

Delaware River Basin Commission

Protecting Water Quality in the Delaware River for Drinking Water

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Photo: David B. Soete



Delaware River Basin Commission

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This Presentation: How DRBC Protects Water Quality for Drinking Water

- **15 million+** water users from Delaware River Basin
 - **4.3 million** drinking water users from main stem Delaware River
-
- Surface Water Quality Standards
 - Monitoring and Assessment
 - Special Protection Waters
 - Automated Flow and Transport Model
 - Coordination with other organizations
 - **Early Warning System (PWD)**



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Our Regulations

18 CFR PART 410, Section 3.10.2

- * **B. Uses to be Protected.** The quality of Basin waters... shall be maintained in a safe and satisfactory condition for the following uses:
 1. agricultural, industrial, and **public water supplies after reasonable treatment**, except where natural salinity precludes such uses;

Surface Water Quality Standards for Drinking Water (DW)

- * Public water supply use Zones 1A through 1E, 2, & 3;
- * Monitoring & Assessment parameters:
 - * TDS;
 - * chlorides;
 - * Toxics (Zones 2&3);
 - * hardness;
 - * odor;
 - * phenol;
 - * sodium (Na); and
 - * Turbidity
- * Absence of DW closures



Uses to be Protected in Delaware River

	Non-tidal Freshwater					Tidal Fresh		Tidal Brackish-Salt		
	1A	1B	1C	1D	1E	2	3	4	5	6
Aquatic Life	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drinking Water	✓	✓	✓	✓	✓	✓	✓			
Primary Recreation	✓	✓	✓	✓	✓	✓		✓	✓	✓
Secondary Recreation							✓	✓		
Fish Consumption	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Shellfish Consumption										✓

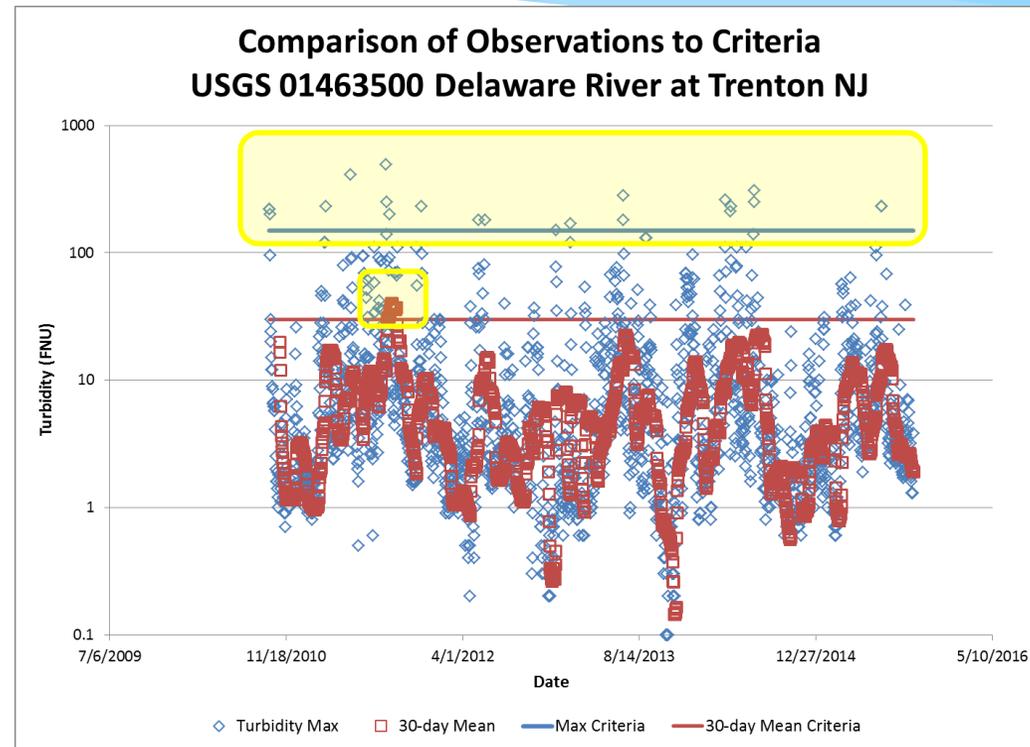
Top of Basin Confluence of East and West Branch

Mouth Of Bay



How are we doing? (2014 Assessment)

- * Meeting Criteria (~ 100%):
 - * TDS, Hardness, Chlorides, Sodium, Toxics, Absence of DW closures
- * Others:
 - * Alkalinity >96% meeting criteria;
 - * Turbidity Max > 94% meeting criteria;
 - * Turbidity 30-day mean



2016 Assessment Preview

DRBC Special Protection Waters Program *anti-degradation*

- * **Keep the clean water clean;**
- * 197 river miles upstream from Trenton
- * Define Existing Water Quality (sampling & analysis);
- * No measurable change (except toward natural conditions)
- * DRBC Water Quality Regulations Sec 3.10.3A.2.

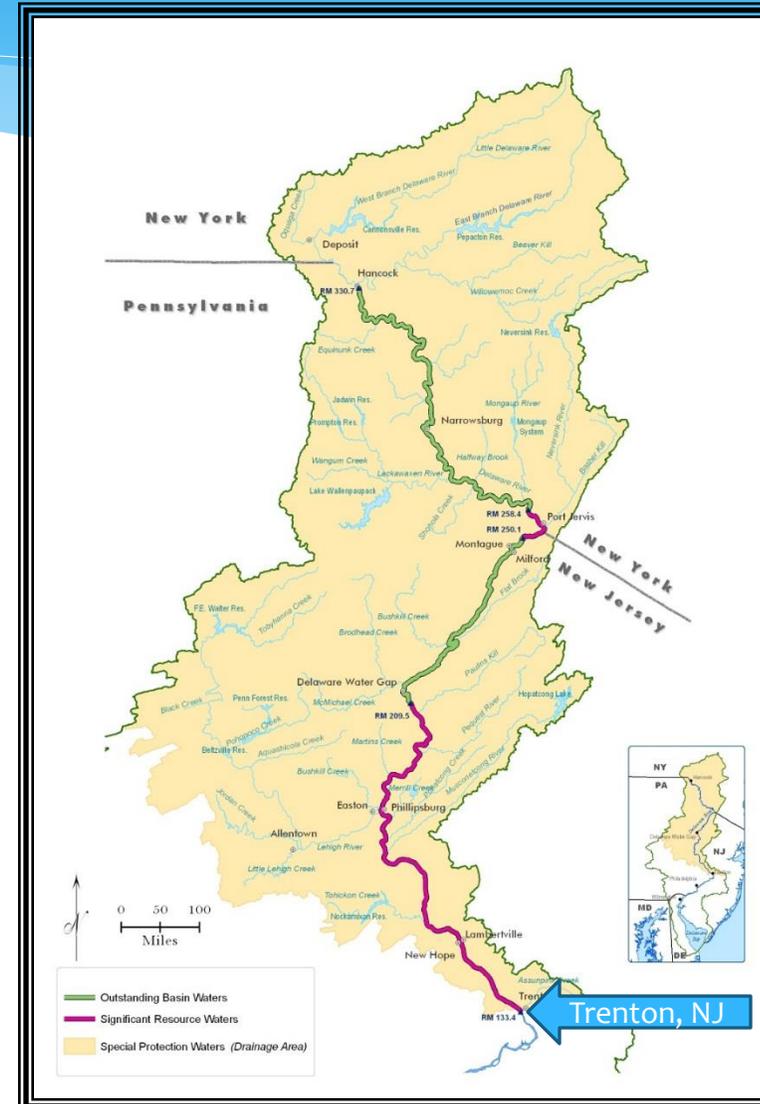


TABLE 2I. Definition of Existing Water Quality: Easton ICP

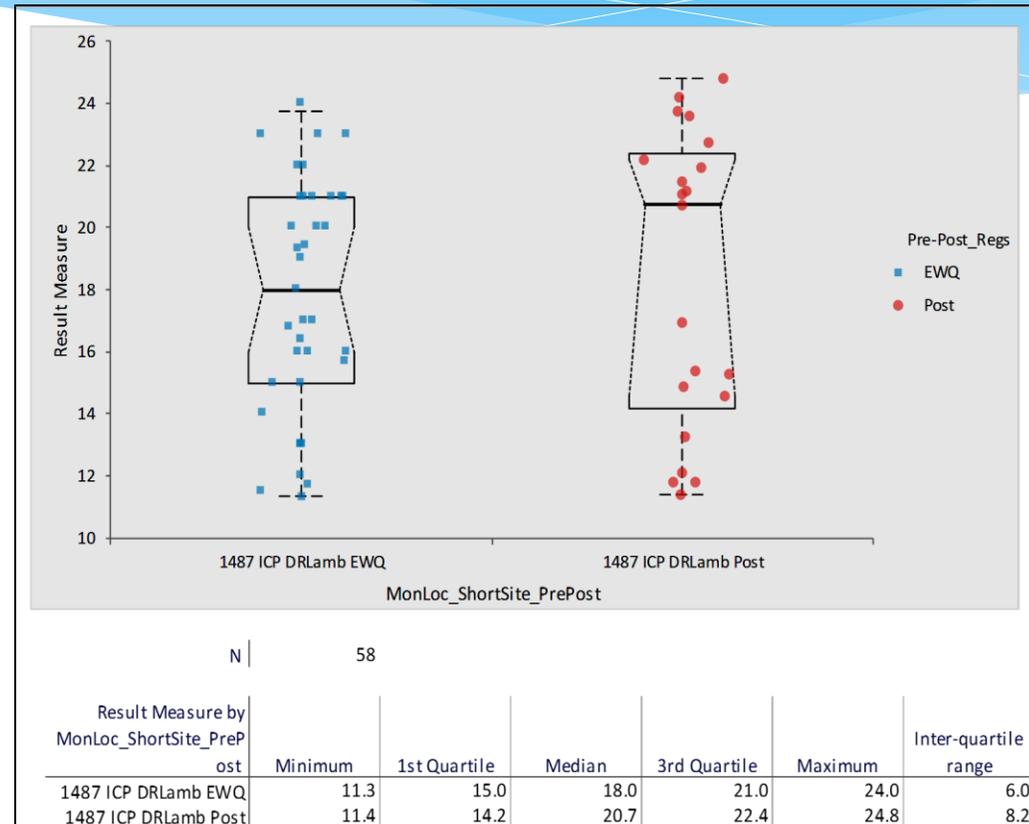
Delaware River at Northampton Street Bridge, Easton-Phillipsburg, PA/NJ, River Mile 183.82

Parameter (Y)	Definition of Existing Water Quality			
	Median	Lower 95%CI	Upper 95%CI	Flow Relationships Site specific regression equation.
Ammonia NH3-N (mg/l) *	<.05	<.05	<.05	
Chloride (mg/l)	16	14	17	$Y = -0.00022184 Q + 16.751$
Chlorophyll a (mg/m ³)	1.45	1.07	2.14	
Dissolved Oxygen (mg/l) mid-day*	8.10	7.90	8.58	
Dissolved Oxygen Saturation (%)	95%	92%	96%	
E. coli (colonies/100 ml)	31	24	64	$Y = \text{antilog}(0.00004425 Q + 1.273)$
Enterococcus (colonies/100 ml)	145	80	250	
Fecal coliform (colonies/100 ml) *	100	64	130	
Nitrate NO3-N (mg/l) *	0.85	0.70	0.90	
Orthophosphate (mg/l)	0.02	0.01	0.02	
pH	7.55	7.41	7.70	
Specific Conductance (umhos/cm)	142	127	155	$Y = -0.0024666 Q + 158.76$
Total Dissolved Solids (mg/l)	110	103	120	
Total Kjeldahl Nitrogen (mg/l)	0.35	0.26	0.46	
Total Nitrogen (mg/l) *	1.19	1.01	1.35	
Total Phosphorus (mg/l) *	0.05	0.04	0.06	
Total Suspended Solids (mg/l) *	4.0	3.0	5.0	$Y = 0.00177536 Q - 4.8027$
Turbidity (NTU)	2.6	1.8	4.0	$Y = \text{antilog}(0.00003836 Q + 0.1845)$
Alkalinity (mg/l)	34	30	39	$Y = -0.00073929 Q + 39.867$
Hardness (mg/l)	48	45	52	

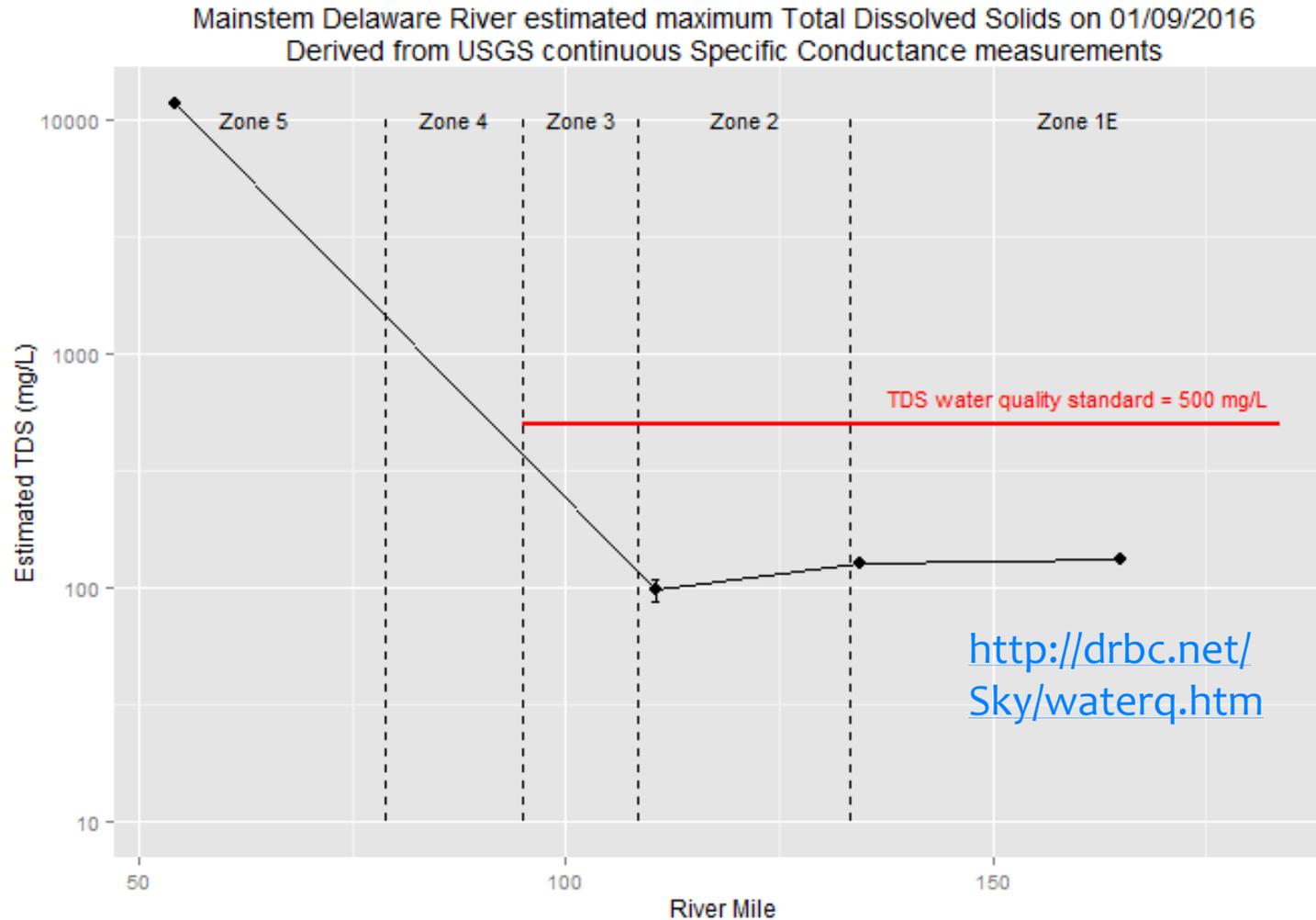
Definitions of Existing Water Quality are contained in DRBC Water Quality Regulations

About to complete an Assessment of No Measurable Change to Existing Water Quality for Lower Delaware

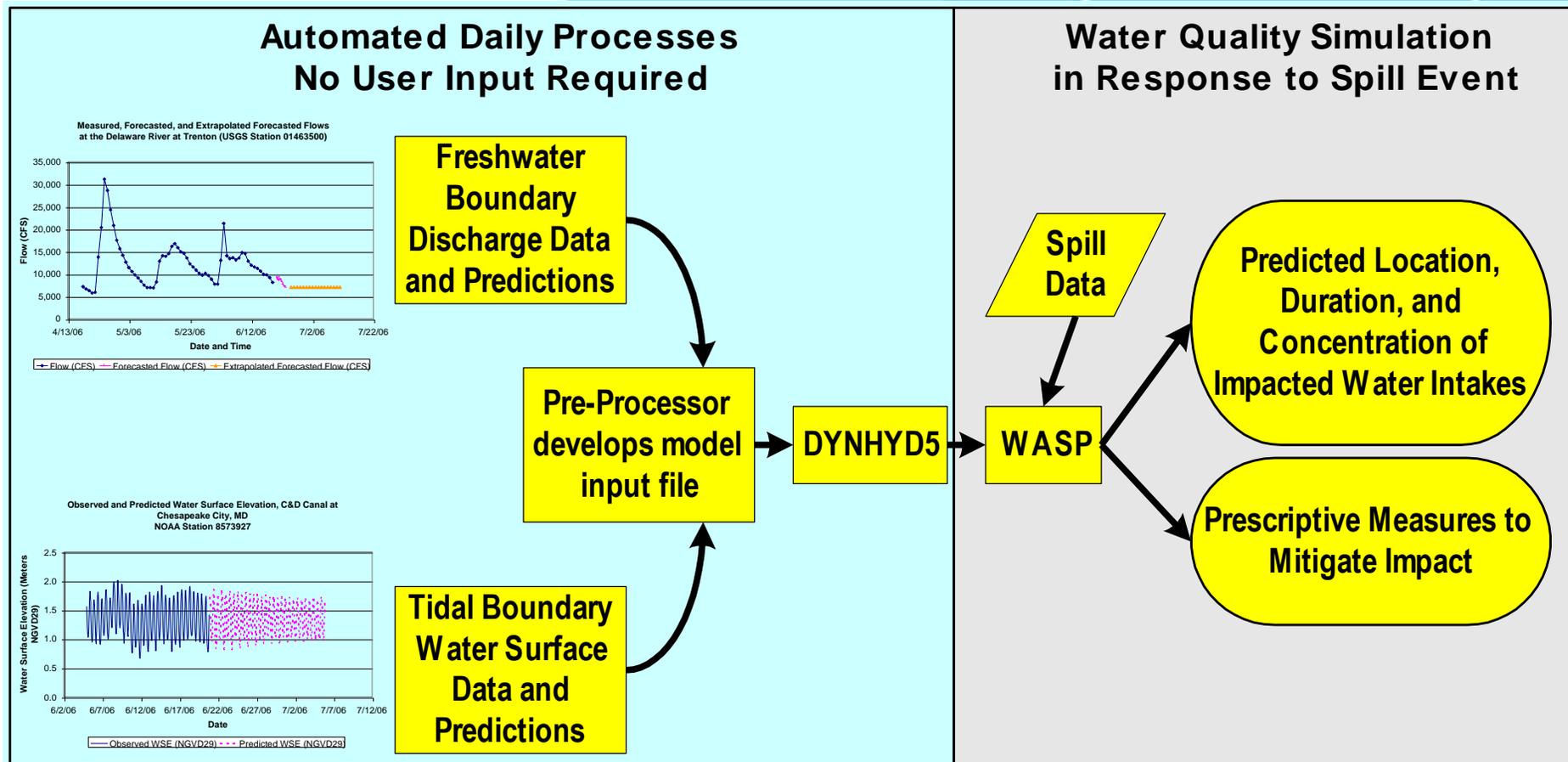
- * Extensive monitoring 2009-2011;
- * Compared 2009-2011 results to EWQ period (2000-2004);
- * No measurable change 17 out of 20 parameters;
- * Indication of measurable change for chlorides, specific conductance, E. coli.



Near Real-Time TDS Results derived from Specific Conductance via regression models



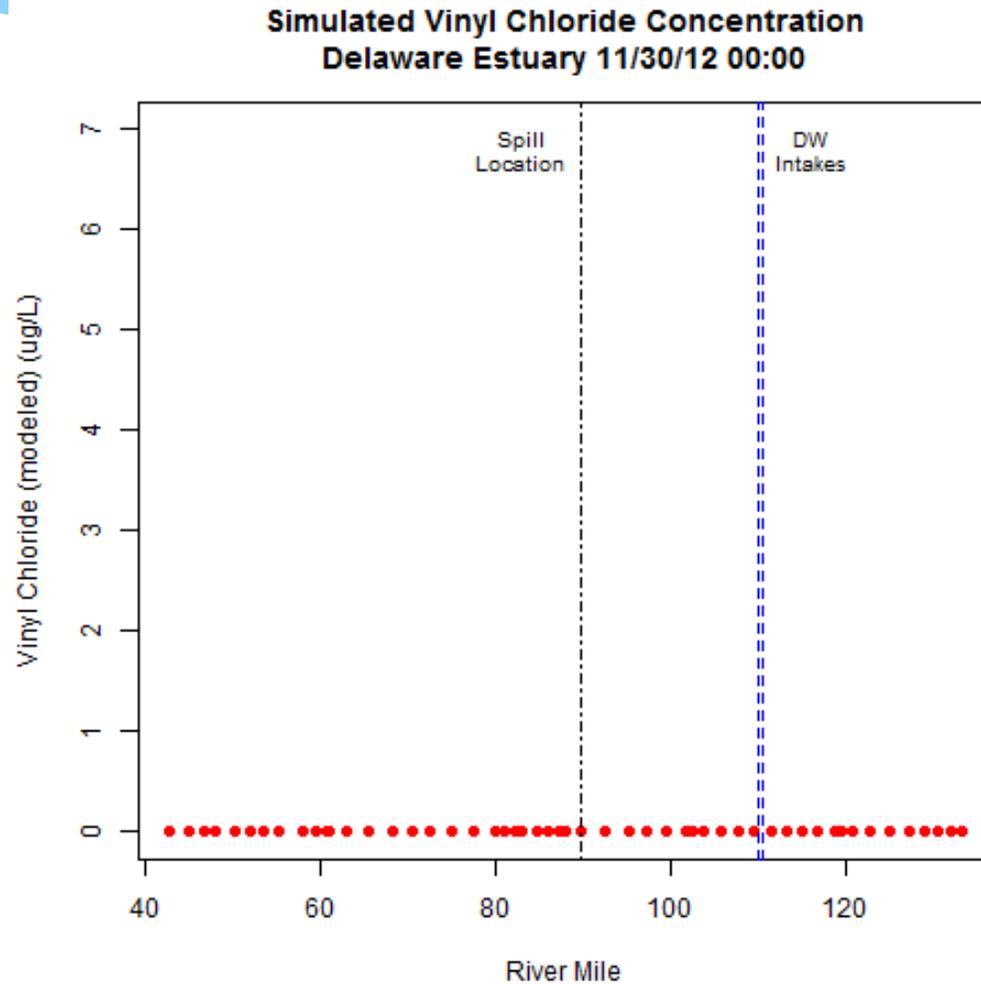
Automated Flow and Transport Model



Automated Flow & Transport Model

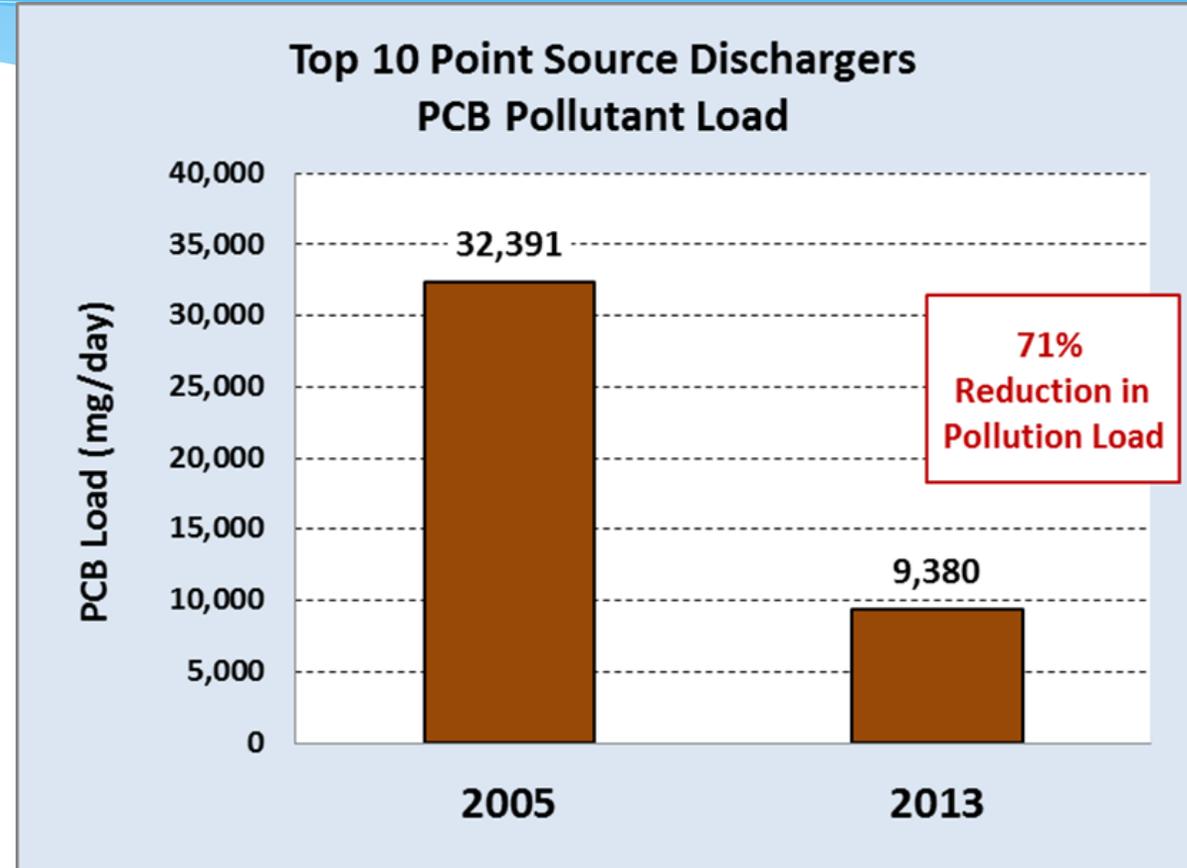
Quick case study

- * Late November 2012 train derailment over tidal Mantua Creek;
- * Vinyl chloride spill;
- * Hydrodynamic model ran the night before;
- * DRBC ran water quality model and communicated results with water purveyors on tidal Delaware same day;
- * Confirmed below detection with monitoring up-estuary.



Polychlorinated Biphenyls (PCBs)

- * **Problem:** Early 2000's ambient concentrations exceeding criteria by 2 to 3 orders of magnitude; Fish consumption advisories;
- * **Action:** DRBC developed TMDLs adopted by EPA in 2003 and 2006;
- * **Implementation:** Pollutant minimization plans – facilities identify and implement means of achieving maximum practicable reductions
- * **Status:**
 - 10 largest point sources reduced by over 70%
 - Nationally recognized program



Emerging Threats and Concerns

- * Increases in salinity, chlorides, conductivity (national problem);
- * Pharmaceuticals, personal care products, perfluorinated compounds;
- * Gas development – Loss of headwater forests?

- * Monitoring to better understand the magnitude & frequency of problem (salts & emerging contaminants) and define baseline (gas);
- * Coordination with other agencies.

Support Other Organizations

find a way to help and do it

- * Provided water intake locations and emergency contact information to US Coast Guard;
- * Administer \$ for Philadelphia Water Department's Early Warning System;
- * Performed assessment of all organizations' data after PPL fly ash spill into the Delaware;
- * Assisted PWD with 2014 dye study;

Thank You!

Delaware River Basin Commission
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