UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF WATER

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Dear Messrs. Tambini, Garvin, LaTourette, and Ziadeh,

This letter constitutes the U.S. Environmental Protection Agency's (EPA's) Administrator's Determination (Determination), pursuant to Clean Water Act (CWA) Section 303(c)(4)(B), that revised water quality standards (WQS) to protect aquatic life in zones 3, 4, and upper 5 (in total, river miles 108.4 to 70.0; hereafter, "specified zones") of the Delaware River Estuary in New Jersey, Delaware, and Pennsylvania are necessary to satisfy the requirements of the CWA.[1] The currently applicable WQS for the specified zones include aquatic life designated uses of "maintenance of resident fish and other aquatic life" and "passage of anadromous fish," and an associated dissolved oxygen criterion of 3.5 mg/L as a daily average. These currently applicable WQS do not include protections specified in CWA Section 101(a)(2) to provide for the "propagation of fish."[2]

[1] 33 U.S.C. 1313(c); *see* 40 CFR 131.22(b).
[2] Zones upstream and downstream of the specified zones include the "propagation of fish" use specified in CWA Section 101(a)(2) and are therefore not the subject of this Determination.

As three of the four state members of the Delaware River Basin Commission (DRBC), you have jurisdiction over parts of the specified zones of the Delaware River Estuary. As such, you are receiving this Administrator's Determination, in addition to DRBC. While each state individually maintains sovereignty over the portion of the Delaware River Estuary within its borders[3] and must comply with CWA Section 303(c), New Jersey, Delaware, Pennsylvania, and DRBC collectively play an important role in protecting and conserving this nationally recognized watershed.[4]

EPA recognizes and commends the significant water quality improvements that have been realized in the Delaware River Estuary since these WQS were established. The collective actions of DRBC and your respective state agencies have played a key role in the restoration of aquatic life and habitat, including the return of species of ecological and recreational importance to the river. However, the currently applicable WQS do not reflect the now abundant evidence that fish species previously thought to only survive but not reproduce in the Delaware River Estuary have in fact been propagating there to some extent for at least two decades.[5] This information, coupled with information on ambient dissolved oxygen concentrations in the specified zones and evidence that further improvements in those ambient concentrations are attainable, discussed further below, indicates that the CWA Section 101(a)(2) use of "propagation" is attainable in the specified zones. EPA's regulation at 40 CFR 131.20(a) requires that states revise their WQS if new information indicates that CWA Section 101(a)(2) uses that were previously not included in the WQS are attainable. Therefore, to be consistent with the CWA and EPA's implementing regulation, the applicable aquatic life designated uses and corresponding dissolved oxygen criterion in the specified zones of the Delaware River Estuary must be revised to protect the propagation of resident and migratory fish species.

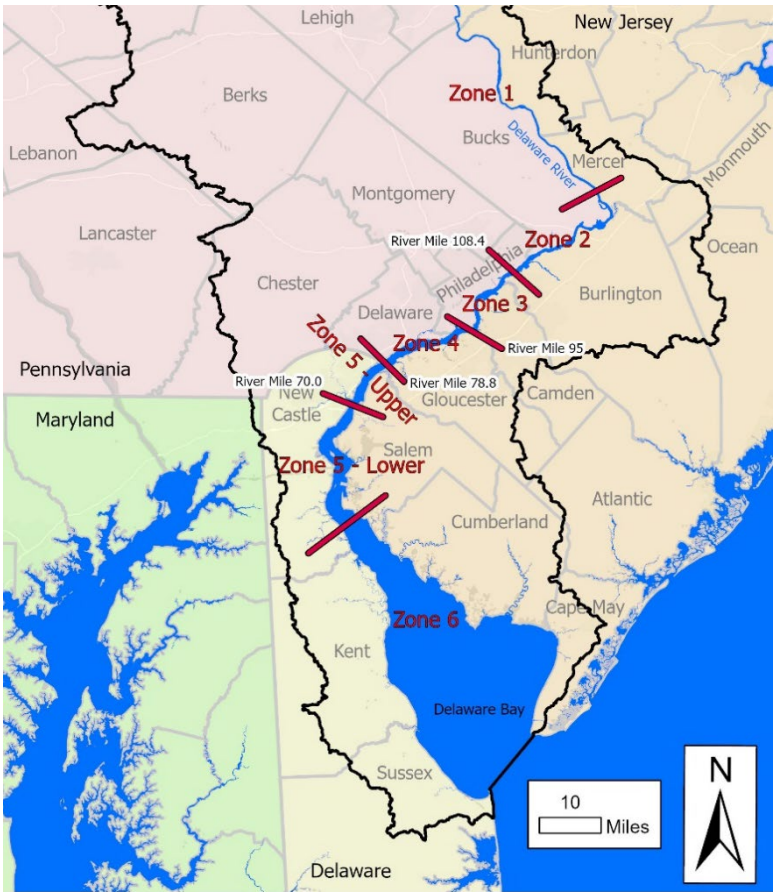
The specified zones addressed in this Determination are listed below and displayed on the following map:

- Zone 3 (river miles 108.4 to 95)
- Zone 4 (river miles 95 to 78.8)
- Upper Portion of Zone 5 (river miles 78.8 to 70.0)

[3] Delaware River Basin Compact, art. 1, "Short Title, Definitions, Purpose and Limitations," § 1.3(b), "Purpose and Findings," p. 3 (1961), *available at* https://www.nj.gov/drbc/library/documents/compact.pdf ("The legislative bodies of the respective signatory parties hereby find and declare . . . (b) The water resources of the basin are subject to the sovereign right and responsibility of the signatory parties, and it is the purpose of this Compact to provide for a joint exercise of such powers of sovereignty in the common interests of the people of the region."); Delaware River Basin Compact, art. 5, "Pollution Control," § 5.5(b), "Further Jurisdiction," p. 11 (1961), *available at* https://www.nj.gov/drbc/library/documents/compact.pdf ("Nothing in this Compact shall be construed to repeal, modify or qualify the authority of any signatory party to enact any legislation or enforce any additional conditions and restrictions to lessen or prevent the pollution of waters within its jurisdiction.").

[4] Delaware River Basin Compact, art. 1, "Short Title, Definitions, Purpose and Limitations," § 1.3(a) & (c), "Purpose and Findings," pp. 3 & 4 (1961), *available at* https://www.nj.gov/drbc/library/documents/compact.pdf ("The legislative bodies of the respective signatory parties hereby find and declare: (a) The water resources of the basin are affected with a local, state, regional and national interest and their planning, conservation, utilization, development, management and control, under appropriate arrangements for intergovernmental cooperation, are public purposes of the respective signatory parties. . . . [and] (c) The water resources of the basin are functionally inter-related, and the uses of these resources are interdependent. A single administrative agency is therefore essential for effective and economical direction, supervision and coordination of efforts and programs of federal, state and local governments and of private enterprise.").

[5] Delaware River Basin Commission. "Existing Use Evaluation for Zones 3, 4, & 5 of the Delaware Estuary Based on Spawning and Rearing of Resident and Anadromous Fishes." September 30, 2015. https://www.state.nj.us/drbc/library/documents/ExistingUseRpt_zones3-5_sept2015.pdf



Map of Delaware River Zones Addressed in EPA's Determination

In the decades since the currently applicable WQS were established, various documents that DRBC produced (e.g., advisory committee minutes, scientific studies, governmental correspondence) or received (e.g., petitions) identify the need to update the aquatic life designated uses and associated dissolved oxygen criterion for the specified zones of the river.[6] In its most recent letter to EPA,[7] DRBC explained its ongoing efforts to evaluate the available evidence with the ultimate goal of undertaking a rulemaking to revise the applicable WQS, in accordance with a 2017 resolution (discussed more

[6] See, e.g., DRBC Annual Report 1990. https://www.nj.gov/drbc/library/documents/1990AR.pdf; DRBC Water Quality Advisory Committee. July 21, 2009 Minutes. https://www.nj.gov/drbc/library/documents/WQAC/wqac_july09.pdf; DRBC Water Quality Advisory Committee. November 17, 2009 Minutes. https://www.nj.gov/drbc/library/documents/WQAC/wqac_nov09.pdf; DRBC. 2010. Continuing Restoration of Dissolved Oxygen in the Delaware Estuary: Historical Data and Current Efforts (Presentation). https://www.state.nj.us/drbc/library/documents/diss-oxygen-estuary_120810pres.pdf; Delaware Riverkeeper, Delaware Riverkeeper Network, Delaware River Shad Fishermen's Association, Lehigh River Stocking Association. 2013. Petition to DRBC. https://www.nj.gov/drbc/library/documents/WQAC/053113/handout3_DRN-DRSFA-LRSA_petition.pdf; DRBC. 2015. Existing Use Evaluation for Zones 3, 4, & 5 of the Delaware Estuary Based on Spawning and Rearing of Resident and Anadromous Fishes. https://www.state.nj.us/drbc/library/documents/ExistingUseRpt_zones3-5_sept2015.pdf; August 15, 2016. Letter from Jon Capacasa, Water Protection Division Director, EPA Region 3 and Jeffrey Gratz, Clean Water Division Acting Director to Steven J. Tambini, Executive Director, Delaware River Basin Commission.

[7] Letter from Steven J. Tambini, Executive Director, Delaware River Basin Commission, to Michael S. Regan, EPA Administrator, and Janet McCabe, EPA Deputy Administrator. (October 17, 2022).

below).[8] EPA recognizes your states' and DRBC's awareness of the issue and efforts to ensure that the WQS for the Delaware River Estuary are consistent with the goals of the CWA. EPA is taking this step to make clear that the WQS must be revised to meet CWA requirements.

I. Statutory and Regulatory Background

CWA Section 101(a)(2) establishes a national goal of "water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and on the water," (hereafter, collectively referred to as "101(a)(2) uses") wherever attainable. See also 40 CFR 131.2. EPA's regulation, at 40 CFR 131.10(g), implements this statutory provision by requiring that WQS protect 101(a)(2) uses unless those uses are shown to be unattainable.

Under the CWA, states have the primary responsibility for reviewing, establishing, and revising WQS applicable to their waters (CWA Section 303(c)). WQS define the desired condition of a water body, in part, by designating the use or uses to be made of the water (40 CFR 131.2 and 131.10) and by setting the numeric or narrative water quality criteria to protect those uses (40 CFR 131.2 and 131.11). There are two primary categories of water quality criteria: human health criteria and aquatic life criteria. Human health criteria protect designated uses targeted toward human health, such as public water supply, recreation, and fish and shellfish consumption. Aquatic life criteria protect designated uses targeted toward aquatic life, such as survival, growth, and reproduction of fish, invertebrates, and other aquatic species. Regardless of their category, water quality criteria "must be based on sound scientific rationale and must contain sufficient parameters or constituents to protect the designated use. For waters with multiple use designations, the criteria shall support the most sensitive use" (40 CFR 131.11(a)(1)).

States are required to hold a public hearing to review applicable WQS at least once every three years and, if appropriate, revise standards or adopt new standards (CWA Section 303(c)(1); 40 CFR 131.20(a)). Every three years, states must also reexamine water body segments that do not include the 101(a)(2) uses to determine if any new information has become available that indicates the 101(a)(2) uses are attainable; and if so, revise the WQS accordingly (40 CFR 131.20(a)).

Any new or revised WQS must be submitted to EPA for review and approval or disapproval (CWA Section 303(c)(2)(A) and (c)(3)). CWA Section 303(c)(4)(B) independently authorizes the Administrator to determine that a new or revised standard is necessary to meet CWA requirements. The authority to make a Determination under CWA Section 303(c)(4)(B) is discretionary and resides with the Administrator, unless delegated by the Administrator (40 CFR 131.22(b)). For the purposes of this Determination, the Administrator has delegated this authority to EPA's Assistant Administrator for the Office of Water.

II. The Delaware River Basin Compact, the Delaware River Basin Commission, and the DRBC-Basin State Relationship

In 1961, the Delaware River Basin Compact established DRBC, a regional partnership between states and the federal government charged with the management of the Delaware River Basin's water

[8] NO. 2017 – 4, A RESOLUTION to recognize that evidence supports further study on the inclusion of propagation as a designated use in Zones 3 and 4 and the upper portion of Zone 5 of the Delaware River Estuary; to provide for such studies to be undertaken in consultation with co-regulators and dischargers; and to direct the Executive Director to initiate DRBC rulemaking to revise the designated aquatic life uses consistent with the results of the identified studies and the objectives and goals of the federal Clean Water Act. The full resolution is available at https://www.nj.gov/drbc/library/documents/Res2017-04_EstuaryExistingUse.pdf

resources.[9] Through DRBC, each state participates in the shared governance of this regional resource and maintains sovereign rights over the portion of the river in its jurisdiction.[10]

Pursuant to the Delaware River Basin Compact, which predated the CWA, DRBC adopts WQS for the Delaware River Estuary.[11] However as noted above, under the CWA, states have the primary responsibility for reviewing, establishing, and revising WQS applicable to their waters, and must submit new or revised WQS to EPA for review and approval or disapproval.

Given the unique interjurisdictional management of the Delaware River Estuary, WQS are submitted to EPA for review through a process coordinated across the state, regional, and federal levels. This process begins when DRBC adopts WQS for the Delaware River Estuary. To comply with CWA Section 303(c), the states of New Jersey, Delaware, and Pennsylvania have provisions in their state WQS regulations that explicitly reference or implicitly incorporate DRBC's WQS as the applicable WQS for the portions of the river under their jurisdiction. When DRBC adopts new or revised WQS, each relevant member state submits a certification to EPA from that state's attorney general or other appropriate legal authority, in accordance with 40 CFR 131.6(e). Those certifications provide that DRBC's new or revised WQS were duly adopted pursuant to state law. EPA then reviews whether those WQS are consistent with the CWA and EPA's implementing regulation and approves or disapproves them.

III. History of the Delaware River Estuary WQS Subject to this Determination

Currently Applicable Aquatic Life Designated Uses and Dissolved Oxygen Criteria

In 1967, DRBC adopted WQS for the specified zones of the Delaware River Estuary.[12] Based on the conditions of the Delaware River Estuary at the time, DRBC concluded that "propagation of fish" was not attainable for the specified zones due to the presence of industrial and municipal discharges, and associated low dissolved oxygen levels. DRBC, therefore, adopted WQS to include "maintenance of resident fish and other aquatic life," "passage of anadromous fish," and a dissolved oxygen criterion of 3.5 mg/L, as a daily average, for the specified zones of the Delaware River Estuary.[13] While DRBC has periodically updated certain WQS for the Delaware River Estuary, it has not updated the aquatic life designated uses and associated dissolved oxygen criterion for the specified zones since 1967; and therefore, those WQS remain currently applicable for the specified zones of the Delaware River Estuary in New Jersey, Delaware, and Pennsylvania.

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[9] The DRBC was established pursuant to federal law (75 Stat. 688 (1961)). The DRBC is a five-member body composed of representatives from the affected states of Delaware, New Jersey, New York, and Pennsylvania, in addition to a federal representative (this seat is currently held by the U.S. Army Corps of Engineers). Given the specified zones of the Delaware River Estuary covered by this Administrator's Determiniation, only DRBC and the states of New Jersey, Delaware, and Pennsylvania are discussed herein.

[10] See footnotes 3 and 4.

[11] Delaware River Basin Compact, art. 5, "Pollution Control," § 5.2, "Policy and Standards," p. 11 (1961), *available at* https://www.nj.gov/drbc/library/documents/compact.pdf (DRBC "may adopt and from time to time amend and repeal rules, regulations and standards to control…future pollution and abate existing pollution"). DRBC, the states and EPA refer to these rules, regulations and standards as equivalent to WQS under the CWA. As such, the term WQS is used herein to refer to these rules, regulations and standards.

[12] Delaware River Basin Commission. 2013. Delaware River Basin Water Code. https://www.nj.gov/drbc/library/documents/watercode.pdf

[13] Delaware River Basin Commission. "Existing Use Evaluation for Zones 3, 4, & 5 of the Delaware Estuary Based on Spawning and Rearing of Resident and Anadromous Fishes." September 30, 2015. https://www.state.nj.us/drbc/library/documents/ExistingUseRpt_zones3-5_sept2015.pdf

Actions to Reexamine and Revise the Currently Applicable Water Quality Standards

Since 1967, DRBC and the member states have been involved in work to reexamine the WQS for the specified zones of the Delaware River Estuary.[14] In a letter dated August 15, 2016, EPA recommended that DRBC and its member states revise these WQS.[15] EPA indicated that scientific information available at the time strongly supported the need for revised WQS and that DRBC should revise them expeditiously. In 2017, DRBC passed resolution 2017-4, which outlined a multi-year study to further evaluate the inclusion of a fish propagation designated use for the specified zones, determine protective criteria, and initiate a rulemaking process to revise the applicable WQS as appropriate.[16] DRBC passed resolution 2017-4, setting out on a path of further study and evaluation, despite robust evidence by that point that the 101(a)(2) use of "propagation" was attainable and therefore the existing WQS were not consistent with the CWA and EPA's implementing regulation.[17]

Originally, resolution 2017-4 set forth a six-year timeline in which DRBC would issue a final rule by September 2023.[18] However in September 2020, DRBC adopted an extension, which delayed the date to issue a final rule by an additional 18 months.[19] Accordingly, DRBC's projected date for issuing a final rule has been pushed from September 2023 to March 2025.[20] Additionally, as noted above, there will presumably be some additional amount of time beyond March 2025 for the states of New Jersey, Delaware, and Pennsylvania to submit the required attorney general certifications to EPA, in accordance with 40 CFR 131.6.

On September 30, 2022, DRBC completed one of the actions set forth in resolution 2017-4, as amended, which was a "full draft analysis of attainability" to inform the regulatory process of upgrading aquatic life designated uses and criteria for the specified zones of the Delaware River Estuary.[21] The draft analysis of attainability describes the results of hydrodynamic[22] and water quality modeling,[23] projects the dissolved oxygen improvements that could be achieved if certain dischargers reduce the ammonia nitrogen[24] concentrations in their effluent, and identifies what DRBC believes is the

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[14] See footnote 6.
[15] August 15, 2016. Letter from Jon Capacasa, Water Protection Division Director, EPA Region 3 and Jeffrey Gratz, Clean Water Division Acting Director to Steven J. Tambini, Executive Director, Delaware River Basin Commission.
[16] Delaware River Basin Comission. Resolution NO. 2017 – 4. Adopted September 13, 2017. https://www.nj.gov/drbc/library/documents/Res2017-04_EstuaryExistingUse.pdf
[17] DRBC. September 13, 2017 Minutes. https://www.nj.gov/drbc/library/documents/9-13-17_minutes.pdf
[18] Delaware River Basin Comission. Resolution NO. 2017 – 4. Adopted September 13, 2017. https://www.nj.gov/drbc/library/documents/Res2017-04_EstuaryExistingUse.pdf
[19] Delaware River Basin Commission. September 10, 2020 Minutes.
[20] Suk, Namsoo. "Resolution for the Minutes 2020-09: Revised Schedule for Aquatic Life Designated Use Project." Delaware River Basin Comission. October 29, 2020. https://www.nj.gov/drbc/library/documents/WQAC/102920/suk_RevisedProjectSchedule.pdf
[21] Delaware River Basin Commission. 2022. *Analysis of Attainability: Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary*. September 2022 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/AnalysisAttainability_DRAFTsept2022.pdf
[22] Delaware River Basin Commission. 2021. *Modeling Eutrophication Processes in the Delaware Estuary: Three-Dimensional Hydrodynamics Model for the Delaware Estuary.* December 2021 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/HydroModelCalibrationRpt_DRAFTdec2021.pdf
[23] Delaware River Basin Commission. 2022. *Modeling Eutrophication Processes in the Delaware River Estuary: Three-Dimensional Water Quality Model.* September 2022 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/WQModelCalibrationRpt_DRAFTsept2022.pdf
[24] Ammonia nitrogen includes both the ionized form (ammonium, NH_4^+) and the unionized form (ammonia, NH_3). *See* https://www.epa.gov/caddis-vol2/ammonia.

"highest attainable dissolved oxygen condition."[25] The draft analysis of attainability also identifies potential treatment technologies for reducing ammonia nitrogen levels in the effluent from specific dischargers, and provides the potential cost estimates and affordability impacts of implementing those technologies.[26] In sum, the analyses set forth in the draft analysis of attainability indicate that the 101(a)(2) use of "propagation" is attainable under the CWA and the WQS for the specified zones must be revised accordingly.

IV. Information Indicating the Need to Revise WQS in the Specified Zones of the Delaware River Estuary

This section discusses information indicating that the CWA 101(a)(2) use of "propagation" is attainable for aquatic life in the specified zones of the Delaware River Estuary, per 40 CFR 131.20(a), and a higher dissolved oxygen criterion is necessary to protect that use and meet CWA requirements per 40 CFR 131.11(a):

1. Information Demonstrating Fish Propagation
2. Information Demonstrating Dissolved Oxygen Levels Above the Currently Applicable Criterion
3. Information Demonstrating Further Improvements in Dissolved Oxygen Levels are Attainable

1. Information Demonstrating Fish Propagation

In September 2015, DRBC published a report that evaluated whether fish propagation was an "existing use"[27] in the specified zones of the Delaware River Estuary.[28] DRBC evaluated data from three sources, including ichthyoplankton (fish eggs and larvae) surveys, beach seine (net) surveys, and the targeted collection and tracking of Atlantic sturgeon (a federally endangered species under the Endangered Species Act[29]). Analysis of the available data led DRBC to draw the following conclusion:

> The combined data sets evaluated for this report nevertheless indicate that the "Existing Use" attained within the Delaware Estuary in the period between 2000 and 2014 includes "propagation" for Zones 3, 4, and the upper 8.8 miles of Zone 5. In each of these zones, the evidence is moderate or even strong for one or more species, indicating substantial progress in attaining the full Clean Water Act aquatic life goal of "maintenance and propagation" for the species evaluated. The "Existing Use" for Zones 3, 4, and upper Zone 5 therefore substantially exceeds the "designated use" of only "maintenance." But the data evaluated in this report also indicates that weakness in successful reproduction exists for

[25] Delaware River Basin Commission. 2022. *Analysis of Attainability: Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary*. Page v. September 2022 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/AnalysisAttainability_DRAFTsept2022.pdf

[26] Delaware River Basin Commission. 2022. *Social and Economic Factors Affecting the Attainment of Aquatic Life Uses in the Delaware River Estuary.* September 2022 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/SocialandEconomicFactors_DRAFTsept2022.pdf

[27] 40 CFR 131.3(e): "*Existing uses* are those uses actually attained in the water body on or after November 28, 1975, whether or not they are included in the water quality standards."

[28] Delaware River Basin Commission. "Existing Use Evaluation for Zones 3, 4, & 5 of the Delaware Estuary Based on Spawning and Rearing of Resident and Anadromous Fishes." September 30, 2015. https://www.state.nj.us/drbc/library/documents/ExistingUseRpt_zones3-5_sept2015.pdf

[29] Shortnose and Atlantic sturgeon are present in the specified zones of the Delaware River and are listed as endangered under the Endangered Species Act. See: Federal Register. 1967. Native fish and wildlife endangered species. Office of the Secretary. Federal Register 32(48): pg. 6. And Federal Register. 2012. Endangered and Threatened Wildlife and Plants; Threatened and Endangered Status for Distinct Population Segments of Atlantic Sturgeon in the Northeast Region. Department of Commerce. Federal Register 77(24): 5880-5911.

> one or more species for all three zones. Thus, full attainment of a "maintenance and propagation" use has not been demonstrated at this time based on the data available and examined for this existing use evaluation.[30]

Based on DRBC's 2015 report, fish species have been propagating in the specified zones of the Delaware River Estuary to some extent since at least 2000 (22 years). In addition to the endangered Atlantic sturgeon, these species include important finfish species, such as American shad, striped bass, white perch, and yellow perch.[31]

However, the early life stages and adults of these resident and migratory fish species that utilize habitats in the specified zones of Delaware River Estuary are likely experiencing either lethal or sub-lethal effects when dissolved oxygen concentrations are at the currently applicable dissolved oxygen criterion of 3.5 mg/L. A 2018 report prepared for DRBC by Drexel University defined a "sensitive" species as "a species that exhibits deleterious effects, either lethal or sub-lethal (e.g., reduced growth, lowered reproduction, increased respiration rates, etc.), when exposed to concentrations of [dissolved oxygen] that are equal to or greater than the current criteria."[32] The report identified nine sensitive species with lethal effects and 11 sensitive species with sub-lethal effects when dissolved oxygen is at the current 3.5 mg/L applicable criterion, including Atlantic and shortnose sturgeon.[33] For example, experimental tests on juvenile Atlantic sturgeon showed instantaneous growth declined 50% when dissolved oxygen decreased from 70% to 40% saturation at 20°C, which is equal to dissolved oxygen concentrations of 6.35 to 3.62 mg/L, respectively.[34] At summer temperatures for the Delaware River Estuary (i.e., 28°C), juvenile Atlantic sturgeon did not grow when dissolved oxygen concentrations were at the currently applicable summer criterion of 3.5 mg/L.[35]

The fact that the propagation of sensitive species like the Atlantic sturgeon has been observed in the specified zones likely depends on the limited fraction of habitat with dissolved oxygen concentrations that exceed 3.5 mg/L, discussed below. As the 2018 report suggests, in the absence of revised WQS, many sensitive species are likely to face continued risks due to unprotective dissolved oxygen criteria.[36]

2. *Information Demonstrating Dissolved Oxygen Levels Exceeding the Currently Applicable Criterion*

Dissolved oxygen levels in surface waters vary naturally by season, time of day, and location, and sometimes also by depth. In estuaries such as the Delaware River Estuary, important factors and processes affecting dissolved oxygen include tidal and other mixing and transport processes, air-water and sediment-water oxygen exchanges, organic matter production and respiration, and nutrient cycling

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[30] Delaware River Basin Commission. "Existing Use Evaluation for Zones 3, 4, & 5 of the Delaware Estuary Based on Spawning and Rearing of Resident and Anadromous Fishes." Page 32. September 30, 2015. https://www.state.nj.us/drbc/library/documents/ExistingUseRpt_zones3-5_sept2015.pdf

[31] Delaware River Basin Commission. "Existing Use Evaluation for Zones 3, 4, & 5 of the Delaware Estuary Based on Spawning and Rearing of Resident and Anadromous Fishes." September 30, 2015. https://www.state.nj.us/drbc/library/documents/ExistingUseRpt_zones3-5_sept2015.pdf

[32] Stoklosa et al. "A Review of Dissolved Oxygen Requirements for Key Sensitive Species in the Delaware Estuary." Academy of Natural Sciences of Drexel University. November 2018. https://www.nj.gov/drbc/library/documents/Review_DOreq_KeySensSpecies_DelEstuary_ANStoDRBCnov2018.pdf

[33] Stoklosa et al. (2018).

[34] Niklitschek, E., & Secor, D. (2009). Dissolved oxygen, temperature and salinity effects on the ecophysiology and survival of juvenile Atlantic sturgeon in estuarine waters: I. Laboratory results. *Journal of Experimental Marine Biology and Ecology, 381*, S150-S160.

[35] Niklitschek & Secor (2009).

[36] Stoklosa et al. (2018).

and transformation.[37] Many of these processes are affected by changes in salinity and water temperature. Variability in these factors contributes to seasonal and interannual dissolved oxygen variability in the Delaware River Estuary, including in the specified zones. The lowest dissolved oxygen levels in the Delaware River Estuary typically occur from May to October when the water is warmest. During this period from May to October, the ability of the water to hold oxygen (i.e., the oxygen solubility) is lowest and biological processes that consume oxygen, such as biological conversion of ammonium to nitrate, are at seasonal maximums.

Average summer dissolved oxygen levels in the Delaware River Estuary near Chester, Pennsylvania (zone 4) declined from near saturation in the late 1880s to near zero (i.e., anoxia) in the 1950s and 1960s.[38] Starting in 1970, dissolved oxygen levels began to increase steadily in conjunction with a decrease in ammonium concentrations in the river.[39] A continuous dissolved oxygen record for the Delaware River near the Ben Franklin Bridge (zone 3) shows that, between 1961 and 1985, only 4% of daily mean dissolved oxygen concentrations for June 15 to September 15 were above 3.5 mg/L, the currently applicable criterion for those months. The fraction of daily means meeting the 3.5 mg/L criterion increased to 80% in the 1986 to 2000 time period. After 2000, more than 99% of means were greater than 3.5 mg/L.[40] In fact, dissolved oxygen concentrations often exceed the currently applicable criterion of 3.5 mg/L by a significant margin; since 2015, the summer median of daily means was 5.4 mg/L near the Ben Franklin Bridge and 5.8 mg/L near Chester, Pennsylvania.[41]

As noted above, certain fish species that utilize habitats in the specified zones of the Delaware River Estuary require dissolved oxygen concentrations above the currently applicable dissolved oxygen criterion of 3.5 mg/L. The fact that the dissolved oxygen concentrations in the specified zones now often exceed the currently applicable dissolved oxygen criterion of 3.5 mg/L is likely the reason why fish propagation, deemed unattainable in the specified zones in 1967, is now frequently observed to some extent. This assumption is supported by a 2016 study that contrasted daily minimum dissolved oxygen concentrations at the Ben Franklin Bridge in years with successful Atlantic sturgeon recruitment (i.e., a metric of successful propagation) and years when recruitment was not observed.[42] Daily minimum dissolved oxygen was above 5.0 mg/L in 90% of the observations during the years when recruitment was observed, and the median minimum daily dissolved oxygen during these years was greater than 6.0 mg/L during the spawning and egg and larval development periods (June and July).[43] During years when

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[37] Delaware River Basin Commission. DRAFT "Analysis of Attainability: Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary." September 2022. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/AnalysisAttainability_DRAFTsept2022.pdf

[38] Sharp, J. (2010). Estuarine oxygen dynamics: What can we learn about hypoxia from long-time records in the Delaware estuary? *Limnology and Oceanography, 55*(2), 535-548.

[39] Sharp (2010).

[40] USGS 2022. National Water Information System, Surface-Water Daily Data for the Nation. Daily water quality for the Delaware River near Penn's Landing (USGS 01467200). https://waterdata.usgs.gov/nwis/dv?cb_00010=on&cb_00300=on&format=rdb&site_no=01467200&referred_module=sw&period=&begin_date=1961-10-03&end_date=2022-09-23. Accessed 10/07/2022.

[41] USGS 2022. National Water Information System, Surface-Water Daily Data for the Nation. Daily water quality for the Delaware River near Chester, PA (USGS 01467200). https://waterdata.usgs.gov/nwis/dv?cb_00010=on&cb_00300=on&format=rdb&site_no=01477050&referred_module=sw&period=&begin_date=1961-10-03&end_date=2022-09-23. Accessed 10/07/2022.

[42] Moberg, T. and M. DeLucia. 2016. Potential Impacts of Dissolved Oxygen, Salinity and Flow on the Successful Recruitment of Atlantic Sturgeon in the Delaware River. The Nature Conservancy. Harrisburg, PA.

[43] Moberg and DeLucia (2016).

recruitment was not observed, the median of daily minimum dissolved oxygen was between 4.0 and 5.0 mg/L, and daily minimums were frequently below 4.0 mg/L.[44]

3. *Information Demonstrating Further Improvements in Dissolved Oxygen Levels are Attainable*

Significant improvements in dissolved oxygen levels in the specified zones have historically correlated with reductions in ambient ammonium concentrations.[45] Wastewater treatment plants in the specified zones currently discharge ammonia nitrogen, a source of biochemical oxygen demand, into the Delaware River Estuary.[46] Advanced treatment[47] could reduce the concentration of ammonia nitrogen and oxygen demand associated with these wastewater discharges, which, based on previously observed responses,[48] would improve ambient dissolved oxygen levels. This is consistent with DRBC's September 2022 draft analysis of attainability, indicating that higher dissolved oxygen levels can be attained in the specified zones by implementing advanced treatment at wastewater treatment plants discharging to the Delaware River Estuary.[49] DRBC's modeling indicates that this advanced treatment could increase dissolved oxygen levels during the most impacted summer months by roughly 2.3 mg/L, resulting in conditions that would consistently provide for both the protection and propagation of even sensitive aquatic species throughout the specified zones.[50] Furthermore, DRBC's analysis suggests that any costs associated with advanced treatment are not expected to exacerbate the affordability burden on ratepayers within the relevant service areas.[51, 52]

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[44] Moberg and DeLucia (2016).
[45] Sharp (2010).
[46] USEPA Enforcement and Compliance History Online (ECHO). https://echo.epa.gov (Accessed 10/20/2022).
[47] EPA classifies advanced treatment as "a level of treatment that is more stringent than secondary or produces a significant reduction in conventional, nonconventional, or toxic pollutants present in the wastewater treated by a facility." *See* USEPA. 2008. Clean Watersheds Needs Survey 2004 Report to Congress. https://nepis.epa.gov/Exe/ZyNET.exe/P10032Z7.TXT?ZyActionD=ZyDocument&Client=EPA&Index=2006+Thru+2010&Docs=&Query=&Time=&EndTime=&SearchMethod=1&TocRestrict=n&Toc=&TocEntry=&QField=&QFieldYear=&QFieldMonth=&QFieldDay=&IntQFieldOp=0&ExtQFieldOp=0&XmlQuery=&File=D%3A%5Czyfiles%5CIndex%20Data%5C06thru10%5CTxt%5C00000007%5CP10032Z7.txt&User=ANONYMOUS&Password=anonymous&SortMethod=h%7C-&MaximumDocuments=1&FuzzyDegree=0&ImageQuality=r75g8/r75g8/x150y150g16/i425&Display=hpfr&DefSeekPage=x&SearchBack=ZyActionL&Back=ZyActionS&BackDesc=Results%20page&MaximumPages=1&ZyEntry=1&SeekPage=x&ZyPURL#
[48] Sharp (2010).
[49] Delaware River Basin Commission. 2022. *Analysis of Attainability: Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary*. September 2022 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/AnalysisAttainability_DRAFTsept2022.pdf
[50] Delaware River Basin Commission. 2022. *Analysis of Attainability: Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary*. September 2022 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/AnalysisAttainability_DRAFTsept2022.pdf
[51] Delaware River Basin Commission. 2022. *Analysis of Attainability: Improving Dissolved Oxygen and Aquatic Life Uses in the Delaware River Estuary*. September 2022 Draft. https://www.nj.gov/drbc/library/documents/AnalysisAttainability/AnalysisAttainability_DRAFTsept2022.pdf
[52] DRBC has not fully evaluated how that cost burden may be distributed across ratepayers, especially in underserved and overburdened communities. However, DRBC has provided a partial list of potential cost mitigation options, such as federal, state, and local assistance programs that, if awarded, adopted, or implemented, may help offset costs for low-income households or help utilities finance costs (see DRBC 2022: *Social and Economic Factors Affecting the Attainment of Aquatic Life Uses in the Delaware River Estuary*).

V. Clean Water Act Section 303(c)(4)(B) Determination

EPA's evaluation of available information—as described in the sections above— indicates that "propagation of fish" is attainable in the specified zones of the Delaware River Estuary. Additionally, the currently applicable dissolved oxygen criterion for these zones is not sufficient to protect propagation throughout the specified zones.

Accordingly, EPA is determining, pursuant to CWA Section 303(c)(4)(B) and 40 CFR 131.22(b), that: 1) revised aquatic life designated uses that provide for propagation of fish, consistent with CWA Section 101(a)(2) and 40 CFR 131.20(a); and 2) corresponding dissolved oxygen criteria that protect a propagation use, consistent with 40 CFR 131.11, are necessary for zone 3, zone 4, and the upper portion of zone 5 (in total, river miles 108.4 to 70.0) of the Delaware River Estuary, to meet the requirements of the CWA.

VI. Next Steps

EPA acknowledges and appreciates DRBC's and your states' commitment to updating the WQS for the specified zones of the Delaware River Estuary. As noted above, DRBC's resolution 2017-4, as amended, envisions completing a rulemaking to revise the WQS subject to this Determination by March 2025. This Determination does not preclude DRBC from proceeding with its own rulemaking effort, and EPA welcomes the opportunity to discuss whether DRBC's March 2025 deadline could be accelerated. That said, CWA Section 303(c)(4) requires that the Administrator promptly prepare and publish proposed regulations setting forth new or revised WQS following a Determination that new or revised WQS are necessary to meet the requirements of the CWA. In the event that DRBC adopts and New Jersey, Delaware, and Pennsylvania certify and submit revised WQS to EPA (as outlined in part II of this Determination) and then EPA approves revised WQS that sufficiently address this Determination before EPA proposes or promulgates federal WQS, EPA would no longer be obligated to propose or promulgate those federal WQS.

In this particular case, given the readily available information that DRBC and other stakeholders have generated, EPA believes that 12 months is a reasonable timeframe to develop proposed federal regulations setting forth revised aquatic life designated uses that provide for propagation and corresponding protective criteria for the specified zones of the Delaware River Estuary. EPA will seek feedback from DRBC and your state agencies, as well as interested stakeholders, on EPA's proposed rulemaking in accordance with 40 CFR 131.22(c) and 131.20(b). After a federal rule is proposed, EPA plans to give full consideration to all comments received before proceeding to the final rule stage.

EPA is committed to continuing to work with DRBC and the member states to ensure that protective aquatic life uses and associated water quality criteria are supported by science and law.

Sincerely,

Radhika Fox
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