

# **Annual Progress Report on the Neuse Agricultural Rule (15A NCAC 2B .0238)**

*A report to Environmental Management Commission by the Neuse Basin Oversight Committee*

## **Summary**

The Neuse Basin Oversight Committee (BOC) has received and approved annual reports from 17 Local Advisory Committees (LACs) in September 2002. As a result, for the basin as a whole, the agricultural community has achieved a 34% nitrogen (N) reduction compared to the overall baseline. Eleven LACs have achieved their nitrogen reduction goal established by the BOC, which is a 30 percent N reduction from their baselines. Nitrogen loss from agricultural land has been reduced by over 40 percent compared to the baseline numbers for Carteret, Craven, Johnston, Wake/Franklin and Wilson counties. Nitrogen loss reduction from agricultural land was accomplished through best management practice (BMP) installation, fertilizer application reduction and cropland attenuation. The BOC continues to encourage counties that have already achieved their N reduction goal to implement additional BMPs to reduce N loss. The BOC will focus additional efforts to assist counties that currently have not met their reduction goals to implement additional BMPs and to seek alternative BMPs to achieve the N reduction goals.

## **Background**

In December 1997, the N.C. Environmental Management Commission (EMC) adopted the Neuse River Basin Nutrient Sensitive Waters (NSW) Management Strategy. For the first time in state history, mandatory controls are applied not only on point source pollution but also on nonpoint source pollution in the Neuse River basin. The strategy has 8 rules that affect both urban and rural areas. The strategy is aimed at reducing the average annual load of nitrogen delivered to the Neuse River Estuary from point and nonpoint sources by a minimum of 30 percent of the average annual load from the period 1991 through 1995 by the year 2003.

The Neuse agricultural rule provides each farmer with the option of becoming part of a collective local strategy for implementing BMPs or implementing standard BMPs as specified in the rule. A Basin Oversight Committee and 17 Local Advisory Committees were established to implement the Neuse agricultural rule and to assist farmers with complying with the rule.

The BOC is made up of eight individuals appointed by the Secretary of the Department of Environment & Natural Resources (DENR). The BOC includes representatives from the following agencies and interest groups: Division of Water Quality (DWQ), Division of Soil and Water Conservation (DSWC), Natural Resource Conservation Service (USDA-NRCS), North Carolina Department of Agriculture and Consumer Service (NCDA&CS), North Carolina Cooperative Extension Service (NCCES), agricultural community, scientific community and environmental community. Responsibilities of the

BOC include developing a method to track and account for net nitrogen reductions from agricultural operations in the basin, approving local nitrogen reduction strategies, and presenting annual reports to the EMC on the progress toward reaching the goal.

Each of the 17 county-level LACs is made up of seven or more individuals representing local agricultural agencies and farmers. The local agricultural agencies include DSWC, NCDA&CS, local NRCS, NCCES and local Soil and Water Conservation District (SWCD). Responsibilities of LACs include conducting farmer sign-up, establishing county agricultural baseline, developing local nitrogen reduction strategy, and preparing annual progress report. Several of the LACs cover more than one county.

Community meetings about the Neuse agricultural rule were held in 17 counties in the basin with assistance from NCCES. A fact sheet about the rule was developed and distributed to all counties within the basin. The sign-up process for farmers to enroll in the local option started in 1998. Both agricultural and mass media publications targeting farmers in the basin carried announcements about the sign-up process. The LACs successfully conducted the farmer sign-up between 1998 and 1999 with assistance from DSWC. Approximately 90 percent of cropland (estimated 800,000 acres) in the Neuse River Basin representing about 3,400 farmers was enrolled in the local option between 1998 and 1999.

### **Neuse Agricultural Baseline and Local Reduction Strategies**

The Nitrogen Loss Evaluation Worksheet (NLEW) was developed to meet the requirement of a scientifically valid accountability method for nitrogen reduction. The NLEW tool, which was based on soil loss, was initially developed in 1995 by the USDA - Natural Resource Conservation Service (NRCS) as a field-based procedure to estimate and report nitrogen loading from agricultural fields. As the need for a nitrogen accounting tool became more important, a multiagency team was formed in 1996 under the leadership of researchers from N.C. State University (NCSU) to begin a critical reevaluation of NLEW. The NLEW committee also included representatives from DWQ, NCSU, DSWC, and NRCS. As a result of the review, NLEW was completely redesigned, including significant research results. The algorithms for NLEW were completely modified. The NLEW tool was developed to serve the following purpose:

1. Estimate nitrogen loading from agricultural sources into the Neuse River during the baseline period of 1991 to 1995;
2. Facilitate local BMP planning and implementation; and
3. Track and account for reduction in nitrogen loss due to the implementation of BMPs, crop and land use changes throughout the basin.

In March 2000, the EMC approved the accountability process of which NLEW is the critical part. Two major training sessions, conducted by DENR and NCSU, were held in central locations for the upper and lower basin. Over 200 LAC members including local agricultural agency staff and farmers attended the training.

Before the county agricultural baselines could be developed, NLEW was computerized. After developing the county agricultural baselines, the baseline N levels were reported to and examined by the BOC then reported to the EMC. To verify the county baseline numbers, a statistical sampling project in the Neuse River Basin was funded. The primary results of this study were reported to the BOC in February 2002. Early information indicates that the baseline figures are high in some counties due to lack of information about existing buffers. The BOC will compare this statistical analysis and work with LACs to make any needed adjustment to county baseline estimates.

NLEW was also used to prepare the local nitrogen reduction strategies. Each strategy is a consensus determination by the LAC. Each is based on the types and amounts of the approved BMPs that they believe need to be implemented to collectively produce the required 30 percent reduction from baseline numbers. The LACs determined which practices would be most acceptable to participating farmers and predicted the number of acres to which they felt these practices could be applied. Table 1 summarizes the BMP implementation goals from the approved local nitrogen reduction strategies.

Table 1. BMP Implementation Goals for all 17 Neuse Basin LACs to Achieve 30% Reduction in Agriculture Nitrogen

<b>BMPs</b>	<b>Acreage (ac)</b>
20' vegetated buffer	1,100
30' vegetated buffer	700
20' forested buffer	270
50' riparian buffer	2,000
Cover Crop	5,200
Nutrient management	280,000
Water control structure	42,000

## **Current Status**

### *Nitrogen Reduction from Baseline in 2001*

All seventeen LACs submitted their first annual reports to the BOC in May 2002. Eleven LACs have achieved their nitrogen reduction goal established by the BOC, which is a 30 percent N reduction from their baseline. Nitrogen loss from agricultural land has been reduced by over 40 percent compared to the baseline numbers for Carteret, Craven, Johnston, Wake/Franklin and Wilson counties. As a result, for the basin as a whole, the agricultural community has achieved a 34% N reduction compared to the overall baseline. Nitrogen loss reduction from agricultural land was accomplished through BMP installation, better management of fertilizer and loss of cropland acreage to development. Table 2 lists each county baseline within the basin, its proposed reduction goal and N reduction from baseline in 2001.

Table 2. Summary of County Baseline and its N Reduction from Baseline in 2001

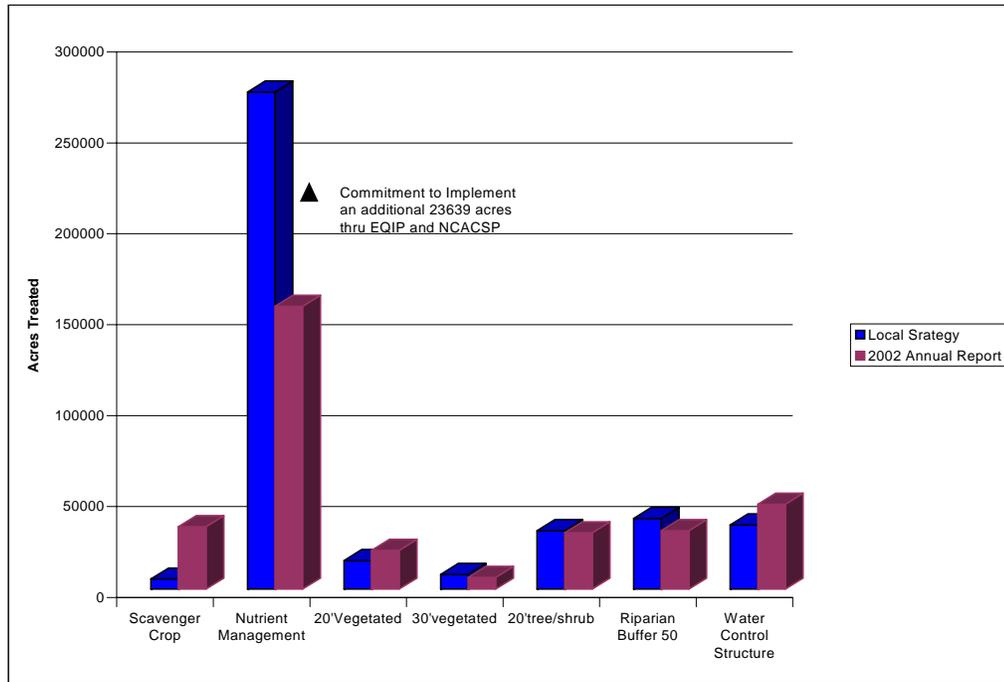
County	Baseline N Loss* in lbs.	Proposed Percent Reduction	2001 N Loss* in lbs.	Percent of N Reduction From Baseline in 2001
Carteret	1284833	>30%	700893	45.4%
Craven	3928696	>30%	2106696	46.4%
Durham	81542	>30%	60009	26.4%
Granville	60057	20.5%	46627	22.4%
Greene	4034046	30%	2542740	37.0%
Johnston	6094690	30%	3194085	47.6%
Jones	2736562	>30%	1808779	33.9%
Lenoir	3994989	>30%	3421915	14.3%
Nash	872259	30%	609184	30.2%
Orange	181276	18%	146034	19.4%
Pamlico	2043961	>30%	1257096	38.5%
Person	339822	30%	231542	31.9%
Pitt	2892783	30%	2230805	22.9%
Wake/Franklin	597078	30%	339857	43.1%
Wayne	5816298	30%	4354422	25.1%
Wilson	1939073	>30%	1133232	41.6%
Collectively for the entire Neuse River Basin	37414381		24927010	34.5%

\* The total nitrogen loss value is for comparative purposes only. It represents fertilizer that was applied and neither used by crops nor intercepted by BMPs in a Soil Management Unit, based on NLEW calculations. It may not represent the actual loss from the Soil Management Unit.

***BMP Installation***

A significant number of BMPs have been installed since 1996. It is estimated that approximately half of enrolled croplands received treatment from the installed BMPs. Figure 1 indicates that farmers installed more water control structures, planted more scavenger crops, and established more 20 foot vegetated buffers and 20 foot tree buffers than were proposed by LACs in their local N reduction strategies. The BOC is confident that all BMP installation targets will be exceeded during the next year with the assistance of the CREP program and expected increase of financial and technical assistance provided in the 2002 Farm Bill.

Figure 1. Best Management Practices Installed in the Neuse River Basin from 1996 to 2001



Not all types of BMPs provide N reduction or receive N reduction credits. However, such BMPs do have water quality benefits. Many BMPs are designed to reduce sediment and other nutrients, such as phosphorus, from agricultural lands to surface water and shallow groundwater. Table 3 lists these other types of BMPs installed from 1996 to 2001. Units of BMPs reported in the table are the actual BMP footprint acreage, not acreage treated by these BMPs. Approximately 480 thousand tons of soil has been saved from installation of these BMPs.

Table 3. Additional BMPs Installed in the Neuse River Basin from 1996 to 2001

Best Management Practice	Units
Conservation Tillage	52202 acres
Conservation Tillage 3 Yr.	2086 acres
Long Term No Till	7377 acres
Terraces	3711 ft
Diversion	121530 ft
Sod Based Rotation	1550 acres
Strip Cropping	44 acres
Field Border	342 foot print acres
Grassed Waterway	237 foot print acres
Livestock Exclusion	10029 ft
Streambank Stabilization	50 ft
Filter Strip	53 foot print acres

\* Information obtained from NC Agricultural Cost Share Reports 12/1995 through 4/2002. This does not include Best Management Practices that were voluntarily installed through various federal programs or without government assistance.

### Implementation Cost

In large measure, the success of this program is due to funding from both traditional and non-traditional sources to pay for cost-share, best management practices; fund informational literature and workshops for farmers; and to cover some of the expense of developing our accountability process. These figures do not include the extensive staff time from the DSWC, local SWCD, NCDA&CS, NCCES, and USDA-NRCS.

Listed below are the major sources that we have identified. These figures are for work done through 2001. This is a comprehensive but not complete list. Most of projects or programs listed are continuing items and will fund this work through the next year or more.

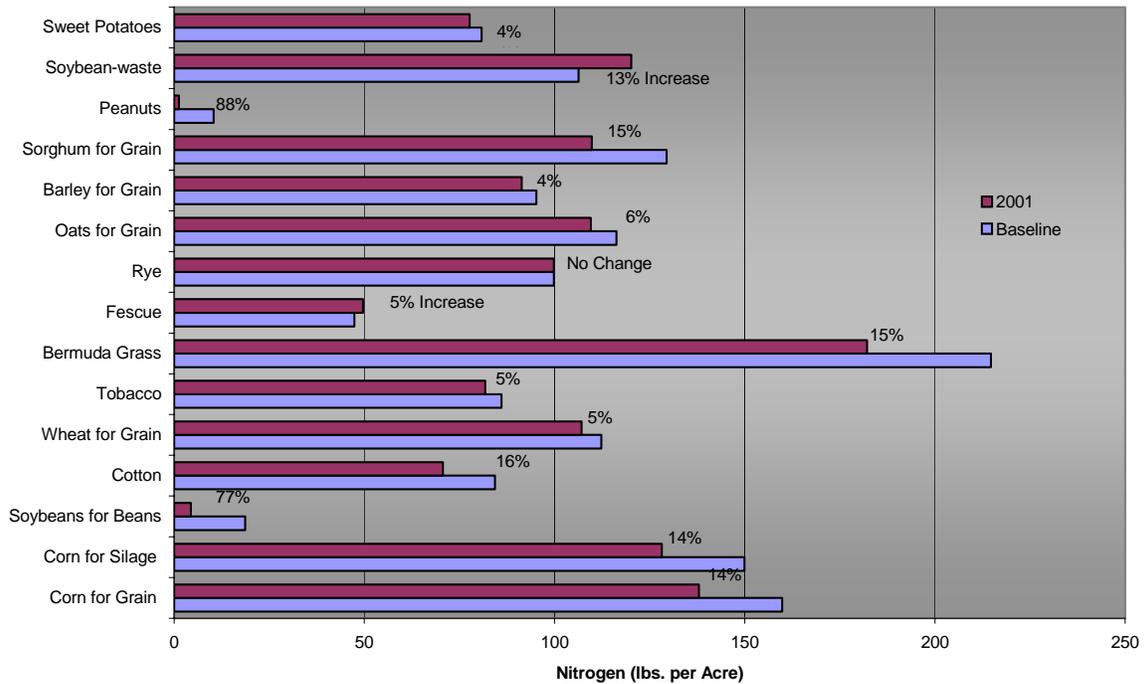
Please note that this does not include the cost to Neuse Basin farmers. We do not have the ability to calculate the out-of-pocket expense to farmers for their portion of cost-share projects or for the practices that they pay for entirely. However, we know that this amount is very substantial and should be acknowledged.

1. Federal Cost Share Funding through the Natural Resource Conservation from the Environmental Quality Incentives Program (EQIP) -\$ 2,690,134
2. The NC Agriculture Cost Share Program – including federal funds sent to the state with state match for the Conservation Reserve Enhancement Program \$ 2,782,915
3. Clean Water Management Trust Fund \$1,160,000. This amount is not grant totals, but actual amounts spent thus far for practices installed on farms.
4. The “Neuse Crop Management Project” conducted by NCSU received primary funding from the Pew Charitable Trust and the US Environmental Protection Agency. That funding paid for nutrient management demonstrations, over 113,000 acres of nutrient management, produced a variety of educational fact sheets for Neuse Basin farmers, and covered the \$50,000 computer programming cost for NLEW (the nutrient accountability program approved by the EMC for the Neuse Agricultural Rule), and \$30,000 for nutrient management training (mandated in Neuse Rule .0239) which is also required for most farmers. The total funding for this project including the portion that came from the Clean Water Management Trust Fund was \$967,000.

Fertilizer Management

With greater nutrient management and increased costs of fertilizer, farmers in the Neuse River Basin have reduced their fertilizer application since 1996. Figure 2 indicates that fertilization rates for most major crops in the basin have been reduced.

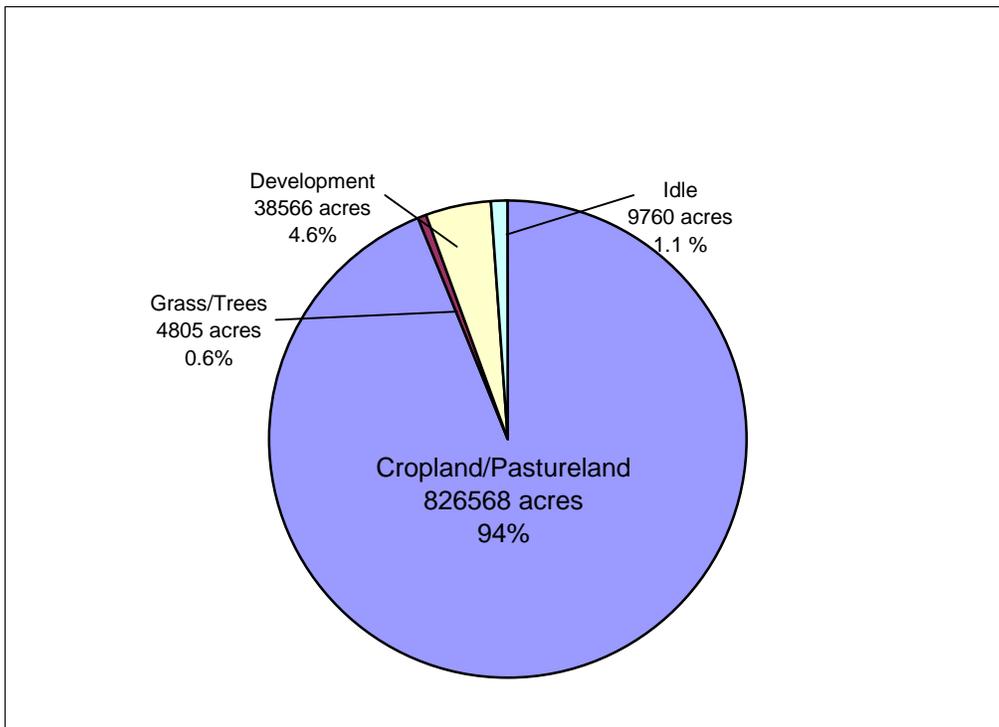
Figure 2. Average Fertilization Rate for Major Crops in the Neuse River Basin in 2001 Compared to the Baseline Period (1991-1995)



Cropland Loss

The Neuse River Basin has experienced significant growth since the 1980s. Durham, Johnston and Wake Counties are growing the fastest in the upper basin, with Pitt County growing fastest in the lower basin. Approximately 5 percent of the cropland in the basin has been lost to development since 1996 (Figure 3). Cropland loss has contributed significant N reductions for Johnston, Wake and Wayne Counties.

Figure 3. Current (2001) Uses of Land in the Neuse River Basin that was all Agriculture during Baseline Period (1991-1995)



The Basin Oversight Committee recognizes that the business of agriculture and the science of agriculture are under perpetual change as a result of a great number of forces. These forces may include:

- Changes in world economies or trade policies
- Government program changes such as commodity support or environmental regulations
- Weather, i.e., long periods of drought or rain
- New crops brought into production or changes in how crops are grown as a result of research and development
- Plant disease or pest problems such as foreign pest or virus
- Farm location, i.e., large grain grower renting local farms moves to cash crop as rental lands sold to development
- Age of farmer, i.e., as retirement approaches farmer may move from row crops to cattle

The strategies of several LACs were influenced by significant acreage shifts from corn to cotton production. Figure 4 shows changes of crop pattern in the Neuse River Basin between the baseline period (1991-1995) and 2001. This change is significant because corn has a considerably higher nitrogen requirement than does cotton. This change in

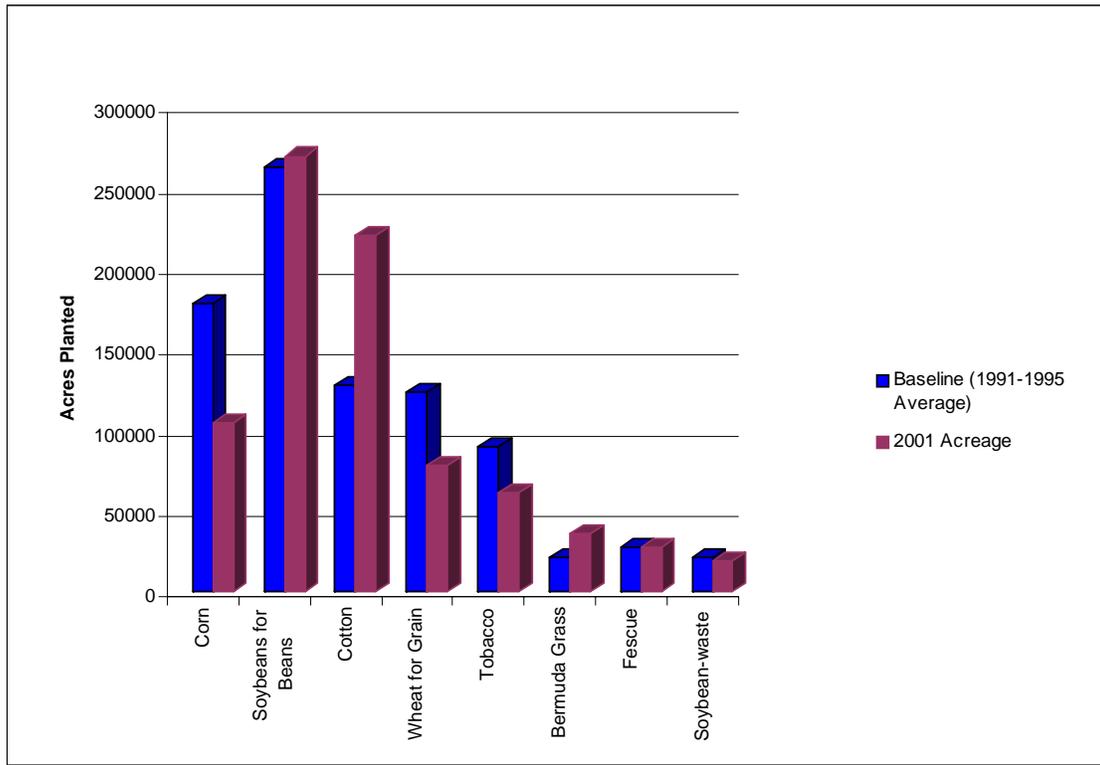
crop production brought about a significant reduction in nitrogen use on agricultural lands since the baseline was established.

It is important to note, however, that nitrogen application rates for corn have dropped significantly relative to the baseline due to intensive nutrient management education efforts and to the increasing cost of nitrogen. This reduction in corn fertilization rates should significantly mitigate the effect of a potential shift back to corn.

Historical farming practices in North Carolina cannot be used as a reliable predictor for the future agricultural picture in the state. Tobacco and peanut program changes have occurred recently that will likely result in major changes for many farms in the Neuse River Basin. Conversion of cropland to other agricultural and non agricultural uses also remains a likely scenario in many Neuse River Basin counties. New crops are likely to be grown in the basin as a result of bioenergy and biopharmaceutical production. Agriculture in the Neuse River Basin will continue to change over the next decade.

The Local Advisory Committees have been advised of the need to monitor changes in agriculture for the county and to update strategies to accommodate these changes. These changes could result in the need to implement additional best management practices or to redesign or reimplement existing practices based on changes in the practice itself over time, or based on the changes in crops grown, crop management, BMP management or other factors. Individual farm plans must be updated as any changes occur that will result in changes in nitrogen uses on farmlands

Figure 4. Changes in Crop Pattern in the Neuse River Basin between Baseline Period (1991-1995) and 2001



### Future Steps

The Neuse Agricultural Basin Oversight Committee will continue to work with Local Advisory Committees and farmers to reduce N loss from agricultural lands in the Neuse River Basin. The BOC continues to encourage counties that have already achieved their N reduction goal to implement additional BMPs to reduce N loss. The BOC will focus additional efforts to assist counties that currently have not met their reduction goals to implement additional BMPs and to seek alternative BMPs to achieve the N reduction goals.