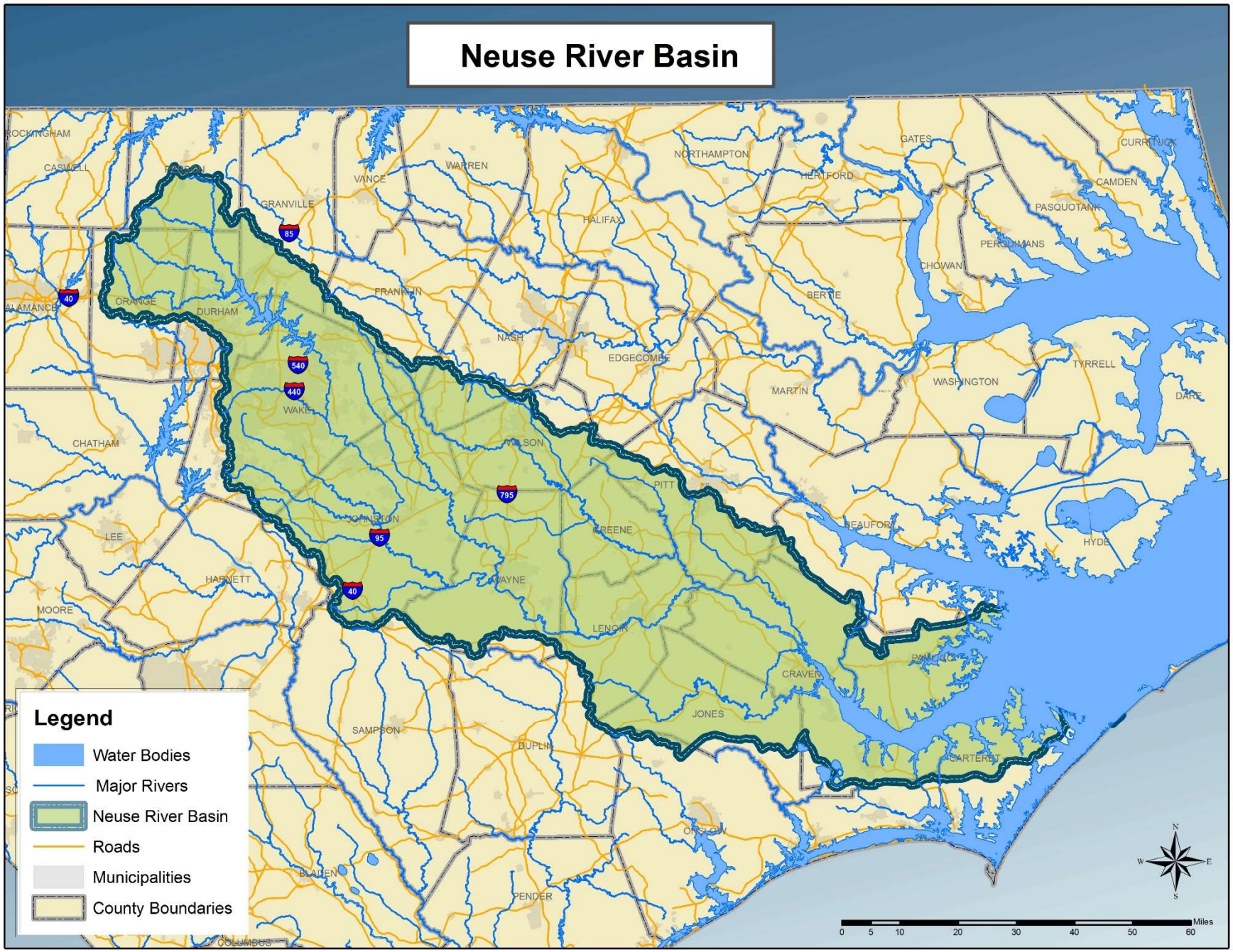
NCDA&CS

2022 Annual Progress Report (Crop Year 2021) on the Neuse Agricultural Rule (15 A NCAC 2B.0712)

A Report to the Division of Water Resources from the Neuse Basin Oversight Committee: Crop Year 2021

Date approved by Neuse Basin Oversight Committee: 09/23/2022
Date submitted to NC Division of Water Resources: 09/23/2022


Neuse River Basin
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CASWELL
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ORANGE
DURHAM
GRANVILLE
VANCE
WARREN
FRANKLIN
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WAKE
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LEE
HARNETT
MOORE
JOHNSTON
WILSON
EDGECOMBE
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HALIFAX
GATES
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Summary

The Neuse Basin Oversight Committee (BOC) received and approved crop year (CY[1]) 2021 annual reports estimating the progress from the seventeen Local Advisory Committees (LACs) operating under the Neuse Agriculture rule as part of the Neuse Basin Nutrient Management Strategy. This report demonstrates agriculture's ongoing collective compliance with the Neuse Agriculture Rule and estimates producer progress in decreasing nutrients. In CY2021, agriculture collectively achieved an estimated 50% reduction in nitrogen loss from agricultural lands compared to the 1991-1995 baseline, continuing to exceed the rule-mandated 30% reduction. All seventeen LACs exceeded the 30% reduction goal established by the BOC. Significant reasons contributing to nitrogen reduction levels seen in CY2021 in comparison to baseline include reduction in reported crops and cropping shifts to crops with lower nitrogen demands and application rates.

Rule Requirements and Compliance History

Neuse Nutrient Sensitive Waters (NSW) Strategy

The Environmental Management Commission (EMC) adopted the Neuse nutrient strategy in December, 1997. The NSW strategy goal was to reduce the average annual load of nitrogen delivered to the Neuse River Estuary by 2003 from both point and non-point source pollution by a minimum of 30% of the average annual load from the baseline period (1991-1995). Mandatory nutrient controls were applied to address non-point source pollution in agriculture, urban stormwater, nutrient management, and riparian buffer protection. The overall 30% nitrogen loading reduction target for the Neuse River Estuary has not yet been reached.

Effective December 1997, the rule provides for a collective strategy for farmers to meet the 30% nitrogen loss reductions within five years. A BOC and seventeen LACs were established to implement the Neuse Agriculture rule and to assist farmers with complying with the rule.

All seventeen Local Advisory Committees (LACs) met as required in 2022. LACs submitted their first annual report to the BOC in May 2002. That report estimated a collective 38% reduction in nitrogen loss with 12 of the 17 LACs exceeding 30% individually. In 2003, all LACs achieved their BOC recommended reduction goal. All counties are currently meeting their 30% nitrogen reduction goal for CY2021. Division of Soil and Water Conservation staff uses input from the LACs to calculate annual reductions using the Nitrogen Loss Estimation Worksheet (NLEW). Adjustments are made to reflect the most up-to-date scientific research. These revisions lead to adjustments in both individual LAC and basinwide nitrogen loss reduction rates.

[1] The 2021 crop year began October 1st, 2020 and ended September 30th, 2021.

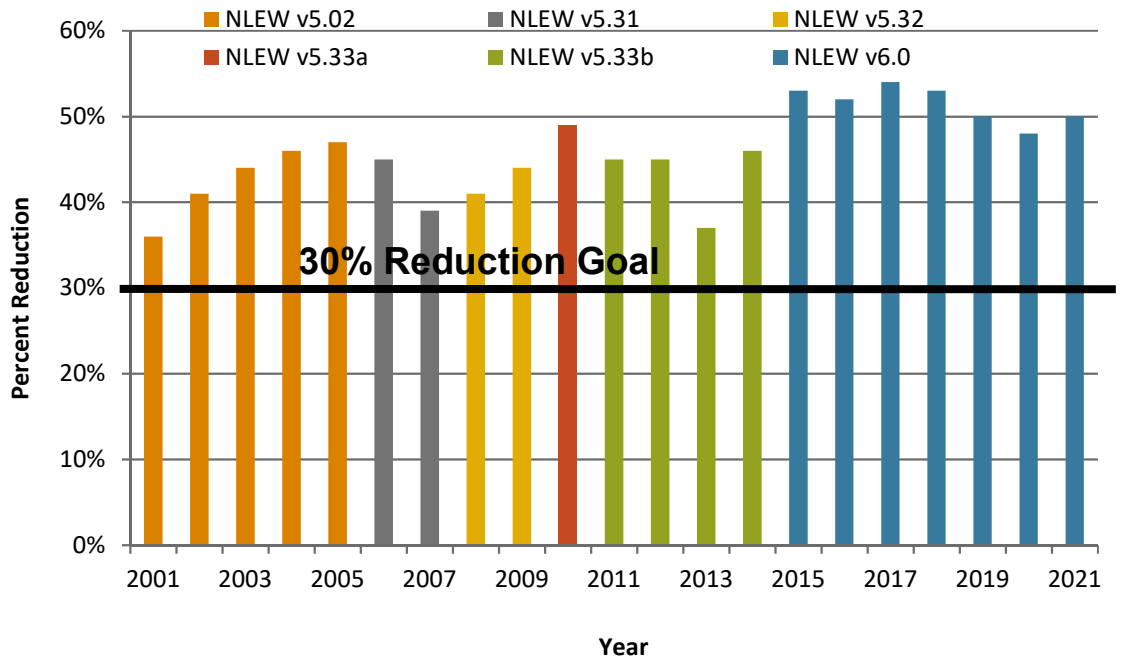
Scope of Report and Methodology

The estimates provided in this report represent whole-county scale calculations of nitrogen loss from cropland agriculture adjusted for acreage in the basin. These estimates were made by NC Division of Soil and Water Conservation (DSWC) staff using the 'aggregate' version of the Nitrogen Loss Estimation Worksheet, or NLEW, an accounting tool developed to meet the specifications of the Neuse Rule and approved by the EMC. The NLEW development team included interagency technical representatives of the NC Division of Water Resources (DWR), NC DSWC and USDA-Natural Resources Conservation Service (NRCS) and was led by NC State University Soil Science Department faculty. The NLEW captures application of both inorganic and animal waste sources of fertilizer to cropland. It does not capture the effects of nitrogen applied to pastureland and NLEW is an "edge-of-management unit" accounting tool; it estimates changes in nitrogen loss from croplands, but does not estimate changes in nitrogen loading to surface waters.

Annual Estimates of Nitrogen Loss and the Effect of NLEW Refinements

The NLEW software is periodically revised to incorporate new knowledge gained through research and improvements to data. These changes have incorporated the best available data, but changes to NLEW must be considered when comparing nitrogen loss reduction in different versions of NLEW. Further updates in soil management units are expected as NRCS produces updated electronic soils data. The small changes in soil management units are unlikely to produce significant effects on estimates of nitrogen loss reductions. Figure 1 represents the annual percent nitrogen loss reduction from the baseline for 2001 to 2021.

Figure 1. Collective Nitrogen Loss Reduction Percent 2001 to 2021 Based on NLEW, Neuse River Basin.



The first NLEW reports were run in 2001, and agriculture has continued to exceed its collective 30% nitrogen reduction goal since that time. The first NLEW revision (v5.31) marked a significant decrease in the nitrogen reduction efficiencies of buffers based on the best available research information, so baseline and CY2005 were re-calculated, and soil management units were revised. The second (v5.32) and third (v5.33a) revisions were minor updates of soil mapping units. In April of 2011 the NLEW Committee established further reductions (v5.33b) in nitrogen removal efficiencies for buffers based on additional research. In 2016 NLEW software was updated (v6.0) from outdated software and transferred to a web-based platform on NCDA&CS servers. Revised realistic yield and nitrogen use efficiency data from NCSU were incorporated, and some minor calculation errors were corrected for corn, sweet potatoes, and sweet corn. Table 1 lists the changes in buffer nitrogen reduction efficiencies over time.

Table 1. Changes in Buffer Width Options and Nitrogen Reduction Efficiencies in NLEW

Buffer Width	**NLEW v5.02 % N Reduction 2001-2005**	**NLEW v5.31, v5.32, v5.33a % N Reduction 2006-2010**	**NLEW v5.33b, v6.0 % N Reduction 2011-Current**
20’	40% (grass)* 75% (trees and shrubs)*	30%	20%
30'	65%	40%	25%
50'	85%	50%	30%
70'	85%	55%	30%
100'	85%	60%	35%

**NLEW v5.02 - the vegetation type (i.e. trees, shrubs, grass) within 20' and 50' buffers determined reduction values. Based on research results, this distinction was dropped from subsequent NLEW versions.*

Current Status

Nitrogen Reduction from Baseline for CY2021

All seventeen LACs submitted their twentieth annual reports to the BOC for approval in August 2022. For the entire basin, in CY2021 agriculture achieved a 50% reduction in nitrogen loss compared to the 1991-1995 baseline. This percentage is 2% higher than the basinwide reduction reported for CY2020. Table 2 lists each county's baseline, CY2020 and CY2021 nitrogen (lbs/yr) loss values, and nitrogen loss percent reductions from the baseline in CY2020 and CY2021.

*Table 2. Estimated Reductions in Agricultural Nitrogen Loss from Baseline (1991-1995) for CY2020 and CY2021, Neuse River Basin**

County	Baseline N Loss (lb)	CY2020 N Loss (lb)*	CY2020 N Reduction (%)	CY2021 N Loss (lb)*	CY2021 N Reduction (%)
Carteret	1,292,586	966,672	25%	615,169	52%
Craven	4,153,187	1,980,469	52%	2,107,272	49%
Durham	220,309	36,470	83%	46,365	79%
Franklin	219,209	46,455	79%	49,691	77%
Granville	193,197	46,313	76%	55,634	71%
Greene	4,439,036	2,466,268	44%	2,474,043	44%
Johnston	6,728,638	3,489,180	48%	3,362,729	50%
Jones	3,283,906	1,785,255	46%	1,860,087	43%
Lenoir	4,455,752	2,909,603	35%	2,828,680	37%
Nash	1,042,072	395,104	62%	481,564	54%
Orange	787,040	85,586	89%	100,155	87%
Pamlico	2,023,294	1,800,264	11%	1,380,846	32%
Person	616,669	103,721	83%	109,283	82%
Pitt	3,399,455	1,982,978	42%	1,835,023	46%
Wake	1,434,602	310,103	78%	263,429	82%
Wayne	8,297,408	3,594,017	57%	3,365,378	59%
Wilson	3,273,647	1,744,588	47%	1,863,388	43%
Total	45,860,007	23,743,048	48%	22,798,735	50%

** Nitrogen loss values are for comparative purposes. They represent nitrogen that was applied to agricultural lands in the basin and neither used by crops nor intercepted by BMPs in a Soil Management Unit, based on NLEW calculations. This is not an in-stream loading value.*

Nitrogen loss reductions in CY2021 were achieved through a combination of fertilization rate decreases, cropping shifts, BMP implementation, and cropland acreage fluctuation. Some of this cropping shift is due to the need for regular rotations on agricultural operations. In order to minimize the threat of disease the double-crop planting of wheat and soybeans is usually

followed by a corn crop thus fluctuations within this rotation are to be expected from year to year even in the face of similar weather conditions. In CY2021, overall corn planting decreased by 6,336 acres from CY2020 totals. Soybean acres decreased by 2,124 acres from CY2020 totals but remain high, approximately 20,900 acres above reported soybean acreage in CY2019. Moderate increases were seen in wheat, fescue, and bermuda acreage in CY2021. Tobacco acreage increased by 5,238 acres from CY2020 totals. Reported cotton acreage fell in CY2021, continuing a trend also seen in CY2020. Fluctuating weather conditions markedly impact annual cropping shifts by affecting farmers' ability to prepare fields for harvest and planting as well as overall crop health and yield. Although the 2020-2021 La Niña winter brought wetter than normal conditions to the North Carolina coastal plain from December 2020 to February 2021[2], overall 2021 concluded as the driest year seen in the state since 2012.[3] Seasonal oscillations in 2021 were extreme and resulted in winter and summer being particularly wet and spring and fall being particularly dry.[3] Factors that influence agricultural nitrogen reductions, calculated from NLEW outputs, are shown in Table 3.

*Table 3. Factors That Influence Nitrogen Reduction on Agricultural Lands (by percentage), Neuse River Basin Since Baseline**

Practice	CY2018	CY2019	CY2020	CY2021
BMP implementation	9%	6%	5%	5%
Fertilization management	9%	13%	11%	12%
Cropping shift	19%	15%	15%	16%
Cropland converted to grass/trees	2%	2%	2%	2%
Cropland lost to idle land	6%	6%	7%	7%
Cropland lost to development**	8%	8%	8%	8%
Total	53%	50%	48%	50%

**Percentages are based on a total of the reduction from baseline, not a year-to-year comparison.*
***Acreage of cropland lost to development has not been tracked since CY2017.*

[2] Davis, C. 2021. Winter Recap 2020-21: La Niña Lays Low in a Persistent Wet Winter. Prepared by North Carolina State Climate Office for the Climate Blog, Climate Summary. https://climate.ncsu.edu/blog/2021/03/winter-recap-2020-21-la-nina-lays-low-in-a-persistent-wet-winter/

[3] Davis C, and K. Dello. 2022. From Deluges to Droughts in 2021: the Weather Year in Review. Prepared by North Carolina State Climate Office for the Climate Blog, Climate Summary. https://climate.ncsu.edu/blog/2022/01/from-deluges-to-droughts-in-2021-the-weather-year-in-review/

BMP Implementation

BMP implementation is one of the factors that influence nitrogen reduction on agricultural land. In low elevation coastal counties near and around the Neuse estuary the predominant BMPs implemented by agricultural producers are water control structures. These practices are normally implemented to control salinity and soil moisture, but they have an additional benefit of allowing for increased denitrification. Many water control structures in use in the Neuse Basin were implemented over a decade ago and are no longer under active cost-share contracts with operation and maintenance agreements. Every effort is made to ensure that BMPs reported continue to function as designed and are maintained appropriately. Verification of functionality and appropriate management requires site visits to individual farm owners who may or may not have this BMP under an active cost-share contract. Coastal counties have reported that despite contract expirations for practices installed more than 10 years ago, the water control structures which have been checked and which are no longer covered by an operation and maintenance agreement are still being actively managed by producers.

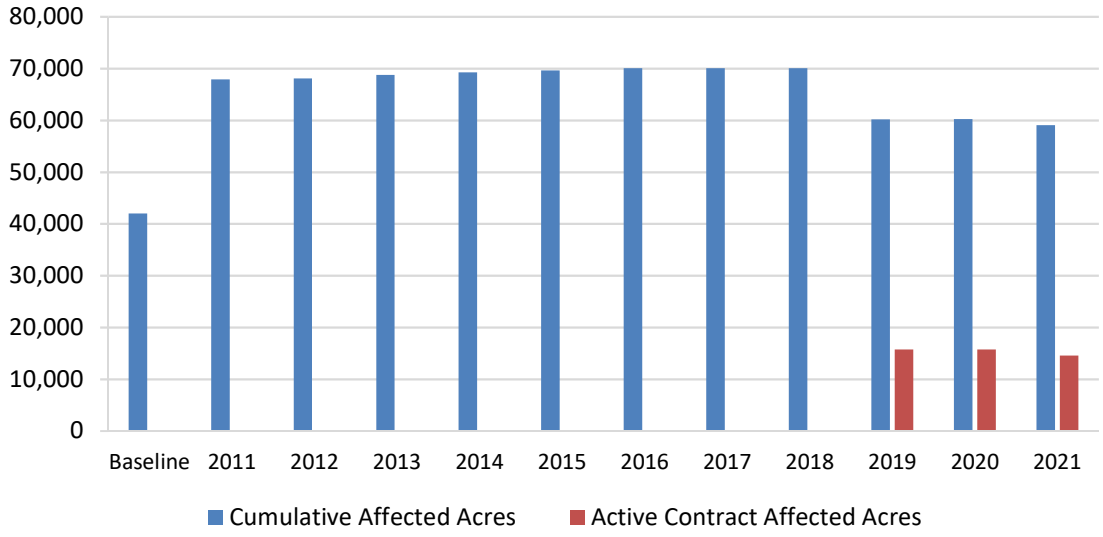
In this report, all acres affected by water control structures reported in CY2011 were manually removed from each county's total to ensure that all affected acres currently being reported are for active contracts only with operation and maintenance agreements. Carteret County is an exception. From CY2015 and on, Carteret has only reported crop acreage for Open Grounds Farm since this facility grows the vast majority, if not all, reportable crops in the portion of the county lying within the Neuse River Basin. In CY2019 Carteret Soil and Water Conservation District staff confirmed with the Open Grounds farm manager that approximately 60% of their overall acres are under actively maintained controlled drainage via water control structures. As a result, total water control structure affected acres for Carteret are annually adjusted to 60% of Open Grounds Farm reported crop acreage. All other water control structure affected acres previously recorded in Carteret County were removed from the cumulative and active contract totals since most of those properties are no longer under active cultivation.

It should be noted that the water control structure reporting change from cumulative affected acres to active contract affected acres began in CY2019. Members of each LAC in coastal counties were notified in Fall 2019 that inactive contract acres, starting in CY2019 and moving forward, would no longer be included in BMP totals until older structures were inspected and determined to be appropriately managed and operational, or until the producer signed a new cost share contract. Several Districts indicated an interest and willingness in re-engaging with cooperators that have older structures. Staff have been working diligently in 2021 and 2022 to set up a field inspection workflow to complete necessary function and management checks for re-adding legacy structures into county BMP totals for nitrogen reduction credit.

The removal of inactive contract BMP acres from annual reports has resulted in a smaller nitrogen loss reduction in CY2021 in coastal counties (primarily Carteret, Craven, Jones, Lenoir, Pamlico, Pitt, and Wayne). It is important to note that this abrupt reduction, first seen in the CY2019 report, is primarily based on a methodological change and not on farmer behavior or BMP functionality. The BOC still expects that most acres where controlled drainage practices were implemented are still actively being managed, but in order to ensure ongoing engagement with cooperators the BOC has decided to adjust reporting guidelines. Due to ever-present

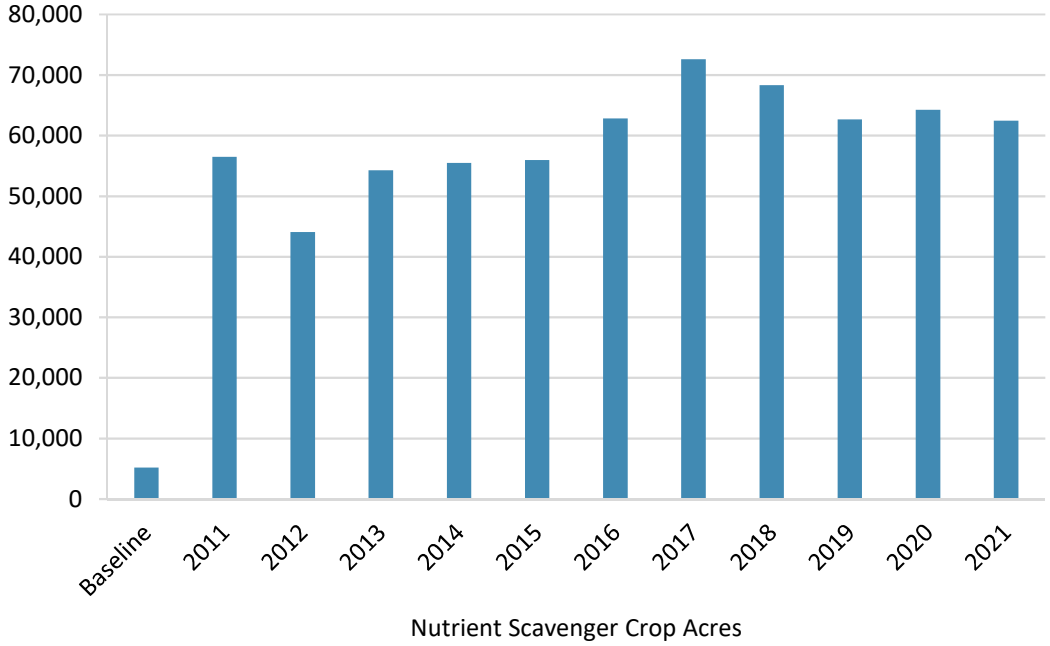
demand, increased prioritization and implementation of water control structure contracts is still evident in many of these counties, and the BOC expects this trend to continue as precipitation patterns change.

Figure 2. Acres Affected by Water Control Structures for Baseline (1991-1995) and Installed from CY2011 to CY2021, Neuse River Basin



The Division of Soil and Water Conservation, Soil and Water Conservation Districts and Natural Resources Conservation Service staff continue to make refinements to the NLEW accounting process as opportunities arise. LAC members estimate annual unfertilized cover crop acres based on crop rotations, producer cropping history, state and federal incentive programs, weather patterns, and seed prices. Buffer and water control structure BMP data is collected from state and federal cost share program active contracts, and in some cases from local partners with knowledge on BMP implementation that occurred without state or federal cost share funding support. While there is some opportunity for variability in the data reported, LACs are including data that is the best information currently available. As additional sound data sources become available, the LACs and the BOC will review these sources and update reporting methodology if warranted. As illustrated in Figure 3, CY2021 BMP implementation yielded a net decrease of 1,813 unfertilized cover crop acres.

Figure 3. Unfertilized Cover Crop Acres Planted Annually on Agricultural Lands for Baseline (1991-1995) and Installed from CY2011 through CY2021, Neuse River Basin



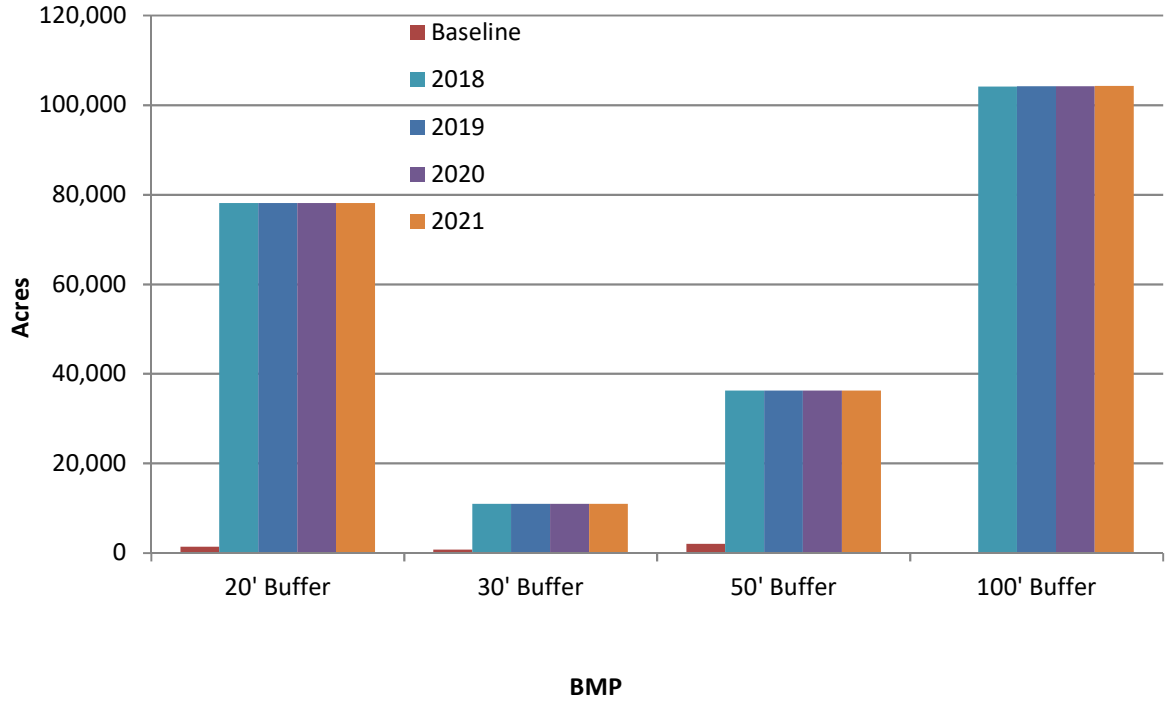
An accurate reassessment of active agricultural land and remaining buffer systems, through GIS analysis or other tools, is needed due to the rate at which urbanizing counties have lost agricultural land. Such assessments will depend on data availability from state and federal agencies. The BOC is considering the feasibility of such assessments for future reporting.

Based on the comparison of total cropland acres and state or federal cost share program BMPs, it is estimated that well over a third of the Neuse River Basin's cropland receives treatment from reported nitrogen-reducing BMPs.[4] This does not include farmer-installed BMPs that are not funded by cost share programs except in some cases where District staff is made aware of work that has been completed and shared that information. Additionally, the estimated acres do not take into account the entire drainage area treated by buffers in the piedmont, which is generally 5 to 10 times higher than the actual acres of the buffer shown in Figure 4.[5] Overall, the total acres of implementation of BMPs have increased since the baseline, as illustrated in Figures 2, 3 and 4. The BMP installation goals were set by the local nitrogen reduction strategy, which was approved by the EMC in 1999. Agriculture exceeded all installation goals in CY2008. As shown in Figure 4, two additional acres of 20-foot buffers, three additional acres of 50-foot buffers, and 93 additional acres of 100-foot buffers were implemented in CY2021.

[4] Osmond, D.L., K. Neas. 2011. Delineating Agriculture in the Neuse River Basin. Prepared for NC Department of Environment and Natural Resources (NCDENR), Division of Water Quality. http://content.ces.ncsu.edu/delineating-agriculture-in-the-neuse-river-basin

[5] Bruton, Jeffrey Griffin. 2004. Headwater Catchments: Estimating Surface Drainage Extent Across North Carolina and Correlations Between Landuse, Near Stream, and Water Quality Indicators in the Piedmont Physiographic Region. Ph.D. Dissertation. Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC 27606. http://www.lib.ncsu.edu/theses/available/etd-03282004-174056/

*Figure 4. Buffer Acres Present on Agricultural Lands for Baseline (1991) and Installed from CY2018 through CY2021, Neuse River Basin**



**The acres of buffers listed represent actual acres. Acres affected by the buffer could be 5 to 10 times larger in the piedmont than the acreage shown above.* [6]

[6] Bruton, Headwater Catchments: Estimating Surface Drainage Extent Across North Carolina and Correlations Between Landuse, Near Stream, and Water Quality Indicators in the Piedmont Physiographic Region. Ph.D. Dissertation. Department of Forestry and Environmental Resources, North Carolina State University, Raleigh, NC 27606. http://www.lib.ncsu.edu/theses/available/etd-03282004-174056/

Additional Nutrient BMPs

Not all types of nutrient-reducing BMPs are tracked by NLEW. These include livestock-related nitrogen and phosphorus reducing BMPs, BMPs that reduce soil and phosphorus loss, and BMPs that do not have enough scientific research to support a nitrogen reduction benefit credit. The BOC believes it is worthwhile to recognize these practices. Table 4 identifies BMPs not accounted for in NLEW and tracks their implementation in the basin since CY1996. Table 5 indicates the total number of BMPs not accounted for in NLEW, which are under active contract approximated by a 10-year rolling window (CY2011 to CY2021).

Since baseline, increased implementation numbers are evident across all BMP types. Most of the additional nutrient-reducing BMPs (which are listed in Tables 4 and 5) experienced implementation increases in CY2021. Some of these BMPs will yield reductions in nitrogen loss that are not reflected in the NLEW accounting in this report but will benefit the estuary.

*Table 4. Nutrient-Reducing Best Management Practices Not Accounted for in NLEW, CY1996 to CY2021, Neuse River Basin**

BMP	Units	1996-2019	2020	2021
Diversion	Feet	183,017	185,317	186,847
Fencing (USDA programs)	Feet	239,587	239,587	243,131
Field Border	Acres	5,955	5,959	5,964
Grassed Waterway	Acres	2,517	2,531	2,540
Livestock Exclusion	Feet	151,648	153,795	154,299
Precision Agriculture	Acres	4,672	5,326	5,326
Sod Based Rotation	Acres	111,304	122,619	123,782
Tillage Management	Acres	62,478	63,634	64,214
Terraces	Feet	77,633	77,633	77,633

** Cumulative data quantified by adding BMPs implemented with State and Federal cost share program funding each Crop Year to cumulative totals reported the previous Crop Year. Additional BMPs may exist in the basin as practices may be installed by farmers without cost share assistance.*

*Table 5. Nutrient-Reducing Best Management Practices installed from CY2011 to CY2021, Not Accounted for in NLEW**

BMP	Units	BMPs Installed (CY2011 – CY2021)
Diversion	Feet	37,398
Fencing (USDA programs)	Feet	88,246
Field Border	Acres	2,627
Grassed Waterway	Acres	279
Livestock Exclusion	Feet	72,910
Precision Agriculture	Acres	5,326
Sod Based Rotation	Acres	63,667
Tillage Management	Acres	30,142
Terraces	Feet	27,663

** Values represent only active contracts in State and Federal cost share programs approximated by a 10-year rolling window. Additional BMPs may exist in the basin as producers may maintain practices after the life of a cost share contract. Practices installed by producers without cost share assistance are not included in BMP totals.*

Fertilization Management

Better nutrient management in the Neuse River has resulted in a reduction of fertilizer application rates from baseline levels. Despite annual fluctuations, fertilization rates for most major crops in the basin have been reduced from the baseline period.

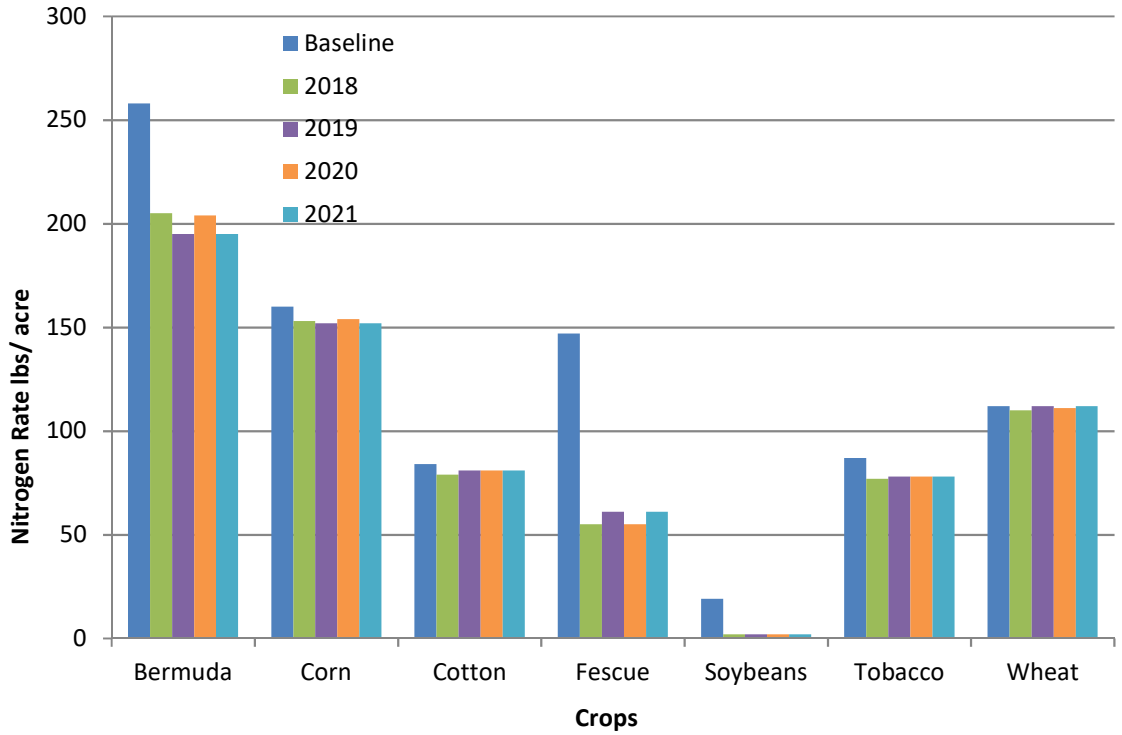
Factors Identified by LACs Contributing to Reduced Nitrogen Application Rates

- Economic decisions and fluctuating farm incomes
- Increased education and outreach on nutrient management
- Mandatory animal waste management plans
- The federal government tobacco quota buy-out reducing tobacco acreage
- Neuse and Tar-Pamlico Nutrient Strategies

Between CY2020 and CY2021 nitrogen application rates remained relatively stable (less than 5 lbs/acre fluctuations) for corn, cotton, tobacco, soybeans, and wheat. Application rates on fescue increased by 6 lbs/acre and application rates on bermuda decreased by 9 lbs/acre. Figure 5 below displays application rate changes from CY2018 to CY2021.

Over time there has been an economic incentive for producers to improve nitrogen management. Fertilizer rates and standard application practices are revisited annually by LACs using data from farmers, commercial applicators and state and federal agencies' professional estimates.

Figure 5. Average Annual Nitrogen Fertilization Rate (lbs/ac) for Agricultural Crops for the baseline (1991-1995) and 2018-2021, Neuse River Basin

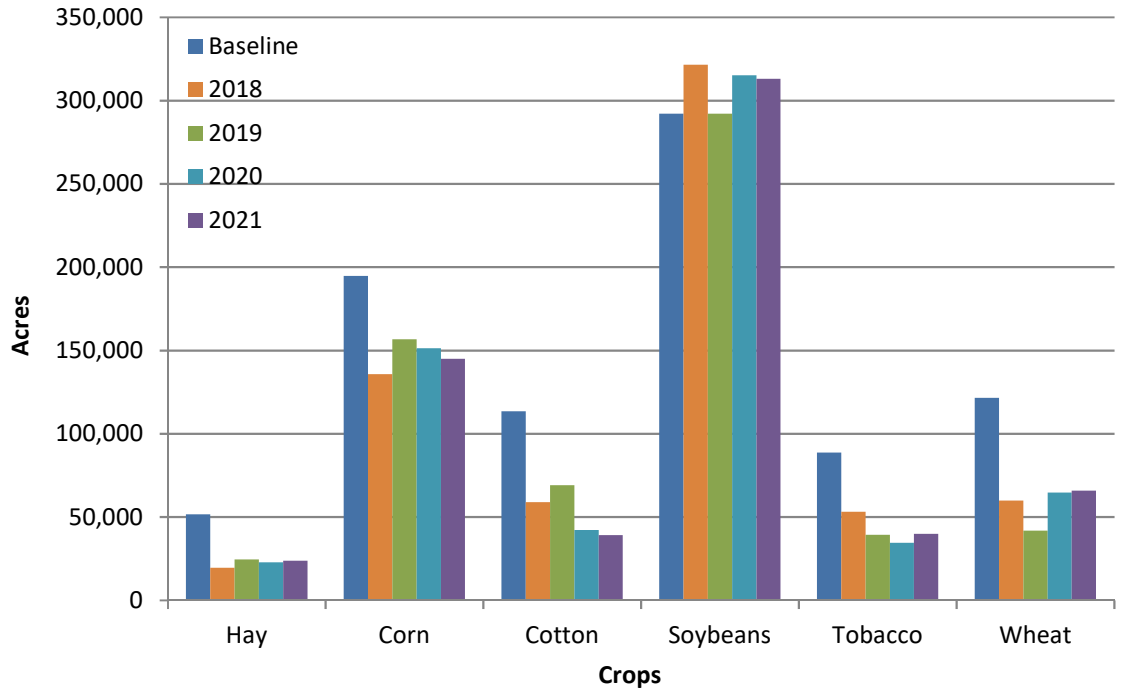


Cropping Shifts

LACs re-calculate cropland acreage annually by utilizing crop data reported by farmers to the Farm Service Agency. Because each crop type requires different amounts of nitrogen and utilizes applied nitrogen with a different efficiency rate, changes in the mix of crops grown can have significant impact on the cumulative yearly nitrogen loss reduction. The BOC anticipates that the basin will see additional crop shifts in the upcoming year based on changing commodity prices and weather patterns.

Corn requires higher nitrogen application rates than other crops. From CY2020 to CY2021, corn acres decreased by 6,336 acres. Cotton acreage decreased in CY2021 from CY2020 by 3,057 acres, a continuation of an acreage reduction trend discussed in last year's report. Soybean acres, which require no nitrogen input, decreased by 2,124 acres between CY2020 and CY2021 and wheat acres, many of which are planted in a double-crop rotation with soybeans, increased by 1,023 acres. Tobacco acres increased by 5,238 acres between CY2020 and CY2021. These cropping shifts caused a slight decrease in overall total nitrogen loss in CY2021 from CY2020 totals. A host of factors from individual choice to global markets determine crop selection. Figure 6 below displays acreage changes for major crops from CY2018 to CY2021.

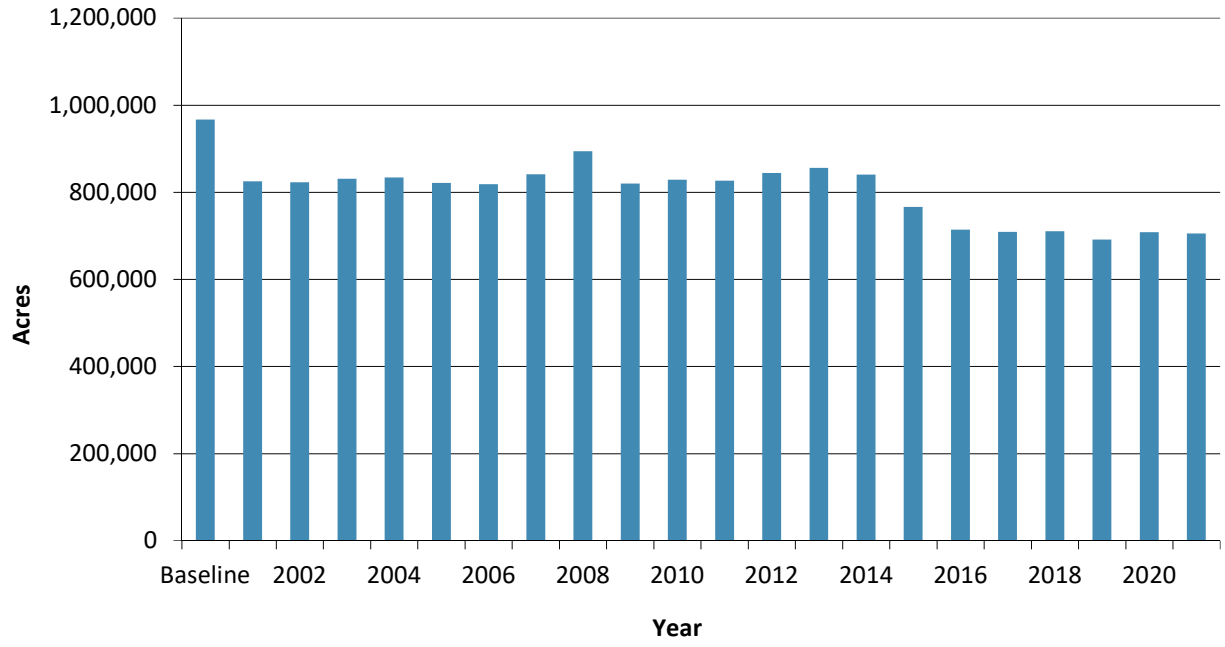
Figure 6. Acreage of Major Crops for the Baseline (1991-1995) and 2018-2021, Neuse River Basin



Land Use Change to Development, Idle Land and Cropland Conversion

The number of cropland acres fluctuates every year in the Neuse River Basin. Each year, some cropland is permanently lost to development or converted to grass or trees, while some cropland is temporarily taken out of production. Idle land represents agricultural land that is currently out of production but could be brought back into production at any time. Cropland conversion and cropland lost to development represents land taken out of agricultural production that is unlikely to be returned to production. It is estimated that more than 81,000 agricultural land acres in the Neuse basin have been lost to development since baseline, although this metric has not been updated since CY2017 due to incomplete data and reporting inconsistencies among local governments in the basin. Cropland conversion totals supported by state or federal cost-share funds are tracked and updated annually and currently 24,140 acres have been converted to grass or trees in the Neuse Basin since baseline (1991 – 1995). In CY2021 there were 73,913 idle acres reported and a total of 705,039 NLEW-accountable crop acres reported. These estimates come from the LAC members' best professional judgment, USDA-FSA records and county planning departments. Cropland acres have continued to decrease from the baseline period (see Figure 7).

Figure 7. Total NLEW Accounted Crop Acres in the Neuse River Basin, Baseline (1991-1995) and 2001-2021



Looking Forward

The Neuse BOC will continue to report on rule implementation, relying heavily on Soil and Water Conservation District staff to compile crop reports. The BOC continues to encourage counties to implement additional BMPs to further reduce nitrogen loss.

Because cropping shifts are susceptible to various pressures, the BOC is working with LACs in all counties to continue BMP implementation that provides lasting reduction in nitrogen loss in the basin.

The Neuse BOC will continue to monitor and evaluate crop trends. The current shift to and from crops with higher nitrogen requirements may continue to influence the yearly reduction.

Basin Oversight Committee recognizes the dynamic nature of agricultural business.

- Changes in world economies, energy or trade policies.
- Changes in government programs (i.e., commodity support or environmental regulations)
- Weather and climate (i.e., long periods of drought or rain)
- Scientific advances in agronomics (i.e., production of new types of crops or improvements in crop performance)
- Plant disease or pest problems (i.e., viruses or foreign pests)
- Urban encroachment (i.e., crop selection shifts as fields become smaller)
- Age of farmer (i.e, as retirement approaches farmers may move from row crops to cattle)

Funding

Ongoing agriculture rule reporting has incorporated data processing efficiencies and improvements since reporting began. NLEW upgrades have allowed LAC members to more actively participate in the compilation of data and analysis of nitrogen loss trends, and the Division of Soil and Water Conservation's digital contracting system has helped optimize BMP documentation efforts.

In CY2021, Soil and Water Conservation Districts spent over $620,000 through the Agriculture Cost Share Program in the Neuse River Basin using recurring state appropriated funds and non-recurring disaster relief funds for BMP implementation. The Natural Resources Conservation Service spent over $1,608,800 through the Environmental Quality Incentives Program in the counties located in the Neuse River Basin. These programs have all helped fund erosion and nutrient-reducing BMPs in the Neuse Basin.

Sufficient funding for technical assistance and BMP implementation incentivization is indispensable for continued achievement and maintenance of agricultural nitrogen reduction goals. Local demand for funding, to support experienced staff versed in conservation planning and cost-share program implementation in addition to supporting adoption of water-quality improving BMPs, far outstrips existing resources. In FY2021, Soil and Water Conservation Districts lying within the Neuse Basin requested over 2.5 times more Agriculture Cost Share Program funding beyond the fiscal year's allocation. Funding of state and federal cost share programs is essential for continued progress in reducing nitrogen losses from agricultural land.

Each year, 150 LAC members contribute to agriculture rule reporting to ensure accurate documentation of agricultural acres and fertilization rates. Farmers and agency staff with other responsibilities serve on the LACs in a voluntary capacity. Basin Oversight Committee members meet at least once per year to review and approve this annual progress report, which includes time spent outside of that annual meeting to review draft documents and approve methodology changes. Participation by so many members of the local agricultural community demonstrates a commitment toward achieving the nutrient strategy's long-term goals.

Funding to support agricultural data collection and annual reporting is critical. In the early years of Neuse Agriculture Rule reporting, grant funding supported technicians and basin coordinators at Soil and Water Conservation Districts to assist with BMP implementation and reporting requirements. At present there is no funding for full-time Neuse Basin coordinators or technicians. The Division of Soil and Water Conservation expends approximately $50,000 on agricultural reporting staff support annually, using funds received through an EPA 319(h) grant administered by the Department of Environmental Quality. Consequently, in addition to other duties, the NCDA&CS Division of Soil and Water Conservation Nonpoint Source Planning Coordinator was assigned the data collection, compilation and reporting duties for the Neuse Agriculture Rule and for all other basins and watersheds subject to existing Nutrient Sensitive Waters Strategies and Agriculture Rules. Responsibility for compilation and review of annual local progress reports for the Neuse Basin also now largely falls on LACs and Soil and Water Conservation District staff. Few currently serving LAC members were active during the stakeholder process for the Agriculture Rule, so some institutional knowledge about annual reporting requirements has been lost. As a result, training of new Soil and Water Conservation District staff and LAC members regarding rule requirements and reporting is necessary and ongoing.

Reductions in funding and staffing necessitates a more centralized approach for collection and verification of agricultural data included in annual progress reports. This evolving approach may involve developing additional GIS analysis tools and streamlining FSA acreage documentation. New tools will be vetted by the BOC and may be incorporated into the agriculture rule accounting methodology. As methods change, LACs will be trained to handle the changing workloads to the best of their ability. Because most District staff have neither the time nor financial resources to synthesize county level data, centralized collection approaches will come at the expense of local knowledge. Annual agricultural reporting is required by the rules; therefore, continued funding for the Division's only remaining nutrient coordinator position is essential for compliance.

Previously, funding was available for research on conservation practice effectiveness, realistic yields, and nitrogen use efficiencies. Due to eligibility changes and other funding constraints, it is unlikely that new data will be developed. Prior funding sources for such research, which provided much of the scientific information on which NLEW was based, are no longer available. Should new funding be made available, additional North Carolina-specific research information should be incorporated into future NLEW updates.

Conclusion

Significant progress has been made in agricultural nitrogen loss reduction, and the agricultural community in the Neuse Basin consistently reaches its 30% reduction goal. However, the measurable effects of management changes and conservation practice implementation on overall in-stream nitrogen reduction may take years to develop due to the nature of non-point source pollution. Nitrogen reduction values presented in this annual summary of agricultural reductions reflect “edge-of-management unit” calculations that contribute to achieving the overall 30% nitrogen loss reduction goal. Significant quantities of agricultural BMPs have been installed since the adoption and implementation of the Neuse Nutrient Management Strategy, and agriculture continues to fulfill its obligations toward achieving the collective goal of a 30% reduction of nitrogen delivered to the Neuse estuary.