

CBP requests for STAC review of Ph7 models and analytical tools, 2026-2027

STAC Retreat June 15, 2026

- Introduction of new models and tools
- Scope of reviews
- Timing and planning of reviews
- Charges and suggested questions
- Path forward

The 4D Interpolator

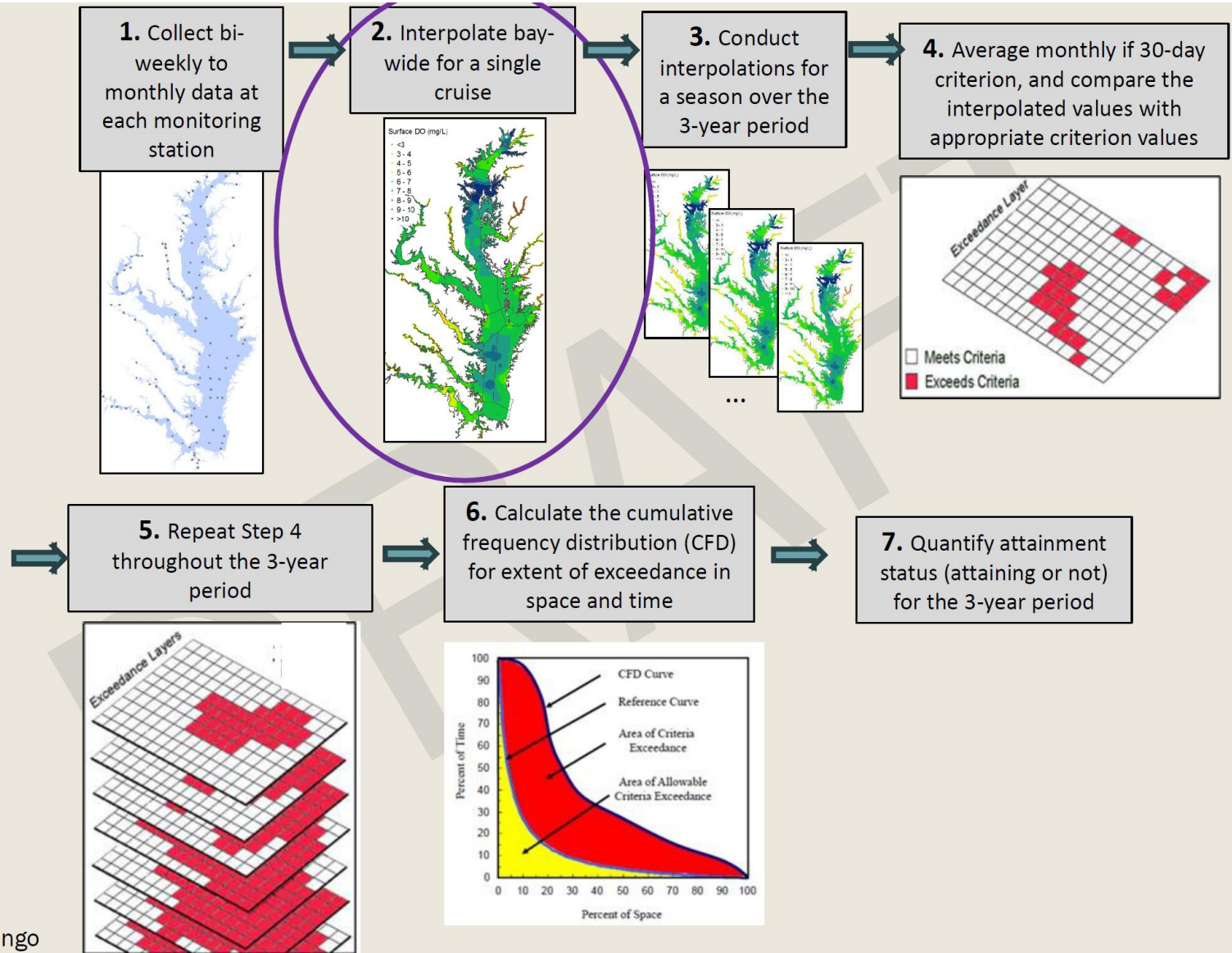
A new 4D (space and time) Interpolator is almost finalized and the CBPO has requested that STAC provide a technical review, which “will help inform decisions for multiple goals in the *Watershed Agreement* and address an assessment need that has existed for over 20 years across the Chesapeake Bay. The approach to be reviewed consists of the methods developed and assumptions made in the process to ensure the scientific integrity of the tool as it stands.”

The CBP has requested that the STAC review begin in October 2026 and be completed before March 2027.

Models are used to simulate the response of the Watershed and Bay to BMP implementation or the changing climate. However, interpolated observations are used to evaluate whether expected changes have occurred/criteria have been met. Currently this is done with a 3D (spatial) interpolator.

WQS Criterion Assessment

From Peter Tango

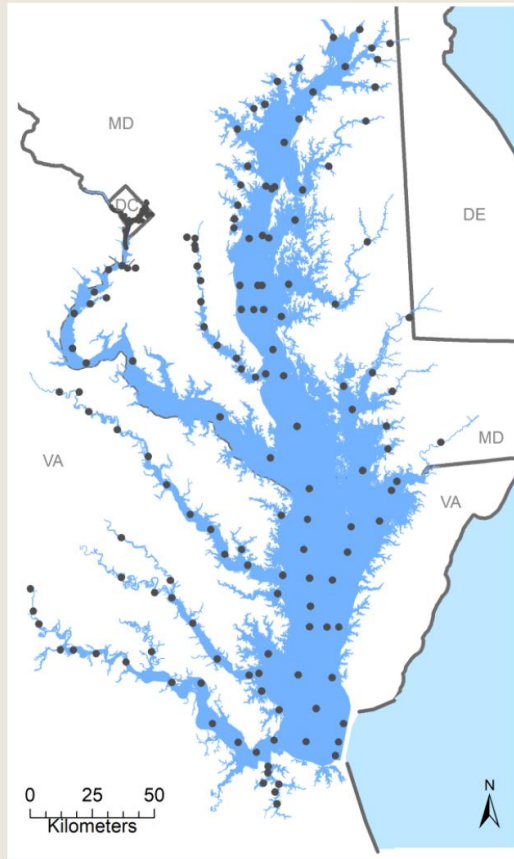


Why do we need a new method?

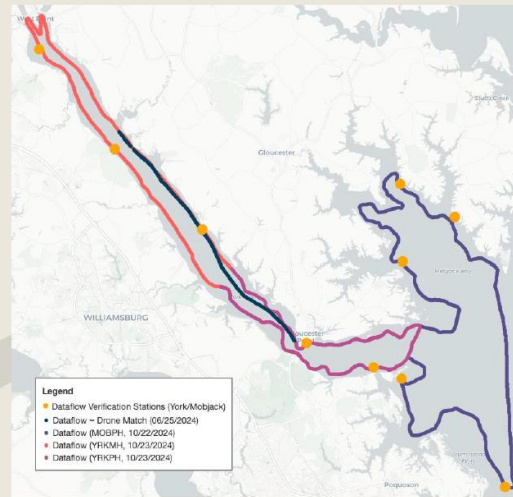
- The current interpolator (developed 20+ years ago) was not designed to interpolate through time or work effectively with unstructured data having mixed time scales and sampling patterns and sourced from multiple monitoring programs.
- There is more high frequency data now to fill in temporal gaps.
- A new interpolation will use all the data to fill in the gaps between data based on observed patterns to help accurately assess high frequency DO criteria.
 - Chesapeake Bay Program interest in 4D Interpolation started because water quality criteria for the 303d listing require assessments at finer space and time scales than current data can support.

Dissolved Oxygen data sets

Bi-weekly long-term sampling (DOEE, MDDNR, VADEQ, CBP)



Dataflow (MDDNR and VECOS)



From <http://vecos.vims.edu/>

Shallow water continuous monitoring (MDDNR and VECOS)

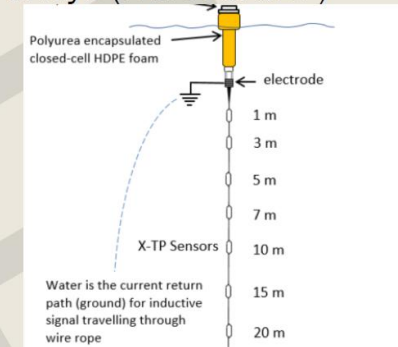


From <http://vecos.vims.edu/>



From <https://eyesonthebay.dnr.maryland.gov/>

New continuous vertical arrays (NOAA & CBP)



<https://www.chesapeakebay.net/who/group/hypoxia-collaborative-team>

And more Citizen science, riverkeepers, research data sets, and future data sets

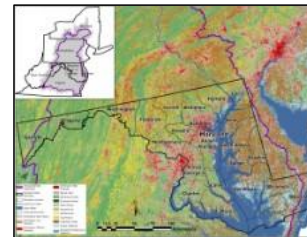
The CBP Model Suite – How CBP Makes a Plan

CBP uses the model suite to:

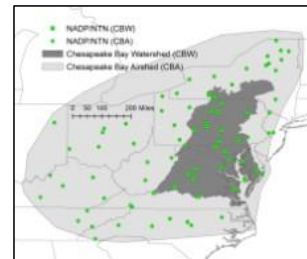
- Estimate levels of nutrients and sediment that reach the bay under different land management scenarios
- Set targets for nutrient and sediment reductions for jurisdictions
- Plan for practices that will allow us to reach goals (Watershed Implementation Plans)
- Track progress towards restoration goals

Data and Model Inputs

BMP Data
Land Use Data
Point Sources Data
Septic Data
U.S. Census Data
Agricultural Data



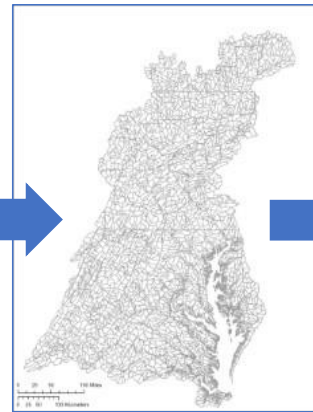
Land Use Change Model



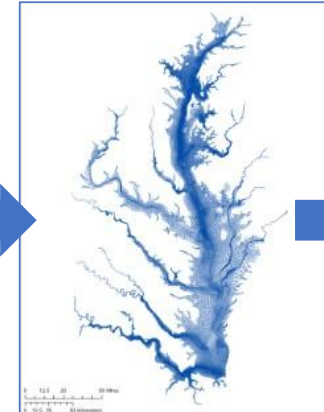
Airshed Model

Precipitation Data
Meteorological Data
Elevation Data
Soil Data

Phase 7 Watershed Model/CAST



Estuary Model

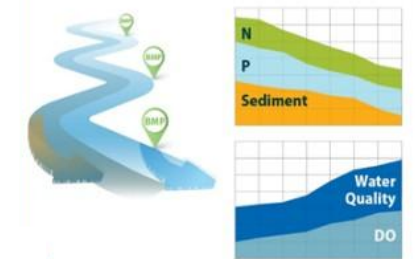


Model Outputs

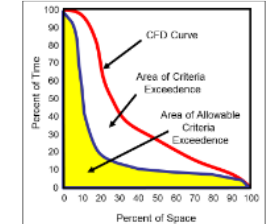
Prediction of Impacts



BMP Implementation Results



Criteria Assessment Procedures



Nutrient and sediment targets for CBP state and Federal partnership

Effects

Targets

The CBP Model Suite—Why we update the model

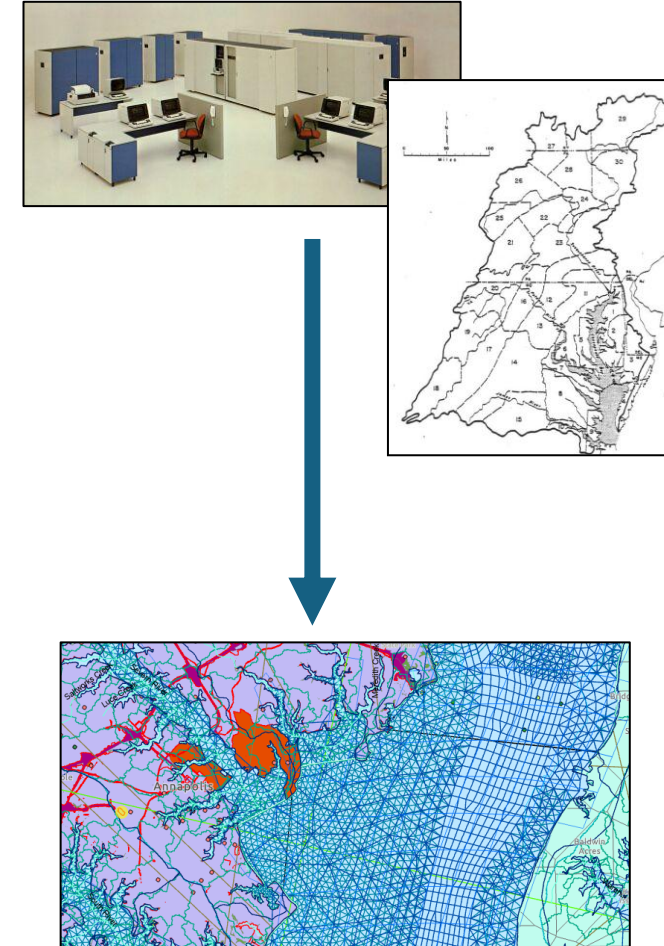
The models are built by the partnership

- Expression of the CBP partnership's knowledge about the Chesapeake system.

Updates ensure confidence and credibility

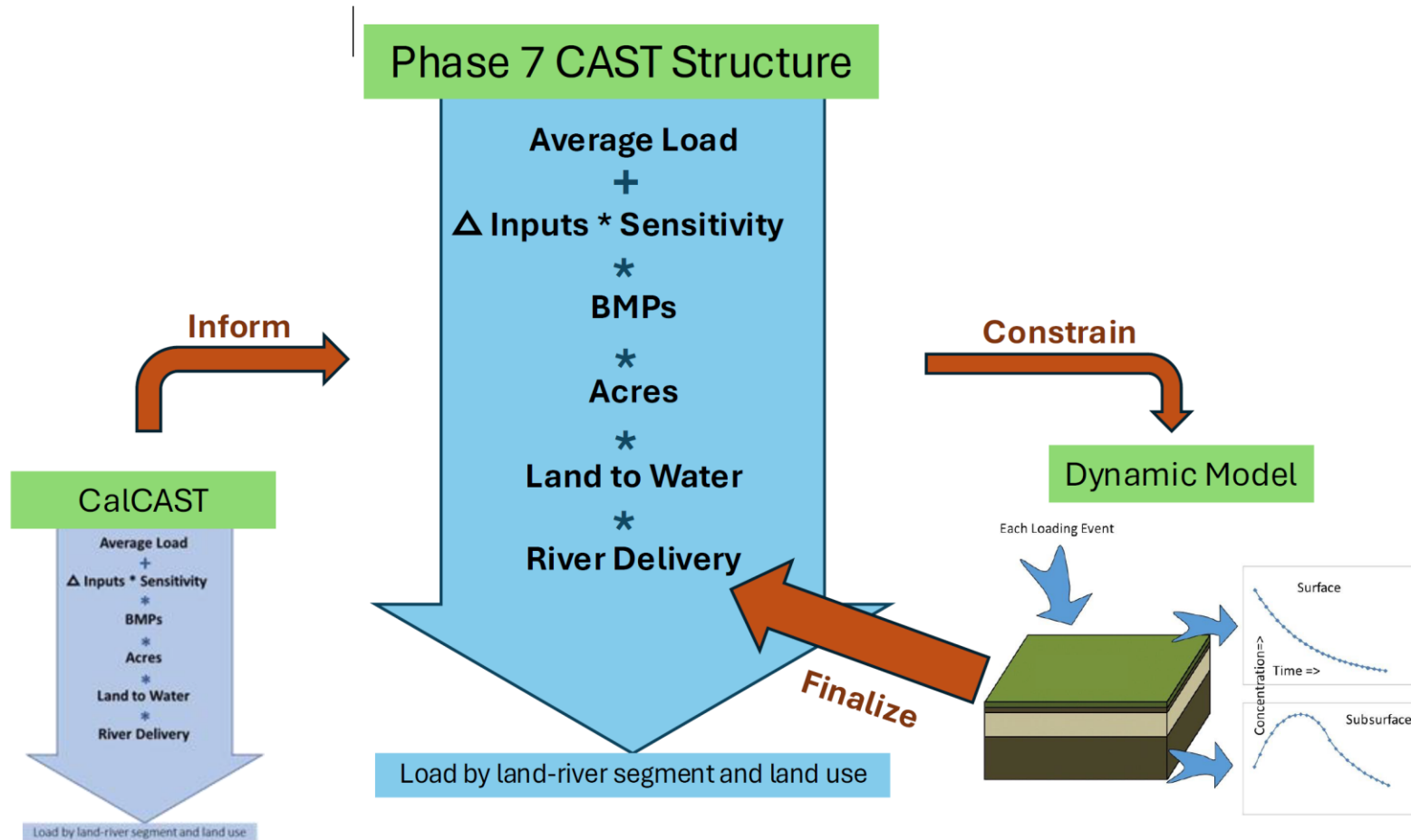
- New model every ~ 10 years
- Smaller updates within (2-4 years)
- Incorporation of new data, scientific advances, and partner feedback... *more confidence, more credibility*

<u>Time</u>	<u>Name</u>	<u>Scenarios</u>
Mid 1980s	NA	0
Early 1990s	Phase 2	<10
Late 1990s	Phase 4.1	37
Early 2000s	Phase 4.3	400+
2009 – 2010	Phase 5.3.0	300+
2011 – 2017	Phase 5.3.2	1000 or so
2017	Phase 6	1000s per year
2028 – 2040	Phase 7	Many more...



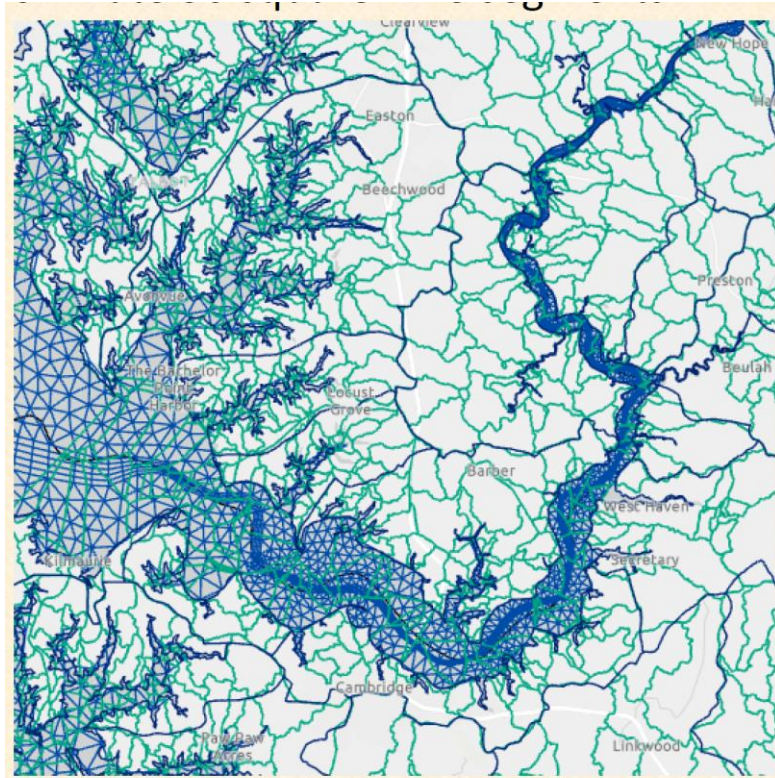
Which aspects of the Watershed Model system should be reviewed?

(figure from Modeling Workgroup meeting July 2025)

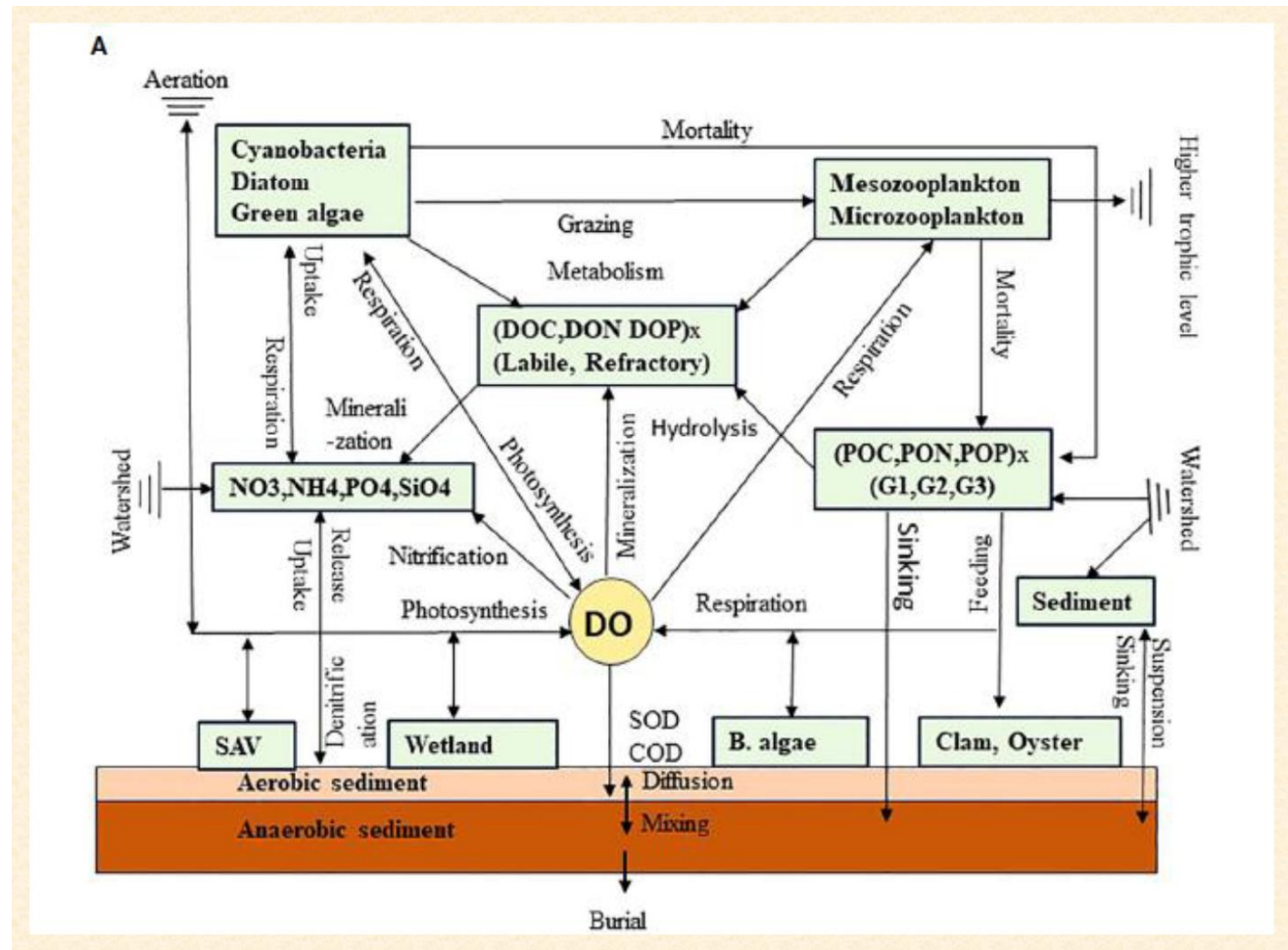


Which aspects of the Main Bay Model system should be reviewed?

(figure from WQGIT talk 3/24/25)



Showing the Phase 7 Watershed Model finest level grid of NHD+ segments and the Phase 7 Bay Model grid.

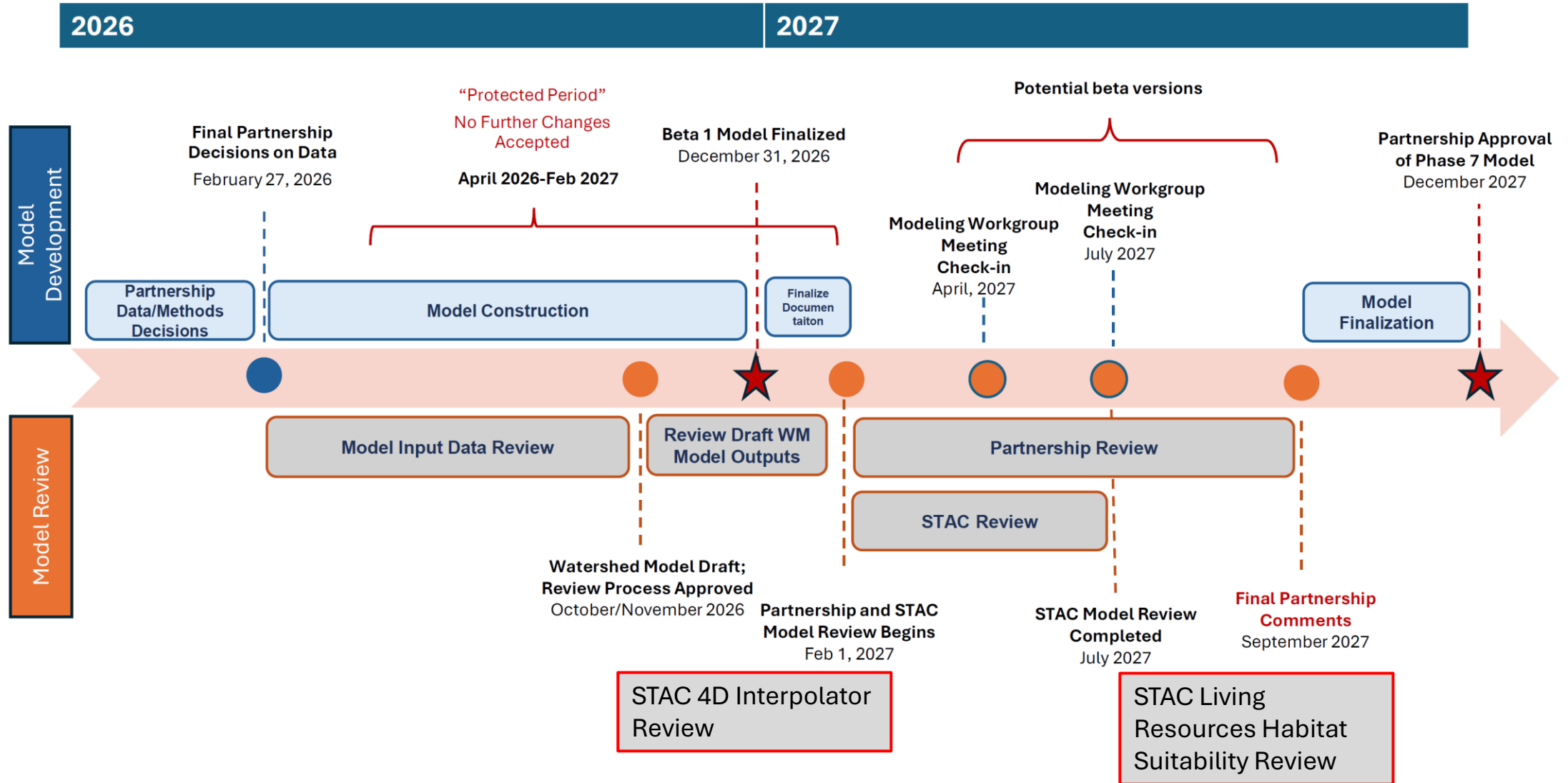


Living Resources Habitat Suitability

- A final piece of the Phase 7 development is Living Resources Habitat Suitability analysis, based on model outputs. This is not as well defined yet, but it is expected to be by the middle of 2027.
- The CBP would like STAC to review this approach, hopefully before the end of 2027 so that it might be completed in time to fold the approach into the Phase 7 target development. This would mean the LR HSI review would likely overlap with the Phase 7 Reviews next year.

Timing of the model suite reviews

from a presentation by Bo Williams 2/23/26



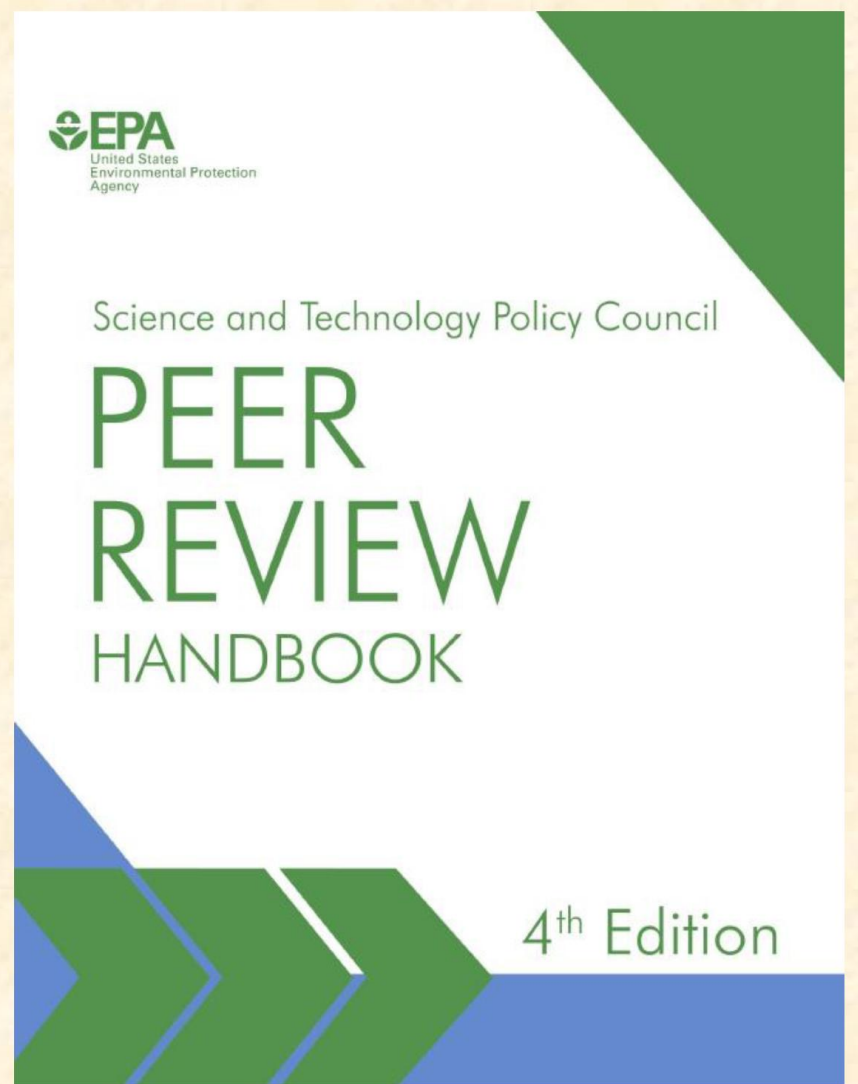
Basis for Review Planning

From a presentation by Lew Linker 7/8/25

EPA's Science Advisory Board (SAB) has provided recommendations for model peer review as part of its guidance on using and evaluating models for environmental decision making.

The recommendations are found in various EPA documents, such as the Peer Review Handbook and Guidance on Development, Evaluation, and Application of Environmental Models. The SAB regularly updates its recommendations.

U.S. Environmental Protection Agency
Peer Review Handbook 4th Edition October 2015
https://www.epa.gov/sites/default/files/2020-08/documents/epa_peer_review_handbook_4th_edition.pdf



Important Steps in planning a formal PR process include:

1. Deciding whether internal or external review is needed.
2. Starting documentation process.
3. Drafting the charge.
4. Ensuring adequate resources.
5. Setting timelines.
6. Identifying independent expertise while avoiding potential COI concerns.
7. Considering Public Input.
8. Preparing Materials for review.
9. THEN, finally carrying out the review, receiving and responding to the report, and disseminating the result.

Figure 1, the diagram of the peer review process, illustrates the Agency's overall peer review process for scientific or technical (including economic and social science) work products. The Agency process emphasizes early categorization of the work product—preferably at the conceptual stage—into one of three categories: Influential Scientific Information (ISI); Highly Influential Scientific Assessment (HISA), which is a subset of ISI; or other.

The ISI and HISA categories have been identified and defined by the Office of Management and Budget (OMB) in its *Final Information Quality Bulletin for Peer Review* (OMB Peer Review Bulletin) (Appendix B). Management approval and documentation of key decisions throughout the peer review process are emphasized. The EPA also demonstrates its commitment to transparency in the peer review process by providing opportunities for public participation.

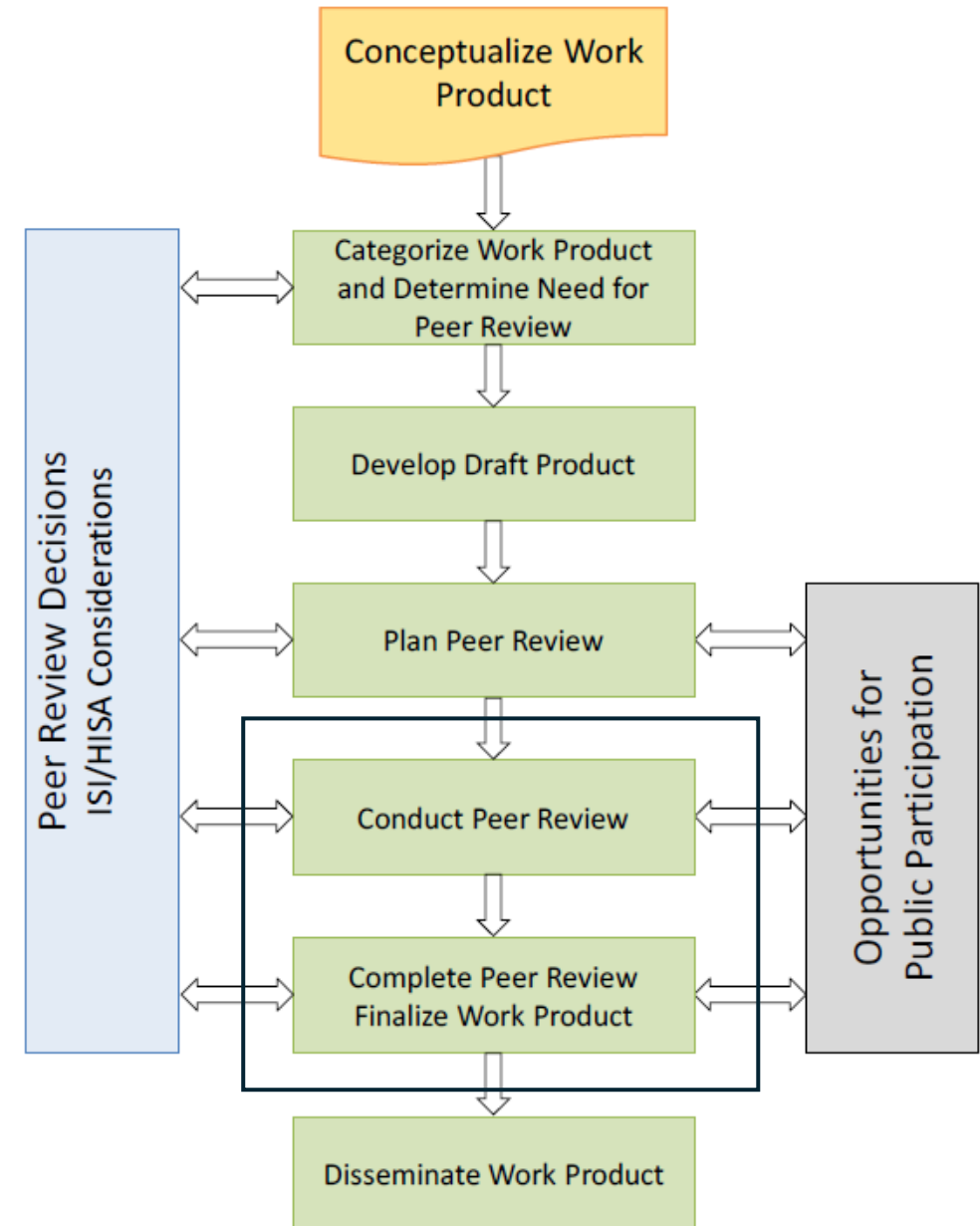


Figure 1. The Peer Review Process

Additional considerations from Lew's July 2025 Presentation

Consideration of application and limitations: The review should assess the model's application niche and the conditions under which its use is scientifically defensible, thereby helping users understand its limitations.

Key review elements: Critical elements of model peer review could include the modeling purpose, theoretical basis, parameter evaluation, data quality assumptions, performance measures, documentation, and retrospective analysis (backcast scenarios).

Planning integration: Peer review should be integrated into the planning and modeling timeline with adequate schedules and resources.

Options for Phase 7 Reviews

- The formality of each requested STAC review depends on
 - **Regulatory status** – if the model system in question is to be used for setting environmental regulations, it requires a high level of independent peer review, probably utilizing at least some external experts to avoid any appearance of conflict of interest
 - **Resource availability** – rigorous reviews (in keeping with past practice) involve at least 1-2 in person panel meetings with CBP personnel available to provide context and answer questions. This implies significantly higher travel costs and much more logistical support.
 - **Partner confidence** – the greatest new tool will accomplish little without partner confidence in its validity.
 - **So – Cadillac or Chevy?** And for which reviews?

Additional Considerations - Topics and Complexity

- Watershed Model
 - TMDL purposes only
 - New Hydrologic Long Term & Critical Period
 - Consideration of additional factors and/or pollutants
 - Characterization of stream habitat suitability
- Bay Model
 - TMDL purposes only
 - New Hydrologic Long Term & Critical Period
 - Consideration of additional factors and/or pollutants
 - Characterization of shallow water environments
- 4D Interpolator performance
 - Separate tool or integration into/comparison with Ph7 Bay Model
- Living Resource Habitat Suitability
 - Characterization of stream habitat suitability
 - Characterization of shallow water environments

Supporting Materials

- EPA Peer Review Handbook available
- Previous Ph6 reviews available
- 2008 STAC Expert Panel report on 4D Interpolator feasibility available
- Draft charges and suggested questions for 4D Interpolator and Phase 7 model reviews available