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THE NEUSE STARTS HERE

Ted Bilderback, Nursery Extension Specialist

Department of Horticultural Science, North Carolina State University

The Neuse Starts Here” is the message on an aqua blue arrow-shaped sticker that is passed out at meetings where the proposed rules for this nutrient sensitive watershed are discussed. The stickers are now seen on many bathroom walls around the NC State Campus. I guess bathrooms are where they are supposed to be pasted to remind everybody living in the watershed that we all are a part of the problem and a part of the solution too. It’s the actions we take to reduce nitrogen deposition into the Neuse that will make the difference. We need to employ practices such as planting vegetative strips where runoff flows. Other practices include calibrating fertilizer spreaders and not exceeding recommended rates of fertilizers when applying to lawns, landscape beds and crops.

Why the Neuse? The Neuse river watershed is totally from start to finish in North Carolina; “Ours to Wreck” I guess. The Neuse is unique due to its history, world wide media attention and because the proposed rules are the first anywhere in the U.S. that will require non-point sources including agriculture to make changes. Some

ivers have certainly had songs written about them but few have had a book that discusses trouble between state agencies and scientists with titles such as “And the Waters Turned to Blood”. The story line has a mysterious villain called *Pfiesteria*, that has been coined the “Cell from Hell”. If you are ever bored while surfing the net just search for one of these terms and you will get plenty of sites to visit. Interviews about the Neuse and *Pfiesteria* have hit People Magazine, U.S. News and World Report and several talk shows. There has even been discussion of a movie starring Jodi Foster.

Flow rate in the Neuse as it enters the estuaries is the major difference between the Neuse and rivers such as the Cape Fear which rapidly flows from it’s mouth to the ocean. In 1887, a law was passed prohibiting throwing dead animals into the Neuse and it’s tributaries. In 1951 a survey was initiated to study the river and in 1959 a report found the water down stream in the river to be low in quality. Eutrophication (low oxygen, and algal growth) were problems in the 1970’s. In 1983 the river was classified as a Nutrient Sensitive Watershed. In 1993 a basin-wide

management plan was developed. In 1995, three fish kills caught the news media and legislators attention. In 1995, the N.C. Environmental Management Commission (EMC) was directed to come up with a plan to reduce nutrient loading in the Neuse estuaries. Public hearings were held on the proposed rules in 1996 and the rules were approved by the EMC in December 1997.

To my knowledge nothing is really certain regarding implementation. However, the rules were forwarded to the Rules Review Commission in January 1998. It is assumed that rules very similar to those approved by the EMC will be enacted sometime this summer, probably in August 1998, regardless of General Assembly action or inaction. If rules for the Neuse are enacted, implemented, and some degree of success is accomplished, there is no secret that the other 16 watersheds in North Carolina will most likely see similar practices introduced within 5 to 10 years. Many other states are also closely watching and have attended Neuse River Conferences so a lot of changes could be upcoming in watersheds across the country. Lots of efforts, jobs and operating capital are being directed at the Neuse to create positive results. For starters, 10 Neuse River Regional Extension agents and 10 Soil and Water Conservation agents will be or have been hired to assist in educational programs, research and demonstration projects. Their job will be to help identify and implement best management practices (BMP's) to meet a 30% (of 1991-1995 levels) nitrogen loading goal.

Extensive comments received on the proposed rules during public hearings in 1996 resulted in changes in the revised rules. Industries, municipalities and agriculture will be required to make the greatest efforts in reducing nitrogen loading in the Neuse River watershed. All discharges of more than 0.5 million gallons daily will have to optimize their facilities for nitrogen reduction. New facilities for waste treatment must cut nitrogen levels from current permit levels of 10 mg/L (ppm) to 3.5 mg/L and from 2.0 mg/L phosphorus to 1.0 mg/L P. One of the most

likely techniques available to cities and industries to accomplish this will be construction of wetland areas to serve as vegetative filters and reduce nitrogen before it is discharged off-site. Storm water treatment from new construction will have considerably more environmental requirements for sediment retention systems and 50 foot undisturbed and continuous riparian buffers will be required along any natural conveyance. Ten cities and five counties will be required to retrofit storm water nutrient discharge systems. They will use techniques such as reducing channeling through riparian areas and establishing wetland filters for storm water nutrient reduction.

Consistent throughout all hearings and meetings regarding this nutrient sensitive watershed has been the .0233 rule: Protection and Maintenance of Riparian Areas. "Intermittent streams, perennial streams, lakes, ponds and estuaries as indicated on the USGS 1:24,000 scale topographic maps require riparian buffers to be maintained. If no riparian buffer exists, then sheet flow and avoidance of channeling and erosion should be achieved. Livestock ponds and irrigation basins are exempt as well as man-made conveyances (ditches: but subject to review). If ditches do create channels through riparian areas, nutrients, sediment loss and sheet flow rather than channeling through the riparian area should be achieved to the fullest extent possible. The protected riparian area is defined by two zones. Zone 1 is an undisturbed area of forest vegetation beginning at the top of the bank and extends landward 30 feet on all sides of the water body. This zone consists of natural vegetation, with minimal soil disturbing activities and no fertilizer application. Some tree removal activities would be allowed. Zone 2 is a 20 foot area described to consist of dense ground cover composed of herbaceous and woody species. Limited harvest of timber, nuts and fruits is allowed in this zone but limited soil disturbance and no fertilizer application are limitations in this area. Dispersal of runoff in sheet flow into the riparian area is required."

The .0238 rule is the Agricultural Nitrogen Reduction Strategy. Agriculture has been given a goal to achieve a collective reduction of 30% total nitrogen from the 1991–1995 nitrogen loading concentrations. Agriculture is being held responsible for what is actually a total rural contribution including nitrogen from septic tanks. Septic tanks are the only primary source of nutrients not specifically covered in the Neuse River plan. There is no mandate that nitrogen from septic tanks be reduced to the 30% level previously mentioned. Even though septic tanks may be major contributors to nitrogen pollution, apparently further regulation seems too difficult except under local conditions.

Agricultural operations are given two options under the .0238 rule. The first option is to sign up and participate in a collective local strategy for agriculture nitrogen reduction. The second option requires the implementation of standard Best Management Practices. Greenhouse and nursery growers will generally have to take Option One. The “standard” Best Management Practices recognized for agriculture currently are limited to riparian buffers and/or nutrient management plans and/or water control structures used in irrigation management plans. Although all of us recognize a whole set of Best Management Practices for the greenhouse industry that relate to nutrient and water management, they currently would not qualify as standard BMP’s. We as an industry, all of us, will be involved in a large educational effort to illustrate and discuss our BMP’s with state and local committees that will conduct the Option One local strategy for nitrogen reduction.

The .0238 rule creates a Basin Oversight Committee. Membership in the committee will be one representative from the: ① Division of Soil and Water Conservation, ② USDA- Natural Resources Conservation Service, ③ N.C. Department of Agriculture, ④ N.C. Cooperative Extension Service, and ⑤ Division of Water Quality (DEHNR); and one member with environmental interests, one member representing

agriculture and one member of the scientific community related to expertise in water quality. Memberships will be 5 year terms. The responsibilities of this committee are extensive including: accountability of methodology, approving BMP’s, calculating separate total N loading, tracking progress, allocating nutrient budgets to local strategy reduction committees, and writing accomplishment reports. Local Strategy Advisory committees are also created with this rule. Membership of these committees will be composed of local county or watershed members of the same agencies and at least two local farm representatives. Members will serve 5 year terms at the pleasure of the Environmental Management Commission and Soil and Water Conservation Commission. Duties of the local committees are also extensive. They will conduct a sign up for the local nitrogen reduction strategy during the first year of implementation of these rules. They will develop local strategies and a matrix of BMP options which account for stream order, flood plain width, regional variations in soil type and topography. The local strategies will specify the name and location of participants in the “local strategy”. They will list BMP’s of each plan; estimate nitrogen reduction; and schedule BMP implementation, operation and maintenance required to attain a 30% N reduction. This committee will prepare annual reports listing BMP’s implemented, costs, estimated nitrogen loading reduction. The report will be submitted to the Basin Oversight Committee.

Greenhouse operators along with other farming operations who sign up the first year to be a part of the local strategy must commit and implement any contracts or agreements with the local committee to reduce nitrogen loading by 30% within 5 years. Participants in the local strategy cannot withdraw during the five year period or they will be required to meet more stringent standard BMP’s.

There are approximately 150 wholesale greenhouse and nursery operations in the 17 counties of the Neuse watershed (Figure 1).

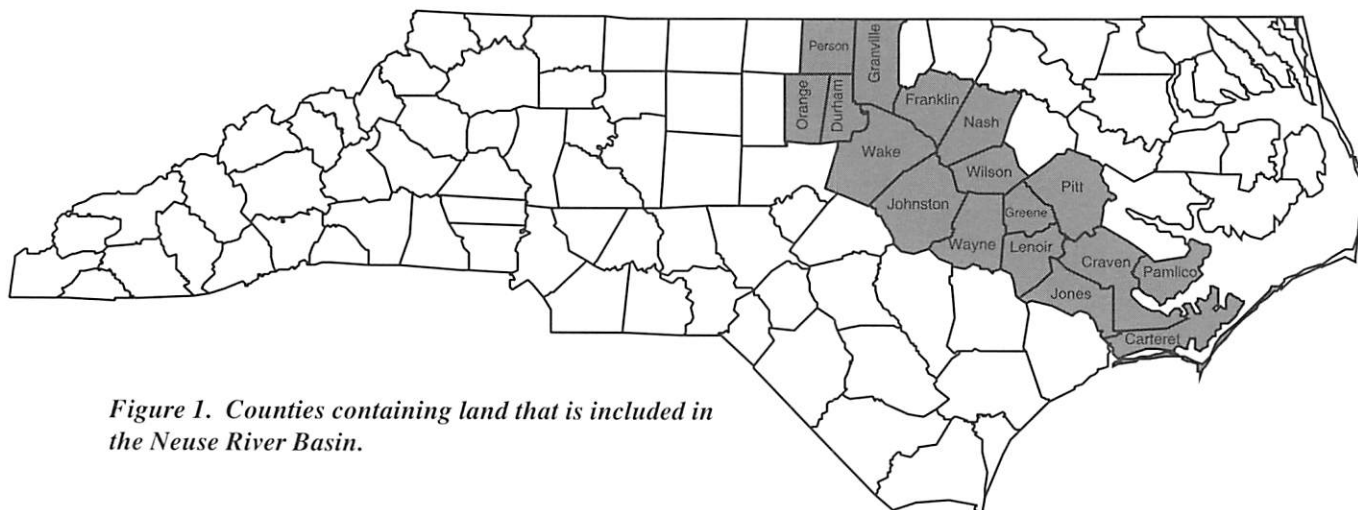


Figure 1. Counties containing land that is included in the Neuse River Basin.

Several counties including Craven, Durham, Franklin, Johnston, Lenoir, Pitt, Wake, Wayne and Wilson have many greenhouses and nurseries that are a large part of the agricultural economy. Some greenhouse and nursery owners may find it in their best interest to get involved with their local committees, either by seeking membership, or sharing information about the uniqueness and environmental stewardship practices used by our industry with members of the local committee.

The greenhouse and nursery industry may be able to take advantage of the Neuse River Rules. Although about 15 nurseries in North Carolina specifically grow wetland crops, it would seem that there will be more demand for various wetland and aquatic plants than can be met. Cities, DOT, industry and agricultural operations may choose constructed wetlands as their primary method of reducing nitrogen loading. Aquatic plant production areas at nurseries and greenhouses can take the form of constructed wetlands. Irrigation runoff from beds and houses can be directed via sheet flow into collection basins. The canals can be wide and lined with 6 mil plastic and ground cloth. Trays or pots filled with wetlands plants can be set across the canal bottom. Stream flow velocity and depth can be controlled using a weir or gate just before it enters the collection basin. Most aquatic plants grow well in 4 to 6 inches of water. A large variety of

herbaceous and woody wetland species could be produced.

The greenhouse and nursery industry will obviously have to use BMP's to comply and reduce nitrogen loading in the Neuse river basin. The SNA Best Management Practices Notebook arrived just at the right time for greenhouses and nurseries in the Neuse river basin. This publication is well written and has impressed all of the members of agencies that I have provided copies to. (The same agencies mentioned below that will form the Basin Wide Oversight Committee and Local Advisory Committees). EPA Region IV followed the development of the manual and provided input so we feel that the BMP Manual does have merit. Most of the BMP's in the manual are focused on improving irrigation efficiency, reducing volume and managing irrigation runoff, sediment control, and good fertilizer and fertility practices. If you have not purchased a copy of the manual, the NC Association of Nurserymen has copies for sale. If you have not had time to look at a manual consider scheduling some time to read through it; these BMP's can save you money whether you are in the Neuse River Basin or not. An NCAN committee, composed of nurserymen with businesses in the Neuse river basin developed a list and credits for BMP's in 1996. This document may also be useful as a review of what practices

are good environmental and economic BMP's. I am currently recommending that greenhouses and nurseries in the Neuse River Basin begin putting together a notebook on their BMP's they practice or could practice. Collecting runoff samples routinely, say monthly and having them analyzed might also be useful in the future. If the rules are implemented as they currently are written, every nursery and greenhouse in the Neuse river basin will host a local committee some time within three years after enactment and will need to demonstrate and show local committee members the BMP's that are in place or can be put into place. However, nurseries and greenhouses in the Neuse River Basin should probably not invest a lot of expense implementing improvements immediately. Make a notebook on BMP's; record keeping and monitoring is enough for now. Local committees may require specific changes, and these changes may qualify for cost share monies, so don't get in a hurry to make capital investments into BMP's just yet.

From discussions that I have attended recently, I feel our BMP's address and provide techniques that will reduce nitrogen loss from greenhouse and nursery operations. Certainly, catch basins provide the best means of reducing nutrient loss. However, I have now realized that they are not 100% effective. The reason is that catch basins catch surface water, but are only partially effective for protecting shallow ground water. Much discussion about riparian buffers and water control structures revolves around shallow ground water. Water control structures which keep winter water tables high in fields facilitate denitrification in the ground water 18 to 36 inches below the surface, particularly in fields in the lower coastal plain. Riparian buffers are effective in lower, middle and even upper coastal plain areas because tree roots provide a carbon source to feed denitrifying bacteria which reduce nitrogen in the water before it reaches the streams. Certainly growing beds and greenhouse floors that have a plastic lining under gravel or ground fabric prevent nitrogen from getting into shallow ground water

below beds and greenhouses. If the drainage ditches are wrapped with the same plastic and fabric they too would prevent N deposition. Our capture basins could be lined, but a better alternative on new construction of collection basins might be to make sure they are not located on the property line or close to a stream edge. Locate them at least 50 feet in front of these boundaries. The overflow then could be sheet flow directed through a wetland area and should appease any concern regarding nitrogen contamination of shallow ground water.

Another consideration as we go through this process is that if changes need to be made at greenhouse and nursery operations to reduce runoff, funding may be available. The cost of constructed wetlands, development of riparian buffers, or creating sheet flow from first order ditches may be eligible for cost share money. The EMC has proposed that commercial fertilizer products be levied to provide cost share money. Up to \$47 million dollars may be available for agricultural cost share projects in the Neuse River Basin. As much as 75% of the cost of some projects may qualify for support. Once installed, the BMP's must be maintained through the life of the contract. Most cost share monies will be administrated by the Division of Soil and Water Conservation, which has offices in every county.

One more rule, .0239 : Nutrient Management also affects the greenhouse, nursery and landscape industries. This rule requires nutrient management training or development of nutrient management plans for any applicators or businesses including row and vegetable crops, floriculture, ornamental and greenhouse production areas (not total land area) that comprise at least 50 acres. The first option, training, will be developed by the Division of Water Quality and N.C. Cooperative Extension Service. The training and the certification will be much like pesticide applicators training and recertification. Successful completion of a test will be required for certification. This training will be mandatory for any operation or person that applies fertilizer

to over 50 acres of production area. If training is not completed within 5 years, a nutrient management plan will be mandatory for each location or business comprising the 50 acres. This nutrient management plan format has not been developed for the greenhouse and nursery industry, but it will follow a format designed for other agricultural commodities.

So when will we know the Neuse is fixed? Nitrogen levels in the Neuse will be monitored over the next 5 years. Years with high rainfall and high flow levels will be compared to years from 1991 to 1995 with high flow. Low flow years during the next 5 years will be compared to low flow years between 1991 and 1995. Reductions will be noted but populations of flora and fauna will also be used to assess the river's health and degree of recovery.

To the best of my knowledge, these are the issues and the status of the Neuse River Nutrient

Sensitive Watershed proposed rules. It will be important for nursery and greenhouse professionals to **get involved** at the local and even possibly the state level. We are a very different type of agriculture than production of field crops or livestock. Most people, particularly people who will be on committees as representatives of government agencies have only limited knowledge related to nursery and greenhouse production. It is time that our green industry is better known since farm crop receipts for nursery and greenhouse in North Carolina are **second** only to tobacco; and we are the **fourth** largest agricultural industry in our state behind swine, poultry and tobacco. I do not feel these rules will be extremely adverse to our industry. As an industry, we are regarded as good stewards of the environment and we have many good BMP's already in place. We just have to demonstrate and talk about our best qualities.