Delaware River Basin Commission

Implementation of Water Quality Management: Part 2

Applications, Successes, & Challenges

2019 Delaware Estuary Science and Environmental Summit

Cape May, NJ

January 29, 2019

Delaware River Basin Commission

John Yagecic, P.E.

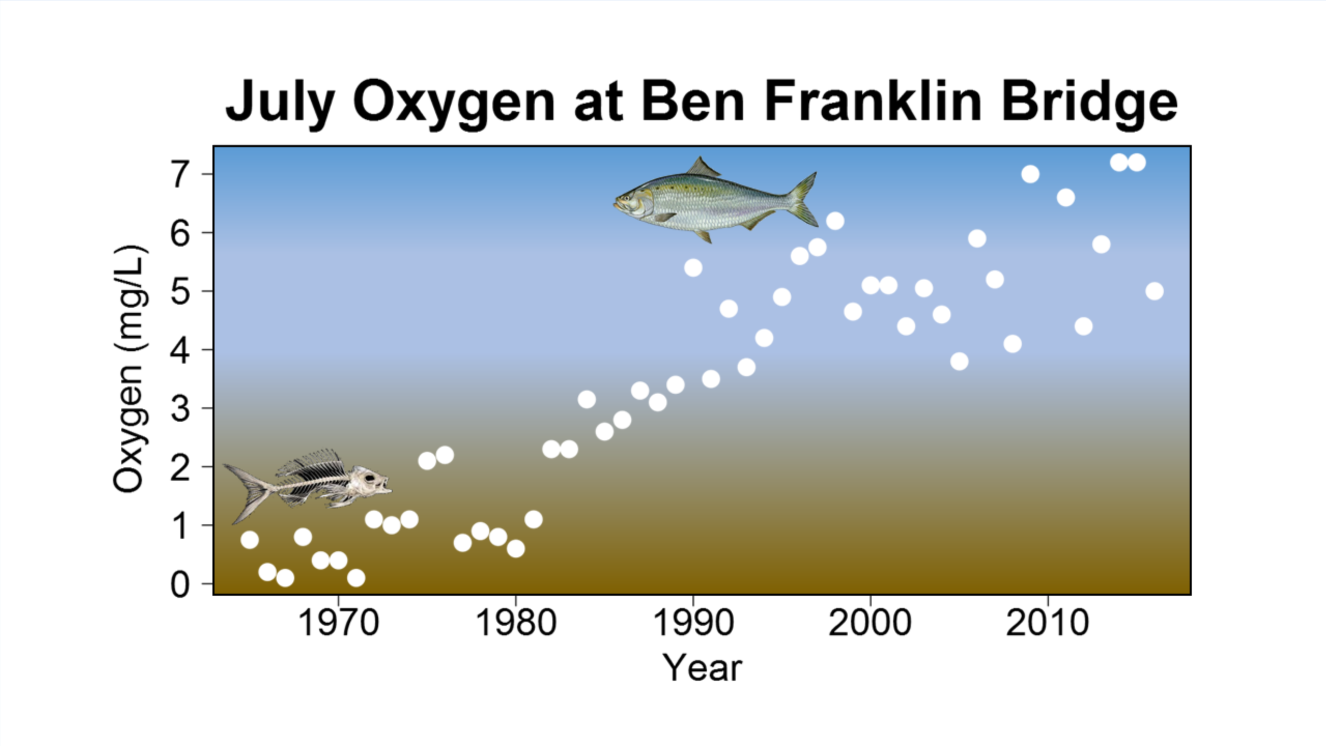
Delaware River Basin Commission

DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Three Quick Case Studies

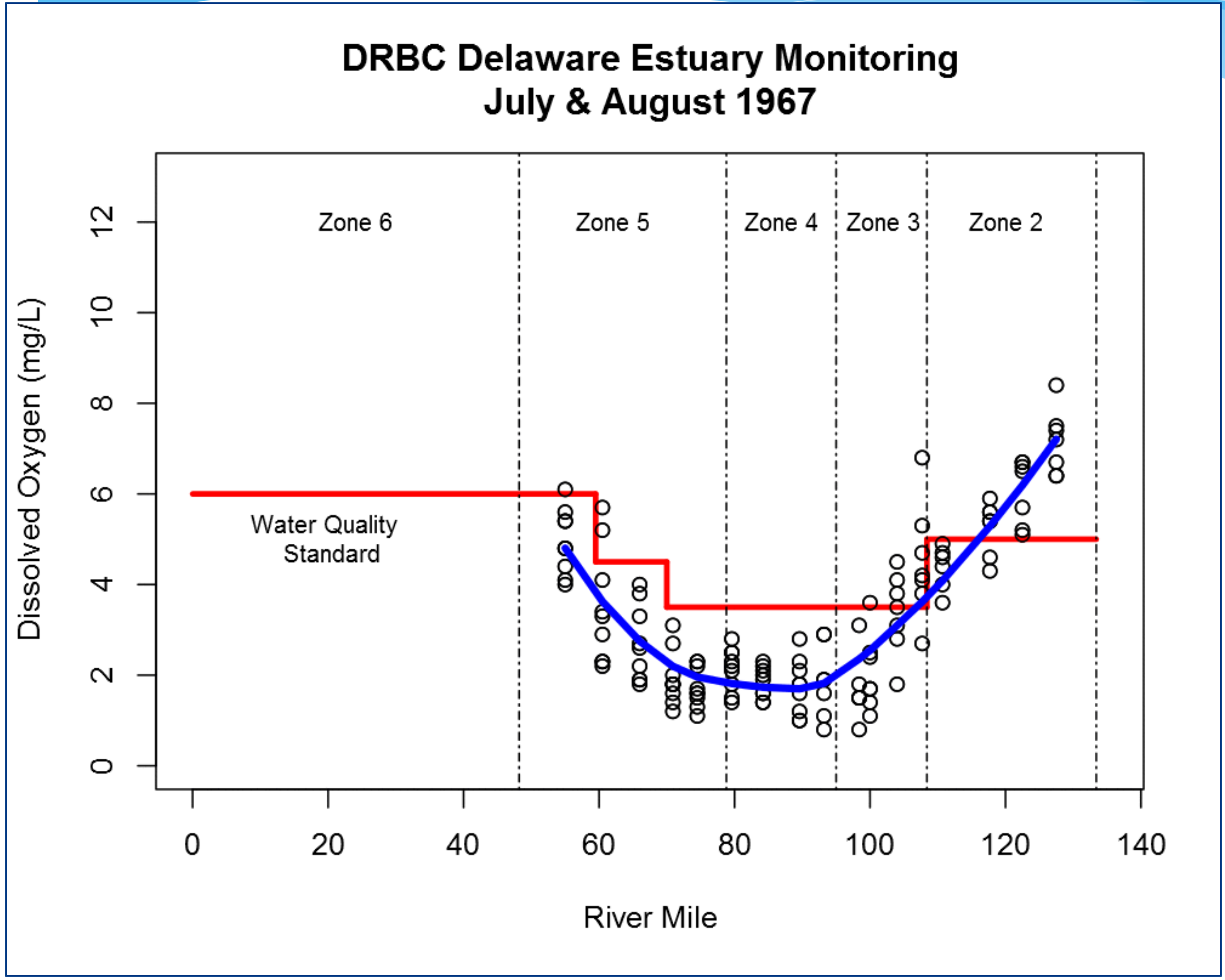
* Dissolved Oxygen
* PCBs
* Nutrients and Special Protection Waters

Success No. 1 – Dissolved Oxygen



* Historically, summer DO in estuary near Philadelphia was too low for migratory fish to reach upstream to spawn
* DRBC adopted water quality standards (1967) & wasteload allocation (1968)
* Secondary treatment added at wastewater treatment plants 70's & 80's – funding CWA

Success No. 1 – Dissolved Oxygen

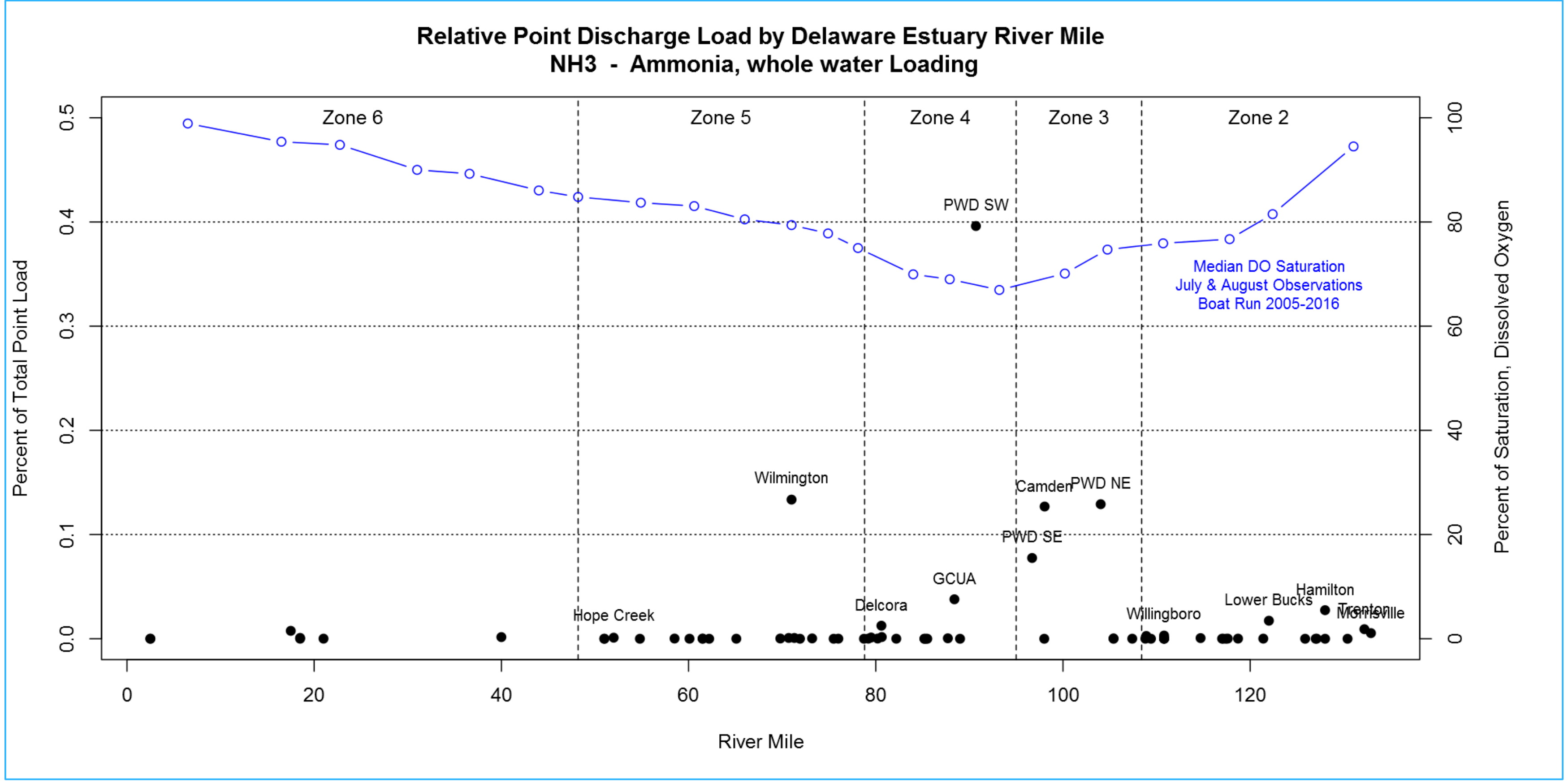


- 3.5 mg/L criteria near Philadelphia, Camden, & Wilmington protect fish migration (not propagation)
- By 2000's that criteria is nearly always met

Next Phase – Dissolved Oxygen

Adopt new designated use & DO criteria to support fish propagation

- Nutrient water quality model
- Engineering evaluation & cost estimate study
- Study of species DO needs



Success No. 2 - PCBs

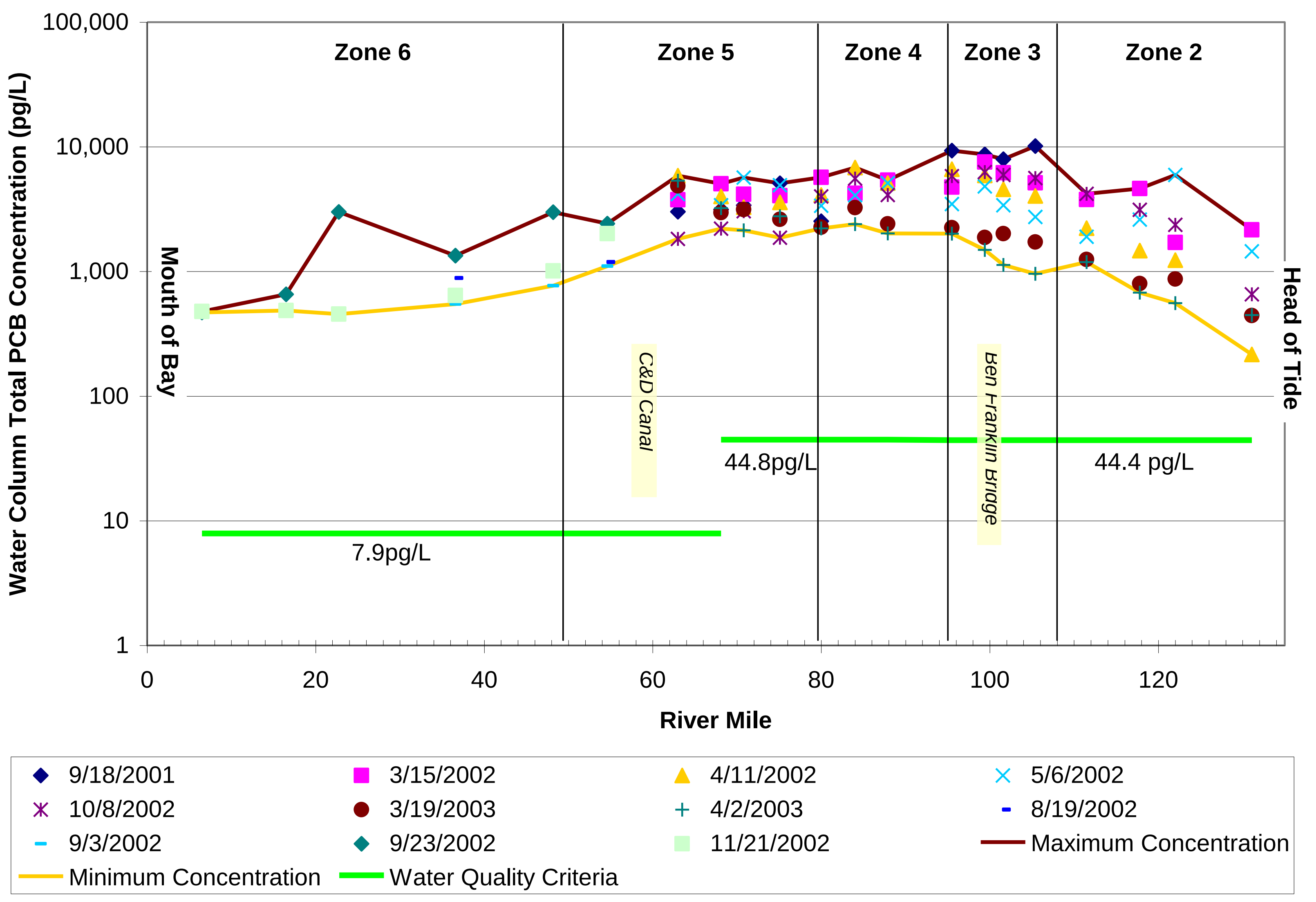
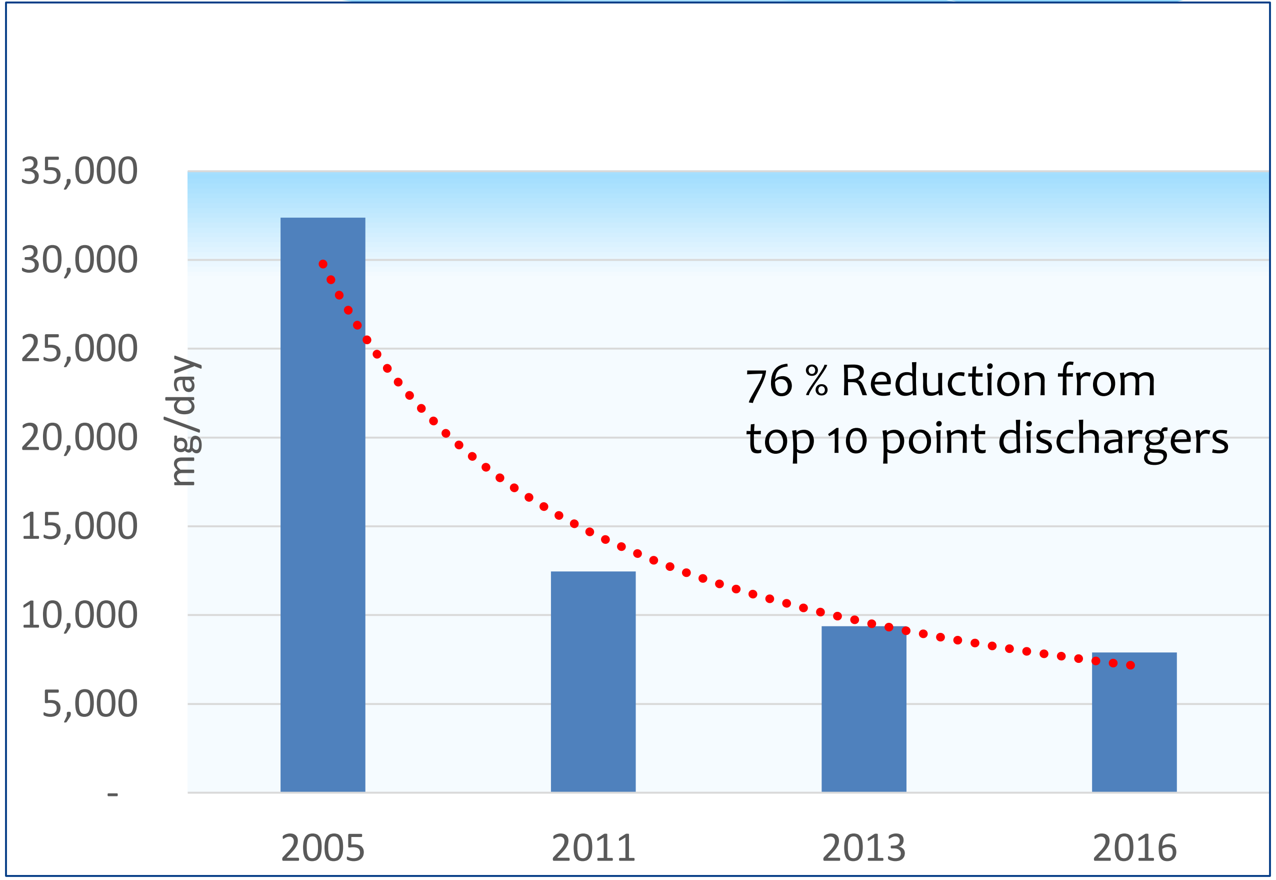


Photo courtesy Phila. Water Department

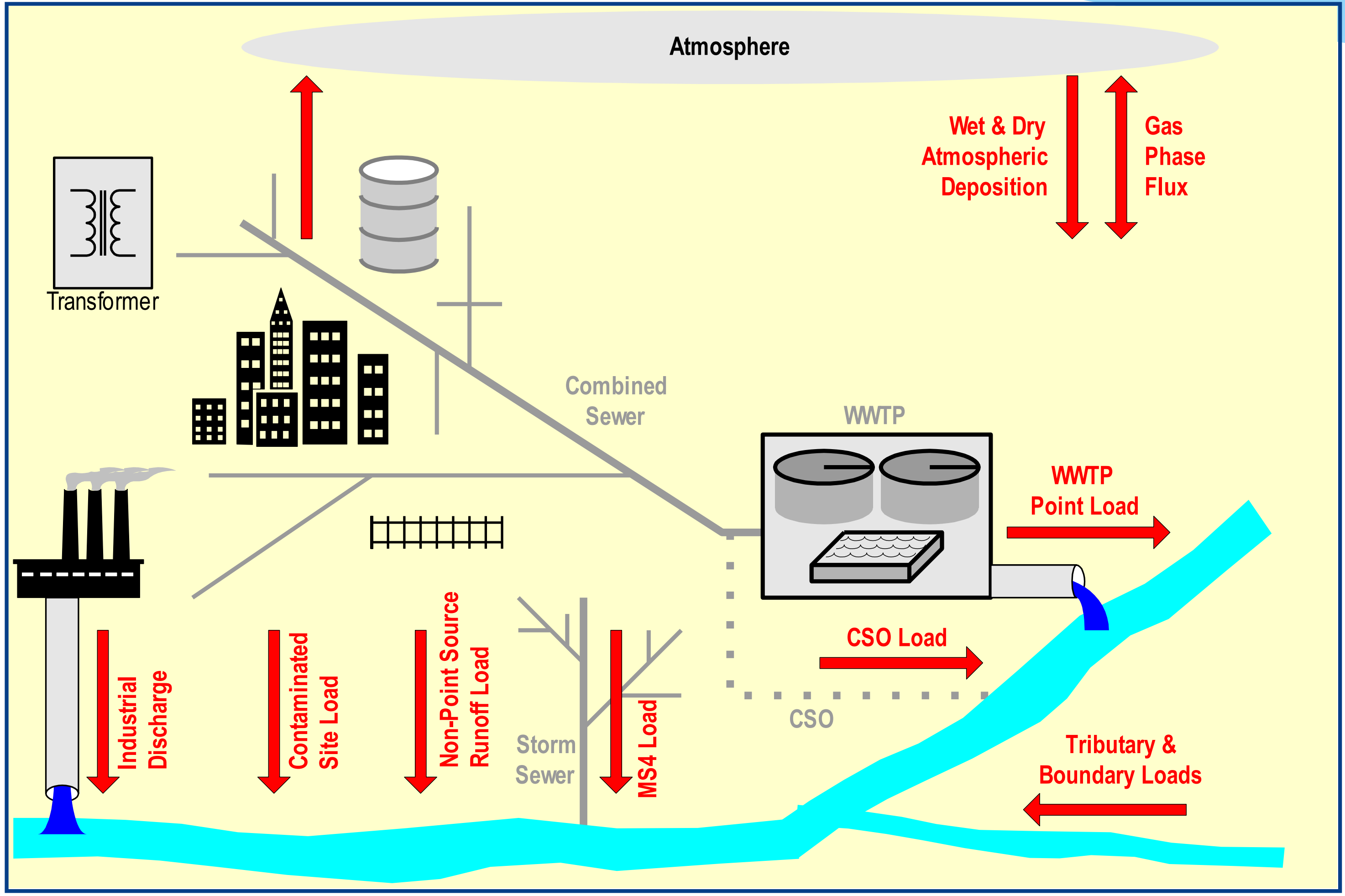
DRBC was an early adopter of more sensitive analytical method for quantifying PCBs in the water column

Success No. 2 - PCBs

- PCBs are probable human carcinogen
- Human exposure from eating caught fish
- Delaware Estuary 100 to 1000X higher than criteria
- DRBC developed TMDLs 2003 & 2006
- Point dischargers perform pollutant minimization plans – DRBC reviews
- DRBC manages all the data from PMPs
- Decades long commitment
- Stage 2 TMDL refinement



Why Pollutant Minimization Plans?



- Operators know their facilities better than regulators
- Trackback studies
- When you remove PCB mass from the watershed, load reductions:
  - **In perpetuity**
  - **Across all pathways**

Fish Consumption Advisories – Meals per Year

New Jersey, general population

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

Location	Fish	2016	2018
Delaware River at Crosswicks Cr.	White Perch	12	52
Delaware River at Tacony-Palmyra Bridge	White Perch	4	12
Delaware River at Woodbury Cr.	Channel Catfish	1	4
Delaware River at Raccoon Cr.	White Perch	1	12
Delaware River at Salem River	Channel Catfish	4	12
PA/DE Border to C&D Canal	Striped Bass	1	3

Success No. 3
Nutrients & Special Protection Waters

- *It is the policy of the Commission that there be no measurable change in existing water quality except towards natural conditions in waters considered by the Commission to have exceptionally high scenic, recreational, ecological, and/or water supply values.*
  - *Sec 3.10.3A.2.*

Define this

Require an analysis to confirm this

Success No. 3
Nutrients & Special Protection Waters

- Non-tidal River
- Keep the clean water clean
- Significant alterations, new or expanding treatment plants must demonstrate to DRBC no measurable change to existing water quality
- DRBC WQ models
- Implementing for over a decade

Drains to Delaware Estuary

Is SPW program effective?

- In 2016 DRBC performed an assessment of program effectiveness
- 440 comparisons
- Vast majority (88%) showed existing water quality was preserved
- Showed improvements in nutrients
- Subsequent report by USGS using different data & methods corroborated improvements in nutrients

Site Color Key — Dark Blue =Interstate Control Point (ICP); Dark Red =Pennsylvania Tributary Boundary Control Point (BCP); Dark Green =New Jersey Tributary Boundary Control Point (BCP)

	Parameter Site--->	Del. River at Trenton	Del. River at Washngtn Crossing	Pidcock Creek, PA	Delaware River at Lambrtvlle	Wicke-cheoke Creek, NJ	Lockatong Creek, NJ	Delaware River at Bulls Island	Pauna-cussing Creek, PA	Tohickon Creek, PA	Tinicum Creek, PA	Nishi-sakawick Creek, NJ	Del. River at Milford	Cooks Creek, PA	Musco-netcong River, NJ	Del. River at Rieglsvll	Pohat-cong Creek, NJ	Lehigh River, PA	Del. River at Easton	Bushkill Creek, PA	Martins Creek, PA	Pequest River, NJ	Del. River at Belvidere	Paulins Kill River, NJ	Del. River at Portland
	Site Number--->	1343 ICP	1418 ICP	1463 BCP	1487 ICP	1525 BCP	1540 BCP	1554 ICP	1556 BCP	1570 BCP	1616 BCP	1641 BCP	1677 ICP	1737 BCP	1746 BCP	1748 ICP	1774 BCP	1837 BCP	1838 ICP	1841 BCP	1907 BCP	1978 BCP	1978 ICP	2070 BCP	2074 ICP
Field	Dissolved Oxygen (DO) mg/l											~													
Field	Dissolved Oxygen Saturation %											~													
Field	pH, units																								
Field	Water Temperature, degrees C																								
Nutrients	Ammonia Nitrogen as N, Total mg/l																								
Nutrients	Nitrate + Nitrite as N, Total mg/l																**								
Nutrients	Nitrogen as N, Total (TN) mg/l																**								
Nutrients	Nitrogen, Kjeldahl, Total (TKN) mg/l																								
Nutrients	Orthophosphate as P, Total mg/l																								
Nutrients	Phosphorus as P, Total (TP) mg/l																								
Bacteria	Enterococcus colonies/100 ml	~			~																				
Bacteria	Escherichia coli colonies/100 ml	**	**	**	**	**	**			**	**	**													
Bacteria	Fecal coliform colonies/100 ml																								
Conventionals	Alkalinity as CaCO3, Total mg/l																								
Conventionals	Hardness as CaCO3, Total mg/l											~													
Conventionals	Chloride, Total mg/l			**		**	**	**	**	**		**	**	**	**	**	**	**	~	**	**	**	**		**
Conventionals	Specific Conductance µmho/cm			**		**	**	~	**	**	**	**	**	**	**	~	**	**	~	~	~	**	~		
Conventionals	Total Dissolved Solids (TDS) mg/l																								
Conventionals	Total Suspended Solids (TSS) mg/l																								
Conventionals	Turbidity NTU																								

KEY — (blue) = No indication of measurable change to EWQ; ** = Indication of measurable water quality change toward more degraded status; ~ = Weak indication of measurable water quality change toward more degraded status

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

In Each Case…

* Fundamentals of mass loading rates, exposure pathways, chemical reactions, & water column response
  * water quality modeling, engineering, & technical analysis
* Intensive monitoring
* Point sources matter
* Substantial Investment
  * Governments & grants
  * Dischargers & regulated community
* Cooperation & coordination - all pulling in the same direction

Delaware River Basin Commission
DELAWARE • NEW JERSEY
PENNSYLVANIA • NEW YORK
UNITED STATES OF AMERICA

John.Yagecic@drbc.gov
609-883-9500 x271