Abstract #114

Water Quality Monitoring in the Interstate Environmental District

Peter L. Sattler

Principal Environmental Planner, Interstate Environmental Commission, 311 W. 43rd Street, Ste 201, New York, NY 10036

Biographical Sketch of Author

Employed by the Commission for over 23 years, Peter Sattler is involved with all aspects of the ambient and effluent monitoring programs including all field logistics and operation of the IEC research vessel, R/V Natale Colosi. He is an active participant in a number of regional projects and workgroups including the Harbor Estuary Program and the Long Island Sound Study. He is active in the IEC public outreach and education activities, as well as being the Commission librarian and archivist. He holds a BS in chemical oceanography from the Florida Institute of Technology (1976), is an US Coast Guard certified captain since 1990 and has logged over 1,700 scuba dives throughout the western hemisphere.

Abstract

On October 27, 2000, the President of the United States signed the Bill containing the language that changed the name of this agency from the Interstate Sanitation Commission to the Interstate Environmental Commission (IEC). The new name more accurately reflects the Commission's mandates, mission and responsibilities that embrace a broad range of programs and activities that include air pollution, public involvement and education, and water quality — an area in which the Commission is a regulatory and enforcement agency.

Investigations of private and municipal facilities involve a six-hour sampling period and an inspection of processes, equipment, and plant records. Investigations of industrial facilities generally involve a 24-hour period or a full day's production. Analyses are performed for the parameters specified in the facilities' National Pollutant Discharge Elimination System (NPDES) permits which contain the Commission's requirements. The data generated from these investigations are used to determine compliance with IEC's Water Quality Regulations and with each facility's NPDES discharge permit.

The year 2003 marked the thirteenth consecutive summer season that the Commission conducted weekly sampling to document hypoxic (low dissolved oxygen) conditions in western Long Island Sound and the upper East River; this survey was performed aboard the IEC's research vessel, the R/V Natale Colosi. This monitoring is performed in support of the Long Island Sound Study and is conducted from July through mid-September in cooperation with several other agencies. During these summer surveys, additional samples are collected at the established 21-station sampling network, as well as in situ water quality data to support other cooperative studies.

In support of the NY-NJ Harbor Estuary Project (HEP), IEC completed a third year of ambient water quality monitoring for pathogens. In situ measurements are made at a network of 46 stations throughout the New York-New Jersey Harbor Complex for temperature and salinity in addition to collected aqueous samples for the subsequent analysis of four pathogens — fecal and total coliforms, fecal streptococcus and enterococcus — by the IEC laboratory. This very important data set represents information on interstate waterways, applications for state and interstate water quality assessments, model calibrations and TMDL development. During 2003, 16 stations were added in order to collect a nonexistent data set for pathogens on the Newark Bay Complex.

These ongoing year-round interstate programs represent collaborative efforts amongst governmental agencies (local, state, federal), the public and academia –a true success story. Ensuring QA/QC and disseminating data in a timely fashion on many levels allows for access to all stakeholders, and supports many important issues including regulatory compliance, modeling, nitrogen management, pathogen control and assessment (shellfishing and bathing beach quality) and immediate environmental conditions.

NY/NJ Harbor Wide Survey – An Area Wide Cooperative Effort

Veronica Craw

Passaic Valley Sewerage Commissioners, 600 Wilson Ave., Newark, NJ 07105

Biographical Sketch of Author
Veronica Craw is an environmental scientist with the Passaic Valley Sewerage Commissioners and has been conducting water quality sampling in the NY/NJ Harbor Estuary for over four years. She holds a BA in Biology, with a specialization in Marine Science, from Boston University. Veronica serves as the representative for the New Jersey Harbor Dischargers Group at the interstate NY/NJ Harbor Estuary Program's Management Committee, and Pathogens and Nutrients Subcommittee meetings. She is also an active participant in the local Watershed Management Area 4 (WMA4) stakeholder meetings and holds the position of Chairperson of the WMA4 Public Advisory Committee.

Abstract
The New Jersey Harbor Dischargers Group (NJHDG) is initiating a long-term ambient water quality monitoring program in the New Jersey waters of the New York/New Jersey Harbor. The NJHDG consists of ten agencies, representing twelve sewage treatment plants, which discharge to the New Jersey portion of the Harbor Estuary.

The primary goals of the long-term water quality monitoring program include providing baseline data reflecting the current status of water quality in the Harbor, and documenting changes in water quality over time. In the absence of this type of data, assumptions made by regulatory authorities about compliance with water quality standards in the New Jersey portion of the Harbor could be based on inaccurate modeling estimates, which can reflect poorly on NJHDG member facilities, ultimately leading to inappropriate regulatory decisions. This data collection effort will allow NJHDG facilities to collectively utilize their scarce resources to best meet water quality objectives.

This NJHDG program is the first multi-agency watershed-wide sampling effort undertaken in the NY/NJ Harbor. Technical assistance is being provided by key federal and state agencies including: the Environmental Protection Agency (EPA), the New Jersey Department of Environmental Protection (NJDEP), the New York City Department of Environmental Protection (NYCDEP), and the Interstate Environmental Commission (IEC).

The Coastal Charlotte Harbor Monitoring Network, an inter-agency, collaborative coastal water quality monitoring program for Charlotte Harbor, Florida

Catherine A. Corbett

Charlotte Harbor National Estuary Program, 4980 Bayline Drive, North Fort Myers, FL 33917

Biographical Sketch of Author

Catherine Corbett is the Senior Scientist for the Charlotte Harbor National Estuary Program. From 1993-1995, she worked as a wildlife biologist in Morocco’s Tazekka National Park, conducting field research for a Barbary sheep census, park species inventories, cave management plan and a pastoral use survey of park inhabitants. She has worked at IUCN-The World Conservation Union and the Atlantic Center for the Environment, on natural resource issues and conflict mediation. Ms. Corbett received a B.S. degree in Zoology and Minor in Physical Geography from Miami University in 1991 and a Master's degree in International Development from Clark University in 2000.

Abstract

Charlotte Harbor is the second largest open water estuary within Florida. The bay covers approximately 270 square miles, while the watershed extends over roughly 4,400 square miles. Charlotte Harbor and its watershed include all or part of eight counties, and two water management districts and two districts of the Department of Environmental Protection have jurisdiction over water supply and environmental regulation. The interconnected jurisdictions of these institutions have created both management opportunities as well as critical gaps. Water quality monitoring programs in the region are designed to sample for analytes and in areas that are of interest to the individual monitoring agency. The number of individual monitoring sites, the frequency of the collection and the sampled analytes at each site are highly variable, depending on the resources of each individual agency. Monitoring agencies also often use different protocols for lab analysis and sample collection. These inconsistencies can result in data gaps and incomparable data across basins. A major goal of the Charlotte Harbor National Estuary Program has been to help facilitate inter-agency cooperation and coordination to utilize the region’s assets for more collaborative natural resources management and research.

In April 2001 an inter-agency, cooperative monitoring network—the Coastal Charlotte Harbor Monitoring Network—was initiated to monitor the coastal Charlotte Harbor region for essential nutrient, biological and field parameters. The Network uses a probabilistic design, based upon EPA’s Environmental Monitoring and Assessment Program (EMAP) that subsegments Charlotte Harbor into 12 strata with 5 randomly selected sites per month per stratum. The Southwest and South Florida Water Management Districts; Charlotte and Lee Counties; FDEP-Charlotte Harbor Aquatic Preserves; Florida Marine Research Institute and Cities of Cape Coral and Sanibel divide monitoring and lab analyses responsibilities, while the Charlotte Harbor NEP has overall program management and data analysis responsibility for this Network.

Phosphorus Loads Upstream (Arkansas) and Downstream (Oklahoma) of Lake Frances: Are Differences Due to Monitoring Program Design, Natural Variation, or the Lake?

Thomas Soerens

Department of Civil Engineering, University of Arkansas, 4190 Bell Engineering Center, Fayetteville, AR 72701

Biographical Sketch of Author

Thomas Soerens is Associate Professor of Civil Engineering at the University of Arkansas and an Associate Director of the Arkansas Water Resources Center. He teaches and performs research in water quality assessment and in the fate and transport of chemicals in ground water.

Abstract

The Illinois River originates in Arkansas and flows into Oklahoma where it designated as a scenic river. A dispute between the states over water quality in the Illinois River reached the U.S. Supreme Court in 1992. Lake Frances is a very small impoundment on the Illinois River that spans the border between Arkansas and Oklahoma. Results of water quality monitoring have shown apparent differences between nutrient concentrations upstream (Arkansas) and downstream (Oklahoma) of the lake. In Oklahoma, results have shown increasing trends in phosphorus loads. The sampling and load calculation are performed by different agencies on the different sides of the state line and monitoring strategies have changed over the years. The goal of this project was to identify the reasons for the differences between the states and to investigate the influence of Lake Frances on phosphorus concentrations and transport. This study used water sampling, sediment sampling, and historical data to evaluate changes in phosphorus concentrations and loads upstream and downstream of Lake Frances during base flow and surface runoff flow regimes. Results should help us determine whether differences between the states are due to monitoring differences, natural variation in sampling and load calculation, or the influence of Lake Frances.

Abstract #118

Developing a Tiered Approach to Volunteer Monitoring

Timothy Craddock

WV Save Our Streams, WV Department of Environmental Protection (WV DEP) Division of Water and Waste Management, 414 Summers Street 2nd Floor, Charleston, WV 25301

Biographical Sketch of Author

Tim is an Environmental Resource Specialist and Program Coordinator for the WV Save Our Streams Program, a position he has held for the past 4 years. He has a bachelors of science in biology with a focus on marine science and a masters in environmental science. Tim has worked in the natural resources field both as a volunteer and under the employ of federal, state and private companies for more than 12 years. Tim has developed outreach and education materials and programs in water quality focusing on wetlands and polluted coalmine drainage; and has been involved in several wetland creation and restoration projects for school science programs and mine treatment projects. Tim has also lead project teams for disaster assistance and environmental assessment with the Federal Emergency Management Agency in the Virgin Islands after hurricane Marilyn and following floods in the Midwest and West Virginia.

Abstract

Like many volunteer monitoring programs across the country, a major goal of the WV Save Our Streams Program is to encourage the use of volunteer data for purposes other than as a compliment to professional data gathered for the 305(b) report. The idea is simply to gain credibility by providing a program that is not only accepted by the volunteers but also by federal and state agencies, and who's information could be a possible mechanism for future funding of volunteer managed monitoring projects. A series of stakeholder and roundtable style meeting were held over an 8 month period in order collect ideas from all interested participants and provide guidance for future program development. The direction was overwhelming from both volunteers and professionals; to develop a program that would provide enhanced training opportunities but would still be understood by those with little experience in stream assessment techniques.

To that end WV Save Our Streams developed a tiered approach to stream monitoring training:

- **Beginning Stream Monitoring**: Introduces the concepts of chemical, physical and biological stream monitoring and provides basic equipment, manuals and other resource materials.
- **Intermediate Stream Monitoring**: Expands upon the concepts by using more thorough techniques, thus beginning to quantify the information collected. Basic equipment, manuals and other resources are provided.
- **Advanced Stream Monitoring**: The training is very similar to a professional method of stream assessment, "rapid bioassessment protocols (RBPs)". Enhanced equipment, manuals and additional resources are provided.

In addition to the training, a volunteer stream condition index was developed and tested for each level of assessment. The advanced volunteer **stream index** has been compared to the state's IBI (known as the WV Stream Condition Index "WVSCI") on 500 benthic collections at random from the state's database. Comparisons were done by applying the volunteer field method of identification to the random samples. Statistical analysis gave a correlation of 0.92 when comparing index methods and 0.96 when comparing the final biological integrity rating (i.e. excellent, good, marginal, poor). In house and field studies will continue. Progress has been slow at times, but within the past year, many agencies such as DEP's Watershed Assessment and Mining and Reclamation Section, WV Division of Natural Resources, US Army Corps of Engineers, US Geological Survey and the WV Conservation Agency are considering using the advanced volunteer methods as a quick reliable field method and screening tool to expedite information about certain water quality indicators to the general public.

Abstract #119

Citizen and Agency Partnership: Volunteer Monitoring in Montana's Flathead Basin

Mark Holston

Flathead Basin Commission, 109 Cooperative Way, Suite 110, Kalispell, MT 59901

Biographical Sketch of Author

Mark Holston is the Public Information Office of the Flathead Basin Commission and is the organization's sole employee. The FBC is a quasi-state agency that functions as a watershed group in the six million square acre Flathead Watershed of northwest Montana and southeast British Columbia. The primary emphasis of this non-regulatory entity is education. Mr. Holston's background is in print and electronic journalism. He has authored many magazine articles on environmental topics for, among other publications, Americas Magazine, the publication of The Organization of American States, and The World & I, the monthly publication of The Washington Times. He has coordinated the FBC's Volunteer Monitor Program since its inception in 1992.

Abstract

Citizen volunteer monitoring programs designed and coordinated by the Flathead Basin Commission for lakes and streams in Northwest Montana demonstrate an effective use of trained citizen volunteers to augment agency-conducted monitoring programs that are increasingly faced with lack of adequate human and financial resources.

The FBC programs are now in their second decade and to date have produced thousands of individual monitoring reports by program participants from over three dozen sites on area lakes and streams. Monitoring methods have been developed and volunteers have been trained according to jointly agreed upon standards. The University of Montana, U.S. EPA, Montana DEQ and other agencies have contributed to this collaborative effort, insuring a high level of data quality and applicability to such agency-driven projects as watershed restoration work and TMDL programs in area basins. The volunteer program is a model of success and has increased public awareness of water quality issues and has improved landowner stewardship. It has also produced high quality data that is available upon request and has been utilized by citizen groups, state and federal agencies, such local government entities as planning boards, consulting firms, educational institutions, and individuals for a variety of purposes.

The presentation will highlight program successes that illustrate the benefit of citizen/agency partnerships and the scientific credibility of citizen-collected water quality data.

Can Volunteers Climb the Learning Curve to Convert their Data to Information?

Candie C. Wilderman

Department of Environmental Studies, P.O. Box 1773, Dickinson College, Carlisle, PA 17013

Biographical Sketch of Author

Candie C. Wilderman is a Professor of Environmental Sciences at Dickinson College in Carlisle, PA. She earned a B.S. in Geology from Tufts University, an M.A. in Geology from Harvard University and a Ph.D. in Geography and Environmental Engineering from Johns Hopkins University. She is also Founder and Science Director of ALLARM (Alliance for Aquatic Resource Monitoring), a community-based volunteer stream monitoring network in Pennsylvania, founded in 1986 and staffed by Dickinson College faculty and students. Her teaching and research interests include: operational models for community-based research, watershed assessment and management, aquatic ecology, and Chesapeake Bay restoration and protection issues.

Abstract

The Alliance for Aquatic Resource Monitoring (ALLARM), a community science project of the Environmental Studies Department at Dickinson College, Carlisle, PA, provides technical and programmatic support to Pennsylvania communities and individuals, who are working to evaluate, protect, and restore streams. During our 18-years of operation, we have engaged citizen scientists in a number of different roles; in recent years we have adopted a community-based participatory model where the volunteers perform the research for all phases of the study, with the support and training of our staff. We have found that the most challenging task for volunteers is to "find the story" in their data during the data analysis and interpretation stage.

This presentation will discuss the importance of volunteers engaging in this difficult process in terms of: 1) the sense of ownership, increased understanding, and empowerment for action that comes out of this involvement, and 2) the value of utilizing local knowledge for sound interpretation of cause and effect. A two-phase model for training volunteers will be presented; the first phase is an analysis of a virtual watershed case study to teach statistical and graphical interpretation and to lead volunteers to discover how patterns in water chemistry may reflect geology and land use patterns. The second phase is the analysis and interpretation of their own actual data; during this phase participants' knowledge of local practices is used to identify the causes of the patterns and to inform action plans. Our own effectiveness and ongoing challenges in training watershed groups to turn their data into information will be assessed.

Abstract #121

The Benefits of Public/Private Partnerships

Ginger North

Delaware Nature Society, P.O. Box #700, Hockessin, DE 19707

Biographical Sketch of Author

Ginger first joined the Delaware Nature Society as a Naturalist for the Education Department at Ashland in 1992 and taught a variety of programs for them. She has worked with the Delaware Stream Watch program in the Natural Resource Conservation department since 1995, first as the Technical Monitoring Assistant, then as Stream Watch Assistant Coordinator, and most recently as the Stream Watch Coordinator.

She received a Master of Science degree in Genetics from the University of Delaware, and a Bachelor of Science degree in Biology/Marine Biology from the University of Long Island. She taught biology laboratories for four years at the University of Delaware. She also has an extensive background in Quality Control, both in a clinical microbiology laboratory and in a hospital endocrinology laboratory.

Abstract

What are the benefits of public/private partnerships? Delaware Stream Watch is a grassroots volunteer waterway protection program focusing on citizen monitoring, education, and advocacy. Founded in 1985 as a partnership between the Delaware Nature Society and the Division of Water Resources of the Delaware Department of Natural Resources and Environmental Control (DNREC), it is one of the oldest statewide volunteer water quality monitoring programs in the nation, and one of the few joint efforts between a state agency and a non-profit environmental organization. Delaware Stream Watch has two main components, which fulfill different needs for each partner. The Stream Adoption program provides public education on the importance of water resource protection, while the State provides a large part of the funding. The other component of Delaware Stream Watch is the Technical Monitoring program. It differs from Stream Adoption in the assignment of strategic monitoring sites, a fixed sampling schedule, additional physical/chemical tests, and more rigorous procedures to ensure quality control in sampling techniques. Monitoring locations are selected in consultation with the Division of Water Resources in order to provide the Division with supplemental baseline data, particularly in some smaller sub-watersheds. This presentation will discuss the mutual benefits of this partnership.

Trace Elements in Ground Waters of the United States: A New Statistical Summary

Lopaka Lee and Dennis Helsel

U.S. Geological Survey, Denver Federal Center MS 973, Denver, CO 80225

Biographical Sketches of Authors

Lopaka (Rob) Lee is a research geologist with the USGS Mineral Resources Program in Denver, Colorado. He holds an M.E. in Geological Engineering from the Colorado School of Mines and specializes in environmental geochemistry. Lopaka currently works on variety of projects integrating field-based observations with predictive geochemical modeling and data analysis. Since 2000 he has served as a technical advisor to private industry and government planning committees on the environmental impacts of mining Mississippi Valley Type Pb-Zn deposits in the U.S. Mid-continent. Lopaka is the author and maintainer of WatRes, a free water-resources statistics library for use in the R and S-Plus statistical computing environments.

Dennis Helsel is a research geologist with the U.S. Geological Survey in Denver, Colorado. He holds a Ph.D. in Environmental Sciences and Engineering from Virginia Tech, and his current research focus is on interpretation of censored environmental data. His textbook *Statistical Methods in Water Resources*, originally published in 1992 and now republished by the US Geological Survey, is considered a standard tool in the water resources community. Dr. Helsel is a longtime member of the American Statistical Association, and has published in a wide variety of journals, from methods papers in Environmetrics to national summaries of arsenic in ground waters in the journal Ground Water. His varied interests center on improving the practice of interpreting environmental data. His new textbook *Nondetects And Data Analysis* will be published by John Wiley in 2004.

Abstract

Accurately defining statistical distributions of trace elements in ground water for a region as large and diverse as the United States is a formidable task. This study provides statistical models of the concentrations of trace elements in ground waters of the U.S. using data generated by the National Water Quality Assessment (NAWQA) Program of the U. S. Geological Survey (USGS). The NAWQA Program provides a consistent sampling and analytical framework that produces water-quality information representative of the majority of ground waters used for public consumption throughout the country.

Our analysis uses new, publicly-available software developed for this study, designed for data sets with multiple detection limits. These methods are necessary to correctly estimate statistics for multiply-censored data without introducing the bias or artificial signals possible when fabricating values for nondetects. Our methods also estimate the probabilities of exceedance for concentration limits such as current or future water-quality standards. For example, the median concentration of dissolved arsenic in U.S. ground water is 0.7 ug/L. The current EPA MCL for Arsenic (10 ug/L) has a probability of exceedance of 7 percent. Alternative arsenic standards at 5 and 3 ug/L have exceedance probabilities of 15 and 25 percent respectively.

We compare our results to a similar study using data from USEPA's STORET, containing water-quality data collected from a variety of unrelated investigations. Our results corroborate results from that study for some elements, but for others we produce lower concentration statistics, presumably due to differences in site selection and design.

Abstract #123

Analytical Measurement Estimation for Environmental Sampling and Testing Data

William Ingersoll

Naval Sea Systems Command (NAVSEA), 1661 Redbank Road, Goose Creek, SC 29445

Biographical Sketch of Author

William Ingersoll is a chemist with Department of Navy, Navy Sea Systems Command (NAVSEA), Laboratory Programs Office located in Goose Creek, South Carolina. He has over 20 years experience in research, quality assurance, and federal government laboratories. For the past 15 year, Mr. Ingersoll has worked in environmental laboratory analysis and field sampling programs with Departments of Navy, Clemson Research Center, and Department of Air Force. He began working for NAVSEA in 1998 to support Navy Installation Restoration Program. He is an environmental laboratory assessor for Navy laboratory quality and accreditation programs.

Abstract

To make the right environmental decisions requires understanding the quality of the data. Data comparability is an important component in data quality and ensuring data comparability requires estimating analytical measurement uncertainty. Strategies for estimating and minimizing data uncertainty are explored in this presentation. The concept of analytical measurement uncertainty is widely recognized among analytical chemists. Replicate preparation and testing of an environmental sample will generate a range of results. This variability of results represents the analytical measurement uncertainty. The strategy that will be presented uses existing data routinely generated by a laboratory to estimate analytical measurement uncertainty.

Environmental data may be censored, qualified, or quantified. Managing the uncertainty associated with each of these data categories requires estimating the analytical measurement uncertainty and modeling the sample data to represent the population parameter. The uncertainty of quantified data can be estimated by replicate sampling strategies. However, because nonquantified data (including nondetects and detects) are swamped by background fluctuation interferences, these data must be managed using a different model, such as a maximum uncertainty model, to represent the underlying population distribution.

Abstract #124

Data Collection and Monitoring of Stream-Channel Processes in Support of Numerical Models and Developing Water-Quality Targets for Sediment

Andrew Simon[1], Robert R. Wells[2], and Eddy Langendoen[1]

[1] USDA-ARS National Sedimentation Laboratory, Oxford, MS
[2] Department of Geological Engineering, University of Mississippi, Oxford, MS

Biographical Sketches of Authors

Andrew Simon is a Research Geologist at the USDA-ARS-National Sedimentation Laboratory in Oxford Mississippi. He has over 24 years of research experience (16 with the USGS) in sediment transport and unstable landscapes, particularly incised channels and streambank processes. He is the author of numerous technical publications and has edited several books and journals. Dr. Simon is an adjunct Professor at the University of Mississippi, a Special Professor in the School of Geography, University of Nottingham, and is on the Editorial Board of the journal *Geomorphology*.

Robert Wells is a Post-Doctoral Research Associate at the University of Mississippi. He received his PhD from Cornell University in the Department of Agricultural and Biological Engineering. His work at the University of Mississippi has concentrated on using a numerical model of stream-channel evolution to determine sediment loadings and channel changes in disturbed watersheds. Dr. Wells is the author of several journal articles and technical reports, and helps in providing training in use of the CONCEPTS channel-evolution model and associated field techniques.

Eddy Langendoen is a Research Hydraulic Engineer at the USDA-ARS-National Sedimentation Laboratory (NSL) in Oxford Mississippi. He is the developer and author of CONCEPTS, a 1-D channel-evolution model, which is unique in that it dynamically incorporates streambank failures along with flow and sediment routing. Dr. Langendoen received his PhD from Delft University, Netherlands and came to NSL after serving as a Research Professor at the Computational Center for Hydroscience Engineering at the University of Mississippi.

Abstract

Sediment, either suspended in the water column or accumulated on the streambed is recognized as a leading cause of water-quality impairment of assessed rivers and lakes in the United States. In studies of streams and watersheds impaired due to sediment, a deterministic, numerical channel-evolution model (CONCEPTS) is used to estimate “existing” rates of sediment transport while background or “reference” rates are determined through a combination of rapid geomorphic assessments and regional, historical flow and sediment-transport data.

CONCEPTS is a one-dimensional unsteady-flow model that routes flow and sediment while adjusting the channel vertically, and laterally by incorporating bank-failure mechanisms. Best results are obtained when supporting data on channel morphology and the hydraulic and geotechnical resistance of the bed and bank materials is provided. *In situ* measurements of bank-material shear strength and bank-toe erodibility are conducted at each cross section location. Particle-size samples of non-cohesive sediment are obtained for sediment-sorting routines and to provide data on critical hydraulic shear stress. Model results provide information on sediment loads, morphologic changes and sediment sources, thereby aiding in the design and implementation of remediation strategies.

Results from the CONCEPTS model represent conditions as they exist for the boundary and input conditions provided to the model but do not provide information as whether the sediment-transport rates are in excess of background or “reference”. “Reference” transport rates are obtained by calculating sediment yields for sites in the same ecoregion with historical flow and sediment-transport data and then differentiating these sites into stable and unstable reaches of different dominant bed-material compositions. This is done using a channel-stability index and identifying stage of channel evolution. The combination of geomorphic and numerical modeling techniques supported by sufficient field data has been found to be a powerful tool in developing water-quality targets for sediment.

Abstract #125

Development of a Methodology to Assess Standards Violations in the Everglades Utilizing Secondary Data Sources

Kenneth Weaver

Florida Department of Environmental Protection, 2600 Blair Stone Rd., MS 3560, Tallahassee, FL 322399

Biographical Sketch of Author

Kenneth Weaver is an Environmental Specialist in the Water Quality Standards and Special Projects Program within the Florida Department of Environmental Protection with training and experience in aquatic ecology, statistics, and water quality. Since joining the Department in 1998, he has provided technical and regulatory support for Everglades restoration projects. This support has included water quality standards attainment assessments, Everglades phosphorus and dissolved oxygen criteria development, monitoring network design, and providing expert testimony in court and before technical advisory committees. Currently, Ken is coordinating the development of statewide numeric nutrient criteria for streams, canals, and lakes.

Abstract

The Florida Legislature directed the South Florida Water Management District and Florida Department of Environmental Protection to annually issue a peer-reviewed report identifying water quality variables, which exceed water quality standards or are causing or contributing to adverse impacts in the Everglades. Although the mandate exists to report standards compliance, there is no uniquely designed and operated monitoring program to measure such compliance. The authors of these reports have attempted to use, in a scientifically sound manner, data collected for other purposes (found data) to assess standards compliance. The methods used to assess standard violations have evolved between 1999 and 2003 through a process that sought to balance consistency with previous Everglades reports, other state of Florida water quality programs, and U.S. Environmental Protection Agency guidance, while acknowledging the limitations of using found data. Prior to the 2003 report, an exceedance was reported when more than 5 percent (raw score) of the annual measurements exceeded numeric criteria. Because a raw-score approach does not account for uncertainty associated with sampling, it was replaced in 2003 with a binomial hypothesis test for sample sizes greater than 27 measurements. Using the binomial hypothesis test at the 90 percent confidence level a standards violation was reported if the annual exceedance rate was greater than 10 percent. For sample sizes less than 28 a violation was preliminarily reported if the annual exceedance rate was greater than 20 percent as a raw score. These preliminary violations were confirmed by applying a binomial hypothesis test over a longer five year period of record.

Abstract #126

The Accuracy and Precision of Laboratories Analyzing Water Quality Samples for Phosphorus: An Evaluation in the Catskill Mountains of New York State

Dennis J. McChesney[1] and Michael R. McHale[2]

[1]USEPA Region 2/DECA/PTSB, 2890 Woodbridge Ave. Edison, NJ 08837-3679
[2]USGS - New York District, Watersheds Research Section, 425 Jordan Road, Troy, NY 12180

Biographical Sketches of Authors

Dennis McChesney is an environmental scientist, currently in the Division of Enforcement and Compliance Assistance, at U.S. EPA Region 2. Until recently, Dennis was a hydrologist in Region 2's Division of Environmental Science and Assessment, where he planned and implemented monitoring projects in New York, New Jersey, and Puerto Rico, and oversaw quality management for the water programs throughout the Region. His previous experience was in the drinking water/ groundwater programs where he focused on groundwater protection and remediation. Dennis previously served as co-chair of EPA's Groundwater Protection Technical Forum, and as a member of the Methods and Data Comparability Board where he chaired the Board's Outreach Workgroup. Dennis earned a B.S. in Biology from the University of San Francisco, an M.B.A. from Fairleigh Dickinson University, and M.S. in Environmental Sciences from Rutgers University, where he is currently a doctoral candidate.

Mike McHale is a hydrologist with the U.S. Geological Survey. His research focuses on the biogeochemistry of small watersheds. He is currently involved in investigations of mercury cycling in the Catskill Mountains of New York, the effect of forest harvesting on nitrogen and aluminum cycling, the effects of agricultural Best Management Practices on stream water, phosphorus concentrations in the Cannonsville Reservoir watershed, and a comparison between the Adirondack and Catskill Mountains of recovery rates from decreased of acid deposition. Mike received his Ph.D. from the SUNY College of Environmental Science and Forestry in 1999 where his research focused on the hydrologic controls of nitrogen cycling in the Adirondack Mountains. He is the author of several peer-reviewed journal articles on biogeochemistry and hydrology in small watersheds.

Abstract

The New York district of the U.S. Geological Survey and the U.S. Environmental Protection Agency - Region 2 conducted a study to analyze the accuracy and precision of laboratories that analyze phosphorus concentrations of natural waters within the Catskill Mountains of New York State. Ten laboratories participated in the study. Each laboratory analyzed four samples for total phosphorus (TP), total dissolved phosphorus (TDP), and soluble reactive phosphorus (SRP or orthophosphate). Three of the samples were reference samples prepared by the USGS Branch of Quality Systems (BQS). The fourth sample was a stream sample collected from the USGS gaging station at Town Brook near Hobart, New York (station USGS ID 01421618). We evaluated data comparability with the same non-parametric statistical methods used by the USGS Standard Reference Sample program. Results indicated a high level of precision for each lab (i.e., laboratories produced consistent data for the triplicate results). However half of the laboratories failed to meet accuracy targets for at least one of the four sample sets (i.e., poor interlaboratory comparability). A workshop was held in Albany, NY with study participants to evaluate the technical aspects of the study, sources of variability in the results, lessons learned, and use of comparability data in watershed evaluations. An overview of the initial study results, results from a second round of stream sample analyses, and insights from the workshop will be presented.

When is an NTU not an NTU? — USGS and ASTM address turbidity data comparability and storage issues with new reporting units

Chauncey W. Anderson[1] and G. Douglas Glysson[2]

[1]U.S. Geological Survey, 10615 SE Cherry Blossom Drive, Portland, OR 97216
[2]U.S. Geological Survey, 12201 Sunrise Valley Drive, Reston, VA 20192

Biographical Sketches of Authors

Chauncey Anderson: is a hydrologist with the Oregon District of the USGS, with a major focus on water quality. Currently he is revising the USGS' National Protocol for the measurement of turbidity. Chauncey also is working on issues of sediment and contaminant transport associated with reservoir drawdown and the use of turbidity as a surrogate for suspended sediment concentration for determination of sediment loads. He has expertise in stream nutrient dynamics, eutrophication, and pesticide occurrence in streams of Oregon. He began working for the USGS since 1991, after completing his Master's Degree from the University of Washington in Seattle.

Mr. Glysson has over 34 years of service with the USGS as a hydrologic engineer, hydrologist, and supervisory hydrologist, working at all levels of the Water Resources Discipline and has served in supervisory and technical management positions. Mr. Glysson has a M.S. in Engineering Administration and a B.S. in Civil Engineering. He currently serves as the Vice Chair of ASTM International's Committee on Water and Secretary of the Board of Registration for American Institute of Hydrology. He has authored over 35 books, reports, papers, and standards on sediment data collection, analysis, and transport. He has taught the USGS' Sediment Field Data Collection Techniques and Sediment Records Computation and Interpretation Courses, a WMO International Workshop on Sediment Transport Measurements in Beijing, China, and numerous short courses. He has preformed research into the differences between TSS and SSC analyses and co-authored USGS policy memorandum on the subject.

Abstract

The availability of relatively inexpensive, yet sophisticated instrumentation that allows nearly continuous monitoring and logging of turbidity data, combined with increasing recognition of the multitude of environmental issues associated with turbidity in water, has resulted in growing demand for high quality and objective turbidity data. Technological advances have resulted in a variety of available turbidimeters that can meet many different objectives. However, different meters often do not yield equivalent results because of differences in instrument design. The US Geological Survey (USGS), in conjunction with ASTM, has recently produced a major revision in its protocols for the measurement and storage of turbidity data. Among the changes, USGS and ASTM have developed a suite of new reporting units that are applied to turbidity data on the basis of the instrument design. Data will be stored according to these reporting units, reducing the likelihood that turbidity data from significantly different technologies will be inappropriately compared against each other; however, some data comparability problems remain. Consistency of procedures and instruments within and among programs in which data will be compared (over space or time) is a crucial consideration for the success of future turbidity monitoring programs.

Evaluation of bioassays for surface water quality monitoring

Peter G. Stoks

RIWA / IAWR, Groenendael 6, Nieuwegein 3439 LV, The Netherlands

Biographical Sketch of Author

From January 1, 2003 Peter Stoks is director of the Rhine Water utility association RIWA in the Netherlands, and acting director of the International Association of Waterworks along the Rhine IAWR. Until 2003 he was Head of the Water Quality Division and Member of the Directory Board of the Dutch WRK Water works. His main interests in Water management include policy development, monitoring and assessment, and early warning strategies.

Abstract

The River water utility association RIWA, is an organization in the Netherlands and Belgium in which the water utilities along the rivers Rhine and Meuse have been working together for over 50 years in an attempt to reduce the levels of pollutants in their source water. One of the instruments RIWA employs is a joint monitoring program in which chemical, as well as biological water quality variables are being studied. Historically, the Ames mutagenicity test has been part of the biological component in this monitoring network. At the national governmental water management level discussions about the pro's and con's of using effect-oriented tests in the assessment of discharges and in ambient monitoring have become increasingly important. Due to a growing aversion against the relevance of the Ames test (notably upstream), as well as for financial reasons a number of other biotests were, therefore, evaluated in a joint project with the national water authority, in order to obtain a better alternative test to obtain information about the potential genotoxicity of the source water.

The overall conclusion from these measurements is, that there is no single genotoxicity test capable of covering the broad range of effects observed. In addition, although a marked decrease in genotoxicity response was observed in both rivers over a 6 year period, there still appear to be distinct differences in genotoxicity response between the two rivers studied. These differences can be partly explained by the differences in chemical composition. In view of the different industrial developments within the Rhine and Meuse catchment areas this indicates that the effluents of waste water treatment plants should be investigated in more detail.

Abstract #129

Mobile Laboratories: An Innovative Approach in Bacteria Monitoring

Arthur Garceau[1] and Mindy K. Garrison[2]

[1]Indiana Department of Environmental Management, OWQ Branch, PO Box 6015, Indianapolis, IN 46206-6015
[2]Ohio River Valley Water Sanitation Commission, 5735 Kellogg Avenue, Cincinnati, OH 45228

Biographical Sketches of Authors

Art Garceau is the Chief of the Surveys Section of the Office of Water Quality, Indiana Department of Environmental Management. He supervises the surface water quality monitoring of the State's rivers and streams, collecting physical and chemical parameters. In his position he is responsible for maintaining the collected data, issuing reports of the monitoring activities, distributing data to many and varied users, and assessing data for CWA 305(b) submissions.

Mindy K. Garrison is a graduate of Morehead State University with a BS in Environmental Science and has been employed as an Environmental Specialist for the Ohio River Valley Water Sanitation Commission for the last three years. She coordinates the Contact Recreation Sampling, Ambient Water Quality Monitoring, and the abatement of Combined Sewer Overflows.

Abstract

Bacteria monitoring over large areas poses special challenges due to the fact that bacteria samples only have a six-hour hold time. In order to collect valid bacterial data at distant locations, IDEM developed the concept of a mobile laboratory equipped to perform bacterial analyses on site. After seeing the advantages of using a mobile laboratory, ORSANCO decided to purchase its own mobile laboratory to allow bacterial monitoring over the entire 981mile length of the Ohio River.

The labs are set-up for processing bacteria samples using the Colilert® method for total coliforms and *E. coli*. In addition to analyzing all samples by Colilert®, confirmation samples are collected at 10 to 20 percent of the sites, and are analyzed for *E. coli* and fecal coliform by contract laboratories using the membrane filtration method.

The State of California's Effort to Develop a Standardized Bioassessment Effort and Biocriteria Development

James M. Harrington

California Department of Fish and Game, 2005 Nimbus Road, Rancho Cordova, CA 95670

Biographical Sketch of Author

Jim is a Staff Environmental Scientist for the California Department of Fish and Game (DFG) based at the Water Pollution Control Laboratory. Jim received his B.S. degree in Fisheries and M.S. degree in Watershed Management from Humboldt State University in Arcata, California. His duties include investigating biological effects of toxic spills, designing water quality monitoring projects for DFG and various government agencies and supporting DFG's regional water quality biologists. Jim established DFG's Aquatic Bioassessment Laboratory in 1993 and since then has lead the development of ecological assessment techniques in California and participates on several U.S. EPA workgroups to integrate biological assessment into water quality regulation.

Abstract

California's water quality agency is divided into nine autonomous regions called Regional Water Quality Control Boards and one state-wide entity called the State Water Resources Control Board. Each board has staff engineers and environmental specialists that report to politically chosen board members that make the final decision on water quality regulation. Although California has an environmentally sound record on water quality regulation, it is very difficult to make changes with established programs or implement new programs, including biocriteria development. In 1993, the California Department of Fish and Game developed a rapid bioassessment procedure based on those used to monitor the effects of their fish hatcheries on the biological condition of receiving waters. Although, DFG is not a water quality regulatory agency, it does have its own anti-pollution code (DFG Code 5650) that allows it to prosecute violators. With the aid of the U.S. Environmental Protection Agency and the State and Regional Boards, DFG's California Stream Bioassessment Procedure (CSBP) has become the state standardized procedure for assessing biological integrity of the state's wadeable streams and rives. Today the CSBP is widely used for point-source, non-point source and ambient monitoring of aquatic resources. Additionally, it is effectively used in enforcement of DFG Code 5650 and natural resource damage assessments. Although, California water regulation does not include biocriteria, considerable effort has been initiated in the state, including establishing the CSBP as standardized sampling protocol, determining regional IBIs and building a substantial database of bioassessment data from more than 2500 sites state-wide.

Using Fish Community Assessments to Predict Percent Stream Miles Impaired for Aquatic Life Use

Stacey L. Sobat

Indiana Department of Environmental Management (IDEM), 100 N. Senate Ave., P.O. Box 6015 (Shadeland), Indianapolis, IN 46206-6015

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

The Surface Water Quality Monitoring Strategy was initiated in 1996 by the Indiana Department of Environmental Management (IDEM), Office of Water Quality, Assessment Branch. One of the goals of the Strategy is to assess the ability of Indiana waters to support aquatic life use (ALUS) within five years using a rotating basin approach. As part of the Strategy, the Watershed Monitoring Program was developed to provide a comprehensive, unbiased assessment and characterization of the overall water quality and biological integrity for all Indiana streams by using randomly selected sampling sites. Initial site selection is conducted by the National Health and Environmental Effects Research Laboratory (NHEERL) in Corvallis Oregon and focuses on all stream sizes within the targeted river basins. Data collected are numerous including water, nutrient, and bacteriological samples for laboratory analysis, in-situ water chemistry measurements, fish and macroinvertebrate community information, and qualitative habitat evaluations. Once the data are collected, stream segments are classified as fully supporting or non-supporting based on water quality standards and the definition of a "well-balanced aquatic community". After classifications are agreed upon by a workgroup of field scientists, staffs calculate the percentage of resource impaired for each basin via statistical packages provided by USEPA NHEERL. These percentages are used to report the comprehensive aquatic life use support status for streams in the Integrated Water Quality Monitoring and Assessment Report. This presentation will focus on the development of biological reference conditions in Indiana to assess fish community samples and the use of these assessments to predict the percent of resource (stream miles) in Indiana impaired for ALUS given the fish community results.

Abstract #132

Nutrient Status and Trends

Mary Skopec[1], Eric O'Brien[1], Lynette Seigley, and Richard Langel[1]

Iowa Department of Natural Resources, 109 Trowbridge Hall, Iowa City, IA 52242

Biographical Sketches of Authors

Mary Skopec is the Section Supervisor of the Water Monitoring Program at the Iowa Department of Natural Resources. Mary earned her B.S. and M.A. degrees in geography from the University of Iowa, and in 1999 she completed her Ph.D. in environmental science. Mary has worked at the Iowa DNR since 1991, during that time she has been involved in water quality projects investigating the impacts of intensive agricultural practices on streams. As supervisor of the water monitoring section, Mary directs the state's water monitoring program including the collection, analysis, and management of information on stream, lake, wetland, and groundwater resources.

Eric O'Brien completed his master's research in Environmental Science at the University of Northern Iowa in the May 2003. His primary interest of focus is environmental microbiology, specifically focusing on bacterial source tracking. Before joining the IDNR Water Monitoring Section, Eric also helped coordinate undergraduate water research activities at the University of Northern Iowa. These interests led him to work for the Water Monitoring Section in June 2003. Eric's effort has been primarily focused on bacterial monitoring as well as tracking of bacterial sources for the state's beaches.

Abstract

In anticipation of the development of numeric nutrient standards, the Iowa General Assembly directed the Iowa DNR to conduct a nutrient study during 2003 (Senate File 2293): '*The department shall conduct a study that considers the effects on waters of this state from phosphorus originating from municipal and industrial sources and from farm and lawn and garden use. The department shall report the results of its study to the general assembly by January 1, 2004.'* The legislation also requires the DNR to develop a nutrient budget by watersheds, establish a phosphorus index rule, assess nutrient control technologies, and establish a numeric water quality standard for phosphorus. Together, these activities will be used to develop a comprehensive strategy for the state over the next few years.

The development of the state's nutrient strategy is occurring through a series of coordinated steps. This presentation focuses on one of the first steps – synthesizing data on the status of Iowa's waters. The methodology used to determine impacts of nutrients on Iowa's water consisted of several activities: 1) Comparison of in-stream and lake nutrient concentrations to established EPA benchmark levels; 2) Comparison of in-stream and lake nutrient concentrations to Iowa indicators of biological health; 3) Determination of relationships between land use and measured nutrient concentrations; and 4) Comparison of inputs as established by a nutrient budget to stream and lake concentrations.

The current status of Iowa's waters based on data from 2000 through 2002 indicates that the majority of Iowa's water bodies exceed the benchmark levels established by EPA. Iowa data show that on average, 70% of Iowa stream and lake samples do not meet benchmark levels for phosphorus and 80% of the time for nitrogen. The percentage of samples exceeding the benchmarks varies annually and seasonally since rainfall is an important driving factor for the transport of nutrients.

The Effects of Single vs. Tiered Aquatic Life Uses, Multiple vs. Single Organism Groups and Biocriteria-Based vs. Chemical Criteria-Based Methods on Estimation of Aquatic Life Use Attainment and Impairment

Edward T. Rankin[1] and Chris O. Yoder[2]

[1]Center for Applied Bioassessment and Biocriteria, P.O. Box 21541, Columbus, OH 43221-0541
[2]Midwest Biodiversity Institute, P.O. Box 21561, Columbus, OH 43221-0561

Biographical Sketches of Authors

Edward T. Rankin is a Senior Research Associate for the Center for Applied Bioassessment & Biocriteria (CABB) in Columbus, Ohio. He previously worked for 18 years for the State of Ohio Environmental Protection Agency as a fishery ecologist in their Ecological Assessment Section. He has worked on projects related to assessing the effects of multiple stressors on aquatic life in streams, development and application of stream habitat assessment methodologies and development and application of biological criteria.

Chris O. Yoder is involved in the national development of biological assessments and biocriteria, including multimetric index development for large rivers and wadeable streams. He is presently the principal investigator of a cooperative agreement with the U.S. EPA, Office of Water for monitoring and assessment, indicators, and biological criteria development and implementation. He was most recently Manager of the Ecological Assessment Section at Ohio EPA (1989 – 2001) and supervisor and staff member since 1976. His experience also includes service on national, regional, and state working groups and committees dealing with monitoring and assessment, environmental indicators, biological assessment, biological criteria, and WQS development and implementation. Recently he served as a member of the National Research Council committee on the role of science in the TMDL process. He has 33 years of experience in the assessment of fish assemblages and other aquatic organism groups, their associated habitats, and 28 years in water quality management including the integration of multiple indicators of stress, exposure, and response.

Abstract

The TMDL program and a myriad of other state water management programs are dependent on the structure of a state's water quality standards program including its aquatic life use structure and the monitoring efforts performed to measure attainment or impairment of these aquatic life goals. The consequences of decisions with regard to the robustness of a monitoring program and the choice of aquatic life goals for waters are not always fully appreciated. In this paper we "deconstructed" Ohio's estimation of impaired waters which is based on tiered aquatic life uses, the use of two organism groups, and a biocriteria-focused decision tree to retrospectively understand the consequences of using a single aquatic life use, a single organism group, and replacement of biocriteria with a focus on chemical surrogates for measuring aquatic life use attainment. When we assumed there was a single aquatic life use for Ohio streams instead of tiered uses only 17.8% of stations now considered to be in a higher tier would be considered impaired, compared to 56.5% of such sites under the existing tiered framework. Conversely, 46% of sites from an existing modified aquatic life use (lower than the interim goal) were considered impaired under a single aquatic life use with vs. about 9% of stations under a tiered use system. When existing water chemistry data alone is used to measure aquatic life impairment over the past 20 years, it overestimated attainment by approximately 30% compared to an existing biocriteria-based aquatic life use estimates during this time period. Similarly, the use of two organism groups documented approximately 20%-30% more impaired sites than the use of a single organism group. This work suggests that a robust monitoring program and well conceived aquatic life uses should be a basic component of any water resource quality effort and the choice of aquatic life uses and monitoring approaches can have important consequences for restoration and protection of aquatic life across the US.