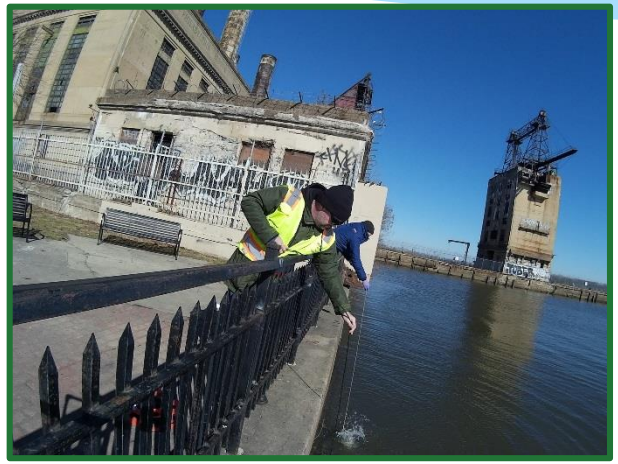
Delaware River Basin Commission

Dissolved Oxygen, Aquatic Life Uses, and the Delaware Estuary



Water Resources Association of the Delaware River Basin

Fall Conference

Rutgers EcoComplex, Bordentown, NJ

November 1, 2018

John Yagecic, P.E.

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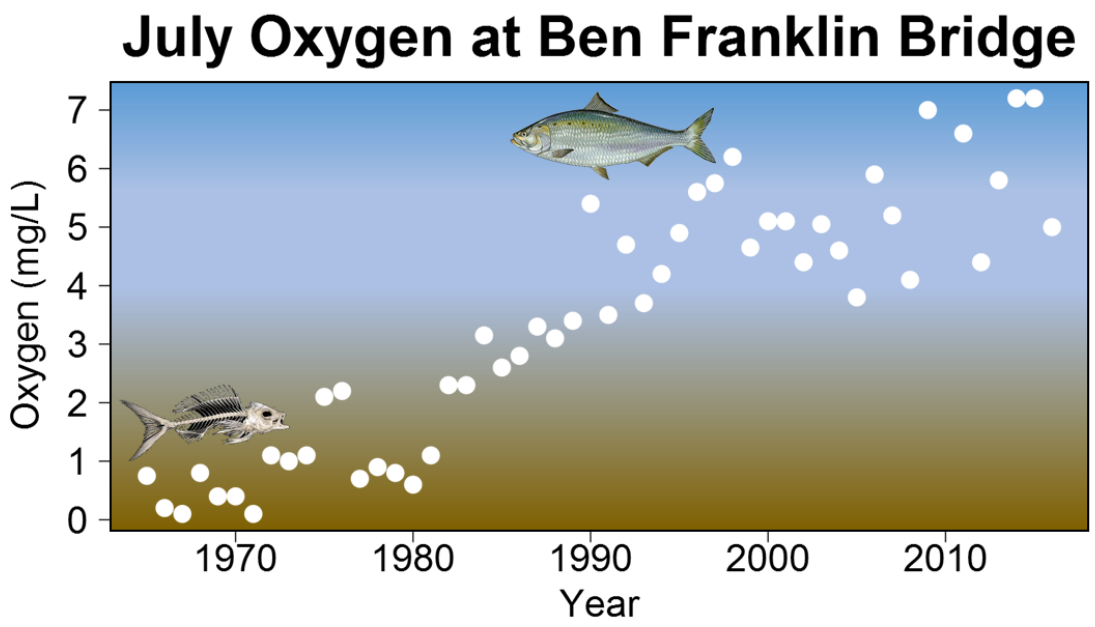
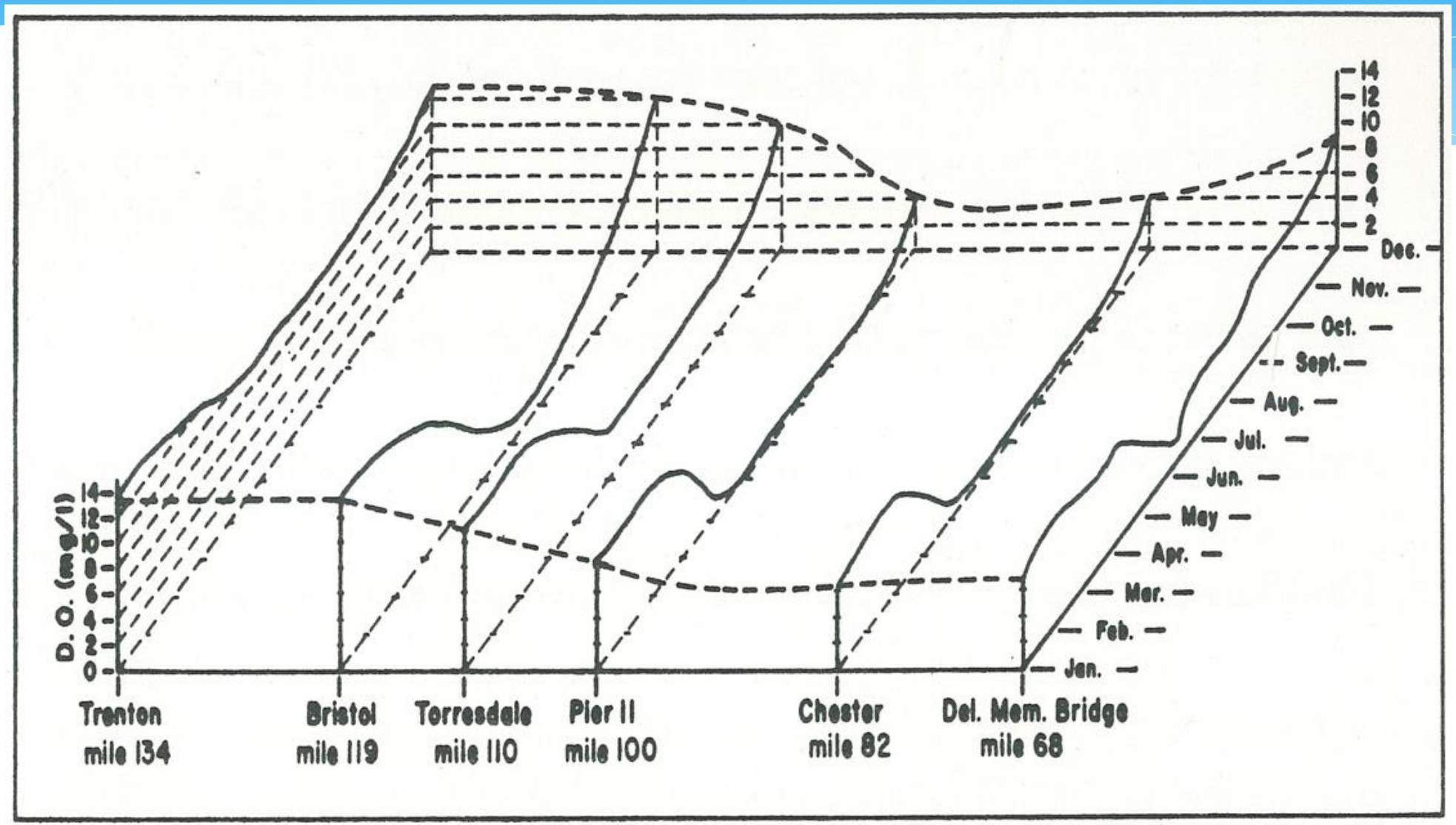
Dissolved Oxygen History

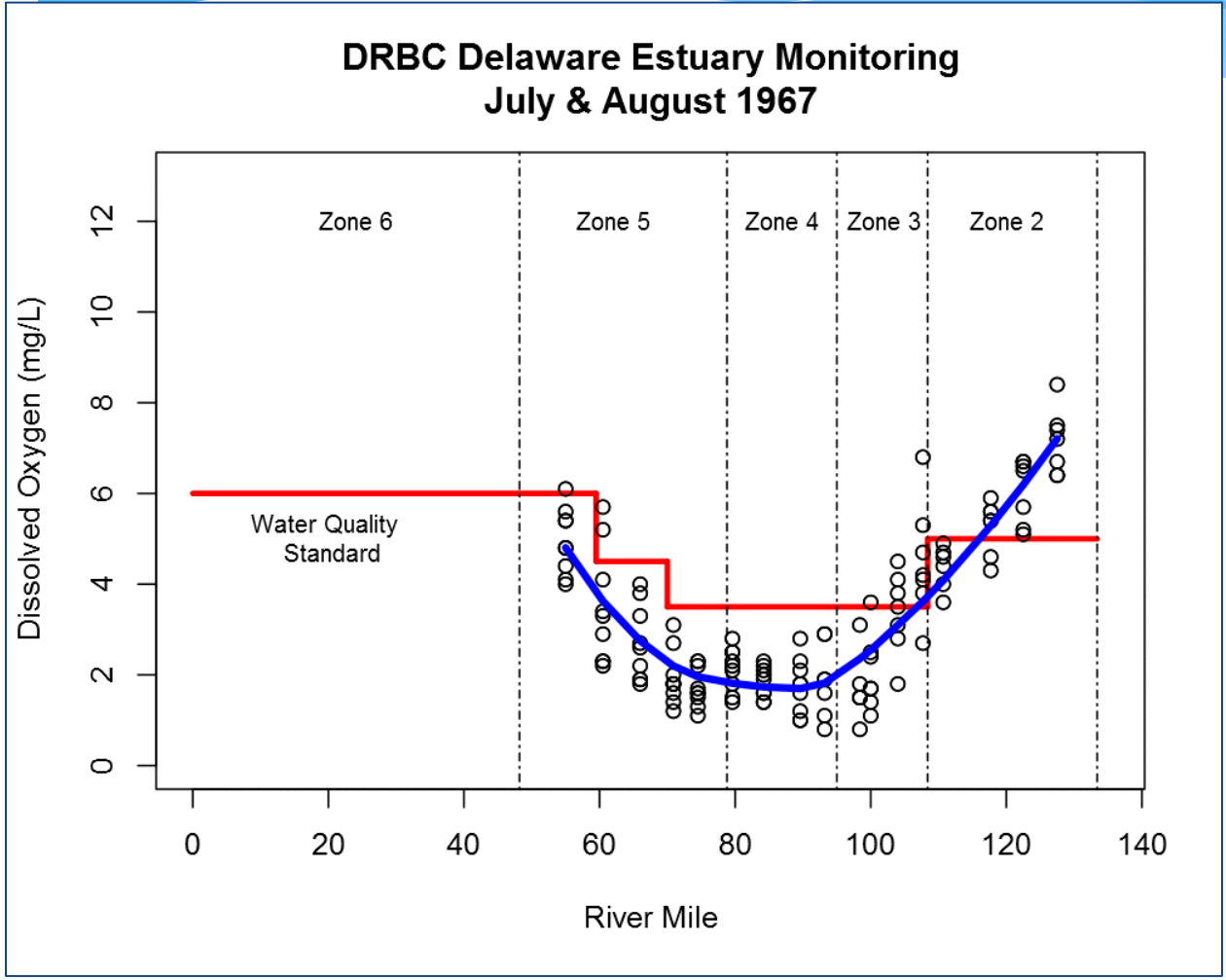


* Historically, summer DO in estuary near Philadelphia & Camden was too low for migratory fish to reach upstream to spawn
* DRBC adopted water quality standards (1967) & wasteload allocation (1968)
* Secondary treatment added at wastewater treatment plants 70's & 80's – funding CWA

Delaware Estuary Dissolved Oxygen 1963

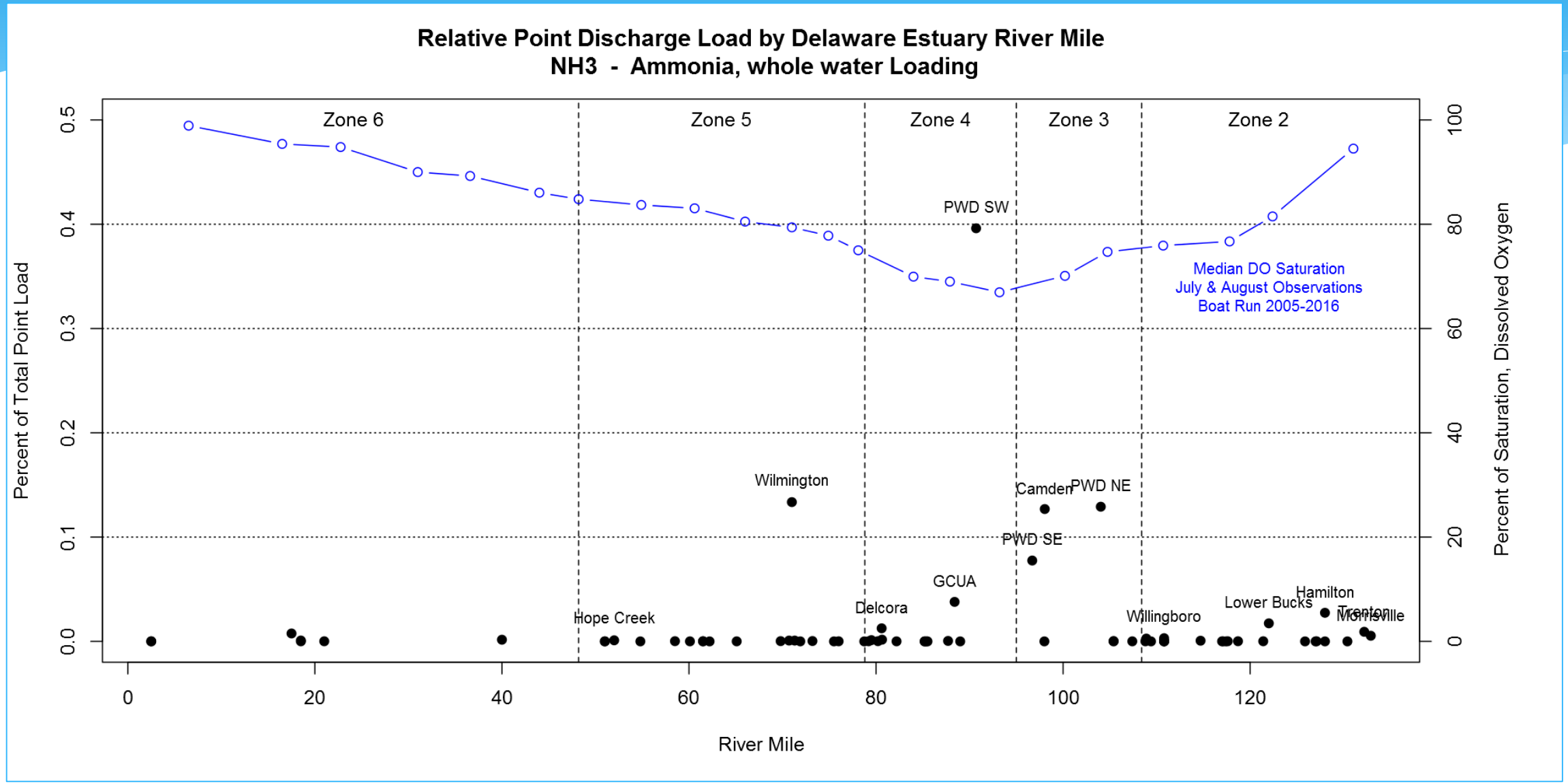


Success No. 1 – Dissolved Oxygen



* 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



Existing vs. Designated Uses

1) ***What are existing uses?***

EPA's regulations define existing uses as "...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."[1,2] Existing uses are relevant to two provisions in the Federal regulation – 40 C.F.R. § 131.10(g), designated uses, and 40 C.F.R. § 131.12(a)(1), antidegradation. Overall, these provisions:

- Prohibit removal of a designated use that would also remove an existing use.[3]
- Require the maintenance and protection of existing instream water uses and the level of water quality necessary to protect existing uses when implementing a state's or tribe's antidegradation policy.[4]

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DRBC Existing Use Evaluation

September 2015

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

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	*Acipenser oxyrhynchus*				
					Zone 3	?	N	N
					Zone 4	Y	N	N
					Zone 5 (upper)	Y	N	N
					RM 70-78.8			
					Zone 5 (lower)	?	N	N
					RM 48.2-70			

DRBC Existing Use Evaluation
September 2015

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- ✓ 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.

Resolution 2017-4

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* 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 PWD's DO partnership

* https://www.state.nj.us/drbc/library/documents/Res2017-04_EstuaryExistingUse.pdf
* Adopted September 13, 2017

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 report from ANS

- Enhanced monitoring for model development
  - Point discharge monitoring
  - Boat run to year-round
  - Added salinity at tidal boundaries
  - Added nitrate at Trenton & Chester
  - Extensive tributary monitoring
  - Light extinction monitoring
  - Primary production

Engineering evaluation & cost estimate

- Contracted with Kleinfelder
- Planning level cost estimate for top 12 loading facilities to achieve new ammonia effluent levels
- Coordination with facilities
- Initiated summer 2018
- 2-year contract

Preliminary Technology and Effluent Level Recommendations

Effluent Level	Conventional Activated Sludge	Pure Oxygen Activated Sludge	Fixed Film (RBC and TF)
NH_3-N – 10 mg/L	Conversion to IFAS with low level of media addition to aeration tanks	Add downstream BAF sized for approximately 50% of plant flow	Add downstream BAF sized for approximately 50% of plant flow
NH_3-N – 5 mg/L	Conversion to IFAS with medium level of media addition to aeration tanks	Add downstream BAF sized for approximately 75% of plant flow	Add downstream BAF sized for approximately 75% of plant flow
NH_3-N – 1 mg/L	Conversion to IFAS with high level of media addition to aeration tanks	Add downstream BAF sized for 100% of plant flow	Add downstream BAF sized for 100% of plant flow
TN – 3 mg/L	Conversion to IFAS with high level of media addition plus downstream DF	Add downstream BAF sized for 100% of plant flow plus DF	Add downstream BAF sized for 100% of plant flow plus DF

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Questions & Discussion?

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