

# WQGIT P7 Update: 4D Assessment Tool and Criteria Assessment Monitoring Advances

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USGS, UM CES

# 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 for 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.

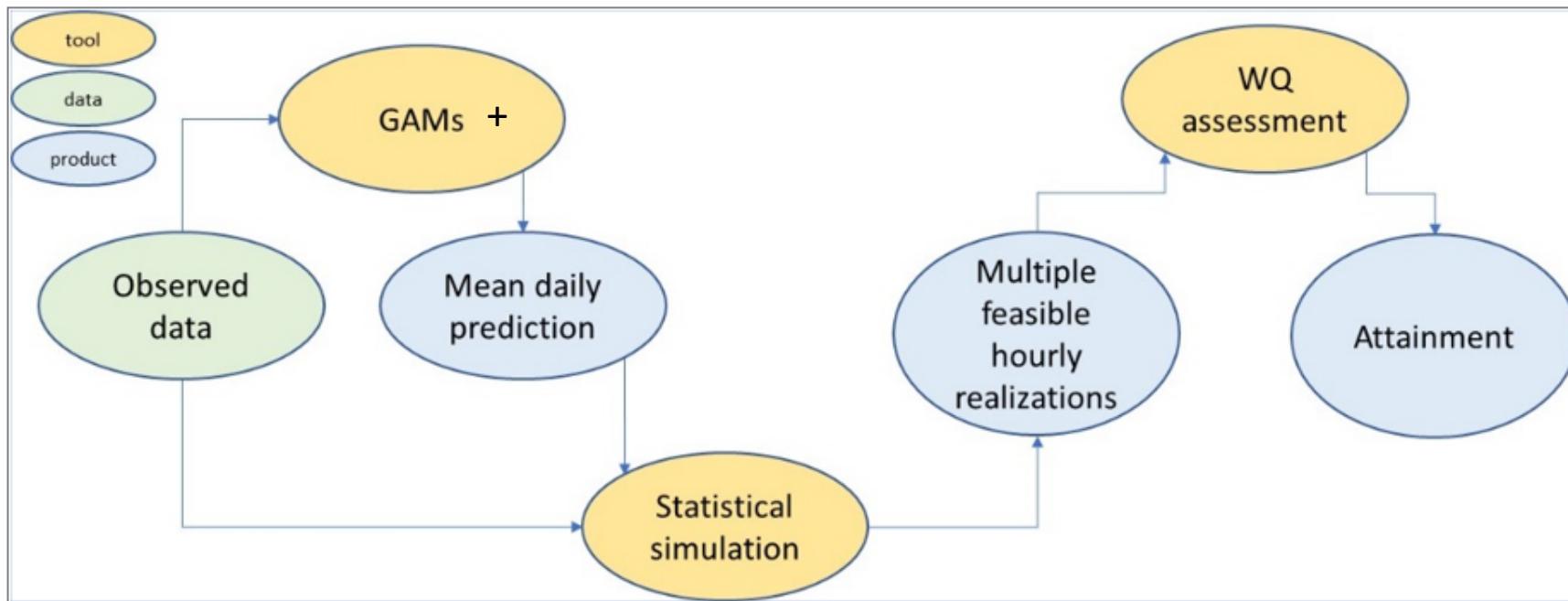
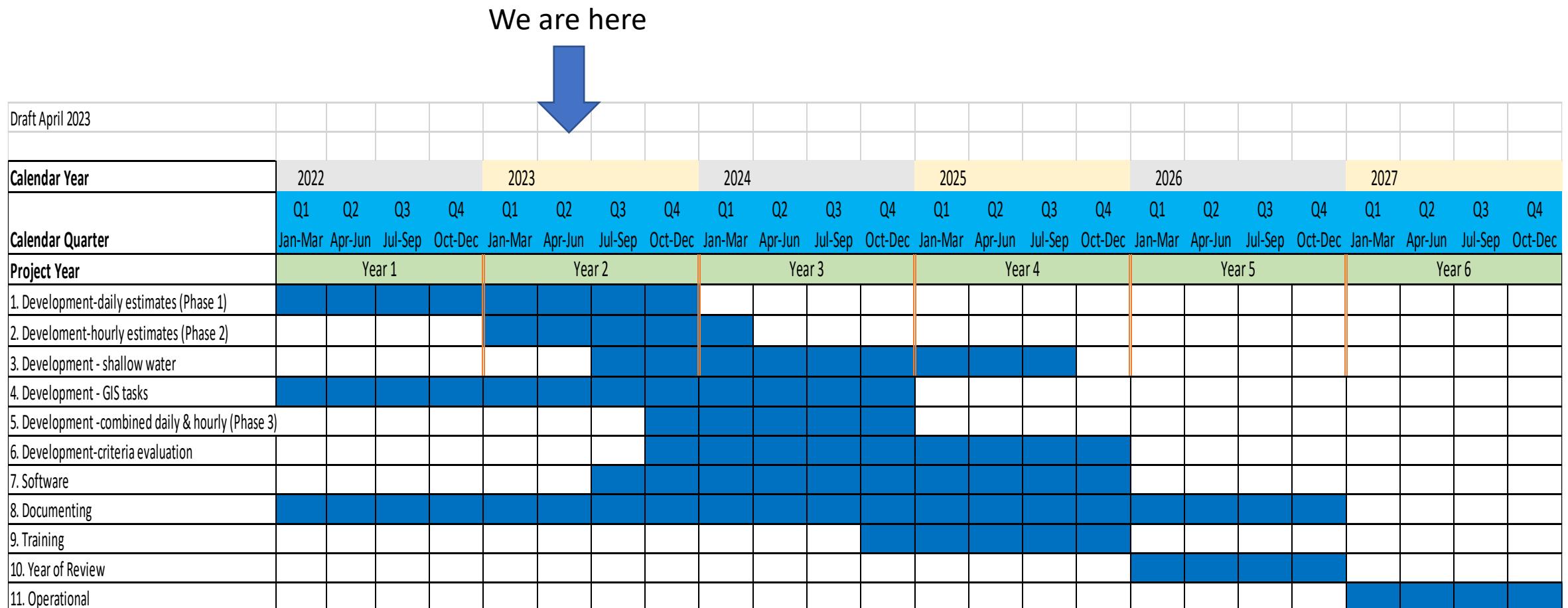


Figure 1: Interpolation and attainment assessment system

# 4D Interpolator Tool: Work timeline

- We are still very much in the early development and testing phases.



## 4D progress for interpolating dissolved oxygen concentrations (2022-early 2023)

- A **coordinate system** has been proposed underpinning the tool (Angie Wie, GIS)
- Success on having a working *daily average prototype using Generalized Additive Models (GAMs)* for a large chunk of the mainstem bay.  
(Elgin Perry and Rebecca Murphy)
  - Work ahead further calibrating and verifying its performance
- Successful application of *daily average prototype to the tidal Patuxent River* (Rebecca Murphy)

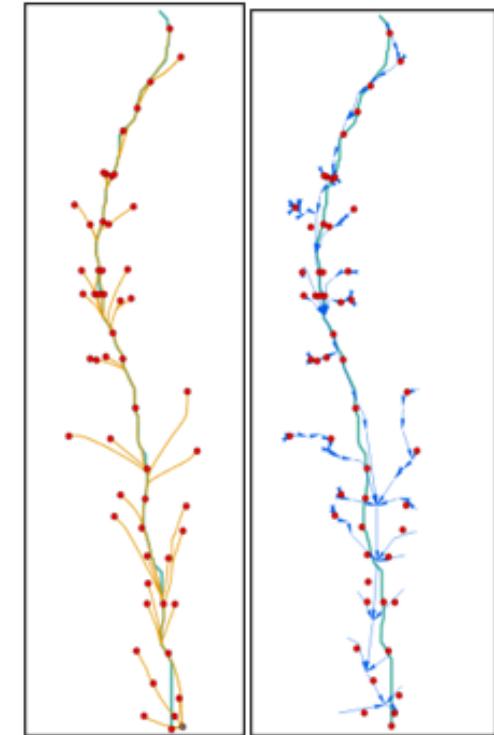
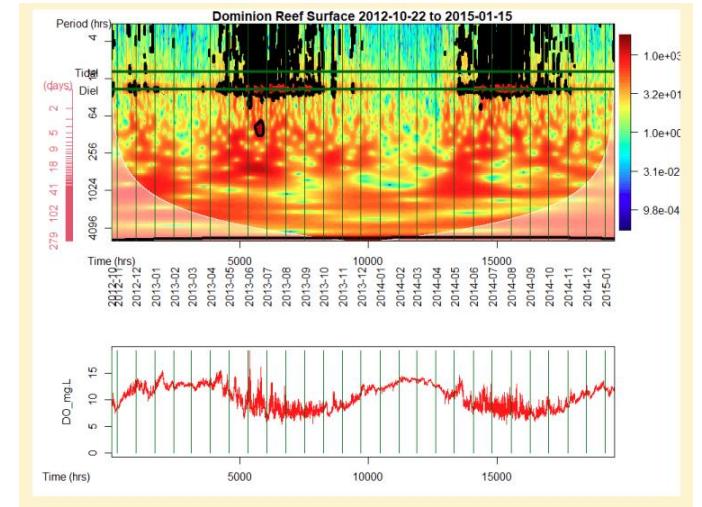


Figure 1. Graphics from RiverMiles\_v4 from Angie  
Old thalweg from Topobathy (point zero in north)  
New thalweg and path from Topobathy (point zero in south)  
NHDPlus Flowline path (point zero in south)

Mainstem bay  
Coordinate system  
Testing for the 4D world  
from Angie Wei, GIS  
team, 2023.

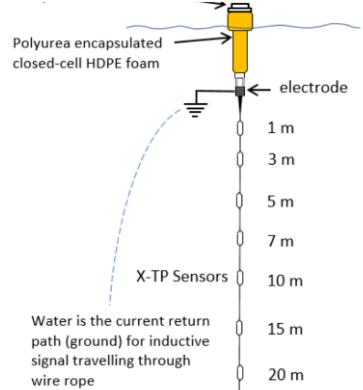
# 4D progress for interpolating dissolved oxygen concentrations (2022-early 2023)

- Method exploration for **short-duration d.o. dynamics** component of the interpolator is underway (Elgin Perry)
- **Tetra Tech support** in place to help on assembling data, creating the software of a working tool, documentation, etc.

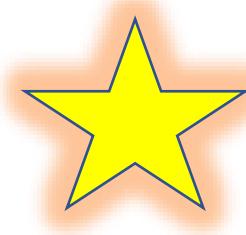


Short duration D.O.  
pattern assessment with  
wavelet analysis  
Elgin Perry, 2023

# 2023 Habitat assessment update: New infrastructure Dissolved Oxygen, Salinity, Temperature

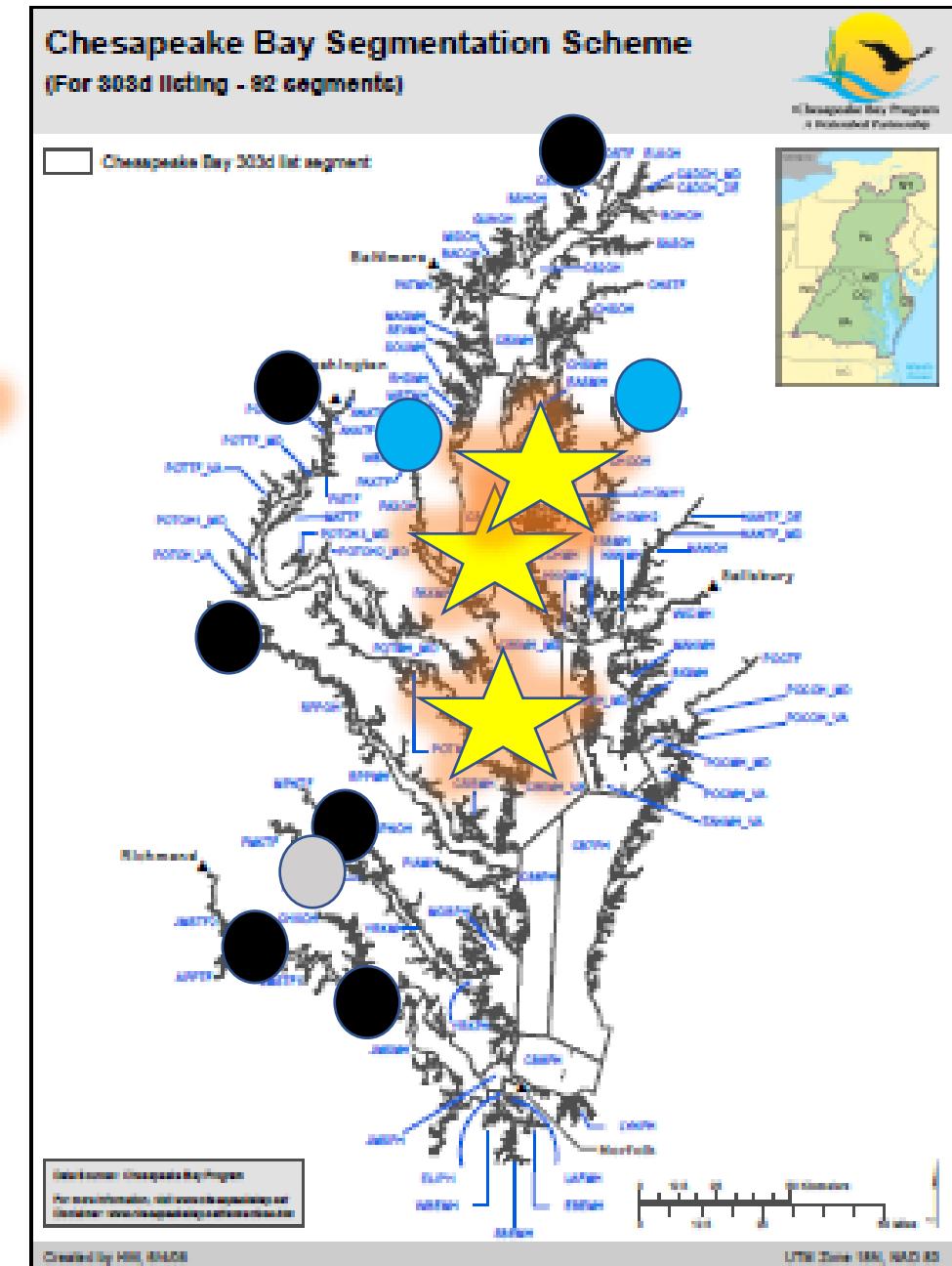


NOAA Deployments of 3 vertical arrays:  
Lower Potomac  
Mainstem Bay  
Lower Choptank River



Conowingo Dam, MD  
One of 9 RIM sites

- River input monitoring sites
  - 2023: 2 new deployments - river input water quality continuous monitoring sites (Patuxent, Choptank)
    - VA Appomatox online now too



# Satellite-assessment of SAV in Chesapeake Bay



- 2023 – EPA is providing support for work to address **2021 PSC Monitoring Review Report recommendations** regarding the developing of satellite-based SAV monitoring programming capacity.

# Improving Chesapeake Bay Program Monitoring Networks



PSC Monitoring Review: May 2021

## Chlorophyll

all customers are considered as the Prepaid Staff Committee (PSC) for three March 1, 2002 meeting stated that status of, and potential resolutions to, the current Unassigned Pay Program (UAPP) monitoring categories. The current monitoring program's presence included the status of existing and proposed UAPP network, UAPP vendor quality monitoring network, individual vendor registration, total service monitoring network, and UAPP license monitoring. In response to the status report, the FSC requested information for guidance on what is necessary to implement the UAPP monitoring categories when launched and a 90-month timeline around the initiation of status, vendor details, monitoring, and vendor access and ongoing network operations, undergoing network support in the UAPP/Unassigned Pay Program. The following table summarizes the FSC's questions and the proposed responses for the FSC. The responses are contained in the last column under pages 139-146.

Materials. Plantago lanceolata (17 plants)

For more information, visit [www.ams.org](#)

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