



**Tidal Monitoring and Analysis Workgroup  
Umbrella Criterion Assessment Team Adhoc Meeting**

Monday, January 7, 2013

<http://www.chesapeakebay.net/calendar/event/19060/>

**MINUTES**

**Participants:**

Walter Boynton (Chair) - UMCES/CBL	Claire Buchanan - ICPRB	Liza Hernandez (Coordinator) - UMCES/CBPO
Mike Lane – ODU	Elgin Perry – Independent Statistical Consultant	Tish Robertson - VA DEQ
Peter Tango - USGS/CBPO	Rich Batiuk - EPA/CBPO	Lea Rubin (Staff) - CRC
Richard Tian - UMCES/CBPO		

**MEETING OBJECTIVE:**

Develop recommendations for assessing the 7-day mean open-water summer dissolved oxygen criterion

Click to view the [Report by the Umbrella Criterion Action Team](#) used as the basis of this meeting

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**Action Items:**

- Define “support” vs. “guarantee” in reference to excessive violation rates (>10%)
- Enhance Table 2. Probability of violating 7-day mean criterion as a function of 30-day mean DO for two levels of 7-day mean variability (pg. 80) using the 30-day assessment mean vs. the 30-day true mean to determine thresholds (E. Perry)
- Conduct follow up analyses to determine how much can be generalized about open-water variability from COMMON shallow-water data
  - Compare vertical profile vs. COMMON data for the Rappahannock, York, Patuxent and Potomac Rivers (T. Robertson, E. Perry, MDDNR Rep.)
- Follow up with Gary Shenk concerning model assessments (R. Tian)
- Follow up on the status of NOAA Buoys QA/QC standing in order to determine utility of additional mainstem bay data for comparison analyses (P. Tango)
- Convene April meeting to address the implications of separating shallow-water from the offshore-water for the open-water DO criteria assessment (L. Hernandez)

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**Four major criterion items to address in the course of the next year and into 2014:**

- 1) *Provide a recommendation on assessing the 7-day mean open-water summer season DO criterion (January 2013)*
  - a. *Present options for illustrating attainment uncertainty beyond the CFD methodology*

- 2) Develop and present the implications of separating shallow-water from offshore-water in the OW DO criteria assessment (*April 2013*)
- 3) Assess alternative definitions of “instantaneous minimum” and present options for a new definition in the context of our assessments (*Fall 2013*)
- 4) Provide recommendations for incorporating high frequency DO measurement results into the 30-day assessments (*2014*)

#### **A brief overview on the purpose of the DO criterion – (R. Batiuk)**

- Maryland, Virginia, Delaware, and the District of Columbia have the ability to list waters as impaired. They do not, however, have the ability to delist without being able to assess the full set of criteria applied to each designated use
- It is essential that we provide the states the necessary tools for assessing of remainder of dissolved oxygen criteria currently without assessment procedures in place
- Working through the TMAW Umbrella Criterion Assessment Team adhoc group and the CAP WG, we need to finalize the recommendations proposed in the Umbrella Criterion Report by 2015.

#### **Appendix 1A (pg. 59) A test of the “umbrella criteria” concept in tidal Potomac shallow waters – (C. Buchanan)**

- Fig.2 (pg. 62): Analysis of shallow-water continuous monitoring (CONMON) data in Potomac tidal embayment’s indicates that meeting the 30-day mean DO criteria “supports” but does not “guarantee” that the 7-day mean DO criteria is met

#### **Summary of Discussion**

##### **SUGGESTIONS:**

- 1) Where the 30-day mean is approaching the 7-day mean criteria, intensify monitoring activity
- 2) Identify those unique habitat characteristics and conditions where the 30-day mean DO criteria is not protective of the 7-day mean criteria and communicate that clearly in the final recommendations
- 3) Add recommendations in criterion for additional steps to increase certainty of DO criteria failure for monitoring programs to opt to use if so desired.

#### **Appendix 2 (pg. 73) Conditional Probability: 30-day mean vs. 7-day mean – (E. Perry)**

- A sub-committee of TMAW reviewed the variability of the weekly mean DO about the monthly mean DO and concluded that in general, if the 30-day DO criterion is satisfied by the monthly mean, then there is less than a 10% chance that the 7-day DO criterion will be violated by the weekly mean. This is supported by Table 2. (pg. 82): Which shows that if the Monthly mean is greater than 5.2, then the probability that the weekly mean is less than 4.0, is less than 0.10. However, the estimates in Table 2 are based on having very accurate estimates of both the

monthly mean and the weekly mean derived from near continuous high frequency observations of DO. In many parts of the bay, the monthly mean is estimated from as few as one to two point observations per month. Because the uncertainty of a monthly mean of two observations is much greater than the uncertainty of a monthly mean from near continuous data, it is reasonable to expect that effectiveness of the umbrella effect of the 30-day criterion for the 7-day criterion will diminish when the low sample size mean is employed.

## Summary of Discussion

- Viewing the table the adhoc group decided that a decision needs to be made as to what the 30-Day mean DO should be in the criterion to still be protective of the 7-Day mean when the 30-day mean is based on small sample size.
  - The 30-Day mean DO value of 5.2 is protective when sample size is very large.
- If the 30-Day mean DO is close to the value 5 and is intended as an umbrella for the 7-day mean, then the 30-Day mean DO needs to be above 5 by so much, how much?
- As moving up stream in the Potomac, the variability tends to increase, in the tidal fresh region, and the 30-day criteria increases to 5.5 therefore the extra “buffer” already exists. The 30-Day mean DO is generally in the range of 5.5
  - Variability was introduced by the SAV
- **SUGGESTION:** Expand Table 2 to show the probability that the 7-day mean falls more than 1 DO unit below the 30-day mean when the 30 day mean is estimated from a small sample size such as obtained by sampling the fixed station network.
- Concerns about this new “buffer” changing the criteria, were addressed as this is an optional way to assess the 7-Day mean DO.
- The standard deviation values were computed from COMMON data, which was close to the true 30-day mean.
  - This would need to be re-evaluated to address the question of whether the 30-Day mean, the way it will be assed, protects the 7-Day mean
- **ACTION:** Enhance Table 2. to include options for standard deviation with an adjusted two samples collected per month as opposed to COMMON
  - The mean DO should be computed with 2 data points per month chosen from the daytime part of a continuous record approximately two weeks apart during each month.
- **Future discussion topic:** should the 30-day mean be computed differently with high density data. In the enhancement of data from 2 points to high density data.
- Biggest challenges: integrate COMMON with data flow data. (One is great for space, the other great for time, TMAW is working on a model to apply both data sets)

**Appendix 3 (pg. 85) Dissolved Oxygen (DO) Criteria Attainment Analysis for Shallow Water Habitats Using ConMon Data Sets and Appendix 4 (pg. 97) Shallow Water, High Frequency Measurements and the 30 Day Mean Umbrella Approach: Two Preliminary Computations – (W. Boynton)**

**Summary of Discussion**

- Results are consistent with C. Buchanan's:
  - The 30-day mean was generally protective of the 7-day mean.
- USGS generated strip charts with continuous data sets (1962-1969) from the upper mesohaline zone of the Patuxent River were converted to digital data (one measurement per hour) and examined for DO characteristics.
  - Those data showed significant relationship between algal productivity and nutrient loading.
  - At times DO criteria failed even during this period prior to the more developed eutrophication now common in the Bay area.
- Due to the dynamic nature of the Bay, DO conditions will likely never be completely failure-free.

**Appendix 5 (pg. 101) Comments on Addressing Optimization Needs of the STAC Review: Optimization of the Chesapeake Bay Water Quality Monitoring Program toward meeting Management Effectiveness needs in the Watershed 9/17/2001 – (P. Tango)**

- Results from the MRAT optimization report confirm that the 30-day mean supports but does not guarantee the 7-day mean

**Appendix 9 (pg. 147) EPA Criteria Assessment-Based Approach to Spectral Casting: Evaluation of the 30-day mean “umbrella” hypothesis against the 7-day mean – (T. Robertson)**

**Summary of Discussion**

- VA assessment conducted using COMMON data and CBP fixed stations (excluded citizen monitoring data and DEQ data)
- No instances occurred where a segment supported the 30-day mean and failed the 7-day mean DO criteria; no excessive violations were found.
- Comparison of rolling 7-day and sequential 7-day means did not show major differences in attainment
- Spectral casting can be used in assessments, though more validation is needed. Also, because it depends so much on continuous monitoring data, it may not be practical.

**Summary of Next Steps**

- **ACTION:** Define “support” vs. “guarantee” in reference to excessive violation rates (>10%)
- Protocol recommendations for assessment of the 7-day mean, particularly when approaching the monthly mean threshold:

- Enhance monitoring
- Must pass the 30-day mean criteria at a higher DO value
- Assess by habitat?
  - Shallow-water vs. open water?
  - Current assumption states that variability is less in open-water than that in shallow-water; therefore, the probability of violation in shallow-water is protective of open-water
    - T. Robertson has polyhaline data that violates this assumption
- **ACTION:** Compare vertical profile vs. COMMON data for the Rappahannock, York, Patuxent and Potomac Rivers to test offshore-onshore variability (T. Robertson, E. Perry, MDDNR Rep.)
- **ACTION:** Follow up on the status of NOAA Buoys QA/QC standing in order to determine utility of additional main bay data for comparison analyses (P. Tango)
- **ACTION:** Follow up with Gary Shenk concerning model assessments (R. Tian)
- **ACTION:** Enhance Table 2. Probability of violating 7-day mean criterion as a function of 30-day mean DO for two levels of 7-day mean variability (pg. 80) using the 30-day assessment mean vs. the 30-day true mean to determine thresholds (E. Perry)
- **ACTION:** Convene April meeting to address the implications of separating shallow-water from the offshore-water for the open-water DO criteria assessment (L. Hernandez)

**NEXT TMAW ADHOC MEETING:**

Joe Macknis Memorial Conference Room (Fish Shack)

April 4<sup>th</sup> 2013

10am-3pm