

WATER RESOURCES RESEARCH INSTITUTE

OF THE UNIVERSITY OF NORTH CAROLINA

Number 165

December 1979

CONTENTS

	<u>Page</u>
USGS Publishes Study of North Carolina Estuaries	1
North Carolina Water Management Plans Published	2
DNCRD Undergoes Organizational Changes	2
Actions by North Carolina Environmental Management Commission	2
OWRT Funds Technical Assistance Effort for Water Reuse Research and Support of Wrightsville Beach Test Facility	3
Farm Sediment Control at the Most Reasonable Cost	3
New Institute Research Projects	4
Assessment Method for NPS Pollution Control Alternatives	4
Public Meetings on National Waterways Study	4
Groundwater Management Capabilities Expanded by USGS Studies	5
New Groundwater Course Offered	5
Natural Resources Legislation	6
Water Resources Conditions in North Carolina	8
Conferences and Workshops	8
Positions Available	8
New Publications Received by the Institute	9

NORTH CAROLINA ESTUARINE STUDY COMPLETED

the most comprehensive study ever done on the hydrology of North Carolina's major estuaries and sounds. The work was done in cooperation with the North Carolina Department of Natural Resources and Community Development.

According to Ralph C. Heath, District Chief for the Survey's North Carolina operations, the 190-page report on the study presents a basic hydrologic "picture" of Pamlico Sound, Albemarle Sound, and the estuaries of the Cape Fear, Northeast Cape Fear, Neuse, Trent, Tar, Pamlico, Roanoke, and Chowan Rivers. The picture presented is in terms of freshwater inflow, freshwater quality, tide-affected flow, water levels, salinity, and sedimentation.

Geological Survey flow, water quality, and salinity data were utilized to develop important hydrologic information, such as graphs showing the relation of salinity to flow for most estuaries, a map showing the upstream limits of tide effects and saltwater intrusion for all major estuaries, and tables giving monthly and annual water budgets for Pamlico and Albemarle Sounds. In compiling the report, however, information from numerous sources other than the Geological Survey was used to complete the picture.

In addition, the report highlights many of the serious problems affecting North Carolina's estuaries and sounds, such as the algal blooms which have recently been plaguing the Chowan, Pamlico, and Neuse Rivers. Other problems discussed include saltwater intrusion into usually fresh estuarine reaches, flood damage due to hurricanes, the effects of agricultural

practices on fish nursery areas within the salt-marsh environment, the problem with Eurasian water-milfoil in Currituck Sound, and shoaling in navigation channels. Heath cautioned that the report was not intended to provide solutions to these problems, but will aid indirectly by bringing together and updating, for the benefit of water managers and scientific investigators, a wealth of hydrologic information which previously was unavailable or difficult to compile.

"The estuarine environment in general," said Heath, "is a very dynamic yet fragile one, and many of the complex physical, chemical, and biological processes at work in them exhibit a high degree of mutual interdependence. This is doubly true for many of North Carolina's estuaries and sounds, particularly those landward of our Outer Banks. Pamlico Sound, Albemarle Sound, and estuaries tributary to them, may be viewed individually as elements of one vast interconnected interactive system. Many of our estuarine problems, when first looked at, may appear to be purely of an engineering nature, or purely of a chemical nature, or purely of a biological nature, and so forth, but one soon discovers that, with few exceptions, a multidisciplinary approach is the only way to develop a clear grasp of the basic causes of and possible solutions to our estuarine problems. The mutual interdependence of estuarine processes is easily seen in an overview report such as this, which, until now, has been lacking for North Carolina's estuarine waters. Once this mutual interdependence is more widely appreciated, we will begin to see more of the kind of multidiscipline attacks on estuarine problems which are most likely to lead to satisfactory and lasting solutions."

The report, "Hydrology of major estuaries and sounds of North Carolina," by G. L. Giese, H. B. Wilder, and G. G. Parker, Jr., is offered for sale by the National Technical Information Service, U. S. Department of Commerce, 5285 Port Royal Road, Springfield, Virginia, 22151. A limited number of copies are also available free on request to the U. S. Geological Survey, P. O. Box 2857, Raleigh, NC 27602.

**NORTH CAROLINA WATER QUALITY
MANAGEMENT PLAN PUBLISHED**

After two years of research, development, public comment, and

revision the North Carolina Water Quality Management Plan (208 plan) has been adopted. Plan documents on the impacts of non-point sources and point sources on surface and groundwaters have been published. A booklet called the "Implementation Summary" lists all of the Plan recommendations and dates when recommended actions should be initiated. There are several topical documents which cover each source in depth. Finally, there is an Executive Summary with a narrative about water quality as well as a summary of Plan recommendations.

To obtain any of the Water Quality Management Plan documents, write to: Public Involvement Unit, Division of Environmental Management, P. O. Box 27687, Raleigh, NC 27611. The publication titles are:

- Water Quality and Wastewater Discharges (point sources)
- Water Quality and Urban Stormwater
- Water Quality and Agriculture
- Water Quality and Construction
- Water Quality and Solid Waste Disposal
- Water Quality and On-Site Wastewater Disposal
- Water Quality and Forestry
- Implementation Summary
- Executive Summary

**DEPARTMENT OF NATURAL RESOURCES
UNDERGOES ORGANIZATIONAL CHANGES**

The Department of Natural Resources and Community Development has undergone some shifts in environmental enforcement programs.

Howard N. Lee, Secretary for the Department, has renamed the enforcement division, and it is now titled Office of Legal Affairs. The director of the office, William G. Ross, Jr., will report to Neil S. Grigg, Assistant Secretary for Natural Resources. Ross will supervise enforcement of environmental regulations governing air and water quality, sedimentation, dam safety, water use, and well construction. Grigg has also been named director of the Division of Environmental Management. He has been acting director since A. F. McRorie resigned in August.

A new Office of Regulatory Relations has also been created in the Department. The new office, headed by Anne Taylor, will coordinate the environmental permit process, evaluate environmental programs, and conduct economic studies of regulatory programs and activities.

**ACTIONS BY NORTH CAROLINA
ENVIRONMENTAL MANAGEMENT
COMMISSION**

The November 8 meeting of the State Environmental Management Commission debated a number

of difficult issues. Among these were:

Weyerhaeuser, Plymouth - Welch Creek Dissolved Oxygen Exception - During this meeting, the Commission voted to take no action with respect to the U. S. EPA disapproval of a State variance for the dissolved oxygen criterion in the water quality standards of Welch Creek near Plymouth, North Carolina. This was one of three alternatives considered. The other two were to continue to oppose EPA or take revisory action and establish a new DO standard on its own initiative. The action step will probably lead to the piping of the effluent to the Roanoke River. With proper diffusion, no additional treatment will be required to protect water quality standards in the River. The added cost is relatively small. The benefits will be to return Welch Creek to its full use for fish propagation and to protect the shoreline waters of the Roanoke below the mouth of the now badly polluted Creek.

Limestone-Muddy Creek Small Watershed Project - Under State law, every preliminary project investigation or recommended report concerning a watershed improvement project or drainage project that involves channelization must be submitted to the Environmental Management Commission for review and for approval or disapproval. This review must be prior to and in addition to the review of watershed work plans.

The initial report on this project was presented at the September meeting. The information provided as a basis for the Commission's decision was viewed as inadequate, and staff was requested to provide members with copies of the draft plan and environmental impact statement at its October meeting. There were still significant questions unanswered at that meeting, and these were referred back to the staff for a fuller response at its November meeting. Questions included such things as other viable alternatives to channelization, degree of land treatment to be associated with the project, prior agreement with the Department of Transportation concerning control of erosion from roads, and so forth.

The staff presentation at the November meeting generally satisfied the Commission and demonstrated the impressive progress made since the Chicod Creek litigation in the control of environmental damage and mitigation measures. A highlight was a review of the Wildlife Resources Commission findings by Frank Barick. Commission members still had questions about the provisions for land treatment to control erosion from farms and in approving the preliminary plan asked the sponsors to raise their target for land treatment from 50 percent to 75 percent and to give greater protection to land treatment where erosion rates exceeded 5 tons per acre.

PCB Wastes from Transformer Company - The Commission approved a special order by consent for the Ward Transformer Company, near the RDU Airport, to construct waste treatment facilities to remove PCB from surface runoff waters draining the plant site. These

waters presently go to holding ponds with overflow to a tributary of Little Briar Creek.

Reclassification of Shellfish Waters - Several areas of coastal waters in four different river basins can now be reclassified SA for shellfish growing because of progress in pollution abatement measures. All the areas had been closed to shellfishing from time to time and the previous SC classification was believed to impede cleanup efforts and the reinstatement of shellfishing. The initiative was prompted by the Shellfish Sanitation Office of the Division of Health Services, Department of Human Resources, in cooperation with Division of Environmental Management Staff. It was hailed by Commission members as a major step forward in the control of water pollution and enhancement of economic activity in the shellfish industry.

OWRT FUNDS TECHNICAL ASSISTANCE EFFORT FOR WATER REUSE RESEARCH AND SUPPORT OF WRIGHTSVILLE BEACH TEST FACILITY

North Carolina State University will assist in the technical supervision of the U. S.

Department of Interior desalinization plant here and conduct water reuse research at the Raleigh campus under a contract with the Office of Water Research and Technology.

The long-range program is designed to use the expertise of North Carolina State University's engineering faculty to enhance desalinization programs at the test facility here and to advance the science and technology of water management across the nation.

The Department of Interior's Office of Water Research and Technology (OWRT) has approved the initial step of a long-range program under which the federal government would provide funding.

Under a half-million dollar, three-year proposal by NCSU, the University will include the following in its technical supervision of the Wrightsville Beach Test Facility:

1. Conduct critical in-depth evaluations of the performance of OWRT test projects to identify opportunities for improvements and adaptations needed for specific applications. These studies would be carried out by on-site university faculty and staff who will also utilize the expertise and resources of the campus at Raleigh.
2. Develop and establish improved operation and control techniques, facilities, and programs, including a modern data acquisition system specifically designed to improve and simplify the experimental techniques for water research and development.
3. Make revisions and adaptations, as approved by the OWRT, to be designed, installed, and tested where such activities are relatively minor changes in OWRT test projects.
4. Propose to OWRT various water research and development projects as needs and opportunities arise, especially where they are related to or are suitable for implementation at the Facility.
5. Propose and seek OWRT approval for programs and developments utilizing the Wrightsville Beach

Test Facility that might be outside the perview of OWRT but where the Facility is needed.

6. As the University will conduct much of its work by its normal procedures, it will utilize substantial numbers of graduate and undergraduate students. Thus, the proposed program will provide a supply of young graduates educated in water research and technology to work professionally in the field.

A Technical Advisory Committee for the program has been appointed by Dr. Larry K. Monteith, Dean of Engineering. Dr. James M. Stewart, Acting Director of the Water Resources Research Institute, is a member of that Committee. The Advisory Committee will work closely with Dr. Ed Stahel who is currently principal investigator for the program.

FARM SEDIMENT CONTROL AT THE MOST REASONABLE COST

Water pollution control programs are emphasizing erosion

control to reduce sedimentation in streams and lakes. Not only is sediment itself regarded as a pollutant but other pollutants are carried into streams with it.

Conservation practices which have been developed over the years to control soil erosion and preserve the soil resource may or may not result in effective reduction of sedimentation in streams. They were not developed with this purpose in mind.

Studies have been underway at Cornell University to determine which soil erosion control practices are most effective in reducing stream sedimentation at the most reasonable cost to the farmer. Computational methods have been developed and tested on four dairy farms to obtain cost comparisons of various mixes of sediment control practices applied at different levels for individual farm situations.

Professor Michael Walter and Paul Robillard of Cornell's Department of Agricultural Engineering recently reported on five major findings that have emerged from their studies:

1. Sediment control costs vary significantly from farm to farm, as other researchers have shown. An investment in sediment control practices that could be handled relatively easily by one farm may place a severe financial strain on another.
2. On all of the test farms the cost of each ton of sediment conserved on the land jumped sharply at specific levels as more stringent limits on sediment movement were imposed. These jumps were associated with changes in corn/hay acreages and total crop production.
3. Generally speaking, placing a soil loss limit on whole farms resulted in lower costs than placing limits on individual fields. This allows trade-offs among fields as long as the total farm soil loss limit for meeting water quality standards is not exceeded.
4. Reduced tillage systems, such as chisel plowing or no-till planting, were shown to be a low cost sediment control technique for all of the test farms.

5. Finally, it was found that directly controlling sediment entering streams from farms was a cheaper method of achieving water quality objectives than generally applying soil erosion controls. This can be attributed to the fact that a good deal less sediment actually enters streams than is eroded from farm fields; although it may move from one point to another on the land, much of it is trapped by various land features before it reaches a stream.

These findings are from a paper on "Field and Practice Priorities for Sediment Control" presented at a joint meeting of the American Society of Agricultural Engineers and the Canadian Society of Agricultural Engineering by Paul D. Robillard, Research Specialist, and Prof. Michael F. Walter, Department of Agricultural Engineering, Cornell University, at Winnipeg, Manitoba, in June 1979. The paper describes linear programming methods to estimate farm sediment control costs for a wide range of sediment control alternatives.

For copies of the complete paper, contact Mr. Robillard or Prof. Walter at the Department of Agricultural Engineering, Cornell University, Ithaca, NY 14853.

- - *Lyle S. Raymond, Jr.*
Water Resources Information Specialist
Center for Environmental Research/
Cooperative Extension, Cornell Univ.

NEW INSTITUTE RESEARCH PROJECTS New one-year Annual Allotment Research Projects supported by the North Carolina Water Resources Research Institute are:

Investigation of Strategies for Reducing Agricultural Non-Point Sources in the Chowan. F. J. Humenik, F. Koehler, et al., Dept. of Bio. & Ag. Engr., NCSU.

Movement of Fecal Organisms from Organic Soils to Estuaries and Other Surface Waters of Eastern North Carolina, J. W. Gilliam, Dept. of Soil Science, NCSU.

Toxic Metal Budget for Jordan Lake, North Carolina, M. S. Shuman, Dept. of Env. Sciences & Engr., UNC-CH.

Erosion of Banks Along Piedmont Urban Streams, M. P. Wilson, Dept. of Geography & Earth Sciences, UNC-C.

Municipal Intergovernmental Relations in Water Resources Decision Making, T. D. Edgmon, Dept. of Political Science, NCSU.

Improved Techniques for Evaluating the Hydraulic Conductivity of Saprolite at Proposed Waste Disposal Sites, C. W. Welby, Dept. of Geosciences, NCSU.

New two to three-year projects with joint funding by the Office of Water Research and Technology and the Water Resources Research Institute are:

Nutrient Kinetics in Relation to Algal Blooms in the Chowan River, E. J. Kuenzler, Dept. of Env. Sciences & Engr., UNC-CH.

Nitrogen Fixation as a Eutrophicating Factor in the Chowan River, North Carolina, Hans Paerl, Institute of Marine Sciences, UNC-CH.

A Phytoplankton Multi-Species Nutrient Criterion Standard for the Management of the Chowan River Estuary, A. M. Witherspoon, Dept. of Botany, NCSU.

Bottom Fauna of the Chowan River and Nutrient Exchanges Between Sediments and Water, S. J. Mozley, Dept. of Zoology, NCSU.

Nitrate Loss from Agricultural Drainage Waters: Implications for Non-point Source Control, J. W. Gilliam, Dept. of Soil Science, NCSU.

Effects of Low Level Turbidity on Fishes in Lakes, J. M. Miller, Dept. of Zoology, NCSU.

ASSESSMENT METHOD FOR NPS POLLUTION CONTROL ALTERNATIVES A technique for assessing alternatives for reducing non-point source pollution from agriculture is presented in a report published recently by the U. S. Environmental Protection Agency's Environmental Research Laboratory in Athens, GA. This watershed level planning approach can be used to identify best management practices agricultural pollution control.

"Costs and Water Quality Impacts of Reducing Agricultural Nonpoint Source Pollution: An Analysis Methodology," was prepared by Meta Systems, Inc., Cambridge, MA. Project officer for the one-year study, which was performed under an EPA grant, was Mr. Thomas E. Waddell of the Athens Laboratory's Technology Development and Applications Branch.

An analytical methodology was developed that allows the simultaneous examination of water quality impacts and economic effects of alternative farming practices and pollution control policies on the farmer. Although the technique is in a preliminary stage of development, it shows promise as a tool for identifying best management practices and evaluating government non-point source pollution control policies at the watershed level.

The methodology includes a farm model, which considers alternative agricultural practices available to the farmer and determines the net revenues resulting from each alternative, and a water quality model, which estimates the impact of the selected agricultural practices in a watershed. Also included in the methodology is a qualitative approach for assessing the social and economic impacts of water quality changes on downstream users. The methodology's use for these purposes is evaluated through an illustrative example based on data from the Black Creek Watershed in North-eastern Indiana and a Synthesized downstream impoundment.

The report (EPA-600/5-79-009) is available from the Environmental Research Laboratory, USEPA, College Station Road, Athens, GA 30605.

PUBLIC MEETINGS ON NATIONAL WATERWAYS STUDY A series of four regional public meetings

on the National Waterways Study (NWS) will be conducted by the U. S. Army Corps of Engineers, Institute for Water Resources. The four meetings are part of the Institute's continuing program to seek public reaction to the findings, design and execution of the National Waterways Study. The initial public meeting, which launched the study, was held in Washington, DC, on June 22, 1978. Subsequent workshops and meetings have been held with representatives of waterways shippers and carriers, railroads, the environmental community, state transportation agencies, and other interested constituencies.

The current series of meetings will concentrate on preliminary findings of the technical studies, commodity flows, scenarios, waterway users, carriers and ports, national defense and emergencies, system capacity, other water resources demands, and environmental aspects of the system. A separate discussion session is also programmed during the afternoon of each public meeting date to focus on: (1) forecasts of future waterway use; (2) scenarios of possible future conditions that represent the assumptions about the future against which the study strategies will be evaluated; and (3) a discussion of the methodology used to organize and apply the findings of the technical elements.

The findings of the technical studies listed above along with research findings on state-of-the-art waterways science and technology, policy and institutional studies will be the key input into the next phases of the study scheduled for initiation in January 1980. The ability of the present waterway system and a system incorporating projected improved technology to meet forecasted transportation needs will be evaluated. Alternative strategies to fulfill the identified projected transportation needs would then be formulated and evaluated.

The December meetings are being held at four locations in the country to make it possible for broad participation by persons who are interested in the nation's waterway system. Comments on any aspect of the national waterways system will be welcomed at the meetings. All meetings are scheduled to begin at 9:00 a.m. with the workshop portion commencing at 1:30 p.m. Meeting dates and locations are:

December 11, 1979 Washington, DC
Washington Hotel
15th and Penn, NW
Washington, DC

December 12, 1979 Chicago, Illinois
219 S. Dearborn Street
Room 204-A
Dirksen Federal Office Building
Chicago, IL

December 14, 1979 Portland, Oregon
Auditorium
Bonneville Power Administration
1002 NE Holladay
Portland, OR

December 18, 1979 New Orleans, Louisiana
Room 10, The Rivergate
4 Canal Street
New Orleans, LA

Additional information concerning these meetings may be obtained from Mrs. Arlene L. Dietz, Study Manager, National Waterways Study, U. S. Army Corps of Engineers, Institute for Water Resources, Kingman Building, Fort Belvoir, Virginia 22060, Telephone Number (202) 325-7141.

GROUNDWATER MANAGEMENT CAPABILITY EXPANDED BY U. S. GEOLOGICAL SURVEY'S REGIONAL AQUIFER STUDIES PROGRAM

Information on groundwater systems is inadequate for intelligent management of these resources, reports the U. S. Geological Survey. Increasing use of groundwater is expected to occur for drinking water supply, irrigation, and energy production in various parts of the Nation. Environmental objections to large surface reservoirs are forcing planners to consider groundwater as an alternative source of supply for all applications.

Groundwater management questions are basically economic issues. Some are clearcut, such as the cost of pumping, the flow rate, or the quality of the water. Others are less clearly defined. If a development scheme is abandoned because of environmental considerations, for instance, a decision has been made to place a higher value on preserving the environment than on the benefits the groundwater would have provided to the economy. A decision of this kind places an implicit dollar value on environmental preservation. In any case, haphazard groundwater development will cost more than well-managed development.

In a groundwater flow system, water is continuously moving from the point where it enters the system (recharge) to the point where it leaves it (discharge). Some underground formations resist percolation by water; others, known as aquifers, are water-bearing zones which allow water to seep through. Prior to development the groundwater flow system is presumed to be in equilibrium; that is, the total recharge to the system is equal to the total discharge from it. Withdrawals by pumping disturb the natural system in various ways; to predict the consequences in advance requires accurate information.

The total amount of groundwater stored in aquifers is extremely high in relation to the amount of water actually moving through the system. This encourages withdrawals of groundwater from storage; it also means it is a far more drought-resistant supply than most surface waters. But if withdrawals exceed the natural system's ability to achieve a new recharge/discharge equilibrium, serious disruption of the entire water system is apt to be the result including diminished stream flow, which is heavily dependent on groundwater discharges during the low-flow periods.

The total amount of groundwater stored in aquifers is extremely high in relation to the amount of water actually moving through the system. This encourages withdrawals of groundwater from storage; it also means it is a far more drought-resistant supply than most surface waters. But if withdrawals exceed the natural system's ability to achieve a new recharge/discharge equilibrium, serious disruption of the entire water system is apt to be the result including diminished stream flow, which is heavily dependent on groundwater discharges during the low-flow periods.

- - Lyle S. Raymond, Jr.
Water Resources Information Specialist
Center for Environmental Research/
Cooperative Extension
Cornell University

NEW GROUNDWATER COURSE OFFERED A new groundwater course, "Hydrogeology of Groundwater Pollution and Protection," GY 566, is to be offered in the Spring Semester, 1980.

The course will cover hydrogeologic factors associated with protection of groundwater and use of geologic principles and materials to protect groundwater quality.

A partial syllabus includes review of subsurface hydrologic principles, physical and chemical properties of materials, sources of groundwater pollution and contaminants, radioactive waste disposal, some models and modelling techniques.

For further information consult the instructor, Charles W. Welby, 202 Withers Hall, 737-2212, Department of Geosciences, N. C. State University, Raleigh, NC 27650.

NATURAL RESOURCES LEGISLATION

Water Resources. This session's highlights in water resources legislation include adoption of

a safe drinking water act, revisions to the floodway and dam safety laws, a formula for state aid to water resources development projects, a new method of financing small watershed and drainage projects, termination of the water well contractors law under the sunset process, and authorization of a major legislative study commission on alternatives for water management. There were also a number of amendments to the enabling laws concerning special districts and authorities for water and sewer systems.

Floodway Regulation and the National Flood Insurance Law

A strengthened federal flood insurance program has focused attention on the need for effective local control over development and occupancy in flood hazard areas, because communities without these controls cannot obtain this insurance. As a result, the Federal Insurance Administration, which oversees this program, has been critically examining state enabling laws that authorize local governments to regulate developments in flood hazard areas, such as the North Carolina Floodway Law. (G.S. 143-215.51 to 143-215.62). In North Carolina federal authorities have objected particularly to G.S. 143-215.54, which permits eight types of uses to be made of floodway areas as a matter of right, without a permit. An NRCDC departmental bill, Ch. 413 (S 85), addresses this issue.

As originally introduced, S 85 would have modified G.S. 143-215.54 by empowering a city or county to require a floodway permit when it determines that this would be necessary in order to remain eligible for federally subsidized flood insurance. When the original bill met with resistance, the Department of NRCDC conferred with federal officials and arrived at a compromise. This compromise, apparently acceptable to the Federal Insurance Administration, consists of the following elements:

1. The concept of "uses as a matter of right" is retained without the change that would have been made by the original bill.
2. The first four categories of uses as a matter of right are retained with minor changes, such as elimination of swimming pools.

3. The other four categories of uses as a matter of right are deleted from the Act. (This includes streets, bridges and similar public uses; temporary facilities, such as circuses; boat docks and similar waterside structures; and dams.)
4. The uses as a matter of right are limited apparently to matters not subject to state approvals or permits. (We say "apparently" because there is a technical defect in the act that leaves the legal effect of this change in some doubt.) If it is legally effective, this change would retrieve some of the ground nominally given up in item (3) above, such as state-approved dams.

Dam Safety Law

Departmental recommendations to amend the Dam Safety Law were enacted as Ch. 55 (S 19) giving the Department of Natural Resources and Community Development the option of referring applications to repair or modify existing dams to other state or local agencies for review. Interagency review had previously been mandatory. The act also amends G.S. 143-215.33 to specify that administrative hearings are to be held in the county where the dam is located, while petitions appealing a hearing decision pursuant to G.S. 150A-45 may be filed either in the county where the dam is located or in Wake County. Ch. 736 (H 1185) extends the life of the Dam Safety Law by eliminating it from the list of General Statutes subject to a July 1, 1979, sunset. (Listed in G.S. 143-34.11.)

Water Resources Development Projects

Enactment of H 582 (Ch. 1046) responds to the need for a more consistent state policy regarding assistance for water resources development projects. Findings from a Legislative Research Commission study on the financing of water resources development projects indicated that projects undertaken for the same purpose but assisted by different federal agencies or using different construction methods were receiving different percentages of State contribution. Ch. 1046 seeks to establish a more consistent statutory policy by providing for specific cost-sharing percentages for each project purpose. Specifically, the act authorized the Secretary of the Department of Natural Resources and Community Development to accept applications and make grants for the non-federal costs of water resources development projects for the following purposes in amounts not to exceed the following percentages of non-federal costs:

- general navigation projects sponsored by local governments (80%)
- recreational navigation projects (25%)
- construction costs for water management purposes (66 2/3%)
- protection of privately owned beaches where public access is provided (75%)
- land acquisition and development of facilities for recreation sites operated by local governments at impoundments owned by the United States (50%)

The act also sets up procedures for project review by the Secretary and Advisory Budget Commission and for disbursement and monitoring of project funds. The

act also amends G.S. 139-54(5) to make clear that the construction costs for water management purposes for which grants may be requested include the costs of utility and road relocations not funded by the State Department of Transportation.

Further attempts to improve the State's management of its water resources were reflected in H 1310 (Ch. 1019) creating a 12-member Legislative Study Commission on Alternatives for Water Management, a bill sponsored by House Speaker Carl Stewart. Among other things, the Commission is to study the feasibility of creating a State water authority to supply water throughout the State, other alternatives for water management, state organization for water resources planning and management, and the need for legislation and regulations regarding local and regional water supplies. Appropriations are made to the General Assembly for the Commission in the amount of \$50,000 for fiscal year 1979-80. The Commission is to file an interim report by March 1, 1980, and its final report by March 1, 1981.

Small Watersheds and Drainage

Ch. 1043 (H 524) gives general support for small watershed projects as follows:

- \$100,000 appropriation to DNRC in 1979-80, and \$50,000 in 1980-81, as a reserve for small watersheds; plus
- Earmarking of an additional \$200,000 to this reserve in each fiscal year from the reserve for civil works and small watershed projects.

Ch. 1043 represents an aggregation of a number of appropriation bills for individual projects that were introduced this session.

Water Supply

Ch. 788 (S 289) enacts the major water supply legislation of recent years, the North Carolina Safe Drinking Water Act. This statute is designed to enable the state to displace EPA and to assume primary jurisdiction over drinking water standards within North Carolina. The 21-page act rewrites existing water supply legislation and empowers the Commission for Health Services to adopt, and the Secretary of Human Resources to enforce, comprehensive regulations over public drinking water supplies, down to systems that regularly serve 25 or more individuals or 15 or more service connections.

Ch. 98 (S 143) requires that the Department of Human Resources, rather than the Commission for Health Services, approve plans for public water supply systems and for sewage or industrial waste water treatment systems discharging above public supply intakes. Since the sections amended by Ch. 98--G.S. 130-161.1 and 165--were eliminated by the Safe Drinking Water Act, it appears that Ch. 98 was superseded by Ch. 788. However, the substance of the changes made by Ch. 98 was incorporated in Ch. 788.

Water Well Contractors Sunset

The Water Well Contractors Law (G.S. Ch. 87, Art. 6) was allowed to expire July 1, 1979, under the Sunset Law. A bill to extend the law for another two years and make it statewide in application (31 counties have

been covered) died in Senate Committee, after an adverse performance evaluation report from the Sunset Commission (S 706). This licensing program will now have one year for winding up its affairs.

Special Districts and Authorities

With enactment of Ch. 595 (H 581), watershed improvement projects, drainage projects and water resources development projects are added to the list of services and functions for which county and municipal service districts may be established under G.S. 153A-301 and 160A-536. The act is made applicable to existing projects and programs and allows the financing and/or operation of existing projects and programs to be discontinued under the law by which it was initiated and undertaken by a service district. This legislation was recommended by the Legislative Research Commission.

Ch. 624 (H 1084) amends the Local Government Bond Act to authorize county water and sewer districts to borrow money and to issue their bonds under the Act.

With passage of H 1149 (Ch. 520), sanitary districts statewide are permitted to contract with any person, firm corporation or political subdivision within or without the district limits to provide sewer services. This authority had been limited to counties larger than 70,000 population.

Maximum compensation of metropolitan sewerage district board members for attending board meetings was increased from ten dollars (\$10.00) to twenty-five (\$25.00) with ratification of H 615 (Ch. 471). The act also allows the board to increase its compensation about twenty-five dollars (\$25.00) per meeting with the approval of its members' governing boards.

Ch. 804 (H 1436) authorized water and sewer authorities to levy benefit assessments in order to finance construction, reconstruction or extension of water systems or sanitary and sewage disposal systems.

The 1979 revenue act (Ch. 801, S 904) authorizes water and sewer authorities and metropolitan water districts to obtain refunds from the Secretary of Revenue for sales and use tax payments. The water districts are authorized to go back three years on past purchases.

Passage of H 53 (Ch. 140) allows absentee voting in certain elections where previously it had been prohibited, including soil and water conservation district elections and sanitary district elections.

Private Water Companies, Milldams and Local Acts

Ch. 605 (H 1242) amends G.S. 105-277 to exclude from a private water company's property tax assessment the portion of the company's investment represented by contributions in aid of construction and by acquisition adjustments.

With enactment of Ch. 493 (H 812) the county engineer in counties with populations exceeding 325,000 is permitted to enforce the laws concerning obstruction of streams and drainage ditches (G.S. 77-13 and -14). The legislation was sought by the Mecklenburg County Engineer.

Finally, Ch. 114 (H202) repeals several outdated laws which called for owners of watermills situated on public roads to maintain bridges attached to milldams over which a public road may run (G.S. 136-73), made it a misdemeanor to fail to provide such maintenance (G.S. 136-74), required railroads to maintain bridges made necessary in establishing the railroad (G.S. 136-75) and required bridge owners to provide draws on notice from steamboat owners (G.S. 136-77).

Editor's Note: This concludes a series of articles on legislation on natural resources and the environment. These reviews by Milton S. Heath, Jr., and Sandi Postel reflect much of the conservation legislation handled in the last General Assembly.

**WATER RESOURCES CONDITIONS
IN NORTH CAROLINA**

Carryover from high flows during late September combined

with storm runoff from heavy rains during early October caused above-normal flows on most streams during the month. Minor flooding occurred along several streams in the Charlotte-Mecklenburg County area as a result of rainfall amounts of over four inches. Moderate rises also occurred on numerous streams located in the western Piedmont and mountains.

Only light scattered showers occurred during late October and streams across the State generally receded to low baseflow conditions.

Monthly mean flows at USGS index-gaging stations ranged from 1-1/2 times normal flow in the eastern Piedmont and Coastal Plain regions to about 2-1/2 times normal in western Piedmont streams.

Ground-water levels rose slightly in the mountains during October and declined elsewhere. As compared to long-term averages for the month, levels were above normal across the entire State except in areas affected by heavy withdrawals.

- - U. S. Geological Survey

**CONFERENCES AND
WORKSHOPS**

Energy Optimization of Water and
Wastewater Management for Municipal
and Industrial Applications

Conference - Energy use and conservation in water and wastewater treatment will be the focus of a national conference December 10 through 13 in New Orleans, LA. The conference will be sponsored by the Department of Energy, Urban Waste and Municipal Systems Branch, and will be held at the New Orleans Hilton and Towers Hotel.

Water Quality Modeling - This is a short course sponsored by the Water Resources Center, Desert Research Institute, University of Nevada System. The objectives of the course are to define the need and justification for water quality criteria, to examine the constraints imposed by current regulations, to present the fundamentals of modeling techniques and to demonstrate their applicability to the rational solution of water quality management problems. The dates for this short course are January 14-18, 1980. For more information contact Peter A. Krenkel, Water Quality

Modeling Short Course, Water Resources Center, Desert Research Institute, P. O. Box 60220, Reno, NV 89506, (702) 673-4750, Ext. 240, 248 or 250.

Wastewater Treatment Process Design - The fundamentals of biological wastewater treatment, including the acquisition and interpretation of wastewater quantities for design, will be presented during the first day. Physical-chemical processes, solid-liquid separations, biological treatment, and sludge handling options will follow together with nutrient removal, nitrification/denitrification, effluent polishing, and filtration on subsequent days.

This program will be presented by the Department of Engineering and Applied Science, University of Wisconsin-Extension in cooperation with the College of Engineering, UW-Madison, December 10-14, 1979.

For further information contact Engineering Registration, The Wisconsin Center, 702 Langdon Street, Madison, WI 53706.

Public Participation in Environmental Engineering Projects - This institute will present, utilizing a variety of presentation formats, the elements necessary for a successful public participation program. Several case studies will show how positive attitudes towards public participation can benefit a project. Specialists in the field will describe the various approaches and techniques that can be employed. Many opportunities will be provided for input by institute participants through exercises, workshops, and guided discussions. Dates for this institute are December 13-14, 1979.

For further information contact Engineering Registration, The Wisconsin Center, 702 Langdon Street, Madison, WI 53706.

POSITIONS AVAILABLE

The Water Resources Council is now soliciting nominations from members of the Universities Council on Water Resources for five one-year assignments with the Council in Washington, DC, in order to obtain skilled manpower on a short-term basis under the authority of the Intergovernmental Personnel Act (IPA). Work assignments will be in one or more areas of Council programs and at a level commensurate with the employee's experience and qualifications. The areas include grants assistance to State programs, regional planning, groundwater management, and continuing water policy analysis.

Nominations are requested no later than December 14, 1979. Contacts should be made with the U. S. Water Resources Council, Suite 800, 2120 L Street, NW, Washington, DC 20037.

The Office of Water Research and Technology (OWRT) of the Department of the Interior is interested in obtaining the services of two or three persons having experience in water research and/or planning and management. This program, conducted under the provisions of the Intergovernmental Personnel Act (IPA), authorizes the temporary assignment of selected employees from and to Federal executive agencies, colleges, universities, and State or local government agencies.

Persons interested in an OWRT mobility assignment in Washington, DC, should submit a letter of interest enclosing a resume of their experience, education, and interests to the Office of Water Research and Technology, Department of the Interior, Washington, DC 20240 (Attention: Administrative Manager).

The Department of Environmental Sciences, University of Virginia, invites applications for a faculty position in HYDROLOGY. Send resume, reprints and three references to G. M. Hornberger, Department of Environmental Sciences, Clark Hall, University of Virginia, Charlottesville, Virginia 22903. The University of Virginia is an equal-opportunity/affirmative-action employer.

The University of Central Florida at Orlando, the Department of Civil Engineering and Environmental Sciences, invites applications for a faculty position in the areas of Environmental Engineering/Water Resources. Interested applicants should send a detailed resume with a list of courses included in the graduate program and the names of 5 references to the address below:

Dr. Yousef A. Yousef, P.E.
Chairman, Search Committee
Civil Engineering & Environmental Sciences
University of Central Florida
Orlando, FL 32816

NEW PUBLICATIONS RECEIVED BY THE INSTITUTE

(Residents of North Carolina may borrow these from the Institute for a two-week period. Where individual copies are desired, readers are encouraged to request copies from the organization issuing the publications. The addresses are provided by the News for this purpose.)

Water Resources Planning

- "Socio-Economic Relationships for Water-Based Recreation Involvement in Indiana," (#125) 9/79, by J. T. O'Leary, et al., Purdue U. WRRRC, Lilly Hall, West Lafayette, IN 47904. (06B)
- "Scoping Report, Carolina Refining and Distributing Company, Carteret County, NC," 9/79, by Wilmington District, US Army Corps of Engineers, avail. from Mr. Frank Yelverton, Regulatory Functions Branch, US Army Corps of Engineers, P. O. Box 1890, Wilmington, NC 28402. (Water & Energy)
- "Water Conservation and Alternative Water Supplies (Proceedings," 11/8-9/78, ed. by J. R. Wallace, et al., Env. Resources Center, GA Inst. of Tech., Atlanta, GA 30332. (03D)
- "(Proceedings) Flood Management Conference," 3/79, Water Resources Center, U. of California, Davis, CA 95616. (04A)
- "Institutional Aspects of Water Resources Management at Substate Level," 1/79, by W. Whipple, Jr., et al., NJ WRRRI, Rutgers U., New Brunswick, NJ 08903. (06E)

Water Quality

- "Summary - 208 Water Quality Management Plan for Region B," 9/79, by Land-of-Sky Regional Council, P. O. Box 2175, Asheville, NC 28802. (208)
- "Dispersion in the Upper Delaware Estuary," 6/79, by C. Ahlert, et al., WRRRI, Rutgers U., New Brunswick, NJ 08903. (02L Estuaries)
- "Long-Term Effects of Land Application of Domestic Wastewater, Dickinson, North Dakota, Slow Rate Irrigation Site," (EPA-600/2-79-144), 8/79, by Benham-Blair & Affiliates, Inc., et al., avail. from NTIS, Springfield, VA 22161. (05E)
- "Long-Term Effects of Land Application of Domestic Wastewater," (EPA 600/2-79-145), 8/79, by Benham-Blair & Affiliates, Inc., et al., avail. from NTIS, Springfield, VA 22161. (05D Land Treatment)
- "Applicability of Land Treatment of Wastewater in the Great Lakes Area Basin, Impact of Wastewater Diversion, Spray Irrigation on Water Quality in the Muskegon County, Michigan Lakes," (EPA-905/9-79-006-A), 5/79, by P. L. Freedman, et al., avail. from NTIS, Springfield, VA 22161. (05E)
- "The Effects on Groundwater From Seepage of Livestock Manure Lagoons," (#78), 9/79, by R. O. Hegg, et al., WRRRI, Clemson U., Clemson, SC 29631. (050)
- "Research Needs Assessment--Livestock Manure Management in the United States," (EPA-600/2-79-179), 8/79, by Research Needs Assessment Task Groups, et al., avail. from NTIS, Springfield, VA 22161. (05A Ag Wastes)
- "Municipal Wastewater Treatment by the Overland Flow Method of Land Application," (EPA-600/2-79-178), 8/79, by D. H. Hall, et al., avail. from NTIS, Springfield, VA 22161. (05D).
- "Identifying Sources of Subsurface Nitrate Pollution with Stable Nitrogen Isotopes," (EPA-600/4-79-050), 8/79, by T. J. Wolterink, et al., avail. from NTIS, Springfield, VA 22161. (05A)
- "Impact of Nonpoint Pollution Control on Western Lake Superior," (EPA-905/9-79-002), 1/79, by S. C. Andrews, et al., avail. from NTIS, Springfield, VA 22161. (05B)
- "Ocean Outfall Wastewater Disposal Feasibility and Planning," 4/30/79, by J. Langfelder, et al., Dept. of Marine Science & Engr., 1205 Burlington Lab., NCSU, Raleigh, NC 27650. (05E)

- "Utilization of Natural Ecosystems for Wastewater Renovation," (EPA-905/3-79-003), 4/79, by T. M. Burton, et al., avail. from NTIS, Springfield, VA 22161. (05E)
- "Treatment of Secondary Effluent by Infiltration-Percolation," (EPA-600/2-79-174), 8/79, by D. G. Smith, et al., avail. from NTIS, Springfield, VA 22161. (05D)
- "Proceedings of a Workshop on Alternative Wastewater Treatment Systems," (#10), 8/79, by Water Resources Center, et al., U. of Illinois, 2535 Hydrosystem Lab., Urbana, IL 61801. (05D)
- "Public Attitudes Toward Community Wastewater Reclamation and Reuse Options," 8/79, by W. H. Bruvold, WRC, U. of California, Davis, CA 95616. (06B)
- "Water Quality of the French Broad River, NC, An Analysis of Data Collected at Marshall, 1958-77," by C. C. Daniel, III, et al., 7/79, USGS, P. O. Box 2857, Raleigh, NC 27602. (USGS)
- "A Routine Water Monitoring Test for Mutagenic Compounds," (#141) 5/79, by J. B. Johnston, et al., U. of Illinois, WRC, 2535 Hydrosystems Lab., Urbana, IL 61801. (05A)
- "Economics of Water Quality in Agriculture--A Literature Review," (ESCS-58) 7/79, by C. W. Ogg, et al., USDA, Economics, Statistics, and Cooperatives Service, Washington, DC 20250. (05B)
- "Water Treatment for Small Public Supplies, Report of Operation: Cuba, Carrizozo, La Luz, San Ysidro, Blue-water, Moriarty, Hagerman," 6/79, by H. G. Folster, et al., avail. from New Mexico WRRRI, New Mexico State U., Box 3167, Las Cruces, NM 88003. (03)

Water Quantity

- "Research Summary, Acid Rain," (EPA-600/8-79-028), 9/79, avail. from Research Publications, Office of R&D, RD-674, US EPA, Washington, DC 20460. (EPA)
- "Dual Purpose Detention Basins and Surveillance Procedures in Urbanizing Watershed," 1/79, by W. Whipple, Jr., et al., Rutgers U., New Brunswick, NJ 08903. (04A Stormwater)
- "A Synoptic Approach for Analyzing Erosion as a Guide to Land-Use Planning," by W. M. Brown, III, et al., avail. from Br. of Distribution, USGS, 1200 South Eads St., Arlington, VA 22202. (06A)
- "Proceedings Stormwater Management Model (SWMM) Users Group Meeting May 24-25, 1979, Miscellaneous Reports Series," (EPA-600/9-79-026), 6/79, by H. C. Torno, avail. from NTIS, Springfield, VA 22161. (04A S.W.)
- "Methodology for Siting Thermal Power Plants on Industrialized Estuaries," (#77), 9/79, by B. Edge, et al., WRRRI, Clemson U., Clemson, SC 29631. (06H)
- "Laboratory Study of Flow and Thermal Structures in Heated and/or Cooled Layers of Water," (#123), 8/79, by M. Behnia, et al., WRRRI, Purdue U., West Lafayette, IN 47907. (05C Waste Heat)
- "Survey and Analysis of Urban Drainage Ordinances and a Recommended Model Ordinance," 2/75, by T. N. Debo, avail. from NTIS, USDC, 5285 Port Royal Road, Springfield, VA 22161.
- "Wastewater Irrigation at Tallahassee, Florida," (EPA-600/2-79-151), 8/79, by A. R. Overman, avail. from NTIS, Springfield, VA 22161. (05D Land Treatment)

Miscellaneous

- "Livestock and the Environment, A Bibliography with Abstracts, Volume VI," (EPA-600/2-79-150), 8/79, by M. L. Rowe, et al., avail. from NTIS, Springfield, VA 22161. (05B)
- "Navigation User Charges: Impact on the Transportation of Agricultural Products," (#121), 10/79, by L. Shabman, et al., VA WRRRI, VPI&SU, Blacksburg, VA 24060. (06C)
- "Abstracts of Technical Papers," 10/7-12/79, Houston, TX, avail. from WPCF, 2626 Pennsylvania Ave., NW, Washington, DC 20037, \$3. (05G)
- "The Felton-Herron Creek, Mill Creek Pilot Watershed Study," (EPA-905/9-78-002), by T. M. Burton, avail. from NTIS, Springfield, VA 22161. (Land Treatment)
- "Watershed Progress, North Carolina," 10/79, by SCS, USDA, P. O. Box 27307, Raleigh, NC 27611. (SCS)

ITEMS OF INTEREST:

*North Carolina Water Management
Plans Published, page 2*

*DNRC Undergoes Organizational
Change, page 2*

*OWRT Funds Technical Assistance
Effort for Water Reuse Research
and Support of Wrightsville Beach
Test Facility, page 2*

*Farm Sediment Control at the Most
Reasonable Cost, page 3*

WATER RESOURCES RESEARCH INSTITUTE
OF THE UNIVERSITY OF NORTH CAROLINA
124 RIDDICK BUILDING
N. C. STATE UNIVERSITY
RALEIGH, NORTH CAROLINA 27650

ADDRESS CORRECTION REQUESTED

PRINTED MATTER

NONPROFIT ORG.
U. S. POSTAGE
PAID
RALEIGH, N. C.
PERMIT NO. 549