

**Chesapeake Bay Committee, Subcommittee, Workgroup Activities for STAC  
April 2006**

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## **Urban Stormwater Workgroup Meeting (February 28, 2006)**

All presentations can be viewed at the following:

<http://www.chesapeake.net/calendar.cfm?EventDetails=6826>

**M-S Cheng (Tetra Tech Inc)** presented the stormwater BMP model for Prince George's County, MD. PG County has developed a decision-support system for evaluating watershed-based stormwater management alternatives. The CBP and EPA Philadelphia office have begun discussions with this and other counties about various modeling techniques and the role of the CBP in promoting these techniques. PG County contracted Tetra Tech, Inc. to develop a computer model to handle low impact development BMP's on small watersheds. A grant from EPA Region 3 in 2003 allowed Tetra Tech and PG County to continue work on and expand the scope of the model.

The objectives are:

- To examine hydrologic response as well as water quality loading benefits of low impact development
- Cost/benefit component when identifying potential low impact developments

The GIS interface allows for individual BMP placement. There are two major classes of BMP's in the model; storage/detention and open channel.

Major processes captured by the model include:

1. Infiltration
2. Weir-controlled overflow spillway
3. Under-drain outflow
4. General loss or decay of pollutant (due to settling, plant uptake, volatilization)
5. Pollutant filtration through soil medium
6. Evapotranspiration
7. Bottom slope influence
8. Bottom roughness influence

A tool within the model, Optimizer, identifies the optimal solution for scenarios/variables input by user. However, the user is encouraged to check multiple scenarios. There is not much performance data available for these BMP's but working with the UMD campus on bioretention cells that are one of 11 ongoing projects being monitored over time.

Effectiveness/performance errors are large since the majority of the research has been based in either Florida or Washington. They are using literature values for wet/dry ponds.

Pollutants being covered in the model are nutrients, metals, and sediment. Model errors can be teased out and it was designed for something like TMDL's in mind. The model can be used for new development but to account for the hydrology of the new site, it would rely on available data. This workgroup would like to see forest preservation tagged as a new BMP, since it is of highest importance within the Bay watershed. The target audience is local governments that need it for watershed planning, the scale can be quite small or as large as 200 square miles. The model will show flows at assessment points, which could be set-up as the receiving stream (output point for NPDES). Information from the model can be routed back into HSPF and similar models such as the EPA Water Quality Analysis Simulation Program (WASP). WASP model helps users interpret and predict water quality responses to natural phenomena and manmade pollution for various pollution management decisions. WASP has been used to

examine eutrophication of Tampa Bay, Neuse and Potomac River Estuaries, phosphorus loading in Okeechobee, FL., PCB pollution of the Great Lakes, kepone pollution of the James River estuary and mercury in the Savannah River, GA.

**Steve Raciti (USFS CBPO)** provided a brief overview of current efforts to promote preservation of trees and natural vegetation using the Urban Forestry Effects Model (UFORE) and Street Tree Resource Analysis Tool for Urban Forest Managers (STRATUM). He also discussed applications of these models and potential strategies and approaches related to stormwater.

The model STRATUM quantifies stormwater volume benefit of street trees (how much runoff volume is avoided via tree canopy interception). The model UFORE is more advanced and calculates both stormwater volume as well as water quality benefits for individual trees and forest patches using interception, infiltration, and evapotranspiration. Use scientific literature and models to provide real numbers for the stormwater quality and quantity for impact of trees. Need to demonstrate how forests and tree canopy help meet important goals and directives such as:

- Cleaner air quality
- Lower energy use
- Habitat enhancement and protection
- Forest connectivity
- Carbon sequestration

Target audiences are: development community, local community board (county council), local fire and safety personnel as well as large developers. Also focus on Urban Tree Canopy communities (priority given to the first five communities in each state).

The final product may include tree credit guidelines, how to develop with trees, and include training modules customized to each audience. The module should sketch out one to two-day training template with topics and scientific data. There might be a possibility to work towards an Executive Directive similarly to the Urban Tree Canopy initiative.

**Tim Karikari (DC Environmental Health Administration)** and **Joe Battiatia (Stormwater 360)** updated the workgroup on its plan to begin validating BMP performance. Washington DC's Watershed Protection Division is developing guidelines for selecting BMP's. Their solution is to adopt a treatment objectives and performance strategy or develop a set of procedures if this strategy is challenged by the development community.

Why evaluate BMP performance?

- 20 years worth of effort has evolved into a \$1 Billion per year spending to improve water quality among the three Bay states and DC region
- The Bay region population of 16 Million people are growing at a rate of 100,000 people per year

Performance goals include the following:

- Volume/flow rate
- Removal mechanism/particle size distribution
- Influent/effluent concentrations
- Maintenance

Removal efficiencies are not a good way to document performance since it based upon flow rate variables such as first flush and individual storm events and overall load of total suspended solids and nutrients. They require a large amount of monitoring data over a long period of time to develop an accurate efficiency. Monitoring is very expensive, in part because the process is very unpredictable and complications are common. Ideal storm water BMP acceptance policy goal is to characterize with a reasonable level of statistical confidence, an emerging technology's effectiveness in removing pollutants from storm water runoff for an intended application. Need to compare results with vendor's claims. The hierarchal process for approval and application will take time to complete.

**Jeff Sweeney (UMD)** updated the group on Phase V model calibration and the status of urban environmental indicators for the CBP. The State of the Bay Report is intended to answer two questions:

- How is the Bay and watershed doing? Final draft report in March for a 60-day public comment period.
- What's being done and are we on track in our efforts to restore the Bay? January draft report and final March report on restoration efforts.

These reports also provide accountability by connecting efforts with results and provide guidance for future efforts. Their intended audience is the interested public or environmental managers.

This is probably the last time the State of the Bay Restoration report will be published without the graphs depicting the progress for urban BMP implementation. The development category now includes septic and mixed open.

The large amount of retrofit included in some states tributary strategies is the dominant force for the negative trends and this trend is negative due to the increase in developed land without tracking urban BMP implementation.

### **Forest Workgroup Meeting (March 1, 2006)**

All presentations can be viewed at the following:

<http://www.chesapeakebay.net/calendar.cfm?EventDetails=7080&DefaultView=2&RequestDate=03/15/2006>

### **Mike Kane, Gem Bingol, and Mike DeHart (Piedmont Environmental Council)**

presented an overview to the group on the watershed projects in Loudoun County.

Overview of the Piedmont Environmental Council:

- Addresses land use issues and acquires land for conservation
- Funded projects have enhanced their ability to perform key elements such as GIS technology for land use conservation, educate landowners and other stake holders, and expand conservation tools and techniques

The Goose Creek watershed contains:

- 247,182 acres (386 square miles)
- 736 miles of streams
- 101,000 acres of forest
- 50,000 acres of easements

Watershed assessment includes:

- Vulnerability analysis
- Review of codes and ordinances
- Stream conditions and priority conservation areas

Impervious cover calculations were done for:

Loudoun County: Direct measurement method

- Use GIS to add area of all impervious cover layers (roads, buildings, parking lots)

Fauquier County: Land use method

- Calculate area of each land use (agriculture, forest, single family residential)
- Then multiply area of land use by land use/impervious cover coefficient (e.g., 10.6% for rural residential)

Revising management categories for rural watershed quality:

Sub-watershed factors: unfavorable points

- Low percentage of wetlands
- Unusual non-point sources – wastewater treatment plants, landfills, golf courses, and vineyards
- High septic density
- High cattle/horse densities
- Bacteria levels

Sub-watershed factors: favorable points

- High percentage of forest cover, conservation easements, forested easements, and streamside forests

Future impervious calculations include:

1. Assumed full build-out
2. Developed impervious cover coefficients for each major zoning category
3. Subtracted un-buildable lands

Building for the future:

- Loudoun County's strategy for watershed management solutions workshop – create a common vision for watershed planning process and develop a declaration of cooperation
- Goose Creek Study – resource and example
- Partnership and products

**Updates and announcements:**

- PA received \$50,000 for watershed practices.
- Growing Native is working in PA with high school students to collect seeds.
- Alliance for the Chesapeake Bay will be planting trees again for carbon sequestration; ten acres on the ground, 5-10 acres will be planted in the spring of

2006, and 10-15 acres will be planted in the fall of 2006. Their goal is to plant 75 acres on Constellation Energy lands.

- Alliance for the Bay and its partners are putting together a watershed restoration forum for local governments in July 2006. It will focus on education and networking.
- Cumberland, MD signed up as the third urban tree canopy community.
- MD state match of \$300,000 for urban tree canopy in addition to the \$300,000 from the Chesapeake Bay Trust
- Environment Virginia 2006 is to be held April 18-20 in Lexington, VA.
- Washington Congress of the Governments held their first meeting of the Regional Agricultural Workgroup. The group includes agricultural experts from both sides of the Potomac River and area of focus reaches outside their boundary. The group will address farmers markets, land conservation, and forestry.
- Judy Okay is packaging information sheets for potential landowners such as: “Alternative Water Sources for Cattle – Plant a Forest Buffer” and “Invasive Plant Species – Plant a Forest Buffer”.

### **Agricultural Nutrient Reduction Workgroup Meeting (March 9, 2006)**

All presentations can be viewed at the following:

<http://www.chesapeakebay.net/calendar.cfm?EventDetails=6890>

**Pete Tarby (PA DEP)** presented to the workgroup information on precision feeding of dairy. PA is submitting this BMP to the Bay Program for inclusion in the Phase V watershed model for nutrient reduction credits.

Current research indicated that dairy cows are overfed by 20%, likely due to routine and as insurance against limiting growth by underfeeding. Precision feeding in dairy is included in PA’s tributary strategies. Precision feeding may be the only way to accomplish the goal of 20% reduction in the nitrogen and phosphorus levels in one-third of the dairy animals in the Bay watershed by 2010 as defined in the Manure Strategy Directive.

A precision feed in dairy development committee was formed in PA in spring 2005 and includes members from PA DEP, PSU, Cornell, UPenn, NRCS, and feed companies. Four meetings were held in 2005 to develop the criteria for this BMP, and this committee wants to move forward for implementation and inclusion in the Bay watershed model. The draft definition and standard is ready to submit to the Bay Program’s Implementation Committee.

This BMP may be more precise than other BMP’s since before and after measurements of manure can be used. 85% of the people certified to do this work are nutritionists already working the dairy farms. Certified professionals may take exams and receive updated training on a regular basis. Precision feeding for dairy is eligible for funding through the USDA NRCS Environmental Quality Incentives Program (EQIP).

**Rick Kohn (UMD)** also made a presentation to the group on precision feeding of dairy. The nutrient contents of milk and meat are pretty constant and inputs (feed) are generally well tracked. However, measuring nitrogen losses is generally difficult due to variability in loss pathways. Dr. Kohn suggests milk urea nitrogen (MUN) levels are closely related

to the nitrogen in urine and is also correlated to production. Generally any MUN value above 8 will probably not impact milk production.

According to a 2002 study of 450 farms in the Bay watershed, which used milk analysis and survey results to predict nitrogen intake, nitrogen in urine and feces and nitrogen use efficiency, 70% of farms are feeding above the recommended NRCS requirements for nitrogen (Jonker et al., 2002). This accounts for 24% more nitrogen in urine and feces. Therefore, the 20% reduction goal is achievable through precision feeding of dairy. Current research indicates that phosphorus levels in milk are more related to metabolism than feeding. Consequently the 2002 study monitored phosphorus levels in feces rather than milk.

The manufacture of ethanol is increasing worldwide. A byproduct of ethanol production is distiller grains, which are increasingly being used by the dairy industry as feed. The price of corn and distiller grain has dropped in price since 1995. Due to the nutrient and other content of distiller grains, dairy animals are being overfed phosphorus and crude protein. Projections are that as more ethanol is produced, the cost of distiller grains will decrease even more, increasing the dairy industry to overfeed phosphorus and crude protein.

Decreases in manure phosphorus will not likely increase applications of fertilizer but a decrease in manure nitrogen may increase fertilizer applications. Note that nitrogen fertilizer is more efficient than manure nitrogen. This may complicate nutrient trading with fertilizer offsets.

VA Tech is getting baseline information on feed concentrations through an incentive program (USDA NRCS Conservation Innovation Grant). If goals for phosphorus intake are reached by participating farmers, they will receive an incentive payment. The program is on a trial basis with 300 herds.

#### **Announcements:**

- PA's Nutrient Trading Agricultural Workgroup met March 1<sup>st</sup> and agreed to build a menu of ten BMP's that will be ready to trade by April 1<sup>st</sup>. There is a meeting scheduled for April 4-5 to identify BMP's and determine life spans, efficiencies, and whether to include historical BMP's. Invitees include CBP and EPA Region 3 office.
- MD released their tributary strategy implementation plan which is available on MD DNR's website outlining details that can be accomplished at the state level in the next 2.5 years.
- VA's nutrient management regulations took effect on January 11, 2006 and will exceed the EPA Concentrated Animal Feeding Operation regulations.

#### **Submerged Aquatic Vegetation Workgroup Meeting (March 28, 2006)**

All presentations can be viewed at the following:

<http://www.chesapeakebay.net/calendar.cfm?EventDetails=7233>

**Steve Ailstock (Anne Arundel Community College)** presented on the isolation, storage and germination requirements of *Ruppia* and redhead grass seeds. This research project has studied germination rates for *Potamogeton perfoliatus* (Ppf) and *Ruppia marina* (Rm) in the lab and found that seeds germinated best at 80°F. Increased salinity decreased

germination rates within a given temperature, and increasing temperature increased germination rates for all salinities. They found that Ppf seeds germinated best at 0ppt and suggested they may be adapted to germinate after a big freshet that kills the adult plants (fire ecology). Rm seeds germinated best under the 0ppt storage/0ppt induction condition and performed well at 10ppt/10ppt treatment. There was a marked decline in germination rates at 15ppt/15ppt treatment. It was suggested that perhaps the main role of seeds is recovery after disturbance.

The next step is testing germination in the field (possibly the Elk River) looking at sediment stability and the process of seedling establishment. Concerns arose that the optimal conditions for germination may not be optimal conditions for establishment. There is significant selective advantage for reproductive variability in wild plants, thus the question of preventing competition between parents and seeds. Predicting and preserving that inherit variability has important implications for SAV restoration. The seeds are close to neutral buoyant, a factor in sinking rates, seed burial, and establishment.

Future steps include looking at anoxia and aeration. There was no benefit in aerating Rm in storage as it began to germinate even at cold temperatures. Most germination occurred within 14 days after induction and only 5-8% of those left were viable seeds. In long-term storage, Rm can last several years and Ppf perhaps a bit shorter.

**Wes Johnson (Wayfarer Nursery)** discussed seed encapsulation and its benefits for restoration efforts. Benefits include the following:

- Ease of handling
- Increased settling velocity
- Decreased movement after dispersal
- Improved germination

Pellets each one containing one seed sinking up to six times faster than loose seeds. Greater initial germination rates were observed for encapsulated seeds (203 times faster than loose seeds with the best rate being only 9%). Encapsulated seeds also sink farther into sediments, a more anoxic environment that promotes germination. A large algal mat formed during the experiment causing the raw seeds to float away but the pellets remained in place. In a field test with four density plots of encapsulated seeds, the germination rates were highest in the lowest density plots.

The most efficient method is to encapsulate seeds directly on the boat just prior to planting. But it was suggested that storing dry pellets would be a simpler and more cost-effective method than hauling equipment from boat to boat as long as no viability was lost.

In the future, they plan to compare germination of raw, sorted, and encapsulated seeds as well as increased seed shelf life. Larger plots and locations of optimal seed sources are needed in the next iteration of experiments. They would also like to develop a method for rapid broadcasting.

**Chris Tanner (St. Mary's College)** reported on the culturing of eelgrass for the Woodrow Wilson Bridge SAV Restoration Project. 2005 was the most successful year to date in creating planting units for this project. The optimal time to plant is early fall, which posed a challenge since germination does not occur until the fall as well. This

restoration effort collected seeds from shoots, vernalized and grew them from mid-summer to October for planting in the fall. Initial studies were conducted at St. Mary's College but the large-scale production was moved to MD DNR's Piney Point Aquaculture facility. Seeds were placed at 1cm depth in trays of natural sediments with fertilizer. Shorter vernalization times at 3-4°C had higher germination rates. Plants usually reached out planting size around 100 days.

The goal of the project was to produce 300,000 plants but the loss of several tanks due to mechanical and cyanobacterial problems reduced the yield to 15,000 seedlings. They also planted 15,000 wild shoots next to the lab-raised plants to compare survival/growth. It was suggested that nutrient-poor sediments may result in lower above ground biomass and better rhizome growth, which might be better for restoration if plant loss is caused by wave energy. On the contrary, they found that both above and below ground biomass increased with nutrient rich sediments and that plants would not grow to specification fast enough in the absence of fertilizer to be useful for restoration.

**Justin Reel (RKK engineers)** explained the measures taken to mitigate damage caused by the proposed Woodrow Wilson Bridge construction to the historic SAV beds. This project is nearing its end with the last planting in October 2005. The intention was to create a 20-acre bed in MD and a 2-acre bed in VA using eelgrass and widgeon grass. The eelgrass was collected wild and widgeon grass supplied by Wayfarer Nursery. The contractor attached planting units to bamboo skewers placed on a grid and installed at selected sites. In 2002, about 50% survived after one month and losses were attributed to poor installation and desiccation during handling process. Eelgrass transplants did not survive the summer of 2003 and widgeon grass died 6 months after planting. In VA, there was no survival of either species at Judith Point and the site was dropped.

In MD, the contractor could plant up to 6,000 units per day at both sites, Piney Point and Sage Point. A third species, sago grass was added to these sites. At Sage Point, the units were installed too shallow and there was almost no survival after one month due to sedimentation and wave energy. By 2005, they focused all efforts on eelgrass and achieved a 67% survival rate.

SAV planting as mitigation is not reliable to satisfy "no net loss", but considered acceptable as part of a larger mitigation package. Tighter specifications are required for plants and the planting process in the future. To fulfill the mitigation requirements for the project, they will plant two acres of marsh in VA and produce a peer-reviewed report on the restoration process in MD. They will also establish a long-term monitoring program around the bridge and restored areas.

**Ed Schenk (USGS)** discussed their work on the sedimentation, erosion, and water quality at a SAV transplant and reference site. The transplants were conducted at Judith Sound as part of the Woodrow Wilson Restoration Project with a control at Dameran marsh using preliminary transplant suitability index (PTSI). Parameters measured included: historic and current SAV distribution, water depth, water quality, sediment height, plant burial, plant height, proximity to natural beds, and shoreline. Both sites lost eelgrass in 2003 as a result of high rainfall. Nitrogen in sediments may be a limiting factor at Judith Sound. Although light did not appear to affect the grasses, there may have been a precipitation effect on salinity, which fell below 10ppt. They recommend the

PTSI model be revised for Chesapeake Bay to incorporate salinity variation and sediment character in the region.

**Scott Marion (VIMS)** reported on eelgrass restoration success with large-scale mechanized seed harvesters. In the Piankatank River in 2004, buoys had less than 1% germination while broadcast sites had much greater success. In the Coastal Bays, broadcast plots had up to 6% germination using VA seeds despite problems with macro algae fouling. Results from 2004 indicate that the timing of harvest is critical and the strategy for 2005 were to develop:

- Their own harvester
- Increase processing efficiency
- Identify causes of seed mortality
- Investigate seed/sediment interactions
- Drop spring buoy deployment to focus on fall broadcasting

VIMS was able to develop its own harvesting sled in 2005 and yielded 110 seeds per square mile from Brown's Bay. Seeds were then separated from wrack and tested under different storage conditions: re-circulation, flow-through, and aeration. Re-circulation had less fouling than raw or filtered water treatments and was less survival with high aeration. Seeds were sub-sampled for hardness and sinking rate and achieved a maximum survival of 80%. They decided to discard the raw water/high aeration treatments to focus on re-circulation tanks with no aeration. In the control test that placed seeds in beakers with and without bleach and greater than 90% survived in the beakers compared to 50% survival in the tubs. In 2006, VIMS may collect seeds from restored beds in the Coastal Bays to use for seedlings in the Bay.

**Mike Naylor (MD DNR)** explained the SAV restoration programs in the Potomac and Patuxent Rivers for 2003-2005. MD DNR has directly seeded 63 acres over 10 locations in the spring and fall with the purpose of re-introducing eelgrass to these river systems. Adult plants are primarily a means to produce propagules. However, it would take 150 years for a one-acre plot to expand to ten acres by vegetative spread, so seeds are the main focus for large-scale restoration efforts. In comparing spring and fall seed dispersals, only one of ten sites still had plants last fall (back of St. George's Island) despite being an area of high flow. Survival seemed to be site-specific rather than method dependent and summer is a critical time for eelgrass survival. Continuous monitoring data shows a large change in temperature and DO at one meter from 2004 to 2005. Technical Synthesis II habitat requirements were used to separate good from marginal growth sites, but this did not provide an effective means of identifying suitable sites. Therefore, existing targeting systems may not work as well since it appears that critical factors are different for new versus existing beds and additional parameters may need to be considered.

**Deborah Shafer (Engineer Research & Development Center, MS)** provided an overview of the Chesapeake Bay SAV Restoration Research Program related to Army Corps of Engineers initiatives.

For FY03-FY06, the program focus areas included SAV production and planting which includes issues related to plant supply and propagation.

For FY05-FY06, the focus areas were engineered SAV habitats specifically wave energy thresholds for created and restored SAV beds; design criteria for wave attenuation structures.

2003 accomplishments included:

1. Initial interagency meeting to establish program research priorities.
2. Development of capabilities for large-scale seed collection and storage using eelgrass (MD DNR project)
3. Protocols for using seeds of mesohaline SAV species in large-scale SAV restoration using widgeon grass and redhead grass (Anne Arundel Community College project).
4. Demonstration planting in the Potomac River: Comparison of hand-planting adult plants with direct seeding of eelgrass (MD DNR project).
5. Hosted regional SAV restoration workshop in Baltimore.
6. Established website: <http://www.wes.army.mil/el/sav/>

2004 projects – no new ones as continuation of existing projects from previous year.

2005-2006 projects included:

1. Development of a protocol for large-scale restoration of *Ruppia maritima* and *Potamogeton perfoliatus* by seed (Anne Arundel Community College project).
2. Production and field planting of vegetative tubers for restoration of redhead grass and sago pondweed in Chesapeake Bay (UMD project).
3. Development of techniques for the use of seeds in the large-scale propagation and restoration of low salinity SAV (VIMS project).
4. Technology development for achieving critical thresholds in large-scale SAV restoration (VIMS project).
5. A comparative test of mechanized and manual planting of eelgrass seeds (VIMS project).
6. Seagrass habitat engineering: Defining the needed balance in wave attenuation (UMD project).
7. Comparison of hand-planting and seeding in the Potomac River, MD (MD DNR project).

SAV technical note products available from ERDC:

- Restoration potential of *Ruppia maritima* and *Potamogeton perfoliatus* by seed in the mid-Chesapeake Bay (available online)
- Buoy deployed seedling: A new low-cost technique for restoration of SAV from seed (final copy)
- Applications and limitations of micro-propagation for the production of underwater grasses (available online)
- Protocols for large-scale collection, processing, and storage of seeds of two mesohaline submerged aquatic plant species (final copy)
- Reproductive ecology of the freshwater macrophyte *Valisneria americana*: A review (in review)

Benefits:

State-of-the-art technical standards and guidance for planning, implementing, and monitoring SAV restoration projects will:

- Provide resource managers with the necessary tools to help meet targeted SAV restoration goals

- Contribute to improved success rates and predictability for SAV restoration projects
- Provide practical guidance on selection of appropriate methods for SAV restoration
- Improve coordination between US Army Corps and other stakeholders involved in SAV restoration

**Nutrient Subcommittee Meeting (March 29, 2006)**

To view presentations and handouts, please visit the following:

<http://www.chesapeakebay.net/calendar.cfm?EventDetails=6754&DefaultView=2&RequestDate=03/30/2006>

**Manure Strategy Update:**

By April 2006, the Bay Program's Nutrient Subcommittee will create a Regional Manure and Litter Use Technology Task Force to identify and promote promising technologies for producing manure and litter products. By 2010, 20% of the total fertilizer, soil amendments, and compost used on state and federal lands will be comprised of poultry litter or animal manure nutrients derived from sources generated within the Bay watershed states. By June 2006, the states and federal agencies will outline their approach for how to best achieve the procurement goal.

In 2003, a rule was proposed for the federal government to use green products. This includes compost from manure and biosolids. Comprehensive procurement guides are looking to help with identifying potential federal land to use preferred products approved by the EPA. This is a voluntary program and EPA will work with General Services Administration because they will put out the guideline for federal installations. EPA is hoping to finalize the regulation in the fall of 2006.

Jamie Baxter (MD DNR) stated that the State Highway Administration is in discussions with Perdue Farms but discussions ended because their product did not meet MD's requirements and was too expensive. The availability of the product in the urban setting is also a barrier.

Stu Wilson (VA DCR) mentioned that VA does not want to place nutrients on lands that do not need it. Nutrient management plans are required on all state lands.

The poultry feed management states by 2010, achieve at least a 30% reduction of total phosphorus in poultry manure from pre-phytase levels through a combination of adjusting supplemental phosphorus levels in feed and adding phytase. Achieve phosphorus reductions beyond 30% is science indicates that they are possible without detrimental impacts on bird health and growth.

The dairy feed management team held their first meeting on March 10<sup>th</sup> and the group reviewed their charge. Tom Simpson presented the technical assistance proposed plan (volunteer certificate) and Suzy Friedman (NRCS) discussed the conservation innovation grants project coordination. The group crafted a list of barriers to technical assistance and education. The group will address what kinds of incentives and cost shares are needed for implementation.

All states are moving forward to adopt the NRCS feed management standard (592). Adoption is not the end point because the infrastructure is not in place to transfer technology to farmers. The Regional Dairy Feed management Technical Assistance, Education, and Outreach group will help implement these portions of the manure strategy.

**Review of BMP's selected by the Water Quality Steering Committee:**

All non-point source BMP's that the states report to the Bay Program office are reported as cumulative (total acres, linear feet, or systems installed or implemented during an entire period) with the exception of the following BMP's which are reported as annual:

- Cover crops
- Alternative uses of manure and manure transport
- Poultry phytase
- Urban erosion and sediment control
- Urban and mixed open nutrient management (goes away in Phase 5)
- Forest harvesting practices
- Septic pumping

To answer the question of how and when a non-point source BMP is used in the Bay Program Watershed Model, it is useful to divide the BMP's into four categories:

1. Existing BMP's that have been peer-reviewed and approved by the Bay Program, applied to the Phase 4.3 watershed model and don't require refinements to their efficiencies prior to their use in the Phase 5 calibration:
  - Agricultural land retirement, tree planting, continuous no-till, poultry phytase, poultry litter transport, off-stream watering without fencing, animal waste management systems (poultry and livestock)
  - Impervious surface reduction, forest conservation, abandoned mine reclamation, general stormwater management, urban infiltration and filtering practices, mixed open nutrient management, septic connections and pumping.
  
2. Existing BMP's that have been peer-reviewed and approved by the Bay Program, applied in the Phase 4.3 watershed model and require revision of their efficiencies prior to use in the Phase 5 calibration:
  - Riparian forest buffers, wetland restoration, conservation tillage and plans, traditional nutrient management, cover crops (late planting), small grain enhancement commodity cover crops, off-stream watering with fencing and rotation grazing
  - Urban wet ponds and wetlands, dry detention ponds and hydrodynamic structures, urban stream restoration, and urban erosion and sediment control
  - Forest harvesting practices, structural and non-structural tidal shoreline erosion control

3. New BMP's in various stages of peer-review and are given credit in the jurisdictions' tributary strategies, but will not be used in the Phase 5 watershed model calibration:
  - Carbon sequestration/alternative crops, enhanced nutrient management, small grain enhancement/commodity cover crops, water control structure, precision agriculture, dairy precision feeding and forage management, swine phytase, ammonia emissions reduction, precision or intensive rotation grazing, and horse pasture management
  - Urban nutrient management, urban street sweeping and catch basin inserts, non-urban stream restoration, dirt and gravel erosion and sediment control
4. New BMP's that are under consideration for the use in the Bay watershed or water quality models and are not currently proposed for use in the jurisdictions' tributary strategies or in the Phase 5 model calibration:
  - Mortality composters
  - Roadway systems
  - Coastal floodplain flooding, SAV planting and preservation, oyster reef restoration and shellfish aquaculture, voluntary air emission controls within jurisdictions, and idle truck technology for truck fleets

**Keely Clifford (EPA)** reviewed the Sediment shed development with the group. Sediment shed by definition is an area including upland, near shore, and sub-aqueous that contributes the sediment loads that directly influences water clarity in specific shallow water habitats defined as designated use areas to achieve shallow water clarity standards.

Purpose:

- Set appropriate geographic frame of reference for setting/revising sediment cap allocations by 2010
- Provide spatial delineation of regions for development of sediment management initiatives
- Reasoning is that impacts from sediment on Bay water clarity and SAV growth are more localized than the impacts of nutrients
- 

Designated use area (shallow water SAV habitat): defined within a segment or sub-segment of the Bay water quality segmentation.

- The designated use area is used as a basis to define/delineate the sediment shed, but unlike watersheds, sediment sheds can be overlapping
- These water quality regulations of MD, DE, VA, and DC
- MD has sub-divided segments and other tidal jurisdictions may as well
- 

Proposed methodology for delineating sediment sheds:

A two-stage process will be considered where the first stage uses natural features to define sub-segments. This first disaggregation should be at a fine scale as it will be

easier to scale up. In the scaling up process consider clustering sub-segment characteristics to support the scaling.

First stage decision rules:

- Start with 76 Bay segments
- Tidal jurisdiction water quality standards segmentation
- Divide opposite shorelines of large tidal tributaries and Bay mainstem
- Upstream/downstream of estuarine turbidity maximum
- Disconnects along shoreline where tributaries enter the segment
- Use boundary of no grow zones
- Longshore transport direction
- Identify wind rows

Second stage decision rules:

- Proximity (location of segments with respect to each other)
- Relative rank of sources
- Be honest with uncertainties
- What are critical conditions and sources during SAV growing season?

Information management for setting-up decisions

Bay scale:

- Shoreline erosion estimates
- Shoreline length
- Shoreline situation reports
- Fixed suspended solids/ volatile suspended solids ratio
- Percent attainment of SAV acreage goal
- Designated use area
- SAV acreage goal
- Current SAV condition
- Historic through 2004 map of all observed/mapped SAV distributions
- Relative proportion of light attenuation by sediment
- Estuarine areas benefiting from sediment controls
- Land use maps along the tidal shoreline
- Sediments of the Bay

Upland:

- Above and below fall line

Shoreline and Bay:

- Shoreline erosion
- Nearshore erosion
- Shallow water wave resuspension
- Deep water resuspension
- Resuspended primary producers in the water column

Use common sense rules:

- Percent of no grow zones
- Percent of historic SAV acres

The proposed schedule includes first stage decision rules by June 2006, present rough sediment sheds through first stage at the June Water Quality Steering Committee meeting, final ordinal ranking of sediment sources for By segments by September 2006, complete second stage decision rules by November 2006, final map and sediment shed report by December 2006.

**Update on tributary strategy implementation from jurisdictions:**

**PA (Kenn Pattison)**

PA's strategy document is its implementation plan.

**MD (Jamie Baxter)**

MD's draft tributary strategy statewide implementation plan is based on practice not by load. The plan is open for comments until June 2, 2006.

**DC (Collin Burrell)**

Their implementation plan is in draft form and Department of the Environment's new director will determine the implementation of the tributary strategy in the upcoming months.

**WV (Randy Sovic and Alana Hartman)**

Their implementation plan is based on securing funding, human resources, engaging private landowners, and political will. The plan lists detailed action items. The challenge is identifying the responsible parties. The implementation plan is going out this spring to local governments for review.

**VA (Stu Wilson and John Kennedy)**

Twenty pages of VA's tributary strategy is an implementation plan. Point source regulations have been established. The total discharge of nutrients for waste water treatment plants serves as the cap and cannot be exceeded. The Water Quality Improvement Fund will also be used to implement tributary strategies.

**NY (Ron Entringer)**

NY is taking implementation into consideration while developing its tributary strategies. Their strategy is based on implementation. The state is discussing where to spend its money, what regulations exist and where there are regulation gaps.

**Mary Lynne Wilhere (ACB)** gave an update on the Businesses for the Bay (pollution prevention workgroup for the Toxics Subcommittee) which is expanding to include nutrients and sediment. There will be three areas of focus and these areas will be turned into sector teams. The teams are:

- Agricultural business (management of corporations for animal production, not CAFO's) including Smithfield, Perdue, Tysons, Pilgrims Pride, Cargill, Country View Family, and VA Poultry
- Builders/Stormwater compliance (nutrient focused) includes Ukrops, Brick Company, Wengers Feed Mill, Merck, Scotts Products, and Lockheed Martin
- Toxics (Mercury, PCB's, PAH's, Cadmium)

**Living Resources Subcommittee Meeting (March 30, 2006)**

**Fred Kern (NOAA/NOS Oxford)** provided an update on the Virginia Seafood Council's (VSC) latest proposal: Re-examination of feasibility study on one-year grow-out triploid *Crassostrea ariakensis*. The VSC proposes using 2.5 million oysters (increase from 1

million requested in the 2005 trial) with the potential for 2500 diploid *C. ariakensis* resulting. Part of the proposal also requires an extension to the grow-out period for the ongoing 2005 trial scheduled for completion in June 2006, but the panel expressed concerns regarding the heightened risk of reproductive success. The panel was unable to reach consensus on the VSC proposal. However, the panel did recommend improved information exchange for the EIS process to prevent duplication of objectives and to pool the knowledge gained through all of the experiments. The panel also wishes to bolster participation in the review process from PA, WV, and DC. To view VSC proposal and Ad hoc Panel full report, please check out the following:

<http://www.chesapeakebay.net/calendar.cfm?EventDetails=7156>

**Jim Uphoff (MD DNR)** made his presentation on impervious surface, fish habitat, and fish in Chesapeake Bay: Lessons learned from developed Bay tributaries. He briefed the group on DNR Fisheries Service's impervious surface project (2003-2005) and estuarine yellow perch that describe the impacts of impervious cover on aquatic habitats and fish. Development within the watershed is rapid and increases nutrients, contaminants, temperature, and sedimentation while decreasing DO and disrupting flow. Dissolved oxygen and fish abundance were the two primary response variables measured in this project. Fish kills and PCB contamination in white perch were observed to increase in tributaries with increasing percentage of impervious cover. The problem is rooted in the fragmented approach to habitat management from local governments to the federal level. The Fisheries Service is only able to manage harvest and manipulate egg production to compensate for habitat loss and degradation. Sampling for the impervious surface project occurred mostly in western shore tributaries and was done every two weeks from July through September using a seine and bottom trawl with a DO profile. As expected, the average catch of target species decreased with increasing impervious cover (low DO) and they found roughly a 10% impervious threshold in tributaries before they started to see changes in the responsive variables. Many fish associate with bottom habitat, but increased imperviousness squeezes the available habitat into the upper water column and closer to shore.

The MD estuarine yellow perch monitoring and stocking project in the Severn River was described as 47% land use was urban and habitat assessments began in 2001 to incorporate stock assessment, experimental hatchery, and water quality. Low hatchery viability was evidenced by the low presence of larvae in plankton tows. During the summer of 2002, DO in the Severn River was frequently below juvenile and adult habitat requirements and salinity in the headwater spawning areas appeared to be higher than historic data.

The Fisheries Service recommends checking the rapid impervious surface expansion through land planning. One method is aggressive promotion of Non-point Education for Municipal Officials (NEMO), which links land use and natural resource protection. There are also concerns that land development is outpacing the growth of county land planning and the planners may need assistance in overcoming their huge workloads to better check the negative impacts of growth on water quality and habitat.

**Scott Stranko (MD DNR)** discussed the urbanization impacts on stream resources in MD. There is a nine-fold increase in sediment that is washed into streams during the

construction phase of development. An example is a 16-fold increase in run-off from a one-acre parking lot compared to natural cover. Increased flooding, bank erosion, and channel widening all result from development. As streams become more embedded, habitat complexity decreases greatly as shown by the examples of sensitive species such as salamanders and brook trout. In a case study of brook trout, imperviousness was digitized from aerial photographs. Brook trout were lost in most areas with greater than 5% impervious cover, although there are some exceptions like Jabez (10% cover) and Stillwater Creek (40% cover). In Stillwater Creek, the trout are concentrated within a small stretch of colder water where groundwater flows directly into the stream, which may explain the presence of these fish despite the high level of impervious cover.

**Glenn Moglen (UMD)** performed a demonstration of the GISHydro 2000, a GIS-based tool developed to automate hydrologic analyses in MD. This tool integrates the data assembly process and hydrographic analyses into a single process performed with a GIS interface. Current data sets include topography, land use from the 1970-2002, hydrologic soil type, and precipitation frequency. Automated basin delineation is implemented for all watersheds extending beyond MD borders except for the Susquehanna and Potomac basins. This tool also estimates nutrients and stream biodiversity. The plan is to use land-use sensitive estimates of loadings consistent with the Bay Program Phase 5 watershed model and enhance: a modified land-use tool that will update the current data set (up to 2002) or accommodate “what if” scenarios, and a feature to create BMP’s within the tool.

In summary, existing capabilities of GISHydro 2000 include:

- Data extraction/assimilation for almost any stream draining into MD
- Automated watershed delineations
- Automated watershed properties calculation
- USGS peak and hydrograph calculations
- Interface to rainfall-runoff model TR-20
- Nutrient loading
- Stream biodiversity

In the future, it is hoped that it will broaden the spatial domain to the entire Bay watershed. A web version of the tool is available (no GIS software necessary). If interested, contact Glenn Moglen at [Moglen@eng.umd.edu](mailto:Moglen@eng.umd.edu) for free login information. A stand-alone version is also available by visiting: <http://www.gishydro.umd.edu>