

AGRICULTURAL BEST MANAGEMENT PRACTICES

INTRODUCTION

According to the Total Maximum Daily Load (TMDL) analysis for the Murderkill watershed, nonpoint source nitrogen loads to surface waters must be reduced from 1418 pounds/day to 966.3 pounds/day and phosphorus must be reduced from 411 pounds/day to 123.3 pounds/day. Agriculture was identified as one of the three major nonpoint sources targeted for reductions.

WATER QUALITY IMPACTS & TYPICAL LOADINGS

Areas with high densities of agriculture are prone to excess nutrient accumulation resulting in ground and surface water pollution. 58% of the Murderkill watershed's total acreage is used for agriculture. How are reductions to be accomplished on agricultural land? In part, by implementing Best Management Practices (BMPs) on farms. A BMP can be defined as "a practical, affordable approach to conserving a farm's soil and water resources without sacrificing productivity" (Ontario Fed. Ag.).

MANAGEMENT TECHNIQUES:

There are two ways of describing BMPs; by type of implementation and by level of management. Dr. Sims of the Delaware Water Resources Center outlines three types of BMPs based on their implementation. **Strategic** BMPs deal with the size of the farm and are focused on preparatory reduction strategies, such as Nutrient Management Plans. **Tactical** BMPs try to initiate reductions by adding different methods to the farming procedures. Buffer strips and crop rotations are two examples of these. BMPs which are **Operational** attempt to change current practices to those that have less impact. There are two levels of BMPs when sorting them by level of management; farm-level and regional.

FARM-LEVEL MANAGEMENT OPTIONS

Accurate nutrient loading reduction values resulting from implementation of best management practices do not exist. The Natural Resources Conservation Service does have values that are used for national reporting but those values should be used cautiously. A number of management, weather, and geographic variables can dramatically affect values. Also, evaluating individual management practices may not accurately portray overall reductions. For instance, storing manure in a shed is important to reducing nutrient pollution and some loading reduction estimates have been developed; however, if the stored manure is then improperly land applied, no pollution reductions have actually occurred. Storage, by itself, does not remove nutrients it simply prevents the transport. Improper land application then allows for that transport to occur.

Farm-level management considerations:

- Mass balance of nutrient inputs and outputs,
- Proper handling, storage, and application of fertilizers and manure, and
- Proper field conservation practices to reduce transport of nutrients offsite.

Cover crop's effect on nutrient reduction, specifically of nitrogen, has been researched by Dr. Sims. He cited the study "Using

Cereal Grains to Minimize Nitrogen Leaching Losses" at a Presentation to the Nutrient Management Commission's Technology Subcommittee. Based on this study, which compared leachate from covered fields and fallow fields through several winters, it can be said that cover crops decreased leachate nitrates regardless of type when compared to fields allowed to go fallow¹. In fact, when used as a cover crop, Cereal Rye can reduce nitrate loads up to 80%².

Buffer strips have been known to reduce nitrate and sediment loads from fields. According to Dr. Sims' research, the most effective buffer strip is a vegetated filter and field border, which decreases sediments by 53-97% and nitrates by up to 70%. When reducing just nitrates, riparian buffers are more effective than a vegetated filter and field border³.

REGIONAL MANAGEMENT OPTIONS

Approximately 750,000 tons of manure are generated on the Delmarva Peninsula each year. In addition to ensuring good environmental practices on individual farms, regional excesses of manure require a comprehensive regional management strategy. The current status of existing options is discussed here.

Regional management considerations:

- Mass balance of nutrient inputs and outputs through transport and development of alternative uses:
- Transport of excess manure off the peninsula—for example, pelletization and rail transport to the Midwest.
- Transport from areas of excess manure to areas low in nutrients
- Expansion of markets other than agronomic fields- nurseries, turf, roadside plantings, etc., using raw material, compost, or enhanced-value products

Transport: Recently, the Governor's Office committed \$250,000 in state funds for the Nutrient Management Commission to continue the manure transport program in FY03. The funds are primarily used to assist manure transport to alternative use facilities with some additional funds going to transport manure from areas of excess to areas of low nutrients. Both the sending farm and the receiving area must be approved by the state Nutrient Management Program. In 2000, almost 5,000 tons of poultry manure had been relocated. The cost to transport manure within a 15-mile radius of generation is about \$15 - \$20/ton.

Pelletization: Perdue AgriRecycle has operated a pelletization plant in the Laurel area since the spring of 2001. Pelletization is the process that converts manure and other wastes into a pellet to be used as fertilizer. Plant construction was subsidized with \$1 million in state funds, and a \$12 million low interest loan. Last year, the plant was able to process 50 thousand tons of manure and send it off the peninsula⁴. The product is being used as an organic fertilizer and sold to local fertilizer dealers, existing accounts in the

¹ Staver and Brinsfield, "Using Cereal Grains to Minimize Nitrate Leaching Losses", in the 1998 Maryland Report to Grain Producers.

² Sims and Campagnini, 2002.

³ Sims and Campagnini, 2002.

⁴ WBOC TV News 10/9/02.

Midwest, and they are planning to expand into the southeast and northeast.

Composting: Composting facilities are available in Maryland for regional use. The most active facility processes 5,000 tons of manure per year. Development of product marketing has been subsidized with federal grant funds through Delaware's Nonpoint Source Program. A site is currently under construction in Delaware near Milton and will potentially process 10 – 20 tons of manure per year. A business proposal is on the table for a second Delaware facility to process 50,000 tons. A location has not been chosen.

Incinerators: Although large, community incinerators are not allowed by law, an individual farm may operate one after registering with DNREC and having an ash disposal plan approved. In accordance with DNREC policy, only double-chambered incinerators with a burner in each chamber are approved for use in Delaware.

Spray Irrigation: After wastewater is treated and disinfected, there is little potential for disease, and so the water can be reused. Kent County has an arrangement with several farmers to distribute the reclaimed water. Currently, the Agricultural Preservation Foundation will not allow enrolled lands to receive this water because of limitations it would place on the type of crops which could be grown.

FUNDING SOURCES

Funds available to farmers: Farmers installing many of the BMP's above are eligible for state and federal cost share funds for up to 75% of the total cost. Farmers can apply for low interest (3%) loans through the State Revolving Loan Fund (SRF) to finance the remaining cost of the following practices:

- Manure storage sheds
- Dairy waste systems (includes lagoons, storage tanks, liquid spreaders, runoff management practices, i.e. rainwater separation, augers, pumps, holding tanks, skid loaders, spray irrigation systems)
- Dead Bird Composters (also front end loaders)
- Manure Spreaders
- Composting equipment for Manure Composting Operations

Planned future expansions of the SRF Program will fund any BMP approved in Delaware's Natural Resources Conservation Service Technical Guide, including terracing, filter strips, and buffers.

- Average annual state cost share funds available: \$1.2 million statewide
- Average annual federal cost share funds available (EQIP)
- Average annual SRF funds available: \$500,000 dedicated to agriculture statewide, though more is potentially available

In addition, the Delaware Nonpoint Source Program, within the Department of Natural Resources and Environmental Control, is currently provided \$1.5 million/year in federal grant funds from the Environmental Protection Agency. A portion of those funds is used to employ two conservation planners in Kent County. Funding is also available for installation of best management practices on farms.

Conservation Reserve Enhancement Program (CREP):

To improve the water quality of streams and increase wildlife habitat, the Delaware State Enhancement Program is authorized to enroll up to 6,000 acres statewide to the following CREP practices and acreages:

- Hardwood trees: 500 acres
- Wildlife Habitat: 1,000 acres
- Grassed Filter Strips: 3,000 acres
- Riparian Buffers: 1,000 acres
- Wetland Restoration: 500 acres

Placement of practices must adjoin impaired streams or contributing drainage ditches in designated project areas.

To date, there are **23** acres of grassed buffers, **82** acres of hardwood trees, and **19** acres of wildlife habitat enrolled in the CREP in the Murderkill watershed.

IMPLEMENTATION ISSUES

- ☞ Farmers are sometimes reluctant to install Best Management Practices (BMP's), such as buffers, which take cropland out of production.
- ☞ All practices on a farm must be evaluated as a whole; proper storage means nothing without proper field application or conservation practices.
- ☞ We can track the number of nutrient management plans. How do we ensure that the nutrient management plans are followed?
- ☞ The need to track implementation and report progress conflicts with long-held policies regarding the farmers' rights to privacy.
- ☞ All implementation is voluntary and incentive based; there will always be a percentage of individuals not wishing to participate.
- ☞ Ensuring proper on-farm mass balances means excesses would become apparent; we must be prepared to then deal with regional excess.

NUTRIENT MANAGEMENT LAW

Delaware Code, Title 3, Chapter 22: The nutrient management law is in place. Soon to follow are state regulations and submission for approval to the Environmental Protection Agency of a state National Pollution Discharge Elimination System (NPDES) program for confined animal feeding operations (CAFO's). As regulations are developed and the law implemented, the following key factors should be carefully tracked:

- How will the Phosphorus Index be used? The P Index is a valuable tool in managing soil phosphorus accumulation resulting from poultry manure use.
- What will nutrient management plans include and how will implementation be tracked? There are 6,166 acres of land under NMPs in the Murderkill watershed. Are all of these plans being enforced?
- Availability of conservation planners: Will funding be made available for planners through the Conservation District (maintaining the existing 2 and/or adding additional planners?) or will funding be directed mainly toward private consultants through the \$5/acre refund to farmers? How many planners are needed and do we prefer conservation planners or private consultants to be the primary mechanism? If planners write comprehensive plans that include structural components as needed (manure storage structures, dead bird composters, etc.), each planner can write plans for about

6,000 acres per year. Writing simplified nutrient management plans without the structural component would allow them to write plans for 15,000 acres per year. There are over 39,000 acres of farmland in the Murderkill watershed.

- District planners provide an additional service of designing structural components that are not strictly part of writing a nutrient management plan. They also provide free in-season

nutrient testing, manure spreader calibration, and technical advice. Who will provide these services if the State drops conservation planners?

- Any facilities covered by a CAFO (NPDES) permit are not eligible for federal sources of money (319 Nonpoint Source Program, SRF). Access to Farm Services Agency funding could be limited.

TYPICAL ON-FARM BEST MANAGEMENT PRACTICES (BMP'S) AND AVERAGE COSTS: (USING MURDERKILL DEMOGRAPHICS)

BEST MANAGEMENT PRACTICES (BMP)	TOTAL ACRES/FACILITIES EXISTING	NUMBER OF BMP'S INSTALLED OR ACRES PLANNED TO DATE	AVERAGE COST PER UNIT
Nutrient Management Plans	39,359.8 acres of agricultural land	6,166 acres with nutrient management plans (not including plans by private contractors)	Must consider depth of plan and whether it includes design of structural components
Manure Storage Structures	Total number of poultry operations = 29 (each operation may have more than one storage structure)	Number of structures built = 18	For 40 x 80 structure: \$22,000
Dead Bird Composters	Total number of poultry operations = 29 (each operation may have more than one structure)	Number of structures built = 19	Free standing: \$6,636 Lean-to: \$5,895
Filter strips		Installed = 142 acres	Cool season grasses: \$200 – 250/acre Warm season grasses: \$300 - \$400/acre
Stream buffers (tree/shrub)		Installed = 82 acres	Tree and shrub establishment: \$500/acre
PSNT Tests	Average number of acres planted in corn = 8,000-11,000 approx.		Cost per test = free to farmer through conservation planners Average number of acres evaluated with one test = 40 (should be done for each crop. Nutrient load reductions calculated based on what farmer would have applied without test data)
Soil Testing			Cost per test = \$7.50 for U of D * should be done seasonally as part of a comprehensive nutrient management plan.
Manure analysis	Total number of producers = 56		Cost per test = \$20
Conservation tillage	Total acres of agricultural land = 39,359.8		After the initial equipment costs, this practice can actually save the farmer money because it is less intensive than conventional tilling
Cover crop		Total number of acres planned = 939 acres (average per year?)	Cost to farmer = \$8-10 /acre
Water Control Structures			Average cost per structure = \$5,000
Manure Spreader calibration		Should be 1 time/yr. per land owner	Provided by conservation planners free to farmer

Murderkill Watershed

This fact sheet was prepared by the Delaware Department of Natural Resources and Environmental Control's Whole Basin Team, at the request of the Murderkill Tributary Action Team, for citizens and stakeholders interested in one of Delaware's most environmentally and economically attractive areas—the Murderkill and its surrounding lands, surface and ground waters.

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