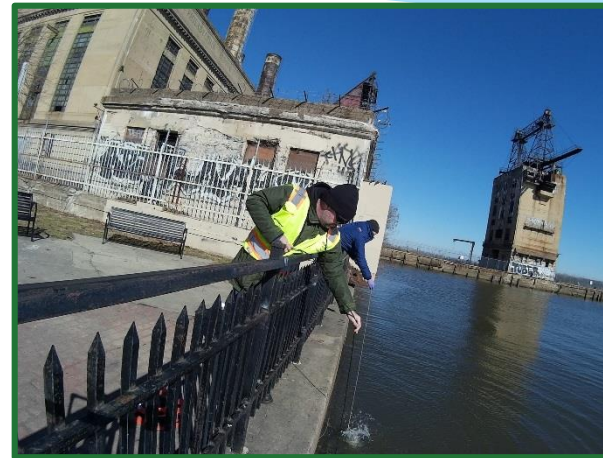


# Delaware River Basin Commission

## DRBC Water Quality Monitoring

September 12, 2017

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Assessment



**Delaware River Basin Commission**

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

# Presentation Topics

- \* Key DRBC Monitoring Programs & Projects
  1. How we use the data
  2. How we serve the data & interpretation to partners and stakeholders
- \* Special one-time monitoring projects



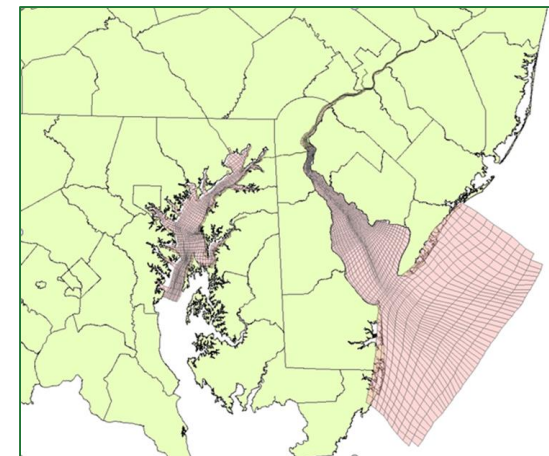
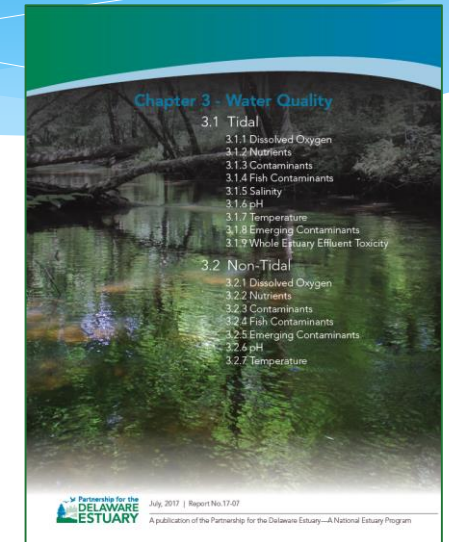
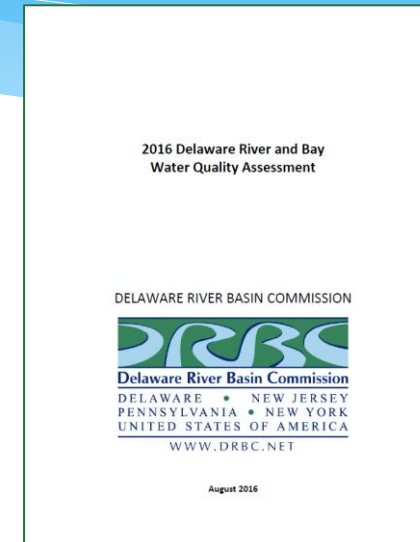
# Delaware Estuary Water Quality Monitoring (Boat Run)



- \* Since mid-1960's
- \* 22 Sites, once per month
- \* Parameter Groups
  - Routine
  - Nutrients
  - Sodium, biotic ligand model & Algal parameters
  - Bacteria
  - Metals
- \* Sampling & Analysis performed by DNREC under contract to DRBC

# How we use the Delaware Estuary water quality data

- \* Delaware River & Bay Water Quality Assessment Report
  - CWA 305(b)
  - Every even numbered year
- \* State of the Estuary Report
  - Cooperation with PDE
  - ~ Every 5 years
- \* Estuary Eutrophication Model
- \* Canned database queries on DRBC web site at <http://www.state.nj.us/drbc/quality/datum/>
- \* Estuary Water Quality Explorer at <https://johnyagecic.shinyapps.io/BoatRunExplorer/>

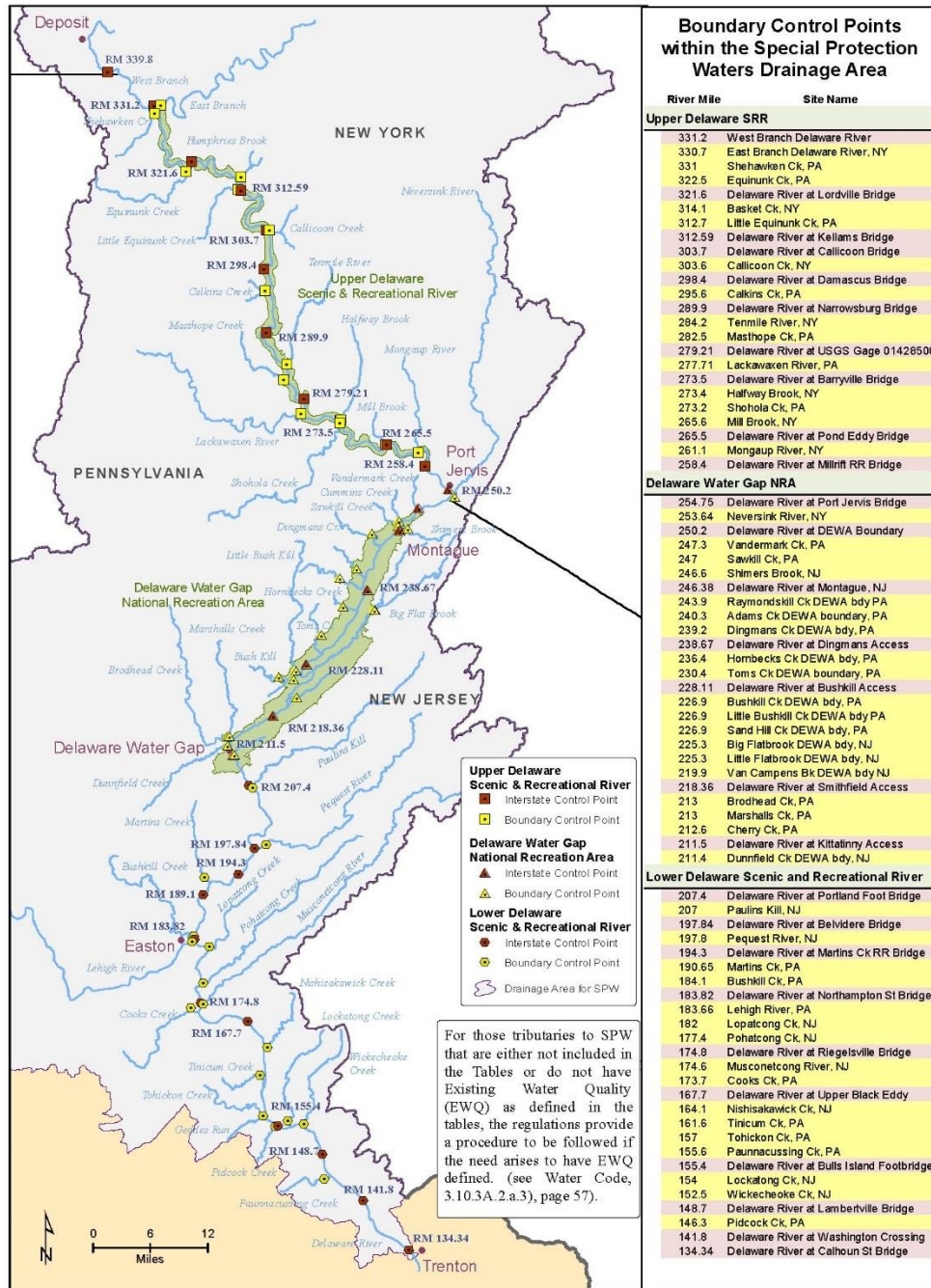


# Special Protection Waters Monitoring

- \* Nutrients & field measurements
- \* Mainstem Delaware River stations (Interstate Control Points (ICPs))
- \* Tributaries near confluence with Delaware (Boundary Control Points (BCPs)) in non-tidal Delaware
- \* Number of stations flexible from year to year depending on strength of definition of Existing Water Quality



# SPW Sampling Stations



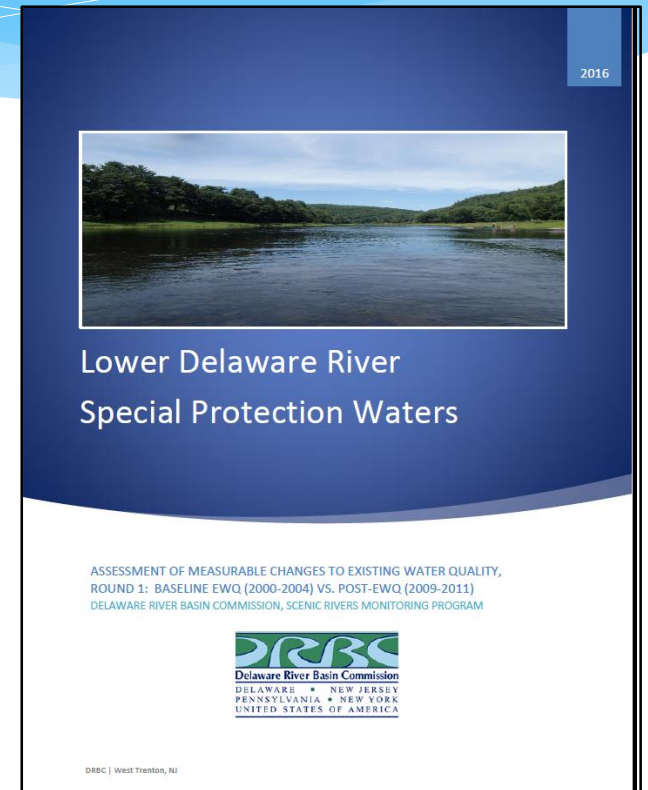
\* “It is the policy of the Commission ... no measurable change in existing water quality except towards natural conditions ...”

\* Data used to establish permit requirements

\* Monitoring to define Existing Water Quality & Assess whether or not Existing Water Quality is being preserved

# SPW Data

- \* Lower Delaware Measurable Change Assessment published August 2016  
[http://www.nj.gov/drbc/programs/quality/lower-delaware\\_EWQassessment2016.html](http://www.nj.gov/drbc/programs/quality/lower-delaware_EWQassessment2016.html)
- \* Canned database queries on DRBC web site at  
<http://www.state.nj.us/drbc/quality/datum/>
- \* Special Protection Waters Monitoring Program Explorer  
<https://elainepanuccio.shinyapps.io/specialprotectionwatersexplorer/>



# Summary Matrix of Measurable Changes: 440 Within-Site Comparisons at a Glance

Good News:  
88% of water quality tests showed no degradation

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)										
		Del. River at Trenton	Del. River at Washngth Crossing	Pidcock Creek, PA	Delaware River at Lambrtville	Wicke-cheokee 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 Rieglsvil	Pohat-cong Creek, NJ	Lehigh River, PA	Del. River at Easton	Bushkill Creek, PA	Marins Creek, PA	Pequest River, NJ	Del. River at Belvidere	Paulins Kill River, NJ	Del. River at Portland		
Parameter		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												~														
	Dissolved Oxygen Saturation %												~														
	pH, units																										
	Water Temperature, degrees C																										
Nutrients	Ammonia Nitrogen as N, Total mg/l																										
	Nitrate + Nitrite as N, Total mg/l																	**									
	Nitrogen as N, Total (TN) mg/l																	**									
	Nitrogen, Kjeldahl, Total (TKN) mg/l																										
	Orthophosphate as P, Total mg/l																										
	Phosphorus as P, Total (TP) mg/l																										
Bacteria	Enterococcus colonies/100 ml	~				~																					
	Escherichia coli colonies/100 ml	**	**	**	**	**	**					**	**	**													
	Fecal coliform colonies/100 ml																										
Conventionals	Alkalinity as CaCO3, Total mg/l																										
	Hardness as CaCO3, Total mg/l												~														
	Chloride, Total mg/l			**		**	**	**	**	**	**	**	**	**	**	**	**	**	**	~	**	**	**	**	**	**	**
	Specific Conductance µmho/cm			**		**	**	~	**	**	**	**	**	**	**	**	~	**	**	~	~	~	**	~			
	Total Dissolved Solids (TDS) mg/l																										
	Total Suspended Solids (TSS) mg/l																										
	Turbidity NTU																										
KEY			= 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							

\* Nutrient reductions corroborated by subsequent USGS assessment using different data, different methods





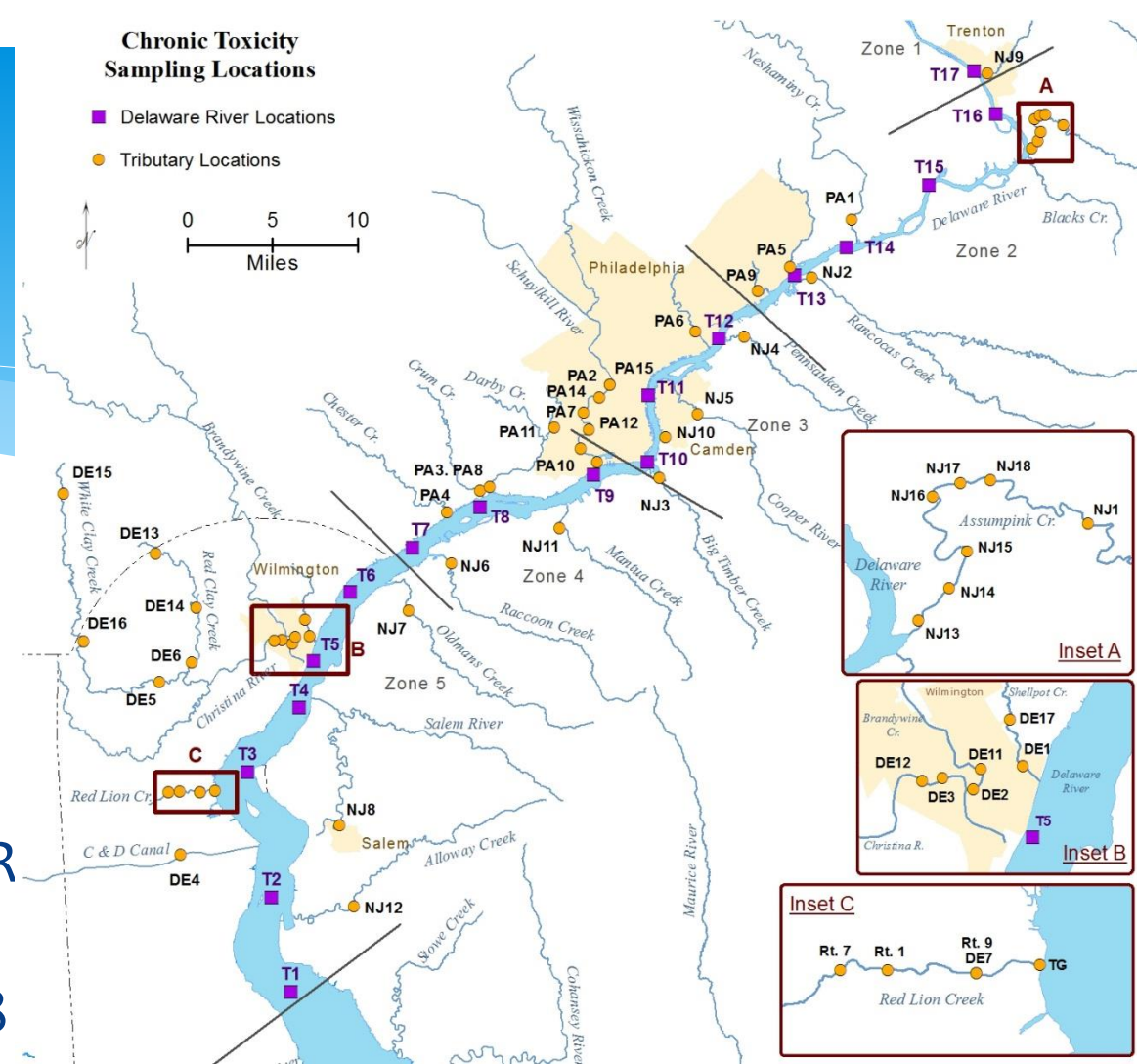
# Biological Monitoring Program

- \* Macroinvertebrates
- \* Periphyton
- \* 25 riffle sites in non-tidal Delaware River
- \* Every 2 or 3 years
- \* Assessment included in Delaware River Water Quality Assessment (305(b))

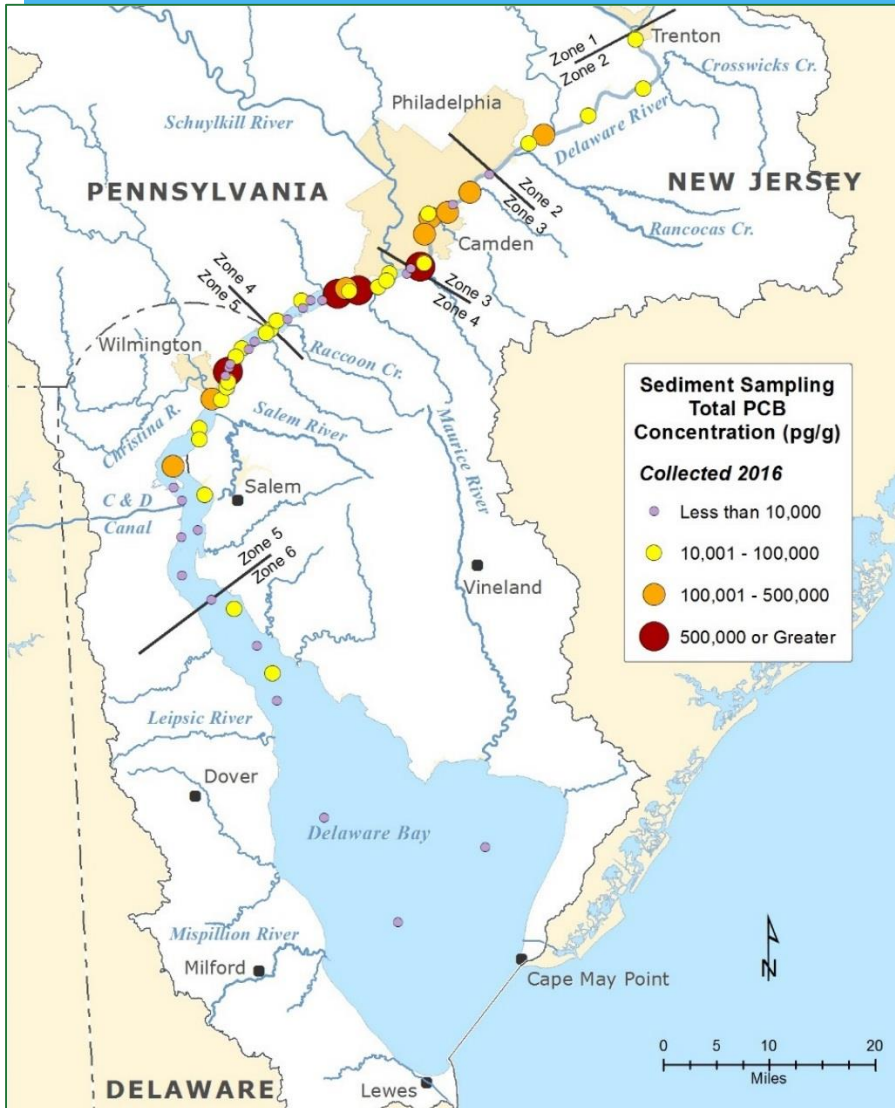


# Ambient Toxicity

- Surface Water Samples
- Laboratory Tests using USEPA Short-Term Chronic Methods
- Freshwater and Estuarine species
- 1990 to present
- 2015 & 2016 in cooperation with DNREC WATAR program
- Next sampling proposed for main stem in 2018 following Ambient Toxicity Workgroup recommendation of main stem monitoring every 3 to 5 yrs



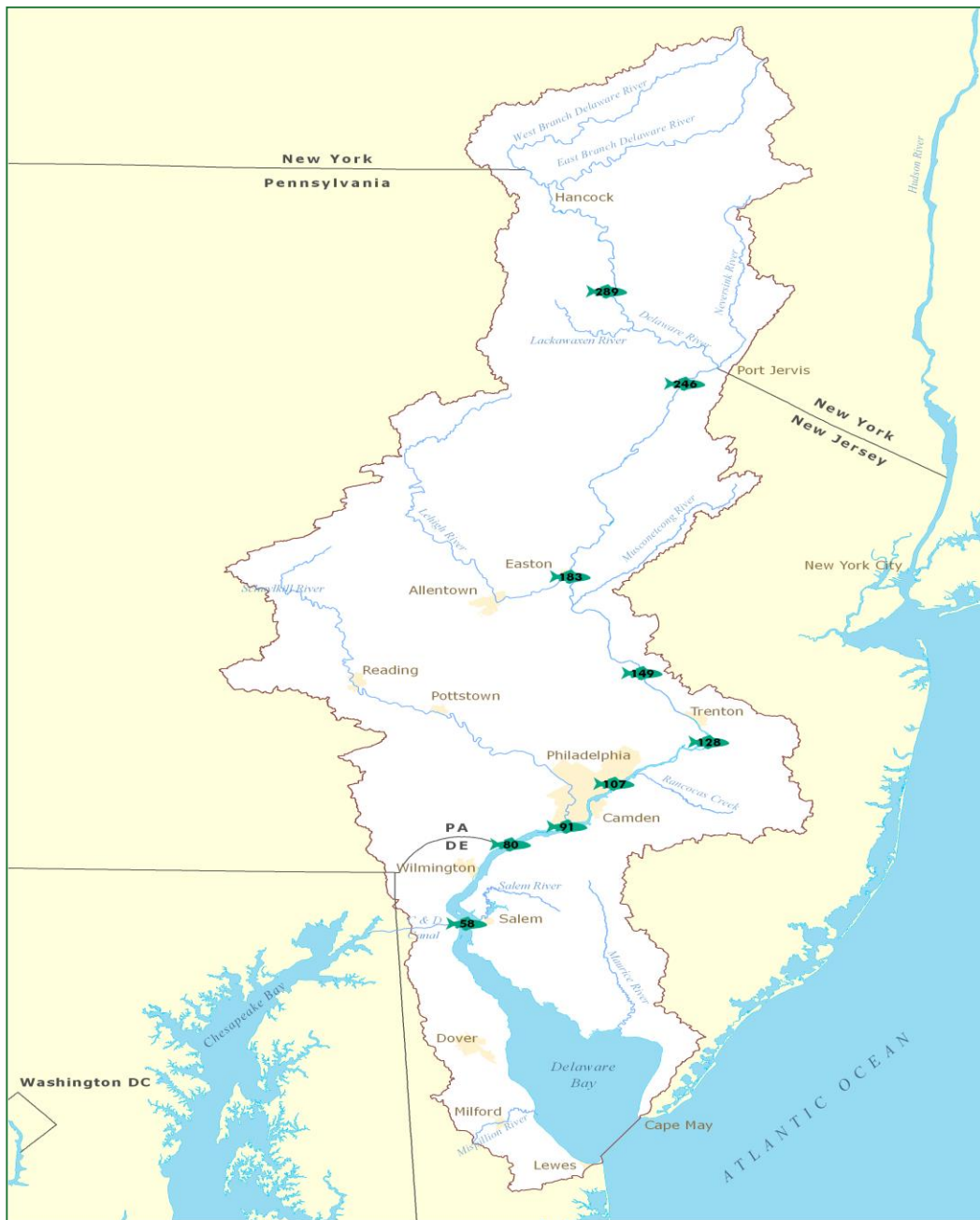
# Sediment Monitoring



- \* Periodic
- \* PCBs, PAHs, perflourinated compounds, emerging contaminants
- \* Monitoring recovery under PCB TMDL, special studies in support of states

# Fish Tissue Monitoring

- \* 8 or 9 sites in both tidal (5 sites) and non-tidal (3 - 4 sites) Delaware River.
- \* Frequency: Yearly 2000 - 2007, 2010, 2012, 2015, 2016 (Delaware Bay), 2018 (planned)
- \* Two fish species at each site representing benthic and pelagic trophic levels.
  - Tidal: white perch, channel catfish
  - Non-tidal: smallmouth bass, white sucker
- \* PCBs, Mercury, Methylmercury, Chlorinated pesticides, Dioxins/Furans, Perfluorinated Compounds, Metals
- \* Data used for fish consumption advisories by NJ



# Special Projects

- \* Natural Gas Baseline Monitoring
  - Biological Monitoring
  - Conductivity Loggers
  - Radiochemistry
  - Archived samples, barium & strontium
- \* SPW Model Calibration Monitoring
  - Brodhead, Neversink, & Lehigh Watersheds
- \* Response Monitoring
  - Vinyl Chloride spill response monitoring
  - Estuary tritium, gross alpha, gross beta emitters



# Special Projects (continued)

## \* Aquatic Life Studies

- Lower non-tidal Delaware Mussel Survey
- Didymo Survey
- Matlock Periphytometer Study
- Winter Estuary Ammonia monitoring

## \* Support for other organizations

- PWD dye study support
- Support to Shad young-of-year survey
- Periodic Emerging Contaminant monitoring



# Supplemental Material: Interesting ways DRBC uses data generated by others - Dashboards

- \* Near Real-Time Water Quality & Flow Dashboards
- \* Pulls data from USGS and NOAA via the internet
- \* Automated scripted processing and plotting of data
- \* Comparisons to criteria and thresholds
  - <http://drbc.net/Sky/waterq.htm>
  - <http://drbc.net/Sky/flows.htm>

# Supplemental Material: Interesting ways DRBC uses data generated by others – Overnight Model

- \* Pulls data from NOAA, USGS, and AHPS overnight via internet
- \* Automated scripts formulate the data into an input file for existing model
- \* Runs existing DYN5 model using new data
- \* Automated comparisons of model output to observations
- \* In the event of a spill, manually feed the output to WASP water quality model to simulate concentration, duration, and movement of plume





# Questions & Discussion

