

12th Annual Conference provides two days of learning about water issues

by Jeri Gray

The Water Resources Research Institute held its 12th Annual Conference on March 30-31. Along with presentations on water research, policy and law, the two-day event featured a symposium on the water-energy nexus sponsored by the N.C. Water Resources Association and a seminar on nutrient management in North Carolina sponsored by Progress Energy. Following are some highlights of this year's conference:

Fire and Water: Making meaning out of water resource policy

In his keynote address, UNC-CH public law and government professor Richard Whisnant likened the making of water resource law to the eruption of a volcano. "Law is like lava," he said.

He explained the comparison: pressures—such as population growth, water demand, urbanization, seasonality, fear and greed—build, and at weak points in the institutional grid—where rivalry or misunderstanding of water ownership occur, where authority is dispersed or interest groups exert influence—legal eruptions occur. He said that North Carolina is in transition from a time of water plenty to one of scarcity and competition, and that the list of conflicts over water—and potential legal eruptions—is growing.

Water law and policy is not well understood in the state he said. "Localities cling to the idea they own water and legislators cling to the idea they will solve local conflicts as they arise. We need to improve the way we communi-

cate with the public about water and we need a better way to solve conflicts."

Whisnant said that water allocation is best handled by a single authority working with a small group of stakeholders by region or river basin. He stressed the need to build resilience into the framework for managing water by learning to shape change, not merely react to it.

Whisnant's presentation can be found in pdf format at: <http://www.ncsu.edu/wrri/conference/2010ac/speakers/presentations/Whisnant.pdf>.

Watershed Retrofit and Management Evaluation for Urban Stormwater Management Systems in North Carolina

In her presentation on research funded by the N.C. Urban Water Consortium, Kathy DeBusk, EIT, described the process that she and Dr. Bill Hunt of NCSU Biological and Agricultural Engineering used to evaluate stormwater retrofit opportunities and to estimate pollutant removal in a portion of the

New Hope Creek watershed, which drains to Jordan Lake. The watershed is located within the City of Durham, which is subject to rules that will require retrofitting of existing development to help reduce nutrient pollution in Jordan Lake.

DeBusk said the evaluation revealed that land use type correlates to the quantity of retrofit opportunities and to the most appropriate kind of retrofit, and that characteristics of residential developments affect the possibilities for stormwater retrofits. Rural land uses and ultra-urban areas offer few retrofit opportunities, and retrofits in "downtown" areas can be prohibitively expensive. Residential areas—particularly older residential developments—offer more opportunities, and targeting retrofits that must be maintained, such as bioretention, to areas that exhibit homeowner awareness and aesthetic sensitivity may help to assure their effectiveness. Com-

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mercial/industrial, institutional, and open space/park land uses offer higher numbers of retrofit opportunities than residential areas, with existing pond modifications, permeable pavement and bioretention being among the most appropriate types.

DeBusk said that the investigators calculated existing nutrient load for the subject watershed and the estimated nutrient removal that could be expected from all retrofit opportunities identified in the watershed by mass reduction, concentration reduction, and mean effluent concentration. She said using the least conservative measuring metric (an assigned mean effluent concentration for outflow from each BMP type), approximately 8.5% of the annual total phosphorus load and 9.5% of the annual total nitrogen load, could be removed if every possible retrofit BMP identified were installed. Using the most widely accepted measuring metric (percent mass reduction), approximately 6.8% of the annual total phosphorus load and 6.5% of the annual total nitrogen load could be removed if every possible retrofit BMP identified were installed. [Reduction goals in the upper New Hope arm of Jordan Lake are 35% reduction of total nitrogen and 5% reduction of total phosphorous.]

Economists in the Department of Agricultural and Resource Economics calculated construction, land acquisition, and maintenance costs for all BMPs recommended and produced cost-pollutant reduction relationship curves for each BMP and for the entire watershed.

The investigators will repeat the process for watersheds in six additional cities in the Urban Water Consortium.

DeBusk's presentation is available in pdf format at <http://www.ncsu.edu/wrri/conference/2010ac/speakers/presentations/DeBusk.pdf>.

Investigation of Flow Losses in the Cape Fear River between B. Everett Jordan Lake and Lillington, NC

In his presentation, Curtis Weaver of the USGS N.C. Water Science Center said that hydrology is sometimes analogous to a jig-saw puzzle with a hundred pieces, of which the hydrologist has only thirty or forty. Weaver said he has been searching for more puzzle pieces to try to answer the question: "Is there a mysterious pipe in the Cape Fear River that is sucking water out between Jordan Lake and Lillington?"

The Cape Fear River is formed at the confluence of the Haw and Deep Rivers just below the B. Everett Jordan Reservoir dam. The U.S. Army Corps of Engineers is required to release water from Jordan to achieve a flow target of 600 cubic feet per second downstream at the USGS stream gage at Lillington. Between Jordan and Lillington is a reach of 24 miles, which includes a coal-fired power plant that withdraws then returns water to the river via a canal, the Buckhorn Dam, two public water supply withdrawals, 5 industrial withdrawals and associated wastewater discharge(s), a hydropower operation on the Deep River, and a quarry operation adjacent to the Deep River.

Underlying about 47% of the drainage area between Jordan Lake dam and Lillington (with exception of most of Deep River basin), are Triassic Basin rocks, which generally have low permeabilities and low potentials for sustained base flows. Downstream of Buckhorn Dam, the drainage area is underlain by the Raleigh Belt (25%), Eastern Slate Belt (3.7%), and some Coastal Plain (21%) sediments. In addition, Fall Line transition between the Piedmont and Coastal Plain physiographic provinces begins in the reach downstream of Buckhorn Dam.

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During some low-flow conditions, the sum of the reported releases from Jordan Lake and the measured streamflow on the Deep River at Moncure is greater than the streamflow recorded downstream at the gaging station at Lillington. Examination of daily discharge and flow release records from 1982-2010 (a total of 10,028 days) showed 2615 days with an average flow loss of 26.8%. Adjusting for losses due to time of travel left 364 days with an average flow loss of 3.6%. The loss could be “apparent”—the result of inaccurate measurement at one or more of the three places of measurement, flow dynamics that occur as a result of surface-water diversion through the canal, or possible flow alterations due to storage behind dam structures. Or the loss could be real—the result of consumptive use somewhere in the drainage area, ground-water withdrawals, evaporation, recharge (loss) to the ground water system, or a combination of these factors.

In an effort to determine if the losses are real, and if so, under what conditions they occur, the USGS installed a stream gage below Jordan to better monitor releases, installed a stage gage at Buckhorn Dam, installed six shallow ground water piezometer clusters at two transects in the study reach to continuously monitor temperature and ground-water level, conducted six sets of synoptic streamflow measurements in the study reach, computed evaporation rates, reviewed withdrawal records from the N.C. Division of Water Resources, and met with water withdrawers and dischargers to obtain additional information concerning the water withdrawals.

Weaver said that research so far has revealed the following:

- synoptic discharge measurement runs indicate a “hint” of possible losing reach in vicinity of Raven Rock State Park in Harnett County;

- part of the flow loss appears to be based on evaporative losses and water withdrawals within the study area;
- an infrared flyover suggests that there is groundwater input into the Cape Fear River downstream of Buckhorn Dam.

Analyses and data collection continue and a report will be published. The abstract of Weaver’s presentation is at: <http://www.ncsu.edu/wri/conference/2010ac/speakers/abstracts/Weaver.pdf>

NCWRA Symposium: Water-Energy Nexus: The Future of Two Valuable Resources

In her luncheon presentation, Renee Hutcheson of the North Carolina State Energy Office, explained that water and energy production are inextricably linked and that the country needs to manage water for reliable power supply and to manage electricity to meet water and wastewater needs. Water and wastewater treatment accounts for 30% to 40% of the electricity used by mid-sized cities, and 40% of all freshwater withdrawals in the United States are used in electricity production, she said. Therefore, energy conservation benefits water resources and water conservation helps conserve energy and water resources. Water utilities should consider ways to use less energy not only in day-to-day operations but also in planning for future sources and infrastructure. Slides of her presentation are at: <http://www.ncsu.edu/wri/conference/2010ac/speakers/presentations/Hutcheson.pdf>.

In a panel discussion:

Jeff Tiller of Appalachian State University discussed North Carolina’s Renewable Energy and Energy Efficiency Portfolio Standards and the renewable energy projects, programs, resources and incentives in North Carolina that are growing out of the

requirements. He also gave an overview of the potential for wind energy in North Carolina and the results of a census of renewable energy and energy efficiency industries in the state. <http://www.ncsu.edu/wri/conference/2010ac/speakers/presentations/Tiller.pdf>

Jeff Lineberger of Duke

Energy emphasized the importance of hydropower in providing peaking capacity for electricity production. He discussed the Federal Energy Regulatory Commission relicensing process that Duke has gone through in the Catawba-Watauga River Basin where it manages 13 hydropower stations on 11 lakes as well as two nuclear and three coal-fired power plants. <http://www.ncsu.edu/wri/conference/2010ac/speakers/presentations/Lineberger.pdf>

The Catawba-Watauga basin provides drinking water for 1.5 million people, and a water supply study done for relicensing found that water supply reliability in the basin will be challenged over the next 50 years as total demand is expected to double, Lineberger said. “Water and electric utilities have more in common than other stake holder groups,” Lineberger said. He also said that local governments, utilities and the state need to work together for comprehensive water resource management. He described the Catawba-Watauga Management Group that Duke established with a group of water suppliers that pay dues and identify and manage projects that help preserve, extend and enhance the capabilities of the reservoir system. <http://www.catawbawataugamng.org/> and http://www.outstandingwaters.org/duke_energy.html

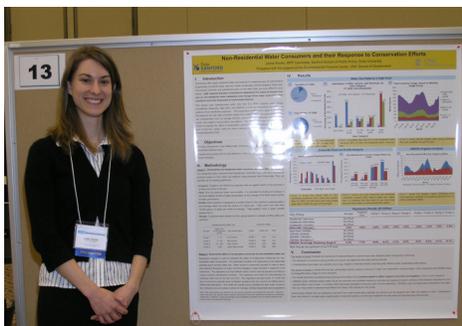
Paul Snead of Progress Energy discussed the utility’s plans for increasing baseload capacity by adding two new nuclear generating units at the Harris Nuclear Plant in Wake County. Net

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NCWRA Student Poster Contest Winners

The North Carolina Water Resources Association, with support from WRRRI, sponsored a student poster contest at the WRRRI Annual Conference. Winners were:

- 1st place (\$200): Jamie Rooke, Duke University, “Characterizing Non-residential Water Consumers and Their Response to Water Conservation Efforts in North Carolina.”
- 2nd place (\$150) Yari Johnson, N.C. State University, “Using Reference Hydrology to Improve



Jamie Rooke's first place poster presented research in which consumer-level water use data was used to identify the water use characteristics of non-residential water consumers and better understand how their use changes in response to drought policies.

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consumptive water use for the two new units will be about 42 million gallons per day. He said that to provide additional water for the new units, the utility plans to raise its reservoir, Harris Lake, by 20 feet, expand the lake size by 4,000 acres, and install a pipe to bring makeup water to Harris Lake from the Cape Fear River near the Buckhorn Dam. He said that increased capacity of Harris Lake would allow reliable operation of the units during drought when withdrawal of makeup water from the Cape Fear would be reduced. The Nuclear Regulatory Commission is now preparing the Environmental Impact Statement for the project and a draft may be complete by late 2010. <http://www.ncsu.edu/wrri/conference/2010ac/speakers/presentations/Snead.pdf>

Pat Davis of the Orange Water and Sewer Authority discussed the authority's water and energy conservation efforts and potential, which are also aimed at reducing the system's carbon footprint. He said, among many other things, that recycling process water had reduced water pumping energy use by about 7% and that by maintaining a tight system the utility is able to sell more of what it uses energy to pump. On the wastewater side, a new rotary

press dewatering system produces lighter biosolids and therefore saves on transportation costs. In addition, providing reclaimed water to UNC-Chapel Hill for use in its chiller system has reduced the energy used to serve those uses by 40%. <http://www.ncsu.edu/wrri/conference/2010ac/speakers/presentations/Davis.pdf>

Sally Hoyt of UNC Chapel Hill discussed the university's energy services operation and efforts there at efficiency. At Chapel Hill, steam, hot water, and chilled water are produced at a central plant and piped underground to individual buildings where it is used for space heating, domestic hot water and air conditioning. She discussed the efficiencies of the operation's cogeneration plant, the use of reclaimed water in chillers, and the installation and use of rainwater capture for non-potable uses. <http://www.ncsu.edu/wrri/conference/2010ac/speakers/presentations/Hoyt.pdf>

Progress Energy Water Resources Seminar: Regulation of Nutrients in North Carolina Surface Waters

Staff of the N.C. Division of Water Quality recounted the history of nutrient management in North Carolina

Forested Wetland Restoration in North Carolina”

- 3rd place (\$100) Rory Polera, UNC-Chapel Hill, “Fluorescent Fingerprinting of Dissolved Organic Matter as a Monitoring Tool in Reclaimed Water Systems”
- Honorable Mention (\$50): Matthew Haynes, N.C. State University, “Comparison of Methods to Remediate Compacted Soils for Vegetative Establishment”

beginning with the adoption of a chlorophyll *a* standard and the “Nutrient Sensitive Waters” supplemental classification in 1979 and moving to development of a point-source strategy for controlling nutrients in the Chowan River in 1981, enactment of a phosphate detergent ban in 1988, and development of basinwide point source and nonpoint source nutrient control strategies for the Neuse and Tar Pamlico basins and Jordan and Falls Lake. They also recounted the history of the U.S. EPA's efforts to get states to deal with current and head off future nutrient problems and the agency's current push for numerical instream standards for nitrogen and phosphorus. They explained DWQ's strategy for managing nutrients to protect unimpaired streams without the application of numeric nutrient standards by establishing chlorophyll *a* threshold levels to trigger management action. Slides of the presentation are at http://www.ncsu.edu/wrri/conference/2010ac/speakers/presentations/Progress_Energy_Seminar.pdf.

A webinar of the presentation is available at <http://mediasite.online.ncsu.edu/online/Viewer/?peid=0fd894d7452940ad86c0faa167c1bc4b>.

New Director of USGS NC Water Science Center brings diverse background and nutrient expertise to the job

Holly Weyers went to Auburn University in 1985 on a golf scholarship with the idea that she would major in microbiology and then go to med school. An ecology class that introduced her to field work at Dauphin Island Sea Lab, Dauphin Island, Alabama, changed her plans and set her on a path that led to a bachelor's in marine biology and a master's in aquatic microbial ecology from the University of Alabama.

Her master's thesis centered on the role of aquatic fungi and bacteria in leaf litter decomposition processes in streams. "Who can get a job doing that?" she remembers. But she did. Her first job—with the National Biological Service—lasted three-months, as the agency was folded into the U.S. Geological Survey in 1996, and as a term appointed employee she was let go.

Her next job with a private contractor called Alaskan Observers put her on fishing boats in the Bering Sea as a groundfish observer. North Pacific waters are regulated under a number of laws and trained biologists are required to live aboard fishing vessels and sample catches for species composition and monitor by-catch and total catch. Commercial fishing trips last from days to months, and biologists can put in twelve to fourteen hours of demanding physical work a day. Viewers of "The Deadliest Catch" understand the conditions under which these biologists work. Weyers did the job for almost two years.

Following two freezing years on the Bering Sea, Weyers headed back south, joining the University of Georgia's Institute of Ecology (now Odum School of Ecology) and began working with fish but eventually worked as a research associate studying nutrient enrichment at the Coweeta Hydrologic Laboratory in the North Carolina mountains. The three-year study led to publication of "Effects of nutrient enrichment on the decomposition of wood and associated microbial activity in streams" in *Freshwater Biology* in 2004 ([http://](http://www.treesearch.fs.fed.us/pubs/29000)



New USGS North Carolina Water Science Center Director Holly Weyers in the field.

www.treesearch.fs.fed.us/pubs/29000) and "Nutrients stimulate leaf breakdown rates and detritivore biomass: bottom-up effects via heterotrophic pathways" in *Oecologia* in 2009 (<http://www.springerlink.com/content/xp64706567k0p816/>), among other publications.

After four years at the Odum School of Ecology, Weyers joined the U.S. Geological Survey as a NAWQA (National Water Quality Assessment Program) biologist at the Maryland-Delaware-DC Water Science Center. She considered herself fortunate to work as lead scientist on the NAWQA Nutrient Enrichment Effects Team (NEET) where she traveled to various parts of the country studying the effects of nutrient enrichment on stream ecosystems in agricultural areas. Specifically, she examined the effects of nutrient enrichment on whole stream metabolism processes which led to publication of "The relative influence of nutrients and habitat on stream metabolism in agricultural streams" (http://wa.water.usgs.gov/neet/Frankforter_Met_EMAS_2009.pdf).

Following six years of primarily fieldwork, she moved into administrative positions in the Delaware office, serving as Office Chief and then Assistant Director of Surface Water Monitoring. But, she also got in some field time, still serving as NAWQA biologist conducting community trend surveys for algae, invertebrates and fish and as project chief of the USGS real-time water quality monitoring program in Delaware.

Weyers had met former N.C. Water Science Center director Jared Bales working on the NAWQA NEET team and learned from him that he was leaving the position to become USGS Chief Scientist for Hydrology in Reston, Virginia. She applied for and was named Director of the USGS North Carolina Water Science Center in November 2009. She moved to the N.C. office in February 2010.

Thoughts on nutrient criteria

Having intensively studied the effects of nutrient enrichment on streams for more than ten years, Weyers said she has more questions than answers about nutrient criteria to protect water quality. On the subject of EPA's current push to set numeric instream standards for nitrogen and phosphorus, she said, "I think it's interesting that anyone thinks they can put a single number on nutrients. All ecosystems function differently and handle nutrients differently. You can have a 'ton' of nutrients in some cases but you still have to have the right habitat conditions to have algae."

As for using chlorophyll *a* as a standard, she said, "North Carolina is the only place I've worked so far that uses chlorophyll *a* as an indicator of impairment. My only issue with using chlorophyll *a* as an indicator of impairment in streams is that no single dipping sample (as is typically performed in lakes and reservoirs) is going to measure all three components (sestonic, benthic and depositional) of an algal community, so you sometimes have to alter or combine the sampling methods to capture the dominant algal community you have in a given stream in order to get a better estimate of algal biomass for that stream".

Weyers does have a suggestion for an alternative evaluation of nutrient effects in streams, and that is to use data that almost every monitoring station on any stream collects: dissolved oxygen.

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“Many in the academic research community and now in a few cases within USGS and other agencies—use diurnal DO cycling to calculate estimates of net primary productivity as an indicator of nutrient effects, and this type of work has been occurring in lake, reservoir and stream ecosystems for years. But widescale application of the diurnal DO method by State and Federal agencies as a monitoring tool and an indicator of the effect of nutrients in streams has not caught on yet. Of course, there are difficulties—accounting for reaeration being the worst—but there is ongoing work looking at methods for dealing with analysis issues and examining seasonal differences in productivity rates that could allow agencies to do a lot more with the years of DO data they already have in addition to the data they are currently collecting. I hope to be able to bring this work to our partners and cooperators soon.”

Expect to see her

Weyers’ first months in North Carolina have been busy. She has been meeting USGS partners across the state and learning about USGS involvement in cooperative programs. She’s been getting to know her staff and was pleased that—in the absence of a director—USGS scientists took on the responsibility of organizing a session for the WRI Annual Conference.

“The conference provided common ground for people working on water issues in the state. It was important for USGS to be there,” she said.

Weyers said that she intends to be very involved in the water community in North Carolina, working with agencies and other USGS partners. “It’s like Jared said, ‘You have to show up.’” So, academics and agency representatives accustomed to relying on Jared Bales for expertise and involvement, can expect the same from the new Water Science Center Director, Holly Weyers.

And, when she gets settled a little more, you can also expect to see her on area golf courses.

Duke-UNC-WRI Water Allocation Research Seminar

Seminar addresses potential for additional water storage and feasibility of reallocating existing hydropower storage

At a water allocation seminar on April 23, 2010, Dr. David Moreau of UNC-Chapel Hill discussed two studies that present possibilities for increasing public water supply. Moreau began the seminar by asking the big question—“Are we running out of water in North Carolina?” He answered with a resounding “NO!” But, he said, we are running out of places to build new storage reservoirs, and that is a major challenge to providing reliable water supply for future growth.

Storage is lynchpin

Because of seasonal and interannual variability of precipitation and streamflow, storage is the lynchpin of reliable water supply systems, Moreau explained. Without sufficient storage, rain that falls in winter and spring is not available in summer when water demand increases, and when periodic drought creeps in, insufficient storage magnifies its effects. The obvious way to provide reliable water supply for a growing population is to build new reservoirs near major population centers. However—despite earlier studies identifying feasible reservoir sites across the state—storage capacity has not kept up with population growth. Eighty-five percent of the current water storage capacity in North Carolina was in place by 1965, Moreau said. Only two major reservoirs—Falls and Jordan—have been built in the last 30 years.

Moreau said that there are now limited appropriate sites for

new reservoirs, but to be more specific about opportunities for new reservoirs, he has developed a system for evaluating the potential of previously identified and new sites. Using N.C. high-resolution digital elevation data, he said, you can take a “digital hike” along a stream and at any point, set normal pool elevation for a reservoir. Next you can identify the inundated area and calculate drainage area and mean annual flow at that location. Finally, you can calculate storage volume as a percentage of mean annual flow and safe yield of a virtual reservoir at some level of development. Overlaying population and environmental resources on the site helps determine the feasibility of a reservoir at the location.

Because of concerns that identifying new sites might imply approval of the sites, Moreau said that he will use the new tool to evaluate previously identified sites and will provide the tool to the State or others to use for identifying new sites.

Reallocation from hydropower could increase economic efficiency

Moreau said that with opportunities for increasing water storage limited, other options—including reallocation of existing storage—will become more important. He discussed his analysis of the reallocation of storage from hydropower to public water supply.

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Of the 47 large dams (more than 10,000 acre feet normal pool capacity) in the state, 32 were built by electric power interests, and these 32 account for 78% of all normal pool capacity. The remaining 15 large reservoirs account for only 12% of normal pool capacity, meaning that over 75% of water storage in large reservoirs is for generation of electricity. Electricity output from hydropower has been declining and now accounts for only 3% of all production. So, said Moreau, three-quarters of water storage is devoted to a use that is becoming increasingly less important in meeting electric needs.

Using High Rock Lake as an example, Moreau compared the value of water used to generate electricity by hydropower to the cost of developing a new water supply and concluded that reallocation could improve the economic efficiency of water use. While there is no demand for public water supply from High Rock Lake (because it is not near enough to a large population center), reallocation of water in Kerr Reservoir from hydropower to public water supply for Piedmont North Carolina could make economic sense. At least, Moreau said, it is an option that needs to be kept on the table.

A pdf version of Moreau's presentation slides is available on the UNC Water Wiki at http://sogweb.sog.unc.edu/Water/images/7/76/NCStorageSeminar_4-23-10.pdf.

Duke-UNC-WRRRI Water Allocation Research Seminar

Seminar details development of Georgia's State Water Plan

At a water allocation seminar on May 14, Dr. Carol Couch of the University of Georgia's College of Environment and Design, discussed events leading up to, development of, and features of Georgia's statewide water management plan. Couch was formerly director of the Georgia Environmental Protection Division.

Couch said that while Georgia has long regulated large withdrawals of both surface and groundwater, water planning had traditionally been reactive, with limited attention to the long-term. However, increasing demand, episodic drought, and interstate conflicts made clear the resource was under stress, and sixteen counties and 90 municipalities around the Atlanta area, where 60% of the state population lives, realized the need for long-term planning. This area straddles the headwaters of seven watersheds, and equity between the Atlanta area and downstream users had become a major issue.

In 2001, the Georgia legislature established the Metropolitan North Georgia Water Planning District to develop comprehensive regional water resources plans to protect water quality and water supply in and downstream of the region. The district engaged in a comprehensive 2-year planning process for stormwater, wastewater and water supply and water conservation, and adopted a plan in 2003 that has subsequently been revised.

Also in 2003, Governor Sonny Perdue created the Georgia Water Resources Council composed of commissioners or directors of various state agencies, which all had a

small piece of the water portfolio, to develop recommendations for a comprehensive statewide water resources management plan. The Council submitted recommendations to the 2004 legislative session and the Comprehensive Statewide Management Planning Act was passed. The act required development of a statewide water management plan, provided principles and procedures for development of the plan and established a Water Council to coordinate plan development.

The planning law

Couch said that the 2004 law charged the Environmental Protection Division of the Georgia Department of Natural Resources—a regulatory agency—with development of the plan because it was the only agency with the institutional knowledge to do the job. The law provided for creation and approval of river basin management plans and ground water management plans and required an extensive stakeholder process—which eventually directly involved about 2,000 people working on basin and statewide advisory committees.

A statutory principle for planning is to manage water for all people of the state—without granting any special property rights in water. Management objectives of the plan are to minimize water withdrawals (conservation must be a central feature), maximize returns to surface waters (because urban areas are upstream, water used there has to go back to the streams in a timely manner), meet instream and offstream needs, and protect water quality.

Couch described some important

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issues that arose during development of the plan:

- Providing equity means regional “wall-to-wall” planning on the same schedule.
- There must be an integration of management objectives because “you often hit the wall on assimilative capacity before you do on water supply.”
- You must use a common model and measuring stick.
- Interbasin transfer is the “boogey man” in the room: “Locals genuinely fear that they’re being shafted.”
- There must be an emphasis on assessment of the resource and improvement of information base. “You can’t manage what you can’t measure.”
- Contract management is important because a great deal of work is done by consultants.

Couch said that finding the \$30 million needed for developing the plan was a problem. Only \$2 million came from direct appropriations. A significant amount came from loan paybacks to state water and wastewater revolving funds.

The Georgia Comprehensive Statewide Water Management Plan was adopted by the General Assembly in 2008. It can be read at http://www.georgiawatercouncil.org/Files_PDF/water_plan_20080109.pdf Georgia is now in the process of developing regional plans.

Finally, Couch said that in Georgia the water planning and management “genie is out of the bottle and you can’t put it back. To do so would be to walk away from the economic viability of the state.” Slides of her presentation are at: http://sogweb.sog.unc.edu/Water/images/4/48/Couch_NC.pdf.

Digest

Nitrate Pollution. A study by scientists at the University of Colorado-Boulder has found a “surprisingly” consistent correlation between nitrates and organic carbon controlled by microbial communities in all environments—pristine or polluted. According to the lead author, the findings can help “explain why nitrate can become so high in some water bodies but remain low in others.” The study, published in the April 22 issue of *Nature*, was partly funded by the National Science Foundation. *Philip G. Taylor; Alan R. Townsend. “Stoichiometric control of organic carbon nitrate relationships from soils to the sea.” *Nature*, 2010; 464 (7292): 1178 DOI: 10.1038/nature08985*

Direct potable reuse. The National Water Research Institute has published a white paper, “Regulatory Aspects of Direct Potable Reuse in California,” prepared by reuse expert James Crook. The purpose of the paper is “to identify issues that would need to be addressed by regulatory agencies and utilities in California interested in pursuing direct potable reuse as a viable option in the future.” According to the paper, while there is limited experience with direct potable reuse, epidemiological and toxicological health effects studies done in the last 30 years on recycled water generated at indirect potable reuse projects and at direct potable reuse demonstration facilities provide a basis for evaluating the public health implications of potable reuse. The paper is available at <http://www.nwri-usa.org/pdfs/NWRIPaperDirectPotableReuse2010.pdf>.

Hydraulic fracturing. The U.S. Environmental Protection Agency has announced that it will conduct a comprehensive research study to investigate the potential adverse impact that hydraulic fracturing may have on water quality and public health. Hydraulic fracturing is a process that drills vertical and horizontal cracks underground that

help withdraw gas or oil from coalbeds, shale and other geological formations. EPA is in the early stages of designing the study and is considering comments from its Science Advisory Board: [http://yosemite.epa.gov/sab/sabproduct.nsf/95eac6037dbee075852573a00075f732/CC6B2E8803C9BFB985257729004F980F/\\$File/Advi+on+EPA%E2%80%99s+Res+Scoping+Doc+Related+to+Hydraulic+Fracturing+_5-19-10+draft.pdf](http://yosemite.epa.gov/sab/sabproduct.nsf/95eac6037dbee075852573a00075f732/CC6B2E8803C9BFB985257729004F980F/$File/Advi+on+EPA%E2%80%99s+Res+Scoping+Doc+Related+to+Hydraulic+Fracturing+_5-19-10+draft.pdf). The goal is to complete the study by 2012.

Energy savings in North Carolina. A new study by researchers at the Georgia Institute of Technology and Duke University’s Nicholas Institute, shows that compared to the rest of the nation, North Carolina has a lower-than-average energy consumption. However, North Carolina’s use of residential energy as a percentage of its overall energy consumption exceeds that of the nation and the rest of the South. The report identifies four residential energy efficiency policies—more stringent building codes with third party verification, improved appliance standards and incentives, an expanded Weatherization Assistance Program, and retrofit incentives with increased equipment standards—that could reduce North Carolina’s projected residential consumption by about 10% in 2020 and 16% in 2030. Overall, the report identifies nine policies that could reduce North Carolina’s energy consumption by approximately 13% of the energy consumed by the State in 2007. The meta report from which the N.C. data were taken says that across the South, energy efficiency programs would lower utility bills by \$41 billion, create 380,000 new jobs, reduce the need for new power plants, and save 8.6 billion gallons of freshwater by 2020. http://www.seealliance.org/se_efficiency_study/north_carolina_efficiency_in_the_south.pdf

Upcoming Water Allocation Research Seminars (WARS)

June 21, 2010 at 1:00 pm
NCSU JC Raulston Arboretum, Raleigh, NC

Katie Kirkpatrick, P.E., Vice-President for Environmental Affairs, Metro Atlanta Chamber will discuss the ways the business community organized to help shape the Georgia Water Plan, and also how Georgia and Metro Atlanta are responding to the July 2009 federal court order that would remove Lake Lanier as a water supply source (280 mgd) for Metro Atlanta by 2012.

June 29, 2010 at 1:00 pm
NCSU JC Raulston Arboretum, Raleigh, NC

Jim Mead, NC Division of Water Resources' instream flow guru, will present the recent work DENR is doing to prepare the state to use presumptive, or more generalized, instream flow needs estimates (rather than just site-specific calculations) to support hydrologic modeling and other water resource planning needs.

More Information:

[http://sogweb.sog.unc.edu/Water/index.php/Water_allocation_research_seminars_\(WARS\)](http://sogweb.sog.unc.edu/Water/index.php/Water_allocation_research_seminars_(WARS))

WRRRI Research Reports

Many WRRRI research reports are available electronically as pdf files through the Institute's website:

<http://www.ncsu.edu/wrri/reports/>

The majority of WRRRI Reports WRRRI-001 to WRRRI-389 are available. Reports will be posted as they become available.

NCWRA Forum Incorporating risk and uncertainty into long range water resources planning

September 13, 2010

Jane S. McKimmon Center, Raleigh, NC

More Information:

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

North Carolina APWA 2010 Water Resources Conference

September 27-28, 2010

Renaissance Asheville Hotel

Asheville, NC

More Information:

<http://northcarolina.apwa.net/events/5564/>

2010 AWRA Annual Water Resources Conference

November 1-4, 2010

Loews Philadelphia Hotel

Philadelphia, PA

More Information:

<http://www.awra.org/meetings/Philadelphia2010/index.shtml>

Stream Restoration in the Southeast: Connecting Communities with Ecosystems

November 15-18, 2010

Marriot City Center Hotel

Raleigh, NC

More Information:

<http://www.bae.ncsu.edu/programs/extension/wqg/srp/conference.html>