2010 Bay Barometer Communication Challenges for the Water Quality GIT (part 2)

(Note: Background related to Challenges I and II was provided to the WQGIT for their Sept 13, 2010 meeting. Please review pages 4-5 in advance of the October 25, 2010 meeting.)

Challenge III: Clearly communicating pollution concentrations and loads to the Bay Context

Are nutrient and sediment loads based on model simulations or annual monitoring data?

- If based on model simulations, does that:
  - Include atmospheric deposition of nitrogen to watershed (or not), or
  - Include atmospheric deposition of nitrogen to tidal waters (or not)?
- If based on annual monitoring data, is that
  - At the fall-line only, or
  - Adding in monitored below-fall-line wastewater loads and simulations of the below-fall-line nonpoint source loads and atmospheric deposition of nitrogen to tidal waters?

Confusion on the above questions resulted in 2004 Washington Post article that claimed "Bay Pollution Progress Overstated"

Results:

- In 2004 GAO used the Washington Post assertions to develop the following "statement of fact" (which was subsequently withdrawn from the final document after CBP had an opportunity to provide documentation and explanations to GAO):
  - "Furthermore, indicators are sometimes supported by unreliable data. The Chesapeake Bay Program uses the outputs from several models in its indicator set to draw conclusions about progress toward reducing nitrogen and phosphorous levels in the Bay. However, physical samples taken from the Bay's tributaries indicate that the conditions in the Bay may not have improved to the extent indicated by the models. According to Chesapeake Bay Program officials, the magnitude of the gap between the models' estimates and the actual water quality remains a matter of scientific debate."
- Since 2004, CBP reports annual, "mostly-monitored" loads of nitrogen (and phosphorus) in the "Factors Impacting Bay and Watershed Health" section of BB.
  - They are based on USGS monitoring data at the river input monitoring (RIM) sites near the "fall line", below-fall-line wastewater loads (monitored and reported) and simulations of the below-fall-line nonpoint source loads (since they can not be monitored).
  - The monitored loads at the RIM sites are calculated based on monitored concentrations and monitored flow.
  - The below-fall-line wastewater loads are calculated based on monitored and/or reported concentrations and flow at the discharge pipe.
    - If the pipes discharge directly to tidal waters, the delivered loads equal the discharged loads.
    - If they discharge to non-tidal waters below the fall line, a delivery factor is used to calculate the portion of the discharge load that is

delivered to tidal waters.
    - Since below-fall-line nonpoint source loads are not monitored, model-simulated loads are included.
    - We have not been including the simulated loads due to atmospheric deposition of nitrogen to tidal waters, but are planning to do so starting next year.
    - The model-simulated loads will be revised to reflect phase 5.3 watershed model simulations.

- Percent achievement of the pollution reduction goals are reported in the "Restoration Efforts" section and:
    - are based on a 1985 baseline, 2010 deadline, voluntary load allocations (established in 2003); and,
    - accounted for via phase 4.3 watershed model simulations using 1985-1994 average hydrology.
    - We have not been accounting for the loads due to atmospheric deposition of nitrogen to tidal waters, but are planning to do so next year since the TMDL includes an allocation for atmospheric deposition of nitrogen to tidal waters.
    - Next year this information will be revised to account for phase 5.3 watershed model simulations and TMDL load allocations.

- We report flow adjusted trends in concentrations of nutrients and sediment in the "Watershed Health" section of BB (based on monitored flow and concentrations at the RIM sites and numerous other monitoring sites throughout the watershed that are upstream of the RIM sites).
    - We report the flow adjusted concentration trends, as opposed to the concentrations, since we believe they are more representative of watershed health.

- We monitor nutrient and sediment concentrations in tidal waters but we do not report them in the BB.
    - This is because the CBP water quality restoration goals for the Bay are based on achieving water quality standards for DO, clarity/SAV and chlorophyll a in tidal waters, not achieving particular concentrations of nutrients or sediment.

Communicating More Clearly in the Future

Loads to the Bay (Factors Impacting Bay and Watershed Health)

- "Factors Impacting Bay and Watershed Health" section of the 2010 BB will continue to report loads to the Bay
- Plan to use a split bar chart to show portions based on annual monitoring data and model simulations
    - simulated loads due to atmospheric deposition of nitrogen to tidal waters (this is a new addition to the "total load" chart)
    - below-fall-line simulated nonpoint source loads
    - below-fall-line monitored wastewater loads
    - above-fall-line monitored loads
- See the end of this document for an example for N loads (P loads will be reported as well).
    - Please note, simulated-loads will be revised in accordance with phase 5.3 watershed model simulations

- Will report data for all years 1990 through 2010.

Pollution Reduction Goal Achievement (Restoration Efforts)

- Recommending that percent achievement of goal charts are replaced with split bars that report model-simulated loads to the Bay since 1985 in the "Restoration Efforts" section of the 2010 BB.
- References to "percent of goal achieved" will be calculated using 2009 baseline (for comparing to 60% by 2017 and 100% by 2025).
- See the end of this document for an example for model-simulated loads of N
  - P and Sed loads will be reported as well
  - Will report additional progress run years (e.g. 2003-2008, 2010)
- Also recommending the development of supporting-level indicators
  - pie chart that shows even more detailed breakouts by sector
  - breakouts for "load allocation" and "wasteload allocation"

Pollutant Concentration Trends (Watershed Health)

- "Watershed Health" section of 2010 BB will continue to report flow adjusted concentration (FAC) trends of N, P and Sed.
- River flow and concentrations of nutrients/sediment are monitored in non-tidal portions of rivers throughout the watershed (above the "fall-line").
- Flow adjusted concentration trends are calculated from those data and Bay Barometer reports these trends (since they are considered representative of watershed health).
- See the end of this document for an example for N FAC trends (P and Sed FAC trends are reported as well).
- Note: Nutrient/sediment concentrations are monitored in tidal waters but not reported in BB (since water quality restoration goals for the Bay are based on achieving tidal water quality standards, not pollutant concentrations).

Challenge IV: Conflicting expectations about what will be achieved by 2025, in terms of Bay restoration

Context:

The following articles, memos and documents present the public with conflicting information:

- "…implementation plans that will put in place all necessary actions, by no later than 2025, to fully restore the Bay and tidal rivers…" (Shawn Garvin, 7/1/2010)
- "The limits represent the first major step toward putting the bay states on a "pollution diet" aimed at restoring the Chesapeake's water quality by 2025." (Tim Wheeler, 7/1/2010)
- "EPA announces draft allocations for Bay states to meet cleanup goals: Numbers set nutrient reductions needed by 2025"; "2025 deadline to get it [the Bay] in shape" (Karl Blankenship, July/August 2010)
- "the EPA has ramped up its tough talk to convince people that its new cleanup plan, known as a Total Maximum Daily Load, will finally achieve the clean Bay goal, albeit not until 2025." (Karl Blankenship, February 2010)
- "The new goal is to take all actions needed to achieve the elusive clean Bay goal by 2025" (Karl Blankenship, January 2010)
- "Meet water quality standards for dissolved oxygen, clarity/ underwater grasses and

chlorophyll-a in the Bay and tidal tributaries by implementing 100 percent of pollution reduction actions for nitrogen, phosphorus and sediment no later than 2025, with 60 percent of segments attaining water quality standards by 2025." (Federal Leadership Committee, May 2010)

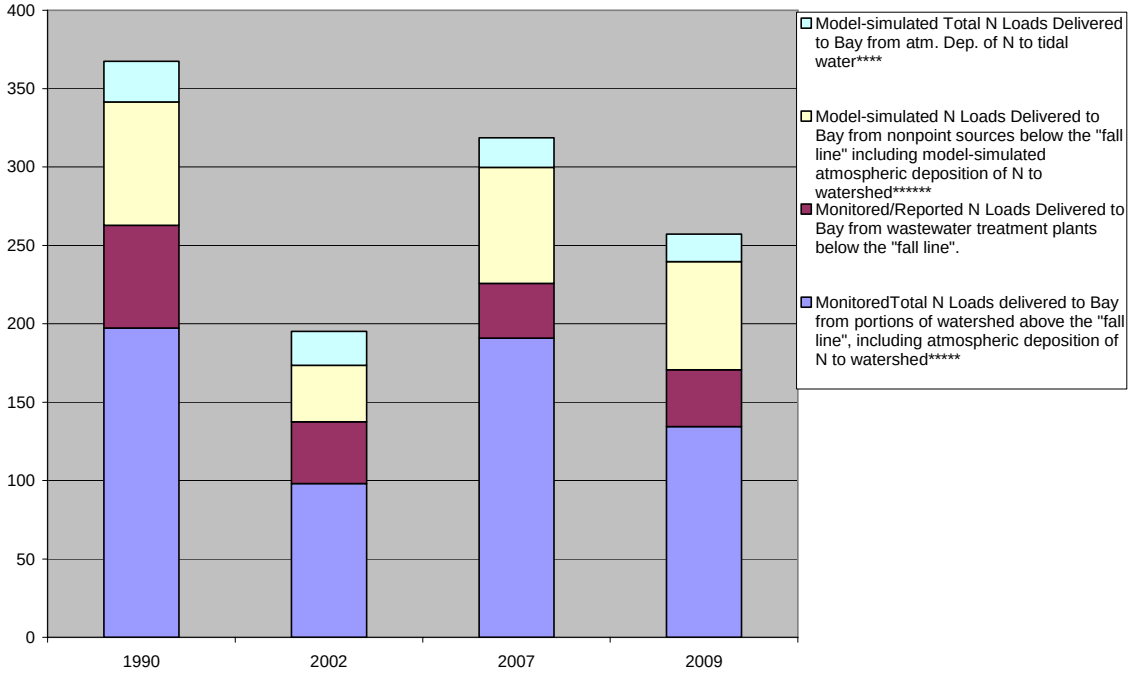
Solutions:

<table>
<tr><td colspan="2">Need to be clear in the 2010 Bay Barometer about what is expected by 2025 in terms of:
▪ loads to the Bay and
▪ the attainment of Bay water quality standards for DO, clarity/SAV and chlorophyll a.</td></tr>
<tr><td>▪ By 2025, 100 percent of nitrogen, phosphorus and sediment pollution reduction actions, necessary to fully restore the Bay and tidal rivers, are expected to be in place.
▪ Model-simulated loads in 2025 are expected to equal the TMDL allocations</td><td>We expect to measure attainment of the pollution reduction actions goal using the watershed model.
▪ 2025 nutrient and sediment loads will be simulated via a 2025 "progress run", using all of the verified "actions" (BMPs) data and point source loads data provided by the partners through Dec 31, 2025 (verification to occur via Bay TAS).
▪ This will likely be reported as percent of goal achieved, by comparing the simulated reductions achieved (2009 "progress run" load minus 2025 "progress run" load) in relation to the reduction goal (2009 "progress run" load minus 2025 "load allocation").</td></tr>
<tr><td>By 2025, 60% of Bay tidal water segments are expected to attain water quality standards.</td><td>We expect to measure attainment of the water quality standards using CBP tidal monitoring data for DO, clarity/SAV and chlorophyll a.
▪ If a tidal segment meets the applicable criteria for each of the applicable parameters, in each of the segment's designated uses, over a three year period then the segment will be considered in attainment of water quality standards and that segment will count towards the 60% goal.
▪ When we release the 2025 Bay Barometer (hopefully no later than March 31, 2026), we will be assessing attainment based on monitoring data collected in 2023, 2024 and 2025.</td></tr>
</table>

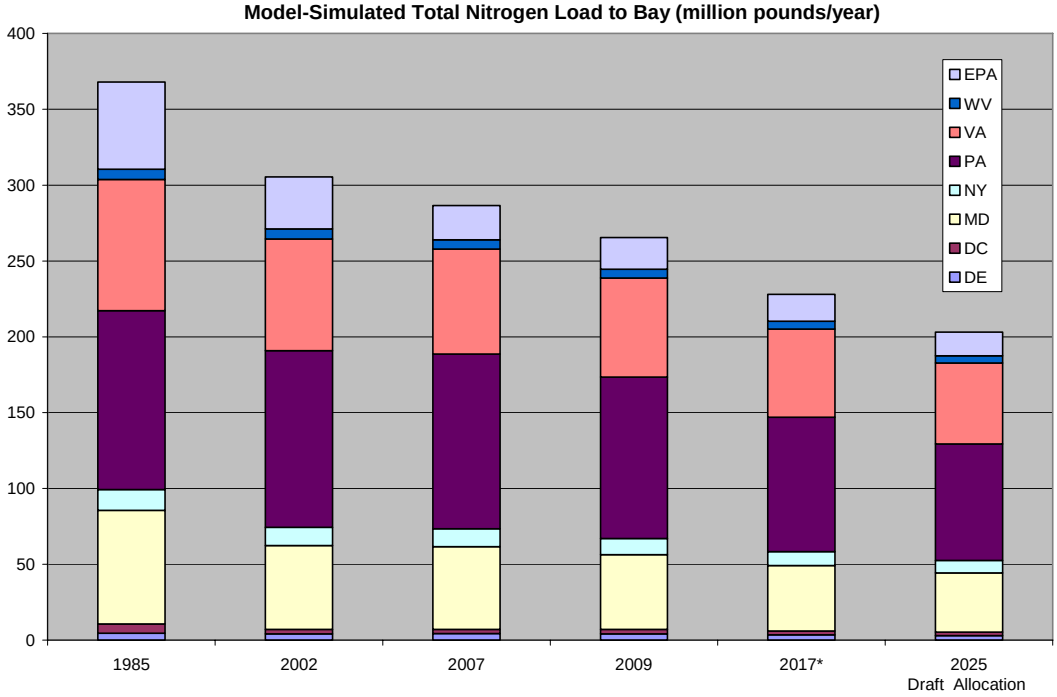
Need to clear up any misconceptions about what to expect by 2025:

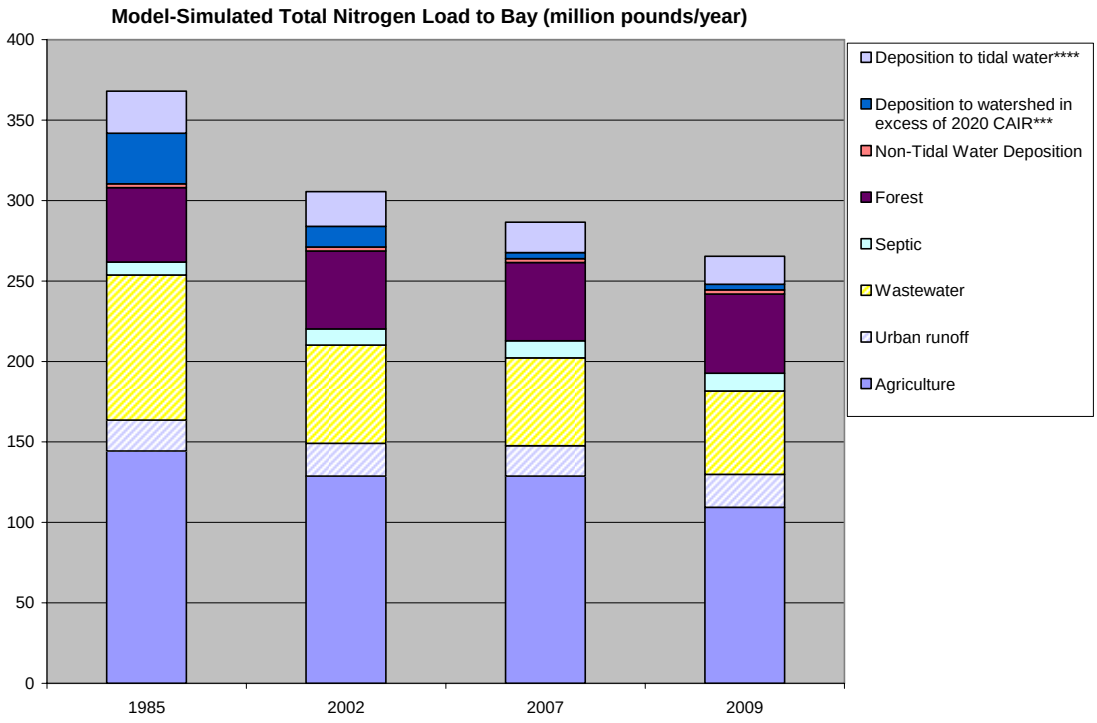
- The Bay will hopefully "be in better shape" but will very likely NOT "be in shape" by 2025.
- It will take time for the ecosystem to respond and for all water quality standards to be achieved in all segments of the Bay

Monitored plus Model-Simulated Total Nitrogen Load to Bay (million pounds/year)



Model-Simulated Total Nitrogen Load to Bay (million pounds/year)




Model-Simulated Total Nitrogen Load to Bay (million pounds/year)
400
350
300
250
200
150
100
50
0
1985
2002
2007
2009
Deposition to tidal water****
Deposition to watershed in excess of 2020 CAIR***
Non-Tidal Water Deposition
Forest
Septic
Wastewater
Urban runoff
Agriculture