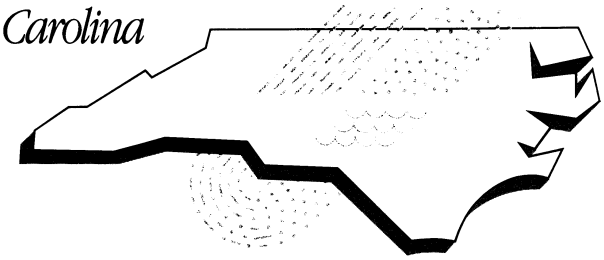
Water Resources Research Institute News
of The University of North Carolina



ISSN 0549-799X Number 338 November/December 2002

Permanent rules will differ

EMC adopts a temporary rule to implement the NPDES Phase II stormwater program

At its October meeting the N.C. Environmental Management Commission (EMC) adopted a temporary rule to implement a federally required program to control stormwater discharges to surface waters from publicly owned drainage systems (in EPA parlance, MS4s) in municipalities and urban areas meeting certain population criteria. The temporary state rule will allow "regulated public entities" identified under requirements of the federal NPDES Phase II stormwater rule to meet the March 10, 2003, deadline for filing applications under the program.

EMC members who put together the temporary rule anticipate that the final rule will differ in some significant aspects. Additional public hearings will be held to gather public comments that will be used to develop a permanent rule that resolves several issues left unresolved by the temporary rulemaking. Public hearings will be held in the first quarter of 2003.

Who's covered?

All "regulated public entities" are subject to this rule. A "regulated public entity" is any municipality or county located wholly or partly within an "urbanized area," as well as public entities specifically designated by the federal rule or under a state designation program. "Urbanized areas" are identified by the Decennial U.S. Census.

■ "Regulated public entities" in urbanized areas identified by the 1990 Decennial Census must file applications under this rule by March 10, 2003. Letters to these entities were mailed the week of November 4, 2002. They must implement a post-construction runoff management program by March 10, 2005. Permit application forms are on the N.C. Division of Water Quality's (DWQ) Stormwater and General Permits Unit website at http://h2o.enr.state. nc.us/su/Forms_Documents.htm

■ "Regulated public entities" in urbanized areas identified by the 2000 Decennial Census (or a future census) will be notified by the State and will

continued page 3

IN THIS ISSUE **November/December 2002 Page**

Director's Forum

Scientific explanations in a political world

Kenneth H. Reckhow, Director, Water Resources Research Institute

"Why can't newspaper reporters accept the fact that some scientists simply want to conduct and present research and have little interest in the political implications?" I moaned to my teenage son, Michael, one recent evening.

"C'mon, Dad," Michael responded. "You weren't born yesterday. You know that water science issues are important to politicians, so of course reporters are going to spin the story in that direction."

"OK, I know, I know. But still…," I pleaded.

"Look," Michael continued. "I know that you say that you weren't elected by anybody; you're just a scientist trying to do research and you just call it as you see it—be as objective as possible."

"Right," I exclaimed.

"But as you keep telling us at every dinner table conversation, all decisions involve knowledge and values. You're focused on the knowledge—the science, but the values are also important," Michael reminded me.

"Good point Michael," I responded as a lightbulb suddenly flickered in my mind. "Let's continue that thought. As a scientist, I look at water issues and think in terms of environmental outcomes—such things as algal blooms, fishkills, floods, and droughts. I expect the public to think in those terms as well, but some do and some don't."

"What do you mean?" Michael inquired.

"Well, the newspaper reporter asked me about the apparent Republican strategy to convert the Clinton TMDL program from a Federal to a State program. When I tried to explain to him that I hadn't thought at all about the political aspects of TMDL oversight responsibilities, but I had thought a bit about the scientific pros and cons of a state-level TMDL program, I could almost hear his eyes glaze over through the phone line."

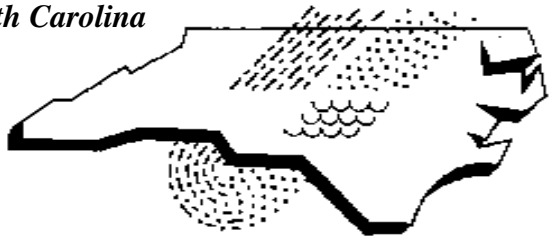
"What did you say to him then?" Michael asked.

"I told him that the NPDES program was successful at the state level, so why couldn't the TMDL program also be a successful state program? I also suggested to him that the limited number of EPA TMDL scientists would be far more effective reviewing 50 state programs than reviewing tens of thousands of individual TMDL applications."

continued next page

Water Resources Research Institute News
of The University of North Carolina

ISSN 0549-799X
Number 338
November/December 2002
Published bimonthly



This newsletter is financed in part by the Department of the Interior, U.S. Geological Survey, as authorized by the Water Resources Research Act of 1984. Forty-three hundred copies of this newsletter were printed at a cost of $1,624 or 38 cents per copy.

WRRI NEWS AVAILABLE ON WRRI WORLD WIDE WEB SITE

The WRRI News plus summaries of more than 100 WRRI technical reports and other information are available on the World Wide Web at: ***http://www2.ncsu.edu/ncsu/CIL/WRRI***

SUBSCRIPTIONS TO WRRI-NEWS LISTSERVE

Anyone with an Email account can subscribe to the WRRI-News list serve. This service is used to announce posting of the WRRI News to the website and to disseminate information about WRRI seminars, workshops, conferences, NCWRA forums, and other pertinent information. To subscribe, send an Email message to: mj2@lists.ncsu.edu. Put nothing in the subject line. In the message say only: subscribe WRRI-News. Please send any Email correspondence regarding the WRRI News or the WRRI-News Listserve to jeri_gray@ncsu.edu.

WRRI offices are located at 1131 Jordan Hall
on the North Carolina State University campus
Mailing address: Box 7912, NCSU, Raleigh, NC 27695-7912
Telephone: (919) 515-2815 General Email: water_resources@ncsu.edu

WRRI Staff
Director/Kenneth H. Reckhow (Ken_Reckhow@ncsu.edu)
Associate Director/Gregory D. Jennings (Greg_Jennings@ncsu.edu)
Asst. Dir. for Information and Communications/ Jeri Gray (Jeri_Gray@ncsu.edu)
Business and Administrative Officer/ Lynne Bridger (Lynne_Bridger@ncsu.edu)
Program Coordinator/ Julie Mason (Julie_Mason@ncsu.edu)
Accounting Technician/Gerry Cheney (Gerry_Cheney@ncsu.edu)
Office Assistant/Diane Fudge (Diane_Fudge@ncsu.edu)

"Sounds reasonable," Michael said.

"I think it is, yet I understand now why our conversation didn't connect," I continued. "I expressed the issue in terms of scientific attributes—given a decision, what would be the quality of the science? However, he thought in terms of interest group attributes—given a decision, who are the winners and who are the losers? Any decision can be expressed either way."

"And so he probably reasoned that more of his readers were interested in the decision when it was framed in terms of political winners and losers rather than in terms of the quality of scientific analysis," Michael added.

"Yes, and as a result, my scientific explanation gets lost and it's replaced by an appearance of political motives behind any quotes of mine that are used," frustration clearly evident in my voice. "So, given that situation, how do we get scientific explanations out to the public?"

Just then my daughter, Sarah, walked in. "While I was watching *The West Wing*, I overheard your conversation," she said.

"Ironically tonight, 'President Bartlet' answered your question. He said it is important for you—well, not you specifically—for scientists in your case, to be persistent with the press. 'President Bartlet's' view is that you should continue to make your points because policy decisions are not about ten-word political sound bites. Policy decisions are about substance and nuance, and knowledge must ultimately be heard for good decisions to be made."

"A weekly TV show," I mused. "Funny, isn't it, that good words of advice are sometimes found in unlikely places."

Temporary Phase II Stormwater rule *continued*

then have 18 months to file applications (Check website http://h2o.enr.state.nc.us/su/stormwater.html for a map of 2000 Census urbanized areas.) They must implement a post-construction runoff management program within 12 months of permit issuance.

- All cities that were permitted under the NPDES Phase I Stormwater program must implement any of the "six minimum measures" described in the rule that they are not currently implementing. (This requirement is not included in the temporary rules but will be implemented.)

Who may be covered in the future?

Basin-by basin designation. Beginning in 2004 in conjunction with the updating of basinwide water quality plans, the DWQ staff will review lists of "public bodies" in each river basin against certain criteria listed in the rule. The public bodies identified for possible inclusion in the Phase II program will be notified, and a list will be published for public review and comment. Basin by basin, the DWQ staff will consider evidence of water quality problems caused by the listed "public bodies" and review any programs that have been put into place to deal with the problems. Staff will then decide which, if any, additional "public bodies" should implement stormwater management programs that include the "six minimum measures."

TMDL designation. "Public bodies" that own MS4s that are discharging pollutants of concern into degraded streams subject to development of Total Maximum Daily Loads (TMDLs) and that have been identified by name to develop urban stormwater programs to meet pollutant reduction goals will be designated to implement a stormwater program that includes the "six minimum measures" and any other measures associated with the TMDL.

Petitioned designation. MS4s or individual discharges may be the subject of a petition by any person (individual, organization, government, etc.) to have the system or specific discharges designated to implement a stormwater management program. The rule lays out the process the petitioner must follow and the process by which the Department of Environment and Natural Resources will determine whether the MS4 or discharge should be designated. Public bodies designated by petition would be required to implement the "six minimum measures."

(Note: In both the State designation and petition process, one of the considerations for designation is whether the discharger is a "significant contributor of pollutants to waters of the United States." "Significant contributor of pollutants" by definition includes not only pollutant loading but also a discharge that "destabilizes the physical structure of a water body such that the discharge that may reasonably be expected to exert detrimental effects on the quality and uses of that water body." Thus high volume discharges that cause severe stream bank erosion may be regulated.)

What's required?

Any "regulated public entity" that owns and operates a "small MS4," (a system of gutters, drains, pipes, storm sewers, etc. that collects stormwater runoff and discharges it to surface waters) must implement a stormwater management program that includes the "six minimum measures" described by the rule (see below). This includes towns, cities, special districts, military bases, large hospitals or prison complexes, universities, school districts, governmental agencies, and any other "public body" created by Federal or State law.

"Regulated public entities" that do not own or operate "small MS4s" are not required to implement a stormwater management program but must certify

continued page 4

Temporary Phase II Stormwater rule *continued*

that they do not own or operate a small MS4 in their applications. These entities may voluntarily implement a stormwater management program that includes the "six minimum measures," or they may ask to be "permitted by rule," which would require them to implement only post-construction runoff control measures (see below) and good housekeeping/pollution prevention measures at their own facilities.

Within the jurisdictional area of all "regulated public entities," post-runoff controls are required and must be implemented wherever construction activity drains in whole or in part to a publicly owned MS4.

The six minimum measures

All regulated public bodies that are designated to implement a stormwater management program must develop and implement in their jurisdictions (including their Extraterritorial Jurisdictions to the extent legally allowable) a program that includes, but is not limited to, the following six elements:

1. A public education program on the effects of stormwater discharge on streams and what citizens can do to reduce pollutants in stormwater. The public body may develop its own program or may participate in a statewide program developed by the Department of Environment and Natural Resources.

2. A public involvement and participation program.

3. A program to detect and eliminate illicit discharges to the storm sewer system. This program must include a map of the system that identifies all waterbodies within the jurisdiction and all stormwater outfalls.

4. A program to control runoff from construction sites. A local erosion and sedimentation control program approved by the N.C. Sedimentation Control Commission or the State's erosion and sedimentation control program in conjunction with the State's NPDES permit for construction activities will satisfy this requirement. (Under a separate part of the NPDES Phase II Stormwater rule, all construction sites greater than one acre—regardless of where they are located—are subject to NPDES permitting and conditions of that permit.)

5. A program to control post-construction runoff from any development that disturbs more than 1 acre or is part of a larger common plan and that drains to an MS4 or an interconnected MS4. The rule lays out minimum requirements for this program and requires that it be adopted by ordinance (see below). It also directs the Department of Environment and Natural Resources to develop a model ordinance that includes both structural and nonstructural BMPs.

6. A good housekeeping/pollution prevention program to reduce pollutant runoff from the public body's own facilities.

Post-construction runoff management program

All "regulated public entities" must develop, adopt by ordinance, and implement post-construction runoff management programs for new development or redevelopment that drains to an MS4 or interconnected MS4.

Projects may be permitted as low density if they result in no more than 2 dwelling units per acre or 24 percent built-upon area. Stormwater runoff must be conveyed by vegetated conveyances as much as possible; all built-upon area must be 30 feet landward of any perennial and intermittent streams; and the permit must require recorded deed restrictions and protective covenants to make sure that the project is maintained in accordance with the approved project plans (no additional built-upon area, no converting vegetated stormwater conveyances, no destroying measures such as level spreaders).

Projects may be permitted as high density if they exceed the low density thresholds. On high density projects, measures must be implemented that control and treat the increase in runoff volume from pre- to post-development conditions for the 1-year, 24-hour storm. Stormwater BMPs must remove 85% of total suspended solids and must have a drawdown of at least 24 hours but no more than 120 hours. All built-upon areas must be at least 30 feet landward of all perennial and intermittent streams, and the permit must require recorded deed restriction and protective covenants to make sure that the project is maintained in accordance with the approved project plans.

All post-construction stormwater runoff management plans must provide for long-term operation and maintenance of any structural BMPs required by the program and provide for control of sources of fecal coliform.

Post-construction runoff management programs for development/redevelopment draining to shellfish (SA) waters must prohibit new or expanded direct points of stormwater discharge to SA waters; must include a program to control sources of fecal coliform that includes a pet waste management program and an oversight program for on-site wastewater treatment systems; and must ensure selection of BMPs that accomplish the highest degree of bacteria die off.

Post-construction runoff management programs for development/redevelopment draining to trout (Tr) waters must ensure selection of BMPs that do not result in a sustained increase in the temperature of the receiving waters.

Post-construction runoff management programs for development/redevelopment draining to nutrient sensitive waters (NSW) must ensure selection of BMPs that best reduce nutrient loading

continued next page

and must include a nutrient application management program.

"Regulated public bodies" may develop and implement comprehensive watershed protection plans that may be used to meet part or all of the requirements for the post-construction runoff program.

Unresolved issues

In developing the permanent state rule to implement the NPDES Phase II Stormwater rule, the EMC will rely on the authority given to it by the Clean Water Responsibility Act of 1997 (SL 1997-458; G.S. 143-214.7) to require public entities that do not own storm sewer systems to implement stormwater management programs. The federal NPDES Phase II Stormwater rule applies expressly to public entities that own and operate small MS4s, and in North Carolina drainage systems in unincorporated areas are owned and operated by the N.C. DOT. Therefore the temporary rule allows voluntary participation for public bodies that do not own MS4s. The EMC considers this a gap in coverage and an inequity between local entities and will address the issue in the permanent rulemaking process.

In developing the permanent rule, the EMC will also revisit the issue of built-upon area for the low density option of the post-construction runoff management program. A built-upon area limit between 12 and 24 percent will be considered.

This is a summary of only part of the temporary rule 15A NCAC 2H .0126. This summary should not be relied upon for regulatory purposes. The text of the entire rule can be downloaded at http://h2o.enr.state.nc.us/su/PDF_Files/PhaseII_Docs/ 15A_NCAC_2H_0126_Temp_Rule.pdf

October action of the N.C. Environmental Management Commission

At its regular meeting on October 10, 2002, the North Carolina Environmental Management Commission took the following action:

- Approved new certification of the Mecklenburg County Department of Environmental Protection as the administrative unit for the Mecklenburg County local air quality program.

- Adopted amendments and new rules for the State Air Quality Program. Included were a change in the visual emission standard for hot mix asphalt batch plants from 40% opacity for older plants to 20% opacity; an amendment to include emissions from storage tank degassing operations in the rule for control of gasoline vapor emissions at bulk terminals; a new rule to establish a process to certify gasoline truck tank tester facilities by the Division of Air Quality, replacing a federal self-certification program; a new rule to allow controls superior to the required control for volatile organic compounds.

- Approved a temporary rule to implement the NPDES Phase II Stormwater Program (see article page 1).

- Approved proposed changes to surface water quality standards resulting from the federally required Triennial Review, except for adoption of a standard for MTBE (methyl tertiary butyl ether). Commissioner Marion Deerhake said that EPA has not set a national health standard for MTBE, only a standard for taste and odor. She said there are no data on which to base regulation of MTBE as a human carcinogen and that it is premature to set a health based standard for MTBE. Deerhake said she would support a standard based on taste and odor. The Commission agreed to send the question of a standard for MTBE back to the Water Quality Committee for further study.

- Approved amendments to the Neuse River Basin Nutrient Sensitive Waters Management Strategy wastewater discharge requirements.

- Heard a report on implementation of the Tar-Pamlico Agriculture Rule and approved the Nitrogen Loss Estimation Worksheet as the accounting method for nitrogen reduction under the rule. (See discussion on this issue under the report on the Water Quality Committee.)

October action of the EMC's Water Quality Committee

At is regular meeting on October 9, 2002, the N.C. Environmental Management Commission's Water Quality Committee took the following action:

- Approved a schedule for developing the Jordan Lake Nutrient Management Strategy. The schedule calls for an additional year of model development and model runs. Allocation scenarios for nutrient reduction will be presented to the Water Quality Committee in December of 2003 and allocation meetings with stakeholders will be held from December to March 2003. A draft management strategy is to be presented to the EMC in May or June 2004, and a final strategy is to be presented in the July-October 2004 time frame. The full schedule is on the EMC's webpage at http://h2o.enr.state.nc.us/admin/emc/committees/wq/2002/20021001.pdf

- Approved a revised Water Supply Watershed Protection ordinance for the Town of Lillington.

continued page 6

■ Approved a major variance from the Piedmont Triad Airport Authority's (PTAA) Water Supply Watershed buffer requirements (which are more stringent than the State minimum requirements) for the construction of the Federal Express regional sorting and distribution facility. The project will impact 5,149 linear feet of buffer. PTAA will mitigate buffer impacts by providing three on-site stormwater control structures with level spreaders as well as other mitigation features required under the 401 Water Quality Certification process.

■ Heard a report on implementation of the Tar-Pamlico River Basin Agriculture Rule and approved the Nitrogen Loss Estimation Worksheet as the accounting tool for nitrogen reduction from cropland under the rule. Rich Gannon with the Division of Water Quality reported that additional accounting procedures to address nitrogen contributions and reduction from pasture operations must be developed and will be presented to the WQC in February 2003. Gannon also reminded the committee that the Tar-Pam rule calls for efforts to account for and address phosphorus loading. A Phosphorus Technical Advisory Committee being established by the Tar-Pam Basin Oversight Committee will develop recommendations for measures to address phosphorus loading. Gannon reported that only about 51% of the approximately 3,000 farm operators subject to the Tar-Pam rule had registered as the rule requires by September 1. Gannon said that the division believes the low registration rate is due to the belief among farmers that registration is optional. Farmers in the Tar-Pam Basin evidently believe they can choose whether to participate in local planning for nitrogen reduction because farmers in the Neuse Basin were given the option to participate in local planning or to implement State mandated BMPs. Gannon said that less State and local resources have been devoted to implementation of the Tar-Pam agriculture rule than were devoted to the Neuse agricultural rule. Therefore, he said, there have been less publicity and fewer educational efforts directed at farmers in the Tar-Pam. He said that DWQ staff are exploring ways to use federal grants and reallocate existing technical assistance resources to increase farmer participation in the Tar-Pam. The report can be downloaded from the EMC website at: http://h2o.enr.state.nc.us/admin/emc/committees/wq/2002/20021004.pdf.

■ Heard a report on implementation of the Neuse River Basin Agricultural Rule. Marion Smith, representing the Neuse Basin Oversight Committee, said that about 90% of the cropland in the Neuse River Basin (representing 3,400 farmers) has been enrolled in the local nitrogen reduction planning option. County baselines for measuring reductions have been estimated, local nitrogen reduction strategies for all counties have been prepared, and 11 of the 17 counties have met implementation goals, meaning that they have achieved their nitrogen reduction goals. For the basin as a whole, the agricultural community has achieved a 34% nitrogen reduction. (The goal was 30%.) According to the report, the Neuse Basin Oversight Committee is "confident that all BMP installation targets will be exceeded during the next year with the assistance of the CREP [Conservation Reserve Enhancement Program] and the expected increase of financial and technical assistance provided in the 2002 Farm Bill." Smith said that the cost in federal, state, and nonprofit dollars of implementing the Neuse Agricultural Rule to this point has been about $7 million. This does not count the out-of-pocket costs to Neuse Basin farmers. WQC Chairman Charles Peterson noted that part of the nitrogen reduction credited to Wake and Franklin counties was due to conversion of agricultural land to urban uses. Peterson questioned whether the change in land use from agriculture to urban should be considered a real reduction in nitrogen loading. The Annual Progress Report on the Neuse Agricultural Rule can be downloaded from the EMC website at: http://h2o.enr.state.nc.us/admin/emc/committees/wq/2002/20021005.pdf or contact Natalie Jones, Neuse River Basin Coordinator with the N.C. Division of Soil and Water Conservation, at Natalie.Jones@ncmail.net.

■ Heard a report on the revised Natural Resources Conservation Service (NRCS) Nutrient Management Standard 590. The revised technical standard will place greater emphasis on phosphorus management from both crops and animal facilities. The federal standard is expected to be acted on by the N.C. Soil and Water Conservation Commission at its November meeting, according to David Vogel, Director of the Division of Soil and Water Conservation. Vogel said that the commission is scheduled to take action on a vote to approve the federal standard for application to the state's Agriculture Cost Share Program and for Neuse and Tar Pamlico agriculture and nutrient management rules. According to the standard, phosphorus-based nutrient management will be implemented where phosphorus is a potential problem and determinations will be made on a site-specific (field-by-field) basis. Vogel said that implementing the standard in this way will mean "a lot of work" for state, federal, and local conservation staff, at a time when state appropriations are being cut. WQC Chairman Peterson noted that the new standard "may address the lack of attention to the poultry industry."

October action of the N.C. EMC's Water Allocation Committee

At its meeting on October 9, 2002, the Water Allocation Committee (WAC) of the N.C. Environmental Management Commission considered a report from the Division of Water Resources (DWR) on

continued next page

EPA, USGS report on national water quality conditions

Water Quality Conditions in the United States, recently released by the U.S. EPA under the Clean Water Act Section 305(b) requirements, and *Assessing the Quality of the Nation's Water Resources* prepared by the U.S. Geological Survey to summarize the findings of the National Water-Quality Assessment (NAWQA) Program provide a wealth of data on the state of the nation's streams, lakes and estuaries. Following is a small sampling of that information.

According to the EPA document, in 2000, states and others reported that:

- they assessed about 19% of the nation's river miles and found 39% of those miles too polluted to support uses such as fishing and swimming;
- they assessed about 43% of the nation's lake acres and found 45% not clean enough to support uses;
- they assessed abut 36% of the square miles of estuaries in the nation and found 51% of them not clean enough to support uses.

Mercury was identified as a leading cause of impairment in estuaries and lakes. Mercury, which originates from air transport from power-generating facilities and incinerators, mining, natural rock weathering, and other sources, was cited in 2,242 of the 2,838 fish consumption advisories issued by states in 2000.

Bacteria, sedimentation, and habitat alternation were identified as the leading causes of impairment in rivers and streams. Nonpoint source runoff from agricultural and urban land is the primary source of pollutants.

Findings from 36 geographical units studied by USGS under the NAWQA Program from 1992 to 1996 and from 1996 to 1998 indicate widespread nonpoint source contamination of streams and groundwater.

In 100 agricultural watershed studies, nitrogen and phosphorus were commonly found at concentrations that contribute to excessive plant growth in steams. Nitrate was found to be prevalent in shallow ground water (less than 100 feet below land surface) beneath agricultural areas, where about 20 percent of samples exceeded the U.S. EPA drinking water standard. Detectable concentrations of pesticides were found to be widespread. At least one pesticide was detected in more than 95 percent of stream samples and in more than 60 percent of shallow wells sampled in agricultural areas.

Findings in 35 urban watersheds, indicate that surface water in urban areas has a characteristic chemical signature that is closely linked to chemicals used in the watersheds. Insecticides were detected more frequently and at higher concentrations in urban streams than in agricultural streams. Concentrations of total phosphorus were as high in urban streams as in agricultural ones. Elevated levels of cadmium, lead, zinc, and mercury were found in streams in heavily populated areas.

Assessing the Quality of the Nation's Water Resources was published in the July 2002 of Water Resources IMPACT, which can be downloaded at http://www.awra.org/impact/0207impact.pdf.

Water Allocation Committee *continued*

whether a capacity use investigation should be conducted for Bladen County.

EMC Commissioner Delilah Blanks had requested an investigation of groundwater resources and use in Bladen County to determine if withdrawals should be restricted.

DWR reported that the Upper Cape Fear Aquifer, from which most large groundwater users in Bladen County take water, shows signs of stress similar to those seen in the central coastal plain, where capacity use rules have been implemented. A cone of depression, centered around Tar Heel (where Smithfield Packing withdraws 1.974 million gallons per day of groundwater) exists in western Bladen County. Water levels near Tar Heel have declined to the top of the Upper Cape Fear Aquifer confining unit, suggesting the potential for dewatering of the aquifer. Should dewatering of the Upper Cape Fear occur, salt water from the underlying Lower Cape Fear Aquifer could intrude into wells in the Elizabethtown wellfield and across the entire Lower Cape Fear confining unit.

Citing a need to focus limited resources on implementation of the Central Coastal Plain Capacity User Area rule, DWR recommended to the WAC that a capacity use investigation in Bladen County not be launched at this time. Instead staff recommended that DWR in conjunction with the Lumber River Council of Governments and the U.S. Geological Survey increase data collection in the Bladen County area; meet with large water users in the area to discuss water conservation and potential alternative sources of water; and re-evaluate the situation in late 2003. The WAC asked DWR to return in December with a detailed scope and timetable for efforts to assess the problem.

October action of the EMC's Groundwater Committee

At its meeting on October 9, 2002, the N.C. Environmental Management's Groundwater Committee approved holding a public hearing on proposed groundwater standards for Benzoic acid, Bis (chloroethyl) ether, Dibenzofuran, Diboromochloromethane, Ethyl Acetate, Hexachlorobutadiene, 2-Hexanone, 1,1,2,2-Tetrachloroethane, and 1,2,4-Trichlorobenzene. For information on the public hearing date, contact David Hance with the N.C. Groundwater Section at (919) 733-3221.

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

In addition to legislation reported in the July/August 2002 and September/October 2002 issues of the WRRI News, the following environment-related legislation was passed by the 2001-2002 Session of the N.C. General Assembly. Full text of these bills is available on the General Assembly's website: http://www.ncga.state.nc.us/BillInfo/BillInfo.html

S 204 AN ACT TO ESTABLISH THE ROANOKE RIVER BASIN BI-STATE COMMISSION AND ROANOKE RIVER BASIN ADVISORY COMMITTEE. Establishes the non-regulatory Roanoke River Basin Bi-State Commission. Commission to have 18 members, 9 from N.C. and 9 from Virginia. N.C. delegation to consist of six members of the General Assembly who reside in the Roanoke Basin and three nonlegislative members who reside in the Roanoke River Basin to be appointed by the Governor. Commission to provide advice to local, state, and federal bodies on use of water in basin. Establishes the N.C. Roanoke River Basin Advisory Committee to assist the N.C. delegation in achieving purposes of the Bi-State Commission. Provides for membership of advisory committee.

S 1161 AN ACT TO AMEND THE PRESENT-USE VALUE STATUTES, TO CREATE A PROPERTY TAX SUBCOMMITTEE OF THE REVENUE LAWS STUDY COMMITTEE, TO CLARIFY THE SALES AND USE TAX EXEMPTION REGARDING CERTAIN AGRICULTURAL SUBSTANCES, AND TO MAKE VARIOUS ADMINISTRATIVE CHANGES IN THE TAX LAWS. Clarifies that land remains eligible for present use taxation after a conservation easement is acquired and that rollback taxes are not owed when forest or farmland is acquired for conservation.

S 1211 AN ACT TO REMOVE BOONE'S CAVE STATE NATURAL AREA FROM THE STATE NATURE AND HISTORIC PRESERVE AND THE STATE PARKS SYSTEM, TO AUTHORIZE THE TRANSFER OF THIS PROPERTY TO DAVIDSON COUNTY FOR MANAGEMENT AS A PARK, AND TO ALLOW CERTAIN PUBLIC ENTITIES TO USE THE FIRE TOWER AT MOUNT JEFFERSON STATE NATURAL AREA FOR PUBLIC COMMUNICATIONS PURPOSES, AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION.

S 1252 AN ACT TO AMEND THE LAND CONSERVATION STATUTES OF THE STATE OF NORTH CAROLINA, AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION. Directs the Department of Environment and Natural Resources to take certain legal steps to assure that real property or interest in real property conveyed to federal, State, local agencies or nonprofit organizations for conservation purposes "will continue to be managed and maintained in a manner that protects ecological systems and the appropriate public use of these systems."

H 623 AN ACT TO PROMOTE ENERGY EFFICIENCY IN STATE-OWNED BUILDINGS. Authorizes State agencies to enter into "Guaranteed Energy Savings Contracts" and provides for contracting and financing procedures.

H 1007 AN ACT TO MAKE CLARIFYING, CONFORMING, AND TECHNICAL AMENDMENTS TO VARIOUS LAWS RELATED TO THE ENVIRONMENT, PUBLIC HEALTH, AND NATURAL RESOURCES, AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION. Among other things, amends various sections of the General Statutes related to erosion and sedimentation control to replace occurrences of "sediment control" with "sedimentation control."

H 1215 AN ACT TO DIRECT UNITS OF LOCAL GOVERNMENT TO EVALUATE THEIR EFFORTS TO CONSERVE WATER, TO DIRECT THE ENVIRONMENTAL MANAGEMENT COMMISSION TO ADOPT RULES GOVERNING WATER CONSERVATION AND WATER REUSE, TO ESTABLISH A GOAL TO REDUCE WATER CONSUMPTION BY STATE AGENCIES BY AT LEAST TEN PERCENT, TO DIRECT THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES TO EVALUATE WATER CONSERVATION AND WATER EFFICIENCY PROGRAMS IN THE STATE, AND TO DIRECT THE UTILITIES COMMISSION TO STUDY METHODS TO FUND AND PROMOTE THE DEVELOPMENT OF GREEN POWER IN NORTH CAROLINA. Authorizes the EMC to develop and implement rules governing water conservation and water reuse during drought and water emergency situations. Adds several items to those that the N.C. Utilities Commission must consider in its study "Investigation of Green Power and Public Benefit Fund Voluntary Check-Off Programs."

H 1537 AN ACT TO AMEND VARIOUS ENVIRONMENTAL LAWS TO: (1) EXTEND THE PILOT PROGRAM FOR INSPECTION OF ANIMAL WASTE MANAGEMENT SYSTEMS AND TO AMEND THE REPORTING REQUIREMENT FOR THE PILOT PROGRAM, AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION; (2) PROVIDE THAT MEMBERS OF THE SOIL AND WATER CONSERVATION COMMISSION MAY HOLD CONCURRENT OFFICES CONSISTENT WITH THE PROVISIONS OF THE CONSTITUTION OF NORTH CAROLINA; (3) AUTHORIZE THE SOIL AND WATER CONSERVATION COMMISSION TO APPROVE GRANTS FOR SMALL WATERSHED PROJECTS RELATED TO DAM REHABILITATION AND IMPROVEMENT; (4) PROVIDE THAT MEMBERS OF THE ENVIRONMENTAL REVIEW COMMISSION WHO ARE NOT REELECTED TO THE GENERAL ASSEMBLY MAY COMPLETE THEIR TERM OF SERVICE ON THE COMMISSION; (5) PROVIDE THAT THE EASTERN BAND OF CHEROKEE INDIANS IN NORTH CAROLINA MAY RECEIVE FUNDS FROM THE CLEAN WATER REVOLVING LOAN AND GRANT FUND; (6) AUTHORIZE THE STATE INFRASTRUCTURE COUNCIL TO MEET IN THE LEGISLATIVE BUILDING AND LEGISLATIVE OFFICE BUILDING IN

continued next page

Congressmen oppose revision of TMDL rule

On September 20, Representative Frank Pallone of New Jersey and 37 other members of the U.S. House of Representatives sent a letter to U.S. EPA Administrator Christine Todd Whitman asking her not to change the existing TMDL (total maximum daily load) rule. According to the Congressman's press release, "The existing regulations, adopted by the Reagan and previous Bush administrations, provide a workable approach to establishing TMDLs for polluted waters. Rather than rewrite and redesign these regulations to delay cleanups further, EPA should focus its efforts on implementing the existing program."

Currently, EPA and the states are implementing the TMDL program under a rule issued in 1985 and amended in 1992. A TMDL rule issued by EPA at the end of the Clinton administration was suspended by the incoming Bush administration, and the implementation date was extended to April 30, 2003. EPA has been drafting a new TMDL rule to replace the Clinton rule.

A report issued by the National Research Council in 2001 recommended a number of changes to the TMDL program including:

- assigning use designations to water bodies (based on attainability analyses) before assessment of conditions;
- using both a preliminary 303(d) list and an action 303(d) list instead of only one list, with the action list including only water bodies for which adequate monitoring and assessment data are available; and
- using adaptive implementation, in which plans are periodically assessed for achievement of water quality standards to achieve designated uses.

The NRC report also recommended, among other things, that EPA develop a uniform, consistent approach to ambient monitoring and data collection across the states; set the TMDL calendar to coincide with each state's rotating basin program; and consider aiding states with matching grants to improve data collection and analysis.

According to EPA, the goals of the rule under development are, among other things, to improve states' monitoring and assessment programs to provide for a more science-based TMDL program, and to accomplish TMDL implementation through states' continuing planning processes.

Now called the "Watershed rule," the draft TMDL rule was scheduled to go to the Office of Management and Budget for review and approval in October and be published in the *Federal Register* for public comment in November.

Public and private community water systems must assess vulnerability to terrorism

In June 2002 President Bush signed PL 107-188, the Public Health, Security, and Bioterrorism Preparedness and Response Act. Among the many provisions of this act are requirements aimed at safeguarding the nation's public drinking water systems against terrorist and other intentional acts.

All community water systems serving more than 3,300 people must conduct vulnerability assessments and submit them to EPA. They must also complete emergency response plans.

Water systems serving 100,000 or more people must submit vulnerability assessments by March 2003 and complete an emergency response plan six months later. Water systems serving 50,000 to 99,999 people must submit assessments by December 31, 2003, and complete emergency response plans by June 30, 2004. Water systems serving 3,301-49,999 people must submit assessments by June 30, 2004, and complete emergency response plans by December 31, 2004.

For more information, visit EPA website: http://www.epa.gov/safewater/security/.

Environment-related legislation *continued*

CERTAIN CIRCUMSTANCES; AND (7) AUTHORIZE THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES TO TRANSFER FUNDS FROM THE GENERAL WATER SUPPLY REVOLVING LOAN AND GRANT ACCOUNT TO THE EMERGENCY WATER SUPPLY REVOLVING LOAN ACCOUNT IN ORDER TO ASSIST WATER SUPPLY SYSTEMS EXPERIENCING A DROUGHT EMERGENCY.

H 1564 AN ACT TO PROVIDE THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES WITH EXPLICIT AUTHORITY TO ASSESS A CIVIL PENALTY FOR A VIOLATION INVOLVING A VOLUNTARY REMEDIAL ACTION UNDER THE INACTIVE HAZARDOUS SITES PROGRAM CONDUCTED BY A PRIVATE ENVIRONMENTAL CONSULTING OR ENGINEERING FIRM AND TO EXPAND THE ENVIRONMENTAL PERMIT WAIVER AUTHORITY UNDER THE PROGRAM, AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION.

H 1572 AN ACT TO AMEND OR REPEAL VARIOUS ENVIRONMENTAL REPORTING REQUIREMENTS, AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION. Replaces quarterly with annual reporting requirements for a number of programs.

Water Resources Research Institute of The University of North Carolina

First announcement and call for exhibits and conference abstracts

Preconference Workshop:
"Implementing Stormwater Regulations for Local Communities"
Monday, March 31, 2003
Jane S. McKimmon Center
Raleigh, NC

2003 Annual Conference
"Valuing North Carolina's Water Resources"
Tuesday, April 1, 2003
Jane S. McKimmon Center
Raleigh, NC

Agendas and registration forms for the workshop and the conference will be on the WRRI website by January 20, 2003:
http://www2.ncsu.edu/ncsu/CIL/WRRI/2003conference.html

Call for Abstracts for 2003 Annual Conference

The Water Resources Research Institute of The University of North Carolina (WRRI) requests abstracts for presentations and posters at its 2003 Annual Conference, "Valuing North Carolina's Water Resources."

The conference plenary session will feature Dr. V. Kerry Smith, Distinguished University Professor of Agricultural and Resource Economics at NC State University, discussing the economic value of North Carolina's water resources, and Bill Holman, Executive Director of the N.C. Clean Water Management Trust Fund, talking on the environmental value of North Carolina's water resources.

Technical session themes will be based on abstracts received. Thirty-six abstracts will be selected for oral presentation. Registration fee will be waived for oral presenters. Abstracts not accepted for oral presentation may be presented as posters. Abstracts are also solicited for posters. Poster presenters must pay the registration fee of $50. Early response is encouraged, as we may have to limit the number of posters.

For the required abstract format, please go to web address: http://www2.ncsu.edu/ncsu/CIL/WRRI/2003abstractformat.pdf. Please submit abstracts of 400 words or less in Microsoft Word or WordPerfect for Windows by email to Jeri_Gray@ncsu.edu. All abstracts will be posted to the WRRI website in pdf format.

The deadline for abstract submission is December 13, 2002. Decisions on oral presentations will be made by January 8, 2003, and all authors will be notified by email of the status of their submissions. All oral presentations must be done using PowerPoint presentation software. **All presentations must be submitted by email or on CD to Jeri Gray no later than March 24, 2003.**

Call for Exhibits

A very limited number of spaces for commercial exhibits will be available in the poster/break area at the pre-conference workshop and the Annual Conference. Exhibitors will be provided a ten-foot space with a six-foot skirted table and an electrical connection, if needed. All exhibits must be confined to the assigned space. The exhibit fee is $500 for two days and includes registration for one person. Exhibitor space will be assigned on a first-come, first-served basis. The Exhibit Space Agreement Terms & Conditions and the Exhibitor Contract can be downloaded in pdf format at web address: http://www2.ncsu.edu/ncsu/CIL/WRRI/exhibitorforms.pdf.

WRRI report available

WRRI has recently published a peer-reviewed technical completion report on research projects for which it provided funding. Single copies of WRRI reports are available free to federal/state water resource agencies, state water resources research institutes, and other water research institutions with which exchange agreements have been made. Single copies of publications are available to North Carolina residents at a cost of $4 per copy prepaid ($6 per copy if billed) and to nonresidents at a cost of $8 per copy prepaid ($10 per copy if billed). 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.

Predicting Long-Term Wetland Hydrology from Hydric Soil Field Indicators
Report 342 August 2002

Michael J. Vepraskas, Xiaoxia He, and David L. Lindbo, Department of Soil Science, and R. Wayne Skaggs, Department of Biological and Agricultural Engineering, NC State University

Current regulations governing wetland identification make it virtually impossible to identify freshwater wetlands routinely using current technology. Jurisdictional wetlands include areas that are saturated within 30 cm of the surface for 5% of the growing season in 4 or more years out of 10. Such information on wetland hydrology can be obtained by long-term monitoring studies that span both wet and dry years. These require long periods of time (5 to 10 years) to complete, and are too expensive to do at most sites where the information is needed.

An alternative approach is to use hydrologic models to estimate water table data over long periods at a few benchmark sites. These data can be obtained quickly (in less than 6 months). The hydrologic information can be extrapolated to other soils by calibrating soil indicators of saturation for the specific frequencies and durations of saturation estimated by the model. These indicators (basically seen as gray and red colors) occur in most wetland soils that are chemically reduced and can be easily identified during on-site inspections. The goal of this project was to use hydrologic models in combination with hydric soil indicators, to estimate quickly and economically how long the major soils are saturated in the Coastal Plain region of North Carolina.

The study was conducted at two Coastal Plain locations in Pitt and Bertie counties. At both sites transects of soil plots were established along hillslopes with plots in moderately well, somewhat poorly, poorly, and very poorly drained soils. In each soil plot the water table was monitored daily for three years, and redox potential was monitored weekly. Rainfall was monitored hourly at each location. Percentages of redoximorphic features were estimated in 15-cm depth increments to a depth of 90 cm in each plot. The hydrologic model DRAINMOD was calibrated for each soil plot using the record of daily water table levels, in situ saturated hydraulic conductivity, soil water characteristics, depth to impermeable layer, depth of rooting, and rainfall. The calibrated DRAINMOD models were used along with historic rainfall data to estimate the number of times each soil plot experienced saturation events lasting 21 days or longer for a 40-year period. Percentages of redoximorphic features (i.e. gray and red colors) were significantly correlated ($r^2 > 0.80$) with average number of saturation events across all soils for individual depths of 45, 60, 75 and 90 cm. Highest correlations (r^2 values > 0.87) were found for relationships between redox depletions and saturation events during the growing season. The hydric soil field indicator the "depleted matrix" occurred in layers that were saturated for 21 to 41 days every year during the 40-year period considered.

The investigators recommend that:

- Water table fluctuations for long-term periods should be predicted using DRAINMOD or other hydrologic models in widespread soils found in rapidly developing areas of North Carolina to provide benchmark data that can be used to make land use decisions.

- Results of long-term hydrologic simulations can be extrapolated to other soils in North Carolina by correlating the data to soil color patterns, specifically the percentages of redoximorphic features. Percentages of features can then be measured on individual sites and the data from simulations studies can be used to estimate the likelihood that a soil will become saturated at a specific depth.

- The soil property described as either the "depth to seasonal high water table" or soil wetness conditions, as used in N.C. regulations governing on-site waste disposal, must be re-defined in order for this property to be verified by water table measurements.

Sediment sampling instruments now available to the public

Instruments developed by the Federal Interagency Sedimentation Project (FISP) that provide precise and accurate readings of the transport and deposition of sediments can now be purchased by the public. These instruments were previously available only to federal agencies. Four companies are now authorized to act as commercial distributors of FISP-produced and tested samplers and associated equipment. For a list of distributors and products available visit website http://fisp.wes.army.mil.

Studies

Study suggests "sprawl" can be a strategy for controlling the cost of local government services

Environmental groups and planners are promoting compact development as a way to accommodate population growth while preserving environmental quality, open space, farmland, and rural character. However, local officials are not always receptive to changes that would encourage compact development. According to a study conducted by economists in the Virginia Tech Department of Agricultural and Applied Economics, their reluctance may arise from the fiscal consequences of replacing low-density development (one home or less per acre outside city centers) with high-density development (four homes or more per acre).

In a study supported by the Virginia Chesapeake Bay Local Assistance Department, the National Science Foundation, and the U.S. Environmental Protection Agency, economists Kurt Stephenson, Cameron Speir, Leonard Shabman, and Darrell Bosch reviewed available literature on the local government revenues and costs of providing local government services that are affected by the spatial form of development (the arrangement of parcels within a development tract and the arrangement of tracts on the larger landscape). They focused on education, roads, water and sewer services, and fire/police protection. Their objective was to determine if different types of settlement patterns create different costs for local government and what spatial attributes influence the cost. The investigators say that per capita cost of providing services can be affected not only by the spatial attributes of development but also by population, demographics, and service standards and that their analytical challenge was to isolate the influence of spatial attributes. In addition, the economists investigated how spatial attributes of development may affect local government revenues, specifically real property tax receipts.

Cost of services

Through their analysis, the investigators found the following:

Education: Educational expenses, typically the largest part of a local government's budget, are largely insensitive to the spatial attributes of development. Teachers' salaries, administration, and capital costs are affected by population growth, but are not affected by tract dispersion, distance and density. Only bussing, which tends to be a small part of total educational costs (less than 5%) is affected by land-extensive development patterns.

Roads: The cost of constructing roads to serve compact development is substantially lower than the cost of serving a more land-extensive development pattern. However, only a portion—usually operating costs—of road costs is paid by local governments. (This varies by state.) While dispersed forms of development can cause higher road maintenance costs than compact forms, higher service standards may be required for more compact forms. The jury is out on the question of whether dispersed development costs local governments more for road operation.

Water and Sewer Services: The cost of providing centralized water and sewer is very sensitive to the spatial form of development. However most of the spatially sensitive infrastructure costs involve connecting individual dwelling units within a development tract as opposed to connecting distant tracts to a wastewater or water plant. Evidence is that local governments can shift large portions of water and sewer costs to private entities by requiring developers to install water and sewer connecting mains when houses are being constructed. Moreover, low-density development frequently relies on wells and septic systems thus greatly reducing the local government share of the cost of water and sewer services.

Fire/police services: It seems intuitive that the cost of providing fire and police protection would be higher for more dispersed development since more fire/police stations and personnel and higher operating costs would be required. However, some studies provide evidence that emergency service response times fall with more dispersed development, suggesting that local governments often limit police and emergency service costs by lowering the level of service. Other studies have shown that low-density development generates lower levels of crime and risk of fire than high-density development, therefore lowering the need for, and thus the cost of, emergency services.

Cost summary

The investigators conclude that it is population growth and not "sprawl" (the spatial pattern of development) that seems to drive local government costs. The struggle to pay for large, up-front infrastructure expenditures caused by population growth occurs regardless of the development pattern.

Revenues

Local governments must pay for these costs through a variety of revenue generating mechanisms. Typically, the largest source of revenue for local governments is property taxes. How development is arranged on the landscape can influence property values and thus tax receipts.

It is well known in real estate that people are willing to pay more for larger lots, detached (as opposed to similar attached) homes, proximity to open space, and cul-de-sac layouts. The researchers constructed scenarios in which 12 acres of agricultural land are developed at various densities and calculated the tax value of each scenario (assuming tax assessment values in the urban fringe areas of Virginia). The total

continued next page

value of a 12-acre parcel developed at low density (one house per acre) can be as much as 16% more than the same 12-acre parcel developed as a high-net-density cluster development (one house per quarter-acre average, 3 acres developed and 9 acres undeveloped), even when the housing units are identical.

The authors point out that many factors influence property values and that location-specific statistical analysis is necessary to estimate how property values change across different settlement patterns. But, based on established general relationships between property characteristics and market prices, it is reasonable to conclude that low-density development produces higher tax value and tax revenue than high-density development.

Thus, say the authors, because the cost of providing local government services appears only moderately related to the spatial attributes of development and because low-density development boosts tax value, it is plausible that land-extensive development forms can have modest positive net fiscal consequences for local governments. Moreover, they point out, because larger lot developments consume more land and increase housing prices, low-density development could dampen the demand for new houses and slow the rate of population growth. Limiting population growth is one sure way to control local government costs.

In fact, local governments in Virginia and Maryland have acknowledged that rules adopted to increase the cost of constructing townhouses, prohibit the building of small homes, and deny sewer service are aimed at slowing population growth by promoting lower densities.

What do these findings mean for those promoting more environmentally sensitive development? The authors suggest that changes in the way local governments raise and spend money could provide more incentives for compact development: reduce the reliance on property tax as the main source of local revenues, give local government more flexibility to charge impact fees for new development; and make local government pay a greater share of road construction costs. The authors say these suggestions should be considered tentative since a number of important questions remain about the relationship between spatial form and net fiscal impact on local government.

The Influence of Residential Development Patterns on Local Government Costs and Revenues*. August 2001. Kurt Stephenson, Cameron Speir, Leonard Shabman, and Darrell Bosch. Department of Agricultural and Applied Economics, Virginia Polytechnic Institute and State University. Paper presented at the "Integrated Decision-Making for Watershed Management Symposium," January 7-9, 2001, Chevy Chase, Maryland. Also a peer-reviewed report of the Rural Economic Analysis Program at Virginia Tech (http://www.reap.vt.edu/Publications/reports/r51.pdf)/*

319 project will trace pathogens from on-site systems in shellfish waters

In a project funded by the Clean Water Act Section 319 program, investigators will use conventional and innovative methods to trace the subsurface movement of pathogens from septic systems that are adjacent to shellfish harvesting waters.

A major problem in assessing nonpoint sources of pollutants is discriminating among the many sources that contribute to a water body. In this case investigators will study potential fecal coliform contributions. Their efforts will be directed at determining the subsurface fate and transport of pathogens from conventional septic systems and if there are contributions from septic systems to adjacent waters. The testing of pathogen mimics to be undertaken in this study, may provide new tools to trace pathogen movement in different soils. In addition, the data from testing repaired and failing septic systems can help quantify any contributions to adjacent shellfish waters .

Dr. Barbara Hartley Grimes, coordinator of the NPS Program in N.C. Onsite Wastewater Section and J.D. Potts, George Gilbert, and Steve Murphey of the N.C. Shellfish Sanitation Section will conduct the research in the Goose Creek Watershed in the White Oak River Basin (Bogue Sound). Similar sites (topography, soils, water use, number of residents, etc.) with on-site wastewater systems and public water supply will be chosen on Bogue Banks. One onsite system will be functioning normally and one will be "failing." Later in the project, the "failing" system will be repaired and examined as "repaired system."

Both conventional dyes and coated (with charged molecules) microspheres that mimic viral, bacterial, protozoan, and helminth (worms) pathogens will be introduced concurrently to the onsite systems. Based on topography and hydrology, sampling wells will be installed to allow sampling of septic effluent as it moves through the soil and groundwater. Preliminary experiments with tracers will be run, then sampling will be conducted through seasonal high water table periods. Samples will be analyzed for dye concentration with a fluorometer and will be filtered with Millipore filters, to collect microspheres. Filtered samples will then be examined by light, fluorescent, and scanning electron microscopy. Fecal coliform counts in samples will also be taken. Surface water samples will be taken concurrently in nearby waters and evaluated for fecal coliform to allow comparison (and perhaps correlation) of fecal coliform movement and movement of tracers.

The data gathered will be critical in understanding the movement of pathogens from septic systems through soils and assessing what potential contributions to adjacent shellfish harvesting areas are linked to conventional onsite systems.

Drought eases somewhat

Above average precipitation over most of North Carolina in the first half of October aided streamflows and replenished reservoirs in most locations. At the end of October, Jordan, Falls and Kerr Scott reservoir levels were above guide curve. However, in the Catawba chain of reservoirs operated by Duke Power, Lookout Shoals Lake above Hickory was 19 feet below target.

The U.S. Drought Monitor as of October 15, 2002, showed improvement in drought conditions over the state, with no areas of "exceptional" drought. However, an area of extreme drought cuts through the state in an area stretching from Greensboro west to Asheville.

As of Nov 5, the U.S. Geological Survey's Drought Watch showed streamflow conditions still in the dry range over the western Piedmont. According to an analysis by the Corps of Engineers, this pattern illustrates the predicament of the western Piedmont: the Appalachian Mountains strip moisture from clouds as they travel from west to east while moisture from the Gulf of Mexico and Atlantic Ocean fails to reach the area.

People

Dr. Stacy Nelson has joined the Center for Earth Observation in the Department of Forestry at NC State University. Dr. Nelson received the PhD in limnology from Michigan State. His research interests lie in applying remote sensing and GIS technologies to address regional and local scale questions affecting aquatic ecosystems.

Jeff Essic, formerly Information Technology Analyst with the Triangle J Council of Governments, has joined the NCSU Libraries as Data Services Librarian. He will lead the Libraries' innovative spatial and numeric data services program, including development and expansion of GIS services.

EPA announces new web-based training module for Watershed Academy

The U.S. EPA marked the 30th anniversary of the Clean Water Act (CWA) by announcing completion of the 44th Watershed Academy web-based training module called *Introduction to the Clean Water Act* (http://www.epa.gov / watertrain/cwa/). This web-based training module provides an introduction to the major CWA programs in the following sequence: (1) water quality standards, (2) antidegradation policy, (3) waterbody monitoring and assessment, (4) reports on condition of the nation's waters, (5) total maximum daily loads (TMDLs), (6) NPDES permit program for point sources, (7) Section 319 program for nonpoint sources, (8) Section 404 program regulating filling of wetlands and other waters; (9) Section 401 state water quality certification; (10) state revolving loan fund (SRF).

North Carolina Precipitation/Water Resources

	Sept	Oct
Rainfall (+/- average)		
Asheville	6.05" (+2.33")	3.14" (-0.03")
Charlotte	3.45" (-0.29")	5.43" (+1.77")
Elizabeth City	2.74" (-2.33")	8.81" (+3.95")
Greensboro	3.76" (-0.54")	8.18" (+2.91")
Raleigh	3.49" (-0.77")	9.35" (+6.18")
Wilmington	4.95" (-1.84")	2.34" (-0.87")

Streamflow **Index Station** (County, Basin)	**Sept mean flow (CFS)** (% of long-term median)	**Oct mean flow (CFS)** (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	252 (336%)	198 (233%)
Oconaluftee River at Birdtown (Swain, Tenn)	283 (113%)	292 (122%)
French Broad River at Asheville (Buncombe, FB)	1,083 (98%)	994 (77%)
South Fork New near Jefferson (Ashe, New)	266 (109%)	279 (99%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	47.7 (110%)	40.8 (82%)
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	87.6 (85%)	83.4 (76%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	35.5 (18%) Rcrd Mn Low	84.7 (47%)
Rocky River near Norwood (Stanly, Yadkin/Pee-Dee)	456 (150%)	1,230 (281%)
Deep River near Moncure (Lee, Cape Fear)	538 (144%)	2,130 (641%)
Black River near Tomahawk (Sampson, Cape Fear)	294 (74%)	109 (42%)
Trent River near Trenton (Jones, Neuse)	14.6 (25%)	11.6 24%)
Lumber River near Boardman (Robeson, Lumber)	217 (32%)	331(66%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	67.3 (204%)	106 (333%)
Potecasi Creek near Union (Hertford, Chowan)	1.88 (13%)	40.4 (279%)

Groundwater **Index well (Province)**	**Sept depth below surface (ft)** (departure from average for month)	**Oct depth below surface (ft)** (departure from average for month)
Blantyre (Blue Ridge)	39.10 (-7.21) Rcrd Mnth Low	38.53(-5.00)
Mocksville (Piedmont)	23.13 (-5.17) Rcrd Mnth Low	22.20 (-4.07) Rcrd Mnth Low
Simpson (Coastal Plain)	8.66 (-3.22) Rcrd Mnth Low	6.60 (-1.08)

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

USGS announces web database of environmental methods

The U.S. Geological Survey (USGS) has announced a new standardized web-searchable database of environmental methods that will allow scientists and managers monitoring water quality to compare data collection methods at a glance and find the method that best meets their needs. This database was developed in conjunction with the U.S. Environmental Protection Agency (USEPA), and other partners in the federal, state, and private sectors. Called NEMI, the National Environmental Methods Index, the tool is a free, web-based online clearinghouse of environmental monitoring methods. By visiting http://www.nemi.gov, users can directly access current methods information. Often, formats for gathering information on various methods involve a time-consuming search through lengthy methods to distill bits of necessary information (e.g., What is the holding time? Is the precision and accuracy of the selected method adequate?). A few minutes with NEMI will provide answers to these questions.

NAS website on emerging issues and data on environmental contaminants

The National Academies' Board on Environmental Studies and Toxicology has established a new web site for the Committee on Emerging Issues and Data on Environmental Contaminants. The website provides a public forum for communication among government, industry, environmental groups, and the academic community about emerging evidence and issues in toxicogenomics, environmental toxicology, risk assessment, exposure assessment, and other related fields. The website is at address: http://dels.nas.edu/emergingissues/.

2002 - 2003
Water Resources Research Seminar Series

Following are the currently scheduled research seminars for 2002-2003. Presentations take place at 3 pm in the Ground Floor Hearing Room of the Archdale Building in downtown Raleigh or in Room 1132 of Jordan Hall on the N.C. State University campus. Licensed Professional Engineers and Surveyors can receive 1 Professional Development Hour for attending these seminars. There is no attendance fee, and registration is not required. For additional information email Jeri_Gray@ncsu.edu.

November 26, 2002, Archdale
"Predicting Long-Term Wetland Hydrology Using Hydric Soil Field Indicators"
Dr. Michael J. Vepraskas
NC State University

January 28, 2003, Jordan
"Technical, Economic, and Environmental Evaluation of Alternatives for Animal Waste Management in North Carolina"
Dr. Michael R. Overcash
NC State University

February 25, 2003, Archdale
"Ultraviolet-based Processes for Meeting Water Quality Goals: Microbial and Chemical Contaminants"
Dr. Karl G. Linden
Duke University

March 25, 2003, Jordan
"An Assessment of North Carolina Water Reuse Regulations"
Dr. Helene A. Hilger
UNC-Charlotte

April 22, 2003, Archdale
"Using Natural and Landscaped Buffers to Reduce Pollution Loading from Agricultural Runoff"
Dr. Richard A. McLaughlin
NC State University

May 20, 2003, Jordan
"From Pfiesteria to Micro Arrays: New Tools for Water Quality Assessment"
Dr. Parke A. Rublee
UNC-Greensboro

EPA publication available

Lead Safe Yards: Developing and Implementing a Monitoring, Assessment and Outreach Program for Your Community (EPA-625/R-00/012)
The Technology Transfer and Support Division of the EPA Office of Research and Development's (ORD's) National Risk Management Research Laboratory has developed this technology transfer handbook for community organizers, non-profit groups, local government officials and others who are considering implementing, lead-safe yard programs. The handbook presents a case study showing how one community-based program—the EMPACT Lead-SafeYard Project (LSYP) in Boston, Massachusetts—is using a variety of low-cost techniques, such as landscaping and yard treatments, to reduce children's exposure to elevated levels of lead in residential soil. The handbook provides step-by-step guidance for developing a similar program to address the problem of lead in soil in other communities. The information will also be useful to individual homeowners.

A PDF version of the handbook can also be downloaded from the EMPACT LSYP Web site at http://www.epa.gov/region01/leadsafe/tool2.html.

Sustainable Land Application Conference

January 4-8, 2004
Wyndham Palace Resort and Spa
Lake Buena Vista, Florida

Since 1973, scientists, engineers, regulators and interested parties in the waste management field have met each decade to assess the body of knowledge on land application of municipal wastewaters and sludges. In 2004, an international conference titled "Sustainable Land Application" will be convened that will address soil reactions of constituents in biosolids, effluents, and manures.

Conference Objectives are to:

✔ Review fundamental and specific reactions of constituents in non-hazardous waste (manures, biosolids, and effluents)
✔ Improve understanding about contaminant reactions in soils
✔ Synthesize multi-disciplinary information and characterize the "state-of-the science"
✔ Identify high priority and critical research needs
✔ Promote interdisciplinary approaches to solving societal problems of waste disposal

For additional information and online registration go to website:
http://www.conference.ifas.ufl.edu/landapp/index.html

NCWRA
North Carolina Water Resources Association

2002 - 2003 Luncheon and Forum Schedule

December 2, 2002
Stormwater Regulations: Phase II and Beyond

February 3, 2003
Post-Construction Stormwater BMPs: Good, Bad, and Ugly

April 7, 2003
Airborne Water Pollutants

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

December 1, 2002
Water Reuse

All luncheon/forums take place at 11:30 am
at the Jane S. McKimmon Center on
the N.C. State University campus.
For registration information call WRRI (919/515-2815)

For information about NCWRA visit the website:
http://bae00du.bae.ncsu.edu/bae/programs/extension/wqg/ncwra/

WATER RESOURCES RESEARCH INSTITUTE
OF THE UNIVERSITY OF NORTH CAROLINA
BOX 7912
NORTH CAROLINA STATE UNIVERSITY
RALEIGH NC 27695-7912

NONPROFIT ORG
U S POSTAGE
PAID
RALEIGH NC
PERMIT NO. 549

ADDRESS SERVICE REQUESTED