

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

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

Summary

The Neuse Basin Oversight Committee (BOC) has received and approved annual reports from seventeen Local Advisory Committees (LACs) in September 2004. As a result, for the basin as a whole, the agricultural community in 2003 has achieved a 42% nitrogen (N) reduction compared to the overall baseline. This represents an improvement in N reduction compared to a 37% N reduction reported in 2002. All seventeen LACs have achieved their nitrogen reduction goal established by the BOC. Counties, including Carteret, Craven, Johnston, Wake, and Wilson counties, have been able to maintain their N reduction of over 40% reported last year. In addition, Greene, Jones, Orange, Pamlico, and Person counties were also able to reduce their N loading from agricultural lands more than 40 percent in 2003. Nitrogen loading reduction from agricultural land was accomplished through best management practice (BMP) installation, fertilizer application reduction, and cropland attenuation. The BOC continues to encourage all seventeen LACs to implement additional BMPs to further reduce N loss.

Background

In December 1997, the Environmental Management Commission (EMC) adopted the Neuse River Basin Nutrient Sensitive Waters (NSW) Management Strategy. For the first time in state history, mandatory controls were applied not only on point source pollution but also on nonpoint source pollution in the Neuse River basin. The strategy has eight 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 source pollution 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 seventeen Local Advisory Committees were established to implement the Neuse agricultural rule and to assist farmers with complying with the rule.

All seventeen LACs submitted their first annual reports to the BOC in May 2002. All LACs had achieved their nitrogen reduction goal established by the BOC in 2003. Nitrogen loss from agricultural land has been reduced by over 40 percent compared to the baseline numbers for Carteret, Craven, Greene, Johnston, Jones, Orange, Pamlico, Person, Wake, and Wilson counties. For the basin as a whole, the agricultural community has achieved a 42% N reduction compared to the overall baseline.

Current Status

Nitrogen Reduction from Baseline in 2003

All seventeen LACs submitted their third annual reports to the BOC in May 2004. Additional BMPs have been planned and implemented in the Neuse River basin in 2003. As a result, for the basin as a whole, the agricultural community has achieved a 42% N reduction compared to the overall baseline. Most Counties reported an increase in N reduction compared to what was reported last year. All LACs have achieved their nitrogen reduction goal established by the BOC. Carteret, Craven, Greene, Johnston, Jones, Orange, Pamlico, Person, Wake, and Wilson LACs reported their N loading reduced by over 40 percent compared to the baseline numbers. Table 1 lists each county baseline within the basin, its proposed reduction goal, and N reduction from baseline in 2002 and 2003.

Table 1. Summary of County Baseline and its N Reduction from Baseline in 2002 & 03

County	Baseline N Loss* in lbs.	Proposed Percent Reduction	Percent of N Reduction From Baseline in 2002	2003 N Loss* in lbs.	Percent of N Reduction From Baseline in 2003
Carteret	1,284,833	>30%	45.6%	687,383	46.5%
Craven	3,928,696	>30%	48.5%	1,619,357	58.8%
Durham	81,542	30%	33.9%	57,079	30.0%
Franklin	49,688	30%	32.5%	34,514	30.5%
Granville	60,057	21%	20.9%	36,264	39.6%
Greene	4,034,046	30%	37.7%	2,391,588	40.7%
Johnston	6,094,690	30%	42.3%	3,159,593	48.2%
Jones	2,736,562	>30%	37.7%	1,641,904	40.0%
Lenoir	3,994,989	>30%	35.2%	2,583,554	35.3%
Nash	872,259	30%	33.2%	558,983	35.9%
Orange	181,276	18%	40.6%	96,846	46.6%
Pamlico	2,043,961	>30%	37.1%	1,189,828	41.8%
Person	339,822	30%	30.0%	194,588	42.7%
Pitt	2,892,783	30%	22.1%	1,893,113	34.6%
Wake	557,881	30%	42.2%	308,121	44.8%
Wayne	7,792,391	30%	31.8%	5,358,550	31.2%
Wilson	1,939,073	>30%	41.7%	745,586	61.5%
Collectively for the entire Neuse River Basin	38,884,549		37.2%	22,556,851	42.0%

* 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.

Nitrogen loss reduction from agricultural land was accomplished through BMP installation, better management of fertilizer, and cropland attenuation. Staff estimates that these factors contributed in the following percent reduction:

BMP Installation	12%
Fertilization Management	14%
Cropping Shift	4%
Cropland converted to grass / tree	1%
Cropland lost to idle land	7%
Cropland lost to development	4%
TOTAL	42%

BMP Installation

More BMPs have been installed in 2003 due to the increase of financial and technical assistance provided in the 2002 Farm Bill and the additional assistance of the North Carolina Agriculture Cost Share Program (ACSP). It is estimated that over half of enrolled croplands received treatment from the installed BMPs. Table 2 indicates that all BMP installation targets, except for nutrient management, established in the local N reduction strategy, which was approved by the EMC in 1999, have been exceeded in 2003.

Table 2. Best Management Practices Installed in the Neuse River Basin from 1996 to 2003

BMPs	Goal (ac)	96-02 (ac)	96-03 (ac)	Practices Installed in 2003	% related to goal
20' vegetated buffer	1,100	13,301	13,992	686	1300%
30' vegetated buffer	700	7,402	7,629	227	1100%
20' forested buffer	270	30,748	30,748	0	13000%
50' riparian buffer	2,000	18,227	19,285	1,058	1000%
Scavenger crop	5,200	36,651	37,074	423	700%
Nutrient management	280,000	238,171	255,595	17,424	90%
Water control Structure	42,000	52,183	55,182	2,999	130%

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 2003. Units of BMPs reported in the table are the actual BMP footprint acreage, not acreage treated by these BMPs. More than 480,000 tons of soil has been saved from installation of these BMPs.

Table 3. Additional BMPs Installed in the Neuse River Basin from 1996 to 2003

BMPs	1996-2002	1996-2003	Annual Changes
Conservation Tillage	54,445 acres	64,486 acres	10,279 acres
Conservation Tillage 3 Yr.	5,035 acres	6,033 acres	1,587 acres
Long Term No-Till	8,564 acres	12,209 acres	4,202 acres
Terraces	6,306 ft	12,921 ft	4,070 ft
Diversion	124,380 ft	130,241 ft	8,711 ft
Sod Based Rotation	1,550 acres	2,038 acres	70
Strip Cropping	44 acres	44 acres	0
Field Border	344 footprint acres	366 footprint acres	22 footprint acres
Grassed Waterway	312 footprint acres	1,369 footprint acres	1,064 footprint acres
Livestock Exclusion	15,489 ft	29,370 ft	13,881 ft
Streambank Stabilization	100 ft	100 ft	0
Filter Strip	54 foot print acres	54 foot print acres	0

* Information obtained from NC Agricultural Cost Share Reports 12/1995 through 12/2003. This does not include Best Management Practices that were voluntarily installed through various federal programs or without government assistance.

Fertilizer Management

With greater nutrient management and increased costs of fertilizer, farmers in the Neuse River Basin have reduced their fertilizer application since 1996. Table 4 indicates that fertilization rates for most major crops in the basin have been reduced from baseline period. For major crops, farmers in the basin have used slightly less fertilizer in 2003 than what was reported in 2002.

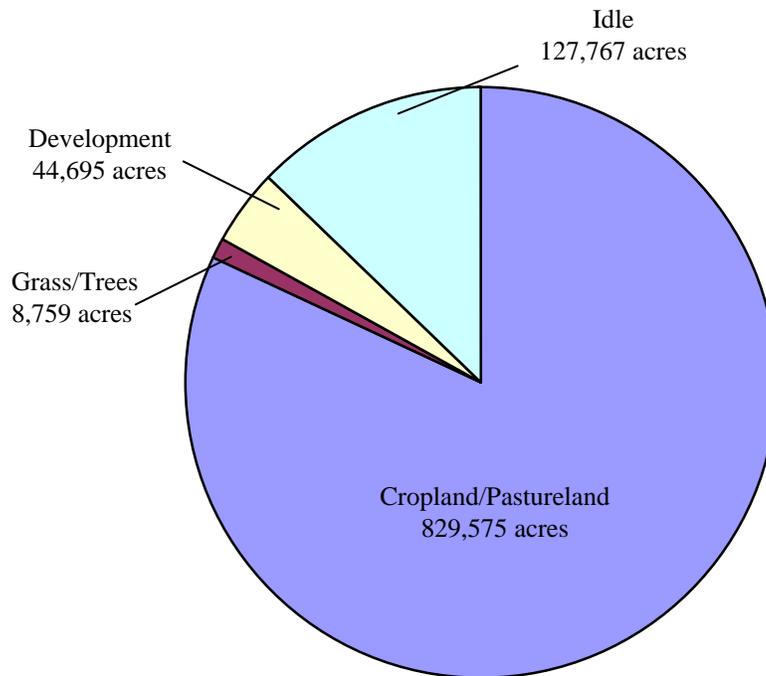
Table 4. Average Fertilization Rate for Major Crops in the Neuse River Basin in 2003 and 2002 Compared to the Baseline Period (1991-1995)

Crop	Baseline Average Fertilization Rate (lbs./acre)	2002 Average Fertilization Rate (lbs./acre)	2003 Average Fertilization Rate (lbs./acre)
Corn for Grain	160	136	135
Corn for Silage	127	138	138
Soybeans	19	5	4
Soybeans – Waste	106	117	119
Cotton	84	77	74
Wheat	112	107	105
Tobacco	87	79	79

Cropland Loss and Cropping Shift

Total acres of cropland in the Neuse River basin fluctuate every year. Each year, some cropland is permanently lost to development or converted to grass or forest land. 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 1208 more acres of the cropland in the basin have been lost to development in 2003 (Figure 1). Cropland loss has contributed significant N reductions for Johnston, Wake, and Wayne Counties. However, some croplands are also temporarily taken out of the agricultural production each year. Those changes are reported in the idle land category.

Figure 1. Current (2003) 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

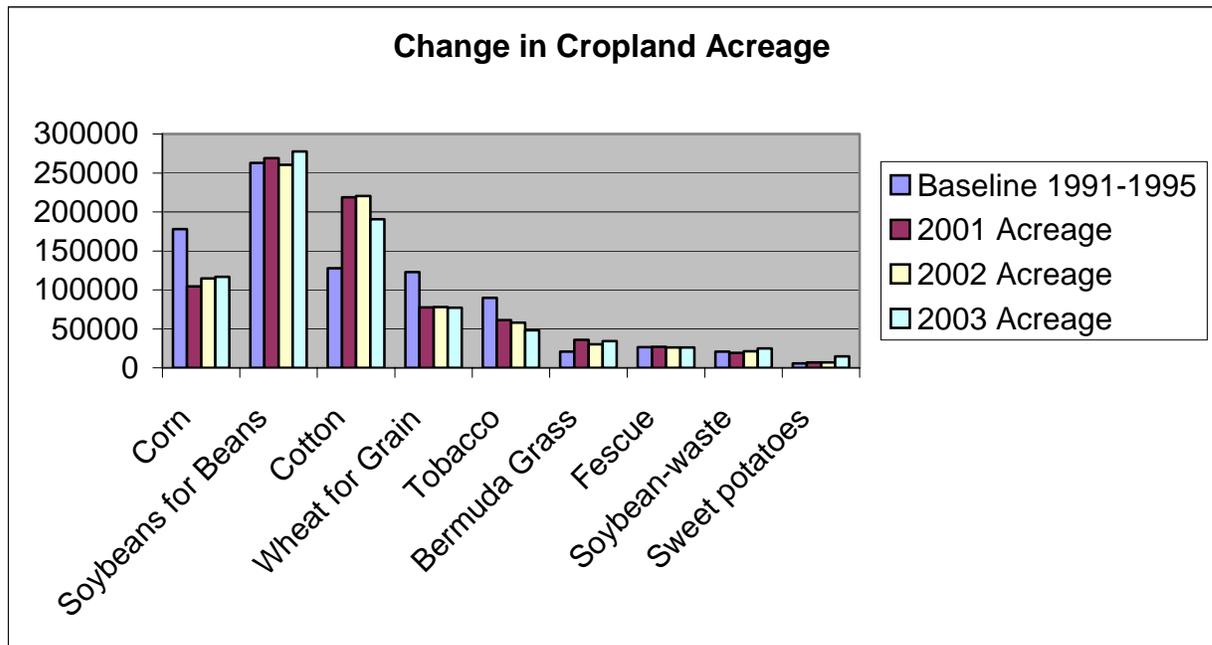
Figure 2 shows changes of crop pattern in the Neuse River basin for the baseline period (1991-1995), 2001, 2002, and 2003. It showed that there were more corn and soybean acreages in 2003 comparing to 2002, and there was less cotton acreage on 2003 comparing to 2002. This is due to a possible shift from cotton to corn production. This change is significant because corn has a considerably higher nitrogen requirement than does cotton. This change in crop production brought about an increase in nitrogen use on agricultural lands in 2003.

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 mitigated the effect of a shift back to corn at certain level. Another important factor is that more BMPs have been installed in 2003 due to the increase of financial and technical assistance provided in the 2002 Farm Bill. As a result, the agricultural community in the Neuse River basin still reported an increase in N loading reduction in 2003 compared to 2002.

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 2. Changes in Crop Pattern in the Neuse River Basin among Baseline Period (1991-1995), 2001, 2002, and 2003



Monitoring

Several water quality monitoring programs were initiated since the adaptation and implementation of the Neuse NSW management strategy. One of those programs is the RiverNet Monitoring Program. The program was funded by the N.C. General Assembly through DENR in 2000. Dr. Bill Shower with N.C. State University (NCSU) is the lead researcher for the program. A continuous monitoring system was established in the lower portion of the basin, near the Neuse estuary (Seven Spring, Grifton & Fort Barnwell). Nitrate nitrogen concentration and other water quality properties (including water temperature, pH, turbidity, and oxygen) are monitored. A 20% nitrogen reduction was observed in the Neuse River basin (near the Neuse estuary) after more than three years of continuing monitoring (2003 RiverNet Report). Dr. Shower credited the implementation of the Neuse NSW management strategy as one of the main reasons for the N loading reduction.

Despite significant N reduction progress that was observed near the Neuse estuary, the 30 percent N reduction target established by the General Assembly has not been reached yet. One of the reasons is that the implementation of the Neuse NSW management strategy is still a “work in progress”. A large number of BMPs were installed in agricultural lands since the adoption and implementation of the management strategy. However, the progress of instream N reduction may take years to be shown due to the nature of nonpoint source pollution and the function of installed BMPs. Staffs with the Division of Soil and Water Conservation (DSWC) and Division of Water Quality (DWQ) are

currently working with researchers from NCSU to initiate a farmer survey to examine some of non-structure BMPs, such as nutrient management and cover crop practices.

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 to implement additional BMPs to further reduce N loss.