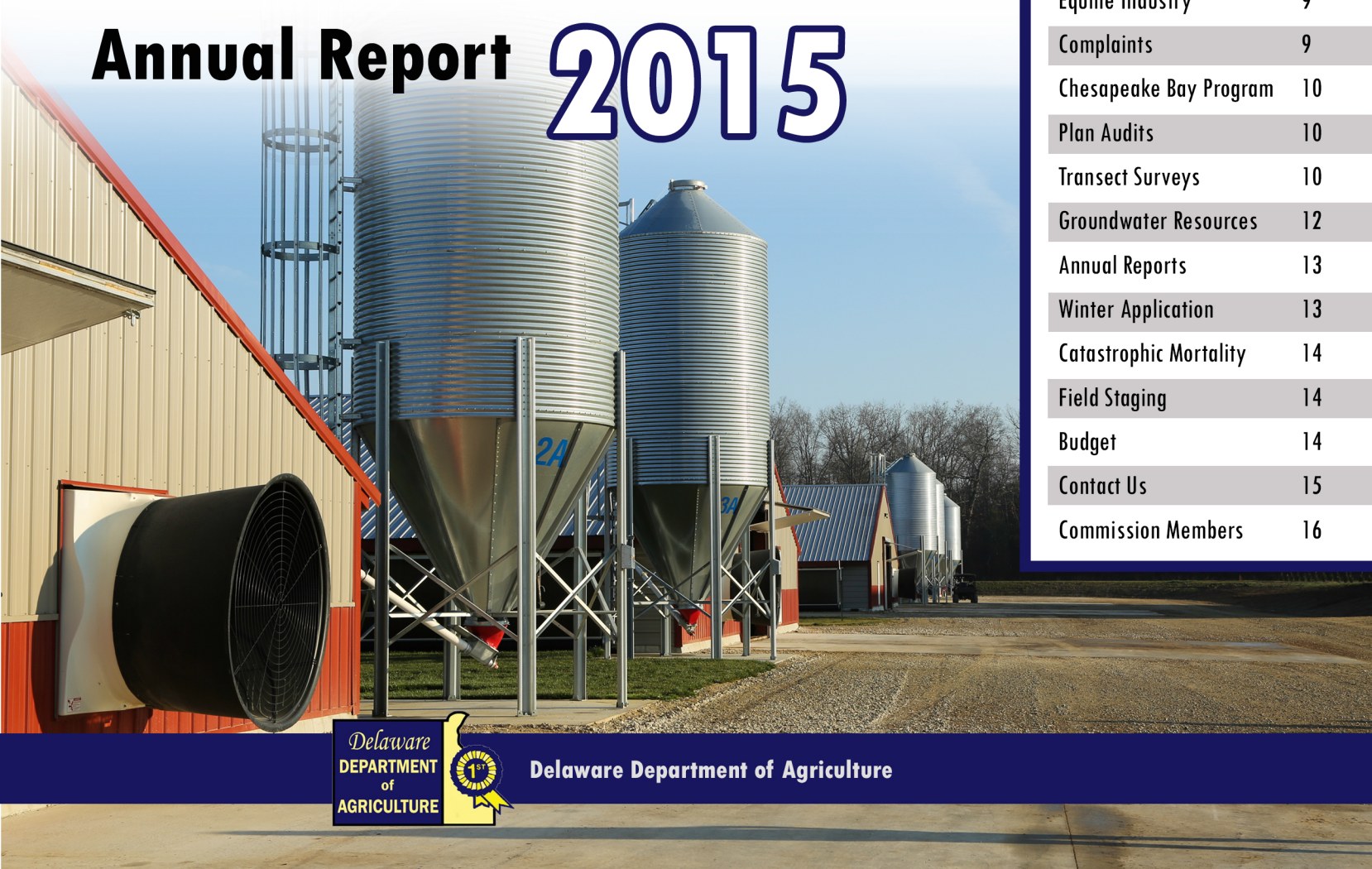
REPORT TO GOVERNOR JACK A. MARKELL AND THE 148TH GENERAL ASSEMBLY

Delaware Nutrient Management Commission

Annual Report 2015



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Delaware DEPARTMENT of AGRICULTURE

Delaware Department of Agriculture

MISSION

To manage those activities involving the generation and application of nutrients in order to help improve and protect the quality of Delaware's ground and surface waters, sustain and promote a profitable agricultural community, and to help meet or exceed federally mandated water quality standards, in the interest of the overall public welfare.

The Nutrient Management Program has completed its 16th year since the passage of the Nutrient Management Law in 1999. The law was enacted to address agriculture's influence on water quality in Delaware. This Annual Report to the Governor highlights the activities of the program during 2015.

GOALS AND STRUCTURE

The Nutrient Management Law established a 19-member Commission that is charged to develop, review, approve and enforce regulations governing the certification of individuals engaged in the business of land application of nutrients and the development of nutrient management plans. The members of this Commission come from many different backgrounds and professions.

The program's purpose is to:

1. regulate those activities involving the generation and application of nutrients;
2. establish a certification program that encourages the implementation of best management practices in the generation, handling or land application of nutrients;
3. establish a nutrient management planning program; and
4. formulate a systematic and economically viable nutrient management program.

The law established an independent 19-member commission consisting of 15 appointed voting members and 4 ex officio members.

The 15 voting members are the Director of the Division of Watershed Stewardship of the Delaware Department of Natural Resources and Environmental Control or his/her designee; four members appointed by the Governor; three members appointed by the President Pro Tempore of the Senate; two members appointed by the Senate Minority Leader; three members appointed by the Speaker of the House; and two members appointed by the House Minority Leader.

The 14 appointed members of the Commission shall be residents of the State, shall have participated in the industry or organization they represent for at least 5 years, and shall consist of seven full-time farmers (one dairy producer, one swine producer, one equine operation owner, two poultry farmers and two row crop farmers [one vegetable, one grain]), one commercial/agricultural nutrient applicator, one member of the commercial nursery industry, one golf course/lawn care industry representative, two members from one or more community-based environmental advocacy groups, one nutrient consultant, and one public citizen.

The ex-officio members include the Secretary of the Department of Agriculture, the Secretary of the Department of Natural Resources and Environmental Control, and the Secretary of the Department of Health and Social Services, or their respective designees, and the Nutrient Management Program Administrator.

COMMISSION'S RESPONSIBILITIES

The Delaware Nutrient Management Commission will:

1. Consider establishing critical areas for voluntary and regulatory programs.
2. Establish Best Management Practices to reduce nutrients in the environment.
3. Develop educational and awareness programs regarding Nutrient Management.
4. Consider cost share programs to redistribute excess nutrients.
5. Establish the elements and general direction of the State Nutrient Management Program.
6. Develop nutrient management regulations.

STRATEGIC GOALS

1 Promote alternative use practices for excess nutrients generated in Delaware by developing and implementing incentive and market-based programs.

2 Maintain a program to assist in developing and funding nutrient management plans according to law and program standards.

3 Maintain nutrient management certification requirements by providing nutrient handlers with initial and continuing educational opportunities.

4 Maintain the State's National Pollutant Discharge Elimination System (NPDES) Permitting program for concentrated animal feeding operations (CAFO) on behalf of the Delaware Department of Agriculture in cooperation with the Department of Natural Resources and Environmental Control (DNREC) and according to the Federal Clean Water Act.

5 Promote research projects within the agricultural community for best management practices.

6 Audit nutrient management activities to ensure legal compliance.

7 Respond to informal and formal complaints against nutrient management handlers and generators.

8 Recognize environmental stewards within the agricultural community with the cooperation and financial support of the agri-businesses operating within the State.

9 Facilitate and actively fund research projects according to priorities that will better balance science-based policy development with modern and responsible nutrient management practices.

PERFORMANCE MEASURE GOALS 2015

	FY 2013 Actual	FY 2014 Actual	2015 Actual
Tons of poultry litter-manure relocated within Delaware for land application	22,817	14,245	11,480
Tons of poultry litter-manure exported from Delaware for land application	20,088	16,203	20,667
Tons of poultry litter-manure relocated to an alternative use project	18,887	20,487	20,245
Acres managed under an updated nutrient management plan	116,048	88,381	83,286
Certified nutrient consultants	113	130	139
Certified commercial nutrient handlers	74	76	86
Trained private nutrient handlers	1,136	1,076	1,086
Trained nutrient generators	519	476	491
Nutrient management plan audits	73	183	83
Compliance complaints by constituents	20	20	29
Percent complaints resolved	100	100	100

TRAINING, EDUCATION AND CERTIFICATION

Dr. Amy Shober and Sydney Riggi
University of Delaware Cooperative Extension

The University of Delaware Cooperative Extension continues to offer initial nutrient management certification training semi-annually to individuals who apply nutrients to ten or more acres of Delaware land or have a commercial livestock operation. These state-wide training sessions are led by University of Delaware Cooperative Extension, with assistance from the Delaware Department of Agriculture. Program oversight is provided by the Delaware Nutrient Management Commission and the Delaware Department of Agriculture. The certification sessions provide the latest information and tools to encourage the adoption of best management practices to reduce the risk of nutrient loss to water. Since its inception in 2001, the University of Delaware Cooperative Extension has provided state-mandated certification training to over 3,200 individuals and certified more than 2,600 individuals at four certification levels (Table 1). In 2015, the University of Delaware Cooperative Extension offered 17 initial certification sessions and seven required examination sessions. In 2015, 111 individuals were newly certified (Table 1), representing a variety of business types (Figure 1).

Once certified by the Delaware Nutrient Management Program, individuals are required to attend continuing education programs to obtain CEUs as required to maintain certification. Program subject matter is as varied as the individuals who attend the continuing education programs. The main program audiences include lawn, landscape, golf course, athletic field, vegetable, grain, poultry, dairy, and many other industries. As the Delaware Nutrient Management Program matures, an emphasis is placed on offering more advanced continuing education topics. Continuing education programs offer the latest scientific research or technologic advancement to improve water quality. In 2015, certified individuals attended a total of 7,606.25 hours of nutrient management continuing education (Chart 1). The combined attendance of certified individuals at the 139 programs approved for Delaware Nutrient Management Continuing Education Credits in 2015 was 3,711. Providing Delaware Nutrient Management Program Continuing Education Credits is a collaborative effort between the many entities that organize and present programs to clientele (Figure 2). The University of Delaware Cooperative Extension approves and tracks all of the continuing education programs.

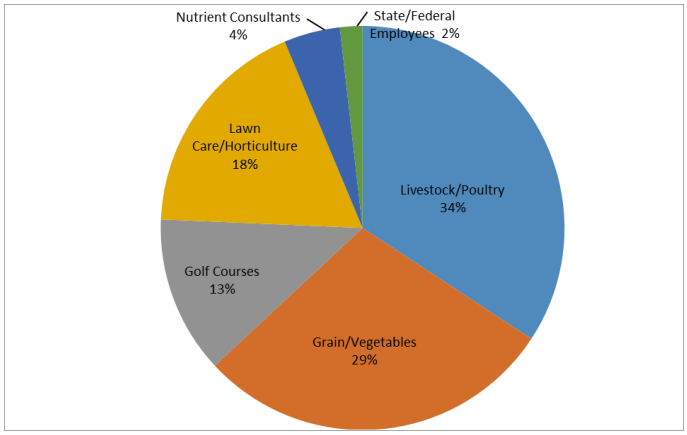
In December 2015, the University of Delaware Cooperative Extension offered inaugural nutrient management certification training to urban horticulture professionals as they are covered by law. Nutrient impairments are common in Delaware waters, resulting from non-point sources of nitrogen (N) and phosphorus (P) from agricultural and urban areas. Urban nutrient losses are partially due to the use of fertilizers on lawns and landscapes.

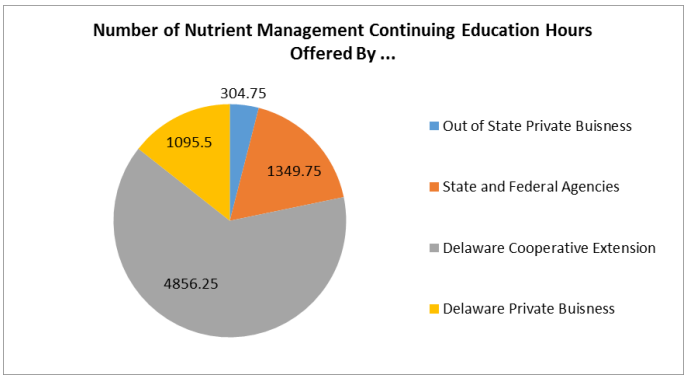
Urban horticulture professionals who fertilize more than 10 acres of land that they manage are required to be certified at as Private or Commercial Nutrient Handlers. Private Nutrient Handlers are required to attend three sessions totaling nine hours of training. Private Nutrient Handlers are often profes-

See **TRAINING**, page 4

Certification Level	Number of Individuals Certified		
	2001-2014	2015	All Years
Nutrient Generator	792	38	830
Private Nutrient Handler	1541	46	1587
Commercial Nutrient Handler	117	20	137
Nutrient Consultant	123	7	130
All Levels	2573	111	2684

Certification in 2015 by business type:





TOWLE STEPS DOWN AS ADMINISTRATOR

Larry Towle, former Program Administrator for the Delaware Nutrient Management Program, retired in July 2015. Towle had managed the program since August 2010. Under his leadership, many steps were taken to meet the complex environmental challenges facing Delaware farmers, including implementation of the 2011 Delaware CAFO permit; increased Nutrient Management audits on Delaware farms to improve compliance; hiring of two additional staff members; helping to craft Delaware's strategy for the Watershed Implementation (WIP) goals for the Chesapeake Bay Total Maximum Daily Load; and serving on several relevant Chesapeake Bay Program teams to improve sector equity.

Towle previously worked in the Pesticide Compliance section of the Delaware Department of Agriculture handling the training and certification of pesticide applicators; prior to that he worked for Southern States in Dover and Felton. He also operates a poultry farm. He is a 1975 graduate of Delaware Valley College with a degree in Agronomy.

BROSCH NAMED NEW ADMINISTRATOR

Chris Brosch was appointed as Program Administrator for the Delaware Nutrient Management Program in late fall 2015. Chris brings a wealth of experience to his new position. He previously worked as an agricultural modeler and data specialist for both Virginia Tech and the University of Maryland, with an emphasis on soil management and water quality issues in the Chesapeake Bay.

Chris was raised in Montgomery County, Md., where he was State President of the FFA. He is a 2007 graduate of the University of Maryland with a Bachelor's degree in Soil and Water Science. He also holds a master's degree from Virginia Tech in Agricultural Science.

DELAWARE AG WEEK OUTREACH

The Delaware Nutrient Management Program has sponsored a booth at the Delaware Ag Week since 2012. Nutrient Management Program staff help farmers complete their annual reports and collect manure samples from poultry, dairy and horse operations to be analyzed by the Delaware Department of Agriculture's Ag Compliance Laboratory. Up to one continuing education credit toward recertification is currently offered for growers who submit a completed annual report and manure sample at the Delaware Ag Week (one half credit for each required annual activity).

This initiative was started to improve response rates of the annual reports and increase manure analysis data for research and Program evaluation purposes. A total of 136 completed annual reports and 180 manure samples were submitted at the nutrient management booth during the 2015 Ag Week. The nutrient management program celebrates the response from Delaware's farmers and intends to continue this program at future Ag Week events.

TRAINING CONTINUED FROM PREVIOUS PAGE

sionals who work at golf courses, museums, estates, parks, athletic fields and cemeteries. Commercial Nutrient Handlers are required to attend four sessions which results in twelve hours of training and pass a state certification exam. Commercial Nutrient Handlers are often professionals who work for or own lawn care companies. In addition, Delaware Nursery and Landscape Association require Livable Lawns certified businesses employ a certified nutrient handler.

As a result of the December 2015 education and certification sessions, 17 urban horticulture professionals were newly certified among 25 attendees. Based on antecedent evaluations, we determined that 96% of attendees for Certification Sessions for Urban Horticulture in 2015 increased their knowledge of Delaware's nutrient management issues and regulations; the average increase was 27% for those attending both sessions I and II. Surveys were conducted after each session. Respondents indicated they were responsible for nutrient management decisions on more than 1,550 acres of lawns and landscapes. Respondents all indicated they had gained skills as a result of the sessions including better knowledge of how to interpret a soil test report. Respondents also indicated their willingness to adopt new or change existing management practices after attending the certification session. For example, 80% indicated that they would change how they manage turfgrass; 88% indicated they would change the plants they recommend/plant for clients or their business. All these improvements are expected to have tangible benefits for industry and state water quality.

RELOCATION PROGRAM

Managing poultry litter including manure has been a priority of the Commission since inception. Many farmers who do not have cropland or test high for soil phosphorous levels must find alternative uses for poultry litter-manure. Several businesses now help such farmers manage their waste litter. The Relocation Program is one of several effective solutions to waste litter challenges on Delaware farms.

The Relocation Program provides a financial reimbursement for the transactions between farmers, brokers and trucking companies for the transportation cost of relocating litter from Delaware farms to alternative use projects or other farms for land application. The Relocation Program provides farmers with the option to move the litter themselves or hire a broker. The application process validates eligible senders, receivers, truckers and alternative use projects.

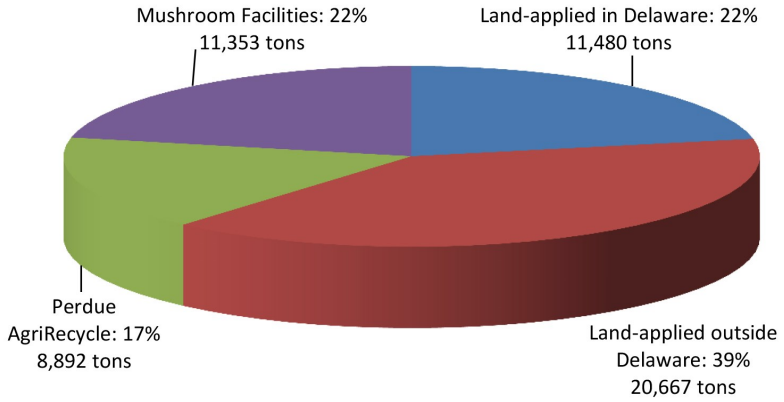
Manure continues to be transported for land application throughout Delaware to farms in need as well as to New Jersey, Pennsylvania and Virginia. Alternative use projects are essential for managing the extent of Delaware's poultry littler. In 2015, 53,392 tons of excess poultry litter-manure was relocated, contributing to a ten-year total of over 878,000 tons. During 2015 almost 40% of the excess litter-manure went to alternative use projects such as the Perdue AgriRecycle fertilizer plant in Blades and utilized by mushrooms by farmers in Southeastern Pennsylvania.

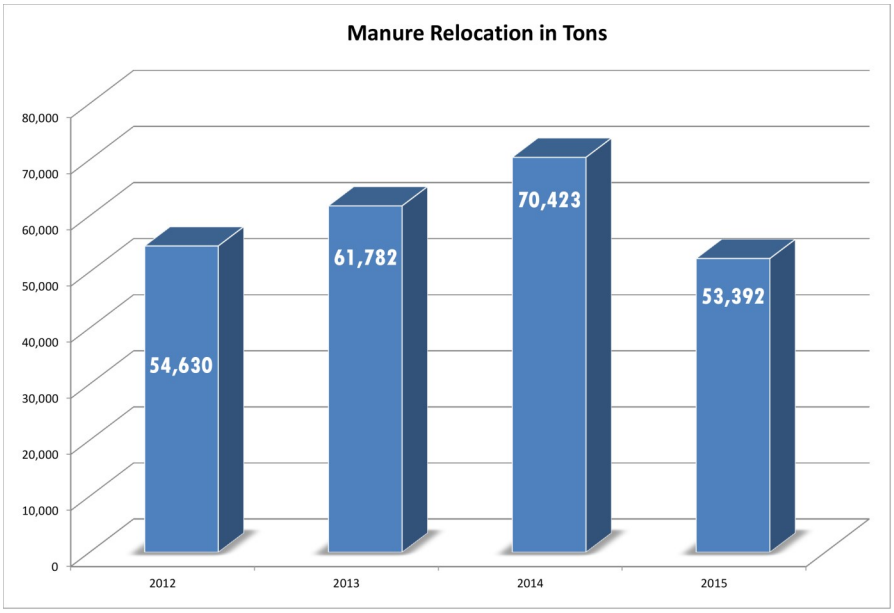
Farmers and service providers wishing to participate in relocation projects can contact the Nutrient Management Program at (302) 698-4550.

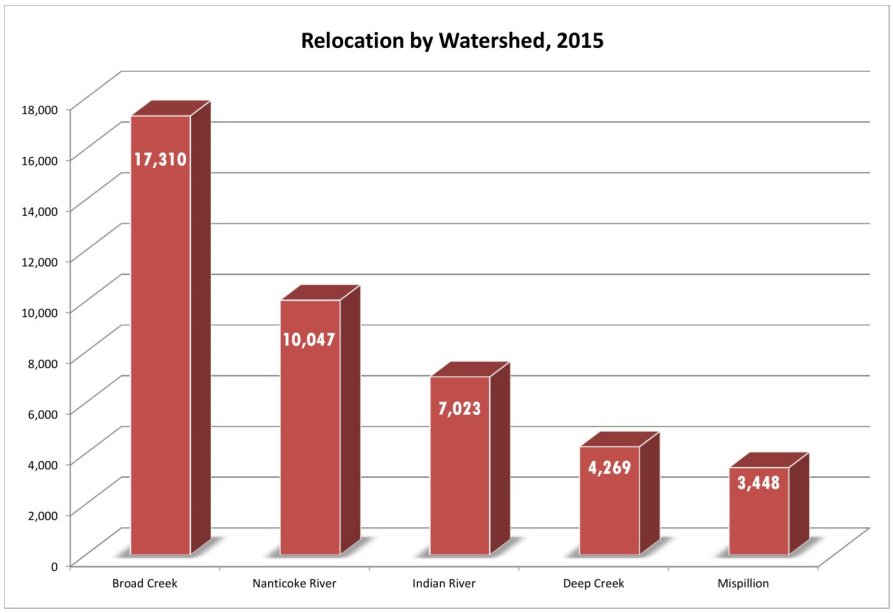
Relocation Summary, FY 2015

- Total Delaware relocation projects with financial assistance: 53,392 tons
- Farm to farm within Delaware: 11,480 tons
- Farm to farm exported from Delaware: 20,667
- Farm to alternative use: Perdue AgriRecycle: 8,892
- Farm to alternative use: Mushrooms: 11,353

Relocation and Alternative Uses of Poultry Manure, 2015







ENVIRONMENTAL STEWARDSHIP AWARDS

During 2015 the Commission partnered with the poultry companies that operate in Delaware to recognize environmental stewards within the agricultural community.

The environmental stewardship award was established in 2001 to recognize farmers whose stewardship and general farming practices contribute to the improvement of water quality within the state. The program recognizes growers by evaluating nutrient management, implementation of best management practices, farm management, innovation, bio-diversity and wildlife habitat management.

The 2015 Delaware Environmental Stewardship Award was presented on January 11, 2015, during the Delaware Agriculture Week conference held at the Delaware State Fairgrounds in Harrington. Chris Lesnowski of Marydel was the winner. Mr. Lesnowski was presented with a cash award of $1,000, a lane sign and a plaque. He grows poultry for Allen Harim Foods. Also nominated were Brian Warrington and Becca Argo (Mountaire Farms), E. B. Workman of Greenwood (Amick Farms) and Jesse Vanderwende of Bridgeville (Perdue Farms). All other nominees were presented with a check for $500, a lane sign and a plaque.

"Chris Lesniowski and his fellow farmers exemplify the virtues of being good environmental stewards, protecting our water and land," said Nutrient Management Program Administrator Chris Brosch. "Delaware has led the way in nutrient management practices and planning thanks in large part to the work of farmers like these."

Nutrient Management Commission President Bill Vanderwende; Eddie Jewell of Allen Harim Foods; Krista and Chris Lesniowski of Marydel, who grow for Allen Harim; and Nutrient Management Program Administrator Chris Brosch.

Nutrient Management Commission President Bill Vanderwende; E.B., Teresa, and Hunter Workman of Bridgeville, growers for Amick Farms; and Nutrient Management Program Administrator Chris Brosch.

Nutrient Management Commission President Bill Vanderwende; Beth Sise of Mountaire Farms; Brian Warrington and Becca Argo of Houston, who grow for Mountaire Farms; and Nutrient Management Program Administrator Chris Brosch.

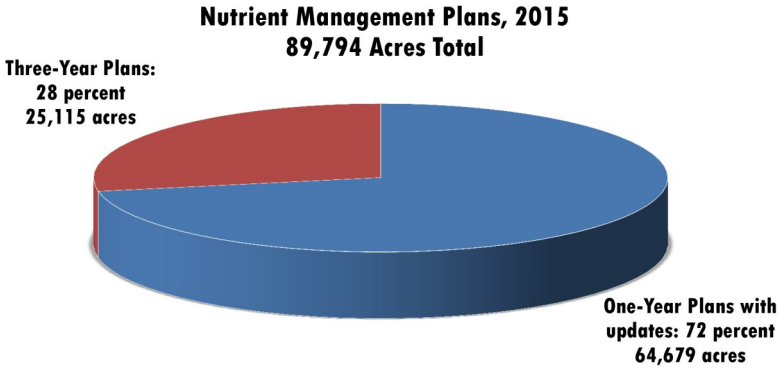
Not pictured: Runner-up Jesse Vanderwende, a grower for Perdue Farms.

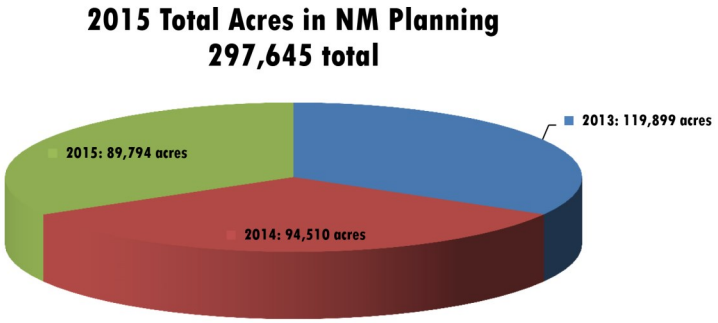
NUTRIENT MANAGEMENT PLANNING

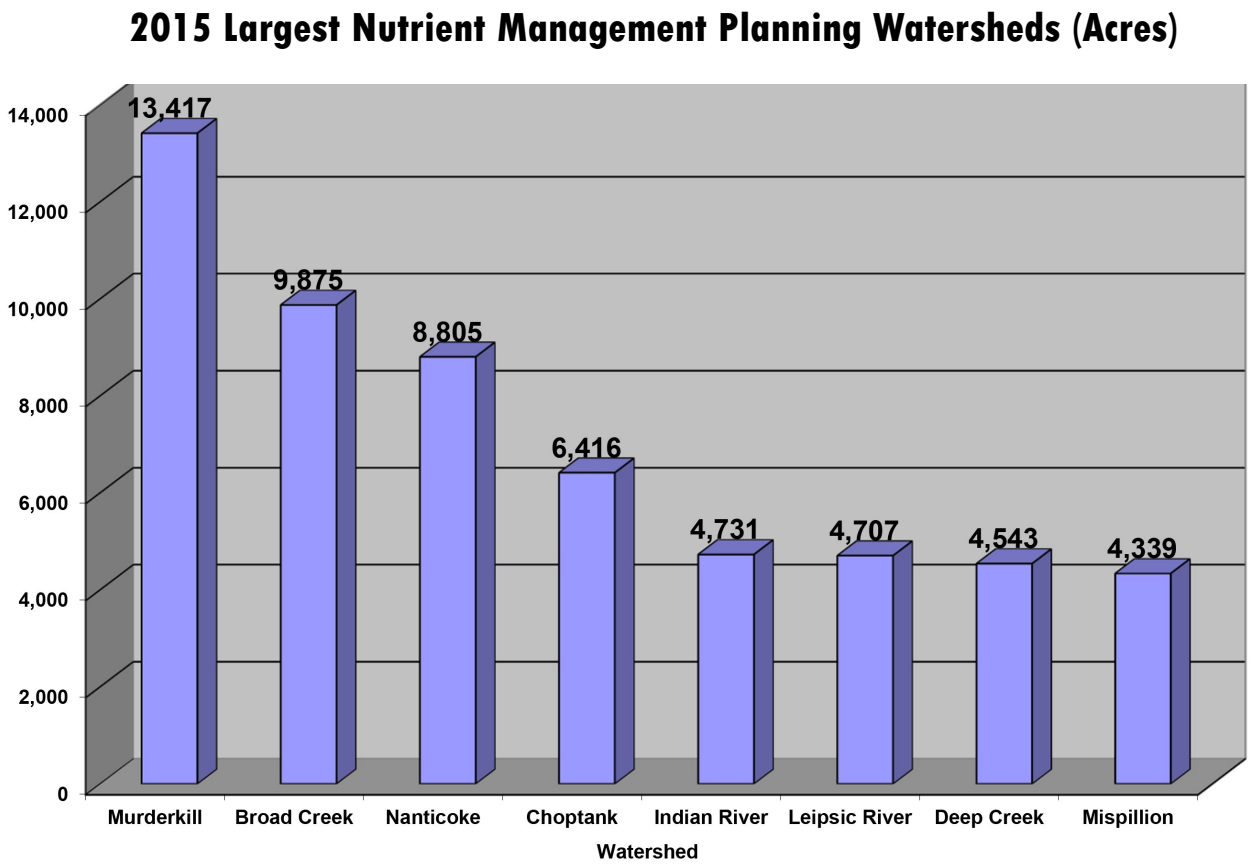
A nutrient management plan is a farmer's "balance sheet" for nutrients. The more efficiently fertilizers are used on the farm; the less nutrients escape to waterways. A plan is developed by a certified nutrient consultant and includes maps, soil analysis, manure analysis, crop yield goals and nutrient application rates for essential plant nutrients.

The Commission utilizes private and public nutrient consultants to develop nutrient management plans for constituents. In 2015, 127 farms representing 89,794 acres were reimbursed for plan costs. The Kent and Sussex Conservation Districts assisted Delaware farmers by writing nutrient management plans totaling 10,006 acres. These acres represent an obligation for 3 years to nutrient management planning.

Additionally, 99 farms were assisted with an animal waste management plans or comprehensive nutrient management plans. The total acreage covered by nutrient management planning reimbursement during 2015, including those farms approved during 2013 and 2014, was 296,279 acres.







CONSERVATION DISTRICT ACCOMPLISHMENTS

The Commission works cooperatively with County Conservation Districts to promote and implement nutrient related Best Management Practices. Many practices that are coordinated by the Conservation Districts result in success that helps both the environment and the farmer. Kent and Sussex Conservation District offices have Conservation Planners who develop nutrient management plans. The following is a 2015 summary of the Districts' accomplishments:

New Castle County

Construction/ Planting Contracts

- Manure storage: 1
- Cover crops: 7,965 acres
- Fencing: 7,000 feet

In-House Accomplishments

- Conservation Plan development: 21 planned, totaling 12,245 acres; 32 applied, totaling 14,991 acres

Kent County

Construction/ Planting Contracts

- Manure storage: 7 poultry
- Mortality storage: 8
- Cover crops (planted): 26,831 acres

In-House Accomplishments

- Nutrient Management Plan development: 13 plans at 5,439 acres
- Animal Waste/ CNMP development: 26
- Conservation plan development: 1,892 planned acres, 7,802 applied acres
- Pre-side soil nitrate test: 42 tests, representing 1,371 acres

Sussex County

Construction/ Planting Contracts

- Manure storage: 13
- Mortality storage: 11
- Cover crops: 75,945 acres
- Concrete pads for manure handling: 74

In-House Accomplishments

- Nutrient Management Plan development: 21 plans at 4,567 acres
- CNMP development: 73 at 1,044 acres
- Conservation plan development: 112 plans at 14,433 acres

Heavy use pads are a best management practice funded by the County Conservation Districts to aid in good housekeeping practices on poultry farms.

PERMITS FOR CONCENTRATED ANIMAL FEEDING OPERATIONS

The National Pollution Discharge Elimination System (NPDES) program is a federal program administered by the Environmental Protection Agency (EPA) under the Clean Water Act (CWA). DNREC was delegated permitting authority in 1983, to administer the NPDES program for surface water discharges in Delaware. Facilities affected by the Federal NPDES program are defined as point sources of pollution and these include combined sewage overflows, storm water construction projects, industrial activities, municipal treatment plants, and CAFOs. Concentrated Animal Feeding Operation regulations were jointly promulgated in Delaware by DNREC and DDA on November 11, 2011. A Memorandum of Agreement signed by the Secretaries of each Department on December 16, 2010, is an integral part of the structure of the Delaware NPDES CAFO Permit program. The Memorandum of Agreement recognized each agency's experience and expertise and identifies the responsibility of each agency in the implementation of the program. This MOA did not transfer any part of the delegated CAFO program to the DDA, but established that DDA would interact with the regulated community as a point of contact and as a facilitator for DNREC's authority.

During 2015, EPA approved the NPDES General CAFO Permit for Large & Medium Poultry Operations that generate manure only and do not land apply manure. Nutrient Management staff worked with DNREC staff and EPA during the year to develop the language for the CAFO General Permit. CAFO General Permits cover multiple operations, allowing for a more streamlined administration compared to individual permits. General permits still focus on limiting discharges of pollutants and allow for enforcement actions if these limitations are exceeded. The General Permit was developed utilizing the Delaware CAFO regulations, the 1999 Nutrient Management Law and the EPA Permit Writers' Manual for CAFOs.

Notice was sent to all identified poultry farms that may have the duty to apply for the General Permit in September of 2015. In October, the permit was publicly noticed in the Delaware State News, The News Journal, and through the Departments' websites to allow the public an opportunity to review and comment on the proposed Draft Permit. A public hearing was also held December 3, 2015 to allow the public an additional opportunity to voice their comments on the Draft Permit. These comments, both written and voiced at the hearing, are being summarized and responded to, following the Administrative Procedures Act guidelines. The NPDES General CAFO Permit for Large & Medium Poultry Operations that generate manure only and do not land apply manure will be finalized in the coming year.

NEW DATABASE LAUNCHED

In the spring of 2015, the Nutrient Management Section began working with the state Department of Technology and Information (DTI) to develop a new web-based data management system. This new data management system is a comprehensive data tracking tool that will replace multiple databases previously used by the Nutrient Management Section.

Nutrient Management Program staff worked with DTI to identify the database improvements that were needed, set data priorities, and establish a development schedule. Then the database came to life one piece at a time as sections were developed, tested, and built upon throughout the year. Certification and continuing education information was transferred over into the new system over a weekend in December, so business was uninterrupted from that transition. Farmer annual report data will be transferred into the new system in the coming year.

The new database will provide major improvements including time and postage savings, improved efficiency, and a better overall picture of the operations covered by the Nutrient Management Law. The new system will help us meet our goal to improve our processes to better serve the community. The web-based platform will enable us to access our data outside the office and on multiple devices, allowing staff more time in the field and reducing trips to and from the office. The system will also allow us to electronically enter information on best management practices gathered during farm inspections and will aggregate the data for reporting purposes. This will help us to more accurately represent all of the good work that farmers are doing to improve nutrient use and protect water quality.

This system will also improve the annual reporting process.

This system will also improve the annual reporting process. We can prepopulate farmers' annual report forms with data that farmers have previously provided, thus reducing the time required to complete the reports. We have also established the option for electronic communications through the new database for those farmers who wish to use email.

The Nutrient Management Program looks forward to continued improvement with our data management and reporting systems as well as serving the community through new technologies.

MANAGING NUTRIENTS FROM THE EQUINE INDUSTRY

The state's equine industry is home to many commercial and hobby stables, as well as several large race horse training facilities, and three public race tracks. Facilities that house seven or more horses (8,000 total pounds or more) or those that apply nutrients to greater than 10 acres are subject to the Nutrient Management Law. Operators of such facilities need to be certified as either Nutrient Generators or Handlers, and have a Nutrient Management Plan developed for their farm. This plan allows the operator to better manage the handling of manure to prevent runoff to nearby waterways.

Horses are an important sector In Delaware agriculture between hobby farms, training facilities and racetracks.

During 2015, the Nutrient Management Program was involved with the Equine Sessions at Delaware Ag Week by presenting information about the program and proper manure handling practices. Staff also became part of the Ag Week equine planning committee for future programs directed towards the equine audience. The program plans to continue to extend outreach and education to the equine industry in Delaware.

COMPLAINT RESOLUTION

Complaints related to manure management and general nutrient handling practices are investigated and resolved by program staff. If the violation is deemed serious enough, the complaint can be upgraded from an informal complaint to a formal complaint. In such a case, action is taken by the Commission in the form of an administrative hearing.

During 2015, 28 informal complaints were received and resolved by program staff relating to manure management, livestock management, odor and nutrient management certification. There was one formal complaint which also was resolved. The categories of complaints and operation types are as follows:

Complaint Category	Operation Type
Manure management 59%	Poultry 66%
Mortality Management 14%	Horse 1%
Odor 26%	Field Crop 32%
Fertilizer Management 1%	Beef 1%

CHESAPEAKE BAY PROGRAM

On June 16, 2014, the Chesapeake Bay Watershed Agreement was signed, and for the first time included representatives from the entire watershed including headwater states such as Delaware, committing to full partnership in the Bay Program. Established in 1983, the Chesapeake Bay Program was built upon the idea that federal and state governments need to collaborate to fully restore the Bay's health. The Program is a regional partnership that brings together leaders and experts from a range of agencies and organizations. These partners work together through the Bay Program's goal teams, workgroups and committees to collaborate, share information and set goals.

Nutrient Management Program staff participate in several of these workgroups and committees to help provide better data and assist with building more accurate modeling inputs and approaches. These Workgroups and committees are:

- **Nutrient Management Panel**, which is striving to assign efficiencies to different levels of nutrient management activities so that Delaware can receive credit in the Chesapeake Bay Model.
- **Conservation Tillage Panel**, which is charged to determine load reductions based on tillage practices used throughout Delaware. In addition, we assist with the
- **Agricultural Modeling Subcommittee,** which reviews work submitted by the various panels and determines how the data should be modeled.
- **The Poultry Litter Subcommittee** is focused on providing data for manure generation, bird populations, and nutrient concentrations of poultry litter to more accurately represent the poultry industry in the model.
- Other Best Management Practice Expert Panels are being established to evaluate the efficiencies of Animal Waste Storage, Animal Mortality Facilities and Heavy Use Area Protection Pads covering the animal sector of agriculture. Ditch management practices are also being evaluated to provide additional credit for practices promulgated with state general and grant funds. Nutrient Management staff will continue to participate in all of the above mentioned groups to help Delaware uphold its commitment to the Chesapeake Bay Watershed TMDL.

MANAGEMENT PLAN AUDITS

Each year program staff performs audits on a number of facilities required to operate with a nutrient management plan, records and certification. This process helps to ensure that plans meet the intent of the nutrient management laws and regulations. During 2015, program staff audited nutrient management plans for 79 agricultural operations/concentrated animal feeding operations. Staff also inspected 4 golf courses.

DELAWARE TRANSECT SURVEYS

Ben Coverdale
Delaware Department of Agriculture
Environmental Scientist

The Delaware Nutrient Management Program has taken a proactive role in assisting data collection efforts to help better represent conservation tillage practices implemented by Delaware cropland farmers. Conservation tillage practices in Delaware account for 11.2% of nitrogen load reductions as prioritized in the current Watershed Implementation Plan (WIP). This has resulted in conservation tillage practices being classified as a priority practice. Historical data reporting in Delaware concerning conservation tillage practices came from the Conservation Technology Information Center (CTIC). However, the last CTIC dataset was collected in 2004. In a coordinated effort among the Delaware Department of Agriculture's Nutrient Management Program, the Delaware Department of Natural Resources and Environmental Control (DNREC), the County Conservation Districts, and the University of Delaware (UD); the Delaware Cropland Residue Transect Survey officially began in June 2014. Based on the success in 2014, the transect survey continues on an annual basis for data collection and reporting purposes.

The transect survey program was developed following all of the guidelines and provisions provided by the CTIC. Part of the objectives of the cropland residue transect survey was to collect a statistically valid dataset of tillage practices and corresponding on-field residue that remained after crop planting practices had occurred. The window of time to collect data is very narrow with the survey beginning prior to row closure on field corn, but after full season soybeans had been planted.

A survey team comprised of DDA, DNREC, and UD staff conducted these residue assessments along a predetermined route of at least 110 miles in length in each county of the state. A minimum of 460 observations had to be made along the routes in each county. For Kent and Sussex Counties, visual field assessments were conducted at 0.5 mile intervals. Visual field assessments were conducted at every 0.2 miles in New Castle County. The survey team members each had specified roles including; a driver, navigator, data recorder, and residue observers. All members of the transect survey team completed appropriate training sessions to perform the duties required. For efficiency purposes, the transect survey is designed to be implemented as a "windshield observation." Specifically, the observers are trained to categorize levels of residue from the transect survey vehicle without having to

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SURVEYS CONTINUED FROM PREVIOUS PAGE

physically walk every field observation point along the route. To ensure survey accuracy, a Quality Assurance and Quality Control (QAQC) team reassessed a subset of field observations along all routes in the state that was recorded by the initial survey team.

Residue assessments observed during the survey were documented and categorized as follows in Table 1.

Tillage Practice	% of Residue
Conventional tillage	0 – 15%
Reduced Till	15 – 30%
Conservation Tillage	30 – 60%
High Residue Minimum Soil Disturbance	>60%

Of note, the State of Delaware incorporated the High Residue Minimum Soil Disturbance (HRMS) residue assessment category as part of the transect survey. The HRMS was established through a Conservation Tillage Expert Panel serving the Chesapeake Bay Program. The HRMS category allowed the Delaware transect survey to represent those farms that have maintained a high level of residue throughout cropping practices. The HRMS category results in additional nutrient and sediment load reductions as reflected in the Chesapeake Bay Model. A proactive approach was taken to collect this data through the transect survey to make sure enhanced conservation tillage practices implemented by Delaware farmers are being properly credited.

Table 2 (below) details observations recorded during the 2015 cropland residue transect survey by county. The statistics represent the percent total of observations recorded in each county categorized by a specific tillage practice and corresponding residue level. Along the entire survey route there were 504 observations in Sussex County, 512 in Kent County, and 458 in New Castle County.

Tillage Practice	Sussex	Kent	New Castle
Conventional Till	22.4%	21.5%	11.6%
Reduced Till	11.5%	6.0%	6.8%
Conservation Till	3.6%	5.3%	12.7%
HRMS	62.5%	67.2%	69%

Delaware Cover Crop Transect Survey

In December 2014, Delaware implemented a pilot program in an attempt to collect more detailed information concerning implementation of cover crops by farmers. Cost shared cover crop programs offered through each county's Conservation Districts have been limited by funding and thus a payment cap has been established to individual farmers. Therefore, the data collection efforts to accurately report Delaware farm acres implementing cover crops have been limited to acres enrolled in cost share programs. The implementation of the Delaware Cover Crop Transect Survey aimed to better provide the "big picture" of cover crop implementation in the state.

The cover crop transect survey is structured identical to the methods utilized in the cropland residue transect survey. The surveyed data include an identification of the species of cover crop planted, planting method, and an assessment of the planting time (early, mid, or late season). Between the cover crop transect survey conducted in the winter months and the following cropland residue transect survey, the small grain crops remaining were documented as commodity (for harvest) or traditional (not harvested; destroyed). Combining surveys provided a complete and accurate assessment of cover crop implementation in the State of Delaware. This survey resulted in a statistically defendable estimate of cover crop acres in the State regardless of the acres being paid cost share or implemented voluntarily by the farmer.

Table 3 (below) represents statistics recorded during the 2015 cover crop transect survey concerning type of cover crop practice. Traditional cover crops are categorized as those that were planted in the fall and subsequently destroyed the following spring. Commodity cover crops were those documented in the fall and identified as harvested before the summer. The percentage of total observations column in Table 3 represent the percent of recorded observations along the route where cover crops where documented.

County	Commodity – harvested	Traditional – not harvested	Percent of total observations
Sussex	20.0%	12.5%	32.5%
Kent	23.6%	19.3%	43%
New Castle	16.4%	7.6%	24%

Table 4 (below) details the types of cover crops implemented in the State of Delaware as recorded by the 2015 cover crop transect survey. The percentage breakdown represents the implementation of each species of cover crop relative to the total number of traditional and commodity cover crop observations made by county during the survey.

County	Barley	Winter Wheat	Forage Radish	Rye	Other
Sussex	14.6%	66.5%	9.8%	7.9%	1.2%
Kent	36.8%	58.6%	2.7%	1.4%	0.5%
New Castle	11.8%	85.5%	1.8%	0.9%	0%

HOW NUTRIENT MANAGEMENT PROTECTS GROUNDWATER RESOURCES

Laura Mensch
Delaware Department of Agriculture, Hydrologist III

Groundwater is an essential resource in Delaware. It is the primary source of drinking water for more than 65% of the population in the state of Delaware[1]. In fact, south of the Chesapeake and Delaware Canal, all water used for public and domestic supply and more than 98 percent of water used for irrigation is groundwater. We use groundwater to irrigate cropland, to water livestock, and for aquaculture and industrial purposes.

Some substances that are naturally occurring in the environment can impact groundwater quality. These substances include: heavy metals such as arsenic and lead; microorganisms such as bacteria and viruses; and other compounds such as nitrogen. Nitrogen is a major constituent of the earth's atmosphere and an essential plant nutrient produced in major quantities for and by agriculture in the form of nitrate.

While nitrate is a common compound, anthropogenic sources have greatly increased the nitrate concentrations in groundwater. Nitrate levels of up to 2mg/L can be considered naturally occurring, or background levels[2]. More than 4mg/L nitrate may indicate anthropogenic sources of nitrate in groundwater[2]. Anthropogenic sources of nitrate in groundwater include septic systems, industrial effluent, and the use of synthetic and organic fertilizers.

Nitrate is soluble in water and can easily move through the soil to the groundwater below. When nitrate is applied to the land surface in the form of fertilizer, some may leach into the groundwater. Certain conditions increase the risk of nitrate contamination of shallow groundwater. These conditions include: application of nitrogen to the land surface; the presence of well-drained, sandy soils; and a relatively high water table.[3] These three conditions are common in portions of Kent and Sussex Counties, and have resulted in an increased risk of nitrate contamination of shallow groundwater.

Because of the risk factors, nutrient management is a critical tool employed by those involved in crop production. A fundamental goal of any nutrient management program is to identify the most profitable and environmentally sound way to provide plants with the optimum supply of nutrients. Nutrient management efforts are designed to maximize yields while minimizing any potentially negative effects on environmental quality. In fact, nutrient management is so essential, every farm that applies nutrients to 10 or more acres must have a valid Nutrient Management Plan written by a Delaware certified nutrient consultant.

Delaware farmers have been using an increasing array of scientifically tested Best Management Practices (BMPs) to reduce nutrient loading to the surface water and groundwater of the state. For example, the use of winter cover crops has become increasingly widespread in Delaware. Cover crops take up nutrients from the soil during the winter months to reduce nutrient leaching to the groundwater. There is extensive research into the benefits of each type of cover crop (cereal grain, legumes, brassicas, and mixed stands being a few examples) and their respective ability to capture nitrogen left over from the growing season. Irrigation can also be a tool in optimizing nutrient use by plants. When plants have a consistent supply of water, they can better utilize nutrients. When more nutrients are taken up and used by the plant, less is left in the soil to potentially leach to the groundwater.

While Delaware farmers have worked hard to reduce their impact on the waterways, we have not yet seen a clear decrease in nutrient loading in surface water. This is due in part to the longer time scales in which nitrate moves in groundwater. Dissolved nitrate moves with the groundwater through an aquifer from its point of entry into the ground to its point of discharge into a surface water body over a time scale of years to decades. Therefore, the water discharging into a stream will reflect activities at land surface years or decades in the past.

Since changes in nutrient practices on land can take decades to be reflected in surface water quality, it is valuable to look at nitrate levels in the groundwater. To assess nitrate levels as they move through the state's shallow groundwater, the Delaware Department of Agriculture (DDA) is conducting a joint study with the US Geological Survey (USGS). DDA and USGS scientists are studying a network of shallow groundwater wells to determine nutrient levels, groundwater age, and source. This study is currently underway, and a final report is due out in the fall of 2016. This study will help identify trends in nitrate levels in groundwater in the state, and assess the effectiveness of the Best Management Practices in use.

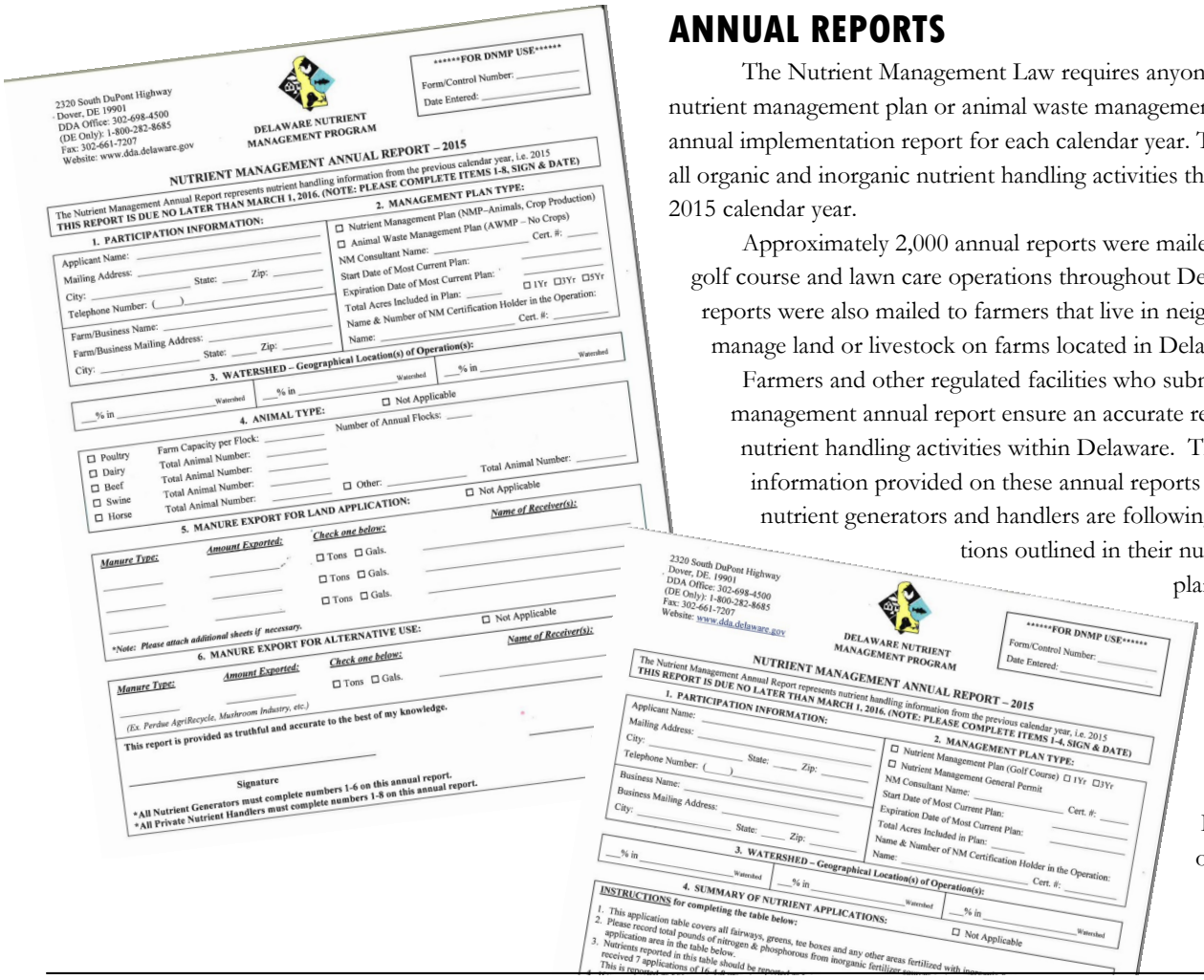
Modern farming relies increasingly on science, and farmers are invested in using this science to maximize productivity while protecting environmental resources. With the development of new technologies and techniques, the modern farmer can increase crop productivity while being a good steward of the environment.

Citations

1. State of Delaware Public Drinking Water Annual Compliance Report and Summary for 2014, Delaware Division of Public Health, Office of Drinking Water. June 2015.

2. David L. Rudolph 2015. Groundwater Quality within the Agricultural Landscape: Assessing the Performance of Nutrient BMPs. Groundwater Monitoring & Remediation 35, no.1, Winter 2015: 21-22.

3. Bernard T. Nolan, Kerie J. Hitt, and Barbara C. Ruddy 2002. Probability of Nitrate Contamination of Recently Recharged Groundwaters in the Conterminous United States. Environmental Science and Technology, v. 36, no. 10: 2138-2145.


2320 South DuPont Highway
Dover, DE 19901
DDA Office: 302-698-4500
(DE Only): 1-800-282-8685
Fax: 302-661-7207
Website: www.dda.delaware.gov

DELAWARE NUTRIENT MANAGEMENT PROGRAM

******FOR DNMP USE******
Form/Control Number:
Date Entered:

NUTRIENT MANAGEMENT ANNUAL REPORT – 2015

The Nutrient Management Annual Report represents nutrient handling information from the previous calendar year, i.e. 2015
THIS REPORT IS DUE NO LATER THAN MARCH 1, 2016. (NOTE: PLEASE COMPLETE ITEMS 1-8, SIGN & DATE)

1. PARTICIPATION INFORMATION:
Applicant Name:
Mailing Address:
City: State: Zip:
Telephone Number: ( )
Farm/Business Name:
Farm/Business Mailing Address:
City: State: Zip:

2. MANAGEMENT PLAN TYPE:
☐ Nutrient Management Plan (NMP–Animals, Crop Production)
☐ Animal Waste Management Plan (AWMP – No Crops)
NM Consultant Name: Cert. #:
Start Date of Most Current Plan:
Expiration Date of Most Current Plan:
Total Acres Included in Plan: ☐ 1Yr ☐3Yr ☐5Yr
Name & Number of NM Certification Holder in the Operation:
Name: Cert. #:

3. WATERSHED – Geographical Location(s) of Operation(s):
___% in _____ Watershed ___% in _____ Watershed ___% in _____ Watershed

4. ANIMAL TYPE: ☐ Not Applicable
☐ Poultry Farm Capacity per Flock: Number of Annual Flocks:
☐ Dairy Total Animal Number:
☐ Beef Total Animal Number:
☐ Swine Total Animal Number: ☐ Other: Total Animal Number:
☐ Horse Total Animal Number:

5. MANURE EXPORT FOR LAND APPLICATION: ☐ Not Applicable
Manure Type: Amount Exported: Check one below: Name of Receiver(s):
☐ Tons ☐ Gals.
☐ Tons ☐ Gals.
☐ Tons ☐ Gals.
*Note: Please attach additional sheets if necessary.

6. MANURE EXPORT FOR ALTERNATIVE USE: ☐ Not Applicable
Manure Type: Amount Exported: Check one below: Name of Receiver(s):
☐ Tons ☐ Gals.
(Ex. Perdue AgriRecycle, Mushroom Industry, etc.)

This report is provided as truthful and accurate to the best of my knowledge.

Signature

*All Nutrient Generators must complete numbers 1-6 on this annual report.
*All Private Nutrient Handlers must complete numbers 1-8 on this annual report.

ANNUAL REPORTS

The Nutrient Management Law requires anyone operating under a nutrient management plan or animal waste management plan to submit an annual implementation report for each calendar year. These reports detail all organic and inorganic nutrient handling activities that occurred in the 2015 calendar year.

Approximately 2,000 annual reports were mailed to agricultural, golf course and lawn care operations throughout Delaware. Annual reports were also mailed to farmers that live in neighboring states who manage land or livestock on farms located in Delaware.

Farmers and other regulated facilities who submit the nutrient management annual report ensure an accurate representation of nutrient handling activities within Delaware. The accuracy of the information provided on these annual reports is vital to ensure all nutrient generators and handlers are following the recommendations outlined in their nutrient management plans. The data from the annual report is important because it helps the Nutrient Management Program advocate on behalf of Delaware nutrient operations.

WINTER APPLICATION OF FERTILIZER AND MANURE

Winter application regulations limit the application of commercial fertilizer and manure during that time of year where such applications are most prone to cause nutrient runoff. The purpose of the regulation is to limit the application of Nitrogen (N) and Phosphorus (P) fertilizer and manure applications as follows. Exceptions may be allowed under emergency storage shortfall conditions if they are reflected in the farmer's nutrient management plan. Such exceptions usually involve liquid manure due to the inability to field stage.

The winter nutrient application ban rules are:

- The application may not occur starting December 7 and continuing through February 15;
- The application may not occur on snow covered or frozen ground;
- The application may not occur on impervious surfaces such as sidewalks, road and other paved areas and the misdirected fertilizer must be removed on the same day of application.

Spreading manure between Dec. 7 and February 15 is not permitted in Delaware.

Failure to comply with these regulations in a timely manner may result in a compliance and enforcement hearing by the Commission.

HANDLING CATASTROPHIC MORTALITY

Every animal operation's nutrient management plan is designed to address daily and catastrophic mortalities. Most daily mortalities are handled in environmentally friendly manners such as composting. Most farms are not designed to handle large-scale mortality events such as what Delaware experienced during the winter of '09/'10. Many farmers faced the challenge of handling large amounts of mortality from roof collapses caused by snow accumulation. The following recommendations were provided to the poultry industries and growers as they dealt with catastrophic mortalities.

Compost mortalities should comply with one or more of the following guidelines:

- A covered structure such as a manure shed should be utilized or the poultry house can even be employed for this function.
- The proper amount of carbon be supplied in order to supply microbes fuel necessary to rapidly heat the pile and promote the breakdown of the birds. In general, the mortality carbon to nitrogen ratio is one to one. Common high carbon sources to increase this ration are straw, woodchips or shavings.
- Relocate the mortalities to a commercial composting site.
- Relocate the mortalities to a landfill. This option requires coordination and approval with the landfill.

FIELD STAGING OF POULTRY MANURE

The most efficient method of handling and storing poultry litter results from handling the poultry litter as few times as possible. Ideally, total house litter cleanouts and crust outs are immediately land-applied, transported to an alternative use facility, or moved to a storage structure. However, timing considerations governed by the growing season may require temporary, outdoor stockpiling of litter before use and must be conducted according to the State Technical Standards. In situations where temporary field staging of litter is needed, piles may be stored temporarily to preserve litter quality and prevent application at a time of the year when environmental loss risk is greatest. Assessing piles in the winter months is a top priority of the Program and compliance with the standards are a key component to our complaint resolution and plan verification activities.

PROGRAM BUDGET

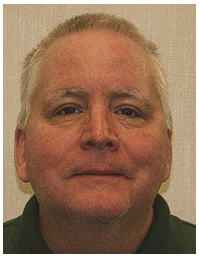
	FY 2013 Budget	FY 2014 Budget	FY 2015 Budget
Program Operating Costs:			
Personnel	306,800	309,600	309,600
Federal Funds Section 319 (Clean Water Act)*	**30,000**	**30,000**	**30,000**
Travel	600	600	600
Contractual	16,000	16,000	16,000
Supplies	4,000	4,000	4,000
Information/Education/Certification	172,500	172,500	172,500
Nutrient Relocation Program	246,000	246,000	246,000
Federal Funds section 319 (Clean Water Act)*	**100,000**	**99,000**	**255,793**
Federal Funds Ches. Bay Program*	**150,000**	**150,000**	**0**
Poultry Companies*	**187,000**	**147,891**	**107,035**
Nutrient Management Planning	411,800	411,800	411,800
Penalties Collected	0	0	
TOTAL	**1,649,200**	**1,587,191**	**1,307,574**

CONTACT US

NUTRIENT MANAGEMENT STAFF

CHRIS BROSCH is the Program Administrator of the Delaware Nutrient Management Program and an ex-officio member of the Nutrient Management Commission. He can be reached at (302) 698-4555 or Chris.Brosch@state.de.us.

MINDY BURD is the Administrative Assistant for the Delaware Nutrient Management Program. She can be reached at (302) 698-4558 or Mindy.Burd@state.de.us.



BOB COLEMAN is the Environmental Coordinator. He can be reached at (302) 698-4556 or robert.coleman@state.de.us.

BEN COVERDALE is an Environmental Scientist III. He can be reached at (302) 698-4627 or michael.coverdale@state.de.us.

CLINT GILL is the Data Management Specialist. He can be reached at (302) 698-4557 or clint.gill@state.de.us.

LAUREN TORRES is an Environmental Scientist III. She can be reached at (302) 698-4628 or lauren.torres@state.de.us.

UNIVERSITY OF DELAWARE STAFF

Several specialists from the University of Delaware provide certification training for the Nutrient Management Program. They also assist the program by providing technical recommendations and by conducting research and demonstration projects on nutrient management practices. They are:

SYDNEY YOUNG RIGGI, Program Coordinator and Extension Associate, at (302) 856-2585, Ext. 571.

AMY SHOBER, Assistant Professor, Dept. of Plant and Soil Science, at (302) 831-2146.

PHILLIP SYLVESTER, Kent County Extension Office, at (302) 730-4000.

SHAWN TINGLE, Extension Associate, at (302) 856-2585, Ext. 572.

COREY WHALEY, Sussex County Extension Agent at (302) 856-2585, Ext. 594.

JENNIFER VOLK, Environmental Quality Extension Specialist, at (302) 730-4000.

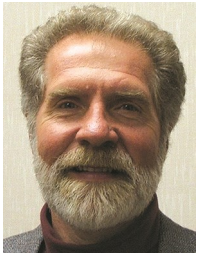
COUNTY CONSERVATION DISTRICTS

The Conservation Districts provide technical agricultural professionals who can assist in nutrient management strategies and recommendations. All nutrient consultants are certified and in most cases, certified crop advisors.

New Castle County: (302) 832-3100
Kent County: (302) 741-2600
Sussex County: (302) 856-3990

ABOUT THE COMMISSION

WILLIAM VANDERWENDE, Commission Chairman, was appointed to the Commission by the Senate, and was named Chairman by the Governor. He is a full-time Sussex County dairy producer who represents the state's dairy industry. He operates a farm with 700-head of dairy, and 3,000 crop acres. He can be reached at (302) 349-4423.



DAVID BAKER, Commission Vice Chairman and Chairman of the Personnel and Planning Subcommittees, was appointed by the Senate as a representative of the New Castle County grain industry. He is a full-time grain farmer of 3,000 acres. He can be reached at (302) 378-3750.

MARK ADKINS was appointed by the Governor to represent swine farmers. He operates a 900 acre family grain farm and 1,000 - head swine farm and is a director for the Delaware Swine Producers. He can be reached at (302) 732-3007.

FRANK PIORKO is the director of DNREC's Division of Watershed Stewardship. Frank's responsibilities include Conservation Programs, State Shoreline and Waterway Programs, Stormwater and Floodplain Management; Drainage and Dam Safety, and Watershed Management. Frank has been involved with Water and Watershed Management Programs for the past 30 years. He can be reached at (302) 739-9921.

BRENNA GOGGIN is one of the representatives of an environmental group. She was appointed by the Senate Minority Leader. Since her start with Delaware Nature Society in 2008 as the Environmental Advocate, Brenna has served on various state committees such as the Clean Water and Flood Abatement Task Force. She can be reached at (302) 239-2334.

F. KENNETH BLESSING, JR. was appointed by the Senate to represent Kent County vegetable farmers. Kenny is part of a diversified farming operation consisting of approximately 3,500 crop acres including vegetables, grain and beef cattle. He can be reached at (302) 422-5746.

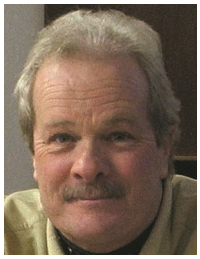
LISA MCCORMICK was appointed by the Governor as a Sussex County public citizen representative. She can be reached at (302) 988-8235.

JIM ELLIOTT was appointed by the House of Representatives as an Environmental Advocacy Group representative. Former Mayor of Fenwick Island, he is no stranger to public service. He can be reached at (302) 337-3653.

LAURA HILL was appointed by the House of Representatives to represent Sussex County poultry farmers. She is part of a family farm that owns a 130,000 capacity broiler operation and farms 3,000 acres of grain and vegetable crops. She can be reached at (302) 945-0725.

JESSICA INHOFF was appointed by the Senate as a Nutrient Consultant. She began her career in agriculture in 1996 and has been part owner of AET Consulting, Inc since 2002. Jessica may be reached at (302) 540-8998.

KEN HOREIS was appointed by the Speaker of the House of Representatives to represent the equine industry. He has owned, bred and shown horses his entire life. Ken is long time member of the Delaware Equine Council, currently serving as vice-president. He can be reached at (302) 270-2648



BUD O'NEILL was appointed by the Governor as a representative for the golf course/lawn care industry. He owns an agronomic service firm that plans and manages Turfgrass for golf courses, athletic complexes and lawns. He is past chairman of the Delaware State Golf Association greens section and can be reached at (302) 653-8618.

RICHARD STERLING was appointed by the Governor as a representative of the commercial nursery industry. He operates a 75-acre nursery specializing in evergreens. He can be reached at (302) 653-7060.

SCOTT WEBB was appointed by the House of Representatives to represent Kent County poultry farmers. He is part of a family farm that operates a 119,000 capacity broiler operation and farms 1,000 acres of grain crops. He can be reached at (302) 381-0402.

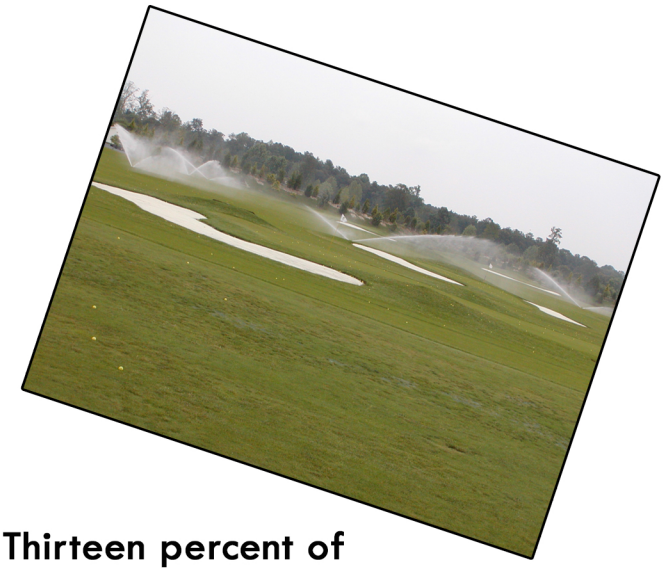
ED KEE, Secretary of the Delaware Department of Agriculture, is an ex-officio member of the Commission. He can be reached at (302) 698-4500.

DAVID SMALL, Secretary of the Delaware Department of Natural Resources and Environmental Control, is an ex-officio member of the Commission. He can be reached at (302) 739-9000.

DR. HAR MING LAU represents Delaware Health and Human Services Secretary as an ex-officio member of the Comission, and is currently the Chief Toxicologist with the Office Environmental Health and Toxicology at the Division of Public Health. He can be reached at (302) 744-4705.

STEWARDS OF OUR LAND AND WATER.

Farmers and other nutrient applicators work hard doing their part to keep Delaware waterways clean and protect our environment for future generations.



Thirteen percent of nutrient management certifications issued in 2015 were for golf courses.

Keeping clean, well-maintained farms is an important part of proper nutrient management.

The Nutrient Management Commission helped relocate more than 53,000 tons of poultry manure in 2015.

dda.delaware.gov/nutrients | 302-698-4500 | 2320 S. DuPont Highway, Dover, DE 19901