DRBC Nutrient Criteria Approach-Delaware Estuary

NJWMCC Meeting

April 20, 2006

Edward D. Santoro M.S.

Monitoring Coordinator

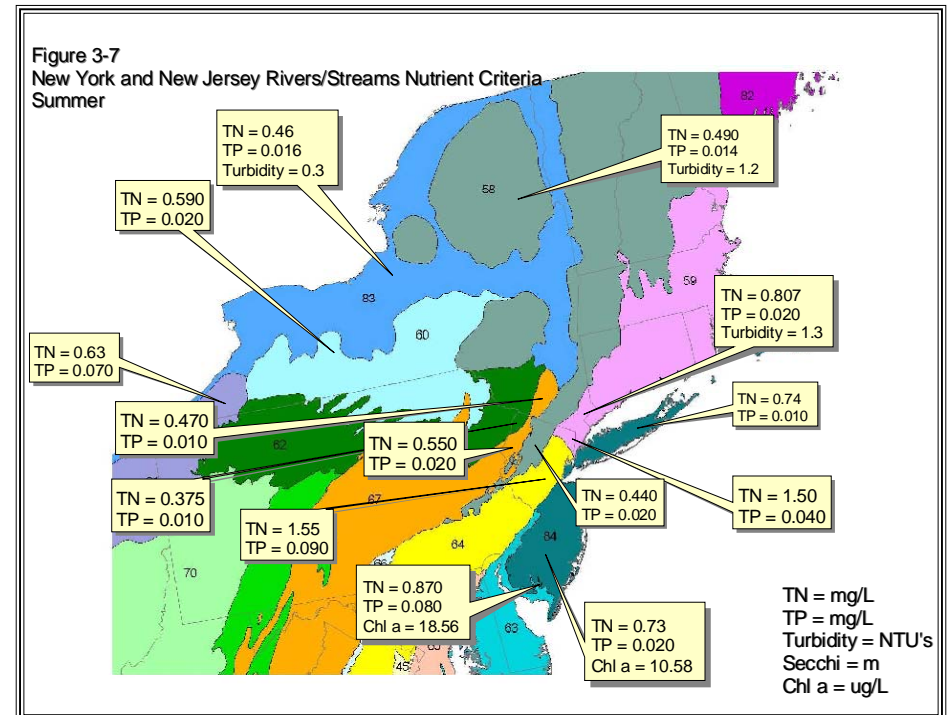**Delaware River Basin Commission**

DELAWARE · NEW JERSEY

PENNSYLVANIA · NEW YORK

UNITED STATES OF AMERICA

Overview of Presentation

- EPA Guidance
- Basin States Nutrient Development
- Data Characterization-Estuary
- DRBC Data
- Findings & Assessment
- Proposal to Establish Nutrient Thresholds
- Issues/Next Steps
- % Values

USEPA Guidance

- **EPA guidance allows for states and interstates to set up nutrient criteria at the 75th percentile in reference areas.**

- **EPA recommends states adopt criteria for Total Nitrogen, Total Phosphate, Chlorophyll-*a* & water clarity.**

- **The current EPA guidance allows for the setting of optional criteria based upon extensive monitoring data.**

Figure 3-7
New York and New Jersey Rivers/Streams Nutrient Criteria
Summer

TN = 0.46
TP = 0.016
Turbidity = 0.3

TN = 0.490
TP = 0.014
Turbidity = 1.2

TN = 0.590
TP = 0.020

TN = 0.807
TP = 0.020
Turbidity = 1.3

TN = 0.63
TP = 0.070

TN = 0.74
TP = 0.010

TN = 0.470
TP = 0.010

TN = 0.550
TP = 0.020

TN = 0.375
TP = 0.010

TN = 0.440
TP = 0.020

TN = 1.50
TP = 0.040

TN = 1.55
TP = 0.090

TN = 0.870
TP = 0.080
Chl a = 18.56

TN = 0.73
TP = 0.020
Chl a = 10.58

TN = mg/L
TP = mg/L
Turbidity = NTU's
Secchi = m
Chl a = ug/L

Basin States Nutrient Development

New Jersey:

NJ has Nitrate criteria for the protection of drinking water (10 mg/l) in their FW2 waters as well as total Phosphorus of 0.1 mg/l in their FW2 waters, unless it can be shown that total P is not a limiting nutrient and that a higher level would not cause nutrient pollution.

Delaware:

there are no numeric nutrient criteria for the streams in the Delaware River Basin, only for inland bays. They do have "targets" of 0.05 mg/l total Phosphorus and 1 mg/l total Nitrogen and TMDL "goals" of maximum 0.2 mg/l total P and 3 mg/l total N for protecting DO. Delaware plans to convene a Nutrients Criteria committee to update nutrient criteria in the near future.

Pennsylvania:

Is in the process of developing nutrient criteria and plans to have them by 2007. PA has default values for N and P for their High Quality and Exceptional Value waters but uses specific data when possible.

When a permit application is received, PADEP uses reference stream data (there are about 10 reference sites in the DRB for EV/HQ streams) such that the most appropriate reference stream is used to infer existing water quality at the proposed discharge site. There are no numeric nutrient criteria at a large scale throughout the state.

New York:

NY State currently has narrative criteria. NYS has received EPA concurrence on a Nutrient Standards Plan, These include some site-specific phosphorus criteria for impounded waters. The state will be developing numerical criteria as a follow-up to the nutrient standards plan.

Data Characterization-Estuary

•Data from our boat run program that has been collected over the period 1990 – 2005 (approximately 9,000 data points) and provides the following:

• Develops criteria which is realistic based upon our understanding of the Delaware River Basin.

•Develops criteria which can be evaluated for change and provides for an assessment of aquatic impact.

•Provide criteria which states can use to identify problem tributaries which contain nutrient level over the proposed levels.

Data Characterization continued

- Surface water samples are collected 12 times / yr from March through November.
- Samples are collected from below Trenton , N.J. to The Cape May – Lewes transect.
- Over the period the same methods were used by the Field/Lab personnel. Parameters have included: TKN, nitrate, nitrite & ammonia nitrogen and total phosphorus
- The flushing time for a water mass is typically 90 – 120 days.

DRBC Data

- **Zones 2 through 6 of the Delaware River Estuary have been designated by the DRBC as the section of the mainstem of the Delaware River and the tidal portions of the tributaries between the entrance of Delaware Bay (River mile 0.0) and the head of tide at Trenton, NJ. (River Mile 133.4).**

- **A well documented (recovering) dissolved oxygen sag occurred in portions of the estuary below Trenton and Philadelphia in 1960 through the 1980's.**
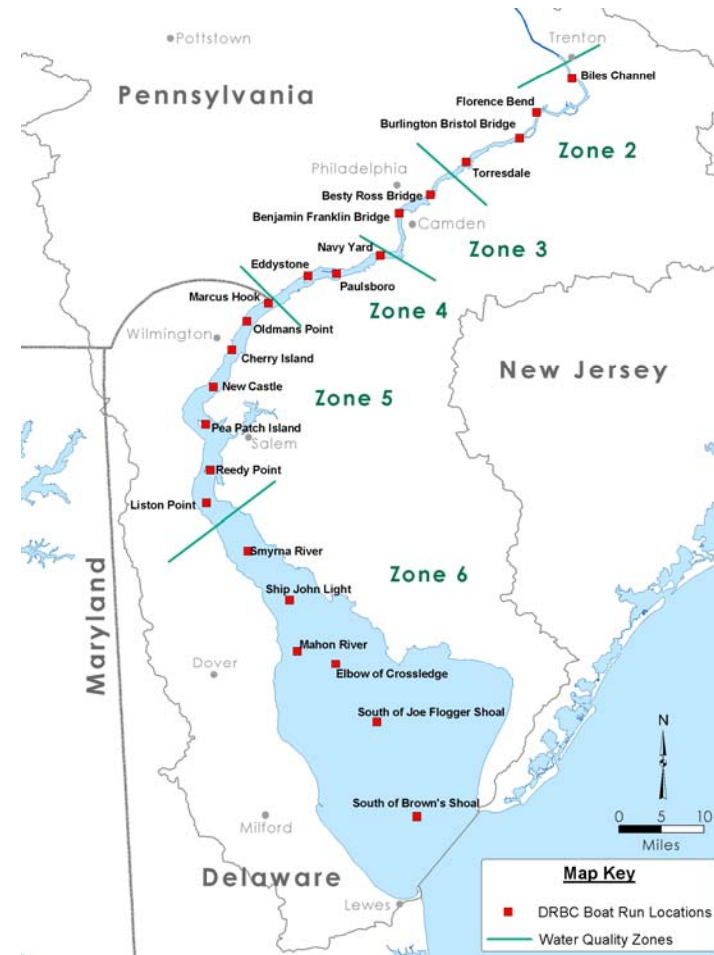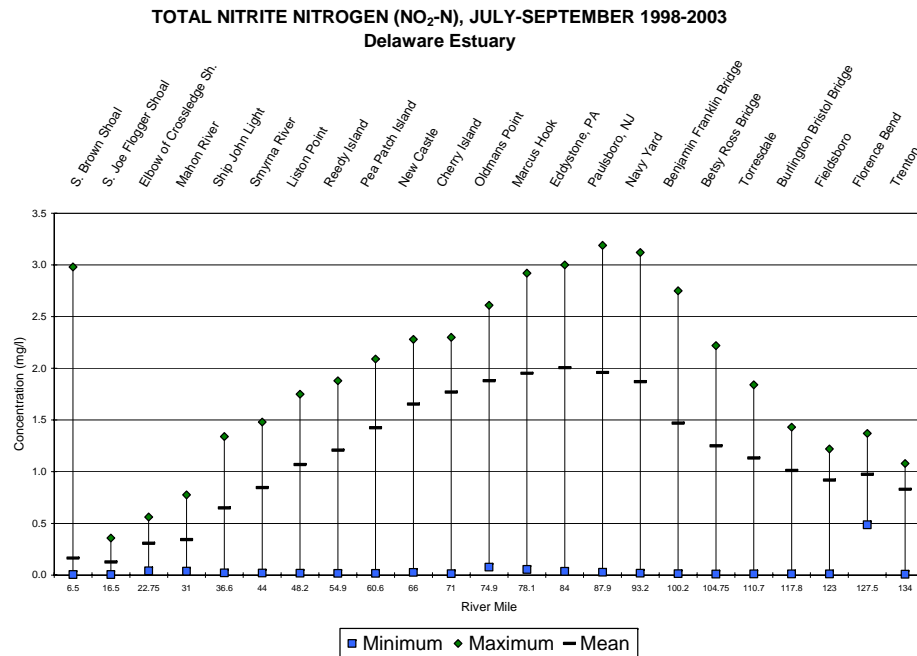
Summer Dissolved Oxygen
Throughout Delaware Estuary
(July - September)

Findings & Assessment

TOTAL NITRITE NITROGEN (NO$_2$-N), JULY-SEPTEMBER 1998-2003
Delaware Estuary
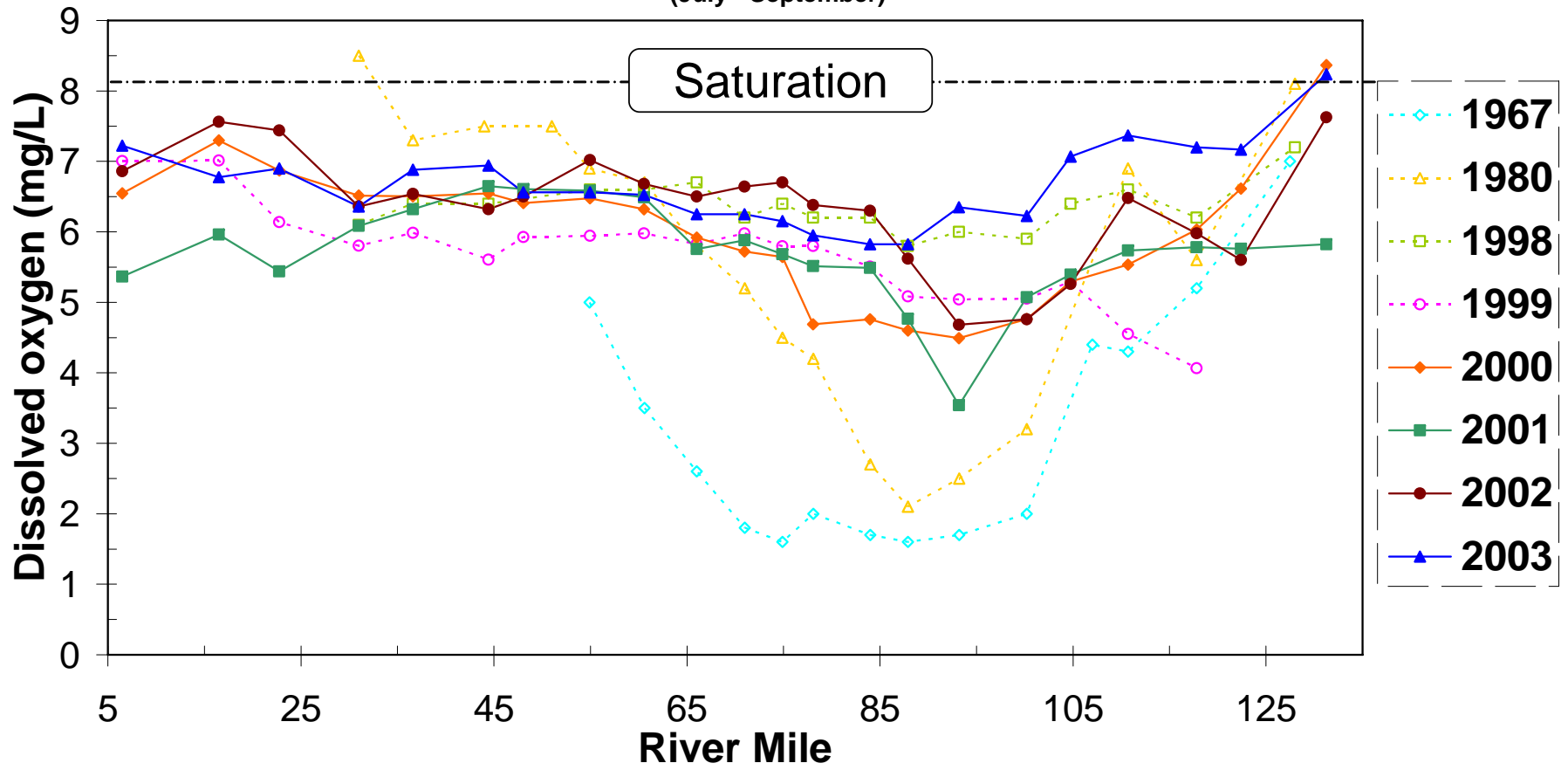
Source: DRBC Boat Run Program

- **Historically the Delaware river and Bay have not experienced the typical signs of eutrophication ie; fish kills, algal blooms, water discoloration or other.**

- **The conditions of the waters of the Delaware Estuary continue to improve. The nutrient levels, while high do not appear to manifest aquatic impacts and are effectively utilized by resources downstream.**

- **It would therefore appear that the assignment of a level encompassed by the 75th percentile of ambient data would be arbitrarily restrictive and may not be achievable.**

- **The DRBC is moving towards using the 95% of ambient data as a nutrient threshold limit.**

- **This level has met with approval by the EPA Region II RTAG.**

Next Steps

- **Eutrophication is a potential problem, but the regulatory effect levels are undefined.**

- **Several tributaries contribute much more than expected background levels of nutrients to the river.**

- **The use of a threshold approach to evaluate nutrient effects in the estuary is a prudent way to establish whether nutrient concentrations are changing.**

- **DRBC has initiated studies to define nutrient impact thresholds:**
    1. **Periphyton biomonitoring & criteria (2005-)**
    2. **Algal stimulation studies (2006-)**

- **Identify and reduce major nutrient sources in tributary watersheds with state interaction (ongoing)**

- **We are moving towards the use of 95% levels as a threshold/criteria in the Delaware Estuary.**

Percentile Values for Nutrient Data by DRBC Zone for the Delaware Estuary.

Total Nitrogen (N) (mg/L)

Zone	# of Samples	95%	75%	50%	25%
2	294	1.91	1.60	1.31	1.10
3	238	2.60	1.91	1.60	1.30
4	383	3.52	2.70	2.20	1.80
5	837	3.17	2.60	2.20	1.81
6	509	2.55	1.80	1.41	1.11

Total   2261

Total Phosphorus (mg/L)

Zone	# of Samples	95%	75%	50%	25%
2	441	0.19	0.13	0.09	0.06
3	402	0.16	0.09	0.06	0.03
4	597	0.23	0.16	0.12	0.09
5	1279	0.26	0.16	0.13	0.10
6	755	0.27	0.14	0.11	0.08

Total   3474

Chlorophyll-A (mg/L)

Zone	# of Samples	95%	75%	50%	25%
2	280	27.86	10.94	4.13	1.87
3	230	25.31	12.87	4.39	1.86
4	437	31.82	14.94	7.32	2.55
5	768	19.72	9.85	4.23	1.79
6	538	40.95	14.78	6.72	2.51

Total   2253

Water Clarity   (FTU)

ZONE	N	95%	75%	0.50%	0.25%
Zone 2	446	12.17	5.29	3.10	1.69
Zone 3	403	11.28	5.39	3.46	2.09
Zone 4	620	19.54	9.96	5.73	3.21
Zone 5	1327	49.61	24.57	15.69	9.44
Zone 6	764	31.96	14.53	8.56	5.42

Total   3560

Edward.Santoro @drbc.state.nj.us
(609)883-9500 ext.268

Questions?