AGRICULTURAL BEST MANAGEMENT PRACTICES

INTRODUCTION

According to the Total Maximum Daily Load (TMDL) analysis for the Indian River, Indian River Bay and Rehoboth Bay, nonpoint source nitrogen loads to surface waters must be reduced from 4447 pounds/day to 1393 pounds/day and phosphorus must be reduced from 163 pounds/day to 78 pounds/day. Agriculture was identified as one of the three major nonpoint sources targeted for reductions. 35% of the Inland Bays' (including Little Assawoman watershed) total acreage is used for agriculture. Poultry production is prominent in the Inland Bays, especially in the Indian River Bay and Little Assawoman watersheds. One report estimates that close to 13 million birds are produced in the watershed per year. Areas with high densities of animal production are prone to excess nutrient accumulation resulting in ground and surface water pollution.

The phosphorus content of manure exceeds the amount required by crops when applied to land to meet plant nitrogen needs. Consequently, even if poultry manure is land applied according to current recommended practice, over time phosphorus will build up in soils increasing the potential for its transport from fields to surface waters primarily by erosion and, in extreme cases, by subsurface flow.

WATER QUALITY IMPACTS & TYPICAL LOADINGS

Values for nutrient loading to surface waters from agricultural land can be found in reports commissioned by the Center for the Inland Bays. University of Delaware researchers have completed studies of agricultural practices, manure nutrient content, and other nutrient management issues.

MANAGEMENT TECHNIQUES:

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.

REGIONAL MANAGEMENT CONSIDERATIONS

- Mass balance of nutrient inputs and outputs through transport and development of alternative uses:
- 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
- Waste to energy
- Transport of excess manure off the peninsula—for example, pelletization and rail transport to the Midwest.

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, considering the meaning of those values. 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.

Material removed from the house will be different if it is from a total house clean-out (all manure and litter removed, done once every 2 – 4 years) or a crust-out (removal of the top several inches of manure and litter, done at least once per year between flocks). Manure and litter removed from the house is the material that will be stored and utilized. Manure storage sheds are designed to contain the volume of litter from a crust-out only since storage for a total clean-out is impractical.

One exception may be for pre-sidedress soil nitrate tests (PSNT's). PSNT's are an in-season test that will help a farmer evaluate a crop's actual need for nitrogen. A reasonable assumption of nutrient reductions per acre can be calculated by comparing the amount of fertilizer applied according to PSNT data to what the farmer would have applied, perhaps in excess, as a precaution.

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.

Transport: Recently, $300,000 in state funds was budgeted by the Governor's Office for the Nutrient Management Commission to establish a manure transport program in FY01. Additional funds, $150,000, were requested and may potentially be provided. The funds will primarily assist manure transport to alternative use facilities with some additional funds going to transport manure from areas of excess to areas of low nutrients. The cost to transport manure within a 15-mile radius of generation is about $15 - $20/ton.

Pelletization: Perdue AgriRecycle plans to have an operational pelletization plant in the Laurel area by spring of 2001. Plant construction will be subsidized with $1 million in state funds, and a $12 million low interest loan. The plant will be able to process approximately 90,000 tons of manure each year. The product would be used as an organic fertilizer and sold to local fertilizer dealers, existing accounts in the Midwest, and planned expansions into the southeast and northeast. A plant in Laurel is unlikely to utilize manure generated in the Inland Bays since plant capacity will be met by more local sources. There has been discussion of a second plant if the first is successful.

***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 near Milton, Delaware, 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.

***Waste to Energy*:** Allen's Family Foods intends to install a unit that generates 3.9 megawatts of energy from a litter *gasification* recovery system. Half of the electricity will be used to power Allen's processing plant and the rest will be sold to a local power grid. Allen's will supply half of the manure required and the other half local growers will supply.

Incinerator projects for generating electricity from burning manure have been proposed for Sussex County. A recent law banning incinerators would have to be amended to allow a waste-to-energy incinerator to be built. State agencies are pursuing that amendment.

FUNDING SOURCES

***State Funds available to farmers*:** Farmers installing many of the BMP's above are eligible for state and federal cost share funds for up to 65% 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, $300,000 to Sussex County for FY00
- Average annual federal cost share funds available: (EQIP) $100,000 - $200,000 per year for the Inland Bays
- 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 five conservation planners in Sussex 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. As areas of critical environmental concern, the Inland Bays and Chesapeake Basins have been identified as designated project areas and specifically targeted for enrollment of 1,000 acres each.

To date there are no acres under contract in the Inland Bays. It is unknown why farmers in this basin have not taken advantage of the program.

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.
- Poultry production is most concentrated in the Laurel area, so regional manure utilization facilities will likely locate there to minimize transport costs. As a result, the Inland Bays area may be under-serviced.

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?
- Availability of conservation planners: Will funding be made available for planners through the Conservation District (maintaining the existing 5 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 about 72,000 acres of farmland in the Inland Bays.
- 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:

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	72,246 acres of agricultural land	36,068 acres with nutrient management plans (not including plans by private contractors)	Must consider depth of plan and whether it includes design of structural components
Animal Waste Systems	Dairy: 2 facilities Hog: 9 facilities Beef: none	Dairy: 2 systems Hog: 7 systems Beef: none	Dairy: $125,000 - $150,000 Hog: $75,000 - $150,000
Manure Storage Structures	Total number of poultry operations = 239 (each operation may have more than one storage structure)	Number of structures built = 108 Number of structures planned = 53	For 40 x 80 structure: $22,000
Dead Bird Composters	Total number of poultry operations = 239 (each operation may have more than one structure)	Number of structures built = 97 Number of structures planned = 33	Free standing: $6,636 Lean-to: $5,895
Fencing		Installed = 1,308 ft	$6/foot
Filter strips		Installed = 132 acres Planned = 692 acres	Cool season grasses: $200 – 250/acre Warm season grasses: $300 - $400/acre
Grassed waterways		Installed = 2.9 acres Planned = 1 acre	Excavation: $2/foot^2 Seeding: $800/acre Curlex: $.13/foot^2 Rock at end of waterway: $60/ton
Stream buffers (tree/shrub)		Installed = 166 acres Planned = 423 acres	Tree and shrub establishment: $500/acre
PSNT Tests	Average number of acres planted in corn = 23,000-24,000 approx.	Total number of tests = 79 Total number of acres = 4,163 (these numbers are for 1999 only)	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 = 239	Average number of tests requested per year = _____	Cost per test = $20
Conservation tillage	Total acres of agricultural land = 72,246	Total number of acres planned = 13,325	
Cover crop		Total number of acres planned = 15,500 (average per year?)	Cost to farmer = _____
Water Control Structures	Number of structures installed = 42 Structures planned = 7		Average cost per structure = $5,000
Manure Spreader calibration	About 5 requests/yr.	Should be 1 time/yr. per land owner	Provided by conservation planners free to farmer

Author: Jenny McDermott, Nonpoint Source Program

INLAND BAYS 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 Inland Bays Tributary Action Teams, for citizens and stakeholders interested in one of Delaware's most environmentally and economically attractive areas—the Inland Bays and its surrounding lands, surface and ground waters.

For additional information, contact the:
Watershed Assessment Section
Department of Natural Resources and Environmental Control
820 Silver Lake Blvd., Suite 220
Dover, Delaware 19904-2464
(302) 739-4590

Delaware's good nature depends on you!