

State completes evaluations of all public water supplies

by Jeri Gray

When Congress passed the Safe Drinking Water Act Amendments of 1996 (S 1316, PL 104-182) it nudged the Nation's approach to assuring safe drinking water in a new direction—toward preventing pollution of drinking water rather than removing pollutants through expensive treatment. Sherry MacQueen, the new source water protection coordinator in the N.C. Public Water Supply Section (PWSS), thinks the 1996 law was a “brilliant piece of legislation” because it offers consumers and local governments information, technical assistance, and even financial help to protect their sources of water and thereby hold down the cost of producing safe drinking water.

To encourage local involvement in source water protection, the 1996 amendments required states to produce and make public reports on the condition of all public drinking water sources and to encourage voluntary local partnerships to protect streams, reservoirs, and wells that supply public drinking water systems. Now that the PWSS has completed the required Source Water Assessment Program (SWAP) reports, it is MacQueen's job to get the information to consumers and encourage them to join with local governments and others to develop local source water protection plans.

“These reports are a gift, a gift of knowledge,” said MacQueen. “Public involvement starts with public awareness. The availability of these reports allows citizens access to numerous databases in one, easy-to-use location. Access to this information, combined with the Environmental Protection Agency's goal to protect source water

through pollution prevention efforts lead by local, voluntary source water protection teams, provides ‘a window of opportunity’ to shift from ‘command and control’ regulations to a more cooperative and inclusive public interaction that brings people with different needs and

values together to protect our drinking water.

“After all,” said MacQueen, “we all have a stake in ensuring a safe, reliable, affordable supply of drinking water.”

To produce the reports, PWSS spent several years determining the boundaries

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Director's Forum

Should we become environmental advocates?

Kenneth H. Reckhow, Director, Water Resources Research Institute

"I just listened to a terrific commencement address by Robert F. Kennedy Jr. at Duke," I enthusiastically told my wife, Ellen, on Saturday afternoon last week. "Kennedy is president of the Waterkeeper Alliance; he discussed a number of critical environmental issues, urging us to become informed advocates for environmental protection and sustainability."

"So, does that mean that you're finally going to take public positions on environmental issues?" Ellen skeptically inquired. "What about the academic objectivity that you so fervently defend?"

"Well, as director of the Water Resources Research Institute, I believe that I have an obligation to discuss the science as objectively as possible," I responded. "If I want to describe policy implications, I've always believed that I can say 'if you undertake this policy, here's what science says is likely to happen; alternatively, if you undertake that policy here's the scientific forecast, et cetera, et cetera. I don't give my personal opinion; instead I outline expected scientific implications of various policies."

Just then, my political scientist daughter, Sarah, walked in. "Oh boy, here we go again—the idealist scientist versus the pragmatist politician."

"Now hold on," I objected. "No one elected me; no one knows my values. For all anyone knows, I'm masquerading as an environmentalist in my role as WRR I director while I'm heavily invested in pollutant-generating industries. Why should I intertwine my values with my science?"

"C'mon Ken," said Ellen in exasperation. "As a County Commissioner, I can't learn the substantive details of every issue that comes before my Board; I have to depend on experts like you for policy guidance."

"Well, as WRR I director, I can give you specific advice once I know your values," I responded.

"But," Sarah inquired, "shouldn't you also have an obligation to inform us about the importance of environmental protection and sustainability? Isn't it possible that our values are based on flawed information? In other words, might we naively, and incorrectly, undervalue the environment because we

are unaware of the full set of benefits associated with an undamaged environment and healthy ecosystem?"

"That's a good point, Sarah," I acknowledged. "And it's certainly consistent with Kennedy's talk at commencement."

"I don't believe it!" Ellen exclaimed. "Does this mean that you're finally going to take a position on environmental issues?"

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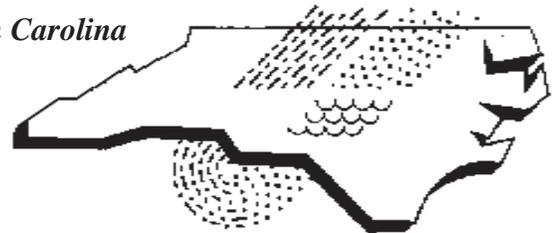
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“Well, I still see my role at WRRI as somewhat different from that as a Duke faculty member,” I responded. “At WRRI, I represent an institution, not simply myself, and in maintaining the viability and integrity of the institution, I believe that I must confine myself to objective scientific interpretation.”

“And at Duke?” Ellen asked.

“At Duke, I’m a faculty member. Clearly, I have responsibility to the University, but I feel that I can discuss my preferences if I put them in a context.”

“Okay, so put on your ‘Duke hat’ and reflect on your WRRI experiences,” Ellen said. “What’s your opinion on the state of the environment in North Carolina?”

“Well, just as a quick response—I’m concerned,” I answered. “Yes, we have many effective environmental protection policies and regulations in the United States and in North Carolina, and we have many successes—for example, wastewater treatment plants have improved substantially over the past thirty years. Yet, I’m particularly concerned about long-term gradual environmental degradation and the potential for irreversible damage. I believe that sustainability—maintaining environmental quality for future generations—is an obligation of ours. I’m not convinced that current policies are up to the task for such issues as sediment and erosion control, nutrient enrichment from intensive agriculture and animal operations, and the vast array of synthetic organics—most recently, endocrine disruptors.”

“But let me think about that some more while I recycle these newspapers,” I continued. “That deserves a long and thoughtful answer. Let’s talk later.”

Editor’s Note: Dr. Reckhow will pick up this discussion in the July/August issue of the WRRI News.

May action of the N.C. Environmental Management Commission

At its regular meeting on May 13, 2004, the N.C. Environmental Management Commission (EMC) took the following action:

■ Approved holding public hearings on amendments to air quality rules 15A NCAC 2D .0530, Prevention of Significant Deterioration and .0531, New Source Review. The rules are being amended to bring them into line with changes to federal rules; however, some modifications to the federal rules are proposed. A number of options will be presented for public comment.

■ Approved holding public hearings on an amendment to air quality rule 15A NCAC 2Q .0102, Activities Exempted from Permit Requirements. The proposed amendment provides that an exemption will not apply if a facility has a source that could likely violate an applicable standard if not properly controlled and operated.

■ Approved holding public hearings on amendments to air quality rule 15A NCAC 2D .0521, Visible Emissions. It provides that facilities that must monitor opacity continuously will receive notice of violation if they exceed the opacity standard more than four times (six-minute periods) in one day. The current allowable exceedance is 10 six-minute periods.

■ Rejected the decision of an administrative law judge (ALJ) and remanded for evidentiary hearing a challenge to conditions for buffer mitigation contained in a 401 certification for piping of a stream by the Raleigh-Durham (RDU) Airport Authority. The Division of Water Quality issued a Clean Water Act Section 401 certification for a runway safety area expansion at RDU, which is in the Neuse River Basin and is subject to the Neuse Riparian Area (buffer) rule. The

certification required mitigation for destruction of a stream buffer caused by piping of a stream. RDU filed a contested case, contending that it should not have to pay for buffer mitigation because (1) DWQ waived the 401 certification requirement by not issuing the certification with 60 days of application and (2) after piping and removal of the stream, there remained no riparian area to which the buffer requirements applied. RDU moved for summary judgment, saying there were no issues of material fact and the law was on its side. The ALJ agreed, ruling for RDU. Before the EMC, the Attorney General’s representative argued for DWQ that the rules say a 401 certification does not have to be issued or rejected in 60 days if there are good reasons for a delay—which there were—and that there is nothing in the rules that allow a waiver from buffer mitigation. After much discussion, the EMC decided that the Neuse buffer rules apply outside the 401 process and that piping a stream does not remove the requirement to mitigate for the functions of a destroyed buffer. Commissioner Charles Peterson referred to special considerations written into the Neuse buffer rules for public facilities, including airports, that allow certain activities in buffers with mitigation. Commissioner Leo Green pointed out that the evidence put before the EMC did not provide a suitable basis for determining whether there was good reason for the delay in responding to the 401 application. The commission voted to reject the ALJ’s decision that RDU does not have to mitigate for the buffer destruction and to remand the case for further evidence regarding the timeliness of the 401 certification.

■ Heard from Jim Gulick of the Attorney General’s Office that the Rules Review

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Source Water Assessments *continued*

of possible pollution influence around every one of the approximately 10,000 public water supply sources (groundwater wells or surface water intakes) in the state, investigating the physical characteristics of the land area within the boundaries, and inventorying 16 types of potential contaminant sources within the boundaries. Putting all this information together, PWSS assigned a “susceptibility” rating of “higher,” “moderate” or “lower” to each source of public drinking water. The susceptibility rating indicates the potential risk of contamination from any of the 16 potential contaminant sources located within the assessment area.

An individual report is available for every public water supply system in North Carolina, and an online geographic information system makes it possible to look at information layers (such as individual contaminant sources) for single water sources or for the entire state.

MacQueen acknowledged that the reports contain highly technical information that may be difficult to understand initially. That is why she is working with nonprofit and volunteer organizations to conduct workshops throughout the State to help water system owners and consumers understand (1) how to interpret the SWAP report results; (2) how to use the reports to further investigate the susceptibility of local drinking water sources; and (3) how to develop plans to protect those sources.

Accessing and using Source Water Assessment reports

To download a pdf version of the Source Water Assessment for your public water supply system, go to website: <http://www.deh.enr.state.nc.us/pws/SWAP>. You must have Adobe Acrobat reader installed on your computer to access the reports.

In the lower right corner, click on “SWAP Reports.” A text window will pop up that explains the limitations of the

reports. Essentially, you are asked to acknowledge that you understand that:

1. The reports are about raw untreated water, not the water that comes from your tap.
2. The reports are not based on monitoring or sampling of the water sources but on the application of a qualitative analysis using expert opinion to assess the relative importance of selected factors thought to impact water quality.
3. The reports include only 16 types of potential contaminant sources contained in existing state databases, not every contaminant source that may exist within the area of possible pollution influence.
4. The reports are based on available data that may be incomplete, inaccurate, or out-of-date.

After you acknowledge the SWAP limitations by clicking “OK,” a second window will open that allows you to search for your water system. If you are a customer of a municipal or district water system, you can enter the name of the town, city or district (such as Orange Water and Sewer Authority) to find your system. If you are a customer of a private water system (such as one that serves a mobile home park or a subdivision) you must know the name of the system, or at least part of it. Type in the name or part of a name and click “get report.”

The next screen may list several reports on systems that contain the name of your system. You may have to scroll down to see the list of matching reports. Find your system and click on the Acrobat image beside it. The report will open in Acrobat.

Sections 1 through 5 of the report contain explanatory text and general information on your water system and water source(s). (For illustrative purposes, this article uses information from the source water assessment for the Town of Wake Forest in Wake County.)

Table 1 describes the source of your drinking water. Table 3 gives you additional general information about your water source. Map 1 (not shown) provides the general location of your water source. Map 2 shows the land area

around the water source that can be affected by contaminants (delineated area) and the locations of potential contaminant sources in relation to the delineated area. It is on Map 2 that you can find the list of the types of contaminant sources considered in the Source Water Assessment reports. Table 4 (now shown) lists and provides information on each of the potential contaminant sources within your watershed or wellhead area.

Table 2 gives the “susceptibility” rating of “higher, moderate, or lower” for your water source, a rating that reflects both the “inherent vulnerability” of the site to pollution and the “contaminant rating” based on the number of potential contaminant sources within the assessment area.

Table 5 tells you how the “inherent vulnerability” rating in Table 2 was derived. Table 7 (from the next section) tells you how the watershed or well characteristics rating used in Table 5 was derived. Figures 1-7 (not shown) illustrate each of the factors used in determining the “Watershed Characteristics Rating” or Unsaturated Zone Rating.” For example, the figures include land cover, precipitation, land slope and land uses within the watershed.

Section 6 of the report is a condensed technical explanation of how the source water assessments were done and the basis of the ratings. For many small systems, Section 6 will be much longer than the assessment report itself.

How should this information be interpreted?

It is important that consumers understand that the “susceptibility” rating for their water sources does not reflect the quality of the drinking water that comes from their taps. Finished drinking water from public water systems must meet high Safe Drinking Water Act standards, regardless of the quality of the raw water source. Nor does the “susceptibility” rating reflect actual contamination of the raw source water. Some idea about the actual quality of the raw water can be found in Table 5 where raw water quality is rated. This rating is based on turbidity

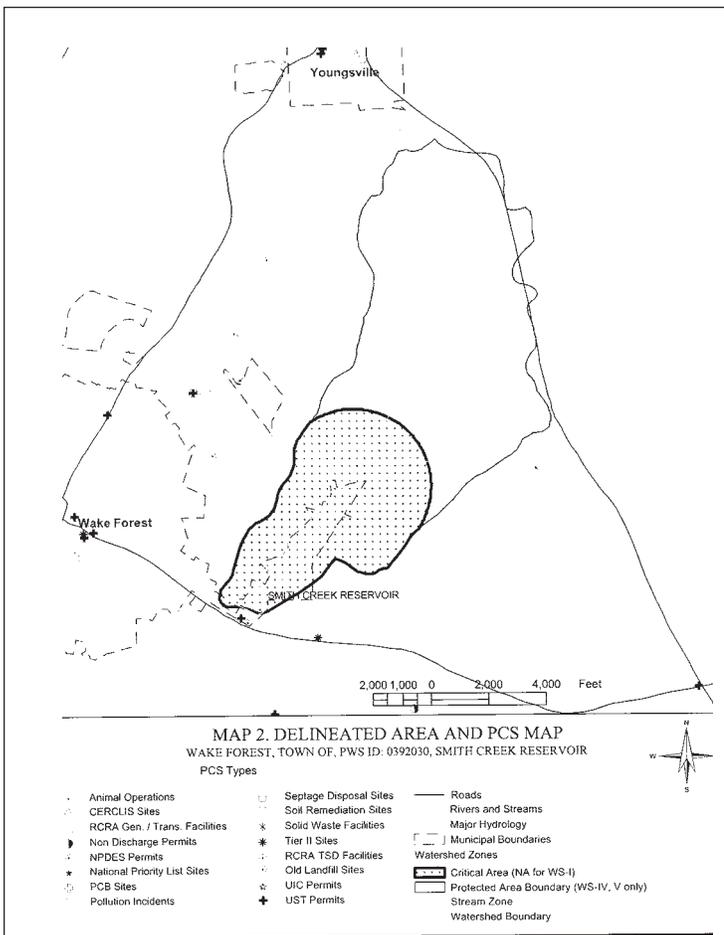
**Source Water Assessment Program Report
for
WAKE FOREST, TOWN OF
*Community Water System***

Table 1. Public Water Supply System Information

System Name	WAKE FOREST, TOWN OF
City	WAKE FOREST
PWS ID	03-92-030
Source Name	SMITH CREEK RESERVOIR

Table 3. Surface Water Source - Information

Source Name	Watershed Classification	Source Location
SMITH CREEK RESERVOIR	WS-II	Class 1



and total coliform data reported by water systems.

The susceptibility rating should be interpreted as a rating of the risk that one or more of the potential contaminants in the watershed or wellhead area could contaminate source water. However, the susceptibility rating in these reports does

not alone tell the whole story about risk to a water source. Many potential contaminant sources are not shown on statewide databases and are, therefore, not included in the SWAP report results. The local source water assessment team must identify these unique, local sources of potential contamination. Pollutants in runoff from dense commercial, industrial, agricultural and residential areas are

Table 2. SWAP Results Summary

Source Name	Inherent Vulnerability Rating	Contaminant Rating	Susceptibility Rating
SMITH CREEK RESERVOIR	Moderate	Lower	Moderate

**Table 5. Inherent Vulnerability Rating
WAKE FOREST, TOWN OF
PWS ID: 03-92-030, SMITH CREEK RESERVOIR**

Surface Water Source Characteristics	Higher Vulnerability	Moderate Vulnerability	Lower Vulnerability
Watershed Classification		Moderate	
Intake Location			Lower
Raw Water Quality (water plant data)		Moderate	
Watershed Characteristics Rating		Moderate	

Inherent Vulnerability Rating: Moderate

Table 7. Inherent Vulnerability of Surface Water Sources

Surface Water Source Characteristics	Higher Vulnerability	Moderate Vulnerability	Lower Vulnerability
Watershed Classification	WS-IV, WS-V 10	WS-III, WS-II 5	WS-I 1
Intake Location	Direct Stream 8	Class 3 Reservoirs 4	Class 1 and 2 Reservoirs 2
Raw Water Quality (water plant data)	T.U. > 100 or T coliform > 2000 5	T.U. >25 or T coliform > 1000 3	T.U. ≤ 25 and T coliform ≤ 1000 1
Watershed Characteristics Rating	10	5	1
Totals	33 - 21	20 - 13	12 - 5

factored into the susceptibility rating using the site's inherent vulnerability with "Land Use Ratings." Some idea of the risk posed by these contaminants can be gleaned from figures showing land cover and land use ratings.

Source Water Protection

MacQueen said that to get more accurate assessments of the risk to a drinking water source, system owners and/or consumers need to "ground truth" their

continued next page

Source Water Assessments *continued*

Source Water Assessment report and add local data about other pollution sources in the delineated area.

“We want the public to refine these reports,” she said. “That’s a big job, and that’s why we are encouraging partnerships among diverse groups that have a stake in holding down the cost of providing safe drinking water.”

To help local groups that want to monitor their watershed or wellhead area and protect their water source, the Public Water Supply Section has compiled a list of funding opportunities and sources of technical assistance. These are available on the Source Water Assessment Program website. Also on the website is a wellhead protection guide for groups that want to develop approved Wellhead Protection Plans for public wells.

Although North Carolina has a mandatory Water Supply Watershed Protection program for surface water sources of drinking water, there is still much that groups can do to make local programs more effective. MacQueen said that she is currently working on a guidance document, analogous to the Wellhead Protection Guidebook, to provide information on how source water protection teams can help develop an approved Surface Water Source Water Protection Plan.

Information to be included in Consumer Confidence Reports

Results from the Source Water Assessments will also be shared with the public through the Consumer Confidence Reports (CCR) provided to them by their water systems. Under requirements of the 1996 Amendments, public water systems that have received Source Water Assessments must include in their CCR’s a brief summary of the system’s susceptibility to potential sources of contamination, an explanation of contaminants that may be in the source water, a report on the likely source(s) of detected contaminants, and a

State Drinking Water Treatment Revolving Loan Fund rule changes address Source Water Protection and Conservation

The State Drinking Water Treatment Revolving Loan Fund receives monies from the U.S. EPA appropriated by Congress for the fund and a 20 percent match from appropriations from the N.C. General Assembly. Loans for drinking water projects are made to local governments at one-half the market interest rate for up to 20 years. Eligible drinking water projects must facilitate compliance with the Safe Drinking Water Act and must be on the State’s Intended Use Plan. To rank projects for the Intended Use Plan, the N.C. Public Water Supply Section awards priority points in the following categories: (1) Public health and compliance with the Safe Drinking Water Act, (2) consolidation to improve water system reliability, (3) reliability, (4) affordability, and (5) source water protection and management (which includes conservation).

In May the Division of Environmental Health proposed changes to rules that govern use of the State Drinking Water Treatment Revolving Loan Fund to encourage source protection and conservation. The rule changes raise the maximum number of points that can be awarded in this category from 10 to 15. They provide that 5 points can be awarded for a water supply watershed protection program or wellhead protection program approved by the division and provide that 3 points can be awarded for each of multiple demand management strategies.

Loan application are due September 30 of each year. For details go to the Public Water Supply Section website at <http://www.deh.enr.state.nc.us/pws/srf/index.htm>.

summary of any monitoring that has revealed *Cryptosporidium* (a biological pathogen) present in the raw water. Source Water Assessment Program report information will be included in the 2004 CCR.

Statewide Geographic Information System Mapping Tool

The PWSS also developed a statewide Geographic Information System (GIS) mapping tool, “NC SWAP Info,” that can be used to see the distribution of differ-

ent kinds of public water systems, the locations of water supply watersheds and public water supply wells statewide, and the distribution of the 16 types of potential pollution sources statewide. Other features are also included. To use the tool, click on “NC SWAP Info” at the bottom of the SWAP homepage and follow the online help.

To use the mapping tool or download Source Water Assessment reports, go to: <http://www.deh.enr.state.nc.us/pws/SWAP>.

May action of the EMC's Water Quality Committee

At its regular meeting on May 12, 2004, the Environmental Management Commission's Water Quality Committee took the following action:

- Approved a revised Water Supply Watershed Protection ordinance for Chatham County.
- Approved holding public meetings on the draft Catawba River Basinwide Water Quality Plan. Meetings will be held in July. Major issues in the basin include conditions of relicensing of hydropower facilities on reservoirs and management plans to reduce nutrient pollution of Lake Wylie and Lake Rhodhiss. For additional information contact Dave Toms of the Basinwide Planning Unit at (919) 733-5083 Ext 577 or David.Toms@ncmail.net.
- Heard from Kim Colson, Supervisor of the Non-Discharge Permitting Unit of the Division of Water Quality, that rule changes will soon be proposed to 15A NCAC 2H .0200 Waste Not Discharged to Surface Waters. Colson said that staff wants to change the rule to reflect current procedures (such as fast track permitting and express review), to add federal references so that DWQ can obtain EPA delegation for the 40 CFR parts 501 and 503 (sludge management)

May EMC *continued*

Commission has filed a "perfunctory" answer regarding their position in the suit brought by the EMC challenging the RRC's rejection of the NPDES Phase II Stormwater rules. Gulick also said that the RRC will be represented by a division of the N.C. Attorney General's office that is separate from the division that represents agencies of the Department of Environment and Natural Resources. Following Gulick's report, the EMC went into executive session to discuss the litigation. **JG**

program, and to reconfigure the rule by program area and permit type to make future rulemaking easier. He said changes to reuse rules may also be included if a committee working on proposals finishes its work in time. Colson said that he expects to bring a draft rule to the Water Quality Committee in late fall or early winter. Municipalities will be the largest affected group.

- Heard an update on the Coastal Habitat Protection Plan (CHPP) process. The Intercommission Review Committee has drafted actions to protect coastal fisheries habitat, and those actions will be subject to public discussions this summer. Many of the actions will require rulemaking by the three lead commissions. The Coastal Resources Commission, EMC, and Marine Fisheries Commission are scheduled to meet September 9, 2004, to review details of recommended actions. The CHPP is to be presented to the three commissions for adoption during the fall and winter of 2004. Information about the CHPP is available on the N.C. Division of Marine Fisheries website: <http://www.ncdmf.net>. (The proposed actions to protect coastal fisheries were not available on the DMF website in mid-May, but the CHPP update with the actions can be downloaded as an attachment to the May Water Quality Committee agenda at <http://h2o.enr.state.nc.us/admin/emc/committees/wq/2004/index2004.htm>.)

- Heard from Anne Taylor of the Environmental Education Fund about a video-enhanced five-week high school curriculum on water quality and quantity issues in North Carolina. The curriculum (It's Our Water) is designed to be part of an earth and environmental science course that all high school students must take to graduate. The project was started with funds from a Clean Water Act 319 grant from DWQ.

The Environmental Education Fund raised another \$160,000 from corporations and foundations to complete the project. The teachers guide and videos are now complete, and in August teacher training sessions will begin. Training will be coordinated by the Project WET program in the N.C. Division of Water Resources. To learn more about It's Our Water go to web address: <http://www.eefund.org/level3.php?mpid=109>. To register for training follow the highlighted link. **JG**

May action of the EMC Groundwater Committee

by Kelly Porter

At its regular meeting on May 12, 2004, the N.C. Environmental Management Commission's Groundwater Committee took the following action:

- Discussed proposed rules to modify the testing requirements in 15A NCAC 2L.0115 (risk-based assessment and corrective action).
- Heard a report on the status of the State Trust Fund for cleanup of commercial and noncommercial petroleum underground storage tanks (UST). As of May 7, 2004, the trust fund was \$30 million short of being able to pay claims for commercial sites. There is a 354-day turnaround from the time a client comes in to the time a check is cut to pay the claims for commercial sites.
- Heard a report on the Piedmont-Mountains Resource Evaluation Program (PMREP). In cooperation with the U.S. Geologic Survey, Water Resources Division, the Groundwater Section has installed a series of groundwater research stations in North Carolina to help refine knowledge of recharge and discharge processes in crystalline bedrock.

Ag Cost Share Program targets impaired waters

According to the latest report by the N.C. Division of Soil and Water Conservation, more than \$582,000 of the \$5.26 million appropriated by the General Assembly for the Agriculture Cost Share Program in 2003 was targeted for installing erosion and sediment control BMPs in watersheds of streams impaired by agricultural sedimentation. Historically, about 30 percent of ASCP funds have been used to implement BMPs in watersheds of impaired waters.

The N.C. Agriculture Cost Share Program (ACSP) is one of the few such programs in the United States. It was authorized by the General Assembly in 1983 to improve water quality associated with agriculture in three nutrient sensitive

areas of the state covering 16 counties. It was expanded in 1990 to include all 100 counties.

Participating farmers receive up to 75 percent of the average cost of an approved best management practice (BMP). Farmers must agree to maintain the practices for ten years. For a BMP to be approved by the N.C. Soil and Water Conservation Commission for the ACSP, there must be a Natural Resources Conservation Service technical standard for the BMP and sufficient cost information to determine the appropriate cost share amount. For 2003, there were 46 short- and long-term BMPs approved for the ACSP. The most-used BMP in 2003 was the three-year conservation tillage

incentive, which has been shown to reduce erosion from agricultural fields dramatically.

In establishing the ACSP, the General Assembly required that each project's benefits to water quality be estimated before funding is awarded. To meet this requirement, the SWCC chose three indicators of water quality benefits: tons of soil saved, pounds of nitrogen saved or managed, and pounds of phosphorus saved or managed. The estimated sediment and nutrient reduction benefits for program years 2001-2003 are summarized in the accompanying table. **JG**

Sediment and Nutrient Reduction Benefits for Agriculture Cost Share Program Years 2001 through 2003

	2001	2002	2003
Number of Contracts	2,060	1,937	1,819
Acres Affected	97,171 acres	79,602 acres	89,436 acres
Soil Saved	344,627 tons	258,853 tons	290,065 tons
Nitrogen Saved	1,911,610 pounds	1,716,024 pounds	1,359,918 pounds
Phosphorus Saved	216,021 pounds	397,875 pounds	741,691 pounds
Waste Nitrogen Managed	4,714,328 pounds	4,481,779 pounds	4,406,982 pounds
Waste Phosphorus Managed	4,945,421 pounds	3,743,366 pounds	4,572,177 pounds

Draft 2004 303 (d) list available

North Carolina's 2004 "Integrated List of Waterbodies" or "303(d)" list is available for review at <http://h2o.enr.state.nc.us/tmdl/> or by contacting Robin Markham with the N.C. Division of Water Quality (DWQ) at (919) 733-5083, Ext 558.

Section 303(d) of the Clean Water Act requires states to develop a list of waters that have water quality or use impairment that cannot be corrected by existing point and nonpoint source pollution control strategies and to develop management strategies or total maximum daily loads (TMDLs) to achieve water quality standards and restore uses.

Report on compensatory mitigation conference available

In May 2003, the N.C. Wetlands Restoration Program (now the Ecosystem Enhancement Program) conducted a conference on compensatory mitigation under an EPA Wetlands Program Development Grant. The conference brought together state and federal agencies, academic institutions, mitigation practitioners, and others to discuss topics related to watershed planning and compensatory mitigation.

The goals of the conference were:

- To further the discussion of factors that affect the cost of mitigation (i.e., credit release, bonding, service area, land availability, risk).

- To explore the future of compensatory mitigation in North Carolina.
- To improve the mitigation process in North Carolina through the Ecosystem Enhancement Program.
- To investigate how watershed planning can improve compensatory mitigation.
- To reach a common understanding of mitigation policy and enhance communication between stakeholders.

A report on the conference, including recommendations, is now available at: http://www.ncsu.edu/wrri/conference/report_index.htm

Airborne contaminants significantly affect New England's waterways

A recently released study led by the U.S. Geological Survey (USGS) shows that nitrogen entering the atmosphere from various sources has a major effect on the quality of streams throughout New England. Using a new computer model designed to map nitrogen and phosphorus transport and how these natural elements change stream quality, scientists determined that 50 percent of the nitrogen found in New England streams, or more than 42,000 metric tons per year, comes from the atmosphere. This nitrogen originates both inside and outside the region.

"Nitrogen is an element released into the atmosphere from numerous sources, including fossil fuel combustion, agricultural fertilizers, and animal manure. Wastewater facilities and

various urban and suburban land uses also contribute to the amount of nitrogen in the region's streams," said Richard Moore, USGS Hydrologist and chief investigator of the study.

The New England Interstate Water Pollution Control Commission (NEIWCCC) and the U.S. Environmental Protection Agency (USEPA) collaborated in the study to better understand and manage nutrient contamination and to improve the water quality in New England's rivers.

"We were surprised to find that contrary to previous theories, nitrogen, once it enters the water, stays dissolved in the larger streams and rivers in New England all the way to the coast where the river discharges into the ocean," said Moore. "The new computer model we

developed now allows us to better identify the major sources of nutrients to New England's rivers, where they come from, and how the quality of the rivers is affected."

The USEPA and states in New England will use the new contaminant-tracking tool to determine what level of nitrogen and phosphorus adversely affects the health of streams and to define acceptable levels of these contaminants in rivers and streams.

These findings are released as USGS Scientific Investigations Report 2004-5012, "Estimation of total nitrogen and phosphorus in New England streams using spatially referenced regression models," by R.B. Moore and others, which is available online at <http://pubs.water.usgs.gov/sir2004-5012> or by contacting the USGS office in Pembroke, NH at (603) 226-7837.

2004-2005 WRRRI Water Resources Research Seminar Schedule

(Date, locations, and speakers are firm. Some topics are to be determined.)

Except for the October seminar, all seminars are presented at 3:00 pm. Seminars are presented either in 1132 Jordan Hall on the NC State University campus or in the groundfloor hearing room of the Archdale Building in downtown Raleigh. An email announcement will be sent to the WRRRI-News list serve about 4 weeks prior to each seminar, and a reminder will be sent about 1 week prior to the seminar. Professional Engineers and Land Surveyors can receive one Professional Development Hour for attendance. Questions regarding location or other logistics should be directed to Julie_Mason@ncsu.edu. Questions about seminar content should be directed to Greg_Jennings@ncsu.edu.

Tuesday, September 21, 2004, 3:00 pm
1132 Jordan Hall, NCSU
 Dr. Curtis Richardson
 Duke University

"Wetlands of Mass Destruction: How the Hussein Regime Destroyed the Mesopotamian Marshes and Their 5,000-year-old Ma'dan Culture"

Monday, October 11, 2004, 2:00 pm
(note earlier time)
Archdale Building, Raleigh
 Dr. David Genereux
 N.C. State University
 To be determined.

Tuesday, November 23, 2004, 3:00 pm
1132 Jordan Hall, NCSU
 Dr. Phil Berke
 UNC-Chapel Hill

"Greening Development to Protect Watersheds: Is the New Urbanist Version of Compact Urban Forms an Answer?"

Tuesday, January 18, 2005, 3:00 pm,
1132 Jordan Hall, NCSU
 Dr. Randy Kramer
 Duke University
 To be determined.

Tuesday, February 15, 2005, 3:00 pm
1132 Jordan Hall, NCSU
 Dr. Nancy White
 UNC Coastal Studies Institute

"Environmental applications of microbial source tracking: results of research using multiple antibiotic resistance and DNA ribotyping to identify sources of pathogens in coastal waters"

Tuesday, March 15, 2005, 3:00 pm
1132 Jordan Hall, NCSU
 Dr. Deanna Osmond
 NC State University

"Effectiveness of Agricultural Best Management Practices"

Tuesday, April 12, 2005, 3:00 pm
1132 Jordan Hall, NCSU
 Dr. Siamak Khorram
 NC State University

"Current Trends in Land Use/Land Cover Mapping, Change Detection, and Monitoring from Remotely Sensed Data"

Legislation introduced in the N.C. General Assembly

These environment-related bills are among those introduced in the current short session of the 2003-2004 General Assembly. Other environment-related bills are active.

H 1496 (=S 1103) AN ACT TO AMEND THE ADMINISTRATIVE PROCEDURE ACT TO AUTHORIZE A PERSON TO PETITION AN AGENCY TO DETERMINE THE NEED FOR A RULE. Provides that a person may petition an agency to review any policy statement, guidance document, interpretive memorandum, or other document created or relied upon by the agency to determine whether the document as written or as applied falls within the definition of a rule and should have been adopted as a rule. The petition shall be in writing and shall include a copy of the document and a statement describing the agency's application of the document. If the agency determines that the document should be adopted as a rule, it shall grant the petition. If the agency determines that the document should not be adopted as a rule, it shall deny the petition. Each agency shall establish by rule the procedure for submitting a petition to determine the need for a rule and the procedure the agency follows in reviewing and deciding the petition.

H 1581 (=S 1211) AN ACT TO PROVIDE FOR IMPLEMENTATION OF FEDERAL PHASE II STORMWATER MANAGEMENT REQUIREMENT. Provides that owners and operators of designated MS4s apply for Phase II permits that implement the six minimum measures on the schedule adopted by the N.C. Environmental Management Commission in its temporary rule to implement the Phase II program. Sets deadlines for sending draft permits to public notice for 1990 census owners and operators of MS4s at Nov 1, 2004, and 2000 census owners and operations of MS4s at May 1, 2005. Does not address stormwater management by urban counties or the state designation and petition process.

H 1585 (=S 1210) AN ACT TO PROVIDE FOR IMPLEMENTATION OF FEDERAL PHASE II STORMWATER MANAGEMENT REQUIREMENTS. Essentially adopts provisions and permit schedule of temporary rule adopted by the Environmental Management Commission to implement the Phase II program. Sets deadlines for sending draft permits to public notice for 1990 census owners and operators of MS4s at Nov 1, 2004, and 2000 census owners and operations of MS4s at May 1, 2005. Provides for voluntary Phase II implementation by urban counties; otherwise, state will implement program and administer post-construction controls in these jurisdictions. Provides for state designation and petition process.

H 1797 AN ACT TO IMPROVE THE QUALITY OF THE ENVIRONMENT IN THE STATE BY APPROPRIATING FUNDS TO IMPROVE IMPLEMENTATION OF THE SEDIMENTATION POLLUTION CONTROL ACT OF 1973, TO COMPLETE STATEWIDE INTERMITTENT AND PERENNIAL STREAM MAPPING, AND TO FULLY FUND THE NORTH CAROLINA ENVIRONMENT AND CLIMATE OBSERVING NETWORK. Would appropriate \$1.5 million to the Division of Land Resources to support 30 new positions in the erosion and sediment control program, \$2 million to the Division of Water Quality to complete statewide mapping of intermittent and perennial streams, and \$600,000 for the State Climate Office of N.C. for 50 new weather stations and data analysis.

S 1056 AN ACT TO REQUIRE LOCAL GOVERNMENTS TO PAY MONETARY COMPENSATION FOR REMOVAL OF LAWFULLY ERECTED OFF-PREMISES OUTDOOR ADVERTISING SIGNS AND TO AUTHORIZE LOCAL GOVERNMENTS TO ENTER INTO RELOCATION AND RECONSTRUCTION AGREEMENTS WITH OWNERS OF NONCONFORMING ADVERTISING SIGNS.

S 1139 AN ACT TO AMEND THE ADMINISTRATIVE PROCEDURE ACT TO CREATE A DISTINCTION BETWEEN THE STANDARD FOR REVIEW OF THE ADOPTION OF RULES AND THE STANDARD FOR REVIEW OF THE CONTENT OF RULES TO BE USED BY THE RULES REVIEW COMMISSION IN REVIEWING TEMPORARY AND PERMANENT RULES AND TO MAKE OTHER CONFORMING CHANGES. Provides that the Rules Review Commission shall first determine if a rule has been adopted in accordance with the APA and if it has not been, return the rule to the agency. If the rule is determined to have been adopted in accordance with the APA, the RRC is then to proceed with content review. Provides the RRC shall not consider questions relating to the quality or efficacy of a proposed rule or the specific means by which the agency has chosen to execute its statutory authority but that it shall restrict its review to determination of whether the rule (1) is within the authority delegated to the agency by the General Assembly, (2) is clear and unambiguous, and (3) is reasonably necessary to implement or interpret an enactment of the General Assembly, Congress or a regulation of a federal agency. Also provides that when objecting to a rule the Commission shall identify each provision of the rule that fails to satisfy any of the content standards set out in G.S. 150B-21.9A(b) and explain how the provision fails to satisfy the standards.

S 1373 AN ACT TO AUTHORIZE GOVERNMENTAL UNITS TO ENTER INTO GUARANTEED WATER SAVINGS CONTRACTS THAT PROVIDE FOR THE INSTALLATION OF WATER CONSERVATION MEASURES IN EXISTING FACILITIES, TO AUTHORIZE THE FUNDING OF THESE CONTRACTS IN THE SAME MANNER AS GUARANTEED ENERGY SAVINGS CONTRACTS, TO RAISE THE CAP FOR FINANCING CONTRACTS FOR ENERGY AND WATER CONSERVATION MEASURES, TO EXPAND THE STATE'S ENERGY POLICY AND LIFE-CYCLE COST ANALYSIS TO INCLUDE WATER CONSERVATION, AND TO MAKE CONFORMING CHANGES

S 1374 AN ACT TO DIRECT THE ENVIRONMENTAL REVIEW COMMISSION TO STUDY WHETHER THE HIGHWAY USE TAX SHOULD BE BASED ON FUEL EFFICIENCY, WHETHER THE VEHICLE REGISTRATION RENEWAL FEE SHOULD BE BASED ON

continued

VEHICLE MILES TRAVELED, AND WHETHER FUNDS GENERATED FROM THESE SOURCES OF REVENUE SHOULD BE USED TO SUPPORT AIR QUALITY AND TRANSPORTATION EFFICIENCY INITIATIVES.

S 1375 (= H 1715; also S 1349 and H 1715) AN ACT TO APPROPRIATE FUNDS TO GLOBAL WARMING INITIATIVES, A NONPROFIT CORPORATION THAT ENCOURAGES INDUSTRIES TO REDUCE THEIR EMISSIONS OF GREENHOUSE GASES AND TO VOLUNTARILY REPORT THEIR EMISSIONS FOR PUBLICATION IN A REGISTRY TO BE PUBLISHED EVERY YEAR BY GLOBAL WARMING INITIATIVES. Would appropriate \$400,000 for continuation of a federally funded pilot program.

S 1376 (= H 1798) AN ACT TO ESTABLISH THE NORTH CAROLINA LOW EMISSION VEHICLES PROGRAM. Would direct the Environmental Management Commission to adopt rules to implement a low emission vehicle program equivalent to California's.

S 1404 AN ACT TO AUTHORIZE THE ISSUANCE OF SPECIAL INDEBTEDNESS TO ADDRESS STATEWIDE CRITICAL INFRASTRUCTURE NEEDS BY PROVIDING FUNDS FOR GRANTS TO LOCAL GOVERNMENT UNITS FOR WATER SUPPLY SYSTEMS, WASTEWATER COLLECTION SYSTEMS, WASTEWATER TREATMENT WORKS, AND WATER CONSERVATION AND WATER REUSE PROJECTS. As title indicates. Also provides for additional funding for the Clean Water Management Trust Fund.

S 1428 AN ACT TO PROVIDE FOR ADDITIONAL STUDY OF HOW BEST TO PROTECT WATER QUALITY AND ENDANGERED SPECIES IN THE EASTERN PORTION OF SWIFT CREEK IN THE TAR-PAMLICO RIVER BASIN AND ITS WATERSHED AND TO APPROPRIATE FUNDS FOR CERTAIN RELATED STUDIES. **JG**

WRRRI Report available

Single copies of WRRRI 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 WRRRI, Box 7912, North Carolina State University, Raleigh, NC 27695-7912 or call (919) 515-2815.

Monitoring and Modeling of the Neuse River Estuary, Phase 2: Functional Assessment of Environmental Phenomena through Network Analysis **Report 343-E February 2004**

Robert R. Christian and James K. Dame, East Carolina University; Galen Johnson and Charles H. Peterson, UNCH Institute of Marine Sciences; and Daniel Baird, University of Port Elizabeth

Management agencies are charged with developing policies that address the degradation of coastal ecosystems such as the Neuse River Estuary (NRE). Monitoring programs for the Neuse have been established to ensure these policies have a strong scientific foundation. However information from the monitoring programs has not necessarily been synthesized to the ecosystem level. As a result, it is difficult to evaluate the severity and consequences of various environmental phenomena. For example:

- What size fish kill is ecologically significant?
- Is a kill of one fish species more significant than an equivalent kill of another?
- Is a fish kill more significant than a comparable kill of benthic invertebrates?

Functional assessment through ecological network analysis can place environmental phenomena within the context of trophic dynamics and foodweb structure. This study demonstrates the application of ecological network analysis to ecosystem management in the lower NRE, North Carolina. The investigators used monitoring data from the Neuse River Estuary Modeling and Monitoring Program (ModMon) and other sources to characterize four reference food web conditions. They then modified conditions to simulate fish kills of pelagic and demersal species and die-off of clams from hypoxia. Four types of output provided by network analysis were then used to evaluate the effects of these modifications on patterns of energy flow relative to reference conditions:

- Quantification of direct and indirect relationships between food web groups.
- Description of flow structure (including trophic structure).
- Description and quantification of material cycling.
- Indexing of system-level attributes (i.e. emergent properties).

The models indicate that fish kills of 10 000, 100 000, and one million individuals can have little or no ecological impact with respect to energy flow within the entire lower estuary as long as standing stocks are relatively large. The biomass of demersal species was much greater than that for pelagic species. Localized effects can be significant, as can effects on specific predators of these groups. Models also indicate that die-offs of clams (*Macoma spp.*) associated with hypoxia in late summer have the potential to affect the diet and production of demersal fish. The indirect effects of hypoxia through an altered food web can be more severe than the direct effects of fish kills. Although ecosystem-level effects from simulated perturbations were minimal, localized effects can be significant, and management decision making may best be done on the basis of these small-scale or localized effects.

WRR I-sponsored research reported

The principal investigator on a WRR I-sponsored research project may fulfill the obligation of providing a final project completion report by submitting a refereed journal publication that meets specific criteria (see policy at <http://www.ncsu.edu/wrr i/WRR Ireportpolicy.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 WRR I. Send requests to WRR I, Box 7912, North Carolina State University, Raleigh, NC 27695-7912 or call (919) 515-2815 or email: water_resources@ncsu.edu.

Greening Development to Protect Watersheds: Does New Urbanism Make a Difference?

Philip R. Berke and Joe MacDonald, UNC-Chapel Hill; Nancy White, Michael Holmes, Dan Line and Kat Oury, NCSU; and Rhonda Ryznar, Tufts University

Journal of the American Planning Association, Vol 69, No. 4, Autumn 2003.

This refereed article has been accepted as the technical completion report for project 70185, *Water Quality and Quantity Impacts of Urban Forms: A Comparative Analysis of Compact and Low-Density Development*, Philip Berke and Rhonda Ryznar, Department of City and Regional Planning, UNC-Chapel Hill, and Nancy White and Dan Line, College of Design and Department of Biological and Agricultural Engineering, NCSU. It has been designated WRR I-2004-JA5.

New urbanism has been widely acclaimed as a more environmentally sustainable form of development than conventional low-density development. Low-density developments generally create more impervious surface that

generates more runoff than do new urban developments. Although large lots may have less impervious surface per lot, the longer roads and driveways, as well as larger parking lots, make the overall design more impervious. While there is little research that evaluates the effectiveness of new urban development regarding watershed protection, the available evidence indicates some advantages of the type of development.

In this project, investigators studied how well new urban design—characterized by high net density, conservation of open space, pedestrian orientation, and mixed uses—supports more environmentally sustainable development. The conceptual framework relates new urban design to the goals of watershed protection, focusing on three categories of techniques:

- protection of hydrologically sensitive areas (e.g., porous soils, steep slopes, forested lands)
- reduction of impervious surfaces
- best management practices to detain and filter stormwater (e.g. bioretention ponds, grass swales, infiltration basins, and landscaping)

Through interviews with key local planning staff, the investigators comparatively evaluated 50 matched pairs of new urban and conventional developments in Georgia, Maryland, North Carolina, South Carolina, and Virginia. Their questionnaires were designed to determine whether a given development incorporated techniques that protect sensitive open spaces, reduce impervious cover and support BMPs that retain and infiltrate stormwater. A separate question was designed to identify whether each development was located on a greenfield or an infill site. They differentiated development by type of location to determine whether new urban development built on greenfield or infill sites are more likely to account for watershed protection than conventional low-density developments.

The investigators found that in greenfields, new urban developments more effectively incorporate watershed protection techniques than conventional developments, mainly through protecting hydrologically sensitive areas. The authors say this is impressive in view of the fact that the new urban developments have average gross densities more than two and one-half times higher than conventional developments in greenfields. They say that new urban developments in greenfields are also more likely to restore degraded streams, incorporate best management practices to control runoff, and use more techniques to reduce and modify impervious surfaces.

In infill areas, new urban developments are more likely to incorporate impervious surface reduction techniques and restore degraded streams than conventional developments. However, both types of development have equivalent levels of sensitive area protection and use of best management practices. Further new urban development in infill sites use fewer techniques to reduce sidewalks, and a much lower percentage prohibit paving of sensitive open spaces. More sidewalks and more pavement in open spaces are likely due to the emphasis on pedestrian orientation in the urban core.

The authors say that their finding suggest that new urban developments in urban core areas should more effectively account for watershed impacts and that emphasis should be placed on building more new urban project in infill sites. They also suggest that new urban development codes and standards could give more attention to watershed protection, and that research should be focused on the institutional and political factors that might support the integration of environmental protection into new urban design.

Workshops and Conferences

The Center for Watershed Protection and others will present the **Watershed Restoration Institute** 2004, September 12 - 17, 2004, at the IslandWood retreat facility, Bainbridge Island, Washington. The Watershed Restoration Institute is a five-day program designed to equip local watershed leaders with the skills, tools and confidence to assess, design and implement effective restoration programs in their home watersheds. This intensive program combines field and classroom time to provide training on urban watershed assessment techniques, stormwater retrofit inventories, stream rehabilitation, riparian reforestation, land reclamation, pollution prevention, watershed stewardship campaigns, and identification and correction of illicit discharges. Continuing Education Units available. Registration and scholarship information at <http://www.cwp.org> or contact Jennifer Zielinski, Center for Watershed protection, phone: 410-461-8323; email: jaz@cwp.org.

The U.S. EPA will sponsor **Getting in Step with Phase II: A Workshop for Stormwater Program Managers** at EPA Region 4 headquarters in Atlanta, Georgia, August 17-18, 2004. The workshop is open to state, regional, and local officials and program managers responsible for developing Stormwater Phase II Programs. No consultants will be admitted. Registration is limited. The six minimum measures will provide the foundation for the workshops and the agenda will be tailored to meet the needs of the MS4 communities in the area. The two-day workshop will provide participants with innovative tools and real-world examples that can be used to implement local stormwater programs. One of the days will include the popular Getting in Step outreach training that EPA has sponsored for nearly 10 years. The workshops will include lively group exercises and many opportunities for discussion. For details and registration go to website: <http://www.tetrattech.com/wstraining/p2wrkshp.htm>.

The N.C. Division of Forest Resources and others will present the **2004 North Carolina Forestry Summit: Sustaining Working Forests** Wednesday, July 28, 10am-3:30pm at the Johnston Community College in Smithfield and Thursday, August 19, 10am -3:30pm at the Statesville Civic Center in Statesville. These summits will provide forest landowners with information on how to keep their forestland productive and healthy. A broad range of speakers will make presentations, including forest landowners, conservationists, forest industry experts and foresters. Registration deadline is June 30. Go to http://www.dfr.state.nc.us/summit_ht.htm to register on the web or download the registration form at: <http://www.dfr.state.nc.us/publications/summit1.pdf>

Websites

Coastal Studies Institute. The University of North Carolina Coastal Studies Institute was founded in 2003 by the University of North Carolina system. CSI has three main purposes: to conduct research, offer educational opportunities and provide outreach in coastal and marine science and management to a wide variety of audiences in North Carolina and beyond. CSI has recently put up its new website at: <http://csi.northcarolina.edu/>.

NC Comprehensive Wildlife Conservation Plan. Congress created the State Wildlife Grants (SWG) program in 2001. This program distributed \$85 million among the states in fiscal year 2002 and continued with an appropriation of \$65 million in FY 2003 and an appropriation of \$75 million in FY 2004. In order to make the best use of the SWG program, Congress charged each state and territory with developing a statewide Comprehensive Wildlife Conservation Plan. These plans will provide an essential foundation for the future of wildlife conservation and a stimulus to engage the states,

federal agencies and other conservation partners to think strategically about their individual and coordinate roles in prioritizing conservation efforts across the nation. North Carolina's Comprehensive Wildlife Conservation Plan is now on the web at: http://www.ncwildlife.org/pg07_WildlifeSpeciesCon/pg7c1.htm

Urban Subwatershed Restoration Manual Series available

The Center for Watershed Protection has spent the better part of the last year developing the Urban Subwatershed Restoration Manual (USRM), a practitioner's guide to restoring urban watersheds. Presented in a series of 11 manuals, the USRM presents practical and useful information on the actual techniques of watershed restoration that can be conveniently accessed and used by planners, engineers, stream biologists and municipal officials. Each manual is profusely illustrated and presents detailed field methods, practice specifications, costs, applicability and tips on implementation. Together, the USRM manuals introduce an integrated framework for urban watershed restoration, outline effective techniques for assessing urban watersheds, and provide a comprehensive review of watershed restoration techniques.

These manuals can be downloaded in .PDF format for FREE from The CWP website at http://www.cwp.org/USRM_verify.htm through September. Color hard copies are also available for a nominal charge.

Offices of the N.C. Department of Environment and Natural Resources formerly in Asheville have moved to Swannanoa. The new offices are at 2090 U.S. Highway 70, Swannanoa, N.C. 28778. The phone number is 828-296-4500, and the fax is 828-299-7043.

North Carolina Drought Management Advisory Council officially advises local governments

by Kelly Porter

Formerly known as the Drought Monitoring Council, the North Carolina Drought Management Advisory Council (NCDMAC) was recognized for doing an outstanding job of monitoring and coordinating drought responses during the drought of 2002 (see *WRRI News* No. 346, July/August 2002). The General Assembly gave the council an official statutory base in House Bill 1062 (2003), assigning it the role of official drought status advisor to local governments. With the authority to issue drought advisories and having the necessary data, the council is able to pinpoint the areas of the state to be under drought advisory rather than declaring an advisory statewide.

The NCDMAC met for their annual meeting on April 15, 2004. They discussed assessments and forecasts as it pertains to streamflow, groundwater levels, reservoir levels, agriculture, climate, public water supply, and the outlook for the summer of 2004. As for 2004, the spring season has been dry. However, most streams are flowing in the near normal range and the reservoir levels are within normal range. There is nothing to determine whether the summer season will be dryer or wetter than normal. The council continues to prepare for the future by learning from the past and coordinating statewide information so North Carolina will be better prepared for future drought events.

Woody Yonts, Chairman of the NCDMAC and Water Resource Engineer for the NC DENR Division of Water Resources, said that as a result of the 1986-1988 drought, legislation was passed in 1989 requiring all public water systems to have Local Water Supply Plans (LWSP) and update these plans every five years (North Carolina G.S. 143-355(l)). In 1992, the first LWSP was completed that included surface area maps, a plan for where additional water would come from, and how much water

could be accounted for. The drought of 2002 made local water suppliers aware of the importance to have the ability to make transfers between water supplies. As a result there are more connections and partnerships between local water supplies. In August 2003 the General Assembly passed amendments to House Bill 1062 that required private community water systems serving 1,000 or more

service connections or 3,000 or more individuals to write up LSWSs. Also public water suppliers and private community water suppliers are now required to include drought response plans as part of their LSWS. As of January 1, 2004, the first LSWSs prepared by over 600 private community water systems became due. Yonts stated

continued next page

North Carolina Precipitation/Water Resources

Rainfall (+/- average)

	March	April
Asheville	2.02" (-2.57")	2.95" (-0.55")
Charlotte	1.61" (-2.78")	1.35" (-1.60")
Greensboro	1.61" (-2.24")	2.53" (-0.90")
Raleigh	3.31" (-0.72")	1.73" (-1.07")
Wilmington	1.85" (-2.37")	1.35" (-1.59")
Elizabeth City	3.12" (-1.55")	2.56" (-0.44")

Streamflow

Index Station (County, Basin)	March mean flow (CFS) (% of long-term median)	April mean flow (CFS) (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	303 (67%)	229 (57%)
Oconaluftee River at Birdtown (Swain, Tenn)	638 (76%)	536 (71%)
French Broad River at Asheville (Buncombe, FB)	1,911 (61%)	2,083 (77%)
South Fork New near Jefferson (Ashe, New)	446 (78%)	502 (92%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	72.5 (49%)	108 (90%)
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	153 (63%)	194 (84%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	272 (48%)	369 (80%)
Rocky River near Norwood (Stanly, Yadkin/Pee-Dee)	933 (36%)	446 (31%)
Deep River near Moncure (Lee, Cape Fear)	1,453 (49%)	820 (47%)
Black River near Tomahawk (Sampson, Cape Fear)	914 (68%)	916 (94%)
Trent River near Trenton (Jones, Neuse)	162 (60%)	164 (76%)
Lumber River near Boardman (Robeson, Lumber)	2,105 (90%)	1,267 (84%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	125 (41%)	154 (83%)
Potecasi Creek near Union (Hertford, Chowan)	158 (42%)	183 (86%)

Groundwater

Index well (Province)	March monthly mean water level (ft) (Monthly mean last month - ft)	April monthly mean water level (ft) (Monthly mean last month - ft)
Blantyre (Blue Ridge)	28.83 (29.57)	29.35 (28.83)
Mocksville (Piedmont)	15.74 (16.29)	15.68 (15.74)
Simpson (Coastal Plain)	3.24 (3.05)	3.61 (3.24)

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

that local governments are doing a better job monitoring water use and demand projections.

Ryan Boyles, Associate State Climatologist, mentioned that the US Drought Monitor creates a consistency from region to region. Information used in determining the Drought Monitor comes from monitoring streamflow, groundwater levels, and rainfall amounts. Boyles explained that since there is no El Niño or La Niña activity it is harder to determine whether the 2004 summer season will be dryer or wetter than normal in North Carolina. There is an effort to identify more specifically what is happening in North Carolina with assessment of water supply and depiction of drought that will provide a more focused drought monitor for North Carolina. Currently, the NCDMAC Drought Advisory Development Team is developing a better way to identify and report water supply conditions in North Carolina and portions of adjoining states. In addition, a system is being designed (in experimental stage) that will allow state regional engineers with Public Water Supply to report information about local water supply conditions via the internet.

For more information:

NCDMAC: <http://www.ncwater.org/drought/>

State Climate Office of North Carolina: <http://www.nc-climate.ncsu.edu/>

U.S. Drought Monitor: <http://www.drought.unl.edu/dm/monitor.html>

People

Dr. Kerry Smith, NCSU University Distinguished Professor of Agriculture and Resource Economics, has been elected to the National Academy of Sciences. Smith is Director of the NCSU Center for Environmental and Resource Economic Policy. CEnREP provides an information source for state policy makers on the benefits and costs of policy interventions available to address environmental quality issues related to rapid population growth and change in North Carolina. Smith's research focuses on non-market valuation of environmental resources, the role of public information in promoting private risk mitigation, environmental policy and induced technical change, and non-point source pollution and nutrient policy. His latest research considers the prospects for linking economic and ecological models to enhance the evaluation of environmental policies.

Dr. Rooney Malcom, NCSU Professor of Civil Engineering, retired at the end of the academic year after 31 years of teaching, outreach, and research. His research interests are water resources and civil engineering design, and many in North Carolina call him "Mr. Stormwater" because of his pioneering work in urban stormwater management. His publications include the widely cited "Elements of Urban Stormwater Design" as well as two WRRI reports on projects related to urban stormwater.



WRRI NEWS SUBSCRIPTION UPDATE

(ADD? DELETE? ADDRESS CHANGE?)

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It will help tremendously if you will return changes promptly so that they can be made prior to our next mailing. If we do not hear from you, we will assume your address is correct as shown on the label.

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

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Return to:

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

Erosion and Sedimentation Control Basic Planning and Design Workshop

October 5-6, 2004
Holiday Inn-Select, Hickory, NC

November 9-10, 2004
Sheraton Inn, New Bern, NC

These workshops are structured to acquaint design professionals with the N.C. Sedimentation Pollution Control act, the rules implementing the act, and design standards for erosion and sedimentation control BMPs. The tentative agenda includes presentations on calculating flow, selecting erosion control matting, innovative sedimentation basins, energy dissipator design, utility lines, establishing vegetation, and construction of BMPs.

Professional Engineers can earn 12 PDHs, and landscape architects can earn 10 continuing education units for completion of both days. A final agenda will be posted in late June with registration information coming in late July at <http://www.ncsu.edu/wrri/erosionseminars.html>.

Sponsored by the N.C. Sedimentation Control Commission, the N.C. Land Quality Section, and the Water Resources Research Institute.



2004 Tentative Luncheon and Forum Schedule

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

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

Updates to this schedule will be posted on
web site:

<http://www.ncsu.edu/wrri/events/ncwra>

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>

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