

AGRICULTURE & WATER QUALITY

IN THE TAR-PAMLICO RIVER BASIN

OVERVIEW

Agriculture is NC's leading industry and is especially strong in the Tar-Pamlico River Basin. Nonpoint source pollution from agriculture is an identified significant source of stream degradation in the Tar-Pamlico River basin. The approach taken in North Carolina for addressing agriculture's contribution to the nonpoint source water pollution problem is to primarily encourage voluntary participation by the agricultural community. This approach is supported by financial incentives, technical and educational assistance, research, and regulatory programs.

Due to the collective nutrient loading to the Pamlico Estuary, the [Tar-Pamlico Agricultural Nutrient Control Strategy Rule](#) and [Law](#) became effective September 2001, providing a collective strategy for farmers to meet the 30% nitrogen loss reduction and no-increase phosphorus loss. Farmers in the basin are to implement land management practices that achieve certain nutrient reduction goals. More information about these goals and accomplishments are discussed in the NSW Chapter 6.

Agricultural practices in the Tar-Pamlico River Basin accounts for 28% of the land use activities; of that, 7% are estimated as pasture/hay land and 21% in cultivated crops (Figure 7-1). The primary crops being soybeans, corn and cotton. The USDA completed an agriculture census in 2007 indicating a slight increase (1%) in the numbers of farms in the basin but a decrease (-11%) in the acreage being farmed (Table 7-1). This census data also indicates an increase in farms and acreage using pasture and a decrease in overall fertilizer and chemical usage. This change could be associated with the increase in number of farms with smaller hoofstock (sheep, goats, horses). Hog and poultry animal numbers have also increased although several hog farms have ceased operation or consolidated with another farm. In 2006, a large egg laying facility opened in Hyde County with the capacity to house more than four million birds. The decrease in fertilizer usage is likely associated with costs; according to USDA economic research the cost of fertilizer has more than doubled since 1991 (<http://www.ers.usda.gov/Data/FertilizerUse/>).

FIGURE 7-1. LAND COVER

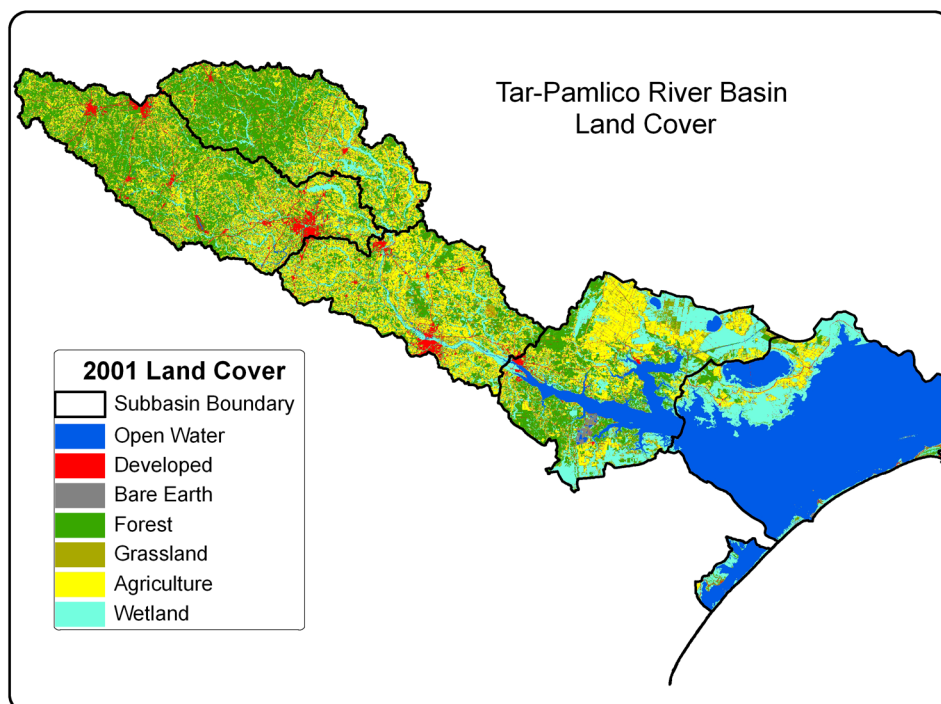


TABLE 7-1. USDA AGRICULTURE CENSUS DATA <http://www.usda.gov/nass/PUBS/TODAYRPT/waters09.pdf>

	% FARM CHANGE	% ACRES CHANGE	2002 FARM #	2002 ACRES	2007 FARM #	2007 ACRES
Farms	1	-	3,277	-	3,307	-
Land acreage in farms	-	-11	-	1,191,263	-	1,077,822
Land Use						
Total cropland:	-13	-12	2,750	801,219	2,424	716,603
Harvested cropland:	-18	-9	2,060	687,252	1,743	629,069
Cropland used only for pasture or grazing:	-49	-22	883	34,796	594	28,449
Cropland w/ failed crops or abandoned:	-46	-79	337	23,538	231	13,150
Cropland idle, cover crops, or soil improvement but not harvested and not pastured or grazed:	-11	-12	769	42,994	690	38,479
Cropland in cultivated summer fallow:	-50	-70	159	12,639	104	7,456
Total woodland:	3	-15	1,977	303,507	2,039	264,435
Woodland pastured:	-24	-170	631	43,296	510	16,050
Woodland not pastured:	8	-5	1,642	260,211	1,791	248,385
Permanent pasture and rangeland:	26	21	861	39,048	1,171	49,526
Land in farmsteads, buildings, livestock facilities, ponds, roads, wasteland, etc.:	-11	0	1,899	47,489	1,716	47,258
Irrigated land:	-30	-30	576	38,181	443	29,464
Harvested cropland:	-32	-32	526	35,863	397	27,110
Pastureland and other land:	-7	2	61	2,318	57	2,354
Land used for organic production:	24	-20	16	477	21	399
Fertilizers and Chemicals						
Commercial fertilizer, lime, and soil conditioners:	-12	-13	1,939	664,245	1,738	586,969
Manure:	-18	-31	326	27,161	276	20,668
Acres treated with chemicals to control -						
Insects:	-49	-17	1,304	463,385	876	396,664
Weeds, grass, or brush:	-30	-22	1,539	579,941	1,182	473,456
Nematodes:	-62	-35	440	95,773	272	70,932
Diseases in crops and orchards:	-50	-27	312	85,442	208	67,351
Selected Crops						
Corn:	1	20	583	120,648	590	150,131
Soybeans:	-12	7	897	207,993	800	223,933
Small grains (wheat, oats, barley, rye):	-23	-4	489	80,405	397	77,512
Cotton:	-64	-75	418	221,033	255	126,243
Vegetables and melons harvested for sale:	8	-8	241	26,468	262	24,612
Fruit and tree nuts:	15	-1	63	330	74	328
Nursery, greenhouse, floriculture, and sod:	-10	65	106	1,186	96	3,428
All other crops (other than those listed above):	-39	-20	1,449	83,390	1,043	69,327
Livestock						
	% Change Farm #	% Change Animal #	2002 Farm #	2002 Animal #	2007 Farm #	2007 Animal #
Cattle and calves:	-13	-4	885	42,152	786	40,473
Hogs and pigs:	-32	5	179	530,017	136	557,371
Sheep and lambs:	26	0	56	1,928	76	1,921
Horses and ponies:	16	20	510	3,169	609	3,944
Goats:	32	15	225	6,540	332	7,724
Chickens (does not include Rose Acres 4,750,000 birds):	2	12	302	6,484,314	309	7,370,874

Animal Operations & Recommendations

In 1992, the Environmental Management Commission (EMC) adopted a rule modification (15A NCAC 2H.0217) establishing procedures for managing and reusing animal wastes from intensive livestock operations. The rule applies to new, expanding or existing feedlots with animal waste management systems designed to serve animal populations of at least the following size: 100 head of cattle, 75 horses, 250 swine, 1,000 sheep or 30,000 birds (chickens and turkeys) with a liquid waste system. Even though the rules adopted by the EMC are focused on managing and reusing animal waste in an environmentally and economically feasible manner, animal operation facilities can have many other impacts on local and downstream water quality.

Currently, DENR has regulatory authority over waste management of swine and cattle feedlots that use dry systems and applications of a wastewater or liquid manure. Most poultry operations produce a dry litter waste which is not regulated. The locations of dry litter poultry operations and the disposal of their waste is not known to environmental regulators due to the fact that there are no permitting requirements, making it very difficult to get a complete picture of the possible non-point sources contributions within a specific watershed. This makes managing, protecting and enhancing water quality that much more challenging. The location of hog and cattle CAFOs are known due to the fact that a State or NPDES permit is required by DWQ. While their direct nutrient contribution is not currently well understood, knowing that these sources exist in the watershed can help water quality managers to better understand the available water quality data and make better regulatory recommendations and decisions.

Due to a hog farm moratorium put in place in 1997 and a new law passed in 2007 prohibiting the construction of new hog waste lagoons and spray fields as the primary method of waste management (SB 1465), nutrient contributions from hog operations have remained fairly constant over the last several years. However, the continued growth in the poultry industry in the coastal plain of NC is continuing to add to the current nutrient loading from non-point sources. The 2007 USDA census data indicates that in 2007 there were 7,370,874 chickens in the Tar-Pamlico basin. The number of chickens has likely increased by at least another 3,000,000 totaling over 10,000,000 chickens due to the Rose Acres egg farm continuing to stock their facility. This would result in an increase of at least 35% since 2002. The data that is currently available for the Rose Acres Farm indicates that poultry operations are likely having a significant impact on the water quality in the Tar-Pamlico River basin and other coastal basins. It is estimated that 40% of the nitrogen entering the Albemarle-Pamlico Sound originate from atmospheric sources (DENR-DAQ, 1999; Costanza et al., 2008). Due to the prevailing wind direction, the highest nitrogen depositional rates from CAFOs are in the Neuse and Tar-Pamlico watersheds (Costanza et al., 2008). This is likely to increase overtime with the continued growth of the poultry industry in coastal North Carolina.

Additional impacts from agriculture include:

- **Streambank Erosion & Sedimentation:** Livestock grazing with unlimited access to the stream channel and banks can also cause severe streambank erosion resulting in sedimentation and degraded water quality.
- **Loss of Riparian Vegetation:** As livestock gather near streams, the riparian zone becomes trampled and thinned out. Establishing, conserving and managing streamside vegetation (riparian buffer) is one of the most economical and efficient BMPs.
- **Excessive nutrients:** Elevated nutrients levels occur when livestock have direct access to the waterbodies and also from stormwater runoff from pastures, feedlots, barnyards and fertilized fields. There are a variety of BMPs designed to prevent nutrient runoff from animal operations. Functioning riparian zones or buffers are known to greatly reduce instream nutrients loads from stormwater runoff.
- **Animal waste is often stored in lagoons before it is applied to fields.** Numerous environmental

hazards exist from these lagoons including: ammonia emissions, overflows into surface waters, and groundwater contamination. It is a concern that several animal operations in the basin will be abandoned without proper closeout of the lagoons.

There are a variety of programs available to and used by agricultural facilities throughout North Carolina. Many give incentives for protecting water quality including activities supported by the Federal Farm Bill. For more information on these programs see [Supplemental Guide to North Carolina's Basinwide Planning Chapter 6](#) and the [2008 Farm Bill](#).

DWQ's Animal Feeding Operations Unit is responsible for the permitting and compliance activities of animal feeding operations across the state. Table 7-2 summarizes the number of registered livestock operations, total number of animals and number of facilities, in the basin. These numbers reflect only operations required by law to be registered and, therefore, do not represent the total number of animals in the subbasin (e.g., dry poultry operations and aquaculture facilities not counted).

TABLE 7-2. DWQ PERMITTED FACILITIES

TYPE	NUMBER OF FACILITIES	NUMBER OF ANIMALS
Animal Individual	14	4,759,600
Cattle	6	2,205
Wet Poultry	7	795,600
Swine	96	369,897

Farmland Preservation & Conservation

A report by the American Farmland Trust organization identifies a majority of the Tar-Pamlico River basin as having high quality farmland with large areas threatened by development. A map of these areas is available from their website <http://www.farmland.org/>. Farmers in the basin are protecting their land with the assistance of the Conservation Reserve Enhancement Program (CREP). CREP is a voluntary program utilizing federal and state resources to achieve long-term protection of environmentally sensitive cropland and marginal pastureland. These voluntary protection measures are accomplished through 10-, 15-, 30-year and permanent conservation easements. In this basin, there are approximately 29,326 acres in easements, of which 54% are in 30 year or permanent easements.

North Carolina Agriculture Cost Share Program

Financial incentives are provided through North Carolina's Agriculture Cost Share Program, administered by DENR's Division of Soil and Water Conservation to protect water quality by installing BMPs on agricultural lands. From 2003-2008, 1,783 BMPs were implemented with a value of over \$6.5 million. The distribution of these BMPs are shown in Figure 7-2. A quantification of how much these BMPs prevented nitrogen and phosphorus loss is totaled in each subbasin chapter.

Drainage Districts.

Principals for land and water management have changed significantly throughout history. The results of the previous land use management strategies still influence current practices and water quality (e.g., ditches, canals, sediment and nutrient accumulation). Removing water quickly and efficiently from the land was a public health and agricultural priority. To facilitate this North Carolina General Statute [Chapter 156](#) provides the right to establish local drainage districts.

"§ 156-54. Jurisdiction to establish districts. The clerk of the superior court of any county in the State of North Carolina shall have jurisdiction, power and authority to establish levee or drainage districts either wholly or partly located in his county, and which shall constitute a political subdivision of the State, and to locate and establish levees, drains or canals, and cause to be constructed, straightened, widened or deepened, any ditch, drain or watercourse, and to build levees or embankments and erect tidal gates and pumping plants for the purpose of draining and reclaiming wet, swamp or overflowed land; and it is hereby declared that the drainage of swamplands and the drainage of surface water from agricultural lands and the reclamation of tidal marshes shall be considered a public use and benefit and conducive to the public health, convenience and welfare, and that the districts heretofore and hereafter created under the law shall be and constitute political subdivisions of the State, with authority to provide by law to levy taxes and assessments for the construction and maintenance of said public works. (1909, c. 442, s. 1; C.S., s. 5312; 1921, c. 7.)"

Drainage Districts are still in use in the Tar-Pamlico River Basin, however little is known about the type of activities (where and how often) being used to maintain drainage within agricultural lands. An inquiry with local governments indicated most county officials are not aware of operating districts within their jurisdiction. The knowledge of instream/in-ditch maintenance activities may be useful to understanding fluctuations in water quality samples that may have been taken near drainage district activities.

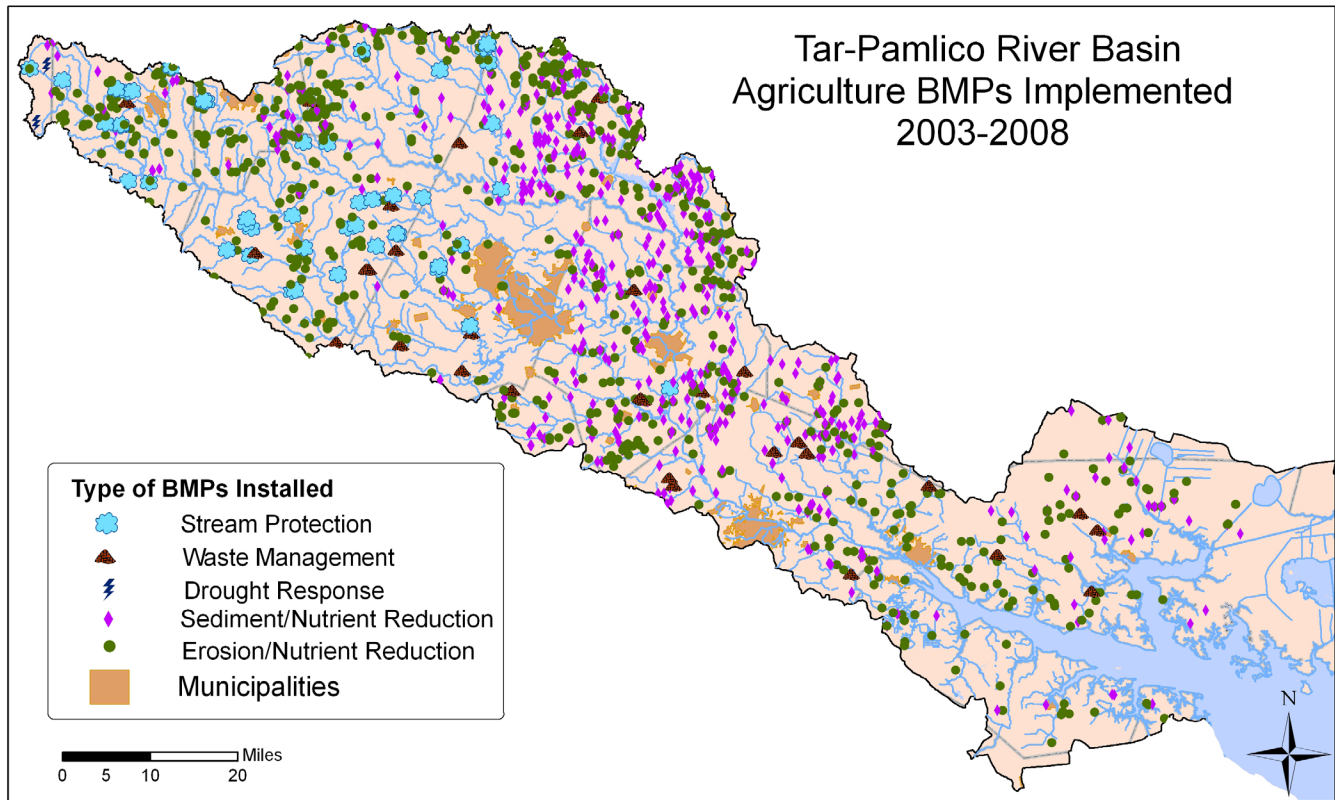


TABLE 7-2. AGRICULTURE BMPs IMPLEMENTED BY DSWC BETWEEN 2003-2008

References

- American Farmland Trust. Farming on the Edge: North Carolina State Map. http://www.farmland.org/resources/fote/states/map_northcarolina.asp.
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- DENR-DAQ 1999. Status Report on Emissions and Deposition of Atmospheric Nitrogen Compounds from Animal Production in NC. <http://daq.state.nc.us/monitor/projects/nstatusreport.pdf>.
- USDA Economic Research Service. The Economics of Food, Farming, Natural Resources and Rural America. US Fertilizer Use and Price. <http://www.ers.usda.gov/Data/FertilizerUse/>.
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