West Virginia Potomac Tributary Strategy Implementation Plan

Prepared by the
West Virginia Potomac Tributary Strategy Implementation Committee

Including representatives of:
West Virginia Department of Environmental Protection
West Virginia Conservation Agency
West Virginia Department of Agriculture
Cacapon Institute
The Conservation Fund - Freshwater Institute

Photo by Neil Gillies: Spring 2005 riparian buffer demonstration planting beside the Cacapon River

Submitted to the Chesapeake Bay Program December 16, 2005

Overview

The Chesapeake Bay is a national and local treasure, and an important source of livelihood, recreation and cultural heritage for the region. However, after receiving pollution from the surrounding landscape for many years, the Bay is in trouble. The states in the Chesapeake Bay watershed – Delaware, Maryland, New York, Pennsylvania, Virginia and West Virginia – the District of Columbia, and the U.S. Environmental Protection Agency have come together to find solutions to the Bay's problems. They have determined that the key to restoring the Bay's health entails reducing the flow of nutrients (nitrogen and phosphorus) and sediment flowing from the Bay states into the Bay, and have set maximum amounts for nitrogen, phosphorus and sediment, known as Cap Load Allocations (CLAs), for each of the jurisdictions.

Bay program partners agreed to develop and carry out cooperative and voluntary Tributary Strategies to reduce current pollutant loads to the CLA levels by the year 2010, an approach that allows innovation and flexibility. The West Virginia Potomac Tributary Strategy was developed with the help of a Potomac Basin stakeholders process. This provided the framework for a comprehensive planning process to equitably reduce the flow of nutrients and sediment loads to the Potomac River, and ultimately to the Chesapeake Bay. The complete text of the Tributary Strategy appears at www.wvnet.org and the implementation deck associated with the strategy includes practices implemented from 1985 through those expected to be implemented by 2010. The West Virginia Potomac Tributary Strategy Implementation Plan summarizes actions to be taken from 2004 through 2010 to meet our cap load, plus a note about "cap maintenance" that explains how cap loads will continue to be honored in the face of population growth and other expected changes in the region.

Everything in this plan is dependent upon four things, funding, human resources to carry out and track these Best Management Practices (BMPs) and basin-wide strategies, the ability to engage a sufficient number of private landowners in the process so that they agree to adopt voluntary BMPs, and the political will to carry out any government-level strategies.

Point Source Implementation Plan
The point source strategy was developed as a potential suite of actions rather than an exact description of new regulations. Details like exact limits on nutrient outputs depended on outside factors.

The Point Source Innovations Workgroup (PSIG) was formed with a six- to eight-month goal to develop a long-term plan. Representatives of the West Virginia Department of Environmental Protection (WVDEP) hosted the first meeting in October 2004 and provided subsequent support to the group, but the members are point source stakeholders. They proposed and investigated innovative solutions to reducing the overall nutrient load contributed by West Virginia sources to the Potomac Basin. The PSIG focused on the need for compliance with Maryland's Chesapeake Bay Water Quality Standards, because Maryland's portion of the Chesapeake Bay is downstream from West Virginia, thus West Virginia must address Maryland's standards under the requirements of the Clean Water Act.

Nonpoint Source sectors (agriculture, urban/mixed open, and forest)
Nonpoint source pollutants will be addressed both on a basin-wide basis and by watershed (HUC10 level watersheds; there are 24 of these in the Potomac Basin of West Virginia) according to their level of priority. Project Teams will be developed in priority watersheds to oversee nonpoint source projects.

Implementation Plan

During the implementation phase two things will be happening. We will be focusing on priority watersheds and working on the development of the basin-wide issues, or activities to be implemented across watershed boundaries, and possibly throughout the entire Basin.

Basin-wide Focus

Funding analysis

All of our activities are contingent upon our ability to secure resources.

- Participate in Chesapeake Bay funding committees ("Chesapeake Bay Funding Network" and Chesapeake Bay Finance Committee)
- Work with congressional delegation and state legislature to secure funding
- Coordinate with University of Maryland Environmental Finance Center to identify funding for priority watersheds
- Assist counties and municipalities in obtaining funding to draft development ordinances, develop conservation plans, manage stormwater, and track urban BMPs

Translating Chesapeake Bay goals into local planning and implementation

Broad Potomac Basin and watershed-based Tributary Strategy objectives will be implemented and achieved largely by cumulative small measures taken at the parcel level. Local municipal and county comprehensive plans, along with regional economic development plans, must coordinate with other units of government and be consistent with West Virginia's commitments to Bay restoration efforts. Counties and municipalities should incorporate language consistent with the State's commitment to achieve the goals of the West Virginia Potomac Tributary Strategy in the development of subdivision and improvement location ordinances, public health codes, farmland protection programs, land use, zoning and overlay ordinances, and water, wastewater and storm water utility infrastructure and public capital facilities plans. West Virginia's legislature recently (2004) passed county comprehensive planning legislation, and Section 8A appears to support the above recommendations. The code requires inter-governmental-unit coordination and states, "sprawl is not advantageous to the community" (Section 8A 1-1-4).

- Create a framework of specific measurable objectives that will be incorporated as elements across all local and regional planning bodies
- Ensure that state funding for infrastructure is tied to implementation of cap load allocation achievement and maintenance of strategic objectives
- Develop templates for comprehensive planning goals and implementation ordinances that can be incorporated at the local level
- Provide counties with nutrient reduction goals and the type and amount of BMPs that could be implemented to achieve these goals, with timely updates on local progress

Public Agency Focus and Cooperation

Coordination among public agencies is necessary to implement the Potomac Tributary Strategy. Public agencies that implement BMPs on state-owned land will serve as examples for private landowners.

- Encourage implementation of BMPs on state-owned land (i.e. the riparian buffer and stream restoration project at the Reymann Memorial Farm in Wardensville, a WVU experimental farm; upgrading the trout-rearing facility on Spring Run; etc.)
- Coordinate activities and existing funding sources for targeted projects in priority watersheds
- Record and report all BMP implementation to the Chesapeake Bay Program

Point Source

The Point Source Innovations Workgroup (PSIG) held its first meeting in Romney, WV October 29, 2004. The workgroup was charged with developing implementable plans and concepts for point source dischargers to meet nutrient and sediment limits needed to protect and restore downstream water quality in the Chesapeake Bay. It was anticipated that by working collaboratively within the point-source sector, and through possible cooperative relationships with other nutrient contributing sectors, there would be cost and efficiency opportunities found to bring both economic and environmental benefits. Included below are recommendations that the PSIG formulated during their deliberations. The agency will take these recommendations into consideration as permit modifications and reissuance occur. The workgroup's proceedings are recorded at www.wvnet.org. The group suggests that DEP should:

a. **Modify all discharge permits, regardless of scale of discharge, to incorporate TN and TP monitoring.** There is no current basis for accurately projecting actual point source nutrient discharges in the absence of performance information. It is important to create an accurate, real world base-line of nutrient loads to fairly credit progress and to assist in Bay watershed model calibration. In addition to the immediate imposition of monitoring, accelerated handling, or electronic submission of DMRs should be made near real time and in concert with national or regional permit compliance systems. Transparency and timeliness are important.

b. **Begin to incorporate nutrient load limits into all new and existing discharge permits.** Priority should be on permit reissuance and major modifications based on facilities likely to discharge nutrients, discharge scale and proximity to the Bay.

c. **Expand point source sector cap load allocation.** All identifiable point sources, irrespective of scale, should be consolidated into the point source sector for Bay modeling and reporting purposes. Currently discharges of <50,000 gpd are lumped into a general land use of mixed open and urban and treated as non-point loading by assumption. The new version of the Bay model provides for specific extraction and modeling of all point sources down to the individual on-site level. Changing land use patterns in West Virginia will favor dramatic expansion of smaller decentralized or cluster treatment systems. The nutrient control implementation strategy must capture the broadest possible base of potential nutrient discharge actors.

d. **Assign nutrient load allocations (NLA).** Nutrient load allocations should be the mechanism for point source dischargers to benchmark individual facility nutrient control performance over an assigned time period. Nutrient load allocations should be based on effluent averaging and reflect that seasonal removal performance will vary and that total annual load is more important than instantaneous concentration. Annual NLA can be achieved by some combination of actual discharge and the use of offsets or credits through partnership with others. Assignment of NLA may also be based on prospective performance drawn from the Best Available Demonstrated Control Technology (BADCT) literature.

e. **Develop a framework for watershed permitting or nutrient trading as part of an inter-state Potomac Basin strategy.** In the absence of an in-place and articulated watershed permitting or trading program it appears that West Virginia point sources will seek technological upgrades as a near-term response to nutrient reduction objectives. Sustained maintenance of cap load achievement goals in the context of double digit population growth and rapid land use conversion will require the development of a framework system of offsets and/or credit trading within and, more likely, with actors external to the point source sector. Critical to such a framework is the certification and monitoring of trades, the creation of a credit reserve buffer for excursions and new projects, flexibility in capital and operational financing of trading investments and coordination with local planning to assure offset consideration.

f. **Develop nutrient-based pretreatment requirement or treatability standards.** A generalized approach to nutrient prevention should be created through development of pre-treatment state standards for nutrients similar to the approach for toxics. These standards would require the connecting customer (including residential) to maintain a waste stream that is cost-effective and equitable to treat and that would not lead to WWTP violations or loss of nutrient load allocation capacity. Making nutrient limitations a condition of wastewater treatment service will place part of the responsibility for the treatability cost in the hands of the generator.

Agriculture

a. **Human Resources:** Natural Resources Conservation Service (NRCS) and West Virginia Conservation Agency (WVCA) staff indicated they would need additional staff resources to sign people up for cost-share programs, to oversee agricultural BMP implementation and to assist with the development and maintenance of nutrient management plans if, as a result of the Potomac Tributary Strategy Implementation, the number of people needing such assistance increases. They cited the recent PL534 program as an example of this phenomenon. Additional staff needs for other agencies, especially the USFWS and the Conservation Districts, should also be investigated.
   - Evaluate the number and type of staff needs of each agency
   - Seek funding and consent for these positions

b. **Litter Transport:** NRCS in cooperation with WVCA and the West Virginia Department of Agriculture (WVDA) initiated a cost-share program in 2004 to offset the costs of transporting litter out of the Potomac Valley Conservation District (Hardy, Grant, Hampshire, Mineral and Pendleton counties) into other areas of West Virginia with nutrient deficient soils. The program is being funded through the USDA Farm Bill Agricultural Management Assistance (AMA) Program. It is estimated that over 7,000 tons of litter annually will be exported out of the Chesapeake Bay Drainage.
   - Develop nutrient management plans on both the sending and receiving ends of the contract
   - Write 166 contracts for a span of three years
   - Perform outreach efforts to both producers and purchasers on the value of proper nutrient management
   - Post a website which will allow resource personnel as well as buyers to access up-to-date information on litter availability, average analysis for nutrient management planning, trucking vendors, and resource documents. The link is accessible at www.wvca.us
   - Encourage priority watershed Project Teams to enhance litter transport efforts through alternative use such as composting poultry litter for use as a soil amendment
   - Partner with the Potomac Valley Conservation District to market their active composting demonstration project for the development of research and demonstration projects with local golf courses utilizing composted poultry litter

c. **Conservation Reserve Enhancement Program:** USDA and West Virginia are sponsoring a 25 million dollar Conservation Reserve Enhancement Program (CREP) to protect water quality and wildlife in selected watersheds in the state, including much of the Potomac Basin. Twenty two million dollars are currently available statewide on a first come first serve basis. There is a statewide goal to enroll 9,160 acres in CREP. There are currently 1,006 acres enrolled in the program in the Potomac Basin.
   - Promote and synchronize West Virginia's CREP program efforts with a CREP Program Coordinator
   - Coordinate with the USDA Farm Service Agency to set annual enrollment goals

- Enroll producers in CREP to convert highly erodible cropland from agricultural production to the planting of native grasses, trees, and other vegetation to improve water and soil quality and wildlife habitat
- Provide rental payments and other financial incentives to encourage producers to voluntarily enroll in 10 to 15 year CRP contracts. Rental payments go to those producers who convert highly erodible cropland or other environmentally sensitive acreage to vegetative cover, such as riparian buffers, filter strips, and/or wetlands

d. Other Farm Bill Programs – West Virginia depends greatly upon USDA Farm Bill Programs to fund the implementation of agriculture BMPs. Approximately $12,000,000 is available to agriculture producers statewide for cost share programs such as the Environmental Quality Incentive Program, Wetland Reserve Program, Wildlife Habitat Incentive Program, Grassland Reserve Program and the Farmland Preservation Program.

- Educate farmers on the availability of this cost share funding
- Coordinate with agriculture agencies to set annual enrollment goals
- Develop contracts with farmers for installation of agriculture BMPs
- Track BMPs for inclusion in Bay Program reporting
- Support Bay Program efforts to regionalize and target Farm Bill funds to watersheds including the Chesapeake Bay
- Support Bay Program efforts to institute other Farm Bill reforms as identified by the Chesapeake Executive Council in November 2005

e. Concentrated Animal Feeding Operation: West Virginia is required to regulate runoff from large animal feeding operations. WVDEP is the regulating agency of the Concentrated Animal Feeding Operation (CAFO) water quality permit. At this time there is only one regulated CAFO in West Virginia's portion of the Chesapeake Bay Drainage area.

- Educate farmers on West Virginia's CAFO regulations and BMPs that could be installed to avoid being subject to the permit
- Work with partner agencies to provide technical assistance to identified CAFOs

f. Nutrient Management Planning: The coordinated effort of Conservation Districts, WVDA, WVCA, NRCS, WVU Extension Service, and poultry integrators will continue to assist landowners with operation and maintenance for existing nutrient management plans.

g. Non Cost Shared BMPs: Assess and document non cost shared BMPs within the Potomac Basin.

- Prioritize agricultural based watersheds for assessment
- Perform a door to door voluntary survey and document existing BMPs on pilot watershed(s)
- Continue documentation as funds allow

Urban

a. Human Resources: Technical assistance is identified as a key feature of West Virginia's urban strategy. Additional features of the strategy imply the need for increased staffing in agencies and county and municipal governments.

- Supply counties and municipalities with the capacity to develop and follow comprehensive stormwater management plans and to follow state stormwater regulations
- Supply state agency(ies) with personnel responsible for the oversight of stormwater programs
- Supply Public Service Districts with capacity to manage onsite and decentralized wastewater treatment
- Increase personnel in county and local governments to enable better tracking of urban BMP implementation

b. Stormwater: A comprehensive approach to stormwater management will be developed for the Potomac Basin, managed by watershed boundaries, and integrated with county planning efforts. In addition, the status and coverage of all existing stormwater management systems will be identified in order to assess gaps in the current stormwater management framework, and determine the effectiveness of its implementation.

- Identify locations of current stormwater ponds and other stormwater infrastructure
- Consult with county governments to predict where future growth will occur
- Identify Combined Sewer Overflow (CSO) problems and develop solutions
- Develop a statewide stormwater management design manual
- Improve State stormwater regulations
- Coordinate with MS4 communities to form stormwater utilities and charge user fees

c. Nutrient Management Plans: An inventory of urban land uses that result in excessive nutrient runoff will be conducted and prioritized. An appropriate nutrient management plan education and assistance program will be developed.

- Develop urban criteria with an emphasis on water conservation to reduce runoff
- Modify the West Virginia Nutrient Management Training and Certification Program to include urban criteria
- Conduct inventory of urban land uses that result in excessive nutrient runoff
    - Airports
    - Grasslands and golf courses
    - Homeowners
- Prioritize and develop education program for targeted land uses
- Assist willing landowners with nutrient management plan development

d. Septic Systems: Of particular concern are the effects of septic system discharges on water quality in the karst areas of the state. Another significant issue is that of residences and other facilities that have non-existent or failing septic systems.

- Work with county health departments to adopt a program that promotes regular pumping and advanced on-site systems, and create infrastructure for septage reception and treatment that minimizes nutrient release
- Develop homeowner education packets that cover operation and maintenance (pumping) of septic systems, targeting areas that have concentrations of failing septic systems
- Pursue incentives to fix failing septic systems
- Coordinate with State Groundwater Program and county health departments to better track location of septic systems for Chesapeake Bay Program reporting

e. Development Practices: The impacts of new development on water quality can be reduced through the implementation of onsite measures and land use planning to manage overall development patterns.

- Develop a Potomac Basin Conservation Plan to identify sensitive lands and incorporate measures to protect or manage these lands relative to pollutant loads within a particular watershed. Develop Conservation Plans for counties or individual watersheds, based upon this document
    - Seek funding to contract with independent researcher to develop plan
    - Implement plan on smaller scales
- Inventory existing county ordinances
- Encourage adoption of local ordinances that approach net zero impact from stormwater (require offsets if necessary)
- Encourage adoption of local ordinances that protect existing riparian buffer areas and require the establishment of riparian buffer areas where none exist
- Train builders and developers on Low-Impact Development and Smart Growth principles

    - Emphasize minimization of impervious area
    - Emphasize conservation of existing forested tracts within developments
- Seek funding for greater enforcement of development codes

Forestry

The following actions come directly from the West Virginia Potomac Tributary Strategy, but are appropriate here as next steps to take in implementing nutrient reductions in the forestry sector.

a. Harvesting

- Provide logger education regarding BMP standards and water quality
- Provide technical assistance to timber operators
- Maintain current level of logging inspections by the West Virginia Division of Forestry (WVDOF)
- Establish a toll free message center so loggers can easily and rapidly notify the WVDOF when they are within a week of completing a logging operation or are forced to move due to adverse weather conditions and/or equipment difficulties
- Provide education to landowners of timber operations on the importance and necessity of BMP maintenance post-harvest

b. Wildfire

- Fire Prevention - contact every fourth grader to apprise them of the dangers of wildfire and its potential. Increase public awareness through Firewise West Virginia Initiative
- Fire Preparedness - train and equip volunteer fire departments (VFD). Continue education for current staff in the fire sciences
- Fire Suppression - Better initial attack and response times. We will strive to have fires under control within one burning period (12 hours)
- Reduce sediment potential from fire line construction via the stabilization practice under the new Forest Land Enhancement Program (FLEP)

c. Landowner Assistance Improvements

- Increase landowner education on managing the forest resource
- Implement practices to ensure protection of Streamside Management Zones, including tree planting initiative
- Increase awareness of available cost-share programs that can be utilized on their property

Wildlife

The following actions come directly from the West Virginia Potomac Tributary Strategy, but are appropriate here as next steps to take in implementing nutrient reductions in the wildlife sector.

- White–tailed deer: continue to recommend to the Natural Resources Commission a liberal harvest objective for the 8 counties in the Potomac Basin of West Virginia
- Educate and encourage private landowners (using a joint effort between the agriculture agencies, landowners/farmers, and West Virginia Division of Natural Resources) to facilitate the legal harvest of antlerless deer
- Canada geese: continue to support the maximum hunting opportunity available, including days in the hunting season and numbers in the bag limits
- Increase education about and opportunities for Canada goose hunting on private land
- Increase utilization of available Canada goose nuisance and damage control programs
- Protect, promote, and create forested or scrubby riparian buffers to reduce the preferred open habitat of Canada geese and to discourage fecal matter deposition in streams

Education

a. Forest buffers: Promote the importance of retaining existing forest buffers when building new residential areas, when making any land use changes on farms, and when logging.

- Educate people about the slowness and difficulty of regeneration, and about the fact that buffers are one of the best practices for nutrient and sediment reduction.
- Emphasize Forest Legacy Program

b. Urban: The multitude of residents, landowners, and land managers in the West Virginia Potomac Basin will be targeted for education and outreach in order to resolve stormwater management, nutrient management, on-site wastewater treatment, and development concerns in a comprehensive, systematic manner. Visitors and non-resident landowners will be targeted for education as to how they can help reduce the impact of their activities on local waterways.

- Encourage Community Environmental Management
- Conduct education programs on karst geology, the use of BMPs, septic system maintenance, and lawn fertilization
- Educate and work with county governments regarding this Implementation Plan
    - Assist them in obtaining funding to carry out the recommendations contained herein
    - Suggest ways to track BMPs most efficiently and completely
    - Conduct a one-day workshop for local government representatives to attempt to develop a Basin-wide approach toward urban issues related to the West Virginia Potomac Tributary Strategy

c. Agriculture: Stakeholders met in November 15, 2004 to determine what needs there were for education about environment-based challenges for the agricultural community. The group discussed both producers' need to be better informed about proposed regulations, and policy and decision makers' need to be better informed about practices that agricultural producers already use to improve water quality. The group identified existing programs that educate agricultural producers about water quality issues, and expressed a desire to expand upon these rather than duplicate efforts.

- Encourage policy and decision makers to become better informed by developing fact sheets and conducting farm tours
- Develop "farmer friendly" educational fact sheets, including one that outlines all BMPs relevant to West Virginia in addition to all incentive programs
- Present PowerPoint presentation on incentive programs
- Repeat efforts of the successful past education campaign by the West Virginia Poultry Water Quality Advisory and Technical Committee to encourage nutrient management and voluntary BMPs for the poultry community

d. Article Series: The purpose is to educate the public about West Virginia's Potomac Tributary Strategy concepts, issues and process. Use this effort to keep the process in the public eye and help to build consensus and public support for the measures required.

- Write a series of concise articles to be submitted to area media outlets
- Prepare presentations on these topics that members of the Implementation Committee and others can take on the road to meetings

Watershed Focus

The purpose of this component of the Implementation Plan is to concentrate efforts on priority watersheds. Watershed priority will be determined using the prioritization method discussed below. Project Teams, formed in the priority watersheds, will be provided with the information necessary to guide them through the process of optimizing BMP implementation based on multiple criteria.

Prioritization of Watersheds
Uncertainty arose during the stakeholder process as to which watersheds should receive priority in a timeline for implementation of the Tributary Strategy. Some felt that the watersheds with the most nutrient and sediment impairment should be addressed first. Others raised the point that some of these areas might be saturated with certain BMPs, e.g. because of cost-share programs in the agriculture sector. Other issues might make a certain watershed a less efficient choice for action. Most agreed that at least some combination of factors should be used when developing the schedule of work. We decided that we needed to employ a "prioritization decision matrix" to show how the values (weights) we placed on individual decision factors affected the overall rank of each watershed. Appendix A discusses how the prioritization decision matrix was developed, details on each of the nine decision factors, how the watersheds were delineated, and the results of the public input on this process.

How the matrix is used
Resultant values in the far right column were calculated for each of the 24 watersheds. The watersheds having the top two scores began a more intensive implementation of the West Virginia Potomac Tributary Strategy in 2005. The watersheds having the highest scores will be priorities. Additional watersheds will be addressed with somewhat less intensity throughout the period from 2005-2010.

Project Teams will be developed in these priority watersheds to identify the potential nonpoint source projects. The teams will be charged with identifying and engaging stakeholders, surveying and mapping the watershed to target project sites, developing watershed based plans, coordinating activities and programs recommended within this Implementation Plan, securing funding sources, overseeing implementation, and measuring success.

Watersheds not specifically addressed through a Project Team by 2010 will benefit from activities outlined in the basin-wide plan above. In addition, portions of the West Virginia Potomac Tributary Strategy will be implemented by default as county and local governments become involved through the work of the other project teams. Many other voluntary, unassessed activities will contribute to pollutant load reductions throughout the Potomac Basin.

Cap maintenance

While this Implementation Plan is intended to meet West Virginia's Cap Load Allocation, ensuring that nutrient and sediment loads remain at these levels for perpetuity will require a significant amount of planning. Population growth and related projections show that urban and residential land uses will pose the greatest challenge because of increased loads from human activity; this challenge extends as well to the point source sector because of increased wastewater treatment requirements. State and county governments will be essential partners for developing cap maintenance strategies.

Obstacles to implementation of West Virginia Potomac Tributary Strategy

1. There is a need for stronger political leadership and support of local and state ordinances. The eight-county region of the Potomac Basin consists of a small fraction of the total land area of West Virginia. It will be difficult to get state legislators to establish statewide legislation to protect a resource that is so far downstream from this eight-county region. Related is the tension between private property rights, long-held respect for local land use determination and the broad need for integrated action to achieve nutrient and sediment reduction goals resulting from State commitments.

2. Funding is increasingly limited. A specific funding issue is the ineligibility of watersheds for Federal 319 funds if they are not listed on the state's 303(d) list of impaired streams. Opening this source of funding to any watershed within the Chesapeake Bay drainage (which is subject to its own "limits") would be helpful to the implementation of the West Virginia Potomac Tributary Strategy.
3. Public wastewater utilities have an obligation to serve and in some cases to provide new service consistent with missions to protect public health and promote economic development. This utility mission may be in conflict with voluntary State targets for cap loads and cap maintenance. Current procedures for determining the common benefit and need for private or public wastewater utility projects (PSC- Certificate of Need and Convenience, or DEP- Community Infrastructure Certificate of Appropriateness) place more decision weight on financial impact analyses and lack specific metrics for determination of consistency with the Tributary Strategy.
4. West Virginia as a headwater state receives a very small portion of the overall funding allocated to the Bay States proper and none for on-the-ground initiatives.
5. Many of the practices that need to occur in order to successfully achieve the goals of the Tributary Strategy are voluntary. One of the greatest challenges in gaining broad-based acceptance and implementation of BMPs is the cost to the landowners. The agricultural community strongly supports a change in current cost share rates to cover 100% of implementation of any practice that does not provide any economic return to the landowner.

Appendix A: The Prioritization Decision Matrix

How the Prioritization Decision Matrix was developed

The Matrix was developed as a tool to help prioritize watersheds for a schedule of work. A subset of the West Virginia Potomac Tributary Strategy Implementation Committee developed the matrix during the summer of 2004. Our goal was to have it ready to present to stakeholders at public meetings in September 2004.

The decision factors – (column headings of the matrix) "Factors" to be used as headings for the matrix columns were contributed by the entire Implementation Committee, with consideration given to stakeholders' comments gathered throughout the Tributary Strategy development process. One factor, Source Water Protection Areas, was added after stakeholders requested it during September 2004 meetings. In the nine factors chosen, we tried to capture not only scientific data indicating nutrient pollution in each of the watersheds, but also various social factors that might either contribute to or detract from any water quality improvement efforts planned in the Tributary Strategy. Using sediment load as factor was considered but was rejected because the workgroup realized that sediment loads were minor compared to nutrient loads, and many BMPs that remove nutrients also remove sediment. A cost-effectiveness factor was considered but rejected because the BMP implementation data was incomplete at the time.

The watersheds –(row labels in the matrix) We chose to base the matrix on HUC 10 fifth-level watersheds because they represented manageable units and approximated the boundaries of a majority of the Phase V Chesapeake Bay Watershed Model segments. Descriptive names of these 24 watersheds were listed down the left column of the matrix, thus serving as labels for the rows.

The matrix is in the form of a spreadsheet (Microsoft Excel). Along the left side are listed the 24 HUC 10 watersheds. Across the top are nine factors. Values from 0 to 1 are entered in each cell, so that numbers can be added together across the columns. The totals, on the right-hand side, show which watershed has the greatest overall value, and should be given the highest priority. Each of the factors can be weighted, or emphasized, so that it will influence the result more than the other factors. We asked the public for input in determining what these weights should be. We provided a form on which they entered weights from 1-10 for each factor. We averaged all responses, including those of members of the West Virginia Potomac Tributary Strategy Implementation Committee. Some stakeholders wished to see numbers in the cells before deciding on weights for the decision factors. We had researched and calculated values for the cells to the best of our abilities in the short time we had. The nine decision factors and notes on how the values were obtained are included here:

1. **Nitrogen impairment index:**
   This is an average of 3 values: the number of impaired stream miles according to the 2004 303d list, water quality data from various sources, and an estimated load. Only those streams listed as impaired in biological and fecal coliform categories were used in the analysis.

   Water quality data came from various sources. The Department of Agriculture is committed to the most comprehensive collection of data within the Potomac Basin, as part of the Non-Tidal Water Quality Monitoring Network. Total phosphorus, nitrate and nitrite water quality parameters were used in the analysis. Gaps in coverage were filled with data from WV Department of Environmental Protection's (WVDEP) Watershed Assessment Program. These data were collected during the program's five-year monitoring cycle and monthly monitoring for the

development of TMDLs. Additional data from the Cacapon Institute were used, primarily for the North River.

The load estimate was derived in the following way: Chesapeake Bay Watershed Model (CBWM) Phase V Land Use acres were multiplied by model segment specific loading rates from the CBWM. Point source and septic system loads were also included. Septic system loads were derived from the USGS SPARROW v2.0 model.

The average of these three values was then *normalized*, which means that each of the 24 watershed's resultant values was divided by the highest value. Thus, the highest value became 1 and all others were between 0 and 1.

2. **Phosphorus impairment index:**
   This value was derived in much the same way as the nitrogen impairment index. It, too, is an average of 3 values: the number of impaired stream miles according to the 2004 303d list, water quality data from various sources, and an estimated load. Only those streams listed as impaired in biological and fecal coliform categories were used in the analysis.

   Water quality data came from various sources. The primary source was from the Department of Agriculture's Non-Tidal Water Quality Monitoring Network. Total phosphorus, nitrate and nitrite water quality parameters were used in the analysis. Gaps in coverage were filled with data from WVDEP's Watershed Assessment Program. These data were collected during the program's five-year monitoring cycle and monthly monitoring for the development of TMDLs. Additional data from the Cacapon Institute were used, primarily for the North River.

   The load estimate was derived in the following way: CBWM Phase V Land Use acres were multiplied by model segment specific loading rates from the CBWM. Point source loads were also included, but septic system loads were not, as they lack a modeled phosphorus load. The average of these three values was then normalized, as described in the nitrogen impairment index section, above.

3. **Impaired high-quality stream miles:**
   This value was calculated from WVDEP's 2004 303d list and West Virginia Division of Natural Resources' list of high quality streams, 6th ed., 2001. The criteria used for high quality stream designation according to this publication is as follows: 1) All streams which are stocked with trout or that contain native trout populations. 2) Warmwater streams over 5 miles in length with desirable fish populations and public utilization thereof. This value was then normalized, as described in the nitrogen impairment index section, above.

4. **TMDL miles:**
   This value is simply the number of miles of streams with Total Maximum Daily Load requirements, and was derived from WVDEP's 2004 303d lists for biological and fecal coliform impairment. Because West Virginia lacks water quality standards for nutrients, these impairments were used because they provide the best available approximation of nutrient impairment. This value was then normalized, as described in the nitrogen impairment index section, above.

5. **Agricultural BMP saturation/likelihood of participation:**
   Watersheds were rated on a scale of 1-5, where 5=very little saturation of BMPs, so future BMP implementation is very possible, and 1=virtually saturated with BMPs. This value was then normalized, as described in the nitrogen impairment index section, above. When asked to weight

this factor, the public was referred to pp. 32-37 of West Virginia Potomac Tributary Strategy for proposed BMPs. This was one of the most subjective factors used in the decision matrix, but one that many stakeholders felt was important to include. One issue complicating this concept is that landowners might be more inclined to implement BMPs if more cost share money were available. Another issue is that some areas have a high percentage of landowners that wish to implement BMPs, but the supporting agencies are understaffed.

6. **Watershed group activity:**
   Watersheds were rated on a scale of 0-5, with 5=watershed group's scope is equal to watershed being considered, and group is very active, and 0=no watershed groups working in this watershed. This value was then normalized, as described in the nitrogen impairment index section, above.

7. **Population growth:**
   This value was calculated by determining population growth as percentages using census tract data from 1990 and 2000 census data from the U.S. Census Bureau. Census tract boundaries were reconciled to watershed boundaries using geographic information system software. This value was then normalized, as described in the nitrogen impairment index section, above. This factor may help address the point source/urban needs of a watershed, and also future pollution potential.

8. **Nitrogen Delivery Factor:**
   The nitrogen delivery factor for each watershed was taken from the CBWM. This value was then normalized, as described in the nitrogen impairment index section, above. This is a way of factoring in the impact a given watershed has on the Chesapeake Bay, mostly because of physical proximity to the Bay. The impact of pollution on the Bay decreases the farther away a watershed is from the Bay, because nitrogen can be lost from streams through pathways in the nitrogen cycle. Sediment and phosphorus delivery factors are equal across all watersheds in the Potomac Basin.

9. **Source Water Protection Areas:**
   Source water protection areas were totaled by watershed for all surface water facilities and groundwater facilities considered to be "under direct influence" of surface water. This factor was added as a result of the September 2004 public meetings, when stakeholders expressed a desire for this addition. This value was then normalized, as described in the nitrogen impairment index section, above.

The average weight of each factor was calculated from user input obtained during the stakeholder meetings and public comment period (Table 1). The weights were then normalized (all divided by 8.72) so that Population Growth's weight would be "1" and all others would be less than 1.

Table 1. Average of the weights for each decision factor, as recommended by public comment.

Factor	**Weight**	**Normalized Weight**	**Stakeholder Responses**
1. Nitrogen Impairment Index	8.04	0.92	28
2. Phosphorus Impairment Index	8.00	0.92	27
3. Impaired High-Quality Streams	5.50	0.63	26
4. TMDL Miles	5.63	0.65	27
5. Agriculture BMP Saturation/ Likelihood of Landowner Participation	6.78	0.78	27
6. Watershed Group Activity	5.86	0.67	29
7. Population Growth	8.72	1.00	29
8. Nitrogen Delivery Factor	4.71	0.54	24
9. Source Water Protection Areas	7.33	0.84	3

Decision Matrix for Watershed Prioritization
WV Potomac Tributary Strategy

Major Basin	Watershed (HUC-10)	Nitrogen Impairment Index	Phosphorus Impairment Index	Impaired High Quality Stream (miles)	TMDL (miles)	Agricultural BMP Saturation / Likelihood of Landowner Participation	Watershed Group Activity	Population Growth	Nitrogen Delivery Factor	Source Water Protection Areas	**Total Score** (unweighted)	**Total Score** (weighted)
Weight>>>		0.92	0.92	0.63	0.65	0.78	0.67	1.00	0.54	0.84		
02070004-Potomac Direct Drains	0207000409 - Opequon Creek	1.00	1.00	0.90	1.00	0.80	1.00	0.41	0.95	1.00	8.06	6.11
02070004-Potomac Direct Drains	0207000402 - Sleepy Creek	0.35	0.32	0.72	0.57	0.60	1.00	0.66	0.95	0.00	5.17	3.75
02070004-Potomac Direct Drains	0207000412 - Rockymarsh Run-Potomac River	0.57	0.56	0.06	0.06	1.00	0.90	0.42	1.00	0.21	4.79	3.64
02070001-S. Branch Potomac	0207000106 - Outlet South Branch Potomac River	0.66	0.58	0.55	0.49	0.70	0.80	0.19	0.72	0.13	4.81	3.56
02070001-S. Branch Potomac	0207000105 - South Fork South Branch Potomac River	0.67	0.67	1.00	0.79	0.50	0.00	0.22	0.72	0.02	4.60	3.39
02070007-Shenandoah	0207000703 - Bullskin Run-Shenandoah River	0.39	0.37	0.37	0.00	0.80	0.90	0.38	0.76	0.42	4.40	3.31
02070004-Potomac Direct Drains	0207000410 - Harlan Run-Camp Spring Run-Potomac River	0.44	0.21	0.08	0.14	0.80	0.00	1.00	0.95	0.31	3.94	3.14
02070001-S. Branch Potomac	0207000101 - North Fork South Branch Potomac River	0.52	0.48	0.81	0.49	0.20	1.00	0.07	0.72	0.00	4.28	3.02
02070003-Cacapon	0207000303 - Lost River	0.37	0.29	0.38	0.28	0.40	1.00	0.24	0.88	0.00	3.84	2.72
02070003-Cacapon	0207000304 - North River	0.22	0.18	0.00	0.00	0.80	0.90	0.62	0.88	0.00	3.60	2.69
02070004-Potomac Direct Drains	0207000404 - Back Creek	0.14	0.06	0.00	0.00	0.80	1.00	0.69	0.95	0.00	3.64	2.69
02070003-Cacapon	0207000307 - Cacapon River	0.28	0.12	0.00	0.00	0.50	1.00	0.63	0.88	0.00	3.42	2.54
02070003-Cacapon	0207000302 - Little Cacapon River	0.18	0.14	0.10	0.00	0.60	0.90	0.54	0.88	0.00	3.35	2.45
02070007-Shenandoah	0207000702 - Long Marsh Run-Shenandoah River	0.04	0.02	0.00	0.00	0.80	0.90	0.56	0.76	0.00	3.07	2.24
02070001-S. Branch Potomac	0207000103 - Headwaters South Branch Potomac River	0.40	0.37	0.22	0.00	1.00	0.00	0.10	0.72	0.12	2.94	2.22
02070001-S. Branch Potomac	0207000104 - South Mill Creek-Mill Creek	0.25	0.31	0.03	0.03	0.80	0.60	0.07	0.72	0.00	2.81	2.04
02070002-N. Branch Potomac	0207000202 - Stony River-N. Br. Potomac River	0.47	0.50	0.00	0.00	0.60	0.60	-0.15	0.73	0.04	2.78	2.03
02070002-N. Branch Potomac	0207000207 - Patterson Creek	0.50	0.33	0.34	0.00	0.50	0.00	0.15	0.73	0.06	2.62	1.97
02070001-S. Branch Potomac	0207000102 - Lunice Creek	0.24	0.24	0.24	0.08	0.60	0.00	0.45	0.72	0.00	2.57	1.95
02070004-Potomac Direct Drains	0207000405 - Warm Spring Run-Cherry Run-Potomac River	0.15	0.16	0.00	0.00	0.40	0.20	0.37	0.91	0.19	2.37	1.74
02070002-N. Branch Potomac	0207000204 - New Creek-N. Br. Potomac River	0.19	0.14	0.00	0.00	1.00	0.00	-0.04	0.73	0.19	2.21	1.60
02070003-Cacapon	0207000308 - Willett Run-Potomac River	0.07	0.09	0.00	0.00	0.40	0.00	0.33	0.88	0.01	1.79	1.28
02070002-N. Branch Potomac	0207000208 - Green Spring Run-N. Br. Potomac River	0.10	0.10	0.00	0.00	0.80	0.00	0.02	0.73	0.01	1.76	1.23
02070006-N. Fork Shenandoah	0207000601 - Little Dry River-N. Fork Shenandoah River	0.16	0.11	0.00	0.00	0.40	0.00	0.25	0.76	0.00	1.68	1.22