NJ Water Monitoring Council

Measuring What Counts for Clean & Plentiful Water

January 29, 2014
MEETING MINUTES

Member Attendees
NJDEP – *WM&S*: Leslie McGeorge, Alena Baldwin-Brown, Helen Pang, Vic Poretti, Bob Schuster *NJGWS* – Karl Muessig *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
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 –
Monmouth University/Urban Coast Institute – Jim Nickels
Meadowlands Environmental Research Institute –
NOAA –
Monmouth County Health Dept –
Barnegat Bay Partnership –
Stony Brook-Millstone Watershed Association –
Musconetcong Watershed Association – Nancy Lawler
NJ Harbor Dischargers –
Brick Township MUA –

Guest Speakers/Discussion Leaders
Daren Carlisle – USGS Reston, VA (via webex)
Larry Feinson - USGS NJWSC
Don Hamilton – National Park Service
Jonathan Kennen – USGS NJWSC
Stefanie Kroll – ANSDU (via webex)
Chris Kunz - NJDEP/WM&S
Paul Morton - NJDEP/WM&S
Jessica Newbern - National Park Service
John Yagecic - DRBC

Guests
Dean Bryson – NJDEP/WM&S
Alex Dinkel - NJDEP/WM&S
Biswarup Guha – NJDEP/WM&S
Brian Henning - NJDEP/WM&S
Laura Kelm – Great Swamp Watershed Association
Frank Klapinski - NJDEP/WM&S
Thomas McKeon - NJDEP/WM&S
Jeff Reading – NJDEP/WM&S

John Vile - NJDEP/WM&S
Eric Vowinkel – USGS NJWSC (retired), Rutgers Environmental Engineering

- **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 09/25/13 Council meeting were approved.
- Next NJWMC meeting is scheduled for May 21 at USGS NJWSC
- Suggested Technical Themes for the May meeting are Ground Water and Mercury. Additional suggested presentations are: DOI Supplemental Sandy Funding Projects Update and The Nature Conservancy's EcoFlow Goals Project.

- Information Updates, Presentations and Announcements:

1. *Announcement* – The deadline to submit proposals for the Department of Interior's RFP for Supplemental Post-Superstorm Sandy Funding was at the end of January. Several NJWMC member organizations announced that they (either alone or with other partners) were submitting proposals. They included: DEP/Freshwater & Biological Monitoring (along with USGS NJWSC), Brick Township MUA (along with USGS NJWSC), Stockton College (along with USGS NJWSC), 2 from DEP/Marine Water Monitoring, DEP/Bureau of Environmental Analysis, Restoration & Standards, DEP/NJ Geological and Water Survey, and the Barnegat Bay Partnership. As mentioned above, an update on the status of these proposals was suggested for the May meeting.

2. *Information Update* – Leslie McGeorge provided updates from the National Water Quality Monitoring Council (NWQMC) and the upcoming National Water Monitoring Conference. Leslie is a member of the National Council, representing the Region 2 states.

National Conference –Leslie announced that registration is now open for the conference, which is scheduled for April 28-May 4 in Cincinnati. The conference schedule includes plenary, poster and oral sessions Tues-Thurs, with field trips, training and short courses on Mon and Fri. Many topics are being offered during the conference including: Barnegat Bay, Continuous Monitoring/Remote Sensing, Nutrients/Nutrient Monitoring, Emerging Contaminants, Volunteer Monitoring, Flood Monitoring, National Scale Assessments, and Mercury, among others. Council members/member orgs who are scheduled to present include: 1. Helen Pang (DEP), Stan Hales (BBP), Fred Spitz (USGS NJWSC) and Zafer Daphne (USGS Woods Hole) – Barnegat Bay session; 2. Brian Henning (DEP) – Headwater IBI Validation; 3. Brian Henning & Leslie McGeorge - Water Quality Indices/Report Cards (poster); 4. Danielle Donkersloot (DEP) – Using Biological Monitoring Data for Assessment; 5. Gloria Post (DEP) – Perflourinated Compounds; 6. John Yagecic (DRBC) – Continuous Monitoring Via Animated Graphic; 7. Bob Limbeck (DRBC) – Wild and Scenic Rivers; and 8. Jim Kurtenbach (EPA R2) – Macro Bioassessment of Puerto Rico Streams.

NWQMC - information on EPA's Water Quality Framework, the National Watershed Reference Network, the Water Quality Indices Survey and the National Water Quality Initiative (NWQI) were presented.

- EPA's Water Quality Framework is designed to integrate and streamline water quality data and information systems to more effectively support water quality managers. In the monitoring area, this is expected to support an improved assessment process as well as provide the means to support sharing of continuous monitoring data. Implementation of the framework is expected to take place over the next 3 years (2014-2016).
- The group working on the National Reference of Watersheds is expecting to have a draft website to share at the upcoming National Water Monitoring Conference. The website will include a mapping interface showing watershed locations, present a disturbance metric that will define reference watershed criteria and place all watersheds in context with each other, and eventually, link this website to the National Water Quality Portal.
- The Water Quality Indices and Report Card questionnaire (which was developed by NJ, with NWQMC input) is designed to evaluate the various indices used to communicate water quality information to both water quality managers as well as the public as well as development of the index itself including applications, benefits and limitations. Seventeen completed questionnaires have been returned: 5 use biological or other (non-composite) indices, 1 used a composite ecological index, 8 use a composite water quality index, 2 use a water quality report card, and 1 use a water quality trends analysis.

- The National Water Quality Initiative (NWQI) is part of the National Resource Conservation Services' (NRCS) national program for financial assistance to farmers to improve water quality through conservation practices. NWQI's focus is on nitrogen, phosphorus, sediment and pathogen impacts. 3 NJ watersheds have been chosen to receive funding under NWQI – Upper Cohansey River, Upper Alloway Creek and Upper Salem River. The goal is to improve water quality either by removing streams/waterbodies from the 303(d) list/threatened status/contributing to impairments or by addressing a TMDL plan. With EPA support, DEP is conducting monitoring at the Upper Salem River site to gauge in-stream water quality changes. NJ has also been selected for assistance with its monitoring design and is currently coordinating with EPA and Tetra Tech on this. Monitoring will also begin in 2014 (existing DEP monitoring sites in this watershed include 5 benthic macroinvertebrate sites with generally fair or poor results, 1 Fish Index of Biotic Integrity site, multiple physical/chemical stream sites, and 1 lake).

3. *NJ Continuous Monitoring Inventory* – Paul Morton and Alena Baldwin-Brown described updates and enhancements that had been made to the NJ Continuous Monitoring Inventory, as a result of the request for updates from the September 2013 meeting. The Inventory spreadsheet currently contains both long term (>1 year) as well as short term (<1 year) monitoring site information from NJ and its shared waters. New information in this latest edition of the spreadsheet includes: the short term deployments, new organizations in the long term section (Hudson River Environmental Conditions Observing System, NOAA PORTS System, and Pequannock River Coalition), and additional stations added to the long term section (DEP's Marine Water Monitoring and USGS NJWSC). There are also new maps showing both the long term and short term sites. During the discussion, USGS noted that there are ~30 additional short term sites on their webpage which need to be included. Paul will make this addition. [NOTE: this has been completed]. Once complete, Alena agreed to send the revised spreadsheet, which includes the live links to available online data, to the full Council for their use.

4. *NAWQA National Report on the Health of US Streams* – Daren Carlisle (USGS Reston, VA). Daren Carlisle provided a summary of the recently released NAWQA National Report on the Health of US Streams, which provides a companion analysis of stream water quality to EPA's National Rivers and Streams Assessment (NRSA). The differences between the 2 efforts includes sampling approach (NAWQA is targeted, NRSA is probabilistic), spatial scale (both are regional and national in scope), temporal scale (NAWQA varies, NRSA is 1x/5years), stressor characterization (NAWQA is time integrated, NRSA is 1x/sample), and design (NAWQA is an observational study, NRSA is a survey) – see attached table. NAWQA's focus in the relationship between land use and the resulting water quality – nationally, 2/3 of US stream miles experience upstream agriculture or urban land use and 20% of stream miles are modified by reservoirs. Algae, macroinvertebrates and fish are the indicators used. In NJ, overall, many altered communities were found along the Route 95 corridor where significant urbanization has occurred. Macroinvertebrates showed both altered and unaltered communities both along the Rt 95 corridor, along with altered communities also along the eastern portions of the state and many unaltered communities along the western portion of the state. Algae showed altered communities both along the Rt 95 corridor as well as in the northern portion of the state, while unaltered communities were found more in the south eastern portion of the state. Related to land use – algae showed more alterations in the agricultural areas, fish had more altered communities in urban land, and where there was mixed land use fish, again, showed the highest percentage of altered communities. Physical/chemical stressors also exhibit stress on stream water quality – nationally, 86% of the streams assessed had modified flows. Modified flows have shown to have a direct effect on altered communities – as flows deplete, macroinvertebrates and fish respond accordingly with higher community alterations. As excess nutrients and/or pesticides are found, algae and macroinvertebrates respond with higher community alterations. National tools have been developed which can assist in local solutions – among them are: western diatoms website (westerndiatoms.colorado.edu), USGS' SPARROW Mapper, USGS' Database of Lotic Invertebrate for North America, and USGS' Health-Based Screening Levels for Evaluating Water Quality Data.

5. *NJ Hydro TMDL Study* – Jonathan Kennen (USGS NJWSC). Jonathan Kennen summarized this cooperative USGS-DEP study designed to support a TMDL to address aquatic life impairments in NJ streams based on using hydrologic alteration as a pollutant surrogate. There were over 300 streams listed as biologically impaired in the 2010 NJ Integrated Water Quality Monitoring and Assessment Report. The study was based on the premise that there is a strong link between hydrologic processes and stream integrity (known as

"Environmental Flows"). Flow variability shapes the physical/chemical and biological functionality of streams and, as such, needs to be managed for. The challenge was to develop a scientifically defensible framework that could address various designated use impairments. Several tools – including the Hydrologic Integrity Assessment Process (HIP) – were used to accomplish this. The HIP, which determines the minimum streamflow needed to adequately protect aquatic biota, provides 3 primary software tools: 1. HIT (hydrologic index tool), 2. SCT (stream classification tool), and 3. NJHAT (NJ hydrological assessment tool). Using the HIP on a targeted area of 51 class A&C streams designated as non- to moderately impaired in the Raritan River Basin, the approach found: 1. Linear & multivariate models were helpful in providing insight into the primary hydrologic attributes driving change in non-moderately impaired streams; 2. Many hydrologic attributes were significantly related to altered ecological response; 3. All 5 major components of the flow regime were contained in the multivariate models; and 4. The magnitude of average, high and low flows and duration and timing of high and low flows are the most important. Further study on the subject could include testing the approach in other drainage basins, altering flow model parameters to better encapsulate regulatory endpoints, applying the approach to other stream classes, and testing the approach further in an urban setting.

6. *Present & Future NJ Water Monitoring by the William Penn Foundation: Delaware Basin & Cohansey* - Stefanie Kroll (ANSDU). Stefanie Kroll provided an overview of the William Penn Foundation's Watershed Protection Program, with an emphasis on the water monitoring project that is being done in the Delaware Basin and the Kirkwood-Cohansey area. The program's focus is to achieve short-term goals with an emphasis on improving/maintaining water quality, consider stressors/threats (forest fragmentation, stormwater, agricultural runoff, aquifer depletion), and to coordinate with different non-profit organizations who are working in the areas of land conservation, watershed protection and/or stewardship. The goals of the Delaware Basin and Cohansey project – for which there are 3 years of funding currently – are to assess current conditions in identified clusters, to achieve a significant increase in water quality (or conservation relative to water quality), to reach out to community members via project implementation or monitoring, to aim to show short term changes as well as measurable outcomes in the long term via monitoring, as well as produce research. Protection strategies include agricultural BMPs, stormwater BMPs (including monitoring), and land preservation. In addition to using monitoring efforts by groups in each of the cluster areas (e.g., Musconetcong Watershed Assoc., Partnership for the Delaware Estuary, etc.), the Academy of Natural Sciences will also be performing monitoring including: baseline "integrative" sites in 2013 and 2015; control sites and project impact sites in 2014 and 2016; and fill in organism groups/indicators that are not covered by the partner groups. Indicators include: water chemistry and nutrients, fish, salamanders, algae and macroinvertebrates. The NJ Council members urged the Foundation to share information and consider collaboration with the member organizations. As they move forward, Stefanie agreed that they would include the NJ Water Monitoring Council for possible monitoring collaboration. Additional information about the overall program or the Delaware River Basin and Cohansey project is available at: www.williampennfoundation.org.

- **Session – Continuous Monitoring**

A. *Overview of Continuous Monitoring and Key Locations in NJ* - Larry Feinson (USGS NJWSC)
Larry Feinson gave a brief history of continuous monitoring in NJ (since the 1940s) as well as provided more in-depth information about the current USGS continuous monitoring network. Currently there are 13 monitors active (7 year-round, 6 seasonal), parameters measured include temperature, specific conductance, pH, dissolved oxygen, turbidity, nitrate and chlorophyll, and there are 32 stream gauges that record provisional temperature information (which disappears after 120 days). The oldest site (Delaware River at Trenton) is operated by the USGS NJWSC and has continuous temperature readings since 1944. Larry explained the differences between early monitors (e.g., minimonitors) and monitors used today (electro-chemical and optical DO sensors), as well as how each sensor works. He also detailed the operating principles behind the nitrate and chlorophyll a sensors at the Passaic River at Two Bridges location. Similar sensors are also currently in operation at the Toms River at Toms River and Barnegat Bay at Mantoloking locations. In addition, Larry also addressed the issues of both Quality Assurance for the data collected as well as fouling (both problems and solutions). Lastly, he provided a series of web references for accessing the continuous monitoring data (WaterNow – http://water.usgs.gov/waternow; National Water Information System Mapper – http://maps.waterdata.usgs.gov/mapper/; NWIS Web – http://waterdata.usgs.gov/nwis)

B. Peering Into the Future: Advantages of Multiple Sensors on Mobile Platforms over Present Day, Fixed Station Continuous Monitoring – Jack Gibs (USGS NJWSC)

Jack Gibs gave both a brief retrospective on the evolution of continuous monitoring – from its beginnings with analogue water temperature through its progression to mini monitors then to sondes and finally to sondes with optical sensors – as well as a prospective on where the current, fixed station continuous monitoring should consider heading next. Integrating the current state-of-the-art technology on to a mobile platform will provide increased functionalities such as: customizable suites of multiple water quality sensors; inclusion of GPS, real time video, depth sounder, auto pilot, velocity sensor, and real time data transmission; remote control steering, real time interface with GPS and highly efficient batteries. It would also allow for measurement of water quality change with time and distance during a short term (several day) deployment. Potential advantages could include measuring the effect of tributary water quality on the main stem of a river (in a mixing zone), measuring the effects of canopy and riparian zone changes on water quality, and being able to directly measure storm water runoff or storm sewer discharge on water quality in receiving waters. Mobile sensor platforms that are currently in use include ocean gliders and the YSI Ecomapper for reservoirs.

C. NJ's Continuous Monitoring: From Research to Practical Applications – Bob Schuster (DEP/WM&S)

Bob Schuster provided a summary of the evolution of continuous coastal monitoring from research to practical applications. A basic tenant of this is understanding that there are always new continuous monitoring research tools under development – the challenge then becomes finding ways to link the tools to practical use and management decisions, while accounting for other factors such as cost, or QA/QC or other certifications. Key to its success is the ability to find ways to leverage multiple partners and uses of the instrumentation. For the marine area, the Mid-Atlantic Regional Association of Coastal Ocean Observing Systems (MARACOOS) and Water Monitoring Councils (including the NJWMC and the National Water Quality Monitoring Council) have been mechanisms to help facilitate collaboration of efforts for new technologies. Tools that have been introduced into the monitoring toolbox in this fashion include CODAR, slocum gliders, continuous real time monitoring buoys, and aircraft remote sensing for chlorophyll a.

D. DEP Short-Term Continuous Monitoring in NJ's Rivers and Streams – Chris Kunz (DEP/WM&S)

Chris Kunz described the short-term continuous monitoring that is currently conducted by DEP in NJ's rivers and streams. He explained how and why multi-parameter sondes are used to assess diurnal dissolved oxygen, how temperature data loggers are used to assess seasonal in-steam temperatures, how conductivity loggers are used to assess impacts from road salt, as well as some future applications that are currently under development. BFBM's use of multi-parameter sondes began in 1997 (initially focusing on diurnal dissolved oxygen) and has advanced to a current cadre of approx. 520 continuous short term deployments, including diurnal DO, seasonal temperature, and winter conductivity loggers. Diurnal DO data are used in targeted efforts (e.g., drought monitoring, as part of the Barnegat Bay Ambient Monitoring Project, narrative nutrient criteria development, etc.) and for screening purposes (e.g., discrete sample follow-up, reference site/headwaters index of biotic integrity initial investigation, etc.). Seasonal temperature loggers are used where discrete sampling show potential violations of the Surface Water Quality Standards. These loggers are deployed during the summer months (June-September) when the likelihood for in-stream temperature violation is the greatest. The data from winter conductivity monitoring, which takes place December-March, can be used as a surrogate for TDS and chloride which are important in determining possible effects from road salt. These data loggers can capture spikes in conductivity in conjunction with freezing temperatures and snowfall – thus allowing for the magnitude and duration of events to also be now captured. Future applications of short term monitoring include continued emphasis on continuous monitoring, saltwater intrusion in groundwater wells, brackish/tidal zone delineation, new sensor use for additional parameters, and monitoring related to climate change.

E. Climbing the Learning Curve of Using Continuous Water Quality Monitors in the Delaware Basin: A National Park Service Perspective – Don Hamilton and Jessica Newbern (NPS)

Don Hamilton and Jessica Newbern shared the National Park Service's (NPS) experiences with use of continuous monitors in the Delaware Basin. NPS has been partnering for >25 years with DRBC as part of the Scenic River Monitoring Program, which includes bi-weekly sampling May-Sept at as many as 20 sites. The rationale for NPS' pursuit of continuous monitoring sondes included: the need to protect an exceptional natural resource which has various threats to water quality, the need to define existing water quality where it was lacking, and the desire for early detection of water quality impairments. In order to maintain the "Special Protection Waters" designation, rigorous sampling is needed to detect measurable change. There is a big bang

for the buck after the initial equipment investment, monitoring is enabled around the clock under varied conditions, and using satellite telemetry for real-time water quality information. NPS began purchasing sondes in 2009 and using them in 2010. Currently there are 3 real-time continuous water quality monitoring data collection platforms in the Upper Delaware Scenic and Recreational River that are co-located with USGS gages: 1. Lackawaxen River at Rowland Bridge, 2. Delaware River at Lordville Bridge, 3. Delaware River at Barryville Gage above Lackawaxen River. There are 5 other real-time water quality monitoring data collection platforms expected to go online in 2014: East and West Branch of the Delaware River, Delaware River at Corwin Farm, Delaware River at Montague USGS gage, and Delaware River at Tocks Island USGS gage. Time series data are being managed using AQUARIUS software. The data are available via the NPS at the Upper Delaware Scenic and Recreational River (via jessica_newbern@nps.gov or 570-729-7842). Goals for this year include data uniformity, developing reports, and enhancing data availability.

F. DRBC Experiences with Low Cost Continuous Data Loggers – John Yagecic (DRBC)
John Yagecic summarized DRBC's experiences with adding low cost continuous data loggers (vs. multi parameter sondes) to their monitoring toolbox. The loggers are being used for 2 projects: a conductivity project in the upper Delaware Basin to develop a natural gas baseline, and a dissolved oxygen project in the Delaware Estuary. Both projects are currently in the pre-deployment validation testing phase. HOBO conductivity loggers are being used as part of the natural gas baseline project, as these are expected to detect any TDS increases as a result of fracking waste entering the stream. DO loggers are being used in the Delaware Estuary project in an attempt to further explore the observed episodic stratification and to determine whether or not this results in different DO levels at the top and bottom of the estuary waters. The current conclusions, related to use of the loggers, are that they offer higher coverage, as well as both rapid and untended deployments. There are, however, still some considerations related to calibrations and pre-deployment validation protocols.

- **Action Items**
  - Add USGS short term sites to Continuous Monitoring Inventory [NOTE: done] and provide revised spreadsheet to full Council - *Paul and Alena*

- **Technical Topics for Next Meeting**
  Ground Water; DOI funding for Supplemental Superstorm Sandy Projects Update [NOTE: funding decision are expected in June], EcoFlow Goals Project

- **Next Meeting**
  May 21, 2014 at USGS NJWSC