MAST Training Webinar
(Maryland’s Assessment and Scenario Tool)

— July 19, 2011 —
Overview of Today’s Webinar

• Introduction: (20 min)
  – Bay models
  – Phase II Expectations
  – Allocation

• MAST Presentation (45 min)
  – About MAST
  – Application: On-line MAST Demonstration

• Summary & Next Steps (20 min)
  – Developing WIP Team Scenarios: Process
  – Hands-on MAST Training Sessions: Synopsis
  – Upcoming Training Dates & Webinars

• Q & A Session (30 min)
Introduction: Background & Orientation

Lee Currey, MDE

• Chesapeake Bay Program Modeling System
• Expectations for the Phase II WIP
• The Allocation Process
Definitions

• **Watershed Model** – Used to estimate nitrogen, phosphorus and sediment loads from the land that are delivered to the Bay
  – **Phase 5.3.2** – The revised watershed model used for the Phase II WIP

• **Scenario Builder** – Pre-processor for the Phase 5.3.2 watershed model

• **Chesapeake Bay Model** – Hydrodynamic, water quality and sediment transport model for the Bay tidal waters

• **MAST** – Maryland Assessment and Scenario Tool.
Chesapeake Bay Partnership Models

MAST

Meet loading targets

INPUTS
- BMP Data
- LU Data
- Point Sources Data
- Septic Data
- U.S. Census Data
- Agricultural Census Data

MODEL-DERIVED
- Airshed Model
- Land Use Change Model
- Precipitation Data
- Meteorological Data
- Elevation Data
- Soil Data

SCENARIO BUILDER

WATERSHED MODEL

CHESAPEAKE BAY MODEL

MEET WQS?
- NO
- YES

ALLOCATION METHODOLOGY
Reasons to Use MAST

- MAST is designed to be consistent with the EPA CBP P5.3.2 watershed model BMP and loading estimates, which is being used to "grade" the Phase II WIP and milestone progress.
- MAST exports scenario information for direct input into EPA models as required for the Phase II WIP.
- Need a consistent process for input and evaluation of 24 WIP teams scenarios.
- EPA will adopt MAST to work at the Bay watershed scale (continued operation and maintenance).
- MAST is open to WIP teams (no fee) and facilitates transparency in the WIP development process.
Model Calibration

Why? …Simulate real world conditions

- Land Simulation Targets
  - Literature (loading targets)
  - Monitoring
- River Simulation
  - Monitoring data
  - flow and concentration
  - Loads
- Tidal Model
  - Monitoring data

• Generates Loads
• Automated and Repeatable
Model Calibration Data

Watershed
Calibration sites ~ 300
Simulation Years = 20

Chesapeake Bay
Calibration sites ~ 120
Simulation Years = 20
P5 MD Calibration Stations

Hydrology and Water Quality

- 112 monitoring stations in MD
- Nutrient loads calibrated against USGS statistical regression model ESTIMATOR at Potomac, Patuxent, Choptank, and Susquehanna Fall Lines and 7 other locations in MD
Calibration Review

• Who?
  – Chesapeake Bay Program subcommittees and workgroups
  – Bay partners

• What?
  – Inputs
  – Processes
  – Land targets
  – Automated methodology
  – Hydrology
  – Water quality
  – Calibration efficiency (model skill)
  – Validation
EPA Expectations for Phase II WIP

- Clear, quantitative goals: Local area strategies and allocations to meet 2017 and 2020 load reduction targets
- In Maryland, “local area” = land within geographic boundaries of 23 Counties and Baltimore City (WIP Teams)

### EXAMPLE OF LOCAL ALLOCATION TABLE:
CARROLL COUNTY PHASE II WIP LOAD REDUCTION ALLOCATIONS BY SOURCE SECTOR

<table>
<thead>
<tr>
<th>Source Sector</th>
<th>2010 Progress</th>
<th>2017 Allocation</th>
<th>% Reduction</th>
<th>2020 Allocation</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>UrbanReg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UrbanNonReg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAFO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Septic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WWTP &amp; CSO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
EPA Expectations for Phase II WIP

• Input deck that demonstrates local area strategies combined will meet Bay Water Quality Standards

• MD Phase II WIP Report will include:
  – Revised Maryland-Major Basin allocations
  – Description of Phase II process – How State engaged local and federal partners to develop the Plan
  – Local area allocations by source sector and implementation strategies (BMP levels and/or programmatic milestones)
  – How local progress will be tracked and reported

• Schedule: Draft due to EPA – Dec. 1, 2011
  Final due – March 30, 2012
The Allocation Process

How are the final allocations determined?

- Principles: **Equity**, **Credit**, and **Relative Effectiveness**
  - Equal levels of effort among nonpoint source sectors
  - Credit given for reduction practices reported to date
  - Consideration of geographic proximity and relative impacts of local area load reductions on Bay water quality
- Public participation and review of allocation process during Phase I WIP
<table>
<thead>
<tr>
<th>Step</th>
<th>Sector</th>
<th>Assumptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forest</td>
<td>Current Progress</td>
</tr>
<tr>
<td>2</td>
<td>Major Municipal</td>
<td>ENR Cap Strategy</td>
</tr>
<tr>
<td></td>
<td>Major Industrial</td>
<td>Tributary Strategy Cap</td>
</tr>
<tr>
<td></td>
<td>Minor Municipal</td>
<td>Tributary Strategy Cap</td>
</tr>
<tr>
<td></td>
<td>Minor Industrial</td>
<td>Current Progress</td>
</tr>
<tr>
<td>3</td>
<td>Urban</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Agricultural</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Septic systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Equitable reductions based on Reducible Load (NA to E3) and relative effectiveness</td>
</tr>
</tbody>
</table>

…Meets statewide allocation provided by EPA…
Step 3 Details: Urban, Ag, Septic Loads

2010 No Action

Reducible Load

2010 E3 (limit of technology)

For each source sector

Load reduction required from current condition

Same % percent reduction of reducible load for all nonpoint source sectors within a geographic area

Load reduction required from current condition

credit for existing actions, by starting at NA
Relative Effect of a Pound of Pollution on Bay Water Quality

Effectiveness
Nitrogen
- 0.0 - 1.2
- 1.3 - 2.7
- 2.8 - 4.2
- 4.3 - 5.5
- 5.6 - 7.1
- 7.2 - 10.3

Effectiveness
Phosphorus
- 0.0 - 1.0
- 1.1 - 2.0
- 2.1 - 3.0
- 3.1 - 4.0
- 4.1 - 5.0
- 5.1 - 7.1
- 7.2 - 10.3

Maryland Department of Planning
MDE
Allocations Summary

- Include Edge of Stream (EOS) and Delivered (DEL) Load
- Within the county geographic extent (WIP team)

- By Source sector (multiple categories within each source sector)

<table>
<thead>
<tr>
<th>Source Sector</th>
<th>2010 Progress</th>
<th>2017 Allocation</th>
<th>% Reduction</th>
<th>2020 Allocation</th>
<th>% Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>UrbanReg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UrbanNonReg</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agriculture</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CAFO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Septic</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forest</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WWTP &amp; CSO</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
MAST Presentation

Olivia Devereux
Interstate Commission on the Potomac River Basin

• About MAST
• Application: On-line Demonstration
MAST – A PLANNING TOOL

MAST CAN ANSWER:
• Did I meet the allocations?
• Am I hitting the targeted load?
• Which BMPs or combination of BMPs give the greatest load reductions?

YOU NEED TO KNOW:
• Which BMPs to use
• Target load
BMP Costs

- Not currently implemented in MAST
- Output of MAST allows calculation of a unit load (lb/A)
- With the cost of each BMP in your local area, you can calculate costs of your scenario
An Adaptive Process

MAST Planning

2-Year Cycle

Implementation

Reporting – Watershed Model

Tracking
MAST CAN...

• Serve as a data management system

• Is Replicable, Consistent, and Transparent

• Facilitate an adaptive process, scenario development is iterative

• Facilitate stakeholder involvement

• Inform stakeholders of the implications of decisions
MAST OUTPUTS

- Land use acres available
- Changes in the acres of each land use
- BMPs submitted
  - Lists the BMPs in your scenario
  - Shows your notes for each BMP. The notes field is your justification.
  - Shows which BMPs it was not possible to credit
- Loads for each land use
  - Edge of stream (EOS)
  - Delivered to the Chesapeake Bay (DEL)
- Inputs to the Chesapeake Bay Program’s Scenario Builder
A TOOL FOR MULTIPLE USERS

MAST can accommodate many simultaneous users

- On line
- Private log in
- Private and public scenarios
PLANNING YOUR SCENARIO

• What do I need to know to use it?
  • Chesapeake Bay Program vocabulary
    – Land Use names
    – BMP names
    – Geographic areas
  • Initial idea of which BMPs you want to implement
    – MAST will help you refine BMP choice

• What don’t I need to know?
  – Calculations and formulas
DATA INPUT SEQUENCE

LOG IN

SCENARIO LIST
- URBAN BMPs
- AGRICULTURE BMPs

SCENARIO DETAILS
- SEPTIC
- ANIMAL BMPs
- WASTE WATER
- MANURE TRANSPORT
- FOREST BMPs

SUMMARY
An On-line MAST Demonstration

WWW.MASTONLINE.ORG
Scenario Results
Scenario Results

![Bar chart showing scenario results with two categories: NoBMP and 2009 Progress. The chart compares the number of people affected by each category.]
Scenario Results

Frederick County Lbs Nitrogen-Delivered

- Forest
- Agriculture
- Septic
- Urban
- Water
- Grand Total

Legend:
- NoBMP
- 2009_Progress
- AddtlReductions
MORE INFORMATION AT IN-PERSON TRAININGS

- Tips to optimize reductions
  - BMP Calculation Sequence and Groups
- BMP Definitions
- Chesapeake Bay Program Land Use Definitions
Summary & Next Steps
Lee Currey, MDE

• Developing WIP Team Scenarios: Process
• Hands-on MAST Training Sessions: Synopsis
• Upcoming Training Dates & Webinars
Developing WIP Team Scenario

Source Sectors

- Forest
- Agriculture
- Urban
- Septic
- WWTP

Additional Reduction Practices and Controls

- Forest
- Agriculture
- Urban
- Septic
- WWTP

County-wide Strategy

Progress Loads

Allocations
Developing a WIP Team Scenario

• Start by working together within sectors, using allocations for each source sector
• Iterative process – revise implementation levels to adjust sector strategies as needed
• Use MAST to
  – Answer questions
    • *What strategies are most effective?*
    • *Did I meet my source sector allocation?*
  – Document decisions
  – Bring sector scenarios (strategies) together to review County-wide results
• Timeline: State will compile Local Team Scenarios in October for draft input deck runs in Bay Model by Nov. 1
Hands-on MAST Training Synopsis

• What will be covered?
  – More details on MAST inputs and output
  – Hands-on instruction: How to use the on-line tool to input BMPs to build a local reduction strategy
  – Training Materials and MAST Users Guide

• Objectives
  – Understanding how to use MAST to facilitate Local Team strategy development for Phase II WIP
  – Understanding how MAST relates to Bay Model (Strategies are common language)
Upcoming Events

- Hands-on MAST Training Sessions
  - MDE – Montgomery Park
  - Local Team Training Sessions: July 21, 26, 28, and Aug. 2 - 9:45 am to 2:30 pm
  - Contact: For any questions call Nan Lyon at 410-537-3325 or email nlyon@mde.state.md.us

- Phase II WIP Webinar for MS4 Stormwater Managers: TBA

- Phase II WIP Webinar for Federal Facility Managers: TBA
Questions & Answers