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of The University of North Carolina

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Operators of animal waste systems needing assistance must register with Soil & Water Conservation Districts by Sept 1, 1996

General Assembly passes animal waste bill

The N.C. General Assembly adjourned the 1996 Short Session on June 21 without passing special Neuse River clean up legislation and without adopting a state budget for the coming fiscal year. The legislators did pass a bill to implement recommendations of the Blue Ribbon Study Commission on Agricultural Waste to address animal waste disposal problems, but their failure to adopt a budget means that Agricultural Cost Share funding to help farmers with animal waste management and funding for operational reviews and inspections of animal waste facilities is not available.

Governor James B. Hunt Jr. called the legislators back to Raleigh to continue budget deliberations, and the Legislature reconvened on July 8. At press time, the outcome of the budget deliberations was not known.

Following are the main provisions of S 1217, *An Act to Implement Recommendations of the Blue Ribbon Study Commission on Agricultural Waste*. These provisions apply to operations with more than 250 swine, 100 confined cattle, 75 horses, 1,000 sheep, and to poultry operations with 30,000 birds if they use a liquid waste system. Poultry operations with more than 30,000 birds using a dry litter system must only have a waste management plan that complies with the waste/soil testing and nitrogen application requirements.

Permits

The new law establishes that, effective Jan 1, 1997, permits are required for operation of animal waste management systems, requires that such systems be designed so as to cause no pollution of waters of the State except as a result of the 25-year, 24-hour storm, and directs the Environmental Management Commission (EMC) to "develop a system of general permits for animal operations based on species, number of animals, and other relevant factors."

Under a general permit system, animal operations are not required to obtain individual permits, but those above the threshold size are required to submit documentation certified by recognized authorities showing that they are complying with regulations established for animal waste systems in the general permit. Thus, the

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general permit system will not differ greatly from the certification system already in place. However, the requirements for the new general permit will be different.

Under the new law just adopted, applications for a general permit to operate animal waste management systems must include a plan approved by a technical specialist that must include the following specific components:

- odor BMPs
- insect control BMPs
- methods of disposing of dead animals
- BMPs for riparian buffers or equivalent controls along perennial streams
- an emergency management plan designed to prevent lagoon failure and to minimize environmental damage from lagoon overflows
- provisions for testing waste to determine nutrient content and testing of soils where waste is to be applied
- provision of a plan for applying waste at rates that assure a balance between nitrogen application and nitrogen requirements of crops
- provisions for keeping records of the required waste and soil testing and waste application

The new law directs the EMC to provide sufficient regulatory flexibility to encourage development of alternative and innovative animal waste management technologies.

Operations Review and Inspection

In addition to establishing a general permitting system and some requirements for waste management plans, the new law establishes a process under which each animal operation must undergo an operational review and a regulatory inspection at least once a year. It requires that technical specialists employed by the Division of Soil and Water Conservation (DSWC), local Soil and Water Conservation Districts, or the Natural Resources Conservation Service (NRCS) will conduct operational reviews and submit reports on the results of the reviews to the Division of Environmental Management (DEM) within 10 days of the review unless one of the following is observed:

- a direct discharge of animal waste into waters of the State
- deterioration or leak in a lagoon system that poses an immediate threat to the environment
- failure to maintain adequate storage capacity in a lagoon that poses a threat to public health or the environment
- overspraying of waste or runoff from application areas into waters of the State

In the case that one of these conditions is observed, the technical specialist must report the violation to DEM immediately. Operational

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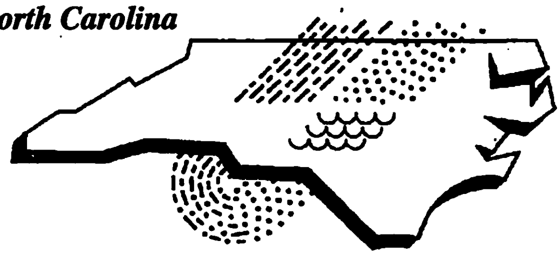

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WRRI offices are located at 1131 Jordan Hall
on the North Carolina State University campus.
Mailing address: Box 7912, NCSU, Raleigh, NC 27695-7912.
Telephone: (919) 515-2815 Email: water_resources@ncsu.edu

review requirements become effective Sept 1, 1996.

In addition, any employee of a State agency or unit of local government who is engaged in related activities on the premises of an animal operation and observes any of the above operational violations is required to report it to the owner and to DEM. This requirement became effective upon ratification of the bill.

Effective Jan 1, 1997, DEM is required to inspect all animal operations subject to general permitting each year to determine if they are in compliance with permit requirements and whether they are causing violations of water quality standards.

Fees

All operations subject to the general permit are required to pay annual permitting fees as follows:

- $50 for operations with waste management systems serving between 38,500 and 100,000 pounds steady state live weight
- $100 for operations between 100,000 and 800,000 steady state live weight
- $200 for operations of 800,000 pounds or more steady state live weight

SOCs and Penalties

The new law deletes a provision of current law which prohibits the EMC from entering into a Special Order of Consent (SOC) with an agricultural operation. This means that rather than issuing a Notice of Violation (NOV) or assessing penalties on an operation found to be in violation of animal waste management requirements, the EMC may now enter into a legally binding agreement that sets out a schedule for actions to be taken to bring the operation into compliance. This provision became effective upon ratification of the bill.

Also effective immediately, the new law increases to $10,000 the maximum amount of fines and penalties that can be assessed when animal operations are found to have constructed pipes, ditches or other conveyances to willfully discharge pollutants to waters of the State.

System Operators Certification and Training

The new law requires that, effective Jan 1, 1997, any animal waste system subject to general permitting must be operated by a person who has undergone 10 hours of training and has been certified by the Water Pollution Control System Operators Certification Commission. Effective Oct 1, 1996, it adds two members from the animal agriculture industry (to be appointed by the Commissioner of Agriculture) to that Commission. It also requires that to retain their certification, animal waste system operators must complete six hours of approved training during each three-year period; sets out conditions under which certification may be suspended or revoked; and provides for a maximum $1,000 civil penalty against an operator who willfully violates any requirements of the law.

Siting/Notice

The law requires that swine houses or lagoons shall be located at least 1,500 feet from any occupied residence, at least 2,500 from any school, hospital, or church and (as of Oct 1, 1996) at least 500 feet from any property boundary and that the perimeter of any waste application area be at least 50 feet from any boundary of property on which an occupied residence is located and from any perennial stream or river, other than an irrigation ditch or canal. It provides that any person owning property affected by the siting requirements may bring a civil action against a swine farmer who has violated the siting requirements.

It requires that any person who intends to construct a swine farm with an animal waste management system subject to general permitting must complete a site evaluation before the site is modified and attempt to notify by certified mail all adjoining property owners and property owners across a public road from the site.

These provisions apply to farms constructed or enlarged on or after Oct 1, 1995, unless the construction or enlargement brings an animal population up to that projected in a registration already filed with the Department of Environment, Health, and Natural Resources, or occurs to bring the animal population up to the design capacity of an existing waste management system, or occurs to comply with animal waste management rules and not to increase the animal population.

Other provisions

Among the other provisions of S 1217 are the following:

- provides that Agricultural Cost Share funding may be used for odor and insect BMPs, spillway and buffer requirements, and animal waste management systems and application and increases to $75,000 per year the maximum Cost Share funds that any one applicant can receive

- requires that the DSWC (as lead agency), the Cooperative Extension Service, and the N.C. Department of Agriculture prepare "a coordinated and comprehensive plan that includes use of existing resources at the local level for nonpoint source pollution prevention and control and report their plan to the Senate Select Committee on River Water Quality and

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Fish Kills and the Environmental Review Commission by Sept 30, 1996

- requires the Environmental Review Commission to evaluate the animal waste program established by the law and make recommendations on or before the first day of the 1998 Regular Session as to whether to transfer responsibility for permitting, compliance inspections, and enforcement to the DSWC

- provides that all operators of animal waste management systems must register with their local Soil and Water Conservation District and begin the process of obtaining an approved animal waste management plan. It provides that those who register and initiate the process of getting a plan before Sept 1, 1996, shall receive priority for technical assistance and funding under the Agricultural Cost Share program and that those who register by Sept 1, 1996, and make good faith efforts to obtain an approved waste management plan by Dec 31, 1997, shall be eligible for SOCs and shall not be issued NOVs. However, operators who do not register or make good faith efforts to obtain a plan will be subject to strict enforcement of penalty provisions.

Permitting Schedule

General permits for animal operations will be issued over a five-year period, with 20% of the facilities in operation on Jan 1, 1997, being permitted each year beginning Jan 1, 1997.

All operations deemed permitted under the current regulatory program may continue to operate on a deemed-permitted basis but will be subject to the operational review and inspection requirements of the new law. DEHNR will notify each owner

Other environment-related legislation passed by the General Assembly

S 687 AN ACT TO PROVIDE FOR IMPROVEMENT PERMITS FOR A WASTEWATER SYSTEM THAT ARE VALID FOR FIVE YEARS IN ADDITION TO THE IMPROVEMENT PERMITS THAT ARE VALID WITHOUT EXPIRATION UNDER CURRENT LAW. Defines "plat" and "site plan" and provides that improvement permits for which a plat is provided shall be valid without expiration and that improvement permits for which a site plan is provided shall be valid for five years. Lists requirements for an improvement permit.

S 1183 AN ACT REGARDING THE JURISDICTION OF THE UTILITIES COMMISSION WITH REGARD TO THE RESALE OF WATER OR SEWER SERVICE IN APARTMENTS, CONDOMINIUMS, AND SIMILAR PLACES AS RECOMMENDED BY THE JOINT LEGISLATIVE UTILITY REVIEW COMMITTEE. Allows owners of apartment buildings and condominiums to resell water and sewer services without having to become a public utility.

S 1317 AN ACT TO PROVIDE FOR THE CONTINUED SOLVENCY OF THE COMMERCIAL LEAKING PETROLEUM UNDERGROUND STORAGE TANK CLEANUP FUND AND TO MAKE OTHER CHANGES TO THE LEAKING PETROLEUM UNDERGROUND STORAGE TANK (UST)CLEANUP PROGRAM, AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION. This act provides for the temporary suspension of some cleanups of leaks from underground petroleum tanks until DEHNR adopts risk-assessment rules. It provides that DEHNR shall classify the impact of leaks as either Class AB or Class CDE, that all leaks are CDE unless (1) a water supply well is contaminated, (2) petroleum vapor is present in a confined space, (3) there is a user of a water supply well located within 1,500 feet of a discharge who is not served by an existing public water supply, (4) the discharge results in a violation of drinking water standards in a [public] surface water supply, or (5) the discharge poses an imminent danger to public health or safety or the environment. DEHNR to notify owners/operators of classification of leaks by first-class mail and publish classifications in N.C. Register. Provides that DEHNR shall not require cleanup of CDE leaks other than stopping the leak, removing any free petroleum product, and mitigating any threat of fire, explosion or vapor hazard. Provides that DEHNR shall not reimburse costs incurred in cleaning up CDE leaks unless the costs were incurred before CDE classification, costs were incurred to meet mitigation requirements listed above, costs were incurred for a leak subsequently classified AB, cleanup is ordered in an adjudicated judgment, cleanup is required in a consent judgment or settlement approved by DEHNR, or DEHNR approved continuation of the cleanup. Provides for petition for continued eligibility for reimbursement under several circumstances, including hardship, defined as an inability to sell or convey property. Makes special provision for funding of cleanups of leaking noncommercial USTs when the original owner/operator of the UST cannot be found or when original owner has begun cleanup and satisfied responsibility under law and wants to sell the property. Provides that DEHNR shall study options for privatization of the leaking petroleum UST cleanup program and report findings and recommendations to the Environmental Review Commission on or before 1 Nov 1996. Directs

continued

Animal waste law *continued*

or operator of a deemed permitted facility of the date by which that facility must submit an application for the general permit program.

Specific questions about the new law and compliance with it should be directed to the N.C. Division of Soil and Water Conservation (919-733-2302) or local Soil and Water Conservation Districts.

DEM is no more

DEHNR reorganization effective July 1

All those conditioned to refer to N.C.'s main environmental regulatory agency as DEM, must learn new terminology. As of July 1, 1996, several organizational changes in environmental protection programs of the N.C. Department of Environment, Health, and Natural Resources became effective, eliminating the Division of Environmental Management. To implement the restructuring, the General Assembly passed S 1328 during its short session to make clarifying, conforming, and technical amendments to various relevant laws.

Following are highlights of the restructuring:

* The Air Quality Section has become the Division of Air Quality.

* The Division of Environmental Management (DEM) has become the Division of Water Quality (DWQ).

* The Office of Waste Reduction has become the Division of Environmental Assistance and now includes the Small Business Ombudsman.

* The Division of Solid Waste has been renamed the Division of Waste Management to reflect the fact that the division also regulates hazardous waste and oversees the Superfund Program.

* The private water supply well siting and construction program and the well head protection program formerly in the Groundwater Section of DEM have been moved to the Division of Environmental Health, which also houses the Public Water Supply program.

* The capacity use activities and water resource availability studies formerly in the Groundwater Section of DEM have been combined with similar programs in the Division of Water Resources.

Reorganization plans call for establishment of a Permit Information Center under the Assistant Secretary for Environmental Protection to help businesses and individuals identify which permits they need and refer them to appropriate programs. While Governor Hunt's budget request included $150,000 to fund the Permit Information Center, no funds for the center were included in either the House or Senate budget versions proposed during the Short Session. According to Richard Rogers, DEHNR legislative liaison, the department hopes to get permission during the General Assembly's special session to move funds to implement the Permit Information Center if funding is not provided.

Legislation *continued*

Environmental Management Commission to publish text of proposed rule to establish risk-based UST cleanup program by 1 Jan 1997 and adopt final rule no later than 1 Oct 1997.

H 859 AN ACT TO REVISE THE SOLID WASTE MANAGEMENT ACT OF 1989 AND RELATED STATUTES. Requires the Commission for Health Services to adopt rules to require demonstration of financial responsibility by privately owned solid waste management facilities to ensure required post-closure monitoring and maintenance of solid waste landfills. Eliminates State's interim solid waste reduction goal of 25% by 30 June 1993 but retains goal of 40% reduction on a per capita basis by 30 June 2001. Removes requirement that each county develop a solid waste management plan addressing waste reduction goal and provides that each unit of local government, individually or in cooperation, shall develop a 10-year comprehensive solid waste management plan. Revises requirements for local solid waste planning and reporting. Deletes requirement that construction and demolition debris be separated from the solid waste stream. Deletes mandates for recycling programs. Replaces references to "recycling" with "waste reduction." Provides that recovered materials are not subject to regulation as solid waste. Establishes that it is policy of the State to obtain and foster economic benefits from recovery from solid waste of reusable materials and energy resources. Revises requirements for State's comprehensive solid waste management plan. Prohibits generators of solid waste from disposing of or collectors from collecting for disposal within a local jurisdiction any material that that jurisdiction requires to be recycled or prohibits from being disposed [the State prohibits disposal of several materials in landfills]. Requires generators of industrial solid waste that operate industrial solid waste facilities to develop 10-year waste management plans and report on implementation of the plans annually. Makes other changes to solid waste laws.

H 1339 AN ACT TO IMPROVE WATER QUALITY BY ESTABLISHING A GOAL TO REDUCE THE AVERAGE LOAD OF NITROGEN DELIVERED TO THE NEUSE RIVER ESTUARY FROM POINT AND NONPOINT SOURCES BY A MINIMUM OF THIRTY PERCENT OF THE AVERAGE ANNUAL LOAD FOR THE PERIOD 1991 THROUGH 1995 BY THE YEAR 2001 AND TO REQUIRE THE ENVIRONMENTAL MANAGEMENT COMMISSION TO DEVELOP A PLAN TO ACHIEVE THIS GOAL AS RECOMMENDED BY THE ENVIRONMENTAL REVIEW COMMISSION. Directs the Environmental Management Commission to develop and adopt a plan to reduce the average annual load of nitrogen delivered to the Neuse River Estuary by a minimum of 30% of the average annual load for 1991-1995 by the year 2001. Requires a proposed plan to be published in N.C. Register by Nov 1, 1996. Provides that in developing the plan, the commission shall determine and allow appropriate credit for reductions through voluntary measures. Provides that Commission report annually on plan development to Environmental Review Commission.

July action of the N.C. Environmental Management Commission

The N.C. Environmental Management Commission (EMC) did not meet in June. At its meeting in July, it took the following actions (among others):

- Approved sending the draft Neuse River Nutrient Sensitive Waters Management Strategy out for public hearings (see separate article on plan and box for dates and locations).

- Approved an $8.2 million low-interest loan from the State Revolving Fund to the City of Raleigh to upgrade wastewater treatment facilities to accomplish advanced nitrogen removal. The City of Raleigh expects to reduce its nitrogen discharge to the Neuse River by 55%.

- Approved reclassification to Class B waters of the Tuckaseegee River in Jackson and Swain counties, Deep Creek in Swain County, Tuckers Lake in Johnston County, the Lumber River in Scotland and Robeson counties, the Catawba River (Lake Hickory) in Caldwell County, and the North Fork Catawba River in McDowell County. The purpose of the reclassifications is to protect the waters for primary recreational uses, including swimming, skin diving, skiing, and other uses involving human body contact with water.

- Approved a fifth revision to the Special Order by Consent (SOC) originally issued in 1984 to Federal Paperboard (a subsidiary of International Paper Company) at Reigelwood in Columbus County in the Cape Fear Basin. The SOC puts the plant on a schedule for conducting pollution prevention projects and/or constructing a holding basin to bring it into compliance with wastewater discharge limitations for BOD_5.

- Approved amendments to rules governing standards for and use of injection wells (15A NCAC 2C .0200). The amendments reflect recent changes in state law allowing use of closed-loop groundwater remediation systems and provide new criteria to specify the types of injection wells (Class 5) that may be permitted by the State. Included are criteria that apply specifically to closed-loop geothermal injection well systems. The rules continue to prohibit use of injection wells for injecting or disposing of waste.

- Approved holding public hearings on rules (15A NCAC 2L .0202) to establish groundwater quality standards for 18 chemicals: acenaphthene, acenaphthylene, anthracene, atrazine, benzo (a) anthracene, benzo (g,h,i) perylene, bromodichloromethane, carbon disulfide, caprolactam, chrysene, chloroethane, cis-1,3-dichloropropene, 1,1-diphenyl, fluoranthene, isopropyl ether, methanol, pyrene, and simazine. (For information on these public hearings call David Hance with the Groundwater Section at (919) 715-6189.)

- Adopted rule amendments removing the oxygenated gasoline requirement for the Raleigh/Durham Metropolitan Statistical Area and revising the contingency plan trigger that requires re-implementation of the oxygenated gasoline program.

- Adopted a resolution calling for establishment of a committee to study, develop, and recommend long-term solutions to improve air quality in the Triangle Region.

Public hearings will be held on Neuse River plan

At its meeting in July, the N.C. Environmental Management Commission approved holding public hearings on the Division of Water Quality's proposed Neuse River Nutrient Sensitive Waters Management Strategy (see box for dates and locations).

The Neuse River nutrient management strategy is being called a "draft interim plan," since it provides for an assessment of progress and adjustment of nitrogen reduction targets one year after plan implementation. The draft strategy has already been discussed in a series of public meetings held in May, and some adjustments to the plan were made as a result of the public meetings. Division of Water Quality staff presented the EMC with changes to the draft interim plan in July along with an extensive fiscal analysis (which will be part of the public comment process) and a document addressing accountability issues. (For highlights of the strategy, see the Mar/April 1996 WRRI News.)

Changes to the proposed strategy include:

- The **effective date for point-source requirements** has been changed from five years from adoption to five years from the effective date of the rule.

- A requirement has been added that **existing industrial dischargers** in the basin, within two years of the effective date, submit for approval reports outlining the best available technology for controlling nitrogen from their specific waste-streams at their particular sites.

- The requirement that municipalities implement a program to discover illicit connections to their stormwater systems has been changed to **a requirement that**

PUBLIC HEARINGS ON

Neuse River Nutrient Sensitive Waters Management Strategy

are tentatively scheduled for the second week of September in

New Bern
Kinston
Goldsboro
Raleigh

For meeting times and locations or for copies of the draft interim plan and/or fiscal analysis, contact Greg Thorpe (Ext 557) or Beth McGee (Ext 575), Division of Water Quality at (919) 733-5083

municipalities larger than 5,000 population implement a program to eliminate illegal discharges to storm drainage systems.

- Specific requirements for **low and high density stormwater options** have been spelled out in the rule.
- Language specifically **allowing cluster development** has been added to stormwater control requirements.
- **Two alternatives for riparian buffers** have been proposed. One is for three-zone forested buffers, the other for vegetated buffers. Buffer requirements would apply to all streams appearing as "bluelines" on the most recent versions of USGS 1:24,000 scale topo maps in areas of new development and agricultural areas. Provisions are made for instances in which maps are inaccurate, for exemptions for certain ditches and other man-made conveyances, for a matrix of options to achieve equivalent water quality protection through alternative Best Management Practices, and for site-specific determination of buffer and alternative requirements. Existing development is exempt from buffer requirements but landowners are encouraged to maintain existing forested buffers and restore buffers to meet the requirements. Agricultural buffer width can be reduced if a nutrient management plan OR water management plan (controlled drainage) is in place and buffer requirements can be eliminated if BOTH nutrient management plan and water management plan are in place. Maintenance of buffers is required to achieve sheet-flow. While vegetated buffers are allowed, forested buffers are encouraged, particularly the preservation of existing forested buffers. Local governments may implement and manage their own buffer programs if the program is first approved by a the Director of the Division of Water Quality.
- Continuous agricultural tracts of more than 250 acres under multiple ownership where nutrients are applied are subject to requirements for nutrient management plans.

As a result of its discussion, the EMC directed staff to add language clarifying that those who lease agricultural land are responsible for meeting requirements of the plan. The Commission also added language committing to "attempt" to meet a nitrogen reduction goal of 30%. (See page 5 for the N.C. General Assembly's direction to the EMC on this issue—H 1339.)

The Growing Piedmont & Land Use Issues

October 11, 1996

Jordan Matthews High School, Siler City, NC

Sponsored by N.C. Cooperative Extension Service and NCSU Department of Forestry

This workshop will feature the following topics running in concurrent sessions:

(A) Balancing the Piedmont's People, Pavement and Sense of Place
- Our connected water resources: urban and rural dependency
- Reasonable solutions to urban water quality
- Harmonizing urban and rural goals through land conservation planning

(B) Forest Sustainability: Balancing Production and Environmental Quality
- The Piedmont forest: an overstory of trees and an understory of people
- Water quality protection: The forest community leading the way
- Piedmont forests: A potential water quality and waste management solution

(C) Animal Agriculture and the Environment
- Social, economic and environmental impacts of animal agriculture
- Animal waste characterization, utilization, and environmental impact
- Complying with animal waste regulations

(D) Field Crop Agriculture and the Environment
- Social, economic and environmental impact of field crop agriculture
- Integrated pest managment

For additional information contact Craven Hudson, Cooperative Extension Area Environmental Agent at (919) 560-0527.

The Growing Piedmont & Land Use Issues Registration Form

Registration accepted until Friday, October 4. Registration of $15.00 per person includes break, lunch, and materials. Make checks payable to: NCSU. Mail checks and registration coupon to: Ann Coughlin, NCSU, Box 8001, Raleigh, NC 27695. Fax number (919) 515-3687.

Name ______________________ Affiliation ______________

Address: ____

City ____________ State ________ Zip ________ Phone: ________

Director's Forum

Kenneth H. Reckhow, Director, Water Resources Research Institute

A Scientific Research Program for the Neuse River

It is the mark of an instructed mind to rest satisfied with the degree of precision which the nature of the subject permits and not to seek an exactness where only an approximation of the truth is possible.

This sensible statement, recently sent to me by a colleague and attributed to Aristotle, is at odds with scientists' tendency to recommend large, detailed models of ecological processes to answer resource management questions. Understanding processes is essential for science-supported management, but I don't believe that useful predictive models should contain all that process detail at the expense of uncertainty.

Process-oriented water quality models such as WASP, CREAMS, and HSP-F yield predictions of ecological response rife with uncertainty. This occurs in part because the resolution and detail demands of the models cannot be satisfied by our current scientific understanding and limited observational data. Smaller models that predict highly aggregated responses are often more reliable at their simpler tasks. Moreover, large ecological models are still so simple relative to the real world that the argument "if we get the processes right, then the model is correct" (and therefore is a good predictor) is inappropriate for highly complex food chain responses such as eutrophication.

Hans Paerl has observed that Neuse River eutrophication can be predicted at a gross scale of resolution. A wet spring, followed by a dry summer with a few summer thunderstorms together with stratification and extended residence time lead to conditions that support algal blooms. At this level of detail, responses do seem predictable, and with quantification and full probabilistic expression of uncertainties and relationships, this scientific understanding could lead to a useful management model.

Rather than a complex process model for the Neuse, what is needed is a probabilistic model—a process model at a rough level of resolution that also includes uncertainty analysis. Such a model will not mirror ecological processes but will produce an honest statement of what we know and don't know. As knowledge is acquired (uncertainty is reduced) the model can be improved.

If we accept that the goal of research on the Neuse River is to improve our ability to predict responses to management efforts rather than reconstruct nature inside a computer, what will our research program look like? I see (at least) three essential components of a useful scientific study:

1. A probabilistic model that is used initially to identify the key scientific research needs (uncertainties) and later to guide management recommendations. As WRRI director, I particularly need the probabilistic model. I need to know where the key scientific uncertainties are (those that make the biggest difference in prediction) to help me decide among funding requests—to help decide, for example, if WRRI should give priority to research on nutrient/algal relations, versus that on denitrification, versus that on characterization of processes in drainage ditches.

2. A focus on important scientific uncertainties in the selection of basic research priorities. Priorities for the scientific research program would be set using the probabilistic model and the usual peer-review criteria. While the research focus would likely be similar to that currently being discussed within the scientific community, there would be some differences in priority topics and a requirement that results of the research include probabilistic statements characterizing uncertainties (for use in the model).

3. A thorough, long-term water quality monitoring program, designed to observe response to proposed changes in nitrogen loading. The monitoring program is critical as it gives us a database for predicting responses and generating new hypotheses for subsequent research. As we know, the river is dynamic, and model predictions must extrapolate beyond the bounds of observation. The monitoring program will expand the bounds of observation if it is long-term and designed to assess response to the proposed 30% reduction in nitrogen loading.

Two final points about the research program need emphasis. First, any study to produce management recommendations for the Neuse should begin with discussions with DEM scientists, key decision makers in North Carolina, and key members of the public on both sides of the issue to clearly set the bounds on the analysis. We must not only identify

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The Director's Forum will be devoted to open discussion of water resources research issues. Responses and independent articles are encouraged. Please direct communication to Kenneth H. Reckhow, Director of WRRI.

N.C. DEHNR launches North Carolina Rivers Assessment

In response to the Legislative Research Commission and at the suggestion of Save Our Rivers, Inc., the N.C. Department of Environment, Health, and Natural Resources has launched a statewide rivers assessment program.

The assessment, being coordinated by the N.C. Division of Water Resources, will increase awareness of the value of rivers and provide information to allow future decisions related to rivers to consider all important riverine resources, values and uses. The assessment will, for the first time, inventory existing uses and evaluate resource categories for which no objective evaluation has been done.

Currently, the appropriate scope and focus of the assessment are being determined. Last August, the initial workshop to receive public input on stakeholder groups to be involved and to identify resource categories to be assessed was held, with 65 participants invited by Secretary of DEHNR, Jonathan Howes. Seven follow-up regional workshops were held in December 1995, and February and March of this year. A summary report of these workshops is being prepared, and Secretary Howes is considering appointments to the N.C. Rivers Assessment (NCRA) Advisory Committee.

The advisory committee will select resource categories, review study products, and provide advice to the study manager and technical work teams. A technical work team will be established to develop assessment criteria for each resource category selected by the advisory committee. In each river sub-basin a team of volunteer citizens and agency personnel will collect assessment data.

The first meeting of the NCRA Advisory Committee is tentatively scheduled for August or September. After the advisory committee selects resource categories, a brochure will be published to provide information about these categories.

The Division of Water Resources hopes to find grant funding for development of GIS layers containing information collected during the assessment.

To learn more about the rivers assessment or to participate in the program, contact Steve Reed, NCRA Study Manager at (919) 715-5424 or email at steve_reed@mail.ehnr.state.nc.us. DWR has also developed a home page for the NCRA: http://www.dwr.ehnr.state.nc.us/~rivers/index.htm.

Director's Forum continued

management options but in addition we need to know what to predict in order to assess how the river will respond to these options. We must also know how people will respond to these management options and their expected consequences.

Second, the research program must be adaptable and must be periodically re-examined. If management is not working, if new science contradicts the current approach, there must be flexibility to modify the program. In many cases, management may not be able to completely eliminate unacceptable responses. Instead, management may mean maintaining system response within generally acceptable bounds. Water quality management will be most effective if it is acknowledged that change and variability, not stability, are the norms in these systems.

Digest

North Carolina Citizens' Water Quality Monitoring Program put on hold. This spring, the N.C. Department of Environment, Health and Natural Resources' Water Quality Section launched the N.C. Citizens' Water Quality Monitoring Program, as had been recommended in legislation proposed by the Senate Select Committee on Water Quality and Fish Kills. The citizen monitoring program was to be developed initially for the Neuse Basin and later to be expanded statewide. The intended purpose of the program is to "train volunteer water quality monitors, work in partnership with those volunteers to develop monitoring plans, coordinate quality assurance activities, coordinate databases utilizing this information, and then to incorporate citizen collected information in water quality management programs." The first issue of a newsletter was published this spring, and two volunteer training sessions were held in June. However, the Citizen Monitoring Program has become a casualty of the state's budget impasse. According to Don Reuter, Public Information Officer for the Division of Environmental Management, the program is on hold pending provision of funding. Reuter said the DEM personnel who designed and organized the program have other responsibilities in the Environmental Services Branch and cannot also conduct the citizens' monitoring program.

Neuse River Foundation expands stream keeper activities upstream. Sponsored by the Neuse River Foundation and assisted by a volunteer force of 75 Creek Keepers and 20 pilots, the Neuse River Keeper patrols and monitors the fifty miles of the Neuse River from above New Bern to the Albermarle-Pamlico

Sound. The Neuse River Keeper, Rick Dove, is now recruiting volunteers to establish Lookout Stations in various sub-basins of the Neuse River Basin between Falls Lake Reservoir and New Bern (Raleigh, Cary, Smithfield, Goldsboro, and Kinston) and to monitor tributaries of the Neuse in these areas. According to Dove, the upstream Lookout Stations will coordinate stream keeper activities, educate the public in the Upper Neuse River on issues of importance to water quality, report violations of water quality regulations, take permissible actions to stop water quality violations, and monitor relevant decisions of local government boards and commissions. Those interested in volunteering should contact the Neuse River Foundation at (919) 637-7972.

BIG SWEEP

- **Why: To remove litter and debris from North Carolina's waterways**
- **When: Saturday, Sept 21, 9 am to 1 pm**
- **Where: Waterways across North Carolina**

On the third Saturday in September, volunteers from all 100 counties in North Carolina snag, bag and itemize trash from rivers, lakes, streams, creeks and beaches—trash that might otherwise spoil our view or harm humans and animals.

Records of the trash found are sent to the Center for Marine Conservation and in June of the following year, the CMC releases the data and compiles a dirty dozen list—a list of the top 12 litter items found in North Carolina waterways.

Sponsored by First Citizen's Bank, N.C. Big Sweep is this year marking its 10th anniversary.

Help make this the most successful Big Sweep ever.

To volunteer, call 1-800-27-SWEEP.

Jordan Lake water supply allocation reopened. As a result of a request from the Town of Cary for a 24 million gallons per day (MGD) increase in its allocation, the State of North Carolina has reopened the process of allocating water from the water supply portion of Jordan Lake. A Corps of Engineers project in the Cape Fear River Basin, Jordan Lake was filled in 1982. At normal elevation, its total volume is about 140,400 acre-feet. Of this, approximately 45,800 acre-feet (15 billion gallons) is designated to provide water supply. This amount of storage is estimated to yield about 100 million gallons per day (MGD). Existing rules limit diversion out of the Cape Fear Basin to 50% of the 100 MGD total water supply yield. Currently 16% of the 100 MGD is diverted out of the basin. The initial allocations of water supply from Jordan, amounting to 42% of the water supply pool, were made in 1988. Since that time some original allocation holders have released the allocations, and water supply needs of the Town of Cary have increased. Any time a request for a new or increased allocation is received, it is the State's policy to open the allocation process to anyone interested in obtaining a new allocation or increasing an existing allocation. The N.C. Division of Water Resources (DWR) has publicized the allocation process, making extensive mailings and holding an informational public meeting in Raleigh on June 27. Letters of intent to request an allocation were due to DWR by July 31, 1996. At the Environmental Management Commission's Water Quality Committee meeting on July 10, DWR reported that two additional letters of intent had been received—one from the City of Durham requesting 24 MGD and one from Chatham County requesting 15 MGD. For additional information on allocation of water supply from Jordan Lake contact Tom Fransen with the N.C. Division of Water Resources at (919) 733-0381.

N.C. Wildlife Resources Commission repeals rules for "critical habitat." In September 1994, the N.C. Wildlife Resources Commission (WRC) adopted a rule defining "critical habitat" and outlining a procedure for designating "critical habitat" (15A NCAC 10I.001). Designation of critical habitat by the WRC was envisioned as the first step in a process by which state agencies could cooperate to save endangered wildlife. WRC adopted the critical habitat rule over the objection of the Rules Review Commission, which had objected to the rule on the grounds that the WRC did not have statutory authority to adopt a legal definition for "critical habitat" even though its own legal staff advised that WRC did have such authority. Following adoption of the critical habitat rule, business and local government interests filed a request for a Declaratory Ruling as to the validity of the rule. However, in 1995 before the action was resolved, the N.C. General Assembly passed H 832 "To Clarify the Role of the Wildlife Resources Commission in the Protection of Endangered and Threatened Wild Animal Species and Wild Animal Species of Special Concern." The law directed the Wildlife Resources Commission to develop conservation plans for protected wild animal species based on, among other things, the cost of any measures to protect and restore the species and the impact of such measures on the local economy, local government and development of private property. It prohibited the Commission from adopting any rule that restricts the use or development of private property. On May 15, 1996, the WRC published in the N.C. Register a notice of intent to repeal its rule for defining and designating critical habitat. A public hearing was held on June 5 and comments were taken until June 14. No commenters attended the public hearing and no comments were received. On July 17, the WRC repealed the rule.

Assessment of economic and environmental impacts of N.C. aquatic weed infestations completed. The N.C. Division of Water Resources (DWR) has recently completed a study of aquatic weed infestations in North Carolina and the potential for economic and environmental losses to aquatic weeds. Exotic aquatic weeds that maintain large infestations in N.C. waters are hydrilla, alligatorweed, and Eurasian watermilfoil. Confirmed hydrilla infestations totalled 5,800 acres in 1989, with the largest number of infested water bodies occurring in the Neuse River Basin in Wake and surrounding counties. The largest acreage of hydrilla infestation is in Lake Gaston, with 3,102 acres. The potential exists for hydrilla infestation of 54,000 acres of Piedmont and mountain reservoirs and virtually all natural coastal lakes. Alligatorweed is most prevalent between the Virginia border and the counties north of the Pamlico River, with about 5,000 acres of infestation in the Albemarle Sound drainage. In Camden, Currituck, Hyde, Pender, Perquimans, Tyrrell, and Washington counties, alligatorweed is encroaching on cropland, with control costs and crop losses amounting to $170,000 annually. Alligatorweed infestations also occur to a lesser degree in the southeastern counties. Approximately 4,000 acres of Eurasian watermilfoil infestation is present in the Currituck and Albemarle Sounds and about 33 percent of the surface area of Roanoke Rapids Lake is covered by the weed. Exotic aquatic weed infestations can displace native plants and reduce habitat diversity, reduce water quality, reduce fish habitat and increase the number of disease vectors and nuisance insects. Severe infestations can disrupt power generation, public water supply, agricultural, industrial and mining activities. The DWR assessment report, *Economic and Environmental Impacts of N.C. Aquatic Weed Infestations*, also surveys control methods, laws and regulations for controlling exotic aquatic weeds, and funding for control programs. For a copy of the report contact the N.C. Division of Water Resources at (919) 733-4064.

Johnston Soil and Water Conservation District launches River Friendly Farmer Program in Neuse Basin. To spread the word about farming practices that benefit water quality and about farmers' contributions to the cleanup of North Carolina's rivers, the Johnston Soil and Water Conservation District has developed the River Friendly Farmer Program. The Neuse River bisects Johnston County, and nearly all the county's land area drains to the Neuse. Any Johnston County farmer in the Neuse River Basin who satisfies the program criteria can be designated a River Friendly Farmer and be recognized with a sign on his/her property and through other public recognition activities. Among the criteria are implementation of applicable Best Management Practices, use of sound nutrient management practices, maintenance of adequate field borders in areas where surface runoff leaves the fields, use of cultural pest-control practices along with use of pesticides according to guidelines, and maintenance of specified buffer distances between waste application fields and property lines and surface ditches. According to Noah Ranells with the N.C. Division of Soil and Water Conservation, the division and the N.C. Soil and Water Conservation District Association plan to develop guidelines, find sponsors, and develop incentives for a statewide River Friendly Farmer Program.

Regional Wastewater System being planned for Carteret, Craven, Onslow and Pamlico counties. At its July meeting, the N.C. Environmental Management Commission's Water Quality Committee heard a report on planning for a future wastewater disposal system for the Coastal Plain counties of Carteret, Craven, Onslow and Pamlico. Thurman H. Upchurch, Mayor of Cape Carteret, appeared with a representative of the engineering firm Malcolm Pirnie, to inform the committee of the study being conducted of options for wastewater disposal in the four-county region. According to Mayor Upchurch, only 3 of the 10 municipalities in Carteret County have wastewater treatment systems; the rest use septic systems. This situation is typical of the region, according to the Malcolm Pirnie representative, with about 36% of the wastewater flow in the four-county region going to septic tanks. According to Upchurch, much of the area is not suitable for conventional septic systems, increasing surface water discharges is problematic, and land application of wastewater has not been shown to be an acceptable option for disposal of total wastewater flow in the region. Therefore, he said, "a regional wastewater system is critical for preserving water quality." The engineering firm has developed several scenarios for wastewater disposal for the region. Two that analysis reveals unacceptable are "status quo" (building no new facilities but allowing growth to be accommodated by septic systems and package plants) and consolidation of treatment facilities with continued heavy reliance on surface water discharge and septic tanks. Other scenarios based on (1) use of ocean outfalls, (2) heavy water reuse, (3) maximum use of natural systems (such as constructed wetlands) and (4) a mixture of the above three options all hold promise for meeting the wastewater disposal needs of the region, according to the consultant. Under the various options, wastewater discharge to rivers and estuaries would be decreased from 20% of total flow (mixture of options) to 1% of total flow (ocean outfalls). The range of costs for the options is $700 million to $800 million.

FERC issues draft environmental assessment of application of City of South Hill, VA, to withdraw water from Lake Gaston. The Federal Energy Regulatory Commission (FERC) announced on June 18, 1996, the availability of its draft environmental assessment (DEA) of an application by the City of South Hill, VA, to withdraw up to 7 million gallons per day of water from Lake Gaston for municipal purposes as part of a regional water supply system. Comment on the DEA was to be taken for 40 days (until July 28), and, at press time, various agencies of the State of North Carolina were preparing comments. Following the comment period, FERC will prepare a final assessment. If the agency issues a finding of no significant impact, then the application presumably would be approved. If there is a finding of potential significant impact, then a full Environmental Impact Statement would be required.

LA, NYC report on water conservation with low-flush toilets. New York City and the City of Los Angeles have both implemented rebate programs to encourage residents to replace water-wasting toilets with ultra low-flush (ULF—1 to 1.5 gallons per flush) toilets. A recent survey of participants in the LA rebate program revealed that participants are generally very satisfied with their ULF toilets. Eighty-six percent said that, if they had to do it again, they would replace their old toilets with ULFs. On a satisfaction scale of 1 (low) to 10 (high), almost half gave their ULF toilets a 9 or 10. The mean rating was 7.6—very positive. What purchasers most like about their ULFs are that they save water and that they perform well. The survey revealed, however, that there are significant differences in performance between brands and models of ULFs. (A copy of the survey, which includes information on the highest rated brands and models, can be obtained by writing DWP Water Conservation Publications, Box 111, Room 1348, Los Angeles, CA 90051.) In New York, where the toilet rebate program has effected replacement of 376,897 toilets citywide, water savings stories are emerging: The Amalgamated-Park Reservoir Co-op, reported a 52% reduction in water use after they replaced 96% of their 1700 toilets and showerheads. (Information on the New York City rebate program is available from Jim Gallagher, NYC Department of Environmental Protection, 13th Floor-BWEC, 59-17 Junction Blvd, Corona, New York 11368-5107.)

NORTH CAROLINA SEEKS DRINKING WATER ADMINISTRATOR

(Environmental Supervisor IV; Grade 79; Range $40,765 - 68,312; Location Raleigh, NC; Closing Date Aug 2, 1996)

The Division of Environmental Health of the N.C. Department of Environment, Health and Natural Resources seeks an administrator for its public water supply program. The position is responsible for planning, implementation, technical supervision and administration of the functions required to fulfill the responsibilities as required by law, rule, policy, and sound engineering principles for a state-wide program of consultative and regulatory environmental functions pertaining to public water systems and their protection. The purpose of the public water supply section is to regulate public water systems within the state under the statutory authority and responsibility of G.S. 130A article 10. The section has units/branches and programs for (1) the review and approval of plans and specifications for new and expanding (or improving) public water systems; (2) implementing the mandates of the federally amended safe drinking water act; (3) inspections and investigations of water systems; (4) administering an operator's certification program; (5) providing financial assistance through loan and grant activities; and (6) administering the operating permit and fee collection program.

Requirements: Four-year degree in civil or environmental engineering, chemistry, a natural science, an environmental science or a closely related curriculum and six years of progressive experience in environmental work including two years in a supervisory capacity or an equivalent combination of education and experience.

Preferred Experience: Drinking Water program experience and Professional Engineer certification.

How to Apply: Must submit a PD-107 State Application to be considered. You may obtain a state application from Employment Security Commission, North Carolina Public Libraries, or by calling (919) 715-3202. Mail application to Winnie J. Creech, DEH/ Personnel, P.O. Box 29596, Raleigh, NC 27626-0596. Refer to vacancy # 20604.

NATIONAL SYMPOSIUM ON EFFECTIVENESS OF EROSION & SEDIMENTATION CONTROL PRACTICES

Sept 23-25, 1996, Raleigh, NC

The focus of the National Symposium is on the effectiveness of erosion and sediment control practices. The objective of the symposium is to provide industry, agriculture, government agencies, researchers and interested citizens with practical experience and methodologies to make erosion and sediment control practices more effective. Professional Development Hours (PDH's) will be available for North Carolina registered professional engineers, land surveyors and landscape architects. A total of 13.75 credit hours are available for attending the entire conference. For additional details contact Bob Holman at WRRI (919) 515-2815.

REGISTRATION FORM

EFFECTIVENESS OF EROSION & SEDIMENT CONTROL PRACTICES AND PERSPECTIVES
SEPTEMBER 23-25, 1996
REGISTRATION DEADLINE IS AUGUST 30, 1996

Name ____________________

Company or affiliation ____________________ Phone Number: ____________________

Mailing address ____________________
street or box number

City ____________________ State ____________________ Zip ____________________

Check for $175 ($150 prior to August 15) made payable to the UNC Water Resources Research Institute

Please return check (prepayment required) and form to: Water Resources Research Institute, Box 7912, North Carolina State University, Raleigh, NC 27695-7912. If you have questions about registration, please call Linda Lambert or Eva Gray at WRRI: (919) 515-2815.

Web sites

A bibliography of more than 660 publications about North Carolina's water resources has been compiled by the **U.S. Geological Survey** and is now available online. The list can be searched by topic, geographic area, author or keyword. Users also can enter their own keywords. URL is http://ser1dncrlg.er.usgs.gov/pubs/search.html.

The **American Association for the Advancement of Science, Duke University, and Stanford University** have created a centralized World Wide Web site to provide free and universal electronic access to the latest research findings in science, medicine and technology. The site, EurekAlert!, posts material from numerous scientific journals, research institutions, government agencies, companies and nonprofit organizations. A search mechanism aids access to specific information, and hypertext links provide a wide range of supplementary material. For additional information, examine EurekAlert! at http://www.eurekalert.org.

The **Conservation Council of North Carolina** is on line at http://www.serve.com/ccnc/.

The **American Environmental Health Foundation** is a nonprofit organization dedicated to furthering the practice of environmental medicine and helping physicians "better diagnose environment-induced illness." Its web page, at http://www.aehf.com/, contains information on chemical sensitivity, food reactivity, premenstrual syndrome, water filtration systems, mold, pollen, and dust mites. Also included is a product catalog.

Public Administration and Management: an Interactive Journal, a new peer-reviewed journal, can be found at http://www.hbg.psu.edu/Faculty/jxr11/. Articles are written for both scholars and practitioners in the fields of public administration and management.

The Water Librarians' Home Page at http://www.wco.com/~rteeter/waterlib.html provides numerous links to a wide variety of Internet materials related to water research and the environment.

The **National Rural Water Association**, a federation of independently governed state Rural Water Associations that provide training and technical assistance, is online at http://www.cais.net/nrwainfo/.

EPA's Economy and Environment web page is at http://www.epa.gov/docs/oppe/eaed/eedhmpg.htm. The program carries out research and analyses of the interaction and relationships between the economy and environmental pollution control as well as other aspects of environmental economics.

The **Consortium for International Earth Science Information Network (CIESIN)** has made

North Carolina Precipitation/Water Resources

Rainfall (+/- average)	May	June
Asheville	2.55" (-1.88")	3.54" (-0.69")
Charlotte	2.13" (-1.69")	2.56" (-0.83")
Greensboro	3.84" (-0.18")	1.93" (-1.88")
Raleigh	3.26" (-0.66")	3.28" (-0.40")
Wilmington	3.00" (-1.43")	8.02" (+2.04")

Streamflow

Index Station (County, Basin)	**May mean flow (CFS)** (% of long-term median)	**June mean flow (CFS)** (% of long-term median)
Valley River at Tomotla (Cherokee, Hiwassee)	344 (146%)	227 (141%)
Oconaluftee River at Birdtown (Swain, Tenn)	678 (142%)	599 (149%)
French Broad River at Asheville (Buncombe, FB)	1,990 (89%)	1,860 (98%)
South Fork New near Jefferson (Ashe, New)	446 (91%)	505 (119%)
Elk Creek at Elkville (Wilkes, Yadkin/Pee-Dee)	83 (75%)	126 (137%)
Fisher River near Copeland (Surry, Yadkin/Pee-Dee)	170 (79%)	299 (191%)
South Yadkin River near Mocksville (Rowan, Yadkin/PD)	276 (81%)	284 (94%)
Rocky River near Norwood (Stanley, Yadkin/Pee-Dee)	655 (128%)	520 (80%)
Deep River near Moncure (Lee, Cape Fear)	969 (100%)	483 (86%)
Black River near Tomahawk (Sampson, Cape Fear)	479 (92%)	308 (74%)
Trent River near Trenton (Jones, Neuse)	32 (32%)	213 (257%)
* **Lumber River** near Boardman (Robeson, Lumber)	1,038 (102%)	659 (79%)
Little Fishing Creek near White Oak (Halifax, Pamlico)	177 (165%)	79 (99%)
Potecasi Creek near Union (Hertford, Chowan)	119 (90%)	36 (40%)

Groundwater

Index well (Province)	**May depth below surface (ft)** (departure from average for month)	**June depth below surface (ft)** (departure from average for month)
Blantyre (Blue Ridge)	26.59 (+3.22)	28.37 (+1.87)
Mocksville (Piedmont)	13.73 (+2.54)	14.56 (+2.18)
Simpson (Coastal Plain)	3.30 (+1.37)	4.08 (+1.09)

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

** Note change in station from Contentnea Creek to Lumber River* accessible on the web the **Demographic Data Viewer**, an interactive mapping tool. It allows users to select geographic areas, specify variables to map, and specify map outlay parameters and color assignments. A map image is created and descriptive summary statistics are provided along with the image. All products may be downloaded. Boundary data were derived from the Bureau of Census TIGER 1992 database and are available for states, counties, census tracts, and more. Demographic data were derived from the Bureau of Census STF3A 1990. Roughly 225 variables are selectable either for mapping purposes or for tabular reports. DDViewer is available at http://sedac.ciesin.org/plue/ddviewer.

The **U.S. Fish and Wildlife Service** has launched a variety of web servers which can be accessed at http://www.fws.gov/servers/html.

Bannister Research and Consulting is sponsor of **groundwater.com**, which provides links to a number of internet sources of information on groundwater as well as the Groundwater Mailing List, a discussion group on groundwater and related topics. The address is http://www.groundwater.com.

Researchers at N.C. State University are developing a safer alternative to herbicide sprays for managing roadside vegetation. Scientists in the Dept. of Horticultural Science, are developing a closed system for application of herbicide called the Burch Wet Blade™. A low-volume fluid pallet attached to a mower pumps herbicide onto the bottom side of the mower blade, which wipes the liquid directly onto the cut surface of a plant stem. As a result of applying herbicide directly to the vascular system of the plant, a very large percentage of the herbicide is absorbed. Very little herbicide contacts the soil and there is no off-target movement. The system provides effective weed control, protects mowing crews from exposure, and reduces the risk of spills by eliminating on-site mixing of pesticide solutions. — ***Center for Transportation and the Environment, NCSU, (919) 878-8080.***

Workshops and conferences

The N.C. Environmental Health State of Practice Committee, N.C. Division of Environmental Health, Environmental Health Services and On-site Wastewater Branches, the UNC-CH School of Public Health and others are presenting ON-SITE WASTEWATER: SUPERVISORY TRAINING IN REPAIRING SMALL SYSTEMS July 10-12 in Greenville, NC, and Aug 7-9 in Asheville, NC. The course has been specially designed to help supervisors, program managers, on-site wastewater program specialists, and soil scientists to become expert at the analysis of on-site wastewater failures and to propose repair or alternative technologies. Also to be discussed are legal aspects of closing failed systems. For additional information or to register, call the UNC-CH School of Public Health Office of Continuing Education at 919/966-4032.

The American Water Resources Association is holding its 32ND ANNUAL CONFERENCE AND SYMPOSIUM ON GIS AND WATER RESOURCES Sept 22-26, 1996, at the Fort Lauderdale, Florida, Bonaventure Resort & Spa. For information call (703) 904-1225 or check the AWRA Home Page at http://www.uwin.siu.edu/~awra.

The International Ground Water Modeling Center at the Colorado School of Mines in Golden will present MODELCARE 96: INTERNATIONAL CONFERENCE ON CALIBRATION AND RELIABILITY IN GROUNDWATER MODELING Sept 24-26, 1996, at the Cecil and Ida Green Professional center on the campus at Golden. The conference will provide an international forum for state-of-the-art presentations on relevant methodologies and techniques to incorporate uncertainty into modelling and quantify the level of uncertainty in model-based decisionmaking. For information on technical content contact the conference secretariat at (303) 273-3103 (email: igwmc@mines.edu). For registration and general information contact the Office of Continuing Education at (303) 273-3321 (email: space@mines.edu).

The United Nations Environment Programme, U.S. EPA, and others are sponsoring WORLD '96: WORLD ENVIRONMENTAL CONGRESS Oct 26-29, 1996, at the Regal Cincinnati Hotel in Cincinnati. The purpose of the conference is to promote environmental science, technology and business. It is designed for those involved in the research, development, demonstration and commercialization of innovative environmental technologies and those involved in applications of conventional and innovative environmental technologies. The conference is being held in conjunction with the ADVANCED OXIDATION TECHNOLOGIES FOR WATER AND AIR REMEDIATION CONFERENCE and the TiO_2 PHOTOCATALYTIC PURIFICATION AND TREATMENT OF WATER AND AIR CONFERENCE. For additional information contact Science & Technology Integration, Inc., London, Ontario. Phone: (519) 858-5055; Fax: (519) 858-5056; Email: sti.ekabi@info.london.on.ca.

Publications available for conservation and historic preservation easements

The Conservation Trust for North Carolina has published two guides that help explain conservation easements and their advantages for private landowners: a simple 16-page "Conservation Easement Introduction" pamphlet, and a more detailed 38-page guidebook "Conservation and Historic Preservation Easements." Single copies may be ordered by mail from the Conservation Trust for North Carolina, PO Box 33333, Raleigh, NC 27636. Costs are $1.75 for the pamphlet and $6.00 for the guidebook (mailing costs and sales tax included). For more information contact Chuck Roe at (919) 828-4199.

Publications received

Residents of North Carolina may borrow these publications from the Institute for a period of two weeks. If you need copies to keep, please request them from the organizations issuing the publication. Addresses are provided for this purpose.

Aquatic Weeds

Economic & Environmental Impacts of N.C. Aquatic Weed Infestations. 1996. Division of Water Resources, N.C. Department of Environment, Health, and Natural Resources, PO BOX 29535, Raleigh, NC 27602-0535; (919) 733-4064.

Groundwater

Water-Level Conditions in the Black Creek Aquifer, 1992-94, in Parts of Bladen, Robeson, and Scotland Counties, North Carolina. 1996. By A.G. Strickland. U.S. Geological Survey Water-Resources Investigations Report 95-4283. U.S. Geological Survey, 3916 Sunset Ridge Road, Raleigh, NC 27607. (maps) (02-F)

Dredging

Dredging: Building and Maintaining Our Underwater Highways. ND. U.S. Army Corps of Engineers, 20 Massachusetts Ave. NW, Washington, DC 20314-1000. (20 pages) (08-A)

Miscellaneous

Geotechnical Earthquake Engineering Practice in North America: The Last 40 Years. By W.F. Marcuson, III., W.D. Liam Finn, and R. H. Ledbetter. Thirty-Second Henry M. Shaw Lecture in Civil Engineering, NCSU, Mar 29, 1996. (97 pages) (08-D)

Water Use

Mirage: The False Promise of Desert Agriculture. 1996. By Russell Clemings. Sierra Club Books, 100 Bush Street, 13th Floor, San Francisco, CA 94104, 415-291-1600. (256 pages; $28 HB) (06-D)

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

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