A Tidal Water Model for the Assessment of 2035 Climate Change Risk to the Chesapeake TMDL

Modeling Quarterly Review

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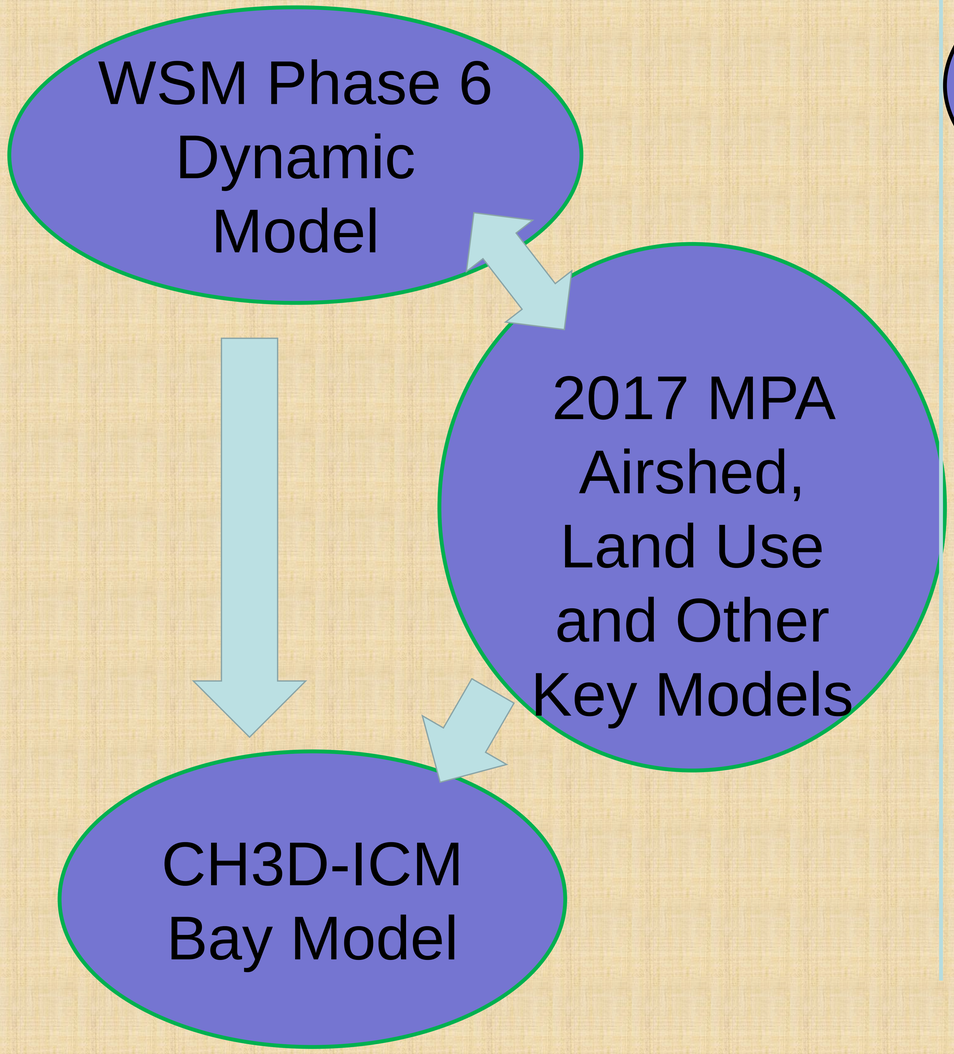
Chesapeake Bay Program

Science, Restoration, Partnership

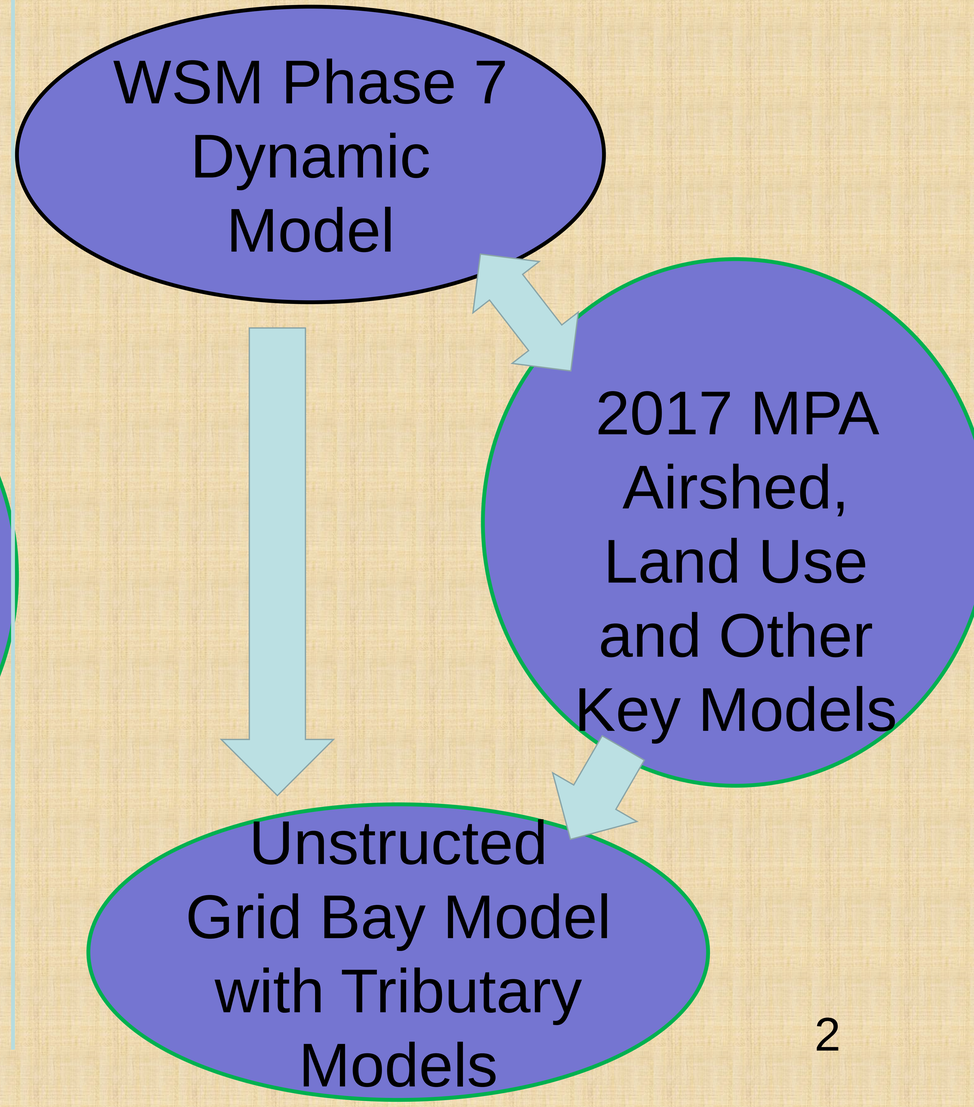
CBP Bay Model Products

Estuarine loading and carrying capacity, ancillary Bay model studies, and information collaboration with CBP research community.

Use from 2017 Midpoint Assessment (MPA) to 2025 assessment of progress with 2025 CBP Goal.

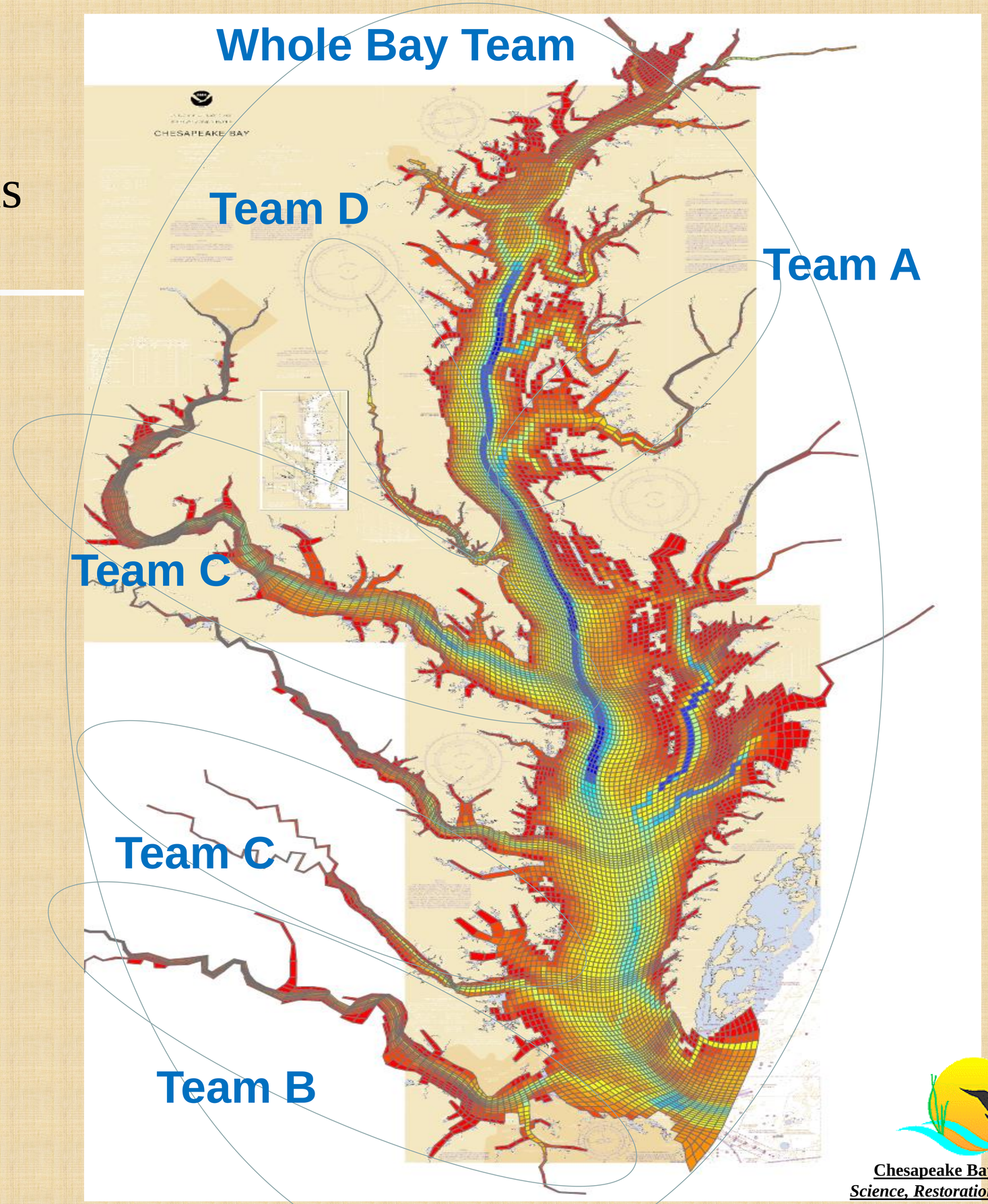


Use in 2025 for 2035 Climate Change Risk Assessment to CB water quality standards and TMDL.



How an Unstructured Grid Model in the Chesapeake with Multiple Model Teams Could Work

- Similar to CMAQ multiple models approach.
- Main Bay Model of all tidal waters used for integration of tributary model findings and for management scenarios.
- Multiple model teams working in tributaries and sharing collaboratively information with all model teams on a regular basis.



Timeline: 2021 to 2022

2021
RFA Completed. Teams in place. Initial Main Bay and Trib. Model Work

- Get initial CBP Bay Model structure in place with Main Model and Nested Fine Scale Tributary Models.
- Work on shallow water DO, clarity, and chlorophyll simulation begins.

2022
Main and Tributary Model Development

- Main and Tributary model structure and boundaries determined.
- Decision rules for regulatory model calibration established.
- Begin Trib Models and semiannual Trib Model PI meetings.
- Examine use of linked watershed to tidal water hydrology inputs from Phase 7.

Timeline: 2023 to 2024

2023
Refine shallow water DO, clarity/SAV, chlorophyll for WQ standard assessment

- Use linked watershed to tidal water hydrology, sediment, and nutrient inputs from Phase 7 Watershed Model (Phase 7 Model complete and fully operational in December 2023).
- Continue semiannual Trib Model PI meetings.
- Demonstrate shallow water DO, clarity/SAV, chlorophyll.

2024
Unstructured Grid Bay Model fully operational December 2024

- Adjust for input load changes from hydrology, sediment, and nutrients due to final reviewed version of Phase 7 model.
- Continue Trib Models and semiannual Trib Model PI meetings.
- Complete shallow water DO, clarity/SAV, chlorophyll refinements
- Unstructed grid Bay Model fully operational December 2024.

Timeline: 2025 to 2026

2025
Apply Unstructured Grid Bay Model to 2035 climate change risk to Chesapeake water quality standards

- Apply the 2025 Unstructured Grid Model to 2035 climate change risk.
- Determine the carrying capacity the Bay has for nutrient loads under 2025, 2035, 2045, and 2055 conditions.
- Examine in detail Open Water DO, clarity/SAV, and chlorophyll water quality standards under scenario conditions for Bay and Tribs.
- Develop nitrogen/phosphorus tradeoffs for tidal waters.

2026
Confirm and support CBP decision makers with 2035 climate change risk assessment

- Develop tributary and local tidal water assessments as requested by CBP Partners.
- Update local tidal water TMDLs, e.g., James Chlorophyll TMDL as requested by CBP.
- Main Bay Model “frozen” until 2035 but continue Trib Models and semiannual Trib Model PI meetings through 2025 and 2026.

Next Steps

- April will see the RFA completed and reviewed by CBPO and EPA Regin 3 Grant Offices and the RFA Evaluation Team formed.
- In the second quarter the RFA will be released.
- The period of RFA response, review of proposals, selection of Main Bay and Tributary Teams, documentation, review, and approval of selections will cover the third and fourth quarter of 2021.
- In late 2021 five-year grant begins for Unstructured Bay Model and Tributary Teams.

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