Welcome to Manure Du Jour – Season II

Serving Pennsylvania’s Best Practices for Animal Ag-, Air- and Water Quality Protection

DEMYSTIFYING TMDLs:
THE STATE WAY THE BAY WAY

Denice Wardrop, Penn State Institutes of Energy & Environment
Brian Benham, Virginia Tech Center for Watershed Studies

Moderator: Kristen Saacke Blunk
Penn State Agriculture & Environment Center
Plan B(asin): TMDLs, EOs, and other upstream views

How did we get here?

Denice H. Wardrop
Senior Research Associate
Department of Geography
Penn State University
Environmental issues in six steps

- Do I have a problem?
- How big is it?
- Is it getting better or worse?
- What’s causing it?
- What can I do to fix it?
- Are my management actions making a difference?
Do I have a problem?

Chesapeake Bay Commercial Oyster Harvest

“Seasonal year” data (include data from the winter harvest and the preceding year’s fall harvest).
Data and Methods: www.chesapeakebay.net/status_oysterharvest.aspx
How big is it? Is it getting better or worse?
What’s causing it?
Major River Basins of the Chesapeake Bay Basin
Graph shows cumulative (top of section bar) and incremental (shaded) inflow at Sections A-E. Pink line indicates monthly mean streamflow at Section E, 1937-2009.
*EPA estimates a nitrogen load of 284 million lbs nitrogen in 2008. EPA assumes a reduction of 7 million lbs due to the Clean Air Act. This leaves 77 millions lbs to be addressed through the TMDL process.
Nutrient Sources of Pennsylvania

Sources of Nitrogen from PA
- Wastewater: 11%
- Forest: 17%
- Developed: 20%
- Agriculture: 52%

Sources of Phosphorus from PA
- Wastewater: 25%
- Forest: 13%
- Developed: 12%
- Agriculture: 50%

N and P values from 2008 Scenario of Phase 5.2 Watershed Model
"The key issue in the bay program is [to] reduce the amount of nitrogen and phosphorous and dirt getting into the bay. That's one of the things I do, is build nutrient budgets," says Boynton. "We frankly need to know where does this stuff come from, how long does it hang out here, and where the heck does it go."

"It all boils down to what we're actually putting into the watershed," says Politano. "People get upset about what's going on in the bay. What they have to realize is that a lot of the problems are coming from the upper watershed themselves. You have to look at restoring headwaters and streams, and rivers and things like that before you are going to see an improvement in the water quality that's coming into the bay."
Things happen...
EPA Needs to Enhance the Chesapeake Bay
A Summary Report

Report No. 08-P-0199
July 14, 2008

United States Environmental Protection Agency
Region 3
Chesapeake Bay Program Office (3CBPO)
Annapolis, Maryland
in cooperation with the Chesapeake Bay Program Partners

Strengthening the Management, Coordination, and Accountability of the Chesapeake Bay Program
Report to Congress
Main Entry: **account·abil·i·ty**  
Pronunciation: \ə-\kɔən-tə-\bɪlə-tə\  
Function: *noun*  
: the quality or state of being **accountable**; especially: an obligation or willingness to accept responsibility or to **account** for one's actions <public officials lacking accountability>  

Main Entry: **account·able**  
Pronunciation: \ə-\kɔən-tə-bəl\  
Function: *adjective*  
1: subject to giving an **account**: **answerable** <held her accountable for the damage>  
2: capable of being **accounted** for: **explainable**
What everyone agreed to...

**A Shared Vision**
A system with abundant, diverse populations of living resources, fed by healthy streams and rivers, sustaining strong local and regional economies, and our unique quality of life.

**Goal 1: Protect and Restore Fisheries**
Restore, enhance and protect the finfish, shellfish and other living resources, their habitats and ecological relationships to **sustain all fisheries and provide for a balanced ecosystem.**

**Goal 2: Protect and Restore Vital Acquatic Habitats**
Restore those habitats and natural areas that are vital to the survival and diversity of the living resources of the Bay and its rivers.

**Goal 3: Protect and Restore Water Quality**
Achieve and maintain the water quality necessary to **support the aquatic living resources** of the Bay and its tributaries and to **protect human health.**

**Goal 4: Maintain Healthy Watersheds**
Develop, promote and achieve sound land use practices which **protect watershed resources and water quality, maintain reduced pollutant loadings** for the Bay and its tributaries, and **restore and preserve aquatic living resources.**

**Goal 5: Foster Chesapeake Stewardship**
Promote individual stewardship and assist individuals, community-based organizations, businesses, local governments and schools to undertake initiatives to achieve **these goals and our shared vision.**

**Goal 6: Enhance Partnering, Leadership, and Management**
Improve and enhance the leadership and management of the Chesapeake Bay Program partnership.
Executive Order

- Signed on May 12, 2009
- Reports due September 2009
- Draft Strategy currently out for comment
- Federal agency plan for Bay restoration
Federal involvement

Executive Order 13508
Draft Strategy for Protecting and Restoring the Chesapeake Bay

November 9, 2009

A New Era of Federal Leadership
As the Chesapeake Bay restoration effort enters a new era, the country and world are watching. Protecting the environment is the defining challenge of the 21st century, and cleaning up the Bay is this region’s responsibility—an obligation to the residents of today and generations of tomorrow. The solutions to create cleaner water, healthy communities, thriving farms, protected habitats and abundant fish and wildlife in the Chesapeake Bay and its watershed can serve as a national model. America must show that it can restore its largest estuary, which is fed by water flowing by the nation’s capitol in the Potomac River.

The Executive Order recognizes that the efforts of the past 25 years were not making sufficient progress in restoring the Chesapeake Bay and its watershed, and that success would require responsible government agencies to make dramatic policy changes and initiate bold new actions.

Developed by the Federal Leadership Committee for the Chesapeake Bay
Press Release: Kaine Announces Plan to Address Shortfall

Posted: Sep 08, 2009 1:45 PM
Updated: Sep 08, 2009 4:20 PM

Press Release:

GOVERNOR KAINE ANNOUNCES PLAN TO ADDRESS FISCAL YEAR 2010 SHORTFALL ~
Shortfall for remainder of fiscal year just over $1.35 billion ~

RICHMOND - Governor Timothy M. Kaine today announced his executive spending reduction plan to meet the FY 2010 revenue shortfall of $1.35 billion. The Governor's plan trims government spending by reducing the scope of some government programs, while protecting K-12 education and other critical government functions.

"The Commonwealth is continuing to manage the worst economic downturn since the Great Depression both responsibly and transparently," Governor Kaine said. "There's no question we remain in the midst of the toughest economy in a generation. But we also remain confident that Virginia will weather the storm and emerge stronger than ever before."

The official revenue reforecast results in a budgetary shortfall of $1.35 billion for FY 2010. The reforecast brings the total revenue shortfall for the biennium to more than $7 billion. This marks the fourth time in the 2008-2010 biennium that Governor Kaine has made budget reductions to meet the challenges presented by the ongoing economic crisis.
TMDLS + EOs + Fiscal crisis = ?

- TMDL accelerated from May 2011 to December 2010
- State and local government voice in restoration plan
- Tools for local governments
- Effectiveness of management actions
Important Premises

- The Bay system is a complicated one that responds to many forces, only some of which watershed managers can influence.

- It has taken more than a half a century to get the Bay into the degraded state that it is in today.

- It will not be restored in a few years.
We must be realistic about:

- How long restoration may take
- How important natural variability and surprise can be
- How long it will take before actions and knowledge pay off
- But, none of these are legitimate excuses for failing to act

Courtesy of Bob Hirsch, USGS
Manure Du Jour

April 1, 2010

Brian Benham

Extension Specialist, Associate Professor, and Director

Center for Watershed Studies

Biological Systems Engineering, Virginia Tech
Demystifying TMDLs: The State Way, The BAY Way

Brian Benham
Biological Systems Engineering
Virginia Tech
Objectives

- Background
  - Watersheds and watershed management
  - What is a TMDL?
- Review the VA TMDL process with generalizations
  - Impairment Designation
  - TMDL Development
  - Implementation
- Discuss the development of the Chesapeake Bay TMDL
What is a watershed?

- Land area that drains to a common waterway, e.g. stream, lake, estuary, wetland, ultimately the ocean.
What is Watershed Management?

- Watershed management recognizes that the water quality of our streams, lakes, and estuaries results from...
  - human activities and
  - watershed characteristics in upstream areas
- The goal of watershed management is...
  - an environmentally and economically healthy watershed
  - that benefits all stakeholders
- Each watershed management plan includes...
  - unique goals and
  - site-specific management strategies to achieve those goals
Watershed Management: Historical Perspective

- Nineteenth an early to mid-twentieth Century
  - Goal was to enhance value of water bodies for residential, agricultural, industrial, navigational, recreational, and power generating uses, and to reduce flooding

- 1970’s
  - Increasing national concern with water quality.
    Clean Water Act (CWA) passed in 1972 – restore chemical, physical, and biological integrity of nation’s waters.
  - Focus on point sources, wastewater treatment
  - Major improvements in water quality

- 1980’s to today
  - Broader concern with ecosystem management and restoration.
    Nonpoint source pollution control. Ambient water quality.
What is a TMDL?

- A Total Maximum Daily Load (TMDL) quantifies the amount of a particular pollutant a waterbody can receive and still meet water quality standards (pollutant budget).

\[
\text{TMDL} = \Sigma \text{WLA} + \Sigma \text{LA} + \text{MOS}
\]

Where:
- \(\text{WLA} = \) waste load allocation (point sources)
- \(\text{LA} = \) load allocation (nonpoint sources)
- \(\text{MOS} = \) Margin of safety

- 3-phase process
  - Impairment Designation
  - TMDL Development
  - Implementation
TMDL Process

Impairment Designation

Water quality standards not met

TMDL Development

Watershed study to determine needed pollutant reduction

Implementation Planning

How many and what type of ‘fixes’ are needed?

Implementation

Adaptive management

Monitoring

Clean

Water quality standards met

Center for Watershed Studies
Impairment designation

- An “impaired water”
  - contains excessive amounts of one or more pollutants
  - is any surface water that does not meet water quality standards (WQS) which are set to ensure water body supports historical beneficial uses
- Biennial assessment of monitoring data
  - 305(b)/303(d) report

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### 2004 Fact Sheets for Category 5 Waters

**RIVER BASIN:** James River Basin  
**CITY/COUNTY:** James City  
**STREAM NAME:** Powhatan Creek  
**HYDROLOGIC UNIT:** 02080206  
**TMDL ID:** VAT-G10R-02  
**ASSESSMENT CATEGORY:** 5A  
**SEGMENT SIZE:** 3.1 - Miles  
**INITIAL LISTING:** 2002  
**TMDL SCHEDULE:** 2014  

**UPSTREAM LIMIT:**  
**DESCRIPTION:** Segment begins at the confluence with Long Hill Swamp.  
**RIVER MILE:** 3.10  
**LATITUDE:** 37.311  
**LONGITUDE:** -76.7659  

**DOWNSTREAM LIMIT:**  
**DESCRIPTION:** Segment ends at the estuarine/riverine transition @ Rt 613.  
**RIVER MILE:** 0.00  
**LATITUDE:** 37.2603  
**LONGITUDE:** -76.7837  

Segment extends from the confluence with Long Hill Swamp downstream to the estuarine/riverine transition.

**CLEAN WATER ACT GOAL AND USE SUPPORT:**  
Aquatic Life Use - Not Supporting, Recreation Use - Not Supporting

**IMPAIRMENT CAUSE:** General Standard (Benthic), Fecal Coliform

Benthic biological monitoring at station 2-POW006.77 (located at State Route 613) indicated the stream’s benthic community is moderately impaired. As a result, DEQ’s General Standard (VR680-21-01.2) is not met for the protection of benthic aquatic life and this segment is assessed as not supporting of the Clean Water Act’s Aquatic Life Use Support Goal for the 2002 305(b) report. Sufficient exceedences of Virginia’s water quality
Sources of Water Quality Impairments

<table>
<thead>
<tr>
<th>Streams and Rivers</th>
<th>Lakes</th>
<th>Estuaries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>Agriculture</td>
<td>Urban Runoff</td>
</tr>
<tr>
<td>Point Sources</td>
<td>Point Sources</td>
<td>Point Sources</td>
</tr>
<tr>
<td>Habitat Modification</td>
<td>Urban Runoff</td>
<td>Agriculture</td>
</tr>
</tbody>
</table>

EPA Fact sheet No. 841-F-96-004A

Percent of Impaired Waters - 1998 (Updated February 2000)

- No Waters Listed
- < 5%
- 5 - 10%
- 10 - 25%
- > 25%

Virginia Tech
Invent the Future

Center for Watershed Studies
TMDL Process

Impairment Designation

Water quality standards not met

TMDL Development

Watershed study to determine needed pollutant reduction
Watershed Characterization

- Spatial
  - Land use
  - Elevation
  - Hydrography
  - Soils
- Hydrology
  - Climate data
    - Precipitation
    - Etc.
  - Stream flow
- Water quality
- Existing activity
  - BMPs, etc.
Link pollutant sources to waterbody

- Watershed model
  - Watershed characterization
  - Source characterization
  - Climate variability
  - Fate and transport
  - Allocation analysis

Models are used to predict how watersheds respond, and to evaluate pollutant reduction options.

Source: EPA 841-B-05-005
Establish a TMDL Target

- Target based on water quality standard

**Numeric Criteria Target**

- Chart showing load fluctuations over time.

**Surrogate Target**

- Graph indicating impaired vs. non-impaired conditions.

- TMDL Target Load

- Toms Brook Watershed

- TMDL Reference Watershed
Existing conditions

![Graph showing Escherichia coli (cfu/100 mL) over time from January 1990 to January 2002. The graph includes daily average, instantaneous standard, monthly geometric mean, and geometric mean standard lines. The data fluctuates significantly over the years.]
TMDL Process

Impairment Designation

Water quality standards not met

TMDL Development

Watershed study to determine needed pollutant reduction

Implementation Planning

How many and what type of ‘fixes’ are needed?
TMDL Implementation Plans

- Details actions or strategies to achieve load reductions to ensure that water quality standards are met

http://www.deq.state.va.us/tmdl/implans/ipguide.pdf
Nine minimum elements of a Watershed-based Plan

1. Identify the causes and sources of pollutants
2. Estimate the load reductions expected to achieve WQS
3. Describe the NPS management measures needed to achieve load reductions;
4. Estimate the amounts of technical and financial assistance needed
5. Provide an information/education component and encourage the public’s participation
6. Provide a schedule for implementing the NPS management measures
7. Describe interim, measurable milestones to assess implementation progress
8. Identify a set of criteria for determining if loading reductions are being achieved
9. Establish a monitoring component to evaluate implementation efforts
What roles can stakeholders play?

- Provide additional detail on watershed
- Actively engage additional stakeholders – peer to peer outreach
- Identify technical/data resources
- Review/suggest ways to address pollution sources
- Identify potential impediments to implementation and ways to overcome
- Identify local funding sources/partnerships
- Lead implementation of control measures (BMPs)
### Identify and prioritize appropriate BMPs

<table>
<thead>
<tr>
<th>Best Management Practice (BMP)</th>
<th>Pollutants Addressed by the BMP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>sediment</td>
</tr>
<tr>
<td>detention ponds/basins</td>
<td>x</td>
</tr>
<tr>
<td>Diversions</td>
<td>x</td>
</tr>
<tr>
<td>field borders</td>
<td>x</td>
</tr>
<tr>
<td>increased E &amp; S inspections</td>
<td>x</td>
</tr>
<tr>
<td>infiltration BMPs</td>
<td>x</td>
</tr>
<tr>
<td>livestock exclusion BMPs (fencing)</td>
<td>x</td>
</tr>
<tr>
<td>low impact development</td>
<td>x</td>
</tr>
<tr>
<td>nutrient management</td>
<td></td>
</tr>
<tr>
<td>public education</td>
<td>x</td>
</tr>
<tr>
<td>restoration of channelized sections</td>
<td>x</td>
</tr>
<tr>
<td>riparian buffer zones</td>
<td>x</td>
</tr>
<tr>
<td>septic system maintenance/pump-outs</td>
<td></td>
</tr>
<tr>
<td>streambank protection and stabilization</td>
<td>x</td>
</tr>
<tr>
<td>street sweeping</td>
<td>x</td>
</tr>
<tr>
<td>vegetated filter strips</td>
<td>x</td>
</tr>
</tbody>
</table>
Establish goals and milestones

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Stage 2</th>
<th>Stage 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>August, 2006</td>
<td>August, 2011</td>
<td>August, 2014</td>
</tr>
<tr>
<td>August, 2011</td>
<td>August, 2014</td>
<td>August, 2019</td>
</tr>
<tr>
<td>39% Stream Exclusion Fencing</td>
<td>78% Stream Exclusion Fencing</td>
<td>100% Stream Exclusion Fencing</td>
</tr>
<tr>
<td>22% Pasture Land Management</td>
<td>22% Pasture Land Management</td>
<td>100% Pasture Land Management</td>
</tr>
<tr>
<td>35% Septic System Repair/Replace</td>
<td>70% Septic System Repair/Replace</td>
<td>100% Septic System Repair/Replace</td>
</tr>
<tr>
<td>Stage 1: 39% Stream Exclusion Fencing 22% Pasture Land Management 35% Septic System Repair/Replace</td>
<td>Stage 2: 78% Stream Exclusion Fencing 22% Pasture Land Management 70% Septic System Repair/Replace</td>
<td>Stage 3: 100% Stream Exclusion Fencing 100% Pasture Land Management 100% Septic System Repair/Replace</td>
</tr>
</tbody>
</table>
TMDL Process

Impairment Designation

Water quality standards not met

Watershed study to determine needed pollutant reduction

TMDL Development

Implementation Planning

How many and what type of ‘fixes’ are needed?

Implementation

Center for Watershed Studies
TMDL Implementation

1. Contour Tillage
2. Detention Pond
3. Rain Garden
4. Wetland
5. Porous Pavement
6. Street Sweeping
7. Buffer Strip

Center for Watershed Studies
City of Seattle
Flow-through Planter Box

Roof Drainage Solutions

From: Presentation made by David Hirschman, Biohabitats, Inc.
Septic Maintenance

Eliminate Straight pipes

Photos: Virginia Department of Conservation and Recreation
Clean water is important to all of us. It’s up to all of us to make it happen. In recent years, sources of water pollution like industrial wastes from factories have been greatly reduced. Now, more than 60 percent of water pollution comes from things like cars leaking oil, fertilizers from farms, gardens, lawns, and failing septic tanks. All these sources add up to a big pollution problem. But each one of us can do something to help clean up our water too and that adds up to a pollution solution!

Why do we need clean water?
Having clean water is of primary importance for our health and economy. Clean water provides recreation, commercial opportunities, fish habitat, drinking water and adds beauty to our landscape. All of us benefit from clean water and all of us have a role in getting and keeping our lakes, rivers, marine and ground waters clean.

What’s the problem with pet waste?
It’s a health risk to pets and people, especially children. It’s a nuisance in our neighborhoods. Pet waste is full of bacteria that can make people sick. If it washes into the storm drain it will end up in a lake, stream or marine water. Unless people take care of it, the waste enters our water with no treatment.

This information is brought to you by the Upper Roanoke River Roundtable, and a group of public agencies working together to reduce nonpoint water pollution through education.

How can you get rid of pet waste and help keep our waters clean?

1) Scoop it up and flush it down the toilet. That’s best because then your community sewage treatment plant or your septic system treats the pet waste.

2) Seal the waste in a plastic bag and throw it in the garbage.

To find out more about the problems of pet waste and what you can do to prevent water pollution, please visit this website:

www.upperroanokeriver.org

The pet waste bags on the City of Roanoke Greenways and this publication are funded by the City of Roanoke and the Virginia Environmental Endowment.
Fencing and Riparian Buffer

Photos: Virginia Department of Conservation and Recreation
TMDL Process

Impairment Designation

Water quality standards not met

Watershed study to determine needed pollutant reduction

TMDL Development

Implementation Planning

How many and what type of ‘fixes’ are needed?

Adaptive management

Implementation

Monitoring

Study

Watershed study to determine needed pollutant reduction

TMDL

Development

Water quality standards not met
Adaptive management
TMDL Process

Impairment Designation

Water quality standards not met

TMDL Development
Watershed study to determine needed pollutant reduction

Implementation Planning
How many and what type of ‘fixes’ are needed?

Implementation

Adaptive management

Monitoring

Clean

Water quality standards met

Center for Watershed Studies
Handbook for Developing Watershed Plans to Restore and Protect Our Waters


EPA 841-B-08-002
TMDL: “The Bay Way”

Why a Chesapeake Bay TMDL now?
- 1999 Consent Decree order
- Water quality goals est. in Chesapeake 2000 Agreement not met by 2010
- Executive Order 13508

How is Bay TMDL different?
- Scale/complexity/pollutants
- Implementation
- Consequences
THE CHESAPEAKE BAY TMDL: Restoring Waters of Pennsylvania and the Chesapeake Bay

Bay TMDL Public Meeting
November 19, 2009
State College, PA

Richard Batiuk and Bob Koroncai
U.S. EPA Region III
Chesapeake Bay Watershed - By the Numbers

- Largest U.S. estuary
- Six states and DC, 64,000 square mile watershed
- 10,000 miles of shoreline (longer than entire U.S. west coast)
- Over 3,600 species of plants, fish and other animals
- Average depth: 21 feet
- $750 million contribution annually to local economies
- Home to 17 million people (and counting)
- 77,000 principally family farms
- Declared “national treasure” by President Obama

Source: www.chesapeakebay.net
Major River Basins of the Chesapeake Bay Basin

- Susquehanna
- Potomac
- Patuxent
- Rappahannock
- York
- James
- Eastern Shore Maryland
- Eastern Shore Virginia

Distance Scale: 0, 20, 40, 60, 80, 100 Miles
Main Sources of Pollution

- Agriculture – animal manure, commercial fertilizer
- Urban/suburban runoff – a growing problem
- Air pollution – tailpipes, power plants
- Wastewater – sewage treatment plants
The Chesapeake Bay TMDL

- EPA sets pollution diet to meet states’ Bay clean water standards
- Caps on nitrogen, phosphorus and sediment loads for all 6 Bay watershed states and DC
- States set load caps for point and non-point sources
The Bay science supports local pollution diets...

Phase 4
Bay Watershed Model
2000-2008

Phase 5
Bay Watershed Model
2009-
Taking Responsibility for Load Reductions

Identify basinwide target loads
EPA, States, DC

Identify major basin by jurisdiction target loads
EPA, States, DC

Identify tidal segment watershed, county and source sector target loads
States, DC, local governments & local partners
Also divide jurisdiction load by 303(d) segment drainage area and, by November 2011, local area.

- Attain jurisdiction-wide load reductions by the interim target, or justify why can still meet final target.
- Jurisdiction would determine desired 2-year schedule to meet interim and final target loads.
- EPA first evaluates milestones based on consistency with jurisdiction target load. EPA accepts shifts among source sectors, basins, segment drainages, and local areas if jurisdiction target load is met and local and Bay water quality goals are achieved.
Mandatory Pollution Diet at Work

Start Here

Develop Watershed Implementation Plans
to identify nutrient and sediment reduction
targets by drainage area of impaired tidal segments,
county and sector to meet TMDL

Employ EPA Consequences
if insufficient commitments
in Watershed Implementation
Plans or 2-year milestones, or
enhancements and reductions
behind schedule

Model and Monitor Effectiveness
to assess actions, load reduction
progress and water quality response

Establish Chesapeake Bay TMDL
- Set total maximum nutrient and sediment loads
- Wasteload and load allocations
  by state/DC, drainage area of
  impaired tidal segments, and
  sector

Biennial Milestones
with specific controls and program enhancements
to maintain schedule.
Contingencies by state/DC
for not achieving milestones

Evaluate Program Capacity*
(programmatic, financial, technical)
necessary to fully achieve reductions

Identify Gaps*
between needed reductions and existing
program capacity

Identify Schedule*
for reducing loads
based on description of
planned enhancements

*Included in Watershed Implementation plans
Federal Consequences

- Directed at states not achieving expectations
- Outlined in an EPA letter Fall 2009.
  - Assigning more stringent pollution reductions to regulated point sources (e.g., wastewater, stormwater, CAFOs)
  - Objecting to state-issued NPDES permits
  - Limiting or prohibiting new or expanded discharges (e.g., wastewater, stormwater) of nutrients and sediment
  - Withholding, conditioning or reallocating federal grant funds
Resources and Contacts

- [http://www.chesapeakebay.net/](http://www.chesapeakebay.net/)
- [http://executiveorder.chesapeakebay.net/](http://executiveorder.chesapeakebay.net/)
- [http://www.epa.gov/chesapeakebaytmdl/](http://www.epa.gov/chesapeakebaytmdl/)

U.S. EPA Region 3 Contacts

- Water Protection Division
  - Bob Koroncai – 215-814-5730; koroncai.robert@epa.gov
  - Jennifer Sincock (sincock.jennifer@epa.gov)

- Chesapeake Bay Program Office
  - Rich Batiuk – 410-267-5731; batiuk.richard@epa.gov
  - Katherine Antos (antos.katherine@epa.gov)
Thank you

Brian Benham, benham@vt.edu
Question and Answers

• Recordings of this session will be posted at www.aec.cas.psu.edu

• For more information on this topic:
  – Denice Wardrop, dhw110@psu.edu, www.psiee.psu.edu
  – Brian Benham, benham@vt.edu, www.tmdl.bse.vt.edu
What’s ahead for season II?

• Next week – CHANGE IN SCHEDULE:
  • Using Industrial Resources or Byproducts for Nutrient Sequestration
    • Ray Bryant, USDA Agriculture Research Service
    • Bob Hedin, Iron Oxide Recovery Inc.
    • Special Guest, Amy Wolfe, Trout Unlimited, W. Branch Susquehanna Initiative

• Full schedule for the Manure du jour program: http://aec.psu.edu
  • Nutrient Management Continuing Education Credits ARE AVAILABLE for Apr 8, 15, 29 programs.