

# Umbrella Criteria Report: Outline and key findings

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# **Chapter 1: Introduction.**

Reviews the basis of the umbrella criterion assumption.

- **Chesapeake Bay Water Quality Criteria and The “Umbrella Criterion” Assumption**
- **How are Chesapeake Bay Dissolved Oxygen Criteria Assessed?**
- **History: Prior Insights on Comparative Criteria Protections**
- **2010 Umbrella Criteria Workshop & Report Proposal**

# Chapter 2. The Umbrella Criteria Analyses

- **The Data** . . . . .
- **Approaches Used to Evaluate the Umbrella Criterion Assumption**
  - Catalog of analyses approaches used for the Umbrella
  - Criteria assessment . . . . .
- **Results** . . . . .
- **Focus method Update:** Spectral Casting. . . . .
- **Focus method:** Simulation. . . . .
- Comparison of Water Quality Sediment Transport Model Output to High Frequency Vertical Profiles of Water Quality Monitoring Data . . . . .
- Open Water: Comparisons of the 30-day mean to the 7-day mean . . .
- Open Water: Comparisons of the 30-day mean to the instantaneous Minimum . . . . .
- Deep Water: 30-day Compared to 1-day mean . . . . .
- Deep Water: 30-day Compared to instantaneous minimum . . . . .
- **Discussion and Recommendations** . . . . .
- Conditions for which the Umbrella Criteria Assumption appears to hold . .
- Conditions for which the Umbrella Criteria Assumption may be violated .
- For what conditions do currently available data not allow us to test this assumption?
- What are the data needed to test this assumption for all conditions? . . . .
- Recommendations and Next Steps Emerging from Workshop . . . . .

# **Chapter 3. Related Questions and Topics of Importance Beyond Umbrella Criteria – Insights, Lessons Learned**

- **Combining versus Separating Shallow-Water and  
Mid-Channel Assessments . . . . .**
- **Duration of Hypoxic Events . . . . .**
- **Eutrophication Gradients and DO Variability .**

# Boiling it all down...

- **USEPA 2004:**
  - 30-day mean DO criterion protects the 7-day mean DO criterion.
  - 30-day mean DO criterion protects the instantaneous minimum sometime (85% cases in OW, 57% cases in DW)
  - No 30-day mean DO criterion as an Umbrella Criterion suggested here.
- **CBPO WQSTM output analysis:**
  - Umbrella Criterion exists within OW and DW designated uses.
- **Umbrella Criteria Assessment Team 2010-11:**
  - Findings closely parallel USEPA 2004 assessment of criteria protections.

# For March TMAW

## Decisions needed to take to the WQGIT:

- Does TMAW agree the weight of evidence supports the 30-day mean DO protection of the 7-day mean criterion?
- Policy & Water Quality standards implications: Does TMAW recommend that we do or do not need to assess the 7-day mean if we are assessing the 30-day mean?

# Additional March decisions for the WQGIT to consider

- Instantaneous minimum – what is the plan to make any adjustments to it's definition for assessment given all our findings?
- Then – do we have time to do a Baywide assessment with Conditional Probability Analysis to assess where and when the instantaneous minimum is protected/not protected by the 30-day mean DO criterion (alla Olson in USEPA 2004).
  - If we have time – set timeline for completion
  - If we do not have time, we need to recommend an approach to any changes in assessment to deal with the instantaneous minimum.

# Boiling it all down...

- Recommended support of Spectral casting for 7-day mean DO criterion assessments (if needed).
- Conditional Probability analysis could be applied to make criteria protection comparisons in other Bay segments.
- Recommended Shallow water as a separate assessment unit due to statistically different DO dynamics compared to offshore habitat.
  - Decision needed confirming this recommendation and its implications as we take it to the WQGIT.



# Hypoxia Event Duration

- EPA 2003 acknowledges that with Bay recovery “occurrences of extreme changes in concentrations over a short period of time (e.g. dissolved oxygen changes from 6 mg/L to 2 mg/L in a matter of hours) will be greatly reduced. Even if the CB ecosystem is fully restored it is unlikely that a circumstance of ‘zero violation’ of these criteria will ever be observed...”
- The Umbrella Criteria report supports and reiterates these points and illustrates the issues with analyses of the high frequency water quality measurements.
  - Recommendation that event duration assessment can be better developed to index site status and track changes in Bay health.

# Further analyses

- We recognize analyses were not exhaustive of Bay segments. With time and resources, workshop participants suggest all areas could be evaluated for comparisons of criteria protection.
- Recommended better declarations of uncertainty with measurement outputs to assist managers with understanding decision error.
- Recommended we capture the findings in a new technical addendum to USEPA regional criteria guidance.
  - *In March - We will lay out a timeline and outline of what is specifically needed for the jurisdictions in this document to get everyone through the 2017 Re-evaluation.*