Use of Continuous Monitors in the Delaware River Basin

Delaware River Basin Commission

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NJ Water Monitoring Coordinating Council
September 12, 2008
John Yagecic, P.E.

This presentation focused on 2 applications of continuous monitoring data

1. Integrated Assessment
2. E-mail notification system

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1. Integrated Assessment
Aquatic Life Results

AU	DO	pH	Turbidity	Temperature	TDS	Alkalinity	Toxic Pollutants	2008 Assessment	2006 Assessment
1A	+	-	ID	ID	+	NC	NC	NS	NS
1B	+	+	ID	ID	+	NC	NC	ID	ID
1C	+	+	+	ID	+	NC	NC	ID	ID
1D	+	+	+	ID	+	NC	NC	ID	ID
1E	+	-	+	ID	+	+	NC	NS	S
2	+	+	+	-*	+	+	+	NS	S
3	+	+	+	+	+	+	+	S	S
4	+	+	+	-*	ID	+	+	NS	S
5	-	+	+	+	NC	+	+	NS	NS
6	+	+	+	+	NC	+	NC	S	S/ID

+	Meets DRBC criteria
-	Does not meet DRBC criteria
S	The assessment unit supports the designated use.
NS	The assessment does not support the designated use.
NC	No Criteria
ID	Insufficient or unreliable data

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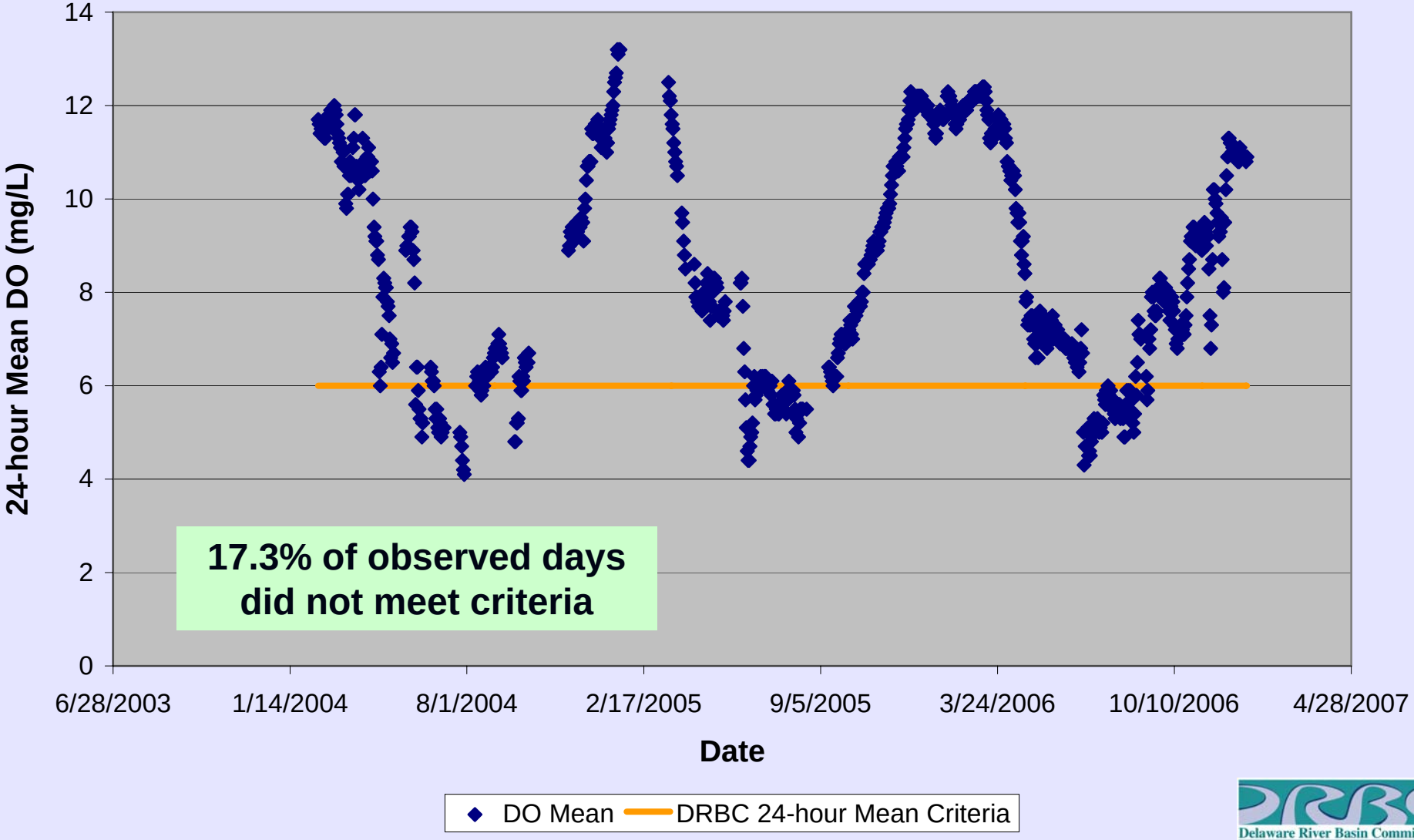
Daily Mean of Measured Dissolved Oxygen from Continuous Monitor at USGS 01482800 Delaware River at Reedy Island Jetty, DE



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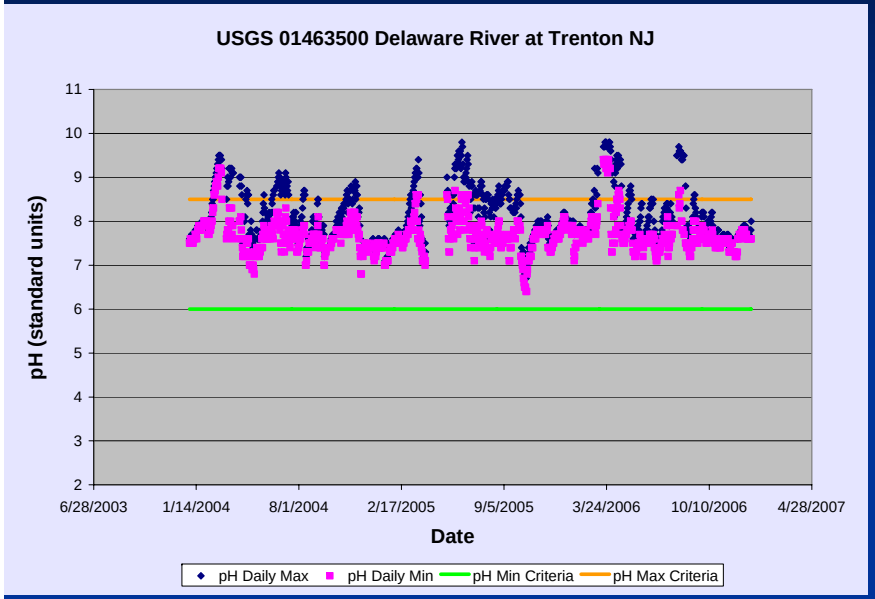
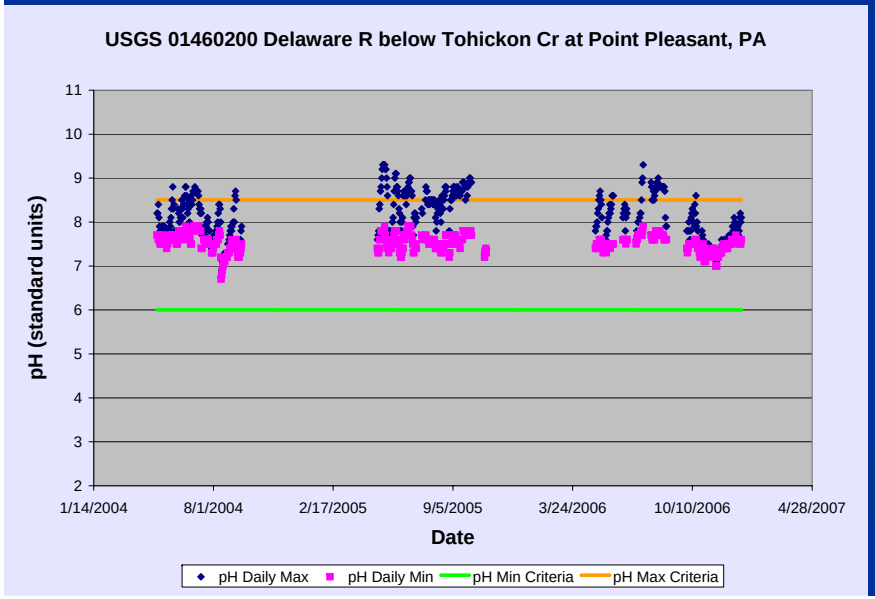
Gaps in DO Assessment

- No continuous monitors in Zones 1A, 1B, 1C, 1D, 2, or 6
- Daytime spot measurements don't capture diurnal swing, so…
  - Don't get daily lows (minimum criteria);
  - Can't compute daily mean (mean criteria).

pH Comparisons, Zones 1E & 1A





- Continuous monitors are both in Zone 1E
- Zone 1A also outside criteria based on field spot measurements
  - > 10% outside criteria
- Need continuous monitors in other zones to capture highs and lows (similar to DO assessment problem)
- Is DRBC criteria too stringent?

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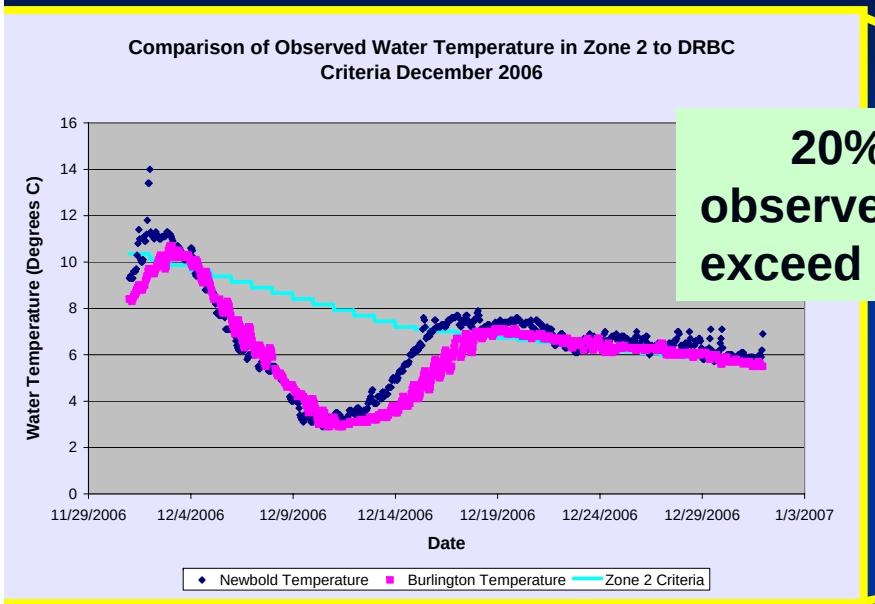
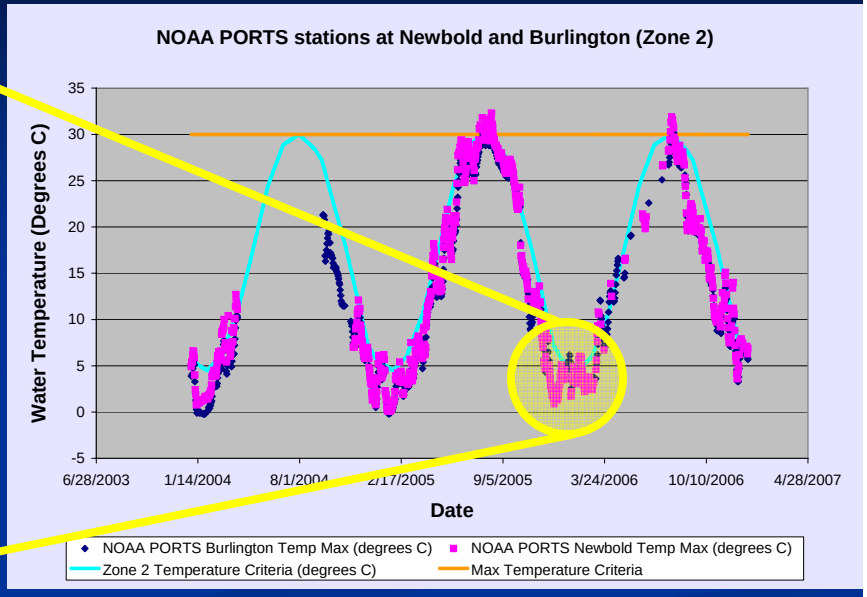
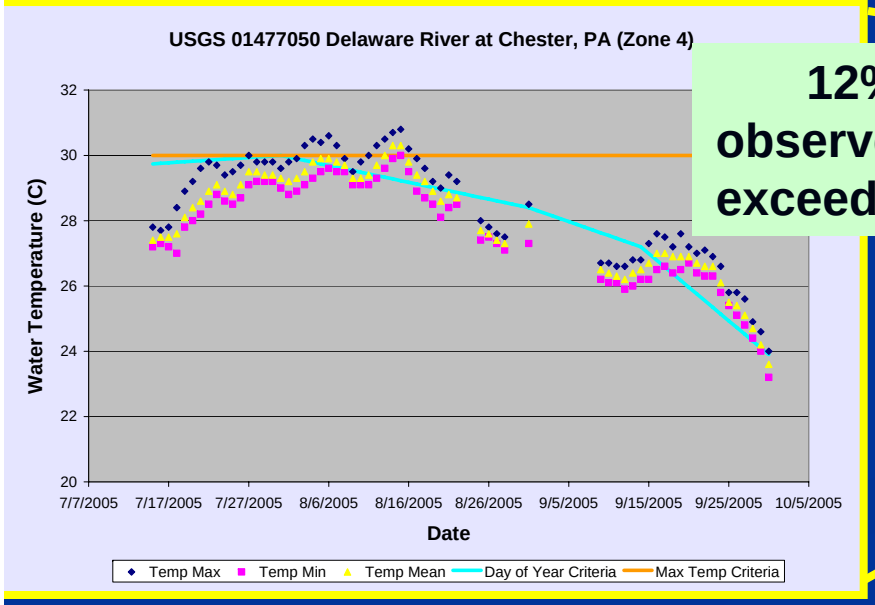
Estuary Temperature Violations, Zones 2 and 4

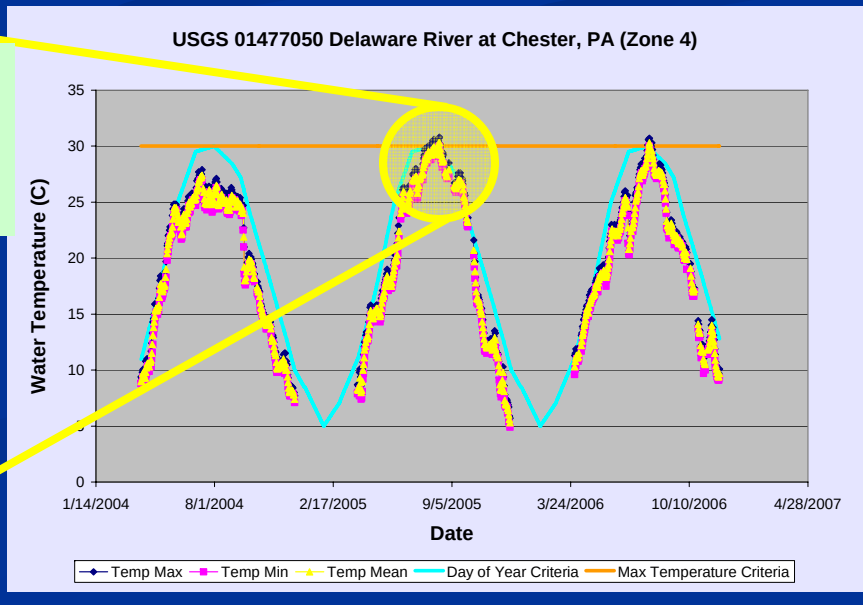


20% of observed days exceed criteria

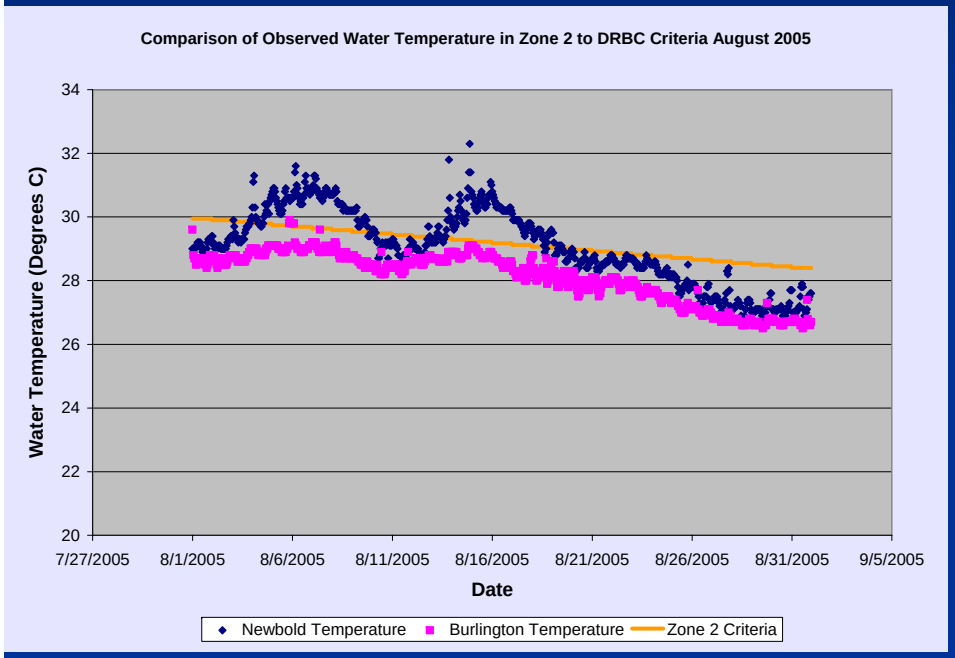


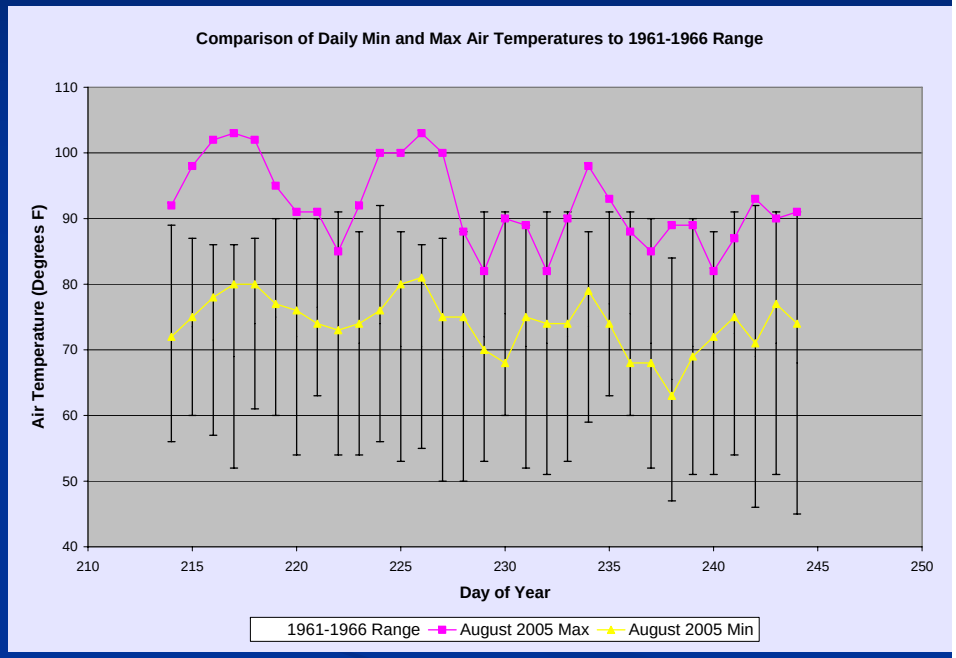


12% of observed days exceed criteria



Comparison of Air and Water Temperatures for August 2005





- If surface water temperature is influenced by meteorological forces and thermal loads, what is the influence of each?
- Currently, don't know.

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Data / Monitoring Issues

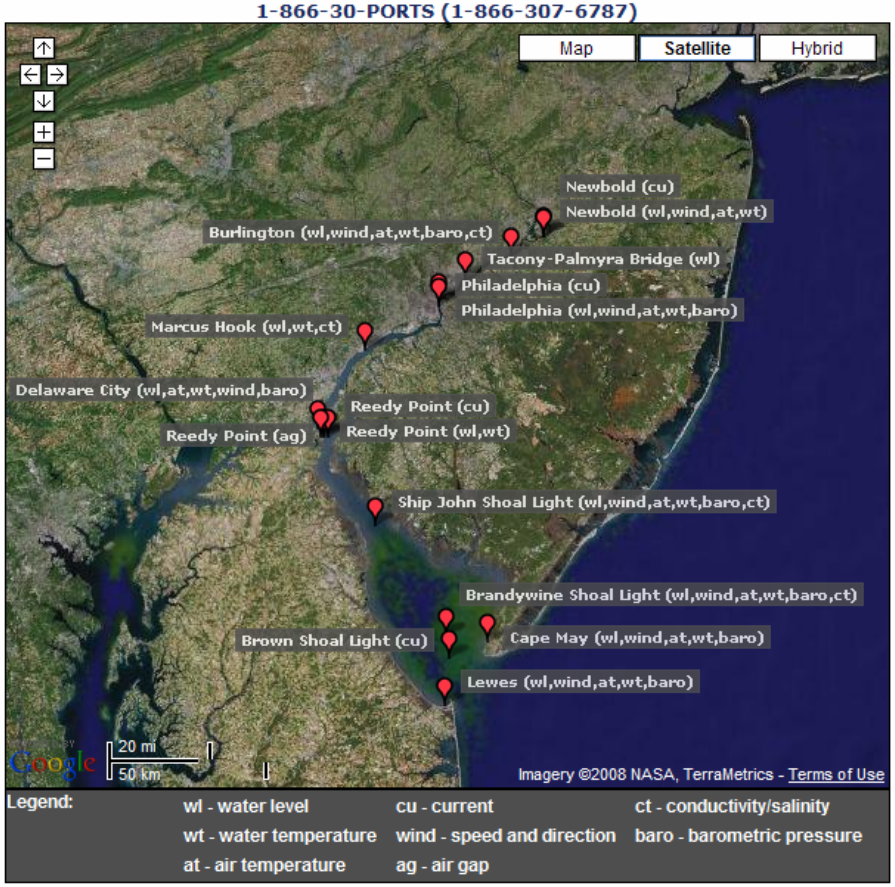
- Should set a monitoring priority level (and rationale) for every parameter for which we have criteria;

- Lack continuous WQ monitors in Zones 1A, 1B, 1C, 1D, 2, and 6;
  - DO, pH, Temperature, Conductivity (typical)
  - Over 220 miles of river not adequately assessed;
  - Most seriously hampers our ability to assess DO (our most basic and important parameter);
- Good news – some infrastructure is already there →

Potential existing infrastructure for continuous monitors

Delaware River and Bay PORTS®

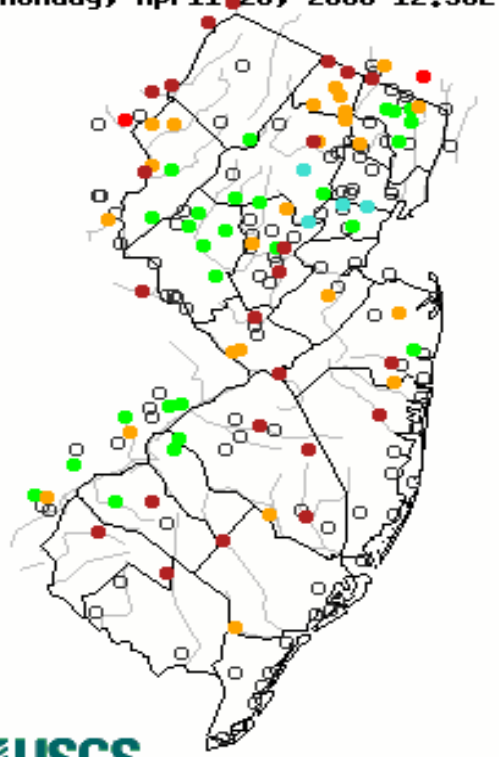
Click HERE for text-based PORTS® Screen
Voice data response system:
1-866-30-PORTS (1-866-307-6787)



Daily Streamflow Conditions

Select a site to retrieve data and station information.

Monday, April 28, 2008 12:30ET



USGS

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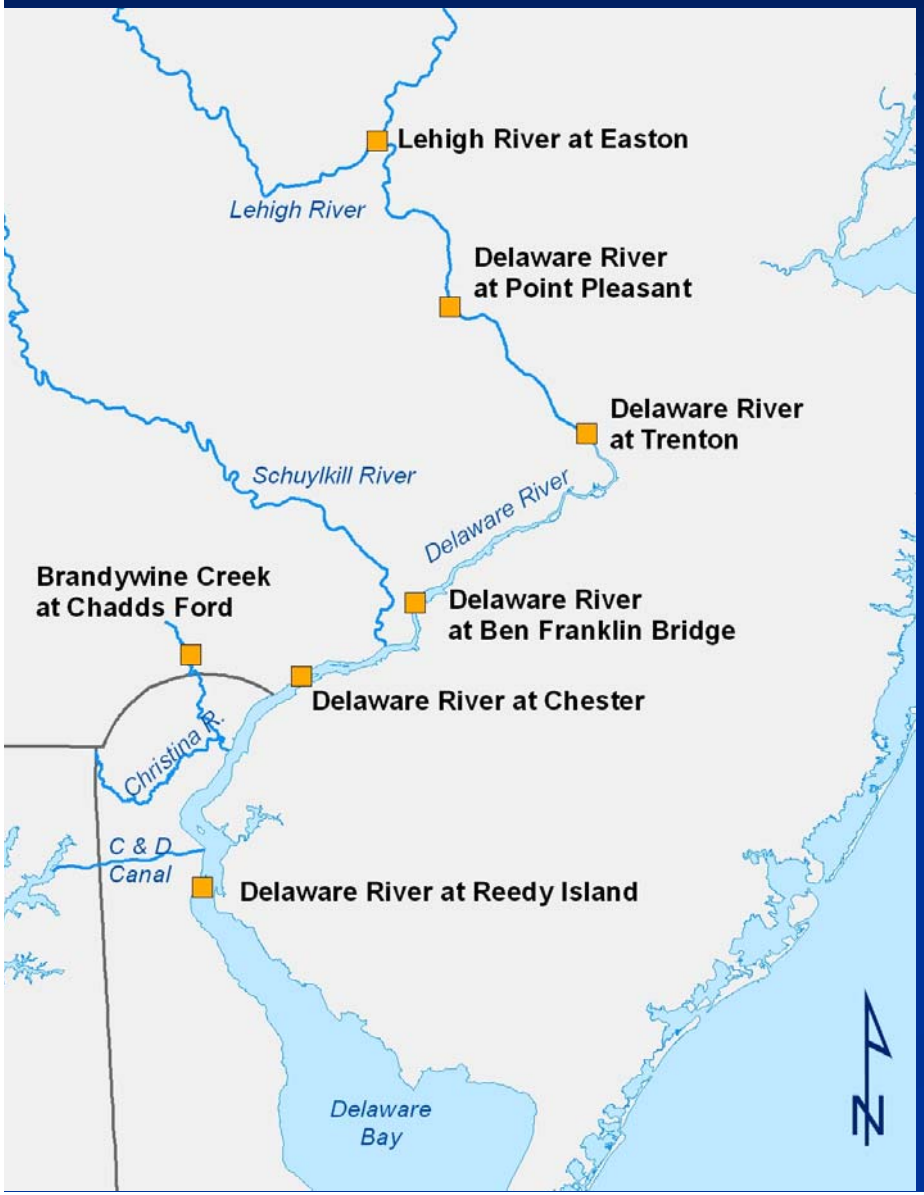
2. An Automated Water Quality e-mail Notification System



- DRBC developed an automated application that performs the following *daily* tasks:
  - Retrieves real time water quality observations from 7 USGS monitoring stations (VBA program);
  - Compares observations to WQ criteria;
  - Generates and sends e-mail to a list server if observations are outside criteria;
- Operational since August 2006

Automated Water Quality Watch Notification

Station	DO Instantaneous	DO 24-hr average	Temperature	pH (min and max)	Turbidity	Salinity
Delaware River at Trenton, NJ 01463500	✓	✓	✓	✓	✓	
Delaware River at Pt. Pleasant, PA 01460200	✓	✓	✓	✓	✓	
Delaware River at Ben Franklin Bridge 01467200		✓	✓	✓	✓	
Delaware River at Chester, PA 01477050		✓	✓	✓	✓	
Delaware River at Reedy Island Jetty 01482800		✓	✓	✓	✓	
Lehigh River at Easton, PA 01454720						
Brandywine at Chadds Ford, PA 01481000	✓	✓		✓	✓	

- **DRBC developed an automated application that performs the following *daily* tasks:**
  - Retrieves real time water quality observations from 7 USGS monitoring stations;
  - Compares observations to WQ criteria;
  - Generates and sends e-mail to a list server if observations are outside criteria;

Sample e-mail

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Subject: [DRBC_WQ_Watch] pH Water Qual. Notice, Delaware River at Trenton, NJ , 5/5/2008 5:00:10 AM
From: John Yagecic <John.Yagecic@drbc.state.nj.us>
Sender: DRBC_WQ_Watch@yahoogroups.com
Reply-To: DRBC_WQ_Watch@yahoogroups.com
Date: 5/5/2008 5:00 AM
To: DRBC_WQ_Watch@yahoogroups.com

Visit Your Group

5/5/2008 5:00:10 AM Delaware River
This is a report generated from an automated daily scan of
real time USGS water quality monitors.

PROVISIONAL Observations indicate that the Delaware River at Trenton, NJ

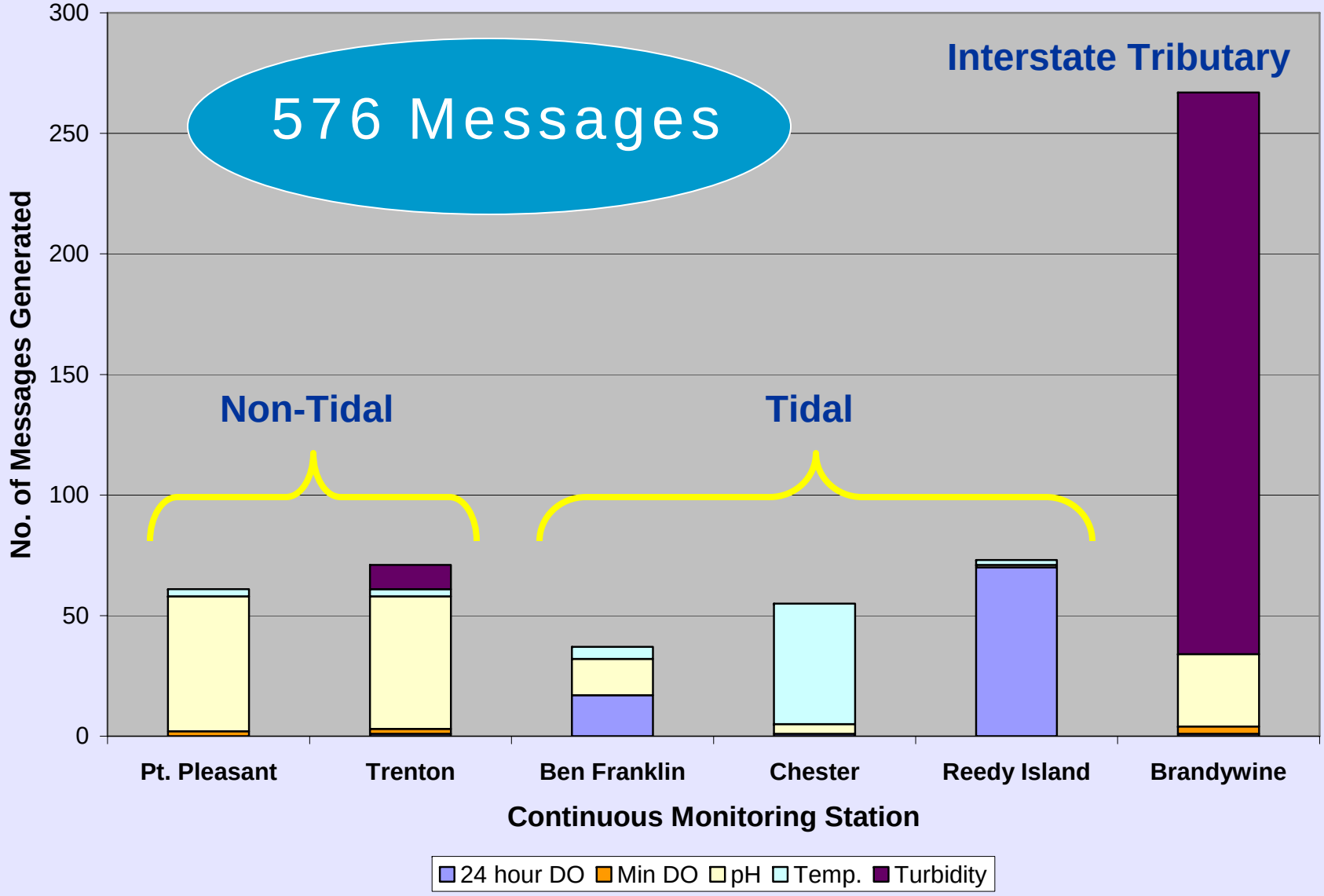
was outside DRBC's criteria for pH not higher than 8.5
including the following dates, and times:

Gage	Date and Time	Measurement
Trenton	05/04/08 04:00 PM	8.6
Trenton	05/04/08 06:00 PM	8.7
Trenton	05/04/08 07:00 PM	8.7
Trenton	05/04/08 08:00 PM	8.7
Trenton	05/04/08 09:00 PM	8.6

For more information, visit the USGS web page at
http://waterdata.usgs.gov/nwis/current/?type=quality
WARNING: This message is based on PROVISIONAL unconfirmed
observations.
Values outside criteria do not necessarily indicate a violation of water
quality standards.
This service is subject to periodic outages and interruptions beyond DRBC
control.
Please do not rely solely on this e-mail alert for water quality information.
Please do not respond to this e-mail. For questions about the e-mail Contact
John.Yagecic@drbc.state.nj.us or
DRBC, 609-883-9500, or visit the DRBC web site at www.drbc.net

Messages Generated

August 29, 2006 to May 14, 2008



Benefits of this system

- Fast notification of apparent WQ standard violations;
- Faster recognition & repair of monitor malfunctions;
- Seeing in real time the linkages in parameters (i.e. pH violations upstream one week – DO violations downstream the following week);
- Fewer surprises at Integrated Assessment time;
- Increase visibility and value of continuous monitors to management and funders;
- Better communication among states and other agencies in interstate waters.

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Questions?

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