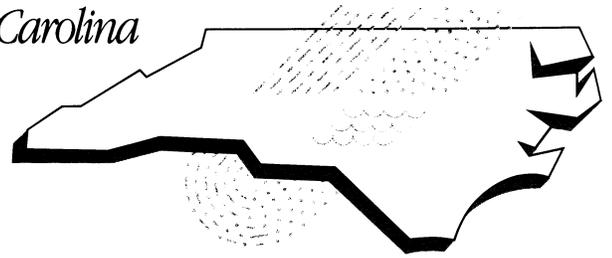


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Changes urged to nation's Water Quality Standards Program

State water quality programs “face the prospect of wasting billions of dollars by focusing on the wrong problems” according to Representative John Duncan, chairman of the U.S. House Subcommittee on Water Resources and Environment. Rep Duncan concluded that states may be focusing cleanup efforts under the TMDL program on the wrong water bodies because they are not updating their water quality standards, and they are not updating their water quality standards because they have little guidance from the EPA on what they have to do to change standards. Rep Duncan based his conclusions on a report he had requested from the U.S. General Accounting Office (GAO), *Water Quality: Improved EPA Guidance and Support Can Help States Develop Standards that Better Target Cleanup Efforts*.

In addition, according to the American Water Works Association (AWWA) current water quality standards based on the Clean Water Act (CWA) goals of “fishable, swimmable” are not adequate to protect surface sources of drinking water. AWWA says EPA needs to develop criteria that will protect drinking water sources from pathogens, such as *Cryptosporidium*, and other pollutants that interfere with and drive up the cost of drinking water treatment.

The GAO report and the statement by AWWA are among several recent calls for changes to the Water Quality Standards Program implemented nationwide by the U.S. EPA under the

Clean Water Act. A National Research Council panel studying the TMDL program identified several shortcomings of the Water Quality Standards Program in its 2001 report *Assessing the TMDL Approach to Water Quality Management*.

Water Quality Standards

The current Water Quality Standards Program was designed by Congress in the Federal Water Pollution Control Act

Amendments of 1977 (Clean Water Act). Water quality standards are composed of (1) designated uses (uses assigned to water bodies, such as drinking water, contact recreation, and aquatic life support) and (2) water quality criteria that specify pollutant limits that protect the designated uses, or physical or biological characteristic (such as temperature) that must be met. States assign designated uses to waterbodies

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Director's Forum**Lessons learned in the Neuse River Basin***Gregory D. Jennings, Associate Director, Water Resources Research Institute*

The Neuse River flows over 200 miles from its headwaters in the Piedmont west of Durham through the Coastal Plain and into the Pamlico Sound east of New Bern. The river was classified by the North Carolina Environmental Management Commission as Nutrient Sensitive Waters in 1988 due to excessive algal production and fish kills in the Neuse River Estuary. This resulted in mandatory controls on nutrient point source discharges and financial incentive programs to reduce nonpoint sources of nutrients from agriculture. Following several major fish kills in the 1990s, new EMC regulations were implemented in 1998 with the goal of reducing annual estuary nitrogen loading from all sources by 30% over five years. As we approach the targeted deadline for achieving this 30% reduction, there remain many questions about how effective the regulations have been in actually improving water quality and estuarine health. However, we have learned many lessons about watershed management that can be valuable as we continue to address complex water quality issues across the state.

The first lesson is that education is the key to success in any endeavor to protect the environment. This may seem trivial, but we need to keep reminding our policy-makers that well-informed people will make good choices if they understand the significance of their actions. Today more people understand more about watersheds and water quality than ever before. The comprehensive educational efforts ranging from school kids sampling creeks to highway signs to television shows to web sites have succeeded in putting the Neuse River and its watershed in the public eye. People are asking what can be done to improve water quality. Farmers, local governments, engineers, and homeowners are willing to change the way they do things because they understand how their actions can improve the Neuse River.

The second lesson is that large-scale changes happen when they make economic sense. The Neuse Crop Management Project coordinated by NC State University Cooperative Extension faculty over the past five years documented that farmers are very willing to improve the efficiency of their fertilizer management practices if they see economic returns. Larger farms were able to save more

money due to economies of scale and therefore, they were more likely to be the most efficient nutrient managers. Economics also plays a large role in the adoption of urban stormwater management practices such as constructed wetlands, bioretention areas, and reduced perviousness. For these practices to be widely accepted, they must be viewed as community amenities that can increase

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property values. Numerous stormwater practices such as the constructed wetland in a community park in the Town of River Bend have been installed over the past five years to demonstrate that these practices can enhance aesthetics, recreation, and environmental education while providing water quality treatment.

The third lesson is that results take time in a watershed as large as the Neuse River Basin. The agricultural community has documented through a detailed accounting process that nitrogen losses from farms have been reduced by more than 30% since the mid-1990s because of more careful fertilizer management, changes in cropping patterns, and installation of best management practices like controlled drainage and riparian buffers. Likewise, the permitted point source dischargers throughout the river basin have exceeded their collective goal of a 30% reduction in direct nitrogen discharges through changes in wastewater engineering and management. Does this mean that we should be able to measure 30% less nitrogen flowing into the estuary, or better yet, that we should be able to document fewer algae blooms or fish kills? We all recognize that the watershed is a very complex system and that we may have to wait several decades to measure the results of the programs being implemented today.

Now that we have spent the past decade investing in education, research, and new technologies to improve water quality in the Neuse River Basin, it makes sense to step back and ask what has worked well and what has not. Are we effectively using dwindling funding resources to provide technical and financial assistance to landowners and local governments? Are we gaining new knowledge on watershed pollutant fate and transport through our research investments so that we can better target future regulatory programs? What needs to be done to control pollutants from atmospheric sources or groundwater transport? Can we ensure that stormwater practices will work in the long term as urbanization continues in the watershed? The Neuse River Basin

has attracted many of the best minds in science, engineering, public policy, and economics to work on finding solutions for its water quality problems over the past decade. Now is a good time to learn from each other about the Neuse and influence future directions in the state's 17 river basins. I encourage you to participate in the upcoming conference: "The Neuse River Basin: Five Years of Progress" scheduled for November 19-20, 2003, in New Bern. See the conference web site for more information: <http://www.soil.ncsu.edu/swetc/neuse/neuse.htm>.

EPA authority to regulate nonpoint sources settled

In June the U.S. Supreme Court declined to review a Ninth Circuit Court of Appeals ruling that the Clean Water Act authorizes the EPA to determine "total maximum daily loads" for rivers and waters polluted only by nonpoint sources.

The ruling stems from a challenge to permit restrictions designed to reduce soil erosion into the Garcia River in northern California. Forest land owners on the river contended that conditions in a permit to harvest timber were "onerous and costly" and that the California Department of Forestry imposed the restrictions to meet a "total maximum daily load" imposed by the U.S. EPA, which had no authority to impose TMDLs on rivers polluted only by timber harvesting, agricultural runoff, and other nonpoint sources. The plaintiffs were joined by local and state Farm Bureaus and the American Farm Bureau Federation. Organizations representing wastewater treatment plants and other point source dischargers filed briefs in support of EPA.

The appeals court decision can be read at: <http://www.epa.gov/owow/tmdl/pronsdecision.pdf>

Water Quality Standards *continued*

and develop criteria based either on guidance issued by EPA or on independent scientific information. EPA is responsible for developing and revising criteria documents in a manner that reflects the latest scientific knowledge. States are required to review designated uses and water quality criteria periodically and propose changes to EPA as needed.

Water Quality Standards and TMDLs

Water Quality Standards are the foundation of the Total Maximum Daily Load Program (TMDL). To determine if a water body's designated use is being met, States compare monitoring data to the water quality criteria for that use. Under the TMDL program, if a water body does not meet its applicable standards, the state must list that water as impaired (on the "303(d) list), calculate a pollutant budget, and specify reductions needed to achieve the standard. States are expected to prioritize their listed water bodies and develop plans for reducing the pollutants of concern.

According to the GAO report, because water quality standards determine how states identify their impaired waters, if the standards are flawed states risk focusing limited resources on the wrong water bodies and/or exposing citizens to health and environmental risks. The GAO survey of all 50 states showed that nearly all believe that some portion of their water bodies have over- or under-protective designated uses, or both. According to the report, many states originally designated uses in the 1970s without the benefit of accurate data.

The National Research Council panel that studied the TMDL program described other problems with water quality standards. The most common problem the panel identified is that the designated uses are too general and broad, reflecting the language of the

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Water Quality Standards *continued*

Clean Water Act (fishable, swimmable). The NRC panel recommended detailed descriptions of specific designated uses. For instance, rather than a broad “recreation” use, waters might be designated specifically for beach use, primary water contact recreation, and secondary water contact recreation. Rather than the broad “fish propagation” designation, waters could be designated for specific species—say trout—and the water quality conditions and invertebrate or other biological communities necessary to support that species would be part of the criteria.

Another problem with designated uses is that they sometimes do not take into account existing conditions. Waterbodies may have been assigned uses with associated criteria that cannot be met because of natural conditions. For instance, it is unlikely that dissolved oxygen criterion for freshwater will be met in swampwaters. Waterbodies may also have been assigned uses that cannot be met because of radically altered landscapes and ecosystems. Urban streams that are little more than drainage canals are an example. More importantly, perhaps, headwaters streams that are too small to support uses for recreation or fish habitat themselves, may be critical for support of those uses downstream. In such cases, it may be desirable to designate use for the smaller stream in terms of the achievement of the designated use of the larger downstream waterbody.

Making changes to use designations

To assure appropriate use designation of waterbodies, the NRC panel recommended employment of the Use Attainment Analysis (UAA), particularly for waterbodies for which TMDLs must be developed. A UAA can determine if impairment is caused by one of the six reasons established by the CWA for changing a use designation:

- naturally occurring pollutant concentrations,
- water flow levels that cannot be changed,
- human-caused conditions that cannot be remedied or whose remedy would cause more environmental damage,
- hydrologic modifications that preclude the attainment of the use and cannot be restored,
- physical conditions that preclude attainment of aquatic life uses, and
- conditions whose correction would result in substantial and widespread adverse social and economic impact.

In addition a UAA can refine the water quality standard by providing more stratified and detailed narrative statements of the desired use and measurable criteria.

Unfortunately, said the NRC panel, the UAA has not been widely used because EPA has not made it clear what technical information constitutes an adequate UAA and has provided little information on how to conduct socioeconomic analyses or how to incorporate such analyses in the UAA decision. Without clear guidance on what is acceptable evidence for a use designation change, states have been reluctant to invest time and money in UAAs. The panel asserts that TMDLs have been developed for waterbodies where the designated use was not attainable for reasons that could have been revealed by a UAA and recommends that EPA should issue new guidance on UAA. The GAO report also recommends that EPA issue guidance that will facilitate changes to designated uses by states.

Problems with criteria

Both the GAO and the NRC panel point to problems with water quality criteria documents provided by EPA. In the GAO survey, states reported that EPA guidance in determining whether waterbodies support designated uses cannot always be used because states cannot perform monitoring as frequently or for as long as criteria documents specify. GAO recommends that EPA

develop alternative, scientifically defensible monitoring strategies that states can use to determine if water bodies are achieving their water quality criteria. The NRC panel also concluded that there is often “a discrepancy between the formulation of water quality criteria and the frequency with which water quality data are gathered.” The NRC panel recommends use of rotating basin management and adoption of an approach that would combine monitoring data with estimates of water quality based on statistical models to determine if water bodies are supporting their uses.

The AWWA says that existing water quality criteria focus too narrowly on ecological risks without considering the specific needs of public water supplies. For instance, in-stream ammonia criteria are designed to protect fish during sensitive periods of their life cycle but allow ammonia levels high enough to totally overwhelm treatment plant disinfection systems.

In addition to problems with existing criteria documents, the GAO report points out that EPA has not issued criteria documents for the two pollutants that are responsible for 50 percent of water quality impairment nationwide—sediment and nutrients. GAO recognizes the effort EPA has made to develop ecoregional nutrient criteria and recognizes that the agency has asked states to make “substantial progress” in adopting nutrient criteria by the end of 2004. However, GAO points out that its survey shows states doubt their ability to adapt the numeric nutrient criteria to local watershed conditions.

EPA has made far less progress in developing sediment criteria, and GAO recommends that the agency set a time frame for developing and publishing nationally recommended sediment criteria.

In addition, water quality criteria for pathogens need to be revised, according to GAO. The AWWA says that EPA’s failure to issue water quality criteria for pathogens, in particular *Cryptosporidium*, for waters designated as drinking water sources makes the job

of providing safe drinking water much more difficult and expensive.

The Association of State and Interstate Water Pollution Control Administrators also say that better criteria for pathogens, sediment, and nutrients are required because they are the top three reasons waters appear on state TMDL lists.

Based on responses from states, GAO concluded that improvement in the process of changing designated uses and improvement in the process of modifying criteria would result in different water bodies being slated for cleanup under the TMDL program in 30 states. Publication of sediment criteria and adoption by states of numeric sedimentation and nutrient criteria will lead to even more changes in water bodies targeted for TMDL development.

According to Rep. Duncan, "EPA has estimated that it will cost states between \$670 million and \$1.2 billion over the next 15 years just to develop TMDLs. Given the magnitude of this investment, I find it very troubling that 30 states think different waters would be identified for TMDL development if improvements were made to the process of modifying standards."

EPA has indicated that it will give serious consideration to recommendations in the GAO report. The agency has already established a national Use Attainment Assessment working group that plans to finalize guidance for recreational uses this summer and start drafting guidance for aquatic life uses in spring 2004. EPA has also established a tiered aquatic life uses working group that will develop guidance for creating aquatic life use subcategories.

The North Carolina Water Quality Standards Program

North Carolina has had a Water Quality Standards Program since the early 1950s—well in advance of federal requirements. The State Stream Sanitation Act of 1951 required development of a stream classification and water

quality standards systems and actual classification of the more important streams throughout the state based on a statewide survey. The State Stream Sanitation Committee (forerunner of the current Environmental Management Commission) approved the state's system of stream classifications—based on "best usage" and water quality standards—in 1953. The system included six classifications for freshwater:

- A-I Protected water supply sources requiring only disinfection
- A-II Water supply sources requiring full treatment
- B Body contact recreation
- C Fish life propagation
- D Agriculture, fish survival, and industrial cooling and processes
- E Navigation, sewage and industrial waste disposal short of nuisance conditions.

A separate system for saline waters included:

- SA Shellfish growing
- SB Body contact recreation
- SC Fish propagation
- SD Navigation short of nuisance conditions

These classifications were established at a time when many waters were severely polluted and streams in the D and E classifications were considered essentially irredeemable. The E classification was abolished in 1968 as a result of the state's first review of water quality standards. The D classification was eliminated in 1973 as a result of passage of the Clean Water Act.

The first use classifications were assigned to streams across the state by 1963. According to Boyd Devane, Head of the Planning Branch of the N.C. Division of Water Quality, while "comprehensive" stream pollution surveys were conducted as the basis for use designations, actual water quality monitoring did not play a big role in the process and it is likely that many designations were made with little or no actual data in hand.

Under Clean Water Act requirements for a Triennial Review, North Carolina conducted its second review of the Water Quality Standards in the late 1970s. This review resulted in adoption of the Nutrient-Sensitive Waters supplemental classification and a chlorophyll a water quality standard in an effort to deal with surface waters experiencing excessive algal growth. Later studies and reviews led to adoption of the Outstanding Resource Waters (1986) and High Quality Waters (1989) supplemental classifications as vehicles for applying the nondegradation requirement of the Clean Water Act. A supplemental classification with associated criteria for trout waters was also added to the classification system.

In 1985, the Environmental Management Commission adopted a new classification system for water supplies. The A-I and A-II classifications were replaced with WS-I, WS-II, and WS-III based—not so much water quality criteria—but more on the risk of pollution from toxic compounds. The in-stream water quality criteria for all water supply classifications are the same. The difference between the classifications lies in the land-use in the watersheds. As a result of legislation passed in 1989, water supply classifications were modified, with WS-IV and WS-V classifications being added.

Major changes to use designations of North Carolina's streams took place in the late 60s and early 1970s as a result of elimination of the E and D classifications. In the late 1970s use designation for a large number of streams was changed from C to B to reflect existing recreational uses.

Over the last two decades, use designations for individual water bodies in North Carolina have been changed continuously as streams and reservoirs have been reclassified for drinking water and as supplemental classifications NSW, trout, HQW, and ORW have been applied. These reclassifications involved assigning a use with more stringent

Water Quality Standards *continued*

control requirements, which does not require approval by EPA.

However, in order to assign a use designation with less stringent control requirements, a state must show that the one or more of the conditions listed above (see “Making changes to use designations”) applies by conducting a UAA or show that the use has not existed since 1975. Boyd Devane remembers only a few of this type of change to use designations in his 29 years with DWQ.

Like Rep. Duncan, Devane laments the fact that huge amounts of money are being spent to develop TMDLs for severely impaired urban streams that can never be restored to support their designated uses.

“The City of Raleigh has spent – it seems like a million dollars—on implementing a TMDL for Pigeon House Branch, a stream on the State’s 303(d) list. Pigeon House Branch flows through the most dense area of Raleigh, is piped for much of its length and is degraded because of high fecal coliform bacteria counts. Raleigh has spent this money, mostly on repairing sewer lines, to try to reduce fecal coliform loading to a level where the water quality standard will be met,” says Devane.

“At the same time,” he says, “I watched development of one of the area’s malls fill a perfectly beautiful little stream with sediment and virtually eliminate all of the existing aquatic life. This action will result in that stream being called impaired and will require a TMDL to be developed for it.

“Although I applaud Raleigh’s initiative, in my opinion, stream quality in Raleigh would be better off if they had devoted the money used on Pigeon House Branch to strengthening their overall program for sediment control and stormwater runoff reduction. I don’t blame Raleigh. EPA’s well intended but misguided program emphasis is at fault.”

Some have suggested a new use designation for severely impacted urban streams that cannot be restored to meet

current uses. However, that suggestion harks back to the days of D and E classifications and is unlikely to gain much support.

That leaves changing water quality standards through the process of Use Attainability Analysis—with all its uncertainties—as the only potential method for focusing restoration efforts where they will do the most good.

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“Water Resources & Environment Chairman Urges Update of Water Quality Standards to Prevent Potential Waste of Billions of Tax Dollars.” Press release, U.S. House Committee on Transportation and Infrastructure, June 19, 2003.

July action of the N.C. Environmental Management Commission

The N.C. Environmental Management Commission (EMC) did not meet in June. At its regular meeting on July 9, 2003, the EMC took the following action:

- Approved renouncing amendments to rules to implement section 112(j) of the Federal Clean Air Act. This section lays out what states must do when EPA fails to promulgate a Maximum Achievable Control Technology (MACT) standard for a source category that the agency has said it intends to cover under a MACT. A public hearing has been held on proposed changes to state rules, but additional changes at the federal level make it necessary to further amend the state rules to make them consistent with federal rules. The rules are expected to come back to the EMC for adoption in October. Draft rules are available at <http://daq.state.nc.us/rules/hearing/112j.pdf>
- Approved loans totaling \$2,521,134 from the N.C. Clean Water Loan and Grant Fund for the Village of Walnut Creek and the towns of St. Pauls and Bolton for wastewater projects.
- Adopted two separate permanent rules to implement the federal NPDES Phase II Stormwater program. One rule applies the federal requirements to small “MS4s”—that is public entities that own or operate storm sewer systems. Another applies to “Regulated Public Entities” (read counties) that are not subject to the NPDES program because they do not own or operate storm sewer systems. Commissioner Charles Peterson noted that the commission developed the two rules to “achieve fairness”—that is, to keep from driving development out of municipalities into counties. He said

continued

that if the pair is separated the stormwater control program will not be successful. Commissioners spent some time discussing last-minute technical details and removed from the rules the terms “approximately” and “approximate” from language describing the location of streams on soil survey maps and USGS topographic maps. Commissioners Kevin Martin and Leo Green said land owners may interpret “approximately” in such a way that will lead them to unintended violations of stream buffer requirements. Significant changes to the rules from the draft version include extending the time for implementing post-construction controls and setting the definition of low density at 12% imperviousness for projects within one-half mile and draining to SA waters and 24% for all other projects. Copies of the rules can be downloaded from the N.C. Division of Water Quality Stormwater and General Permits website at: http://h2o.enr.state.nc.us/su/NPDES_Phase_II_Stormwater_Program_Perm_Rules.htm

■ Approved a model ordinance and memorandum of agreement which local governments can use to receive delegation of authority to issue permits and perform inspections and enforcement under the State Stormwater Management Program. The State Stormwater Management Program is different from the NPDES Stormwater Program. It applies only in 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.

■ Adopted permanent rules for protection of riparian buffers in the Catawba River Basin. The rules require maintaining and protecting existing vegetated riparian areas along the Catawba River below Lake James and along the mainstem lakes from, and including Lake James to Lake Wylie. For a copy

of the rules, contact Lin Xu in the N.C. Division of Water Quality Nonpoint Source Management Program at (919) 733-5083 ext. 357 lin.xu@ncmail.net

■ Adopted procedural rules for Declaratory Rulings. A person “aggrieved” by the application of a rule can request a ruling from the EMC as to the validity of the rule or the applicability of the rule to a specific situation. The procedural rules for Declaratory Rulings prescribe the circumstances in which rulings shall or shall not be issued, establish procedure to be followed when a request is received, and set out the type of information the EMC needs to evaluate a request. According to Commissioner Marion Deerhake, who served as Hearing Officer for the rules, they simply formalize the procedures the EMC has been following for many years.

■ Passed a resolution delegating to the Secretary of DENR (who will delegate to the Director of the Division of Air Quality) the authority to respond to notices of intent to alter sources of air emissions or air pollution control equipment as provided by Senate Bill 945. The law requires the EMC to respond to notices within 15 days but the EMC meets only monthly (except in January, June, and August).

■ Heard a report on changes to the Administrative Procedure Act made by the legislature in House Bill 1151 (Session Law 2003-229) ratified in June. According to DWQ’s Jeff Manning, the bill

○ Removes the requirement for Notice of Rulemaking Proceedings for permanent rules [Publication of text of a proposed rule in the *N.C. Register* will be the first step in adopting a permanent rule.]

○ Lowers from \$5 million to \$3 million the threshold for requiring preparation of a “fiscal note” on proposed rules.

○ Changes the circumstances under which a temporary rule may be adopted

and changes the process for adopting temporary rules. [The Environmental Management commission may no longer file a temporary rule over the objection of the Codifier of Rules as it has done in the recent past. The Rules Review Commission may now disapprove filing of a temporary rule and the agency can only ask for a declaratory judgment in Wake County Superior Court in an effort to have the rule filed.]

○ Provides for adoption of an emergency rule.

○ Provides that requests for legislative review of a permanent rule must be submitted to the Rules Review Commission and that for legislative review to be granted, at least 10 persons must request the review.

Commissioner Dan Besse commented that the key provision of HB 1151 is giving the Rules Review Commission veto power over temporary rules. “The rest is minutiae” said Besse. The many provisions of HB 1151 can be read at <http://www.ncga.state.nc.us/html2003/bills/AllVersions/House/H1151vc.html>

July action of the EMC’s Water Quality Committee

At its regular meeting on July 9, 2003, the Water Quality Committee of the N.C. Environmental Management Commission took the following action:

■ Approved allowing the City of Greensboro to use maps that the city and its consultants developed to identify perennial waters for implementation of buffer requirements in its water supply watersheds. The maps are more accurate than USGS maps in depicting surface waters required to have vegetated buffers. The City of Greensboro was asked to clarify the process for dealing with landowner challenges to the identification on their property of water bodies as requiring buffers.

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Water Quality Committee *continued*

■ Approved sending the draft Lumber River Basinwide Water Quality Plan to public meetings. This will be the first update of the 5-year plan for addressing water quality problems in the Lumber River. The major issue in the basin is fish advisories due to mercury contamination. Public meetings are to be held in September. For dates contact Jennifer Everett in Basinwide Planning at (919) 733-5083, ext. 374, or jennifer.everett@ncmail.net.

■ Approved the Annual Report on the Coastal Habitat Protection Plans program required by the Fisheries Reform Act of 1997. For information contact Gloria Putnam with the Nonpoint Source Management Program at (919) 733-5083 ext 567 or gloria.putnam@ncmail.net.

■ Heard from Kim Colson, Supervisor of the Nondischarge Permitting Unit of DWQ, that staff is developing proposed amendments to Rules Not Discharged to Surface Waters (15A NCAC 2H .0200). The changes will address recently promulgated federal rules for concentrated animal feeding operations (CAFOs) and will incorporate provisions aimed at receiving delegation from the U.S. EPA for the CFR Title 40, Chapter 1, Subchapter O Part 501 Sludge Management Regulations and Part 503 Standards for the Disposal or Use of Sewage Sludge.

■ Considered a request for a major variance from the Neuse River Riparian Area Protection Rule for the "Watauga Street Townhouses" project in Historic Oakwood in Raleigh. Discussion of the request uncovered an aspect of variance requests that previous cases had not brought up—the fact that they are quasi-judicial in nature and that, therefore, the applicant should not contact commissioners, and commissioners should not discuss the proposed
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Conservation scientists share views on threats and possibilities for North Carolina's natural systems 100 years in the future

The North Carolina Office of Environmental Defense has published a report in which a panel of distinguished experts in ecology review the many threats to North Carolina's natural systems and offer their view that only aggressive conservation can protect future generations from "the tyranny of ecological crises."

Nine of the state's leading conservation scientists share their vision of North Carolina after 100 years of unmanaged growth and lack of attention to nature's needs and, in contrast, a vision of a "future North Carolina environment in which the most comprehensive, biologically rich, integrated, and functional native ecosystems were conserved and restored at appropriate scales while ensuring a high quality of life for a growing human population."

The report, *Horizon 2100, Aggressive Conservation for North Carolina's Future*, offers strategies for "aggressive conservation," which it defines as "a new economic model based on environmental stewardship." It asserts that failure to improve current strategies of conservation and environmental protection will result in a state that is far less healthy and prosperous than the one that the conservation scientists say is attainable.

The report can be downloaded in pdf format from the Environmental Defense website at <http://www.environmentaldefense.org/go/nchorizon> or copies are available from the North Carolina Office, Suite 330, 2500 Blue Ridge Road, Raleigh 27607 (919/881-2601)

N.C. Supreme Court says EMC can protect wetlands

In March the N.C. Supreme Court let stand an appeals court decision confirming the authority of the N.C. Environmental Management Commission (EMC) to issue rules to protect wetlands.

In 1996, the EMC adopted and subsequently filed over the objection of the Rules Review Commission rules to classify and designate uses of wetlands in North Carolina and to set forth the procedure to be used by the EMC to review water quality certifications issued under Clean Water Act Section 404.

In 1999, the N.C. Home Builders Association, N.C. Citizens for Business and Industry, N.C. Aggregates Association, N.C. Farm Bureau Federation and two individuals filed a petition for Declaratory Ruling with the EMC, asserting that the EMC did not have statutory authority to adopt the wetlands rules and that the EMC did not follow Administrative Procedure Act procedures for rulemaking in adopting the rules. The EMC denied the petition.

The petitioners filed a petition for judicial review of the EMC's decision in Wake County Superior Court. In 2001, the superior court affirmed the EMC's declaratory ruling and dismissed the petition for judicial review.

The petitioners filed appeal with the Court of Appeals, contending that the Superior Court erred in its interpretations of law. In December 2002, the Court of Appeals affirmed the order of the Superior Court, saying that the definition of water specified in N.C.G.S. § 143-212(6) is very flexible and encompasses a catchall provision for "other body or accumulation of water, whether surface or underground" and that absence of the term "wetland" in the definition of water does not deprive the EMC of statutory authority to adopt standards for wetlands.

The Court of Appeals decision can be read at <http://www.aoc.state.nc.us/www/public/coa/opinions/2002/020099-1.htm>.

Environment-related legislation passed by the N.C. General Assembly

In addition to legislation reported in the May/June 2003 issue of the WRRRI News, the following environment-related legislation has been passed by the legislature. Text of bills can be read online at <http://www.ncga.state.nc.us/homePage.pl> or links to bill text are provided in the online version of the WRRRI News at <http://www2.ncsu.edu/ncsu/CIL/WRRRI/news/342.html>.

S 295 AN ACT TO AUTHORIZE THE DIVISION OF MOTOR VEHICLES TO ISSUE SPECIAL REGISTRATION PLATES FOR PARAMEDICS AND THE NORTH CAROLINA COASTAL FEDERATION.

S 593 (SL 2003-266) AN ACT TO EXTEND THE MORATORIA ON CONSTRUCTION OR EXPANSION OF SWINE FARMS.

S 627 (SL 2003-234) AN ACT TO DEDICATE AND ACCEPT CERTAIN PROPERTIES AS PART OF THE STATE NATURE AND HISTORIC PRESERVE, TO REMOVE CERTAIN LANDS FROM THE STATE NATURE AND HISTORIC PRESERVE, AND TO DELETE A PARK FROM THE STATE PARKS SYSTEM.

S 765 (SL 2003-64) 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 824 AN ACT TO AMEND VARIOUS LAWS RELATED TO THE ENVIRONMENT, ENVIRONMENTAL HEALTH, AND NATURAL RESOURCES TO: (1) MAKE CLARIFYING, CONFORMING, AND TECHNICAL AMENDMENTS; (2) AMEND THE REPORTING REQUIREMENT SET OUT IN S.L. 2001-442; (3) CLARIFY WHAT CONSTITUTES A BASE OF OPERATIONS FOR MOBILE FOOD UNITS AND PUSHCARTS; (4) INCREASE THE MEMBERSHIP OF THE ENVIRONMENTAL REVIEW COMMISSION BY TWO; (5) EXTEND BY ONE YEAR THE TIME THAT TEMPORARY RULES TO PROTECT WATER QUALITY AND RIPARIAN BUFFERS IN CERTAIN RIVER BASINS WILL REMAIN IN EFFECT; (6) EXTEND BY TWO YEARS THE PILOT PROGRAM FOR INSPECTION OF ANIMAL WASTE MANAGEMENT SYSTEMS INITIALLY ESTABLISHED BY SECTION 15.4 OF S.L. 1997-443; AND (7) ESTABLISH AN EXCEPTION TO THE MORATORIUM INITIALLY ESTABLISHED BY SECTION 1.2 OF S.L. 1997-458 FOR FACILITIES THAT WERE APPROVED FOR FUNDING UNDER THE AGRICULTURE COST SHARE PROGRAM FOR NONPOINT SOURCE POLLUTION CONTROL AT THE TIME THE MORATORIUM WAS ESTABLISHED.

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 945 AN ACT TO CLARIFY THE EXTENT TO WHICH A PROSPECTIVE APPLICANT FOR AN AIR QUALITY PERMIT FOR A NEW FACILITY MAY ENGAGE IN CONSTRUCTION PRIOR TO OBTAINING THE AIR QUALITY PERMIT AND TO SPECIFY THE CIRCUMSTANCES UNDER WHICH A PERSON WHO HOLDS AN AIR QUALITY PERMIT MAY ALTER OR EXPAND THE FACILITY UPON GIVING NOTICE TO THE ENVIRONMENTAL MANAGEMENT COMMISSION AND THE PUBLIC OF THE PERMITTEE'S INTENT TO APPLY FOR MODIFICATION OF THE PERMIT.

S 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.

H 47 AN ACT ADOPTING THE CAROLINA LILY AS THE OFFICIAL WILDFLOWER OF NORTH CAROLINA.

H 397 BUDGET BILL for 2003-2005. Provisions of interest:

■ The Department of Agriculture and Consumer Services with the cooperation and assistance of the Agricultural Research Service at NCSU are directed to investigate the potential for the production of turtles for food purposes and other commercial purposes that could support turtle production as an alternative agricultural product in North Carolina.

Legislation *continued*

- The Department of Environment and Natural Resources is authorized to use up to \$500,000 from fees collected for water quality permits for cleanup of the Warren County landfill if the cleanup cannot be done without the funds and if no other funds are available.
- Appropriates \$2,625,000 in recurring funds from the Commercial Leaking Petroleum Underground Storage Tank Cleanup Fund and \$1,295,000 in recurring funds from the Noncommercial Leaking Petroleum Underground Storage Tank Cleanup Fund to the Department of Environment and Natural Resources for administration of the underground storage tank program.
- Directs the Department of Environment and Natural Resources (DENR) to develop an Express Review Pilot Program to provide express permit and certification reviews. Participation in the pilot program by those seeking permits is to be voluntary. The pilot program may be applied to any or all of the permits, approvals, or certifications in (1) the erosion and sedimentation control program, (2) the coastal management program, (3) the water quality programs, including stormwater permits, water quality certifications, and stream origination certifications. DENR may establish up to eight positions to administer the pilot program and may determine the fees (with certain limitations) for express application review under the program. DENR is to report to the General Assembly by May 1, 2004, on the success of the program and to recommend whether it should be continued or expanded.
- Directs the Property Tax Subcommittee of the Revenue Laws Study Committee to study the positive and negative impacts on local government ad valorem tax revenues of the acquisition of land by the state and nonprofit organizations using money from the Clean Water Management Trust Fund and other state funds for conservation purposes. Subcommittee to report by Jan 15, 2004.
- Appropriates \$62,000,000 each year to the Clean Water Management Trust Fund and provides that the CWMTF Board of Trustees may allocate up to \$40,000,000 to match federal, state, local and private farmland preservation and forestland preservation funds and to acquire permanent conservation easements on working farms and forests.
- Authorizes transfer of up to \$1,700,000 from the General Water Supply Revolving Loan Account (under the Clean Water Revolving Loan and Grant Fund) to match federal grant moneys authorized under the Safe Drinking Water Act Amendments of 1996 for the 2003-2004 fiscal year.
- Provides that once DENR or any agency within DENR has issued a permit that is required for a transportation construction project undertaken by DOT under the TIP, the permit shall remain in effect until the project is completed and shall not be modified except under specific circumstances listed.
- Provides that Metropolitan Planning Organizations and regional transportation planning agencies with policy setting authority in air quality nonattainment or maintenance areas may apply to DOT for funds to avoid a plan conformity lapse. Funds must be matched and must be repaid. Limits are set on the amount of grants to any one agency.
- Provides that any state agency or agency of a political subdivision of the state that is using state funds or any person working under contract with the state must use recycled steel if a product of appropriate standards is readily available at a reasonable price.

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 855 AN ACT TO INCREASE THE FEE FOR A PERSONALIZED REGISTRATION PLATE BY TEN DOLLARS AND TO CREDIT THE INCREASED FEE REVENUE TO THE NATURAL HERITAGE TRUST FUND AND THE PARKS AND RECREATION TRUST FUND, TO REQUIRE THE JOINT LEGISLATIVE TRANSPORTATION OVERSIGHT COMMITTEE TO STUDY VARIOUS ISSUES RELATED TO SPECIAL REGISTRATION PLATES, TO ALLOW THE NC COASTAL FEDERATION SPECIAL PLATE TO HAVE A DIFFERENT PLATE BACKGROUND, AND TO AUTHORIZE THE DIVISION OF MOTOR VEHICLES TO ISSUE THE FOLLOWING NEW SPECIAL REGISTRATION PLATES: ALTERNATIVE FUEL VEHICLES, BE ACTIVE NC, BLUE RIDGE PARKWAY FOUNDATION, BREAST CANCER AWARENESS, BUFFALO SOLDIERS, CELEBRATE ADOPTION, CRYSTAL COAST ARTIFICIAL REEF ASSOCIATION, DELTA SIGMA THETA SORORITY, FRATERNAL ORDER OF POLICE, FRIENDS OF THE APPALACHIAN TRAIL, MOTHERS AGAINST DRUNK DRIVING, POW/MIA, RED HAT SOCIETY, RETIRED LAW ENFORCEMENT OFFICERS, SURVEYORS, AND ZETA PHI BETA SORORITY.

continued

H 566 N ACT TO APPROVE IN PART AND TO DEFER ACTION ON PART OF THE ADMINISTRATIVE RULE RECLASSIFICATION BY THE ENVIRONMENTAL MANAGEMENT COMMISSION OF PORTIONS OF SWIFT CREEK AND SANDY CREEK IN THE TAR-PAMLICO RIVER BASIN AND TO AUTHORIZE THE ENVIRONMENTAL REVIEW COMMISSION TO EVALUATE HOW BEST TO PROTECT WATER QUALITY AND ENDANGERED SPECIES IN THE EASTERN PORTION OF SWIFT CREEK AND ITS WATERSHED.

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

H 897 AN ACT TO IMPROVE THE SOLVENCY OF THE COMMERCIAL LEAKING PETROLEUM UNDERGROUND STORAGE TANK CLEANUP FUND AND THE NONCOMMERCIAL LEAKING PETROLEUM UNDERGROUND STORAGE TANK CLEANUP FUND BY TEMPORARILY REQUIRING THAT CLEANUPS PROCEED ONLY AFTER PREAPPROVAL BY THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES PURSUANT TO A SCHEDULE BASED ON THE DEGREE OF RISK TO HUMAN HEALTH AND THE ENVIRONMENT AND OTHER FACTORS; TO PROVIDE THAT PAYMENT OR REIMBURSEMENT FROM THE COMMERCIAL FUND AND NONCOMMERCIAL FUND BE LIMITED TO THAT NECESSARY TO ACHIEVE THE MOST COST-EFFECTIVE CLEANUP; TO PROVIDE FOR THE IMPLEMENTATION OF PERFORMANCE-BASED CLEANUPS; TO MINIMIZE FUTURE DISCHARGES AND RELEASES BY AUTHORIZING THE ADOPTION OF RULES TO REQUIRE THE USE OF SECONDARY CONTAINMENT FOR PETROLEUM UNDERGROUND STORAGE TANK SYSTEMS; TO AUTHORIZE THE ENVIRONMENTAL MANAGEMENT COMMISSION TO ADOPT TEMPORARY AND PERMANENT RULES TO REDUCE CERTAIN TESTING REQUIREMENTS APPLICABLE TO THE LEAKING UNDERGROUND STORAGE TANK CLEANUP PROGRAM TO REDUCE COSTS; TO PROVIDE THAT A MIXED PLUME OF CONTAMINATION THAT RESULTS FROM RELEASES OF PETROLEUM FROM BOTH AN UNDERGROUND STORAGE TANK AND AN ABOVEGROUND STORAGE TANK OR OTHER SOURCE MAY BE CLEANED UP UNDER THE RISK-BASED CLEANUP RULES APPLICABLE TO RELEASES FROM PETROLEUM UNDERGROUND STORAGE TANKS; AND TO AUTHORIZE THE ENVIRONMENTAL REVIEW COMMISSION TO STUDY ISSUES RELATED TO THE LEAKING PETROLEUM UNDERGROUND STORAGE TANK CLEANUP PROGRAM IN ORDER TO PROTECT PROPERTY VALUES, ENSURE TIMELY REIMBURSEMENT OF PERSONS WHO ENGAGE IN CLEANUPS, AND PROTECT GROUNDWATER.

H 948 AN ACT TO CLARIFY THE AUTHORITIES OF THE DEPARTMENT OF AGRICULTURE AND CONSUMER SERVICES AND THE WILDLIFE RESOURCES COMMISSION WITH RESPECT TO THE REGULATION OF CERVIDS.

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 AUTHORIZE THE COASTAL RESOURCES COMMISSION TO ADOPT TEMPORARY AND PERMANENT RULES TO ESTABLISH A GENERAL PERMIT FOR THE CONSTRUCTION OF RIPRAP SILLS FOR WETLAND ENHANCEMENT AND SHORELINE PROTECTION IN ESTUARINE AND PUBLIC TRUST WATERS, TO PROHIBIT THE CONSTRUCTION OF PERMANENT EROSION CONTROL STRUCTURES IN OCEAN SHORELINES, AND TO PROVIDE THAT TEMPORARY EROSION CONTROL STRUCTURES IN OCEAN SHORELINES SHALL BE LIMITED TO SANDBAGS.

H 1062 AN ACT TO REQUIRE COMMUNITY WATER SYSTEMS THAT REGULARLY SERVE 1,000 OR MORE SERVICE CONNECTIONS OR 3,000 OR MORE INDIVIDUALS TO PREPARE LOCAL WATER SUPPLY PLANS AND TO PROVIDE THAT THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES SHALL ESTABLISH A DROUGHT MANAGEMENT ADVISORY COUNCIL AND TO AUTHORIZE THE COUNCIL TO ISSUE DROUGHT ADVISORIES.

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

H 1201 AN ACT TO PROMOTE WATER CONSERVATION BY EXPANDING THE DEFINITION OF CONTIGUOUS PREMISES TO INCLUDE MANUFACTURED HOMES AND MANUFACTURED HOME PARKS.

WRRRI-sponsored research reported

Under a new publications policy, the principal investigator on a WRRRI-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/WRRRI/WRRRIreportpolicy.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 WRRRI. Send requests to WRRRI, Box 7912, North Carolina State University, Raleigh, NC 27695-7912 or call (919) 515-2815 or email: water_resources@ncsu.edu.

Tracing Nitrate Transport and Environmental Impact from Intensive Swine Farming Using Delta Nitrogen-15

Jonathan D. Karr¹, William J. Showers², J. Wendell Gilliam², and A. Scott Andres³

Journal of Environmental Quality
30(4):1163-1175

This refereed journal article has been accepted as the final technical completion report for WRRRI project 70157, Stable Nitrogen Isotopic Tracer ($\delta^{15}\text{N}$) of Nitrogen Sources to Surface and Groundwaters near Animal Production Facilities, William J. Showers, NC State University (w_showers@ncsu.edu). It has been designated WRRRI-2003-JA2.

The overall objective of this study was to determine whether nitrate derived from swine waste was being exported from a fairly typical Mid-Atlantic Coastal Plain intensive swine farming site. It was conducted in the Black River subbasin of the Cape Fear River Basin. The study site encompasses two adjacent instrumented commercial swine farms with approximately 110 monitoring wells clustered in nests across sprayfields and in riparian buffers. Each well nest consists of shallow, intermediate, and deep wells. A stream running between the two farms enters Stewarts Creek, an ungauged third-order stream. Forested riparian buffers on the edge of the stream running between the farms range in width from about 10 to about 100 meters. Sprayfields on the farms are separated from Stewarts Creek by a riparian buffer

of more than 30 meters. The study site has been receiving swine waste for at least 20 years and has not received any artificial fertilizers for at least 10 years, if not longer.

Animal waste-generated nitrate generally takes on a nitrogen isotopic signature greatly enriched in ^{15}N relative to other nitrate sources. Therefore, to determine the movement of nitrate from the swine fields, investigators monitored nitrogen concentrations and $\delta^{15}\text{N}$ values in swine lagoon liquids, in groundwater beneath sprayfields and riparian buffers, and in nearby surface waters. The on-site stream was sampled at several locations. Surface water samples were taken from Stewarts Creek near the downstream limit of each farm and at bridges about 3 km upstream and about 1.5 km downstream. There are no other intensive livestock operations or point source dischargers along Stewarts Creek between the upstream and downstream sampling sites, although there are several other intensive livestock operations within the headwaters upstream of the study area.

The researchers also investigated denitrification in fields and riparian buffers, as well as ammonia losses during spraying. Nitrate N concentrations, $\delta^{15}\text{N}$, chloride to nitrate N ratios, pH, and dissolved oxygen were used to determine whether denitrification significantly affects the total isotopic signal of any exported nitrate.

The median $\delta^{15}\text{N}$ values of the three major classes of samples from the study site (lagoons, wells, impacted streams) were identical. Neither denitrification nor losses of ammonia during spraying significantly altered the bulk ground water $\delta^{15}\text{N}$ signal being delivered to streams.

Nitrate N concentrations in Stewarts Creek near the farms were much lower than concentrations in the sprayfield stream. Work by the USGS suggests that the bed of Stewarts Creek is receiving pre-1950, very low-nitrate discharge from the deeper aquifer. Mean nitrate N concentrations rose from 0.4 mg/L at the sampling site upstream of the farms to 2.0 mg/L adjacent to the first farm and 1.7 mg/L just downstream of the second farm. This indicates nitrate export to Stewarts Creek via ground water beneath the farm sprayfields and the stream draining the sprayfields. Same-day nitrate N levels were always 1.5 to 10 times higher at points downstream of the farms than upstream of the farms. A general rise in $\delta^{15}\text{N}$ - NO_3 values along Stewarts Creek near the study farm units is consistent with delivery of nitrate generated from swine waste.

In general, shallow wells showed significantly higher $\delta^{15}\text{N}$ - NO_3 than intermediate or deep wells. This indicated that denitrification was occurring in the upper meter or two, while little or no nitrate attenuation was occurring in the deep wells. These results show that denitrification and significant nitrate losses within the narrow (about 10 meters) buffers at this site are apparently mainly in the shallowest wells. Deeper flow paths appear to export nitrate with little attenuation where only a narrow buffer exists. It is possible for deeper ground water flow paths to export nitrate beneath even very wide (100 meters or wider) buffers in scenarios where no shallow aquitard is present.

The results of the study demonstrate that the total $\delta^{15}\text{N}$ signal of the waste nitrogen was conserved during transformation and transport in ground water and streams at the study sites. This net conservative behavior allows positive identification of the animal waste nitrate source in receiving waters and demonstrates nitrate export from the site despite the presence of riparian buffers that meet current regulatory requirements.

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Studies

Project explores effects of urban riparian forest

Restoration of riparian forests is often part of efforts to improve degraded stream ecosystems. However, in urban watersheds the ecological benefits of riparian forest may be diminished and there may be a danger of wasting effort on unsuitable restoration techniques. The investigators on this EPA STAR project started with the hypothesis that when upland or contributing watershed disturbance reaches a certain level, riparian forest has a limited influence on stream ecosystems.

The researchers conducted their project in the Piedmont of southeastern Pennsylvania and northern Delaware. Using a paired-reach design, they compared ecosystem attributes in forested and nonforested sections of 12 streams with different amounts of urban development within their watersheds. Forested reaches had mature, relatively undisturbed riparian forest of 30 meters or more along both banks. Nonforested reaches had grasses or small herbaceous vegetation of 30 meters or more on both banks. The percent of impervious cover in the watersheds ranged from 1 to 66 percent, with only 3 sites below 25 percent.

While the research revealed no clear general trend to either support or reject the research hypothesis, the project resulted in many important findings. A few of them are:

1. Riparian vegetation exerts a strong influence on channel morphology regardless of the level of urbanization in the watershed.
2. There was no clear trend between nutrient concentrations and the amount of impervious cover in watersheds.
3. The amount of algal biomass in nonforested reaches was significantly greater than in forested reaches.
4. All macroinvertebrate metrics were significantly correlated with the amount of watershed impervious cover,

but most macroinvertebrate metrics showed no significant difference in the response to impervious cover for forested and nonforested reaches.

5. There was a strong urban gradient in fish communities, with major effects being seen at low levels of urbanization.
6. Data on bank erosion rates, combined with estimates of bed material transport rates, suggest that rates of floodplain storage and reworking are significantly higher in nonforested reaches than in forested reaches. Bed material composed of sand and gravel tends to be stored in point bars in grassy reaches.

Hession, W.C., D.D. Hart, R.J. Horwitz, D.A. Kreeger, D.J. Velinsky, J.E. Pizzuto, D.F. Charles, and J.D. Newbold. Riparian Reforestation in an Urbanizing Watershed: Effects of Upland Conditions on Instream Ecological Benefits. Final project report published on the EPA National Center for Environmental Research website: <http://es.epa.gov/ncer/>.

This report was not peer-reviewed; however, a large number of reports resulting from the project have been published by refereed journals and are listed with the final project report.

Journal features Neuse modeling papers

The July/August 2003 issue of the *Journal of Water Resources Planning and Management* published by the American Society of Civil Engineers is a special issue on "TMDL Approach to Water Quality Management." Special editors are Kenneth H. Reckhow, Director of WRR I, and Richard M. Vogel of Tufts University.

Many of the technical papers in the issue resulted from the Neuse ModMon research program and deal with the modeling portion of the program. The table of contents for the issue and abstracts of articles are accessible on line at: <http://www.pubs.asce.org/journals/jrns.html>

In Memoriam Warren Jake Wicker

Warren Jake Wicker, Gladys Hall Coates Professor of Public Law and Government, Emeritus, of the School of Government, the University of North Carolina at Chapel Hill, died June 25, 2003.

Wicker was a graduate of the University of North Carolina at Chapel Hill from which he received undergraduate and master degrees in political science.

In 1955 he joined the faculty of the Institute of Government (now a part of the School of Government) and devoted himself for the next 47 years to teaching, research, and consulting in the legal, financial and administrative aspects of local and state government. Within the local government area, he developed specialties in public purchasing, city and county organization and administration, local finance, municipal incorporation and annexation, city-county cooperation and consolidation, public personnel, water and sewer services, and solid waste administration and finance.

His chief teaching assignments covered numerous courses in public purchasing, directing the courses for newly elected mayors and council members, and programs in municipal and county administration. Enrolled in these courses were mayors and council members, county commissioners, city and county managers, city and county attorneys, purchasing officials, clerks, finance officers, and a host of other officials in public works, and public safety.

He was the editor of, and contributor to, several books and the author of some 300 articles, bulletins, monographs and special studies. Among these were comprehensive textbooks on municipal and county government in North Carolina.

Water Quality Committee *continued*

variance separately with the applicant or with staff prior to considering the request. In this case, the applicant proposed that the amount of mitigation required by the buffer rule be reduced because a stormwater management feature to be installed would reduce the amount of nitrogen leaving the site below current levels. DWQ staff had recommended that the request be denied because what the developer proposed was not consistent with previously granted variances and because, in the judgment of staff, the applicant was not proposing sufficient buffer mitigation. Commissioner Dan Besse pointed out that the buffer rules do not specifically allow reduction of buffer mitigation in exchange for nitrogen reduction through stormwater management structures. He suggested that if the commission wishes to make that trade, rulemaking is required. The applicant had contacted several commissioners to argue his case. This not only violated the prohibition on ex parte communication but also drew the attention of several of the more technically oriented commission members to details of the request. Several focused on the engineering calculations asserted to prove the nitrogen reduction claim. The calculations—which had not been reviewed by staff—turned out to be incorrect. Commission Chairman David Moreau reviewed the economic analysis purported to show that the proposed development plan for the site was the only one that could produce a profit and found unacceptable procedures there. Alleging unfairness because the engineering and economic questions had not been raised in negotiations with staff during the year the request had been with DENR, the applicant withdrew the request. The case offered lessons for staff, commissioners, and applicants for variances alike. It could lead to rulemaking on allowable mitigation practices and engineering calculations and to arrangements for formal review of economic analyses for such requests.

People

Dr. Nancy White, formerly extension associate professor in landscape architecture with the NC State University College of Design, has been named interim director of the UNC Coastal Studies Institute in Manteo, NC. The Coastal Studies Institute is an inter-institutional marine research and education program focusing on marine archeology, estuarine ecology, coastal processes and observing, sustainable tourism, development and growth.

Conferences and workshops

North Carolina State University, the Water Resources Research Institute, and the Neuse River Education Team will present **The Neuse River Basin: Five Years of Progress** November 19-20, 2003, at the New Bern Riverfront Convention Center in New Bern, NC. Exhibits and posters are invited. For information and online registration go to website: <http://www.soil.ncsu.edu/swetc/neuse/neuse.htm>

North Carolina Precipitation/Water Resources

	May	June
Rainfall (+/- average)		
Asheville	8.36" (+3.95")	6.19" (+1.81")
Charlotte	10.69" (+7.03")	5.06" (+1.64")
Elizabeth City	5.47" (+1.04")	4.85" (+1.12")
Greensboro	6.85" (+2.90")	4.33" (+0.80")
Raleigh	4.28" (+1.55")	4.16" (+0.74")
Wilmington	7.44" (+3.04")	5.42" (+0.06")
Streamflow		
Index Station (County, Basin)	May mean flow (CFS) (% of long-term median)	June mean flow (CFS) (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	720 (302%)	249 (141%)
Oconaluftee River at Birdtown (Swain, Tenn)	1,130 (209%)	500 (114%)
French Broad River at Asheville (Buncombe, FB)	4,530 (175%)	2,710 (149%)
South Fork New near Jefferson (Ashe, New)	545 (102%)	743 (156%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	165 (150%)	312 (326%) ^{Rcnd high mnth dschr}
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	250 (113%)	433 (264%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	598 (142%)	916 (304%) ^{Rcnd high mnth dschr}
Rocky River near Norwood (Stanly, Yadkin/Pee-Dee)	4,600 (587%) ^{Rcnd high mnth dschr}	4,520 (893%) ^{Rcnd high mnth dschr}
Deep River near Moncure (Lee, Cape Fear)	2,550 (263%)	2,380 (438%)
Black River near Tomahawk (Sampson, Cape Fear)	1,070 (210%) ^{Rcnd high mnth dschr}	1,550 (495%)
Trent River near Trenton (Jones, Neuse)	233 (249%)	238 (326%)
Lumber River near Boardman (Robeson, Lumber)	1,510 (146%)	2,080 (306%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	370 (330%)	233 (279%)
Potocasi Creek near Union (Hertford, Chowan)	364 (297%)	519 (812%)
Groundwater		
Index well (Province)	May depth below surface (ft) (departure from average for month)	June depth below surface (ft) (departure from average for month)
Blantyre (Blue Ridge)	26.19 (+3.52)	25.98 (+4.28)
Mocksville (Piedmont)	15.45 (+0.99)	15.64 (+1.37)
Simpson (Coastal Plain)	2.62 (+2.09)	4.77 (+0.43)

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

The North Carolina American Public Works Association (NC APWA) Water Resources Division's Annual Conference, **Stormwater Management: Innovation, Implementation, & Integration**, will be held September 28-30, 2003, at the Blockade Runner, Wrightsville Beach, NC. For information contact Brennan Buckley at 919-787-5620.

Websites

To learn 100+ ways to conserve water visit the **Water Use It Wisely** website at: <http://www.wateruseitwisely.com/regions/index.html>. The site includes some printable files of water conservation materials. Several N.C. water utilities have joined the Water Use It Wisely campaign. To see a list click on "Contact your local water authority."

The winter 2002 issue of *Pipeline*, published by the National Small flows Clearinghouse includes an extensive article on safe use of graywater. The article discusses the difference between graywater and blackwater, legal uses, advantages and disadvantages, and tips for homeowners. Articles from Pipeline can be read online at http://www.nesc.wvu.edu/nsfc/nsfc_pipeline.htm

The Carolina Health and Environment Community Center is the home of the online version of the **Guide to North Carolina's Environmental Groups**. To find groups in your area, you can search the database at <http://www.checc.sph.unc.edu/guide.htm>

As the outreach arm of two major research programs at UNC-Chapel Hill, the Environmental Resource Program has created websites to make research findings accessible to citizens, school teachers, and policy makers:

■ **Superfund Basic Research Program** at <http://www.sph.unc.edu/sfcoep>

■ **Center for Environmental Health and Susceptibility** at <http://www.sph.unc.edu/cehs>

Publications

Answers to Frequently Asked Questions About Managing Risk at LNAPL Sites. American Petroleum Institute Soil and Groundwater Research Bulletin No. 18. This brochure was produced by the American Petroleum Institute. It offers answers to practical and technical questions about cost-effective management, cleanup or closure of sites with groundwater impacted by light non-aqueous phase liquids (LNAPLs), such as petroleum hydrocarbons. (May 2003, 24 pages.) View or download at <http://www.api.org/lnapl>

The USDA Natural Resources Conservation Service has published the 2001 **National Resources Inventory**. This is a survey designed to help gauge natural resource status, conditions, and trends on the nation's nonfederal land. The inventory found that: * In 2001, there were about 330 million acres of prime

farmland in the contiguous United States.*Between 1997 and 2001, almost 9 million acres were converted to developed uses—46 percent came from forest land, 20 percent from cropland, and 16 percent from pastureland. For other key findings go to website: <http://www.nrcs.usda.gov/technical/land/nri01/>

Other resources

Consumer Confidence Report aids. EPA has designed these software applications to help water suppliers quickly create their consumer confidence reports. They take users through all the sections of a CCR, convert lab results into "CCR units" and allow users to insert and edit EPA's recommended text. CCR Writer runs on computers that use Microsoft Windows 95/98/Me/2000/NTv4. CCRiWriter is a web based applications that requires internet access to use. For overviews and the applications go to website: <http://www.epa.gov/ogwdw/ccr/ccrwriter.html>

CALL FOR PROPOSALS Water Resources Research Institute of The University of North Carolina

Proposals are solicited from faculty members of senior colleges and universities in North Carolina for grants under the Water Resources Research Institute's Fiscal Year 2004-2005 Program. The deadline for submitting proposals is September 22, 2003 (proposals must be postmarked by September 22, 2003). No exceptions will be made to this deadline.

Total available funds are approximately \$423,000. This includes \$85,000 in federal funds from the U.S. Geological Survey and \$90,000 in state funds from the N.C. Water Quality Workgroup. Funding through the Water Quality Workgroup is available only to researchers in the University of North Carolina system and requires collaboration with an agency of the N.C. Department of Environment and Natural Resources.

A complete application/instruction package for the WRRRI grant program is available at the WRRRI website: <http://www2.ncsu.edu/ncsu/CIL/WRRRI/2004cfp.html>. Please follow instructions closely. The maximum award is \$50,000. The anticipated starting date for projects is no earlier than March 1, 2004. Projects funded through WRRRI must be completed within a 12-month period, but investigators may apply for a 12-month renewal next year. Applications for renewal grants will be evaluated in the same manner as a proposal for new projects.

Proposals for the WRRRI program should be addressed to:

WRRRI-CFP-FY 2004-2005
Water Resources Research Institute
Box 7912, NCSU, Raleigh, NC 27695-7912

Hard copies of the application/instructions packages may be obtained by calling WRRRI at (919) 515-2815 or emailing Julie_Mason@ncsu.edu. Applications may also be delivered to the WRRRI offices at 1131 Jordan Hall, N.C. State University campus prior to 5 pm on the closing date.

Erosion and Sedimentation Control Basic Planning and Design Workshops

October 15-16, 2003 October 29-30, 2003
Holiday Inn Select Sheraton Grand
Hickory, NC New Bern, NC

Purpose: These workshops are presented to familiarize design professionals who develop erosion and sedimentation control plans—including engineers, landscape architects, and surveyors—with erosion and sedimentation control principles and practices. Twelve (12) PDHs are available to professional engineers and land surveyors, and 10 continuing education units are available to landscape architects for completion of both days.

Fee: \$125.00. Covers materials, breaks, and lunches.

Deadline: Registrations will be taken on a first-come, first-served basis, but no registrations will be taken after October 1, 2003, for the Hickory workshop, and October 15, 2003, for the New Bern workshop.

The draft agenda and a registration form are online at:

<http://www2.ncsu.edu/ncsu/CIL/WRRI/erosionseminars.html>

Sponsored by

N.C. Sedimentation Control Commission; Land Quality Section, Division of Land Resources,
N.C. Department of Environment and Natural Resources; and Water Resources Research
Institute of The University of North Carolina



2003

Luncheon and Forum Schedule

September 8, 2003

Land Use & Water Quality Interactions: GIS to the Rescue

For registration information call WRRRI (919/515-2815)
or download a brochure at:
<http://www2.ncsu.edu/ncsu/CIL/WRRI/NCWRABrochuresept2003.pdf>

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/howtogether/htgh.htm>

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

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