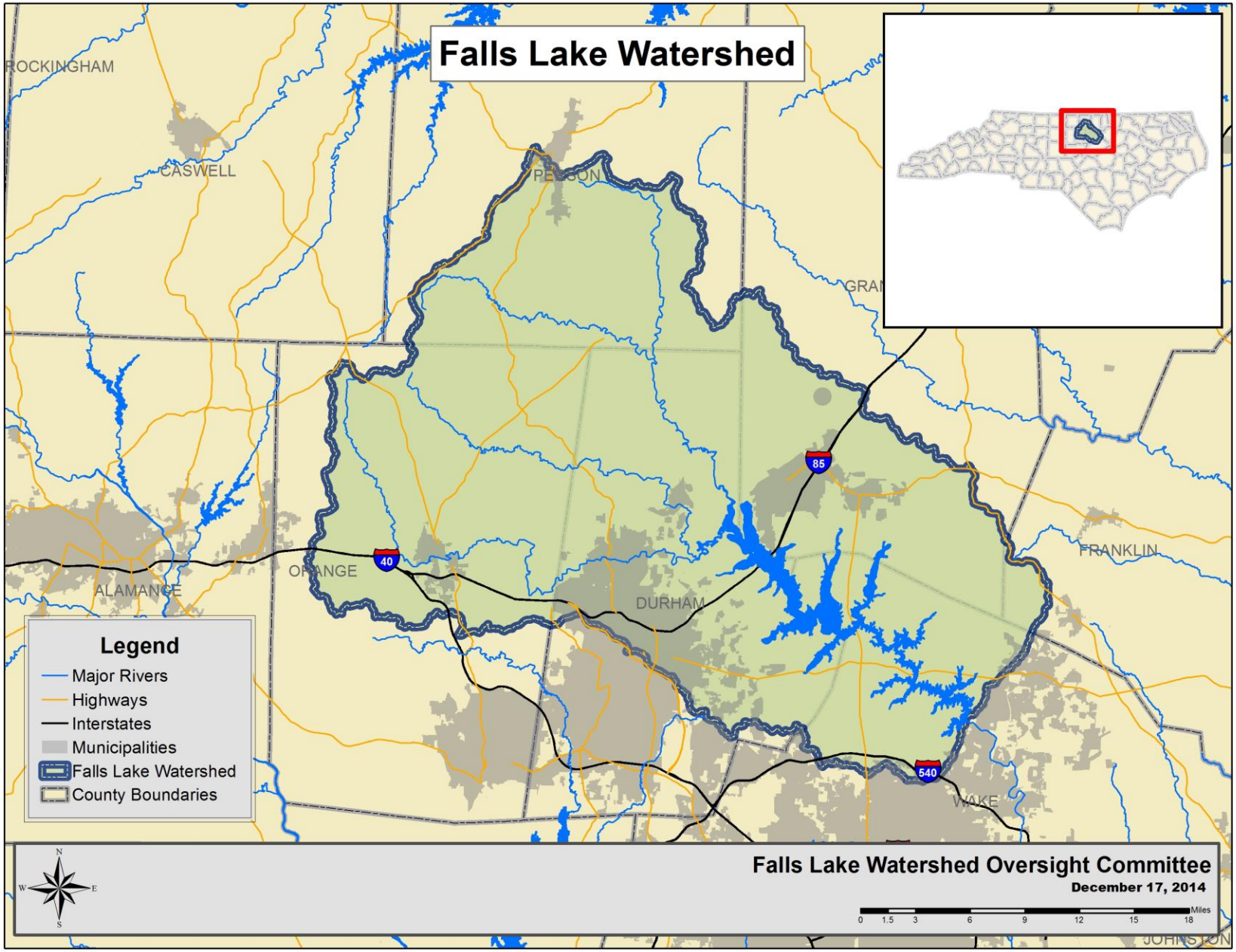
NCDA&CS

2014 Annual Progress Report (Crop Year 2013) on Agricultural Operations' Stage 1 Reductions for the Falls Lake Agriculture Rule (15 A NCAC 02B.0280)

A Report to the Water Quality Committee of the Environmental Management Commission from the Falls Lake Watershed Oversight Committee: Crop Year 2013


Falls Lake Watershed
ROCKINGHAM
CASWELL
PERSON
GRANVILLE
ORANGE
ALAMANCE
DURHAM
FRANKLIN
WAKE
JOHNSTON
85
40
540
Legend
Major Rivers
Highways
Interstates
Municipalities
Falls Lake Watershed
County Boundaries
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Falls Lake Watershed Oversight Committee
December 17, 2014
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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 Water Quality Committee in March 2012 to estimate changes in nitrogen loss and phosphorus loss trends in the Falls Lake Watershed for the period between the strategy baseline (2006) and the most recent crop year (CY) for which data was available, 2013. The Falls Lake WOC received and approved crop year CY2013 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 CY2013, agriculture collectively exceeded its 20% Stage I nitrogen reduction goal, with a 35% reduction compared to the 2006 baseline. This represents a 4% increase in nitrogen loss reduction compared to CY2012. Five out of six counties exceeded the mandated 20% reduction goal this year, with Wake nitrogen loss increasing to within 1% of baseline. For the small part of Wake County in the Falls Lake Watershed, limited cropland acreage greatly increases the effect of any change in agricultural operations on nitrogen loss estimates.

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

Reductions in nitrogen 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 the baseline, cropland decreased in the watershed by 13,056 acres, and an estimated 4,404 acres of agricultural land were lost to development. As part of the mandated reductions, Falls Lake Watershed is required to accumulate at least 20 pasture points from pasture-based BMPs. From 2008 through 2012 the watershed is reporting 60.7 pasture points, due primarily to large exclusion systems installed in Franklin County. Phosphorus qualitative indicators demonstrate that there is no increased risk of phosphorus loss, with a 7% and 4% decrease in animal waste phosphorus production and tobacco acreage, respectively, and an increase in cropland conversion to grass and trees since the 2006 baseline.

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. This is reported as a 20 point increase calculated using the pasture points accounting method. Stage II sets reduction goals of 40% and 77% for nitrogen and phosphorus, respectively, by year 2035, which includes at least 40 pasture points for the watershed. A Watershed Oversight Committee (WOC) was established to implement 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 addressing non-point source pollution in agriculture, urban stormwater, and riparian buffer protection. The management strategy was built upon the Neuse River, Tar-Pamlico River, and Jordan Lake Strategies.

All county Local Advisory Committees (LAC) submitted their third annual reports to the WOC in November 2014. Collectively, agriculture in the six counties is meeting the nitrogen loss reduction goal, with a 35% reduction. Phosphorus qualitative indicators for phosphorus suggest there is no increased risk of phosphorus loss from agriculture in the watershed.

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 soil and water conservation district technicians using the 'aggregate' version of the Nitrogen Loss Estimation Worksheet, or NLEW, and adjusted for the percentage of each county in the Falls Lake Watershed. The 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 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. 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 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. Assessment methods were developed and approved by the Water Quality Committee of the EMC for pastureland and phosphorus, and are described later in the report.

Nitrogen Reduction from Cropland from 2006 Baseline for CY2013

All counties submitted their third progress reports to the WOC in November 2014. In CY2013 agriculture achieved a 35% reduction in nitrogen loss compared to the average 2006 baseline. All but one of the counties surpassed the Stage 1 20% reduction goal for nitrogen in the Falls Lake watershed, with only Wake County falling below the goal. Table 1 lists each county's baseline, CY2012 and CY2013 nitrogen (lbs/yr) loss values from cropland, along with nitrogen loss percent reductions from the baseline in CY2012 and CY2013, and Figure 1 shows annual loss percent reductions per year since CY2011.

Figure 1. Collective Nitrogen Loss Reduction Percent 2011 to 2013, Falls Lake Watershed.

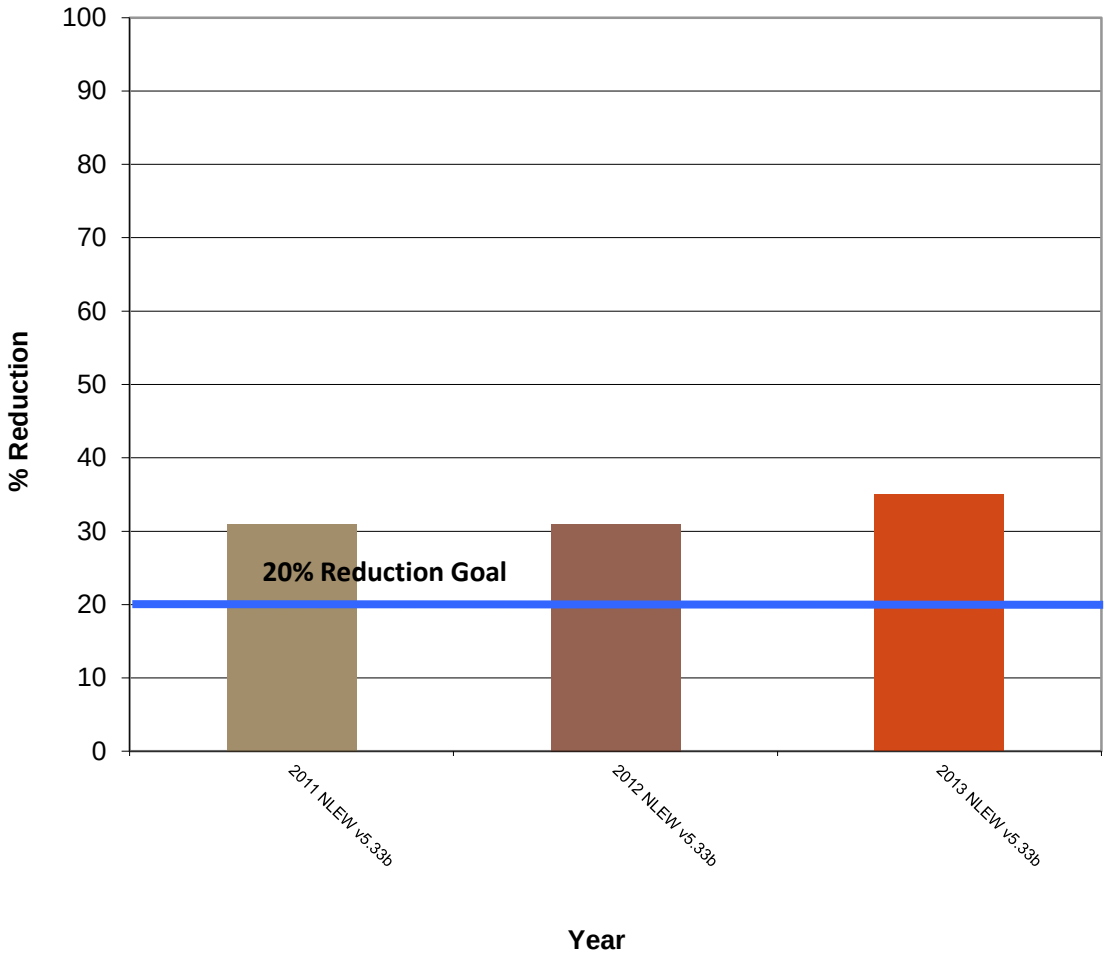


Table 1. Estimated reductions in agricultural nitrogen loss (cropland) from baseline (2006) for CY2012, CY2013, Falls Lake Watershed

County	Baseline N Loss (lb)* NLEW v. 5.33b	CY2012 N Loss (lb)* NLEW v. 5.33b	CY2012 N Reduction	CY2013 N Loss (lb)* NLEW v. 5.33b	CY2013 N Reduction
Durham	135,902	104,557	23%	97,972	28%
Franklin	11,717	5,080	57%	5,159	56%
Granville	127,704	101,675	20%	91,469	28%
Orange	347,402	276,838	20%	250,184	28%
Person	484,123	267,950	45%	258,126	47%
Wake	49,932	39,537	21%	50,595	-1%
Total	1,156,780	795,637	31%	753,505	35%

**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.*

Best Management Practice Implementation

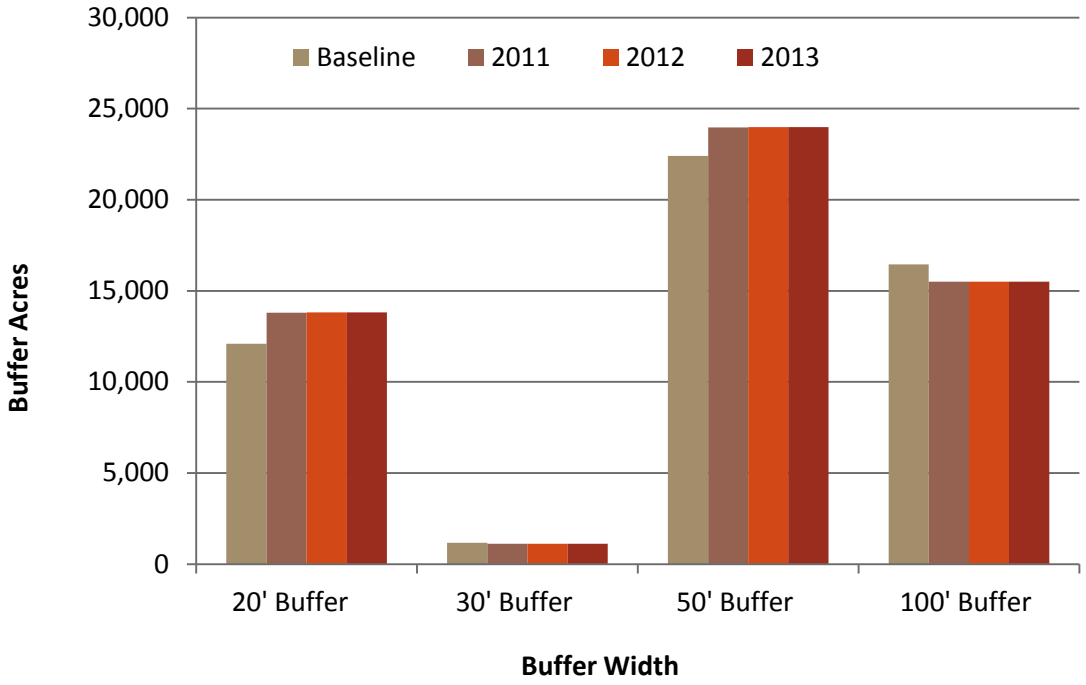
Agriculture is credited with different nitrogen reduction efficiencies, expressed as percentages, for riparian buffer widths ranging from 20 feet to 100 feet. The NLEW version 5.33b for Neuse River Basin provides the following percent nitrogen reduction efficiencies for buffer widths on cropland: 20' 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 v5.33b % N Reduction
20'	20%
30'	25%
50'	30%
100'	35%

Figure 2 illustrates the amount of buffers on cropland in the baseline (2006) and CY2013. Overall, total acres of buffers have slightly increased since the baseline (4.4%). Acres of buffers of 20 and 50 foot widths have increased, while 30 and 100 foot buffers have remained unchanged. The reported buffer acres do not take into account the entire drainage area treated by buffers in the piedmont which is generally 5 to 10 times greater than the actual acres of the buffers shown in Figure 2.[1] Riparian buffers have many important functions beyond being effective in reducing nitrogen. 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.[2] In addition, riparian buffers can reduce phosphorus and sediment as they move through the buffer and provide other critically important functions such as wildlife habitat and stream shading.

Figure 2. Nitrogen Reducing Buffers installed on Croplands from Baseline (2006) through CY2013, Falls Lake Watershed*



**The acres displayed represent buffer acres. Acres treated by the buffer could be 5 to 10 times larger in the piedmont than the actual buffer acreage shown above.[1]*

[1] 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.

[2] 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.

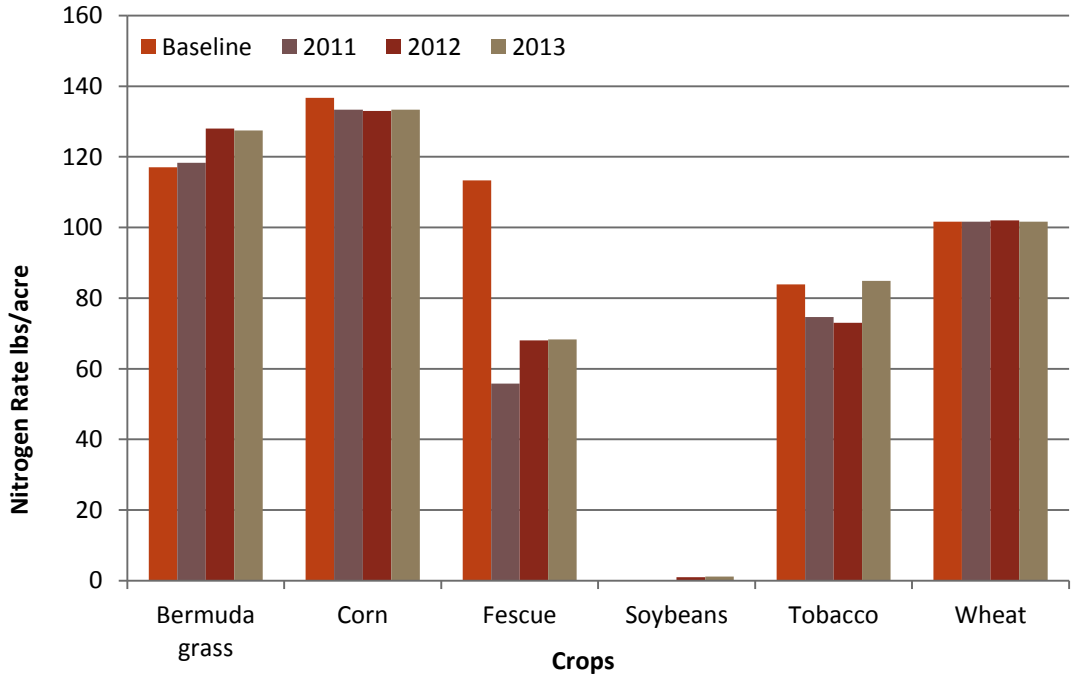
Fertilization Management

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 still 45 pounds/acre lower than during the baseline, despite an increase in application rates from CY2012. The decrease since the baseline is due to increasing costs associated with fertilizer and other farm expenses like diesel fuel. Rates on bermuda grass increased, while rates on tobacco returned to baseline levels. Corn, soybeans and wheat nitrogen application rates remained relatively constant in CY2013 compared to the 2006 baseline. Only 10% of Wake County is in the Falls Lake Watershed. Of the land in the Falls Lake Watershed in Wake County, 4.2% is in crop production, so any change in fertilization rate or cropping shift has a significant effect on nitrogen loss estimates. Fertilizer rates will be revisited annually by county local advisory committees using data from farmers, commercial applicators and state and federal agencies' professional estimates.

Factors Identified by LACs Contributing to Reduced Nitrogen Application Rates since the Baseline Year:

- Rising fertilizer costs and fluctuating farm incomes.
- Mandatory waste management plans.
- The federal government tobacco quota buy-out reducing tobacco acreage.
- Neuse Nitrogen Strategies.

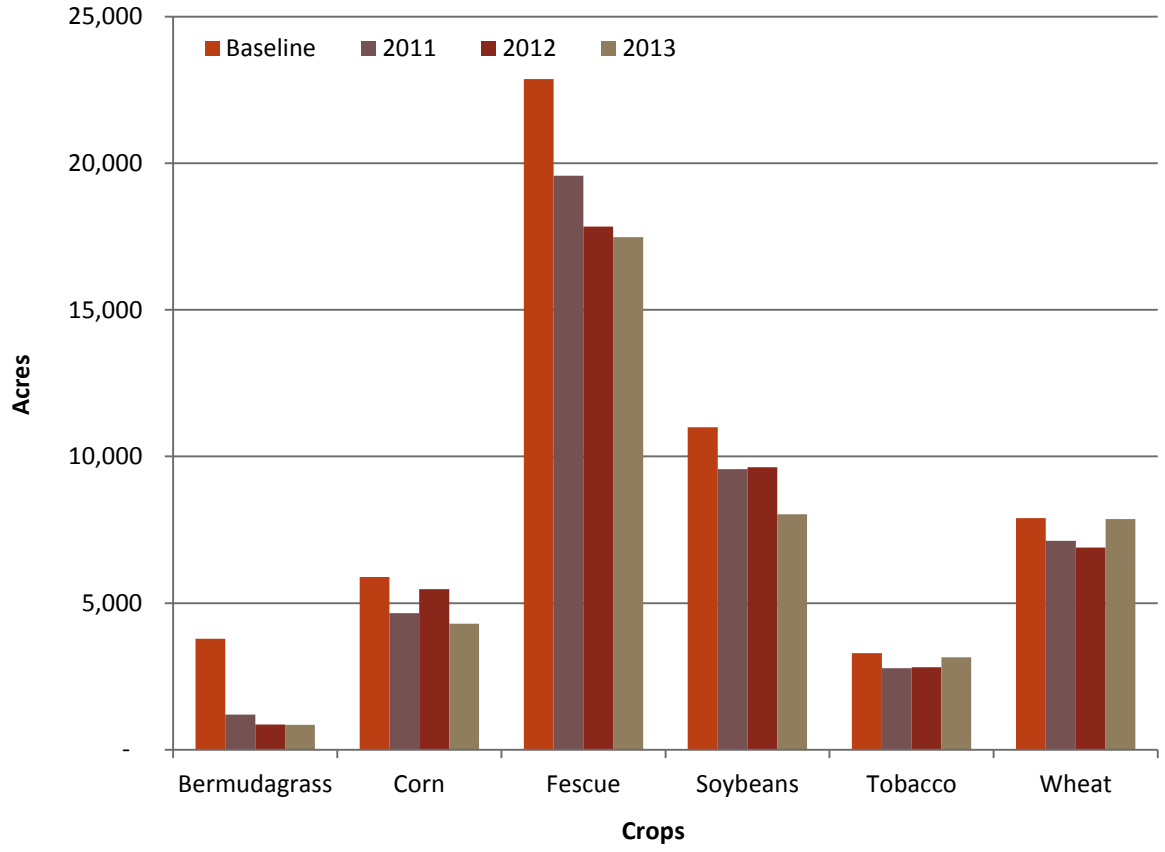
Figure 3. Average annual nitrogen fertilization rate (lb/ac) for agricultural crops for the baseline (2006), 2011, 2012, 2013, Falls Lake Watershed



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 WOC anticipates that the watershed will see additional crop shifts in upcoming years based on economic changes. A host of factors from individual to global determine crop choices. Crop acreages are expected to fluctuate yearly with market changes. Figure 4 shows crop acres and shifts for CY2013 compared to the baseline. The acres of all major crops have decreased by over 12,800 acres in the watershed since the baseline.

Figure 4. Acreage of Major Crops for the Baseline (2006), 2011, 2012, 2013 Falls Lake Watershed



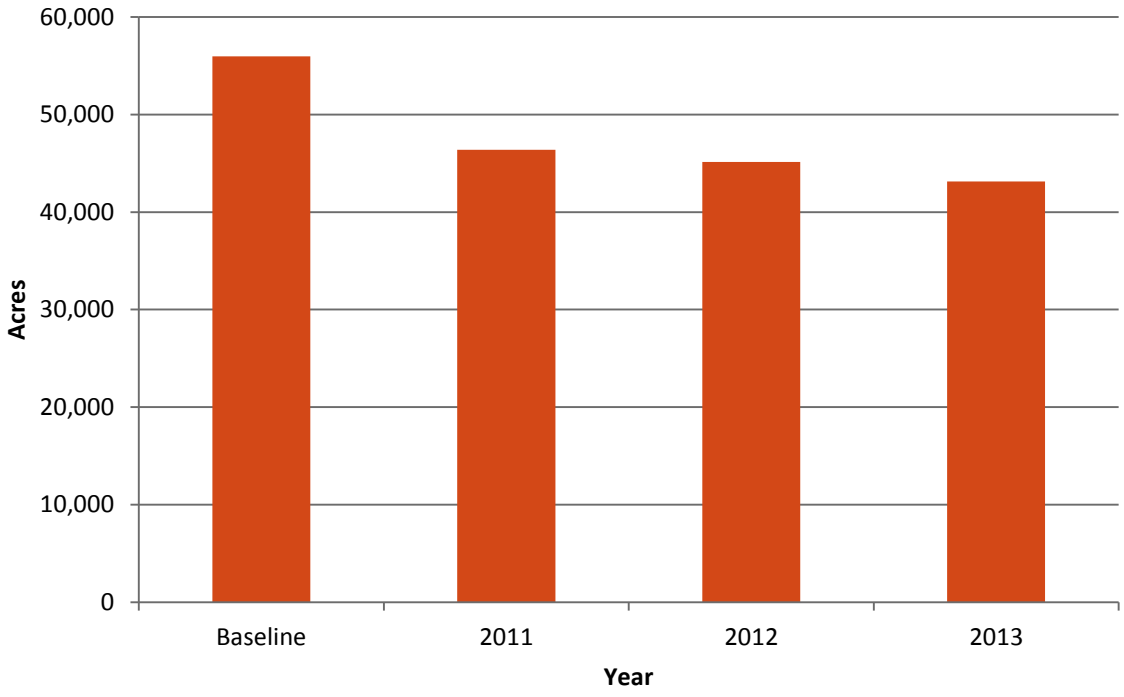
Land Use Change to Development and Cropland Conversion

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.

It is estimated that since the 2006 baseline there has been a decrease in crop production of 13,056 acres (23% of total cropland). Of that, 4,404 agricultural acres (34% of cropland loss) have been permanently lost to development. Through state and federal cost share programs, 1,853 cropland acres (14% of cropland loss) were converted to grass or trees.

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. The remaining acreage could potentially be brought back into agricultural land. These estimates do not separate the amount of cropland versus pastureland lost; the number reported is agricultural land converted to development.

Figure 5. Total Cropland Acres in the Falls Lake Watershed, Baseline (2006), 2011, 2012, 2013



Phosphorus Indicators for CY2013

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. This approach was recommended by the Phosphorus Technical Advisory Committee (PTAC) in 2005 due to the difficulty of developing an aggregate phosphorus tool parallel to the nitrogen NLEW tool and the PTAC reconvened to make minor revisions for the tool's use in the Jordan Lake Watershed in April 2010. This modified approach was approved for use in the Falls Lake Watershed by the Water Quality Committee of the EMC. This report includes phosphorus indicator data for the baseline period (2006), CY2011, CY2012 and CY2013. Most of the parameters 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 4%
- Animal waste P was reduced by 7% from livestock and poultry
- Cropland conversion to other uses

The soil test phosphorus median number reported for the basin 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 basin, and have not been adjusted to include only those samples collected in the Falls Lake Watershed.

Phosphorus Technical Assistance Committee (PTAC):
The PTAC's overall purpose was to establish a phosphorus accounting method for agriculture in the Tar-Pamlico River Basin. 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 1991." (1991 was the Tar-Pamlico Basin's baseline year.) 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. This is the approved approach for the Falls Lake Watershed.

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	CY2012	CY2013	Percent '06-'13 change	CY2013 P Loss Risk +/-
Agricultural land	acres	FSA	55,969	45,132	43,136	-23%	-
Cropland conversion (to grass & trees)	acres	USDA-NRCS & NCACSP	1,527	1,822	1,090	21%	-
CRP / WRP (cumulative)	acres	USDA-NRCS	0	0	0	0%	N/A
Conservation tillage*	acres	USDA-NRCS & NCACSP	26,787	18,179	19,228	-28%	+
Vegetated buffers (cumulative)	acres	USDA-NRCS & NCACSP	52,139	54,418	54,419	4%	-
Scavenger crop	acres	LAC	0	5	605	605%**	-
Tobacco	acres	LAC	3,288	2,817	3,145	-4%	-
Animal waste P	lbs of P/ yr	NC Ag Statistics	586,612	541,096	546,008	-7%	-
Soil test P median	P Index	NCDA&CS	77	74	67	-13%	-

** Conservation tillage is being practiced on additional acres but this number only reflects acres under active cost share contracts, not acres where contracts have expired or where farmers have adopted the use of conservation tillage without cost share assistance. Based on field office reports, conservation tillage acres remain high, even after contracts expire, due to farmer satisfaction with the practice after initial implementation.*

*** 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.*

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 the 2005 PTAC report that added tobacco acreages 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 2015 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 will 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 the Division of Water Resources (DWR) annually, and as directed by the rule to the Environmental Management Commission, with the next report to the Commission due in January, 2016 on Stage 1 progress. 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 Points Accounting

The Falls Lake WOC adopted methodology developed during the Jordan Lake Agriculture Rule reporting. The Jordan WOC reconvened a pasture point system subcommittee in 2010 to revisit the accounting method developed as mandated by a Session Law of the NC General Assembly for the Tar-Pamlico Basin Agriculture Rule. The subcommittee consisted of individuals representing North Carolina State University (NCSU), United States Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), NC Division of Soil and Water Conservation (DSWC), NC Division of Water Resources (DWR), NC Department of Agriculture and Consumer Services (NCDA&CS), and Alamance Soil and Water Conservation District. After reviewing available data sources and existing research findings the subcommittee made certain observations and recommendations, which the WOC has accepted.

The pasture point subcommittee found that:

- While the Tar-Pamlico point system was of sound design, it was not practically implementable because it required field-scale assessment, for which human resources were not available. For the purposes of this rule, given the same resources limitations, a county-scale approach to nitrogen loss accounting will be necessary as is done with cropland NLEW accounting.

- Unlike state-based cropland statistics that are developed annually, pasture activities are tracked only by the federal Census of Agriculture conducted by USDA-National Agricultural Statistical Service every five years. This will necessarily limit pasture accounting under this rule to a 5-year cycle. For Falls Lake accounting, the baseline will be 2007 compared to 2012.

- The point system developed for the Tar-Pamlico is fundamentally sound. It assigned nitrogen "point" credit values for BMPs in lieu of percent reductions based on recognition that research data are insufficient to provide the level of confidence required for attributing percent reductions in nitrogen at the edge of the management unit. Point values reflect best estimates of percent reduction but instead bear the "point" label to connote this greater uncertainty. Research has advanced since the Tar-Pamlico system was developed but not sufficiently to depart from this approach.

As part of the pasture points system, the following data was used for calculation purposes: acres of pastureland, number of pastured animal units, and livestock densities (animal units per acre). Pasture animals included in this analysis include: cattle, equine, and goats. This information was analyzed using the 2007 and 2012 Census of Agriculture, and is presented in Table 4. The percent of each county in the Falls Lake Watershed, determined by GIS analysis, was used to calculate pasture data.

Cattle are the predominant pasture animal in the watershed, and the recommended stocking rate is 1 cow per 1.5 acres, for a livestock density of 0.67. While the livestock stocking rate increased from 2007 to 2012, as an aggregate the livestock density of the watershed is below the recommended rate.

Table 4. Pasture and pastured animal unit data in the Falls Lake Watershed, 2007 and 2012

	2007 Pasture Acres	2007 Pastured Animal Units	2007 Livestock Density (animal units/acre)	2012 Pasture Acres	2012 Pastured Animal Units	2012 Livestock Density (animal units/acre)
Falls Lake Watershed						
Durham	5,164	2,853	0.55	3,778	2,599	0.69
Franklin	427	242	0.57	391	308	0.79
Granville	16,363	8,170	0.50	11,762	5,054	0.43
Orange	9,331	7,596	0.81	7,526	6,133	0.81
Person	7,958	2,694	0.34	5,413	2,661	0.49
Wake	1,322	720	0.54	947	564	0.60
Total	**40,565**	**22,275**	**0.55**	**29,816**	**17,319**	**0.63**

In the five years between releases of the Census of Agriculture, pasture acreage has decreased over 10,700 acres in the watershed. Due to the decrease in pasture acreage (Figure 6), and a smaller decrease of 4,956 pastured animal units, the livestock density increased from 2007 to 2012. Livestock stocking density is depicted in Figure 7 as measured in animal units per acre.

Figure 6. Pasture acreage in the Falls Lake Watershed, 2007 and 2012

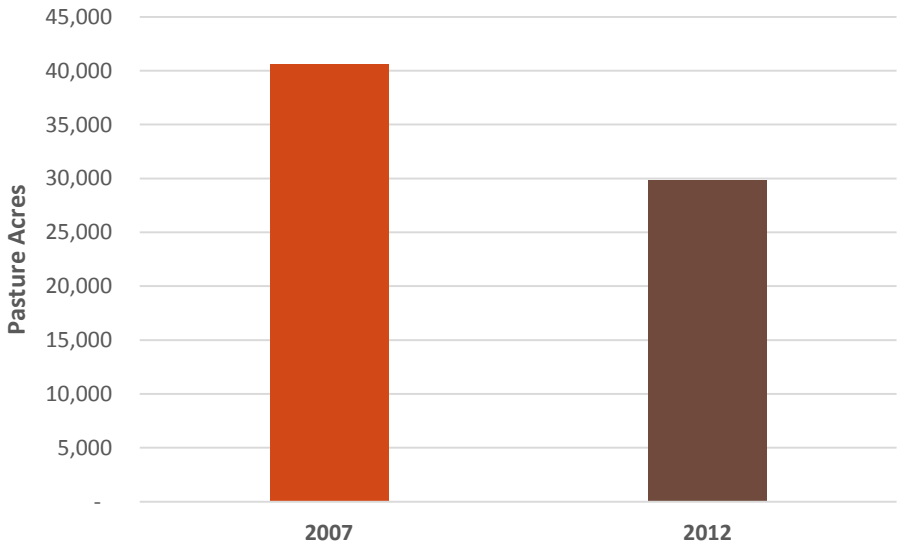
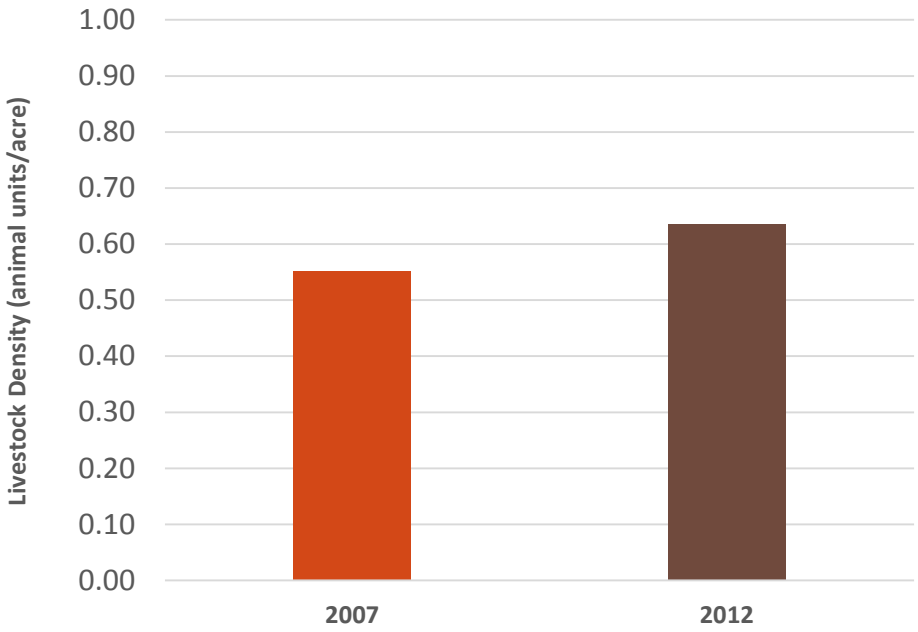


Figure 7. Livestock stocking density in the Falls Lake Watershed, 2007 and 2012



To complete the pasture point system accounting method in each county, pasture BMPs funded by state and federal cost share programs are to be tracked annually and compiled every five years. Individual contracts are reviewed to compile pasture acres affected by each BMP. According to the adopted methodology, for each county for each implementation period, acreage-weighted BMP point assignments will be aggregated and compared to baseline values to yield a county point reduction estimate.

Pasture BMPs implemented in 2007 served as the baseline for this analysis, and were compared to pasture BMPs implemented from 2008-2012. Pasture BMPs receive point reduction credit as described in Table 5. These buffer credits incorporate the most recent adjustments made to NLEW cropland accounting, which reflect current research estimating restored buffer net efficiency improvements.

Table 5. Points nitrogen reduction from pastureland for different BMPs, Pasture Point System

Pasture BMP	**Pasture points**
Exclusion fencing with a 10’ stream setback	30 points
Exclusion fencing with a 20’ buffer	50 points
Exclusion fencing with a 30’ buffer	55 points
Exclusion fencing with a 50’ buffer	60 points
Exclusion fencing with a 100’ buffer	65 points

Nitrogen reduction points are calculated by multiplying the acres affected by pasture BMPs in the watershed, and this total is then normalized by the total pasture acres in each county to give a nitrogen point ratio for pasture BMPs when compared against the total amount of pasture land available for these BMPs. At the end of each 5 year period, the difference between each calculated reduction point ratio is considered reportable. For the purposes of the Falls Lake Agriculture Rule, a 20% nitrogen reduction is translated to a 20 point nitrogen reduction total from pastureland BMPs in the watershed for the period of 2008-2012 as compared against 2007. Thus agriculture as a whole is required to accumulate at least 20 nitrogen reduction pasture points since the 2007 baseline. The data for this five year period is displayed in Table 6. As this table shows, the Falls Lake Watershed is meeting its cumulative 20 point goal for the 2008-2012 period. The large point ratio in Franklin County is due to a single contract in the Falls Lake Watershed with nearly 200 acres of pastureland affected. Though reportable points in other counties are lower, all six counties have shown improvement since the baseline.

Table 6. Nitrogen reduction points from pastureland by county in Falls Lake Watershed, Pasture Point System

	2007		2012		Reportable points (2012 ratio - 2007 ratio)
	Reduction points	Point ratio (points/pasture acres)	Reduction points	Point ratio (points/pasture acres)	
Durham	0	0	1,546	0.4	0.4
Franklin	0	0	15,351	39.3	39.3
Granville	246	0.02	2,193	0.2	0.2
Orange	935	0.10	13,248	1.8	1.7
Person	150	0.02	2,100	0.4	0.4
Wake	0	0	17,745	18.8	18.7
				Total	**60.7**

The Falls Lake WOC will continue to monitor the accounting method and offer recommendations for improvements to the pasture points subcommittee as new research arises. Several factors may affect why the pasture points are low in some counties of the Falls Lake Watershed. The first factor is the amount of land already buffered. The Falls Lake Watershed is very similar to the Jordan Lake Watershed, both in geographic location of the state, farm operations and management practices. According to a report completed in 2011, *Delineating Agriculture in the Lake Jordan River Basin,* a large portion of agricultural land is already buffered. This study found that six counties in the Jordan Lake Watershed had more than 30% of their agricultural land buffered, and that the average buffer width was greater than 50 feet.[3] Land that was

[3] Osmond, D. L and K. Neas. 2011. Sampling Analysis: Delineating Agriculture in the Neuse River Basin. NC Department of Environment and Natural Resources, Division of Water Quality, Raleigh, NC.

buffered before the baseline is not captured in these reports, as the pastureland points system only measures BMPs installed and the affected acres of pasture associated with those practices since the baseline. The second factor is that equine operations are not eligible for cost share assistance through federal programs, which are funded at a much higher level than state cost share programs. This is particularly important because horses are the second highest population of livestock in the watershed, following cattle.

On a positive note, the six Falls Lake Watershed districts are participating in an EPA 319 grant administered by the Division of Soil and Water Conservation that targets equine operations for nutrient reducing and waste management BMPs.

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-CY2013)
Critical Area Planting	Acre	7
Composting Facility	Number	3
Cropland Conversion - Grass	Acre	313
Cropland Conversion - Trees	Acre	58
Diversion	Feet	15,079
Dry Stack	Number	5
Fencing (USDA programs)	Feet	38,379
Field Border	Acre	26,666
Grassed Waterway	Acre	8,530
Livestock Exclusion	Feet	31,690
Nutrient Management	Acre	399
Pasture Renovation	Acre	326
Stream Crossing	Number	1
Sod-Based Rotation	Acre	11,606
Tillage Management	Acre	19,326
Terraces	Feet	4,163
Trough or Tank	Number	24
Waste Storage Facility	Number	7

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

Looking Forward

The Falls Lake WOC will continue to improve 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.

The committee overseeing the development of NLEW has reviewed BMP efficiencies credited by the nutrient accounting software. This review was part of the ongoing examination of practices utilized to assess cropland's nutrient losses. Currently there is no funding for NLEW updates, which are required when new data are developed through ongoing research or if soil map units are changed. Corn realistic yield expectations were updated by the Interagency Nutrient Management Committee in 2014, and it is important that these changes be added to a new version of NLEW so that nitrogen utilization is a good approximation of real world conditions. Without funding these updates cannot be incorporated into the software.

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 will be conducted every five years contingent upon availability of funding and staff resources. Additionally, understanding of agricultural phosphorus management could be improved through in-stream monitoring contingent upon the availability of funding and staff resources.

A subcommittee of the Falls and Jordan Lake WOCs is 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 cropland in the watershed, the WOC will consider whether separate accounting for those applications of nutrients is feasible and appropriate.

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 for technicians will expire on June 30, 2015. A more centralized approach to data collection and verification will be necessary. This approach will involve GIS analysis and more streamlined FSA acreage documentation. Farmers and agency staff personnel with other responsibilities serve on the LACs in a voluntary capacity. These LACs will be trained to handle the new workload to the best of their ability. Given that district staff has neither the time nor financial resources to synthesize county level data, however, this centralized approach will come at the expense of some local knowledge.

Additionally, due to budget reductions for staff, the Division of Soil and Water Conservation no longer has the resources to fund a Neuse/Tar-Pamlico Basin Coordinator focused solely on coordinating agricultural rule implementation. This year the Division combined that position's job duties with another employee's current work plan, requiring changes in how reporting will be done and the amount of follow up and support available locally. Annual agricultural reporting is required by the rules; therefore continued funding for the Division's staff resources needed for the reporting is essential for compliance.

Financial constraints will affect future reporting:

- The Falls Lake Watershed has lost one basin technician, and funding for the remaining technician expires on June 30, 2015. LACs will be required 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.
- There are currently no funds available to update NLEW with new crop varieties and soil management groups. These updates are needed to ensure reporting accuracy.
- Periodic land use surveys critical to understanding watershed agricultural activities are contingent upon future funding.