Incorporating DO variances for three DW/DC segments into the WQS attainment indicator

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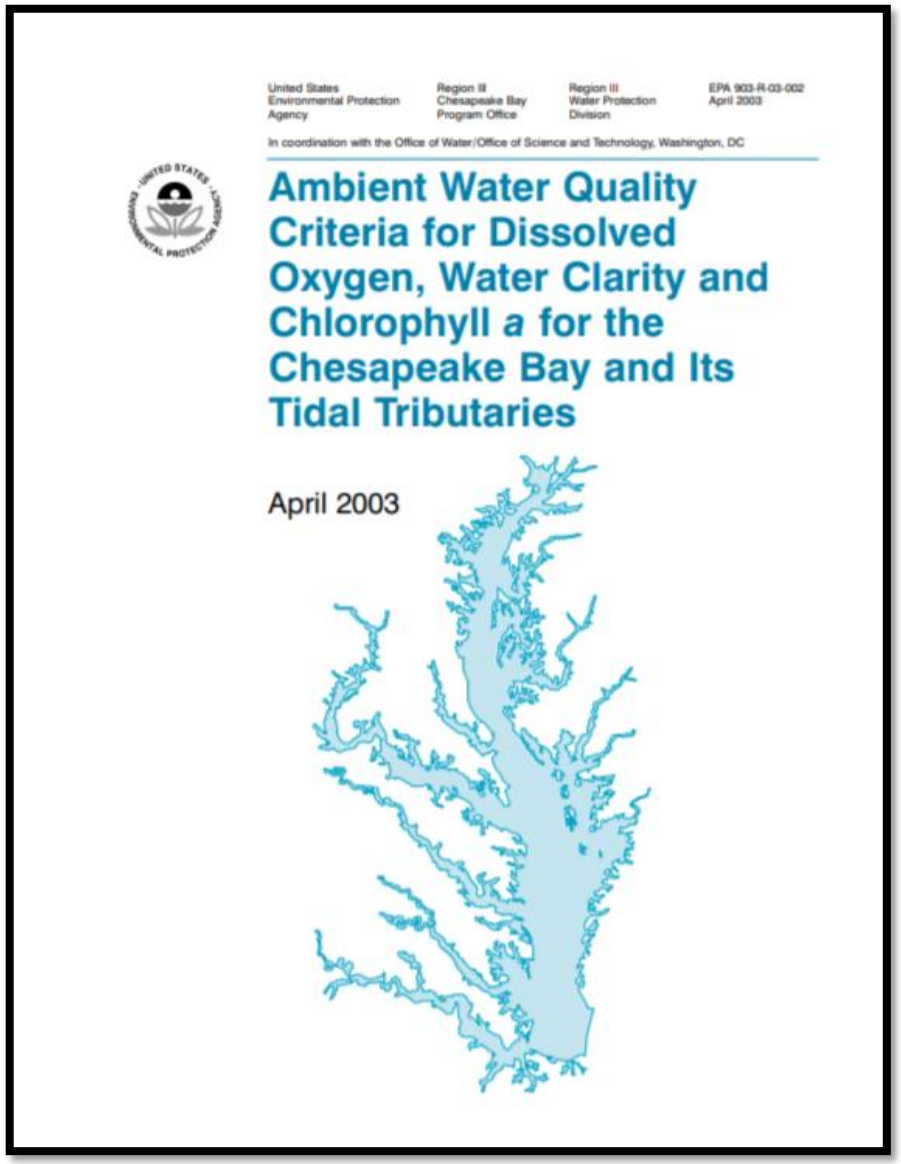
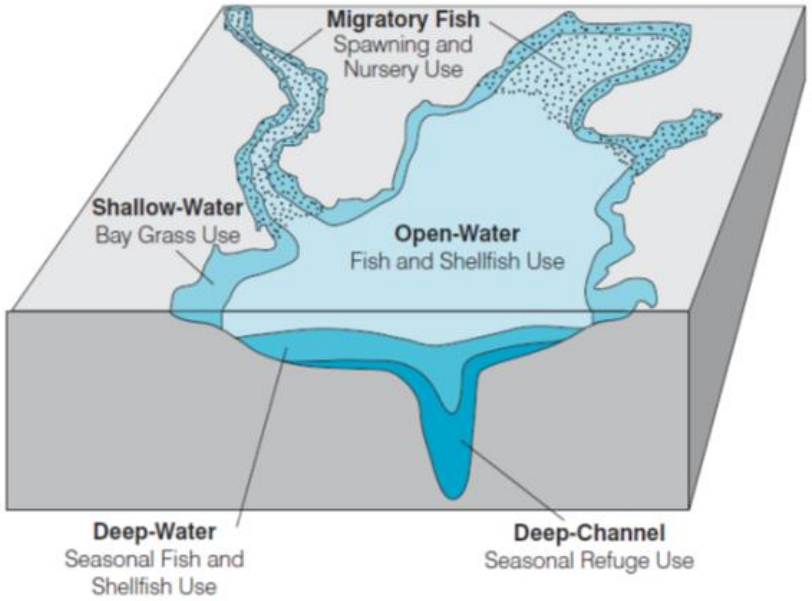
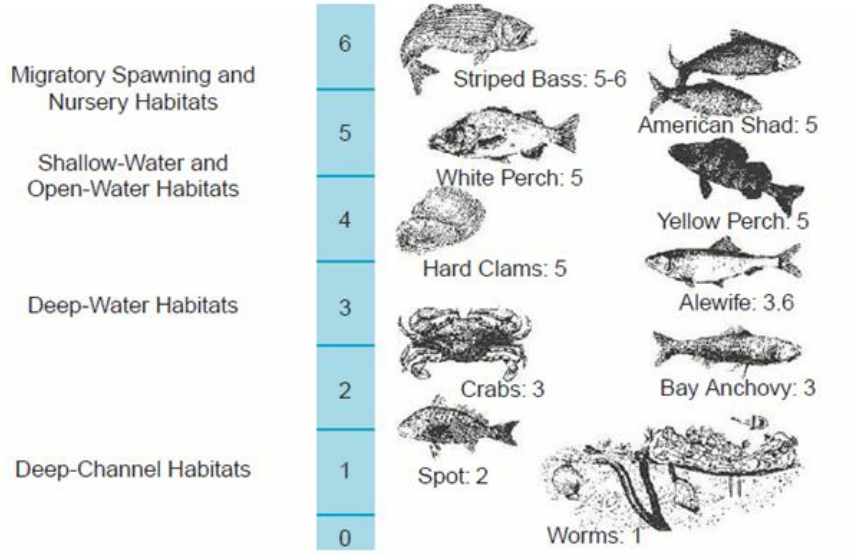
Background



- **Symptoms:**
  - algal bloom,
  - poor water clarity,
  - decreased submerged aquatic vegetation (SAV) acreage, and
  - low dissolved oxygen (DO).
- **Criteria assessment:**
  - The Chesapeake Bay Program partnership published guidance framework to establish the criteria assessment procedures (USEPA, 2003), which have been periodically refined as new scientific knowledge became available (e.g., USEPA, 2003, 2004, 2007, 2010, 2017).

Designated Uses (DUs)





- Each segment contains **up to five DUs**:
  - **DC**: deep channel,
  - **DW**: deep water,
  - **OW**: open water,
  - **SW**: shallow water,
  - **MSN**: migratory fish, spawning & nursery.

- Each DU has its own set of criteria for **one or more of the following**:
  - **Dissolved oxygen,**
  - **Water clarity/SAV, and**
  - **Chlorophyll-a.**

WQS Criteria

Criteria	Designated Use	Threshold	Applicable Segments
Dissolved Oxygen	Migratory Fish Spawning & Nursery (MSN)	30-day mean, February-May	**71**
	Open Water (OW)	30-day mean, June-September	**92**
	Deep Water (DW)	30-day mean, June-September	**18**
	Deep Channel (DC)	Instantaneous, June-September	**10**
Chlorophyll-a	Open Water (OW)	Chlorophyll-a concentrations	**7**
SAV and/or Water Clarity	Shallow Water (SW)	Segment-specific water clarity and bay grass acreage goals	**91 (w/ split segments)**

Note: The indicator uses a subset of the complete accounting for the water quality criteria to ESTIMATE the attainment of water quality standards.

DO Variances

- Use of **variances** in TMDL for conditions beyond management and control.
- Tools for states to address specific circumstances where specified designated uses are unattainable now, or in the future.
- One such tool is a **restoration variance**, which can be defined as the allowable exceedance of a specific WQ criteria based on the best available scientific understanding consistent with Clean Water Act requirements.
- Restoration variances are temporary and are reviewed at a minimum of every three years, as required by the Clean Water Act and EPA regulations and may be modified based on new scientific findings.

Source: **Influence of Climate Change Risk on the Chesapeake Bay Open-Water Dissolved Oxygen Water Quality Standard April 27, 2020**
https://d18lev1ok5leia.cloudfront.net/chesapeakebay/documents/cc_risk_to_cb_open-water_do_wqs_-_initial_first_cut_white_paper_4-27-20.pdf

DO Variances

- **MDE Webpage**: "A **restoration variance** allows dissolved oxygen criteria to slightly exceed the requirement up to 7% in a couple of the deepest areas of the Bay. This modification to the Bay water quality standards was necessary because in those few deep areas, we may not meet the dissolved oxygen requirements. Even after spending billions of dollars to reduce nitrogen, phosphorus, and sediment pollution to clean up the rest of the Bay, essentially doing everything we know how to do at this time, the deep areas still could not attain the dissolved oxygen standard. This is a better, more protective alternative than lowering the standard based on current understanding." (https://mde.maryland.gov/programs/water/tmdl/waterqualitystandards/pages/faqs.aspx)

- **EPA use-attainability analyses**: "An example of how this appears in Maryland's adopted and approved WQS is: For the dissolved oxygen criteria restoration variance for CB4MH .. deep-water .. subcategory, not lower for dissolved oxygen in segment CB4MH than the stated criteria … for more than 7 percent spatially and temporally (in combination), from June 1 to September 30." (https://www.epa.gov/sites/default/files/2014-11/documents/chesapeake-bay-uaa.pdf.)

DO Variances

Adjustment to the Main Bay Segment CB4MH Deep-Channel and Deep-Water Dissolved Oxygen Criterion for Persistent Nonattainment and Removal of Chester River Deep-Channel and Patapsco River Deep-Water Restoration Variances (CBPO, May 2020)

Conclusions:

Based on compelling evidence of an improved 2017 assessment of DO water quality standards in the deep-channel and deep-water subcategory designated uses, and further confirmed with monitoring and research data, the Chesapeake Bay Program Partnership, including EPA, agreed at the December 2017 PSC meeting (PSC, 2017) to support Maryland in the revision of their existing DO restoration variances to:

- Change the Chesapeake Bay Mainstem Segment 4 Mesohaline (CB4MH) deep-channel refuge restoration variance from 2 percent to 6 percent.
- Change the Chesapeake Bay Mainstem Segment 4 Mesohaline (CB4MH) deep-water fish and shellfish restoration variance from 7 percent to 5 percent.
- Remove the lower Chester River Mesohaline (CHSMH) deep-channel refuge restoration variance of 16 percent.
- Remove the Patapsco River Mesohaline (PATMH) deep-water fish and shellfish restoration variance of 7 percent.
- No recommended change to the Eastern Bay Mesohaline (EASMH) deep-channel refuge restoration variance of 2 percent.

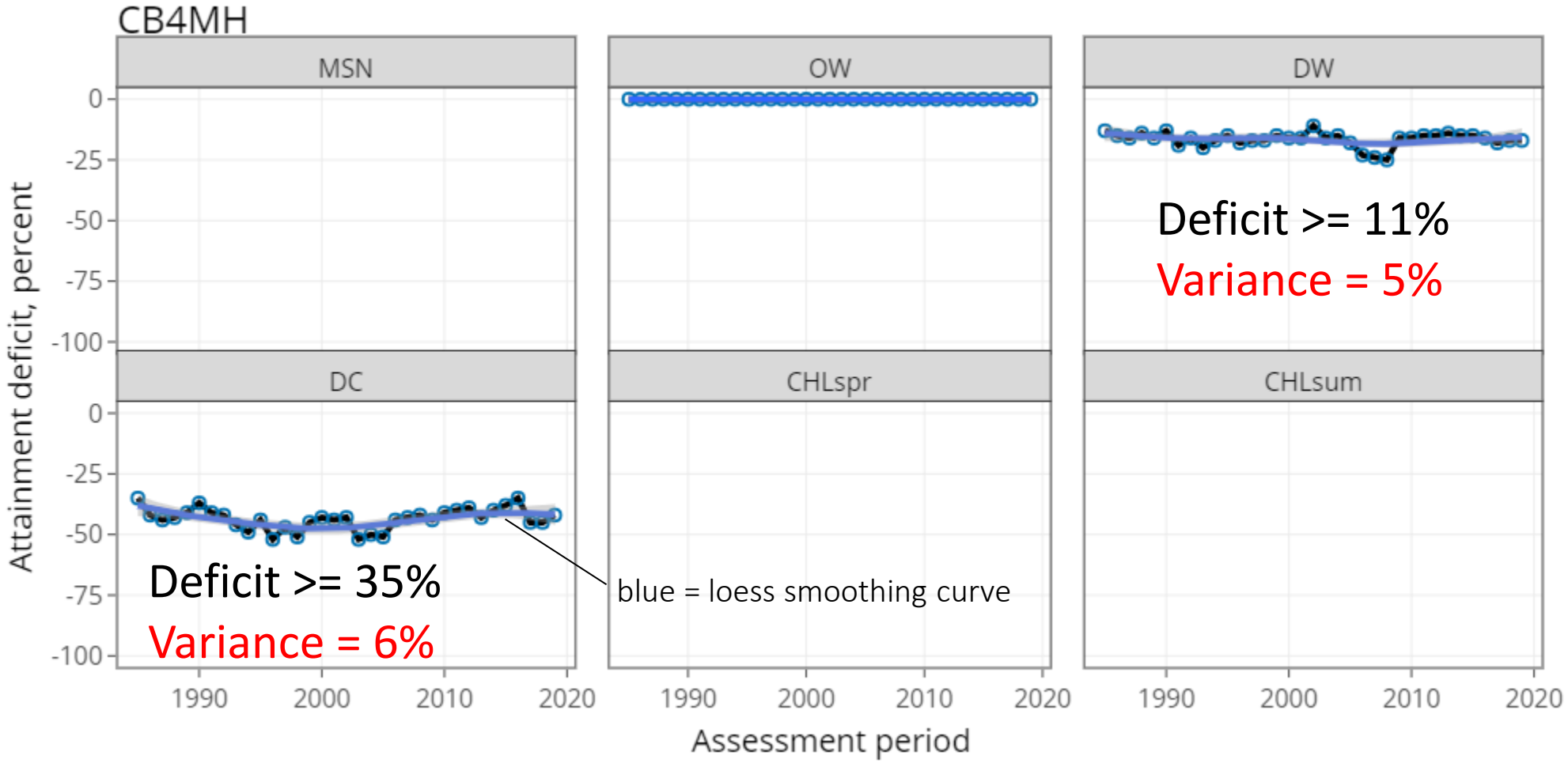
The proposed variance changes are fully protective of the Chesapeake deep-channel and deep-water designated uses and form the basis and foundation of the CBP Partnership's Phase 3 WIPs.

https://mde.maryland.gov/programs/Water/TMDL/WaterQualityStandards/Documents/Adjustment%20to%20the%20Main%20Bay%20Segment%20CB4MH%20Deep-Channel%20and%20Deep-Water%20Dissolved%20Oxygen%20Criterion.pdf

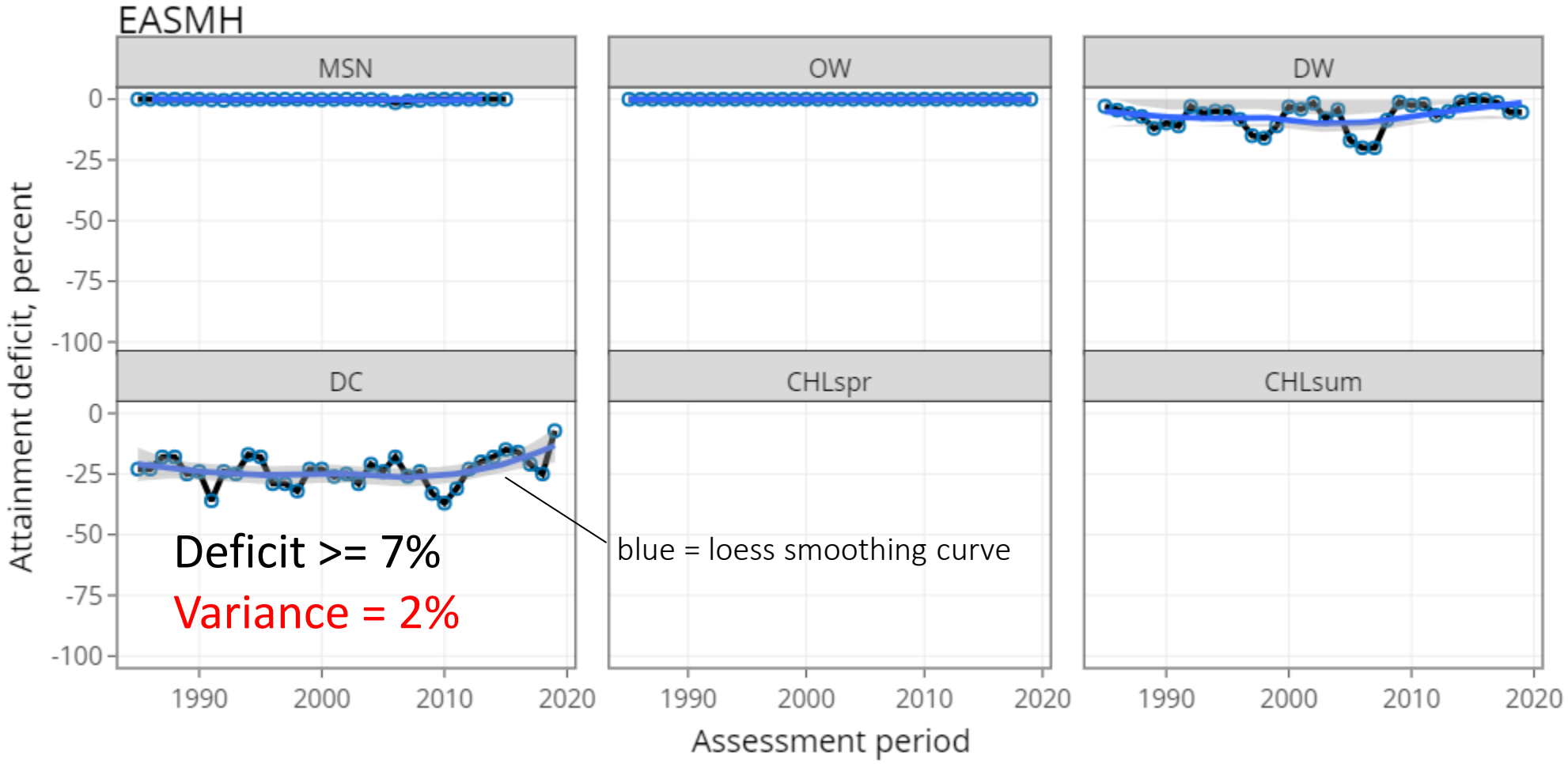
DO Variances (Approved by PSC)

Segment	Previous Variance	Revised Variance
Middle Ches. Bay Mainstem (CB4MH)	7% for DW	5% for DW
Patapsco River (PATMH)	7% for DW	Removed
Middle Ches. Bay Mainstem (CB4MH)	2% for DC	6% for DC
Eastern Bay (EASMH)	2% for DC	2% for DC
Lower Chester River (CHSMH)	16% for DC	Removed

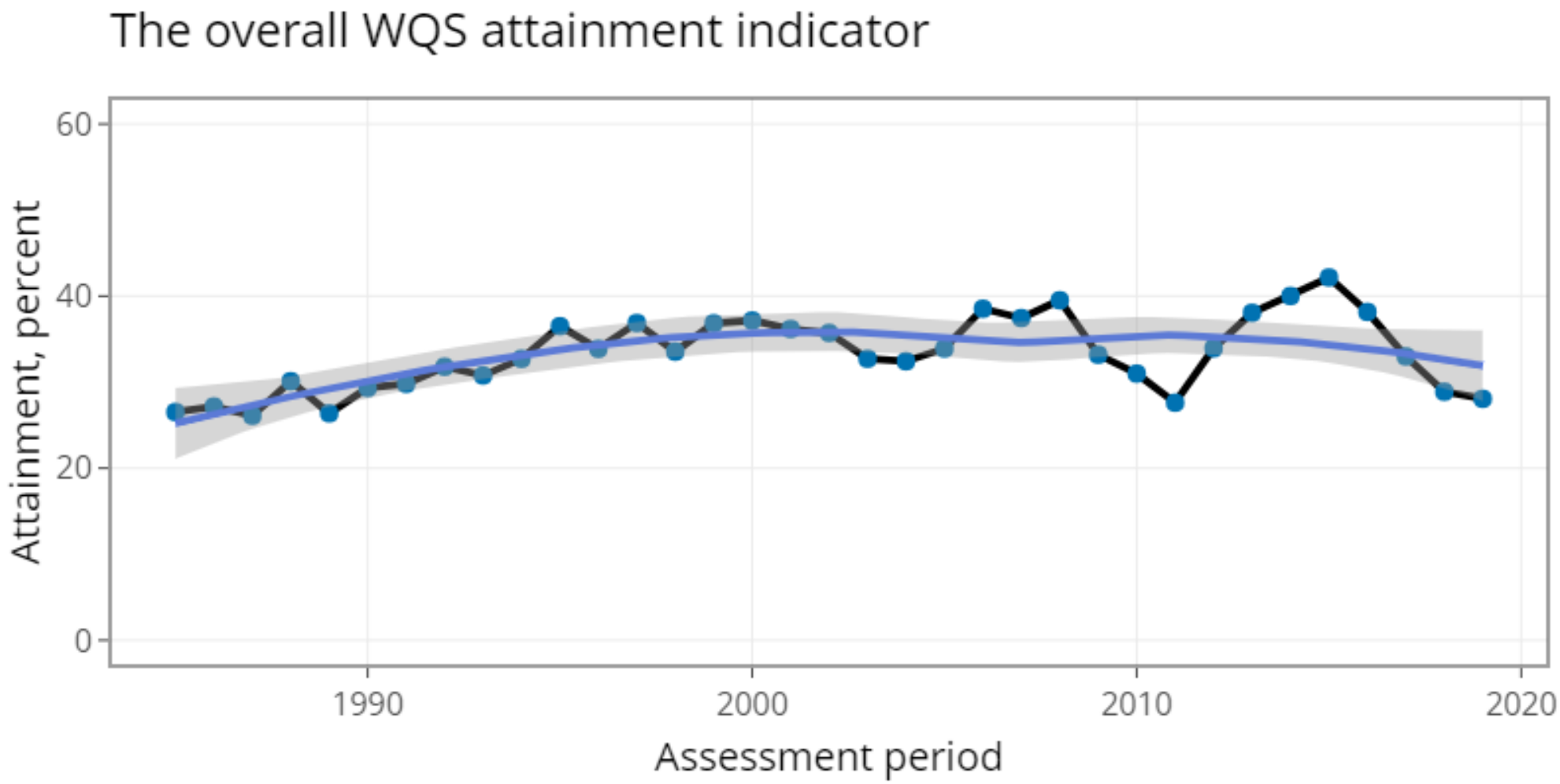
No Impact on CB4MH DW & DC



No Impact on EASMH DC



No Impact on Overall Attainment Indicator



Summary

- Several DO variances were previously established for a few CB segments.
- Revisions on those DO variances have been proposed by MD and approved by PSC in December 2017.
- Analysis showed no impact by these three variances to attainment indicator results in all assessment periods (i.e., 1985-1987 through 2019-2021).

Summary

- We request to incorporate the PSC-approved DO variances into the annual update of the WQS attainment indicator. They include CB4MH DW (5%), CB4MH DC (6%), and EASMH (2%).
  - Start to apply these variances in the upcoming assessment for the 2020-2022 period, which is expected to be completed in late 2023 or early 2024.
  - Retrospectively apply these variances to all periods since 1985-1987.
  - Document this change in the indicator's A&M file.