

**Part II: Progress Report for CY 2006-2007
on the Implementation of the
2005 Reservoir Watershed Action Strategy**

FINAL - August 2009

Introduction

The Reservoir Watershed Management Agreement of 2005 was accompanied by a *2005 Action Strategy for the Reservoir Watersheds*, which included a long list of policy commitments and program commitments reflecting many different aspects of watershed protection, restoration and management.

A number of the policies, activities and program commitments listed in the 2005 Action Strategy are being continued from the past and were included in the prior Action Strategies. At the same time, many of the commitments made in 2005 were new. On a number of these, actions were taken during 2006-2007 (or 2008). On a few of them, actions have not yet been taken. This report notes the status of all of the commitments included in the 2005 Action Strategy.

Status of Action Strategy Commitments

Note: The numbers refer to the numbering system used in the 2005 Action Strategy, and (in most respects) the text next to each number comes directly from the Action Strategy.

1.1 Monitoring

1.1.1 Baltimore City will continue to conduct comprehensive water quality monitoring in the three reservoirs and in selected major tributaries. Concentrations of key pollutants of concern will be measured, and estimated annual loadings of sediment and total phosphorus will be calculated.

- The City is continuing to do the dry-weather sampling at 28 stations (12 in-lake and 16 on tributaries). Because the City labs are short-staffed, it is not possible to do all the storm-event sampling/analysis that is needed. Yet the majority of annual phosphorus and sediment loadings to the lakes occur during and after storms. The limited storm-related monitoring data reduces the accuracy of annual loading estimates and makes difficult the detection of loading trends over time.
- A cursory analysis of the City's data revealed that chlorides continue to increase in the watersheds and in the reservoirs. While this trend has occurred ever since 1982 (and probably before), the rate of increase has not been as high ever since the occurrence of the historic drought of 2002 - 2003.
- Low streamflow rates during dry periods can increase the concentration of solutes such as chloride. There also were other trends noted which corresponded to the

2002-03 period of drought--most notably a rise in nitrate concentrations and a fall in dissolved solids, as indicated by changes in specific conductance. Although nitrates are generally believed not to affect algal populations in the reservoirs, this trend should be followed closely, because nitrates and phosphorus (which is known to affect algae in the lakes) are often associated with each other.

- The factors most critical to water treatment processes and to water quality concerns in the reservoirs are phosphorus concentrations, algae levels (indicated by chlorophyll) and dissolved oxygen. All of these parameters have continued to display tremendous ambient variability in the three reservoirs, not increasing or decreasing consistently over the period of record.

1.1.2 Baltimore County will continue to conduct chemical and biological sampling in the tributaries in its portions of the three reservoir watersheds, including its Randomized Biological Monitoring Program to assess general water quality in the three watersheds and its Baseflow Chemical Monitoring Program to assess dry-weather-flow water quality in the three watersheds. Results will be reported annually in Baltimore County's NPDES/MS4 report, submitted to MDE.

- Baltimore County continued stream monitoring in the reservoir watersheds (using an alternate year sampling policy) in 2006-2007. During 2006 (a Gunpowder basin year), the County monitored/sampled 32 baseflow stream locations in the Loch Raven watershed and 3 baseflow stream sites in the Prettyboy watershed. Samples were analyzed for a number of different parameters. During 2007 (a Patapsco basin monitoring year), the County monitored 6 baseflow stream sites in the county's portion of the Liberty Reservoir watershed.
- The mean nitrate and nitrite concentrations measured at the majority of these tributary stations during 2003-2008 were considered to be "elevated" to "high". Three percent of the mean nitrate/nitrite concentrations were in the "excessive" category (>5 mg/l), 33% were in the "high" category (3-5 mg/l), 30% in the "moderate" category (2-3 mg/l), 27% in the "elevated" category (1-2 mg/l), and only 7% were in the "baseline" category (<1 mg/l). Prettyboy Reservoir tributary sites had the highest mean nitrate/nitrite concentration (3.30 mg/l), and none of these sites met the "baseline" criteria. The Loch Raven Reservoir stream sites had an overall mean nitrate/nitrite concentration of 2.36 mg/l, and only one site met the "baseline" criteria. The Liberty Reservoir tributary sites had the lowest mean concentration (1.73 mg/l), and four of the six sites met the "baseline" criteria for nitrate/nitrite concentrations.
- Total phosphorus concentrations in the tributaries during 2003-2008 were rated as "baseline" (<.05 mg/l) at all but three sites (out of 62 total sites). One site in the Liberty Reservoir watershed had an "excessive" rating (>.2 mg/l) and a second site had an "elevated" rating (.05-.075 mg/l). The remaining site was located in the Loch Raven watershed and had a "high" rating (.1 - .2 mg/l). It is known that most of the phosphorus in a typical year is delivered to the lakes during storm events. As such, these baseflow measurements do not provide an accurate picture of total phosphorus load generation in the reservoir watersheds.

1.1.3 The Reservoir Technical Group will evaluate the existing reservoir/watershed monitoring programs and will determine the resources needed to develop and maintain a monitoring program which will meet certain long-term informational/management objectives. (Refer to the 2005 Action Strategy for details on these objectives.)

- A committee including representatives of Baltimore City, the two counties and BMC has been working on this. During 2006, agreement was reached with the US Geological Survey (USGS) on a detailed “scope of work” for the evaluation study. In May 2007, Carroll County entered a contract (on behalf of the other two jurisdictions) with the USGS for a detailed technical study to evaluate the current in-lake and tributary monitoring datasets and to recommend possible improvements in the future monitoring efforts.
- The USGS submitted a draft “retrospective” evaluation report to the RTG in late 2007, and the work is continuing to refine that report as of March 2009.
- Baltimore City intends to implement the final recommendations of the USGS study, contingent on obtaining the funding needed to support the additional work.
- The City has committed to a comprehensive quality assurance plan for its ongoing monitoring program, in response to the report’s preliminary findings.

1.2 Reservoir Modeling and Predictive Analysis

1.2.1 MDE and its contractors, working in consultation with the RTG, will develop in-lake models of Prettyboy and Loch Raven Reservoirs. These models will be in support of MDE’s efforts to develop TMDLs (total maximum daily loads) for nutrients and sediments entering Loch Raven and for nutrients entering Prettyboy. (The TMDL program is required of the State (MDE) under the federal Clean Water Act.)

- MDE has completed the work to develop in-lake models of Prettyboy and Loch Raven. The TMDLs for the two reservoirs were released as a draft report in May 2006 and were commented on by the RTG in July 2006. MDE modified portions of the draft TMDL report in response to some of the RTG’s comments.
- The Gunpowder reservoirs TMDL report was reviewed by the USEPA and given final EPA approval in March 2007.
- The Gunpowder TMDL report sets a “total phosphorus” TMDL to Prettyboy of 23,192 pounds per year, which represents a 54% reduction from the TP loads to Prettyboy calculated to have existed during the baseline period (1992-97). It sets a total phosphorus TMDL to Loch Raven of 55,098 lbs/year, which represents a 50% reduction of the TP load calculated for Loch Raven during the baseline period. The document also sets an annual limit of 28,925 tons of sediment per year to Loch Raven, which represents a 25% reduction from the load estimated for the baseline period.
- It is the position of the RTG that these new phosphorus and sediment loading goals should replace earlier loading goals for the two reservoirs, which were developed by the RTG in the mid-1980s.
- In July 2008, MDE released a draft TMDL for *fecal bacteria* in the streams tributary to Prettyboy Reservoir; this is independent of the earlier TMDL for nutrients and sediment loadings to Prettyboy and Loch Raven. The RTG

reviewed and commented on the draft TMDL document. MDE submitted the final draft to EPA Region 3 for its review at the end of August 2008.

1.2.2 MDE, working with the RTG, will develop pollutant loading targets for Liberty Reservoir (expressed in maximum pounds per year), using the TMDL process or a suitable alternative method. MDE will consider funding this work through the Chesapeake Bay Restoration Fund.

- MDE did not do any work from 2005-2008 on developing nutrient or sediment load limits for Liberty Reservoir. However, in February 2009, MDE's consultant (ICPRB) started the work to create the watershed model and the in-lake model that together are needed to support the development of sediment and nutrient TMDLs for Liberty Reservoir.
- In July 2008, MDE released a draft TMDL for *fecal bacteria* in the streams tributary to Liberty Reservoir. The RTG reviewed and commented on the draft TMDL document. MDE submitted the final draft to EPA Region 3 for its review at the end of September 2008.
- MDE is not using the Chesapeake Bay Restoration Fund to pay for TMDL development.

1.3 Watershed Studies and Modeling

1.3.1 MDE will link its hydrologic and water quality model of the Prettyboy and Loch Raven watersheds with the in-lake models described in Section 1.2, in order to develop TMDLs for the two reservoirs and to allocate load-reduction goals among the various land uses in the respective watersheds.

- This work has been completed. The two watershed models have been updated by MDE, and the final Gunpowder TMDL report (Appendix D, dated June 2007) allocates load-reduction goals among the major source categories in each watershed (Loch Raven and Prettyboy).
- The watershed models used for the TMDL indicate that most of the phosphorus and sediment loads entering the two reservoirs wash off the landscape. (Point sources make up a very small percentage of the total annual loads.) To demonstrate compliance with the loading goals set forth in the TMDL, participants in the Reservoir Program (including MDA, MDE, Baltimore County, and Carroll County) have been asked to summarize changes in the watersheds since the baseline period (1992-97) that relate to nutrient and sediment loads to the Gunpowder reservoirs.
- The Maryland Department of Agriculture (MDA) has developed a statewide system for tracking agricultural BMPs built (for structural practices) or applied (for agronomic practices) in individual watersheds and during specified time periods. This was done in part to support Maryland's Tributary Strategies Program. The MDA system estimates the total pounds of nitrogen loadings reduced per (average) year and the total pounds of phosphorus loadings reduced per (average) year by BMPs applied in a specified watershed. Analysis can be done for any sequence of years selected. Members of the Reservoir Technical

Group (RTG) have agreed to use this system to track changes in N and P annual loadings from agriculture in each of the three reservoir watersheds.

- Baltimore County recently (in 2008) has calculated the annual pollutant-load-reductions (for total suspended solids, total phosphorus and total nitrogen) resulting from ongoing urban sanitation practices and from completed capital projects to improve/treat urban storm runoff from developed Baltimore County areas draining to each reservoir. For each watershed, annualized load reductions are estimated for recently-completed stormwater management BMPs and for completed stream restoration projects, for the routine cleaning of street stormdrain inlets, and for routine street-sweeping by the County.
- The RTG is willing to work with MDE to refine a system for tracking the relevant changes in the reservoir watersheds over time, with the intent of being able to estimate progress towards meeting the established TMDL loading goals for each reservoir over specific selected time periods.

1.3.2 MDE will give high priority to the reservoir watersheds on the new statewide Priority List for Watershed Water Availability Studies. These studies will determine the availability of ground water and surface water sources to meet future water demands.

- MDE has not undertaken the kinds of forward-looking watershed evaluations that were being considered as a State activity during 2005.
- However, in 2006, a new State law was enacted which requires (among other new features) that a Water Resources Element (WRE) be developed and adopted by counties and municipalities as a component of the local Comprehensive Plan. The WREs that these local governments are required to adopt by October 2009 must include a “water supply availability analysis” that compares current and future demands for public water in each area with the known and planned sources of water (wells, stream withdrawals, reservoirs, etc.). The State agencies have provided detailed guidance to the local governments on how to develop their WREs.
- MDE is not questioning the “safe yields” that Baltimore City has already determined for the three reservoirs. Instead, MDE is using these values in its own planning analyses for the Baltimore metropolitan area.

1.3.3 Baltimore and Carroll Counties will work with the RTG to conduct GIS-based landscape assessments of the reservoir watersheds and will develop appropriate “landscape indicators” for use in summarizing watershed conditions and tracking progress over time.

- In December 2007, Baltimore County produced *The State of Our Forests - 2007* report that compiled federal, state, and local data and maps, organized by using the Montreal Process Criteria and Indicators. Based on this work, Baltimore County will discuss with Carroll County those landscape indicators/measures that would best characterize watershed conditions that are important for protecting the reservoirs. By helping the Reservoir Program to document significant landscape changes over time, this will be useful for demonstrating compliance with the Gunpowder TMDL for phosphorus and sediment.

2.0 Point Source Management

No new issues arose in 2006-07. Existing discharge permits and related reservoir-protection policies continued in effect.

2.0.1 Hampstead WWTP will continue to meet the requirements of its NPDES discharge permit (issued by MDE in 1997), which requires an effluent phosphorus concentration below 0.3 mg/l. Since its latest upgrade, the WWTP has consistently met this requirement.

- The effluent limitation for phosphorus from the Hampstead WWTP is expressed in terms of total phosphorus (TP). The TP limits included in the plant's discharge permit require comparison of observed effluent concentrations with a weekly average maximum limit of 0.45 mg/l, and with a monthly average maximum of 0.30 mg/l. Compliance with these respective TP limits is based on the analysis of 8-hour composite samples, taken twice weekly. The results are then averaged and compared to the appropriate limit (either the weekly average limit or the monthly average limit.)
- There have been no violations of the effluent limitations for TP at the Hampstead WWTP over the most recent three years. To verify this, Carroll County staff reviewed the data reported on the Daily Monitoring Reports (submitted to the State) during the past three years. They found consistent compliance with both the TP "weekly average limit" and the TP "monthly average limit".

2.0.2 Policy for **new** municipal discharges in the watersheds: The Department of the Environment (MDE), through its NPDES permit program, will discourage new discharges exceeding 1,000 gpd, except as needed to correct failing septic systems. In those cases, MDE will encourage land treatment of the plant effluent. *Policy continues; MDE reports that there have not been any applications made for new municipal discharges in the watersheds for at least the last 10 years.*

2.0.3 MDE, through its NPDES permit program, will discourage discharges from package sewage treatment plants intended to serve new residential communities and proposed to discharge in the reservoir watersheds. *Policy continues; MDE reports that there have not been any applications made for new package treatment plant discharges in the watersheds for at least the last 10 years.*

2.0.4 Policy for **existing** industrial discharges in the watersheds: MDE, through its NPDES permit program, will set a phosphorus limit of 0.3 mg/l effluent concentration when each permit comes up for renewal, if phosphorus is present at any significant level in the waste stream.

- As of January 2009, the NPDES discharge permit in effect for the Congoleum WWTP (Liberty watershed) contains a total phosphorus (TP) limit of 2.0 mg/l effluent concentration. MDE is currently reviewing the permit in light of this commitment in the Action Strategy. TP limits of 0.3 mg/l average and 2.0 mg/l maximum are under consideration for a new, revised permit.

- As of January 2009, the existing NPDES permit for the Weston WWTP (also in the Liberty watershed) contains no effluent limit for total phosphorus. MDE is reviewing the permit, and an average effluent concentration of 0.3 mg/l TP is under consideration for a new, revised permit.
- Baltimore City periodically samples the effluent discharges of the Congoleum WWTP and the Weston WWTP.
- For the Congoleum WWTP (City data), a total of 58 samples were gathered between 2003 and 2008. Of these, the TP concentration in 50 samples was *below* 0.3 mg/l, and 8 samples had TP *above* 0.3 mg/l.
- For the Weston WWTP (City data), a total of 62 samples were gathered between 2003 and 2008. Of these, the TP concentration in 60 samples was *below* 0.3 mg/l, and just 2 samples had TP *above* 0.3 mg/l.

2.0.5 Policy for **new** industrial discharges in the watersheds: MDE, through its NPDES permit program, will discourage significant phosphorus discharges to the reservoir watersheds. *Policy continues; MDE reports that there have been no new industrial discharges proposed in the watersheds in recent years.*

2.0.6 When a phosphorus loading goal has been established through the TMDL process (see commitment item 1.2.1) for each reservoir, MDE, through its NPDES permit program, will not permit an increase in the total phosphorus loads delivered to the reservoirs.

- Annualized loading goals for “total phosphorus” were set for Prettyboy and Loch Raven with the EPA’s approval of the Gunpowder TMDL in March 2007.

3.0 Nonpoint Source Management, Land Use and Resource Protection

3.1 Agricultural Practices

3.1.1 The Baltimore County Soil Conservation District (SCD) and the Carroll SCD will continue to encourage farm owners/operators in the three reservoir watersheds to utilize their various technical and financial assistance programs for soil conservation practices and other measures to protect local water quality. This includes both the federal programs (from NRCS and FSA) and the state assistance programs which are delivered in cooperation with the two SCDs (see items below). *These efforts are ongoing.*

3.1.2 The Baltimore County SCD and the Carroll SCD (also referred to as “the two SCDs”) will give targeted attention to farms operated in the reservoir watersheds, and will adopt the long-term goal of preparing a “soil conservation and water quality plan” (SCWQ plan) for every farm in the reservoir watersheds.

- During 2006-07, the Baltimore County SCD prepared 79 new SCWQ plans (covering 4,809 acres) in the Loch Raven watershed, 40 new plans (covering 1,596 acres) in the Prettyboy watershed, and 6 new SCWQ plans (covering 374 acres) in the Liberty watershed.

- The Baltimore County SCD reports that in total, it has SCWQ plans in effect for 59% of all the agricultural land in the Baltimore County portion of the Loch Raven watershed, 62% of all the ag land in the county's portion of the Prettyboy watershed, and 25% of all the ag land in the county's portion of the Liberty watershed.
- During 2006-07, the Carroll SCD prepared 15 new SCWQ plans (covering 1,038 acres) in the Liberty watershed and 7 new SCWQ plans (covering 524 acres) in the Prettyboy watershed. (Only a very small area in Carroll County drains directly into the Loch Raven watershed.)
- The Carroll SCD reports that in total, it has SCWQ plans in effect for 43% of all the agricultural land in the Carroll County portion of the Loch Raven watershed, 73% of all the ag land in the county's portion of the Prettyboy watershed, and 54% of all the ag land in the county's portion of the Liberty watershed.

3.1.3 The two SCDs will continue their efforts to follow up on the implementation by farmers in the watersheds of their existing SCWQ plans (i.e., plan maintenance) and to update all SCWQ plans that are 10 or more years old.

- During 2006-07, the Baltimore County SCD worked with farmers to revise 43 of its existing older SCWQ plans (involving 4,509 acres) in the Loch Raven watershed, 16 of its older farm plans (covering 1,134 acres) in the Prettyboy watershed, and one older farm plan (175 acres) in the Liberty watershed.
- During 2006-07, the Carroll SCD worked with farmers to revise nine of its older farm plans (covering 742 acres) in the Liberty watershed and two of its older plans (covering 202 acres) in the Prettyboy watershed.
- During 2006-07, the Baltimore County SCD helped farmers plan for and install/apply 231 BMPs in the Loch Raven watershed, 243 BMPs in the Prettyboy watershed, and 6 BMPs in the Liberty watershed. The BMPs included agronomic practices (such as cover crops, residue management, rotations) and more permanent structural measures (such as fencing, watering troughs, and grassed waterways).
- During 2006-07, the Carroll SCD helped farmers plan for and install/apply 123 BMPs in the Liberty watershed and 37 BMPs in the Prettyboy watershed. The BMPs included both agronomic practices and more permanent structural measures.

3.1.4 The two SCDs will continue to assist farmers in meeting the requirements of federal (USDA) laws and regulations, which require up-to-date SCWQ plans for all farms that apply for benefits under a variety of federal USDA programs. *Efforts are ongoing.*

3.1.5 The two SCDs will continue to assist farmers in meeting the requirements of Maryland laws and regulations, including: *These efforts by the SCDs are ongoing.*

- a) Maryland Agricultural Land Preservation Program requirements that participants develop and implement a SCWQ plan. The same plan requirements apply for the local land preservation programs and for Rural Legacy designation;

- b) Maryland water-quality and sediment-control requirements, which utilize SCWQ plans to address pollution concerns;
- c) Maryland state discharge permits for confined animal feeding operations, which require SCWQ plan components as part of a Comprehensive Nutrient Management Plan for such operations; and
- d) The Maryland Water Quality Improvement Act, which requires farmers to implement animal waste management measures as part of a complete nutrient management plan.

3.1.6 The two SCDs will encourage farm owners and operators in the reservoir watersheds to use the Maryland Agricultural Cost-Share program (MACS) to help offset the costs of best management practice (BMP) implementation. *These efforts continue.*

3.1.7 The two SCDs will provide information and assistance to farm owners and operators in the watersheds to help them utilize the Low-Interest Loan Agricultural Conservation Program to cover the cost of implementing conservation measures. *These efforts continue.*

3.1.8 The two SCDs will promote and support farmer participation in various federal conservation programs, including EQIP (Environmental Quality Incentive Program), CRP (Conservation Reserve Program), CREP (Conservation Reserve Enhancement Program), WHIP (Wildlife Habitat Incentives Program), AMA (Agricultural Management Assistance) and other new programs as they become available. These programs typically provide funding or other incentives for the application of eligible BMPs on farms or for the removal of highly erodible areas from crop production.

- During 2005-08, the Baltimore County SCD enrolled Baltimore County farmers in 15 contracts involving the Environmental Quality Incentives Program (EQIP), covering a total of 2,325 acres of cropland/pasture in the Loch Raven Reservoir watershed. This program typically treats on-farm resource concerns that relate to livestock production, soil erosion, and water quality.
- The Baltimore County SCD enrolled 10 farmers in the 2008 Patapsco-Gunpowder Conservation Security Program (CSP), covering a total of approximately 5,900 acres of cropland/pasture land in Baltimore County's portions of the Liberty, Prettyboy and Loch Raven watersheds.
- In 2008, the Baltimore County SCD enrolled one cooperator in the Loch Raven watershed into NRCS's Wildlife Habitat Incentives Program (WHIP) to assist with the removal of a fish-passage obstruction on a major stream. In 2006, the Baltimore County SCD enrolled one cooperator in the Loch Raven watershed into WHIP to assist with the planting of one acre of native warm-season grasses for wildlife habitat.
- The Baltimore County SCD reports that they have worked to make Baltimore County farm owners/operators aware of the Conservation Reserve Enhancement Program (CREP) program, but that there has been little interest shown in the program in recent years. This program takes selected cropland or pasture out of production and requires the planting of a permanent cover on the acreage. In

2007, the SCD enrolled one cooperator in CREP to assist with planting trees for water quality benefits on 1.7 acres.

- During 2006-07, the Carroll SCD enrolled in the CREP program about 53 acres of cropland/pasture in the Liberty Reservoir watershed and about 40 acres in the Prettyboy watershed.
- During 2005-08, the Carroll SCD enrolled Carroll County farmers in 16 contracts in the EQIP Program, covering 1,475 acres of cropland/pasture in the Liberty Reservoir watershed. During this same time period, the Carroll SCD also signed 6 EQIP contracts with farmers in the Prettyboy watershed, covering a total of 548 acres of cropland/pasture. This program typically treats on-farm resource concerns that relate to livestock production and soil erosion.
- Two Carroll County farmers, one each in the Prettyboy and Liberty watersheds, participated in the AMA program from 2005-2008, covering approximately 32 acres of pasture/cropland. Their efforts under this program were focused on improving grazing practices and conversion to organic production methods.
- The Carroll SCD enrolled 35 farmers in the 2008 Patapsco-Gunpowder Conservation Security Program, covering a total of 7,600 acres of cropland/pasture land in Carroll County's portions of the three reservoir watersheds.
- In 2008 the Carroll SCD enrolled 3 landowners in the Prettyboy watershed into the WRP (Wetland Reserve Program) easement program. These easements permanently protected and restored 30 acres of critical Bog Turtle wetlands.

3.1.9 The two SCDs will encourage and assist agricultural producers to comply with the requirements of their "nutrient management plans", including the implementation of those soil-conservation, water-quality, and animal-waste-management BMPs which support the appropriate management of nutrient inputs to croplands. *Efforts continue.*

- The Maryland Water Quality Improvement Act of 1998 requires all farms that make \$2500 or more annually (or have 8 or more animal units) to have and implement a nutrient management plan. Beginning July 2005, all such plans were required to address nitrogen and phosphorus as limiting nutrients, in accordance with the regulatory guidelines.

3.1.10 In support of the Maryland Water Quality Improvement Act of 1998, as well as the Reservoir Watershed Management Program, the Maryland Department of Agriculture (MDA) will:

- a) provide comprehensive educational programs developed for nutrient consultants, as well as operation-specific training and certification for farmers, nutrient applicators, and fertilizer users in urban/suburban areas;
- b) offer related assistance to farmers through the MACS cost-share program;
- c) support technical assistance provided through the SCDs and county Extension offices;
- d) enforce the Act and its regulations, including taking action against noncompliant farms;
- e) compile information and generate reports at the county and state levels on operator/farmer compliance with nutrient management plan requirements; and

- f) with the development of an advanced database system, may generate nutrient plan implementation reports at both the county and watershed levels.

MDA continues to carry out these functions and policies.

- As of mid-summer of 2009, MDA reported that, since the Water Quality Improvement Act of 1998 took effect, the following numbers of farms in the reservoir watersheds (and the combined acreages represented by those farms) have had nutrient management plans prepared and implemented: 89 farms (a combined total of 12,106 acres) in the Loch Raven watershed; 36 farms (for a total of 12,425 acres) in the Prettyboy watershed; and 68 farms (for a total of 17,806 acres) in the Liberty watershed.

3.1.11 The signatories will work to evaluate the pollution potential from horse operations located in the reservoir watersheds. The two SCDs will expand outreach and assistance to those operations.

- During 2006, staff members began to review the available literature on the water-quality impacts of sizeable horse operations. In general, the adverse effects of horse wastes and horse farms have not been studied as extensively as have the effects of cow, steer and swine operations.
- MDA has compiled data on the horse populations in each reservoir watershed, drawing solely upon MDA's "nutrient management plan" database. In comparison with other data (the 2002 Maryland Equine Census), the MDA numbers seem to be missing significant numbers of horses. This needs to be pursued further.
- During 2007, the Baltimore County SCD hired a Planner/Outreach specialist. One of his responsibilities was to work with the smaller horse operations in the watersheds, to introduce them to the District, and to offer technical and possible cost-share assistance to them.
- In summer 2008, MDA hired an equine specialist, based at the Baltimore County SCD, to work with horse operations in Baltimore, Carroll and Harford counties.
- Also during 2007, the Baltimore County SCD introduced its own Small Farm Cost-share Program. The goal of the program is to provide cost-share to livestock operations (including horses) that are too small to qualify for the traditional State and federal cost-share programs.
- At the end of 2007, the Carroll SCD was working with approximately ten horse operations in the Prettyboy and Liberty watersheds; projects included stream fencing, tree buffers and pasture management.

3.1.12 Baltimore County DEPRM and the Baltimore County SCD will continue to provide technical review of proposed farm ponds in the county. *Policy continues.*

3.1.13 MDA and the two SCDs will target assistance to farmers with on-site problems having the potential to cause water pollution. Where polluting conditions are suspected to exist on a farm, the particular SCD will work with MDA and with the Maryland Department of the Environment (MDE) to follow the enforcement protocol developed

pursuant to a Memorandum of Understanding among MDA, MDE, and the State Soil Conservation Committee. *Policy continues.*

3.1.14 MDE will continue to inspect each site (often a farm) proposed for sewage biosolids application, and may issue a permit which specifies the allowed application rate, taking the sludge nutrient content into consideration. An MDE inspector also visits the site/farm at the time the biosolids are being applied, to verify that permit conditions are being met. *This regulatory program continues.*

3.1.15 Baltimore City, the Carroll SCD and MDA will continue their cooperative agreement, under which the City partially funds an MDA position at the SCD to work with farmers in the reservoir watersheds, to help them implement agricultural BMPs. As a result of this and other funding, the Carroll SCD currently has three full-time staff who work in the reservoir watersheds.

- Baltimore City continued its partial support of an MDA position at the Carroll SCD during 2006-2007. The position was vacant from July 2007-January 2008, when it was filled again. As of mid-2008, the Carroll SCD had two conservation planners and one technician working almost full-time with landowners in the reservoir watersheds.

3.1.16 The signatories agree to investigate the possibility of increased staffing support for the Baltimore County SCD, so that more outreach and assistance effort can be focused on farms in the reservoir watersheds in the county.

- During 2006, the Baltimore Co SCD received a new, permanent MDA position, supported with EQIP funds from USDA. The new employee focused on developing grazing plans for farmers (with an eye to minimizing erosion), as well as developing new overall farm plans. In 2007, his efforts were focused on farms in the Prettyboy watershed.
- During 2006, the Baltimore Co SCD also shared a technician with the Harford SCD. This was a temporary position supported with EQIP funds; it was terminated in March 2007.
- There have been other shifts in personnel at the Baltimore Co SCD, but there still has been a net gain since late 2005 of two full-time technical positions involved in agricultural conservation outreach and planning.

3.1.17 The two SCDs, working with MDA staff and with the Reservoir Technical Group (RTG), will develop “indicators” of agricultural-pollution-reduction program effectiveness in the watersheds. These indicators should include measures of BMPs actually applied, which can be related directly to the need to reduce phosphorus and sediment inputs to the reservoirs. This is another effort which relates directly to documenting compliance with the Gunpowder TMDL (refer to the bullets for item 1.3.1).

- A background paper was developed by the RTG in October 2006 which summarized the types of BMP-progress-reporting the two SCDs already were required to do, and how that data might be related to estimates of cumulative nutrient load reductions achieved by farms in the reservoir watersheds.

- In response to a number of different ongoing watershed planning and tracking efforts (such as the Chesapeake Bay tributary strategies), MDA has developed a system for recognizing certain farming BMPs (when installed in defined watersheds) and for estimating the annual pounds of N and P (runoff) loads reduced by each BMP applied. (The calculated “savings” are a function of the practice type and the acreage being treated.) Actions that are recognized by the MDA tracking system include 16 different MACS-cost-shared BMPs (including both agronomic and structural practices), the adoption of a farm-specific Nutrient Management Plan (based on the acres covered), the existence of a Soil Conservation and Water Quality Plan (acres) and the application of a winter cover crop (acres).
- The Reservoir Technical Group believes the MDA system to be sufficient, and a reasonable approach to “tracking” estimated changes in nutrient loads from agriculture in the watersheds, as called for in Reservoir Action Strategy item 3.1.17. One unresolved issue is the estimation of the annual sediment load reductions resulting from the various measures recognized by the MDA system.

3.2 Sediment Control and Stormwater Infrastructure

3.2.1 Baltimore and Carroll Counties will continue to implement State-mandated stormwater management regulations for all new development (including residential, commercial and institutional.) The current county regulations, amended to adhere to MDE’s year 2000 regulations and supporting Design Manual, provide for enhanced water quality protection and onsite groundwater recharge, as compared to the older local regulations. (The counties and the State Highway Administration are also subject to the state law, in connection with all new or reconstructed road projects.)

- In 2004, Carroll County adopted new regulations which require the use of enhanced stormwater management practices for all new commercial or industrial development in the County’s designated “surface watershed/water resource management areas” (which, under the regulations, include the reservoir watersheds.)

3.2.2 Baltimore and Carroll Counties will continue to operate their respective programs for the periodic inspection of all existing stormwater management facilities in their jurisdictions. The two counties’ programs meet state/federal requirements for stormwater facility approval, inspection and enforcement, as set forth in their federal/state NPDES/MS4 (municipal stormwater) permits, which are issued in Maryland by MDE.
Programs continue.

3.2.3 In accordance with the conditions of their respective NPDES/MS4 permits, Baltimore and Carroll Counties will continue to carry out long-term studies of a few specified stormwater BMPs. Each county will estimate the annual nutrient load reductions (on a watershed basis) resulting from all completed capital projects (stormwater retrofits and conversions; stream restorations.) For projects located in the

reservoir watersheds, the estimated nutrient reductions will be counted against the established nutrient-load-reduction goals.

- Between 1997-2004, Baltimore County completed nine different water quality capital improvement projects in the Loch Raven drainage area. Most of these were stream-restoration or -stabilization projects. The County has calculated the average annual load reduction of total phosphorus, total nitrogen, and total suspended solids resulting from each project. (The numbers are presented in Table 7-4 in the County's 2008 NPDES/MS4 report.)
- Baltimore County recently has calculated the annual pollutant-load-reductions (for total suspended solids, total phosphorus and total nitrogen) resulting from ongoing urban sanitation practices and from completed capital projects to improve/treat urban storm runoff from developed county areas draining to each reservoir. For each watershed, load reductions are estimated for completed stormwater management BMPs and for stream restoration projects, for the routine cleaning of street inlets, and for routine street-sweeping. As an example, the County estimates that all four types of projects/activities, taken together, have reduced the annual urban nonpoint source loads in the Loch Raven watershed by 15.1% for total suspended solids, 4.8% for total phosphorus, and 4.4% for total nitrogen. (See Baltimore County's 2008 NPDES/MS4 report, Table 10-5.)
- Carroll County has not been required in their MS4 permit from MDE to perform controlled field studies of selected types of stormwater BMPs.
- Carroll County has carried out an ongoing program of evaluating existing stormwater structures in the Liberty Reservoir drainage area. A stormwater basin serving the Marriott Wood community was retrofitted and completed during 2007. A stormwater retrofit for facilities serving the Hickory Ridge Addition community was in design by the end of 2007.
- Carroll County has laid out a five-year capital budget program for stormwater upgrades or retrofits that involves some 13 different communities or facilities which lie in one or another of the reservoir watersheds.

3.2.4 Baltimore and Carroll Counties will continue their respective maintenance programs for all publicly-owned stormwater management facilities. *Programs continue.*

3.2.5 Baltimore and Carroll Counties will review and revise, as necessary, their respective design standards for roads and parking areas, in order to reduce the extent of impervious surfaces.

- Baltimore County completed a "Builders for the Bay" process, resulting in a consensus document published in June 2006. This process included a review of the County's residential and commercial development design standards (including paving requirements), and resulted in recommendations to reduce certain mandatory dimensional requirements for paved surfaces. The Baltimore County DPW is currently in the process of revising its Design Manual, which includes the road standards for rural, urban and suburban roadways. The County's Office of Planning is responsible for reviewing and revising the

parking lot standards (re: minimum sizing) for institutions and for commercial properties.

- Carroll County completed a “Builders for the Bay” process during 2007-2008 (with the final report completed in July 2008). This process included a detailed review of the County’s current residential and commercial development design standards (including paving requirements), and resulted in recommendations for changes to those standards that would reduce some mandatory dimensional requirements for paved surfaces.

3.2.6 The RTG will investigate the feasibility of having local and state agencies adopt an alternative de-icing policy in the reservoir watersheds.

- Several RTG members have made preliminary literature searches on the available alternatives to the exclusive use of sodium chloride as a pavement de-icing compound. The main alternatives involve the use of either much more expensive de-icing materials than NaCl or specialized trucks (for “pre-wetting” roads with brine or with CaCl at the start of a snowstorm).
- In late 2007, the BMC Reservoir Program manager carried out a survey of the appropriate road operations supervisors working for Baltimore County, Carroll County, and the State Highway Administration regarding the types and quantities of de-icing materials and the kinds of equipment they employ to keep the roads in the three reservoir drainage basins passable during winter storms. Written responses were received by January 2008.

3.2.7 Baltimore and Carroll Counties, working in cooperation with their respective SCDs, will continue to operate sediment and erosion control programs county-wide, in order to limit sediment runoff from all new private construction and redevelopment sites. (The SCDs and the county agencies cooperate on sediment-control plan review and approval, while the county agencies do the inspection and enforcement.) At the present time, Carroll County enforces the sediment and erosion control regulations in the towns of Hampstead, Manchester and Westminster. *Programs continue.*

3.2.8 The state (MDE) will continue to enforce sediment and erosion control on state agency construction projects; the State Highway Administration provides sediment control inspection on its own construction projects; and the two counties will continue to enforce sediment and erosion control on local government projects, using the same standards as those applied to private construction projects. *Programs continue.*

3.2.9 The state (MDE) will continue to carry out triennial reviews of the respective local sediment/erosion control programs and stormwater management programs. *Policy continues.*

3.3 Sewerage System Infrastructure

3.3.1 Baltimore and Carroll Counties will continue to operate sewage pumping stations located in the Liberty and Loch Raven watersheds in compliance with current state

standards for backup systems, including secondary power sources and/or reserve storage capacity, in addition to backup pumps. This greatly reduces the chances of sewage overflows from the public collection systems which are adjacent to the two reservoirs. *Operations continue in compliance with the standards.*

3.3.2 Baltimore County will implement new capital and operating/maintenance programs for its county-wide sewerage system, consistent with the recent Consent Decree entered into with federal and state agencies.

- During 2006, the County completed improvements (mostly intended to better prevent overflows during power outages) at two sewage pumping stations in the Loch Raven watershed: Springdale A and Merryman's Branch. A major upgrade project at the Texas sewage pumping station (also in the Loch Raven watershed) began in 2006 and continued during 2007, with significantly improved backup power installed by early 2008.

3.3.3 Carroll County will implement computer-based inspection/maintenance systems for the Hampstead and Freedom sewer service areas.

- During 2006-07, the County DPW continued to study the alternative systems available on the market. As of mid-2008, they were trying to decide which system to purchase and to put into use in these two service areas.

3.3.4 Baltimore and Carroll Counties will continue to maintain their respective Master Water and Sewerage Plans (as required under state law) so as to reinforce the reservoir-protection goals and policies which are contained in their master land-use plans. (See also section 3.6.) *Reservoir-protection policies are included in the local plans.*

3.4 Septic Systems

3.4.1 The signatories will seek funding through the Chesapeake Bay Restoration Fund to carry out a study regarding the extent to which residential septic systems in the reservoir watersheds contribute nutrients, sodium and pathogens to the tributary streams.

- This initiative was discussed with key staff at MDE's Water Management Administration. They have indicated that CBRF dollars cannot be used to support this kind of study.
- Source-tracking of nitrate-nitrogen (NO₃-N) was conducted on a number of streams in the Baltimore area during 2005 by Dr. Sujay Kaushal of the University of Maryland Center for Environmental Science, within the framework of the Baltimore Long-Term Ecological Research Site. Of all the streams studied, only Baisman Run, located in Oregon Ridge Park and a tributary of Beaver Dam Run, was located in a reservoir watershed (i.e., the Loch Raven drainage).
- By using isotopic "fingerprinting" of the nitrogen and oxygen comprising the nitrates found in Baisman Run, it was possible to determine that the nitrates originated from both lawn fertilizers and septic systems present in the stream's residential/forested subwatershed. This analysis was based on stream-sampling that was performed during just two seasons in 2005. A full year's sampling and

analysis would be needed to be able to determine the percentages of the total annual nitrate load in the stream that could be attributed to the different “source types”.

- During the 2005 survey, both the nitrogen levels and the phosphorus levels observed in the Baisman Run samples were significantly elevated, when compared to the levels found in a stream that drains an adjacent, forested “reference” watershed. Follow-up field work and analysis is now underway, in an attempt to determine the “bioavailability” of organic carbon and organic phosphorus in the Baisman Run watershed.

3.4.2 Financial assistance for income-eligible residents for the repair of failing septic systems will continue to be provided by Baltimore County through its Single-Family Rehabilitation Loan and Emergency Repair Program. *Program continues.*

3.4.3 Baltimore and Carroll Counties will promote the proper maintenance of septic systems by homeowners through education conducted via the development-approval process. The Carroll County Health Department (a state agency) will continue to distribute brochures to the public on proper septic system operation. *Efforts continue.*

3.4.4 The Baltimore County Soil Conservation District will continue to distribute its educational booklet for rural homeowners, which includes information on the proper maintenance of septic systems. Carroll County will consider the publication of a similar booklet.

- The Baltimore County SCD estimates that, by the end of 2007, about 1,000 copies of this booklet were distributed to homeowners by itself and by the County DEPRM.

3.4.5 Baltimore and Carroll Counties will continue to license septic system scavengers and will provide facilities for septage disposal into public sewer systems. (Septage can be put into the Baltimore County sewer system at two points in the reservoir watershed areas. In Carroll County, septage is accepted at the site of the Westminster WWTP, which is located outside the reservoir watersheds.) *Programs continue.*

3.4.6 The Baltimore County DEPRM and the Carroll County Health Department will continue to administer septic system regulations and design standards which are intended to ensure reliable service and to prevent septic system failures. *Programs continue.*

3.4.7 The Baltimore County DEPRM and the Carroll County Health Department will conduct sanitary surveys, as needed, to identify areas of failing septic systems and to evaluate the alternatives available for making corrections.

- Baltimore County has not carried out any sanitary surveys of communities within the reservoir watersheds in recent years.
- The Carroll County Health Department has recognized the neighborhood located along Charmil Drive, which lies on the southeastern edge of the Town of Manchester (just inside of the corporate limits) as an area of concern for sewage disposal, due to the age of the individual septic systems and the small

lot sizes. The neighborhood includes fewer than 30 homes and falls just inside the Prettyboy Reservoir drainage basin. This area has been annexed into the Town of Manchester, and the intention is for it to be served by public (town) sewers. The April 2009 Amendment to the Carroll County Water and Sewer Master Plan designates a portion of the Charmil Drive neighborhood for the S-3 (“priority”) sewer service category, and the other portion of the neighborhood for the S-5 (“future”) sewer service category.

- The Carroll County Health Department has not carried out any sanitary surveys of communities within the reservoir watersheds in recent years.

3.4.8 The Department of the Environment (MDE) will develop a protocol to evaluate and verify the stated performance of "best available technology" being used to remediate conventional on-site wastewater disposal systems which have experienced problems.

- Since 2005, MDE has established a workgroup including local health and public works representatives and industry representatives, to develop specifications for approved onsite disposal system (OSDS) technologies that are intended to reduce nitrogen levels in the liquid discharged to the soil profile. Referred to as the Best Available Technology (BAT) Workgroup, this group of professionals has established the procedures for determining what specific types of on-site systems will be eligible for grants under the OSDS portion of the Maryland Bay Restoration Fund (BRF).
- The BAT workgroup has adopted a protocol used by the EPA (known as Environmental Technology Verification or ETV) to establish the procedure to verify the performance of nitrogen-reducing OSDS. A review team comprised of two engineers from MDE and one County Environmental Health Director are reviewing the BRF grant applications to ensure that each new technology has been third-party-evaluated to meet a nitrogen-removal standard that is at least as stringent as the EPA/ETV criteria.
- Currently, twelve different proprietary technologies (designs) have been evaluated by the program and are eligible for BRF funding in Maryland.

3.4.9 MDE will evaluate the legal/financial options for providing long-term maintenance of existing innovative on-site disposal systems.

- MDE has adopted a policy requiring that five years’ worth of operation and maintenance costs be included in the up-front selling price of any BRF-grant-eligible enhanced on-site disposal system.

3.5 Urban Nutrient Management

3.5.1 The Department of Agriculture (MDA) will continue to operate a statewide training and certification program for commercial lawn care companies, which addresses the proper use of lawn fertilizers and pesticides. Baltimore County will continue to offer on a periodic basis fertilizer/pesticide training to institutional grounds managers (for facilities such as business parks, hospitals and schools.)

- MDA has trained and certified 225 commercial applicators in Baltimore County and 379 commercial applicators in Carroll County.
- Several agencies, including MDA, Extension, and Baltimore County DEPRM, have ongoing programs to educate homeowners about “environment-friendly” lawn management practices, including reduced fertilizer use.

3.5.2 Baltimore County will continue to conduct programs involving street-sweeping, stormdrain-inlet cleaning, and storm pipe cleaning in its urbanized areas, in support of urban nonpoint source control objectives (by reducing pollutant inputs.) *Programs continue.*

3.5.3 Carroll County will continue to regularly inspect inlets and storm sewers in commercial and industrial areas. *Program continues.*

3.5.4 Baltimore City and Baltimore County will conduct a cooperative study of the water-quality benefits of regular street-sweeping and stormdrain-inlet cleaning.

- Baltimore City and the Center for Watershed Protection (CWP) monitored the runoff from selected city streets that were being swept regularly. The intent was to be able to estimate the average annual nutrient load reductions (in storm runoff) that could be expected to result from routine street-sweeping. The project has ended, and CWP released the final report in September 2008. Go to http://www.cwp.org/Resource_Library/Center_Docs/municipal/CBStreetSweeping.pdf
- Based in part on the City’s controlled study of the runoff from city streets that were swept with certain kinds of sweepers at monthly and at weekly intervals, a conceptual model was developed that estimated the likely range of expected pollutant-removal efficiencies achieved by mechanized sweeping. Total solids loads could be reduced by from 9 to 31%, total phosphorus loads could be reduced by 3-8%, and total nitrogen loads could be reduced by from 3-7%.
- Under the catch-basin portion of this study, Baltimore County carried out work in selected urban areas that measured the monthly accumulation of solids and debris in 100 stormdrain inlets. Samples were taken from 16 of these inlets for categorization purposes and for limited lab analysis. A conceptual model was developed during this study that would permit the estimation of the efficiency with which stormdrain inlets trap or store solid materials that otherwise would reach local waterways. The model predicted the following annual pollutant-removal rates as the result of regular catch-basin cleaning: between an 18% and a 35% reduction in the annual total solids load; between a <1% and a 2% reduction in the annual total phosphorus load; and from a 3% to a 6% reduction in the annual total nitrogen load.

3.5.5 The two counties and Baltimore City will continue to evaluate a variety of urban best management practices under the technical work required by their NPDES/MS4 (municipal stormwater) permits, which are issued by MDE.

- During 2006-07, Baltimore County did not measure the performance of any types of urban BMPs other than the evaluation of street-sweeping and inlet-cleaning

described above (see item 3.5.4). However, the County did institute a long-term study of Scotts Level Branch (in the Gwynns Falls watershed), in an attempt to document overall water quality improvements in the stream as a number of planned urban runoff BMPs are installed there.

- Carroll County has not been required in their MS4 permit from MDE to perform any controlled field studies of selected types of stormwater BMPs.

3.6 Land-Use Planning and Zoning

3.6.1 Baltimore County will continue to apply Resource Conservation (RC) zoning in the reservoir watersheds, with allowed residential densities and performance standards that are protective of water quality.

- Baltimore County's zoning policies and practices continue to protect against land conversion in the reservoir watersheds that likely would degrade water quality.
- In 2007, Baltimore County began to accept petitions for the 2008 Comprehensive Zoning Map Process (CZMP), through which site-specific changes to zoning in the county are proposed and reviewed. Of the more than 570 petitions received county-wide from landowners, contract purchasers, community organizations, the Planning Board, and the County Council, 190 were located in the three reservoir watersheds. Baltimore County DEPRM reviewed and commented internally on these petitions in support of the zoning policies stated in the 2005 Reservoir Watershed Action Strategy. The Reservoir Technical Group submitted individual written comments on the 190 “issues” in March 2008 and presented oral testimony at district-level public hearings held in March and again in June.
- The final decisions on all of the CZMP rezoning petitions were made by the County Council in late August 2008. This included the 190 issues which fell into one of the three reservoir watersheds. As a result of this process, only about 10 acres of Resource Conservation-zoned parcels in the reservoir watersheds were changed to higher-density uses -- primarily to “rural commercial overlay districts” for existing businesses in designated rural centers, such as Hereford. In addition, more than 150 acres petitioned for change from Resource Conservation zoning to urban density zoning were denied, and about 1,650 acres of existing RC-zoned lands (primarily RC 4 and RC 5) were downzoned to lower-density RC zones (primarily RC 2, RC 6, RC 7 or RC 8).

3.6.2 Baltimore County will maintain insofar as possible the current limits of extension of the Urban-Rural Demarcation Line (URDL) in the Loch Raven and Liberty watersheds. (The Prettyboy watershed lies well outside of the URDL line.) The URDL essentially represents Baltimore County’s urban growth boundary. *Policy continues.*

3.6.3 Baltimore and Carroll Counties will maintain the current extent of conservation and agricultural zoning in the reservoir watersheds, insofar as possible.

- During 2007, Carroll County finalized and adopted the *Westminster Environs Community Comprehensive Plan*, which recommended the conversion of 16 acres of land zoned Conservation (3-acre residential lots) and some 193 adjacent acres

zoned Agriculture to an Employment Campus zoning category. The acreage involved was part of the Liberty Reservoir watershed. In July 2007, the Reservoir Technical Group (RTG) submitted comments on the draft Westminster Environs Plan that were critical of these proposed zoning changes. The draft plan was not revised in response to those comments.

3.6.4 Baltimore and Carroll Counties will protect the reservoir watersheds by limiting insofar as possible additional urban development zoning within the reservoir watersheds.

- The RTG has discussed the need to set up a mechanism to track proposed new urban development in the watersheds, regardless of the current zoning. We need a way to estimate the additional loadings that will result from the new development and to project how these will be offset by accompanying BMPs. This question relates directly to documenting compliance with the TMDLs for the Gunpowder reservoirs. (Refer to the bullets under commitment 1.3.1.)

3.6.5 The Baltimore County and Carroll County master land-use plans will continue to support the goals of the Reservoir Watershed Management Agreement and the commitments made in this Action Strategy. *Policy continues in effect.*

3.6.6 The signatories will work with the Maryland Department of Natural Resources (DNR) to include the reservoir watersheds in the Forest Legacy Program and to seek funding for protection of selected forested areas.

- Maryland's 2006 "Assessment of Need" for the Forest Legacy Program, submitted by DNR to the US Forest Service, included forested lands in the reservoir watersheds. The Forest Legacy Program provides matching funds for voluntary conservation easements intended to protect forested lands. However, funding is not yet available for this area.

3.7 Resource Protection and Restoration; Development Guidelines

3.7.1 Baltimore and Carroll Counties will continue to implement the sensitive-area-protection provisions of their development regulations for non-tidal wetlands, steep slopes, floodplains and water courses, forests, water bodies, and natural land areas. These regulations are intended to protect important ecosystem functions and tributary stream quality. *Policies continue in effect.*

3.7.2 Baltimore County will work to establish a comprehensive forest resource management program in the watersheds, with the goal of ensuring the ecological and economic sustainability of forest resources as a means to help stabilize watershed hydrology and to help protect water quality.

- DEPRM is leading this effort for the County. Working with a diverse steering committee, a "forest sustainability program" for Baltimore County was launched in 2003. The steering committee developed a draft Forest Sustainability Strategy in 2005, and the County subsequently signed a four-year

memo of understanding with the USDA Forest Service, Maryland DNR, and American Forests to implement the strategy.

- Working with these agencies and organizations, and with other participants in the national Roundtable on Sustainable Forests, the County has developed local programs to address the ecological and economic sustainability of its forest resources, using the Montreal Process Criteria and Indicators framework.
- The County is working to assess its existing urban tree canopy and to set Urban Tree Canopy Goals. This is relevant to the highly-developed portions of the reservoir watersheds, such as the Towson-Timonium-Hunt Valley corridor in the Loch Raven watershed.
- Using restricted grant monies and capital program funding, DEPRM is working to increase tree cover in both urban and rural communities in the county. The Growing Home Campaign provides education for homeowners and a point-of-purchase coupon (cost-shared with local nurseries and garden centers) towards the purchase of qualifying trees for planting in residential yards. Working with various rural conservation/watershed organizations, DEPRM is also reforesting portions of large, low-density rural residential lots.
- In 2007, a Forest Health Assessment and Forest Management Plan was completed for the 900-acre public forest at Oregon Ridge Park, which lies in the Loch Raven Reservoir watershed. Implementation began during 2008.

3.7.3 The signatories will encourage the Maryland DNR to manage its land holdings in the reservoir watersheds so as to benefit reservoir protection.

- Baltimore County has implemented a reforestation project on about 5.5 acres at the headwaters of Fitzhugh Run and other streams located within the Gunpowder Falls State Park, just east of Loch Raven Reservoir.

3.7.4 Baltimore City will work with Baltimore and Carroll Counties to evaluate the adequacy of land-acquisition and development-rights easement programs (e.g., Rural Legacy, etc.) for protecting critical or sensitive areas in the reservoir watersheds which are vulnerable to development. Following this evaluation, the City and the two counties will develop a strategy for supplementing current preservation and/or acquisition efforts in the reservoir watersheds.

- Since 2005, RTG members have discussed other approaches, such as paying for the reforestation of portions of existing rural tracts, which might be more cost-effective for overall water quality purposes than purchasing conservation easements would be. No action has been taken so far. A work group needs to be set up on this issue.
- During State fiscal years 2005-2007, Carroll County received Rural Legacy funds (a total of \$1.35 million) from DNR to support agricultural land preservation in the Upper Patapsco Rural Legacy Area (located above Liberty Reservoir). These funds were used during FY 2008 and FY 2009 to purchase development rights on three different farms in the Liberty watershed, totaling approximately 216 acres.
- Baltimore County contracted with The Conservation Fund to conduct an Agricultural Land Prioritization Study, which assessed all rural parcels in the

county 50 acres or greater (and parcels contiguous to larger parcels) for their agricultural, forestry, ecological, water quality, and community (aesthetic and historical/archaeological) values. This report was intended to help Baltimore County to determine an optimal strategy (i.e., location, function and costs) for protecting the additional 30,000 acres of land which are needed to meet the County's long-term agricultural-land-preservation goal of 80,000 acres.

- This prioritization study has been completed. It indicated that there is more than enough undeveloped rural land in Baltimore County that meets the criteria for agricultural land preservation, to allow the County to meet its 80,000-acre goal. The study determined that some pockets of undeveloped, suitable agricultural lands were nearby or adjacent to the 2010 Master Plan's Designated Agricultural Preservation Areas, and that minor adjustments to those boundaries could be made to include this adjacent acreage. This action would help to ensure that there is sufficient acreage to enroll/preserve to meet the 80,000-acre goal.

3.7.5 Baltimore City and Baltimore County will work cooperatively with Maryland DNR to develop a comprehensive deer management program for the reservoir watershed areas, with an initial focus on the Loch Raven watershed. [During 2006] the City and the County will develop a preliminary set of recommendations for deer management, and will present these recommendations to the BMC Management Committee.

- In 2006-2007, Baltimore County worked with Baltimore City to develop an approach to the deer population problem, which is particularly acute in public and private areas located close to Loch Raven, where all types of deer hunting have been banned for many years.
- In the summer of 2008, Baltimore County and Baltimore City announced that a managed deer hunt by individual bow-hunters (sportsmen) would be conducted on selected City-owned areas adjoining Loch Raven Reservoir. The public hunt, which began in September 2008, was needed primarily to control deer browsing, which has greatly reduced the natural regeneration of the City-owned forests that protect the quality of the region's drinking-water supply.
- Baltimore County, working cooperatively with the City, has augmented the City's deer management efforts (above) by contracting with a licensed deer cooperator to manage areas of the City's Loch Raven property that are not intended for public bow-hunting. Implementation began in February 2009.
- DNR is proposing to do a controlled deer hunt in an area it owns (located on both sides of Jarrettsville Pike, south of Blenheim Road and east of Loch Raven), on land presently leased for farming. This is expected to help relieve grazing pressure on young trees in the adjacent City-owned watershed area.

3.7.6 Baltimore County will continue to implement its capital improvement program for stream restoration and for upgrading of existing stormwater BMPs to stabilize selected stream channels and to improve water quality in the reservoir watersheds.

- Several Baltimore County projects involving Loch Raven tributaries are included in the 6-year Capital Budget, but have not yet been initiated: the East Beaver Dam Run stream-restoration project, located near Cockeysville Middle School, and several stormwater retrofit projects yet to be determined. In

addition, capital funding has been allocated for stream-restoration work by the County on Frog Hollow and Prettyboy Branch, both tributaries in the Prettyboy watershed.

- The Gypsy Lane stream-restoration project is under design. This project will be on an unnamed tributary to Loch Raven located in the Hampton area.
- The Lower Spring Branch stream-restoration project, located south of Pot Spring Road (involving a direct tributary of Loch Raven), was in design from 2005 into early 2008; construction began in July 2008.

3.7.7 Carroll County will continue its multi-year process of systematically assessing the condition and integrity of various tributary streams in the reservoir watersheds. Portions of these streams will be selected on a priority basis for restoration work, to be supported with County capital funds.

- In 2006-2007, Carroll County carried out detailed field studies of stream/channel conditions in the Snowdens Run watershed, a tributary of Liberty Reservoir in the Eldersburg area. This was based in part on a WRAS study done previously for the Carroll County portion of the Liberty drainage area. In 2007, the County identified specific stormwater-conversion and stream-buffer-planting opportunities in the Snowdens Run area. Some of these sites are represented on the County's current 5-year list of potential stormwater upgrade projects.
- Carroll County continued work on its integrated Patapsco Road Watershed Restoration Project in the Liberty Reservoir watershed. The project is multi-year and will include stormwater management, stream restoration, flood mitigation, and land preservation. The project is located in a 530-acre headwater region that is characteristic of rural Carroll County.

3.7.8 Baltimore and Carroll Counties will evaluate and implement, where desirable, the site-design recommendations of the Builders for the Bay Roundtable, in order to enhance resource protection in the reservoir watersheds

- Baltimore County completed a county-wide "Builders for the Bay" (B for B) process, which resulted in a "consensus document" published in June 2006. This process included a review of the County's current zoning policies, and of residential and commercial development design standards (including sensitive area/open space set-asides, restrictions on lot widths and depths, reductions in the mandatory minimum paved surfaces, disconnecting residential rooftop runoff from community storm drains, etc). A number of possible improvements in these kinds of areas were recommended in the B for B consensus document.
- In Baltimore County, a multi-agency steering committee was created to continue the process of implementation. By the end of 2007, this committee had reviewed the more than eighty B for B recommendations. The County's Department of Public Works is currently in the process of revising its Design Manual, which includes the road standards for rural, urban and suburban roadways. The County's Office of Planning is responsible for reviewing and revising the parking standards for institutions and for commercial properties.

- In Baltimore County, subdivision designers now can “earn” environmental credits for their projects by using a variety of practices, including rooftop disconnection from the stormdrain system (wherever site conditions are suitable).
- In Baltimore County’s B for B report, some recommendations urged more flexibility on planning for permanent open space and on establishing minimum residential lot sizes. The County’s latest Planned Unit Development regulations now allow more unit type options in low-density residential zones and more flexibility on designating permanent open space.
- The Baltimore County Landscape Manual has been revised to allow for more tree-planting in urban residential zones.
- New Baltimore County policies relating to stormwater management necessarily will be tied to a new “model” local ordinance currently being developed by MDE, in response to the Maryland Stormwater Management Act of 2007.
- Carroll County completed a “Builders for the Bay” process during 2007-2008 (with the final report completed in July 2008). This process included a detailed review of the County’s current residential- and commercial-development design standards (including sensitive area/open space set-asides, restrictions on lot widths and depths, reductions in the mandatory minimum paved surfaces, etc).

3.7.9 Baltimore and Carroll Counties will continue to apply their regulations for the design, construction and operation of golf courses. These guidelines address water-quality and habitat-protection issues, including appropriate nutrient application and pesticide management, as well as the preferred designs for wetlands crossings and guidance on the removal of vegetation. *Policies continue in effect.*

4.0 Management of Municipal Watershed Property

4.0.1 Baltimore City will continue its efforts to maintain diverse and vigorously-growing forest communities on the City-owned watershed properties surrounding the three reservoirs. *These efforts continue; refer to items 4.0.2 through 4.0.4.*

4.0.2 When and where appropriate, Baltimore City will implement the recommendations of the *Comprehensive Forest Conservation Plan for Long-term Watershed Protection on the City of Baltimore’s Reservoirs* (DNR Forest Service, 2003) These recommendations are aimed at improving the health, diversity and sustainability of the forests surrounding the lakes. [During 2006] the City will evaluate the DNR report and develop a list of recommended actions for implementation.

- During 2008 and 2009, Baltimore City, in cooperation with Baltimore County, implemented a deer population management plan for the Loch Raven Reservoir watershed property, in order to reduce deer browse pressure on natural tree-seedling regeneration, thereby protecting the long-term sustainability of the forest surrounding the reservoir. This change in policy addressed a key recommendation of the 2003 DNR report.

- The City is developing an improved “woods road” maintenance program, focusing on taking soil-stabilization and erosion-control measures intended to reduce sediment loads to the reservoirs from interior forest roads.
- Boundary encroachment: The City has initiated actions against six adjacent private property owners at Loch Raven who have encroached on City watershed property. The Department of Public Works and the Department of Law are working jointly on these cases.

4.0.3 New or expanded recreational or commercial facilities should not be constructed in the City-owned watersheds. Existing facilities should be managed so as to not represent a significant threat to the health of the City-owned forests, nor to the water quality of the reservoirs. *This policy continues in effect. No new issues arose during 2006-2008.*

4.0.4 Baltimore City will continue to take action to discourage or prevent unauthorized recreational uses of the City-owned watersheds which present a significant threat to public safety, forest health, and/or reservoir water quality.

- In early 2008, the City hired the first member of a new Watershed Ranger force that will focus its attention on dealing with/discouraging unauthorized recreational uses of the City-owned watersheds. A standing force of 13 rangers eventually will be in place to deal with these types of issues in the three different areas.

4.0.5 Baltimore City DPW officials will continue to meet periodically with the “Friends of the Watersheds” advisory group. This group serves as a forum for nearby community associations, watershed advocates, and recreational users’ groups to exchange information and views with City managers and to discuss problems and opportunities involving the reservoirs and the City-owned watersheds.

- Baltimore City DPW officials have discontinued the periodic meetings of the “Friends of the Watersheds” advisory group. However, beginning late in 2007, citizens’ groups working primarily in the Gunpowder watershed formed a new working group, the Reservoir Watershed Coalition, which focuses on habitat protection issues and restoration projects in the public lands (Gunpowder State Park and the City-owned watershed properties). The coalition meets quarterly, and Baltimore City watershed managers from the City’s Reservoir Natural Resources Section regularly attend their meetings. (Refer also to item 7.0.4.)

5.0 Toxics, Pathogens, Potential Spills, and Disinfectant Byproduct Precursors

5.0.1 The Department of the Environment (MDE), working in cooperation with the Hazardous Waste Facility Siting Board, will enforce the provision in State law which prohibits the siting of any hazardous waste facility that would “adversely affect” a public water supply, such as the reservoirs. *This policy continues in effect.*

5.0.2 The Reservoir Program participants will continue to stay abreast of new developments and new issues relating to potential toxics problems in the reservoirs.

- The signatories to the *2005 Reservoir Watershed Management Agreement* do not have evidence of a toxics problem in the reservoirs at this time (except for mercury, addressed below.) Baltimore City labs routinely screen for some specific toxic compounds in the raw water (prior to treatment), and they find no violations of EPA standards.

5.0.3 MDE will continue to support fish-consumption “advisories” for fish taken from the three reservoirs, based on the potential for bioaccumulation of mercury present in the lakes’ water columns. Such advisories have been issued for most Maryland lakes. The source of the mercury is atmospheric, with much of it coming here from out of state. *This policy continues in effect.*

5.0.4 Baltimore City will analyze the raw (untreated) reservoir water for a range of pathogens, in compliance with new federal EPA requirements (the Long-term 2 Enhanced Surface Water Treatment Rule).

- The City continues to be in compliance with EPA’s Long-term 2 Enhanced Surface Water Treatment Rule. This includes daily analysis of the raw water entering the two treatment plants for total coliform bacteria and for fecal coliform or *E. Coli* bacteria, and monthly analysis of the water for *Giardia* and *Cryptosporidium*.

5.0.5 Baltimore City will track sodium and chloride levels in both the raw water and the finished water. Using the information gained, Reservoir Program participants, working through the RTG, should establish a goal for sodium concentration in the lakes. This goal should relate to the current EPA health advisories for water consumed by individuals who are on a sodium-restricted diet.

- At the present time (2008), Baltimore City’s water-testing labs are being modernized and improved extensively. Analysis for sodium and chloride levels in the raw water and in the finished water will resume when the renovations are completed.
- During 2006, Baltimore County added routine analysis for sodium concentration in samples taken from all of its tributary stations upstream of the two Gunpowder reservoirs (Loch Raven and Prettyboy). During 2007 (a Patapsco sampling year), they did the same for baseflow stations located on six different county tributaries to Liberty Reservoir. The Loch Raven Reservoir watershed sites had the highest mean concentration of sodium, at 23.97 mg/l (128 samples, range 5.2 to 124.1 mg/l), while the Prettyboy Reservoir watershed sites had the lowest mean concentration of sodium at 10.29 mg/l (42 samples, range .025 to 35.1 mg/l). The Liberty Reservoir watershed sites were intermediate, with a mean concentration of sodium at 20.12 mg/l (19 samples, range 8.1 to 39.9 mg/l).

5.0.6 Baltimore City, in cooperation with other Reservoir Program signatories, will investigate the principal sources of the “precursors” (organic substances present in the raw water) of the disinfection byproducts (DBPs) which have been detected at various points in the metropolitan water system. The research would include a study of the

relationship between sub-watershed land cover, total organic carbon/dissolved carbon in the tributaries and the reservoirs, and DBP precursors in the raw water.

- The decision on whether or not to proceed with this study will await the final recommendations of the U.S. Geological Survey's evaluation of the current local reservoir and tributary monitoring programs. (See Item 1.1.3)

5.0.7 Reservoir Program signatories, working with other agencies as appropriate, will study the routine transport of hazardous materials over the bridges crossing the reservoirs and their major tributaries, and will make recommendations on the prevention of and response to accidental spills on or near those bridges. The potential hazards of ruptured pipelines also will be evaluated. *No work has been done on these issues since 2005 by the RTG.*

5.0.8 Reservoir Program signatories will review and comment on the existing arrangements and established procedures for notification of all appropriate agencies in the event of a significant spill or discharge of a hazardous substance in any of the reservoir watersheds.

- During 2006 and 2007, the BMC Reservoir Program Manager interviewed Baltimore City, Baltimore County, Carroll County and State (MDE) officials who were directly responsible for managing their respective spill-response programs. In November 2007, a draft report was presented to the RTG which summarized the existing local government (fire department/public safety) and State (MDE) arrangements for responding to reported chemical or petroleum spills anywhere in the three reservoir watersheds. The draft report concluded with a suggestion of a possible change in how (or when in the process) the Baltimore City Watershed Management Office is to be notified of any spill occurring close to either Liberty Reservoir or Loch Raven Reservoir.

6.0 Reservoir Watershed Program: Coordination and Administration

6.0.1 The six major jurisdictions in the Baltimore region will continue to fund the operation and coordination of the Reservoir Watershed Protection (Management) Program by making annual payments to the Baltimore Metropolitan Council, with each jurisdiction's contribution based in part on the volume of Baltimore City or (raw) reservoir water consumed by that jurisdiction in the previous fiscal year.

- The six jurisdictions have continued to support the regional program in FY2007, FY2008 and FY2009.

6.0.2 Program participants, working through the Reservoir Technical Group (RTG), will prepare a biennial report on progress made in implementing the *2005 Action Strategy for the Reservoir Watersheds*, including the quantification of cumulative accomplishments, such as the estimated reduction of the annual pollutant loads to each reservoir.

- The present document, covering the decisions made and actions taken during 2006, 2007 and (for some commitment items) 2008, is the first biennial progress report released by the RTG and the Reservoir Watershed Protection Committee

since the signing of the *Reservoir Watershed Management Agreement of 2005*, which occurred in November 2005.

- Wherever possible, quantifiable units of measure for the respective watersheds--such as the number of acres preserved for farming, the number of agricultural acres now covered by a Nutrient Management Plan, or the estimated reductions in annual nonpoint-source loadings that result from applied farming BMPs or from completed/applied urban BMPs (such as stormwater controls)—have been provided to the RTG by local or State agencies and included in this report.
- The RTG has been in discussion with the Maryland Department of the Environment (MDE) over the mechanisms that will be used to estimate the cumulative reductions (since the mid-1990s) in the average annual sediment and nutrient loads delivered to the two Gunpowder reservoirs (Loch Raven and Prettyboy), for which sediment and nutrient TMDLs have been established by MDE (see commitment item 1.2.1). For more information on the RTG's current approach to tracking these changes in loads over time, please refer to the status bullets under commitment item 1.3.1.

6.0.3 Program participants will encourage greater participation by the municipalities (Westminster, Hampstead and Manchester) in the Reservoir Watershed Management Program. *No actions have been taken in this regard since 2005.*

7.0 Public Awareness

7.0.1 Reservoir Program participants, working through the Reservoir Technical Group, will continue to identify and pursue opportunities for public education programs relating to reservoir protection, including outreach to schools. *No actions have been taken in this regard since 2005, although a reservoir-related school curriculum had been developed in prior years.*

7.0.2 The Reservoir Watershed Protection Program will continue over the years to distribute its progress reports and technical reports to public agencies and to interested citizens' groups.

- The program's Interim Progress Report (March 2007) was distributed electronically to all participating agencies and to interested citizens' groups working in the reservoir watersheds.

7.0.3 Reservoir Program participants will use the Baltimore Metropolitan Council (BMC) website to disseminate current information and to promote public awareness about the Reservoir Program and its activities and accomplishments.

- In early 2006, BMC staff expanded and updated the information about the program that is available on the BMC website. The 2005 Reservoir Watershed Management Agreement and Action Strategy are both available on the website.
- Working in cooperation with the RTG, the program coordinator and other BMC staff prepared a printed and bound version of the 2005 Agreement and Action

Strategy, which has been distributed widely to interested local and state agencies and to watershed-area citizens' groups.

7.0.4 Reservoir Program signatories will continue to assist and encourage the efforts of local citizens' organizations which are concerned about watershed management issues and reservoir protection.

- The local participating agencies and BMC maintain ongoing working relationships with such groups as the Gunpowder Valley Conservancy and the Prettyboy Watershed Alliance.
- During 2006, the Baltimore County DEPRM provided "watershed association restoration planning and implementation grants" to the Gunpowder Valley Conservancy (GVC - area of interest includes the Loch Raven tributaries) and the Prettyboy Watershed Alliance, for staff support. During 2007, the GVC received their second grant under the County program, which was intended to help them expand their member base, recruit new volunteers, and carry out cleanup events and tree-planting projects.
- Late in 2007, citizens' groups working primarily in the Gunpowder watershed formed a new working group, the Reservoir Watershed Coalition (RWC), which focuses on public education about habitat-protection issues, while organizing hands-on habitat-restoration projects in the public lands (Gunpowder State Park and the City-owned watershed properties). Projects sponsored by the member groups have involved tree-plantings, the removal of undesirable invasive plant species from portions of the public lands, and the reduction of the adverse impacts of certain activities by recreational users of the public lands (e.g., trail bike enthusiasts). The RWC meets quarterly, sharing information on current problem areas and coordinating upcoming public events. Baltimore City watershed managers attend each meeting of the Reservoir Watershed Coalition.

Significant project that was not included in the 2005 Reservoir Action Strategy:

The **Prettyboy Watershed Restoration Action Strategy** (Prettyboy WRAS). This effort was begun in 2004 by Baltimore and Carroll Counties, working in cooperation with DNR and MDE, as well as with local citizens' and sportsmens' organizations. During 2005-2006, field surveys of the main tributary streams to Prettyboy were completed by several different multi-agency technical teams. These included surveys of stream water quality, in-stream biological diversity, and assessment of physical conditions (including observed potential threats) in selected stream corridors.

During 2006 and 2007, Baltimore County DEPRM, working closely with the WRAS steering committee (which included staff from Baltimore City, Carroll County and BMC, as well as members of local watershed associations) completed two major documents. One was a detailed Prettyboy Watershed Characterization Report, and the other was the main Prettyboy WRAS document. Both reports were submitted to MDE in January 2008.

In 2008, DEPRM has already begun some of the additional fishery sampling (in selected tributaries) called for in the report. The WRAS will be used by the County to qualify portions of the watershed for possible restoration/protection grants under a number of different federal and state grant programs.