

Delaware River Basin Commission

The Next Chapter in the Story of Restoring Clean Water to the Delaware River Estuary

Steve Tambini and Namsoo Suk

AWRA Annual Conference
Baltimore, MD
November 7, 2018

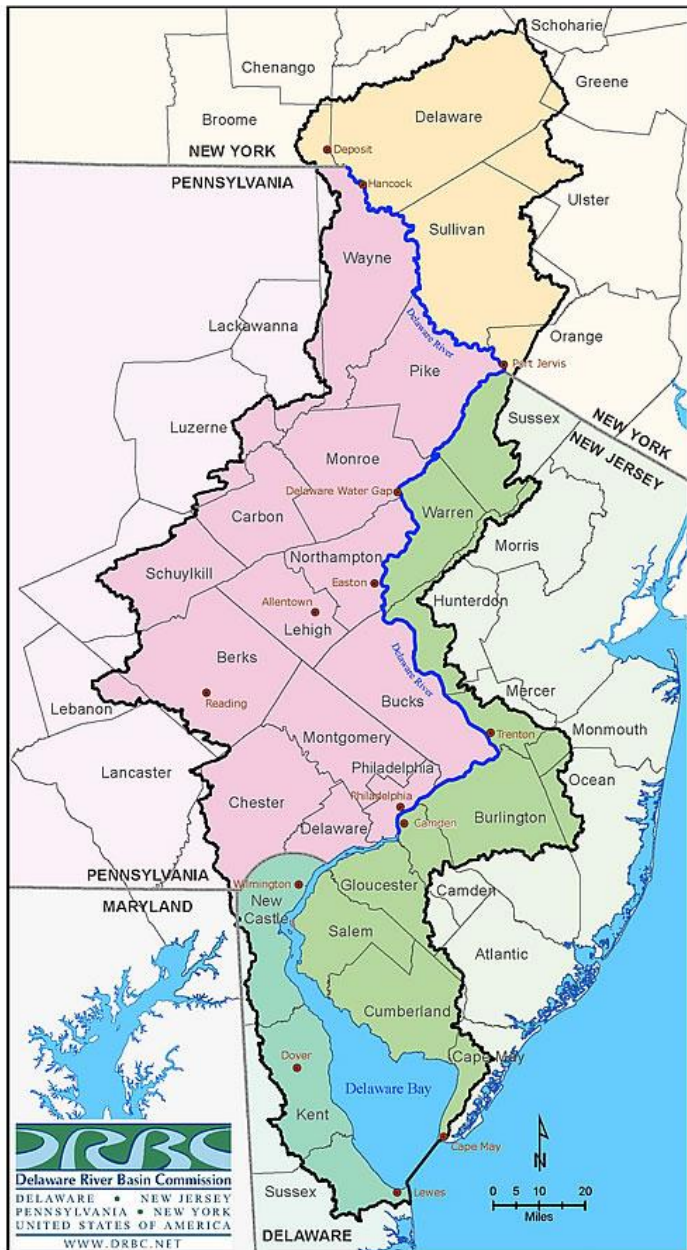


“A river is more than an amenity, it is a treasure”

-US Supreme Court Justice
Oliver Wendell Holmes

Fast Facts:

- Delaware River Main stem river is **330 miles long**
- Delaware River forms an interstate boundary over its entire length
- **~15 million people** (about 5% of the U.S. population) rely on the waters of the Delaware River Basin
- **Drains 13,539 square miles** of watershed in 4 states.
- Water **withdrawal** in the Basin = **6.6 billion gallons a day**
- **Significant Exports: NYC (up to 800 MGD) and NJ (up to 100 MGD)**
- Longest, un-dammed U.S. river east of the Mississippi (dams are located on tributaries, not the main stem Delaware)
- **Contributes over \$21B in economic value** to the Region.





Delaware River Basin Commission



Federal interstate compact agency established in 1961:

DRBC:

- Delaware
- New Jersey
- Pennsylvania
- New York
- Federal Government



Broad Responsibilities for:

- * Water Supply
- * Drought Management
- * Flood Loss Reduction
- * Water Quality (Pollution Control)
 - Establish Water Quality Standards
 - Monitoring & Assessment
 - Load Reductions
- * Watershed Management
- * Regulatory Review (Permitting)
- * Outreach/Education
- * Recreation



Delaware River Basin Commission

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UNITED STATES OF AMERICA



Photo: Nicholas A. Tonelli

Clean Water

Water Efficiency

Sustainable and Available Water



Photo: Justin Curtis



Today's Session



- **The Next Chapter in the Story of Restoring Clean Water to the Delaware River Estuary**
 - *Namsoo Suk, Ph.D., DRBC Director of Science and Water Quality Management*
- **The Delaware River: Wild, Scenic and Managed**
 - *Amy Shallcross, P.E., DRBC Manager of Water Resource Operations*
- **Replacement Program for Power Facilities in the Delaware River Basin**
 - *Chad Pindar, P.E., DRBC Manager of Water Resource Planning*
- **DRBC Water Demand Management: Benefits of Promoting Best Practices**
 - *Kenneth Najjar, Ph. D, P.E., DRBC Director Water Resource Management*

OUTLINE: The Next Chapter in the Story of Restoring Clean Water to the Delaware River Estuary

- ❑ Water Quality Standards
 - Designated Use and WQ criteria
- ❑ Delaware River Estuary and Bay
- ❑ Dissolved Oxygen:
 - Historical and Current Management Issues
 - DRBC Actions

Water Quality Regulations

Water Quality Standards

Designated Uses:

e.g., Drinking water supply, protection and propagation of aquatic life, recreation in and on the water.



Criteria:

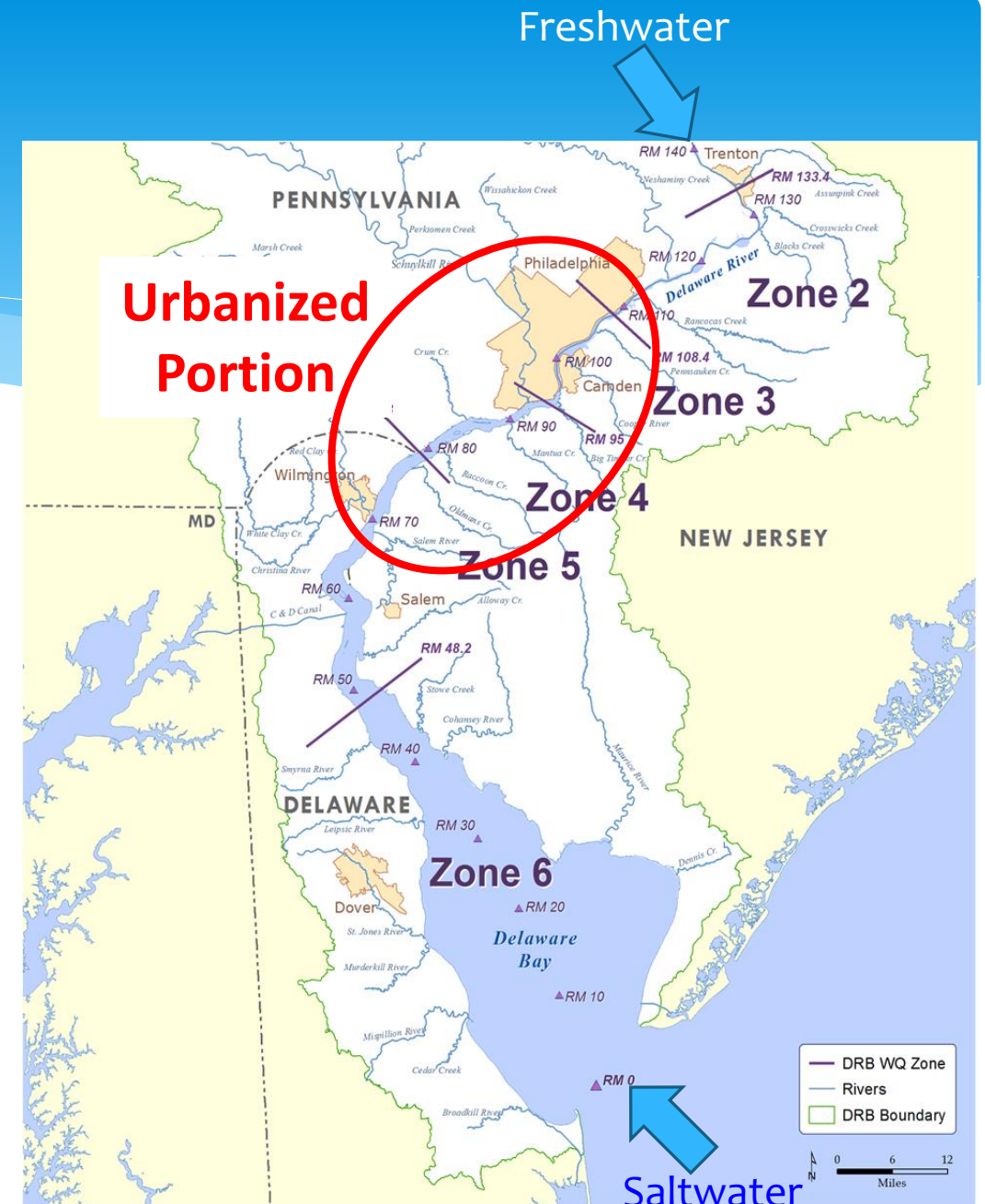
numeric and/or narrative parameters to protect the designated uses.

Antidegradation Policy And Procedures:

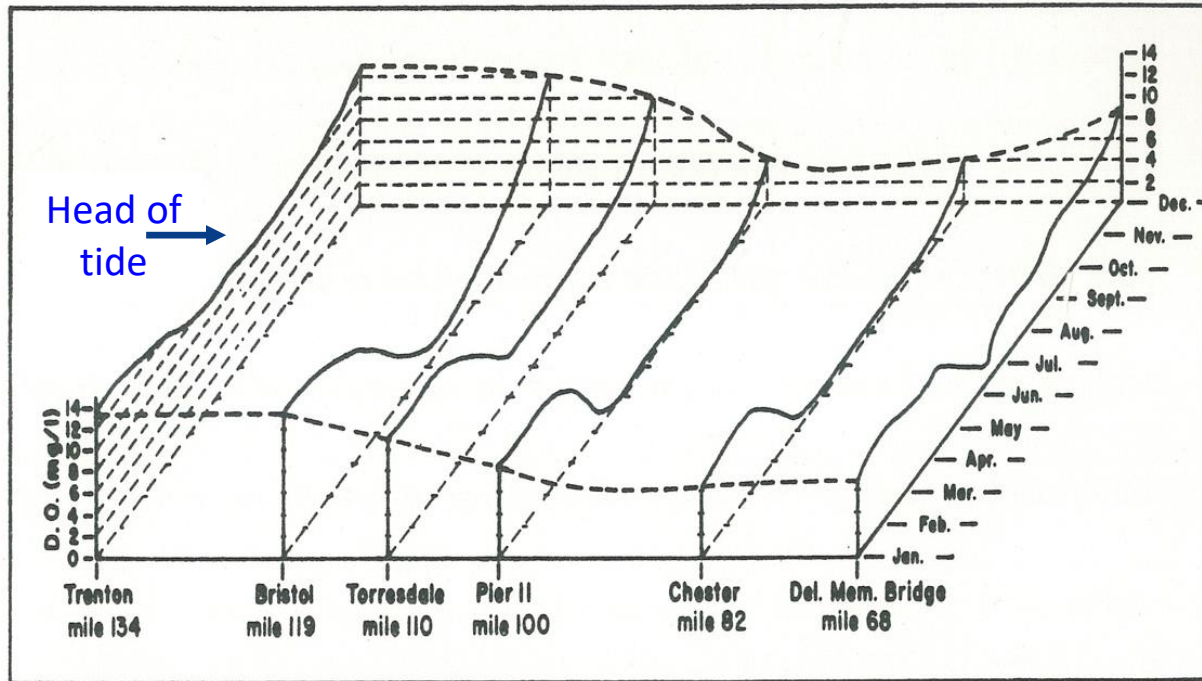
to maintain and protect existing water quality.

Delaware Estuary and Bay

- ❑ Delaware Estuary and Bay is 133.4 miles long
- ❑ Divided into five water quality management Zones
- ❑ Tidal ranges vary from 4 ft at the mouth of Delaware Bay to over 8 ft near the head of tide
- ❑ The average flow is 13,100 cfs at Trenton
- ❑ DRBC established water quality standards for the Estuary in 1967 and update based on data and science
- ❑ Fish consumption advisories issued by three estuarine states mainly by PCBs – DRBC developed PCB TMDLs in 2003 and shown improvements



Dissolved Oxygen in Delaware Estuary



Mean monthly dissolved oxygen concentration –Tidal Delaware River, 1963

- Historically, summer DO near urban portions of estuary was too low to support aquatic life
- Main causes of oxygen depletion
 - Carbonaceous Biochemical Oxygen Demand (CBOD): Oxidation of organic materials
 - Nitrogenous Biochemical Oxygen Demand (NBOD): Oxidation of ammonium (NH_4) to nitrate (NO_3)
- DRBC adopted water quality standards in 1967

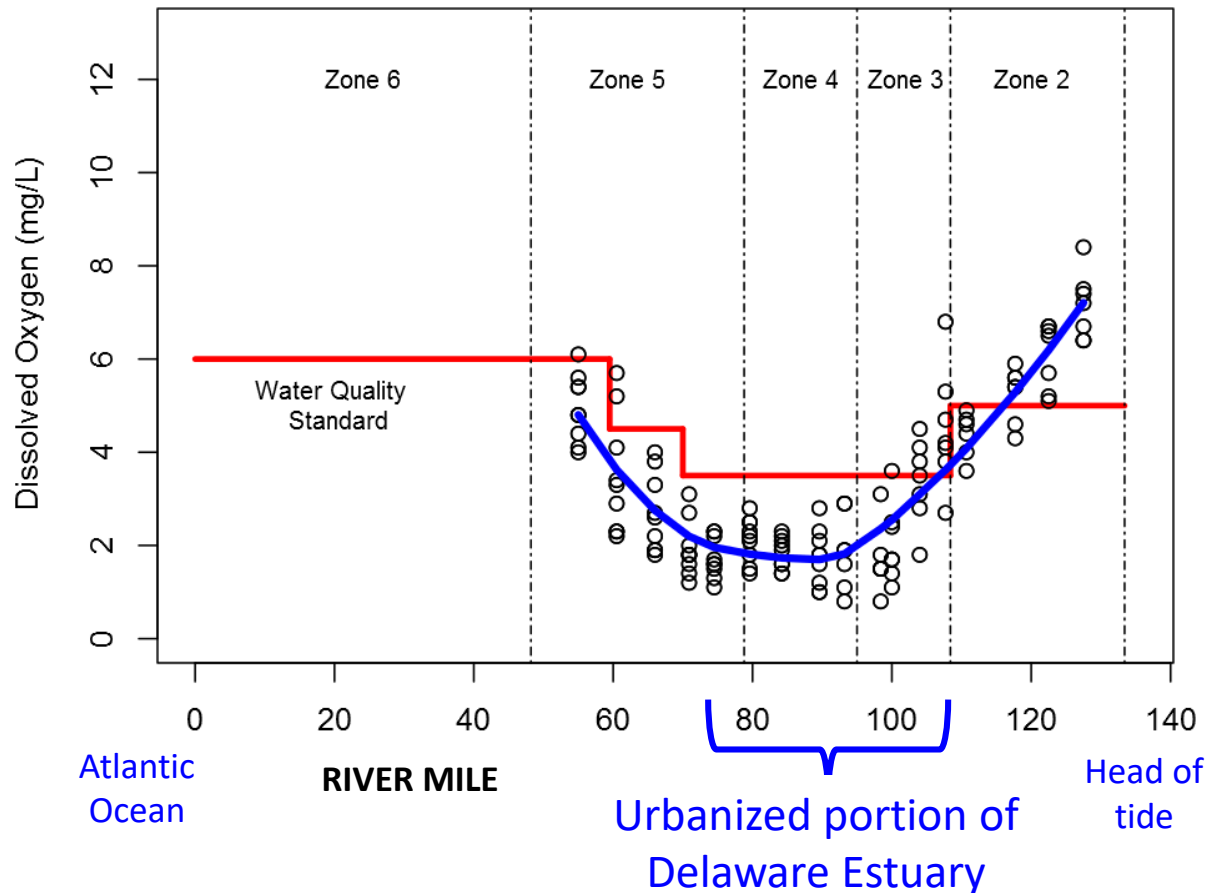
Aquatic Life Designated Uses in Current DRBC Regulations since 1967

Zone	River Mile	Aquatic Life Use	Migratory Fishes	24-hour average D.O. Criteria
2	108.4 – 133.4	maintenance and propagation of resident fish and other aquatic life	passage of anadromous fish	5.0 mg/l
3	95 – 108.4	maintenance of resident fish and other aquatic life	passage of anadromous fish	3.5 mg/l
4	78.8 – 95	maintenance of resident fish and other aquatic life	passage of anadromous fish	3.5 mg/l
5	70 – 78.8	maintenance of resident fish and other aquatic life	passage of anadromous fish	3.5 mg/l
	48.2 – 70	maintenance and propagation of resident fish and other aquatic life	passage of anadromous fish	4.5 – 6.0 mg/l
6	0 – 48.2	maintenance and propagation of resident fish and other aquatic life maintenance and propagation of shellfish	passage of anadromous fish	6.0 mg/l

Urbanized portion of Delaware Estuary

Dissolved Oxygen

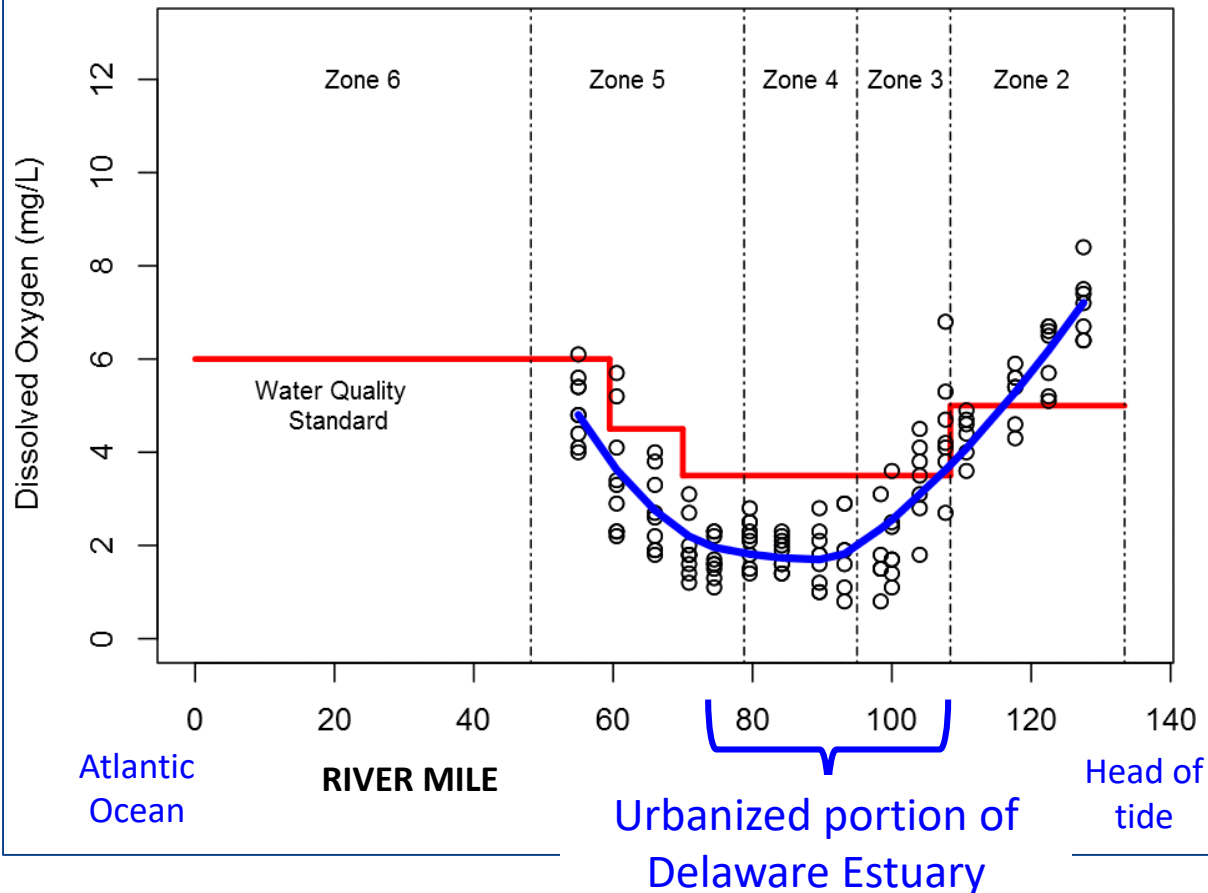
DRBC Delaware Estuary Monitoring
July & August 1967



- ❑ DRBC issued CBOD wasteload allocations (WLAs) for Zones 2 – 5 in 1968
- ❑ Implementation of CBOD WLAs
 - Via DRBC's dockets (equivalent to NPDES permit)
 - Over 70 point source dischargers get CBOD effluent load limits
 - Minimum required CBOD percent reduction
 - Secondary treatment added at wastewater treatment plants 70's & 80's – funding CWA
- ❑ By 2000's D.O criteria is nearly always met

Dissolved Oxygen

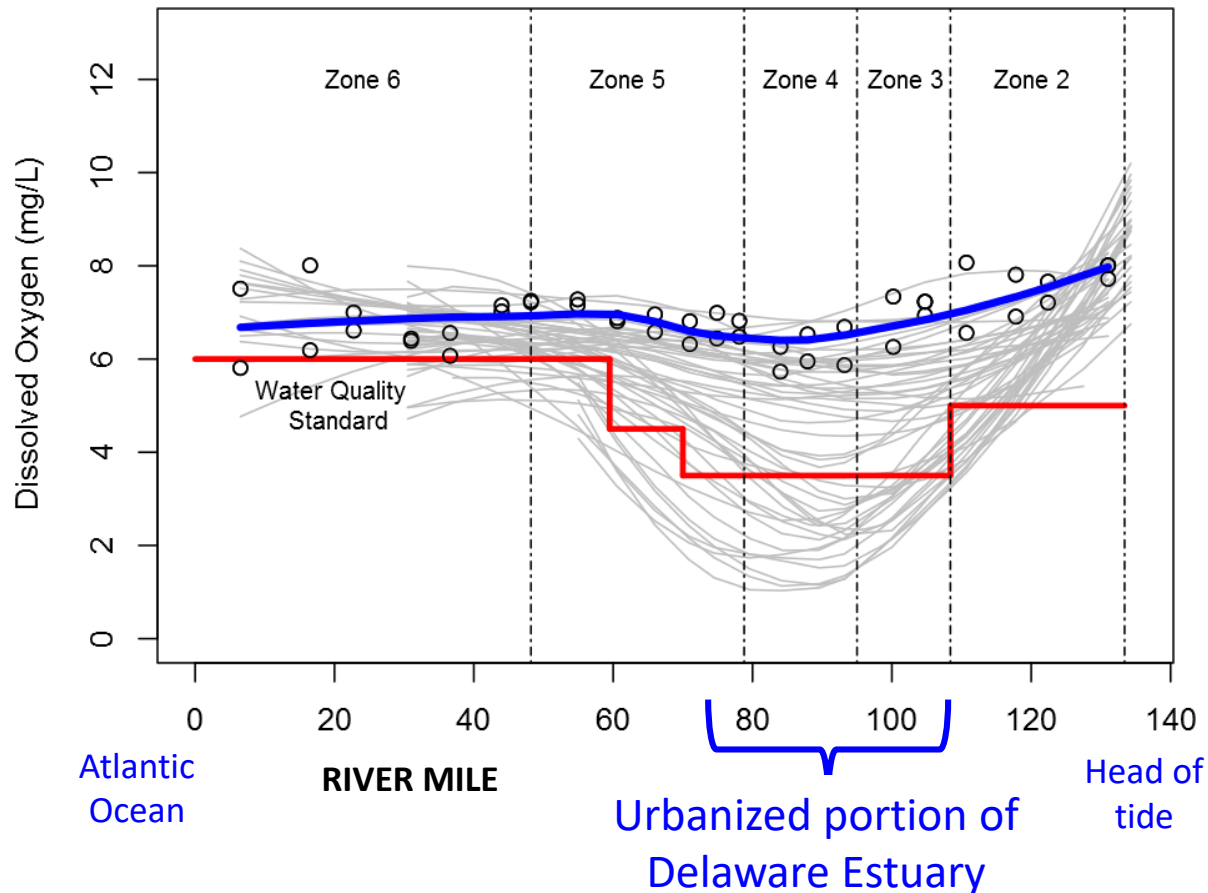
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Dissolved Oxygen

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July & August 2017



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Evaluation of Existing Use

❑ 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)

✓ Update to DRBC Water Quality Regulations needs to be considered

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.nj.gov/drbc/library/documents/
ExistingUseRpt_zones3-5_sept2015.pdf](https://www.nj.gov/drbc/library/documents/ExistingUseRpt_zones3-5_sept2015.pdf)



DRBC Resolution 2017-4

- Shared achievement & goals
 - Continuous water quality improvement
- Study to determine attainability of new DO criteria, with a fixed schedule
- Initiate rulemaking
- DO early action workgroup
- Recognition of Philadelphia Water Department's DO partnership

https://www.state.nj.us/drbc/library/documents/Res2017-04_EstuaryExistingUse.pdf

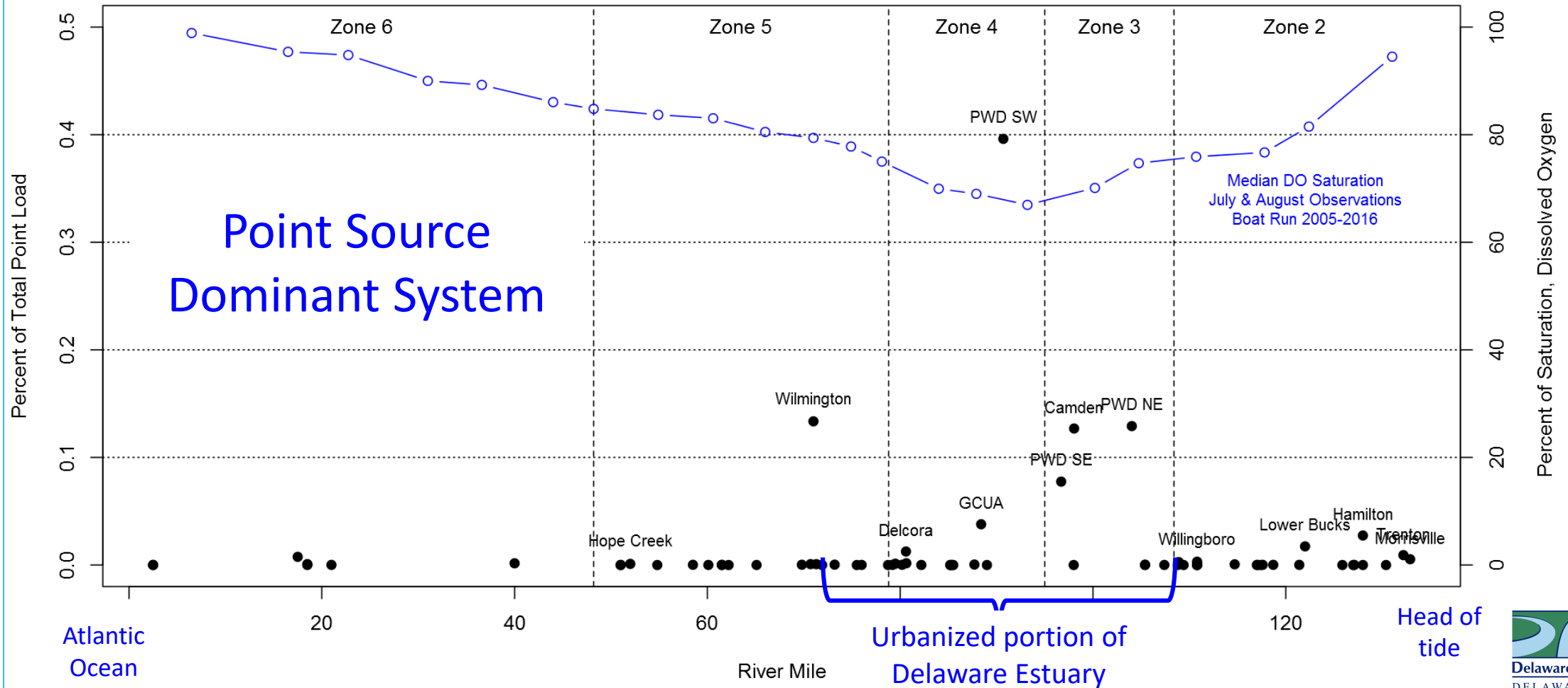
Adopted September 13, 2017

Key Questions

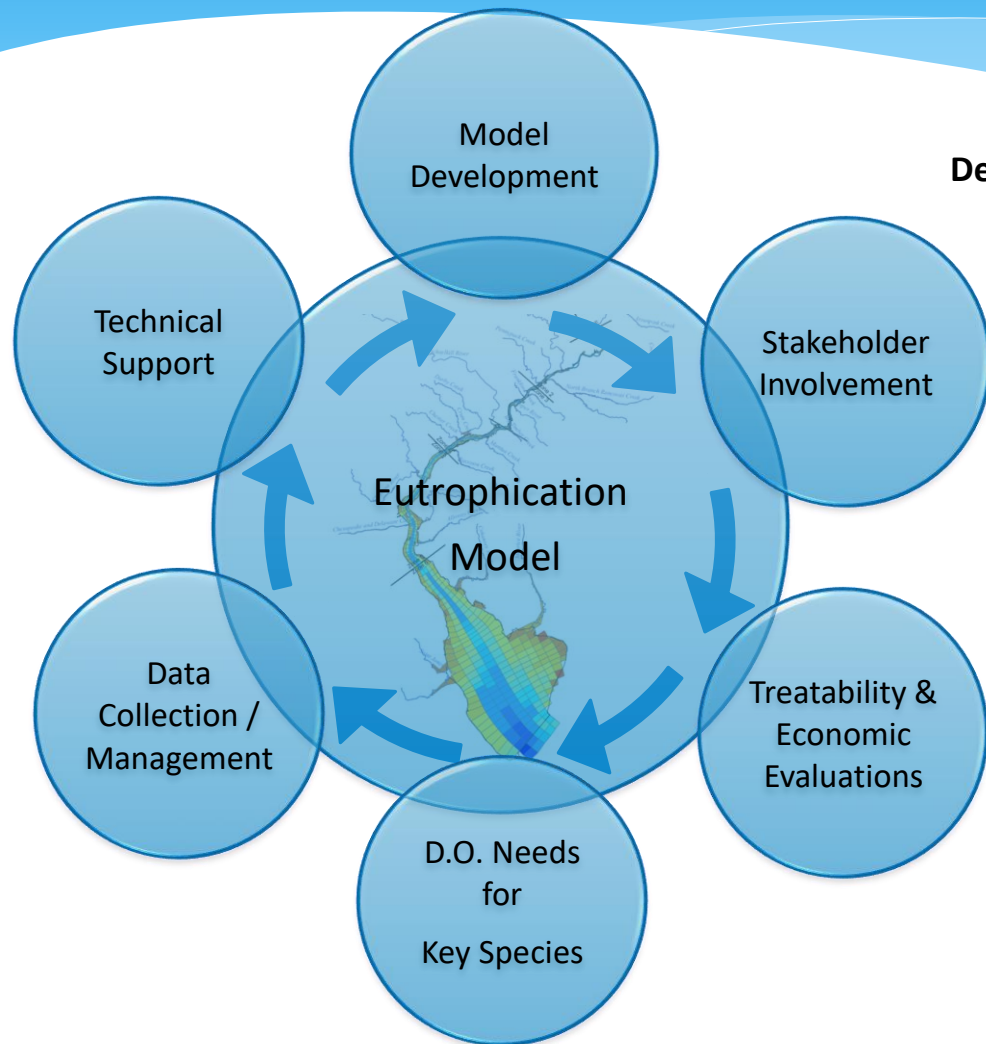
1. What water quality criteria must be achieved to protect *target fish species* and *life stages*?
2. What impacts will any proposed changes have on *endangered species*?
3. What *seasonal, geographic* and/or *temporal conditions* must be considered along with any suggested changes to related water quality criteria?
4. What are the estimated *oxygen demand* and nutrient (pollutant) loadings from point and non-point *sources* in the Estuary today?
5. What total wasteload and load **allocations** must be achieved to protect target species?
6. How and to whom will loads *be allocated*?
7. What are the capital and operating *costs* of technologies to achieve higher levels of dissolved oxygen in the Estuary?
8. What physical, chemical, biological, social and *economic* factors will affect the attainment of the water quality standards?

Next Phase – Dissolved Oxygen

Relative Point Discharge Load by Delaware Estuary River Mile
NH3 - Ammonia, whole water Loading



Adopt new designated use and DO criteria to support fish propagation



Management Options
Designated Use & WQ Criteria

Implementation

DRBC's Rule
Making Process



Actions Underway

- ❑ Development of estuary eutrophication model
 - Model expert panel
- ❑ Engineering evaluation & cost estimate for improved WWTP ammonia & TN
 - Benefit analysis
- ❑ DO early action workgroup
- ❑ DO needs study for Delaware Estuary fish species
- ❑ Enhanced monitoring for model development
 - Point discharge monitoring
 - Boat run to year-round
 - Added salinity at tidal boundaries
 - Added nitrate sensors at Trenton & Chester
 - Extensive tributary monitoring
 - Light extinction monitoring
 - Primary production

Expectations

- ❑ Establishment of the designated aquatic life use and attainable dissolved oxygen criteria for Delaware River Estuary through DRBC's Rule making process
- ❑ Establishment of wasteload allocations for point source discharges and load allocations for non-point sources to attain instream dissolved oxygen criteria
- ❑ Substantial Investment:
 - Governments & grants
 - Dischargers & regulated community
- ❑ Cooperation & coordination - all pulling in the same direction

Questions?

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