Abstract #34

Arizona Volunteer Monitoring Program

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Biographical Sketches of Authors

Mario Castaneda is a faculty in the Water Resources Technology Program at GateWay Community College. He has also coordinated the Volunteer Monitoring Program for the Arizona Department of Environmental Quality. He has worked on binational surface water and groundwater water quality monitoring studies leading to the exchange of water quality data between Mexico and the U.S. and was responsible for developing a bilingual water quality field sampling manual for the agency. He holds a B.S. in Chemical Engineering from University of Sonora, a M.S. in Petroleum Engineering from Stanford University, and pursued graduate studies in Chemical and Petroleum Engineering at the University of Kansas.

Lisa Young is the Program Director for the Water Resources Technology and Occupational Safety and Health Technology Programs at GateWay Community College. Ms. Young earned a B.S. in Geography, a M.Ed. in Learning and Instructional Technology and is currently working on her Ph.D. in Geography at Arizona State University. She teaches courses in hydrology, treatment technologies, geographic information systems (GIS) and industrial safety.

Linda Taunt is manager of the Hydrologic Support & Assessment Section at the Arizona Department of Environmental Quality. Her group is responsible for all the ambient surface and ground water sampling throughout the state, establishing water quality standards, conducting TMDLs and assisting in the remediation of impaired water bodies. She attended Arizona State University and has a B.S. degree in Geography and Regional Planning and an M.S.E. in Civil Engineering.

Abstract

Across the nation, volunteer groups monitor the condition of streams, rivers, lakes, reservoirs, estuaries, coastal waters, wetlands and wells. Volunteers can make visual observations of habitat, land uses, and the impact of storms, measure the physical and chemical characteristics of waters and assess the abundance and diversity of living creatures; aquatic insects, plants, fish, birds, and other wildlife. The number, variety, and complexity of these projects are continuously on the rise.

In Arizona, a large, geographically diverse arid state, the Arizona Department of Environmental Quality (ADEQ) is developing a Volunteer Monitoring Program to support these volunteer efforts. Volunteer groups across the state will collect data to supplement the water quality information collected by ADEQ. The volunteer data can be used by ADEQ to: screen water for potential problems, conduct further research or implement restoration efforts, establish baseline conditions or trends for water that might otherwise go unmonitored, and help evaluate the success of Best Management Practices designed to mitigate problems. Helping volunteer groups to collect credible and scientifically defensible water quality data is important since ADEQ, like many other organizations, is having to do more with less resources in both personnel and funding. ADEQ has teamed up with GateWay Community College in Phoenix to offer a course on water quality sampling for volunteer groups that will interact with the agency's new volunteer monitoring program. The one-credit course offered through GateWay's Water Resources Technology Program is designed to teach volunteers how to use water quality monitoring equipment, develop sampling plans, address data quality objectives, collect samples, and compile data. In addition, GateWay is housing and maintaining the field equipment provided by ADEQ and used by the volunteers during the groups' water quality monitoring activities.

Abstract #35

College Community Partnerships as a Path to Building & Sustaining Successful Volunteer Monitoring & Watershed Assessment Programs

Lauren S. Imgrund

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Biographical Sketch of Author

Lauren Imgrund is the Director of The Alliance for Aquatic Resource Monitoring (ALLARM) at Dickinson College. She is responsible for leadership of the ALLARM program including overseeing the operation, managing the budget, fundraising, training, and supervising the staff. She develops and executes technical assistance to watershed organizations and represents ALLARM on state and non-profit advisory panels. Lauren has worked in the conservation field for 15 years and has a B.S. in Environmental Science from Juniata College, Huntingdon, PA.

Abstract

The Alliance for Aquatic Resource Monitoring (ALLARM) a community science project of the Environmental Studies Department at Dickinson College, Carlisle, PA has collaborated with Pennsylvania volunteers in citizen science and water quality monitoring initiatives since its founding in 1986. ALLARM has two major goals: to build and enhance the effectiveness of community watershed organizations by providing capacity building programmatic and technical assistance; and, to provide Dickinson College students with opportunities to apply their classroom knowledge to work with these organizations thereby enhancing and enriching the college curriculum.

ALLARM is an excellent example of the mutual value of a strong partnership between an academic institution and its community. This presentation will focus on the power and challenge of college-community partnerships for water quality monitoring programs. It will address the benefits to the community, the college, and the students. The focus will be on how a college acting as a service provider can bridge the gap between scientists, policy makers and the community; and, how community-based participatory research projects can be an effective vehicle for meaningful undergraduate science education. Also discussed will be institutional obstacles particularly in terms of the traditional science curriculum and the commitment of college resources required for this type of project. In addition the challenges of partnering with volunteer-driven community groups will be examined.

Abstract #36

Participatory Watershed Monitoring: Linking Citizens to Scientists Through the NH Lakes Lay Monitoring Program

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Biographical Sketch of Author

Jeff holds a joint appointment at the University of New Hampshire as an Extension Associate Professor in the Zoology Department, a Research Scientist in the Center for Freshwater Biology and as a Water Resources Specialist with Cooperative Extension. Since 1986, he has been the coordinator of the New Hampshire Lakes Lay Monitoring Program a volunteer lake and tributary monitoring program initiated in 1979. He lectures in Water Resources, Limnology, Watershed Ecology, Community Mapping with GIS, and Lake and Watershed Management. He also works directly with individuals, associations, communities and cooperating agencies concerned with surface water resources assessment and volunteer monitoring.

Abstract

Although originally intended as a university outreach effort to assist local communities, the New Hampshire Lakes Lay Monitoring Program (NH LLMP) has proven to be highly beneficial to all parties involved. By truly engaging and integrating the volunteers and their communities with faculty, students and cooperators the 25 year old volunteer watershed and water quality monitoring effort has evolved to take advantage of the synergy created through truly participatory research and monitoring programs.

The participatory monitoring model employed has a few key common elements:

- It involves community members in the design and implementation of the monitoring efforts.
- The research processes and data analysis outcomes should benefit the community.
- Community members should be part of the analysis and interpretation of data and should have input into how the results are distributed.
- Productive partnerships between agencies, researchers and community members should be encouraged to last beyond the life of the monitoring effort.

The outcomes of the participatory approach generally go well beyond the typical cost-effective monitoring and educational outcomes shared by all volunteer programs. The attention to community stakeholder involvement from the start allows for early buy-in to a project and also can allow for ridding the project of actual and perceived conflicts between stakeholder groups from within and outside the community. If facilitated successfully it may also bring diverse community interest groups together. Often the projects generate the needed momentum to energize or (reenergize) the community as well as spread interest in developing monitoring interest in other communities.

The university also benefits in providing “real world experience” to its students and by connecting the faculty to the communities. Not only do the faculty better understand the prevailing applied research needs but they often have a large and well distributed corps of “field technicians” to help with any type of research interest. Understanding community needs and concerns is a powerful advantage for grant proposal success. Creative funding strategies involving local, agency and university elements can also be developed.

Examples of successful participatory projects will be highlighted.

Abstract #37

Enhancing Collaboration & Increasing Capacity in Extension Volunteer Monitoring Programs

Linda Green[1], Elizabeth Herron[1], Kristine Stepenuck[2], Kelly Addy[1], Arthur Gold[1], and Robin Shepard[2]

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Biographical Sketches of Authors
Linda Green is Project Director for the National Facilitation of Extension Volunteer Monitoring Efforts project. She is also Program Director of the seventeen-year old URI Watershed Watch Program, a part of the University of Rhode Island Cooperative Extension Water Quality Program, and has been since its inception. She is the Volunteer Monitoring Representative on the NWQMC and co-chairs its Collaboration and Outreach subcommittee. She is a member of the editorial board of *The Volunteer Monitor* newsletter.

Elizabeth Herron, Kelly Addy and Kris Stepenuck staff the National Facilitation of Extension Volunteer Monitoring Efforts project. Elizabeth Herron is Program Coordinator for the URI Watershed Watch program, and Region I Director, North American Lake Management Society. Kelly Addy is a Research Associate II in the URI Watershed Hydrology Laboratory and Web Content Coordinator for Regional and National Extension Water Quality sites. Kris Stepenuck is Volunteer Stream Monitoring Program Coordinator for Wisconsin Extension's Water Action Volunteers.

Arthur Gold is a Professor of Watershed Hydrology in the Department of Natural Resources Science at the University of Rhode Island. Robin Shepard is Assistant Dean and State Program Leader for Community Natural Resources and Economic Development, University of Wisconsin-Extension. Both serve as project advisors.

Abstract
In this presentation we will share what we have learned in our efforts to enhance collaboration & increase capacity in Extension volunteer monitoring programs. Extension is involved in water quality research, education, and outreach throughout the nation, regionally to locally, and in environments rural to urban. Extension brings university science to the community and community concerns and local knowledge to the university. Volunteer water quality monitoring is a growing focus of Extension water quality programs.

We staff a national USDA-CSREES project, *National Facilitation of Extension Volunteer Monitoring Efforts*, that is building a network and comprehensive support system for Extension-affiliated volunteer water quality monitoring efforts throughout the country. Our goal is to expand and strengthen existing programs and support new ones in a collegial and collaborative manner. Our flagship website (http://www.usawaterquality.org/volunteer/) lists all Extension volunteer monitoring programs and contains results from an extensive inquiry of these programs. Our "*Guide to Growing Programs*" has modules on program design, training techniques, quality assurance, volunteer support tools, outreach tools and funding- with special emphasis on materials that are available through existing monitoring programs. Regional and statewide workshops educate, motivate, and encourage those newly involved, revitalize long-term efforts and encourage new directions and activities. Communication and collaboration among programs are definitely leading to success in overcoming institutional obstacles. By linking with Extension, both professional *and* volunteer water quality monitoring programs can gain support in their efforts to educate the public, encourage citizens to adopt "water-friendly" behaviors, and solve environmental problems.

Abstract #38

Benefits of a Collaborative Monitoring Strategy

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Biographical Sketch of Presenting Author

Pixie Hamilton has worked as a hydrologist for the USGS since 1984, primarily doing regional ground-water modeling and regional and national water-quality assessments. She currently serves as a Staff Hydrologist and Water Information Coordinator for the National Water-Quality Assessment (NAWQA) Program, which assesses water-quality conditions and trends in some of the nation's most important streams and aquifers. Her current emphasis largely is on communicating research and technical implications of NAWQA information to government, research, and interest-group partners in order to help guide water-resource management and protection strategies and policy.

Abstract

A single monitoring program, by itself, cannot address the full range of water-resource issues. Collaborative monitoring and data sharing among the U.S. Environmental Protection Agency (EPA), U.S. Geological Survey (USGS) and other federal agencies, States and Tribes, and volunteer organizations are critical to understanding, protecting, and restoring water quality at all scales, and to ultimately get the best return from federal and state monitoring investments.

Such collaboration requires a balanced approach with multiple monitoring designs and tools, including: (1) Probabilistic-Based (or "random") designs, which allow characterization and prioritization of water resources across a State or the Nation by answering broad questions, such as "What percentage of rivers and streams are impaired, and what are the average concentrations across the State?"; (2) Targeted designs, which address leading causes of impairment (such as land use and natural features); whether conditions at specific locations are getting better or worse over time; and, effectiveness of management actions; and (3) Predictive Tools, such as landscape models that utilize data from the combined probabilistic and targeted approach to better predict where and when impairment will occur, and to extrapolate findings to unmeasured areas. Resources are, thereby, optimized by strategically targeting monitoring and water-management actions to the most vulnerable ecosystems.

The State of Virginia has developed a balanced and collaborative monitoring strategy that embraces partnerships and data sharing, and incorporates probabilistic and targeted designs and multiple tools for predictive capabilities. The Virginia strategy supports the full range of decisions for all water body types and strengthens the State's ability to protect its water quality and achieve water-quality standards in the most cost-effective and efficient manner.

Abstract #39

Indiana's Surface Water Quality Monitoring Strategy

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Biographical Sketch of Author

Stacey Sobat is an environmental manager in the Office of Water Quality within the Indiana Department of Environmental Management's Biological Studies Section. Since 2000, she has served as project leader for the probabilistic fish community-sampling program. Stacey is a field and laboratory supervisor for fish community sampling. She also manages the data collected to calculate Index of Biotic Integrity Scores using Indiana Reference Conditions, assesses the condition of waterbodies as attaining or impaired for aquatic life use, and works closely with other staff in the Assessment Branch to make predictions of the overall health of the watersheds studied.

Abstract

Following the guidance of the Clean Water Act, Indiana has declared "…to restore and maintain the chemical, physical, and biological integrity of the waters of the State" [327 IAC 2-1-1.5]. In 1990, the reality was that past practices and resources were not sufficient to meet the State's goal; thus, the Surface Water Quality Monitoring Strategy was developed in 1995 to generate the primary data necessary to assess the integrity of Indiana's rivers, streams, and lakes for designated uses. The Strategy focuses on a watershed approach for addressing water quality issues and uses a five-year rotating study cycle of all major river basins in the State. The Strategy is designed to provide technical data and information in support of the Indiana Integrated Water Monitoring and Assessment Report (a combination of the Section 305(b) Water Quality Report and the Consolidated List including Section 303(d) List of Impaired Waters), National Pollutant Discharge Elimination System (NPDES) permitting program, drinking water source protection activities, and the annual Fish Consumption Advisory. Sampling programs that provide the data include: fixed station monitoring; sampling from statistically selected sites for biological, chemical, and physical data; fish and macroinvertebrate community analysis; fish tissue and sediment contaminant testing; pesticide measurements; bacteriological sampling; site specific sampling in support of NPDES permitting program; and special projects such as trace metals and Total Maximum Daily Loads (TMDL) sampling. This oral presentation will cover the Strategy components (Planning, Sampling Programs, and Reporting), accomplishments, and proposed refinements of the Strategy.

Pennsylvania's Strategy for Assessing Wadeable Surface Waters – A "Census" Approach

Tony Shaw

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Biographical Sketch of Author

Tony Shaw bas been a field biologist with Pennsylvania's Department of Environmental Protection for over 25 years and currently is a Biologist Supervisor in that agency's Water Quality Assessment & Monitoring Section. He has training and experience in benthic macroinvertebrate biology and has conducted many aquatic life use surveys and biological stream assessments for Pennsylvania's water quality monitoring and Antidegradation Programs. He is directly involved in the development of PA's Statewide Surface Water Assessment Program protocols and biocriteria projects and serves as a first level manager for PA's water quality monitoring programs.

Abstract

Historically, Pennsylvania's Water quality monitoring programs had focused on point sources (PS) and permit compliance actions. Non-point sources (NPS) received less emphasis. Consequently, the extent and severity of NPS impacts were not clearly defined. This overall point source monitoring emphasis reflected the lack of a comprehensive statewide assessment program in Pennsylvania. Consequently, the water quality of most of Pennsylvania's surface waters had never been assessed prior to 1997. At that time, less than 25% of the state's 83161 stream miles had ever been directly assessed. Further, many of these earlier assessments were outdated. Consequently, in order to complete a "first time ever" statewide surface water assessment, a biological screening protocol was developed to assess aquatic life use attainment, determine NPS and lesser-known PS impacts, and delineate good quality waters. The resulting Statewide Surface Water Assessment Program (SSWAP), now in its 8^{th} season, has completed assessments of approximately 82% of Pennsylvania's surface waters. This represents over 12500 stations, 67865 stream miles – an assessment rate of about 6 miles/station. This detailed level of spatial resolution will result in a water quality "census" of all of Pennsylvania's wadeable streams upon completion of this first statewide assessment effort.

SSWAP's water quality assessments are based on land use, benthic biota, and stream habitat evaluations. Assessment results are entered into ArcView GIS and Access database formats. Advantages of this assessment approach were that impairment decisions can be made quickly and can target discrete stream segments. In 1996, prior to SSWAP implementation, 7% of the statewide total stream miles were listed as impaired by NPS sources and as 17% in 2003. Further, in 1996, 65% and 16% of the impairment totals were attributed to abandoned mine drainage and agriculture sources, respectively. In 2003, these rates were to 29% and 27%.

Developing Transboundary Monitoring Networks in Europe

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Jos Timmerman is programme manager and interim director for the International Water Assessment Centre, a collaborating center under the UNECE Water Convention, and programme manager at the Institute for Inland Water Management and Waste Water Treatment (RIZA). He is specialized in strategies for water quality monitoring and assessment with emphasis on the specification of information needs.

Abstract

Water quality monitoring in Europe is a national issue in the European countries. However, as an estimated 60% of the European rivers are transboundary, national monitoring does not provide for all the necessary information. The UN Economic Commission for Europe was among the first to recognize this and developed the Convention on Protection and Use of Transboundary Watercourses and International Lakes that was adopted in 1992. The convention obliges the signatories to develop transboundary monitoring networks to determine the mutual influences from riparian countries.

Several pilot projects are performed to gain experience in developing joint monitoring programs. These projects built on an analysis of the water management situation and structuring of information needs where the objectives of the different countries were compared and brought together into one monitoring system. This presentation will describe how the water management analysis and the subsequent specification of information needs was done and how this helped the countries to develop a joint monitoring program that provides information for all riparian countries.

Enhancing Citizen *E. Coli* Monitoring in Streams in the Upper Midwest

Barbara Liukkonen[1], Lyn Crighton[2], Lynette Seigley[3], Kris Stepenuck[4]

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Barbara Liukkonen is the Water Resources Education Coordinator at the U of MN Water Resources Center. She's been an outreach educator with the Minnesota Extension Service and Sea Grant Program for 17 years, working on shoreland management, safe drinking water, invasive exotic species, wastewater treatment, and volunteer water quality monitoring.

Lyn Crighton coordinates Hoosier Riverwatch, Indiana's statewide volunteer stream monitoring program, which is supported by the Indiana Department of Natural Resources and Purdue University. She has been working in water resources management, limnology, and watershed education for the past ten years.

Lynette Seigley is a research geologist with the Iowa Department of Natural Resources' Water Monitoring Program. She has worked for the IDNR since 1987 and currently helps coordinate Iowa's ambient water monitoring program and is involved in IOWATER, Iowa's volunteer water monitoring program.

Kris Stepenuck is the coordinator for the Water Action Volunteers and Volunteer Stream Monitoring program with UW-Extension and WI Department of Natural Resources.

Abstract
The public increasingly demands monitoring to identify whether public waters are safe from bacteria contamination. However, state and local agency resources may be too limited to adequately monitor surface waters and the cost of frequent lab analyses may be prohibitive. Developing a trained volunteer network able to use test kits to produce accurate and reliable results is a priority for a team of university and agency partners from the Upper Midwest. Through a three-year grant, the project will evaluate test kits, create a comprehensive training program, and develop public outreach materials.

To evaluate the accuracy, reliability, and usability of *E. coli* test kits, trained volunteers will collect grab samples that will be analyzed using both the test kits and a professional laboratory with approved methods. A QA plan will ensure that test kit results and lab analyses can be compared for accuracy and precision. We will assess Coliscan™ Easy Gel (incubated and not), 3M™ Petrifilm, Coliscan™ MF Method, and Colisure™ Method with IDEXX Quanti-Tray/2000™ test kits.

Pilot testing begins in spring 2004 in Iowa and Indiana; from that work the team will identify and recommend the test kit method which best combines accuracy and user-friendliness. Volunteers in Minnesota, Wisconsin, Michigan, and Ohio will use the recommended kit during 2005 and 2006 and collect samples for comparative lab analysis. Volunteers will be trained with consistent methods across the six states; their knowledge and the skills they develop in using the test kits will be tracked over time. Training methods will be assessed and revised as necessary to produce proficient volunteers.

The project will produce test kit recommendations, a training curriculum, and educational materials that will be transferable to other regions. This presentation will describe our experimental design, present the QA plan, and introduce examples of training and educational materials.

A Storm Water Sampling Comparison Study: The Search for the Perfect Storm

David E. Kroening[1], Steve Jadlocki[2], David Caldwell[1], and John McCulloch[1]

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Biographical Sketches of Authors

David Kroening is a Water Quality Systems Analyst with the Mecklenburg County Water Quality Program. He has worked for the United States Geological Survey and the Great Lakes Research Facility and has spent five years in private consulting. His work and research experience includes several ground water and surface water investigations as well as ground water/surface water interaction studies. His current focus is on special monitoring and modeling projects for Mecklenburg County and the City of Charlotte.

Steve Jadlocki is employed by the City of Charlotte and works as the city's NPDES permit administrator. He is responsible for determining and implementing the overall water quality strategy for Charlotte.

David Caldwell is a supervisor with the Mecklenburg County Water Quality program. He has more than 12 years of experience in stormwater management and monitoring.

John McCulloch is a supervisor with the Mecklenburg County Water Quality Program. He has 12 years of experience in ground water and surface water investigations to support resource assessment and management.

Abstract

In order to determine the most accurate and efficient methodology to collect in-stream storm water samples the Mecklenburg County Water Quality Program (MCWQP) and Charlotte Storm Water Services the Mecklenburg County Water Quality Program devised a storm water sample collection methodology comparison study. Quarterly storm water samples have been collected at seven locations throughout the City of Charlotte and Mecklenburg County since 1995 to satisfy a requirement of Charlotte's Phase I NPDES Permit. These historic samples were collected using a four-hour flow weighted composite method. However, recent comparison of the sample collection data with USGS stream flow records revealed that only a small portion of the hydrographs for sampled runoff events were represented using the current method. The study called for the sampling of individual runoff events at a unique site with three different collection methods: 1. Four-hour flow weighted composite method; 2. Full runoff event flow weighted composite method; and 3. Individual aliquots collected hourly over the entire runoff event. Runoff event pollutant loads were calculated for each sample collection method utilized. For smaller runoff events the results tended to indicate a reasonable similarity between the sample methods for most parameters analyzed, however sediment load values varied considerably. It is possible that the current method's inability to capture pollutant loading during the highest flows may have a significant impact in the accuracy of pollutant load estimates.

Application of Automated Systems for Clean Composite Sampling

Jamie Heisig-Mitchell, Danny L. Barker, and Norman E. LeBlanc

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Biographical Sketches of Authors

Jamie Heisig-Mitchell coordinates and conducts field sampling activities for the Technical Services Division of the Hampton Roads Sanitation District. These activities include ground water, storm water and ambient water quality monitoring as well as VPDES discharge monitoring. She provides training in clean metals sampling to HRSD employees and any interested Virginia municipality personnel. A recent graduate of Old Dominion University, she earned an M.S. in Biology for her research in marine ecology.

Danny Barker is an Environmental Scientist with the Hampton Roads Sanitation District where he has 15 years of experience working in HRSD's Technical Services Division. He was the project manger and primary developer of HRSD's clean composite sampling system, currently under review by the Patent and Trademark Office in Washington DC. Additionally, he designs and manages environmental monitoring programs for various regulatory and research activities. He served as a member of the Virginia Water Monitoring Council Steering Committee and is currently serving on the Virginia Association of Municipal Wastewater Agencies Permit Review Committee. He earned his B.S. in Biology from Old Dominion University.

Norman LeBlanc has over 25 years experience in the field of water quality management with respect to discharges from publicly owned treatment works (POTWs) to estuarine and near shore coastal waters. As Chief of Technical Services for the Hampton Roads Sanitation District, his major responsibilities include all NPDES, biosolids and air permitting activities for nine major POTWs. He represents AMSA on the SETAC Metals Pellston conferences, moderated the regulatory session at Argentum VI on Silver in the Environment and served on the National Water Quality Monitoring Council and the USGS Advisory Committee on Water Information. He also served six years as a member of the Research Council for the Water Environment Research Foundation and is a member on the EPA SAB Review Panel on the Report on the Environment. He did his undergraduate studies in physical oceanography at New York University and his graduate studies in physical oceanography at Old Dominion University.

Abstract

The quality of data used for regulatory purposes such as establishing wastewater permit discharge limitations and in determining the compliance status of dischargers must meet very high standards due to the legal liability of this data. The quality of trace metal data may be compromised due to contamination of samples during collection, preparation, storage and analysis. The use of clean techniques for sampling and analysis is critical to obtaining representative and accurate data.

To address these issues, an automated sampling system involving the collection of an "intermediate" composite sample was developed. The sample is split into total recoverable and dissolved fractions upon sample completion. Filtering after composite completion reduces sample labor costs, decreases the risk of sample contamination from increased sample handling, and increases the probability of obtaining a representative sample.

Though earlier studies demonstrated that dissolved metal concentrations do not change over the 24-hour time period prior to sample filtration, concerns about the accuracy of dissolved data collected in this manner continue to arise. To further address these issues and to test the applicability of the automated composite sampling system to the collection of mercury for EPA 1631, a prior study comparing dissolved metals concentrations in grab and composite samples was expanded to provide a more robust data set and to include mercury analysis. Results demonstrate that automated composite sample concentrations are not significantly different than those obtained by manual grab sampling and that delays of up to 48 hours in filtration/preservation do not significantly affect the sample values.

Making the Pieces Fit For a Sampling Program

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Biographical Sketch of Presenting Author
Richard Franzetti is an environmental engineer in Malcolm Pirnie's White Plains, New York office. His background in environmental engineering includes engineering and environmental studies of storm water, streams and lakes, and ocean outfall diffusers and mixing zones. His duties have included developing storm water and wastewater sampling plans, organizing and directing field surveys, and 'clean techniques' sampling and analysis. He is a graduate of Manhattan College (Chemical Engineering undergraduate and Environmental Engineering Masters) and has worked at Malcolm Pirnie for the past 15 years.

Abstract
The Ponce Regional Wastewater Treatment 301(h) Waiver Monitoring Program allowed for the development of innovative sampling techniques in a deepwater environment. Our collaborative solution entailed:

1. Positioning of a discrete depth sampler in 400 feet of water, within 10 feet of the mark;
2. Collecting large volumes (120 liters) of discrete depth samples;
3. Employing clean technique sampling methods, and
4. All while conducting the field operations at night.

Vincenty, Heres & Lauria, Malcolm Pirnie Inc. and PRASA effectively partnered to successfully work with the regulatory agencies, and eight highly specialized subcontractors to collectively assess how best to:

- Achieve the rigorous program requirements;
- Develop efficient field procedures;
- Transfer information effectively amongst the team.

The program required that a comprehensive marine monitoring program be developed and implemented to determine whether the discharge adversely affects the marine environment. The analytical requirements for the program are substantial, with over 5,600 analyticals per round reported to assess water quality at seven different locations. In addition biological samples were collected to indicate potential impacts of the discharge, including collection of benthic invertebrates, fish and epibenthic invertebrates and the marine phytoplankton.

The results indicate that the Ponce outfall is functioning as designed to provide high levels of dilution within a minimal mixing zone (MZ) without adversely affecting the local marine environment.

Collaborative Environmental Data Access Using the World-Wide Web

Jonathon C. Scott

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Biographical Sketch of Author

Jonathon has been employed by the U.S. Geological Survey since 1976, collected hydrologic data in Oklahoma, and coauthored several data and interpretative reports. During the 1980's, Jonathon helped the USGS increase usage of computing technology in hydrologic studies. As a guest lecturer at Langston University, he taught a class in the application of computers to scientific-problem solving. More recently, he led data-management activities for the National Water-Quality Assessment Program and assisted in the design and compilation of databases.

Abstract

Evolving internet and related technologies have created opportunities to improve access to water-quality data. Data providers periodically are required to copy data into national systems by current technologies. This approach has several disadvantages. Data are translated from one database schema into another, resulting in generalizations, subtle changes, and losses of information. Some of the copied data become incorrect, as soon as data in the source database are modified to make corrections. Centralized databases are updated relatively infrequently due to the effort and lack of benefits for the data providers. Finally, data consumers that aggregate data from multiple systems are faced with the problem of duplicated data records, caused by the presence of the same data in more than one database system. Use of the internet, web services, and other evolving computing techniques can improve access to water-quality data in terms of data quantity, quality, and timeliness. The U.S. Geological Survey and the U.S. Environmental Protection Agency have been exploring mechanisms to present a common data-access mechanism for environmental-data archives using a World-Wide-Web portal, such as Window-to-my-Environment. This conceptual approach uses web services, an integrated mapping interface, inventories of site data, and a standards-based approach to data sharing. This approach will incorporate other efforts, including geospatial data standards, date-time standards, and the water-quality data elements list developed by the Advisory Committee on Water Information (http://wi.water.usgs.gov/methods/tools/wqde/index.htm).

Abstract #47

Pacific Northwest Water Quality Data Exchange

Curtis Cude

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Biographical Sketch of Author

Curtis Cude is the project coordinator for the Pacific Northwest Water Quality Data Exchange. His training is in chemistry and experience over the past 10 years with Oregon DEQ includes water quality monitoring, data management, and data analysis, including development and implementation of the Oregon Water Quality Index. Curtis is an alternate member (representing Region 10 states) on the National Water Quality Monitoring Council, and is a member of workgroups (Environmental Sampling, Analysis, and Results standard and related Water standard) under the Environmental Data Standards Council.

Abstract

Water quality and water related issues (such as Total Maximum Daily Load or the Endangered Species Act listing of several salmonid populations) are the most critical environmental issues in the Pacific Northwest. There is an unprecedented need for sharing of watershed data across jurisdictional boundaries. The major obstacles to such sharing are:

- A reliable mechanism does not exist to catalog available data, and to discover what is available.
- Data is of highly variable quality.
- There is significant professional disagreement about the inclusion of poor quality data in any collection.

The environmental agencies of Alaska, Idaho, Oregon, and Washington and EPA Region 10 created the Pacific Northwest (PNW) Water Quality Data Exchange (the Exchange) to enhance the ability of the PNW scientific community to discover and gain access to data that may suit their purposes. The Exchange will develop a consortium of sources of water-related data throughout the PNW to include the traditional regulatory community as well as agencies in closely related mission areas (e.g. Fish and Wildlife Management agencies). Data may be made available on the network, regardless of quality, provided that the supplier agrees to document what is known of data quality. The technological “bar” for participation will be set as low as possible, which is crucial to developing broad participation. The Exchange is developing a location-based front end for data extraction. Project background, goals, and progress will be discussed.

STORET - EPA's Repository for Monitoring Data

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Biographical Sketches of Authors

Robert King is a biologist in the Office of Wetlands, Oceans and Watersheds within the U.S. Environmental Protection Agency's Office of Water with training and experience in data system design. Since the early 1990's, he has served as the project manager of the modernization of the STORET System, moving the project from its planning phase into full implementation.

Cary McElhinney is an Information Technology Specialist in the Office of Wetlands, Oceans and Watersheds within the U.S. Environmental Protection Agency's Office of Water. He works on a variety of data managment and GIS issues for water programs.

Abstract

In 1999, the Office of Water released into production a new and re-engineered STORET system. This new STORET relies on data generators operating a local copy of STORET and periodically uploading a copy of their system to EPA for incorporation into a central Data Warehouse.

The new STORET has the ability to store water, sediment, and tissue chemistry data as well as biological community and habitat assessment information. It greatly increases the data generators' ability to document their monitoring data. For the first time the entire monitoring process, beginning with the collection of a sample, equipment used during collection, the sample container material, field preservation, sample handling and storage, and laboratory operations can be documented, permitting a full description of the business of environmental monitoring, and enabling the sharing of data with confidence.

STORET has enhanced its ability to report information to the public by creating a new Data Warehouse for faster and larger data queries. Access to STORET through web GIS applications provides easy-to-use map-based interfaces to monitoring data. Future data sharing methods through Web Services will also be discussed.

Distributing Iowa's Water Quality Data Using STORET and ArcIMS

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Joost received his master's degree in geology from the University of Iowa, and has worked in Iowa state government for 20 years in various roles including systems analyst, research geologist, geographic information specialist and IT network administrator. Joost is a member of the Geological Society of Iowa, a certified well operator and a Microsoft Certified Professional. As a member of the water monitoring staff at the Iowa Geological Survey, Joost provides expertise in both geology and IT data management (including STORET).

Abstract

Iowa's ambient water quality program is a diverse program responsible for the collection and analysis of information on the state's rivers, lakes, groundwater and wetlands. Physical, chemical, biological and habitat data are administered as part of this program. To handle this complex data set, the Iowa Department of Natural Resources (IDNR) is using the Environmental Protection Agency (EPA) database called STORET (STOrage and RETrieval). The DNR recognizes the need to have this data available to staff, other governmental organizations, and the public. A data warehouse was constructed that provides access to all DNR water monitoring data. The warehouse also includes data from participating organizations that choose to submit their data to the IDNR including: IOWATER (volunteer monitoring organization), Iowa State University, the Iowa District of the United States Geological Survey, Rathbun Watershed Alliance, the Corps of Engineers, and others. The warehouse relies on custom scripting developed by the IDNR to quickly pull data from various organizations and download the data via XML or text delimited files.

The warehouse also includes on-line graphing capabilities that allow users to quickly graph several parameters to track trends in water quality for projects such as Iowa's beach monitoring, high-flow stream monitoring, or groundwater trends monitoring. The warehouse has also been integrated into an ArcIMS environment. Combining the statewide water quality database with ArcIMS integrates disparate pieces into a more seamless framework.

Fish Community Patterns Upstream and Downstream of Pulp and Paper Mill Discharges on Four U.S. Receiving Waters.

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Jill Thomas is a senior research biologist in the Northwest Aquatic Biology Facility (NABF) of the National Council for Air and Stream Improvement (NCASI). Since 2000 she has been involved with the NCASI Long-Term Receiving Water Study (LTRWS), a 10 to 20 year study to assess possible effluent effects on aquatic communities in four U.S. receiving waters. Her current activities are focused on analysis and interpretation of the data generated by this study.

Tim Hall is project manager at the NCASI NABF in Anacortes, WA. He has been with the NCASI for 25 years, studying multiple aspects of aquatic biology, including experimental streams, mesocosms and field studies. Mr. Hall was instrumental in the creation and implementation of the LTRWS during the 1990s and continues as project supervisor for the study.

Abstract

This study compares spatial and temporal patterns of fish communities in four rivers that include pulp and paper mill effluent point source discharges. This project covers the initial three years (1998 to 2001) of a larger long-term study being conducted on Codorus Creek, PA; the Leaf River, MS; and the McKenzie and the Willamette Rivers, OR. The four receiving waters represent a diversity of geographic, mill process, and river conditions. Collection methodologies varied between rivers due to size and site accessibility; however, river to river comparisons are made on the assumption that sample collection methods were all designed to allow for capture of a representative fish population. Codorus Creek, with 38% effluent at the edge of the mixing zone, had a significant gradient in communities. The pattern was weakly correlated with the three water quality variables. There was no significant temporal pattern for seasons or years. The Leaf River, 4% effluent, demonstrated no significant pattern between sites; however, there was a significant temporal difference. The McKenzie River, 0.6% effluent, demonstrated a significant but weak difference between two upstream sites and two sites immediately downstream of the mill. The largest river, the Willamette, 0.2% effluent, had no apparent fish community gradient. Diversity indices showed no significant differences between sites for any of the four rivers. This study showed a pattern of relative response in receiving waters and demonstrated that multivariate analysis of assemblages provides the ability to identify community patterns and their associations with water quality.

Stressor Identification for Short Fork Creek, Mississippi

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Dr. James Stribling is a biologist in Tetra Tech's Baltimore Office and a Director in the Center for Ecological Sciences. He has over 20 years of experience in the development and calibration of biological indicators for assessment of water resource quality. An integral part of that process is ensuring that implementation of routine monitoring programs using those indicators is directly applicable to technical and programmatic objectives.

Mr. Matthew Hicks (formerly, with the Mississippi Department of Environmental Quality [MDEQ]) is an aquatic ecologist with the Mississippi Field Office of The Nature Conservancy. He played a primary technical role in leading the redevelopment of the statewide biological monitoring program for Mississippi's stream and watersheds.

Mr. Jeffrey Thomas is Director of MDEQ's Water Quality Assessment Branch. He is a the primary recipient and user of biological assessment results in writing the state's 305(b) report, developing its 303(d) list, and in performing diagnosis of the results for identification of stressors and sources.

Mr. Barry Tonning is a watershed management specialist in Tetra Tech's Kentucky office. He compiles existing and historical data for watershed characterization, manages technical workgroups for development of restoration designs, and performs extensive public outreach activities.

Abstract
This analysis has been developed to examine potential water quality impacts associated with the development of a major wastewater treatment plant (WWTP) in Desoto County, Mississippi. The analysis examines impacts of potential stressors using two different approaches: 1) monitoring and assessment, and 2) modelling. The biological indicator (the Mississippi Benthic Index of Stream Quality [M-BISQ]) uses the structure and function of the benthic macroinvertebrate assemblage, in comparison to other streams in the Northwest Bioregion of the state, to assess stream condition. The modelling effort employed land use/land cover characteristics to estimate the rate of annual pollutant loading under a Generalized Watershed Loading Functions (GWLF) model; overall, model results provide some estimate of the potential exposure of instream biota to pollutants. Following USEPA's Stressor Identification Guidance, a weight-of-evidence analysis was developed that identified those sources and stressors most likely contributing to impaired biological condition. Components of the SI process include plausibility of mechanism, spatial and temporal co-location, consistency, and strength of evidence. This analysis concluded that the primary stressors affecting the degraded biological condition are physical habitat (especially, channel morphology, including an abundance of sand/silt fines), and potentially some unknown stressor source that is indirectly indicated by total chlorides. Because the effluent from current facilities within the County is often poorly treated, implementation of the Short Fork Creek WWTP, which will collect and treat wastes from several of the existing permitted facilities, could actually lead to an overall improvement in these conditions.

A Water Quality Assessment of Representative Trout Streams on Minnesota's North Shore of Lake Superior

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Biographical Sketch of Presenting Author
Jesse Anderson is a hydrologist with the Minnesota Pollution Control Agency. He received a B.A. degree in Biology from Gustavus Adolphus College, and a Master's of Science degree in Water Resources Sciences from the University of Minnesota. Together with coauthors Mark Evenson, Tom Estabrooks, and Bruce Wilson, he works on water quality monitoring and watershed planning projects in northeastern Minnesota.

Abstract
The beauty and unique setting of Lake Superior's North Shore have made the region a popular recreation destination. While the impact of tourism on the area's economy is substantial, with tourists spending approximately $275 million dollars in 2000 along the North Shore area, the impacts of development on the area's sensitive water resources have not been well documented. Water quality and streamflow were monitored on six North Shore streams (Amity, Talmadge, French, Sucker, Poplar, and Brule Rivers) in 2002. Flow weighted mean concentrations of water chemistry parameters typically associated with non-point source pollution (total phosphorus and total suspended solids), were greatest in the southern portion of the Shore, and decreased farther up the Shore. This is likely due to a combination of natural watershed variation (size, soils, storage, slopes) and land use changes such as increased urbanization. Loads of total phosphorus and total suspended solids increased by factors of about two-fold and six-fold, respectively, between two monitoring sites bracketing a developed area on the Poplar River. Total mercury levels in the Poplar River exceeded the state standard, and mercury and suspended solid levels were strongly correlated. Historical data from the 1970's suggests that water quality has declined, except in the Brule River- a watershed that has maintained relatively pristine. Given these findings, it is recommended that long-term monitoring of a representative number of North Shore streams continue in order to track water quality trends and to help provide accurate and up to date information for local decision makers

Analyzing Watersheds to Determine Sources of Bacteria at Two of Iowa's Beaches

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Biographical Sketch of Author

Janice Boekhoff is a Research Geologist for the Iowa Department of Natural Resources, Iowa Geological Survey. She began work at the IDNR in August 2000 in the Hydrogeology and Environmental Studies Section where she worked on the Source Water Protection Program. Beginning in April 2002, she began working on projects for the Water Monitoring Section. She is involved in bacterial monitoring at the state's beaches, source tracking of bacteria, establishing a groundwater network in Iowa, and coordinating the municipal-well water quality project.

Abstract

Iowa's Ambient Water Monitoring Program has monitored Iowa's state-owned beaches since 2000. Monitoring has shown persistent high levels of bacteria at several beaches. Intensive watershed investigations have been undertaken at these beaches to determine the cause of the elevated bacteria levels. Results have shown numerous causes for bacterial contamination. Bacteria levels at some beaches appear to be correlated to rainfall, indicating sources from within the watershed. Other beaches demonstrate no rainfall influence, and bacteria appear to be coming from a source closer to the beach.

Two beaches with persistent elevated bacteria, Backbone and George Wyth beaches, both located in northeast Iowa, provide a contrast in likely bacteria sources. Both beaches differ in their watershed:lake ratio, watershed size, landuse, and patterns in elevated bacteria. Backbone Beach has a 919:1 watershed:lake ratio, a watershed dominated by agriculture, and is a beach where bacteria levels increase after rainfall events. Bacteria levels are also elevated throughout the lake and at several tributaries entering the lake. Backbone Beach is located on the lower end of a lake created by a dam on the Maquoketa River. In comparison, George Wyth has a watershed:lake ratio of 89:1, is primarily an urban watershed, and elevated bacteria levels occur primarily in the ankle zone at the beach while lake bacteria levels tend to be low, suggesting a bacteria source close to the beach. An understanding of watershed composition, and its effects on bacterial inputs in lakes can be utilized as an important asset when monitoring beaches.