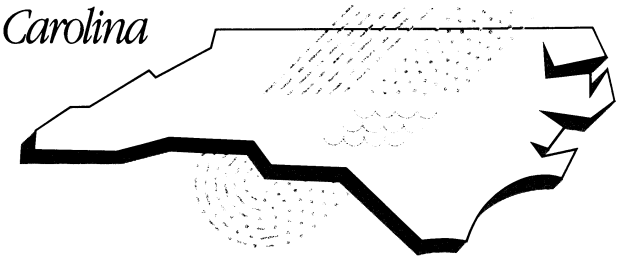
Water Resources Research Institute News
of The University of North Carolina



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WRRI conference speakers say N.C. policy inadequate to ensure sustainability and economically efficient use of water

"Water use laws in North Carolina are quite lenient, and this will come back to haunt us," said Dr. Kerry Smith in a plenary address at the WRRI Annual Conference on April 1. Smith is University Distinguished Professor and Director of the Center for Environmental and Resource Economics Policy at NC State University. He was one of several conference speakers who discussed the future implications of North Carolina's current water laws and policy. Bill Holman, Executive Director of the Clean Water Management Trust Fund, reviewed past policy actions to deal with water quality and quantity issues in North Carolina and noted that in all cases, action was spurred by crisis situations. Michelle Nowlin of the Southern Environmental Law Center said North Carolina needs to "plan for what we know is coming rather than react to disasters."

Water policy and economics

In his presentation, "The Economic Value of Water Resources in North Carolina: Gauging Both Direct Use and Amenity Values," Smith said, "Economic efficiency requires that resources should be allocated to their highest valued uses." For instance, research shows that the marginal value (the value of an additional gallon) of water used for industrial purposes is many times the marginal value of water used for irrigation. An economically efficient allocation system would assure that when competition for water arises, industrial use will trump use for irrigation.

However, Smith said, the relative abundance of water has led to a system of water rights and patterns of use that never consider relative values of water. For example, groundwater access from private property allows virtually unrestricted use until an aquifer is threatened. In addition, interbasin tranfers are restricted in ways that do not align with the values from alternative uses.

Examples of the problems with these rights can be found with groundwater. The only exception to unlimited use

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Director's Forum

The Data Quality Act: Implications for Regulatory Modeling

Kenneth H. Reckhow, Director, Water Resources Research Institute

In this issue of *WRRI NEWS* beginning on page 6, we provide some background on the Data Quality Act. Based on information from the recently reinvigorated EPA Council for Regulatory Environmental Modeling (CREM; see www.epa.gov/crem), the Data Quality Act may have significant implications for environmental modeling and forecasting.

CREM "was established in 2000 to promote consistency and consensus among environmental model developers and users," and it is now providing a vehicle for EPA to address modeling related issues associated with the Data Quality Act. Of particular interest to CREM is the question "when does a model serve as a defensible basis for a decision?" Accordingly, in early 2003, EPA Administrator Whitman asked CREM, by the end of the year, to provide guidance on model use and to "initiate immediately a collaborative effort with the National Academy of Sciences to develop a report recommended best principles and practices in using environmental and human health models for decision making."

In response to Administrator Whitman's request, a committee formed through the National Academy of Science's Board of Environmental Studies and Toxicology will "assess evolving scientific and technical issues related to the selection and use of computational and statistical models in decision making processes at the Environmental Protection Agency (EPA)… The objective of the committee will be to provide a report that will serve as a fundamental guide for the selection and use of models in the regulatory process at the EPA—the goal is to produce a report on models similar to the NRC's 1983 "red book" on risk assessment."

The NAS committee is to examine the following issues:

- What scientific and technical factors should be considered in developing model- acceptability and application criteria that address the needs of the EPA, as well as those of interested and affected parties?

- How can the agency provide guidance on procedures for appropriate use, peer review, and evaluation of models that is applicable across the range of interdisciplinary regulatory activities undertaken by the EPA?

- How can issues related to input data quality, model sensitivity, uncertainty, and the use of model outputs be addressed in a unified manner across the multiple disciplines that encompass modeling at EPA?

- Models developed outside of the agency must meet the same acceptability and application criteria as models

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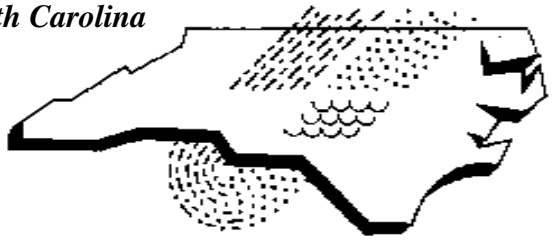

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developed within EPA. How can users of proprietary models meet acceptability and application criteria for the use of models in environmental regulatory applications while maintaining the possible proprietary nature of the code?

- Are there unique evaluation issues associated with different categories of models, such as statistical dose-response models based on epidemiological data?

- How can models be improved in an adaptive management process to allow simpler tools and models to be used now while having the flexibility to incorporate new data, scientific advances, and advances in modeling in the future?

- How can uncertainties and limitations of models be effectively communicated to policy-makers and others who are not experts in the details of the models? How should secondary uses of models be treated, including communication of model uncertainties and limitations?

- What are the emerging scientific and technologic advances that may affect the selection and use of models? Specifically, what are the emerging sources of data (such as remote sensing and other spatially-resolved environmental data, and genomic/proteomic data) and developments in information technology for which EPA will need to prepare?

In this column, I have often expressed my concerns about models used for water quality prediction in support of decision making. Few models are rigorously tested, and uncertainties are rarely reported; as a consequence, users of models generally have little awareness of the risks involved when relying on a model prediction to guide decision making. Thus, this recent shift in attitude for EPA, and the resultant study by the National Academy of Sciences, are promising developments. However, even if this effort results in a red book on the selection and use of models in the regulatory process at the EPA, there are many technical challenges remaining to put guidance into practice.

Water policy *continued*

arises with "Capacity Use Areas," two of which were designated in Eastern North Carolina only when dewatering of aquifers became evident.

Anyone who owns property adjacent to surface water can use the water for any purpose so long as the use does not excessively diminish the quality or quantity of water that flows to other riparian owners. Where public access is not provided, non property owners must obtain access across private land to use surface waters. The only restriction on the traditional system of riparian rights is mandated by the Regulation of Surface Water Transfers Act, which requires a permit for transfers of 2 million gallons per day or more across basin boundaries set by statute.

Smith said that an efficient and sustainable system for managing water resources will be an integrated system that:

- Recognizes the physical realities of water, including the interrelationship between surface and groundwater quality and quantity.

- Recognizes the implications of each water use for water quality and for the valuable recreational and aesthetic services supported directly and indirectly by water resources.

- Recognizes that economic as well as environmental analyses should serve as the basis for decisions on spatial reallocation of water by interbasin transfer.

He said that while it is not possible to determine a marginal value for recreational and aesthetic uses of water resources, travel cost recreational demand along with willingness-to-pay surveys show that the amenity value of water in North Carolina is high, and the amenity value of water is significantly affected by water quality.

Smith said that analyses of benefits and costs of water quality improvements nationwide under the Water Quality Act indicate that "the way we're implementing water quality controls is too expensive. We need to do something about that."

His studies of the Neuse River Basin nitrogen reduction strategy suggest that more spatially delineated policies would produce better results at lower cost. "But there is a disconnect between environmental science and economics that must be brought together to make spatially delineated policy possible."

A water quality improvement plan

In his plenary address, Bill Holman said that North Carolina should take a broad initiative to improve management of the state's water resources rather than responding to crises or Federal mandates in a piecemeal fashion.

"We have the basis for proactive, integrated management in our Basinwide Water Quality Management Program," said Holman. "However, the funding to make the program work is not there. Monitoring and research need to be improved, and billions are needed to protect resources, restore degraded resources, repair and expand infrastructure, and implement preventive measures such as stormwater controls."

"North Carolina needs a dedicated source of funds for water resources management like the Highway Trust Fund and a plan/build program like the Transportation Improvement Program."

Water management in the public interest

In her presentation, "What's Needed for a 21st Century Water Policy for North Carolina," Michelle Nowlin said that population and water use projections show water scarcity and conflict between water uses will increase in North Carolina and will be exacerbated if the amount of available water decreases because of ecosystem degradation and a resulting decline in water quality. She quoted Mark Twain's observation that

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Water policy *continued*

"whiskey's for drinkin', but water's for fightin'" and predicted that without a better water allocation system and integration of water quality and water quantity planning, water users in the state are "on a collision course."

"Water is a public resource," she said, "and must be protected and managed in the public interest. This means that its long term sustainability, including adequate supply for aquatic ecosystems, must be ensured."

Nowlin said that the Regulated Riparian Model Code, which has been adopted by a number of states along the East Coast provides a more contemporary and balanced framework for water allocation. In this model, states exercise sovereign power to plan, regulate and control the withdrawal and use of waters for a variety of purposes, including conservation and prevention of ecosystem degradation. She proposed that planning and management for water quality, water use, and minimum instream flows for ecosystem and habitat protection should be integrated and carried out on a regional basis with emphasis on the 38 sub-basins of the state's 17 major river basins.

"We can't engineer our way to the future by constructing more reservoirs, deeper wells and pipelines," She said. "We must meet our needs by conserving and making more efficient use of water and by taking advantage of the services that wetlands and other ecosystems provide to sustain our water resources."

THMs and aquifer storage

A U.S. Geological Survey study of a test site in southern California found that when treated surface water was used to recharge the aquifer, by-products of the water disinfection process accumulated in the aquifer. The study found that THMs continued to form in the aquifer until the residual disinfectant (chlorine) present in the injected surface water was used up. To download the pdf report, go to website: http://water.usgs.gov/pubs/wri/wri034062/

Congratulations to WRRI Annual Conference student poster award winners

At the WRRI Annual Conference on April 1, members of the board of the N.C. Water Resources Association (NCWRA) evaluated posters presented by graduate students, and at lunch, NCWRA President Garry Grabow presented three awards. Awards went to:

1st. ($75) Christopher W. Bason, Department of Biology, East Carolina University, for his poster "Effect of Beaver Impoundments on Water Quality in Coastal Plain Streams." Dr. Mark Brinson is the advisor. Poster abstract can be downloaded at: http://www2.ncsu.edu/ncsu/CIL/WRRI/Bason.pdf

2nd. ($50) Julie R. Gibson, Department of Forestry, NC State University, for her poster "Effectiveness of Raingarden Biorentention on Strormwater Pollutant Removal." Dr. Ted Shear is the advisor. Poster abstract can be downloaded at: http://www2.ncsu.edu/ncsu/CIL/WRRI/Gibson.pdf

3rd. ($25) John Fear (presenter), Tom Gallo, Nathan Hall and Josh Loftin, Institute of Marine Sciences, UNC Chapel Hill. Dr. Hans Paerl is the advisor. Poster abstract can be downloaded at: http://www2.ncsu.edu/ncsu/CIL/WRRI/Fear.pdf

Posters were judged by Garry Grabow, Marcia Lieber, Beth Wrege, Ken Carper, Gloria Ferrell and Fred Royal. Evaluation criteria were visual presentation, motivation (problem statement, objectives, etc.) organization, appropriate analysis and summary, and appropriate conclusions. NCWRA expects to present student poster awards at the 2004 WRRI Annual Conference.

May action of the N.C. Environmental Management Commission

At its regular meeting on May 8, 2003, the North Carolina Environmental Management Commission took the following action:

- Approved holding public hearings on proposed changes to air quality rules including (1) amendment of the ethylene oxide emissions standard, (2) a new rule to control particulate emissions from concrete batch plants (including a definition for PM2.5), (3) amendment of the rule for petroleum liquid storage in external floating roof tanks, (4) several changes to the open burning rule (including a ban on most types of open burning on code orange days), (5) a new rule to require permit applicants in areas without zoning to notify the public of intent to file an air quality permit application, (6) an amendment to the air toxic rule for modifications to treat insignificant activities at Title V facilities the same way exempted activities at non-Title V facilities are treated, and (7) a new exclusionary rule for concrete batch plants.

- After much discussion approved sending revisions of the toxic air pollutant guideline for hydrogen sulfide to public hearing. The proposed revisions will include five options for acceptable ambient air concentrations. They will also include two options for providing a temporary exemption for and requiring a study of emissions from pulp and paper wastewater treatment plants.

- Approved an amendment to air quality rules setting the opacity standard for fugitive emissions of particulates from hot mix asphalt plants not covered elsewhere in 15A NCAC 2D .0506 at

20 percent. Also changed the compliance date for sources currently subject to a 40 percent stack opacity standard to meet the 20 percent opacity standard from Jan 1, 2004, to Jan 1, 2005.

■ Approved a variance from groundwater quality standards for the Flynt-Wansona Manufacturing Corporation Facility in Wadesboro, NC. The variance is for an 8.4-acre area where settling ponds and a septic system formerly received wastes that have contaminated the soil and groundwater with metals, volatile organic chemicals and other organic substances. Investigations show that the contamination is not moving off site and is being naturally degraded. The variance approved requires continued monitoring and paving of two areas of residual soil contamination.

■ Approved holding public hearings on reclassification of two sections of the Rocky River in Chatham County from C and Watershed-III to Watershed III Critical Area. The reclassification is needed because the City of Siler City plans to expand its reservoir by construction a new dam below the existing dam. This item had been delayed while commissioners were provided copies of the Environmental Assessment prepared for the project. However, the EMC's role in approving water supplies involves only determining whether the water after treatment will be suitable for drinking. Environmental impacts of reservoir construction and impoundment are considered under the Corps of Engineers 404 process and the Division of Water Quality's 401 Water Quality Certification process. Since there are concerns about the environmental impacts of the project that will most likely be voiced at the public hearing on reclassification, the EMC asked that the public hearing on the reclassification be held in concert with a public hearing on the 401 Water Quality Certification in which those concerns are more properly heard. For information on the reclassification and public hearing contact Elizabeth Kountis with the Division of Water Quality (Elizabeth.Kountis@ncmail.net) or (919) 733-5083 ext 369

■ Approved a $2.2 million emergency wastewater loan for the Town of Whiteville to replace failing aeration basins at its wastewater treatment plant.

May action of the EMC's Water Quality Committee

At its regular meeting on May 7, 2003, the Water Quality Committee of the N.C. Environmental Management Commission took the following action:

■ Approved water supply watershed protection ordinances for Lenoir County required by reclassification of a section of the Neuse River to Water Supply -IV and for Columbus County to correct minor problems.

■ Approved a major variance from the Randleman Lake Water Supply IV buffer requirements for an expansion of the Polo Ralph Lauren facility located in High Point's City Lake watershed.

■ Approved sending to the full EMC a proposed plan for delegating to local governments the State Stormwater Management Program. The State Stormwater Management Program is different from the NPDES Phase II Stormwater Program. The State Program applies only to projects that require an Erosion and Sedimentation Control Plan or a CAMA major permit and are within the twenty coastal counties or drain to Outstanding Resource Waters or High Quality Waters. The Division of Water Quality has developed a model ordinance and a memorandum of agreement which can be used by local governments to receive delegation of authority to issue permits and perform inspections and enforcement under the State program. For information, contact Bill Reid with the Division of Water Quality at (919) 733-5083 Ext 537.

■ Heard an update on North Carolina's Eastern Regional Mercury Study. Michelle Woolfok, Supervisor of the Modelling and TMDL Unit of DWQ, said that her unit is 8 months into a study of mercury in waters, sediments, and fish tissue in southeastern North Carolina. The special study was requested by the EMC because of fish consumption advisories and mercury-impaired stream segments in a number of areas. She said results so far indicate levels of total mercury in North Carolina are comparable to levels reported in other states but that levels of methylmercury are comparatively high. She also said that because the water quality standard for mercury (0.012µg/l) is an order of magnitude lower than the detection level using traditional methodology (0.2 µg/l), some wastewater treatment plants are being required to use a new, more sensitive method for analysis for mercury (EPA Method 1631).

Princeville is Environmental Justice Revitalization Demonstration Site

In March 2003, the EPA's Interagency Working Group on Environmental Justice selected 15 new Revitalization Demonstration Projects to showcase collaborative partnerships among federal agencies and other stakeholders in the area of community revitalization and environmental justice. Among the projects is The Sustainable Redevelopment and Revitalization of Princeville, North Carolina. The redevelopment workplan is divided into three categories: residential, infrastructure support, and economic development. Lessons learned from this project are intended to enable the federal government to better respond to the needs of the nation's small towns. For a fact sheet on the project go to website: http://www.epa.gov/compliance/resources/publications/ej/iwg_2003_demo_projects.pdf

The Data Quality Act: A revolution in the role of science in policy making or a can of worms?

If you've never heard of the Data Quality Act, you're not alone. What is being called the Data Quality Act (and the Information Quality Act) was enacted with no discussion and no debate as Section 515 of the Treasury and General Government Appropriations Act of 2001 (PL 106-544, H.R. 5658). The section directs the Office of Management and Budget (OMB) to issue government-wide guidelines that "provide policy and procedural guidance to Federal agencies for ensuring and maximizing the quality, objectivity, utility, and integrity of information (including statistical information) disseminated by Federal agencies."

OMB published final guidelines to implement Section 515 in the *Federal Register* on September 28, 2001 (66 Fed. Reg. 49718 - http://www.whitehouse.gov/omb/fedreg/reproducible.html). Between then and October 1, 2002, federal agencies issued hundreds of pages of agency-specific implementing guidelines that include "administrative mechanisms allowing affected persons to seek and obtain correction of information maintained and disseminated by the agency that does not comply with the OMB guidelines."

Some regulatory analysts believe that the information/data quality guidelines will "revolutionize the role of science in policy making by ensuring and maximizing the quality, objectivity, utility and integrity of scientific information." Others believe that the guidelines will be a "central battleground for reshaping or repeal of environmental laws and regulations." Still others say that the effect of the guidelines will be determined by the number and quality of petitions filed to challenge information and the vigor with which OMB oversees and enforces the requirements. (Dr. John Graham, Administrator of OBM's Office of Information and Regulatory Affairs, has stated that the Bush administration is "committed to vigorous implementation of the new information quality law.") One observer has predicted that the information quality initiative could degenerate into a "stakeholder food fight."

Background

What prompted the rider that enacted the Data Quality Act? Because there is little legislative history, the genesis of Section 515 is obscure. One widely accepted view is that Section 515 was a reaction by business and industry to "regulation by information." The idea behind "regulation by information" is that agencies can accomplish regulatory goals by publishing information more easily than by enacting regulations. For instance, industries are required to provide information to EPA for the Toxics Release Inventory (TRI) which EPA disseminates on the Internet (http://www.epa.gov/tri/). Dissemination of this information may embarrass industries into actions they are not required by regulation to undertake. The fact that very important information dissemination is frequently done outside the procedural safeguards of the Administrative Procedure Act, some say, led business and industry to ask for "regulation OF information."

Whatever the genesis of the Data Quality Act, the guidelines issued to implement it have raised a good many legal and practical questions, many of which are of significant importance to the research community.

Requirements of the OMB guidelines

OMB's guidelines direct Federal agencies "to develop information resources management procedures for reviewing and substantiating (by documentation or other means selected by the agency) the quality (including the objectivity, utility, and integrity) of information before it is disseminated. In addition, agencies are to establish administrative mechanisms allowing affected persons to seek and obtain, where appropriate, correction of information disseminated by the agency that does not comply with the OMB or agency guidelines. Agencies must apply these standards flexibly, and in a manner appropriate to the nature and timeliness of the information to be disseminated, and incorporate them into existing agency information resources management and administrative practices."

OMB defines "quality" as the encompassing term, of which "utility," "objectivity," and "integrity" are the constituents. "Utility" refers to the usefulness of the information to the intended users. "Objectivity" focuses on whether the disseminated information is being presented in an accurate, clear, complete, and unbiased manner, and as a matter of substance, is accurate, reliable, and unbiased. "Integrity" refers to security – the protection of information from unauthorized access or revision, to ensure that the information is not compromised through corruption or falsification. "Dissemination" is defined to mean "agency initiated or sponsored distribution of information to the public."

Of interest to the research community is *sponsored* distribution of information to the public. Sponsored distribution refers to situations in which an agency has directed a third-party to disseminate information, or in which the agency has the authority to review and approve the information before release. For example, if an agency, through a grant, provides for a person to conduct research, then directs the person to disseminate the results (or the agency reviews and approves the results before they may be disseminated), then the agency has "sponsored" the dissemination of this information.

By contrast, if the agency simply provides funding to support research and the researcher (not the agency) decides

whether to disseminate the results and determines the content and presentation of the dissemination, then the agency has not "sponsored" the dissemination even though it has funded the research and may even retain ownership or other intellectual property rights. (According to OMB guidelines, "To avoid confusion regarding whether the agency is sponsoring the dissemination, the researcher should include an appropriate disclaimer in a publication or speech to the effect that the "views are mine, and do not necessarily reflect the view" of the agency.")

However, if the agency subsequently disseminates information from sponsored research, the information must adhere to the agency's information quality guidelines.

OMB guidelines state that as a general matter, scientific and research information that has been subjected to formal, independent, external peer review is regarded as presumptively objective. An example of a formal, independent, external peer review is the review process used by scientific journals. However, in discussion of the guidelines in the *Federal Register* notice, OMB says "Although journal peer review is clearly valuable, there are cases where flawed science has been published in respected journals." Consequently, the guidelines provide that the presumption of objectivity "is rebuttable based on a persuasive showing by the petitioner in a particular instance."

The OMB guidelines also require that agency-sponsored peer-review be "transparent," meaning that (a) peer reviewers be selected primarily on the basis of necessary technical expertise, (b) peer reviewers be expected to disclose to agencies prior technical/policy positions they may have taken on the issues at hand, (c) peer reviewers be expected to disclose to agencies their sources of personal and institutional funding (private or public sector), and (d) peer reviews be conducted in an open and rigorous manner.

"Influential" information

The OMB guidelines apply stricter quality standards to the dissemination of information that is considered "influential." In regard to scientific, financial, or statistical information, "influential" means that "the agency can reasonably determine that dissemination of the information will have or does have a clear and substantial impact on important public policies or important private sector decisions." Each agency is authorized "to define 'influential' in ways appropriate for it, given the nature and multiplicity of issues for which the agency is responsible."

If an agency disseminates "influential" scientific, financial, or statistical information, that information must meet a reproducibility standard. Analytic results related to influential scientific, financial, or statistical information, must generally be sufficiently transparent about data, methods, models, assumptions, and statistical procedures that an independent reanalysis (or more practically, tests for sensitivity, uncertainty, or robustness) could be undertaken by a qualified member of the public. The guidelines direct agencies to consider in their own guidelines which categories of original and supporting data should be subject to the reproducibility standard and which should not.

In cases where public access to data and methods cannot occur because of privacy or proprietary issues, agencies are directed to apply especially rigorous robustness checks to analytic results and document what checks were undertaken.

If agencies wish to rely for important and far-reaching rulemaking on previously disseminated scientific, financial or statistical studies that at time of dissemination were not considered "influential," then the studies would have to be evaluated to determine if they meet the "capable of being reproduced" standard.

Risk analyses

Agencies that maintain or disseminate information on analysis of risks to human health, safety and the environment must either adopt or adapt (indicating some degree of flexibility) the quality principles applied by Congress to risk information used and disseminated under the Safe Drinking Water Act Amendments of 1996 (42 U.S.C. 300g-1(b)(3)(A) & (B)). These quality principles require that in communicating risk in support of a regulation, agencies make available to the public a document that, to the extent practicable specifies (i) each population addressed by any estimate [of applicable risk effects]; (ii) the expected risk or central estimate of risk for the specific populations [affected]; (iii) each appropriate upper-bound or lower-bound estimate of risk; (iv) each significant uncertainty identified in the process of the assessment of [risk] effects and the studies that would assist in resolving the uncertainty; and (v) peer-reviewed studies known to the [agency] that support, are directly relevant to, or fail to support any estimate of [risk] effects and the methodology used to reconcile inconsistencies in the scientific data." Information quality requirements can be temporarily waived in cases of imminent threat to public health or homeland security.

Challenges to information

Under the Section 515 guidelines, "affected persons" can legally challenge any information disseminated by a federal agency at any stage of development, including draft form. Petitioners must clearly demonstrate that a specific dissemination of information does not meet the applicable quality standards. OMB, many business and industry groups, and some legal experts interpret Section 515 to apply to rulemaking, although a few legal analysts disagree. Agencies must respond to requests to correct information according to timeframes established by their own

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Data Quality Act
continued

guidelines and must provide a process for re-appeal. Most legal analysts say that judicial review of final decisions is available, although some disagree.

EPA assessment factors for third party information

Section 515 guidelines apply to all federal agencies subject to the Paperwork Reduction Act, but implementation of the guidelines by the U.S. EPA is of most interest to readers of this newsletter. EPA guidelines to implement Section 515 (Guidelines for Ensuring and Maximizing the Quality, Objectivity, Utility and Integrity of Information Disseminated by the Environmental Protection Agency) can be found on the EPA Website at http://www.epa.gov/oei/qualityguidelines/. The guidelines spell out which information is subject to the guidelines, what quality standards apply, and how to submit a request for correction of information.

Of additional interest is EPA's draft document "Assessment Factors for Evaluating the Quality of Information from External Sources." (http://www.epa.gov/oei/qualityguidelines/af_assessdraft.pdf) EPA receives a huge amount of information from third party sources. Pesticide companies seeking registration, for instance, must provide hazard information. Trade groups and environmental groups provide information during the rulemaking process. State agencies implementing EPA rules provide monitoring data, laboratory results and analytic studies. And, EPA gathers information from outside sources—such as scientific journals and academic and research institutions—for use in developing policy and regulatory decisions. EPA does not apply quality controls when such information is being generated but must apply quality controls when it uses or disseminates this information. Although EPA has not yet announced an intention to require use of the information quality guidelines by those who provide information, the agency has published for review the draft cited above. In the draft EPA states that its goal is not to impose legally binding obligations but to make the assessment factors broadly known to those who generate information.

Current challenges

If the potential of the Data Quality Act is indicated by the nature of challenges to information filed, then a look at some of those challenges suggests the act will be used—not just by business and industry—but by an array of parties for an array of reasons. Requests for correction of information filed with EPA can be found at http://www.epa.gov/oei/qualityguidelines/af_req_correction_sub.htm. Included are

- A request by the Center for Regulatory Effectiveness, the Kansas Corn Growers Association and the Triazine Network for correction of information in EPA's Atrazine Environmental Risk Assessment. The petitioners challenge EPA's published reference to a scientific study suggesting that atrazine has endocrine-disrupting effects on frogs (See *WRRI News* March/April 2003). The petitioners allege that there are no validated endocrine-effects tests for atrazine.
- A petition by Senators Jim Jeffords, Paul Sarbanes, Barbara Boxer and Frank Lautenberg challenging information upon which EPA based a decision to postpone a permit deadline for a storm water phase II regulation for the oil and gas industry. The Senators had the General Accounting Office conduct an evaluation of the information that they say found some critical data to be out-of-date.
- A request by the Competitive Enterprise Institute for EPA to remove Internet links (and thereby stop disseminating) the Climate Action Report of 2002 because data in the report fails to meet standards of the Data Quality Act.
- Requests by the Ohio EPA that U.S. EPA correct formatting problems with a document on its website relied on for information on RACT for VOC emissions and that it make available in electronic form and correct confusing writing in another document relating to control of VOCs.
- A request from the U.S. Chamber of Commerce, which says it has been involved in a long-fought battle to see the Data Quality Act passed and implemented, that the minutes of an Oct 1, 2002, meeting of the EPA Science Advisory Board be corrected to include a statement made by the SAB Chairman Dr. William Glaze regarding EPA's failure to validate a sizeable number of models used by the agency. (EPA says minutes of meetings are not covered by the guidelines.)
- A request from BMW asking for correction of EPA's Enforcement Compliance History Online database and other databases showing BMW in Significant Non-Compliance with RCRA.

As a further indication of the can of worms the Data Quality Act opened, on April 3, 2003, Public Employees for Environmental Responsibility (PEER) announced that it has lodged a Freedom of Information Act request with the Corps of Engineers asking for its Information Quality Guidelines and has asked OMB to take action to ensure compliance with the Data Quality Act by Pentagon agencies. PEER wants to prepare a series of requests for correction of information regarding Corps water development project studies that it says understate environmental consequences or overstate development benefits but cannot do so because the Corps has not issued its guidelines.

Resources

Anderson, Frederick R. 2002. "Data Quality Act." *The National Law Journal*. October 14, 2002 (http://www.nlj.com)

David, Joseph A. 2003. "Industry Test-Fires New Secrecy Weapon." Metcalf Institute

Environment-related legislation in the N.C. General Assembly

This list is not comprehensive. The status of bills can be found at http://www.ncga.state.nc.us/homePage.pl

The following environment-related legislation has been ratified.

H 581 (S 498) AN ACT TO ALLOW ELECTROFISHING FOR CATFISH IN COLUMBUS COUNTY.

H 699 A HOUSE RESOLUTION EXPRESSING GRATITUDE TO THE NUCOR CORPORATION FOR ITS CONTRIBUTIONS TO THE STATE'S ECONOMY AND ENVIRONMENT.

H 1025 AN ACT TO AUTHORIZE THE ADDITION OF HAW RIVER STATE PARK TO THE STATE PARKS SYSTEM.

H 1205 AN ACT TO FACILITATE THE IMPLEMENTATION OF THE "CLEAN SMOKESTACKS ACT" BY EXEMPTING SANITARY LANDFILLS USED FOR THE DISPOSAL OF WASTE GENERATED BY INVESTOR-OWNED PUBLIC UTILITY COAL-FIRED GENERATING UNITS THAT ARE SUBJECT TO THE "CLEAN SMOKESTACKS ACT" FROM THE REQUIREMENT THAT FRANCHISES BE OBTAINED FOR THE OPERATION OF THOSE LANDFILLS.

H 1078 AN ACT TO AUTHORIZE THE ADDITION OF MAYO RIVER STATE PARK TO THE STATE PARKS SYSTEM.
H 1134 AN ACT TO EXTEND THE DEADLINE BY WHICH COASTAL HABITAT PROTECTION PLANS MUST BE ADOPTED.

S 733 (=H 1144) AN ACT TO STUDY THE USE OF GENERAL PERMITS FOR ANIMAL WASTE MANAGEMENT SYSTEMS FOR SMALL AND MEDIUM DAIRY, POULTRY, AND ANIMAL OPERATIONS AND RECOMMEND ANY ADDITIONAL PERMIT REQUIREMENTS THAT ARE NEEDED TO PROTECT WATER QUALITY.

S 765 AN ACT TO LIMIT THE AREA OF WESTERN CORE SOUND THAT MAY BE LEASED FOR THE CULTIVATION OF SHELLFISH AND TO DIRECT THE DIVISION OF MARINE FISHERIES TO REPORT TO THE JOINT LEGISLATIVE COMMISSION ON SEAFOOD AND AQUACULTURE ON THE IMPLEMENTATION OF THIS ACT.

S 825 AN ACT TO AUTHORIZE THE WILDLIFE RESOURCES COMMISSION TO PROTECT CERTAIN REPTILES AND AMPHIBIANS THAT REQUIRE CONSERVATION MEASURES.

The following environment-related legislation is still alive in the N.C. General Assembly either because it has been passed by one chamber, because it affects appropriations or finance or because it is not subject to crossover.

H 142 AN ACT TO ALLOW THE TOWN OF SUNSET BEACH TO EXERCISE THE POWER OF EMINENT DOMAIN FOR PURPOSES OF ENGAGING IN BEACH EROSION CONTROL AND FLOOD AND HURRICANE PROTECTION WORKS AND PUBLIC BEACH ACCESS.

continued page 10

Data Quality Act *continued*

Environment Writer December/January 2002-2003. (http://www.environmentwriter. org/resources/articles/1202_dataquality.htm)

Pielke, Roger, Jr. 2002. "Flying Blind: The Data Quality Act and the Atmospheric Sciences." WeatherZine No 33, April 2002. University of Colorado Center for Science and Technology Policy Research. (http://sciencepolicy.colorado.edu/zine/archives/33/editorial.html)

"Little law could block major government decisions" *Environmental Science & Technology* Online. Nov 7, 2002. (http://pubs.acs.org/subscribe/journals/esthag-w/2002/nov/policy/rr_epaguidelines.html)

Noe, Paul, Frederick R. Anderson, Sidney A. Shapiro, James Tozzi, David Hawkins and Wendy E. Wagner. 2003. "Learning to Live with the Data Quality Act." *ELR* 33:10224-10236. (http://www.eli.org)

National Research Council. 2003. *Ensuring the Quality of Data Disseminated by the Federal Government: Workshop Report.* Washington: National Academies Press.

"Corps Violates Data Quality Act." April 3, 2003. Public Employees for Environmental Responsibility website (http://www.peer. org/press/326.html

"The Data Quality Act." ND. U.S. Chamber of Commerce. (http://www.uschamber.com/isr/dqa.htm)

"Data Quality." ND. The Center for Regulatory Effectiveness website (http://www. thecre.com/quality/20030211_cei.html).

Legislation *continued*

H 429 AN ACT TO REQUIRE LOCAL GOVERNMENTS TO PAY JUST COMPENSATION FOR REMOVAL OF LAWFULLY ERECTED BUILDINGS, STRUCTURES, OUTDOOR ADVERTISING, OR FIXTURES.

H 566 AN ACT TO DISAPPROVE THE ADMINISTRATIVE RULE RECLASSIFICATION BY THE ENVIRONMENTAL MANAGEMENT COMMISSION OF PORTIONS OF SWIFT CREEK AND SANDY CREEK IN THE TAR-PAMLICO RIVER BASIN THAT WOULD HAVE THE EFFECT OF IMPOSING CERTAIN MANAGEMENT STRATEGIES APPLICABLE TO OUTSTANDING RESOURCE WATERS (ORW) IN THE WATERSHED OF THESE CREEKS.

H 679 AN ACT AUTHORIZING THE CITY OF RALEIGH TO LIMIT THE CLEAR-CUTTING OF TREES IN BUFFER ZONES PRIOR TO DEVELOPMENT AND ALLOW FOR THE PROTECTION OF SPECIMEN TREES DURING THE DEVELOPMENT PROCESS, AND TO ALLOW WAKE COUNTY TO LIMIT THE CLEAR-CUTTING OF TREES IN BUFFER ZONES PRIOR TO DEVELOPMENT.

H 727 AN ACT TO CLARIFY THAT MEMBERS OF THE SOIL AND WATER CONSERVATION COMMISSION ARE AUTHORIZED TO HOLD OFFICE CONCURRENTLY WITH OTHER ELECTIVE OR APPOINTIVE OFFICES.

H 864 AN ACT INCREASING THE EFFICIENCY OF GUARANTEED ENERGY SAVINGS CONTRACTS FOR STATE GOVERNMENTAL UNITS.

H 864 (= S 910) AN ACT INCREASING THE EFFICIENCY OF GUARANTEED ENERGY SAVINGS CONTRACTS FOR STATE GOVERNMENTAL UNITS.

H 866 (=S 981) AN ACT TO ESTABLISH THE CLEAN AIR TRUST FUND AND TO APPROPRIATE FUNDS TO IT.

H 868 AN ACT TO IMPROVE THE ENFORCEMENT OF VARIOUS ENVIRONMENTAL LAWS.

H 878 (= S 970) AN ACT TO ESTABLISH A RECYCLING PROGRAM FOR CERTAIN ELECTRONIC DEVICES AND TO IMPOSE A TAX ON THOSE DEVICES IN ORDER TO FUND THE PROGRAM AND TO PROVIDE LOCAL GOVERNMENTS WITH FUNDS TO ENABLE THEM TO RECYCLE ELECTRONIC DEVICES.

H 987 AN ACT TO AUTHORIZE THE FISHERIES DIRECTOR TO ISSUE PROCLAMATIONS THAT BECOME EFFECTIVE IMMEDIATELY UPON ISSUANCE AND TO MAKE OTHER TECHNICAL, CLARIFYING, AND CONFORMING CHANGES.

H 933 (=S 763) AN ACT TO ESTABLISH THE NORTH CAROLINA CLEAN VEHICLES PROGRAM.

H 953 AN ACT TO STRENGTHEN THE SEDIMENTATION POLLUTION CONTROL ACT OF 1973.

H 999 AN ACT MAKING VOID AND UNENFORCEABLE AS A MATTER OF PUBLIC POLICY ANY PROVISION IN ANY AGREEMENT OR CONTRACT THAT PROHIBITS THE REUSING, REMANUFACTURING, OR REFILLING OF A TONER OR INKJET CARTRIDGE.

H 1028 AN ACT TO ESTABLISH A GENERAL PERMIT FOR THE CONSTRUCTION OF RIPRAP SILLS FOR WETLAND ENHANCEMENT AND SHORELINE PROTECTION IN ESTUARINE AND PUBLIC TRUST WATERS. (Not subject to crossover)

H 1062 AN ACT TO REQUIRE COMMUNITY WATER SYSTEMS THAT REGULARLY SERVE ONE THOUSAND OR MORE SERVICE CONNECTIONS OR THREE THOUSAND OR MORE INDIVIDUALS TO PREPARE LOCAL WATER SUPPLY PLANS AND TO AUTHORIZE THE SECRETARY OF ENVIRONMENT AND NATURAL RESOURCES TO MAKE DROUGHT DESIGNATIONS.

H 1082 AN ACT TO AMEND VARIOUS ENVIRONMENTAL REPORTING REQUIREMENTS.

H 1100 AN ACT TO AMEND THE AUTHORITY OF THE WILDLIFE RESOURCES COMMISSION TO ENABLE PROTECTION OF CERTAIN REPTILES AND AMPHIBIANS REQUIRING CONSERVATION MEASURES.

H 1111 (=S 980) AN ACT TO PROVIDE A REFUNDABLE TAX CREDIT FOR VOLUNTARY EXPENSES TO REDUCE STORMWATER POLLUTION BEYOND EXPENSES REQUIRED BY LAW.

H 1151 AN ACT TO AMEND THE ADMINISTRATIVE PROCEDURE ACT TO REVISE THE PROCEDURE FOR ADOPTING PERMANENT AND TEMPORARY RULES, TO CREATE A PROCEDURE FOR THE ADOPTION OF EMERGENCY RULES, TO CLARIFY THE

Legislation *continued*

ROLE OF THE RULES REVIEW COMMISSION AND TO EXCLUDE THE STATE MEDICAL FACILITIES PLAN FROM THE DEFINITION OF A RULE.

H 1179 (= S 908) AN ACT TO PROTECT GROUNDWATER AS A CURRENT AND FUTURE WATER RESOURCE AND TO ENCOURAGE REDEVELOPMENT OF BROWNFIELDS SITES.

H 1207 AN ACT TO REQUIRE THE PREPARATION, COMPILATION, AND PRESENTATION TO THE GENERAL ASSEMBLY OF SUMMARIES OF EACH RULE SUBJECT TO LEGISLATIVE DISAPPROVAL.

H 1227 N ACT TO PROVIDE A STATUTORY FRAMEWORK FOR THE FINANCING OF CAPITAL FACILITIES BY THE STATE AND TO AUTHORIZE THE ISSUANCE OF SPECIAL INDEBTEDNESS FOR CAPITAL IMPROVEMENTS AND LAND ACQUISITION FOR PARKS, RECREATION, AND THE PRESERVATION OF NATURAL HERITAGE.

S 160 AN ACT TO CLARIFY EXISTING DELEGATIONS OF AUTHORITY TO COUNTIES AND CITIES AND TO CONFIRM FLEXIBILITY IN THE EXECUTION OF THOSE DELEGATED AUTHORITIES.

S 330 AN ACT AUTHORIZING THE CITY OF RALEIGH AND THE TOWNS OF HOLLY SPRING AND RUTHERFORDTON TO LIMIT THE CLEAR-CUTTING OF TREES IN BUFFER ZONES PRIOR TO DEVELOPMENT AND AUTHORIZING THE CITY OF RALEIGH AND THE TOWN OF RUTHERFORDTON TO ALLOW FOR THE PROTECTION OF SPECIMEN TREES DURING THE DEVELOPMENT PROCESS.

S 593 AN ACT TO EXTEND THE MORATORIA ON CONSTRUCTION OR EXPANSION OF SWINE FARMS.

S 732 (= H 897) AN ACT TO MAKE IMPROVEMENTS IN THE REGULATION OF PETROLEUM UNDERGROUND STORAGE TANKS AND TO THE LEAKING PETROLEUM UNDERGROUND STORAGE TANK CLEANUP PROGRAM.

S 811 AN ACT TO APPROPRIATE FUNDS FOR THE PLANNING AND DEVELOPMENT OF THE CAPE FEAR RIVER FRESHWATER AQUARIUM.

S 823 AN ACT TO MAKE CLARIFYING, CONFORMING, AND TECHNICAL AMENDMENTS TO VARIOUS LAWS RELATED TO THE ENVIRONMENT, ENVIRONMENTAL HEALTH, AND NATURAL RESOURCES.

S 824 AN ACT TO AMEND VARIOUS ENVIRONMENTAL REPORTING REQUIREMENTS.

S 831 AN ACT TO PROVIDE FOR IMPROVED STAGGERED TERMS OF THE MEMBERS OF THE CLEAN WATER MANAGEMENT FUND BOARD OF TRUSTEES, TO INCREASE THE NUMBER OF MEMBERS OF THE BOARD, AND TO MAKE APPOINTMENTS TO THE BOARD.

S 846 AN ACT ENCOURAGING THE USE OF SOLAR ENERGY SYSTEMS AND PROHIBITING ORDINANCES, COVENANTS, AND OTHER RESTRICTIONS THAT UNREASONABLY RESTRICT THE INSTALLATION OR USE OF SUCH SYSTEMS.

S 911 (=868) AN ACT TO IMPROVE THE ENFORCEMENT OF VARIOUS ENVIRONMENTAL LAWS.

S 945 AN ACT TO PROVIDE THAT THE SECRETARY OF ENVIRONMENT AND NATURAL RESOURCES SHALL MODIFY THE PERMIT PROCESS FOR CERTAIN AIR QUALITY PERMITS, SHALL CONDUCT A THOROUGH REVIEW OF THE ENVIRONMENTAL PERMIT PROGRAMS TO IDENTIFY IMPEDIMENTS TO THE TIMELY ISSUANCE OF PERMITS BY THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES, AND SHALL MAKE RECOMMENDATIONS FOR MODIFICATIONS TO THESE PROGRAMS IN ORDER TO ENHANCE ECONOMIC DEVELOPMENT.

S 959 (= H 959) AN ACT TO AUTHORIZE THE COMMISSION FOR HEALTH SERVICES TO ADOPT RULES REGARDING MONITORING OF COASTAL RECREATION WATERS IN ORDER TO IMPLEMENT THE FEDERAL BEACHES ENVIRONMENTAL ASSESSMENT AND COASTAL HEALTH ACT OF 2000.

S 989 AN ACT TO PROTECT WATER QUALITY AND SEAFOOD HABITATS BY STRENGTHENING THE LAWS REGARDING SEDIMENTATION POLLUTION CONTROL TO REDUCE SEDIMENTATION, THE NUMBER ONE CAUSE OF WATER QUALITY DEGRADATION IN NORTH CAROLINA.

WRRI-sponsored research reported

Under a new publications policy, the principal investigator on a WRRI-sponsored research project may fulfill the obligation of providing a final project completion report by submitting a refereed journal publication that meets specific criteria (see policy at http://www2.ncsu.edu/ncsu/CIL/WRRI/WRRIreportpolicy.html). The journal article summarized below has been accepted as a final completion report under the new policy. A limited number of reprints of the full journal article are available from WRRI. Send requests to WRRI, Box 7912, North Carolina State University, Raleigh, NC 27695-7912 or call (919) 515-2815 or email: water_resources@ncsu.edu.

Optimizing ferric sulfate coagulation of algae with streaming current measurements

David S. Briley, CH2M Hill, and Detlef R.U. Knappe, Department of Civil Engineering, NC State University (knappe@eos.ncsu.edu)

Journal AWWA 94(2): 80-90.

This refereed journal article has been accepted as the final technical completion report for WRRI Projects 50215 and 50217, ***Optimization of Treatment to Mitigate Impacts of Algae and Algae Control on Finished Water Quality*** *by Detlef Knappe, Sarah Liehr and JoAnn Burkholder, NC State University. It has been designated WRRI-2003-JA1.*

One of the consequences of nutrient overload of surface water supplies is proliferation of algae. Algae in drinking water reservoirs cause numerous difficulties in water treatment plants and distribution systems: impairment of coagulation and flocculation processes, filter clogging or premature filter breakthrough of particulate matter, increased chlorine demand and disinfection by-product (DBP) concentrations, taste and odor problems, algal toxins, and increased microbial regrowth potential in distribution systems.

The best way to combat the many problems algae cause in drinking water systems, is to remove algae before raw water is filtered and disinfected, and the best way to remove algae without causing cell breakdown that can release toxins, is the process of coagulation, flocculation, and sedimentation. However, the presence of algae in raw water makes coagulation more difficult because algae raise the pH of water and excrete polysaccharides that increase coagulant demand.

In this project sponsored jointly by the N.C. Urban Water Consortium and the American Water Works Research Foundation, investigators focused on developing enhanced methods for coagulating, flocculating and settling algae using ferric sulfate. Ferric sulfate causes coagulation by neutralizing the electrical charge of materials in the raw water. However, when algae concentrations in or quality of raw water coming into the plant fluctuate, the concentration of negative charges in the raw water and the coagulant dose required to neutralize these charges can vary rapidly. For effective algae removal, plant operators must have a rapid and reliable method for determining coagulant demand.

In recent years the streaming current detector has become widely used in the water treatment industry as a method of continuous, on-line monitoring and controlling coagulant dosage. The instrument conducts a charge titration on raw water and provides a value that can be used to determine the coagulant dose needed. The investigators evaluated the effect of streaming current value at pH 6 on algae removal using water from Falls Lake (NC) spiked with laboratory-cultured filamentous blue-green alga *Anabaena flos-aquae* at initial concentrations of approximately 10,000 and 50,000 cells/mL. They conducted charge titrations with a bench-scale streaming current detector to determine the ferric sulfate doses that corresponded to selected streaming current values. These streaming current values were then evaluated in jar tests to determine whether a given streaming current value could be used as a setpoint in online coagulant dose control that maximizes algae removals in waters with varying initial algae concentrations and/or background water quality.

Ferric sulfate doses required to reach the streaming current value of zero (point of zero charge) were 85 mg/L $Fe_2(SO_4)_3$ for the initial algae concentration of 10,000 cells/mL and 95 mg/L for the 50,000 cells/mL concentration. At the point of zero charge and with the addition of an anionic flocculant aid, nearly complete algae removals were achieved at both initial alage concentrations. Settled water algae counts were approximately 100 cells/mL, which was the detection limit of the counting technique used. For the spiked Falls Lake water, algae removal improved from approximately 60% in the absence of polymer to greater than 96% in the presence of 0.1mg/L polymer at otherwise equal coagulation conditions.

Similar algae removals were also obtained at a streaming current value of –0.5, but algae removal started to suffer at a streaming current value of –1. The results showed that the negative surface charges in the water needed to be sufficiently neutralized to obtain effective algae removal with ferric sulfate at both initial algae concentrations.

At the point of zero charge and slightly negative streaming current values (-0.5 and –1.0), settled water turbidity levels were below 1 NTU at both initial algae concentrations. Natural organic matter removal trends paralleled trends in algae and turbidity removal.

At pH values 7.0 and 7.5, the point of zero charge was not reached, even at the highest tested ferric sulfate doses. Given that point zero charge could not be reached with ferric sulfate at pH values 7.0 and 7.5, the addition of cationic polymers would be necessary to achieve effective charge neutralization and thus improved algae removal with ferric sulfate in the sweep floc range.

Jar tests conducted with a natural algae bloom water confirmed results obtained with laboratory-cultured algae in that algae were effectively incorporated into settleable floc following ferric sulfate coagulation at pH 6.0, provided that the coagulant dose yielded the point zeros charge and that a flocculant aid was added.

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Studies

Graduate project shows stream restoration may promote spread of invasive vegetation

While the goals of stream restoration projects are admirable, the projects frequently fall short of establishing vegetation that will mature into riparian zones like those of natural reference streams. Although species are planted to begin the process of reaching a target plant community, establishment also depends on recruiting other native species into the area, and there is clear evidence that is not often happening. In fact, stream restoration projects may even be promoting the invasion of non-native species into upland areas along stream corridors. These are conclusions of research performed by forestry student Melissa Ruiz for the Master of Forestry degree at NC State University. Ruiz presented the results of her research at the WRRI Annual Conference on May 1.

To determine how successful stream restoration projects may be in recreating functioning ecosystems, Ruiz characterized plants and soils in the riparian zones of restored streams in Piedmont North Carolina. At ten restoration sites in Greensboro and Raleigh monitored by the N.C. Division of Water Quality, Ruiz marked plots along the stream edge and sampled soils and surveyed plants within the plots. Soil fertility, pH, bulk density and aeration porosity were determined. Vegetation was identified to the species level, and percent coverage of each species was estimated. Ruiz also obtained lists of species that were supposed to have been planted at most of the restoration sites.

Ruiz found 95 native species, 40 non-native species and some unknown species at the sites. Non-native species made up a large percentage of cover at all sites. Most species that had been planted were not found. Shrubs and saplings that were found are not indicative of what might be found in the reference, a Piedmont bottomland forest.

Soils analysis revealed that in general fertility was not a limiting factor in the survival and growth of native species that were planted. Aeration porosity at all sites exceeded the minimum considered necessary for adequate aeration. Bulk density was high at about 10% of the plots indicating soil compaction at these sites, probably from construction.

A number of factors—including soil compaction and drought—could contribute to the lack of survival of planted native species on stream restoration project. However, a prominent factor is competition for nutrients, light, and rooting space from non-native species. Records of restoration projects indicate that some non-native species were planted. It is also likely that some species were introduced in seed mixes sown for erosion control. However, invasive species take advantage of disturbed soils, and it is likely that most invasive non-native species found on stream restoration projects spread their way in from nearby areas or established themselves by waterborne or airborne seeds.

Other studies have shown that riparian zones can serve as corridors for movement of non-native species and are sometimes sources of non-native plant invasions in upland areas. It is therefore clear that stream restoration sites can end up promoting the invasion of non-native species into surrounding areas and that preventing invasive non-native species from gaining a foothold at restoration sites is important.

This research project did not address how the amount of invasive non-natives at stream restoration sites compares with the amount along natural streams. However, it does offer insights into improving the chances that restoration sites will evolve into functioning ecosystems.

Recommendations for avoiding establishment of invasive non-natives and promoting survival and growth of native species are:

- Don't plant non-native species. Even those that are not invasive can pave the way for invasives if they don't survive. A case in point is the Redosier dogwood (*Cornus sericea*) which was planted in large numbers at two of the study sites but did not survive because it was out of its range and succumbed to the heat.

- Choose a grass mix for erosion control that contains neither persistent nor invasive species (such as Bahia grass, Chinese lespedeza, meadow or tall fescue).

- Till soil to counteract compaction during construction.

- Control weeds and grasses around seedlings. A vegetation-free circle will reduce competition for water and nitrogen and promote growth. This may require use of herbicides.

- Promote the establishment of woody native species. Fast growing shrubs can stabilize a site and will eventually be taken over by tree species. (Black willow, silky dogwood, tag alder, stiff dogwood are native species found to have the highest average coverages at study sites.)

Ruiz, Melissa McElroy. 2003. Characterization of vegetation and soils along restored streams in the North Carolina Piedmont. Masters thesis. Department of Forestry, NC State University.

For more information, contact Dr. Ted Shear, Restoration Ecology Program, Department of Forestry, NC State University. (Ted_Shear@ncsu.edu)

NOAA and EPA will collaborate on new air quality forecasting tool

The National Oceanic and Atmospheric Administration (NOAA) and the U.S. EPA marked World Asthma Day by announcing a partnership to jointly develop a forecasting tool which will enhance the ability to predict air quality in communities.

World Asthma Day is May 6. It coincides with the beginning of weather reports that will issue "ozone alerts" when the ground-level ozone (or smog) can exceed EPA standards because of a combination of hot, hazy weather and pollutants from vehicles and industrial activity.

In the first phase of the collaboration announced in May, NOAA and EPA will produce a model that provides daily forecasts for ozone in the northeastern U.S. by Sept. 2004. Within five years, following initial deployment and evaluation, the enhanced forecasting system will be used nationwide.

The new model will create a consistent national, numerical system of forecasting ozone and particular matter. This tool will provide the Air Quality Index in daily weather forecasts and will report a more accurate warning of the days in which outdoor activities could prove to be a health risk.

Optimizing ferric sulfate coagulation of algae with streaming current measurements *continued*

These results show that utilities can rely on charge titration data, which can be rapidly obtained with a bench-scale streaming current detector to select suitable coagulant doses. Furthermore, the results of this research suggest that coagulant dose control based on online streaming current measurements should be effective for treating waters with fluctuating algae concentrations and/or background water quality.

People

William H. Schlesinger, James B. Duke Professor of Biochemistry and Dean of the Nicholos School of the Environment and Earth Sciences at Duke University, has been elected a member of the National Academy of Sciences. This is one of the highest honors that can be accorded a U.S. scientist or engineer.

J. Todd Kennedy has taken a position as an environmental modeler with the N.C. Division of Water Quality. Formerly an environmental specialist with the division's planning branch, his primary focus in this new role is TMDL development.

Linda Sewall, Director of the Division of Environmental Health (DEH), will retire on May 31. Effective June 1, Mike Kelly, the division's deputy director, will begin serving as the acting director. Kelly began working in the department in 1991 with the Division of Waste Management, has been the DEH deputy director since July 2002.

North Carolina Precipitation/Water Resources

	March	April
Rainfall (+/- average)		
Asheville	4.34" (-0.25")	5.26" (+1.76")
Charlotte	7.06" (+2.67")	8.25" (+5.30")
Elizabeth City	4.82" (+0.15")	7.21" (+4.21")
Greensboro	6.69" (+2.84")	6.39" (+2.96")
Raleigh	5.24" (+1.21")	4.35" (+1.55")
Wilmington	5.33" (+1.11")	6.48" (+3.54")

Streamflow **Index Station** (County, Basin)	**March mean flow (CFS)** (% of long-term median)	**April mean flow (CFS)** (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	376 (84%)	327 (82%)
Oconaluftee River at Birdtown (Swain, Tenn)	705 (84%)	810 (107%)
French Broad River at Asheville (Buncombe, FB)	2,960 (94%)	3,260 (120%)
South Fork New near Jefferson (Ashe, New)	606 (106%)	863 (159%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	169 (114%)	246 (206%)
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	312 (129%)	463 (201%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	1,330 (237%) Rcrd mnth dschrg	1,180 (255%)
Rocky River near Norwood (Stanly, Yadkin/Pee-Dee)	6,400 (247%)	6,720 (470%)
Deep River near Moncure (Lee, Cape Fear)	6,020 (203%)	6,030 (343%)
Black River near Tomahawk (Sampson, Cape Fear)	1,730 (129%)	1,570 (161%)
Trent River near Trenton (Jones, Neuse)	561 (208%)	408 (190%)
Lumber River near Boardman (Robeson, Lumber)	3,260 (140%)	2,760 (183%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	556 (183%)	544 (293%)
Potecasi Creek near Union (Hertford, Chowan)	600 (158%)	736 (346%)

Groundwater **Index well (Province)**	**March depth below surface (ft)** (departure from average for month)	**April depth below surface (ft)** (departure from average for month)
Blantyre (Blue Ridge)	30.47 (+0.34)	28.30 (+1.69)
Mocksville (Piedmont)	17.14 (-1.26)	16.11 (-0.08)
Simpson (Coastal Plain)	3.34 (-0.21)	3.66 (+0.28)

Source: U.S. Geological Survey's *Water Resources Conditions in North Carolina http://nc.water.usgs.gov/monthly/*

Conferences and workshops

Watershed Restoration Institute. September 21 - 26, 2003, Pearlstone Retreat Center, Reisterstown, MD. Registration Deadline July 1. The Watershed Restoration Institute is an intensive six-day program developed by the Center for Watershed Protection and others designed to equip local urban watershed leaders with the skills and tools to plan, design and implement effective restoration programs in their home watersheds. The Institute features both classroom time and hands-on field instruction covering watershed assessment and mapping techniques; watershed inventory and restoration strategies; and organizational development and management skills. For information go to website: http://www.cwp.org/Watershed_Institute.htm

Enhancing the Southern Appalachian Forest Resource: A Symposium Engaging Economic, Ecological and Social Principles and Practices, Kanuga Conference Center, Hendersonville, North Carolina, October 2-3, 2003. Presented by the NCSU Forestry Educational Outreach Program. For information go to website: http://www.ces.ncsu.edu/nreos/forest/feop/symposium/

Publications

Local governments implementing NPDES Stormwater Phase II requirements may be interested in EPA Region 9's Pollution Prevention Program fact sheets that provide complete **environmental, technical and economic evaluations of the top pollution prevention "fixes" for fleet maintenance operations**. You can also order videos that feature these same P2 "fixes" at work in fleet maintenance operations, and that include operator testimonials and case studies. These materials are meant for state and local environmental agencies and technical assistance programs that want high-quality, tested materials to use in their outreach effort. Go to website: http://www.epa.gov/region09/cross_pr/p2/autofleet/factfleet.html

Occurrence Summary and Use Support Document for the Six-Year Review of National Primary Drinking Water Regulations (EPA 815-D-02-006). Summarizes contaminant occurrence findings for 30 regulated contaminants in support of the EPA's Six-Year Review of National Primary Drinking Water Regulations. Included is detailed information regarding each contaminant's occurrence in drinking water and related information relevant to initial exposure assessments. (March 2002). View or download at http://clu-in.org/techpubs.htm .

CUT HERE

WRRI NEWS SUBSCRIPTION UPDATE

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Please review your address as it appears on the back page of this newsletter. If you wish to have your name removed from our mailing list, or if your address needs to be corrected, please indicate the action we should take directly on the reverse side of this page adjacent to your address label and return the lower portion of the page to us for correction.

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If you know others who would benefit from receiving the WRRI News, please ask them to send name, affiliation, address and phone number to the address below with a request to be added to the mailing list.

Return to:
Water Resources Research Institute
of The University of North Carolina
Box 7912, N.C. State University
Raleigh, NC 27695-7912

N.C. Department of Environment and Natural Resources seeks environmental stewards

The N.C. Department of Environment and Natural Resources (DENR) is looking to recognize and partner with organizations that keep the environment in mind throughout the year as part of their daily business practices. These organizations are invited to apply for membership in the Environmental Stewardship Initiative (ESI), a voluntary program designed to promote and encourage superior environmental performance.

In its second year, the ESI establishes incentives to stimulate regulated organizations to develop and implement programs that use pollution prevention and other innovative approaches to meet and exceed their regulatory requirements. This program seeks to reduce the impact on the environment beyond measures required by any permit or rule, producing a better environment and a stronger economy and conserving natural resources.

Any organization that operates a facility in North Carolina is eligible to participate in the initiative. This includes but is not limited to manufacturers, businesses, agribusiness, service providers, government agencies, schools and nonprofit agencies. Applications to become an Environmental Steward will be accepted until Monday, June 23, with a decision expected in late fall.

For more detailed information or to apply for the program, please visit the Environmental Stewardship Initiative Web site at http://www.p2pays.org/esi or contact Beth Graves of the Division of Pollution Prevention and Environmental Assistance, at (919) 715-6506 or beth.graves@ncmail.net.

NCWRA
North Carolina Water Resources Association

2002 - 2003 Luncheon and Forum Schedule

September 8, 2003
Land Use & Water Quality Interactions Using GIS

December 1, 2003
Water Reuse

Please note new meeting location.

All luncheon/forums take place at 11:30 am
at the College of Textiles Building on Centennial Campus
N.C. State University.
For directions, go to website:
http://centennial.ncsu.edu/howtogethere/htgh.htm

For registration information call WRRI (919/515-2815)

For information about NCWRA visit the website:
http://www.ncsu.edu/waterquality/ncwra/home.htm

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