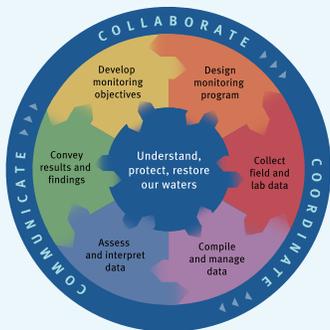


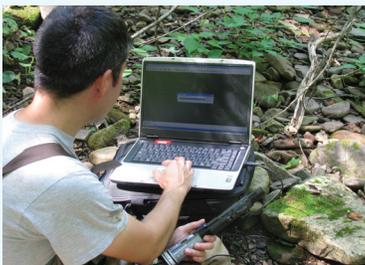
National Water Monitoring News

Highlights

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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.



MDNR biologist downloads conductivity logger data for a baseline stream monitoring program prior to possible Marcellus Shale natural gas development in Western Maryland. (Photo courtesy Maryland Department of Natural Resources)



Monitoring streams draining agricultural fields can help in developing tools that farmers can use to help protect water quality. (Drawing by Benjamin Siebers, USGS)

The National Water Quality Monitoring Council
 Editor: Cathy Tate
 (303) 236-6927 (phone) • email: cmtate@usgs.gov



National Water Monitoring News – Greetings from the Council Co-Chairs

Welcome to the seventh edition of the Council's newsletter!

We are excited to bring you another issue packed full of cutting-edge science and important news from the world of monitoring. Our newsletter has been and continues to be an excellent forum that supports the Council's mission to foster partnerships and collaboration; advance water science; improve monitoring strategies; and advance data integration, comparability, and reporting.

Among the topics you will find in this issue:

- ✓ Mark your Calendar for the Council's **9th National Monitoring Conference** (April 28th – May 2nd, 2014)
- ✓ Council Resource – Webinars on the Water Quality Portal
- ✓ New Tools and Technology:
 - An Inside Look at PhyloChips
 - Enhancements to EPA's STORET Data Warehouse
 - A Decision Support Tool to help Farmers Protect Water Quality in Wisconsin
- ✓ Updates on monitoring including:
 - U.S. EPA's National Aquatic Resource Surveys
 - U.S. Forest Service's NorWest Stream Temperature Database & Model
 - Muskegon Lake Monitoring
- ✓ Spotlight on State programs from Maryland, New Jersey, North Dakota and California
- ✓ Volunteers piloting the Charles River App for monitoring the Charles River near Boston
- ✓ Updates on National Monitoring Networks including:
 - Puget Sound's study as part of the National Monitoring Network for U.S. Coastal Waters and Their Tributaries



We encourage everyone to be an active part of the Council through this newsletter. Please share your successes and challenges in monitoring, announce upcoming meetings and conferences, and share related Internet links and other water-related information. If you have an article idea or would like to write something yourself, don't hesitate to contact our editor, Cathy Tate, cmtate@usgs.gov, (303) 236-6927. New articles and ideas are always welcome!

On behalf of the entire Council and all those who contributed to this issue of our newsletter, thanks for reading and for helping to protect our Nation's waters. We hope you enjoy this newsletter and we encourage your input and future communication!

Sincerely yours,

Michael Yurewicz, USGS Co-Chair
mcyurewi@usgs.gov

Susan Holdsworth, EPA Co-Chair
holdsworth.susan@epa.gov

National Council Highlights

Webinar Series



"Healthy Waters 101: Water Quality Monitoring for Public Health" is just one of the popular webinars in the Council's webinar series providing up to date information and references on the topic.

Timely and informative, our webinar series continues to be an extremely popular means to inform the monitoring community. The webinars attract hundreds of virtual attendees, and the format allows attendees an opportunity to ask questions and discuss ideas with the presenters.

Recent webinar topics have included Cyanobacteria Monitoring in Kansas; CUASHI's Hydrologic Information System; and

Ecological Flows in the Shenandoah River Valley, Virginia. Watch out for future webinars on the Water Quality Portal; the National Ecological Observatory Network (NEON); and updates to the popular National Environmental Methods Index.

All past webinars are archived and available for viewing at: acwi.gov/monitoring/webinars/index.html. Contact: Cathy Tate, cmtate@usgs.gov, (303) 236-6927 with questions or ideas for a future webinar. We welcome any and all great monitoring topics!

Working Together for Clean Water Ninth National Monitoring Conference April 28th – May 2nd, 2014

Make plans now to join us for the Ninth National Monitoring Conference to be held April 28th – May 2nd, 2014. The conference, with around 1,000 attendees in 2010 and 2012, is an exciting opportunity for water practitioners from all backgrounds—including governmental and tribal organizations, academia, watershed and environmental groups, and the private sector—to exchange information, develop new skills, showcase new findings, and highlight recent innovations and cutting-edge tools in water-quality monitoring, assessment, and reporting. More information will be forthcoming later this Spring on the Council's website: acwi.gov/monitoring/

Webinar for Tribes and Volunteer Monitoring Groups Interested in Sharing Data on the Water Quality Portal

The U.S. Environmental Protection Agency's (EPA) Office of Water Storage and Retrieval (STORET) Team held a webinar titled "*Water Quality Exchange: A Tool for Tribes, Volunteer Monitors and Others to Share WQ Data*" on March 13, 2013 to describe how to use EPA's Water Quality Exchange (WQX Web) tool to share water quality data. The webinar included details on how to organize data, populate the WQX Web tool, and submit a file. WQX Web is a web-based data entry tool that enables data owners to upload their data to EPA using a MS Excel based tool. Once data is flowed to EPA STORET using WQX Web, then that data is available through the Water Quality Portal. For more information on STORET, WQX, and WQX Web visit: www.epa.gov/storet/wqx/index.html.

This webinar was the second in a four part series designed to explain the steps and benefits of sharing water quality data via WQX and WQX Web. The first webinar titled "*Using the New Water Quality Portal*" was held on October 23, 2012 and had over 500 participants. It provided an overview of the relationship between the Portal and WQX-Web (water.epa.gov/learn/training/wacademy/archives.cfm#w20121023). The third webinar, to be scheduled in Spring 2013, will describe how to submit biological data; the fourth webinar, to be scheduled in Summer 2013, will describe some commonly experienced user questions with WQX and WQX Web. Visit the Watershed Academy Webcast website for more information on the webinars, including archived past webinars at: water.epa.gov/learn/training/wacademy/webcasts_index.cfm

The Water Quality Portal www.waterqualitydata.us/ is a team effort by the U.S. Geological Survey (USGS), EPA and the National Water Quality Monitoring Council to bring together chemical, physical and microbiological data from USGS's National Water Information System (NWIS) and EPA's Storage and Retrieval Data Warehouse (STORET).

Contributed by: Charles Kovatch, kovatch.charles@epa.gov, (202) 566-0399.



Council Member Updates

Welcome New Council Members!

Monty Porter – States of USEPA Region 6 Representative, Oklahoma Water Resources Board, Oklahoma City, Oklahoma



Monty Porter is a Technical/Quality Manager for the Oklahoma Water Resources Board (OWRB) in Oklahoma City, OK. With a MS in Biology, he has over 20 years of experience related to water quality management and freshwater ecology. Until 2012, he co-managed the OWRB's Beneficial Use Monitoring Program (BUMP). The BUMP is holistic and statewide, collecting physical, chemical, and biological data in streams, rivers, lakes, and groundwater. Through regional, long-term trend and probabilistic networks, the agency provides comprehensive data and analytical products for water management and planning. In his current position, Monty develops products that enhance the agency's data quality, management, analysis, and reporting, and continues participation in a variety of state, regional and national workgroups and committees. Since 2005, Monty has been involved with the design and implementation of the rivers/streams portion of the National Aquatic Resource Surveys and recently served as a state representative for the National Advisory Committee for Aquatic Resources. He also serves as President of the Oklahoma Clean Lakes/Watersheds Association, a state affiliate of NALMS. Monty can be contacted at: maporter@owrb.ok.gov.

Geoff Scott – NOAA Representative, National Centers for Coastal Ocean Science (NCCOS), Center for Coastal Environmental Health and Biomolecular Research, Charleston, South Carolina

Dr. Geoff Scott is currently Director of the National Oceanic and Atmospheric Administration's (NOAA) Center for Coastal Environmental Health and Biomolecular Research (CCEHBR). Since 1990, he has conducted research measuring the health of coastal ecosystems and evaluating the impacts of changing landscape ecology on ecosystem and human health. He has a BS in Biology from Wofford College and a MS and PhD in Marine Science from the University of South Carolina. His research experience also includes: (1) Aquatic Toxicologist, U.S. EPA's Bears Bluff Field Station (1976-80), studying the impacts of water chlorination on estuarine organisms and conducting ecological assessments of oil spill impacts around the world, including assessing impacts of the Ixtoc Well Blowout in the Gulf of Mexico; (2) Director, Toxicology Program and Wide Awake Landing Marine Field Station for Research Planning Institute (1980-84), conducting research on hazardous waste sites impacts, oil spills, and *Vibrio cholerae* outbreaks in the Gulf of Mexico; and, (3) Associate Professor, University of South Carolina's Arnold School of Public Health (1984-90) assessing the impacts of agricultural and urban NPS runoff on coastal ecosystems. Geoff also served as Acting Director for the Center for Human Health Risk, Hollings Marine Laboratory. He holds faculty appointments at the Arnold School of Public Health, University of South Carolina; Marine Biomedicine Program, Medical University of South Carolina; the Marine Biology Program, College of Charleston; and, Texas Tech University's Institute for Environmental and Human Health. Geoff has served on numerous advisory panels (including an EPA panel), the Interstate Shellfish Sanitation Conference, which regulates the harvesting, processing and shipment of molluscan shellfish in the U.S.; SC Governor's Primary Health Care Task Force; the United Nations Gulf of Guinea Large Marine Ecosystem Team Member; Oxford University Roundtable Fellow on Global Climate Change and Sustainability; and State of California Expert Panel on Contaminants of Emerging Concern. Geoff can be contacted at: geoff.scott@noaa.gov.



Glenn Skuta – States of EPA Region 5 Representative, Minnesota Pollution Control Agency, St. Paul, Minnesota



Glenn Skuta has been the Water Monitoring Manager for the Minnesota Pollution Control Agency (MPCA) for three years, and has statewide responsibility for all ambient monitoring of surface and ground water. Prior to that, he served in various capacities in the watersheds and TMDL program areas since 1996. He began his career at the MPCA in 1990. Glenn is also currently serving on the Upper Mississippi River Basin Association (UMRBA) Water Quality Task Force. He has a BA in both Biology and Philosophy from St. John's University, Minnesota. Glenn loves outdoor recreation, including running, backpacking, biking, canoeing, and camping. Glen can be contacted at: glenn.skuta@state.mn.us.

Erik Host-Steen – Industry Representative, Hach Hydromet, Loveland, Colorado

Erik is a product marketing manager with the Hach Company based in Loveland, Colorado. His role is part of Hach Hydromet which is a group focused on environmental water monitoring. While Erik is primarily responsible for the Hydrolab brand of multiparameter water quality instruments, he also works closely with the Sea-Bird Electronics, WET Labs, Satlantic, and Hach product teams. His 16-year career has been spent in various product development, sales, marketing, and business development roles in specialty materials and measurement instrumentation manufacturing businesses, the last five of which has focused on environmental water quality instruments with Hach. This professional experience is built on an academic foundation of a BS in Chemistry, MS in Environmental Engineering, and an MBA. Erik is eager to build on his contributions to the Aquatic Sensor Workgroup of the Methods and Data Comparability Board and to leverage the diversity of his background to bring valuable perspectives and contributions to the Council. Erik can be reached at: ehostste@hach.com.



Thanks to Outgoing Council Members!

The Council bids farewell to Gary Kohlhepp and Chris Piehler who have provided exceptional representation on behalf of their organizations.



Gary Kohlhepp represented the States in EPA Region 5 for the Council and Michigan Department of Environmental Quality on the Council for four years. Gary was an active member of the Water Information Strategies workgroup and Chair of the Council's Awards Committee for the 2010 Denver and

2012 Portland National Monitoring Conferences. Gary spearheaded the development of a Council white paper, "What Your Boss Needs to Know about Monitoring" – a guide to helping technical staff explain the importance of monitoring to managers and other decision makers. Gary brought not only his practical experience and technical expertise to the Council but also an infectious smile and genuine friendliness that made him a pleasure to work with. We wish Gary continued success at Michigan DEQ.



Chris Piehler represented the States in EPA Region 6 for the Council and the Louisiana Department of Environmental Quality. Chris was an active member of the Water Information Strategies workgroup providing valuable insight on a new Council initiative aimed at helping States and municipalities conduct

monitoring related to natural disasters and spills. His experience dealing with flood water monitoring during Hurricane Katrina provided a blueprint for action during the Midwest Floods of 2008 and in the Northeast United States with Hurricanes Irene and Sandy. He also hosted the Council meeting in New Orleans in 2011. Chris served six years on the Council after kindly extending his service by two years to continue his involvement in preparations for the 8th National Monitoring Conference. We'll miss his "Big Easy" style and many contributions to the Council. Chris retired from State service (congratulations Chris!) and we wish him the best as he embarks on new and exciting adventures.

Collaboration Through Partnerships

Federal Partnerships

NorWeST: A Comprehensive, Interagency Stream Temperature Database and Model for the Northwest U.S.

Large amounts of stream temperature data have been collected during the last two decades. Moreover, legislative mandates to maintain temperatures below certain thresholds, concern over climate change, and decreasing costs of data acquisition have accelerated the rate at which stream temperature data are being collected. Until recently, strategic coordination of these collection efforts within and among agencies was lacking and many redundancies exist. The U.S. Forest Service, NOAA, Commonwealth Scientific and Industrial Research Organisation, Trout Unlimited, and U.S. Geological Survey are working collaboratively with funding from the Great Northern Landscape Conservation Cooperative to address the issues associated with temperature monitoring and the effects of climate change on several fronts (greatnorthernlcc.org/technical/stream-temp).

The NorWeST stream temperature database

First, a comprehensive, interagency stream temperature database across a five state area in the Northwest U.S. was developed. The NorWeST (**N**orthwest **W**est **S**tream **T**emp) temperature database contains > 45 million hourly temperature recordings at > 15,000 unique stream sites (Figure 1) from data collected by hundreds of aquatic professionals from more than 60 organizations. The NorWeST database may be the largest in the world and estimates to replicate the database from scratch would require an investment of approximately \$10,000,000.

Stream climate information from data

Second, the NorWeST temperature database was used to develop accurate stream temperature models, which will then be used to develop a consistent set of historic and future temperature scenarios for all 350,000 stream kilometers across the project area. Using a new type of spatial statistical model for stream networks (www.fs.fed.us/rm/boise/AWAE/projects/SpatialStreamNetworks.shtml), the first temperature models and climate scenarios have been developed for streams in the Salmon and Clearwater River basins that encompass approximately 40,000 stream kilometers in central Idaho (Figure 2). The models use nationally available geospatial data layers to provide flexibility for future expansion of the model to other parts of the U.S. Stream temperature data organization and model development are currently ongoing for the remainder of Idaho, Montana, and Wyoming, with anticipated completion dates in spring of 2013. Stream temperature data for Oregon and Washington will be subsequently addressed through the remainder of 2013. Additional details regarding the stream temperature models are documented at the NorWeST website.

Disseminating information

A third goal is to openly distribute NorWeST stream temperature information for use in more efficient decision making, monitoring and planning efforts. A variety of geospatial stream temperature data products, which can be displayed in ArcMap and used for spatial database queries, are available at the NorWeST website (www.fs.fed.us/rm/boise/AWAE/projects/NorWeST.html). Data contri-

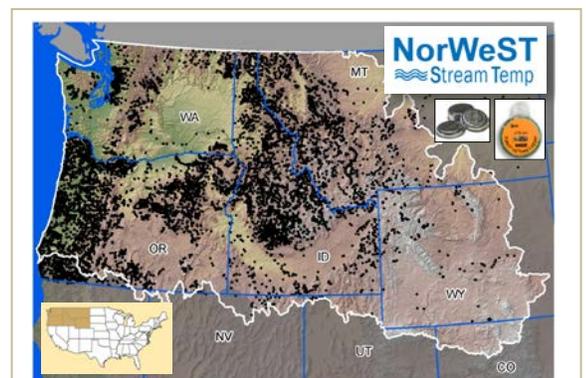


Figure 1. Locations of stream temperature data in the NorWeST database.

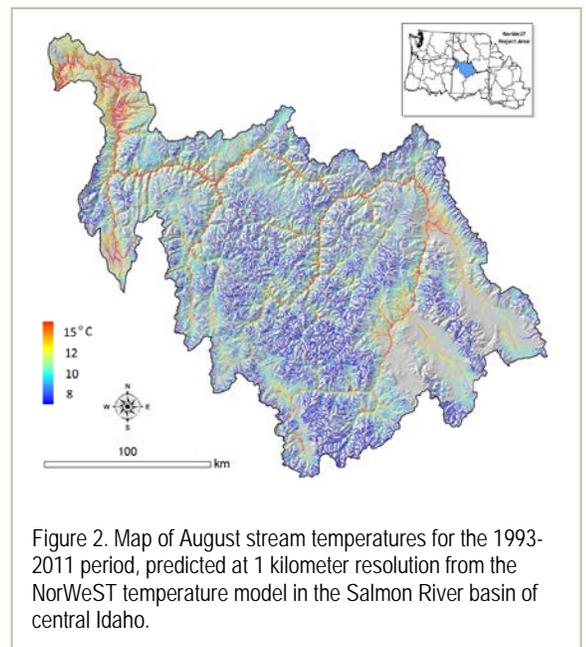


Figure 2. Map of August stream temperatures for the 1993-2011 period, predicted at 1 kilometer resolution from the NorWeST temperature model in the Salmon River basin of central Idaho.

butors will be notified as temperature data products are developed and finalized within a river basin and posted on the website. Initial responses to data products for the Salmon and Clearwater River basins have been very positive and download activity from the NorWeST website shows substantial use by resource professionals.

The value of better information

Although the raw data assembled in NorWeST are valuable, a much greater value will accrue over time from the improved efficiencies and decision making that accurate geospatial temperature data provide. A series of complimentary projects that use NorWeST model outputs are being developed in parallel, including: 1) regional temperature and biological monitoring protocols, 2) vulnerability assessments for sensitive species, 3) decision support tools, 4) consistent thermal niche descriptions for aquatic species, and 5) improved bioclimatic models and projections. As the NorWeST project progresses, it is developing considerable interest and support across the region, stimulating collaborations and coordination among dozens of resource agencies, and serving as a model for initiatives in other parts of the country through the Landscape Conservation Cooperative system.

For more information contact: Dan Isaak, U.S. Forest Service, disaak@fs.fed.us, (208) 373-4385.

USEPA Update: National Aquatic Resource Surveys

Working with partners in the states, tribes, and other federal agencies, the U.S. Environmental Protection Agency (USEPA) is leading a series of statistical surveys of the nation's waters known as the National Aquatic Resource Surveys (NARS). As we begin 2013, significant accomplishments have been made in the surveys of rivers and streams, lakes, coastal waters, and wetlands.

- **National Rivers and Streams Assessment (NRSA):** The draft NRSA 2008-2009 was released in March 2013 for public comment. This is the first national study of the overall biological condition of U.S. rivers and streams conducted using a probability-based approach. (See related story below). In addition, the NRSA has nearly completed its design and planning for the 2013-2014 sampling season. Indicators have been selected and field and lab manuals are being finalized. Sampling for the next stage of the NRSA begins in early summer 2013.
- **National Lakes Assessment (NLA):** Steady progress continues on data processing and management of 2012 field data for all indicators. The project plans on beginning data analysis in fall of 2013 for the second NLA report, planned for 2014.
- **National Coastal Condition Assessment (NCCA):** This survey is currently wrapping up its data validation phase and will be embarking on data analysis and report writing, with a report – the first under the NARS program -- scheduled to be released for public comment in late 2013.
- **National Wetlands Condition Assessment (NWCA):** This first-ever survey of the ecological integrity of the nation's wetlands is also in its data validation/data analysis phase. Data processing and management of field and lab data is continuing. A session on the NWCA and the use of monitoring and assessment data to inform wetland management will be held with the Association of State Wetland Managers annual meeting in March.



NWCA soil team conducting field analysis at a soil pit in an Illinois wetland. (Photo courtesy Illinois Natural History Survey)

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.

New Release: USEPA's Draft National Rivers and Streams Assessment 2008-2009

In March, the U.S. Environmental Protection Agency (USEPA) released the latest in its series of National Aquatic Resource Surveys for public comment; this draft report summarizes the biological condition of the nation's rivers and streams. Field sampling for the National Rivers and Streams Assessment (NRSA) was conducted in collaboration with states and tribes during the summers of 2008-2009 using standardized field protocols and following a probability-based approach. USEPA has produced a report using a similar approach for small streams (*The Wadeable Streams Assessment*), for lakes and reservoirs (*The National Lakes Assessment*), and for estuaries and coastal waters (*The National Coastal Condition Reports*). Key findings of the NRSA include the following:

- 55% of the nation's river and stream miles do not support healthy populations of aquatic life. Fair conditions are found in 23% of river and stream miles, while 21% are in good condition and support healthy biological communities.
- Of the stressors that were examined, phosphorus and nitrogen are by far the most widespread: 40% of the nation's river and streams miles have high levels of phosphorus, and 27% have high levels of nitrogen. Rivers and streams are at increased risk for poor biological condition when phosphorus and nitrogen pollution levels are high.
- Poor vegetative cover and high amounts of human disturbance near river and stream banks are also widespread, reported in 24% and 20% of the nation's river and stream miles respectively.
- The report assessed two indicators relevant to human health: enterococci bacteria and mercury in fish tissue. In 9% of U.S. river and stream miles, enterococci exceed thresholds protective of human health. In addition, over 13,000 river miles are found to have mercury in fish tissue at levels that exceed human health screening values.
- Compared to the findings of the 2004 *Wadeable Streams Assessment*, the NRSA finds 7% fewer stream miles in good biological condition and 19% fewer stream miles in good condition for phosphorus. However, the report also finds more stream miles in good condition for nitrogen and for three stream habitat indicators.

The draft NRSA, a fact sheet on the report, the data upon which it is based, and its supporting technical document are available at: www.epa.gov/aquaticsurveys. Printed copies of the report will not be available until the comment period ends and final approval occurs. For more information on the NRSA, contact: Ellen Tarquinio, Tarquinio.Ellen@epa.gov, (202) 566-2267.



NRSA field crew collecting macroinvertebrates in a small stream. (Photo courtesy U.S. EPA)

Regional Partnerships

Muskegon Lake Monitoring Buoy is a Resource for Scientists, Educators, Students, and Public

In spring 2011, Annis Water Resources Institute (AWRI) associate professor Bopi Biddanda and research assistant Scott Kendall launched a state-of-the-art environmental and water quality monitoring buoy in Muskegon Lake, situated literally a stone's throw away from the Institute's backdoor. One of the largest watersheds in the state, the Muskegon Lake watershed, drains into its namesake lake at one end, ultimately flowing through a channel into Lake Michigan on the other side.

AWRI, housed at Grand Valley State University in Muskegon, Michigan, is a multidisciplinary research organization with the mission to integrate research, education, and outreach to enhance and preserve freshwater resources.

Due to a history of industrial pollution and degraded environmental conditions in and around the lake, it was included as one of the 43 sites that were designated as a Great Lakes Area of Concern (AOC). AOCs are designated geographic areas within the Great Lakes basin that show severe environmental degradation. The Muskegon Lake Observatory (MLO) project was funded by a grant from the US EPA Great Lakes Restoration Initiative program as a tool to bolster monitoring efforts in this sensitive aquatic system.

The MLO consists of a five-foot diameter surface buoy that houses a weather sensor, data logger, along with solar panels and a battery pack to power the system. Under the water is a subsurface buoy holding up a vertical string of sensors anchored to the lake's bottom. The sensors collect water quality data at multiple depths in the water column. Physical, chemical, and biological data collected by the MLO are transmitted via wireless telemetry back to the lab where they are stored and quality-controlled before being posted to the project website (URL provided below), all within a matter of minutes. The project has already achieved several successes:

- Most of the MLO time-series data can be accessed on the project website. An advanced interactive data graphing tool has been developed for the site, improving data accessibility.
- A wealth of baseline data has been collected that can be used in future studies to determine how the lake responds to changing environmental conditions due to the effects of climate or land use changes, or to assess the effectiveness of ongoing restoration efforts.
- In keeping with the educational mission of AWRI, the project involves graduate students and undergraduate interns in hands-on research experiences on water quality issues.
- Hundreds of grade 4 -12 students are exposed each year to MLO's time series information in real time during their onboard educational voyages on the R/V *W.G. Jackson*.
- Project organizers are developing collaborations with local teachers to bring MLO's lake data directly into classrooms, connecting students to their local environment while they learn about grade-specific scientific concepts and principles.
- The general public, boaters and fishers in particular, are using the real-time data to observe current conditions on the lake.

For additional information contact: Dr. Bopi Biddanda, Principal Investigator, biddandb@gvsu.edu, (616) 331-3978; Scott Kendall, Observatory Manager, kendalsc@gvsu.edu, (616) 331-8795; Leon Gereaux, Graduate Research Assistant, gereauxl@mail.gvsu.edu, (616) 331-8795; or visit the project website at: www.gvsu.edu/wri/buoy/.



Students observing the Muskegon Lake Observatory buoy from onboard the Grand Valley State University's Research Vessel *W.G. Jackson*.
(Photo courtesy Bopi Biddanda)

Spotlight on States

Maryland Water Monitoring Council Holds 18th Annual Conference

The Maryland Water Monitoring Council (MWMC) held its 18th annual conference on December 6, 2012 at the Maritime Institute near Baltimore. The conference theme was *What Else is in Your Water?: From Arsenic to Zinc*. The day started with a morning plenary session that included an inspiring talk by US EPA Deputy Secretary Bob Perciasepe and the Council's annual Carl Weber Award for leadership and volunteerism in advancing the monitoring of Maryland's waters. Concurrent session topics included Headwaters, Chesapeake Bay Contaminants, and Citizen Science, Marcellus Shale, Road Salt, Fish Tumors, Mercury, Groundwater and Public Access to Environmental Information. The agenda included 42 oral presentations, 34 posters, the first-ever MWMC Student Poster Award (\$50 cash prize), and plenty of time for networking.

To learn more about the 2012 Annual Conference and other MWMC activities, go to: www.marylandwatermonitoring.org, or contact: Dan Boward, Maryland Dept. of Natural Resources, dboward@dnr.state.md.us, (410) 260-8605.



Charlie Conklin (second from right) receives the MWM Annual Carl Weber Award. (Photo by Dan Boward)



Shelby Servais receives the MWM Student Poster Award from Award Committee Chair Kevin Brittingham. (Photo by Dan Boward)

New Jersey's 2012 Water Monitoring Summit



On November 28 and 29, the 9th NJ Water Monitoring Summit was held at Rutgers University's EcoComplex in Columbus, NJ. The Summit was co-sponsored by the NJ Department of Environmental Protection (NJDEP), the NJ Water Monitoring Council (NJWMC), and NJ's volunteer monitoring Watershed Watch Network. During the Summit, 120 members of the State's ambient water monitoring community exchanged information and participated in training through 7 plenary, 43 platform, 9 posters presentations and 2 training sessions. Plenary talks featured presentations on a National Water Monitoring Perspective and National Surveys (Ellen Tarquinio - EPA HQ Office of Water), Wetlands Conditions in NJ and the National Wetlands Survey (Kathleen Walz - NJDEP), the National Water Census and a Delaware River Focus Study (Jeff Fisher - USGS NJ Water Science Center), and Use of New Tools for Ocean Observing in Coastal Waters (Josh Kohut - Rutgers University). National perspectives were also shared by Leslie McGeorge (NJDEP) who presented National Water Quality Monitoring Council activities and Nate Booth (USGS) who discussed the new National Water Quality Portal (Portal), which is a USGS, EPA and National Council product.

Platform and poster presentations included the following topics: continuous monitoring, stormwater monitoring, new biological tools, mercury (sources, TMDLs, and tissue monitoring), groundwater monitoring, stressor identification/source trackdown, microbiological tools, monitoring to support dam restoration, emerging volunteer monitoring applications, streamflow monitoring, the Barnegat Bay partner-based water quality project, and accessing /communicating water information. Training sessions focused on Quality Assurance Project Plan (QAPP) development, as well as access to water quality data from various national and state websites, including the Portal, USGS' NWIS, EPA's STORET, and NJ's Water Quality Data Exchange System.

Attendees included representatives from federal and state government, interstate agencies, environmental and regional planning commissions, academia, watershed associations, water treatment and electric/gas companies, environmental non-profit groups, regional planning associations, and NJ's AmeriCorps watershed ambassadors.

Information from the 2012 Summit (agenda, presenters' bios/abstracts and presentations) is available online at: www.state.nj.us/dep/wms/2012_summit.htm.

Contributed by: Leslie McGeorge, leslie.mcgeorge@dep.state.nj.us, and Alena M. Baldwin-Brown, alena.baldwin-brown@dep.state.nj.us, NJDEP.

Maryland Initiates Baseline Stream Monitoring in Advance of Marcellus Shale Natural Gas Development

The Marcellus Shale formation clips the western edge of Maryland, where gas exploration is confined to Garrett and Allegany counties. This region, 70% forested land, is rich in natural resources, with many high quality streams. On June 6, 2011, Governor Martin O'Malley established the Marcellus Shale Safe Drilling Initiative, which will determine whether and how Marcellus Shale gas development can be accomplished in Maryland without adverse impacts to public health, safety, the environment and natural resources. A final report is due August 1, 2014.

Realizing the importance of pre-drilling (baseline) data to assess impacts related to Marcellus Shale gas development on surface waters, the Maryland Department of Natural Resources (MDNR) began a pilot stream monitoring program in Garrett County during summer 2011. Baseline data establishes the range of current stream conditions that will serve as a reference point for comparison in the future, if Marcellus Shale natural gas development occurs.

MDNR established monitoring stations on 12 stream reaches associated with Marcellus Shale gas interests and began collecting continuous conductivity and temperature data, indicators of stream health based on benthic macroinvertebrates and fish, physical habitat measurements, and a suite of water quality parameters.

In March 2012, MDNR organized the Marcellus Shale Stream Monitoring Coalition (MMC), a network of non-profit organizations, colleges, and interested citizens, with a goal of collecting weekly water quality and biological data from streams to help characterize baseline conditions and improve spatial coverage. Currently, 70 MMC volunteers are monitoring 62 stream reaches in Garrett County with direct oversight by MDNR staff. The baseline stream data collected by MDNR staff and MMC volunteers (for a total of 74 monitoring locations) is available at www.dnr.maryland.gov/streams/marcellus.asp.

To communicate baseline stream monitoring results and future plans, and also learn from scientists in Pennsylvania and New York, MDNR staff participated in a MD Water Monitoring Council-sponsored workshop "*Water Resources Monitoring and Marcellus Shale Gas Development in Western Maryland: What Do We Have, What Do We Need?*" Information on the workshop can be found at: mddnr.chesapeakebay.net/MWMC/MWMC2010/2012MarcellusConference.asp

MDNR plans to continue stream monitoring and support volunteer monitoring efforts in Garrett County in 2013 and beyond. Data are currently being collected from less than 15% of the stream reaches in Garrett County that could be affected by natural gas development. However, if Maryland proceeds with Marcellus Shale gas development in the future, MDNR has developed a detailed monitoring plan that, if implemented, will be able to assess potential impacts from gas development to Maryland's surface waters.

For additional information, contact: Dr. Ronald Kluda, rkluda@dnr.state.md.us, (410) 260-8615, Tony Prochaska, tprochaska@dnr.state.md.us, (410) 260-8616 or Michael Kashiwagi, mkashiwagi@dnr.state.md.us, (410) 260-8622.



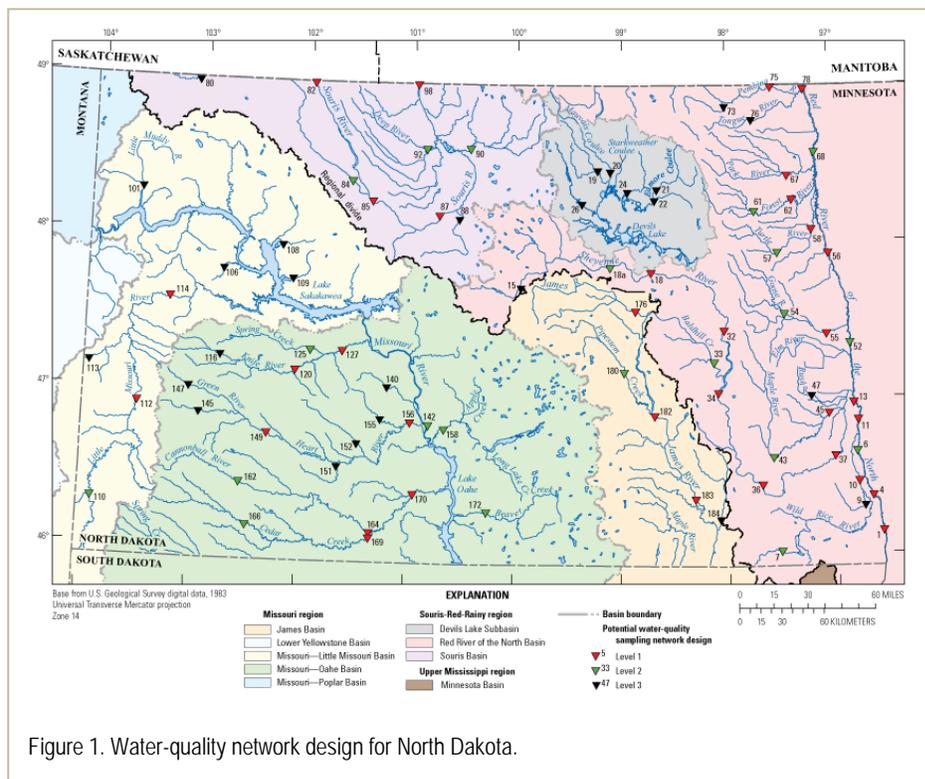
Volunteers are trained to use hand-held water quality meters for Marcellus Shale monitoring. (Photo MDNR).

Stream Water-Quality Network in North Dakota

Streams in North Dakota have been monitored for water quality by multiple agencies over the years. Like many other states, the various programs and projects in North Dakota have different goals and objectives and some of the programs overlap spatially and temporally, and their water samples are analyzed by multiple laboratories for a variety of analytes. Although the data collected by these entities provide valuable information on the quality of water in streams of the State, a more efficient and cost-effective approach was needed in these times of shrinking resources.

In response to the need to evaluate the efficiency of the state-wide sampling programs, a study was conducted by the U.S. Geological Survey (USGS) in cooperation with the North Dakota State Water Commission (NDSWC) and the North Dakota Department of Health (NDDH) to examine the large amount of historic water-quality data across North Dakota. The objective was to describe existing water-quality data and to determine an efficient state-wide sampling design to monitor future water-quality conditions (Galloway and others, 2012¹). Spatial and temporal variability, trends, and loads of selected major ions, nutrients, and trace metals were analyzed.

The redesigned monitoring program for North Dakota was implemented in October 2012 by the USGS, NDSWC, and NDDH. The monitoring sites are sampled at one of 3 frequencies (Figure 1). A network of thirty-four level 1 sites are sampled 8 times per year: twice in April, once each in May, June, July, August, and October, and one time in the winter (January) under ice-cover conditions. There are twenty-one level 2 sites that are sampled 6 times per year: once each in April, May, June, August and October and once under ice during the winter (January). The twenty-six level 3 sites are sampled 4 times per year: once each in April, June, August and October. Samples collected at level 1 sites are analyzed for major ions, trace elements, nutrients, total suspended solids, and *E. coli* fecal-indicator bacteria by the NDDH laboratory in Bismarck, ND. Samples collected at design level 2 and 3 sites will only be analyzed for major ions, trace elements, and nutrients.



For more information contact: Joel Galloway, jgallowa@usgs.gov, (701) 250-7402, or Mike Ell, mell@nd.gov, (701) 328-5218.

¹Galloway, J.M., Vecchia, A.V., Vining, K.C., Densmore, B.K., and Lundgren, R.F., 2012, Evaluation of water-quality characteristics and sampling design for streams in North Dakota, 1970–2008: U.S. Geological Survey Scientific Investigations Report 2012–5216, 304 p. Publication can be found at: pubs.usgs.gov/sir/2012/5216/

Trash Monitoring Data in Southern California Used to Support Ban on Plastic Bags in the City of Los Angeles



A stream site assessed for trash in the Stormwater Monitoring Coalition's Regional Monitoring Program. (Photo courtesy of Ted von Bitner)

Monitoring data on trash helped the Los Angeles City Council decide to ban plastic bags in the City of Los Angeles. On May 23, 2012, the Los Angeles City Council voted to phase out single-use plastic bags over a time period of 16 months. The plastic bag ban will begin after a four-month environmental impact report of the bag ban is complete and after the council adopts an ordinance. The monitoring data were collected under a southern California regional monitoring program conducted by the Stormwater Monitoring Coalition (SMC). The SMC program, started in 2009, involves 14 regulated, regulatory and research entities located in southern California. Sampling sites in streams were usually sampled and analyzed for biological community characteristics, chemical parameters, aquatic toxicity, and physical habitat condition. In 2011, trash assessments were added to the SMC program.

This regional trash assessment, led by Dr. Ted Von Bitner from the Orange County Public Works Department, is one of the first probabilistic surveys of this type in the nation, and provides the first estimates about the true extent of trash in coastal watersheds in the region. The results from the trash assessment showed that plastic bags were the most prevalent trash item present in southern California's streams representing nearly 20% of all items found during the survey — more than any other type of trash encountered. The SMC study has also shown that approximately 73 percent of stream-miles in southern California were estimated to be affected by trash and that accessibility and proximity to roads greatly increased the amount of trash observed.

Trash assessments will continue to be a part of the SMC program. In addition, beginning in 2013, the Southern California Bight Regional Monitoring Program will include debris monitoring as a focus in the multi-agency effort. The Bight program is a large scale regional survey conducted every five years by a partnership of more than 60 organizations collaborating to address common important management questions, mostly in the nearshore and marine environments. This collaborative effort to study debris in the offshore, nearshore, and estuarine coastal waters in southern California, along with data from the SMC trash monitoring in streams, will provide decision-makers with a comprehensive picture about debris and trash and provide scientifically based information about how to address trash in southern California.

Contributed by: Dr. Ted von Bitner, Orange County Public Works, Theodore.VonBitner@ocpw.ocgov.com, Dr. Lilian Busse, San Diego Water Board, LBusse@waterboards.ca.gov, and Dr. Raphael Mazor, Southern California Coastal Water Research Project, raphaelm@sccwrp.org

For additional information go to:

www.sccwrp.org/ResearchAreas/RegionalMonitoring/WatershedRegionalMonitoring.aspx

www.socalsmc.org/

www.sccwrp.org/ResearchAreas/RegionalMonitoring/BightRegionalMonitoring.aspx

Volunteer Monitoring News

Charles River App Project



Volunteer submitting data to an online database using the Charles River App. (Photo courtesy CRWA)

The Charles River Watershed Association (CRWA) is working with a local technology firm to develop a smart phone application (App) that allows its volunteer monitors to submit data to an online database directly from their monitoring sites using their smart phones.

The CRWA App, which is currently only compatible with the Android platform, allows volunteer monitors to upload temperature and depth readings, site observations and descriptions, and geo-located photos directly to an online database. Data submission via the Charles River App will replace the paper datasheets which the volunteers currently use. Volunteers can also use the App to report and upload information about suspicious or unusual river conditions or interesting wildlife sightings.

CRWA is presently piloting the App with a small group of volunteers but hopes it will be adopted broadly over the coming year. The ultimate goal is for the App to be widely used by the Charles River recreational community to report river observations directly to CRWA scientists, vastly increasing the CRWA's powers of observation across its 308-square mile watershed. Additionally, CRWA is partnering with a local school to develop an interactive website that allows students to easily view, analyze, and create reports with data collected through the App.

The Charles River is a vital asset to the metropolitan Boston area and surrounding communities, providing numerous ecosystem and economic benefits. However, despite a notable cleanup effort led by CRWA and a dramatic decrease in bacterial pollution, the Charles River still faces many threats which are challenging to understand, address, and communicate to the general public. The Charles River is currently threatened by nutrient pollution, which alters the natural ecosystem balance and increases the risk of harmful algal blooms, and is exacerbated by deteriorating infrastructure and the effects of climate change. The Charles River App should serve as a valuable communication tool in addressing these complex issues by engaging the community in scientific study and information sharing.

Contributed by: Julie Wood, Senior Scientist, Charles River Watershed Association, jwood@crwa.org

Timing Farm Activities in Wisconsin Can Help Protect Water Quality

Farmers in Wisconsin can help protect water quality by timing their field activities to avoid weather and soil conditions that often lead to runoff, according to a study by the U.S. Geological Survey, University of Wisconsin, and other partners. A web-based decision support tool, the Wisconsin Runoff Risk Advisory Forecast Map (www.manureadvisorysystem.wi.gov/app/runoffrisk), can help producers make informed decisions about performing land management activities with the least impact to water quality. This interactive map categorizes future runoff risk for 214 moderately sized watersheds based on outputs from the National Weather Service's Sacramento Soil Moisture Accounting Model.

This model takes antecedent conditions into account, as well as forecast precipitation, in an attempt to help farmers time applications of fertilizers or manure to periods when the risk of runoff is minimized. Using information from a cooperative study between Federal, state, and university researchers (pubs.usgs.gov/sir/2011/5008/) the time periods and conditions when sediment



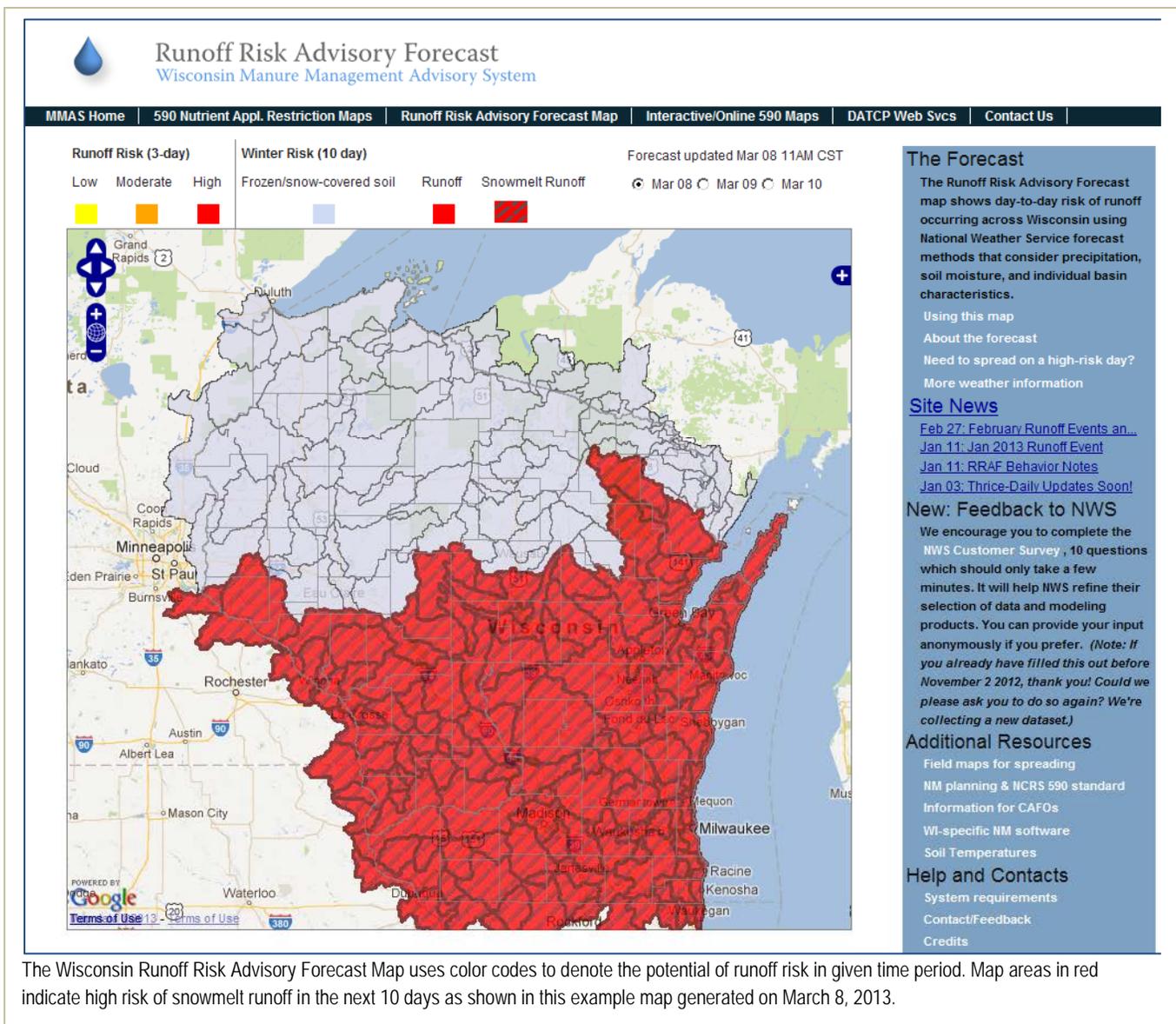
Precipitation-runoff relations and water-quality characteristics were measured at edge-of-field stations to provide information needed to develop the web-based decision support tool for farmers. (Photo courtesy USGS)

and nutrients have an increased potential of moving to water resources from agricultural fields through surface runoff are identified. "This study highlights how important day-to-day decision making can be on a livestock farm, especially when it comes to the timing of manure applications," said Dennis Frame, coauthor and director of the University of Wisconsin Discovery Farms Program. "One untimely decision can result in high nutrient yields that can overshadow many of the beneficial practices that are already in place to reduce the risk of nutrient and/or sediment loss."

About half of Wisconsin's annual runoff occurs in February and March, while May and June contribute another third. The snow melting while the soil is still frozen during February and March consistently contributes to runoff from agricultural fields. During other times of the year, soil moisture is an important runoff factor, as heavy or persistent rains produce runoff from thawed soils.

On average, 80 percent of the annual sediment yield occurs in May and June. Sediment delivery is highest in tilled fields that experience a significant amount of runoff during these months, when plant cover is minimal and the soil is at or near saturation. Sediment delivery is lowest when runoff occurs on frozen soils. Nutrients, such as phosphorus and nitrogen, can be transported in runoff regardless of whether or not the ground is frozen. Livestock manure applied to fields shortly before a runoff event increases the amount of nutrients present in runoff.

For more information, contact: Todd Stuntebeck, tdstunte@usgs.gov, (608) 821-3872.



The Wisconsin Runoff Risk Advisory Forecast Map uses color codes to denote the potential of runoff risk in given time period. Map areas in red indicate high risk of snowmelt runoff in the next 10 days as shown in this example map generated on March 8, 2013.

Tools and Technology

The Cutting Edge: An Inside Look at PhyloChips

The PhyloChip is a fast DNA microarray that is unique in its ability to identify multiple bacterial and archaeal organisms from complex microbial samples and can be used to help us further understand the microbial ecology of our waters. Gary Anderson, Todd DeSantis and their colleagues from the Lawrence Berkeley National Laboratory (LBNL) designed the PhyloChip technology to determine specific taxa based on the unique structure of the 16S gene, which is contained in all bacteria and archaea.

The California State Water Resources Control Board and the County of Marin Environmental Health Services compared the PhyloChip to multiple tube fermentation, a traditional method of testing for microbes. The PhyloChip identified 1,524 different types of bacteria. However, when using the multiple tube fermentation method, only a few species were identified. The difference is due to the fact that many species of bacteria cannot survive in a culture and detection by the Phylochip does not require bacterial growth for reliable detection.

The PhyloChip was designed to isolate DNA from the the sample of interest, which is used for the 16S rRNA gene sequences amplification. After redesigning the PhyloChip several times, it is now able to detect the presence and relative abundance of over 59,000 discrete taxa of bacteria and is engineered to perform in multiple environments, including aquatic testing to address public health problems in recreational water environments.

For additional reading on PhyloChips, visit:

www.lbl.gov/tt/techs/lbnl2229.html

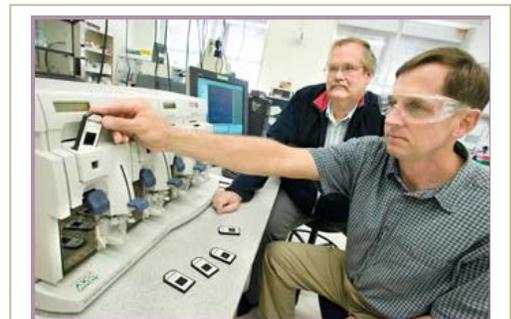
www.mobio.com/blog/2011/01/10/phylochip-technology-for-simultaneous-microbial-taxa-detection/

www.phylochip.com/phylochip.html

Contributed by: Erick Burres, eburres@waterboards.ca.gov, (213) 576-6788 and Romy Tabet, California's State Water Resources Control Board, Surface Water Ambient Monitoring Program, Clean Water Team.



PhyloChip, Berkeley Lab's DNA microarray for rapid profiling of bacteria. (Photo courtesy www.lbl.gov/tt/techs/lbnl2229.html)



Terry Hazen (left) and Gary Andersen, microbiologists with Berkeley Lab, are using 16S PhyloChip technology to analyze a sample for the unique DNA signatures of all known species of bacteria. (Photo courtesy lbl.gov/LBL-Publications/Currents/Archive/Oct-14-2005.htm)

What's New with the National Hydrography Dataset Plus Version 2?

The National Hydrography Dataset Plus (NHDPlus) is a suite of geospatial products that build upon and extend the capabilities of the NHD (1:100,000-scale) by integrating it with the National Elevation Dataset (30M) and the Watershed Boundary Dataset. Interest in estimating NHD stream flow volume and velocity to support pollutant fate-and-transport modeling was the driver behind the joint U.S. Environmental Protection Agency (EPA) and U.S. Geological Survey (USGS) effort to develop NHDPlus. NHDPlus has been used in a wide variety of applications since its initial release in the fall of 2006, including serving as the sample and analytical framework for the rivers and lake surveys under the EPA's National Aquatic Resource Surveys. This widespread positive response prompted the multi-agency NHDPlus team to design an enhanced NHDPlus Version 2 (NHDPlus2) and release it to the public in the fall 2012.

NHDPlus2 benefits from significant improvements to its primary ingredient datasets as well as a more robust stream flow estimation process. The USGS has connected over a thousand isolated networks in the NHD, the National Elevation Dataset has been enhanced for over 60% of the country, and the Watershed Boundary Dataset, for which only 12 states were available for use in the initial NHDPlus, has been completed for the country. NHDPlus2 stream flows now incorporate improved runoff estimates from a USGS national water balance model and new components, such as potential evapotranspiration, major water withdrawals and additions, and network-interpolated adjustments to align with gaged flows.

Additional information on NHDPlus2, including the user guide, data, and metadata, can be found on the EPA WATERS Web site at: www.epa.gov/waters (NHDPlus quick link on the right).

For more information, contact: Tommy Dewald, Dewald.Tommy@epa.gov, (202) 566-1178.

USEPA Enhances STORET Data Warehouse



The U.S. Environmental Protection Agency's (USEPA) Office of Water Storage and Retrieval (STORET) Team has successfully deployed an enhancement to the STORET Data Warehouse to deliver metric and index data. Now, when data owners calculate an index of biological integrity, they can store that index value with taxonomic data. This is a major step in completing the Warehouse upgrades to match the Water Quality eXchange (WQX) data standard. With the new enhancements, data owners can now submit and retrieve metrics and indices data from STORET using the online data query tool.

To learn more, visit: www.epa.gov/storet/ or contact: Charles Kovatch, kovatch.charles@epa.gov, (202) 566-0399.

National Monitoring Network

River Sediment and Toxic Chemical Loads into Puget Sound, WA - A Demonstration Study of the National Monitoring Network for U.S. Coastal Waters and Their Tributaries

The U.S. Geological Survey's (USGS) Washington Water Science Center is developing a coastal monitoring Network for Puget Sound that meets the goals of the National Water Quality Monitoring Network for U.S. Coastal Waters and their Tributaries, while also being well aligned with existing Federal and cooperative monitoring efforts in the region. Puget Sound is the second largest estuary in the United States and its unique geology, climate, and nutrient-rich waters sustain biologically-productive terrestrial, coastal, and marine habitats. The objectives of the Puget Sound project are to:

- 1) Conduct a data inventory and gap analysis of monitoring activities in the Puget Sound; and,
- 2) Implement new monitoring to fill a recognized data gap in sediment loads and associated toxic chemical loads from large rivers to Puget Sound.

During the first year of this project, USGS has been participating in working groups of the Puget Sound Ecosystem Monitoring Program that have just completed their initial data inventories and gaps analyses in support of Puget Sound restoration monitoring. Those results will be compared to the needs of the National Monitoring Network to identify any Network related gaps. To address the recognized data gap, the USGS is determining annual sediment loads from large rivers to Puget Sound using modern technology and methods such as continuous, real-time turbidity monitoring, discrete bridge-based representative sampling, a LISST-SL for determination of particle size-dependent sediment flux, and acoustic doppler current profilers (ADCP) for water velocities to construct sediment profiles. USGS is also developing and implementing a monitoring approach using flow-through centrifuges to concentrate suspended sediment from large volumes of water for the analysis of toxic chemicals, including polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), polybrominated diphenyl ethers (PBDEs), and particulate carbon and nitrogen.

The sediment and toxic chemical loads determined from this project will be comparable to those concurrently being determined by the USGS in the Green River, which transports sediment to the Lower Duwamish Waterway Superfund site near Seattle, WA. This project also supports the assessment of pathways and body burdens of toxic chemicals in the Puget Sound forage fish foodweb through the USGS Coastal Habitats in Puget Sound (CHIPS) program (puget.usgs.gov). Further, this project connects to current USGS bedload sampling in the large, glacially-driven Puyallup River Basin. The results will aid in understanding sediment transport processes such as channel deposition that could affect flood flow conveyance through developed, lowlands areas.

To learn more visit: wa.water.usgs.gov/projects/riverloads/ or contact: Kathy Conn, USGS Hydrologist, kconn@usgs.gov, (253) 552-1677 or Rick Dinicola, Associate Director, dinicola@usgs.gov, (253) 552-1603.



A flow-through centrifuge concentrates suspended sediment from large volumes of river water for analysis of toxic chemicals.



A LISST-SL (Laser In-Situ Scattering and Transmissometer-StreamLine) sampler determines particle size-dependent sediment flux.

Announcements

Diatom Short Course for Water Quality Professionals

A “Diatom Short Course” will be offered at Iowa Lakeside Laboratory from May 13-17, 2013 and is targeted for people in state and federal programs that use diatoms in water quality assessment. This course is an introductory training on diatom biology, taxonomy, ecology and assessment for water quality professionals. In this one week course, participants will be introduced to application of diatoms to water quality assessment through lecture, lab and field sessions. **For more information on this course and other algal courses being offered, go to:** www.freshwater-science.org/Classified-Ads/Workshops-and-courses/Summer-Courses-at-the-Iowa-Lakeside-Laboratory.aspx or **contact:** Sarah Spaulding, sspaulding@usgs.gov, (303) 492-5361. **Information on the field station and course registration is available at:** www.continuetolearn.uiowa.edu/lakesidelab/.



EPA Releases “Study of the Potential Impacts of Hydraulic Fracturing on Drinking Water Resources: Progress Report”



On Dec. 21, 2012 the U.S. Environmental Protection Agency (EPA) released a report highlighting the progress it has made on its national study to understand the potential impacts of hydraulic fracturing on drinking water resources. The report summarizes the current status of 18 research projects undertaken as part of the study and updates information about the chemicals used in hydraulic fracturing. The report does not draw conclusions about the potential impacts of hydraulic fracturing on drinking water resources.

Publication available at: www.epa.gov/hfstudy/pdfs/hf-report20121214.pdf. **For more information, go to:** www.epa.gov/hfstudy

Assessing Toxins on the Columbia River (Video)

The mid-Columbia River, above Bonneville Dam, has never been tested extensively for contamination until now. Oregon’s Department of Environmental Quality (DEQ) conducted one of its largest surveys and found the middle river shares many of the same contaminants as the lower river. Learn about this collaborative monitoring study and what they learned by **viewing the Oregon Public Broadcasting’s Oregon Field Guide video** at:

www.opb.org/programs/ofg/segments/view/1854. *This video won't disappoint!*

Thanks go to the Producer – Vance Patton.

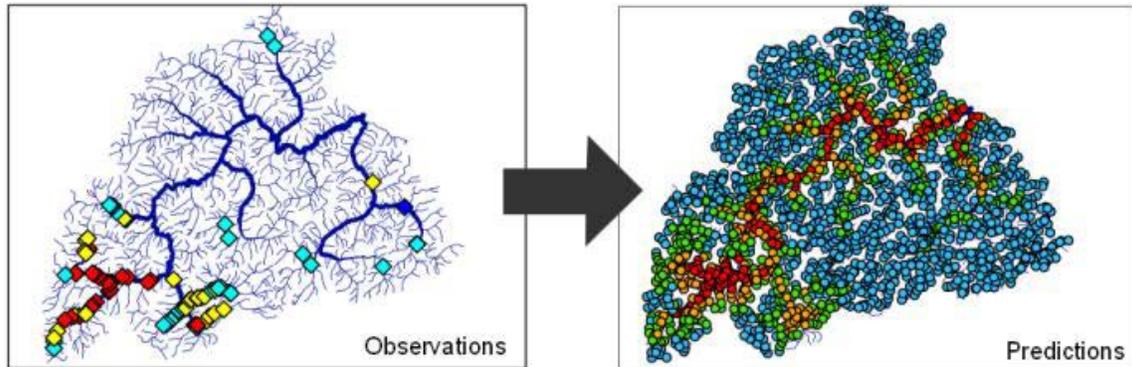


Also check out the DEQ Mid-Columbia Toxics Report at: www.deq.state.or.us/lab/wqm/middlecolumbia.htm

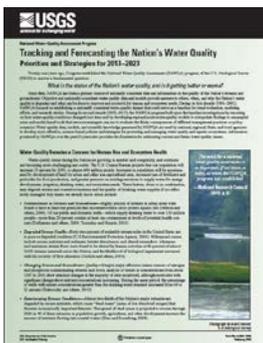
April 15th Workshop on Spatial Statistical Models for Stream Networks at Western Division American Fisheries Society

For those interested in gaining familiarity with a new class of spatial statistical model for stream networks, there will be a 1 day workshop held in conjunction with the Western Division American Fisheries Society meeting in Boise on Monday, April 15. Jay Ver Hoef (NOAA) and Erin Peterson (CSIRO in Australia), who will conduct the workshop, have developed the statistical theory for these models over the last decade and have recently developed freeware statistical software for the R environment to make implementation of the models convenient. The spatial statistical models are applicable to a wide variety of data types commonly collected from streams

(water quality parameters, habitat conditions, biological attributes), provide improved estimation relative to traditional statistical models, and even enable new types of analyses that were not previously possible for streams. To learn more about the workshop, the stream statistical tools, supporting documentation, and example datasets, **go to the SSN/STARS website at:** www.fs.fed.us/rm/boise/AWAE/projects/SpatialStreamNetworks.shtml. **For more information, contact:** Dan Isaak, U.S. Forest Service, disaak@fs.fed.us, (208) 373-4385.



New USGS Fact Sheet on “Tracking and Forecasting the Nation’s Water Quality Priorities and Strategies for 2013–2023”



Water-quality issues facing the Nation are growing in number and complexity, and solutions are becoming more challenging and costly. Tracking and forecasting some of the Nation’s water quality issues are important goals for 2013–2023, the third decade of the U.S. Geological Survey’s National Water-Quality Assessment (NAWQA) program. In consultation with stakeholders and the National Research Council, a new strategic Science Plan has been developed that describes a strategy for building upon and enhancing assessment of the Nation’s freshwater quality and aquatic ecosystems. This fact sheet describes surface-water and groundwater monitoring and modeling activities that will start in fiscal year 2013. It also provides examples of the types of data and information products planned for the next decade, including (1) restored monitoring for reliable and timely status and trend assessments, (2) maps and models that show the distribution of selected contaminants (such as atrazine, nitrate, and arsenic) in streams and aquifers, and (3)

Web-based modeling tools that allow managers to evaluate how water quality may change in response to different scenarios of population growth, climate change, or land-use management. **Fact sheet available at:** pubs.usgs.gov/fs/2013/3008/. **For more information, contact:** Bill Wilber, wgwilber@usgs.gov, (703) 648-6878 or Gary Rowe, glrowe@usgs.gov, (303) 236-1461.

National Water Monitoring News Editorial Board:

- Cathy Tate, U.S. Geological Survey, cmtate@usgs.gov
- John Hummer, Great Lakes Commission, jhummer@glc.org
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- Dan Sullivan, U.S. Geological Survey, djsulliv@usgs.gov
- Wendy Norton, U.S. Geological Survey, wenorton@usgs.gov

Layout by Kim Martz, U.S. Geological Survey, kimmartz@usgs.gov
