

# Delaware River Basin Commission

## Review of comments and intended responses regarding draft document:

“Linking Aquatic Life Uses with Dissolved Oxygen Conditions in the Delaware River Estuary”

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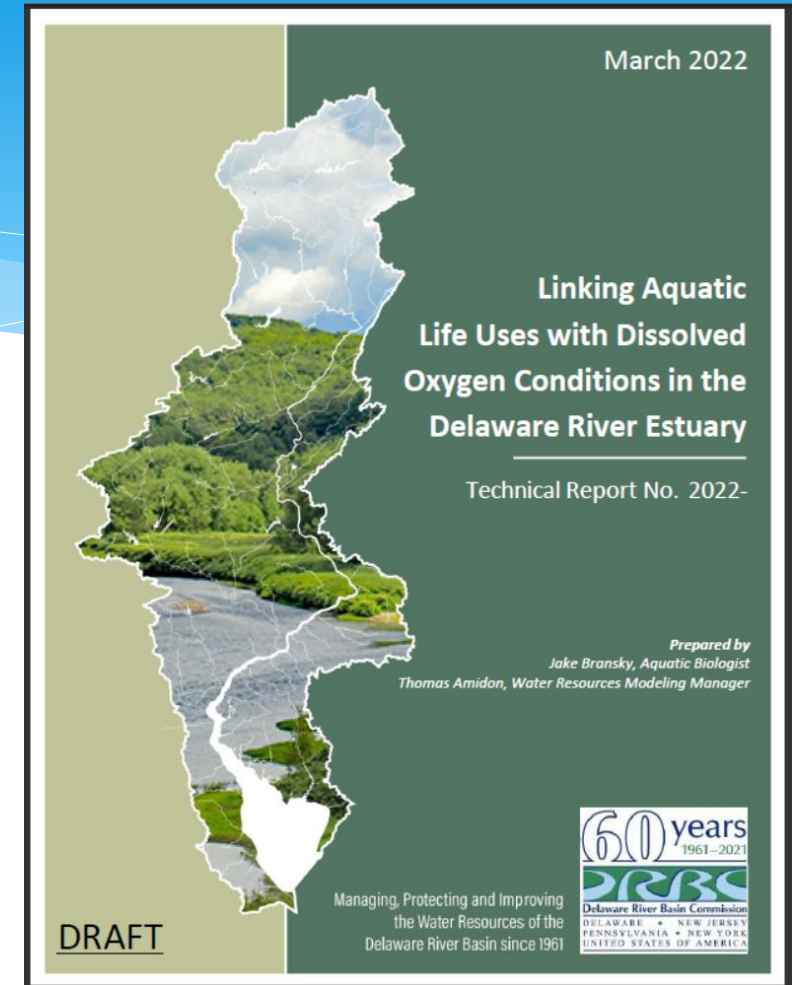
April 27, 2022

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# Background

- ❑ DRBC distributed report titled “Linking Aquatic Life Uses with Dissolved Oxygen Conditions in the Delaware River Estuary” to the WQAC for review on March 4, 2022.
- ❑ Comments were requested by March 28, 2022.
- ❑ The goal of the report was to synthesize the available literature on the dissolved oxygen requirements of sensitive species in the Delaware River Estuary with species distribution data to assign dissolved oxygen thresholds that correspond to Unsuitable, Suitable, and Optimal conditions for propagation.
- ❑ These thresholds link aquatic life uses with dissolved oxygen conditions and will be used in the context of DRBC’s analysis of attainability to evaluate the degree of propagation that might be expected with the dissolved oxygen conditions associated with various management scenarios.



# Comments

## EPA

### Comment

Page 4. Second Paragraph. Last Sentence. EPA recommends the following change: Conditions in this yellow shaded region would be protective of instantaneous mortality, but still fall below the suitability threshold.

### Response

As suggested, using the word “acute” instead of “instantaneous”

Page 4. Third Paragraph. Second Sentence. The sentence states: To capture this dynamic, we characterized the current condition as the seasonal 1st percentile dissolved oxygen value at the USGS gage in each zone over the past 10 years. It would be helpful to explain why it is appropriate to use the 1st percentile. Also, the sentence references zone 2. Is that data relevant in this analysis? If so, it would be helpful to explain why.

DRBC will add explanation on the use of the 1<sup>st</sup> percentile as an indicator and the inclusion of Zone 2

Page 5. Second Paragraph. First Sentence. The report states: Based on our analysis, a dissolved oxygen value of 5.0 mg/L would be protective against sub-lethal effects of all life stages of DO-sensitive species in all portions of the estuary (zones 2 – 6) during all seasons (Table 2). EPA recommends clarifying whether 5.0 mg/l is an instantaneous minimum value.

DRBC will clarify that the thresholds in this report were deemed protective against acute impacts based on available literature. It is outside the scope of this report to discuss the format of any new criteria.

# Comments

## Chemours

### Comment

“Implementation of an Analysis of Attainability associated with resolution 2017-4, and the finalization of the rulemaking that will follow, will result in improved dissolved oxygen conditions in the Delaware estuary, which will enhance the degree of suitability for propagation of DO-sensitive fish species.”

This sentence is written as if it is a forgone conclusion that DRBC will revise the dissolved oxygen criteria and that Tier 1 facilities will be required to upgrade their wastewater treatment systems such that the new criteria can potentially be met. This is not the case since DRBC is still in the process of performing an overall “Analysis of Attainability”. For example, it is our understanding that DRBC has recently entered into agreement with the Environmental Finance Center at the University of Maryland for a technical review of the forthcoming socioeconomic analysis being developed internally by DRBC.

Chemours requests that this sentence be deleted since it is inappropriate to make this statement at this time because the DRBC has not completed its work and a resolution has not been brought to the DRBC commissioners for consideration and approval.

### Response

DRBC will remove or revise to clarify

# Comments

## EPA Freshwater Biology Team

### Comment

The data in the Draft Linking Aquatic Life Uses with Dissolved Oxygen Conditions in the Delaware River Estuary (Draft Report) is sourced from A Review of Dissolved Oxygen Requirements for Key Sensitive Species in the Delaware Estuary (2017). If literature was excluded from this document and therefore not used in the Draft Report, could DRBC explain which literature sources were excluded, and why? Who determined if the literature was appropriate scientific or published sources? How was it determined if a scientific source was reliable or not reliable? Or were there instances for certain species/life stages where there simply was no information (good, bad or otherwise) available. There are many NV (no values) listed for life stages of species in the appendix. This lack of information is not apparent in the plots of the appendix – it looks as though only the known values are included.

The EPA 2003 document was updated in 2017. Why was the 2003 version used and cited?  
[https://www.chesapeakebay.net/documents/2017\\_Nov\\_ChesBayWQ\\_Criteria\\_Addendum\\_Final.pdf](https://www.chesapeakebay.net/documents/2017_Nov_ChesBayWQ_Criteria_Addendum_Final.pdf)

Page 3. Paragraph below Table 1. Please clarify 'interpretative analysis of available data' And provide written justification of the data not used.

Page 5. Justify the use of the 1st percentile in this assessment. If what you are proposing is a instantaneous minimum, maybe we should be looking at monthly minimums in that reach by season. Or seasonal minimums?

### Response

DRBC will expand the explanation of how literature sources were selected and utilized.

DRBC will review the updated version and will likely include both, since the earlier version includes more detail regarding Atlantic sturgeon.

DRBC will expand upon the selection of literature sources.

See above EPA comment responses.

# Comments

## Academy of Natural Sciences

### Comment

I looked over the draft water quality standards for the estuary. I think they do a good job summarizing the literature and issues. However, I find one point confusing. The "suitable" conditions are said to be those which might incur non-lethal effects but not lethal effects. However, the sturgeon papers suggest, as you note, that juvenile mortality may be higher at  $DO < 6.3$ , so this seems to contradict the definition of suitable.

I'm guessing that you are trying to set some acceptable standard which could support sturgeon, even though it might not be optimal. This is obviously very tricky, and the lethal vs non-lethal effect distinction, while appealing, may turn out to be messy.

### Response

DRBC will expand upon its definitions of "optimal", "suitable", and "non-suitable".

# Comments

## Philadelphia Water Department

### Comment

Many of the sources included in Appendix 1 of the draft report are inappropriate for use as the basis of determining dissolved oxygen (DO) criteria.

The draft report should more explicitly acknowledge the paucity of high-quality controlled laboratory experimental data available for sensitive species and clearly communicate the variability of the types of information cited in Appendix 1.

The draft report should clarify that laboratory experiments described in sources cited in Appendix 1 generally used relatively few hypoxia exposure levels and were not specifically designed with a toxicological approach to identifying DO endpoints for hypoxic effects.

DRBC should include a brief discussion of the physiological effects of hypoxia as it relates to DO percent saturation, include equivalent DO saturation values in the table in Appendix 1, and consider DO percent saturation when developing DO criteria in general.

### Response

DRBC will review and potentially revise the list of sources used.

DRBC will add clarification about the quality of available literature (primary vs. secondary, etc.).

DRBC will add clarification.

DRBC will add text discussing the biological importance of DO percent saturation and will add equivalent values to Appendix 1.

# Comments

## Philadelphia Water Department

### Comment

The draft report should not omit a 2018 study by Wirgin and Chambers entitled "An Experimental Approach to Evaluate the Effects of Low Dissolved Oxygen Acting Singly and in Binary Combination with Toxicants on Larval Atlantic Sturgeon, *Acipenser oxyrinchus oxyrinchus*"

### Response

DRBC will review and reconsider inclusion of this study if deemed appropriate.

The table in Appendix 1 contains a record for optimal DO for white perch juveniles attributed to Hanks and Secor 2011 with the Note "Growth threshold effect in this range". This is a misinterpretation of the experimental findings.

DRBC will review and revise if appropriate.

The Table in Appendix 1 contains a Yellow perch adult record indicating an optimal level of 5mg/L, but there are no accompanying sources or notes.

Source will be added (Auer 1982).

Lastly, it was noted that there is a typographic error on page 2 "The second phase of the review involved pairing down the list..."

Typo will be corrected.



# Comments

## Delaware Riverkeeper Network

Comment	Response
[IN SUMMARY] The report did not appropriately cite the available literature and assigned a value for Optimal that should be characterized as Suitable.	DRBC and its state and federal partners will review and revise as appropriate.

# Next Steps

- ❑ DRBC appreciates the comments received from the WQAC
- ❑ DRBC will revise report and redistribute to the WQAC for a second round of review
- ❑ More information on deadlines for comments, etc. will be provided in the coming weeks

