REPORT TO THE ENVIRONMENTAL REVIEW COMMISSION AND FISCAL RESEARCH DIVISION OF THE NORTH CAROLINA GENERAL ASSEMBLY
ON
THE PILOT PROGRAM FOR INSPECTIONS OF ANIMAL WASTE MANAGEMENT SYSTEMS
2011 ANNUAL REPORT
For Calendar Year 2010

EXECUTIVE SUMMARY

For 12 years, the pilot program has collected data from 4,216 documented site visits to permitted animal operations in Brunswick, Columbus, Jones and Pender counties. Division of Soil and Water Conservation (DSWC) staff has used this data to study and better understand the factors that influence compliance and affect the potential for environmental impact by animal waste management systems. For 2010, DSWC experienced or observed the following:

- Variability in precipitation distribution, in addition to total precipitation amounts, had substantial influence on overall compliance by pilot farms in 2010. (p.6)

- The number of pilot farms categorized into the potential high and medium impact categories increased to seven and 18, respectively, out of 166 farms. (Fig. B, p.6)

- “Immediate threat” problems were identified on 5 percent of all site visits in the pilot counties. (p.7)

- The operational indicator with the highest frequency of occurrence was “receiving crop/sprayfield needs improvement” at 11.7 percent of all site visits in the pilot counties. (p.7)

- DSWC per-visit costs continue to be less for pilot farms when compared to non-pilot farms. (Table 4, p.8)

- DSWC per-farm costs are higher for pilot farms than non-pilot farms due to increased frequency of site visits. (Table 4, p.8)

INTRODUCTION

In accordance with Section 12.7(b) of S.L. 2005-276, the objective of the Animal Waste Management Inspection Pilot (hereinafter the pilot), is to determine how DSWC staff can respond more quickly and effectively, with technical assistance, to complaints and problems to help farms achieve compliance with environmental regulations. In addition, the program allows Department of Environment and Natural Resources (DENR) staff to test approaches for earlier identification of problems and to target DENR's resources toward expediting corrective actions.

The pilot program started in 1997 with Columbus and Jones counties and was expanded in 1999 and in 2005 to include Brunswick and Pender counties, respectively. The General Assembly, through Session Law 2009-84, extended the pilot program through Sept. 1, 2011.

In non-pilot counties, the Division of Water Quality performs annual routine compliance inspections of all permitted livestock operations; however, in the pilot counties, DSWC staff conducts *routine* compliance inspections in addition to performing *routine* operation reviews of all permitted livestock operations. In the pilot counties, DWQ staff provides regulatory oversight, performs compliance audits with DSWC staff of "targeted" potential high environmental impact farms, responds to DSWC referrals and conducts additional compliance inspections for further investigation and enforcement actions as warranted.

There are 166 active swine farms in the pilot area of Brunswick, Columbus, Jones and Pender counties. When the Environmental Protection Agency (EPA) revised its National Pollutant Discharge Elimination System (NPDES) regulation in response to the 2nd U.S. Circuit Court of Appeals ruling in the *Waterkeeper et al. v. EPA*, the number of pilot farms operating under NPDES permits dropped from 95 to 1 in 2007. Currently, all 166 pilot farms are operating under state non-discharge general permits.

PRECIPITATION

Annual precipitation amounts and events have the biggest impact on compliance performance by farms in the pilot program area. Animal waste management systems, including anaerobic lagoons and waste storage ponds, are generally designed to store one 25-year, 24-hour storm event (ranges from 7 to 8 inches in pilot area), 180 days of excess rainfall over evaporation, wash water and animal waste. Heavy precipitation amounts greater than the historical average and/or periods of prolonged precipitation can strain the storage capacity of the waste system. In addition, the waste system's capacity to land apply waste to receiving

crops is also diminished due to wet or frozen soil conditions, wind and/or limited availability of adequate crops to use nutrients in the waste. Conversely, dry conditions can negatively impact vegetative cover on dike walls of waste structures and damage receiving crops.

A number of weather-related factors combined to make 2010 a challenging year for animal waste management in the pilot area. Due to the remnants of Tropical Storm Ida and an ensuing El Nino weather pattern, the pilot area experienced excessively high precipitation amounts during the final two months of 2009. These large precipitation amounts resulted in an above average number of lagoons entering the 2010 year with liquid levels above compliance thresholds. Due to saturated spray field conditions and continued precipitation, lagoon levels remained high through the first two months of 2010. As conditions dried off during the early spring of 2010, farmers were able to lower lagoon levels through land application.

Following the summer of 2010, the pilot area experienced a tremendous spike in precipitation amounts at the end of September. Heavy rainfall initially started due to a slow-moving front that approached from the northwest. As the front became stationary, the rainfall continued. The situation was aggravated as moisture from the remnants of Tropical Storm Nicole was absorbed into the frontal system resulting in record rainfall in the pilot area and eastern North Carolina.

Table 1 lists total rainfall amounts for the last week of September 2010 in the pilot counties. Jones County received 22.41 inches during this period.

Pilot County	Rainfall Amount (inches)
Jones (Trenton Weather Station)	22.41
Pender (Willard Weather Station)	11.47
Columbus (Whiteville Weather Station)	9.85
Brunswick (Longwood Weather Station)	8.52

Table 1. Rainfall totals for the last week of September 2010.

Source: North Carolina State Climate Office – CRONOS Database

While large spikes in precipitation amounts occurred at times during the year in the pilot counties, actual 2010 precipitation totals were less than normal for all pilot counties except one. In Jones County, the 2010 precipitation total was 9.3 inches (18 percent) greater than normal. Variability in precipitation distribution can have an impact on animal farm compliance performance even if annual precipitation totals are near normal or less.

Figure A reflects the abnormally wet conditions experienced by the pilot area during the spring and fall of 2010. The variability in monthly distribution of precipitation had a greater impact on the pilot area than total annual precipitation amounts in 2010.

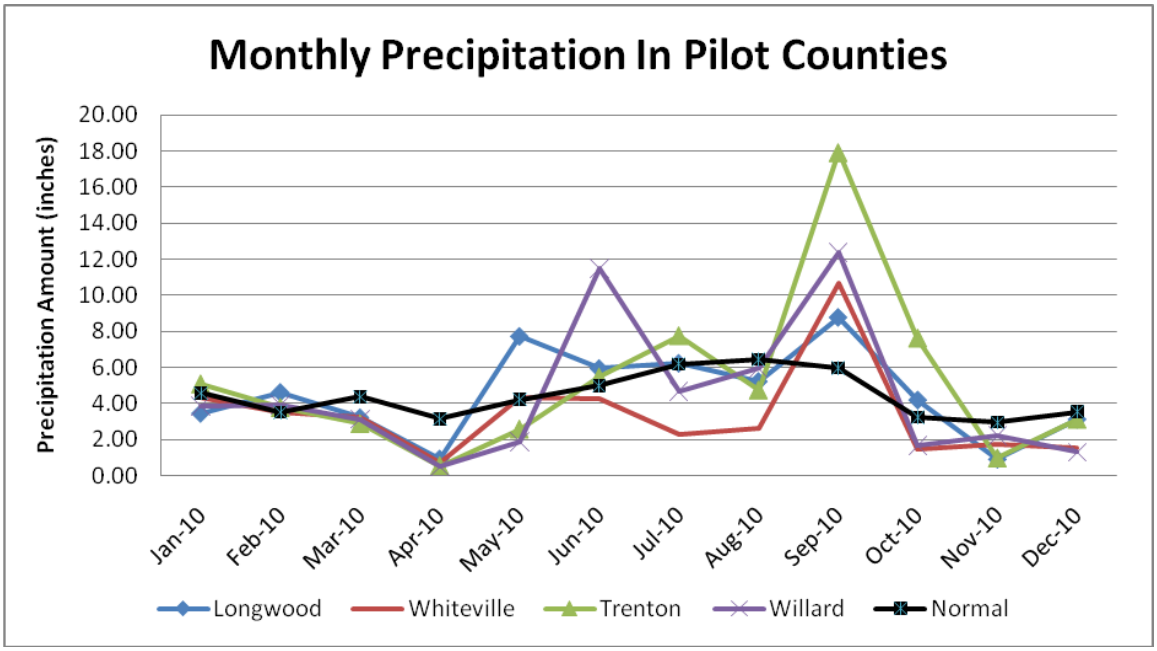

Figure A. January 2010-December 2010 monthly normal and actual precipitation amounts measured at weather stations located within the four pilot counties.

Source: North Carolina State Climate Office – CRONOS Database.

ENVIRONMENTAL IMPACT GROUPS

DSWC staff continued to use the environmental scale first described in the May 21, 2002 ,Addendum ERC Report to separate pilot animal operations based on their compliance performance and relative potential for environmental impact. Data is gathered through DENR's standard inspection form and entered into DWQ's Basinwide Implementation Management Systems (BIMS) database. The pilot's operational indicators and problem parameters are then queried and assessed from these documented site visits.

Table 2 lists the operational indicators used to assess animal waste management systems' performance on pilot farms with assigned points to reflect the degree of "immediate" or "potential" threat a specific compliance deficiency would have on the environment. The program is based on the following 15 indicators with relative point values remaining constant since 2002.

Operational Indicators	Point Value
Offsite discharge	20
Structural integrity compromised	18
Waste in structural freeboard range	16
Hydraulic overloading	15
Nitrogen over-applied ≥ 10%	12
Waste level in storm storage	11
Irrigation system maintenance deficiency	11
Structural maintenance deficiency	10
Receiving crop inconsistent with waste plan	10
Irrigation records deficient	10
Lagoon level records deficient	9
Nitrogen over-applied <10%	8
Receiving crop/sprayfield needs improvement	8
Waste analysis deficient	8
Soil analysis deficient	7

Table 2. Operational indicators and related point values are used by DENR staff to evaluate farm's potential impact on the environment. Items in italics represent "immediate threat" indicators.

Pilot farms were assessed using the non-compliance point values and categorized into three potential impact groupings based on their total scores.

Point ranges for the three groups, as shown in **Table 3**, were initially determined from farm performance in 2000 and remained unchanged through 2010.

Potential Impact Group	Noncompliance points
Low environmental impact	0 – 12 points per year
Medium environmental impact	13 – 30 points per year
High environmental impact	31 or more points per year

Table 3. Potential environmental impact groupings and corresponding noncompliance point ranges.

Farms in the low and medium environmental impact groups are generally deemed to be responsive to technical assistance and subject to continued *routine* operation reviews and compliance inspections by DSWC. Farms scoring in the high impact group are subject to more intensive oversight by DSWC and DWQ through compliance audits and additional DWQ involvement.

PROGRAM FINDINGS

Site Visit Data

Activity from Jan. 1 through Dec. 31, 2010, both in and out of the pilot area, is reflected in the following data that was either queried from DWQ's BIMS database or presented in DWQ's data reports:

- Statewide – 2,384 animal operations were subject to permitting and inspection.

- Statewide - DENR staff conducted 4,881 site visits (2,497 by DSWC & Soil and Water Conservation Districts and 2,384 by DWQ).

- Pilot area - 166 animal operations were subject to permitting and inspection.

- Pilot area - DENR staff conducted 384 site visits (350 by DSWC and 34 by DWQ).

Farm Performance

In **Figure B**, pilot farms are grouped by their environmental impact scores and shown as a percentage of the total number of pilot farms in operation within a given year.

In 2010, 85 percent of the pilot farms were categorized as low impact. The number of farms in the medium environmental impact group with scores from 13 to 30 points increased from eight to 18 (11 percent). The number of farms with scores of 31 or more points and placed in the high environmental impact group increased from three to seven (4 percent).

Due to the heavy rainfall events that occurred during calendar year 2010, there were numerous “self-reported” high lagoon levels both in and out of the pilot area. If these self-reported incidents of non-compliance were considered when assigning impact scores to the pilot farms, the number of high impact farms would increase slightly, to eight. There would also be an increase in the number of medium impact farms, to 22.

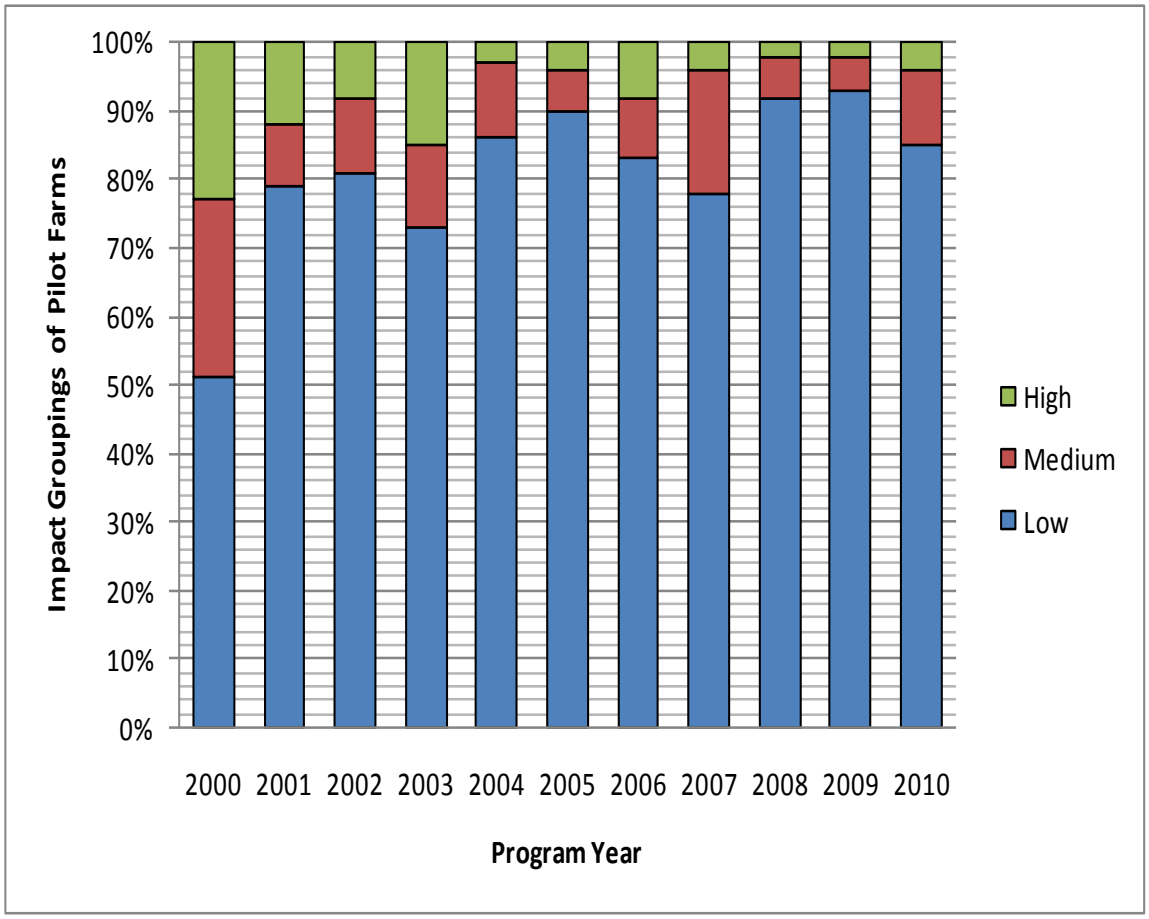

Figure B. Pilot farms grouped into environmental impact categories.

As noted earlier, precipitation amounts and events have a large impact on compliance performance by farms in the pilot program area. The increased number of farms categorized in the medium and high impact group for 2010 can be largely attributed to the excessive rainfall periods that occurred during the year. Program year 2010 illustrated that variability in precipitation distribution, in addition to total amount, can have a large impact on compliance performance.

Table 4 summarizes the frequency of occurrence for the operational indicators during calendar year 2010 in the pilot area. The high frequency of waste level non-compliance is mainly due to periods of excessive rainfall that occurred during 2010. Waste level non-compliance includes the "waste in structural freeboard range" and the "waste level in storm storage" operational indicators. The excessive rainfall also contributed to an increase in the number of receiving crop deficiencies due to late plantings and crop failures from drowning. This is illustrated by the high frequency of deficiencies for *receiving crop/sprayfield needs improvement* in the pilot area.

Operational Indicator	2010 (%)
Offsite discharge	*2.08*
Structural integrity compromised	*0.00*
Waste in structural freeboard range	*3.65*
Hydraulic overloading or ponding	*4.95*
Nitrogen over-applied ≥ 10%	*0.26*
Waste level in storm storage	5.21
Irrigation system maintenance deficiency	0.52
Structural maintenance deficiency	4.43
Receiving crop inconsistent with waste plan	1.04
Irrigation records deficient	3.13
Waste level records deficient	4.69
Nitrogen over-applied < 10%	0.26
Receiving crop/sprayfield needs improvement	11.72
Waste analysis deficient	1.30
Soil analysis deficient	2.86

Table 4. "Frequency of Occurrence" displayed as a percentage for finding an operational indicator on a site visit from Jan. 1, 2010, through Dec. 31, 2010. Items in italics represent "immediate threat" indicators.

Cost & Labor Comparisons

Salaries, office rent, administrative and operating costs, coded work hours and actual mileage costs were updated and compiled to determine a DSWC operating cost of $27.97 per hour in 2010, down from the 2009 cost of $29.30 per hour. DSWC's hourly operating cost is the same for pilot and non-pilot farms alike. Differences between pilot vs. non-pilot costs arise as a result of the frequency and duration of site visits.

Table 5 reflects key cost and labor comparisons. The DSWC's per-visit costs continue to remain less for pilot farms compared to non-pilot farms. Conversely, DSWC's per-farm costs continue to be higher in the pilot program, and are a direct function of the higher frequency of site visits made to pilot farms.

Pilot Farms	Non-pilot Farms
$164.13 per DSWC visit	$199.30 per DSWC visit
2.11 visits per farm	1.02 visits per farm
5.87 hours per visit	7.13 hours per visit
$346.06 per farm	$203.27 per farm

Table 5. Key cost comparisons for DSWC Operations Review Staff in the 2010 calendar year

CONCLUSIONS

For 12 years, the pilot program has collected data from 4,216 documented site visits to permitted animal operations in Brunswick, Columbus, Jones, and Pender counties. DSWC staff continues to use the data to study and better understand the factors that influence compliance and affect the potential for environmental impact by conventional animal waste management systems. During the report period, DSWC experienced or observed the following:

- In program year 2010, 96 percent of farms in the pilot counties were identified as having a medium or low potential impact based on operation indicators. Due to heavy rainfall that resulted in non-compliant lagoon liquid levels, 10 facilities shifted from the low impact grouping to the medium impact grouping.

- The variability in monthly distribution of precipitation had a greater impact on the pilot area than total annual precipitation amounts in 2010. The rainfall distribution variability also contributed to an increase in the occurrence of deficient receiving crops in spray fields.

- The impact of the statewide operation review program on producers, both in and out of the pilot area, indicates DSWC site visits are meeting the overall program objective of providing technical assistance.

- In accordance with current legislation, the pilot program is scheduled to terminate on Sept. 1, 2011.