

WRRI gets new leadership

by Jeri Gray

The Water Resources Research Institute of UNC will be counting on two experienced NCSU faculty to lead the way during some difficult budgetary times.

In August, N.C. State University announced that Dr. Michael Voiland, executive director of the N.C. Sea Grant Program, will also serve as permanent director of WRRI, overseeing the institute's statewide research and technology transfer programs. Voiland had been acting director of WRRI since April.

In September, WRRI announced that Dr. David Genereux, professor in the NCSU Department of Marine, Earth and Atmospheric Sciences, had been named to a one-quarter-time position as WRRI's associate director for research. His duties include working with the WRRI Advisory Committee to establish research priorities, managing the annual request for proposals (including proposal review and award decisions), advising prospective investigators, reviewing final reports, and advancing technology transfer.

The appointments of Voiland and Genereux bring to a close the search for leadership for WRRI that began when Dr. David H. Moreau stepped down as director in 2008. Budget constraints within the University of North Carolina system had complicated the search for a full-time director and contributed to the decision that both director and associate director positions would be part-time.

Voiland's 33 years in higher education has given him research management and outreach experience highly relevant to WRRI. He has experience in joint program administration, having served for six years in a joint position as assistant director for research and extension at Cornell University's Agricultural Experiment Station and Cornell Cooperative Extension, where he saw that research and outreach programs were effectively integrated. As North Carolina Sea Grant executive director since 2006, he oversees the program's research and outreach efforts on coastal topics including ecosystems, fisheries and seafood, coastal community development, and hazard mitigation.

Genereux, who specializes in groundwater and surface water hydrology, has previously served joint appointments between university

departments and centers. At Florida International University he had joint appointments between the Department of Geology and two research centers, the Drinking Water Research Center and the Southeast Environmental Research Center. In addition to his teaching and research, he has served as associate editor for *Water Resources Research* and the *Journal of Contaminant Hydrology*, and has served on grant program panels for the National Science Foundation, U.S. Environmental Protection Agency, and U.S. Department of Agriculture.

Programs to remain distinct

In a recent interview, Voiland emphasized that, while Sea Grant and WRRI will be under one director, the programs are not being consolidated.

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Michael Voiland, Director

“WRRRI and Sea Grant are both focused on water and have similar missions: to facilitate research identified by stakeholders and to conduct outreach,” said Voiland, “but the two programs need to remain separate and distinct. They are authorized by different federal agencies—NOAA and USGS; have different reporting and grant requirements; and have different streams of federal and state support that we can’t blend.”

“There are opportunities for WRRRI and Sea Grant to share, collaborate, and learn from each other in ways that will make both programs more efficient,” he said, “but, we’re not going to try to ‘mush’ them into one program. It’s not possible.”

Statewide focus to continue

Voiland also emphasized that even though WRRRI no longer reports directly to UNC General Administration, is headquartered at NCSU, and is now headed by NCSU faculty, the institute will continue to serve all of North Carolina’s research campuses, just as it always has.

“The fact that all of the state’s research universities continue to submit proposals to both WRRRI and Sea Grant shows that both have done a



*David Genereux,
Associate Director for Research*

great job of serving all campuses,” he said. “I believe that WRRRI is viewed as an honest broker of support and information. Faculty across the state know that good proposals addressing real questions will be funded regardless of their origin.”

Striving for basic and applied research balance

Any continuation of the fall-off seen in federal and state funding for WRRRI may make it more challenging to keep the Institute’s research portfolio balanced between applied and basic research, said Voiland.

“Both Sea Grant and WRRRI have traditionally supported research projects ranging from those that might provide immediate and practical answers to pressing questions, to those that would advance water-related science in more fundamental and incremental ways,” Voiland said. “As traditional public funding sources have been restricted, Sea Grant has had to narrow its research focus—to become more applied, such that the impact of its programs can be more readily demonstrated to budget

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ISSN 0549-799X
Number 368
September-December 2009

This electronic newsletter is published by the Water Resources Research Institute of the University of North Carolina. It is financed in part by the Department of the Interior, U.S. Geological Survey, as authorized by the Water Resources Research Act of 1964. You may sign up to receive the electronic newsletter via an electronic listserv by sending an email to water_resources@ncsu.edu.

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decision-makers. WRRRI may be in the same boat, and may need to address more immediate needs and problems raised by stakeholders.

“WRRRI has a good start on that path, with its management of the Urban Water Consortium and of gifts such as the recent Royal Bank of Canada (RBC) Blue Water Project leadership grant. Yet, I would hope that WRRRI could continue to be nimble enough to take on more applied studies, while still supporting enough research that truly moves the science,” stated Voiland. “And, of course, WRRRI can continue to fertilize and nurture the research development process by convening seminars, symposia, and workshops, facilitating

researcher interactions and collaborations, and supporting cooperative proposals to research sponsoring agencies such as NSF.”

Research completion reports remain important

Genereux—who will be reviewing and overseeing electronic publication of research completion reports—said that project reporting provides accountability to sponsors and that project completion reports are not only necessary but also valuable.

“Peer-reviewed journal articles are the “gold standard” for research publication,” he said. “But, they aren’t all that the research community relies upon.

“Reports have important details—data and methods—that cannot

be included in shorter articles. There is great merit to archiving these details for those who want to build on the work,” he said. “In addition, if reports can be published in a timely manner, they can make results available earlier than journals, which typically take a year or more to publish articles.”

While report publication is an important priority for Genereux, his first task as associate director is to manage the complex and resource-intensive proposal review and selection process now underway.

“I’ve been involved in research from a number of perspectives, but this is a seat I haven’t sat in yet,” he said. “I have had experience organizing solutions to complicated technical problems and think that will be relevant and useful here.”

Bales moves up with USGS

Dr. Jerad Bales left his position as Director of the U.S. Geological Survey North Carolina Water Science Center October 1 to become USGS Chief Scientist for Hydrology at USGS headquarters in Reston, Virginia.

In his new position, Bales is responsible for the planning and development of national basic and applied research programs related to the hydrologic environment. He also oversees and evaluates the results of research efforts conducted by USGS staff and by universities under the mandates of the Water Resources Research Act of 1984; coordinates the USGS Hydrologic Research and Development Program and the Water Resources Research Institutes Program; and assists other USGS leaders with external national and international programs.

Bales came to North Carolina in 1986 as Hydrologist and Supervisory Hydrologist with USGS and was named Director in 2007. Concurrent with his positions with USGS, Bales has served



Dr. Bales prepares a dye solution for use in a time-of-travel measurement as a part of whole-stream metabolism experiment near the headwaters of the Mississippi River at Itasca, MN.

as Adjunct Professor at the Department of Geography at the University of North Carolina at Chapel Hill, and Visiting Assistant Professor in Forestry and Environmental Studies at Duke University, Durham.

Throughout his career in North Carolina, Bales has lent his expertise on hydrology and water quality to many groups established to address water issues in the state, beginning with the Albemarle-Pamlico Estuarine Study in 1986 and including most recently the North Carolina Endocrine Disruptors Workgroup in 2008. He has also served as a member of numerous interagency model review panels.

An exceptionally good friend of the NC WRRRI, Bales has served on the Institute’s advisory and technical committees, has organized sessions for the Annual Conference, and most recently served on the search committee for WRRRI director.

Marjorie Davenport, USGS Southeast Area Associate Regional Executive, in addition to her current duties, assumed the role of acting NC Water Science Center Director on October 1. A new director should be named by November 30, or earlier.

September action of the N.C. Environmental Management Commission

Water Allocation Committee

The N.C. Environmental Management Commission's (EMC) Water Allocation Committee met September 9 in Raleigh and heard reports on the following:

■ Status of Central Coastal Plain Capacity Use Area (CCPCUA).

Nat Wilson of the Division of Water Resources (DWR) reported on the latest monitoring results, enforcement actions, and status of development of alternative water supplies in the 15 counties of the central Coastal Plain subject to the CCPCUA rules.

Wilson said that although the threats of declining water levels, dewatering, and saltwater encroachment in the CCPCUA have not diminished since 2004, significant progress is being made by water users to plan and construct sustainable, alternative water supplies. Some public water systems are using different aquifers and some have formed alliances to plan and operation a surface water treatment system. He said that in fall 2008, Kinston and other water providers associated with the Neuse Regional Water and Sewer Authority (NRWASA) brought a surface water intake and treatment plant on-line and that ground water levels in a few monitoring well stations near the NRWASA service area are beginning to show improvement due to reduced withdrawals. "We're on the right course, I think," said Wilson.

However, he also said that systems that have made significant investments in alternative supplies have been quite vocal in insisting that all permit holders in the area comply with CCPCUA

requirements. As a result, the General Assembly has increased penalties for noncompliance to as high as \$1,000 per day. The division has issued a number of Notices of Violation and assessed some penalties for noncompliance. Enforcement actions are included in the latest CCPCUA status report at http://www.ncwater.org/Reports_and_Publications/GWMS_Reports/CCPCUAStatusRep2009final.pdf

■ Interbasin Transfer Requests.

Steve Reed with DWR reported that the Greenville Utilities Commission (GUC) will hold a public hearing on its IBT certification petition in November and that the hearing record will close December 4. Greenville is asking to transfer water from the Tar River Basin to the Contentnea Creek subbasin and Neuse basin to serve the Town of Farmville, Town of Winterville, and Greene County, which must reduce withdrawals from the Cretaceous aquifers under the CCPCUA. GUC has received a finding of no significant impact on its Environmental Assessment of the transfer.

Reed also reported that a draft Environmental Impact Statement is expected in 2010 on Brunswick County's request to increase its transfer of water from the Cape Fear River Basin to the Shallotte and Waccamaw sub-basins of the Lumber River. Public hearings will be scheduled on the draft EIS.

In addition, a draft EIS is expected in 2010 on the Kerr Lake Regional Water System's request to increase a transfer from the Roanoke River Basin to the Tar and Fishing Creek basins and to

make a transfer from the Roanoke to the Neuse Basin. Public hearings will be scheduled on the draft EIS.

■ Legislative issues.

Tom Reeder, Director of DWR, reported on relevant legislation passed by the 2009 General Assembly.

Session Law 2009-134 (HB 1399 Capacity Use Areas Enforcement) increases from \$250 to \$1,000 per day the maximum civil penalty assessment for violation of capacity use area laws. S.L. 2009-480 (HB 1236 Promote Water Use Efficiency) authorizes a trade or professional organization representing commercial car washes to establish a voluntary water conservation and water use efficiency certification program and provides that public water systems must credit certified car washes with percentage reductions required of car washes under water shortage plans.

Reeder also reported that there have been discussions within DENR about a section of the interbasin transfer law (§ 143-215.22L. (h) Regulation of surface water transfers) that provides for settlement discussions when there is disagreement between IBT applicants and other parties regarding the adequacy of environmental documents. The EMC is authorized to adopt rules to govern the conduct of the mediation process and, Reeder said, some people want to see rules adopted. The department's position is, however, that the law itself is specific enough that rules are not needed and that rulemaking could become a long, contentious

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process. Reeder said the department suggests adoption of a policy document instead, and that a draft document may be presented to the Water Allocation Committee in November.

Water Quality Committee

The EMC's Water Quality Committee met September 9 and took the following action:

- Instructed the Division of Water Quality to incorporate some changes suggested by committee members to proposed buffer mitigation rules and to bring the rules back to the committee in November. At that time the committee will decide whether to send the rules to the EMC and ask for public hearings.

DWQ is proposing to consolidate several buffer mitigation rules (Neuse Basin, Catawba mainstem, Randleman Lake Watershed, Tar-Pamlico Basin, Goose Creek Watershed, and Jordan Reservoir Watershed) to make them easier to use. In addition the proposed buffer rules incorporate new flexible mitigation options and mitigation bank requirements of Session Law 2009-337 (SB 755 Promote Mitigation Banks). The rule presented to the Water Quality Committee can be found at <http://h2o.enr.state.nc.us/admin/emc/documents/09wqc01b.pdf>. The changes requested by committee members are to include preservation and retrofitting of existing structural BMPs as options.

- Approved asking the EMC to approve the model local riparian buffer protection ordinance for lands within the Jordan Water Supply Watershed. The ordinance was presented to the EMC the next day (Sept 10). See EMC report.

The model ordinance can be found at <http://h2o.enr.state.nc.us/admin/emc/documents/09wqc02a.pdf>

- Approved asking the EMC in November to approve holding public hearings on revisions of rules that set out pretreatment standards governing discharge of non-domestic (largely industrial) wastes to wastewater treatment plants. The changes are being proposed to respond to changes of the federal pretreatment regulations under the Federal Water Pollution Control Act. The changes allow municipal wastewater treatment plants to reduce sampling required of extremely small industrial users and expand coverage of adjudication hearings to include civil penalties and administrative orders. Proposed changes can be accessed through the Water Quality Committee agenda at <http://h2o.enr.state.nc.us/admin/emc/SEPT2009WQCAGENDA.htm>. According to Deborah Gore with DWQ's pretreatment program, the changes create the potential for more significant noncompliance with pretreatment rules, and a pretreatment permit writing workshop will be held for operators of wastewater treatment plants.
- Approved sending notices to a list of communities in the Catawba, Neuse, and Chowan-Pasquotank River Basins that they meet the population and housing unit criteria for designation as "MS4s" that are required to implement stormwater controls under the NPDES Phase II stormwater program (as implemented in N.C. under Session Law 2006-246) and are being considered for designation by the EMC. The list of potential

designees can be found at <http://h2o.enr.state.nc.us/admin/emc/documents/09wqc04arevised.pdf>. The WQC also delegated to DWQ staff the authority to notify potential designees.

- Approved the 2009 Coastal Habitat Protection Plan Annual Report.
- Heard an update on development of a nutrient management strategy for Falls Lake in Wake and Durham counties. The deadline established by SB 981 passed in 2005 for adoption of a strategy for Falls Lake has already passed. Legislation passed in the last session of the General Assembly establishes January 15, 2011, as the new deadline for adoption of a strategy.

According to DWQ staff, draft rules will come to the Water Quality Committee and the EMC in March 2010.

In January, rules are to be adopted as temporary until the rulemaking process is complete. According to the report, unprecedented reductions in total nitrogen and total phosphorus will be needed to stem high levels of chlorophyll *a* in the upper parts of Falls Lake. Accomplishing reductions will be a tremendous challenge since point sources and agriculture have already made reductions under the Neuse Basin nutrient sensitive waters rules and because a large area of the watershed is forested, a land use for which there is little opportunity to implement nutrient management. The staff report with links to relevant websites can be accessed at: <http://h2o.enr.state.nc.us/admin/emc/documents/09wqc06a.pdf>.

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Environmental Management Commission

The EMC met on September 10 and took the following action:

- Observed the swearing in of new commissioner Yvonne C. Bailey who was appointed by the General Assembly replacing Steven Weber. Bailey is assistant general counsel with Martin Marietta Materials in Raleigh.
- Elected Charles Peterson as vice chair of the commission.
- Adopted a resolution thanking Steven Weber for his service on the EMC.
- Adopted changes to air quality rules to update the ambient air quality standard for ozone to 0.075 parts per million (ppm), to update the ambient air quality standard for PM10 by retaining the daily standard and revoking the annual standard, to update the daily ambient air quality standard for fine particulate matter (PM2.5) to 35 micrograms per cubic meter, and to replace the newspaper publishing requirements for public notices on the issuance of the final permits, draft permits, and permit revisions, except permit revisions issued under Rules 15A NCAC 02Q .0514, .0515, and .0524, with a requirement to post these public notices on the DAQ web site. Title V permit issuance and revision will still be noticed in a general circulation newspaper.
- Approved holding a public hearing on proposed reclassification of the Catawba River and all its tributaries through and including the Left Prong Catawba River (McDowell County, Catawba River Basin) from Class C Trout to High Quality Waters (HQW).
- Approved holding a public hearing on proposed reclassification of the North Fork New River watershed from its source in Elk Knob State Park in Watauga County to where it merges with the South Fork New River to form the New River proper in Ashe County as Outstanding Resources Waters (ORW). The waters are currently classified C+, C Trout (TR) + and C TR High Quality Waters. The ORW supplemental classification is a designation intended to protect unique and special waters having excellent water quality and being of exceptional state or national ecological or recreational significance.
- Approved recommendations to revise the Groundwater Quality Standards in 15A NCAC 02L .0202 as part of the Triennial Review. Groundwater standards are the maximum allowable concentrations resulting from any discharge of contaminants to the land or waters of the state that may be tolerated without creating a threat to human health or that would otherwise render the groundwater unsuitable for its intended best usage as a source of drinking water. The table of changes to standards for some 40 pollutants is accessible at <http://h2o.enr.state.nc.us/admin/emc/documents/AttachmentAto09-46HOrecommendations.pdf>. The recommended change to the arsenic standard (from 50 µg/L to 0.02 µg/L) led to discussion of whether groundwater standards should be more stringent than drinking water standards, with Commissioner Marion Deerhake holding that allowable concentration should be no higher than naturally occurring concentrations and asking that records be reviewed to determine if the EMC has been operating under that principle, as she believes it has.
- Delegated the reclaimed water local permit program to Johnston County.
- Approved the model local riparian buffer protection ordinance for the Jordan Lake Water Supply Watershed.
- Heard from Jim Simons, Director of the Division of Land Quality, about legislation that removed the exemption for coal ash ponds from the Dam Safety Act, for which the EMC has rulemaking authority. Simons said that when his division began surveying ponds that would be brought into the dam safety program it “got a surprise.” He said that instead of the 14 ash ponds they had expected, they found 50 dams of various kinds owned by electric power companies that will now be regulated. He said that his division will inspect them all by January 1. Ted Bush of the Aquifer Protection Section of DWQ said that his group is reviewing data from voluntary groundwater monitoring around coal ash ponds. He said most exceedances of groundwater standards are within compliance boundaries.
- Heard a report on changes to surface water standards for metals and chlorophyll *a* that will be proposed under the Triennial Review. DWQ’s Connie Brower said that metals standards will be modified to reflect current science, and that changes in the

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way concentrations are calculated for hardness-dependent metals will cause a reduction in ambient water quality standards and permit limitations for metals. Commissioner Leo Green said that the changes will have a significant impact on dischargers and that he wants to see a fiscal note before public hearings. Commissioner Ernest Larkin said he wants to see a primer on the impact on resources of metal toxicity at the November EMC meeting. (See separate article on chlorophyll *a* standard.) Brower's presentations can be downloaded through the EMC agenda at <http://h2o.enr.state.nc.us/admin/emc/SeptFinalAgenda.htm>

N.C. Division of Water Quality prepares to introduce nutrient control strategy

At the N.C. Environmental Management Meeting in September, staff of the Division of Water Quality presented information on changes to the chlorophyll *a* standard for surface waters and a new proactive strategy for managing nutrients in the state's streams and lakes. The presentation was prelude to formal proposal of standards and rules that will be made to the EMC's Water Quality Committee in November.

North Carolina's current chlorophyll *a* standard is 40 µg/L for fresh and salt waters, except for trout waters, where the standard is 15 µg/L. As part of the "Triennial Review" of surface water standards required by the Clean Water Act, DWQ will propose an additional chlorophyll *a*

standard for the mountains and upper piedmont region of the state. It will also propose a frequency component to the existing standards for chlorophyll *a* in all waters of the state.

Chlorophyll *a* standards for fresh and salt waters are proposed to be:

- For classified trout waters: not greater than 10% of data shall exceed 15 µg/L;
- For mountain and upper Piedmont waters, defined by 15A NCAC 02B .0202: not greater than 10% of data shall exceed 25 µg/L;
- For all other fresh surface waters: not greater than 10% of data shall exceed 40 µg/L;
- Not greater than 10% percent of data from any portion of sounds, estuaries and other waters subject to growths of macroscopic or microscopic vegetation shall exceed 40 µg/L.

These water quality standards will establish the level beyond which the water body is considered impaired and not meeting designated uses. These standards will be used for impaired waters (303(d)) listing and total maximum daily load (TMDL) development.

Proactive Strategy

In addition, the Division is proposing to shift its strategy to proactively protect the state waters from becoming impaired by nutrients. To that end, DWQ will propose chlorophyll *a* threshold levels that, if exceeded, will indicate the water body is nutrient-enriched and in danger of becoming impaired.

Those threshold levels are proposed to be:

- For classified trout waters: not greater than 10% of data shall exceed 10 µg/L;
- Four mountain and upper Piedmont waters, not greater than 10% of

data shall exceed 15 µg/L;

- For all other waters: not greater than 10% of data shall exceed 25 µg/L.

If these threshold levels are crossed, the water body will be identified as nutrient-enriched, and, to prevent further degradation, DWQ will require major sources of nutrients to take significant steps to control total nitrogen and total phosphorus loads. DWQ will develop and implement specific nutrient management controls for both point and non-point sources that are designed to stem increases in nutrient inputs to the targeted waterbodies.

According to Connie Brower, who manages nutrient criteria development for DWQ, threshold values will not be standards but guides that will give communities, and DWQ, a mandate to proactively head off impairment. It is important to note that these strategies will be applied to areas/waters not already subject to TMDL or nutrient management strategies.

With full implementation of the strategy, all lakes, reservoirs, estuaries, rivers and streams determined to be "nutrient enriched" will have site-specific nutrient management control levels and guidance.

According to Brower, in November the division will formally propose to the EMC's Water Quality Committee changes to the chlorophyll *a* standards and the threshold levels and associated management strategies, as well as additional changes as needed under the 2008-2010 Triennial Review of water quality standards. Subject to the Water Quality Committee's approval, the new standards and nutrient management strategy will be presented to the EMC in January 2010 and public hearings will be held in the summer/fall of 2010.

Investigators urge research on chronic effects of common antidepressants on native freshwater mussels

In a project sponsored by WRI, researchers at NC State University have confirmed that acute exposure to high concentrations of fluoxetine, a common selective serotonin reuptake inhibitor prescription antidepressant often found in wastewater discharges, negatively affects the reproductive activities of native freshwater mussels. They say that while fluoxetine concentrations used in their research were much higher than concentrations measured in wastewater, the research shows that fluoxetine exposure has the potential to disrupt reproduction in a faunal group recognized as one of the most imperiled in the world.

Importance and status of mussels

Freshwater mussels are a critical part of river and stream ecosystems. By siphoning bacteria, algae and other small particles out of water, they improve water quality. Of the estimated 1,000 species of freshwater mussels worldwide, one-third was historically found in the United States. Today, seven percent of native mussel species is extinct and another 50 percent is listed under the Endangered Species Act. Fifty percent of North Carolina's 62 species is designated Endangered, Threatened, or Special Concern within the state.

Freshwater mussels (Family: *Unionidae*) have a unique life cycle. In the reproductive season (largely controlled by temperature), male mussels release sperm into the water column. The female draws in sperm as she filters water for food. Fertilized eggs develop into larvae called glochidia—tiny parasitic creatures that must find a suitable fish host to complete their life cycle. Females of

several mussel species have modified their mantle tissue (folds of the body wall) to look like prey fish or insects to fish suitable as a host. When the fish host attacks the “prey,” glochidia attach to its gills.

Effects of serotonin

Serotonin is a key mediator for a wide variety of physiological functions in mollusks. In mussels, serotonin regulates egg maturation and release of glochidia. Serotonin and selective serotonin reuptake inhibitors such as fluoxetine have been used to artificially induce spawning in freshwater bivalves for aquaculture purposes and have been investigated as a potential chemical control mechanism for exotic bivalve species like the zebra mussel.

The investigators on this project evaluated the potential effects of fluoxetine on native wild mussel reproduction by monitoring the release of sperm, development of glochidia and mantle lure display behavior under controlled conditions and exposure to concentrations of the compound.

The research

The investigators collected adult *Elliptio complanata* (eastern elliptio) from relatively uncontaminated rural streams in Piedmont North Carolina. Females that had not released glochidia during an acclimation period were exposed to one of five fluoxetine treatments (0, 0.3, 3.0, 30, 300 or 3000 µg/L) with 3, 5 or 6 replicates per treatment for 96 hours. A serotonin treatment (40 mg/L) was used as a positive control. Mussels were examined at 24-hour intervals to determine release and viability of glochidia. Investigators found that mussels in the 300 µg/L and 3000 µg/L treatments

released significantly more nonviable glochidia than controls. Mussels exposed to the serotonin control released glochidia at about the same rate as those in the 3000 µg/L fluoxetine treatment.

Because previous research had not evaluated reproductive effects of an SSRI on male unionid mussels, the researchers conducted an exposure investigation of effects on male *E. complanata*. The experiment was complicated by the fact that male and female *E. complanata* are not visibly different. They started with 48 mussels of varying sizes and unknown gender that were not “in season” and exposed them to three treatments: control, 300 µg/L fluoxetine/L or 3000 fluoxetine µg/L at constant temperature of 20 degrees C. Water samples were examined for release of sperm or glochidia. Male *E. complanata* exposed to 3000 µg fluoxetine/L released aggregates of hundreds to thousands of spermatozoa but those exposed to the next lowest concentration, 300 µg/L, did not.

To investigate the effects of fluoxetine on mantle lure behavior, the investigators secured adult female *Lampsilis cardium* from the Upper Mississippi River and *Lampsilis fasciola* from a rural reach of the Little Tennessee River near Franklin, NC. Only mussels that displayed fish lures and had not released glochidia during acclimation were used for the experiment. Exposure treatments were similar to those used for the *E. complanata* investigation. Six stages of mantle flap behaviors were defined and all mussels were monitored for mantle flap display and release of glochidia. The results showed a concentration-related

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response in mantle lure display behavior. Release of glochidia during this experiment was similar to that in the *E. complanata* experiment, except that all glochidia released were viable.

Conclusions and recommendations

The investigators say that the ecological effects of ill-timed release of glochidia or sperm or ill-timed fish lure behavior caused by fluoxetine exposure could be potentially devastating to localized mussel populations. They say that although the lowest observed effects concentration in their study (300 µg/L) is greater than the highest measured concentration in the environment (0.1 µg/L), their test durations were short (between 48 and 96 hours). Little is known about the effects of chronic low-level fluoxetine exposure on mussels that live 30 to 100 years. They recommend additional research on the long-term effects of total SSRI concentration in waters receiving treated wastewater on mussel reproduction and other behaviors such as burrowing and feeding.

The report on this research—Report No. 382, Endocrine and Reproductive Effects of the Pharmaceutical Fluoxetine on Native Freshwater Mussels: Proximity to Measured Environmental Concentrations by W. Gregory Cope, Damian Shea, Robert B. Bringolf, and Rebecca M. Heltsley of NC State University—will soon be available on the WRRRI website: <http://www.ncsu.edu/wrrri/reports/>. An article based on the research has been provisionally accepted for publication in the journal, *Environmental Toxicology and Chemistry*.

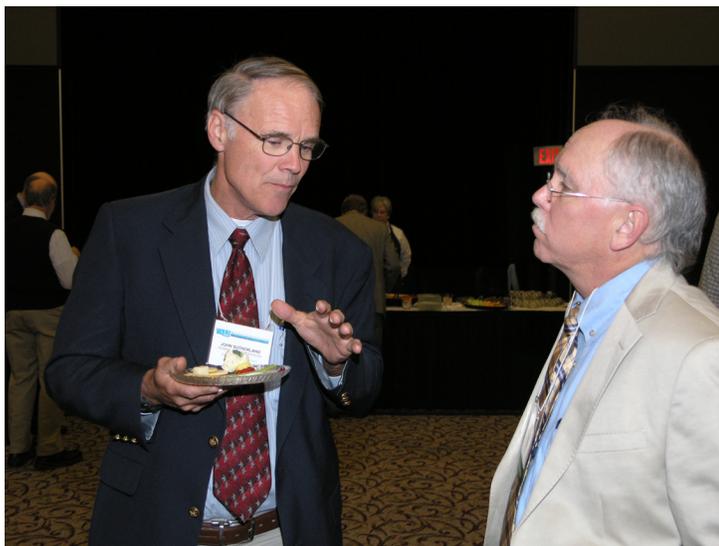
Sutherland retires as N.C. Division of Water Resources' Water Project Section Chief

After 38 years with the Department of Environment and Natural Resources and its predecessors, John Sutherland retired as Water Projects Section Chief with the Division of Water Resources on September 30.

Sutherland joined what was then the Department of Water and Air Resources as a water planner in 1971 and became section chief in 1983 when the Water Projects Section was created. He has been administrator of the multi-million dollar Water Resources Development Projects Grant Program, which includes state matching for federal Corps of Engineers projects and local government cooperative projects for general navigation, recreational navigation, water management, stream restoration, beach protection, land acquisition and facility development for water-based recreation, and aquatic weed control.

Sutherland said his 38 years with the department have gone by quickly and in some ways he hates to retire. But, he looks forward to being able to travel with his wife, Anne, and to spending more time volunteering with his church on Habitat for Humanity projects rebuilding in hurricane ravaged areas.

At a retirement party on September 29, Sutherland was awarded the prestigious Order of the Long Leaf Pine, which is given to employees of the State of North Carolina who have 30 or more years of service and a proven record of extraordinary service to the state. He was also awarded the Department of Army's Commander's Award for Public Service by the Corps of Engineers and a lifetime achievement award from the N.C. Beach, Inlet and Waterways Association.



John Sutherland (left) talks to Ken Carper at the 2008 WRRRI Annual Conference

Rate deadline not extended for grant seekers

SWIC adopts “adequate rate” guidelines

The 2009 General Assembly failed to pass legislation that was expected to extend a July 1, 2009, deadline for public water systems applying for certain state grants to satisfy “adequate rate” criteria.

House Bill 2499, Drought/Water Management Recommendations passed in 2008, requires that beginning July 1, 2009, to be eligible for state water grants or loans, public water systems that want to extend water lines or expand water treatment capacity have to demonstrate that they have adopted a water rate that is adequate to pay the cost of system operation, maintenance and repair.

The legislation directed that the adequate rate requirement is to be applied by agencies disbursing state funds as they consider grant applications and that the agencies use guidelines developed by the State Water Infrastructure Commission (SWIC). Since it had become clear that SWIC could not develop the guidelines by July 1, agencies had requested that the deadline be extended for a year.

However, legislation that included the deadline extension did not pass the 2009 session of the General Assembly, and funding agencies are now obligated to apply adequate rate criteria to the affected applications. While questions remain about how to include criteria addressing depreciation and reduced revenue due to conservation, SWIC adopted adequate rate guidelines in September. The guidelines were developed by the Department of Environment and Natural Resources using recommendations

from a study conducted by the UNC-Chapel Hill Environmental Finance Center. Specifics on the guidelines should be requested from funding agencies. (The Department of Commerce, the Department of Environment and Natural Resources, the Clean Water Management Trust Fund, and the N.C. Rural Economic Development Center.)

SWIC not funded; role uncertain

The 2009 General Assembly did not appropriate funds for the work of the State Water Infrastructure Commission but did not dissolve the commission. At the same time, the legislature established the Legislative Study Commission on Water and Wastewater Infrastructure to focus on the development of “an ongoing process to identify and regularly report to the North Carolina General Assembly on statewide water and wastewater infrastructure needs and to improve the delivery of State appropriated water and wastewater programs”—the same charge that was given to SWIC when it was established.

Members of SWIC agreed in September that the forum SWIC has provided is important and that the group should continue to meet. The N.C. League of Municipalities offered to continue providing meeting space. However, with no administrative support, it is uncertain how the commission will provide the required meeting minutes and annual report.

People

Ken Carper, Vice President and Director of Watershed Services for WK Dickson and Co., Inc., has been elected to serve as a director of the American Water Resources Association for 2010. Carper currently serves on the N. C. Water Resources Association Board. Carper has 30 years of experience as a water resources consulting engineer. He oversees watershed projects throughout the Southeastern United States.

Jon Calabria, Extension Associate with N.C. State University Department of Biological and Agricultural Engineering’s Water Quality Group was presented a “Friends of the River” Award by the Land-of-Sky Regional Council in August. The awards recognize individuals, private organizations, civic groups, and/or

public agencies in Buncombe, Henderson, Madison, and Transylvania counties who have made significant contributions to the enhancement or restoration of the French Broad River. As Coordinator of the French Broad River Watershed Training Center, Calabria has implemented over \$4 million in water quality protection demonstration projects and training programs.

Kenneth H. Reckhow, former director of WRRRI and professor of water resources at the Nicholas School of the Environment at Duke University, has been appointed chair of the National Academies Committee on the Evaluation of Chesapeake Bay Program Implementation for Nutrient Reduction to Improve Water Quality.

Additional environment-related legislation passed by the N.C. General Assembly

The following were among environmental bills passed by the General Assembly in the closing days of the 2009 regular session.

S 600 (SL 2009-439) AN ACT TO REQUIRE A DEMONSTRATION OF LACK OF PRUDENT AND FEASIBLE ALTERNATIVE IN ORDER FOR PUBLIC CONDEMNORS TO CONDEMN PROPERTY ENCUMBERED BY A CONSERVATION EASEMENT. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S600v6.pdf>

S 831 (SL 2009-406) AN ACT TO EXTEND CERTAIN GOVERNMENT APPROVALS AFFECTING THE DEVELOPMENT OF REAL PROPERTY WITHIN THE STATE. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S831v6.pdf>

S 968 (SL 2009-485) AN ACT TO SUPPORT PLANNING FOR MOUNTAIN RESOURCES. Establishes the Mountain Resources Commission, a permanent body composed of members from the mountain region of Western North Carolina to identify and evaluate issues affecting important mountain resources and recommend policies and programs to address those issues. Also establishes the Mountain Area Resources Technical Advisory Council to assist the commission. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S968v5.pdf>

S 1020 (LS 2009-486) AN ACT TO PROTECT AND RESTORE WATER QUALITY AND QUANTITY IN THE UPPER NEUSE RIVER BASIN, FALLS LAKE, AND OTHER DRINKING WATER SUPPLY RESERVOIRS BY DIRECTING THE ENVIRONMENTAL MANAGEMENT COMMISSION TO PROVIDE CREDIT TO LOCAL GOVERNMENTS, LANDOWNERS, AND OTHERS WHO REDUCE WATER POLLUTION IN THE UPPER NEUSE RIVER BASIN BEFORE PERMANENT RULES ARE ADOPTED AND TO MODIFY THE NUTRIENT MANAGEMENT STRATEGY AND ADOPT A SEDIMENTATION STRATEGY FOR CERTAIN DRINKING WATER SUPPLY RESERVOIRS. Requires the EMC to adopt a nutrient strategy for Falls Lake by January 15, 2011. Sets out erosion control requirements for "land-disturbing activities" in the Falls Lake Watershed and requires the Sedimentation Control Commission by Dec 31, 2011, to adopt rules to implement erosion control in the watershed that are similar requirements in the act. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S1020v5.pdf>

S 1067 (SL 2009-530) AN ACT TO ESTABLISH THE NORTH CAROLINA SUSTAINABLE LOCAL FOOD ADVISORY COUNCIL TO ADDRESS PROGRAM AND POLICY CONSIDERATIONS REGARDING THE DEVELOPMENT OF A SUSTAINABLE LOCAL FOOD ECONOMY IN NORTH CAROLINA. <http://www.ncga.state.nc.us/Sessions/2009/Bills/Senate/PDF/S1067v5.pdf>

H 569 (SL 2009-478) AN ACT TO DIRECT THE DIVISION OF WATER QUALITY IN THE DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES TO AUTHORIZE THE USE OF THREE-SIDED, OPEN-BOTTOM, OR BOTTOMLESS CULVERTS ON PRIVATE PROPERTY, BASED ON SOUND ENGINEERING PRACTICES, AS RECOMMENDED BY THE JOINT LEGISLATIVE TRANSPORTATION OVERSIGHT COMMITTEE. <http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H569v6.pdf>

H 1196 (SL 2009-503) AN ACT TO DEDICATE AND ACCEPT CERTAIN PROPERTIES AS PART OF THE STATE NATURE AND HISTORIC PRESERVE AND TO REMOVE CERTAIN LANDS FROM THE STATE NATURE AND HISTORIC PRESERVE. Adds to the State Nature and Historic Preserve some 18,000 acres including: The following units of the State Park System: Bear Paw State Natural Area, Deep River State Trail, Pineola Bog State Natural Area, Sugar Mountain State Natural Area, and (with some exclusions) Chimney Rock State Park, the Mountains-to-Sea Trail, and land added since May 2007 to other state parks. <http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H1196v6.pdf>
The State Nature and Historic Preserve Dedication Act seeks to ensure that lands and waters acquired and preserved for park, recreational, and scenic areas for the purpose of controlling and limiting the pollution of air and water; controlling excessive noise, and in every other appropriate way preserving as a part of the common heritage of the state, continue to be used for those purposes. The addition and removal of lands to and from the State Nature and Historic Preserve require a vote of three-fifths of the members of each house of the General Assembly.

H 945 (SL 2009-574) The Studies Act of 2009. Establishes the Legislative Study Commission on Water and Wastewater Infrastructure to focus on the development of an ongoing process to identify and regularly report to the North Carolina General Assembly on statewide water and wastewater infrastructure needs and to improve the delivery of State appropriated water and wastewater programs. Authorizes a number of studies by the Environmental Review Commission including: * Topics identified for further research and study in the 2008 Report of the Water Allocation Study; * Desirability and Feasibility of Consolidating the State's Environmental Policymaking, Rule-making, and Quasi-Judicial Functions Into One Commission; * Use and Storage of Reclaimed Water (aquifer storage of reclaimed water). <http://www.ncga.state.nc.us/Sessions/2009/Bills/House/PDF/H945v7.pdf>

Events

NCWRA Forums/Luncheons

11:30 am, Monday, December 7, 2009
McKimmon Center, Raleigh, NC

Recent and Current Projects and Initiatives in Hazard Risk Management for North Carolina Water Resources

Speaker: Hope Morgan GISP, GIS Manager, Office of Geospatial & Technology Management, NC Department of Emergency Management
Jack W. Moyer, National Water Security and Preparedness Lead, URS Corporation

In recent years, there has been increasing recognition of the vulnerability of water systems and water resources to the impacts of disasters of various forms and the interdependency of the water sector with other sectors.

Hope Morgan of the NC Division of Emergency Management and Jack Moyer of URS Corporation have been involved in a number of the recent initiatives and projects to improve water sector and multi-sector resiliency, including the NC Division of Emergency Management (DEM) Floodplain Mapping, the DEM Integrated Hazard Risk Management project, the NC Division of Water Resources Drought Tabletop Exercise and Toolbox, the current DHS Regional Resiliency Assessment Project in NC and the NC Public Water Supply Section Toolbox for Water Systems Tabletop Exercises, which they will review in this presentation.

February 22, 2010

Israeli Water Technology
McKimmon Center, Raleigh, NC

More information:

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

WRR I Annual Conference: The State of Water Resources in North Carolina

NCWRA Symposium: Water-Energy Nexus

March 30-31, 2010

Jane S. McKimmon Center
Raleigh, NC

Call for Presentation and Posters for Annual Conference Coming Soon

More information at:

<http://www.ncsu.edu/wrri/conference/index.html>

WRR I NEWS changes publication frequency

The current issue of the WRR I News (Sept-Dec 2009) will be the last issue for 2009.

A report on November meeting of the N.C. Environmental Management Commission will be provided through the WRR I Listserv in November.

In 2010, the WRR I News will be electronically published on a quarterly basis, beginning with the January-April issue. Reports on Environmental Management Commission and General Assembly action will be provided periodically through the WRR I Listserv.