National Water Monitoring News

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The National Water Quality Monitoring Council brings together scientists, managers, and citizens to ensure information about the quality of our water resources is accurate, reliable, and comparable. The Council fosters collaborative and cost-effective approaches to improve and advance the science of water-resources monitoring.

Collin Eagles-Smith, James Willacker, Jr., and John Pierce, from USGS Forest and Rangeland Ecosystem Science Center sampling biota as part of a mercury research project on the Hells Canyon reservoir complex, Snake River, Idaho. Photo taken near river mile 252 by Marshall Williams from the USGS Idaho Water Science Center.

National Water Quality Monitoring Council

Working together for clean water

Words from the Council Co-chairs

Welcome to the ninth edition of the Council's Newsletter!

Back in August Susan and I were asked to brief the Advisory Committee on Water Information (ACWI) on Council activities annual meeting (the Council is a subcommittee of ACWI). Given there has been a fair bit of turnover on ACWI since our last briefing I thought it would be helpful to give the ACWI members a brief history of the Council before describing recent activities and accomplishments. This includes:

- 1991-USEPA and USGS began talks to address problems caused by different water-quality sampling, analytical, data storage, reporting, and assessment methods in use by local, state, & Federal agencies.
- 1992-1997- Intergovernmental Task Force on Monitoring Water Quality (ITFM) evaluated status of Nation's monitoring programs and recommended the Council be formed.
- 1997-ACWI formed; first act of ACWI was to designate National Water Quality Monitoring Council as the permanent successor to the IFTM
- 1998-1st National Monitoring Conference held in Reno, Nevada
- 2002-Methods and Data Comparability Board formed; National Environmental Methods Index (NEMI) launched
- 2004-First meeting of Water Information Strategies work group; Collaboration and Outreach work group formed.
- 2005-Design of National Monitoring Network (NMN) started
- 2007-First round of NMN pilot studies started (Delaware Bay, San Francisco Bay, Lake Michigan)
- 2010-First Council newsletter published
- 2011-Second round of NMN pilot studies started (Puget Sound, Albemarle Sound)
- 2012-Water-Quality Portal launched. Aquatic Sensors work group formed. National Network of Reference Watersheds work group started. Statistical NEMI launched. First issue of Volunteer Monitoring News published.
- 2014-9th National Monitoring Conference held in Cincinnati, Ohio

Based on this abbreviated history it's clear the Council has made a LOT of progress since 1997 and has fulfilled its mission to foster partnerships and collaboration, advance water science, improve monitoring strategies, and promote data comparability, integration, and coordination. The success of the Council is attributed to past and current Council members as well as many, many others involved from the local, state, tribal, federal or private-sector level who support the work of the Council. For all the work you do, we offer our sincere thanks for your efforts.

We'd also like to acknowledge that yes, we did miss a newsletter earlier this spring! Unfortunately several factors conspired to prevent us from getting a spring newsletter done including the retirements of USGS Co-chair Mike Yurewicz and Council Executive Secretary Cathy Tate in January, Barb Horn's transitioning off the Council as Collaboration and Outreach Co-Chair, and last, Mike, Cathy, and Barb's extensive involvement in planning the 9th National Monitoring Conference. Given the circumstances we hope you can understand why we weren't able to produce a newsletter this spring. However we will work hard to make sure we don't miss any future editions!

That said we are proud to bring you the Fall 2014 edition of the newsletter which as always, features news about Council activities, cutting edge science, new tools and technology, information on water-quality monitoring activities at the local, state, regional, and national level, announcements regarding upcoming meetings and conferences, and other important news concerning water-quality monitoring. To help make sure we don't miss the spring newsletter we invite you to submit your water-quality news, successes and challenges, announcements, or findings to our newsletter editors at any time.

On behalf of the entire Council and all who have contributed to this newsletter, thanks again for your contributions and for helping to protect our Nation's waters. We hope you enjoy this newsletter and we encourage your input and participation!

Best Regards,

Gary Rowe, USGS Co-Chair
glrowe@usgs.gov

Susan Holdsworth, EPA Co-Chair
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National Council Highlights

Highlights from the 2014 National Monitoring Conference

A total of 648 attendees from multiple states, countries, and Tribes attended the Ninth National Monitoring Conference "*Working Together for Clean Water*" in Cincinnati, Ohio, April 28 – May 2, 2014. Conference participants included Federal (33%), State/Province (21%), Private/Commercial (17%), Academics (10%), Nongovernmental Organizations (8%), Local/Regional (10%), and Tribal (1%) representatives.

Presentations Online from the 9th National Monitoring Conference are now available at: acwi.gov/monitoring/conference/2014/

Attendees chose from about 280 talks, more than 80 technical posters, and over 27 workshops, panel sessions, and short courses as well as interacting with over 30 exhibitors. Proceedings and the conference program are available online at acwi.gov/monitoring/conference/2014/index.html.

This year's conference included a networking block called "Meet Your Peers – Who is Working in Your Backyard?" Conference attendees were encouraged to meet other people from their geographic area and share ideas and perspectives. Groups gathered for 90 minutes and discussed topics relevant to their geographic area.

A stellar lineup of plenary speakers included:

- Peter Tennant (Executive Director, Ohio River Valley Water Sanitation Commission)
- Sally Gutierrez (Director, U.S. Environmental Protection Agency Technology Innovation Cluster Development and Support Program)
- Robert Hirsch (Research Hydrologist, U.S. Geological Survey)
- Robert Glennon (Regents' Professor and Morris K. Udall Professor of Law and Public Policy at the University of Arizona).

Volunteer Monitoring Group at the 9th National Monitoring Conference. *Photo credit: Danielle Donkersloot.*

A special thanks to YSI for providing travel scholarships to thirty-one attendees in the volunteer monitoring community.

For additional information, contact: Candice Hopkins, USGS, chopkins@usgs.gov, (208) 387-1331

Second Fluid 5K was Fluid !

Racers reach the finish line of the Fluid 5K. *Photo Credit: Cathy Tate*

The second biannual Fluid Five race was held at the 9th National Monitoring Conference in Cincinnati, Ohio. Weather for race day was beautiful, and the course showed off the scenic riverfront of the Ohio River. Thirty-eight hearty racers ran or walked the 5K race. In addition, 20 fantastic volunteers assisted with a variety of duties related to the event. Peter Tango won the men's race with a time of 18:56, and Rebecca Kreiling won the women's race with a time of 21:53. The course passed through three city parks, and over a unique geologic time map; racers turned around on this out and back race route at the 174 million years ago mark.

Special thanks go to Mike Higgins, Jim Lazorchak, Stephanie Lazorchak, and Kris Stepenuck for organizing and planning the race. Thanks also go to the sponsors who donated prizes, including Road ID, Gold Systems and Revital Katznelson, and to the many individuals who sponsored racers. Just under $800 was raised for the Eleanor Ely Memorial Scholarship that will help support volunteer monitoring colleagues' attendance at the 2016 National Monitoring Conference.

Congratulations to the 2014 Winners of the Council Awards!

Elizabeth Jester Fellows Award

The 2014 EJF Award was presented to Linda Green, the Director of the University of Rhode Island Watershed Watch. For 26 years, Linda has been a tireless leader of one of the most respected statewide volunteer monitoring programs in the nation. Linda's efforts along with her dedicated volunteers have led skeptical water resources managers to respect and value the contributions of citizen scientists. Linda has also been a leader of numerous professional organizations including the Council.

Barry Alan Long Award

Jim Harrington, an Environmental Scientist with the California Department of Fish and Wildlife, won the BAL Award in 2014. Jim estabilised the Aquatic Bioassessment Laboratory in northern California where he developed bioassessment procedures that proved cost-effective and consistent for the state. In addition, Jim shares his knowledge by leading training forums for students and groups throughout the western U.S. His students range from novices to seasoned scientists but all have benefited from Jim's encouragement and generous spirit.

Vision Award

Under Director Mark Hoyer, Florida LAKEWATCH has collected water quality data on more than 1,100 lakes, 175 coastal sites, 120 rivers, and 5 springs in 57 Florida counties. A large number of these sites have long-term datasets. The successes and accomplishments of LAKEWATCH are many; and the quality of the data collected by LAKEWATCH have proven to be of consistently high quality and are used in regulatory decision-making. Congratulations to the Director, staff, and volunteers of Florida LAKEWATCH!

To learn more about the meaning and history of these awards and the recipients, visit the National Monitoring Conference at acwi.gov/monitoring/conference/

NWQMC Membership Updates

Welcome New Council Members!

Claudio Ternieden, Environmental Representative, Alexandria, VA

As Director of Regulatory Affairs with the Water Environment Federation (WEF) in Alexandria, VA, Claudio supports WEF's regulatory and legislative efforts. Previous positions include water technology transfer and transition activities leader at Concurrent Technologies Corporation (CTC), a non-profit scientific research organization; conducting and leading research in emerging contaminants, stormwater, climate adaptation, decentralized systems, infrastructure and disinfection at the Water Environment Research Foundation (WERF); and a variety of research positions with several private and governmental entities. Claudio has a law degree from Pace University School of Law, a Master Degree in Public Policy from George Mason University, and a BA from Concordia College.

Nancy Schuldt, Tribal Representative, Cloquet, Minnesota

Nancy has served as the Water Projects Coordinator for the Fond du Lac Band of Lake Superior Chippewa since 1997. She developed the Band's water quality standards and long-term monitoring program, and is finalizing numeric nutrient criteria for lakes and biological criteria for streams on the reservation. Nancy also directed research to characterize mercury impacts to Tribal members, and collaborated on wild rice ecology and toxicity research as well as watershed hydrologic modeling. She is also involved in cooperative wastewater management projects, mining and energy reviews, and nonpoint source management. Nancy participates in numerous local, regional, and binational working groups to ensure the tribal perspective is represented. Nancy has a degree in Biology from the University of Dayton, and a Master's Degree in Aquatic Ecology from the University of Kansas.

Jon Marshack, EPA Region 9 Representative, Sacramento, California

An Environmental Program Manager with the California Environmental Protection Agency, State Water Resources Control Board, Jon also serves as Executive Director of the California Water Quality Monitoring Council. Prior to moving to the State Water Board in 2008, Jon worked for 27 years at the Central Valley Regional Water Quality Control Board, applying California's water quality standards to a variety of programs designed to protect the quality of Central Valley surface water and groundwater resources. Jon is the author of the widely used publications *A Compilation of Water Quality Goals* and *The Designated Level Methodology for Waste Classification and Cleanup Level Determination*. He holds Bachelor and Master of Science degrees in Biochemistry from UCLA and UC Davis, respectively, and a Doctorate in Environmental Science and Engineering from UCLA.

Gary Rowe, Co-Chair NWQMC, Lakewood, Colorado

Gary's involvement with the Council began in 2005 as a member of the Conference Planning Committee for the 5th National Monitoring Conference. Since then, he has participated on several Council work groups including the National Monitoring Network Contaminant work group, the Water Information Strategies work group, and Conference Planning Committees. Gary filled in as acting USGS Co-Chair in between Pixie Hamilton and Mike Yurewicz. Starting in 2008, Gary led a three-year planning effort that was responsible for developing and implementing a strategic science plan for the third decade of the NAWQA Program. Gary is currently the Regional NAWQA Program Officer, overseeing NAWQA data collection and studies in 13 Midwest and Mountain states. He received his B.S. in Geology at the University of California at Davis and a Ph.D. in Geochemistry and Mineralogy at the Pennsylvania State University.

Candice Hopkins, Executive Secretary, Boise, Idaho

Candice has worked as a hydrologist with the USGS since 2007, where she has conducted projects involving water quality, groundwater geochemistry, trends in water levels, and geochemical modeling for both state and federal agencies. Candice has participated in an international groundwater geochemistry study that included training Iraqi scientists as well as collection and analysis of groundwater in Ethiopia and Iraq. She sits on Idaho groundwater monitoring and nitrate technical advisory committees, and teaches introductory geology courses at the College of Western Idaho. Candice holds a BS in Geology and Economics from Southern Methodist University and a MS in Hydrology from the University of Arizona.

Danielle Donkersloot, Citizen Science Coordinator

Danielle is an Environmental Specialist and has worked with the NJ Department of Environmental Protection for 15 years. She currently serves as the Citizen Science Program Manager in the Office of Coastal and Land Use Planning. Ms. Donkersloot has vast experience developing and coordinating volunteer monitoring and citizen science programs. She began her career in state service working with nonprofit organizations and the Department on data sharing and communication planning for rivers, streams and lakes. Her program has developed a pathway for volunteer collected data to be used at the agency for assessment and restoration efforts. She is a leader in the field of volunteer monitoring and continues to build networks and partnerships across the water community. Danielle's current focus is developing a new Citizen Science Monitoring Program for coastal resiliency and living shorelines.

Michele Wheeler, Great Lakes Representative

Michele serves as the Lake Superior Binational Program Coordinator for the Wisconsin Department of Natural Resources and works to represent the state of Wisconsin in implementing the Great Lakes Water Quality Agreement in conjunction with domestic and Canadian partners in Lake Superior. Ms. Wheeler has been conducting field work to evaluate aquatic habitat/water quality conditions and identify sources of pollution for the past 18 years. She holds a bachelor's degree from Penn State University in Environmental Resource Management and a master's degree in fisheries from Humboldt State University in California. She has been living in Northern Wisconsin since 2004 and works with state, county, federal, tribal and NGO partners on a wide variety of Lake Superior and Great Lakes watershed issues.

Alan Ellsworth, National Park Service

Alan is currently serving as acting Chief for the NPS Aquatic Systems Branch in their Water Resources Division (WRD). He is normally based in Washington DC as the WRD water advisor/liaison. He previously worked for NPS as the northeast regional hydrologist based at the USGS NY Water Science Center, serving parks from Maine to Virginia and has been based at Delaware Water Gap and St. Croix Wild and Scenic River. Alan was a physical scientist at the USFS Rocky Mountain Research Station prior to his NPS career where he simultaneously completed graduate studies in the Watershed Science Department at Colorado State University. Alan hails from Syracuse NY where he studied at the SUNY College of Environmental Science and Forestry and has served as a Peace Corps Volunteer based in Ecuador, SA. His interests include watershed science, snow hydrology, wetlands, and atmospheric impacts to watersheds.

The Council Bids Farewell to Our Retired Members

Michael Yurewicz, Former Co-Chair NWQMC

The Council wishes all the best to Mike as he heads off to a well-deserved retirement. Mike was a great advocate of the Council's mission and his positive outlook and gentle encouragement of workgroup efforts were an enormous asset to the Council. After receiving his education at Rutgers College, Mike accepted a position with USGS in New Jersey in 1972. Mike held a variety of positions of increasing responsibility and complexity, including stops in Tallahassee, Florida; Reston; Atlanta; Tennessee; Massachusetts; and back to Reston in 1994. Mike was a member of the National Water-Quality Assessment (NAWQA) Program Leadership Team where he coordinated NAWQA activities in the Northeast United States, and provided guidance to the many activities at the national scale. Mike was also involved in the formation of both the Tennessee and the New England Sections of the American Water Resources Association (AWRA), and served as President of both Sections.

Geoff Scott – NOAA Representative, Charleston, South Carolina

Dr. Geoff Scott is leaving the Council as NOAA representative as he retires from his position as Director of the National Oceanic and Atmospheric Administration's (NOAA) Center for Coastal Environmental Health and Biomolecular Research (CCEHBR). We thank Geoff for his contributions and wish him all the best in retirement.

Greg A. Pettit, EPA Region 10 State Representative

The Council would like to wish Greg Pettit all the best as he heads off to retirement. As the EPA Region 10 state representative and the Administrator of the Oregon DEQ Laboratory and Environmental Assessment Division with the Council, Greg was a co-chair of the 8th National Monitoring Conference in Portland, the most well-attended conference to date, and an active member of the Water Information Strategies workgroup. In his day job, Greg enjoyed a long career with Oregon DEQ that began in 1977; at retirement he was the Administrator of the Laboratory and Environmental Assessment Division of the ODEQ. He worked at the regional and national level on environmental policy development, including the development of the Oregon Groundwater Protection Act. Greg was an active, vocal, and fun member of the Council and his hard work and cheerful disposition will be missed.

Tony Shaw, Representative EPA Region 3

Tony Shaw, long-time Council member and owner of some really nice Hawaiian shirts, has retired. Tony was well known for his humor and his passion for the environment. In his day job, he was the Chief of the Water Quality Monitoring Section at the Pennsylvania Department of Environmental Protection. A biologist by training and for most of his professional life, Tony was directly involved with the development of Pennsylvania's surface water assessment protocols and biocriteria processes.

Cathy Tate, Executive Secretary 2010-2014

After 4 years as the Council's Executive Secretary and 23 years of dedicated service to the USGS, Cathy Tate officially retired following the 9th National Monitoring Conference. Cathy's background is in biology and stream ecology, but she worked on projects as diverse as acid mine drainage in Colorado and ecological research studies in Antarctica. A long-time member of the USGS NAWQA Program, Cathy held numerous leadership positions and helped prepare Circular 1391 which summarized the first 15 years of NAWQA ecological studies. In addition to the Executive Secretary position for the Council, she co-chaired the Collaboration and Outreach workgroup and the Conference Planning Committee. Cathy was an outstanding Executive Secretary with keen attention to detail and wonderful organizational and cat-herding skills. Following retirement, Cathy has traveled extensively in Australia (apparently to get as far away from us as possible).

Collaboration Through Partnerships

Spotlight on Federal Agencies

Forecasting Harmful Algal Blooms in Lake Erie

The National Oceanic and Atmospheric Administration (NOAA) has been monitoring and forecasting harmful algal blooms in Lake Erie since 2008, and has routinely delivered monitoring and forecast products since 2009. The forecast is delivered as geo-referenced PDFs to an email subscriber list of over 1000 people, and is available online at www2.nccos.noaa.gov/coast/lakeerie/bulletin/bulletin_current.pdf. This forecast provides managers and the public with the modeled current location and expected future position of the blooms.

The forecast and monitoring system is used to look at cyanobacteria primarily of the genus *Microcystis* but can also detect *Anabaena* and *Planktothrix*. The system currently uses an algorithm based on ocean color data from the MODIS sensor to produce an image. This image is generally one day old at the time of the forecast, unless cloud cover is excessive. Concentration data is combined with a hydrodynamic model from the Great Lakes Coastal Forecasting system (www.glerl.noaa.gov/res/glcfs/) to produce a "nowcast" (the modeled location of the bloom today) and a forecast (the modeled position of the bloom for three days into the future) (Figure 1).

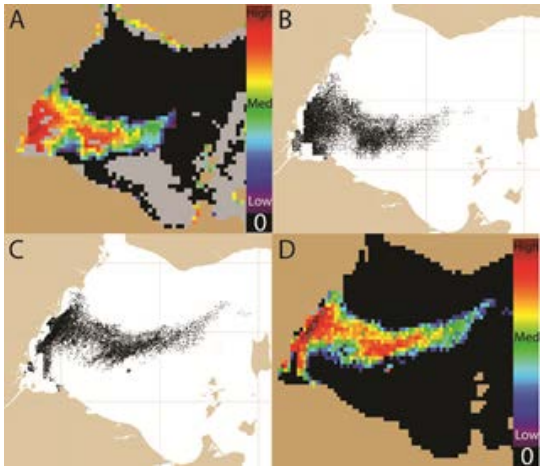


Figure 1: A the initial image of the western Lake Erie Basin where black is no cyanobacteria, warmer colors (red and orange) are high concentrations of cyanobacteria (~>100,000 cells ml^{-1}) and cooler colors (blue and purple) are lower concentrations (the estimated lower detection threshold is 35,000 cells ml^{-1}). B shows the concentration from A as particles. C shows the particles after being advected by a hydrodynamic model after a period of 72 hours. D shows C as an image and would be used as a forecast.

The forecast also shows ancillary data that influence bloom dynamics. Water temperature, recorded by buoy, is shown because temperature affects cyanobacteria growth and senescence. Wind speed and direction, shown as wind stress, control the distribution of cyanobacteria in the water column. Modeled surface currents are also shown. These data sets, together with *in situ* observations of bloom characteristics (toxicity, species) collected by other agencies, are combined and an analysis of the bloom, forecasted transport and relevant weather conditions is written.

The forecast system has been well received by the user community, and the web traffic and subscriber list has continued to grow. To subscribe to the forecast, visit www.glerl.noaa.gov/res/waterQuality/?targetTab=habs.

Contact: Timothy Wynne, NOAA, timothy.wynne@noaa.gov, (301) 713-3028 x139

Update: National Ground-Water Monitoring Network

The National Ground-Water Monitoring Network (NGWMN) is a compilation of selected groundwater monitoring wells from Federal, State, and local groundwater monitoring networks across the nation and is a product of the Subcommittee on Groundwater (SOGW). The NGWMN framework (acwi.gov/sogw/ngwmn_framework_report_july2013.pdf) outlines the information needed to assess the quantity of groundwater reserves as constrained by quality. The NGWMN Data Portal (cida.usgs.gov/ngwmn) was developed to provide access to groundwater data from multiple, dispersed databases (see figure, right). The web-based mapping application provides access to current and historical data including water levels, water quality, lithology, and well construction. The portal was enhanced in 2013 to include advanced searching, site selection, and download capabilities. The NGWMN Data Portal provides centralized, real-time access to data that are maintained and served by each participating organization.

Screen capture of the NGWMN Data Portal.

The 2009 pilot phase provided water-level information to the portal; water-quality data are now also available from a few of the pilot states (IL, IN, MN, MT, NJ, TX) and for USGS wells. Furthermore, in the last year, the US EPA stepped forward to provide analytical services from their regional laboratories in support of water-quality pilots in Utah and New England (MA and NH). These data are expected to be available from the portal in the coming year.

For more information, see the SOGW website at acwi.gov/sogw/, or contact Bill Cunningham of the USGS at wcunning@usgs.gov.

EPA Update: National Aquatic Resource Surveys

Working with partners in the states, tribes, and other federal agencies, EPA is leading a series of statistically-valid surveys of the nation's waters known as the National Aquatic Resource Surveys (NARS). Each summer, field crews around the country embark on sampling water quality, biology, habitat, sediment and other indicators for the surveys using standardized methods and following strict quality assurance guidelines. In many states, survey intensifications allow researchers to form conclusions about the condition of rivers and streams across the state with a known degree of certainty (see related story, below, "First-of-its-Kind Report on Condition of Minnesota's Rivers and Streams"). In 2014, significant headway has been made in the national surveys of rivers and streams, lakes, coastal waters, and wetlands.


Field crews collecting biology samples. *Photo credit: Alice Mayio*

- *National Rivers and Streams Assessment (NRSA):* As of early September 2014, over 90% of the second year of field sampling for the NRSA 2013-14 had been completed. Release of the final 2008-2009 NRSA has been delayed.
- *National Lakes Assessment (NLA):* Steady progress continues in the analysis of field data on lakes, ponds, and reservoirs collected in 2012, and report writing is also beginning.
- *National Coastal Condition Assessment (NCCA):* This survey is in its report writing stage, with a report – the first under the NARS program -- scheduled to be released for public comment in early 2015. Planning is also underway for the next cycle of field sampling for the NCCA, scheduled for the summer of 2015.
- *National Wetlands Condition Assessment (NWCA)*: This first-ever survey of the ecological integrity of the nation's wetlands is also in its data-analysis and report-writing phase. Sampling for the first NWCA took place in 2011. Planning is underway for the next cycle of field sampling for the NWCA, scheduled for the summer of 2016.

When the NWCA is released, EPA will have national-scale reports describing the ecological condition of *all* aquatic resources in the conterminous U.S. The intent is to revisit each water type every five years. For more information on the surveys, visit www.epa.gov/aquaticsurveys.

Spotlight on States

How's the Water in Minnesota?

Showing how land use directly affects water quality in Minnesota just got easier with a new web feature called "How's the Water?" (www.pca.state.mn.us/index.php/water/hows-the-water/index.html). By clicking through maps, graphics and concise information, users can easily see the challenges facing the state's lakes, streams and wetlands. They can also access the science and data – in layperson's terms – behind the issues. For example, clicking on "lakes" leads to a page explaining the threats of runoff, erosion and sediment, along with road salt and invasive species.

The Minnesota Pollution Control Agency (MPCA) gathers and analyzes a huge amount of environmental data, but often that data is embedded in long technical reports that are not user-friendly for citizens. "How's the water?" offers a broad and accessible look at the:

- Threats to state waters;
- Current water quality in regions around the state; and
- Steps the MPCA and other groups are taking to restore and protect our water resources.

Kelly O'Hara of the MPCA prepares equipment to collect water quality samples at the surface and at depth on Square Lake in Washington County, Minnesota. *Photo credit: Catherine Rofshus*

Users can also access details about specific water bodies, including water quality data, MPCA projects in the area, maps of land use and water monitoring stations, watershed overviews, recent reports, agency contacts and fish consumption advisories. They'll also learn how they can help waters across the state.

"How's the water?" was developed by public information officers, web designers and senior managers in water monitoring and water quality permit programs. The MPCA decided on a web-based feature because it's more interactive and can be updated easily. For more information, contact Glenn Skuta, MPCA section manager for surface water monitoring, at glenn.skuta@state.mn.us or 651-757-2730.

20th Annual Maryland Water Monitoring Council Conference

The Maryland Water Monitoring Council will hold its 20th Annual Conference at the Maritime Institute, North Linthicum, Maryland, on Friday, November 21, 2014. The theme of the one-day conference is *Looking to the Past to Guide our Future*. This year's conference will highlight the advances in monitoring, improvements in methods and equipment, technological innovations, and environmental trends. Possible themed sessions include *Stream Restoration Effectiveness Monitoring, Water Quality Trends in Chesapeake Bay, Freshwater Streams, and Coastal Bays, Columbia as an Early Attempt at Sustainable Development, Fish Kills, Maryland's Coldwater Fishes, and Volunteer Monitoring.* A conference highlight will be a plenary talk by estuarine ecologist and environmental historian Dr. Kent Mountford, titled *Monitoring: A Chesapeake Historical Perspective.* The conference will also feature presentation of the 8th annual Carl S.Weber Award honoring those who have volunteered their time and energy towards increasing watershed awareness, advocacy and stewardship of the waters of Maryland.

For more information, visit mddnr.chesapeakebay.net/MWMC/MWMC2010/annualConference.asp

New Projects & Products from the Florida Water Resources Monitoring Council

Since 2011, the Florida Water Resources Monitoring Council (Council) has served as a project- and product-driven collaboration of stakeholders who participate in water resource monitoring and management. The 21 members represent state, federal and local agencies, non-governmental organizations, volunteers and remote-sensing groups. The Council and its workgroups focus on developing useful, timely, Florida-specific products to assist water resource managers, the public and policymakers. For example:

The Groundwater Level Index, developed by the Salinity Network workgroup, is a report on the index of percentile rankings of Florida well water levels designed to inform the public about aquifer level conditions (Figure 1). It will be available in winter 2014 on the Florida Department of Environmental Protection website. The workgroup is also spearheading the development of a Salinity Groundwater Quality Index to alert the public to changes in saltwater encroachment; it will be used in concert with the Groundwater Level Index. Contact: Rick Copeland at Rick.Copeland@dep.state.fl.us or 850-245-8503.

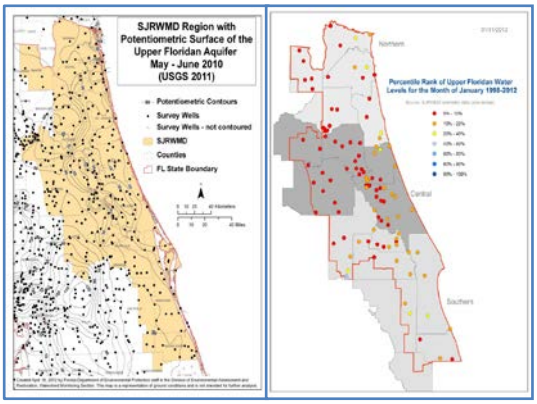


Figure 1: Image from the Groundwater Level Index

The Catalog of Florida Monitoring Programs (Water-CAT), an interactive, searchable website that provides information on the "who, what, when, where and why" of monitoring in Florida, was developed by the Catalog workgroup and the University of South Florida's Water Institute (Figure 2). The Catalog allows easy identification of monitoring efforts to increase collaboration, conduct gap analysis and locate existing stations for adverse event response or research. Released in May 2014, the Water-CAT currently contains information on 75 monitoring organizations and 104,000 stations. Refinement of the Water-CAT is ongoing. For more information, go to www.water-cat.org or contact Kate Muldoon at Kathryn.Muldoon@dep.state.fl.us or 850-245-8579.

Figure 2: Water-CAT home page

The Adverse Events Response Plan is being developed by the Coastal Monitoring workgroup to facilitate coordination among stakeholders in response to events that cross jurisdictions (Figure 3). It is being developed as a result of lessons learned from many crises, including the Deepwater Horizon oil spill and the sea grass, marine mammal and bird die-off in the Indian River Lagoon. It includes a database of experts, events responded-to by agency, and the Plan, including database management requirements. Contact: Amber Whittle at Amber.Whittle@myfwc.com or 727-502-4889.

Figure 3: Map of spread of Deepwater Horizon Spill

To learn more about the Florida Water Resources Monitoring Council, contact Gail Sloane at Gail.Sloane@dep.state.fl.us or 850-245-8512.

Volunteer Monitoring

Volunteer Monitoring Spotlight: Florida LAKEWATCH

Since the program's inception in 1986 and continuing through the present, thousands of Florida LAKEWATCH volunteers have collected reliable long-term water quality data on more than 1100 lakes, 175 coastal sites, 120 rivers and 5 springs in 57 Florida counties. Currently, LAKEWATCH analyzes approximately 45,000 samples each year. For long-term trend analyses, LAKEWATCH provides at least 20 years of monthly data on 27 lakes and 15 years of monthly data on 195 lakes. All of these data are placed in EPA's STORET data management system and on the Florida LAKEWATCH web site where they are available for anyone to use.

Florida LAKEWATCH group, photo courtesy of Dan Willis, Florida LAKEWATCH

Monitoring with LAKEWATCH volunteers is cost effective and requires a lower level of QA/QC than is required for setting standards or mitigation by Florida Department of Environmental Protection (FDEP). However, comparison studies have shown that the data collected by volunteers and processed by LAKEWATCH staff are equivalent to data collected and processed by FDEP professionals. These comparison studies allow FDEP to use LAKEWATCH data for development and implementation of numeric nutrient criteria for proposed water quality standards; impairment assessment of surface waters; development of Total Maximum Daily Loads; and development of Basin Management Action Plans.

Over the last 25 years, Florida LAKEWATCH staff and other scientists have used LAKEWATCH data to publish over 40 peer-reviewed scientific publications and three books that expand the limnological knowledge-base for Florida. LAKEWATCH has also cooperated with scientists from around the world by sharing data for comparative ecological studies. These efforts have helped maintain a strong state, national, and international research component. Many publications and other information generated by the program to promote the science-based management of Florida's aquatic resources are available for free on the LAKEWATCH web site (lakewatch.ifas.ufl.edu/LWCIRC.HTML).

This year, Florida LAKEWATCH and its volunteers received two awards: the Distinguished Service Award from the University of Florida's School of Forest Resources and Conservation, and the Vision Award from the National Water Quality Monitoring Council. Florida LAKEWATCH is a great example of what a volunteer water quality-monitoring program can be. However, to the volunteers goes the glory: without their tremendous efforts, there would be no Florida LAKEWATCH.

For further information please visit: lakewatch.ifas.ufl.edu

Minnesota Monitoring Videos: Lights, Camera, and Monitoring Action!

MPCA public information officer Steve Mikkelson prepares to videotape Citizen Stream Monitoring coordinator Laurie Sovell demonstrating how to use a Secchi tube. *Photo Credit: Catherine Rofshus*

With more and more people turning to YouTube and other video resources for information, video can be a great way for water monitoring agencies to explain their work. The Minnesota Pollution Control Agency recently released a video program, "Stream gets a check-up," (www.pca.state.mn.us/sbiz8cc) that explains the biological monitoring efforts underway across the state. The agency encourages watershed districts, Soil and Water Conservation Districts and other local partners to show this video to their governing boards and at kickoff meetings before beginning intensive water monitoring efforts in their watersheds.

With the Minnesota Department of Natural Resources, the MPCA also produced a series of training videos for the Citizen Stream and Lake Monitoring programs, posted online at www.pca.state.mn.us/dm0rfc0.

The agency is now planning a series of short monitoring training videos for local partners who participate in Minnesota's Watershed Pollutant Load Monitoring Network (www.pca.state.mn.us/pyrieeb), which collects data from dozens of sites on the state's major rivers.

New Study: Natural Resource Management and Policy Impacts of Volunteer Water Monitoring Programs in the US

Volunteer water monitoring programs have existed in the US since the 1960s, and many thousands of citizen scientists have participated in them, monitoring biological, chemical, and physical characteristics of rivers, streams, lakes, bays, and wetlands across the country. However, little is known about the collective impacts these programs have had on natural resource policy and management.

In 2013, Kris Stepenuck, Director of the Wisconsin Water Action Volunteers Stream Monitoring Program, surveyed 345 coordinators of volunteer water monitoring programs in order to identify the types and breadth of natural resource management and policy outcomes these programs had achieved. The programs surveyed represented the population of about 1675 volunteer water monitoring programs in the US. Stepenuck incorporated survey results into multiple regression analyses to identify those program characteristics that were significantly related to natural resource policy and management outcomes.

Results suggest that volunteer monitoring programs are achieving natural resource policy and management successes (Figure 1). Some key findings:

- Volunteer monitors frequently become civically engaged (e.g., serving on natural resources boards, testifying for or against proposed natural resources policies) at the local and state levels.
- Volunteer monitoring data are commonly used to help identify where and when water quality standards are not being met.
- Programs operating entirely within K-12 schools are associated with fewer reported natural resource policy and management outcomes than those that operate outside of the schools.
- Programs that coalesce around and focus on addressing an environmental crisis, those that have state and/or EPA-approved quality assurance project plans, and those with larger budgets had more policy and management successes than others.

For more information, contact kfstepenuck@wisc.edu or 608-265-38887, or search for Stepenuck's dissertation on Proquest's Dissertation and Theses database.

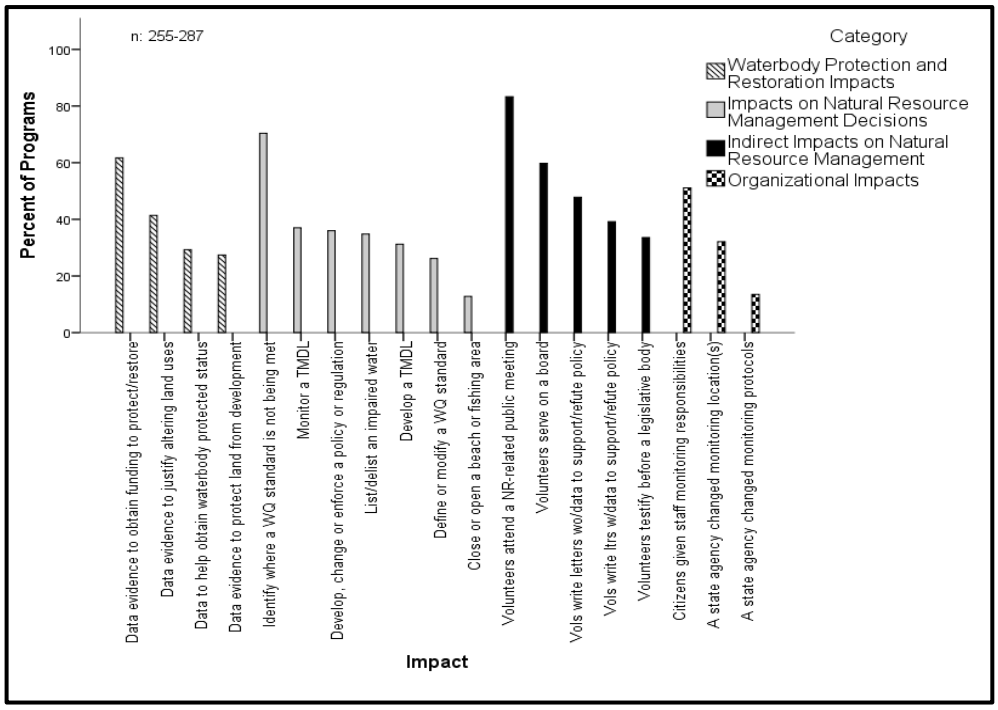


Figure 1: Impacts of volunteer water monitoring programs include those that affect waterbody protection and restoration, natural resource management decisions, natural resource organizations, and volunteer civic engagement. The most commonly reported types of impacts related to volunteer civic engagement and identifying when a water quality standard was not being met.

Tribal News

Tribal Research to Improve Communication of Water Quality Conditions

In order to improve communication about water quality data, the Little River Band of Ottawa Indians (Tribe), along with partnering agencies, evaluated a number of macroinvertebrate and fish biotic indices in use throughout the Big Manistee River watershed in Northern Michigan. Because many different agencies collect water quality data in the watershed, the Tribe sought to ensure that multiple datasets could be used together to make informed management decisions. The project was designed to determine the comparability and suitability of these indices to help interpret data, improve outreach, and communicate findings. The study found that communicating information on the structure of individual indices, their underlying assumptions and the reference conditions upon which they are based is necessary for the proper interpretation and communication of assessment data. This study has assisted the Tribe in improved communication with area partners, its own membership, and the general public. For more information, visit: www.lrboi-nsn.gov/index.php/water-quality-program.

Updates from Workgroups

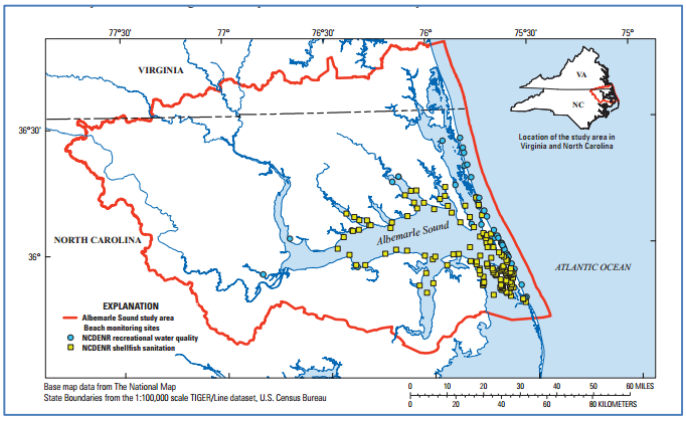
National Monitoring Network

Albemarle Demonstration Project Update

A Water-Quality Monitoring Network for Albemarle Sound has been implemented to examine critical water-quality management issues as a demonstration project for the National Monitoring Network (NMN) for U.S. Coastal Waters and Tributaries. The goal of the NMN is to provide information about the health of our oceans and coastal ecosystems and inland influences on coastal waters for improved resource management. The NMN is an integrated, multidisciplinary, and multi-organizational program using multiple sources of data and information to augment current monitoring programs.

The Albemarle demonstration project's objective is to improve understanding of current and historic water quality in the Albemarle Sound with a specific emphasis on eutrophication. The demonstration project began in Feb. 2012 documented current and historic monitoring and research programs in the Sound, and identified research gaps. One of the gaps was monitoring of nutrients and phytoplankton communities with an emphasis on harmful algal blooms, algal toxins and primary production in the Albemarle Sound. The Albemarle demonstration project has implemented a monitoring program to address this gap and in the first 3 years of monitoring, algal blooms have been observed in the Albemarle Sound. This suggests that cultural eutrophication can be a problem in the Sound during certain conditions and may be an important driver of hypoxia and subsequently the decline of important fisheries in embayments and major tributaries. The state of North Carolina is currently working on developing nutrient criteria for the Albemarle Sound and will utilize information from the Albemarle demonstration project to accomplish this goal (DWR Nutrient Criteria plan, 2014). This project will be used to help build important water quality projects in the Sound such as a real-time continuous monitoring network for harmful algal blooms and other water-quality parameters of concern such as low DO and elevated pH.

To learn more about the project, visit the project's website at: nc.water.usgs.gov/projects/asnmn/



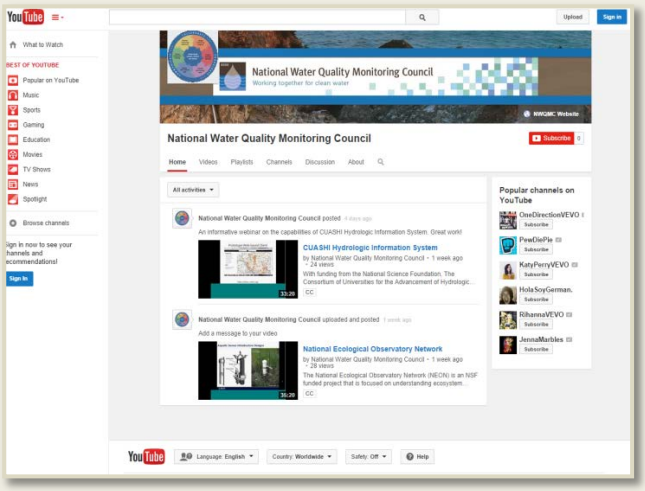
Map of monitoring sites in the Albemarle Sound

Collaboration and Outreach

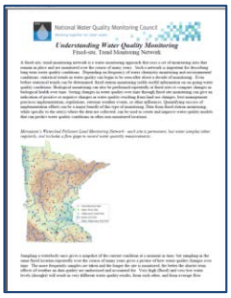
National Monitoring Network: NWQMC YouTube Channel

Did you miss a NWQMC webinar that you really wanted to attend? From now on, you will be able to view webinars on the Council's YouTube Channel! Subscribe to our channel to watch previous webinars or other instructional videos: www.youtube.com/NWQMC.

Our most recent video is Brian Pellerin's talk on "Continuous Monitoring for Nutrients: State of the Technology and State of the Science."



Water Information Strategies



An example of a fixed-site, trend monitoring network Fact Sheet.

New Resource: What Your Manager Needs to Know

Communicating the value of water monitoring programs to decision makers can be challenging in the best of circumstances. In an effort to provide clarity to the myriad of monitoring designs and programmatic pieces for a typical monitoring program, the Water Information Strategies workgroup is developing a series of fact sheets aimed at explaining "what your manager needs to know" about water monitoring.

Fact sheet topics include the design and use of fixed, targeted, probabilistic and effectiveness monitoring programs; uncertainty in monitoring programs; how the use of remote sensing and models can fit within a monitoring program; and continuous versus discrete sampling. The fact sheets are intended to be template documents that can be modified to fit the user's specific needs and locational information or examples. Look for the first fact sheets to show up on the Council web page (acwi.gov/monitoring/) by Spring of 2015.

Tools and Technology

The Nutrient Sensor Challenge: Technology Innovation for Better Nutrient Management

Nutrients are essential for ecosystems and food production. However, excessive levels of nutrients can harm our health, our ecosystems, and our economy. Recent events in Toledo have again highlighted the impacts of nutrient runoff and the resulting harmful algal blooms on precious drinking water supplies and public health. Current methods for measuring nutrient loads are insufficient and costly, which means decisions to reduce excess nutrients and our ability to track the progress of reductions are based on limited data. We need affordable sensors to improve measurement; expand monitoring and forecasting of nutrients in our lakes, rivers, and streams; and ensure the effectiveness of policies that aim to reduce nutrient loads.

Challenging Nutrients, a coalition of federal agencies, universities, and non-profit organizations, is coordinating innovative approaches to develop a suite of effective and affordable sensors to measure nutrients in water and soil. With the Alliance for Coastal Technologies (ACT), Challenging Nutrients recently brought together sensor developers, users, and experts in Washington, D.C., to envision the future for these important technologies. A report from the September workshop, including specific requirements for the upcoming Nutrient Sensor Challenge, will be available in the coming month.

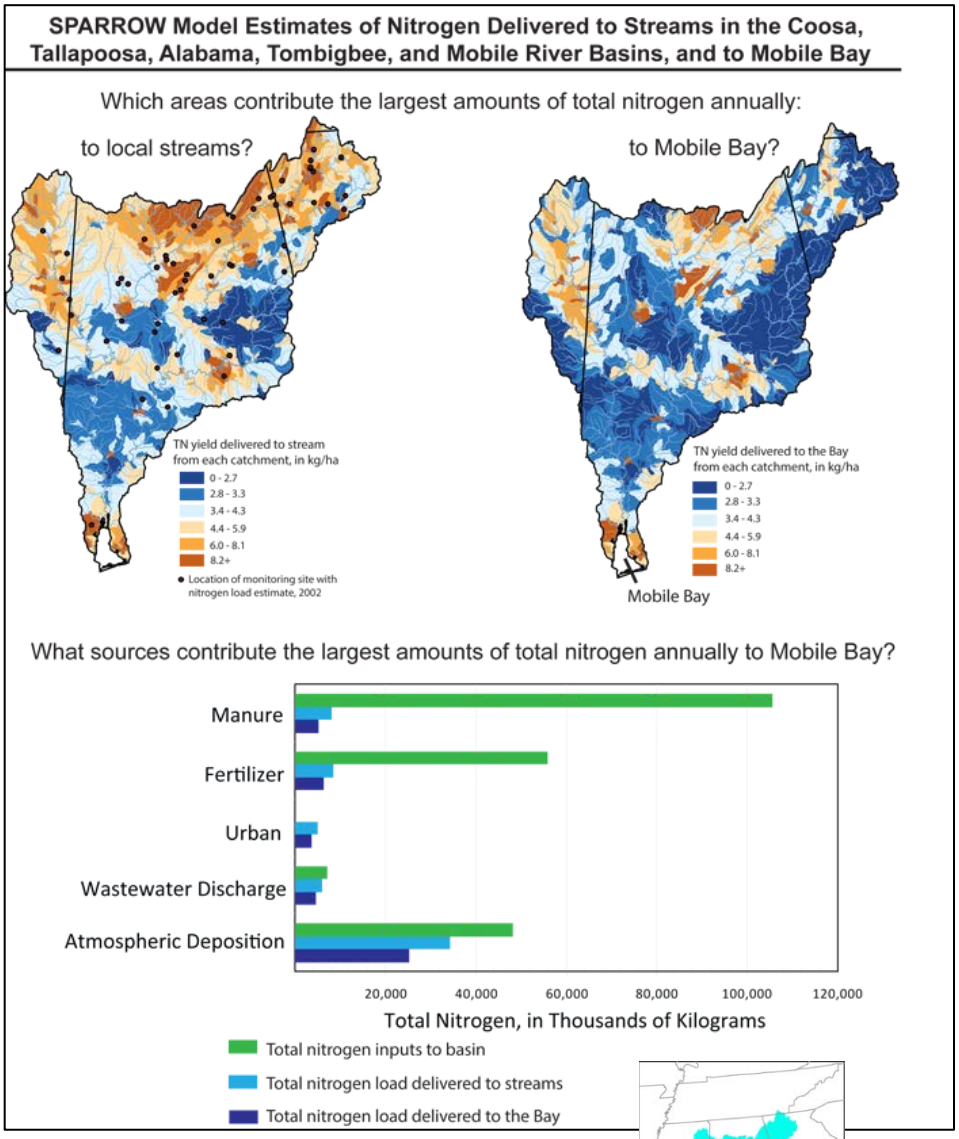
For more information, visit www.nutrients-challenge.org

Assessing Nutrient Inputs to the Nation's Estuaries and Great Lakes

New maps and data tables that describe nutrient source and loading information for major estuaries throughout the conterminous U.S. are now available online at water.usgs.gov/nawqa/sparrow/estuary/index.html. These new web pages describe the major sources and contributing areas of nutrients to 115 estuaries along the Atlantic Coast, Gulf of Mexico, the Pacific northwest coast, and from 160 watersheds draining into the Great Lakes. This combination of national maps and an online decision support system are provided to improve access to water-quality modeling information that can be used in the development of nutrient reduction strategies and to inform nutrient policies across the nation.

In addition to the new web pages, water resource managers interested in a particular stream, reservoir, or estuary can use the online, interactive SPARROW model decision-support system (DSS) to estimate how reductions in nutrient sources affect downstream nutrient loads at a stream outlet. A new reporting feature within the DSS provides summary information on the amounts and sources of nutrients from upstream states or major hydrologic regions. For instance, output from the new reporting feature shows the amount of nitrogen contributed from each of the 31 states that drain into the Gulf of Mexico from the Mississippi River Basin (see example SPARROW model results for Mobile Bay drainage basin). The user can then zoom in to see results for specific subwatersheds.

These maps and data tables were produced using the USGS SPARROW (SPAtially Referenced Regressions On Watershed attributes) nutrient models. The SPARROW models incorporate geospatial data on geology, soils, land use, fertilizer, manure, wastewater treatment facilities, temperature, precipitation and other watershed characteristics from USGS, NOAA, USDA, and USEPA. These data are linked to measurements of stream flow from USGS stream gages and water-quality monitoring data from more than 2,700 sites operated by 73 monitoring agencies. Please contact Mike Woodside (mdwoodsi@usgs.gov) if you have questions regarding this product.



Examples of SPARROW model

Location map showing Mobile Bay Drainage Basin.

Human and Bovine Viruses in the Milwaukee River Watershed

In a study published recently in the journal "Science of the Total Environment", Corsi and others examined the occurrence, hydrologic variability, and seasonal variability of human and bovine (cattle-borne) viruses in surface waters at three locations in the Milwaukee River watershed in Wisconsin during 2007-08. Monitoring sites included urban and rural settings, as well as the Milwaukee River at the mouth (Figure 1). The study was a collaborative effort between the USGS Wisconsin Water Science Center and the USDA-Agricultural Research Service. Samples were analyzed at the Laboratory for Infectious Diseases and the Environment in Marshfield, WI.

In order to characterize virus concentrations that capture the natural variability in streams due to flow variation and diurnal fluctuations, an automated large-volume virus sample collection and filtration system was developed to collect samples over extended durations (Figure 2). This system provided flow-weighted mean concentrations during runoff and extended (24-h) low-flow periods.

Human viruses and bovine viruses were detected by real-time qPCR in 49% of runoff and 41% of low-flow samples (n=63), respectively. All human viruses analyzed were detected at least once including adenovirus (40% of samples), GI norovirus (10%), enterovirus (8%), rotavirus (6%), GII norovirus (1.6%) and hepatitis A virus (1.6%). Three of seven bovine viruses analyzed were detected including bovine polyomavirus (32%), bovine rotavirus (19%), and bovine viral diarrhea virus type 1 (5%). Human viruses were present in 63% of runoff samples resulting from precipitation and snowmelt, and 20% of low-flow samples. Maximum human virus concentrations exceeded 300 genomic copies/L. Bovine viruses were present in 46% of runoff samples resulting from precipitation and snowmelt and 14% of low-flow samples. The maximum bovine virus concentration was 11 genomic copies/L. Statistical modeling indicated that stream flow, precipitation, and season explained the variability of human viruses in the watershed, and hydrologic condition (runoff event or low-flow) and season explained the variability of the sum of human and bovine viruses; however, no model was identified that could explain the variability of bovine viruses alone. Understanding the factors that affect virus fate and transport in rivers will aid watershed management for minimizing human exposure and disease transmission.

Contact Steve Corsi (srcorsi@usgs.gov or 608-821-3861) for more information.

Citation: Corsi, S.R., Borchardt, M.A., Spencer, S.K., Hughes, P.E., and Baldwin, A.K., 2014, Human and bovine viruses in the Milwaukee River watershed: Hydrologically relevant representation and relations with environmental variables: Science of The Total Environment, Vol. 490, pp. 849–860.

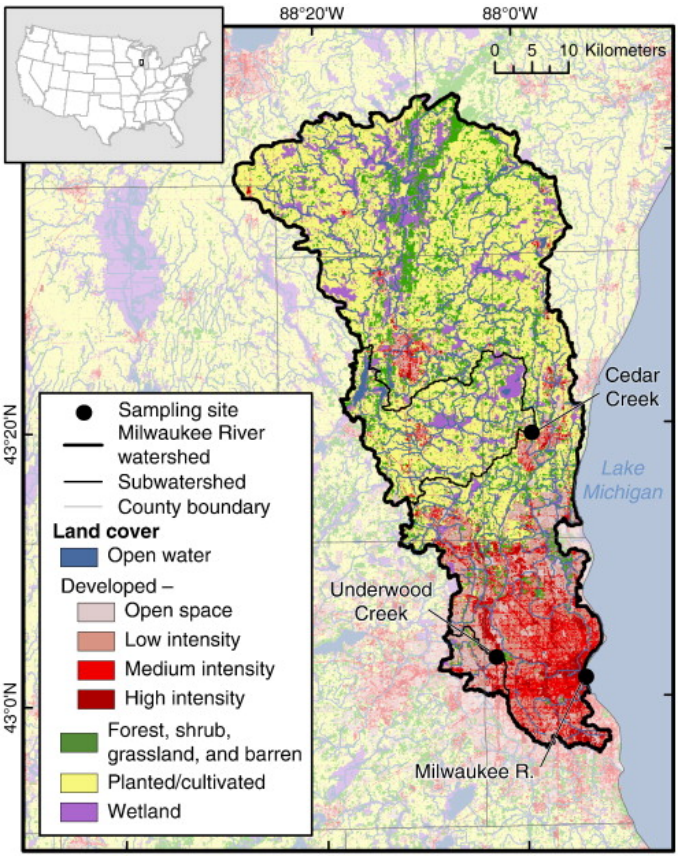


Figure 1. Map of Milwaukee River Watershed, sampling sites, and land cover.

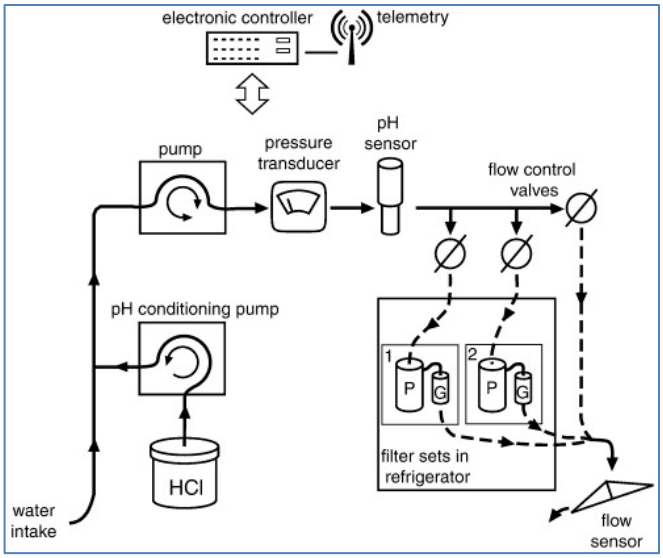
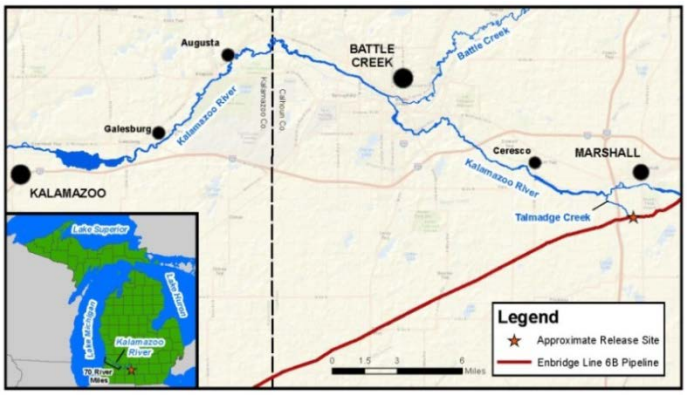


Figure 2. Diagram of the automated large-volume virus sample collection and filtration system. "P" and "G" designations for the filter sets refer to prefilter and glass-wool filter, respectively.

Heavy Crude Oil Spills: Multiple-Lines of Evidence Approach for Assessment and Recovery

One of the largest inland oil spills into a freshwater system in North American history occurred in July 2010 in a tributary of Michigan's Kalamazoo River. More than 843,000 gallons of heavy oil (diluted bitumen or dilbit) were released from the ruptured Enbridge Line 6B in Marshall, MI, Within about 2 weeks of the spill, the bitumen sank from a combination of the volatilization of the diluent and mixing with river sediment. The oil ultimately affected about 40 miles of the Kalamazoo River. By the end of August 2010, the focus of cleanup efforts switched from floating oil to submerged oil. Submerged oil containment and recovery remained the focus of USEPA cleanup efforts through 2014.



Map of Kalamazoo River

The unprecedented scale of impact and massive quantity of oil released from the Line 6B spill required the development and implementation of a multiple-lines-of-evidence approach for submerged oil detection and recovery. This approach had six linked components:

- Geomorphic mapping of depositional areas was the first line of evidence that submerged oil and oiled sediment was found in depositional settings along 40 miles of the Kalamazoo River.
- A field assessment using a sediment poling technique was used to liberate oil from the sediment and the percent coverage of oil sheen and number of globs at the water's surface were recorded.
- Systematic tracking and mapping of the oil sheen reinforced the poling and geomorphic mapping.
- Forensic oil chemistry using oil fingerprinting further reinforced that the sheening was from Line 6B oil. Hydrodynamic modeling helped to confirm areas of the river that switch from depositional to erosional, and is being used as a framework for future models of oil-sediment interactions in freshwater environments.
- A net environmental benefit analysis (NEBA) combined everything we knew about the river to balance the ecological risks of leaving the oil in place or removing it.

Photos from the Kalamazoo River: (A) Oiled soft sediment in the vicinity of the Ceresco impoundment in 2012 and (B) typical oil sheen and globs on the water surface near soft sediment deposits in the Battle Creek millponds in 2013.

Ultimately, the six lines of evidence were used to determine that dredging was necessary in certain areas of the river, including three impoundments and five sediment traps.

Lessons learned from the Line 6B heavy oil release into the Kalamazoo River are:

- A portion of spilled heavy crude oil (dilbit, which is bitumen with one or more lighter petroleum products) will submerge (10-≥20 percent)
- Turbulent river flows of about 1 m/s are adequate for forming oil-particle interactions.
- Oil-particle aggregates form readily in rivers, even in sediment supply limited systems with predominantly silt-sized particles.
- Submerged oil and oiled sediment are readily deposited in quiescent areas of low-gradient rivers.
- Depositional areas with oiled sediment require long-term sheen management.
- Cleanup endpoints will need to consider the ecological implications of leaving submerged oil and oiled sediment in place or removing it.

As of this writing (September 2014), USEPA is transitioning the cleanup to MI DEQ from emergency response status to mitigation. A team of scientists at the USGS, USEPA, USACE, University of Illinois-Champaign-Urbana, and New Jersey Institute of Technology, and private sectors are currently documenting laboratory and flume experiments and transport and fate modeling of oil-particle aggregates involving weathered bitumen (Cold Lake Blend), river sediment, and freshwater. The results from these studies will be helpful for future spills.

Early understanding of the potential fate and behavior of submerged oil when combined with timely, strong conventional recovery methods may significantly influence response success and decrease the potential for oiled sediment to migrate to downstream areas.

For more information about the spill, contact Faith Fitzpatrick (fafitzpa@usgs.gov, 608-821-3818), or see USEPA's web site: www.epa.gov/enbridgespill/index.html.

Further reading: Dollhopf, R.H., Fitzpatrick, F.A., Kimble, J.W., Capone, D.M., Graan, T.P., Zelt, R.B., and Johnson, R., 2014, Response to heavy, non-floating oil spilled in a Great Lakes river environment: multiple-lines-of-evidence approach for submerged oil assessment and recovery: 2014 International Oil Spill Conference Proceedings. http://ioscproceedings.org/doi/pdf/10.7901/2169-3358-2014.1.434

New USGS Report on Dissolved Solids in Streams

A new USGS report available for download at http: pubs.usgs.gov/sir/2014/5012 provides science-based information on where dissolved solids concentrations are elevated and what are the dominant sources contributing to these conditions.

Maps of concentrations, yields, and loads of dissolved solids in streams are available on the online in the form of an interactive decision support tool (Figure 1). The online tool can also be used to evaluate dissolved-solids loads to any user selected watershed outlet or to predict how changes in selected sources of dissolved solids within a selected watershed may change loadings to the watershed outlet.

Please contact David Anning (dwanning@usgs.gov) if you have questions regarding this report.

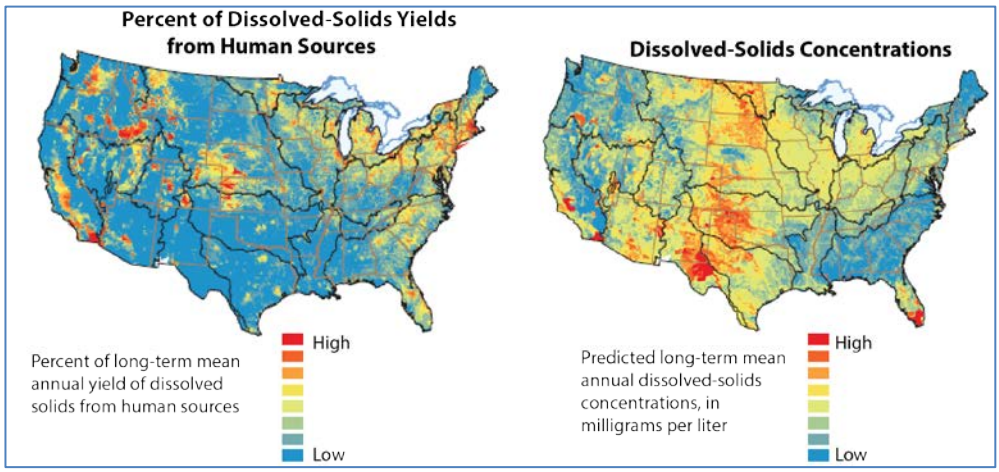


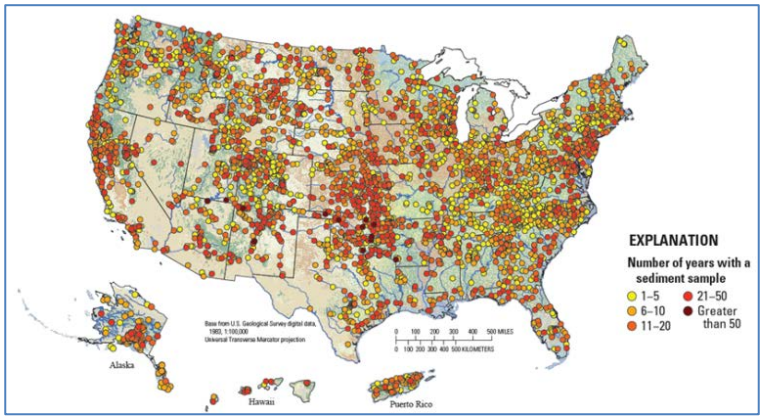
Figure 1. Maps of national distribution of dissolved solids

New USGS Portal Provides Access to More Than a Century of Sediment Data

An online, interactive, sediment data portal (cida.usgs.gov/sediment) has been developed to improve the utility and accessibility of USGS suspended-sediment data to watershed managers, policy-makers, researchers, and the public. This database represents the best available compendium of suspended-sediment data at over 4,900 stream sites in the Nation. Ancillary information on streamflow condition, sediment grain size, sampling method, and landscape condition are also available within the portal.

Since the first samples on the Rio Grande in 1889, the U.S. Geological Survey has been collecting information on sediment transport in streams and rivers in the United States. The portal provides easy access to valuable long-term data sets that can be useful in assessing how landscape modifications are affecting sediment transport in streams and rivers.

A USGS Data report DS776 (pubs.usgs.gov/ds/776/) describes the methods used to recover, quality control, and summarize USGS suspended-sediment data through 2010. Please contact Casey Lee (cjlee@usgs.gov) if you have questions about the sediment portal.

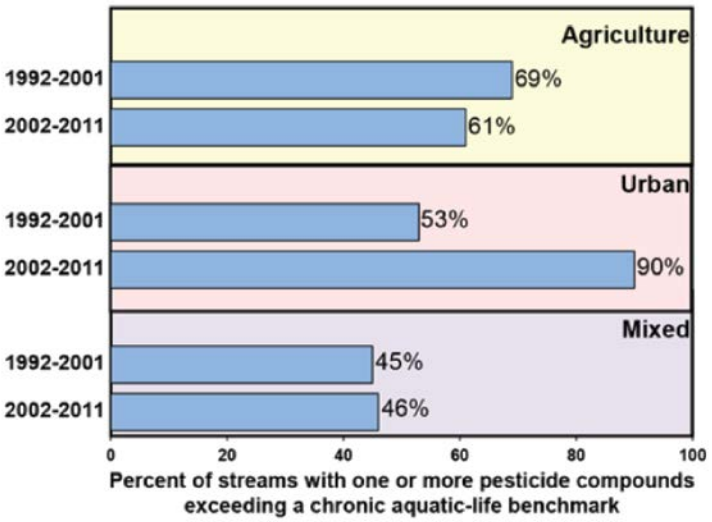


Map of sites with multiple years of sediment data from USGS Data report DS776.

20 Years of Monitoring Indicates Pesticide Occurrence Still a Concern for U.S. Rivers and Streams

Levels of pesticides continue to be a concern for aquatic life in many of the Nation's rivers and streams in agricultural and urban areas, according to a new USGS NAWQA (National Water-Quality Assessment Program) study spanning two decades (1992-2011). In contrast, pesticide levels seldom exceeded human health benchmarks. Over half a billion pounds of pesticides are used annually in the U.S. to increase crop production and reduce insect-borne disease, but some of these pesticides are occurring at concentrations that pose a concern for health of aquatic organisms.

The proportion of streams with one or more pesticides that exceeded an aquatic-life benchmark was similar between the two decades for streams and rivers draining agricultural and mixed-land use areas, but much greater during 2002-2011 for streams draining urban areas (see photo). Since 1992, there have been widespread trends in concentrations of individual pesticides, some down and some up, mainly driven by shifts in pesticide use due to regulatory changes, market forces, and introduction of new pesticides.



Access the article and additional information including data, reports, and maps of pesticide status, trends, and use at water.usgs.gov/nawqa/pnsp/pubs/pest-streams/. Please contact Wes Stone (wwstone@usgs.gov) if you have questions regarding this report

First-of-Its-Kind Report on Condition of Minnesota's Rivers and Streams

How healthy are Minnesota's rivers and streams? How do our land use choices affect water quality and aquatic life? Do conditions vary in different parts of the state? These are some of the questions the Minnesota Pollution Control Agency (MPCA) is working toward answering in its newly published report, "The Condition of Rivers and Streams in Minnesota."

From 1995-2006, and again in 2010-11, the MPCA conducted two statewide water monitoring surveys at randomly selected sites to help researchers characterize the condition of rivers and streams throughout Minnesota. The two surveys were Minnesota's part of the EPA National Aquatic Resources Surveys' (NARS) National Rivers and Streams Assessment.

These probabilistic surveys allow researchers to form conclusions about the condition of rivers and streams across the state with a known degree of certainty, much like a political poll. Information from the two surveys provides insight on current conditions and how different patterns of land use are associated with water quality and aquatic life.

According to MPCA's April Lueck, co-author of the report, a third survey will begin in 2015, which, "combined with this report will help further identify short-term changes, build on our understanding of long-term trends, and aid in the development of watershed restoration and protection strategies throughout the state."

The report found that:

- The likelihood of finding healthy aquatic life in streams is dependent on both natural and human factors.
- Nearly 50 percent of Minnesota's streams have been altered to promote drainage for agriculture and urban development.
- The state was divided into three regions based on soils, vegetation, topography, and land use. River and stream conditions generally range from very good in the northeast region to poor in the southwest region.

The report established baseline conditions for Minnesota's rivers and streams so that future surveys can track changes in overall river health.

To see the report, visit www.pca.state.mn.us/index.php/view-document.html?gid=21234. For more information, contact Glenn Skuta at glenn.skuta@state.mn.us or 651-757-2730.

Announcing the Council's very first PHOTO CONTEST!

We're looking for photos that capture the essence of the Council and its partners' role in promoting water monitoring and protecting our water resources. Send us your best shots of people monitoring, protecting, or simply enjoying water. Check in as our new website is rolled out in Spring 2015 to see if your photo(s) are part of our new look. We need lots of submissions to keep our rotating homepage photos fresh. Please email your photos, along with information on who, what, when and where, and photographer's credits to Candice Hopkins (chopkins@usgs.gov).