

President announces Clean Water Action Plan

In his 1998 State of the Union address, President Clinton announced a new five-year \$2.3 billion initiative to speed restoration of the nation's waterways. At the center of the initiative is the "Clean Water Action Plan" developed at the request of Vice President Gore by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Agriculture (USDA) in collaboration with other federal agencies and with input from state, tribal, and local governments and the public.

According to EPA, the action plan is built around four key tools to achieve clean water goals:

- Developing a "Watershed Approach" in which federal, state, tribal and local governments as well as the public and private sector collaborate to set priorities and take action to improve the health of watersheds.

Collaborative watershed assessments will be the vehicle for targeting new resources requested in the President's FY 1999 budget to clean up waters that are not meeting water quality goals. Funds made available to federal agencies through the FY 1999 Clean Water and Watershed Restoration Budget Initiative will be used to help states implement plans to restore watersheds. Federal agencies will also provide small grants to local organizations that want to take a leadership role in building local efforts to restore and protect watersheds.

- Strengthening federal and state standards and making existing programs more effective.

Phase II of the NPDES storm water rules will be finalized (see page 4), and implementation of Phase I programs will be monitored. Efforts will be made to improve monitoring of water quality at beaches, improve standards, and make public health risk information more accessible. EPA will establish by the year 2000 numeric criteria for nutrients and will publish and implement an Animal

Feeding Operation Strategy to minimize the environmental and public health impacts of animal feeding operations. (Draft released Mar 5. Go to web site <http://www.epa.gov/owm/afo.htm>.)

- Improving water quality by improving land conservation and stewardship through more effective application of federal resources and technical expertise.

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Director's Forum*Kenneth H. Reckhow, Director, Water Resources Research Institute***On-site versus regionalized wastewater treatment**

One of the seemingly inevitable consequences of population growth in North Carolina is the connection of homes previously served by on-site wastewater treatment (septic tanks) to municipal or regional wastewater collection and treatment systems.

Is this a good idea?

There is no quick and easy answer to that question, but there are a number of issues worth exploring before adopting a regionalized wastewater system as the only viable option.

Before exploring these issues, however, it is important to acknowledge that in some areas growth may result in a population density that is best served by a community wastewater collection and treatment system. Smaller community or municipal systems serve this essential need in these designated service areas. In this discussion, we focus on land with existing housing of relatively low density and the undeveloped areas between these existing housing zones. Collectively, these areas might be served by current on-site units or they might be connected by a regional wastewater system.

Now, let's briefly outline the issues of concern. To varying degrees, the decision is likely to reflect costs (and distribution of costs), environmental impacts, human health effects, and socioeconomic impacts. In essentially all cases, the immediate motivation for decision is either the desire to accommodate population growth or the perception of widespread failure of septic tanks. Here, we focus on the environmental impacts and human health effects of each option.

For septic tanks serving individual homes, there are relatively few impacts of concern. Septic tank leach fields can fail; that is, contaminated effluent from these fields can penetrate the land surface and pose a local human health problem. This is less likely to become an environmental problem because of the

small magnitude and diffuse nature of these individual system discharges in the environment.

Failure of the leach field may be due to a number of factors, including faulty design, lack of tank maintenance, and saturated soils. In some cases, the solution is evident—proper tank maintenance or installation of a second leach field. Septic tank effluent may also penetrate the groundwater, contaminating groundwater and/or surface water.

How widespread are septic tank system failures and groundwater contamination? In most areas, leach field failure leading to surface penetration of effluent is probably rare; groundwater contamination is difficult to assess, but it too seems unlikely on a broad scale. In either case, it seems prudent to confirm the extent of failures and the lack of on-site or localized alternatives before

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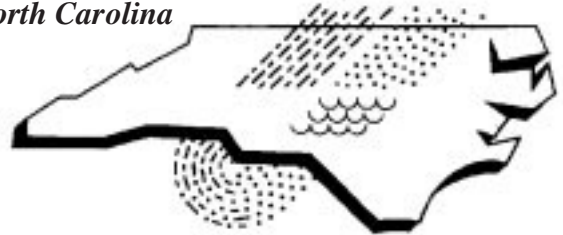
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undertaking regionalization of wastewater treatment.

Aside from the costs and benefits of population growth and increased density made possible by regionalized wastewater collection systems, the environmental and human health effects of regional wastewater treatment can be substantial. By centralizing wastewater collection and treatment, the discharge is converted to a large, concentrated point source. Even with advanced treatment technology, the point source will have an impact on the water quality of the receiving waterbody.

In addition to discharging at a concentrated point source, regionalized wastewater collection systems provide the infrastructure necessary for population growth and development. This growth, in turn, has a variety of environmental impacts. Specific to water, these impacts include increased volume and rate of storm water runoff, increased quantity and variety of water pollutants in runoff, and increased demand for drinking water supply from surface and groundwater sources. All of these can lead to an overall degradation of ambient surface water quality.

In fact, current experience demonstrates that even if the state-of-the-art in treatment technology is employed to minimize the impact of the wastewater treatment plant discharge, ambient water quality standards may still be violated by nonpoint source runoff alone.

In summary, there are a number of issues that should be considered when examining wastewater treatment options in areas subject to population growth. Further, it should not be assumed that there is a logical and inevitable technological progression from "old style" septic tanks to the modern technology of regional wastewater treatment plants.

Without question, on-site wastewater treatment, including septic tanks, serve an important function in North Carolina. This technology does work and is reliable when adequately designed and maintained. Water quality and water resource protection is sometimes best served by seemingly simple solutions.

Clean Water Action Plan

continued

By 1999, the U.S. Department of Interior (DOI) and USDA will take the lead in developing a unified federal policy to enhance management of federal lands for water quality and aquatic ecosystem health. By improving federal restoration programs and expanding incentives to landowners, wetland acreage will be increased by 100,000 acres per year by the year 2005.

NOAA will lead a federal effort to reduce polluted runoff to coastal waters and to address fisheries management and emerging problems like *Pfiesteria*. Part of the effort will be technical and financial assistance for implementation of states' Coastal Nonpoint Pollution Control Programs. (See page 7.)

USDA with other partners, will establish by 2002 two million miles of conservation buffers to reduce polluted runoff. New funding for the Environmental Quality Incentives Program (EQIP) will support watershed restoration strategies. DOI will expand its Partners for Wildlife Program to restore degraded fish and wildlife habitats.

- Providing to citizens and officials clear, accurate and timely information about the health of their watersheds and safety of their beaches, drinking water, and fish.

Federal agencies, led by the U.S. Geological Survey, will work with states and tribes to improve monitoring and assessment of water quality, focusing on nutrients and related pollutants. Federal agencies will work with states and tribes to develop and use state-of-the-art communications technologies to get meaningful information to the public about water quality conditions in their communities.

The full text of the Clean Water Action Plan is accessible on the EPA web site at <http://www.epa.gov/cleanwater/action>.



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To order call the Conservation Technology Information Center at Purdue University at 765-494-9555.

The cost is \$12 for the first CD and \$7 for each additional CD with the same order.

The project was funded by EPA Region VII through the Nebraska Department of Environmental Quality.

EPA proposes second phase of NPDES rules to manage storm water runoff

Eighty-four more cities and urbanized counties in North Carolina and all construction sites larger than one acre will be required to get permits and manage storm water runoff under rules proposed by the U.S. Environmental Protection Agency in January.

The rules are the long-anticipated "Phase II" Storm Water regulations, which will expand the national program put into place in 1990 to regulate storm water discharges as "point sources" under the National Pollutant Discharge Elimination System (NPDES). Issuance of regulations to control "unregulated discharges" to waterbodies is required by section 402 (p) of the Clean Water Act of 1987.

Phase I Storm Water Program in North Carolina

Under Phase I storm water rules, cities or urban areas with a population of 100,000 or more (in North Carolina those are Charlotte, Raleigh, Durham, Greensboro, and Winston-Salem and Cumberland County) were required to develop storm water management programs and obtain NPDES permits to discharge storm water to surface water. In addition, certain industrial operations and construction sites larger than 5 acres were required to obtain NPDES permits and manage storm water runoff.

In North Carolina, Phase I storm water requirements for industries and construction sites were implemented through "general permits." A general permit applies to a class of dischargers and sets out what individuals in that group must do to be in compliance. Construction sites larger than 5 acres in North Carolina are considered to be in compliance with the NPDES general permit for storm water for land disturbance if they obtain and follow an erosion and sediment control plan approved under the state program or a delegated local program.

Phase II Storm Water Rules for Construction Sites

Under the Phase II rules, construction sites that disturb between 1 and 5 acres will have to get permits and control storm water runoff. Although EPA is taking comment on a number of options for regulating small construction sites, according to Bill Mills with the storm water section of the N.C. Division of Water Quality, it is likely that small construction sites in North Carolina will also be regulated under the existing general permit for land disturbance already in place.

The N.C. Sedimentation Pollution Control Act already requires all land disturbing activities involving more than one acre (other than agriculture, forestry, or mining) to obtain and follow an approved sediment and erosion control plan. Therefore, according to Mills, implementing Phase II storm water rules for small construction sites could involve simply developing a general permit and attaching it to all erosion and sedimentation control plan approvals under 5 acres, as is currently the case for larger sites.

Under the proposed Phase II rules, states could also designate construction sites less than one acre and require them to control runoff. In addition, EPA is taking comment on a proposed mechanism by which waivers could be granted for certain construction sites.

Phase II Storm Water Rules for Small Municipalities and Urban Areas

Under proposed Phase II storm water rules, there are four ways by which municipalities with a population under 100,000 could be designated to implement a storm water management plan.

First, the rules list cities in urbanized areas and urban counties proposed to be automatically designated (see list in box).

Second, other small municipalities outside urbanized areas could be designated by the state. The state must evaluate for designation all municipalities located outside urbanized areas that have a storm sewer system and that have a population of at least 10,000 and a population density of at least 1,000 (and may evaluate for designation even smaller municipalities outside urbanized areas).

Third, the state must also evaluate for possible designation any municipal storm sewer system contributing substantially to the storm water pollutant loadings of a regulated physically interconnected municipal storm sewer system.

And, finally, municipalities could be designated on a case-by-case basis based upon citizen petition and investigation by the state.

Small municipal storm sewer systems designated must develop storm water programs within three years and 90 days of the date the final regulations take effect (June 1, 2002 at the earliest). With June 2002 as a deadline for permit applications, local governments would have to fully implement programs by June 2007.

States could also waive storm water management requirements for municipalities judged not to be contributing to water quality problems. In order to enact case-by-case waivers, states would have to justify their actions within the framework of an implemented watershed plan that includes wasteload allocations based on the equivalent of total maximum daily loads (TMDLs) for pollutants of concern.

General permits for small municipalities

It is possible that the storm water management requirements for smaller municipalities and urban areas could be

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implemented through general permits. The proposed rules would allow the state NPDES permitting authority (the Division of Water Quality) to issue either individual permits to designated municipalities and counties or to issue general permits that would set out what a city or county must do to be considered in compliance. The rules recommend issuing general permits for the designated jurisdictions on a watershed basis, tailored to watershed conditions and reflecting an approved watershed management plan.

Required program components

EPA would develop a "model" general permit which states that want to use the general permit approach could adopt and/or modify. Municipal/urban area storm water management programs under either individual or general permits must include, at a minimum, measures to address:

- public education and outreach
- public involvement
- illicit discharge detection and elimination
- construction site runoff control
- post-construction storm water management in new development and redevelopment
- pollution prevention and good housekeeping at municipal operations

To be covered under a general permit, a municipality would submit a Notice of Intent (NOI) which would (1) describe the best management practices it would use to implement each of the six minimum measures categories, (2) state measurable goals for each of the minimum measures, and (3) state the month and year each minimum measure would be started and completed or the frequency of the action.

To comply with the general permit, a municipality would have to implement the six minimum measures and submit implementation reports.

It is also possible that small municipalities near large municipalities that

have approved, permitted storm water management programs under Phase I rules could ask to become co-permittees and implement control measures approved for the large municipality.

This is only a very brief description of some of the major features of the proposed Phase II storm water rule. The proposed rule covers more than 100 pages in the January 9, 1998 (Vol 63 No 6) *Federal Register*. It is quite complex and includes numerous options upon which EPA will take comment. A copy of the proposed rules and instructions for submitting comment are available through the Federal Register Online via GPO Access (http://www.access.gpo.gov/su_docs/aces/aces140.html) and at the EPA web site (<http://www.epa.gov/owm/sw2.htm>). Comments on the proposed rules are due to EPA by April 9. A final rule is due in March 1999.

Fears and fantasies

Interested parties are reading a great deal into the proposed Phase II storm water rules.

Some environmental attorneys are predicting a broadening flood of citizen suits to enforce implementation of storm water requirements. A number of enforcement actions have already been brought against state and local agencies in California. One suit resulted in a conclusion by a U.S. judge that the California Department of Transportation had merely paid "lip service" to requirements of its storm water permit and an order that Caltrans implement storm water control measures.

Some local government officials think that the NPDES permitting system will be used as an enforcement tool to implement TMDLs and to control the flow rate and volume of urban storm water, which, they fear, could lead to local land-use regulation by the federal government. (The proposed rules provide that when an approved TMDL study indicates that measures more stringent than the six minimum measures are needed to meet the limitations on pollutants of concern, additional requirements can be imposed.)

Since some of the core features of the storm water management program (such as NPDES permitting) have been determined by litigation brought under the Clean Water Act, the only way to change those features is to change the act. Therefore, fears and fantasies about the future of storm water regulation could play themselves out in the current session of Congress if lawmakers decide to take up reauthorization of the act.

N.C. municipalities and counties proposed to be designated to develop and implement storm water management programs under the Phase II National Pollutant Discharge Elimination System Storm Water rules

Alamance County	High Point
Apex	Hildebran
Archdale	Hope Mills
Asheville	Indian Trail
Belmont	Jacksonville
Belville	Jamestown
Bessemer City	Kannapolis
Biltmore Forest	Landis
Black Mountain	Leland
Brookford	Long View
Brunswick County	Lowell
Buncombe County	Matthews
Burke County	McAdenville
Burlington	Mebane
Cabarrus County	Mecklenburg County
Carrboro	Mint Hill
Cary	Montreat
Catawba County	Mount Holly
Chapel Hill	Nash County
China Grove	New Hanover County
Clemmons	Newton
Concord	Onslow County
Conover	Orange County
Cramerton	Pineville
Dallas	Pitt County
Davidson County	Randolph County
Durham County	Ranlo
Edgecombe County	Rocky Mount
Elon College	Rowan County
Fletcher	Rural Hall
Forsyth County	Spring Lake
Garner	Stallings
Gaston County	Thomasville
Gastonia	Union County
Gibsonville	Wake County
Goldensboro	Walkertown
Graham	Wayne County
Greenville	Weaverville
Guilford County	Wilmington
Harnett County	Winterville
Haw River	Woodfin
Hickory	Wrightsville Beach

EPA proposes rule requiring Consumer Confidence Reports on drinking water

Public right-to-know provisions of the 1996 amendments to the Safe Drinking Water Act (SDWA) require community water systems to provide reports to consumers about where their drinking water comes from, what is in it, and what the sources of contamination are.

Community water systems are all those that deliver drinking water to 15 connections and 25 year-round residents. The intention of the reporting requirement is to educate consumers about the importance of protecting drinking water supplies and to give consumers with special health needs information to make decisions about their drinking water.

To implement the Consumer Confidence Reports requirement of the SDWA amendments, the U.S. Environmental Protection Agency (EPA) in February proposed rules setting out what must be included in the reports and how they must be delivered or made available to consumers. The rules were developed by EPA with input from stakeholders through the Consumer Confidence Report Working Group of the National Drinking Water Advisory Council. EPA is taking public comment on the proposed rules until March 30.

Following are the major requirements for Consumer Confidence Reports:

- They must identify the type (groundwater or surface water) and sources (commonly used names and locations of water bodies) of water delivered by the water system. Maps are encouraged.
- They must include an explanation about contaminants that may **reasonably** be expected to be present in drinking water, including bottled water. The rule provides language to address this requirement.
- They must include generic information about the likely sources of contaminants that are regulated under the SDWA and that have been detected in a system's finished drinking water. If a Source Water Assessment has been done for the source, the report must tell customers how to obtain information from the assessment. (Under the 1996 amendments, Source Water Assessments, which will identify actual or potential sources of contamination, will eventually have to be done for all drinking water sources.)
- They must include a table showing detection data for contaminants for which the system is required to monitor, including contaminants that must be controlled and contaminants for which only monitoring is mandatory. The table must include maximum contaminant levels (MCLs) for detected regulated contaminants presented in whole units (included in an appendix of the proposed rule), as well as maximum contaminant level goals and detection levels. The table must also include the likely sources of detected regulated contaminants, either generic sources found in an appendix or more specific source information obtained through a source water assessment.
- The report must also include, in a section separate from the table if the system desires, results of voluntary monitoring that has detected radon or Cryptosporidium and any other contaminant that the system elects to include. Systems that detect radon or Cryptosporidium must provide a summary of the monitoring results, information on how the monitoring was performed, and an explanation of the significance of the results.
- They must include specific information for every regulated contaminant detected in violation of an MCL, including a clear and readily understandable explanation of the violation, the potential health effects, and the actions taken by the system to address the violation. This information may, but need not be, included in the table described above. The description of potential adverse health effects should use language provided in an appendix of the rules.
- They must include information on violations of drinking water regulations other than MCLs—such as monitoring requirements—along with a clear and readily understandable explanation of health significance of the violation.
- They must include notice if the system is operating under a variance or exemption, the basis on which the variance or exemption was granted, and steps the system is taking to install treatment or otherwise comply with terms of the variance or exemption.
- They must identify several categories of person who may be more vulnerable than the general population to infections that could be caused by contaminants in drinking water and encourage them to seek advice from health providers.

In general, community water systems must mail a Consumer Confidence Report to each customer. Governors of states may waive the requirement to mail for systems that serve fewer than 10,000 customers. If a waiver is granted to these systems, they must publish the report in local newspapers and make it

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EPA/NOAA findings note deficiencies in N.C.'s coastal nonpoint pollution program

The U.S. Environmental Protection Agency (EPA) and the National Oceanic and Atmospheric Administration (NOAA) have delivered to the N.C. Department of Environment and Natural Resources (DENR) their assessment of

SDWA Consumer Confidence Reports

continued

available on request. Systems with fewer than 500 customers may simply notify customers the report is available and provide it on request. All systems must provide a copy of their reports to the state drinking water program.

EPA has committed to issue more detailed guidance, including examples, to help systems comply with the report requirements. The agency will also develop computerized "fill-in-the-blank" templates that water systems will be able to use if they like. These supplemental materials are expected to be published prior to the effective date of the rules. The rule becomes effective 30 days after the final version is promulgated. A final rule is required by August 1998. Systems have 13 months after the effective date to deliver their first report.

EPA has proposed in the Consumer Confidence Report rules that states be allowed to adopt alternative requirements concerning the form and content of the reports. However, EPA also says that much of what must be in the reports is dictated by the 1996 SDWA amendments, and any state alternative requirements would not differ greatly from those proposed by EPA.

This is only a brief summary of the major features of the proposed rules. A complete copy of the rules published in the February 13, 1998 (Vol 63 No 30) Federal Register is available from the Federal Register Online via GPO Access (http://www.access.gpo.gov/su_docs/aces/aces140.html).

how well the state's Coastal Nonpoint Pollution Control Program conforms to requirements issued under Section 6217 of the 1990 Coastal Zone Act Reauthorization Amendments (CZARA).

Since North Carolina's Coastal Nonpoint Pollution Control Program is largely a catalog of the state's existing nonpoint source control regulations that apply to the coastal area, the assessment is also a commentary on the state's nonpoint source efforts.

Requirements for a coastal nonpoint source control program

CZARA requires that states with approved coastal zone management programs develop and submit coastal nonpoint pollution control programs that (1) extend far enough inland to include those nonpoint source that, individually or cumulatively, have a significant impact on coastal waters and (2) include enforceable policies and mechanisms to ensure implementation of conforming nonpoint source "management measures" in the categories of forestry, agriculture, urban, marinas and boating, and hydromodification.

North Carolina's program was developed by the N.C. Division of Coastal Management (DCM) in cooperation with the Division of Water Quality through an intensive effort to catalog existing programs that control nonpoint source pollution in the coastal area, determine if they meet requirements under CZARA, and identify new or modified measures needed to craft an approvable program.

Draft documents in each nonpoint source category, collectively addressing 56 federally required management measures for coastal nonpoint pollution control, underwent extensive public review. The state's program was submitted to EPA and NOAA in July 1995.

In February 1998 EPA and NOAA notified DENR that they have given North Carolina's program "conditional approval." Following are some of the agencies' findings:

- The area of the state proposed to be covered by the program does not include land and water that could have a significant impact on the coastal waters of the state. The state's program proposes that only the "20 coastal counties" subject to the N.C. Coastal Area Management Act be covered by the Coastal Nonpoint Program. The state is advised to "review relevant information and determine an appropriate . . . management area ("6217 area") boundary to protect the State's coastal waters from nonpoint source pollution."
- In regard to agriculture, the state's program does not include management measures for pesticides and irrigation water, and does not include the limiting nutrient concept as part of the nutrient management measure. In addition, the state has not demonstrated that it has enforceable mechanisms to ensure that all confined animal operations in the "6217 area" implement the waste management measure or to ensure implementation of the agriculture erosion and sediment management measure.
- In regard to management measures for erosion and sediment control, the program does not include measures to require 80 percent reduction of total suspended solids (TSS) in runoff from new development, and the state has not shown that it can implement measures to control erosion and sediment from construction sites smaller than one acre.
- The programs does not include management measures for comprehensive watershed protection or to reduce pollution from existing nonpoint sources.

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- In regard to management measures for on-site disposal systems (septic systems), the state's program does not provide for adequate separation distances between on-site system components and groundwater that is closely hydrologically connected to surface waters, measures for inspection and maintenance of systems serving single family residents, or denitrifying systems where nitrogen-limited surface waters may be adversely affected by excess nitrogen loadings from on-site systems.
- In regard to roads, highways and bridges, the state's program does not include management measures for runoff systems. The findings note that N.C. DOT and DWQ are developing a program to monitor, evaluate and improve the quality of road and highway runoff.
- In regard to marinas and recreational boating, the state's program does not include management measures for fueling station design. In addition, the state has not shown that it can implement measures to assure clean boat operation.
- In regard to hydromodification, the state's program does not include a comprehensive process to identify and solve existing nonpoint source problems caused by streambank and shoreline erosion.
- In regard to wetlands and riparian areas, the state has not demonstrated that it has enforceable policies and mechanisms to ensure protection of wetlands and riparian areas outside designated Areas of Environmental Concern.

According to Rich Shaw, DCM Assistant Director for Policy and Planning, the findings also spell out what the state must do to bring the program into compliance. Shaw said that updating the plan by including measures adopted since the plan's submittal might address some of the deficiencies.

Future direction of the coastal nonpoint pollution control program

Under CZARA Section 6217, coastal states that do not submit conforming programs are supposed to lose increasing percentages of federal grant money for statewide nonpoint source control programs authorized by Section 319 of the Clean Water Act (CWA) and operational funds under Section 306 of the Coastal Zone Management Act (CZMA).

However, according to Peyton Robertson, Water Quality Specialist with NOAA's Coastal Program, the agencies are not eager to "drop the hammer." All state coastal nonpoint pollution control programs have been given conditional approval and will have at least five years to meet their conditions.

Meantime, Robertson said, NOAA, EPA, and other federal agencies are going to collaborate with state coastal zone and water quality agencies to figure out how to make the "6217 program" workable.

President Clinton's recently announced Clean Water Action Plan targets implementation of states' coastal nonpoint pollution programs, and his 1999 budget requests \$12 million for technical and financial assistance through NOAA, as well as increased funding for nonpoint source programs in EPA and the U.S. Department of Agriculture.

However, the CZARA 6217 program created jurisdictional overlap not only for the federal agencies involved but also for state coastal zone and water quality agencies, and those problems will have to be addressed.

With the Clean Water Action Plan, federal agencies are placing emphasis on inter-agency coordination and efficient use of funding resources. States will be encouraged to join that approach.

EPA and NOAA are holding a workshop in April so that coastal states and federal agencies can develop a "joint state/federal vision for coastal nonpoint pollution control." The workshop will

include state coastal nonpoint source program coordinators, section 319 water quality coordinators, and Natural Resources Conservation Service personnel responsible for distributing funding under the Environmental Quality Incentives Program (EQIP).

According to Robertson, one of the purposes of the workshop is to acknowledge all the hard work that went into developing the states' coastal nonpoint pollution control programs and the benefits that came from the effort—one of which was an evaluation of coastal nonpoint source control programs "on the ground."

In addition, said Robertson, the agencies will begin the process of envisioning how all the various nonpoint source programs—CZARA 6217, CWA 319, EQIP and the recently proposed NPDES Phase II storm water rules—can fit together and complement one another to reduce nonpoint source pollution in coastal waters.

New guidance issued

On March 12, NOAA and EPA published in the *Federal Register* (Nov 63, No 48) proposed administrative changes to Coastal Nonpoint Pollution Control Program Guidance. According to the announcement, after consultation with the states the agencies concluded that "while the goals of the CZARA program remain valid, the program and schedules originally conceived by NOAA and EPA were extremely ambitious and additional flexibility would be needed to enable the States to successfully implement their programs." The changes include a 15-year implementation timeframe.

Public comment on the proposed administrative changes will be taken until May 11, 1998. Copies are available from Joseph P Flanagan, NOAA Coastal Programs Division (301) 713-3121 Ext. 201.

According to the announcement, NOAA and EPA intend to have all state coastal nonpoint pollution control programs fully approved under the revised guidance by December 1999.

Changes in DENR will focus on delegation to local governments rather than reorganization

Environment and Natural Resources (ENR) Secretary Wayne McDevitt told the N.C. General Assembly's Environmental Review Commission in February that months of study and discussion with stakeholders have convinced him that departmental reorganization is not the key to providing better protection of the state's environment.

McDevitt announced that he will shift only one program: The Pollution Control Branch of the Groundwater Section of the Division of Water Quality (which oversees the underground storage tank regulatory and cleanup programs as well as the Leaking Underground Storage Tank Fund) will be moved to the Division of Waste Management (which oversees cleanup of other contaminated sites) effective July 1.

However, McDevitt said the department is looking at the possibility of delegating to local governments implementation of some permitting programs, including private well construction, package wastewater plants, domestic nondischarge, and storm water. He said the department will explore with local governments options that would let them

Riparian Buffer rule remains in effect in Neuse River Basin

According to the Division of Water Quality, the Neuse River Nutrient Sensitive Management temporary rule on riparian buffers which was amended in January 1998 remains in effect.

Questions about the rule's requirements should be directed to Beth McGee at (919) 733-5083 Ext 575.

DWQ is developing a technical guidance manual to help implement the riparian buffer rules. The manual is expected to be finalized soon. To receive a copy when it is available, send an email request to: annette@dem.ehnr.state.nc.us or call Annette Lucas at (919) 733-5083 Ext 587.

implement the programs if they want to and are able to but allow DENR to take back the programs if problems arose. If local governments are interested in this approach, said McDevitt, the department will request that the General Assembly amend some statutes to allow delegation and to give local governments the authority to levy fees to carry out their new responsibilities.

McDevitt noted that it is not the department but the General Assembly that will make decisions about placement of programs administered by the Division of Environmental Health (DEH). Departmental officials are holding discussions with stakeholders and DEH staff to develop a departmental position, which will be presented to the ERC. At issue are placement of the On-site Wastewater and Public Water Supply sections of DEH.

How's the water quality in the Lumber River Basin?

Come share your thoughts at the Lumber River Basin Workshops
(Includes the Lumber and Waccamaw Rivers and Coastal Areas Within Brunswick County)

The N. C. Division of Water Quality is beginning the process of updating the 1994 Lumber River Basinwide Water Quality Management Plan. The draft basin plan will be available for public review in late 1998 and the plan is scheduled to be finalized in May 1999. Please plan to attend one of the workshops and get involved in protecting the water quality of the Lumber River basin.

April 8, 1998 - 1:00 p.m. - 4:00 p.m
Government Center Complex
Brunswick County Extension Ctr.
Bolivia, NC

April 23, 1998 - 9:00 a.m. - 11:45 a.m.
O. P. Owens Bldg
Cooperative Extension Office
Lumberton, NC

For More Information Contact:
Darlene Kucken, Basinwide Planner,
Division of Water Quality, P.O. Box
29535, Raleigh, NC 27626-0535
(919) 733-5083 Ext. 354

February/March action of the N.C. Environmental Management Commission

At its regular meeting in February, the N.C. Environmental Management Commission (EMC) took the following action:

- Adopted air quality rules or rule changes relating to visibility, particulates, fugitive dust emissions, volatile organic compound reasonable available control technology, and permit fee applicability; repealed the perchloroethylene dry cleaning system rule; and adopted amendments to incorporate final federal requirements and permitting procedures for case-by-case maximum achievable control technology. For information, contact Tom Allen with the Division of Air Quality at (919) 733-1489.
- Approved a schedule by which existing wastewater treatment facilities discharging into Nutrient Sensitive Waters must comply with the technology standards for removal of nitrogen and phosphorus established by the Clean Water Responsibility Act. The requirements apply to plants that discharge more than 0.5 million gallons per day into the Tar-Pamlico, New, Chowan, and Neuse Rivers and the Jordan Lake Watershed. For information, contact Bobby Blowe with the Division of Water Quality at (919) 733-6900.
- Approved a request from the Town of Highlands for a major variance from Water Supply Watershed Protection rules for a site located within the Cullasaja River WS-III watershed; revisions to ten-mile protected area water supply watershed boundaries

continued

EMC action

continued

for the Dan River (Madison), Mayo River (Mayodan), First Broad River (Cleveland County Sanitary District), and South Fork Catawba River (High Shoals); and revisions of the Falls Lake Water Supply Watershed Critical and Protected areas in Wake, Durham, Franklin and Granville counties (necessitated by the raising of the dam height and normal pool elevation of Falls Lake).

- Approved reclassifying East Fork Pond Creek (Avery and Watauga counties) from its source to the backwaters of Santis Lake from WS-II Trout to WS-III Trout, Santis Lake from WS-II Trout Critical Area to WS-III Trout, and a connecting stream from WS-II Trout Critical Area to C Trout.
- In response to objections by the Rules Review Commission (RRC) approved changes to: (1) Air Quality Inspection and Maintenance Rules; (2) Neuse River Nutrient Sensitive Waters Management Strategy Rules; and (3) permanent Risk-Based Corrective Action Rules for leaking underground storage tanks. RRC objected to incorporation by reference of Air Quality Division and Groundwater Section guidance documents which had not gone through public hearing and been formally adopted. Guidance language was inserted into rules to address objections. In regard to the Neuse rules, RRC objected to language considered unclear and to certain requirements it considered to go beyond the EMC's authority. Changes were proposed to address the objections.

At the EMC's March meeting, the body took the following action:

- Adopted amendments to the state's air toxic rules, including incorporation of

recommendations of the Air Toxics Working Group established by the Environmental Review Commission.

- Approved holding public hearings on amendments to air quality rules on monitoring, recordkeeping, and reporting; definitions; confidentiality; and acid rain. (For information, contact Tom Allen with the Division of Air Quality at (919) 733-1489.)
- Approved rule changes for the Wetlands Restoration Fund in response to objections by the Rules Review Commission and approved final rules for the Wetlands Restoration Program.
- Adopted a revised temporary rule for maintenance of riparian buffers in the Neuse River Basin. (Revision of the temporary rule was necessary to make it consistent with permanent rule now being filed.)

The Duke Wetland Center Wetland Ecology Lecture Series

"The Role of Northern Peatlands in the Global Carbon Cycle, and Likely Responses to Global Warming" **Thursday, March 26, 1998**, 3:00 - 4:00 p.m. Rm. A237 Levine Science Research Center **Presenter: Eville Gorham, Ph.D.** Regents' Professor of Ecology and Botany Dept. of Ecology University of Minnesota St. Paul, MN

"Mother Nature and Father Time: Chief Contractors in Wetland Design" **Tuesday, April 21, 1998**, 2:30 - 3:30 p.m. Rm. A247 Levine Science Research Center **Presenter: William J. Mitsch, Ph.D.** Professor of Natural Resources & Environmental Science Director of Olentangy River Wetland Research Park, School of Natural Resources, The Ohio State University Columbus, OH

Lectures are held in the new Levine Science Research Center located behind the Engineering and Physics buildings facing Science Drive on the University's West Campus. For further information please contact: Lisa Blumenthal, Duke University Wetland Center (919) 613-8008 email: lblu@duke.edu

February/March action of the EMC Water Quality Committee

At its regular meetings in February and March, the EMC Water Quality Committee took the following action:

- Approved Water Supply Watershed protection ordinances for the towns of Huntersville, Mayodan, Nashville, and Wagram; the cities of Claremont and High Point; and the counties of Alleghany, Buncombe, Forsyth, Franklin, Gaston, Richmond, Durham and Rowan.
- Approved holding public meetings on the draft **Broad River Basinwide Water Quality Management Plan. Public meetings will be held in Shelby at 1 pm and in Spindale at 7 pm on April 14.** For additional information, contact Suzanne Hoover with the Division of Water Quality at (919) 733-5083 Ext 573.
- Upheld the original method for delineation of the WS-IV five-mile Protected Area and half-mile Critical Area boundaries for Falls Lake and Jordan Lake. The City of Durham and Durham County had requested different interpretation of the delineation method that could have resulted in sending all water supply watershed boundaries back through rulemaking.
- Tabled a request to initiate development of a temporary rule to define "innovative swine waste system." The Clean Water Responsibility Act establishes a moratorium on new and expanding swine operations but provides an exception for innovative animal waste management systems that do not employ anaerobic lagoons. Commissioners tabled the request because they felt they had not had sufficient time to study the proposed definition.

Digest

N.C. Ag Cost Share funding. During the 1997 fiscal year, North Carolina's 96 Soil and Water Conservation Districts obligated nearly \$16.5 million to help farmers install best management practices, such as long-term no-till cropping systems, stock trails, fencing to keep livestock out of streams, field borders, buffers along streams, conversion of cropland to grass or trees, and animal waste management systems. Farmers who entered into contracts during the 1997 fiscal year have until June 1999 to install their practices. They cannot receive payment until they have installed the practices and the practices have been inspected by government personnel to insure they work properly. Farmers must keep the practices in proper working order for their life expectancy and, in nearly all cases, the practices have ten-year life expectancies. The best management practices that farmers agreed to install through their 1997 contracts are expected to yield the following results:

- 232,160 tons of soil saved each year of the practices' life expectancy when all are fully installed;
- 611,928 pounds of properly managed nitrogen for each year of the practices' life expectancy;
- 269,902 pounds of properly managed phosphorus for each year of the practices' life expectancy.

The state's Agriculture Cost Share Program is a voluntary program established by the General Assembly in 1983. Between the start of the Cost Share program and September 30, 1997, the General Assembly has appropriated \$87,909,954 to the program for BMP installation. At the end of September, farmers had spent at least \$18,993,500 as their contribution for installed BMPs.

Quaker Neck Dam removal. At the turn of the twentieth century North Carolina's Neuse River produced more American shad than any other river in the United States. The Neuse was also a major producer of striped bass. According to Mike Wicker with the U.S. Fish and

Wildlife Service, the upstream limit of these anadromous species was near the Flat River in Durham County. However, over the years, dams constructed along the river blocked the passage of these saltwater fish to much of their upstream spawning ground and populations dropped. Soon, a 75-mile stretch of the Neuse River and 925 miles of tributary spawning area will once again be accessible to anadromous fish. In December 1997, voluntary removal began of Carolina Power & Light Company's Quaker Neck Dam near Goldsboro. The nation's first voluntary, cooperative dam removal for purely environmental reasons, the Quaker Neck Dam removal is supported by a public-private partnership among CP&L, EPA, the National Fish and Wildlife Foundation and the N.C. Marine Fisheries Commission. Removal, being managed by the N.C. Division of Water Resources, is expected to be complete this summer. Wicker theorizes that if fish populations recover, water quality in the Neuse might benefit as more fish take productivity out of the system. In February, the N.C. Wildlife Federation named the Quaker Neck Dam removal project "Water Conservationist of the Year."

Radon in groundwater in Guilford County. Radon is a heavy radioactive gas that results from the decay of uranium-238. Inhalation of radioactive particles from radon decay may damage lung tissue and potentially result in lung cancer. Well water may introduce radon gas into air in the home. The U.S. EPA had proposed a maximum contaminant level for radon in drinking water of 300 pCi/L (picocuries per liter), but the Safe Drinking Water Act Amendments of 1996 required the withdrawal of that regulation and promulgation of a new standard. A 1994 study by EPA reported a median radon activity of 246 pCi/L in public water supplies in the United States. The U.S. Geological Survey has recently published a fact sheet summarizing results of a study of radon levels in groundwater in Guilford County, NC (Fact Sheet FS-147-97). Radon activities

in groundwater in Guilford County range from 37 to 6,300 pCi/L. The highest radon activities occur in the northwestern portion of the county. Median radon activities in most hydrogeologic units in the county were found to exceed 300 pCi/L. For a copy of the fact sheet, contact the N.C. District of USGS in Raleigh at (919) 571-4000.

On the Edge. A recent study by Northern Illinois University and American Farmland Trust found that people living in widely scattered subdivisions around Chicago face police response times 600 percent longer, ambulance response times 50 percent longer, and fire response times 33 percent longer than in adjoining municipalities. The research also showed that, despite large assessed valuations, homes in scatter development sites do not generate enough taxes to educate the children who live there; fall woefully short of paying to maintain the roads leading to and through their subdivisions; and where municipal water and sewer are available, rely on other taxpayers to pay the costs of building that infrastructure. An earlier report by AFT found that 79 percent of the nation's fruit, 69 percent of its vegetables, and 52 percent of its dairy goods are now produced on high quality farmland threatened by sprawling growth. The report says that with the U.S. population expected to double by the mid-21st century and high quality farmland projected to shrink 13 percent, the U.S. could become a net food importer instead of an exporter within 60 years. The Conservation Trust for North Carolina reports that North Carolina lost 295,000 acres of its best farmland between 1982 and 1992; that the number of farm operations in the state declined 78% since 1925; and that 100 dairy farms went out of business in 1997 alone. Read AFT's reports *Living on the Edge* and *Farming on the Edge* on its web site at <http://www.farmland.org>.

Water and wastewater privatization. According to Water Online (<http://news.wateronline.com>), regulations

issued by the Internal Revenue Service in January 1997 will make it easier for municipalities to enter into long-term contracts for private operation of their water and wastewater systems. Previously, contracts between municipalities and private companies were limited to five years and were required to be terminable by the municipality without cause at the end of the third year. With the new regulations, contracts may be arranged for 10, 15, and 20 years (although some state laws forbid such extended agreements). However, the IRS has also issued "safe harbor guidelines" for municipalities to follow when they enter into long-term partnerships with private companies. Compensation may not be based in any part on a share of net profits but must be based on differing levels of periodic fixed fee arrangements.

Groundwater nitrogen from septic systems. Concern that rapid development relying on septic systems in the Barton Creek, TX, recharge area of the Edward Aquifer would increase nitrate concentrations in the aquifer led to a 1997 study by researchers at the University of Texas at Austin. They determined the current level of nitrogen in the aquifer by analyzing water quality discharged from Barton Springs, wells and baseflow to Barton Creek. Using a mass balance equation they determined how changes in nitrogen loadings could impact groundwater quality. Nitrogen inputs included septic tank effluent, stream recharge, infiltration from rainfall, runoff, leaking sewer pipes and leaching from fertilized crops and landscapes. The researchers used the computer simulation model GLEAMS, modeling outflows from septic tanks as injected fertilizer, to estimate the input of nitrogen to the aquifer from septic systems. They concluded that the smallest nitrogen load to the aquifer is derived from on-site wastewater systems (10%), while diffuse recharge contributes 50% and creek recharge 37%.—June 1997 *New Waves*, Texas WRI

Nitrogen from forests. The Appalachian Laboratory (AL) of the University of Maryland Center for Environmental Science (UMCES) has been awarded an EPA research grant to determine the effects of forest disturbances in the Chesapeake Bay watershed. The project will allow scientists to quantify how defoliation of forests by insects—such as the gypsy moth caterpillar—influences the amount of nitrogen transported to the Bay from the watershed's forested lands. According to Keith Eshleman, director of the project, under normal conditions, healthy eastern hardwood forests can accumulate large quantities of nitrogen in plant and soil organic matter, so only small amounts of nitrogen are transported to local streams and rivers, but when forests are stressed or defoliated, nitrogen losses may increase dramatically. For example, after several years of gypsy moth defoliation, the amount of nitrogen lost to streams draining such forests may be 50 times greater than under undisturbed conditions. "Gypsy moth defoliation as well as other forest disturbances such as clearing for development, timber harvesting, fire suppression, and even deer browsing have become quite extensive in the Bay watershed. Through their effect on nitrogen export, these disturbances may be contributing significantly to the degradation of the Bay," says Eshleman. "These disturbances need to be recognized and accounted for as an additional source of nitrogen loading."

Multiuse filter strips. Purdue University researchers exploring the use of income-producing plants in filter strips have found a way to offset the monetary losses that a farmer incurs when removing land from production. They planted a filter strip with a ground cover of orchard grass and three rows of horticultural shrubs, spaced six feet apart in rows 12 feet apart. The researchers chose to plant pussy willow, red-twigged dogwood, and corkscrew willow because the ornamental branches of each can be sold to florists. An added benefit is that the shrubs can be harvested in the late fall or winter, a farmer's "down time." The pussy willow

normally flowers in the early spring but can be harvested as early as January and forced to bloom indoors. The branches of the red-twigged dogwood turn an attractive bright red during the fall. The corkscrew willow has appealing bent and curved branches that can be harvested at any time but most easily during winter dormancy. The unique qualities of the plants add interest to flower arrangements. The money that the shrubs provide is substantial. Based on their third year harvest, the researchers estimate that a farmer can make \$5,000 per acre, assuming a planting of 660 shrubs per acre.—*Nonpoint Source News-Notes* Jan 1998

Soil glue. Agricultural Research Service soil scientist Sara E. Wright has discovered a unique fungal protein that may be the primary glue that holds soils together. She named the gooey protein "glomalin" for the group of common root-dwelling fungi that secrete the protein through hairlike filaments. According to Wright, the substance "coats soil particles and may be what holds them together in the stable structures we call aggregates. Farmers and gardeners know them as the small grains of soil that sift through their hands and suggest to them that the soil has good structure." Starting with a dozen eastern soils, she measured glomalin and found that it was as high as 2 percent of the total weight of a soil aggregate. When she moved on to test soils from the West and Midwest, she found levels were dramatically lower, although still abundant. "It may be that the higher glomalin levels explain why eastern soils have stronger structural stability than western soils," says Wright. "Knowing about glomalin gives us a reason to alter farming practices to raise or maintain glomalin levels. For example, tillage tends to lower glomalin levels. We found that soil from no-till corn plots had more glomalin and higher aggregate stability than soil from tilled plots."—ARS

WRRRI reports available

WRRRI has recently published peer-reviewed reports on projects for which it provided funding. 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, NCSU, Raleigh, NC 27695-7912 or call (919) 515-2815, or Email: water_resources@ncsu.edu.

Nutrient Limitation and Eutrophication Potential in the Cape Fear and New River Estuaries Report No. 313 September 1997

Michael A. Mallin, Lawrence B. Cahoon, Matthew R. McIver,
Douglas C. Parsons and G. Christopher Shank
Center for Marine Science Research, UNC-Wilmington

Phytoplankton nutrient limitation experiments were performed from 1994-1996 in both the Cape Fear River Estuary, a riverine system originating in the North Carolina Piedmont, and the New River Estuary, a Coastal Plain lagoon system. Bioassay experiments consisted of spiking triplicate 4-liter (L) samples in cubitainers with various nutrient combinations and incubating the cubitainers in circulating pools for three days. Daily subsamples were collected and nutrient response was determined by analyzing both chlorophyll *a* production and ¹⁴C uptake. Ambient chlorophyll *a* and nutrient concentration data were collected on station, as well as associated physical data.

Nutrient limitation results varied among the Cape Fear Estuary stations. At NAV an oligohaline riverine station characterized by nutrient-rich, turbid waters, no significant response to nutrient additions were observed with the exception of a lowflow spring period. It is likely that light was the principal factor limiting phytoplankton production at NAV. A downstream mesohaline station (M54) showed a seasonally differing response. In summer the phytoplankton community displayed significant nitrogen (N) limitation, while phosphorus (P) was occasionally limiting in early spring with some N colimitation. Light was apparently limiting during fall and winter when the water was turbid and nutrient-rich. During May and June 1996 (and other months of heavy rainfall) there was no significant nutrient limitation. Channel Marker 23 (M23), a polyhaline station located between Snow's Cut and Southport had clearer water and displayed significant response to nutrient additions during all bioassay experiments.

Bioassays demonstrated that nitrogen limitation occurred in summer and fall and phosphorus limitation (with strong N+P colimitation) occurred in winter and spring. The data suggest that in the Cape Fear system in general, when high turbidity

from increased rainfall and runoff or from local dredging occurs, light limitation dominates and the waters become more nutrient enriched. Further results indicate that water quality in the system is strongly linked to upstream precipitation events and subsequent sediment and nutrient non-point source loading from the middle and upper basins. Low flow periods led to less turbidity, higher chlorophyll *a*, lower nutrients, and more pronounced nutrient limitation. The tendency toward nutrient limitation rather than light limitation of phytoplankton productivity increased along with distance from the head of the estuary. Overall, the Cape Fear is more sensitive to phosphorus loading than any of the other North Carolina estuaries previously analyzed.

The New River Estuary is affected by considerable sewage treatment plant effluent loading. It maintains generally high phytoplankton biomass, and cell counts are high relative to other North Carolina estuaries. The low inorganic N/P molar ratio is suggestive of waters sensitive to nitrogen loading. Bioassay experiments demonstrated that significant nitrogen limitation occurred year-round at a polyhaline sampling station. Additionally, silica (Si) limitation occurred on occasion in spring, and secondary silica limitation occurred in summer as well. This is a system in an advanced state of eutrophication. The phytoplankton community was dominated by flagellates (especially cryptomonads and dinoflagellates) which may be partly a result of periodic silica limitation of the diatom population.

Nutrient inputs to this estuary are dominated by point-source discharges. Reduction of nitrogen inputs will likely restrict further phytoplankton increases. However, this estuary is already in an advanced state of eutrophication and reduction of point-source discharges of both nitrogen and phosphorus are required to significantly improve water quality.

Water Quality Effects of Above-Stream Fish Feeders in Low-Nutrient North Carolina Mountain Streams Report No. 314 December 1997

James F. Gilliam and Thomas A. Cady
Department of Zoology, North Carolina State University

Population growth and increased recreational development in the mountain region of North Carolina has increased demand on wild trout sport fisheries. Designated wild trout waters are not presently stocked with hatchery reared fish, so the fishery relies on natural reproduction and growth to maintain trout populations. These naturally low nutrient waters produce trout seldom exceeding 200 mm total length.

The North Carolina Wildlife Resources Commission (NCWRC) initiated a wild trout supplemental feeding project in 1990 on four North Carolina mountain streams. The NCWRC project assessed whether addition of pelleted food would

continued next page

increase trout maximal size and standing stocks (grams/m²) within 900-m fed sections of streams over a three-year period. The NCWRC study was directed at assaying trout populations in the streams. This report evaluates possible effects of feeders on water quality.

Samples were collected in 1993, the final year of the three-year NCWRC project. In each of the four study watersheds, the researchers chose four study sections: a section upstream of the 900-m fed section, the fed section itself, a section below the fed section, and a nearby 'control stream' of similar size. This design enlarged upon the NCWRC study, in which trout populations were measured in the fed sections and one additional section per stream (a section above the fed section in two of the streams, and a section below the fed section in the other two streams).

Primary emphasis was on bioassessment of macroinvertebrate communities by criteria established by the North Carolina Division of Environmental Management. In addition, the researchers sampled nutrient concentrations (ammonia, nitrite, nitrate, dissolved reactive phosphorus, and total phosphorus) and other chemical parameters (pH, alkalinity, hardness, percent oxygen saturation, and conductivity).

Researchers detected no statistically significant impacts to water quality due to the supplemental feeding when each nutrient level was considered separately. Invertebrate community analysis, a long-term integrator of water quality, yielded bioclassifications of "excellent" for all samples except for two late-summer sections in one stream. While none of the six of these metrics was statistically significant when considered alone, all six gave some suggestion of some impact, and a meta-analysis combining the six metrics yielded a statistically significant indication that the feeders had a subtle enriching impact. However, the increased nutrient levels caused by the feeders, if present but statistically undetected in the individual analyses, were estimated to be small (about 0-30%) relative to the response of the main

target trout species (about 100% increases in numbers and 400% increase in mass per unit area).

Researchers conclude that feeding at the intensity and spatial extent of the experiment can produce desired responses in the targeted trout populations without substantial local deterioration of water quality. Because the water quality assessments were made in the third year of the feeders' input, and taken in a year with unusually low water flow, they feel that this conclusion is likely to be valid even if the feeding activity were ex-

tended to additional years with the same intensity, although they cannot strictly dismiss the possibility that deterioration of water quality would become apparent under some climatic circumstances, or over a longer time scale.

Also, they note that expansion of the feeding program in intensity or spatial extent can be expected to produce water quality deterioration locally or in downstream areas, and emphasize that the feeding levels at which water quality deterioration should become apparent are not known.

North Carolina Precipitation/Water Resources

	January	February
Rainfall (+/- average)		
Asheville	9.96" (+6.71")	6.38" (+2.47")
Charlotte	5.74" (+2.03")	3.82" (-0.02")
Greensboro	6.88" (+3.71")	4.39" (+1.07")
Raleigh	7.49" (+4.01")	5.79" (+2.10")
Wilmington	7.29" (+3.42")	11.22" (+7.52")

Streamflow

Index Station (County, Basin)	Jan mean flow (CFS) (% of long-term median)	Feb mean flow (CFS) (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	524 (143%)	368 (89%)
Oconaluftee River at Birdtown (Swain, Tenn)	1,170 (179%)	802 (109%)
French Broad River at Asheville (Buncombe, FB)	5,590 (247%)	6,332 (252%)
South Fork New near Jefferson (Ashe, New)	756 (166%)	1,182 (213%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	167 (193%)	258 (244%)
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	442 (244%)	278 (137%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	893 (231%)	732 (152%)
Rocky River near Norwood (Stanly, Yadkin/Pee-Dee)	7,423 (270%)	4,442 (131%)
Deep River near Moncure (Lee, Cape Fear)	6,736 (292%)	6,478 (213%)
Black River near Tomahawk (Sampson, Cape Fear)	2,501 (232%)	4,082 (301%)
Trent River near Trenton (Jones, Neuse)	592 (182%)	1,037 (266%)
Lumber River near Boardman (Robeson, Lumber)	3,876 (200%)	6,270 (292%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	560 (235%)	551 (177%)
Potocasi Creek near Union (Hertford, Chowan)	592 (139%)	1,114 (214%)

Groundwater

Index well (Province)	Jan depth below surface (ft) (departure from average for month)	Feb depth below surface (ft) (departure from average for month)
Blantyre (Blue Ridge)	30.03 (+2.65)	25.87 (+5.91)
Mocksville (Piedmont)	13.88 (+2.51)	13.46 (+2.40)
Simpson (Coastal Plain)	2.73 (+0.67)	3.05 (-0.06)

Source: U.S. Geological Survey's *Water Resources Conditions in North Carolina*

People

Steve Tedder, formerly chief of the Water Quality Section in the N.C. Department of Environment and Natural Resources (DENR), has taken a position with EPA in Research Triangle Park. Tedder was recognized for his twenty-plus years of service at the N.C. Environmental Management Commission meeting in March. Water Quality Director Preston Howard read from a staff nomination of Tedder as division employee of the year. The peer-written nomination reviewed the first-in-the-nation programs that Tedder implemented in North Carolina—statewide Water Supply Watershed Protection, Nutrient Sensitive Waters Management Strategies, Outstanding Resource Waters, and most recently Basinwide Water Quality Planning—and noted that his contributions are probably recognized more outside the state than at home.

Colleen Sullins is now acting head of the N.C. Water Quality Section.

Tommy Stephens, formerly with DENR's Fayetteville Regional Office, is acting deputy director of the Division of Water Quality.

John R. Bratton, chairman of the N.C. Sedimentation Control Commission, was named Land Conservationist of the Year by the N.C. Wildlife Federation in February. **Robert Lucas**, former chairman of the N.C. Marine Fisheries Commission was named Wildlife Conservationist of the Year, and NCSU botanist **JoAnn M. Burkholder** was named N.C. Conservationist of the Year.

Sandra J. Birkhead has been appointed by Gov. James B. Hunt, Jr. as the 17th member of the N.C. Environmental Management Commission. A regulatory compliance specialist with Glaxo-Wellcome, Birkhead formerly worked with the Air Quality Section of the N.C. Division of Environmental Management (now Division of Air Quality.)

SMARTech '98

Site Monitoring, Assessment & Remediation Technologies Expo and Conference

April 22, 1998
NCSU McKimmon Center
Raleigh

The North Carolina Hazardous Waste Section and the Groundwater Section of the Department of Environment and Natural Resources are sponsoring SMARTech '98: Site Monitoring, Assessment & Remediation Technologies Expo and Conference, Wednesday, April 22, 1998, at the NC State University McKimmon Center in Raleigh, NC.

The goal of this event is to promote awareness of various expertise, services and technologies available for soil and groundwater investigation and remediation.

This event is also an opportunity for North Carolina facility representatives, state agencies, environmental consultants and technology vendors to exchange information and ideas in an informal setting.

The event will include displays staffed by technology vendors, consultants and state agencies, as well as presentations, technology demonstrations and an Internet resources workshop, focusing on innovative use of technology.

For more information, please visit our website at: <http://wastenot.ehnr.state.nc.us/HWHOME/smartech.htm> or call Marti Morgan (919) 733-2178 ext.222 or Surabhi Shah (919) 733-2178 ext. 236.

Cost of registration is \$25 / person. To register, please contact Sue Page at (919) 733-2178 ext. 207.

Workshops and Conferences

The Association of State Dam Safety Officials is presenting its **1998 South-east Region Biennial Dam Safety Conference** June 7-10, 1998, in Hot Springs, AR. For information call (501) 682-3901 or email ds@aswcc.state.ar.us.

The Urban Forestry Institute is presenting a course on **Restoring the Urban Forest Ecosystem** June 15-19, 1998, at the Lago Mar Hotel in Fort Lauderdale, FL. For Information contact Mary Duryea, School of Forest Resources and Conservation, University of Florida, at (352) 846-0896 or visit web site <http://gnv.ifas.ufl.edu/~conferweb/> and click on The Urban Forestry Institute.

The Water Environment Federation is presenting **Watershed Management: Moving from Theory to Implementation** May 3-6, 1998, at Adam's Mark Hotel in Denver, CO. The conference will feature 32 technical sessions, 37 poster presentations, and 6 preconference workshops focusing on watershed management. For information visit web site <http://www.wef.org> or call WEF at 1-800-666-0206.

The National Water Research Institute, EPA and USGS are presenting **Source Water Protection 98** April 28-30, 1998, in Dallas TX. For information visit the EPA web site at <http://www.epa.gov/OGWDW/swp/source2a.html>.

The Florida Lake Management Society is hosting the North American Lake Management Society's **Seventh Annual Southeastern Lakes Management Conference** April 15-18, 1998, at the Radisson Plaza Hotel in Orlando, FL. For information write the FLMS at P.O. Box 92448, Lakeland, FL 33804-2448 or check the NALMS web site at <http://www.nalms.org/>.

Call for Papers

The North American Lake Management society has issued a call for papers for its 18th International Symposium to be held Nov 10-13, 1998, in Banff, Alberta, Canada. For information visit web site: <http://www.biology.ualberta.ca/alms/1998.htm>.



Atlantic Coast Watch is a new bimonthly nonprofit newsletter presented by the Sustainable Development Institute, free of charge, to those interested in bringing about the environmentally sound development of the coastline from the Gulf of Maine to the Eastern Caribbean. The newsletter is available both on paper (call 202/338-1017 or email susdev@igc.org) and at http://www.susdev.org/html/acw_newsletter.html.

The February 1998 issue includes an article on the emerging Atlantic menhaden crisis.

Water Resources Research 1997-98 Seminar Series

Tuesday, March 30, 1998, Room 1132, Jordan Hall, NCSU Campus. "Development of Methods of Estimating the Cost of Watershed Management Policies." *Professor David Moreau, Department of City and Regional Planning, University of North Carolina at Chapel Hill.*

Monday, April 20, 1998, Ground Floor Hearing Room, Archdale Building, downtown Raleigh. "Effectiveness of Four 'Best Management Practices' for Reducing Nonpoint Source Pollution from Piedmont Tobacco Fields." *Professor Carlyle Franklin, Department of Forestry, North Carolina State University.*

Tuesday, May 19, 1998, Room 1132, Jordan Hall, NCSU Campus. "Development of the Technical Basis and a Management Strategy for Reopening a Closed Shellfishing Area." *Associate Professor William Kirby-Smith, Nicholas School of the Environment, Duke University.*

North Carolina Water Resources Association

NCWRA

North Carolina Section of the American Water Resources Association

Luncheon and Forum Schedule

Apr 13, 1998

Sept 14, 1998

Nov 9, 1998

Stream Restoration

Water Quantity Issues in N.C.

Nutrient Management

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

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