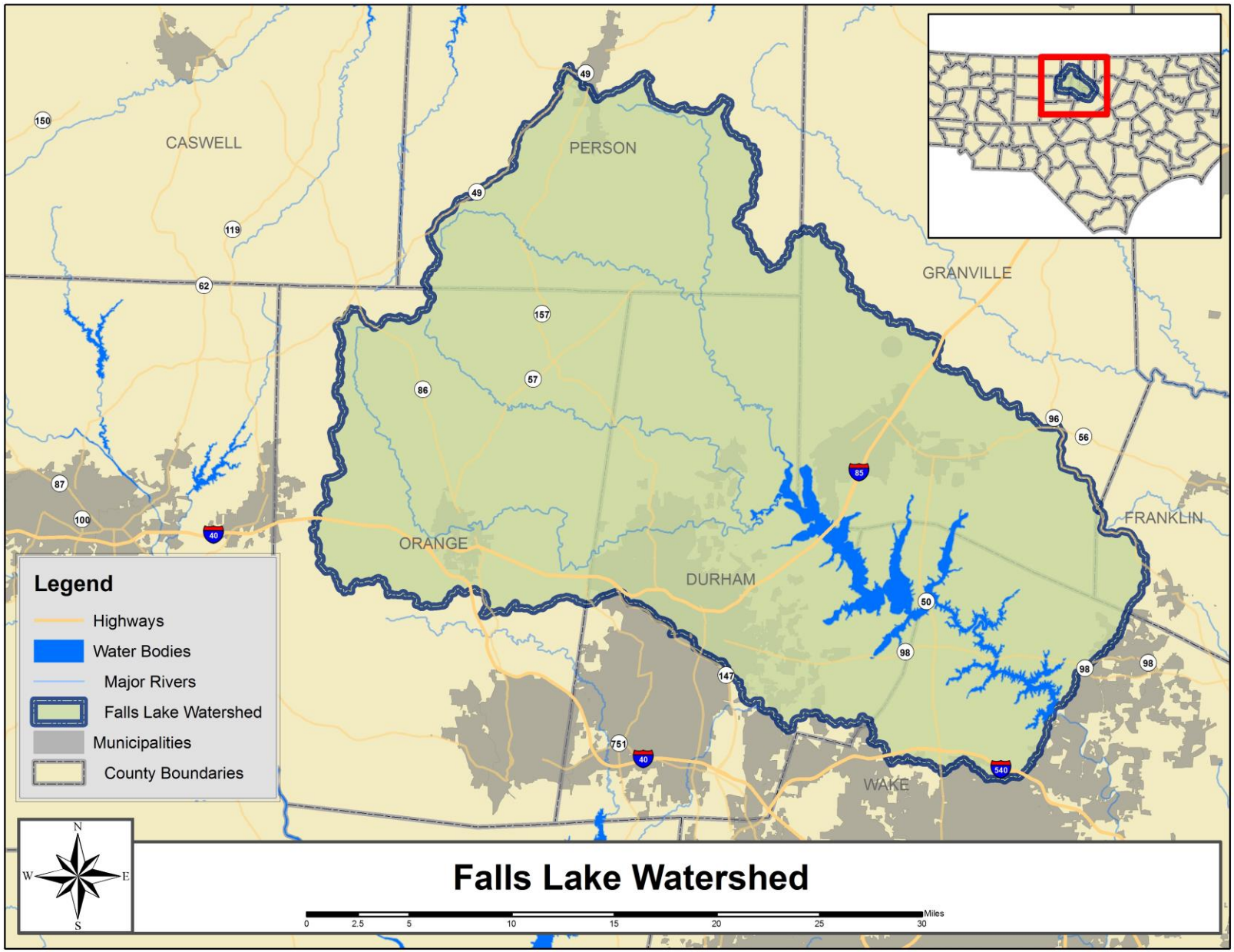
NCDA&CS

2017 Annual Progress Report (Crop Year 2016) on Agricultural Operations' Stage 1 Reductions for the Falls Lake Agriculture Rule (15A NCAC 02B .0280)

A Report to the Division of Water Resources from the Falls Lake Watershed Oversight Committee: Crop Year 2016


CASWELL
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Summary

This report provides the annual progress report of collective progress made by the agricultural community to reduce nutrient losses toward compliance with Stage 1 of the Falls Lake Agriculture rule. For this report, the Falls Lake Watershed Oversight Committee (WOC) oversaw the application of accounting methods approved by the Environmental Management Commission's Water Quality Committee in March 2012 to estimate changes in nitrogen loss and phosphorus loss trends in the Falls Lake Watershed. This report is for the period between the strategy baseline (2006) and the most recent crop year (CY)[1] for which data was available, 2016. The Falls Lake WOC received and approved crop year CY2016 annual reports from six counties as part of the Falls Lake Agriculture rule, which is part of the Falls Reservoir Water Supply Nutrient Strategy. To produce this report, Division of Soil and Water Conservation staff received, processed and compiled baseline and current-year reports from agricultural staff in six counties, and the WOC compiled the information and prepared this report. Agriculture has been successfully decreasing nutrient losses in the Falls Lake watershed. In CY2016, agriculture collectively exceeded its 20% Stage I nitrogen reduction goal for cropland, with a 75% reduction compared to the 2006 baseline. All six counties exceeded the mandated 20% reduction goal this year.

Falls Lake Watershed Oversight Committee Composition, Falls Agriculture Rule:

1. NC Division of Soil & Water Conservation
2. USDA-NRCS
3. NCDA&CS
4. NC Cooperative Extension Service
5. NC Division of Water Resources
6. Watershed Environmental Interest
7. Watershed Environmental Interest
8. Environmental Interest
9. General Farming Interest
10. Pasture-based Livestock Interest
11. Equine Livestock Interest
12. Cropland Farming Interest
13. Scientific Community

Since the baseline, reductions in nitrogen loss have been achieved through an overall decrease in cropland in production, a decrease in nitrogen application rates, and an increase in best management practices (BMPs) such as 20 and 50-foot riparian buffers. Since reporting began, reported cropland acres decreased in the watershed by 27,996. It is assumed that some of those agricultural lands were converted to development. Phosphorus qualitative indicators demonstrate that there is no increased risk of phosphorus loss, with an 18% and 6% decrease in animal waste phosphorus production and tobacco acreage, respectively, and a 31% increase in cropland conversion to grass and trees since the 2006 baseline.

[1] The 2016 crop year began in October 2015 and ended in September 2016.

Rule Requirements and Compliance

In January 2011, the permanent Agriculture Rule that is part of the Falls Reservoir Water Supply Nutrient Strategy became effective. The Agriculture Rule provides for a collective strategy for farmers to meet nitrogen loss reduction goals in two stages. The strategy goal is to reduce the average annual load of nitrogen and phosphorus to Falls Lake from 2006 baseline levels. Stage I requires that agriculture reach a goal of 20% nitrogen loss reduction and 40% phosphorus reduction by year 2020. This Stage I nitrogen goal requires a 20% reduction from pasture sources. Stage II sets reduction goals of 40% and 77% for nitrogen and phosphorus, respectively, by year 2035, which includes a 40% nitrogen reduction from pasture sources for the watershed. A Watershed Oversight Committee (WOC) was established to guide the implementation of the rule and to assist farmers with complying with the rule.

Falls Lake NSW Strategy:
The Environmental Management Commission (EMC) adopted the Falls Reservoir Water Supply Nutrient Strategy rules in 2011. The strategy goal is to reduce the average annual load of nitrogen and phosphorus to Falls Lake from 2006 baseline levels. In addition to point source rules, mandatory controls were applied to address non-point source pollution in agriculture, urban stormwater, and riparian buffer protection. The management strategy was modeled after similar nutrient strategies for the Neuse River, Tar-Pamlico River, and Jordan Lake.

All county Local Advisory Committees (LAC) submitted their sixth annual reports to the WOC in January 2018. Collectively, agriculture in the six counties is meeting the cropland nitrogen loss reduction goal, with a 75% reduction. Qualitative indicators for phosphorus suggest there is no increased risk of phosphorus loss from agriculture in the watershed. Pasture nitrogen loss accounting relies on USDA-NASS data which is gathered via the Census of Agriculture every five years. The most recent year for which pasture nitrogen loss could be calculated was CY2012. That year counties in the Falls Lake Watershed reported a 32% nitrogen loss reduction from baseline, which exceeds the rule-mandated 20% goal.

Scope of Report and Methodology

The estimates provided in this report represent county-scale calculations of nitrogen loss from cropland agriculture in the watershed made by the NC Division of Soil and Water Conservation (DSWC) using the 'aggregate' version of the Nitrogen Loss Estimation Worksheet (NLEW) and adjusted for the percentage of each county in the Falls Lake Watershed. NLEW is an accounting tool developed to meet the specifications of the Neuse Rule and approved by the Environmental Management Commission's (EMC) Water Quality Committee in March 2012 for use in the Falls Lake Watershed. The NLEW development team included interagency technical representatives of the NC Division of Water Resources (DWR), NC Division of Soil and Water Conservation (DSWC), United States Department of Agriculture (USDA)-Natural Resources Conservation Service (NRCS) and was led by NC State University (NCSU) Soil Science Department faculty. NLEW captures application of both inorganic and animal waste sources of fertilizer to cropland. It is an "edge-of-management unit" accounting tool that estimates changes in nitrogen loss from cropland and pastureland, but does not estimate changes in nitrogen loading to surface waters. Assessment methods were developed and approved by the Water Quality Committee of the EMC for phosphorus, and are described later in the report.

Over time NLEW has been updated to incorporate updated realistic yield expectations, nitrogen use efficiencies, and soil management groups. In 2015 a new web-based version of NLEW (v6.0) was created on NC Department of Agriculture and Consumer Services servers which corrected user interface bugs and allowed more accurate reporting of aggregate nitrogen loss.

Nitrogen Reduction from Cropland from 2006 Baseline for CY2016

All counties submitted their sixth progress reports to the WOC in January 2018. In CY2016 agriculture achieved a 75% reduction in nitrogen loss from cropland compared to the average 2006 baseline. Figure 1 shows annual loss percent reductions per year since CY2011, calculated with the two different versions of NLEW, and Table 1 lists each county's baseline, CY2015 and CY2016 nitrogen (lbs/yr) loss values from cropland, along with nitrogen loss percent reductions from the baseline in CY2015 and CY2016.

Figure 1. Collective Nitrogen Loss Reduction Percent 2011 to 2016, Falls Lake Watershed.

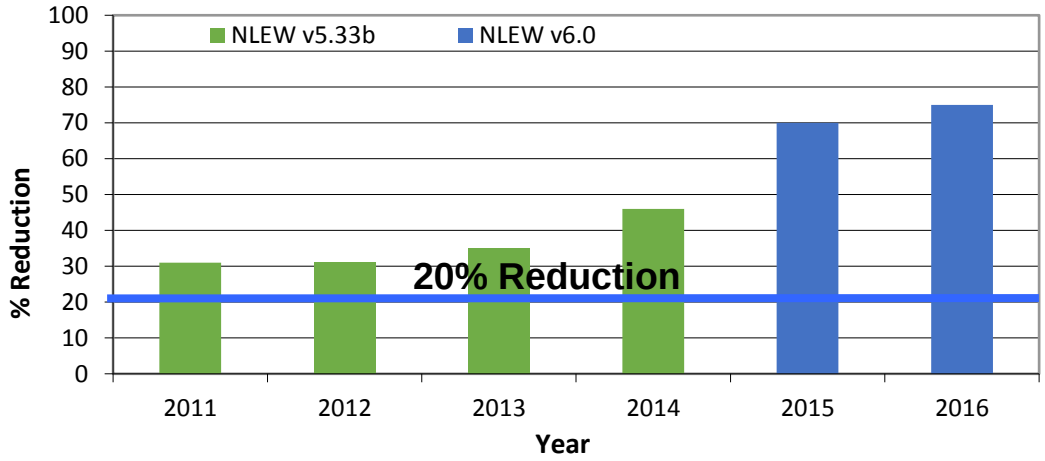


Table 1. Estimated reductions in agricultural (cropland) nitrogen loss from baseline (CY2006) for CY2015 and CY2016, Falls Lake Watershed

County	Baseline N Loss (lb)	CY2015 N Loss (lb)*	CY2015 N Reduction (%)	CY2016 N Loss (lb)*	CY2016 N Reduction (%)
Durham	146,090	39,312	73%	55,342	62%
Franklin	11,772	3,528	70%	7,240	38%
Granville	127,704	26,701	79%	64,180	50%
Orange	347,402	109,040	69%	61,123	82%
Person	484,123	139,231	71%	80,349	83%
Wake	52,405	34,766	34%	28,925	45%
Total	1,169,495	352,578	70%	297,159	75%

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

Notably, Orange and Person Counties are currently reporting more than 80% nitrogen loss reduction from baseline. These counties have both lost over 50% of their corn acres. Orange has lost over 45% of their tobacco acres and over 75% of their wheat acres. Person has lost over 50% of their wheat acres. Some of these acres may have been lost to development, converted to another crop, or they may currently be idle and not receiving fertilizer application. It is possible that some of these acres are now grazed as pasture, which means that they are now accounted for in the pasture NLEW reporting framework described later in this report. Only non-grazed hay acres are accounted for in the cropland NLEW reduction calculation.

In addition, Granville County saw an increase of nearly 300 acres of corn and 48 acres of tobacco from CY2015 to CY2016, which partially explains their lower reduction percentage. Both of these crops generally receive higher nitrogen inputs, so the fertilization of this acreage is likely to significantly impact annual nitrogen loss reduction calculations. It is important to note that small number of agricultural acres in Durham, Franklin, and Wake Counties tends to result in a magnified effect of year-to-year crop shifts on aggregate nitrogen loss reduction in those counties. Overall, the Falls Lake Watershed is reporting a cropland nitrogen loss reduction of 75% for CY2016.

Best Management Practice Implementation

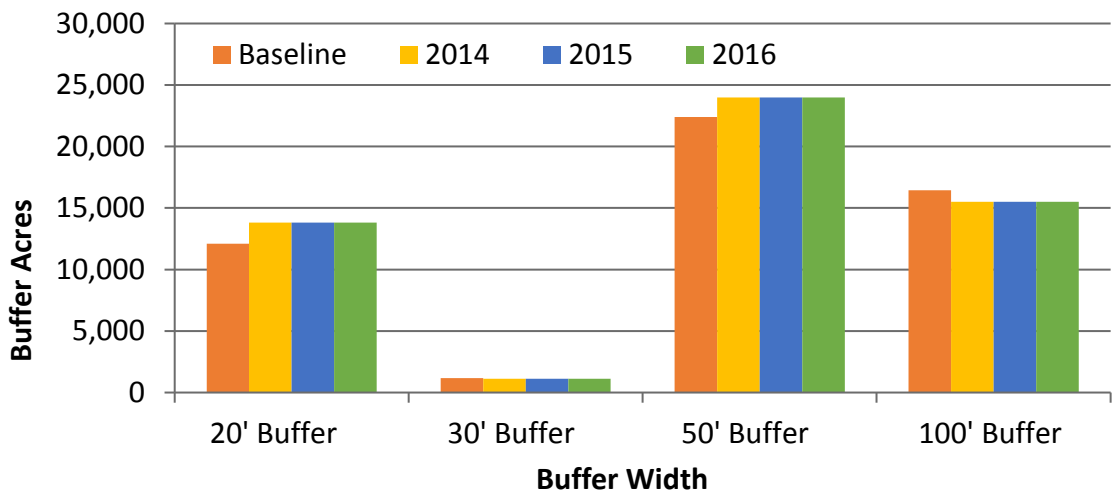
Agriculture is credited with different nitrogen reduction efficiencies, expressed as percentages, for riparian buffer widths ranging from 20 feet to 100 feet. NLEW versions 5.33b and 6.0 for the Neuse River Basin provide the following percent nitrogen reduction efficiencies for buffer widths on cropland: 20’ receives 20% reduction, 30’ receives 25% reduction, 50’ receives 30%, and 100’ receives 35% reduction (see Table 2). Note that these percentages represent the net or relative percent improvement in nitrogen removal resulting from riparian buffer implementation.

Table 2. Buffer Width Options and Nitrogen Reduction Efficiencies in NLEW

Buffer Width	NLEW % N Reduction
20’	20%
30’	25%
50’	30%
100’	35%

Figure 2 illustrates the amount of buffers on cropland in the baseline (2006) and CY2016. An accurate reassessment of active agricultural land and remaining buffer systems is needed due to the rate at which urbanizing counties have lost agricultural land. A countywide field analysis of buffer and agricultural acres in Durham is currently being performed by SWCD staff, and their findings are expected in time for the CY2017 progress report. This reduction in agricultural acreage also has implications for the other counties in the watershed which do not have local staff capable of performing a new agricultural land inventory. The WOC is exploring ways to address this need and expects to be able to provide more detail in future reports.

Figure 2. Nitrogen Reducing Buffers installed on Croplands from CY2014 through CY2016, compared to Baseline (CY2006), Falls Lake Watershed



**Some of these buffers have been moved to new development or are no longer buffering active agricultural operations.*

BMP data is collected from state and federal cost share program active contracts, and in some cases BMPs were installed without cost share funding. While there is some variability in the data reported, LACs are reporting the best available information. As additional data is collected, the LACs will review the sources and update their methodology for reporting if warranted.

Reported riparian buffer acre estimates 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 2.[2] Riparian buffers have many important functions beyond being effective in reducing nitrogen.[3] Recent research has shown that upwards of 75% of sediment from agricultural sources is from stream banks and that riparian buffers, particularly trees, are important for reducing this sediment.[4] In addition, buffers sequester phosphorus and sediment as they move through the riparian zone and provide other critically important functions such as wildlife habitat and stream shading.[5]

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[2] 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.

[3] Sweeney, B. et al., 2004, Riparian deforestation, stream narrowing, and loss of stream ecosystem services, PNAS 101:39, 14132-14137; Sweeney and Newbold, 2014.

[4] Osmond, D., D. Meals, D. Hoag, and M. Arabi. 2012. How to Build Better Agricultural Conservation Programs to Protect Water Quality: The NIFA-CEAP Experience. Soil and Water Conservation Society, Ankeny, IA.

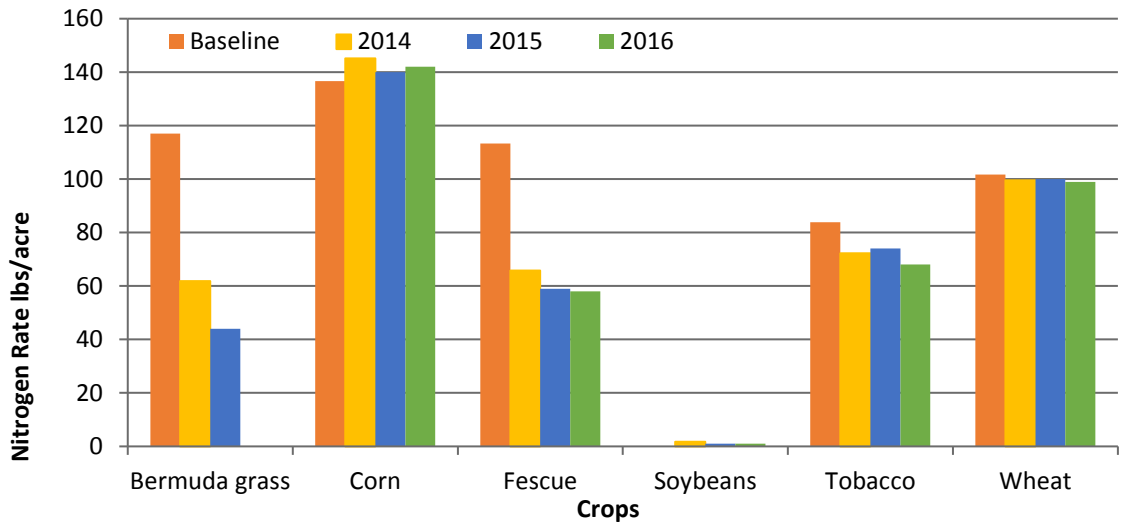
[5] Spruill, T.B., 2004, Effectiveness of riparian buffers in controlling ground-water discharge of nitrate to streams in selected hydrogeologic settings of the North Carolina Coastal Plain, Water Science and Technology 49:3, 63-70.

Fertilization Management

Since the baseline year, reduced nitrogen application rates have resulted from economic decisions and fluctuating farm incomes. Increased fertilizer cost has impacted the application rates of nitrogen on farms in the Falls Lake Watershed. For most crops, farmers have reduced their nitrogen application rates from baseline levels. Figure 3 displays the nitrogen application rates in pounds per acre for the major crops in the watershed. Nitrogen application rates for fescue hay are 55 pounds/acre lower than during the baseline. Nitrogen rates on corn and wheat remained relatively stable between CY2015 and CY2016, and tobacco application rates decreased 6 lbs/acre from CY2015. No Bermuda grass hay was planted in CY2016. Fertilizer rates are revisited annually by county local advisory committees using data from farmers, commercial applicators and state and federal agencies' professional estimates.

Agriculture in the six counties within the Falls Lake watershed is focused primarily on pasture-based systems, with pasture ranging from 29-64% of the agricultural land use. On hay and pasture nitrogen application rates are significantly less than NC State University recommendations and only small amounts of phosphorus are added. Thus, it appears that hay production acres are underfertilized in the Falls Lake Watershed.[2]

Figure 3. Average annual nitrogen fertilization rate (lb/ac) for agricultural crops for the baseline (2006), 2014-2016, Falls Lake Watershed

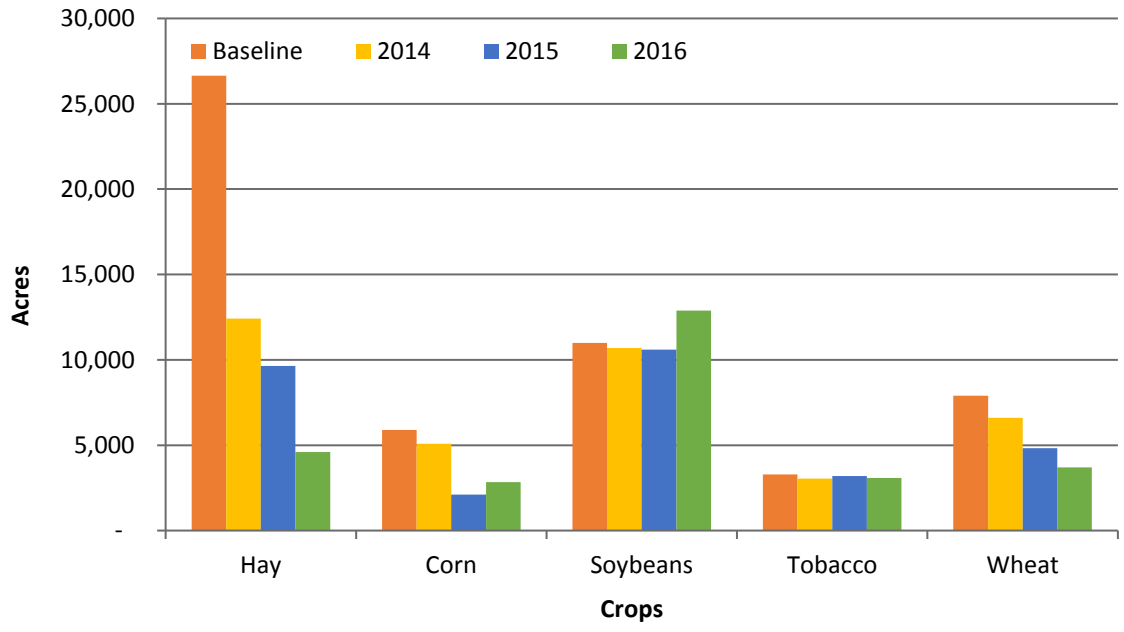


Cropping Shifts

The LACs recalculate the 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 uses applied nitrogen with a different efficiency rate, changes in the mix of crops grown can have a 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.

Corn requires higher nitrogen application rates than other crops, and corn acres increased by over 700 acres from CY2015 to CY2016. Soybeans, which require no nitrogen input, increased by over 2,000 acres from CY2015 to CY2016. In addition, a second consecutive extremely wet fall prevented many farmers from accessing their fields in time to plant a crop of winter wheat. In most cases wheat acres are "double cropped" with soybeans, which means that wheat acres are planted on the same acreage before a spring soybean crop. In CY2015, soybean acreages were accounted for in these double cropped systems, but some of those acres were not fertilized over the winter months where a wheat crop was not planted. This resulted in an overall decrease of over 1,100 wheat acres between CY2015 and CY2016. These trends in soybean and wheat plantings have helped reduce overall nitrogen loss. A host of factors from individual to global determine crop choices. Figure 4 shows crop acres and shifts for CY2016 compared to the baseline. The reported acres of all major crops have decreased by almost 28,000 acres in the watershed since the baseline. None of the hay acres reported in this table are grazed by livestock.

Figure 4. Reported Acreage of Major Crops for the Baseline (2006), 2014-2016, Falls Lake Watershed



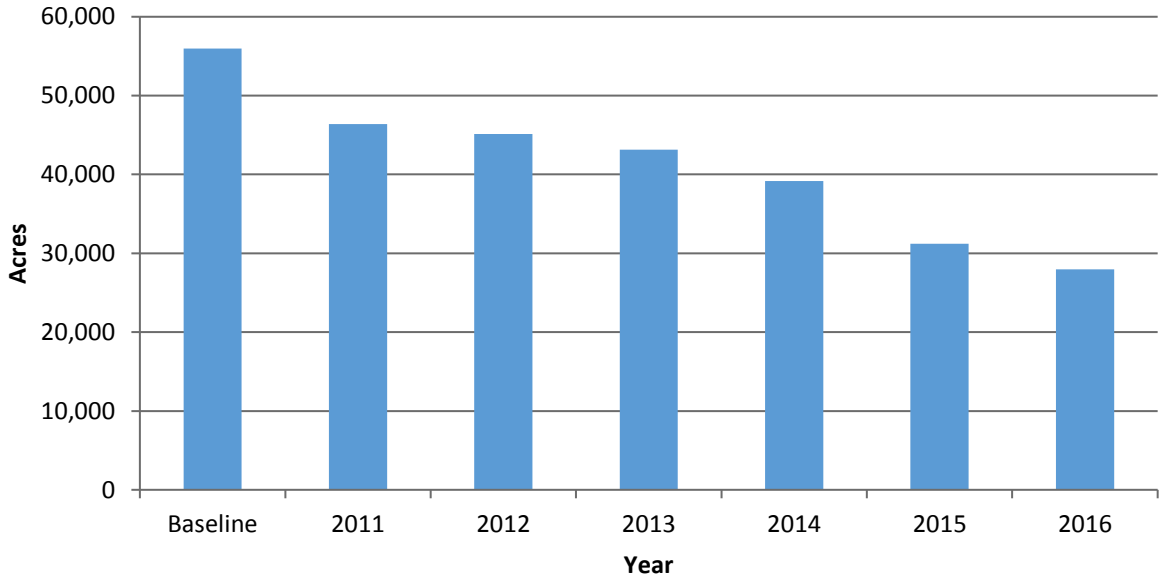
Land Use Change to Development and Cropland Conversion

The number of cropland acres fluctuates every year in the Falls Lake Watershed due to cropland conversion and development. Each year, some cropland is either permanently lost to development or converted to grass or trees and likely to be ultimately lost from agricultural production. Data regarding land use change since the baseline is summarized below.

As shown in Figure 5, it is estimated that since the 2006 baseline there has been a decrease in crop production of 27,996 reported acres (50% of total cropland). An estimated 15% of agricultural land (cropland and pasture) has been permanently lost to development. Through state and federal cost share programs, 1,995 cropland acres (7% of cropland loss) were converted to grass or trees. The remaining cropland reduction, which includes 9,183 acres of idle land, could potentially be brought back into agricultural production.

The estimates for agricultural land lost to development come from methodologies developed at the individual county level based on available information and the many and diverse local government reporting requirements associated with development. Each county uses a different method, but these methods are documented and use the best local information available. These estimates do not separate the amount of cropland versus pastureland lost; the number reported is agricultural land converted to development.

Figure 5. Total Reported Cropland Acres in the Falls Lake Watershed, Baseline (2006), 2011-2016



Phosphorus Indicators for CY2016

The Phosphorus Technical Assistance Committee (PTAC) was created to establish a phosphorus accounting method for agriculture in the Tar-Pamlico River Basin. In 2005 it determined that a defensible, aggregated, county-scale accounting method for estimating phosphorus losses from agricultural lands was not feasible due to "the complexity of phosphorus behavior and transport within a watershed, the lack of suitable data required to adequately quantify the various mechanisms of phosphorus loss and retention within watersheds of the basin, and the problem with not being able to capture agricultural conditions as they existed in [baseline year] 1991." The PTAC instead developed recommendations for qualitatively tracking relative changes in practices in land use and management related to agricultural activity that either increase or decrease the risk of phosphorus loss from agricultural lands in the basin on an annual basis. In 2010 the PTAC reconvened to make minor revisions for the tool's use in Falls Lake Watershed, all of which were approved by the Water Quality Committee of the EMC. The qualitative indicators included in Table 3 show the relative changes in land use and management parameters and their relative effect on phosphorus loss risk in the watershed for baseline (CY2006), CY2014, CY2015, and CY2016.

Table 3. Relative Changes in Land Use and Management Parameters and their Relative Effect on Phosphorus Loss Risk in the Falls Lake Watershed

Parameter	Units	Source	Baseline 2006	CY2014	CY2015	CY2016	% change '06-'16	P Loss Risk +/-
Reported Cropland	acres	FSA, LAC	55,969	39,179	31,208	27,973	-50%	-
Cropland conversion (to grass & trees)	acres	USDA-NRCS & NCACSP	1,527	1,853	1,991§	1,995	+31%	-
CRP / WRP (cumulative)	acres	USDA-NRCS	0	0	0	0	0%	N/A
Conservation tillage†	contracted acres	USDA-NRCS & NCACSP	26,787 (47%)	19,607 (45%)	19,874 (50%)	19,999 (64%)	-25%	-
Vegetated buffers (cumulative)	acres	USDA-NRCS & NCACSP	52,139	54,420	54,420	54,420 ¤	+4% ¤	-
Scavenger crop	acres	LAC	0	599	1,190	1,400	+1,400%‡	N/A
Tobacco	acres	FSA, LAC	3,288	3,036	3,202	3,082	-6%	-
Animal waste P	lbs of P/ yr	NC Ag Statistics	586,612	487,203	489,061	482,969	-18%	-
Soil test P median	P Index	NCDA& CS	77	65	68	53	-31%	-

§*This number has been revised due to a discovered spreadsheet error.*

† *Conservation tillage is being practiced on additional acres but this number only reflects acres under active cost share contracts.*

¤*This number includes some buffer acres on formerly agricultural land which has been converted to other uses (see page 6).*

‡*The percent change for scavenger crop acres is assumed to have increased from 1 due to the problem with calculating a percentage difference from zero.*

Most of the parameters in Table 3 indicate less risk of phosphorus loss from agricultural management units than in the baseline period. Factors contributing to the reduced risk of phosphorus loss in the Falls Lake Watershed include:

- Tobacco acres were reduced by 6%
- Animal waste P was reduced by 18% from livestock and poultry
- Cropland conversion to other uses

Based on field office reports, conservation tillage acres remain high even after contracts expire due to farmer satisfaction with the practice after initial implementation.[2] Despite the reduction in reported tillage acres, and because some farmers have adopted the use of conservation tillage without cost share assistance, a higher percentage of agricultural land is currently being cultivated with reduced tillage than was reported during the baseline due to the overall reduction in agricultural acres. By this metric, the phosphorus loss risk remains negative.

The soil test phosphorus median number reported for the watershed fluctuates each year due to the nature of how the data is collected and compiled. The soil test phosphorus median numbers shown in Table 3 are from agricultural operations and are generated by using North Carolina Department of Agriculture and Consumer Services (NCDA&CS) soil test laboratory results from voluntary soil testing and the data is reported by the NCDA&CS. The number of samples collected each year varies. The data does not include soil tests that were submitted to private laboratories. The soil test results from the NCDA&CS database represent data from entire counties in the watershed, and have not been adjusted to include only those samples collected in the Falls Lake Watershed.

Given the key role of phosphorus in the Falls Lake nutrient strategy, the Falls WOC recommends that phosphorus accounting and reporting follow a three-pronged approach:

1. Annual Qualitative Accounting: Conduct annual qualitative assessment of likely trends in agricultural phosphorus loss in the Falls watershed relative to 2006 baseline conditions using the method established by a 2005 PTAC report that added tobacco acres and removed water control structures.
2. Phosphorus Loss Assessment Tool (PLAT): The PLAT has been developed to assess potential P loss from cropland to water resources. A survey of the Falls Lake watershed counties was conducted in 2010, with the next survey to be conducted in the future if funding is available. The results of the 2010 survey demonstrated that the potential for phosphorus loss is very low (< 0.35 lbs/ac/yr) for four of the five counties surveyed. Phosphorus loss in Orange County is rated at the low end of the medium range (> 1 lb/ac/yr). Even with the installation of buffers along all streams and the discontinuation of phosphorus application (fertilizer, biosolids, or animal waste), there would be limited potential for additional phosphorus loss reduction.
3. Improved understanding of agricultural phosphorus management through studies using in-stream monitoring: quantitative in-stream monitoring should be conducted. Such monitoring is contingent upon the availability of funding and staff resources. An appropriate water quality monitoring design would be a paired-watershed study of subwatersheds with only agricultural land use. This design would allow estimates of phosphorus loading for different management regimes and load reductions after conservation practices have been implemented. However, funding for this study is currently unavailable.

The WOC recommends that no additional management actions be required of agricultural operations in the watershed at this time to comply with the phosphorus goals of the agriculture rule. The WOC will continue to track and report the identified set of qualitative phosphorus indicators to DWR annually, and as directed by the rule to the Environmental Management Commission. The WOC expects that BMP implementation may continue to increase throughout the watershed in future years, and notes that BMPs installed for nitrogen, pathogen and sediment control often provide significant phosphorus benefits as well.

Pasture Accounting

In August 2016, the WOC accepted the recommendation of the Pasture Points Committee to revise the pasture accounting method. The "pasture point" system was replaced with a system that utilizes NLEW to estimate reductions in nitrogen loss over time. Pasture nitrogen loss accounting relies on USDA-NASS data which is gathered via the Census of Agriculture every five years. Because of this the next pasture-based nitrogen loss calculation will be included in a future report when the 2017 Census of Agriculture is published. In CY2012 counties in the Falls Lake Watershed reported a 32% nitrogen loss reduction from baseline, which exceeds the rule-mandated 20% goal.

BMP Implementation Not Tracked by NLEW

Not all types of nutrient and sediment-reducing BMPs are tracked by NLEW such as: 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 estimating a nitrogen benefit. The WOC believes it is worthwhile to recognize these practices. Table 7 identifies BMPs and tracks their implementation in the watershed since the end of the baseline period.

Table 7: Nutrient and sediment-reducing installed best management practices, Falls Lake Watershed*

BMP	Units	BMPs Installed (CY2006-CY2016)
Critical Area Planting	Acre	560
Composting Facility	Number	8
Diversion	Feet	21,048
Dry Stack	Number	8
Fencing (USDA programs)	Feet	76,002
Field Border	Acre	26,725
Grassed Waterway	Acre	8,666
Nutrient Management	Acre	1,209
Pasture Renovation	Acre	326
Stream Crossing	Number	1
Sod-Based Rotation	Acre	12,492
Tillage Management	Acre	19,999
Terraces	Feet	4,163
Trough or Tank	Number	72
Waste Storage Facility	Number	9

**Values represent active contracts in State and Federal cost share programs.*

Looking Forward

The Falls Lake WOC will continue to report on and encourage rule implementation, relying heavily on the local soil and water conservation districts who work directly with farmers to assist with best management practice design and installation.

Because cropping shifts are susceptible to various pressures, the WOC is working with all counties to continue BMP implementation on both cropland and pastureland that provides for a lasting reduction in nitrogen and phosphorus loss in the watershed while monitoring cropping changes. Due to improved weather during the fall growing season in late 2016, the WOC expects reported wheat acre totals in CY2017 to increase significantly.

The WOC recognizes several factors affecting agriculture:

- Urban encroachment
- Market Fluctuations
- Changes in government programs (i.e., commodity support or environmental regulations)
- Weather (i.e., long periods of drought or rain)
- Scientific advances in agronomics (i.e., production of new types of crops or improvements in crop sustainability)
- Plant disease or pest problems (i.e., viruses or foreign pests)

Funding

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

In CY2016 soil and water conservation districts spent over $134,000 through the Agriculture Cost Share Program in the Falls Lake Watershed, and the Natural Resources Conservation Service spent over $460,000 through the Environmental Quality Assistance Program in the counties of the Falls Lake Watershed. These programs have all helped fund erosion and nutrient reducing best management practices. Funds are also expended for installation of these practices by local farmers and landowners either through participation in these cost share programs, or by installing practices at their own cost. Participation by so many members of the local agricultural community demonstrates a commitment toward achieving the nutrient strategy's long-term goals.

The EPA 319(h) grant program, which is administered by the Department of Environmental Quality, awards competitive grant funds for implementation of approved management programs for all types of nonpoint sources. Grant funds from the 319(h) program can be used to supplement technical assistance, match cost share funding, and support BMP implementation. From 2012 through 2015 an EPA 319(h) grant valued at $131,563 supported BMP implementation on equine operations in the Falls Lake Watershed. The Division of Soil and Water Conservation, funded through an EPA 319(h) grant, expends approximately $50,000 on agricultural reporting staff support annually.

Funding is an integral part in the success of reaching and maintaining the goal through technical assistance and BMP implementation. It is also important for data collection and reporting.

In 2001, grants from several sources funded a total of two watershed technicians and a Neuse River Basin Coordinator. The technicians' primary responsibility was to assist farmers with BMP implementation. These technicians assisted existing county staff to expedite the installation of nutrient reducing BMPs in the basin. On June 30, 2015 the last technician funding was expended, and technician funding is no longer eligible for grant awards by funding entities in the state. Therefore, less technical assistance for BMP implementation is available. Ongoing responsibility for conservation practice planning and installation now depends on local staff that also have other duties. Budget changes at the USDA have necessitated a statewide restructuring of North Carolina NRCS field staff, and these changes have led to a reduction in federally-funded technical capacity at the local level. At the present time there is also no funding for a basin coordinator. Part of the responsibilities of the technicians and basin coordinators was to assist with the reporting requirements for the Neuse and Tar-Pamlico Agriculture Rules. In addition to his other duties, an employee within the NCDA&CS Division of Soil and Water Conservation funded by EPA 319(h) funds has been assigned the data collection, compilation and reporting duties for the Agriculture Rules for all existing Nutrient Sensitive Waters Strategies.

Now that watershed technician funding has been eliminated, a more centralized approach to data collection and verification is necessary. This evolving approach will involve GIS analysis and more streamlined FSA acreage documentation. Durham County, for example, has hired part-time staff to assist with detailed agricultural land delineation, including field verification of intact best management practices. Results of this analysis should be available for the CY2017 annual report. Few counties have these kinds of resources, however, so LACs will be trained to handle the new workload to the best of their ability. Because most district staffs have neither the time nor financial resources to synthesize county level data, this centralized collection approach 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 could be incorporated into future NLEW updates.

Phosphorus accounting and reporting will continue to address qualitative factors and evaluate trends in agricultural phosphorus loss annually. Periodic land use surveys with associated use of PLAT are needed every five years, but it is unlikely that funding will be available for this activity. Additionally, understanding of agricultural phosphorus management could be improved through in-stream monitoring contingent upon the availability of funding and staff resources.

Members of the Falls and Jordan Lake WOCs have been working with DWR on issues regarding nutrient offsets that arise from trades involving agricultural land. Also, the WOC feels that additional research is needed on accounting procedures for pasture operations, and supports such research being conducted. Additionally, should readily accessible information become available on biosolids applications to agricultural acres in the watershed, the WOC will consider whether separate accounting for those applications of nutrients is feasible and appropriate.

Financial constraints will affect future reporting:

- The Falls Lake Watershed has lost all funding for watershed technicians. LACs are being asked to take on a more active role in the data collection and synthesis that these positions conducted previously. It should be noted that farmers and agency staff personnel with other responsibilities serve on the LACs in a voluntary capacity.
- The Neuse/Tar-Pam Basin Coordinator position is no longer funded, and the Division of Soil and Water Conservation has had to restructure current staff workloads to ensure that Falls Lake reporting can be completed. Therefore, less time is available to support local efforts to do the reporting and assist with BMP implementation and outreach.
- Periodic land use surveys critical to understanding watershed agricultural activities are not currently being conducted. These surveys are contingent upon future funding.

Conclusion

The Falls Lake WOC 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. Significant progress has been made in agricultural nitrogen loss reduction, and the agricultural community is achieving its 20% phase I reduction goal. However, the measurable effects of these BMPs 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 20% phase I nitrogen loss reduction goal. Significant quantities of agricultural BMPs have been installed since the adoption and implementation of the nutrient management strategy, and agriculture continues to do its part towards achieving the overall nutrient reduction goals of Falls Lake.