CAP WG
Water Quality Criteria Assessment – Beyond 2025 Discussion intro

Peter Tango
USGS@CBPO
Chair CAP WG
5/6/2024

Today's meeting – focused on 4D update and questions to help guide development details

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appendix

Analytical Approaches for Assessing Short-Duration Dissolved Oxygen Criteria

The Chesapeake Bay dissolved oxygen criteria have several different durations: 30-day mean, 7-day mean, daily mean and instantaneous minimum. Users' ability to assess these criteria and to have certainty in the results depends on the time scale of available data and on the ability of models to estimate conditions at those time scales. At present, long-term, fixed-station, midchannel water quality monitoring in the Chesapeake Bay and its tidal tributaries provides dissolved oxygen measurements twice monthly at most or approximately every 15 days between April and

USEPA 2003

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  - Spectral analysis using long-term and short term patterns in data (Appendix I USEPA April 2003)
  - Conditional attainment – (Chapter V in USEPA Oct 2004, Chapter II USEPA 2017).
  - Direct assessment with enhanced monitoring (Chapter II USEPA 2017)

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    - Potentiallly applicable, feasible, but it requires agreement upon acceptable uncertainty
    - Low sample density translates to large uncertainty bounds on means requiring massive changes in water quality conditions to overcome the boundaries of uncertainty if you want/need 90% or 95% confidence in a change in attainment status
  - Direct assessment with enhanced monitoring (Chapter II USEPA 2017)

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- Basically, 25 years without agreed upon, approved, adopted short duration criteria assessment
- Multiple approaches have been presented during this time.
- New approaches that effectively address all criteria assessment application periods are being developed.
- New monitoring support of high temporal density information in deep waters presents revisiting even basic questions – i.e., how do we calculate a mean? How do we handle missing data? How do we interpret the result against a criterion?

Historical interest in 4-dimensional (4D) water quality interpolation: 2008 STAC Workshop

Assessing the feasibility of developing a four-dimensional (4-D) interpolator for use in impaired waters listing assessment December 2008 STAC Publication 08-008

Recommendations from the STAC Expert Panel

- Frank Curriero (Johns Hopkins University)
- Eileen Hofmann (Old Dominion University)
- Ragu Murtugudde (University of Maryland)
- Jian Shen (Virginia Institute of Marine Science)
- J. Andrew Royle (U.S. Geological Survey)

2008 Findings

The panel recommended a study to evaluate the different approaches available for developing a 4-D interpolator

Where we are heading: Assessment of all Bay oxygen water quality criteria in beyond-2025

A new analysis system, built on an expanded data collection effort, is envisioned that will allow assessment of all water quality criteria. Figure 1 shows the flow of information in the proposed system.

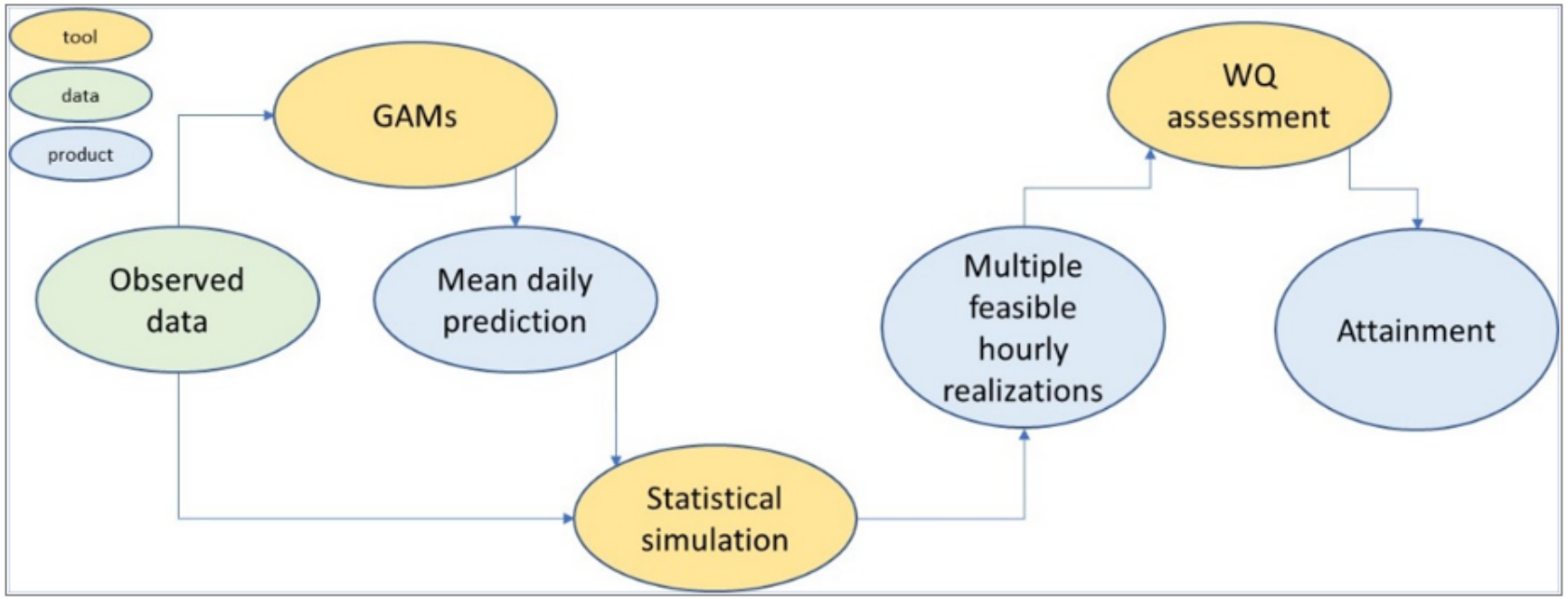

Figure 1: Interpolation and attainment assessment system

Source: G. Shenk

Plan as of February 2024

2024: Continued development on daily and hourly interpolation

2025: Additional development and linking to criteria evaluation

2026: Review year

2027: Operational

Draft January 2024

Priority categories for 2024 are in red

Calendar Year	2022				2023				2024				2025				2026				2027		
Calendar Quarter	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-Sep	Q4 Oct-Dec	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-Sep	Q4 Oct-Dec	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-Sep	Q4 Oct-Dec	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-Sep	Q4 Oct-Dec	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-Sep	Q4 Oct-Dec	Q1 Jan-Mar	Q2 Apr-Jun	Q3 Jul-S
Project Year	Year 1				Year 2					Year 3			Year 4				Year 5				Year 6		
1. Development-daily estimates	■	■	■	■	■	■	■	■	■	■	■												
2. Develoment-hourly estimates					■	■	■	■	■	■	■	■											
3. Development - shallow water							■	■	■	■	■	■	■	■	■								
4. Development - GIS tasks	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■						
5. Development -combined daily & hourly								■	■	■	■	■											
6. Development-criteria evaluation								■	■	■	■	■	■	■	■	■							
7. Software							■	■	■	■	■	■	■	■	■	■							
8. Documenting	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■			
9. Training													■	■	■	■							
10. Year of Review																	■	■	■	■			
11. Operational																					■	■	■

May 2024: Questions from CAP WG members are helping direct presentations, discussions, document topics, e.g.,

1. What can the 4D interpolator do, what can’t it do?

2. We'd like to make sure that the 4D interpolator can handle and use all of the continuous monitoring data that our DNR partners are collecting and be adaptable enough to incorporate new data streams (from both government entities and NGOs) as they become available.

3. Be able to have it be recalibrated over time to improve its accuracy

4. Be fully understood by and maybe even run by the states.

Co-development – we need continued community input

- **Creating a new EPA Technical Document**
  - Dissolved oxygen chapters needed include
    - Development underpinnings of the new 4D tool
    - Updates on dissolved oxygen assessment protocols
    - Clarifications of any issues highlighted by the community for our Beyond 205 world of criteria and assessment

- Presentations on progress and issues aimed to highlight development decisions needing community input in a discussion session format for some CAP WG meetings.
  - "**The CAP WG Café**" meeting sessions
  - **Actions**: Request we come together in June with recommendations on technical guidance where possible regarding issues presented by Elgin

- **Today's café session features Elgin Perry:**

Overview of 4-D Interpolator Prediction End Points With Discussion on use in Criteria Assessment.

Elgin Perry
eperry@chesapeake.net
CAP 5/6/2024

Next CAP WG café – June 2024

Follow-up on Q&A from Elgin's May 2024 presentation for D.O. criteria assessment details under the 4D tool analysis framework; capture issues in new tech doc outline.

SAV and satellite based assessment – what is our checklist of needs for accepting a new protocol for SAV cover assessment? (Note – details to be determined as to applying a new method as part of a hybrid approach or uniquely satellite-based. TBD.)