

Delaware River Basin Commission

Research and Policy Decisions: Aquatic Life Uses in the Delaware Estuary

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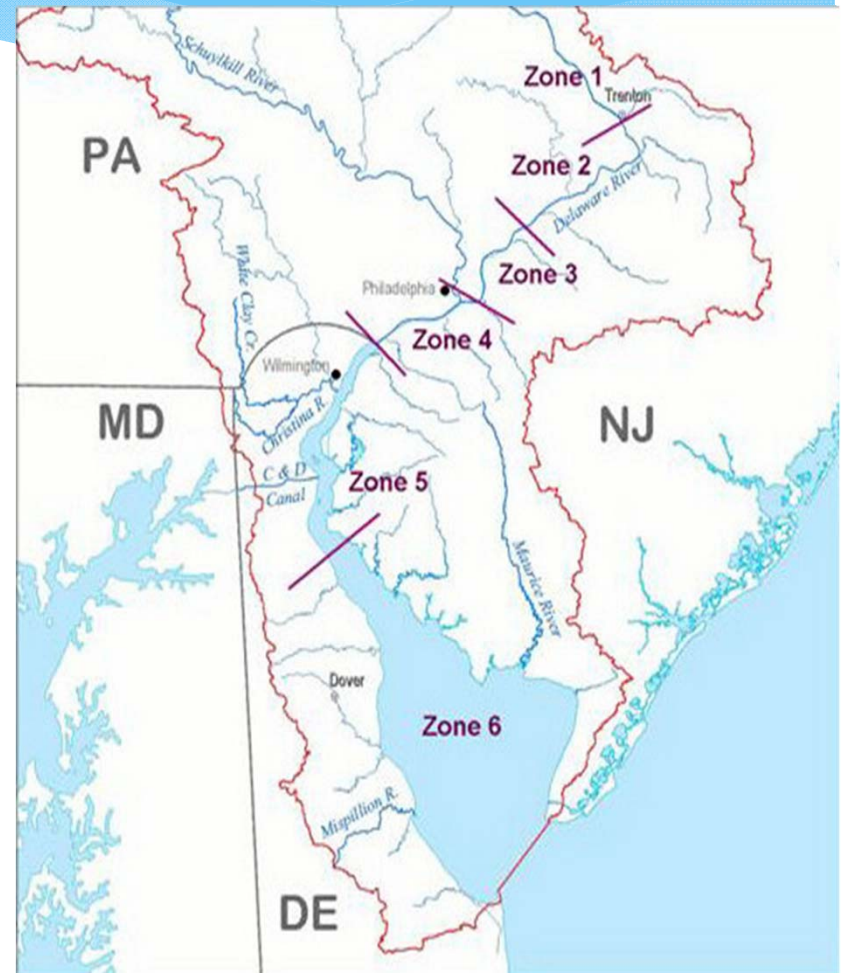


Presentation Outline

- ❑ History of water quality issues in the Delaware Estuary - dissolved oxygen
 - Past degradation
 - Designated Aquatic Life Use and Water Quality Criteria
 - Deliberations of the WQAC
- ❑ Resolution 2017-4
 - Elements
- ❑ Why This Approach?

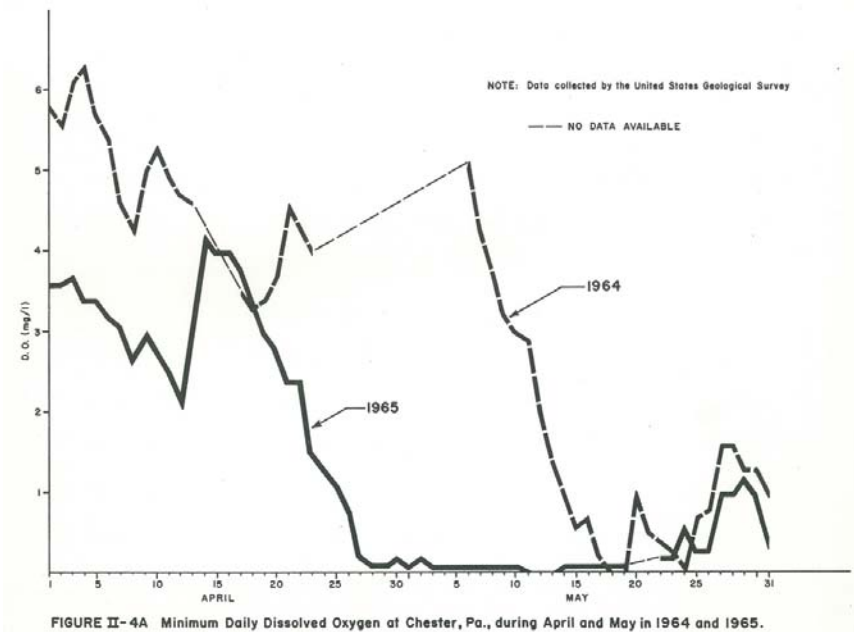
Background

- The estuary consists of five water quality management units called “Zones”.
- DRBC established water quality standards (“stream quality objectives”) for the Estuary in 1967.
- Clean Water Act of 1972 establishes Section 101(a)(2) uses:
“water quality should provide for the protection and propagation of fish, shellfish and recreation in and on the water, wherever attainable.”



Dissolved Oxygen Impacted by Pollution

- Early 1900s through the 1970s – little or no dissolved oxygen in the Estuary spring through October, from Wilmington, DE to Burlington, NJ.
- Fish species such as striped bass could not spawn.
- Low DO conditions from late summer through fall prevented juvenile shad spawned above this region from migrating to the ocean.



Chester, PA

Mean Monthly D.O. - 1963

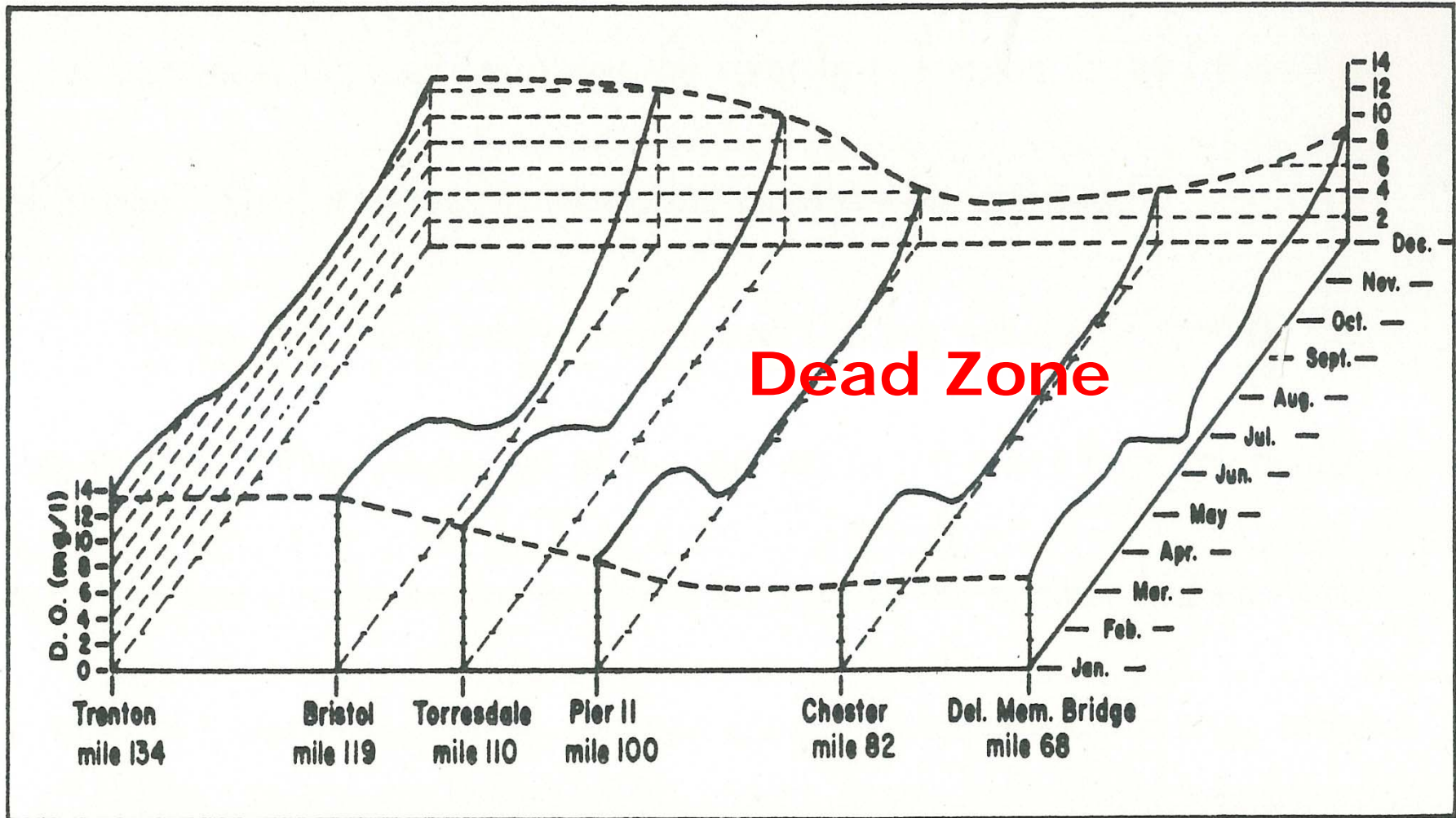
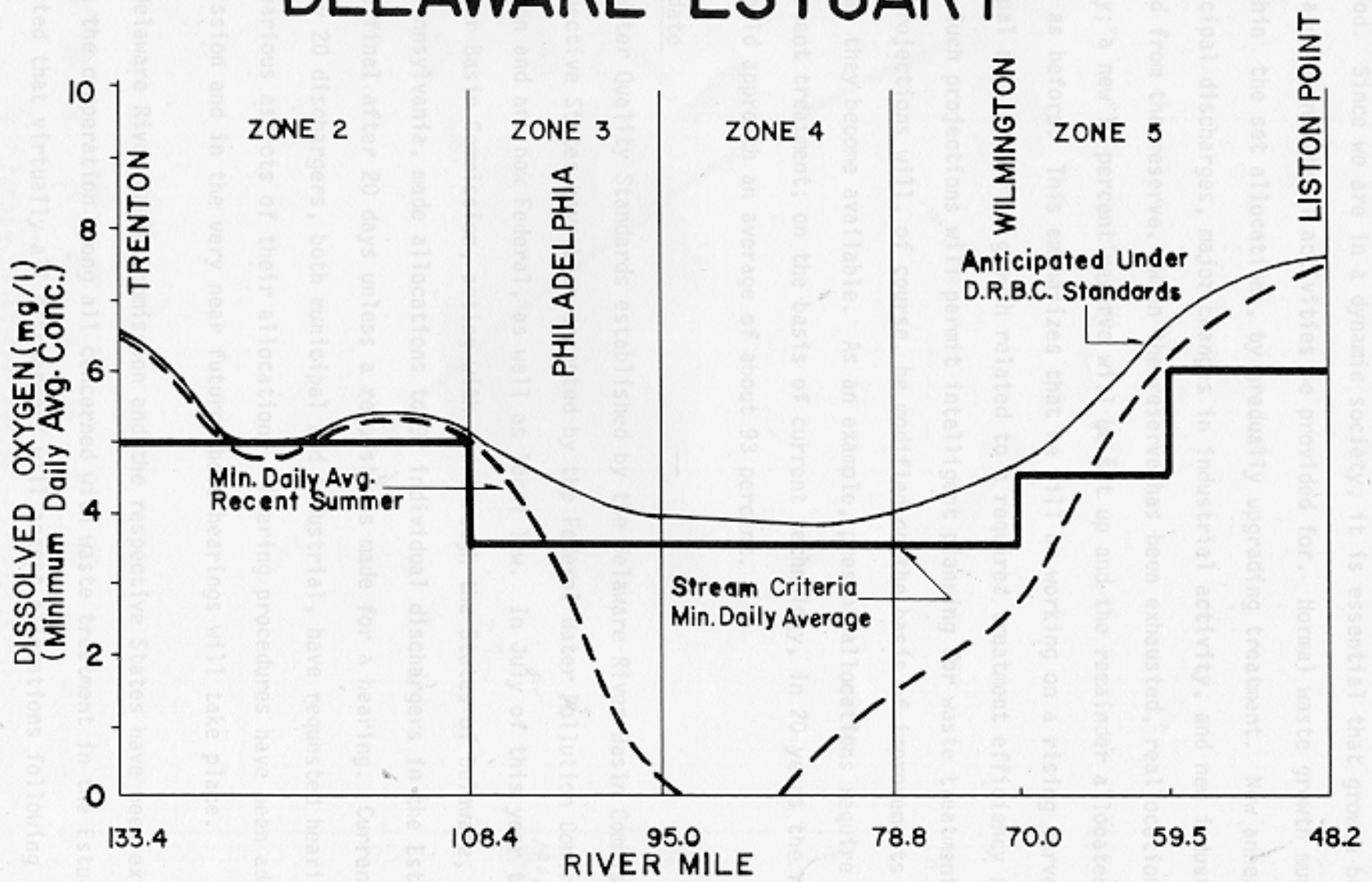
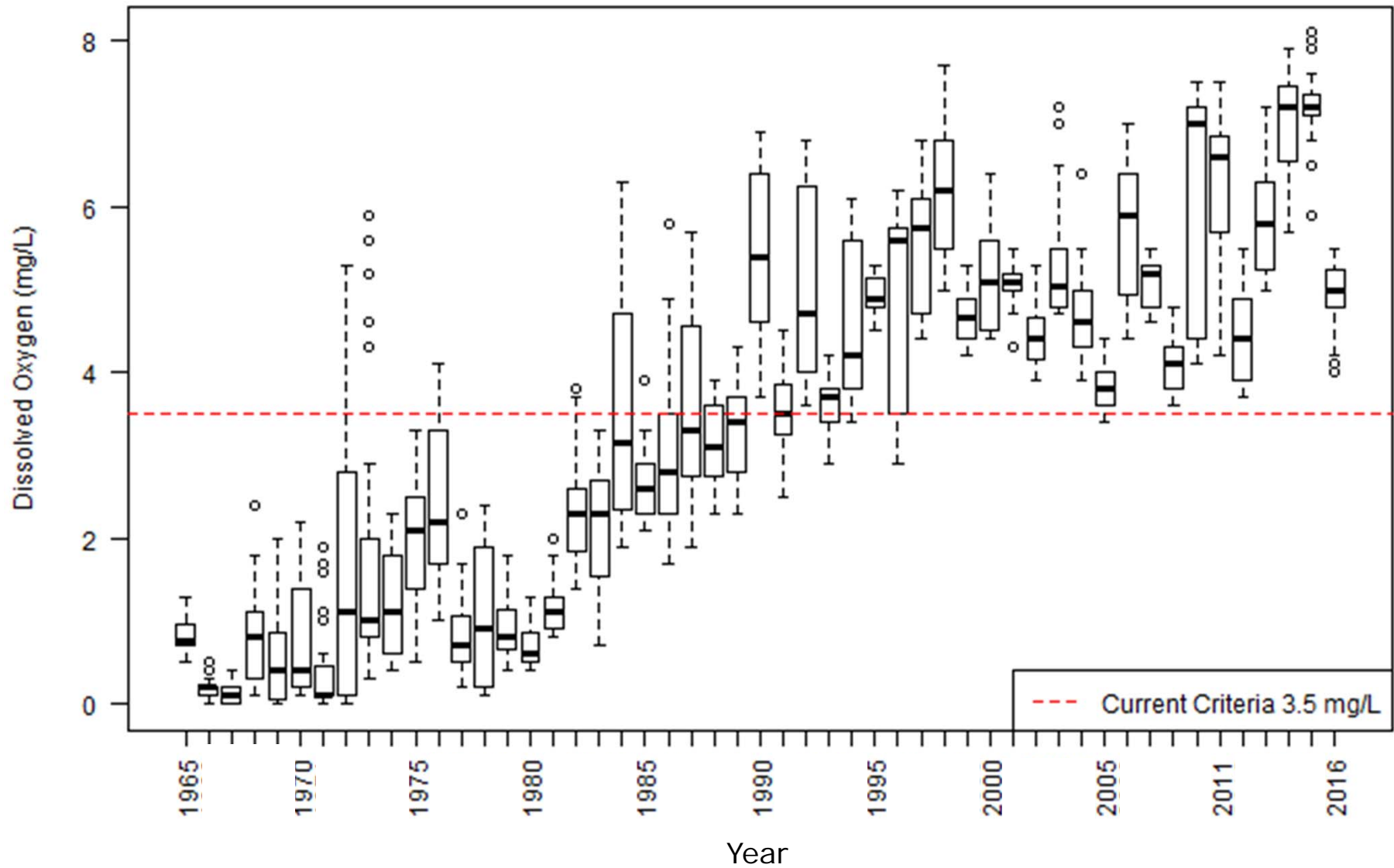


FIGURE II-2 - Mean monthly dissolved oxygen concentration - Tidal Delaware River, 1963

DISSOLVED OXYGEN PROFILES DELAWARE ESTUARY



July Dissolved Oxygen Daily Mean Values USGS 01467200 Delaware R at Ben Franklin Bridge at Philadelphia



Water Quality Standards & Designated Uses

- **Water Quality Standards** consist of designated uses, water quality criteria and anti-degradation requirements.
- A **Designated Use** is the goal for the waterbody, whether it is being attained or not. The aquatic life use is the pertinent use.
- **CWA Aquatic Life Goal:** “..wherever attainable, an interim goal of water quality which provides for the protection and propagation of fish, shellfish, and wildlife..”
- Where the CWA goals are not attainable, **Highest Attainable Use** is the designated use closest to the CWA goals that is attainable.

Designated Uses in Current DRBC Regulations

Zone	River Mile	Aquatic Life Use	Migratory Fishes
2	108.4 – 133.4	maintenance and propagation of resident fish and other aquatic life	passage of anadromous fish
3	95 – 108.4	maintenance of resident fish and other aquatic life	passage of anadromous fish
4	78.8 – 95	maintenance of resident fish and other aquatic life	passage of anadromous fish
5	70 – 78.8	maintenance of resident fish and other aquatic life	passage of anadromous fish
	48.2 – 70	maintenance and propagation of resident fish and other aquatic life	passage of anadromous fish
6	0 – 48.2	maintenance and propagation of resident fish and other aquatic life maintenance and propagation of shellfish	passage of anadromous fish

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Evaluation of Aquatic Life Use

2007:

Water Quality Advisory Committee (WQAC) begins deliberations on this issue as part of a broader evaluation of nutrient and dissolved oxygen conditions in the Delaware Estuary.

Evaluation of Aquatic Life Use

- **2008 to 2013: DRBC staff develops Nutrient Criteria Plan in response to EPA initiative on nutrients.**
 - Plan recommends focus on oxygen demand (NBOD) of nutrients in view of lack of evidence of traditional impacts of high nutrient loads (e.g., algal blooms).
- **Fall 2013 - Water Quality Advisory Committee (WQAC) recommends staff evaluate the use of Zones 3, 4 and upper Zone 5 for propagation of resident and anadromous fish species.**

DRBC 2015 Report

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



“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.”

Atlantic Sturgeon



1979 Task Force PSEG target (12 spp) NJ: 10 K/yr and 10/yr groups	Common name	Scientific name	Any evidence of successful reproduction?	Regular evidence of successful reproduction?	Strong numbers & high consistency of successful reproduction?	
	Atlantic Sturgeon	<i>Acipenser oxyrinchus</i>				
			Zone 3	?	N	N
			Zone 4	Y	N	N
			Zone 5 (upper) RM 70-78.8	Y	N	N
		Zone 5 (lower) RM 48.2-70	?	N	N	

Striped Bass



1979 Task Force PSEG target (12 spp) NJ: 10 K/yr and 10/yr groups		Common name	Scientific name	Any evidence of successful reproduction?	Regular evidence of successful reproduction?	Strong numbers & high consistency of successful reproduction?	
m		Striped Bass	<i>Morone saxatilis</i>				
				Zone 3	Y	Y	N
				Zone 4	Y	Y	?
				Zone 5 (upper) RM 70-78.8	Y	Y	Y
				Zone 5 (lower) RM 48.2-70	Y	Y	Y

2015 Evaluation of Existing Uses

- ✓ Some **strong** evidence for successful reproduction for:
 - White Perch (Zones 3 & 4), Striped Bass (Zone 5)
- ✓ Some **moderate** evidence for successful reproduction for:
 - American Shad (Zone 3), Alewife (Zones 3 & 4), Bay Anchovy (Zones 4 & 5)
- ✓ Evidence for **weak** reproductive success in each Zone:
 - Atlantic Sturgeon (Zone 4), American Shad (Zone 4), Blueback Herring (Zones 3 & 4)
- ✓ Evidence for nursery habitat in each Zone across most species evaluated.

2015 DRBC Evaluation of Existing Use

Summary:

1. The goals established in 1967 through DRBC's designated uses have been exceeded, at least in part, by the successful restoration of dissolved oxygen to 3.5 mg/L as a daily average concentration.
2. Data collected in Zones 3, 4 and upper Zone 5 indicate at least some degree of propagation has been observed.
3. Full attainment of propagation has not been demonstrated at this time based on the data available and examined for this evaluation.

What's Next?

Key Question that still needs to be answered is:

What should the water quality standards be for the WQ Zones in the Delaware River Estuary?



Dissolved Oxygen
Temperature
Salinity
Ammonia

Why more study?

2015 DRBC Study Key Questions:

1. Based upon existing, available and reliable data, is there evidence that existing uses in the Estuary exceed the current designated use? Is there evidence of propagation?
2. If evidence of successful reproduction exists, for which species? In which estuary zone(s)? And what is the degree to which successful reproduction had been restored for that species?

Why more study?

Key Questions not answered in the 2015 study, and for which additional studies are needed:

1. What water quality criteria must be achieved to protect target fish species and life stages?
2. What are the estimated oxygen demand and nutrient (pollutant) loadings from point and non-point sources in the Estuary today?
3. What total wasteload and load allocations must be achieved to protect target species?
4. How and to whom will loads be allocated?
5. What treatment and BMPs are available to meet wasteload allocations?

Why more study?

Key Questions not answered in the 2015 study, and for which additional studies are needed:

6. What seasonal, geographic and/or temporal conditions must be considered along with any suggested changes to related water quality criteria?
7. What impacts will any proposed changes have on endangered species?
8. What are the capital and operating costs of technologies to achieve higher levels of dissolved oxygen in the Estuary?
9. What physical, chemical, biological, social and economic factors will affect the attainment of the water quality standards?

Resolution 2017-4

- ❑ Adopted following public participation on September 13, 2017.
- ❑ Recognizes that evidence supports further study on the inclusion of propagation as a designated use in Zones 3, 4 and the upper portion of Zone 5 of the Delaware River Estuary.
- ❑ Provides for:
 - scientific and technical studies to be performed
 - early action by dischargers
- ❑ Directs initiation of rulemaking to revise the designated aquatic life uses consistent with the results of the studies and the CWA.

Resolution 2017-4

Shared goals of the DRBC, EPA and co-regulator states are:

1. Protecting the conditions and uses achieved to date,
2. Continuing progress to improve water quality conditions,
3. Updating water quality standards consistent with the Clean Water Act as quickly as possible and practicable,
4. Identifying and implementing early actions to optimize existing infrastructure pending final regulatory actions,
5. Consulting with stakeholders, including the regulated community, in the rulemaking process and development of implementation strategies.

Resolution 2017-4

The study will include:

- Input from expert panels on eutrophication modeling and the DO requirements of aquatic species.
- Development and calibration of a eutrophication model for the Delaware Estuary and Bay.

Schedule:

- Directs the Executive Director to prepare a schedule to complete the draft attainability assessment within 3.5 years.
- Commission seeks to issue a final rule and an implementation strategy within 6 years.

Acknowledges:

- the work of the **WQAC**, and
- the proposal by the **PWD** for a Delaware Estuary DO Partnership.





Why This Approach?

- ❑ The traditional approach is to adopt a water quality goal and wasteload allocations, and then see if the goal can be met.
- ❑ The approach outlined in the Resolution turns the traditional approach on its head:
 - Determine the goal(s) for the estuary that are protective of key species, and ***attainable***.
 - Do this through a deliberate, collaborative process embodying scientific, engineering, economic and social elements.

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