Evaluation of Options for a Chesapeake Bay Modeling Laboratory

CB Management Board

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"Establishing a Chesapeake Bay modeling laboratory would ensure that the CBP would have access to a suite of models that are state-of-the-art and could be used to build credibility with the scientific, engineering, and management communities."

- Achieving Nutrient and Sediment Reduction Goals in the Chesapeake Bay: An Evaluation of Program Strategies and Implementation; National Research Council

Modeling Lab Action Team

- The action team's charge:
  - Evaluate of existing modeling laboratories and adaptive management programs that use modeling
  - Addressing how they function and how applicable they are to the Chesapeake Bay Program Partnership
  - Consider a range of options for a Chesapeake Bay modeling laboratory,
    - a virtual laboratory
    - a program reorganization to accomplish recommendations from the NRC, STAC, and the jurisdictions

Modeling Lab Action Team

- The action team's charge:
  - Develop options and recommendations for institutional sponsorship and laboratory function
  - Assess the possible range of costs and funding mechanisms

Modeling Lab Action Team (MLAT)

- Action Team membership
  - 7 jurisdiction members; Maryland, Virginia, Pennsylvania, New York, Delaware, Washington DC , and West Virginia
  - 8 academic members
  - 4 Federal agency members; USACE, USDA, NOAA, and USGS
  - Support to MLAT from the Modeling Team

Review of National Laboratories

- Physical Modeling Laboratory – dedicated buildings and staff; the *National Center for Atmospheric Research* (NCAR), which develops widely-used weather and climate change models, is a good example ($170 million annually).
- Virtual Modeling Laboratory - U.S. Integrated Ocean Observing System (IOOS), a consortium of different universities, agencies, and principal investigators effectively sharing modeling platforms, code, and expertise, is a good example ($1-4 million annually).

Review of National Laboratories

- Hybrid Modeling Laboratory - combines both physical and virtual assets; an example is the modeling laboratory that supports the Community Multiscale Air Quality Model (CMAQ), the model widely used in the nation and internationally for air quality management (small core staff, with multiple funding partners).

Rationale for a Modeling Lab?

- Testing of the model/establishing uncertainty
- Assessing monitoring needs
- Enhancing credibility by involving more expert opinion
- Adding model enhancements not now possible
- Gaining buy-in from stakeholders
- Implementing adaptive management
- Communicating understanding

Rationale for a Modeling Lab?

- Modeling Team is not able to address all of the priorities/recommendations that it has received
- Current list of 431 model issues identified by the Water Quality GIT + STAC recommendations
- Major issues such as:
  - Incorporating lag times
  - Including more BMPs
  - Adding shallow water modeling
  - Connecting water quality to living resources
  - Model use & accessibility at state and local level

Essential Functions of Models for the Chesapeake Bay Program

- Operations – defined as the rapid and automated development of scenarios. The CBP Partnership currently undertakes 100-200 Scenario Builder and Watershed Model runs per year
- Operational Development - programming and development work that supports the ability of the CBPO to efficiently run scenarios and to quickly respond to decisions made by the partnership. Usually enhancing the current models to incorporate new information, to run more efficiently, or to be calibrated more effectively

Essential Functions of Models for the Chesapeake Bay Program

- Research-Oriented Development - model development to add new processes or BMPs that are not represented in the current model; consists of conceptual modeling, code development, testing, and model validation.
- Research – processes that the current model does not represent and may require significant model reconfiguration or sub-model development (lag times as an example).

Modeling Laboratory Governance

- The Modeling Laboratory governing body or Board of Directors appointed by the Management Board.
- Appointees must have the authority to make the technical decisions related to modeling at the CBP.
- Appointees must also have the technical and scientific expertise in order to make those decisions.
- The Board would determine the work elements related to model development that would be incorporated into annual laboratory workplans.

Recommended Actions to Create a CBML

- **Recommendation #1:** MLAT reached consensus on a recommendation that a Chesapeake Bay Modeling Laboratory be established to take on research, research-oriented development, and some operational development of Chesapeake Bay Program models. A modeling laboratory is a critical component in addressing the significant issues brought up by the NRC/NAS report and STAC recommendations.

Recommended Actions to Create a CBML

- **Recommendation #2:** The state representatives on MLAT strongly recommended that the Modeling Laboratory should also assemble and calibrate the operational models. Under this recommendation, the existing Modeling Team at the CBPO office would be incorporated into the Modeling Lab.

Recommended Actions to Create a CBML

- **Recommendation #3:** A Modeling Laboratory Board of Directors appointed by the Management Board should be created from a re-constituted Modeling Workgroup. The appointees must have both the technical expertise and the authority to make the technical decisions related to modeling at the CBP.

Funding a Modeling Laboratory

- Funding must be sustainable; not grant funding.
- The governance board should work with the funding organization to develop a Request for Proposals or Services (RFP/RFS) that outlines the ML tasks.
- The Modeling Laboratory will require new funding of $1.5M for the research component and an additional $0.5M for the operational component.

Observations from MLAT

- Strengthen the Modeling WG – regardless of whether a CBML is funded, the role of the Modeling Workgroup in decision making regarding model revisions/improvements and final model approval should be strengthened.
- Formalize communication – communication regarding model revisions and final model approval needs to be improved. This is particularly true as deadlines approach.

Questions?