high live stock densities and mobilization of previously stable phosphorus reservoirs (biomass, soil organic compounds). Major human influenced sources of nitrogen and their relative percentage include:

- fertilizer application (cropland, urban land) 38%,
- nitrogen fixing crops 19%,
- fossil fuel burning 10%, and
- mobilization of stored nitrogen 33%.

For nutrients, four parameters are measured in the monitoring program to characterize the level of nitrogen and phosphorus in the water:

- Total Kjeldahl Nitrogen (TKN): TKN measures the concentration of organic nitrogen and ammonia.
- Nitrate/Nitrite Nitrogen: This analysis measures the combined concentration of NO_3 and NO_2. Normally, only small amounts of nitrite are present as it is readily converted to nitrate.
- Total Phosphorus: Measures all forms of phosphorus present in a sample including particulate phosphorus, organic phosphorus and dissolved phosphorus.
- Ortho Phosphorus: Measures the phosphorus that is in the form of PO_4 and available for plant uptake.

Maryland Criteria

Total nitrate levels greater than 10 mg/l are above the human health standard for drinking water and are considered unsafe for human consumption. Although there are no official criteria for the protection of aquatic life, concentrations above 1 mg/l are considered unnaturally elevated.

Total phosphorus levels greater than 0.1 mg/l are generally considered high for the protection of aquatic life, although no official criteria have been set. To control eutrophication, the US-EPA recommends that total phosphorus should not exceed 0.1 mg/L in streams that do not discharge directly into a lake or reservoir. Because of the static nature of lakes and reservoirs the recommendations are that the levels should not exceed 0.05 mg/l (as phosphorus)

Results

The following four maps depict nitrate nitrogen and total phosphorus levels found from baseflow sampling done by Baltimore City and Baltimore County for the period of 1999 to present. The area was divided into two maps representing the major tributary basins, Upper Western Shore and Patapsco-Back River. Each sampling location is shown as a colored circle for County sites or a square for City sites. The colors represent the geometric means of the nitrate or total phosphorus concentrations (mg/l) by category, found at each sampling site. For nitrates sample values ranged from 0.07 mg/l to 5.6mg/l. For total phosphorus the City values ranged from 0.02 mg/l to 0.52 mg/l. Total phosphorus is not shown for the County in the Patapsco/ Back River basin because previously the laboratory had too high of a high detection limit. Only the Upper Western Shore Basin has been sampled since the laboratory changes have been made.

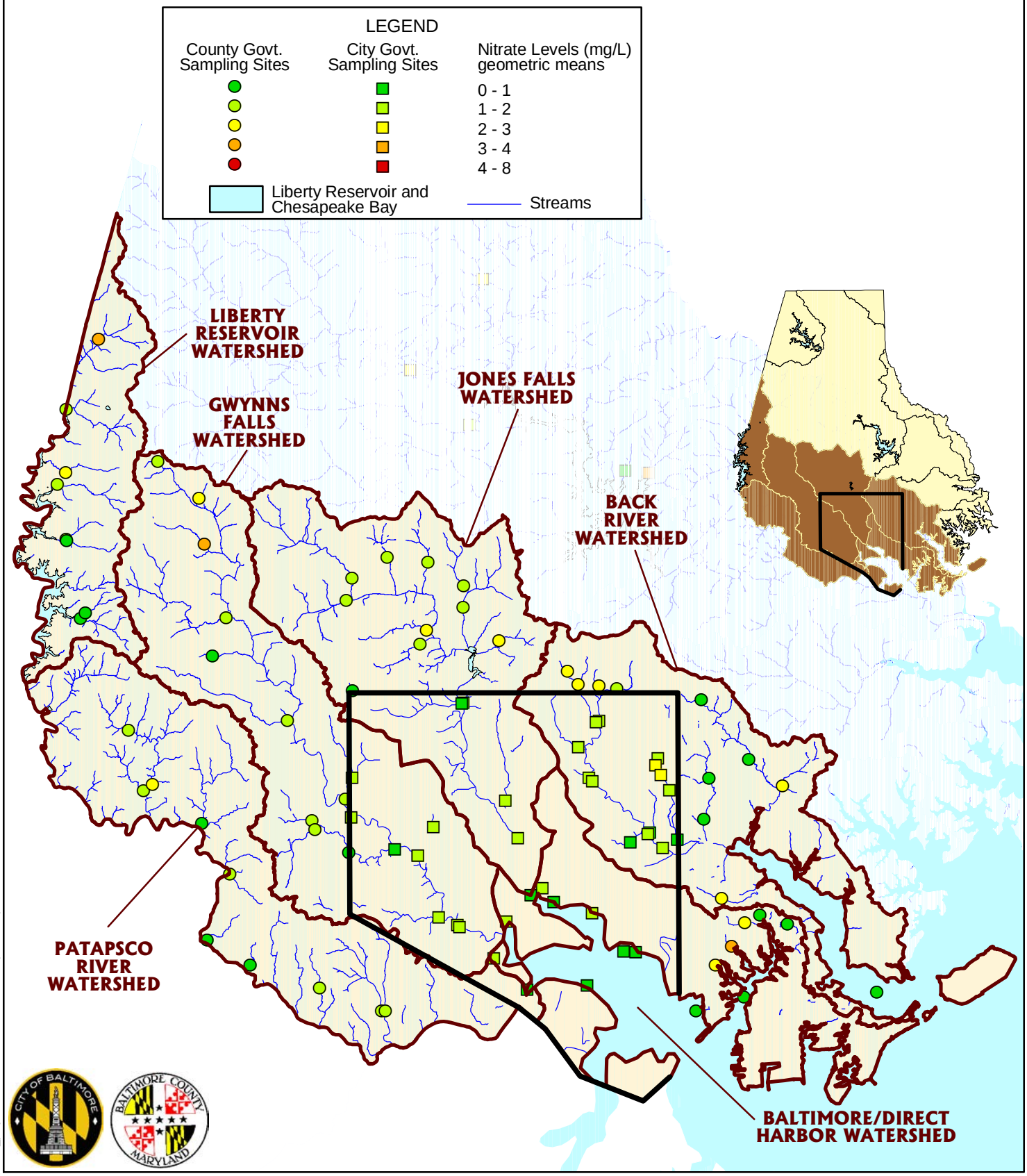
Upon examination of the maps, certain observations can be made:

- Nitrogen is generally higher in the rural areas and lower in the more urban areas except the upper Gwynns Falls and three northwest tributaries of Bear Creek that have relatively high levels for such urbanized areas. Nitrogen levels are also elevated in Moore's

Run. The higher rural area concentrations are not unusual due to the presence of agricultural operations that utilize nitrogen fertilizers for crop production. On site septic systems are also common in rural areas whereas, urban areas are served by sanitary sewers. On-site septic systems can be a source of nitrogen to nearby streams.

- Phosphorus levels were generally lower in the rural and northern areas than the urbanized areas. Exceptions are Herring Run, Middle River, and Moore's Run. Phosphorus levels of storm flows would be expected to be higher in all areas due to the increased suspended sediment present in storm flows, because large amounts of phosphorus can be attached to sediment particles.

Nitrate Nitrogen Levels in the Patapsco-Back River Basin Watersheds from Baseflow Sampling 1999 - Present



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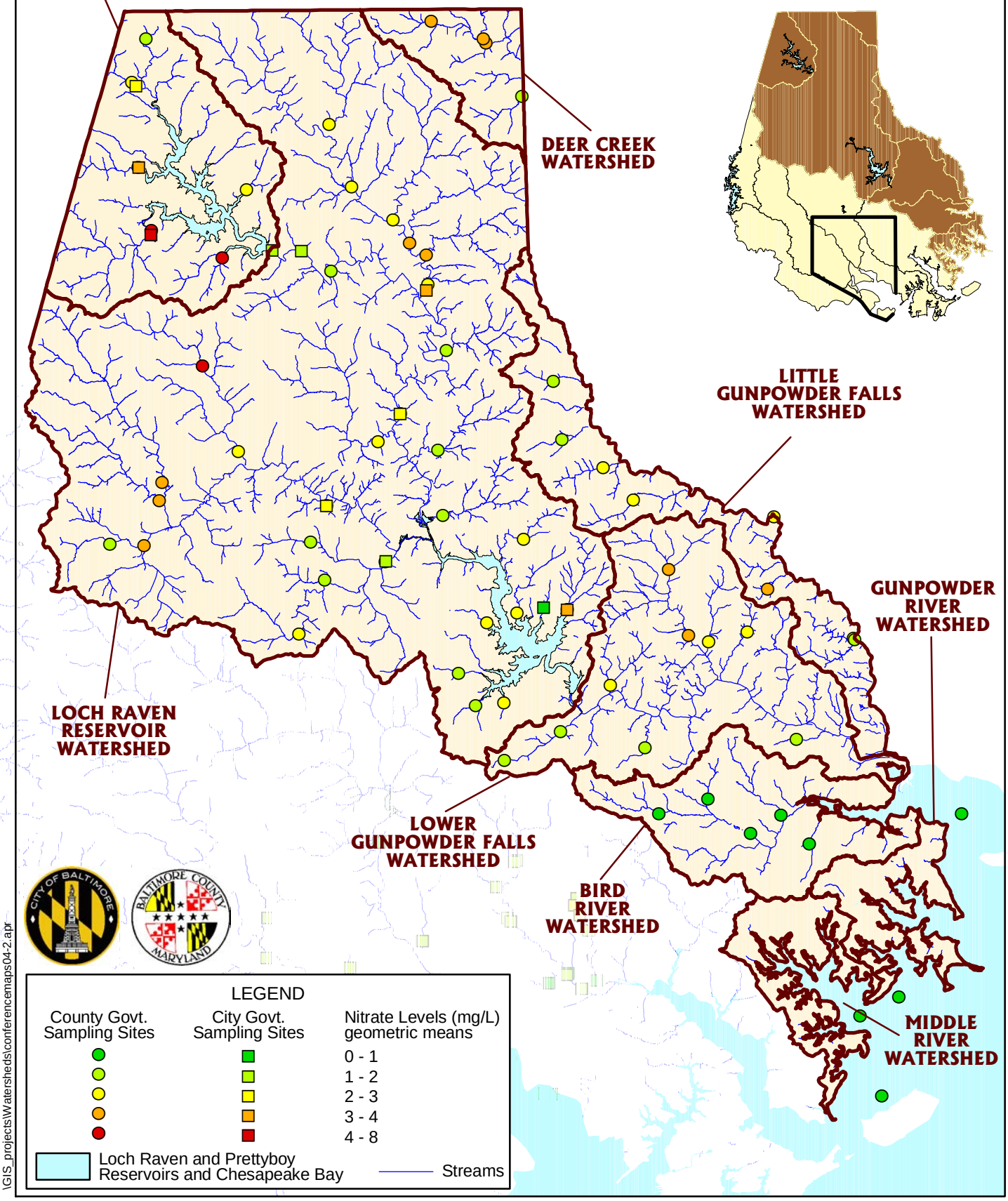
Nitrate Nitrogen Levels in the Upper Western Shore Basin Watersheds from Baseflow Sampling 1999 - Present



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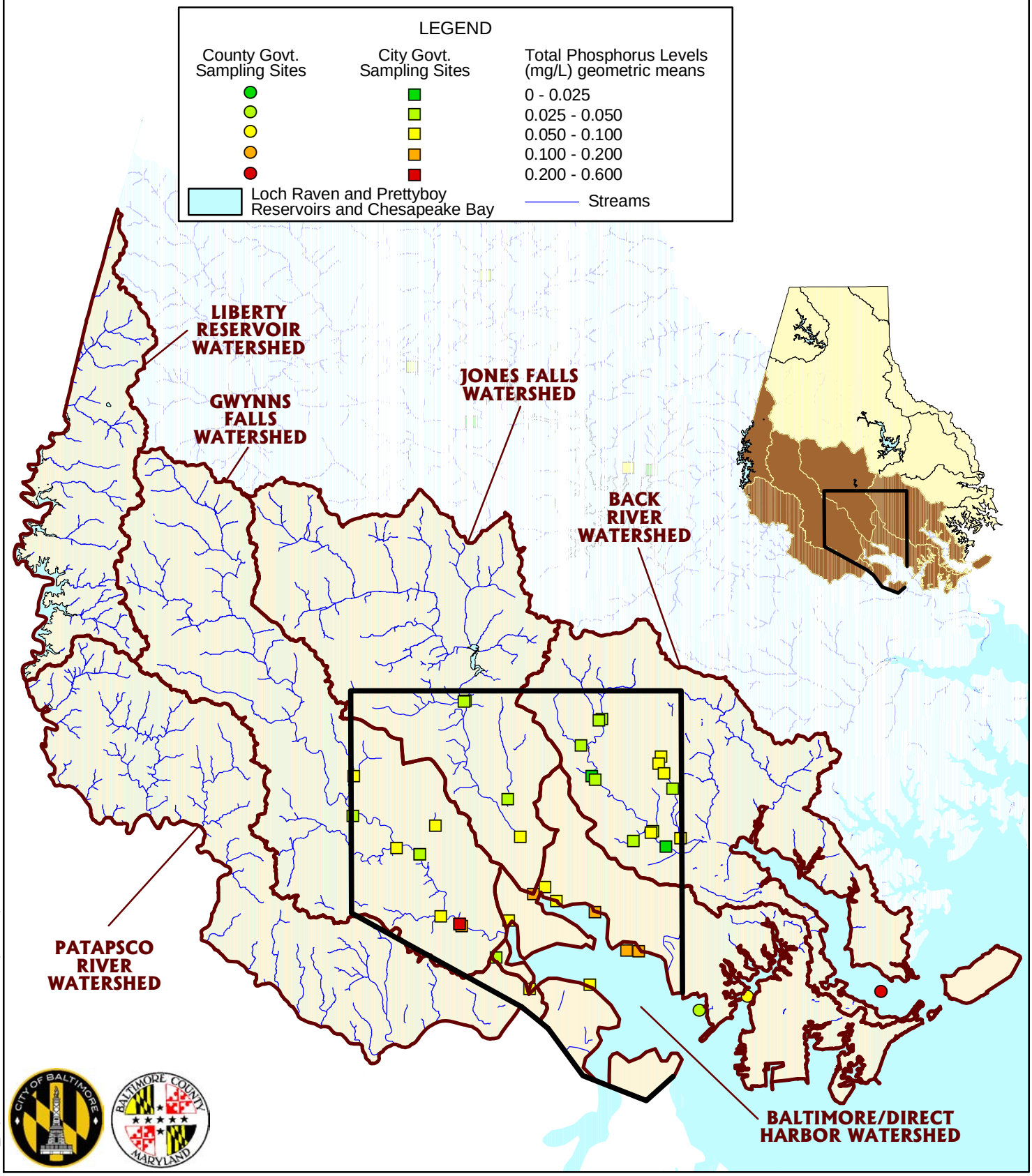
Total Phosphorus Levels in the Patapsco-Back River Basin Watersheds from Baseflow Sampling 1999 - Present



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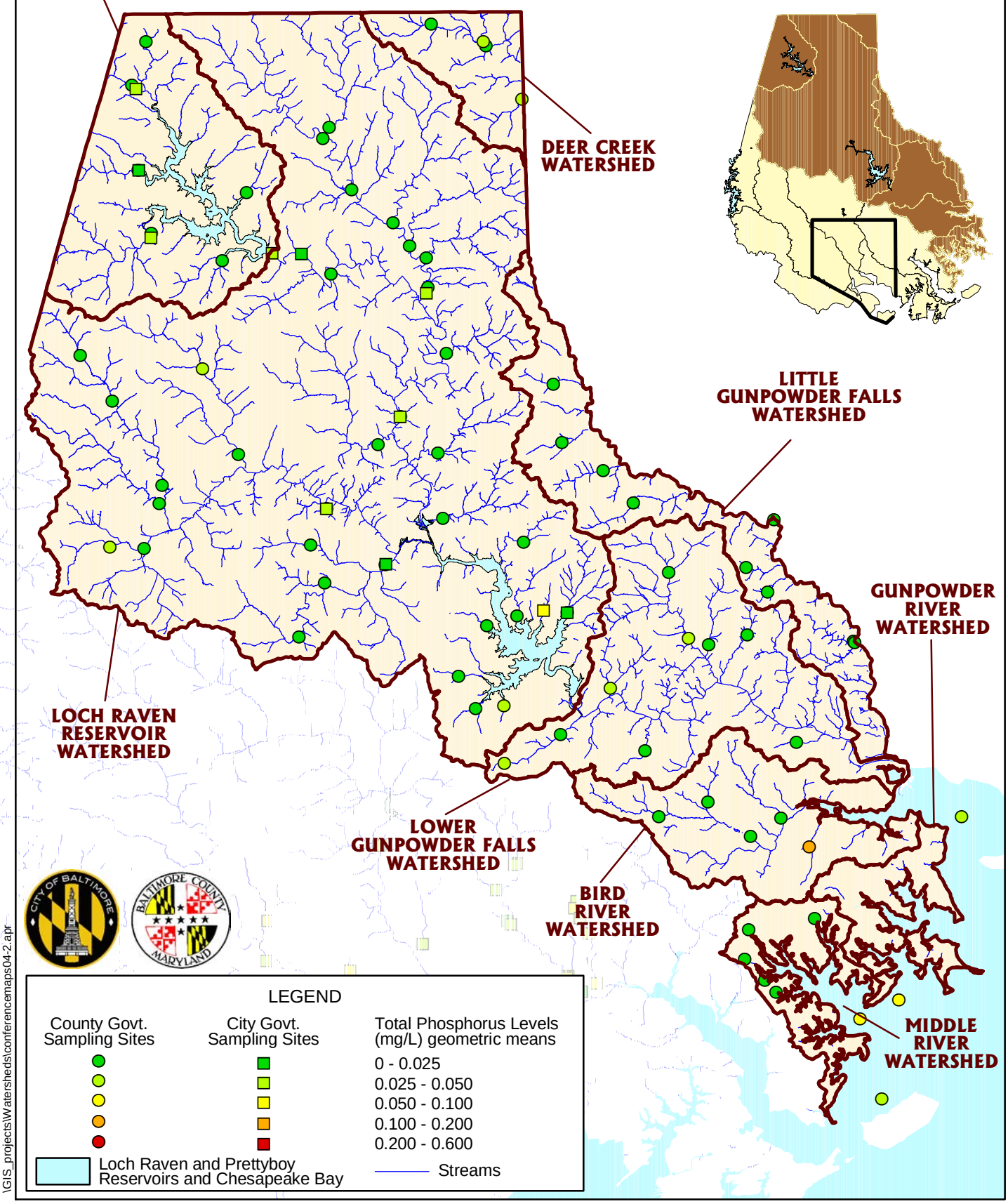
Total Phosphorus Levels in the Upper Western Shore Basin Watersheds from Baseflow Sampling 1999 - Present



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Temperature, pH, & Dissolved Oxygen

Temperature has been identified as one of the physical factors that play a primary role in the ecology of aquatic systems. The temperature of stream systems influenced by groundwater (low order streams, spring fed) approximates the groundwater temperature. The groundwater temperature for the northern Maryland region is approximately 14^0 C (57^0 F). As water moves away from the headwater areas of the stream system, groundwater exerts less of an influence on the temperature of the water. The temperature of the water in these situations displays a close relationship with the air temperature. Stream temperature is affected by direct solar radiation, which in turn, is affected by riparian vegetation and drainage basin aspect. Stream temperature may also be affected by discharge from point sources, discharge from the surfaces of ponds or reservoirs and storm runoff after contact with hot impervious surfaces.

Typically, streams are divided into cold water streams and warm water streams. Cold water streams will normally occur in the upper reaches of a drainage basin and warm water streams will occur in the lower reaches of a drainage basin. The aquatic species composition is different in these two types of aquatic regimes. Temperatures that are too high (or too low) may exceed the physiological limits of the adults and/or juveniles of aquatic species. Trout, for example, are particularly sensitive to temperatures higher than 14^0 C (68^0 F). The daily temperature variation is influenced by position of the stream segment within the drainage system. Small headwater streams dominated by groundwater input with a good forest canopy may experience little variation. The daily temperature variation increases downstream until the volume of water has increased to the point that it serves as a buffer to short-term temperature changes.

The pH of a natural stream system is typically a function of the underlying geology, biological transformation, and/or drainage from acidic bogs or alkaline fens. Carbonate based bedrock underlying the stream system will cause the water to have a higher pH than bedrock derived from igneous sources. Streams that are supporting a dense growth of aquatic vegetation may experience daily fluctuations in pH due to the photosynthetic uptake of CO_2. The normal range of pH in natural streams is 6.0 to 9.0. Typically, the pH increases from the headwaters downstream. Different communities of benthic macro-invertebrate fauna have been found to occur at different pH values. The diversity of the benthic macro-invertebrate fauna has been found to decrease below a pH of 6.0. In addition to an appropriate temperature and pH range, dissolved oxygen is also required for a stream to support heterotrophic biotic communities. Although a few species do utilize atmospheric oxygen, most stream organisms obtain their oxygen from solution in the water. Oxygen enters into solution through diffusion from the atmosphere and from photosynthetic production. Molecular diffusion of oxygen is a slow process. How much oxygen water can hold is dependent on temperature, pressure and salinity. In stream systems, temperature is the predominant controlling variable. Colder water can hold more oxygen. Periods of higher water temperature during the summer can be the most stressful for the aquatic fauna. However, even during the warmer months, most flowing stream systems will have sufficient oxygen to maintain aquatic life due to turbulent mixing. Turbulent mixing of atmospheric oxygen in the water results in the maintenance of oxygen saturated conditions. Lower oxygen levels occur when there are special conditions such as organic loading from point source discharges or runoff during storm events. Oxygen is also used during respiration with bacterial decomposition of organic matter.

Maryland Temperature, pH and Dissolved Oxygen Criteria

Maryland water quality standards are based on the use classification of the water bodies. The criteria (COMAR 26.08.02.03-3A-3E) applicable to this Section are presented in the table below.

Maryland Water Quality Standards for Temperature, pH and Oxygen for Uses I- IV Waters

Parameter	Use I Std.	Use II Std.	Use III Std.	Use IV Std.	Notes
Temperature (C, F)	32^0 C, 90^0 F	32^0 C, 90^0 F	20^0 C, 68^0 F	23.9^0 C, 75^0 F	1
pH	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	6.5 – 8.5	2
Dissolved Oxygen	5 mg/l.	5 mg/l.	5 mg/l., 6mg/l.	5 mg/l.	3

Notes:

1. Temperature may not exceed the numeric degrees stated or the ambient temperature of the surface waters, whichever is greater
2. pH may not be outside the numeric range stated
3. For Use III the oxygen concentration additionally may not be less than a minimum daily average of 6 mg/l.

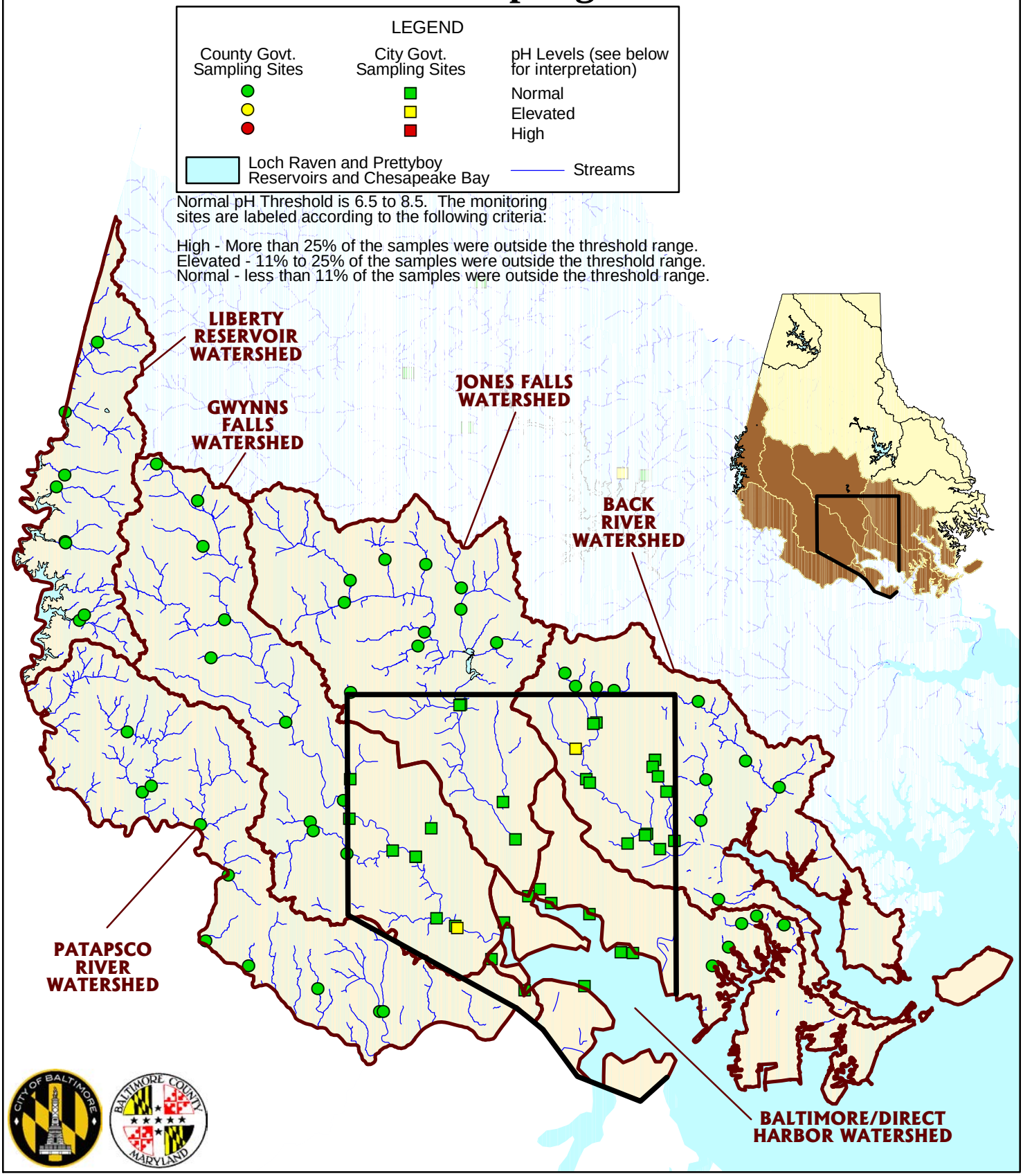
Results

Stream acidity (pH) does not appear to be a general problem as shown on the following maps covering the City of Baltimore and Baltimore County. There is no particular pattern between urban and rural settings. A few areas show out of range samplings – namely tributaries to the southwest arm of Loch Raven Reservoir and tributaries to the Bird River. Most of the out-of- range samples were on the alkaline side of neutral pH. Temperature and dissolved oxygen are not mapped at this time.

Linkage Between Nutrients, DO, and pH

Nitrogen, phosphorus, dissolved oxygen, and pH are all interconnected. When nitrogen and phosphorus levels are high they effect the pH and biological oxygen demand (BOD), and promote a deadly situation for fish and other aquatic life. When introduced to water in above normal concentrations, nitrates and phosphates can stimulate accelerated algal growth called “blooms”. When these “blooms” die off and are broken down by bacteria they raise the biological oxygen demand to the point where oxygen depletion can occur. This “eutrophication” process has been a major cause of fish kills in the Chesapeake Bay and other water bodies. The above mentioned oxygen demand may be measured in several fashions. There is also a diurnal fluctuation in acidity (pH) of the water as photosynthesis increases during sunny days thus using up the dissolved CO_2 in the water. This causes a decrease in the hydrogen ions and a resulting increase in the pH.

pH Levels in the Patapsco-Back River Basin Watersheds from Baseflow Sampling 1999 - Present



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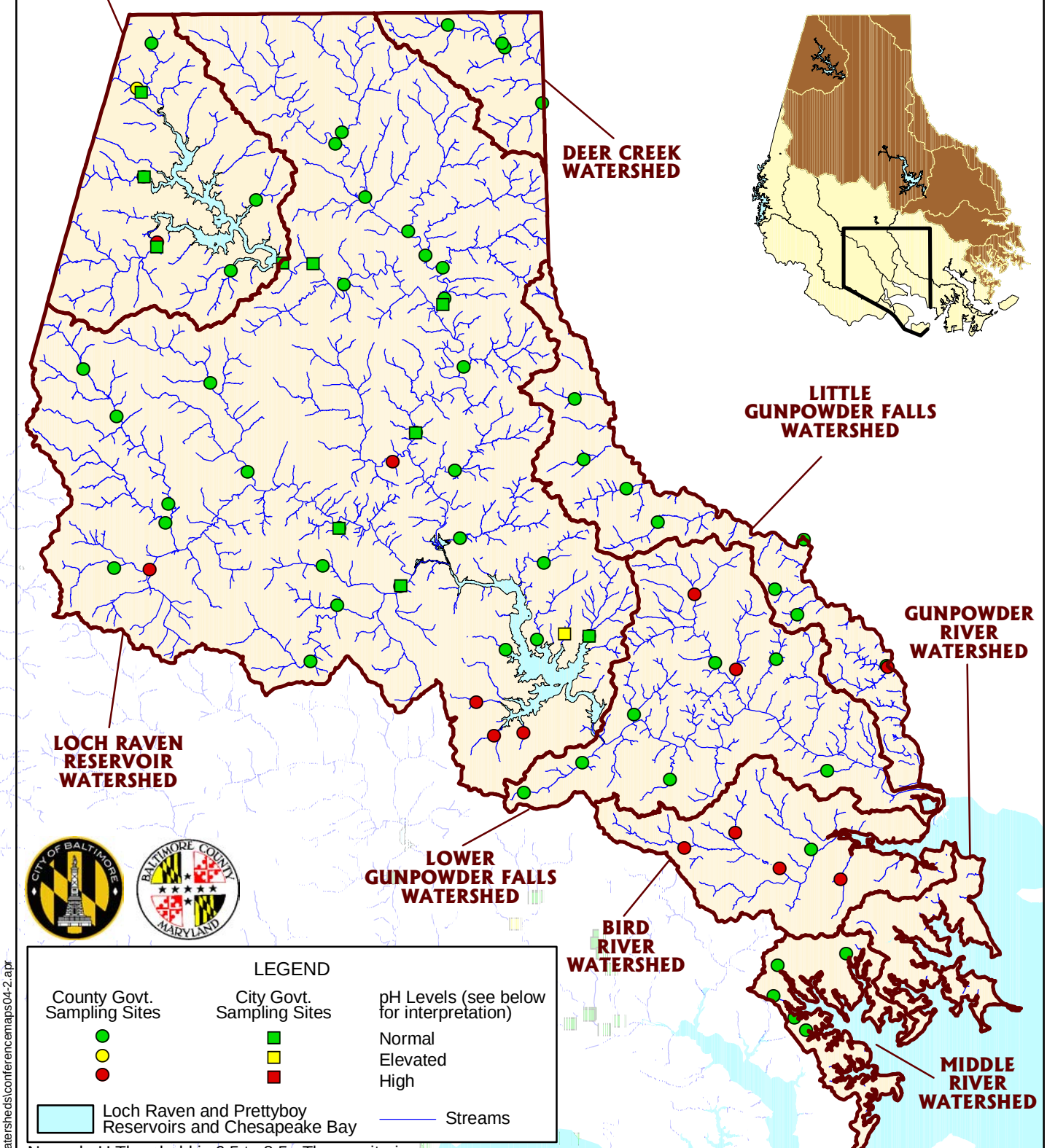
pH Levels in the Upper Western Shore Basin Watersheds from Baseflow Sampling 1999 - Present



Normal pH Threshold is 6.5 to 8.5. The monitoring sites are labeled according to the following criteria:

High - More than 25% of the samples were outside the threshold range.
Elevated - 11% to 25% of the samples were outside the threshold range.
Normal - less than 11% of the samples were outside the threshold range.

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Maryland Section 303(d) List

The Federal Clean Water Act requires that states assess water quality every two years and publish a list of those waters failing to meet water quality standards. This list of impaired waters is called the "303(d) List". Water bodies listed as impaired may require a detailed analysis of pollution sources known as the Total Maximum Daily Load (TMDL). Maryland's draft 2004 Integrated 303(d) List for Baltimore City and County is depicted in the maps on the following pages.

Background

Why compile a 303(d) list?

The Clean Water Act of 1972 requires states, territories, and authorized tribes to: 1) develop water quality standards for all jurisdictional surface waters; 2) monitor these waters; and 3) identify and list those waters not meeting water quality standards. A water quality standard is the combination of a designated use for a particular body of water and the water quality criteria designed to protect that use. Designated uses include activities such as fishing, swimming, drinking water supply, and oyster propagation and harvest. Each use has associated water quality criteria, both numeric and narrative.

How does Maryland's Integrated 303(d) List relate to TMDLs?

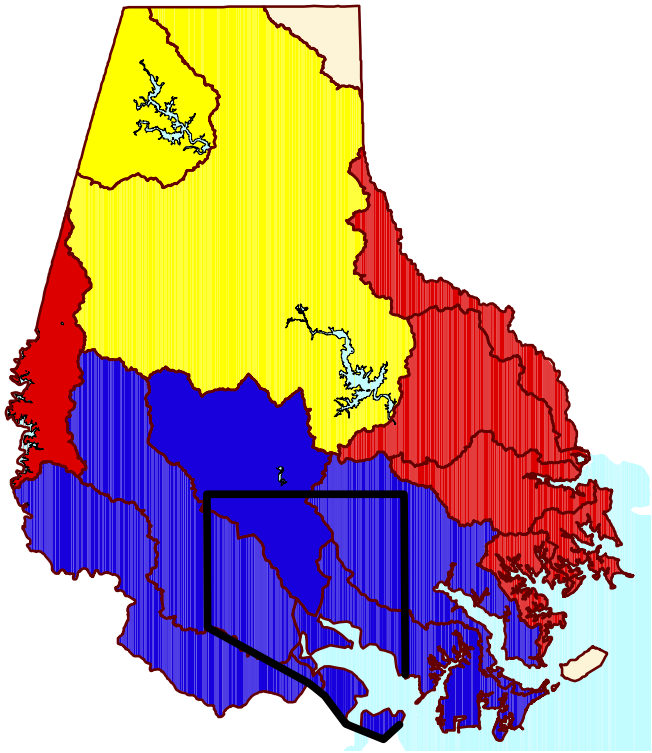
All impairing substances or pollutants identified on Part-5 of Maryland Integrated 303(d) List must be addressed by either a water quality analysis (WQA) or a total maximum daily load (TMDL). A WQA is completed when current watershed monitoring data support delisting a waterbody (i.e., putting it on Part-6 of the Integrated List) because water quality standards are being attained. TMDLs are completed when a waterbody continues to violate water quality standards. A TMDL is the amount of a pollutant or stressor that a waterbody can assimilate and still attain water quality standards, as well as a margin of safety. The TMDL requires the identification and reduction of sources of the impairing substance in the watershed that is necessary to attain water quality standards. In some cases, erroneous listings are removed with an explanation, which may include wrong criteria applied, refinement of subbasin or additional data (under the Good Cause Provision [CFR130.7]). Such listings do not require a WQA or TMDL. Each year the MDE publishes an Integrated Report giving the updated listings. Their website is:
http://www.mde.state.md.us/Programs/WaterPrograms/TMDL/Maryland%20303%20dlist/draft_2004_303d_for_pubnotice.asp. For further information please call or e-mail MDE at 410-537-3906 / 303d@mde.state.md.us.

The maps presented in this report show the 303(d) listings for sediment, bacteria, and nutrients in the City and County. Ten watersheds are currently listed for sediment including five for tidal waters, two for impounded waters, and three for non-tidal waters. Five watersheds are currently listed for bacteria (fecal coliform). Thirteen watersheds are currently listed for nutrients. TMDLs are pending for five of the watersheds within one year. For the two impoundments, TMDLs are pending within two years; the remaining six watersheds have no pending TMDLs.

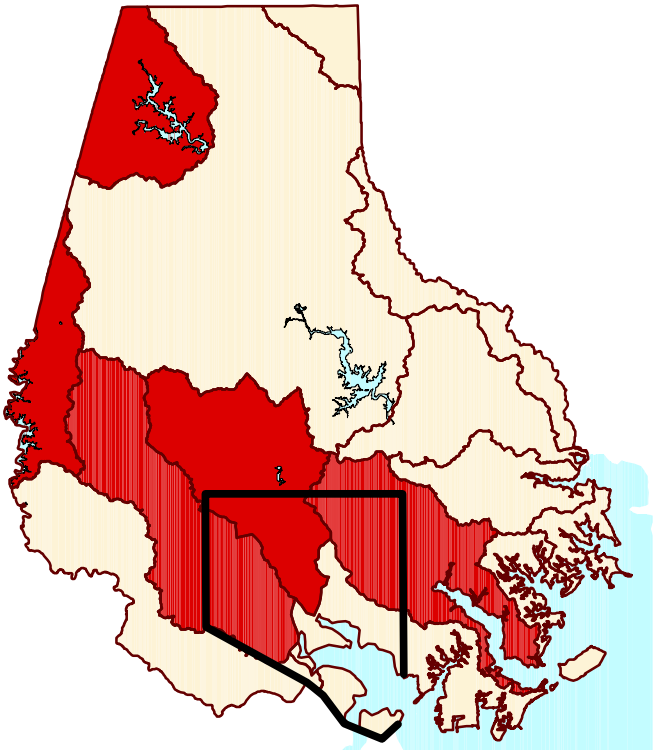
Note: Excerpts for the above narrative were taken from the above mentioned MDE website.

Impaired Watersheds "303(d) Listed" in Baltimore City and County

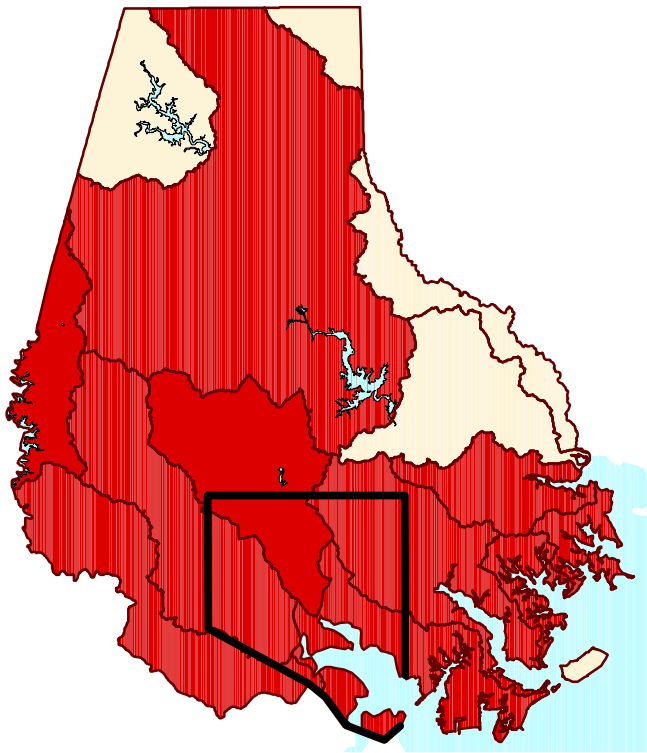
Watersheds Listed for Nutrients



Watersheds Listed for Bacteria (fecal coliform)



Watersheds Listed for Sediment



LEGEND

- Unimpaired Watersheds

Impaired Watersheds
TMDL Plan Status

- Pending within 1 Year
- Pending within 2 Years
- Not Initiated Yet

- Reservoirs and Chesapeake Bay

MDE

CITY OF BALTIMORE

BALTIMORE COUNTY MARYLAND

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Biology

Randomized Sampling

The use of benthic macroinvertebrates for the assessment of biological integrity has increased in recent years. The benthic macroinvertebrate community composition is affected by changes in water quality, flow regime, food (energy source), and the physical habitat. As such, the benthic macroinvertebrate community reflects the sum of multiple stressors. Typically the assessment is conducted through the use of multi-metric indices that assess the community at a variety of levels including: individual, population, community, ecosystem and landscape.

The benthic macroinvertebrate monitoring in this report was conducted in accordance with the protocols detailed in *Maryland Biological Stream Survey Sampling Manual* (Kazyak 2001). Data has been collected utilizing these protocols since the inception of the program in 2003. This sampling methodology employs a D-framed net to sample multiple habitat types in the proportions that they are found in the 75 meter sampling reach. A total of twenty square feet of habitat are sampled and the material in the net is preserved and taken back to the laboratory. A sub-sampling tray is used to remove a 100-organism subsample in the laboratory. The macroinvertebrates are then identified to genus or the lowest practical taxonomic level.

A Benthic Index of Biotic Integrity (BIBI) is then calculated from the data. For the complete BIBI calculation, please see *Development of a Benthic Index of Biotic Integrity for Maryland Streams* (Stribling, 1998). The BIBI gives a score between 1.0 and 5.0 that classifies the condition of the benthic macroinvertebrate community. The BIBI ranges are as follows:

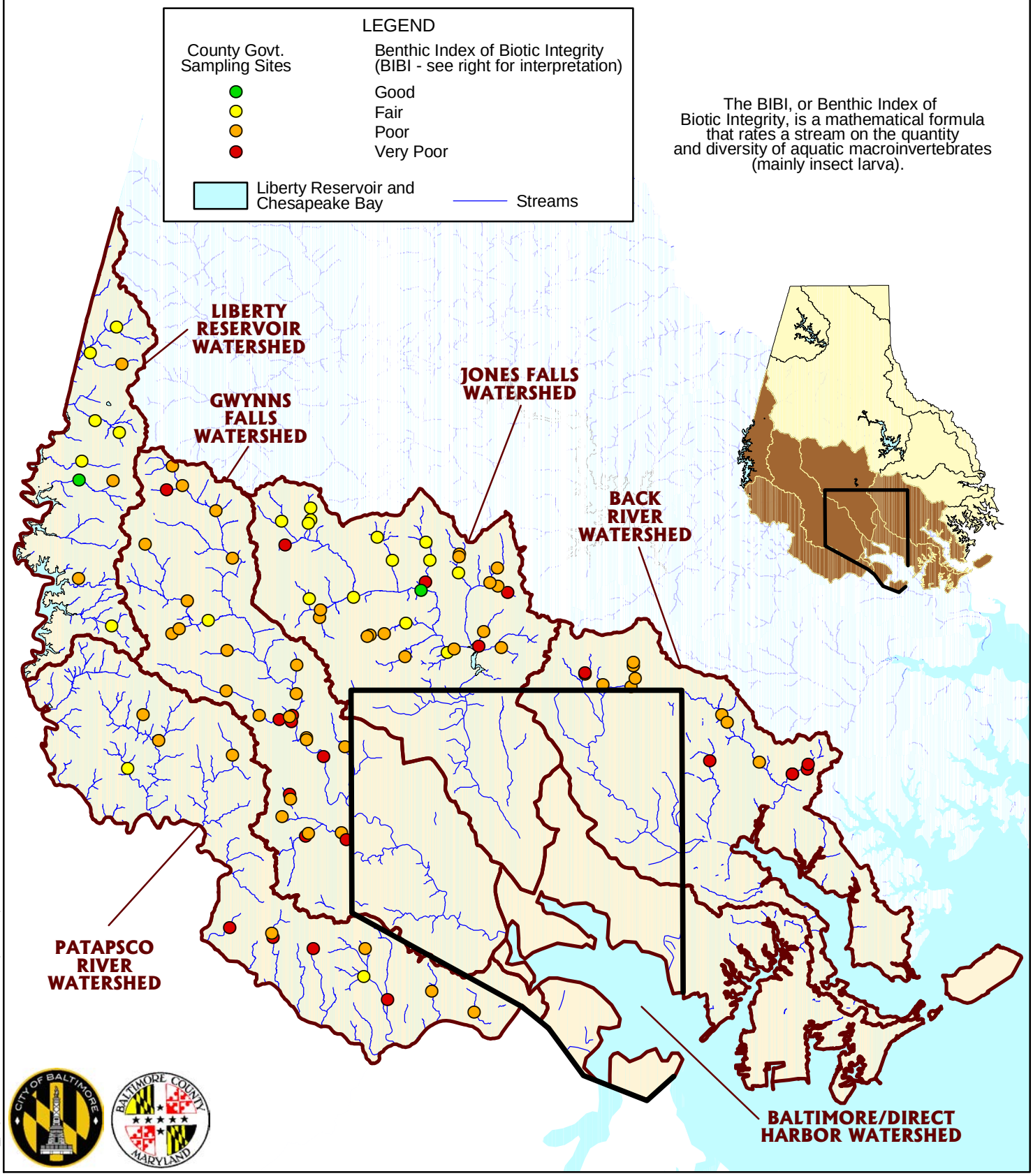
- 1.0 – 1.9 – Very Poor
- 2.0 – 2.9 - Poor
- 3.0 – 3.9 - Fair
- 4.0 – 5.0 – Good

Only BIBI results from the Patapsco/Back River Basins are available at this time for the County portions of those watersheds. Samples collected in 2004 in the Gunpowder/Deer Creek Basins are still being identified and will be presented in 2005.

Results

The following map shows the locations of sampling sites in the City and County that were monitored using the same randomized sampling protocols. The resulting BIBI scores are color coded for the four categories. As can be seen, the biological indicators proceed from good and fair in the rural region to poor in the more urbanized areas of the County and City. This is likely due to a combination of stressors that include but are not limited to physical, chemical, and poor habitat.

Biological Condition of Streams in the Patapsco-Back River Basin Watersheds from Macroinvertebrate Sampling



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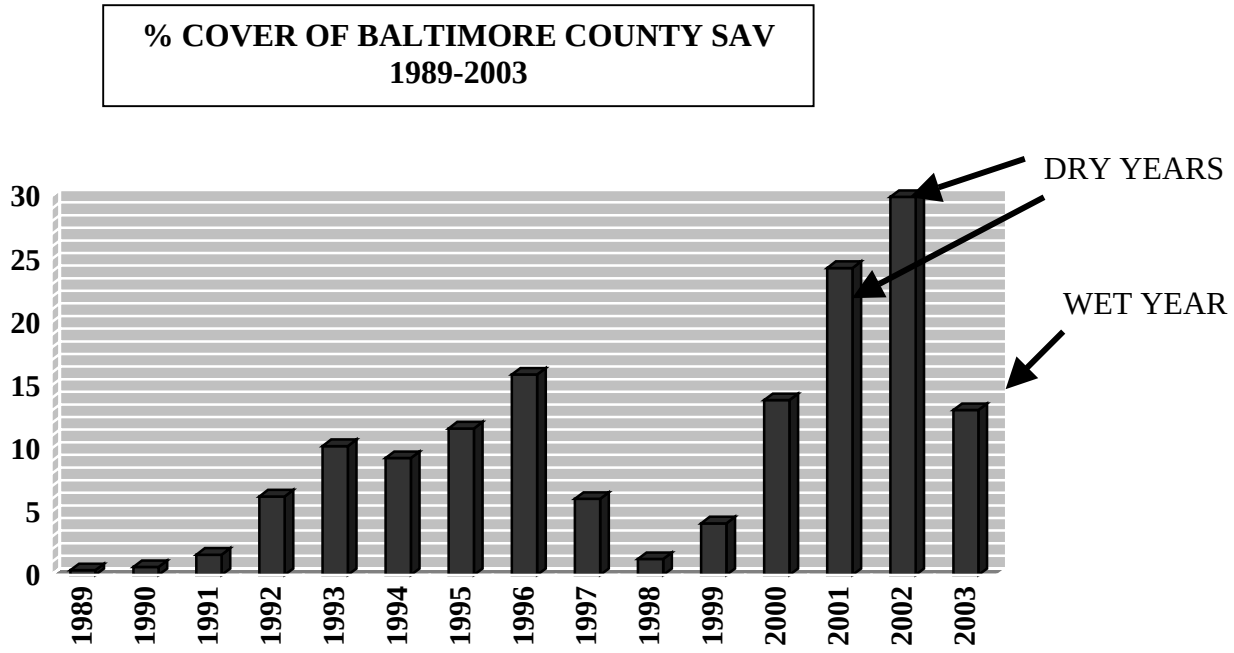
Habitat – Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV) are found in the shallow waters of the Chesapeake Bay. In Baltimore County, these plants commonly include Vallisneria americana (wild celery), Myriophyllum spicatum (Eurasian watermilfoil) and Elodea canadensis (common waterweed), to name a few. SAV grasses are good indicators of the water qualtiy conditions of our waterways. They provide critical food, shelter, and nursery grounds for many species of shellfish, finfish, waterfowl, and other organisms. These grasses also stabilize the sediments and incorporate oxygen into the water. SAV is sensitive to pollution, especially suspended sediments that reduce sunlight needed for photosyntheses. High nutrient levels can also reduce light penetration when they stimulate dense phytoplankton blooms that block sunlight.

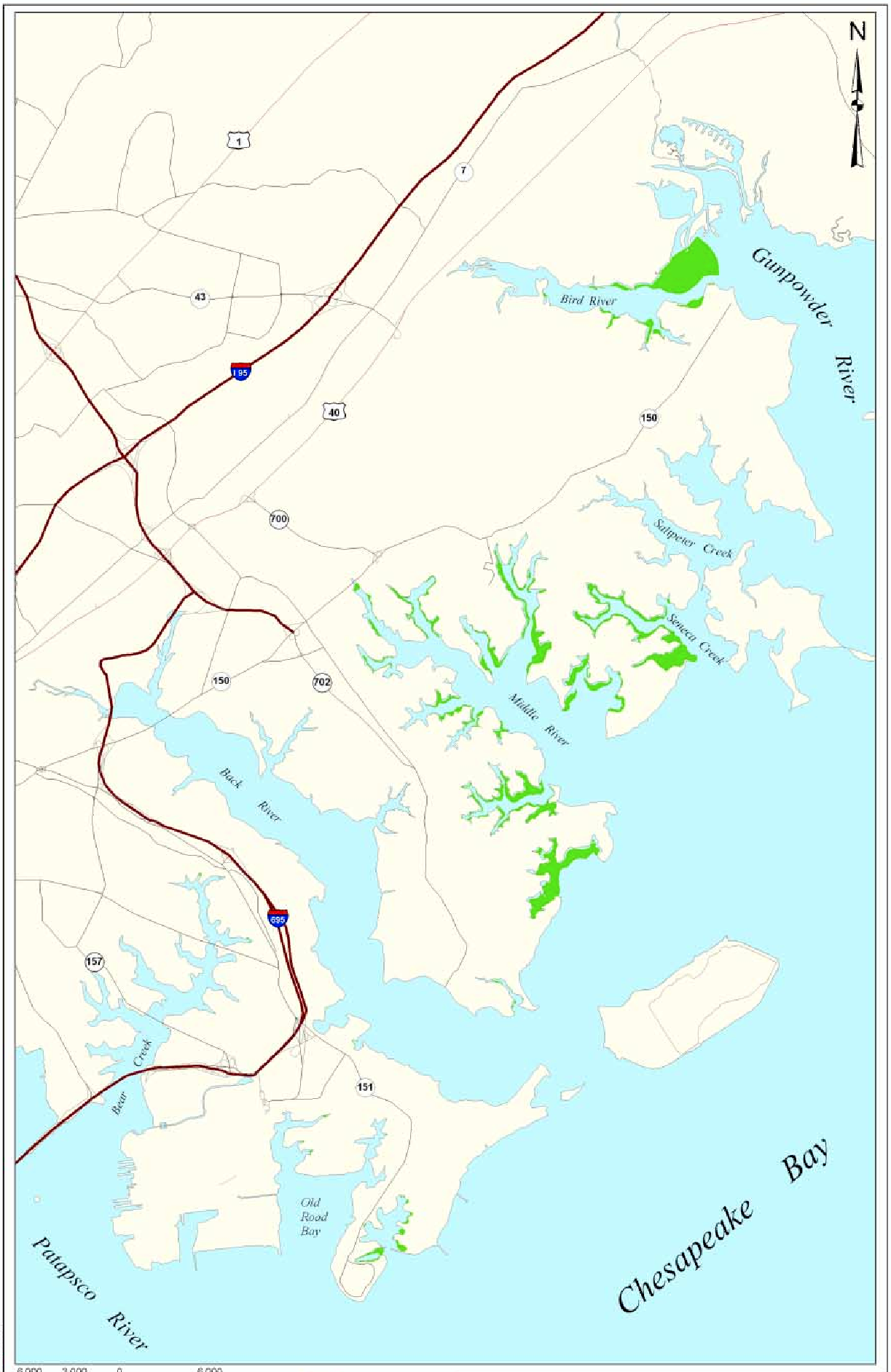
SAV density and distribution are monitored by Baltimore County in its tidewater areas in the spring and summer of each year. County waterways are surveyed by boat by paddling the shallow areas and motoring in deeper waters. The presence or absence and density of SAV are determined by several methods. Visually, the presence or absence of SAV can be observed on the bottom in shallow water or in areas where the tops of plants are near the surface. In waters from 5 to 7 feet deep, a long handled rake is used to rake 2 to 4 square foot areas in random grid patterns. In waters deeper than 3 feet deep, a tethered rake was also frequently towed along the bottom. The shoreline and creek surface is also monitored for floating pieces of SAV, an indication of SAV presence although not necessarily from the specific area. SAV densities are recorded based on the Virginia Institute of Marine Science (VIMS) Annual Distribution Studies measurement system. Density is estimated based on crown cover.

Results

SAV density and distribution is documented in an annual report and the County's SAV Geographic Information System (GIS). The SAV GIS includes data from 1988 to the present for many of the County's tidal waterways. The GIS tool is invaluable to better understand SAV growth and potential impacts. The GIS is used to evaluate SAV characteristics and trends, to advance techniques for protecting and expanding this natural resource and to satisfy condition of certain dredging permits. The following chart presents the total percent cover of submerged aquatic vegetation in all the County's waterways surveyed during the period 1989 – 2003.



The following maps show the distribution of SAV in Baltimore County tidewater areas during 2002 and 2003. As can be seen, the predominant beds are in Bird River, Seneca Creek, and Middle River with minor occurrences in Old Road Bay, Shallow Creek, Back River and Bear Creek. During the sampling period in 2003, the County experienced extremely wet conditions and in fact, 2003 was the wettest year of record. The preliminary data from the 2004 surveys indicate the submerged aquatic vegetation has recovered and is flourishing in the County's waterways.



6,000 3,000 0 6,000 Feet

1" = 6,000'

2002 SAV

1. This SAV map was composited from 26 individual waterway surveys that were field conducted by BayLand in spring 2002 and summer 2002.
2. Basemap taken from 1995 County 200 scale planimetrics.

BayLand Consultants & Designers, Inc.
"Integrating Engineering and Environment"
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Hanover, Maryland 21076
Phone: (410) 694-0401
Fax: (410) 694-9405

BALTIMORE COUNTY, MARYLAND
2002 SUBMERGED AQUATIC VEGETATION (SAV) OCCURENCE

OCTOBER 2003

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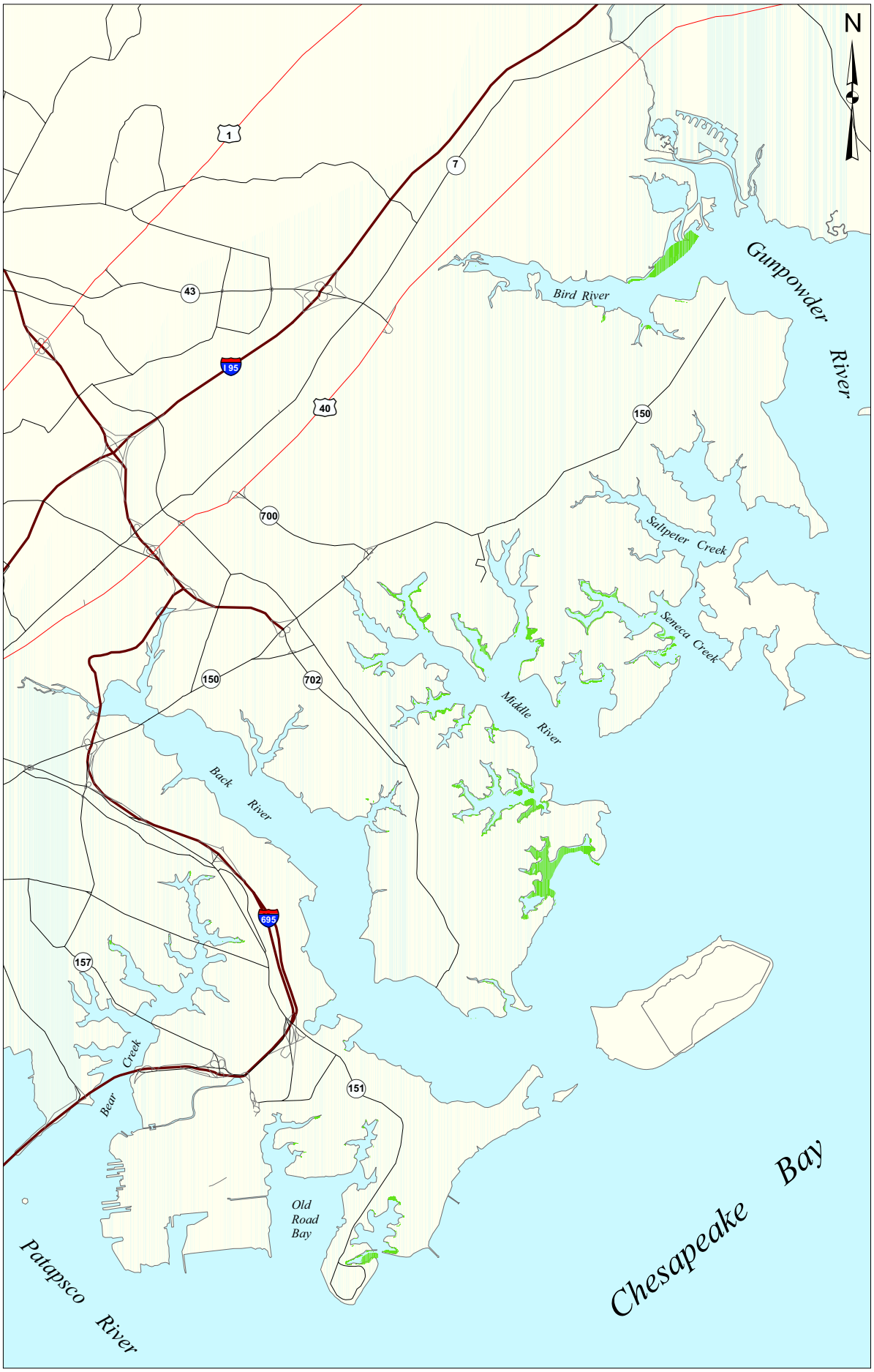

6,000 3,000 0 6,000 Feet

1" = 6,000'

2003 SAV

1. This SAV map was composited from 28 individual waterway surveys that were field conducted by BayLand in spring 2003 and summer 2003.
2. Basemap taken from 1995 County 200 scale planimetrics.

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BALTIMORE COUNTY, MARYLAND
2003 SUBMERGED AQUATIC VEGETATION (SAV) OCCURENCE

OCTOBER 2004

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Pollution Source Tracking Program

Baltimore County

Introduction - Under the Federal Clean Water Act, Baltimore County was issued a National Pollutant Elimination System (NPDES) Municipal Stormwater Discharge Permit that requires it to monitor discharges to its streams. The permit requires the County to screen discharges to detect and eliminate pollutants entering the streams. Pollution can enter the streams as a result of illegal dumping, illegal stormdrain connections, spills, leaking municipal sewer lines, leaking private septic systems, and leaking municipal drinking water supply lines.

Program Status - In Baltimore County, there are approximately 3,509 total outfalls of which approximately 2,800 are less than 36 inches in diameter. These smaller outfalls have not, as of yet, been given a prioritization. There are 709 outfalls located over the entire county that have pipe openings 36" in diameter and larger of which 435 have been given a prioritization rating. Baltimore County's Department of Environmental Protection and Resource Management (DEPRM) annually screens at least 200 stormwater outfalls.

The prioritization system works as follows: outfalls that have not yet been screened twice have not been prioritized;. outfalls that have been screened two or more times are assigned one of three other priority ratings; outfalls with major problems that require immediate correction and/or close monitoring; or outfalls with recurrent problems will be assigned a ***Priority 1 (Critical)*** rating. Outfalls with moderate to minor problems that have the potential to become severe are assigned a ***Priority 2 (High)*** rating. Outfalls with minor or no problems that do not require close monitoring are given a ***Priority 3 (Low)*** rating. Outfalls categorized as "Low Priority" are on a ten-year screening cycle, "High Priority" outfalls are screened once each year, and "Critical" outfalls are screened four times each year. This system allows for a more streamlined approach in selecting outfalls to screen, and provides a more efficient use of manpower. In addition, the system allows for more outfalls that have only been screened once or not at all ***(Priority 0)*** to be screened sufficiently (2 or more times) and properly prioritized.

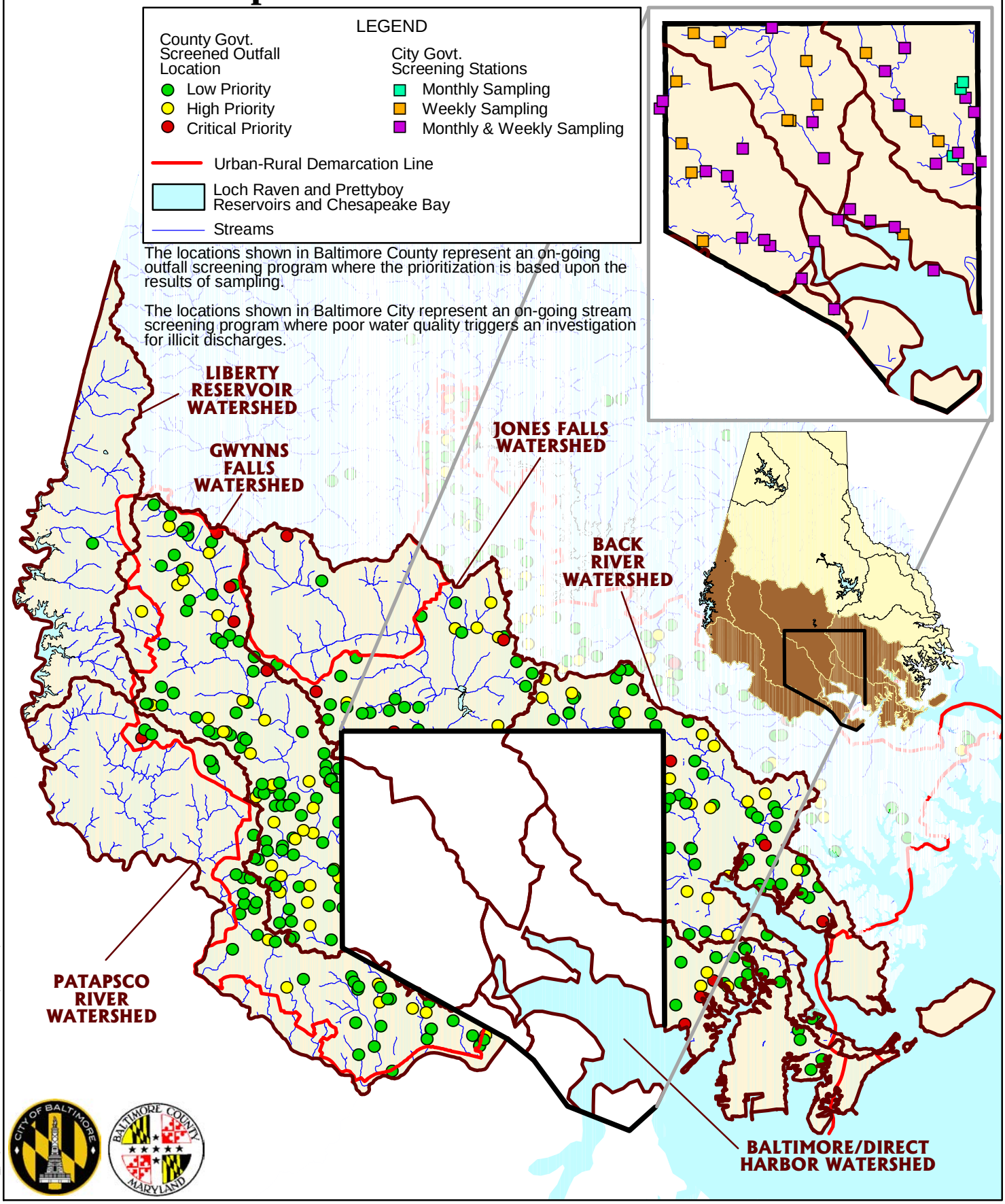
Baltimore City

Baltimore City established forty-nine (49) screening stations in its streams to help uncover illicit discharges, to characterize water quality, and to look for long-term trends. The "Screening Station Locations" map shows the location of these stations and the frequency of visits.

At forty-six (46) of these stations, there is a weekly field screening during which field instruments are used to measure ammonia nitrogen, chlorine, conductivity, pH, dissolved oxygen and water temperature. When any of these measurements sufficiently depart from acceptable values, the field team begins an investigation to look for a possible illicit discharge.

At thirty-five (35) of these stations, the City collects a monthly sample for laboratory analysis of the following parameters: fecal coliform, total coliform, ammonia nitrogen, total Kjeldahl nitrogen, nitrate+nitrite nitrogen, total phosphorus, antimony, arsenic, cadmium, chromium, copper, lead, zinc, biological oxygen demand, chemical oxygen demand and suspended solids. It takes a few weeks to get the results from the labs. When a station shows a history of elevated results (i.e., poor water quality), an investigation is initiated to look for a possible illicit discharge. Pollution source tracking investigations are also initiated in response to citizens' complaints.

Pollution Screening Station Locations in the Patapsco-Back River Basin Watersheds



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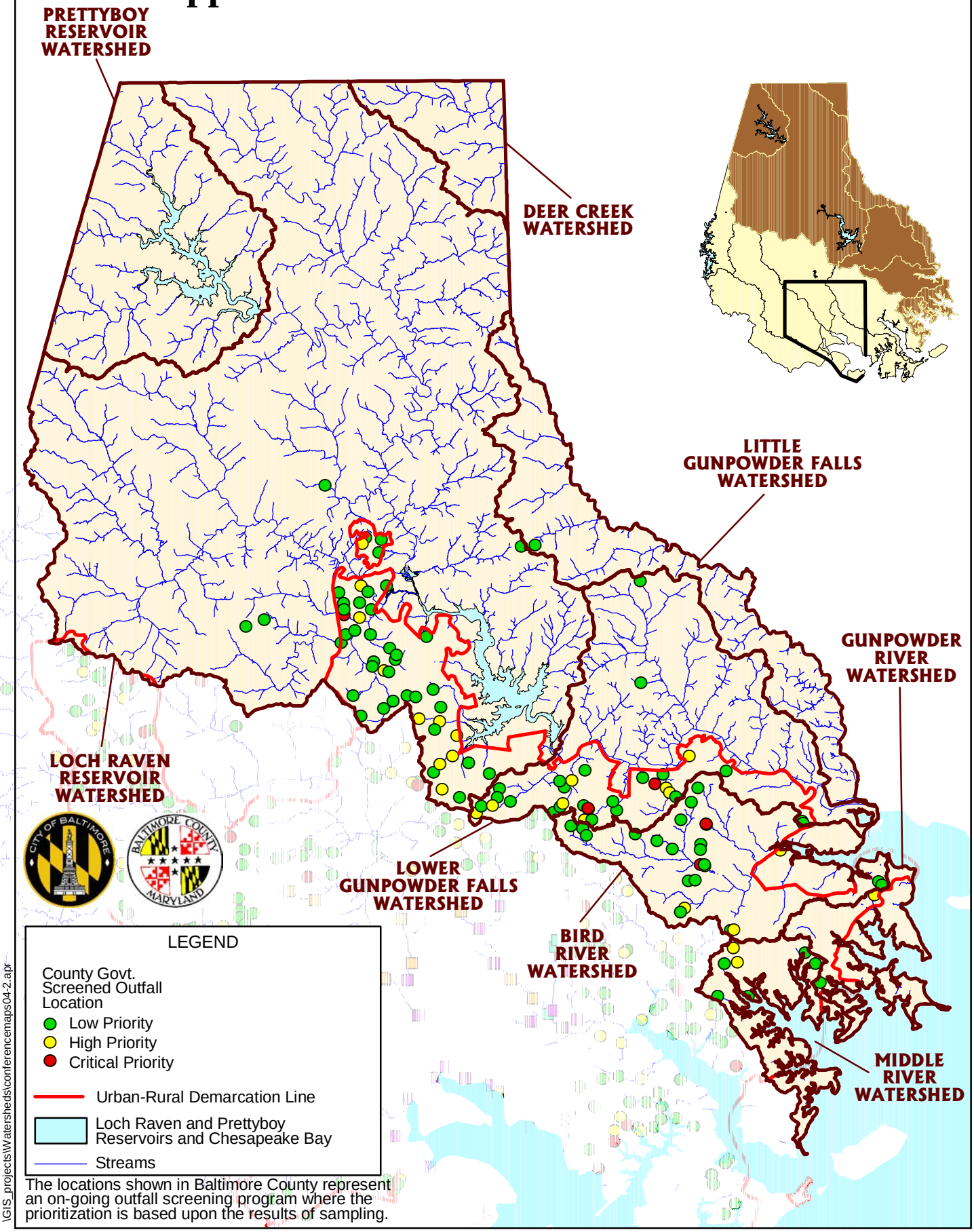
Pollutant Screening Station Locations in the Upper Western Shore Basin Watersheds



The locations shown in Baltimore County represent an on-going outfall screening program where the prioritization is based upon the results of sampling.

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Sediment and Stream Geomorphology

One of the natural functions of a stream system is to transport the products of erosion from the head of the basin. The amount of sediment transported to the stream by overland flow is a function of watershed characteristics (such as slope, geology and soil type) and land use practices. Forest cover provides protection of the soil surface from excessive erosion, while agricultural crop production results in bare soils during certain times of the year and urban land development also results in bare soil during the building phase. The institution of various best management practices (BMPs) can result in a reduction of soil loss from development and agricultural activities.

Once sediment has been delivered to the stream, the ability of the stream to transport the sediment is dependent upon sediment particle size and the energy associated with the water flow. The energy or "power" of the stream is a result of both the volume of discharge and the slope of the stream channel. Finer particles are moved more easily than coarse particles and higher energy flows can move larger particle sizes. In the stream, these finer particles are found throughout the water column and are referred to as the washload. The coarse, heavier particles that more slowly shift or skip downstream along the bottom are called the bedload. Storm flows have higher energy than baseflows and are therefore able to transport larger particles and a greater load. These higher flows also have the capability to erode the stream channel making it wider and deeper over time. If more sediment is delivered to the stream system than can be transported out, the stream aggrades by deposition of sediment in the stream channel. If less sediment is delivered to the stream system than it is capable of transporting, then the stream degrades by the erosion of the stream channel and/or banks.

An increase in runoff can also occur by increases in the impervious area in a watershed. This increases the frequency of high flows and changes the recurrence interval of erosive flow events. The stream channel adjusts to the new hydrologic conditions by erosion of the stream channel and/or banks

Suspended sediments are of concern for two reasons - infilling of reservoirs and degradation of aquatic habitat. The deposition of sediment on the bottom substrate is a major cause of degradation of aquatic habitat. This deposition decreases habitat space and diversity by embedding the larger particles in a uniform layer of smaller particles. This results in a decrease in diversity of macro-invertebrates and fish species and can result in a decrease in productivity. Additionally, suspended sediments in the water column can block the sunlight needed for the growth of submerged aquatic plants. A measure of the opaqueness of water to the transmission of light is turbidity. Maryland standards for surface waters state that the turbidity may not exceed levels detrimental to aquatic life.

The amount and rate of net channel erosion or deposition can be measured over time by taking survey measurements at permanently established cross sections and longitudinal stretches. Changes in the physical character of stream bed material can also be measured by such methods as Wolman pebble counts to supplement the survey information. Stream stability can also be assessed by measuring and classifying them by certain criteria (such as width to depth ratio, entrenchment, slope, etc.) that have been found to correlate with overall stability. A classification system was developed by David Rosgen of Pagose Springs, Colorado that assesses streams by categorizing them into one of seven (7) major types from A through G where types F and G are considered to be unstable stream types.

Results

Stream stability was assessed in several County watershed management plans. In most cases a Rosgen classification of type F or G was a primary factor used to indicate an unstable channel, however other factors were considered as well depending on the plan. Stream stability was also predicted for the future using specialized models that assumed build out at the current zoning class for a given drainage system. The impaired stream reaches were mapped and are used as a guide in the prioritization and selection of stream restoration capital projects. An example of this process is the Gwynns Falls watershed. Many of its streams were field assessed during 2003. A map of the results is shown elsewhere in this report.

Stream restoration projects managed under the Capital Improvements Program at DEPRM are normally monitored for three years after construction for morphologic stability, biology, riparian planting success, and performance of the structural features installed in the stream. The monitoring activities provide compliance with NPDES permit requirements as well as U.S. Army Corps of Engineers and Maryland State construction authorizations. The monitoring is used to determine the success of the projects in achieving the goals of self-maintaining channel stability, reduction of bed and bank erosion, protection of private and public infrastructure, and habitat improvement. Further, the monitoring has enabled the County to discover and correct any developing problems that have occurred post project, and it has provided valuable feedback for continued improvements in the design and construction of future stream restoration projects. As of mid-2004, ten stream restoration projects are being monitored by either engineering firms or by DEPRM staff. The results show that the stream restoration projects are achieving the goals of the program.

ENVIRONMENTAL RESTORATION PROGRAMS

Baltimore County Waterway Improvement Program

In 1987 DEPRM implemented a capital program for the assessment and identification of water quality problems and implementation of design and construction of watershed restoration projects, including preparation of watershed management plans, stormwater conversions and retrofits, stream and wetland restoration, shore erosion control, and waterway dredging. Restoration is especially important in communities built prior to environmental regulatory programs. The program seeks to protect, restore and improve the water resources of the County. The program structure is based on the County's fourteen (14) major watersheds in order to provide a comprehensive framework of protection and restoration of the County's natural resources. Projects are prioritized in part based on opportunities identified in watershed management plans. Project funding is supported primarily by County General Obligation Bonds and supplemented by State funds from the Maryland Departments of the Environment and Natural Resources through the Storm Water Pollution Control, Small Creeks and Estuaries, and Waterway Improvement cost-share programs. FY 1988-2005 allotments have totaled $42 million, including $17 million in State cost-share funds. The County's proposed FY2005-2010 budget for this program is $31 million. The Waterway Improvement Program funds the following types of projects:

Stormwater Conversion Projects

These projects involve the conversion of existing stormwater detention (dry) ponds to extended-detention with shallow marsh or retention (wet) pond facilities that provide water quality benefits in addition to runoff volume control. These projects are often constructed in conjunction with stream channel restoration.

Stormwater Retrofit Projects

These projects involve the installation of new stormwater best management practices (BMPs) facilities in communities developed prior to stormwater management requirements. Types of BMPs include extended-detention water quality ponds, bio-retention, stormwater wetlands and marsh, end-of-pipe storm drain outfall plunge pools, and water quality inlets.

Stream Restoration Projects

These projects restore highly degraded urban channels and enhance riparian ecosystems. The stream restoration projects utilize state-of-the-art techniques based on applied fluvial morphological principles and engineering hydraulics to restore and provide natural stream functions. Primary goals of these stream restoration projects are to reduce excess sediments by creating stream channel equilibrium, and enhance natural riparian and aquatic habitats by utilizing bioengineering techniques and natural materials. Projects have included removal of deteriorating concrete channels, and replacement with boulders and vegetative devices to emulate natural step pools and meanders for stream stability and velocity control. For some projects, detailed water quality, habitat, and geomorphologic monitoring is performed to assess the effectiveness of the project. DEPRM has completed 33 projects to date with many projects in design, permitting, or construction.

Shore Erosion Control Projects

These projects stabilize eroding shorelines and create tidal habitat. Since program inception, nearly 15,000 feet of shoreline has been protected at numerous County waterfront parks and Hart-Miller Island Parks, at a total cost of nearly $3 million. Shoreline projects consist primarily of establishing shoreline vegetation and providing ancillary revetments or offshore structural protection, if appropriate, through gapped breakwaters.

Waterway Dredging Projects

The Baltimore County Department of Environmental Protection (DEPRM) has an ongoing program to restore navigation channels for recreational boating access while protecting and enhancing aquatic habitat of the Chesapeake Bay and its tributaries. The projects include providing a channel in the center of a creek as well as individual spur channels connecting piers to the main channels. Dredging projects have companion projects in the watershed for the reduction of nutrient and sediment loading to the dredged channel. Baltimore County also collects submerged aquatic vegetation (SAV) data for all creeks that have been or are proposed to be dredged. Submerged aquatic vegetation is considered a key indicator of the general health of a waterway. SAV growth has rebounded in many of the County's waterways and the County has been documenting and mapping these trends since 1989. This data provides the necessary information to satisfy State and Federal permit requirements and to better understand SAV growth and the limiting factors.

In 2004, the County completed a study on the effects of dredging on SAV. This study documents the resurgence of submerged aquatic vegetation (SAV) after dredging in tributaries of the Chesapeake Bay in Baltimore County, Maryland. Results from five waterways are presented over a 5-year period utilizing pre- and post-dredge SAV surveys. Comparison to five reference sites and overall SAV trends are also evaluated. All five case study waterways are typical of Baltimore County waterways that require dredging of accumulated sediment runoff to restore active recreational boating access and to help minimize sediment re-suspension from prop wash. Specific SAV/Dredging relationships, if any, are masked by other variables such as climate, boating, and land use. During this retrospective study period for example, an extended period of drought and severe summer heat in 2002 was followed by the wettest year on record for 2003 rainfall. During both events SAV beds were observed to be under stress and dying back. However, in this study there appears to be more improvement in SAV habitat following well planned and implemented dredging. Avoidance and minimization of direct SAV disturbance should be pursued and balanced with providing adequate channelways for active boating that are terraced and narrowed to complement natural conditions as much as possible.

Baltimore County Facility Maintenance Program

DEPRM coordinates the stormwater maintenance program to help to assure that existing structural controls continue to provide the pollution reduction benefits for which they were designed. Maintenance programs also reduce pollution in urban areas where new structural controls are unable to be located due to space or funding limitations.

Storm Water Management Facilities

There are more than 2,685 approved stormwater facilities in Baltimore County, which includes 978 that are designated to be publicly-owned facilities. These facilities help reduce downstream impacts of stormwater runoff from development projects, and facilities built during the past decade generally provide some water quality benefits such as the trapping of phosphorus

that can cause nutrient enrichment of receiving waters such as reservoirs and the Chesapeake Bay. DEPRM established a four-person operations crew in 1997 to accelerate the maintenance of the County owned facilities, focusing on the removal of woody vegetation from fill-slopes (berms) of ponds and clearing of sediment and debris blockages in pond pipes. In July, 2003 an additional 2-person crew was added to the program.

In 2003, 127 separate maintenance activities were performed at 158 facilities, with 73 total inspections. This program fulfills reporting requirements for the County's delegated Stormwater Management Program as well as the NPDES Municipal Storm Water Permit.

Baltimore City Capital Improvement Program

The Capital Improvement Program (CIP) maps out the implementation phase of the watershed restoration plans. A list of the capital projects, organized by major watershed, with description and status for each project is listed below.

Gwynns Falls Watershed Capital Improvements

Gwynns Falls Habitat Improvement
Cost: $300,000

Status: This project has been described in previous years' Annual Reports. As of last year, the Army Corps of Engineers (ACE) was waiting for approval from Headquarters to fund the implementation Phase of the project, which would not only include stream and watershed restoration projects, but sanitary rehabilitation projects as well. While approval was given last fall, only limited funds were authorized. The City and the ACE agreed to target the remaining funding for the design of the MC10 project. The City is in the process of developing a memorandum of Understanding with the ACE to do the design. The City will be required to provide 35 percent in matching funds. The design time frame is approximately one year.

Description: The MC10 project site is located near Beechfield Elementary School on the Maidens Choice Run. A wetland is proposed next to the school. A portion of storm drain may be removed to recreate the natural stream. The wetlands will treat runoff from both the storm drain and the school parking lot nearby. Also a portion of Maidens Choice Run at this location will be stabilized.

Maidens Choice Creek Wetlands Restoration/Enhancement
Cost: $1,500,000

Status: The design proposal was submitted by consultants and is currently being reviewed by the Department of Audits. Site survey works should begin in April 2004. Design should be completed in April 2005. Construction is anticipated to begin in September 2005, and be completed in August 2006.

Description: This project is located in Baltimore City in the northeast quadrant of the Caton Avenue/Benson Avenue intersection along an unnamed northwardly flowing tributary of Maidens Choice Creek on the Seton Keough High School campus. This was originally a joint project with the Army Corps of Engineers to restore impaired streams within the Gwynns Falls watershed. Maidens Choice was selected as the candidate stream for restoration as it was found to be the most impaired stream in the watershed. The City is using consultants to design the

project because the Army Corps did not receive funding authorization for this project under their Civil Works Program.

The proposed wetlands will treat urban runoff from approximately 255 acres of a highly urbanized area. This will help improve the water quality in the surrounding area. Additionally, the restoration of this stream will also help prevent the ongoing bank erosion, and protect the proposed wetland. This project also helps the City to satisfy its NPDES requirement and supports the Mayor's goal of making Baltimore safer and cleaner.

Gwynns Run Pollution Control Facility
Cost: $1,500,000

Status: Construction started in March 2003. An overhead crane across the Gwynns Run and a concrete pad will be constructed to facilitate the maintenance of the debris collection system. The projected project completion date is May 17, 2004.

Description: This project is located on the right bank of the Gwynns Run in the Carroll Park Golf Course. Three water quality basins, a fore bay, a wetland and a wet pond will be constructed to treat storm water diverted from the Gwynns Run. Runoff from the upstream watershed (1373 acres) will be diverted into a three-stage wetland treatment train with a treatment volume of 5.8 acre-feet. A cast-in-place reinforced concrete debris collection structure using net bags will be constructed in the stream and at the entrance to the fore bay to collect floatable trash. Between 10 and 24 percent of the annual runoff will be diverted into the system for treatment. City staff will evaluate the need to replace the debris collector bags biweekly, or after every storm (with ¼ inch or greater rainfall), whichever comes first. The overhead crane will facilitate removal of the debris collector bags from the debris collector structure across the Gwynns Run. A roll-off will be parked on the concrete pad to store debris. The roll-off will be transported to an existing landfill to dispose of the debris on a regular basis.

Gwynns Falls Debris Collector
Cost: $600,000

Status: The design phase was initiated in January 2002. The project was advertised and notice to proceed was issued on October 13, 2003. The debris collector is part of a much larger project involving the construction of a new water main and storm drain. The debris collector is scheduled to be completed by July 2004.

Description: At the request of the Gwynns Falls Watershed Association, a site was chosen for an off-line trash and debris netting system attached to the storm drain in the vicinity of Briarcliff Rd. and Winans Way. A parallel stormdrain is being designed to alleviate flooding. The watershed area to the facility is 232 acres and runoff (first half inch) will be diverted into a box chamber in which the netting system will be housed. After passing through the nets, the flow will return to the storm drain.

The contractor will be responsible for maintaining the system during its first year of operation. The system will be inspected after each major storm or at least every two weeks. The trash will be weighed, lifted out of the junction chamber via a truck-mounted crane and removed to a landfill.

School Greening Project
Cost: $407,000

Status: Conceptual design plans and approval meetings with schools' principals have been completed. Bentalou and Gilmor Elementary Schools were packaged under an existing Department of Recreation & Parks contract. Construction at Gilmor began in December 2002 and construction for Bentalou began in April 2003. The remaining schools will be packaged under one contract, with the exception of Calverton Middle School. Construction should begin for Hilton Elementary, Harlem Park Elementary, and West Baltimore Middle Schools in June 2004.

Description: The DPW will be working with the Baltimore City School System and the Department of Recreation and Parks to convert unused impervious surfaces (e.g., asphalt playgrounds and parking areas) into environmentally friendly landscaping. The following six schools have been selected for greening: Gilmor Elementary, Bentalou Elementary, West Baltimore Middle, Harlem Park Elementary, Hilton Elementary, and Calverton Middle. A private developer will fund Calverton Middle School, as part of an offset to their storm water management requirements.

Water Quality Management Section staff met with other related parties (Baltimore City participants and non-Baltimore City participants) to select six new schools for the continuation of the Baltimore Green School Project. The new schools approved by the Baltimore City Public School System are Franklin Elementary, James McHenry Elementary, Canton Middle, Stuart Hill Elementary/Middle, Benjamin Franklin Middle, and Hamilton Middle Schools. Funding for these six additional schools will come through an innovative program that would allow developers to "green schools" as mitigation when they are unable to meet their redevelopment requirements for stormwater.

<u>Jones Falls Watershed Capital Improvements</u>

Open Channel Improvements- Upper Stony Run
Cost: $1,200,000

Status: The consultant has completed 90% of the design. There has been an on-going issue with property owners (Friends and Gilman Schools) to negotiate fees and rights of entry. Currently the City and the consultant are working to resolve these issues. This will delay the construction until summer of 2005.

Description: The stream banks of Stony Run, from Northern Parkway to Wyndhurst Avenue will be improved and stabilized using "natural channel" materials (e.g., boulders, root wads, live plantings) based on Rosgen concepts. The purpose of the project is to reduce erosion and sedimentation and improve the habitat of the stream channel and near-bank area. The project will also alleviate further damages to public utilities and roads by restoring the stream.

Open Channel Improvements- Middle Stony Run
Cost: $1,000,000

Status: The initial design firm was terminated last spring because of contractual problems. A new firm was selected, initiated design last fall and is presently conducting a morphological stream assessment. Expected advertisement date is early November 2005.

Description: The stream banks of Stony Run stream, from Coldspring Lane to Wyndhurst Avenue will be improved and stabilized using "natural channel" materials (e.g., boulders, root wads, live plantings) based on Rosgen concepts. The purpose of the project is to reduce erosion and sedimentation and improve the habitat of the stream channel and near-bank area. The project will also alleviate further damages to public utilities and roads by restoring the stream.

Open Channel Improvements- Lower Stony Run
Cost: $1,200,000

Status: The study phase began in winter 2003 and final design recommendations are being reviewed. Design should begin by mid-April 2004 and be completed by April 2005. Construction should begin in October 2005 and be finished by October 2006.

Description: Consultants will use the hydrogeomorphological assessment for the section of Stony Run below Coldspring Lane to determine the extent of the stream channel that will be restored under this phase of the project. The project length will be determined by logical breakpoints in the stream geomorphology; however, available funds are also a driving factor. The section immediately below Coldspring Lane is severely entrenched with limited floodplain area, failing gabions and concrete channels throughout. The natural channel design approach may not be applicable until after the stream passes below University Parkway. The project will try to stabilize the substrate and remove potential fish blockages.

Open Channel Improvements- East Stony Run
Cost: $1,250,000

Status: Consultants submitted a proposal to design restoration alternatives for East Stony Run from Homeland Ave. to Charles Street. Design was initiated last year, and the 30% design was submitted for review last January. Unfortunately this project was put on hold indefinitely to address two major issues. The first issue is that the principle designer is now with a new firm and is negotiating with the original firm hired by the City to complete the design as a joint venture. The second is that the culvert under Charles Street must accommodate the new alignment of the stream channel. The culvert is also in need of major repair work. To optimize resources, the City made a decision to combine the culvert repairs and realignment with the stream restoration work under the same contract.

Description: The design will use the principles outlined by the Rosgen (Natural Channel Design) approach where possible. The City will be working closely with the property owners along the stream including Notre Dame/Loyola Colleges, as well as enlisting help from the Jones Falls Watershed Association.

Herring Run Watershed Capital Improvements

Moores Run Wetland
Cost: $1,000,000

Status: The design phase has started and will be completed by Spring 2004. Construction should begin November 2004.

Description: A wetland is being designed next to Moores Run on the left bank near the intersection of Relcrest and Denview Way. The wetlands will receive a portion of storm flow (high flows) from the Moores Run. The wetland will remove pollutants through settling and plant uptake processes. The facility should be able to treat a sizable percentage of the approximate 3000-acre upstream area. The exact amount has yet to be determined and will be depend on the final configuration of the pond.

Soil borings and analysis were completed at the wetland site. A camera inspection took place inside of an existing 27" sanitary line that is located underneath the facility to determine the condition. Inquiries have been made to reduce Denview Way's width so that a pathway can be constructed at the wetlands perimeter.

Open Channel Drainage Facility Study Herring Run
Cost: $205,788

Status: The study should be completed by June 2004.

Description: The initial scope of work involved a comprehensive hydrogeomorphological and habitat assessment of the main stem of Herring Run. The data would be used to prioritize sites for restoration. The first phase of the study would focus on the area of the stream adjacent to Morgan State University. This work would lead to conceptual designs. The second phase would address the remainder of the stream system.

The consultants were asked to modify their proposal. Rather than focusing on the Morgan State area, the entire watershed would receive the same level of assessment. Also, rather than using a Rosgen Level 3 assessment, which is used more for conceptual designs, a rapid assessment protocol using the Rosgen method would be used.

The first phase of the study would include the stream assessments. Phase II would include conceptual designs (5-10 based on budget) for stream restoration projects that should be prioritized.

Open Channel Improvements Biddison Run
Cost: $1,500,000

Status: The project was advertised on June 27, 2003. Bids were opened on September 17, 2003. The contract will be awarded after the State Highway Administration issues a concurrence to the award. The approximate notice to proceed date is April 30, 2004. The construction will have to wait until June because of permit restrictions. The construction period is one year.

Description: This project is located on Biddison Run, next to Bowley's Lane Landfill in East Baltimore. Approximately 1500 feet of the stream, from Moravia Road to its confluence with Herring Run will be restored to protect the existing landfill on both of its banks. The Herring Run Watershed Association will monitor the restored portion of the stream for three years after the completion of the project. The City has received a $440,850 grant from the Governor's Watershed Revitalization Partnership Program (utilizing Transportation Equity Act funds), which has to be matched by 50 percent. The Department of Natural Resources is administering

the grant and has made available an additional $157,459 in grant funds.

Water Quality Sampling Station- Moores Run
Cost: $100,000

Status:
Hamilton Avenue Sampling Station: The design was completed and advertised on September 26, 2003 with Storm Water Contract 7751 (Moores Run, Section One). The contract was awarded on March 17, 2004 and the notice to proceed for this contract is expected by April 30, 2004. Construction should be completed by December 2004.

Radecke Avenue Sampling Station: The design for Radecke Avenue sampling station is 95 % complete. The project is on hold because of concerns about park encroachment by the Department of Recreation and Parks. The construction cost at the alternate site is more than the budgeted amount. The station will be constructed if additional money becomes available. Otherwise, the City will continue to monitor storms using the existing set- up at Radecke Avenue.

Description: An automated water quality sampling station will be constructed to monitor wet weather flows and water quality on a tributary to Moores Run near Hamilton Ave. The station will house refrigerated automated samplers that can be automatically triggered by a rise in stream stage.

Moores Run Stream Restoration
Cost: $174,000

Status: The design should begin during the spring of 2004 and take one year.

Description: Funding has been approved to design restoration alternatives for the section of Moores Run downstream of Radecke Ave. The approximate limits for the Moores Run stream restoration design will be from Relcrest Road to Force Road. The purpose of the design is to reduce channel erosion, improve habitat and protect the embankment of the Moores Run Wetland described above.

Harbor Watershed Capital Improvements

Bon Secours of Maryland Sandtown-Winchester Project
Cost: $31,250

Status: Ongoing

Description: This is a joint project agreement between the City and the Bon Secours of Maryland Foundation. The Bon Secours of Maryland Foundation completed its first year partnership with the Department of Public Works. The Foundation completed 185 lots- turning them from unattractive impervious spaces to beautiful, tree-lined, green spaces. They were able to complete 60 more lots than they had originally planned. The Foundation has awaiting a similar contract that is now working its way through the State's Critical Area Commission. Should the funds be approved, the City hopes to sign a new contract within the next couple of months.

Brooklyn SWM Pond
Cost: $1,500,000

Status: This project was advertised on February 28, 2003. Construction began in November 2003. This project is still under construction and is 26% complete.

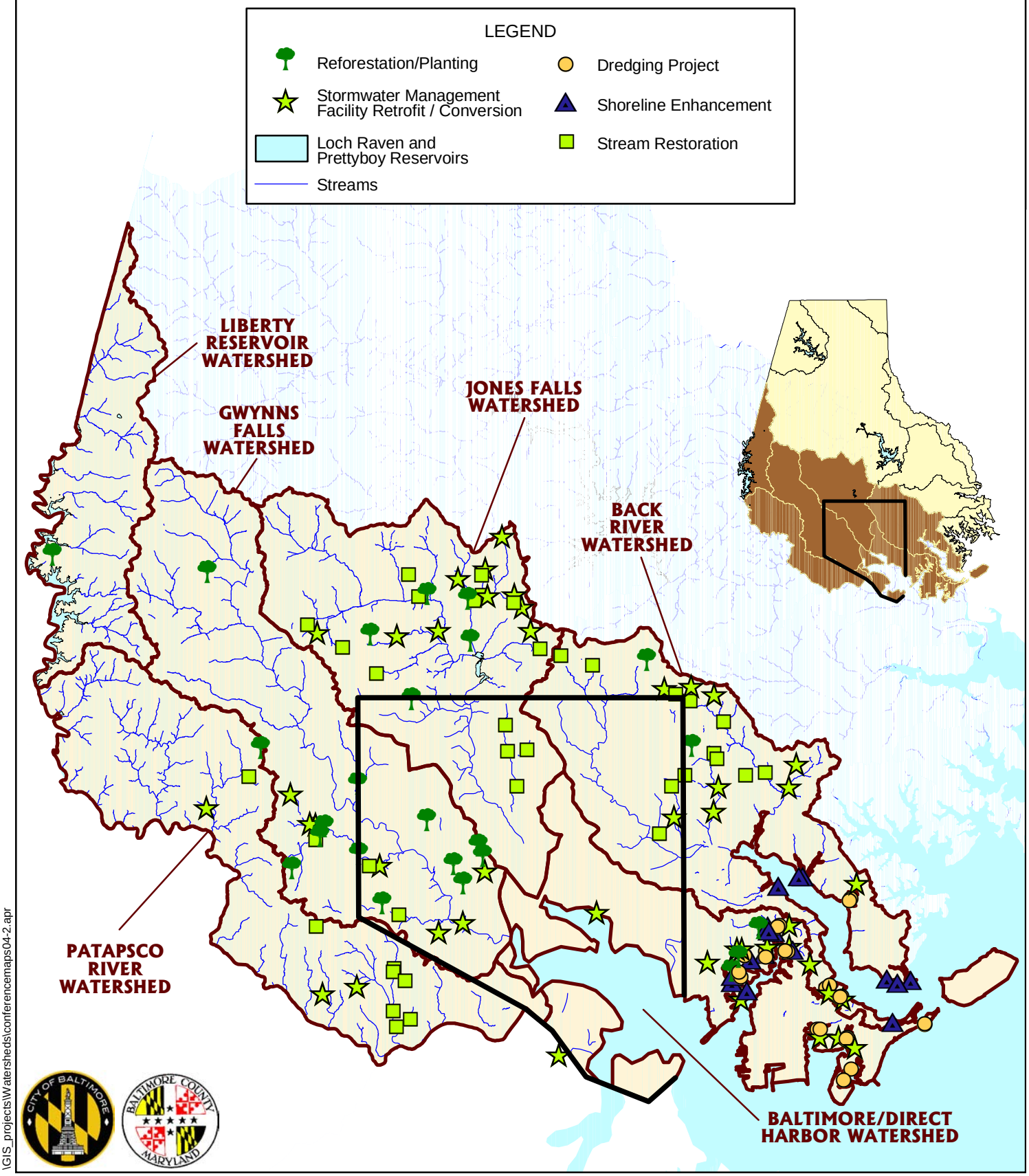
Description: This project involves the construction of a shallow marsh-stormwater management extended detention pond in the Brooklyn Park area of the City. The pond was originally designed to provide water quality and quantity (flood) control for the surrounding communities, but there was insufficient storage space available to mitigate storm events without causing further flooding problems. The pond was re-designed primarily to provide pollutant removal and water quality treatment for the 306 acre contributing drainage area. The pond has been sized to provide the maximum possible water quality control for smaller storm events in the available space. Approximately 75% of the one-inch storm will be treated.

Harris Creek Trash-Debris Interceptor Study
Cost: $500,000

Status: The study phase was completed. The consultant has completed 30% of the design, which is being reviewed by the community. The design should be completed by the end of the summer of 2004. The watershed association is working on securing the commitments necessary to provide maintenance after construction. Advertisement for construction will not occur until after this has been resolved.

Description: A trash and debris netting system is being designed for the Lakewood Avenue storm drain outfall, which drains the Harris Creek watershed. The system will include a series of 4 removable nets that will be anchored by cable, just downstream of where the Lakewood drain empties into the Harbor in the Canton area. The nets are attached to a floating super-structure. Floating booms funnel the flows into the nets where trash and debris are intercepted. The disposable nets are removed by crane at approximately two-week intervals.

Stream Capital Improvement Projects
Patapsco-Back River Basin Watersheds



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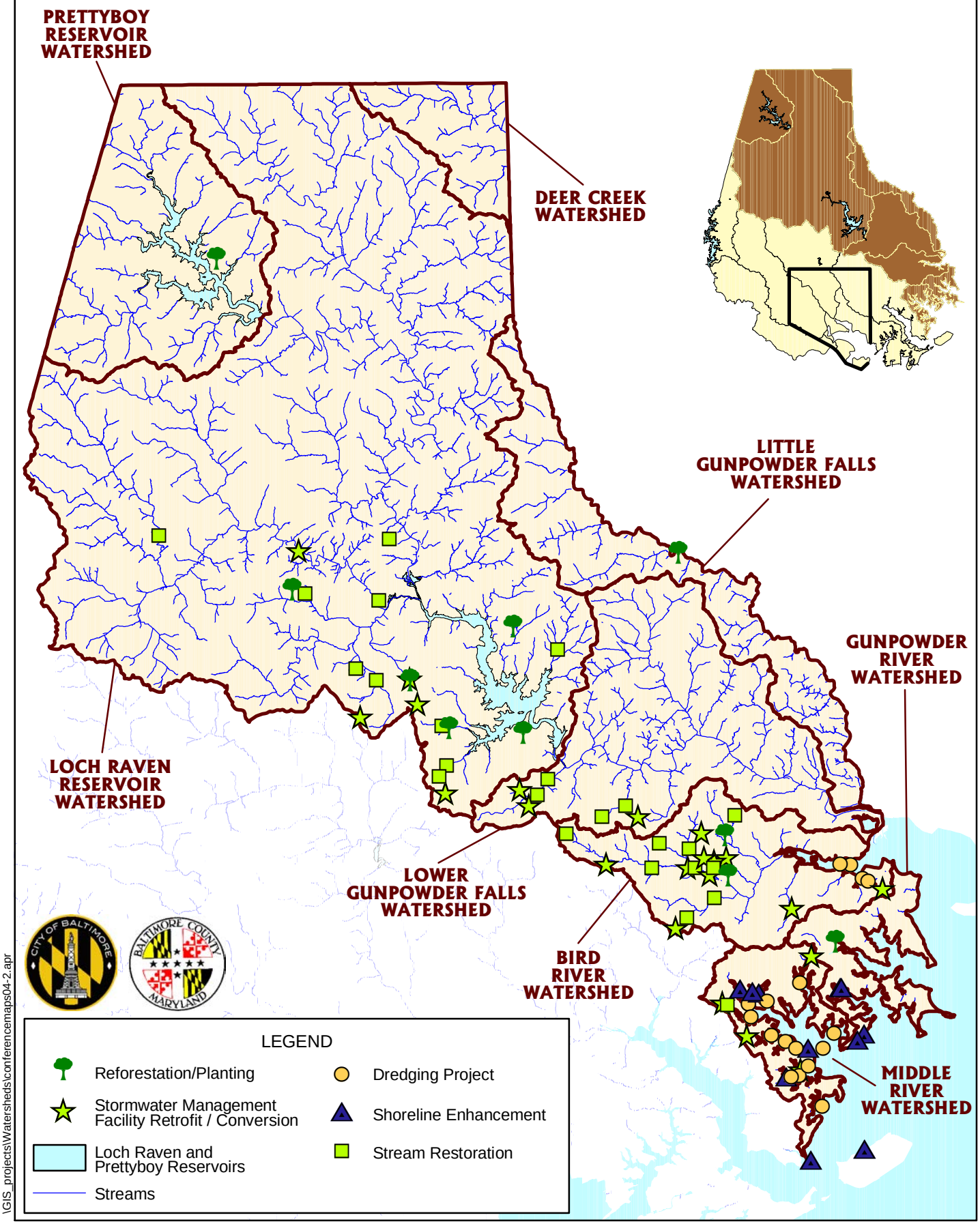
Stream Capital Improvement Projects
Upper Western Shore Basin Watersheds



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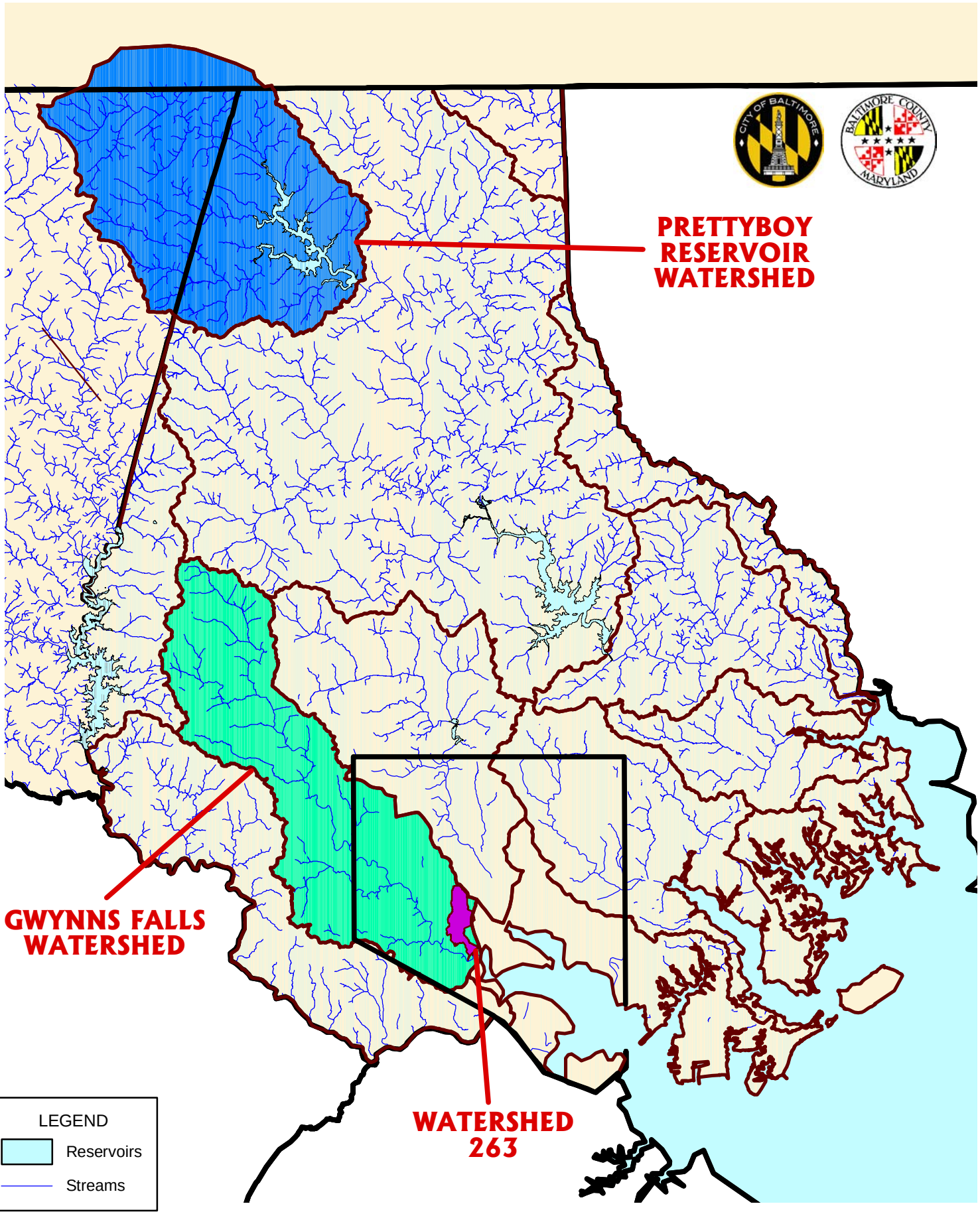
Watershed Plans:
Prettyboy Reservoir, Gwynns Falls, and Watershed 263



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WATERSHED MANAGEMENT

Baltimore County DEPRM and Baltimore City DPW are actively involved in watershed management. Watershed management is the protection and/or restoration of natural resources and water quality that may be or have been degraded by human disturbance. Watershed plans are prepared to evaluate and determine in a comprehensive manner the steps needed to meet the restoration and protection goals of the watershed. The following are short summaries pertaining to a selection of watershed management plans that are currently being prepared in the Baltimore Region.

Prettyboy Reservoir Watershed Restoration Action Strategy (WRAS)

The Prettyboy Reservoir watershed is a unique watershed in that it contains one of three reservoirs that provide water for 1.8 million residents of the Baltimore Metropolitan area. This fact brought The Trust for Public Land (TPL) to use the Prettyboy Reservoir watershed as one of four watersheds in a Source Water Protection Study. The TPL study brought together local, state and federal governmental agencies, non-profit organizations, and concerned citizens. This group developed two schemes for prioritizing lands for restoration and conservation within the Prettyboy Reservoir watershed.

Starting in January 2005, Baltimore County, Baltimore City, Carroll County, the Prettyboy Watershed Alliance and the Trust for Public Land are collectively initiating a Watershed Restoration Action Strategy (WRAS) with the assistance of the Maryland Department of Natural Resources. The WRAS is a watershed plan that strives to include stakeholders that represent all the unique viewpoints within this watershed. The stakeholders will provide input in developing a management scheme to prioritize the challenges and identify possible solutions for achievement of the watershed goals. The partnerships developed during the TPL study will be vital to the success and usefulness of the Prettyboy WRAS. The final WRAS document will be available in late 2006.

Gwynns Falls Water Quality Management Plan

The recently completed Gwynns Falls Water Quality Management Plan was a collaborative project between Baltimore County and Baltimore City. The Baltimore City firm of Parsons, Brinkerhoff served as the lead consultant in the preparation of the plan.

The objectives of the plan were to:

1. Identify and evaluate non-point source stormwater pollution,
2. Assess geomorphic condition of the stream network and evaluate the state of degradation,
3. Assess and determine management measures for the reduction of non-point source pollution and reestablishment of stream stability, and
4. Provide a watershed restoration framework and capital improvement planning tool for the City and the County.

The field assessment component of the plan included stream stability assessments, forest assessments, and stormwater management facility and storm drain outfall assessments. An example of the results from the stream stability assessment is displayed on the map on the facing page. A pollutant load model was developed to estimate non-point sources of pollution and an overall watershed and subwatershed characterization were prepared. The modeling, characterization, and field assessment data were used to develop a prioritized list of capital restoration opportunities.

One hundred and twenty (120) capital projects were identified at an estimated cost of $30 million. Implementation of these projects would result in ten (10) miles of stream restoration, eight (8) miles of riparian buffer enhancements, and sixty-seven (67) stormwater retrofits. The stream restoration projects would restore 25% of the stream miles with the most unstable stream reaches.

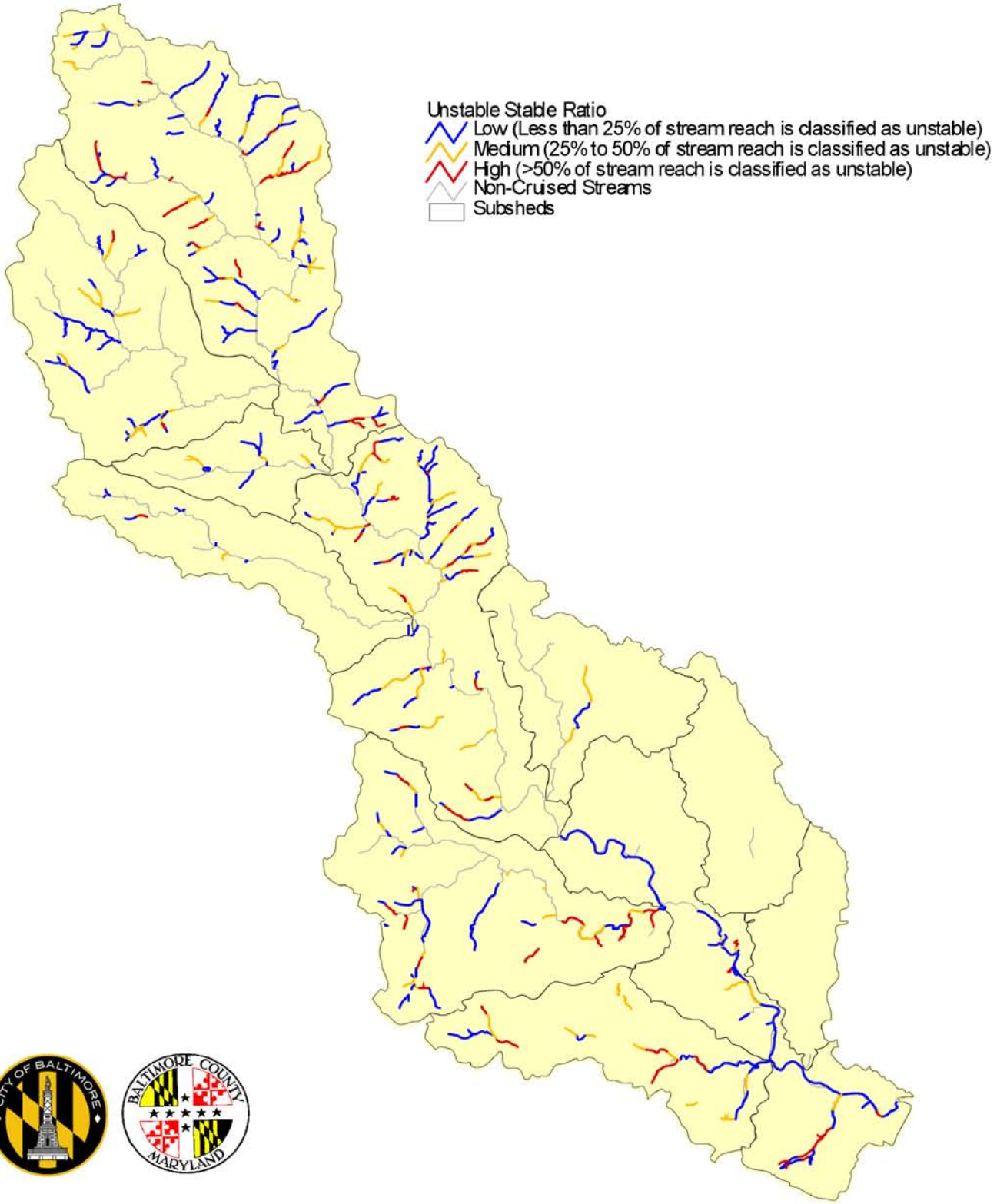
Watershed 263

This innovative project will undertake significant urban watershed forestry restoration research and demonstration projects building on the decade long partnership experience of the Parks & People Foundation, Baltimore City, and community groups. The Watershed 263 project will apply and test the most innovative and efficient best management practices focusing on "low impact" nonstructural techniques applied to vacant and abandoned or underutilized properties. The initial products will include a community assessment, watershed ecological resource atlas, restoration plan and community participation, demonstration site designs, several highly visible and unique restoration demonstration projects with research, training, and evaluation value.

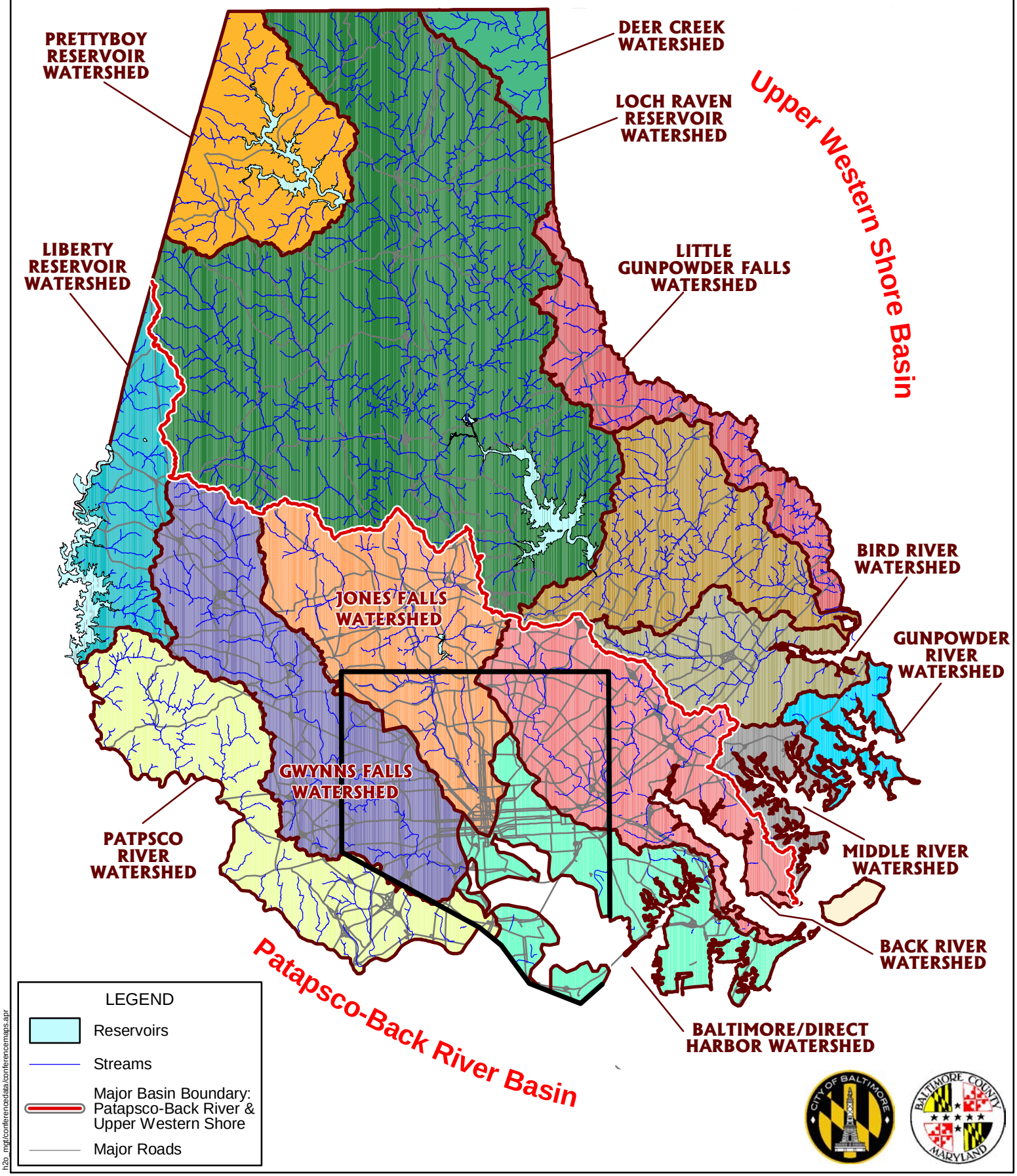
Watershed 263 is a 900-acre area of west and southwest Baltimore City and one of the City's *stormsheds.* Usually, in a watershed, all the rainwater that falls, and everything that is carried with it, drains into a particular body of water-like a stream or river. In a stormshed there are no longer any above-ground streams because our communities have been built over them. Instead of emptying into a stream, the storm drains on the streets empty into a series of connected underground pipes that flow to one large outfall. For Watershed 263, that outfall is a twenty-five (25) foot wide pipe that drains into the Baltimore Harbor, Middle Branch, and the Chesapeake Bay.

Restoring urban forests is critical to reversing the decline in urban population centers such as Baltimore City. Society today seeks connections with healthy, green environments. Baltimore's urban forest currently falls below important national thresholds for ecological values, including water quality, terrestrial and aquatic habitat, and open space for recreation and renewal. Restoring urban forest health and water quality to levels that adequately support ecosystem function and process will require long-term partnerships that are ultimately directed by the values of local communities and ecological opportunities presented by the landscape.

Gwynns Water Quality Management Plan
Unstable to Stable Stream Ratio



Major Watersheds of Baltimore City and County



VOLUNTEER ORGANIZATIONS

This information is provided by the following major watershed associations and volunteer organizations.

Alliance for the Chesapeake Bay

www.AllianceChesBay.org

The Alliance for the Chesapeake Bay is a regional nonprofit organization that builds and fosters partnerships to restore the Bay and its rivers. Known as "The Voice of the Bay", the Alliance is respected as a source of unbiased information and as a neutral party on all Bay watershed issues. Through partnership building and regional cooperation, the Alliance is a coalition of educators, scientists, farmers, recreationists, environmentalists, businesses, government officials, and citizens across the Chesapeake Bay Watershed. Historically, the Alliance has been a leader in facilitating groups to come to consensus on programs that help to protect the Chesapeake Bay. Founded in 1971, the Alliance is funded by individuals, corporations, governments, and foundations. The Alliance maintains staff and offices in Baltimore, Maryland; Annapolis, Maryland; Camp Hill, Pennsylvania; Richmond, Virginia, and; Washington, DC. The Alliance also conducts related projects that extend our connections with Chesapeake Bay stakeholder groups, as well as increase our competence in habitat restoration, stewardship, citizen engagement, environmentally sound landscaping and development practices, restoration training, and river sojourns.

Through our RestoreCorps program, a program designed to mesh with the individual needs of watershed groups to build their capacity to undertake restoration, the Alliance is working or has worked with many of the City and County's watershed groups. Through these partnerships we have helped plant trees in stream valleys, designed and installed urban BayScape gardens, implemented maintenance programs on restoration sites and been a part of several "Watershed Snapshots", an annual picture of the water quality in a watershed that is taken by volunteers across the entire watershed.

Project Clean Stream is a coordinated effort by the Alliance to clean trash, tires and other discarded items from area streams, stream valleys and nearby roadsides. Project Clean Stream is the area's largest one-day stream and watershed clean up effort. In 2004, more than 1,200 volunteers cleaned over 80 sites in Baltimore City and the surrounding counties and recovered more than 65,000 pounds of trash. 2004 partners include the Gunpowder Valley Conservancy, the Gwynn's Falls Watershed Assoc., the Irvine Nature Center, the Herring Run Watershed Organization, the Jones Falls Watershed Association, the Baltimore City and County Governments and others. Funding was provided by the Chesapeake Bay Trust.

Friends of the Patapsco Valley and Heritage Greenway

www.patapscoheritagegreenway.org.

The Friends of Patapsco Valley and Heritage Greenway (FPVHG) is a non-profit, 501(c)(3) organization of volunteers who are dedicated to preserving, protecting, interpreting and restoring the environment, history and culture of the Valley. We translate this mission into two primary goals: 1) telling the story of the valley 2) protecting the valley. While we do not own property and we are not a governmental organization, we do try to encourage the positive management of the Patapsco Valley, including the Patapsco State Park and the surrounding communities. We also are actively involved in developing educational materials about the environment and the history of the valley. Finally, we are actively involved with interpreting the story of the valley.

In support of our Environmental Mission, we completed our fifth annual "Garlic Mustard Challenge" this past May. FPVHG utilizes the Garlic Mustard Challenge to educate the community about the importance of understanding the balance of nature. Garlic Mustard is a native plant of Europe and was first recorded in the United States about 1868 in Long Island, New York. Settlers probably introduced it for food and medicinal purposes. Garlic Mustard, like other "Invasives", poses a severe threat to native plants and animals in forest communities in much of the eastern United States.

To date, volunteers have picked nearly 3,000 pounds of Garlic Mustard. To peak interest and make a fun event, we have a cooking contest open to both professional chefs and amateurs. Everyone gets to taste the food, which is excellent especially with the backdrop of native bluegrass music. Prizes are given to those who pick the most as well as to the winning recipes. The positive educational exposure has grown exponentially each year.

Also supporting our Environmental Mission, we sponsored a Watershed Symposium in 2002. At this event representatives of governmental organizations on both sides of the Patapsco River assembled to talk about the state of our watershed and what each of the jurisdictions are doing to enhance the water quality of the river. We are planning a second symposium this coming year. We also sponsor stream and road-side cleanups throughout the year and hold our annual meeting in January on a topic of interest to the community.

In support of our Historical Mission, we sell Professor Henry Sharp's book, "The Patapsco River Valley? Cradle of the Industrial Revolution in Maryland." It is a wonderful, descriptive book about our Patapsco Valley. FPV&HG was responsible for funding Dr. Sharp's initial research as well as helping him write the manuscript in preparation of the publication of the book by the Maryland Historical Society. Read it!

In support of our Mission to Tell the Story of the Valley and Preserve its Culture, we have actively promoted "Celebrate Elkridge", a month long festival celebrating Elkridge, a unique community, full of history, located at the cross roads of the Patapsco River and Route One. The spirit of Elkridge lives on through the Elkridge Food Pantry,

the Elkridge Volunteer Fire Department, Elkridge Senior Housing, and the Elkridge Youth Organization in the form of carnivals, block parties, teen dances, poetry readings, recitals and art and craft exhibits, quilting, carving, wining, dining, walking, biking, or hiking.

The Friends of the Patapsco Valley and Heritage Greenway is a non-profit organization that believes that the Patapsco Valley is our local treasure. We are working to preserve, protect and interpret its history, culture and environment. We are working with local organizations to showcase sites and activities in Elkridge, Oella, Ellicott City, Catonsville and the Valley. You should become a member! Call 410-480-0824 or visit our web site listed above.

Gunpowder Valley Conservancy

www.gunpowdervalley.org

The Gunpowder Valley Conservancy (GVC) is a non-profit conservation organization dedicated to preserving the character, history and environmental integrity of the watershed. It is run by volunteers and is chartered as a publicly supported charity. The GVC is currently active in the following areas of conservation:

- Land Preservation – Sponsored two Rural Legacy areas in the county, the Coastal Rural Legacy Area, partnering with Baltimore County, and the Gunpowder River Legacy. In this effort, the GVC has raised over $4.3 million from public and private sources, holds easements on 1000 acres and has co-published a "Preserving Lands in Baltimore County" booklet with the Greater Sparks Glencoe Community Council, the County and the other local land trusts in the county.

- Restoration - The GVC has conducted extensive tree plantings within the watershed in partnership with local schools, scout groups, service clubs and citizens. Plantings have been located on farms under conservation easements, within the Gunpowder Falls State Park, and streamside areas in county buffer easements. In 2003 and 2004, the GVC has partnered with the Alliance for the Chesapeake Bay's RestoreCorps to build its capacity in restoration.

- Streams – For three years the GVC has partnered with the Friends of Loch Raven, a member of the Streams Committee, to clean up the reservoir shores. The third annual Loch Raven Reservoir Cleanup Day was held on Sunday October 10, 2004, as a part of Baltimore County's Pitch-In For Progress and was a great success that attracted over 250 volunteers, including some of our prominent elected officials. Participation in Project Clean Stream coordinated by the Alliance for the Chesapeake Bay will become a major stream clean up effort in tributary streams to the reservoir and the Bay. The volunteers, that included all ages from elementary school children to grandparents, worked for several hours and gathered over 200 sacks of rubbish, tires, and large pieces of debris from the shoreline's edge. To find out more about how you can be a part of this effort as well as other efforts to protect our streams and drinking water, contact Paula Kurrus at (410) 683-3144 or email FriendsLochRaven@aol.com

and receive a copy of an environmental videotape that includes Down To Earth (Everyday Ways You Can Help Save the Bay).

- Community Outreach – The GVC is working with Baltimore County Dept of Environmental Protection and Resource Protection (DEPRM) and local community homeowners associations to increase forested stream-side areas as well as the size of forest patches in rural residential areas. Outreach using the Homeowners Guide to protecting drinking water and natural resources developed in part by the Baltimore County Soil Conservation District and DEPRM to promote better stewardship of the land will also be a focus of this activity.

- History – Conducted, in partnership with the Watershed Protection Coalition, a conference at Goucher College on the history of the Loch Raven Watershed. In the past the GVC has conducted several educational conferences on the history of the watershed, including Gunpowder Falls State Park and has been instrumental in the designation of Franklinville as a historic village. Currently, the GVC is working with the Friends of Cromwell Valley Park on the expansion of the Gunpowder Scenic Byways, to include parts of Loch Raven Reservoir and the park.

Gwynns Falls Watershed Association

www.gwynnsfalls.net

The Gwynns Falls Watershed Association, (GFWA) is a non-profit volunteer organization dedicated to the protection and enhancement of the Gwynns Falls watershed as a resource for the people of Baltimore City and County. Since its formation in 1997, it has worked with community groups to create awareness of streams and their degraded condition and conduct restoration activities within the 65 square mile watershed.

Funding from the Parks and People Foundation, Revitalizing Baltimore grant program enabled the organization to implement dozens of stream restoration and outreach activities, resulting in thousands of volunteer hours donated for stream cleanups, tree plantings and creating greater public awareness of the streams within the Gwynns Falls watershed. Through a National Fish and Wildlife Foundation (NFWF) grant, the GFWA created the Stream Watch program, through which volunteer teams are trained to monitor and report on the condition of their adopted streams.

The Restoration Partnership program with the Center for Watershed Protection with funds provided by NFWF and Chesapeake Bay Trust increased the GFWA's capacity for organizational development and stream restoration activities. The GFWA Program Manager recruited and organized volunteers to evaluate and monitor stream conditions using CWP USA and USSR protocol within three sub-watersheds. The collected data was used to develop a prioritized list of restoration projects, which will be implemented with additional funding.

Herring Run Watershed Organization

www.herringrun.org

The Herring Run Watershed Association (HRWA) is a grassroots, volunteer-based watershed organization active in Baltimore City and Baltimore County. Located in northeast Baltimore, the HRWA mobilizes volunteers for environmental stewardship through outreach, public education, and advocacy. Activities include stream monitoring, planting of native species for habitat restoration, and removal of invasive species. Special program efforts include "Stream Teams" and the "Adopt-A-Pond" project. Additionally, HRWA works with local schools to remove impervious surface, install plantings, and provide environmental education about storm water management.

In addition to its overall functions as an environmental organization, the HRWA plays important specific environmental monitoring, education, and advocacy roles in the communities of northeast Baltimore City and County. Within these communities are several low-to-moderate income neighborhoods, including Armistead Gardens, Rosedale, and Belair-Edison that have suffered disproportionate environmental damage over the last 50 years.

Through generous foundation support, HRWA is a key player in making sure residents of these communities have the skills they need to insure the clean up of industrial sites, have access to clean and green open space, and are able to interact effectively with local, state, and federal elected officials regarding health and other concerns related to their industrial past.

The HRWA works with Baltimore City and Baltimore County officials to protect and advocate for the streams of the watershed.

Irvine Nature Center

www.explorenature.org

The Irvine Nature Center is a non-profit environmental education organization whose mission is to inspire appreciation and respect for the natural world, to increase awareness of environmental issues, and to encourage individuals to sustain earth's ecosystem. Since its inception twenty-nine years ago, the Irvine Nature Center has provided environmental education programs and community outreach activities to engage people in the world of natural science.

As the only private non-profit nature center in the region, Irvine's programs include school field trips; *Natural Connections* urban outreach; *Community T.I.E.S.* schoolyard habitats; a variety of natural history public programs for children, families, and adults; nature-themed summer camps; scout programs; volunteer naturalist training; *Habitat Stewards* training; and special events such as PumpkinFest, Bird-A-Thon, Native Plant Seminar and Sale, and Project Clean Stream.

Approaching its 30th year, Project Clean Stream is a coordinated effort by Irvine and many partner organizations to clean trash, tires, and other discarded items from area streams and nearby roadsides. Project Clean Stream is the region's largest, and oldest, one-day stream and watershed clean up effort, and in 2004 Irvine turned the helm over to the Alliance for the Chesapeake Bay with the intention that the event will continue to grow in size to incorporate more of Maryland's imperiled watersheds. In 2004, more than 1,200 volunteers cleaned at over 100 sites in Baltimore City and six surrounding counties.

The nature center also features, on-site, a natural history museum, hands-on exhibits in the Kids' Corner, live animals (21 species), a green house, demonstration gardens, a self-guided nature trail, and a fabulous nature store. The Center is free and open to the general public seven days a week, year round, except for major holidays. For more information contact: Irvine Nature Center, 8400 Greenspring Avenue, Stevenson, MD 21153, 410-484-2413, or via email at irvine@explorenature.org.

Jones Falls Watershed Association

www.jonesfalls.org

The Jones Falls Watershed Association is a volunteer-driven grassroots organization started in 1997 to protect and restore the Jones Falls and its tributaries. The mission of the Jones Falls Watershed Association is to protect and restore the health and beauty of the Jones Falls watershed through restoration, monitoring, advocacy, and citizen awareness. The organization is credited with bringing attention back to the river and building awareness of the stream and stream valley as natural resource assets for the community.

The Jones Falls watershed encompasses fifty-eight (58) square miles including rural segments of Baltimore County at its upper reaches. The stream meanders through increasing levels of development until it emerges from a tunnel at Baltimore City's Inner Harbor.

The JFWA is a primary partner with Baltimore City on the Jones Falls Trail. The trail route will eventually connect Baltimore's Inner Harbor with Robert E. Lee Park and Lake Roland. The JFWA is assisting with signs, promotion and other trail enhancements.

The watershed association also sponsors the Jones Falls Valley Celebration, the Concert Under the Arch and canoeing/kayaking events. Volunteer activities include trash cleanups, water quality monitoring, buffer plantings and outreach. Additionally, volunteers assist with outreach and work with large landowners in the watershed to improve land management practices to improve water quality.

Stream Watch is a partnership between the JFWA, the Center for Watershed Protection and the Baltimore County Department of Environmental Protection and Resource Management. The program matches neighbors with their backyard streams to provide monitoring of stream conditions. Training and more or less depending on the

time commitment desired and the accessibility of the stream segment. The following is a list of adoption levels that may be selected by the volunteer:

- Stream Cleaner- Volunteers remove trash from their adopted section on a quarterly basis.
- Stream Walker - Volunteers complete an assessment form that helps describe the health of the stream and the conditions of the riparian area.
- Stream Watcher - Volunteers complete the duties of the Stream Cleaner and Stream Walker and provide more detailed information sheets on specific conditions in their adopted section.

Other Stream Watch programs occurring during the year include taking grab samples from the stream and collecting water insects for analysis with Maryland DNR's Maryland Biological Stream Sampling program.

Parks & People Foundation

www.parksandpeople.org

The Parks & People Foundation is dedicated to supporting a wide range of recreational and educational opportunities; creating and sustaining beautiful and lively parks; and promoting a healthy natural environment for all. Established in 1984, the Parks & People Foundation is a non-profit organization that strives to improve the quality of life for all people in the Baltimore area through educational and recreational programs that motivate young people and through partnerships that create and sustain green spaces.

Our staff, partners, and volunteers in the community have developed innovative solutions to issues facing Baltimore including the restoration of neighborhoods and their natural resources as well as the academic enrichment and motivation of our children. In order to realize our vision of a healthy environment where people live, work, learn and play, we have formed a strategy targeting two major fields of endeavor:

- Great Parks, Clean Streams & Green Communities - Helping to improve the physical, social and environmental quality of neighborhoods through greening activities and forming networks among communities to sustain natural resources.
- Motivating Youth - Programs nurturing children and supporting communities by working together to provide enriching activities for youth.

We are proud of our efforts to develop incredible parks and trails, such as the Gwynns Falls Trail and Greenway. Our greening programs also include community forestry, tree planting, as well as vacant lot, schoolyard and watershed restoration supported by U.S. Forest Service and Maryland Forest Service. We also work closely with other organizations and projects that increase recreational opportunities and protect Baltimore’s natural resources including the Urban Resources Initiative, Office of Park Partnerships, and Baltimore Track FAC with Baltimore City Department of Recreation and Parks, as well as Baltimore/Chesapeake Bay Outward Bound Program, Baltimore Ecosystem

Study, Baltimore Alliance for Great Urban Parks, and nationally, the City Parks Alliance and the Urban Ecology Collaborative.

Prettyboy Watershed Alliance

www.prettyboywatershed.org.

The Prettyboy Watershed Alliance (PWA) is a new watershed group that formed in December, 2003. It is a citizen-led organization created to promote landowner stewardship, build public-private partnerships and advocate watershed protection and restoration throughout the region.

The Prettyboy watershed is an 80 square mile drinking water source watershed. It extends from northwestern Baltimore County into the northeastern corner of Carroll County and a sliver of York County, PA. Land-uses in the rural watershed are primarily farming-oriented with 47% of the area in agriculture and only 15% of the land developed. The remaining 38% is made up of forest, wetlands and water. The watershed is the headwaters of the Gunpowder watershed. The Prettyboy Reservoir along with Loch Raven Reservoir, downstream, provide 61% of the drinking water for the entire Baltimore Metropolitan system.

The catalyst for the formation of the PWA was a two-year Source Water Protection Study coordinated by the Trust for Public Land (TPL) and completed in the fall of 2003. The purpose of the TPL study was to demonstrate land conservation and forest management practices for source water protection. One of the many ambitious recommendations put forth by this study was the need for a citizen-based group to advocate for stewardship of the lands within the watershed.

The PWA's initial efforts in the region have largely been to build capacity by creating an identity for itself through the media and public educational events. We have successfully organized several nature walks, a Prettyboy Spring Celebration, and an informal citizen campaign to protect Hemlock Gorge, a well-loved hemlock grove on Baltimore City-owned reservoir property, from illegal campers. We also held a highly popular Canoe Jaunt on the Prettyboy Reservoir at the end of September.

The Alliance for the Chesapeake Bay's RestoreCorps Program is currently partnered with the PWA to assist with capacity building. With this and other support, PWA will be undertaking the following programs in 2005:

- Conduct numerous public presentations throughout the watershed,
- Organize a Watershed Celebration,
- Offer three restoration/stewardship workshops,
- Organize four tree plantings, and
- Continue to explore creative approaches to reach out to local landowners.

RESOURCE LIST

Organization	*Support*
The Alliance for the Chesapeake Bay Mr. David Bancroft, Director Phone: 410-377-6270 www.acb-online.org/ Mail@acb-online.org	Project Tech Support Watershed Awareness Information BayScaping
Baltimore City Mr. Bill Stack Division of Environmental Services WQ Management Office Phone: 410-396-0732 Bill.stack@baltimorecity.gov	Regional Watershed Coordination City Data Greening Schools Program
Baltimore City Department of Recreation and Parks Mr. Nathaniel Massaquoi, Public Information Officer Phone: 410-396-7900 http://www.ci.baltimore.md.us/government/recnparks/ bcrpgeninfo1@baltimorecity.gov	Nature Centers Trail Systems
Baltimore County Department of Environmental Protection and Resource Management (DEPRM) Phone: 410-887-3733 deprm@co.ba.md.us www.baltimorecountyonline.info/deprm	Local Regulations Green Schools Program Capital Projects Regional Watershed Coordination
Baltimore County Department of Public Works Recycling Division Mr. Clyde F. Trombetti, Jr. Phone: 410-887-2000 www.co.ba.md.us/Agencies/publicworks/recycling/index.html publicworks@co.ba.md.us	Solid Waste Management Recycling Education
Baltimore County Department of Recreation and Parks Ms. Jan Cook, Local Open Space Phone: 410-887-5883 Fax: 410-825-3305 www.co.ba.md.us/Agencies/recreation/index.html rpnorthwest@co.ba.md.us	Nature Centers – Oregon Ridge, Marshy Point, Days Cove, Cromwell Valley Education Programs Natural History
DNR Forester for Baltimore County Mr. Rob Prenger Cub Hill Ranger Station Phone: 410-665-5991	Community Greening Committee Right-of-Way Planting Permits
Baltimore County Forestry Board Mr. Melvin Noland Phone: 410-592-2400 www.bcfb.sailorsite.net/ mlnoland@bcpl.net	Tree Planting Projects Schoolyard Reforestation Wildlife Habitat Program Schoolyard Assessment Teacher Training

RESOURCE LIST

Baltimore County Public Schools Mr. C. David Copenhaver, Science Coordinator Phone: 410-887-2063 www.bcps.org ccopenhaver@bcps.org	Administration – Baltimore County Public Schools
Bear Creek Watershed Association Ms. Tamara Leaver Phone: 410-933-6905 bearcreekwatershed@mail.com	Coordination of Local Watershed Activities
Businesses for the Bay MDE Ms. Laura Armstrong 410-537-4119 Ms. Mary Lynn Wilhere 1-800-968-7229x719 www.b4bay.org larmstrong@mde.state.md.us	Pollution Prevention Program for Businesses Recognition Program
Center for Watershed Protection Mr. Tom Schueler Phone: 410-461-8323 www.cwp.org center@cwp.org	Watershed Data Presentations Workshops and Training Technical Assistance Water Quality Information
Chesapeake Bay Foundation (CBF) Philip Merrill Environmental Center Phone: 410-268-8816 www.cbf.org/site/PageServer Chesapeake@cbf.org	Raingardens Manual School Programs Demonstration Sites
Chesapeake Bay Trust Ms. Kerri Bentkowski Phone: 410-974-2941 www.chesapeakebaytrust.org kbentkowski@cbtrust.org	Grant Funding
Environmental Concerns Ms. Mandy Burch, Restoration Specialist Phone: 410-745-9620 www.wetland.org/ restoration@wetland.org	POW guide (Planning of Wetlands) Training Workshops
Friends of the PatapscoValley and Heritage Greenway Mr. Kit Valentine Phone: 410-747-4325 kibe@juno.com www.patapscoheritagegreenway.org	Coordination of Local Watershed Activities
Gunpowder Valley Conservancy Mr. Charles Conklin Phone: 410-661-1233 cconklin@comcast.net www.gunpowdervalley.org	Coordination of Local Watershed Activities

RESOURCE LIST

Gwynns Falls Watershed Association Ms. Sharon Scheuler Phone: 410-455-9441 Sharonpisces22@cs.com www.gwynnsfalls.net	Coordination of Local Watershed Activities
Herring Run Watershed Association Ms. Mary Robe, Director Phone: 410-254-1577 Mroby@herringrun.org www.herringrun.org	Coordination of Local Watershed Activities
Irvine Nature Center Mr. W. T. Dixon Gibbs Jr., Director Phone: 410-484-2413 irvine@explorenature.org www.explorenature.org/	Project Tech Support Habitat Stewards Training School Programs Native Plant Sales Annual Conference
Jones Falls Watershed Association Ms. Cristel M. Cothran, Program Director Greater Homewood Community Corporation Phone: 410-261-3515 www.greaterhomewood.org ccothran@greaterhomewood.org	Community Organizing Volunteering Events Planning and Coordination Landscape Assessment
Living Classroom Foundation Mr. Scott Raymond, V.P. of Education Phone: 410-685-0295 x217 Scott@livingclassrooms.org www.livingclassrooms.org	Educational Programs Teacher Training Staff Development
MD Association of Environmental and Outdoor Education (MAEOE) Dr. Kate Clavijo Phone: 202-342-1521 www.maeoe.org Kate.clavijo@verizon.net	Green Schools Program Annual Conference Schoolyard Habitat Partners Environmental Education Training
MD Cooperative Extension Baltimore County Office Phone: 410-531-5973 www.agnr.umd.edu/MCE/index.cfm WT4@umail.umd.edu	Information BayWise Landscaping Yardstick Program Pest Management
MD Department of Agriculture Mr. Earle Canter, Urban Nutrient Specialist Phone: 410-841-5959 http://www.mda.state.md.us/ canterme@mda.state.md.us	Guidelines: Urban Nutrient Management Plans Training
MD Department of Natural Resources Ms. Cindy Etgen www.dnr.state.md.us cetgen@dnr.stae.md.us	Green Schools Program Tree-Mendous MD Storm Drain Stenciling Grant Funding

RESOURCE LIST

MD Department of the Environment Mr. Kendl P. Philbrick, Secretary Phone: 410-537-3000 www.mde.state.md.us	Businesses for the Bay Program Funding Hazardous Waste Issues
MD Native Plant Society www.mdflora.org consultants@mdflora.org	Native Plants Invasive Species Plant Lists
MD State Department of Education Phone: 410-767-0100 www.msde.state.md.us	Information
Parks and People Foundation Mr. Guy Hager 410-448-5663 info@parksandpeople.org www.parkandpeople.org	Watershed organizing & restoration Urban forestry Small grants Park partnerships Surveys and planning
Soil Conservation Service District Office Agricultural Building Phone: 410-666-1188 www.mda.state.md.us/balt/balt.htm bcscd@yahoo.com	Information
Towson University Ms. Jane Wolfson, Environmental Science and Studies Program Phone: 410-704-4920 Jwolfson@towson.edu	University Contact
Tree-Mendous MD Program Ms. Terry Galloway Phone: 410-260-8517 Tgalloway@dnr.state.md.us	Native Plants
UMBC – Baltimore Ecosystem Study (BES) Mr. Ken Belt Phone 410-455-8011	Research
US Fish and Wildlife Service Phone: 410-573-4500 www.fws.gov	BayScaping Wetlands and Ponds Schoolyard Habitat Program
Valleys Planning Council Ms. Teresa Moore Phone: 410-337-6877 www.thevpc.org	Community Stewardship Land Preservation

THE BALTIMORE WATERSHED AGREEMENT

MEMORANDUM OF UNDERSTANDING
BY AND BETWEEN
THE MAYOR AND CITY COUNCIL OF BALTIMORE
AND
BALTIMORE COUNTY
FOR
WATERSHED MANAGEMENT COOPERATION

THIS MEMORANDUM OF UNDERSTANDING made this _____ day of _____, 2002 by and between the Mayor and City Council of Baltimore, a municipal corporation of the State of Maryland (hereinafter referred to as "Baltimore City") and Baltimore County, Maryland, a body corporate and politic of the State of Maryland (hereinafter referred to as "Baltimore County").

WHEREAS, although politically independent, Baltimore City and Baltimore County are part of a greater metropolitan area, having developed in relation to one another historically and geographically. Citizens of Baltimore City and Baltimore County value and enjoy the recreational, economic, and aesthetic water resources associated with streams in our inter-jurisdictional watersheds, including the Baltimore Harbor and the Patapsco and Back Rivers and other tidal waterways; and

WHEREAS, this geographical relationship dictates that the quality of surface water resources within these systems is influenced by water sources originating in the Gwynns Falls, Jones Falls, Back River, and Baltimore Harbor watersheds of Baltimore County. Inter-jurisdictional cooperation is also critical for the management and protection of Baltimore City-owned municipal water supply reservoirs and other facilities located in Baltimore County; and

WHEREAS, in 1993 and 2000, Baltimore City and Baltimore County each signed local Partnership Agreements with the State of Maryland to work cooperatively as part of Chesapeake Bay Tributary Strategy Teams in the development and implementation of watershed protection and restoration programs. Baltimore City and Baltimore County seek to strengthen partnerships and cooperative efforts with federal and state agencies in carrying out those agreements, and desire to coordinate strategies that address Chesapeake Bay Agreement goals and objectives for natural resources and habitat, including protection and restoration of forest corridors and wetlands; and

WHEREAS, the major inter-jurisdictional watersheds are served by citizen-based watershed organizations and regional non-profit water quality and natural resource organizations, all of which interact with the environmental agencies and programs of Baltimore City and Baltimore County; and

WHEREAS, Baltimore City and Baltimore County, in response to provisions of the Federal Clean Water Act pertaining to non-point sources of water pollution and as authorized by the Maryland General Assembly, entered into a regional Reservoir Watershed Management Agreement with other jurisdictions and agencies in 1979. The Agreement was strengthened in 1984 and re-affirmed in 1990. Baltimore City and Baltimore County will continue to work cooperatively to protect the regional drinking water supplies through the management program facilitated by the Baltimore Metropolitan Council; and

WHEREAS, Baltimore City and Baltimore County must each implement watershed-based efforts to control and reduce sources of non-point source pollution, under jurisdiction-wide permits issued in 1993 and 1999 to Baltimore City and in 1995 and 2000 to Baltimore County under the continuing Municipal Separate Storm Sewer System program issued by the Maryland Department of the Environment to meet provisions of the Federal Clean Water Act's National Pollutant Discharge Elimination System (NPDES); and

WHEREAS, future environmental regulatory programs will place an increasing responsibility on Baltimore City and Baltimore County. Through increased cooperation and coordination, Baltimore City and Baltimore County can promote unified strategies to meet their responsibilities more effectively and efficiently and can collaborate in seeking funding for programs. A watershed agreement will assist in securing the necessary funding for enhanced stormwater maintenance, coordination of watershed monitoring, and implementation of restoration programs; and

WHEREAS, enhanced coordination between Baltimore City and Baltimore County will help the jurisdictions comply with revised water quality criteria and standards and will facilitate the development and implementation of programs in response to Total Maximum Daily Loads (TMDLs) as required by the Federal Clean Water Act.

NOW THEREFORE, THIS MEMORANDUM OF UNDERSTANDING WITNESSETH that, in consideration of the mutual covenants set forth herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereto agree as follows:

I. Baltimore City and Baltimore County hereby acknowledge that they embrace common goals for management of the natural resources of shared watersheds, including the national water quality goal to protect and restore the physical, chemical, and biological integrity of waters; the goal to protect, conserve, and restore forest resources to provide sustainable ecological and economic benefits; and to otherwise manage air, land, and water resources for the environmental, economic, recreational, and aesthetic benefits of the citizens

of Baltimore City and Baltimore County and this region.

II. Baltimore City and Baltimore County hereby agree to work to improve cooperative inter-agency management of environmental resources, including coordination of watershed management planning, water quality monitoring programs, data collection and management, public lands and wildlife management, computer mapping, and operational and capital restoration program implementation and tracking.

III. Baltimore City and Baltimore County hereby agree to work cooperatively with watershed associations and interested organizations to develop and implement coordinated education and restoration programs and projects to benefit water quality and protect natural resources of the region.

IV. Baltimore City and Baltimore County hereby agree to establish a working committee of principals from respective agencies to coordinate implementation of this Memorandum of Understanding ("Committee"). The Committee will meet regularly, with meetings open to the public, and will form subcommittees as needed. The Committee will annually review progress and prepare recommendations for future work.

V. The Committee will meet at least annually with recognized watershed associations to review work of the prior year and identify future work needs.

VI. The Mayor of Baltimore City and the County Executive of Baltimore County agree to annually prepare a "state of our watersheds" report outlining progress and establishing priorities for future work.

VII. This Memorandum of Understanding shall commence upon execution by the parties and shall continue for four (4) years, unless terminated sooner by either party. It may be renewed, at the discretion of the parties, for additional four (4) year periods.

VIII. This Memorandum of Understanding constitutes the entire and full understanding of the parties hereto, and may not be modified except by means of a written amendment.

IX. The Recitals are incorporated herein.

X. This Memorandum of Understanding shall be governed by and construed under the laws of the State of Maryland.

IN WITNESS WHEREOF, the parties hereto have caused this Memorandum of Understanding to be executed the day and year first above written.

ATTEST/WITNESS:

By:_____
Custodian of the City Seal

MAYOR AND CITY COUNCIL OF BALTIMORE

By:_____
Martin O'Malley, Mayor

ATTEST/WITNESS

By:_____

BALTIMORE COUNTY, MARYLAND

By:_____
C. A. Dutch Ruppersberger
County Executive

APPROVED AS TO FORM AND LEGAL SUFFICIENCY

By:_____
Assistant City Solicitor

By:_____
Assistant County Attorney

APPROVED

By:_____
George L. Winfield, Director
Baltimore City Department of Public Works

By:_____
David A.C. Carroll, Director
Baltimore County Department of
Environmental Protection and
Resource Management