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Reckhow to step down as WRRI Director

Kenneth H. Reckhow has announced that he will step down as director of the Water Resources Research Institute of The University of North Carolina on August 1, 2004. He will return to fulltime teaching and research as Professor of Water Resources and director of the Center for the Analysis and Prediction of River Basin Environmental Systems in the Nicholas School of the Environment and Earth Sciences at Duke University. He will assume additional duties as chair of the Department of Environmental Sciences and Policy.

Reckhow has served as director of WRRI since January 1996. During his tenure, WRRI was judged among the top four state water institutes by a U.S. Geological Survey evaluation team. From 1997 to 2001 as WRRI director Reckhow led the multi-institute Neuse ModMon Program, funded by the N.C. General Assembly and charged initially with providing the scientific basis for the Neuse River nutrient management strategy and, later, the Neuse nitrogen total maximum daily load (TMDL). Currently, he is leading a team of scientists in designing a Hydrologic Observatory in the Neuse River watershed under a grant from the Consortium of Universities for the Advancement of Hydrologic Science.

At the state level, Reckhow has served as chairman of the stakeholder committee that developed recommendations for the Neuse Basin riparian buffer protection rule and as chairman of the N.C. Sedimentation Control Commission. Nationally, he has served as president-elect and president of the National Institutes for Water Resources, the network of state water institutes, and as a member of the Board on Natural Resources of the National Association of State Universities and Land Grant Colleges.

In 2001, he served as chairman of a National Academy of Sciences committee that examined the scientific basis for the U.S. EPA's TMDL program. He is serving, or has served on the editorial boards of *Water Resources Research, Water Resources Bulletin, Lake and Reservoir Management, Journal of Environmental Statistics, Urban Ecosystems*, and *Risk Analysis*.

continued page 5

In this issue **March/April 2004**

Director's Forum

Nonpoint Source Pollution: Scientific and Regulatory Challenges

Kenneth H. Reckhow, Director, Water Resources Research Institute

It is generally recognized that point and nonpoint sources contribute large quantities of fixed and reduced nitrogen to North Carolina river basins. However, while our scientific knowledge and options for regulatory control of point source loads support informed and effective decision making, the same cannot be said for nonpoint source impacts. If we are to achieve and maintain desired water quality in North Carolina's lakes, rivers, and estuaries, fundamental changes are needed in research programs, in pollutant control incentives, and in regulatory options for effective management of nonpoint sources of nitrogen.

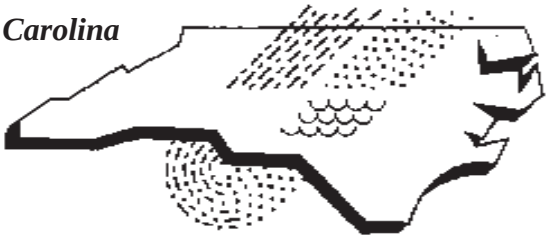
With respect to scientific knowledge, it is increasingly evident that predictive understanding of the transport and fate of fixed and reduced nitrogen on a river basin scale is inadequate to address critical water science and policy issues. "What is needed for understanding water resources is a more holistic conceptual framework that encompasses regional scale hydrologic systems, land-atmosphere interactions, and the biogeochemical cycles that control contaminant transport" stated the National Research Council Water Science and Technology Board in *Envisioning the Agenda for Water Resources Research in the Twenty-first Century* (NRC 2001). To fill this need, The Consortium of Universities for the Advancement of Hydrologic Sciences (CUAHSI), through support from the National Science Foundation, is initiating a research program of river basin scale hydrologic observatories. As described in the 2003-2004 Annual Program for WRRI, we are designing the first prototype hydrologic observatory in the Neuse River Basin.

Why is a large-scale field program of this nature needed? Simply put, the reductionist approach that has dominated science has been remarkably successful in developing basic hydrologic process understanding. For example, on a small scale, with controlled experiments, scientific knowledge of important processes affecting nitrogen transformation and transport is excellent. In essence, scientists understand the nitrogen cycle; they know what can happen. However, translating this small-scale knowledge into large-scale prediction is a different matter. Forcing functions may change with scale, and relevant factors may be highly variable in space/time. On a river basin scale, nature is just too complex to adequately capture

continued page 8

Water Resources Research Institute News

of The University of North Carolina



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Constitutionality of Rules Review Commission will also be raised

Stormwater rules go to court

by Jeri Gray

At the March 11, 2004, meeting of the North Carolina Environmental Management Commission (EMC), Commission Counsel Frank Crawley announced that a Complaint for Declaratory Judgment regarding the NPDES Stormwater Phase II rules rejected by the N.C. Rules Review Commission (RRC) had been filed in Wake County Superior Court on behalf of the EMC. Crawley also said that he would seek a stay of the RRC decision. Both actions had been authorized by the EMC at its February 12, 2004, meeting.

Environmental groups represented by the Southern Environmental Law Center have also announced that they have filed a complaint against the RRC in Wake Superior Court. In their suit, the N.C. Coastal Federation, N.C. Shellfish Growers Association, N.C. Trout Unlimited, and Environmental Defense allege that the RRC exceeded its authority when returning the stormwater rules to the EMC and that the RRC violates the N.C. Constitution because it "impermissibly delays rules and prevents the enactment of rules without utilizing constitutionally permissible measures."

Events preceding the lawsuits

As reported in the January/February 2004 *WRRI News*, the RRC in January voted to return to the EMC two rules developed to implement the NPDES Stormwater Phase II rules and to establish an equivalent state stormwater program for urban counties not covered by the federal program. The return of a rule by the RRC means that the rule may not become effective. The motion passed by the RRC to return the rules did not clearly state which rule(s) the RRC was returning or the explicit basis for the action. No further explanation of the RRC's action was available until February.

At the February 6, 2004, meeting of the legislative Environmental Review Commission, RRC Staff Attorney Joseph DeLuca presented to legislators a letter officially stating the RRC's action and basis for the action. The letter stated that the RRC was returning both rules, saying that they were not adopted in accordance with the N.C. Administrative Procedure Act (APA), that the EMC lacks authority to adopt the rules, that the EMC failed to respond appropriately to previous objections, and that the rules were ambiguous. However—except for the charge of non-responsiveness—the letter did not cite specific parts of the rules and explain how they violated legal requirements.

Representative Joe Hackney and Senator Dan Clodfelter were highly critical of the letter, Hackney asking why the decision had not been explained and Clodfelter asking for an explanation of the alleged deficiency under the APA. DeLuca told the legislators that the commissioners did not explain their reasons for the action.

"A decision rendered without reasons is arbitrary and capricious," said Clodfelter.

Implications of the RRC action

By returning the permanent stormwater rules to the EMC, the RCC effectively ended the rulemaking and ended the temporary rule that had been in effect since October 2002. The temporary rule had extended the deadline by which some municipalities were required to submit permit applications, leaving these cities out of compliance with the federal rules. While DENR assured the cities it would not take enforcement action, the potential for third party suits exists until the cities apply for and receive the required permits. Loss of the permanent and temporary rules also means that—in addition to failing to establish a permitting system for those required to get permits—the State of North Carolina has failed to meet federal requirements to adopt procedures for state designation and for petitions for designation of additional owners and operators of storm sewer systems that must obtain permits. Any failure of the State to meet federal requirements presumably makes the State vulnerable to federal action and third party lawsuits under the Clean Water Act. Moreover, lack of rules to specify how developers are to meet the post-construction requirements of the Stormwater Phase II program creates uncertainty for the development community.

NPDES Stormwater Phase II General Permits

At its February meeting, the EMC supported development of a general permit under which owners/operators of municipal separate storm sewer systems (MS4's) that have not yet applied for permits can seek coverage if they are not prepared to submit applications for individual permits. Coverage under a general permit will protect cities from potential third-party suits; however, general permits typically provide no flexibility in the requirements. In addition to the local government general permit, the N.C. Division of Water Quality is designing a development general permit under which developers may seek coverage for the post-construction stormwater control requirements of the NPDES Stormwater Program. Draft general permits will be published in the State Register for comment before being finalized. For updates and drafts of general permits check the DWQ Stormwater and General Permits Unit website at http://h2o.enr.state.nc.us/su/Phase_2_Update.htm.

It is possible that the N.C. General Assembly will take up the NPDES Phase II Stormwater rules in its "short session," which begins May 10. The N.C. League of Municipalities has stated its intention to ask the legislature to enact the rules as statutory requirements.

February, March, April action of the N.C. Environmental Management Commission

At its regular meeting on Feb 12, 2004, the N.C. Environmental Management Commission (EMC) took the following action:

- Approved an amendment to the Air Quality rules covering municipal waste combusters. The amendment extends the compliance date for small municipal combusters to December 1, 2004.

- Approved air quality rules that establish maximum feasible control technology for facilities that use ethylene oxide as a sterilant in production or packaging of medial devices, define and list requirements for issuing Special Orders by Consent for compliance with air quality rules, and place an additional application requirement on new or expanding facilities located in non-zoned areas of the State. Included was a request by Commissioner Dan Besse that the EMC strongly recommend that Special Orders be posted to the Division of Air Quality website at the same time they are issued.

- Approved holding public hearings on three options for an "exceptions rule" that will establish a uniform set of procedures to provide exceptions from specific Division of Water Quality rules. One version of the exceptions rule does not address the issue of "vested rights." One version provides an automatic exception for "vested rights." One version requires that exceptions for "vested rights" be applied for.

- Approved initiating a suit against the Rules Review Commission challenging the RRC's return of the NPDES Stormwater Phase II rules, seeking a stay of the RRC's decision, and developing a General Permit under which municipalities that must receive an NPDES Stormwater Phase II permit can be covered (see article page 3). During the discussion, Chairman David H. Moreau asked the staff of DWQ to prepare to discuss in a Water Quality Committee meeting the general state of stormwater management and the possibility of initiating rulemaking to address stormwater runoff from all significant urban development.

- Upheld an administrative law judge's decision upholding civil penalties assessed by the Department of Environment and Natural Resources against the Nash-Rocky Mount Schools for wastewater discharge violations.

At its regular meeting on March 11, 2004, the EMC took the following action:

- Narrowly approved air quality rules and amendments to air quality rules governing concrete batch plants, volatile organic compounds, nitrogen oxides, and cotton gins. A long discussion focused on a change—opposed by the Ready Mixed Concrete Association —to opacity measurement at concrete batch plants. Commissioner Will Fowler said that the industry charges that the rule will increase the cost of concrete "radically." Division of Air Quality Director Keith Overcash said that the rule change should cost plants nothing if they are maintaining their bag houses properly.
- Approved the final Tar-Pamlico Basinwide Water Quality Plan. This is the first basin in which the Division of Water Quality's new swamp waters rating criteria have been applied. Basinwide plans can be downloaded from DWQ's Basinwide Planning Program website at http://h2o.enr.state.nc.us/basinwide/index.htm.

- Approved an NPDES permit for the Neuse River Compliance Association. The Neuse River Basin Nutrient Sensitive Waters Management rules provide for a cooperative agreement among wastewater dischargers for group compliance with total nitrogen limits in the Neuse Basin. An NPDES permit has been developed for the Neuse River Compliance Association that establishes the total nitrogen allocation for the group and its members.

- Delegated to the chairman of the EMC the authority to sign requests for extension of time on contested cases.

At its regular meeting on April 8, 2004, the EMC took the following action:

- Approved an acceptable ambient level (AAL) for hydrogen sulfide and approved an exemption from the standard for pulp and paper mills' wastewater treatment systems. The pulp and paper industry is to complete studies of hydrogen sulfide emissions at their facilities by 2008, and the studies are to be presented to the EMC in 2009. Presumably, the EMC will decide in 2009 whether to continue the exemption.

- Approved changes to air quality rules governing open burning, including a prohibition on open burning on days with code orange and higher air quality ratings for areas with air quality problems.

- Approved a language change to rules governing emissions of ethylene oxide in response to objections by the Rules Review Commission.

continued

Reckhow *continued*

"I will miss my friends and colleagues at WRRI, at NCSU, and in the water research community," said Reckhow. "Fortunately, I'm not going very far. However, I am looking forward to getting back fulltime to research and teaching, and to some exciting new opportunities with the Nicholas School at Duke."

EMC *continuted*

- Approved holding public hearings on changes to various air quality rules. See the Division of Air Quality website for details: http://daq.state.nc.us/

- Approved permanent rules amending the reclassification of a portion of Swift Creek and a portion of Sandy Creek from Nash County SR 1004 to Nash County SR 1003 from Class C NSW to Class C ORW NSW and applying watershed management requirements to protect outstanding resource values found in the designated waters and undesignated waters that drain to the designated waters, as required by the General Assembly.

- Confirmed appointment of Wayne Hollowell, Director of Public Works for the City of Clinton, and Frankie Buck, system operator for the City of Washington, to the Water Pollution Control System Operators Certification Commission.

- Went into executive session to discuss with EMC counsel Frank Crawley, the suit filed against the Rules Review Commission. **JG**

February, March action of the EMC's Water Quality Committee

At its regular meeting on February 12, 2004, the Water Quality Committee (WQC) of the N.C. Environmental Management Commission (EMC) took the following action:

- Approved a major variance from the Neuse River riparian area protection rule for a private residence located in the Swift Creek watershed in Cary, NC.

At its meeting on March 10, 2004, the WQC took the following action:

- Approved revised water supply watershed protection ordinances for the Town of Nashville, Town of Newton, Henderson County and Johnston County. The revisions generally make the local ordinances more protective than the state minimum requirements. The local governments were commended for the changes.

- Heard a presentation by staff of the Division of Water Quality (DWQ) on the "Site-Specific Water Quality Management Strategy for the Swift Creek (east of State Road 1003 in Nash County), Tar-Pamlico Basin." In 2003 the N.C. General Assembly disapproved part of an EMC reclassification to Outstanding Resources Waters of portions of Swift Creek and Sandy Creek in the Tar-Pamlico River Basin and authorized the legislative Environmental Review Commission (ERC) to study how best to protect water and endangered species in the eastern part of Swift Creek and its watershed. To aid the ERC in its evaluation of management options, the EMC directed staff of DWQ to develop a site-specific management strategy that would protect both water quality and the endangered species (Tar Spinymussel) found in the Swift Creek watershed. Through multiple agency cooperation, DWQ developed a management strategy to be submitted to the ERC. The plan recommends expansion of riparian buffer protection, measures to maintain normal flow regimes, prohibition of new and removal of existing wastewater discharges, and enhanced erosion and sediment controls for all construction projects requiring a stormwater general permit. In connection with this presentation, Assistant Secretary of DENR Robin Smith announced that the department is working on an overall plan to address endangered species issues. She said that North Carolina has seven federally listed endangered mussels and fish and that habitat requirements for these species are putting "major kinks" in permitting for infrastructure projects such as highways and wastewater treatment plants. She said that DENR wants to examine the concept of working with local governments to develop habitat conservation plans to get ahead of infrastructure projects. Such plans might be used by DENR to target conservation and acquisition funds.

The Water Quality Committee did not meet in April. **JG**

Recruitment for the 2005 North Carolina Natural Resources Leadership Institute (NRLI) will be underway by May 2004

The goal of the NARLI is to develop leaders who can build consensus around contentious issues and move beyond conflict to find solutions.

For information and an application go to website:
http://www.ces.ncsu.edu/depts/agecon/nrli/natural_res.html

USGS reports water use in 2000 unchanged since 1985 despite growth

Despite growing population and increasing electricity production, water use in the United States remains fairly stable, according to a new report released in March by the U.S. Geological Survey (USGS).

The USGS report shows that in 2000, Americans used 408 billion gallons of water per day, a number that has remained fairly stable since 1985 and a sign that conservation is working. In the report, *Estimated Use of Water in the United States in 2000*, USGS researchers found that the chief water users for the nation are power generation, agriculture and public water supply. The USGS report also finds that the personal use of water is rising, but not faster than population change.

Power generators make up 48 percent of the usage. Irrigation is 34 percent of the total, and public supply (that delivers water to homes, businesses, and industries) accounts for 11 percent of daily water usage. Self-supplied industrial users, livestock, mining, aquaculture and domestic wells, taken together, account for about 7 percent of the Nation's daily water usage.

Since 1950, USGS has compiled water-use information in cooperation with all of the states and many other federal agencies and organizations. The information reflects withdrawal of water from the nation's rivers, streams, lakes, estuaries, and groundwater.

The full report is available online at: http://pubs.water.usgs.gov/circ1268/. Additional water use information is available at: http://water.usgs.gov/watuse/ .

Discussion from North Carolina Aquatic Weed Control Council 2004 Annual Meeting

by Kelly Porter

The North Carolina Aquatic Weed Control (AWC) Council met on February 18, 2004, for its annual meeting. Many items were discussed.

- The weed species that were controlled using chemical and biologic control methods by the AWC program in 2003 included alligatorweed, coontail/milfoil, duckweed, hydrilla, parrotfeather (*Myriophyllum aquaticum*), pond weeds, primrose (*Ludwigia hexapetala*), and salvinia.
- Sterile grass carp, a nonnative species, are used as a biological weed control method for hydrilla and pond weeds. Some of the council members expressed concern about the issue of the escapement of carp into riverine systems, especially since anyone can purchase less than 150 grass carp without a permit to stock in private or public waters. A permit is required only for the purchase of 150 or more grass carp. It was noted that no major problems to rivers have been found where "escaped" grass carp have been identified.
- Discussion of the 2004 work plan concluded that field surveys of vegetation composition are to be initiated during control operations beginning this year. A trial introduction of the flea beetle (*Agasicles hygrophila*) as a biological control of alligatorweed will be performed in 2004 if the flea beetles become available. The Council approved the Aquatic Weed Control program's 2004 workplan unanimously.
- Council members targeted water lettuce, parrotfeather, and water hyacinth as candidates for the NC Noxious Weed List. A potential opportunity to include aquatic weed material into the Coastal Water Management Plan (CWMP) was discussed. Including this material in the CWMP may be an avenue for the process of getting the aforementioned species added to the NC Noxious Weed List.
- *The North Carolina Agricultural Chemicals Manual* will no longer contain the Aquatic Weed Control section as there is no longer a person in NC Cooperative Extension to handle this. It was suggested that an electronic version be made available this year. The purpose of this section was in part to recommend herbicides that are approved for use in and around aquatic systems.
- Mr. Ken Manuel of Duke Energy gave an update of hydrilla infestations along the Catawba River. He mentioned that hydrilla is aggressive as it can reproduce asexually through tubers, fragmentation, and turions. Control methods include the use of grass carp (biological) and copper (chemical). The use of grass carp have shown to be a successful biological control method of hydrilla as they have a preference for feeding on germinating tubers.
- There is concern with the growth of large mats of floating aquatic plants as it provides excellent breeding grounds for mosquitos. This becomes a health issue due to diseases mosquitoes transmit. Virginia has identified at least one case of malaria. It is possible that low levels of malaria may exist along the eastern seaboard.
- During his discussion on the history of hydrilla in North Carolina, Mr. Wayne Batten, Pender County Cooperative Extension Service, expressed the need for more educational outreach programs. Individuals in the pond and water garden hobby need to know the importance of maintaining their water plants in a closed system, and not to get rid of them by throwing them into other water systems.

For more information about the Aquatic Weed Control Program visit: http://www.ncwater.org/Education_and_Technical_Assistance/Aquatic_Weed_Control/

OMB peer review proposal said to threaten quantity of sound scientific information

According to the National Academy of Sciences, if the White House Office of Management and Budget (OMB) follows through on a recent proposal, peer review of scientific studies conducted for federal agencies "will become so onerous and time consuming that it will reduce the amount of sound scientific information and analysis that is available as input to important public policy decisions and to an informed public."

Under the "Proposed Bulletin on Peer Review and Information Quality" issued by OMB in September 2003, scientists who peer review major studies commissioned by a federal agency and used for "significant" regulatory purposes will be asked to:

- address specific questions about information quality, assumptions, hypotheses, methods, analytic results, and conclusions in the agency's work product;
- be familiar with and apply the reproducibility and other quality guidelines issued by the Office of Management and Budget and the specific agency under the Information Quality Act;
- be briefed on the content of OMB's guidelines for regulatory analysis;
- take into account comments submitted by other agencies and persons;
- participate in the development of a final peer review report—which would be made public—disclosing the names, organizational affiliations, and qualifications of all peer reviewers as well as any current or previous involvement with the agency or issue under peer review; and
- disclose other types of personal information, potentially including prior service as an expert witness, sources of personal or institutional funding and/or other matters that might suggest a possible conflict of interest or appearance of a conflict of interest.

Reviewers of studies used in support of a major regulatory action or studies that could have a substantial impact on public policies or private sector decisions with an impact of more than $100 million per year would be required to comply with these guidelines.

According to critics of the proposed bulletin, these requirements alone could decrease the number of qualified scientists willing to perform peer review of government funded studies. In addition, other parts of the guidelines could require agencies to exclude from consideration as peer reviewers many more expert scientists.

According to the bulletin, potential peer reviewers could be excluded if the individual:

- has any financial interests in the matter at issue;
- has, in recent years, advocated a position on the specific matter at issue;
- is currently receiving or seeking substantial funding from the agency through a contract or research grant (either directly or indirectly through another entity, such as a university); or
- has conducted multiple peer reviews for the same agency in recent years, or has conducted a peer review for the same agency on the same specific matter in recent years.

The proposal has drawn fire from many academics, academic and professional organizations, public health organizations and legal experts. In comments submitted to OMB, the Association of American Universities (AAU) and the National Association of State Universities and Land-Grant Colleges (NASULGC) said:

> By mandating that individual agencies "shall strive" to exclude from peer review individuals receiving support from the agencies, the OMB regulation has the potential to exclude the most qualified scientists from the peer review process, thus compromising the quality of expertise brought to bear on science conducted in the development of federal regulatory policies. The proposal to exclude such individuals from the peer review process would be even more problematic in highly specialized areas of science as it would bring about a situation in which the pool of potential peer reviewers would be too small, thus creating the possibility of not having peer review at all.

The American Library Association commented that OMB appears to advocate excluding from peer review scientists receiving or seeking substantial funding from a federal agency through a contract or research grant, but makes no recommendation for excluding scientists who are currently receiving or seeking substantial funding from a regulated or affected industry through a contract or research grant.

The Association of American Medical Colleges (AAMC) commented that proposed requirements for review of studies with major financial impact on the private sector could prevent the public from receiving important health information. The AAMC says "agencies of the Public Health Service must be acknowledged to have special prerogatives for evaluation and announcement of timely information important to the public health even though from time to time such announcements may have impacts on the private sector that cross the 'significant' threshold." The organization cites as an example the recent finding—announced immediately upon termination of the study—that hormone replacement therapy for post menopausal women is of minimal benefit and causes troubling side effects.

continued page 8

OMB Peer Review *continued*

However, the OMB proposal on peer review does have its proponents. William L Kovacs, U.S. Chamber of Commerce vice president for environment, technology and regulatory affairs, commented on the proposed bulletin: "This is an important and beneficial step toward enhancing the quality of peer review of scientific information by government agencies."

The National Petrochemical and Refiners Association commented, supporting the proposed guidelines in general but opposing part of the guidelines that presume as adequate peer review undertaken by a scientific journal. NPRA said: "Not all scientific journals are of the same quality in the content of the articles nor are they all 'scientific.' NPRA suggests that the use of a journal peer review be presumed adequate only if the journal can provide the agency with sufficient documentation of the reviewers' qualifications and the merits of the review."

The National Association of Home Builders, a frequent and strong advocate of the use of "sound science" in rulemaking, suggested that excluding many qualified scientists who receive agency funding from peer review panels should not be problematic. NAHB said that to meet the need for peer reviewers, the pool of people doing reviews should be expanded beyond recognized experts to include new PhD's, tenured faculty at colleges and universities in general, and members of the regulated community. According to NAHB:

> Indeed, one of the benefits of these rules, whether intended or accidental, is that reviewing and evaluation can no longer be contained within a relatively small clique of professional comrades, people who continually attend the same meetings, serve on the same panels, review the same articles, and develop a culture among themselves. This is the culture so ruefully described by Thomas Kuhn in *The Structure of Scientific Revolutions*, and which led him to conclude, "Science progresses one funeral at a time."

The proposed guidelines on peer review were originally intended to take effect in February 2004. However, according the Margo Schwab in the OMB Office of Information and Regulatory Affairs, OMB was in March "considering the diversity of public comment." She could not predict when the final bulletin on peer review would be published. The Proposed Bulletin on Peer Review and Information Quality can be downloaded from the OMB website at http://www.whitehouse.gov/omb/inforeg/regpol.html. One hundred eighty-seven comments on the peer review proposal can be read at http://www.whitehouse.gov/omb/inforeg/2003iq/iq_list.html. **JG**

Legislation would set standards for scientific data for Endangered Species Act

In April 2003, U.S. Representative Greg Walden of Oregon introduced H.R. 1662, the Sound Science for Endangered Species Act Planning Act of 2003. Among other things, the act would require that the Secretary [of the Interior] "shall promulgate regulations that establish criteria that must be met for scientific and commercial data to be used as the basis of a determination under this section that a species is an endangered species or a threatened species."

According to Rep. Walden, the act has 62 bi-partisan co-sponsors and was filed as a result of decisions by federal agencies that withheld irrigation waters from farmers in the Upper Klamath Basin in 2001 to protect threatened fish species. According to Walden, the National Academy of Sciences reviewed the data upon which the decision was based and found it lacking. See his explanation at http://resourcescommittee.house.gov/archives/108/testimony/2004/gregwalden.pdf

Director's Forum, *continued*

in a simulation model. Thus, much of the past scientific research that has increased basic knowledge has simply not provided the observations necessary for predictive understanding in the hydrologic sciences at the river basin scale. However, the proposed hydrologic observatories should provide the large-scale science necessary to understand and predict the transport and fate of nonpoint source nitrogen in river basins.

From a regulatory standpoint, the NPDES program provides a framework for decision and control of point sources of nitrogen, such as wastewater treatment plants and urban stormwater runoff. Unfortunately, even if scientific knowledge advances as a consequence of new basin scale research, current approaches for enforcing and financing nonpoint source controls are inadequate, as recently noted by Dr. David Moreau at the 2004 WRRI Conference. According to Moreau, even if best management practices (BMPs) are identified, we need additional staff to monitor for compliance and effectiveness. Further, we need a program to finance the BMPs. In his remarks, Moreau suggested that basinwide nonpoint source loads be allocated on a watershed basis, and that runoff fees—similar in concept to that used by urban stormwater utilities—be implemented.

In summary, it appears that emerging NSF programs are being crafted to address the scientific challenges so that we may better understand the nature and control of nonpoint source pollution. However, the regulatory challenge remains. Reasonable solutions have been proposed, yet will we see a commitment to implement nonpoint source pollution regulations and controls on an equal basis with point source management?

2004 WRRI conference is showcase for progressive watershed planning and restoration

The 2004 WRRI Annual Conference held March 31 in Raleigh showed that North Carolina—one of the first states to embrace watershed planning and restoration— continues to advance the frontiers of comprehensive resource management and improvement. The keynote speakers set the tone for the conference, suggesting bold new policy approaches, and technical presenters described advances in watershed assessment methods, water quality best management practices, and resource restoration techniques.

Ken Reckhow talks with WRRI staff, Julie Mason and Lynne Bridger.

Uses, Non-Uses and Abuses

In the first presentation of the day, Dr. David H. Moreau—professor of city and regional planning at UNC-Chapel Hill and chairman of the N.C. Environmental Management Commission—provided an historical perspective on watershed planning in North Carolina and suggested ways in which state's pioneering basinwide planning program can be improved. Moreau pointed out that the U.S. EPA has cited North Carolina's basinwide planning program as a national model, and he praised the basinwide water quality plans as "excellent documents."

"They identify water quality problems, their probable causes and the needed remedial actions," he said, "and best of all, they're on the web so citizens have access to them."

He noted that the basic water quality plans for the 17 river basins have been supplemented by basinwide wetland and riparian restoration plans and the state water supply plan drawn from local plans, as well as more specific nutrient sensitive water strategies for the Neuse River Basin, the Tar-Pamlico River Basin and the Jordan Reservoir watershed.

"We've come a long way in planning for water resources on a basin scale in North Carolina," Moreau said, "but I would like to suggest a few improvements."

First, Moreau suggested, North Carolina needs to move toward a greater degree of comprehensive planning. Water supply, water quality, and other uses such as electric power generation and agricultural irrigation should be integrated into one basinwide plan.

"We need to consider the uses, non-uses (that is preservation) and abuses of water resources. We especially need to consider future sources of public water supply and protect the quality of these waters by considering other likely uses of the watersheds and the water quality implications of those uses, particularly land conversion."

Second, he suggested, North Carolina needs to "remove the veil of mystery that still surrounds management of nonpoint sources of pollution.

"This mystery is created by the fact that we have a large number of diffuse sources subject to random precipitation events in a river basin with little knowledge of the management practices being used. In our nutrient management strategies we have identified BMPs to be used and encouraged their adoption. But, there's no enforcement, no verification of load reduction from BMPs, and no monitoring for progress."

Moreau said that to achieve greater accountability for nonpoint source pollutant reduction, loads should be allocated by watershed instead of an entire basin and monitoring networks should be constructed that are designed to track progress in individual watersheds.

"We should consider financing these monitoring networks through runoff fees throughout the watershed."

Moreau's third suggestion for improving basinwide water quality planning was to include cost information in plans.

"Many think that cost information is antagonistic to water quality but I think that the practices we advocate are very affordable. We were told at one time that sewage treatment costs were

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WRRI Annual Conference
continued

unaffordable, but the cost of treating sewage has not placed that service out of reach. As a percent of median family income, wastewater service is still less than seven-tenths of one percent—less than the cost of cell phone service.

"Of course, I know that some will insist that if we include costs, we also include benefits."

Janet Paith of the N.C. Division of Land Resources, Land Quality Section, exhibited information about the Dam Safety and Erosion and Sedimentation Control programs.

Insanity is . . .

Following Moreau, Ron Ferrell—Director of Operations for North Carolina's new Ecosystem Enhancement Program—delivered an editorial in the form of his vision for progress in watershed assessment and restoration.

Ferrell said that while North Carolina has more money than ever before to mitigate and restore impacts to wetlands and riparian areas, managers are hamstrung by constraints on uses of the funding.

"The biggest challenge we face in restoration is the cumulative impact of many small, diffuse impacts. We need to be able to address the cumulative impact in the watershed, but the compensatory mitigation paradigm of 'on-site, in-kind, no-net-loss' stands in the way."

The scale for restoration efforts should be decided by the restoration goal, Ferrell said. For instance, restoration to mitigate the effects of nonpoint source pollution should be undertaken at the small watershed scale, while restoration to mitigate habitat destruction must be done at a much larger scale.

Ferrell said that treating small impacts outside the context of watershed planning is just putting a band-aid on a problem.

"The North Carolina Wetlands Restoration Program [forerunner of the Ecosystem Enhancement Program] was criticized because projects weren't getting on the ground. We were focusing on assessment and planning to address problems at the watershed level. Unfortunately, planning and assessment don't create many photo ops."

Ferrell said that policy makers need to think "outside the box" about what qualifies as "restoration."

"Sometimes stormwater BMPs have as much to do with restoring water quality as reconfiguring a stream channel," he said. "Anything you can do to meet the goals of the Clean Water Act should be considered restoration."

For mitigation/restoration efforts to be ecologically successful, Ferrell said, resources and projects should be concentrated in areas of greatest need, partnerships must be forged among agencies and programs with varying resource goals, and success must be measured.

"To measure success, you must have clear goals, which will be determined only through good assessment and planning. And because some results will take years or decades to become evident, you must have interim goals and measures."

Ferrell ended his presentation advocating new approaches to watershed restoration by quoting Albert Einstein: "Insanity is doing the same thing over and over again and expecting a different result."

In addition to the two keynote addresses dealing with watershed planning, each of the three concurrent technical sessions included a watershed planning session, in which 12 papers were presented describing methods, projects and programs that are advancing watershed planning in North Carolina.

PowerPoint presentations of the keynote talks as well as abstracts of all the technical presentations are on the WRRI web site at http://www.ncsu.edu/wrri/2004_annual_conference.html. **JG**

The Environmental and Water Resources Institute of the American Society of Civil Engineers presents

World Water and Environmental Resources Congress
June 27- July 1, 2004 . . .
Grand America Hotel, Salt Lake City, UT
"Critical Transitions in Water & Environmental Resources Management: Understanding the Past - Shaping the Future!"

For information go to website: http://www.asce.org/conferences/ewri2004/

Congratulations to WRRI Annual Conference student poster award winners

During the WRRI Annual Conference on March 31, members of the board of the North Carolina Water Resources Association (NCWRA) judged poster presentations by students. At lunch, NCWRA President Ken Carper presented three awards and two honorable mentions. Awards went to:

Ken Carper, President of NCWRA, and Francine Durso, Secretary of NCWRA, helped judge the student poster presentations

1st: ($75) Matthew Skidmore (presenter) and Francis de los Reyes III of the Department of Civil, Construction and Environmental Engineering at NC State University for their poster "Improving the Dewaterability of Biosolids Using Heat Treatment and Cation Addition." The poster abstract can be downloaded at: http://www.ncsu.edu/wrri/2004_ac/abstracts/MatthewSkidmore.pdf

2nd: ($50) Thomas Gallo (presenter), Michael Piehler, and Hans Paerl of the Institute of Marine Sciences, UNC-Chapel Hill, Morehead City, NC, for their poster on "Proximate Landuse Influence On Primary Productivity In Estuarine Nursery Creeks." The poster abstract can be downloaded at: http://www.ncsu.edu/wrri/2004_ac/abstracts/ThomasGallo.pdf

3rd: ($25) Jera Mendenhall and Audria Humes (presenters) of the Department of Statistics, NC State University, Raleigh, NC, for their poster "Is there a better way to define swamplands in the Coastal Plain and Sandhills?" Dr. William Hunt is their advisor. The poster abstract can be downloaded at: http://www.ncsu.edu/wrri/2004_ac/abstracts/Mendenhall_Humes.pdf

Honorable mentions went to:

- Melanie Carter (presenter), Bill Hunt, Jean Spooner, Robert Evans, Karen Hall, of the Department of Biological and Agricultural Engineering, NC State University, and Doug Frederick of the Department of Forestry, NC State University, Raleigh, NC, for their poster "Constructed Stormwater Wetland Design: Balancing The Urban Landscape Form With Water Quality And Research Functions." The poster abstract can be downloaded at: http://www.ncsu.edu/wrri/2004_ac/abstracts/MelanieCarter.pdf

Dave Williams of the Division of Soil and Water and Tim Baumgartner of Stantec Consulting look at posters.

- R.D. Rheinhardt, M.M. Brinson, R.R. Christian, K.H. Miller, Greg Meyer (presenter), and J.E. O'Neal of the Department of Biology, East Carolina University, Greenville, NC, for their poster "Developing And Calibrating An Indicator For Biogeochemical Condition Of Headwater Riparian Ecosystems." The poster abstract can be downloaded at: http://www.ncsu.edu/wrri/2004_ac/abstracts/GregMeyer.pdf

WRRI-sponsored research reported

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://www.ncsu.edu/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.

Interplay of Science and Stakeholder Values in Neuse River Total Maximum Daily Load Process

Lynn A. Maguire

Journal of Water Resources Planning and Management 129(4): 261-270

This referred journal article has been accepted as the final technical completion report for WRRI project 50288, "A Negotiated Approach to Developing TMDL's for Nitrogen in the Neuse Basin," Lynn A. Maguire, Nicholas School of the Environment and Earth Sciences, Duke University (lmaguire@duke.edu). It has been designated WRRI-2004-343-G (JA4). This project was part of the Neuse River Estuary Modeling and Monitoring Project Stage II and a follow up to the study described in WRRI Report 325-G ***Neuse River Estuary Modeling and Monitoring Project Stage 1: Assessment of Stakeholder Interest and Concerns to Inform Long-Term Modeling****.*

As water quality modeling and monitoring have become more sophisticated and public participation has become more important, water quality management has become more complex and socio-politically difficult. A number of analysts have proposed methods for dealing with environmental problems when technical complexity and competing values among many stakeholders make regulatory decisions especially difficult. From this literature, the investigator drew a list of standards of good practice for integrating stakeholder values with science in environmental decision making. She used these standards to examine the strengths and weaknesses of the science/stakeholder interaction in the process of developing a total maximum daily load (TMDL) for nitrogen in the Neuse River Estuary, NC.

In 1998, with funding from the N.C. General Assembly, scientists at several North Carolina universities undertook a monitoring and modeling effort to provide a strong scientific underpinning for rules adopted to improve water quality in the Neuse River Estuary. The Neuse ModMon Project involved an intense monitoring program in the estuary and development of models (a Bayes Net probability model and a two-dimensional simulation model) to predict the response of water quality in the estuary to reduced levels of nitrogen. Part of the Neuse ModMon Project was a public involvement process aimed at ensuring that the water quality parameters considered in the project would address the features that people living in the basin cared about. The investigator used public meetings, written and phone surveys, and face-to-face interviews to determine stakeholder values for Neuse Estuary water quality. She discovered early on that the modeling and monitoring efforts would be defined much more narrowly than the broad array of economic, social and cultural consequences of water quality management that most engaged the stakeholders.

As the models were being developed, some of the more technically oriented members of the stakeholder group began attending meetings with scientists and regulators and following the modeling process. When a mandated TMDL process was folded into the Neuse ModMon Project in 1999, this small group of stakeholders was expanded to form the Neuse TMDL stakeholder group. The charter for the stakeholder group stated that stakeholders were welcome to comment on development of models used to help set the TMDL and on the TMDL levels and margins of safety that would be proposed by the N.C. Division of Water Quality to the U.S. EPA. However, DWQ retained authority to propose the TMDL and margin of safety and EPA retained authority to accept what DWQ sent them. Even though implementation of TMDLs is not required by law, DWQ agreed to take as "strong advice" any consensus strategy developed by the stakeholders for allocating the allowable nitrogen load determined by the TMDL process.

Shortly after the TMDL stakeholder process began, EPA began developing a three-dimensional simulation model of the estuary, and work began on a spatial regression model to estimate nitrogen contributions from various sources in different locations in the Neuse watershed.

The investigator concluded that many aspects of the Neuse stakeholder-science interaction went well. Stakeholders were involved in the development of the Bayes' net and two-dimensional estuary models early and made important contributions to the model used to analyze sources of nitrogen delivered to the estuary. Stakeholders were helped to understand how scientific uncertainty might influence the margin of safety specified in the TMDL. On the other hand, the models developed were not designed to capture the stakeholders' concept of the river system and were much too complex for stakeholders to use themselves, which limited their sense of ownership. Differences of opinion among modelers (particularly EPA's decision to develop a separate three-dimensional model) made stakeholders uneasy about using the models for regulatory purposes, and delays in modeling results prevented stakeholders

from considering results fully before submitting an allocation strategy. Data problems also served to undermine stakeholders' confidence in the models. They came to view models as a necessary evil, to be relied on only when observational data would be too late or too expensive to gather.

Many of the problems with the science-stakeholder interaction in the Neuse TMDL process can be attributed to the regulatory framework, which will likely affect other TMDL processes. Relegating stakeholders to an advisory role—which is necessary under the current regulatory framework—reduces their incentive to become involved with details of the science and decreases ownership of the process. Lack of flexibility in regulatory deadlines frustrated stakeholders who had followed the modeling for more than three years and wanted to see results used in the allocation process. Perhaps the biggest constraint on stakeholder-science interactions was that impaired water quality was defined by failure to meet the chlorophyll a standard, which did not connect in a meaningful way with the features of water quality that stakeholders cared about: fishkills, noxious algal blooms, contaminated shellfish, and turbid water. Moreover, the entire TMDL process fails to address issues of fairness, equity and cost-effectiveness that are important to stakeholders.

The investigator concludes:

> These larger issues are not limited to TMDLs; they plague regulatory processes ranging from food additives to airport security. Failure of the Neuse TMDL process to address the most important stakeholder concerns is not the fault of the scientists, the stakeholders, or even the regulators who were involved. Rather it stems from an overly narrow construction of regulatory decision making, where the scientific basis for regulation is limited to biophysical concepts of the river system, rather than the full range of biological, economic, social and cultural elements which should inform regulatory decisions.

Neuse stakeholders recommend better monitoring, adaptive management

In their final report to the N.C. Division of Water Quality, the Neuse TMDL Stakeholders Group stopped short of identifying numerical targets for nitrogen reduction for specific sources in the Neuse River Basin "with great reluctance." The stakeholders say that despite extensive work that has gone into modeling and estimating nitrogen loading from various sources within the basin, " there is still too much uncertainty for us to feel confident in identifying a percentage loading from each of the sources we are interested in." The report—representing the stakeholders' general consensus—urges the Environmental Management Commission to use an adaptive approach to reducing nitrogen in the Neuse River Estuary and to continue the modeling and monitoring necessary to support adaptive management. The final report—presenting the stakeholders' conceptual framework and guiding principles for allocating the total maximum daily load (TMDL) of nitrogen in the Neuse River Basin—was delivered in June 2003, after the Neuse River Estuary TMDL had been submitted to EPA. An interim report delivered before submittal of the TMDL also advocated adaptive management.

The stakeholders ask that their report be made part of the next Neuse River Basinwide Water Quality Plan and that the following principles be used as guidance in any revision of the Neuse rules:

- **Full participation**. While the report identifies several sources from which little or no reduction is currently expected, the group says that all sources in all parts of the watershed should participate in nitrogen reduction. For example, while there is no required reduction target for forestland, the stakeholders advocate new guidelines and additional monitoring to verify compliance with forest BMPs. In a similar vein, more funding should be devoted to monitoring compliance with BMPs on highway and other construction sites.
- **Equity**. Allocation strategy should treat different sources and different regions within the basin equitably. They point out that some strategies that are desirable from the standpoint of cost-effectiveness could compromise equity.
- **Cost effectiveness**. Implementation programs that achieve a given level of nitrogen reduction at the least cost will do the most for water quality with the fewest unwanted side effects. A flexible nutrient trading scheme will be essential to making nitrogen reductions cost effectively. Developing models that will determine the appropriate trading ratios between upstream and downstream sources should be a priority.
- **Fiscal responsibility**. Both public and private entities must take fiscal responsibility for nitrogen reduction.
- **Avoidance of unintended negative consequences**. Implications of regulatory strategies must be thought through carefully.
- **Stability/predictability**. Because decisions are being made under circumstances of great uncertainty, the ability to monitor and adapt according to results is desirable; however, an adaptive approach may conflict with many stakeholders' desire for a stable regulatory environment.
- **Monitoring and adaptability of regulatory approach**. Because of uncertainty in model predictions being used to set the TMDL and allocation strategy, the regulatory framework should be flexible enough to respond with new recommendations as new data and models suggest. A monitoring design should

continued page 15

Research links droughts in U.S. to ocean temperature variations in the North Pacific and North Atlantic

Large-scale, long-lasting droughts in the United States tend to be linked to warmer than normal sea surface temperatures in the North Atlantic Ocean, and not just cooling in the tropical Pacific, according to a U.S. Geological Survey study published in March in the *Proceedings of the National Academy of Sciences*.

The statistical study was aimed at delineating temporal and geographical variations in drought frequency and correlating these variations with indices of Pacific and Atlantic Ocean climate. The researchers were able to correlate two of the three leading modes of drought frequency with the Pacific Decadal Oscillation (PDO) and Atlantic Multidecadal Oscillation (AMO) variations.

Both negative and positive PDO events in the North Pacific Ocean tend to last 20-30 years, with recent research increasingly associating these events with regional temperature and precipitation variability across the country. For example, most scientists think the PDO variability is linked to changes in the frequency and duration of El Niño or La Niña events over the course of decades.

The AMO association with U.S. climate is less well known, but recent studies suggest that variation in water temperatures in the North Atlantic affects summertime precipitation and could also regulate the strength of El Niño/La Niña effects on weather year-round, particularly in the Midwest.

The third pattern of variability, the researchers suggest, may represent a complex pattern of trends in drought frequency related to increasing Northern Hemisphere temperatures, or some other as-yet unidentified climate trend.

The U.S. climate of the last century was marked by three prolonged continental-scale wet spells (1905-1930, the 1940s, and 1976-1995) and three dry spells (the 1930's, 1950s-60s, and 1996-2004). Although researchers believe that such large and sustained shifts in United States precipitation are linked with the natural variability of sea surface temperatures, the mechanisms are not well understood and cannot yet be used to help predict the likelihood of droughts.

In general, the authors suggest, large-scale droughts in the United States are likely to be associated with positive AMO — the kind of warming of sea surface temperatures that occurred over the North Atlantic in the 1930s, 50s, and since 1995.

In contrast, wet conditions prevail over most of the country during North Atlantic cooling (negative AMO). The researchers found that cool waters in the central North Pacific are associated with drought in the Northern Rockies and Pacific Northwest, whereas warm waters in the central North Pacific are generally associated with drought in the Southwest and central Plains.

The researchers said that the best hope for predicting long-term droughts seems to lie with identifying precursor states in oceanic climate that could lead to drought.

North Carolina Precipitation/Water Resources

Rainfall (+/- average)

	January	February
Asheville	0.83"(-3.23")	4.20"(+0.37")
Charlotte	0.92" (-3.08")	3.55" (=avg)
Elizabeth City	1.17" (-3.41")	1.78" (-1.32")
Greensboro	0.89" (-2.65")	2.41" (-0.69")
Raleigh	1.23" (-2.79")	3.32" (-0.15")
Wilmington	2.18" (-2.34")	5.28" (+1.62")

Streamflow

Index Station (County, Basin)	January mean flow (CFS) (% of long-term median)	February mean flow (CFS) (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	283 (63%)	362 (88%)
Oconaluftee River at Birdtown (Swain, Tenn)	553 (74%)	630 (80%)
French Broad River at Asheville (Buncombe, FB)	1,785 (74%)	3,222 (123%)
South Fork New near Jefferson (Ashe, New)	374 (79%)	472 (90%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	74.3 (79%)	121 (105%)
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	163 (85%)	249 (120%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	229 (52%)	505 (101%)
Rocky River near Norwood (Stanly, Yadkin/Pee-Dee)	324 (11%)	1,595 (54%)
Deep River near Moncure (Lee, Cape Fear)	585 (22%)	2,079 (72%)
Black River near Tomahawk (Sampson, Cape Fear)	582 (52%)	989 (81%)
Trent River near Trenton (Jones, Neuse)	111 (35%)	275 (92%)
Lumber River near Boardman (Robeson, Lumber)	1,066 (52%)	1,730 (76%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	127 (48%)	282 (91%)
Potecasi Creek near Union (Hertford, Chowan)	153 (37%)	378 (74%)

Groundwater

Index well (Province)	January monthly mean water level (ft) (Last month's mean water level [ft])	February monthly mean water level (ft) (Last month's mean water level [ft])
Blantyre (Blue Ridge)	29.49 (29.99)	29.57 (29.49)
Mocksville (Piedmont)	16.72 (16.59)	16.29 (16.72)
Simpson (Coastal Plain)	3.36 (2.94)	3.05 (3.36)

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

Neuse stakeholders *continued*

be put into place to supply data needed to improve models and regulatory decisions. Better atmospheric monitoring and better watershed delivery modeling are particularly needed.

A list of members of the Neuse TMDL Stakeholders Group can be found in Appendix II of "Phase II of the Total Maximum Daily Load of Total Nitrogen to the Neuse River Estuary, North Carolina" on the N.C. Division of Water Quality's TMDL and Modeling Unit website at http://h2o.enr.state.nc.us/tmdl/TMDL_list.htm#Final_TMDLs

UNC WRRI Seeks Director

The Director of the Water Resources Research Institute manages a statewide research program that is open to all public and private institutions of higher learning in North Carolina. State appropriations provide a modest, but reliable financial base to be leveraged for additional funds for research. The Director is expected to work with a statewide advisory committee to identify research priorities, to seek out funding opportunities, and to work with faculty from various North Carolina universities to develop proposals that are responsive to those priorities and opportunities. The Director is also expected to manage a technology outreach program and participate in state policymaking processes. By mutual agreement of all parties, a portion of the Director's time may be devoted to teaching and research in an academic department at one of the universities. By statute, the Director also serves as a member of the North Carolina Sedimentation Control Commission.

An applicant should possess an earned doctorate and a record of significant accomplishments in water resources research. Criteria to be considered will include scholarly publications, awards, contributions to the work of professional societies, public service, and peer recognition at the national level. A candidate should have a demonstrated capability in organization, funding, and coordination of multidisciplinary research. He or she should also have the ability to work with the diverse community of interests in water resources, including citizens, federal, state, and local agencies, and the private sector.

Interested candidates should submit a C.V. and a letter of application (along with salary requirements and the names, addresses and phone numbers of three references) to Ronald G. Hodson, Chair, WRRI Search Committee, North Carolina Sea Grant, Box 8605, N.C. State University, Raleigh, North Carolina 27695-8605. Deadline for applications is June 11, 2004.

NCSU is an Equal Opportunity, Affirmative Action Employer with a strong commitment to encouraging diversity.

Conferences and workshops

The **Cape Fear River Assembly's 31st Annual Meeting** will be held April 29-30, 2004, at the N.C. Aquarium at Fort Fisher. The program is titled **New Programs, Old Programs, and How They Relate to the How New Acronym: TMDL**. For a brochure with registration form, call Glenda Dye with the Mid-Carolina Council of Governments at (910) 323-4191, Ext 22.

The NC State University Department of Biological and Agricultural Engineering, JC Raulston Arboretum, Soil Science Department and the Triangle J Council of Governments will present a **Green Roof Symposium**, May 11, 2004, at the JC Raulston Arboretum in Raleigh. The purpose of the symposium is to expose the green building community to the many facets of green roofs: their history and current usage, using regulations to promote their use, the media, the vegetation, research on their effectiveness and case studies. There will be a tour visiting three green roofs in Raleigh, NC. To register or see complete conference details go to web address: www.soil.ncsu.edu/swetc/greenroofs/main.htm

The National Water Quality Monitoring Council, U.S. EPA, USGS and others will present the **2004 National Monitoring Conference "Building and Sustaining Successful Monitoring Programs,"** May 17-20, 2004, Chattanooga, TN. For more information and to register online, go to www.nwqmc.org.

The NCSU Forestry Education and Outreach Program will present **Delineation of Piedmont and Coastal Plain Jurisdictional Wetlands**, May 24-28, 2004, Raleigh and New Bern, NC. Information at http://www.ces.ncsu.edu/nreos/forest/feop/programs.html.

The North Carolina Stream Restoration Institute and others will present **Southeastern Regional Conference on Stream Restoration**, June 21-24, 2004, Winston-Salem, NC. This conference will showcase stream and wetland restoration efforts from Maryland to Florida. Professionals from the southeastern United States and beyond will have an opportunity to present and discuss topics related to the field of restoration. Research and results will be the primary focus of this four-day event, including topics such as sediment transport, in-stream structures, and monitoring and evaluation. Habitat issues, ecosystem assessments, mitigation, funding sources as well as other topics associated with restoration will also be highlighted. For information go to: http://www.bae.ncsu.edu/programs/extension/wqg/sri/2004_conference/index.html

Restore America's Estuaries will present the **2nd National Conference on Coastal and Estuarine Habitat Restoration,** September 12-15, 2004, at the Washington State Convention & Trade Center and the Grand Hyatt Seattle, Seattle, Washington. For information go to web address: http://www.estuaries.org/2ndnationalconference.php

The Metropolitan Washington Council of Governments will present **Putting the LID on Stormwater Management**, September 21-23, 2004, in College Park, Maryland. The 2-1/2-day conference will highlight innovative low impact design/development techniques designed to mitigate the effects of urbanization and development at the watershed level. Information at: http://www.mwcog.org/environment/lidconference/

Is your drinking water source safe today? Will it be tomorrow?

"Protecting Your Drinking Water at Its Source"

Friday & Saturday, June 18- 19, 2004
near Greenville, NC (eastern NC)

Learn to download and use Source Water Assessment reports soon to be available on-line, showing where your drinking water comes from and possible threats to its safety.
Explore strategies for water quality protection, build local partnerships, and learn about funding opportunities!

For registration information, call Clean Water for NC at (919) 401-9600, and visit their web site at www.cwfnc.org.

Sponsored by Clean Water for North Carolina in partnership with the Community Source Water Protection Initiative (Clean Water Fund, Clean Water Network, Campaign for Safe & Affordable Drinking Water, USEPA funding). Planning co-sponsors: NC Public Water Supply Section, NC DENR; NC Rural Communities Assistance Project; UNC Environmental Finance Center

NCWRA
North Carolina Water Resources Association

2004 Tentative Luncheon and Forum Schedule

September 13, 2004
NCSU Centennial Campus, College of Textiles
Advanced Wastewater Treatment and TMDLs

December 6, 2004
NCSU Centennial Campus, College of Textiles
The Impact of TMDLs on Stormwater Programs

Updates to this schedule
will be posted on web site:
http://www.ncsu.edu/wrri/events/ncwra

Become a member of NCWRA. For more information contact WRRI at 919-515-2815.

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

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