Predicting Criteria Achievement Under Management Scenarios: Model Simulations Inform Monitoring Data

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The Challenge

Identify the pollutant load reductions required to restore the Chesapeake Bay and its tidal tributaries to an un-impaired condition; finalize a Chesapeake Bay TMDL by December, 2010.
Tools

Chesapeake Bay Program Decision Support System

Land Use Change Model

Watershed Model

Bay Model

Criteria Assessment Procedures

Management Actions

Airshed Model

Scenario Builder

Effects

Allocations

Sparrow
Tools, continued

Frequency of summer bottom [DO] in CB5MH

- Historical conditions
- Versus estuarine model (calibration scenario)
Tools, continued

Frequency of summer bottom [DO] in CB5MH

historical conditions
versus
estuarine model (calibration scenario)
versus
estuarine model (EEE scenario)
1. Regress management scenario against calibration scenario

2. Use regression equation to “scenario” the historical data

3. Assess the scenario’d data
Solution

monitoring stations mapped to model cells
Solution

One regression for each data point
Solution

regression of E3 scenario against calibration scenario

\[ [E3] = 0.8 \times [\text{calibration}] + 1.5 \]
Solution

Frequency of summer bottom [DO] in CB5MH

mg/l

percent less than

Data

Data (3E)
Solution

Frequency of summer bottom [DO] in CB5MH

Data

Data (3E)
## Solution

Assessment “stoplight plots”

<table>
<thead>
<tr>
<th>Cbseg</th>
<th>State</th>
<th>Scenario →</th>
<th>Year →</th>
<th>DATA '93-'95</th>
<th>(CAL) 340TN '93-'95</th>
<th>279TN '93-'95</th>
<th>236TN '93-'95</th>
<th>222TN '93-'95</th>
<th>192TN '93-'95</th>
<th>159TN '93-'95</th>
<th>(EEE) 138TN '93-'95</th>
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</thead>
<tbody>
<tr>
<td>CB3MH</td>
<td>MD</td>
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<td>2.5%</td>
<td>0.8%</td>
<td>0.5%</td>
<td>0.3%</td>
<td>0.1%</td>
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<td>CB4MH</td>
<td>MD</td>
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<tr>
<td>CB5MH</td>
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<td>4.9%</td>
<td>1.9%</td>
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<tr>
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</tr>
</tbody>
</table>

### decreasing pollutant loads
Dissolved Oxygen (June - September, 2006 - 2008)
Percent of Goal Achieved (3 Year Analysis)

Percent of Goal Achieved
All Uses, Summer Period
- 0% - 50%
- 51% - 75%
- 76% - 90%
- 91% - 99%
- 100% - Pass
- No Data

Data Sources: Chesapeake Bay Program
Disclaimer: www.chesapeakebay.net/terrnofoce.htm
For more information about the methods and data for this map, please refer to the Dissolved Oxygen Indicator and Data Survey: www.chesapeakebay.net/dbas_dissolveoxygen.htm

Created by HW, 3/3/09

Thank You
Questions?