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

April 24, 2023

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USGS, UMCES

# 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.

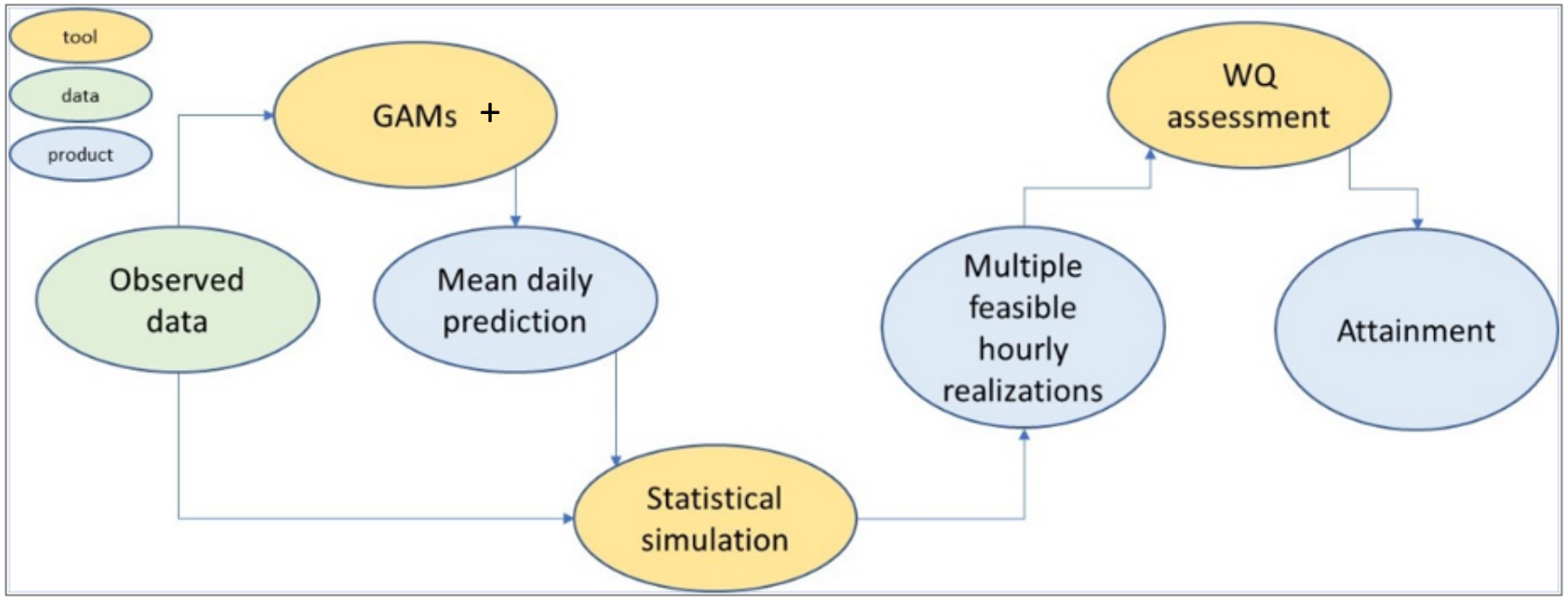


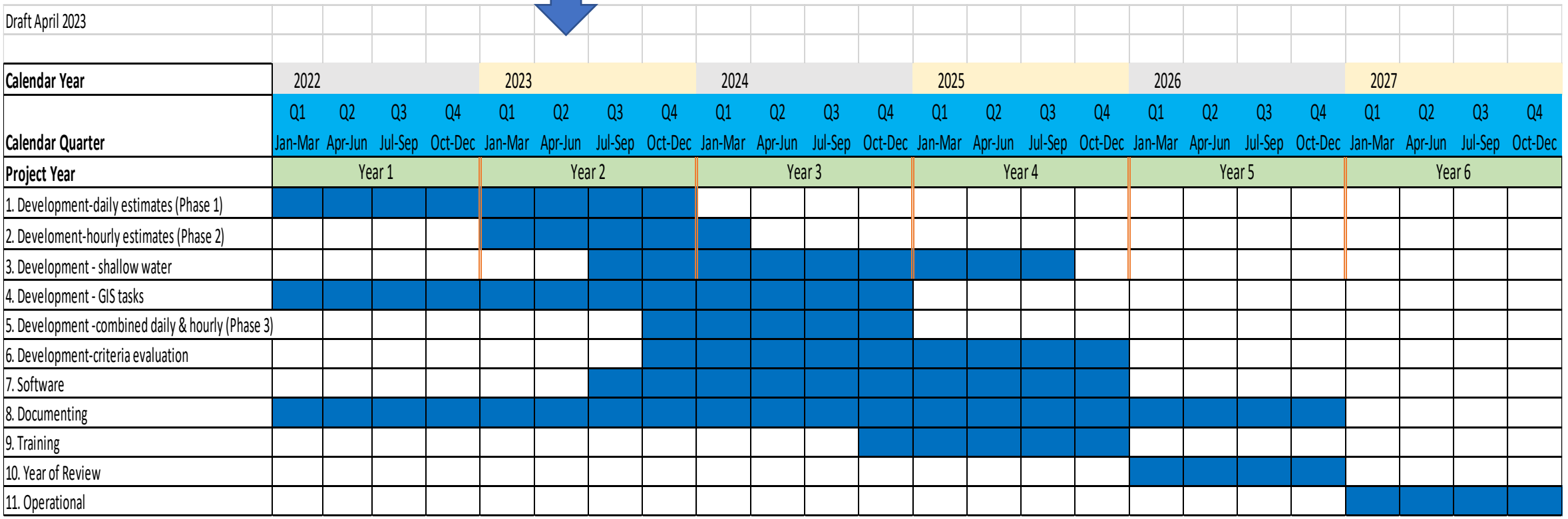

*Figure 1: Interpolation and attainment assessment system*

Source: G. Shenk

# 4D Interpolator Tool: Work timeline

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

We are here



# 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)

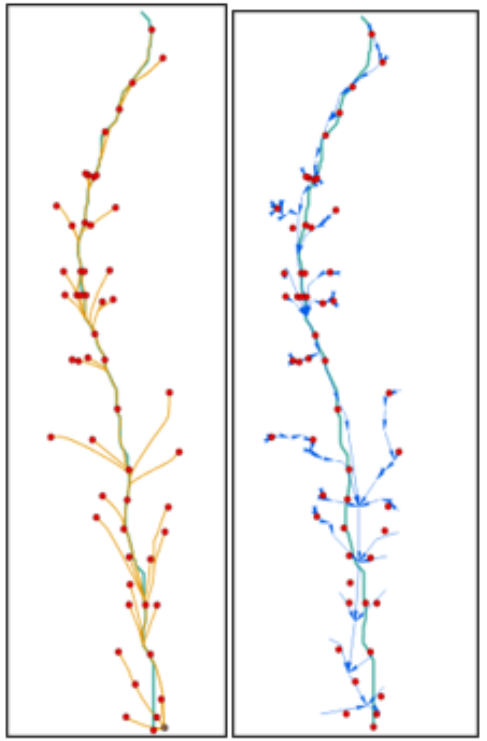


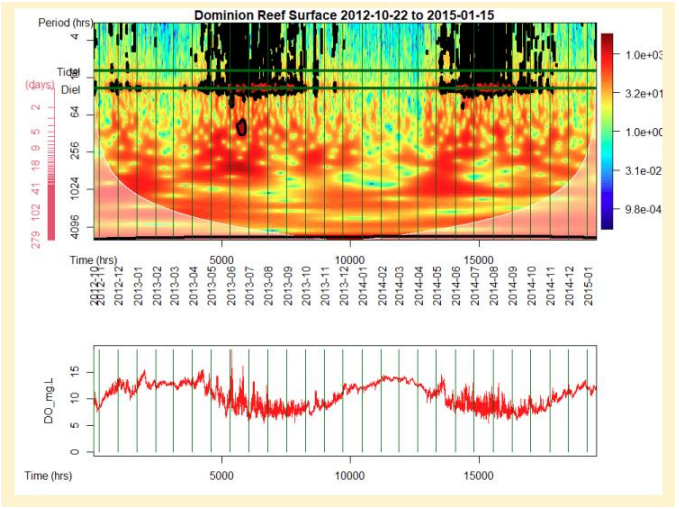

Figure 1. Graphics from RiverMiles_v4 from Angie

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)

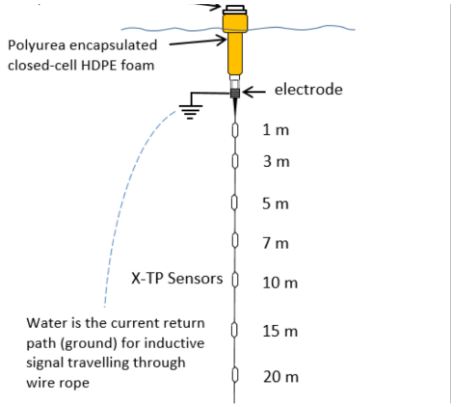
- Method exploration for **short-duration d.o. dynamics** component of the interpolator is underway (Elgin Perry)

- **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

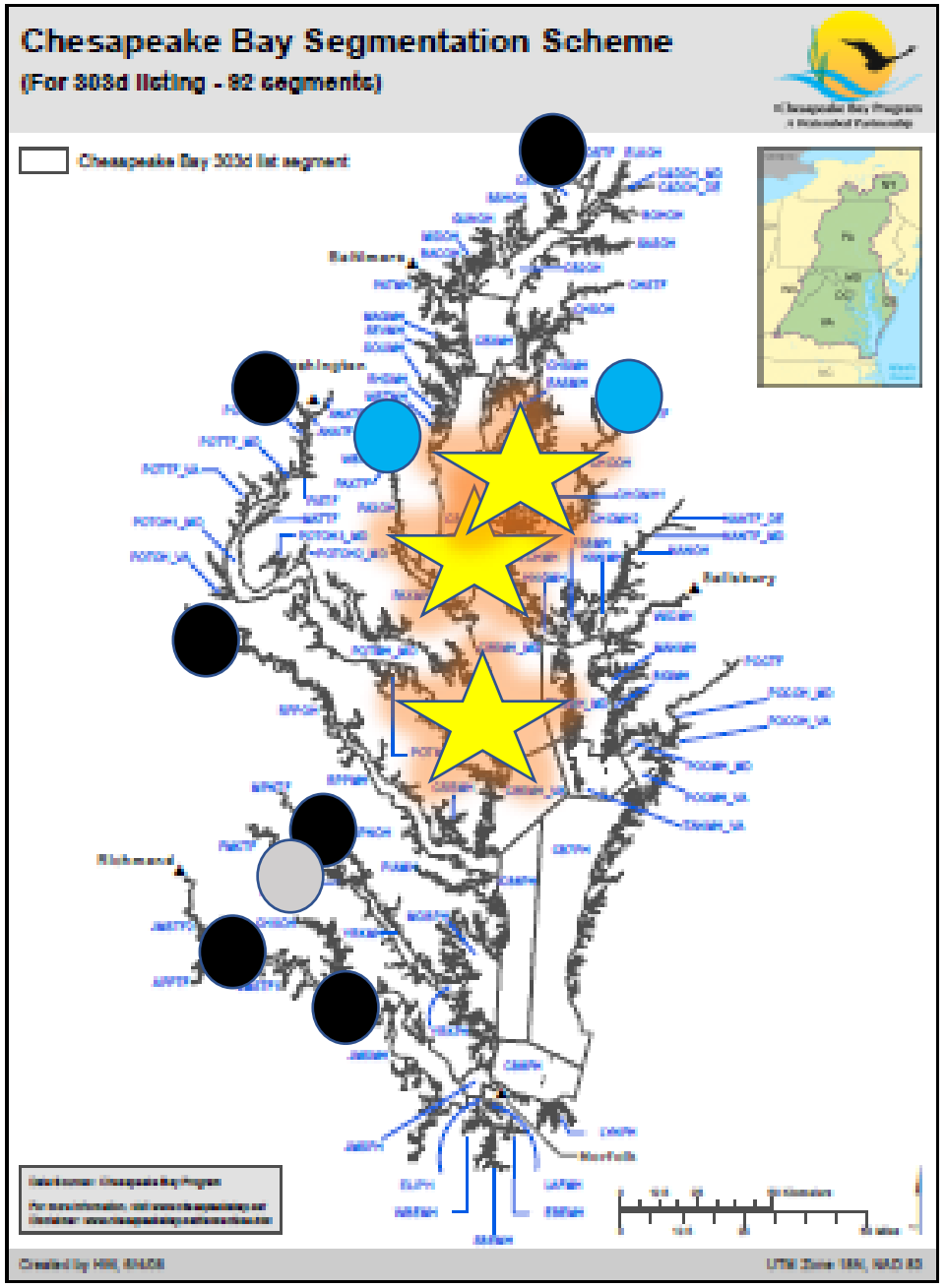



NOAA Deployments of 3 vertical arrays:

- 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.