Response to Comments on the STAC Peer Review of the 2017 Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll *a* for the Chesapeake Bay and Its Tidal Tributaries 2017 Technical Addendum

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USGS@CBPO
Chair: Criteria Attainment Protocols Assessment Work Group

Water Quality Goal Implementation Team Meeting
November 13, 2017
1-4pm

USGS science for a changing world

Chesapeake Bay Program
A Watershed Partnership

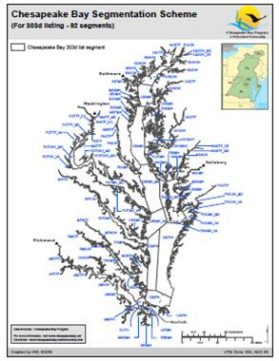
Acknowledgments to the STAC membership and Review Panel Members

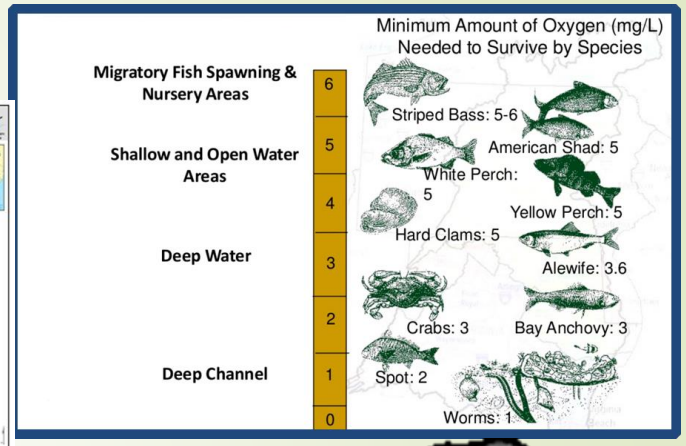
- On behalf of the Management Board, thank you for your timely recommendations.
- We extend the gratitude of the:
  - The Partnerships' Criteria Assessment Protocol WG
  - STAR Team

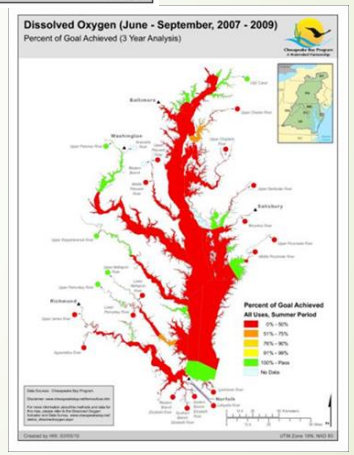
for helping improve our individual and collective management of the Chesapeake Bay and watershed restoration efforts.

Addendum: Reminder, we have 5 chapters

- Assessing Short-duration Dissolved Oxygen Criteria Attainment
- Accounting for Missing Volumes in the CBP Segmentation to Support CWA 303d Listing Assessments
- Development of a Multi-metric Chesapeake Bay Water Quality Indicator for Tracking Progress toward Chesapeake Bay Water Quality Standards Achievement
- Aligning the Chesapeake Bay Program's SAV Restoration Goal with the Jurisdictions' Chesapeake Bay Water Quality Standards
- Interim Rules for Water Quality CWA Section 303d Listing Status Using the Chesapeake Benthic Index of Biotic Integrity to Support Aquatic Life Use Assessments





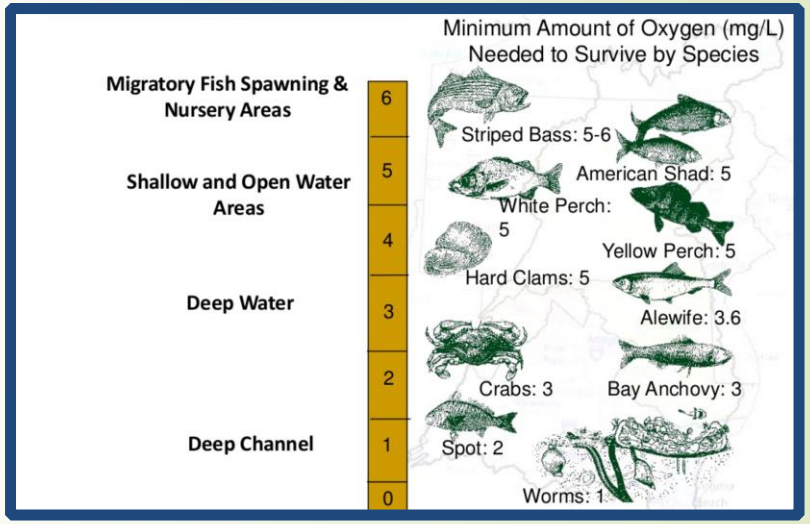


The STAC Review Panel Report

- Indicates the methods are generally appropriate and necessary
- The Peer Review Panel -
  - Provides clarity on 3 new segment volumes to support water quality standards attainment assessment and CWA 303d impairment listings.
  - Recommends adding details of the multi-metric indicator.
  - Supports improvements of DO standards attainment assessment.
  - Highlights differences in the derivation of SAV goal acreages under the water quality standards basis for restoration goals.
  - Promotes additional work DO assessment and , application of Chesapeake benthic index of biotic integrity

STAC Criteria Addendum Review:

Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll a for the Chesapeake Bay and Its Tidal Tributaries: 2017 Technical Addendum



STAC Review Report Spring 2017

STAC Publication 17-004

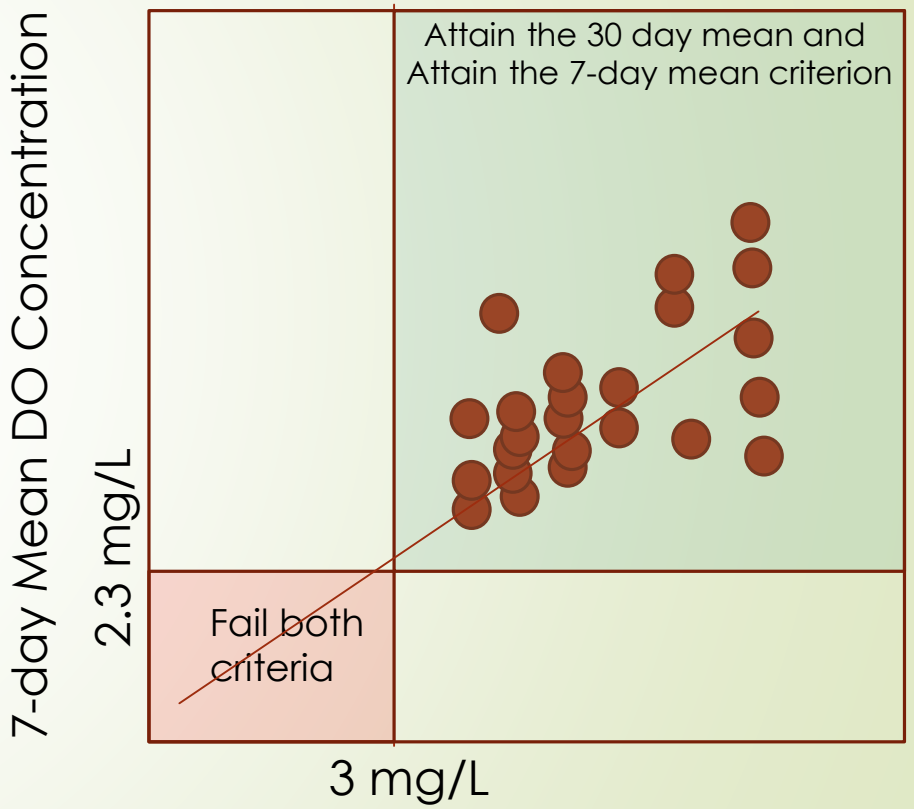
Chapter: Assessing Short-duration Dissolved Oxygen Criteria Attainment

- STAC Comment: The document does not provide context for how the proposed conditional attainment assessment approach will be used to make a decision on attainment status when applied to evaluating a short duration criteria.

- Response
  - The general context for the approach is recognized by the state agency regulatory community
  - The final table in the chapter directs applications of the method.
  - CAP WG is working on a decision flow chart

Conceptual Example of Conditional Attainment

CB4MH Deep Water



Approximate reproduction from USEPA 2004 Chapter V, pg 65

STAC Comment: The review panel presented concerns about the site specific nature of relationships used to develop the conditional attainment assessment approach.

- Response:
  - The authors refer to USEPA 2004 and Table A-1 in this report showing data sets used to establish relationships were derived 1) from within Chesapeake Bay, 2) across years and 3) across salinity zones.
  - Water clarity acres are evaluated using regional relationships
  - We look forward to additional research to enhance the support for extending the use of the conditional attainment assessment approach.

Appendix A, Table A-1

Program Description	Data Collection and Availability	Sampling Locations and Habitats
CBP long-term water quality monitoring program: Low temporal frequency and spatial resolution, good vertical profile resolution of the data.	1985-present. Biweekly to monthly sampling. Water column profiles taken with grab samples and sensors. Web accessible data: *CBP CIMS*	Fixed site, mid-channel, Bay and tidal tributaries, approximately 150 stations. Covers tidal fresh to polyhaline habitat conditions.
USEPA EMAP: Historical short-term buoy deployments with high temporal frequency at a station. Single depth sensor evaluations.	Mix of short term (days to weeks) time series with high temporal frequencies by sensor. See USEPA (2004).	Fixed site, off shore locations, varied depths. Tidal fresh to polyhaline habitat conditions.
CBP Shallow Water Monitoring Program, **Con**tinuous **Moni**toring (CONMON): High temporal frequency at moored locations.	Approximately 2000-present. Mostly seasonally, near continuous (15 min interval) time series April-October. Fixed depth sensor, usually 1m off bottom. Web accessible data: *Eyes on the Bay* in MD, *VECOS* in Virginia.	Fixed site, shallow water, nearshore locations, approximately 70 sites Baywide with 1-9 yrs of data. Tidal fresh to mesohaline conditions.
VIMS, MD DNR Vertical Profilers: High temporal frequency in 2 dimensions. **VIMS**: Bottom sonde .	Approximately 2006-present. Limited seasons. Sensors provide water column profiles at sub-daily scales. Bottom sonde. Web accessible data: MD DNR and VADEQ.	Fixed sites (n<5), offshore locations in MD (Potomac River) and VA (York and Rappahannock Rivers). Dominantly mesohaline lower tidal tributary data.
CBP Shallow Water Monitoring Program: surface water quality mapping with DATAFLOW. High Spatial resolution along temporally dense collection track.	Approximately 2000-present. Biweekly to monthly mapping assessments within April-October season. Multi-year assessments (3 yr sets). Sensor 0.5m below surface Web accessible data: *Eyes on the Bay* in MD, *VECOS* in Virginia.	Chesapeake Bay Program management segments. Approximately 40 of 92 segments assessed to date. Tidal fresh to polyhaline habitats.
VIMS Volumetric Assessment with ACROBAT: (towed sensor underwater at variable depths). High spatial resolution.	Approximately 2003-present Limited seasons. 3-dimensional sensor assessment of water column water quality. *VIMS data*, Brush et al.	York and Rappahannock Rivers (VA) study sites, deep water reaches. Dominantly mesohaline habitat.

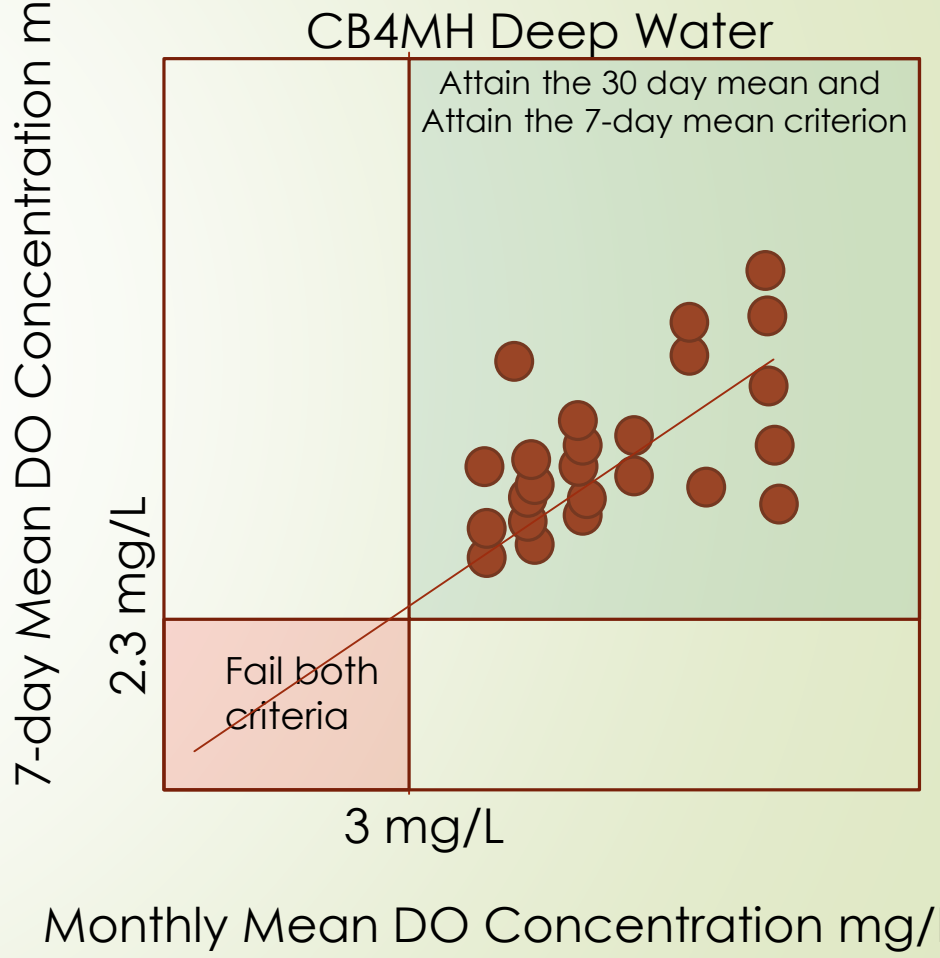
STAC Comment: Conditional Attainment is improbable.

Response

- The authors demonstrated 1) the approach for the development of the relationships and 2) provided an example of its possible application for making decisions with different times scales of DO criteria.

- Final decisions on the thresholds that determine attainment will be made between the State's and USEPA. Only then can we judge the probability of getting an attainment or nonattainment result.

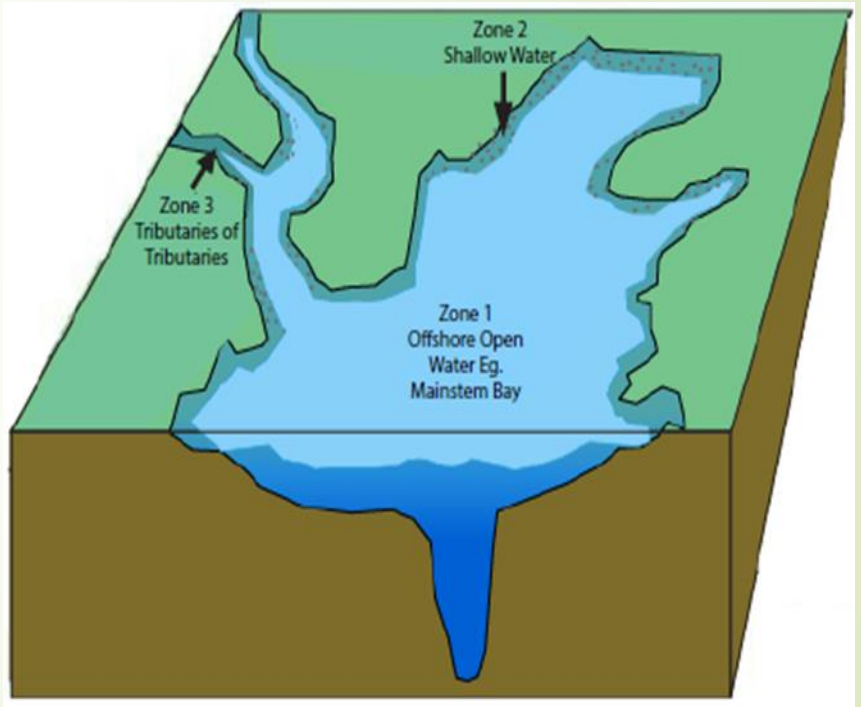
Conceptual Example of Conditional Attainment



Approximate reproduction from USEPA 2004 Chapter V, pg 65

STAC Comment: Why are three subsegment zones for assessment optimal over other numbers of zones?

- Response:
  - We have already implemented two zone sub-segmenting to support water quality standards attainment assessments (e.g. Potomac River).
  - Three zones was scientifically defensible. (USEPA, Boynton et al. 2014)
  - In nontidal waters, Virginia already applies a three zone approach to habitat separation for assessment purposes.
  - Three segments represents a defensible water quality criteria monitoring and assessment option.



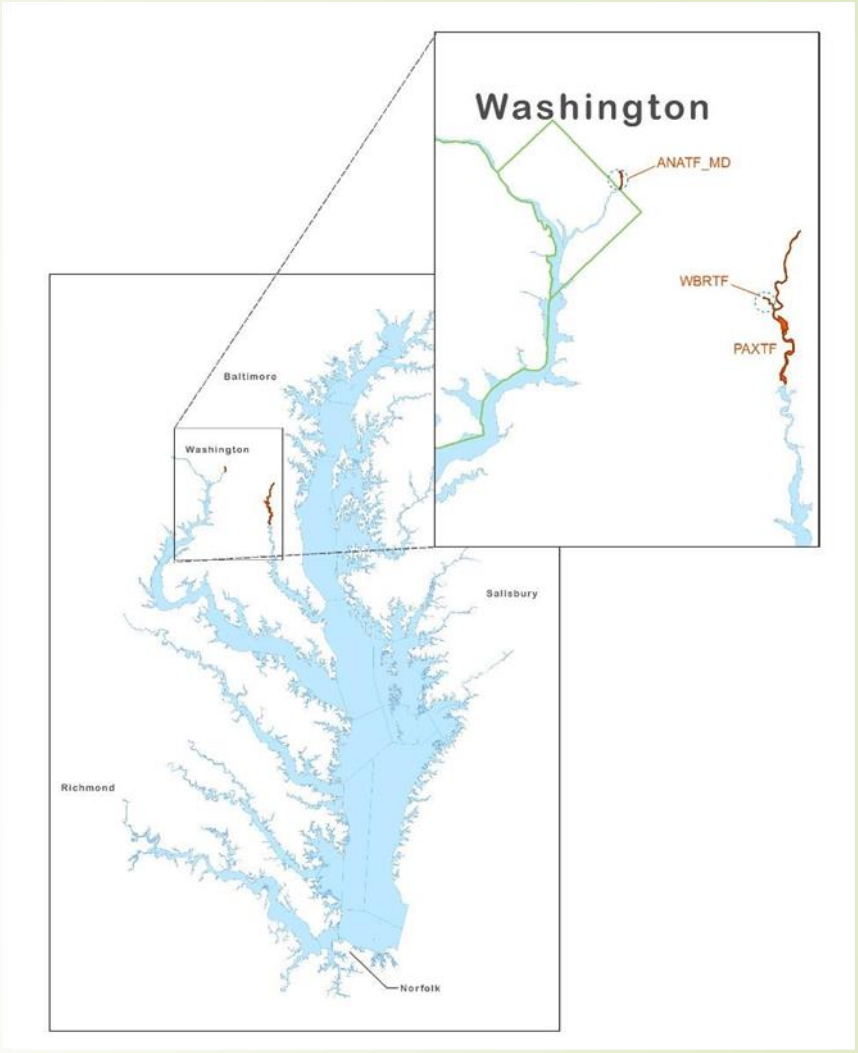
STAC Comment: Proposal for further interpretive text on using continuous monitoring data for assessment purposes

- Response:
  - We have modified the chapter structure and the final chapter table that summarizes applications of different time scales of data collection for use in water quality standards attainment assessments.

Chapter: Addressing missing volumes for three Chesapeake Bay assessment segments

- STAC comment
  - The document is concise and provides the needed information. Minor edits recommended for clarity.

- Response
  - Text edits welcomed, chapter clarity improved.

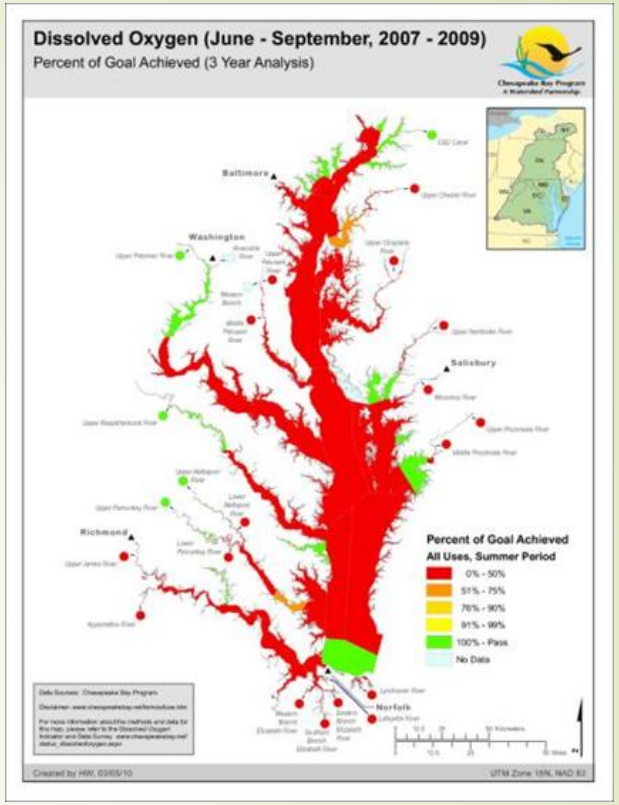


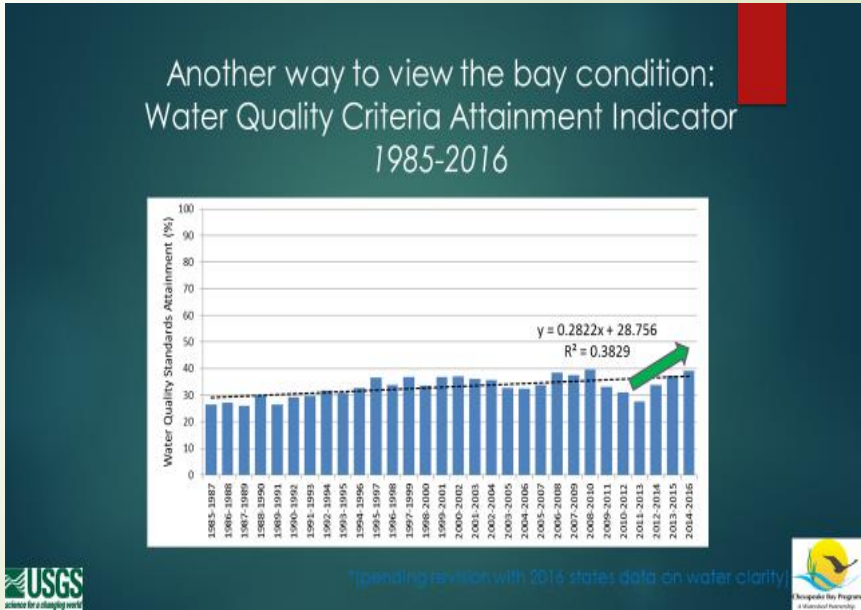
WBRTF segment: calculated volume of 111,567 cubic meters (m^3)
PAXTF segment: model-based volume is 11,025,000 m^3; and
ANATF MD segment: model-based volume estimate is 172,500 m^3.

Chapter: The Water Quality Standards Multi-metric Indicator

- STAC Comments
  - The text contradicts the surface area multiplication factors in the calculations.
  - Is the use of "zones" creating new designated uses?
  - There is an apparent contradiction in two assessment rules.
  - Two figures regarding the assessment are redundant.

- Response
  - Text and formula reflecting the computations has been aligned and updated.
  - There are no new designated uses being created when we subsegment a designated use.
  - The authors reviewed the two rules and found them to be appropriate in supporting their intended use in the assessments.
  - We eliminated one of the two figures to simplify the presentation of attainment assessment in this chapter.





Chapter: Documenting an update to the Chesapeake Bay underwater grasses goal. Alignment of the goal with the jurisdictions Chesapeake Bay water quality standards restoration acres.

- STAC Comments
  - Model attainability application in goal setting – There were a few exceptions to the pattern of differences between how state and Chesapeake Bay Program goal acreages were derived. These differences need to be highlighted.
  - The panel recommended text edits on the alternative goals that could be considered and monitoring support.

Chapter: Documenting an update to the Chesapeake Bay underwater grasses goal. Alignment of the goal with the jurisdictions Chesapeake Bay water quality standards restoration acres.

- STAC Comments
  - Model attainability issues – there were a few exceptions to the pattern of differences between how state and Chesapeake Bay Program goal acreages were derived. These differences need to be highlighted.
  - The panel recommended text edits on the alternative goals that could be considered and for further monitoring support.

Examples of Virginia segments with alternative WQ Standards acreage derivations compared to the remainder of the Bay segments

Chesapeake Bay Segment	Source of the 1993 CBP SAV Restoration Goal Acreages	1993 CBP SAV Restoration Goals Acreages	State Water Quality Standards SAV Restoration Acreages	Difference Between State WQ Standards Acreages and 1993 Restoration Goal
RPPMH	Historical	5,380	1,700	-3680
JMSMH	Historical	531	200	-331
JMSPH	Historical	604	300	-304

1700 acres were derived as "attainable acres" developed from the May 2004 Chesapeake Bay Program Water Quality/Sediment Transport model confirmation run (Source: Lewis Linker (USEPA) via Cindy Johnson VADEQ)

200 acres derived as “attainable acres”

300 acres derived as “attainable acres”

Model Attainability – Accounting for the history of goal acreage setting. Setting the stage for goal alignment with consistent methods. New text.

- In setting the original SAV restoration acreages back in 2003, the Partnership reached agreement on a methodology for derivation of the acreages which was applied consistently across all Chesapeake Bay segments. In amending their state water quality standards regulations, Virginia made the decision in 2005 to adjust the SAV restoration acreages for four segments – three in the tidal James River and one in the lower Rappahannock River based on model attainability considerations using model simulated outcomes. This was not the standard approach, but rather an internal state decision specific to a handful of tidal Bay segments.

Model Attainability continued

- EPA supported Virginia decisions as they were made with the best available information at the time and reflected Virginia concerns about their ability to reduce nutrient and sediment pollution loads down to levels necessary to restore SAV to the restoration acreages based on historical coverage.

Model Attainability continued

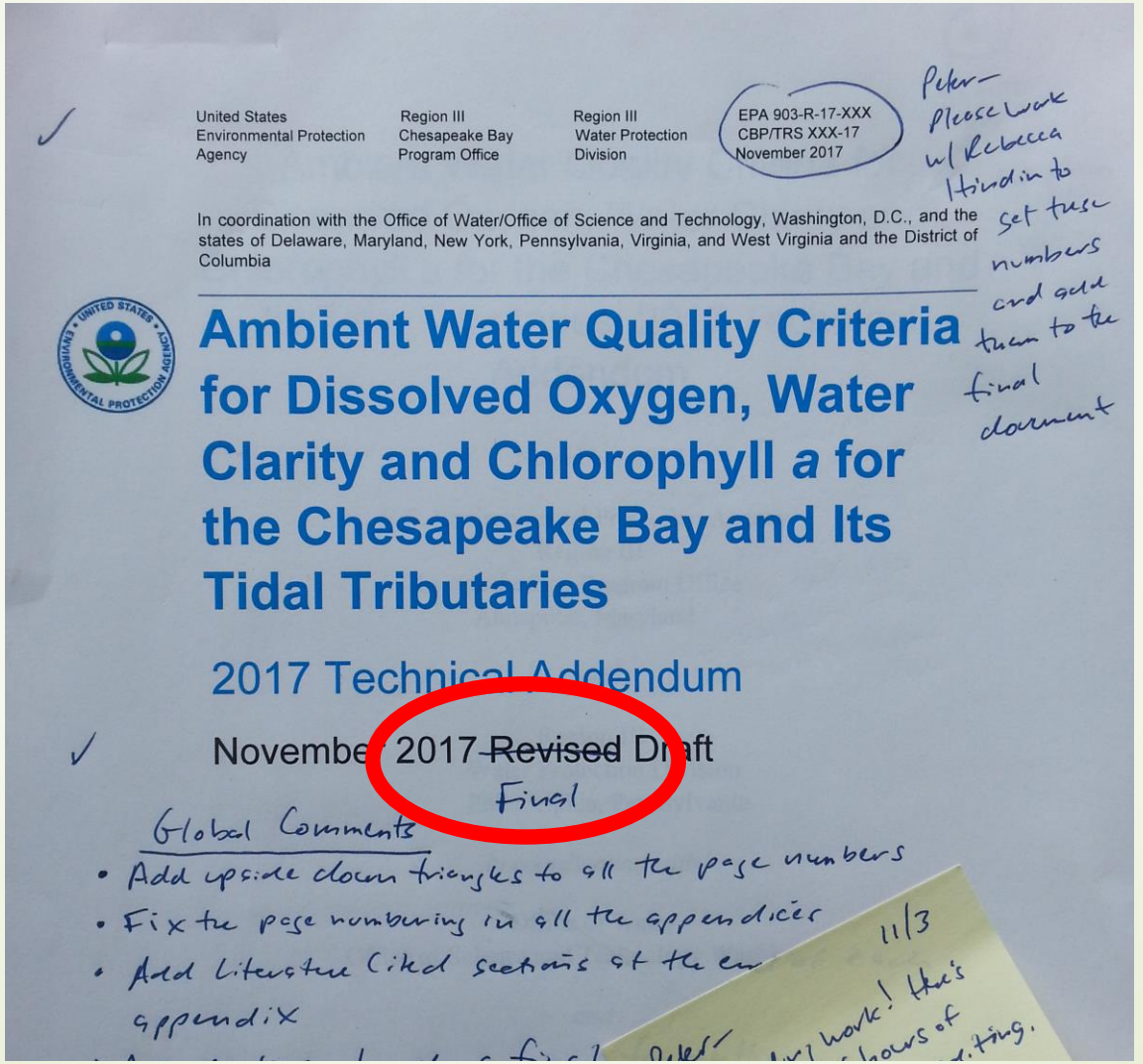
- Opening to the last section of the chapter:
  - There are four Virginia segments on the James River and the lower Rappahannock River segment which are lower than the 1993 restoration goal acreages because they are based on model simulation attainability decisions. These acreages are inconsistent with the methodology used in all the other 99 segments in Virginia, Maryland, Delaware, and the District of Columbia.
  - Future consideration should be given to building additional consistency between the four jurisdictions in their methodologies for the basis of setting their water quality standards underwater bay grasses restoration goal acreages.

Chapter: An alternative method of classifying water bodies based on the Chesapeake Benthic Index of Biotic Integrity (B-IBI).

- STAC Comment: the Review Team agrees with taking a precautionary approach given the uncertainties about the BIBI index.
- STAC Comment: The Review Team recommends further approaches to improving the B-IBI.

- Response:
  - We contacted the authors of the original BIBI work who indicated there have been multiple workshops and publications of peer review journal articles on some of the suggested index comparison alternatives.
  - We recognize there is significant work to pursue in the future to improve the performance of an IBI.
  - Alternatively, the states' have the option to collect more samples in a particular segment to reduce uncertainties and better inform the status assessment of the waterway.

The End



United States Environmental Protection Agency | Region III Chesapeake Bay Program Office | Region III Water Protection Division

EPA 903-R-17-XXX
CBP/TRS XXX-17
November 2017

Peter— Please work w/ Rebecca Hinds in to set these numbers and send them to the final document

In coordination with the Office of Water/Office of Science and Technology, Washington, D.C., and the states of Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia and the District of Columbia

Ambient Water Quality Criteria for Dissolved Oxygen, Water Clarity and Chlorophyll *a* for the Chesapeake Bay and Its Tidal Tributaries

2017 Technical Addendum

November 2017 ~~Revised~~ Draft

Final

Global Comments

- Add upside down triangles to all the page numbers
- Fix the page numbering in all the appendices
- Add Literature Cited sections at the end of appendix

11/3

Great work! This shows a lot of editing.