



NJ Water Monitoring Council

Measuring What Counts for Clean & Plentiful Water

September 25, 2013
MEETING MINUTES

Member Attendees

NJDEP – *WM&S*: Leslie McGeorge, Alena Baldwin-Brown, Bruce Friedman, Debra Hammond, Helen Pang, Vic Poretti, Bob Schuster *NJGWS* – Karl Muessig, Ray Bousenberry *OS* – Gary Buchanan, Judy Louis, Nick Procopio *DWQ* – Marco Alebus
NJDHSS – Doug Haltmeier
USGS – Bob Reiser, Jack Gibs, Pam Reilly
DRBC – Bob Tudor, Tom Fikslin
EPA R2 – John Kushwara, Paula Zevin
IEC – Caitlyn Nichols
NJ Pinelands Commission – Sarah Smith
NJ Water Supply Authority – Heather Desko
Rutgers (Coop Extension Service) – Lisa Galloway Evrard
Rutgers (IMCS) –
Montclair University – Meiyin Wu
Monmouth University/Urban Coast Institute – Jim Nickels
Meadowlands Environmental Research Institute –
NOAA –
Monmouth County Health Dept –
Barnegat Bay Partnership – Stan Hales
Stony Brook-Millstone Watershed Association – Erin McCollum Stretz
Musconetcong Watershed Association – Nancy Lawler
NJ Harbor Dischargers – Ashley Slagle
Brick Township MUA –

Guest Speakers/Discussion Leaders

Michele Siekerka – NJDEP – Acting Deputy Commissioner
Tom Belton – NJDEP/OS
Brian Henning – NJDEP/WM&S
Ward Hickman – USGS NJWSC
Paul Morton - NJDEP/WM&S
Erik Silldorff - DRBC
Tom Suro - USGS NJWSC
Brian Taylor – NJDEP/WM&S
Izabela Wojtenko - EPA Region 2

Guests

Kassandra Archer – Passaic River Institute/Montclair Univ.
Art Baehr – Richard Stockton College
Kevin Berry – NJDEP/WM&S
Dean Bryson – NJDEP/WM&S
Jamie Ewalt Grey – NJDEP/WRM
Angela Gorczyca – Raritan Headwaters Association
Biswarup Guha – NJDEP/WM&S

Al Korndoerfer – NJDEP (retired), Past Council Steering Committee member
Chris Kunz - NJDEP/WM&S
Jill Lipoti - NJDEP/WM&S
Rick Kropp - USGS NJWSC, Past Council Co-chair
Jeff Reading – NJDEP/WM&S
Paul Schorr – NJDEP/DWS&G
Eric Vowinkel – USGS NJWSC (retired), Past Council Co-chair

- **Council Business** (Copies of the agenda, minutes and many of the information updates and presentations will be available on the Council’s webpage, under “Meeting Information” - <http://www.state.nj.us/dep/wms/wmccmeetinginfo.html>)
- Minutes from the 05/22/13 Council meeting were approved.
- Next NJWMC meeting is scheduled for January 29, 2014 (snow date: February 5) at DRBC
- Technical Theme for the January 2014 meeting will be Continuous Monitoring. Council members interested in giving presentations during this session should contact Leslie McGeorge, Bob Reiser or Alena Baldwin-Brown.
- Information Updates, Presentations and Announcements:
 1. 10th Anniversary – September 2013 was the 10th Anniversary of the Council’s formation. DEP Acting Deputy Commissioner Michele Siekerka contributed to the Council’s commemoration of this significant event in which its accomplishments over the last 10 years were recognized. Former USGS Co-chairs, Rick Kropp and Eric Vowinkel, as well as retired Steering Committee member Al Korndoerfer also participated in the meeting and the anniversary celebration, which included remarks from current Council Co-chairs and members, a photo collage of Council members and activities over the last 10 years, and a photo of the current Council. Approximately 12 current members were founding members of the Council.
 2. Member Updates – The Council recognized the retirements of Debra Hammond and Jill Lipoti and acknowledged the substantial contributions of both with Certificates of Appreciation.
 3. Information Update – Leslie McGeorge provided updates from the National Water Quality Monitoring Council (NWQMC) and the Association of Clean Water Administrators (ACWA). Leslie is a member of the National Council, and now represents NJ and EPA Region 2 states/territories on the ACWA Board.

NWQMC - information on Indiana’s Water Monitoring Council, the National Environmental Methods Index (NEMI) update, Water Quality Portal Enhancements, the status of biological data in EPA’s STORET system, USGS’ new BioData System, and the 2014 National Water Monitoring Conference was presented.

 - The Indiana Monitoring Council, a 5-year old organization, has several products/projects that the NJWMC might wish to consider exploring, including an electronic member directory, a comprehensive water monitoring inventory (beyond continuous monitoring) and a water monitoring network optimization project. The Indiana Council’s website is: www.inwmc.org.
 - A new version of NEMI has been launched and can be found at: <https://www.nemi.gov/home>. This version of NEMI includes statistical methods. Use of NEMI to search for information on methods or to suggest addition of methods is encouraged.
 - The Water Quality Portal (www.waterqualitydata.us), a product of NWQMC, USGS and EPA, now has several enhancements including: faster retrievals, maps displays (now by HUC 8 and can select sites & parameters to map), and forthcoming QA/QC checks. Further enhancements are planned and needs and ideas encouraged.
 - As of August 2013, 11 states were submitting biological data (results, metrics and/or index) to STORET. EPA’s next steps will be to review the way biological data is being entered for consistency, encourage additional entries, and to work with the Portal Team to add biological data output to the portal in the future.
 - USGS’ BioData (<http://aquatic.biodata.usgs.gov>) database currently houses >2700 fish community samples, >7600 invertebrate samples and <8950 algae samples from over 2000 sites nationwide. No resources are currently available to map these data to the Water Quality Portal.

- Four (4) NJWMC members/member organizations (NJDEP, USGS, Barnegat Bay Partnership and DRBC) submitted abstracts for the 2014 National Water Monitoring Conference (April 28-May 2, Cincinnati).

ACWA – information from the “Monitoring Program Adaptations” session at the Annual ACWA Meeting in August, 2013 was presented re: a State-EPA discussion on many, competing needs for water monitoring, including support to evaluate new criteria. A water monitoring fact sheet was developed for ACWA Water Resource Managers which includes: core role of monitoring in water resource management, various monitoring objectives, key monitoring questions, water programs dependent on monitoring, state long term monitoring strategies, funding sources for monitoring, and the role of water monitoring councils such as the NJ Council. The fact sheet is available online at http://acwi.gov/monitoring/ppt/telecon_087-2013/P17.ACWA_Monitoring_Program_Adapations_Session_Handout_080213.pdf and was also distributed at the NJWMC meeting.

3. **Announcements** – 1. Bob Reiser summarized a recently-released USGS NAWQA report on the ecological health of US streams. This study was a comprehensive assessment of biological communities integrated with key chemical and physical properties. Additional information about the study can be found at: <http://water.usgs.gov/nawqa/ecology/pubs/cir-1391/index.html>. Darren Carlisle (USGS VA) is expected to provide a more in-depth presentation on this study at the January 2014 meeting. 2. Pam Reilly briefly summarized the completed cooperative USGS-NJDEP project to develop a hydrologically-based TMDL approach to address aquatic life impairment associated with hydrologic alteration of NJ’s streams. The project’s final report is available at: <http://pubs.usgs.gov/sir/2013/5089/>. She also conveyed that Jonathon Kennon will give a more in-depth presentation on the project at the January 2014 meeting. 3. Paul Morton distributed a draft update to the NJ Continuous Monitoring Inventory spreadsheet. This update includes new long term information from the NOAA PORTS system and the Pequannock River Coalition, as well as short term deployments from both the Passaic Valley Sewerage Commission, as well as DEP’s Bureau of Freshwater & Biological Monitoring. Caitlyn Nichols offered to assist in getting HRECOS/NYHOPS information into the inventory. Council members were asked to review the spreadsheet and provide modifications to existing information or new information to either Paul or Alena. 4. Debra Hammond provided information regarding EPA’s Ammonia Criteria for aquatic life which was published on August 22. The criteria added new toxicity information on freshwater mussels and snails, no longer recommends different criteria based on presence/absence of mussels, is expressed as Total Ammonia Nitrogen, and is dependent on pH and temperature. Additional information is available at: <http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/ammonia>. 5. Caitlyn Nichols announced that the IEC has moved its offices, that its new Director is Bill Shadel, and that the IEC is now part of NEIWPC (New England Interstate Water Pollution Control Commission). 6. Bob Tudor announced that Dr. Ruth Patrick, of the Academy of Natural Sciences, had passed away recently at the age of 105. Much praise for Dr. Patrick’s lifelong work was shared among Council members.

4. **Private Well Testing Act and Data Summary** – Nick Procopio provided an update on the data communication efforts, related to the Private Well Testing Act (PWTA), that have been ongoing in the NJDEP Office of Science. Nick reviewed the history of the PWTA, which is now 10 years old, and explained that the Piedmont Region and Salem/Cumberland Counties were chosen for more focused study as a result of the levels of Arsenic (As) and Nitrate (NO₃) that were found in wells in those regions. Suspected sources of As included: historical arsenical pesticides as well as natural sources such as pyrite-rich formations, hematite, glauconite and clays. Suspected sources of NO₃ included: residential and agricultural runoff, septic systems, and atmospheric deposition. Proposed next steps may include expanding the radiologic sampling to all northern NJ counties, initiating gross alpha testing statewide, and performing uranium testing in all counties within and north of the Piedmont region of the state. Additional information on the PWTA is available online at: <http://www.state.nj.us/dep/pwta>.

5. **Comprehensive Water Resource Management** – DEP Acting Deputy Commissioner Michele Siekerka presented an overview of DEP’s new Comprehensive Water Resource Management (CWRM) effort. CWRM’s approach is to use existing tools, data and information in an integrated

fashion to prioritize work and resources in areas and/or watersheds within the state. Within DEP, it's designed to bring all relevant programs together to address problems/issues in a comprehensive manner. It also relies on external partnerships (including the NJWMC) to fill data/information gaps as well as to assist in advancing solutions to various water resource issues. The goal is to focus this process for priority areas of the state. Currently, several DEP efforts are already operating under this CWRM umbrella (including the Barnegat Bay 10 point plan) and a few additional areas for focused attention are now being identified.

➤ **Session – Monitoring for Nutrients and their Impacts**

A. *Nutrients Overview: Criteria, Monitoring & Progress* - Debra Hammond (DEP/WM&S)

Debra Hammond provided a nutrient overview including sources of nutrient pollution, evolution of NJ's nutrient criteria progress towards numeric nutrient criteria across the states, and a summary of NJ's Criteria Enhancement Plan (which includes water monitoring needs). Debra also shared information on current freshwater nutrient assessment, including an example of applications of narrative nutrient criteria related to aquatic life impairment determination. In addition, she discussed progress made to date to reduce the levels of nutrients in our streams through regulatory actions, such as NJPDES permitting and Total Maximum Daily Loads, and described the nutrient concentrations and trends at stream monitoring locations throughout the state. Most stations had no temporal trend or a decreasing trend in the level of phosphorus in streams.

B. *Evolution of a National Approach to Nutrient Criteria and Assessment* - Izabela Wojtenko (EPA R2)

Izabela Wojtenko shared information related to EPA's priority focus on nutrients, including the development and adoption of numeric nutrient criteria (for TP and TN) by states. She also shared various tools that EPA has in place to assist states with nutrient criteria development including: technical support (guidance documents, N-STEPS or Nutrient-Scientific Technical Exchange Partnership & Support); information and training (webcasts, fact sheets); State Development of Numeric Criteria for N and P Pollution website: <http://cfpub.epa.gov/wqsits/nnc-development>; and a toolkit with resources for criteria & standards development, water quality monitoring/assessment/reporting/planning, permitting & trading, economics & financing, as well as communications materials (<http://www2.epa.gov/nutrient-policy-data/toolkit-resources-provide-states-flexibility-adopting-and-implementing-numeric>). In addition, EPA HQ's Nutrient Criteria Roadshow (which will be combined with an EPA Region 2 RTAG meeting) is coming to Region 2 in late Winter-early Spring 2014.

C. *NJ's Nutrient Monitoring Networks: Marine & Freshwater* – Bob Schuster & Vic Poretti (DEP/WM&S)

Bob Schuster and Vic Poretti provided overviews of NJ's current marine and freshwater nutrient monitoring networks. Bob Schuster explained the monitoring (including nutrients) that is and has been done along NJ's coast. Forty (40) stations are sampled monthly. Parameters measured include: Nitrate + Nitrite, ammonia, total nitrogen, phosphate, total organic carbon, total phosphorus (only from 1998-2012), chlorophyll a (1998-2012), biogenic silica, as well as temperature, salinity, dissolved oxygen, total suspended solids, turbidity, pH and secchi depth. Vic Poretti detailed NJ's current freshwater monitoring for nutrients in its rivers and streams as well as lakes. In rivers and streams, 196 sites, statewide, are monitored quarterly. Nutrient-related parameters include: dissolved ammonia, dissolved nitrite + nitrate, phosphorus (total & dissolved), and total Kjeldahl nitrogen. NJ's probabilistic monitoring lakes network consists of 200 randomly selected sites statewide, 40 of which are sampled/year. Parameters monitored include: ammonia, nitrite + nitrate, total phosphorus total Kjeldahl nitrogen, chlorophyll a as well as a trophic assessment. Data are available via EPA's STORET (www.epa.gov/storet) and USGS' NWIS (<http://nwis.waterdata.usgs.gov/usa/nwis/>) (USGS cooperative stream data only) databases, the National Water Quality Portal (www.waterqualitydata.us/) and the WM&S Bureau of Freshwater & Biological Monitoring's website (www.state.nj.us/dep/wms/bfbm).

D. *Nutrients Trends in the Northeast and NJ's Cooperative Network* – Brian Henning (DEP/WM&S) and Ward Hickman (USGS NJWSC)

Brian Henning introduced both the long-term, stream water quality trends project that USGS is working on with DEP, using information from the NJ Cooperative Network (which is conducted by

both NJDEP /BFBM and USGS NJWSC), as well as the nutrient-specific trends work at 24 stations from this network. Nutrient data from this Cooperative Network are used in both NJ's Integrated Water Quality Monitoring and Assessment Report as well as for environmental trends reports found on NJDEP's Environmental Trends website (<http://www.state.nj.us/dep/dsr/trends/>).

Ward Hickman provided a brief summary of two USGS reports that contain information on water quality trends in NJ streams – 1) Trends in the Quality of Water in New Jersey Streams, Water Years 1998–2007 (<http://pubs.usgs.gov/sir/2010/5088>) and 2) Nutrient Concentrations and Loads in the Northeastern United States—Status and Trends, 1975–2003 (<http://pubs.usgs.gov/sir/2011/5114>). The first study, which was funded in part by NJDEP, looked at water quality trends at 69 Cooperative Network stations and the Delaware River. Parameters measured included dissolved oxygen (year-round and growing season only), total dissolved solids (TDS), total phosphorus, total organic nitrogen + ammonia, and dissolved nitrate + nitrite. Results for this study period showed that dissolved oxygen (growing season) increased at 4 stations and decreased at 4 stations, TDS increased at 24 stations but did not decrease at any station, total phosphorus decreased at 12 stations and increased at 5 stations, total organic nitrogen + ammonia increased at 9 stations and decreased at 6 stations, and dissolved nitrate + nitrite decreased at 4 stations and increased at 19 stations. The second study focused on streams draining to the Atlantic Ocean from Maine to Virginia. Study objectives included determining trends in nitrogen and phosphorus between 1975-2003; comparing water quality to criteria; determining annual loads and trends in loads; and (in 4 basins) comparing in-stream loads to point source loads. Results from 10 stations in NJ for the period, 1975-2003, show total phosphorus decreased at 5 stations and did not increase at any stations while total nitrogen decreased at 3 stations and increased at 1 station.

E. Using Nutrient & Nutrient Response Sensors: Data Processing, Accuracy, QA & Costs – Jack Gibs (USGS NJWSC)

Jack Gibs shared the advantages and disadvantages of using various technologies for in-situ measurement of nutrients including ultraviolet nitrate sensors, wet-chemical nutrient sensors, and ion selective electrodes. Direct UV-visual spectroscopy can produce high quality data but its acquisition cost is high. Wet chemistry can produce high quality data for continuous monitoring but it's expensive to operate and maintenance intensive. Ion selective electrodes are useful for punctuated data but not continuous monitoring. Jack also provided examples of two UV nitrate sensors – Toms River at Toms River and Passaic River at Two Bridges – and offered to take any interested Council members for an on-site visit for either /both. Potential new capabilities for these sensors, including the ability to monitor in-stream processes as well as building real-time relationships among multiple monitored parameters were also explained.

F. Evaluating Nutrient and BOD Effects within the Delaware Estuary – Erik Silldorff (DRBC)
Erik Silldorff summarized how DRBC has been evaluating nutrient and BOD effects within the Delaware Estuary. Historically, substantial progress has been made on dissolved oxygen while there have been some improvements in nutrients (however, the Delaware Estuary has seen a substantial increase in nutrient concentrations/loadings relative to the Chesapeake Bay). Short term monitoring, related to nutrients, for point sources is the highest priority. As such a 2 year effort was undertaken monitoring 78 facilities in the Delaware Estuary for nutrients. Preliminary results indicated that ammonia varies widely among facilities and ammonia can be up to 90% of total nitrogen that is discharged. DRBC's draft Nutrient Criteria Plan was released in 2013 and places a dual emphasis on dissolved oxygen (upgrading uses and associated criteria to the highest level possible and ameliorating the DO sag) and nutrient criteria development (lack of most severe symptoms and evaluation of a broader suite of endpoints for evaluating nutrient effects). Interim measures include updating the non-point and quantifying the point source nutrient loads. There is also a need to do Estuary-wide eutrophication modeling to determine the best approaches.

G. NJ's Ambient Ground Water Quality Network: Preliminary Nitrite + Nitrate Trends – Ray Bousenberry (NJDEP/DWSG)

Ray Bousenberry provided an overview of some preliminary nitrite + nitrate trends from NJ's Ambient Ground Water Quality Monitoring Network. The network consists of 150 wells, statewide (60 in agricultural areas, 60 in urban areas and 30 in undeveloped areas). The network is further broken down into Coastal Plain (39 - Ag, 27 - urban, 19 - undeveloped) and Bedrock (21 - Ag, 33 - urban, 11 - undeveloped). The network is on a 5 year sampling cycle, with 30 wells sampled/year.

The 3rd sampling cycle for the network was completed in Summer 2013. Discussion of preliminary trend analysis was provided. Data from Cycles 1 and 2 as well as additional information on this network can be found online at: <http://www.nj.gov/dep/njgs/functions/index.htm>.

H. Assessing Nutrient Impacts in NJ Lakes – Brian Taylor (NJDEP/WM&S)

Brian Taylor discussed NJ's Ambient Lakes Monitoring Network, including an overview of the program, statewide nutrient results and relationships, nutrient results by Level III ecoregion, and the potential for additional analyses. Related to nutrients, the parameters monitored in the network are: total phosphorus, total Kjeldahl nitrogen, nitrite-nitrate nitrogen, ammonia nitrogen, and total nitrogen. Phosphorus is the only nutrient-related parameter that also has an applicable Surface Water Quality Standard (SWQS). As such, results indicate that 77% of seasonal total phosphorus (statewide) are below the SWQS, however higher values are likely seen in the early Fall due to lake turnover. On an EcoRegion level, higher total phosphorus levels are seen in both the Atlantic Coastal Pine Barrens and Northern Piedmont regions, high total nitrogen and total Kjeldahl nitrogen levels are seen in all ecoregions but the highest are, again, in the Atlantic Coastal Pine Barrens and Northern Piedmont regions. Potential additional analyses include: lake drainage area and drainage land use, lake volume and retention times, and how these relate to seasonal nutrient levels, as well as quantitative habitat surveys and aquatic vegetation surveys. Additional information about this network can be found online at: <http://www.nj.gov/dep/wms/bfbm/lakes.html>.

I. Algal Indicators: How Diatoms Can be Used to Inform Nutrient Response Monitoring & Criteria Development – Tom Belton (NJDEP/OS)

Tom Belton provided a summary of an approach, using a diatom biological condition gradient (BCG), to assist in nutrient response monitoring and development of nutrient criteria. Diatom total phosphorus and total nitrogen indices were used to develop impairment categories (good, fair, poor) which would establish BCG category boundaries that would identify nutrient criteria options. Results showed that the BCG approach is effective for developing nutrient criteria boundaries, diatom total phosphorus and total nitrogen indices can be used to assess site nutrient conditions within the BCG category boundaries, recommendations are currently being evaluated, and BCG rules are being developed. Several pilot studies are currently planned for 2013-2014.

- **Panel Discussion – Nutrient Monitoring Enhancements to Inform Comprehensive Water Resource Management** (see last page for Draft key gaps/potential enhancements mentioned during this discussion. These represent ideas from individual monitoring Council members.)
- **Action Items**
 - Review draft Continuous Monitoring Inventory and provide updates/new information to Paul Morton or Alena - *all Council members*
- **Technical Topics for Next Meeting**
Continuous Monitoring; NAWQA Report on Health of US Streams; Hydro TMDL Report
- **Next Meeting**
January 29, 2014 at DRBC (snow date: February 5)

Nutrient Monitoring Panel Discussion
Moderator: Bob Tudor

Key Gaps/ Potential Enhancements

General

- Consider setting long- term ecological goals and associated nutrient-related metrics

Monitoring

- Add stream & estuarine sediment monitoring for nutrients (TN & carbon)
- Consider focused & more frequent regional or local monitoring at sites/areas where problems are seen (e.g., areas that derive their potable water from private wells)
- More frequent/routine benthic sampling in marine/estuarine waters, lakes & non-wadable streams
- Add storm sampling for better load definition in priority areas
- Need reference or least disturbed sites (to understand the natural variability)
- Increase sampling frequency for both ground and estuarine waters (note: estuarine waters recently increased from quarterly to monthly). The National Subcommittee on Ground Water is recommending each monitoring well be sampled quarterly (4x a year), however this is very expensive and personnel intensive. Ideally ,sampling all 150 Ambient Ground Water Quality Monitoring Network wells annually would be ideal, but this is costly and personnel intensive. A possible scenario would be to reduce the sampling cycle from 5 years to 3 years (sampling 50 wells yearly versus 30 wells currently sampled). To do this there would need to be an increase in funding and dedicated personnel.
- Shallow vs. deep ground water information - In theory the relationship between the shallow aquifer and deep aquifers is understood. However this needs to be ground-truthed Statewide - either by areas of concern, land use, or geology. It is recommended that a deep aquifer network be installed along-side the shallow network. There are, however, extensive start-up costs, sampling costs, and lab fees that would be associated. In the Coastal Plain, where there are numerous shallow private wells for potable water, the shallow network may be of more importance, while in the northern portion of the State where the deeper portions of the aquifers are utilized for drinking water (private or public), a deeper network may be more of interest. Statewide, both are important to understand how certain compounds behave in the whole aquifer system.

Criteria

- Institute and continue key projects in the NJ Nutrient Criteria Enhancement Plan such as: Exploring ecoregional nutrient ranges, exploring stream stressor-response relationships, Continuing diatom collection and enhancement to TDI and BCG, evaluating natural variability in phosphorus.
- Investigate the development of combined criteria or potential seasonal criteria
- Evaluate appropriate Nitrogen values for aquatic effects

Research

- Develop relationships between multiple real time parameters (e.g., DO & nitrate)
- Examine existing nutrient species as well as other nutrient species (e.g., biogenic silica)
- Investigate Nitrogen-Phosphorus relationships with physical/chemical/biological endpoints

Permitting

- Enhance Total Phosphorus and Total Nitrogen monitoring requirements on point source facilities (particularly larger facilities)