Nonpoint Source
News-Notes
May 2003, #71
The Condition of the Water-Related Environment
The Control of Nonpoint Sources of Water Pollution
The Ecological Management & Restoration of Watersheds

Notes on the National Scene

Clean Water is Everybody's Business!

As part of the Year of Clean Water activities, EPA celebrated Nonpoint Source Pollution Awareness Month in March 2003! Many people don't realize that polluted runoff is the Nation's leading source of water quality degradation. As EPA's National Water Program continues to celebrate the 30th Anniversary of the Clean Water Act, EPA and its state partners must focus on polluted runoff that enters our storm drains and waterbodies every day. EPA has developed materials reiterating that the choices we make in our communities, businesses, and as individuals can impact America's waters.

The following documents are available for order from National Service Center for Publications by calling (800) 490-9198 and will be available on the Web at www.epa.gov/nps.

- "Make Your Home the Solution to Stormwater Pollution," a homeowner's guide to healthy habits for clean water
- "Preventing Polluted Runoff: Everybody's Business," a poster depicting three major sources of polluted runoff with tips on how to keep runoff clean
- "Protecting Water Quality from Agricultural Runoff," a fact sheet describing agricultural polluted runoff and measures for prevention
- "Protecting Water Quality from Urban Runoff," a fact sheet describing urban sources of polluted runoff and measures for prevention

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Clean Water is Everybody's Business! (continued)

- "Take the Stormwater Runoff Challenge!," a crossword puzzle on a paper placemat that can be distributed to restaurants or at community events
- "Let it Soak!," a pop-up sponge promoting Low Impact Development (LID)
- "10 Things You Can Do," a bookmark with tips on preventing polluted runoff

To see how EPA is celebrating the Clean Water Act all year long, visit www.epa.gov/water/yearofcleanwater. For more information on Nonpoint Source Pollution Awareness Month, contact Don Waye, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, 4503T, Washington, DC 20460. Phone: (202) 566-1170; e-mail: waye.don@epa.gov.

Special Focus: News in Agriculture

New Farm Bill Yields Tremendous Opportunities

On May 13, 2002, President Bush signed the Farm Security and Rural Investment Act of 2002 (Farm Bill), providing nearly $13 billion for conservation programs over the next six years. The Farm Bill succeeds a 17-year period of modern U.S. Department of Agriculture (USDA) conservation policy, first established in the 1985 Farm Bill and followed by subsequent Farm Bills in 1990 and 1996. The new Farm Bill authorizes an 80 percent increase in funding above levels previously available for USDA programs designed to protect and conserve natural resources. This article examines critical new aspects in the Farm Bill which extends support for a number of existing conservation programs including:

- *Environmental Quality Incentives Program (EQIP)*: EQIP is a voluntary, incentive-based program in which private agricultural landowners are eligible for technical, financial, and educational assistance to help resolve significant environmental and natural resource concerns identified on their land. Under EQIP, landowners enter into voluntary contracts agreeing to apply and maintain land management practices in a specified period, in exchange for payments when practices are completed. Key provisions in the 2002 Farm Bill include (1) allowing for flexible contract periods of 1 to 10 years (as opposed to fixed 5- and 10-year contracts); (2) increasing maximum EQIP payments per producer to $450,000 over the life of the contracts (regardless of the number of contracts a producer has); (3) removing restrictions on cost-sharing for large confined animal feeding operations; and (4) establishing a national water conservation program to provide cost-share and other incentives for ground and surface water conservation in all states. Perhaps most significantly, the 2002 Farm Bill provides $5.8 billion in EQIP program funding for more than six years.
- *Conservation Reserve Program (CRP)*: The CRP is a voluntary program that offers landowners annual rental payments, incentive payments, and cost-share assistance to establish approved cover on eligible cropland. The program encourages farmers to plant long-term cover crops to improve soil, water, and wildlife resources. The 2002 Farm Bill increases the program's acreage cap from 36.4 million to 39.2 million acres at a total cost increase for more than six years of $1.5 billion over current spending. Key provisions in the 2002 Farm Bill include: (1) extending the Farmable Wetlands Pilot Program to all states to enroll small acreages of wetlands in fields in the CRP (with a one million acre cap); (2) allowing 30-year contracts for hardwood trees and providing equal priority for covers that advance the goals of erosion control, water quality, and wildlife habitat; (3) incorporating the Conservation Reserve Enhancement Program (an extension of CRP that protects wetlands and riparian areas) and the CRP Buffer Initiative into the statute; and (4) allowing haying and grazing to be carried out on CRP lands under a conservation plan, with reduced annual rental payments.
- *Farmland Protection Program (FPP)*: The FPP provides cost-shares to states for the purchase of conservation easements to protect agricultural land from conversion to other uses. The federal share is limited to 50 percent, and any highly erodible land enrolled in the FPP must

be protected under a conservation plan. The 2002 Farm Bill extends the FPP through 2007 with total funding of $597 million.

- *Wetlands Reserve Program (WRP)*: The WRP is a voluntary program that provides financial incentives to landowners to restore and protect wetlands on private property in exchange for retiring marginal agricultural land (e.g., via easements). The 2002 Farm Bill increases the acreage enrollment cap up to 2.275 million acres (an additional 1.2 million acres), representing a $1.5 billion increase in funding over previous levels.

The Farm Bill also establishes many new conservation programs, including:

- *Conservation Security Program (CSP)*: The USDA Natural Resources Conservation Service (NRCS) will carry out this new program. The program provides payments for producers who practice good stewardship on their agricultural lands and incentives for those who want to do more. Those producers adopting and/or maintaining conservation practices on private working lands are eligible for 5- to 10-year contracts to receive incentive payments. The CSP offers three tiers of conservation practices and systems to choose from, with the more complex and comprehensive tiers receiving higher incentive payments. The maximum annual payments for Tiers I, II, and III are respectively, $20,000, $35,000, and $45,000. In addition to the base payment, participants may receive up to 75 percent (up to 90 percent for beginning farmers and ranchers) of the cost of maintaining conservation practices as determined by the county average costs for 2001 of conservation practice maintenance, unless a maintenance agreement exists or practices are required by conservation compliance.

- *Grassland Reserve Program (GRP)*: This new $254 million program uses 30-year and permanent easements and 10- to 30-year rental agreements to restore and protect grasslands. Of the two million acres to be enrolled in the GRP, 500,000 acres are to be reserved for tracts of native grassland that are 40 acres or less. Eligible land includes restored, improved, or natural grassland, rangeland, pastureland, and prairie land. Restoration is cost-shared up to 75 percent, and the fair market value of the land (less its grazing value) will determine payments for permanent easements and rental agreements.

The new Farm Bill presents tremendous opportunities to protect and restore water quality. "The 2002 Farm Bill opens new doors for EPA to work in partnership with USDA to achieve our common goals of promoting and assisting sound conservation activities by producers that will achieve improved restoration and protection of water quality," says Chuck Sutfin, Director of the Assessment and Watershed Protection Division in EPA's Office of Water. Sutfin offers, "By integrating funding and other resources available in our respective programs, EPA and USDA can work together in a way that does not duplicate, but augments, each other's programs."

Thomas Christensen, Director of the Animal Husbandry and Clean Water Programs Division in NRCS agrees, "USDA will be seeking the support of other agencies, such as EPA, in the implementation of many of the programs established and extended in the new Farm Bill."

Christensen points out that "Many of EPA's existing programs, for example, relating to water quality monitoring and watershed planning, can be helpful to the successful implementation of our conservation programs."

To help farmers, ranchers, and the general public learn the latest information about the new Farm Bill, USDA launched an implementation Web site (www.usda.gov/farmbill). Users can learn more about the Farm Bill program, access online program applications and sign-up forms, and find out what's new relating to Farm Bill implementation activities. The National Association of Conservation Districts' Web site also houses a downloadable Farm Bill Implementation Toolkit (www.nacdnet.org/FB/index.htm) that features materials like talking points and sample news releases to help districts assume a leadership role in promoting and implementing the conservation programs of the Farm Bill.

New Farm Bill Yields Tremendous Opportunities (continued)

Implementation Currently Underway

In October 2002 USDA began issuing nearly $1.6 billion in annual rental payments to producers under the CRP. Additional resources also have been made available recently to producers through the FPP, the WRP, and the Conservation Reserve Enhancement Program. The new law also provides record levels of support for environmental stewardship and conservation of working lands.

[For more information, contact Tom Christiansen, USDA, NRCS, 5601 Sunnyside Avenue, Stop Code 5473, Beltsville, MD 20705. Phone: (301) 504-2196. Sources include National Association of Conservation Districts, News & Views *(May/June 2002), and the Farm Service Agency Web site.]*

Hot Off the Presses!

2002 Farm Bill Brochure

A new, easy-to-read brochure is available to inform producers and others about the 2002 Farm Bill. The 6-page, foldout brochure covers three Farm Bill topics: commodity programs, conservation, and energy. In addition to basic information, a Natural Resource Concern table links specific environmental concerns with the applicable farm program. For example, EQIP, CSP, and CRP are applicable programs for soil management practices such as contour buffers, terraces, no-till, and grazing management. These same programs may also cover water quality practices such as filter strips, contour buffers, and waterways. As a practical guide, the document also shows producers how to take advantage of EQIP and CSP by gathering data and by developing and implementing plans proactively. Produced by Monsanto in partnership with the National Association of Conservation Districts and the Conservation Technology Information Center (CTIC), the brochure is available for free by contacting CTIC at (765) 494-9555.

A New No-Till Booklet Released

Economic Benefits with Environmental Protection: No-till and Conservation Buffers in the Midwest, is a 32-page publication from the CTIC examining the adoption of no-till and conservation buffers in the Midwest. Farmers and the environment in the Great Lakes watershed and North Central region, which includes Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, Wisconsin, and the western portions of New York and Pennsylvania, stand to benefit from increases in no-till practices and conservation buffers. The region, although very productive, has millions of highly erodible acres. The document explores many of the challenges, opportunities, management strategies, and successful marketing efforts for promoting conservation here. Soil quality benefits derived from no-till practices are explained, along with techniques to overcome transitional challenges producers face when converting from conventional systems. To download a copy, visit www.core4.org/ctic/FINAL.pdf.

Free Agricultural Conservation Video

CTIC, with the support of IMC Global, released a new Core 4 conservation video. Titled "Production Agriculture: Feeding People While Protecting the Environment—Core 4," this free video (a $9.99 value) takes viewers from the origins of production agriculture to today's cropland and livestock operations. In this 10-minute feature, conservation plays a starring role. Footage includes demonstrations of Best Management Practices (BMPs), no-till planting, and seeding. To order, call CTIC at (765) 494-9555.

Delaware Nutrient Management Program Meets First Deadline

Like states across the Nation, Delaware's water resources are impacted by nonpoint source pollution. It is well-known that rain-induced runoff from land with excessive fertilizer and manure leads to over-enrichment of ground water, streams, and estuaries. The result is excess algal growth, large swings in bacterial populations, decreased dissolved oxygen levels, and ultimately, degraded water quality and biological resources. Delaware's Nutrient Management Act of June 1999 (The Act) has been addressing the problem of nutrient over-enrichment of water from land-applied fertilizers and livestock manure. Requirements began this January and will be phased in over a 5-year period.

The Act applies to farmers, golf course managers, and other landowners whose operations meet certain nutrient-use threshold requirements. Landowners or operators who apply manure or fertilizer to more than 10 acres of land, or agricultural producers that manage more than 8,000 pounds of poultry or other livestock (8 animal units), must develop nutrient management plans, maintain detailed records, report annually to the state on their use of manure and fertilizer, and maintain certification in nutrient management. In the first phase, 20 percent of all affected parties were required to meet requirements by January 1, 2003. Each year until 2006 an additional 20 percent will be selected randomly and notified that they must begin participating in the manage-

Delaware Nutrient Management Program Meets First Deadline (continued)

ment program. In addition, by January 1, 2004, all regulated users must be trained and certified in nutrient management.

Delaware laid the groundwork for implementing the rule's requirements by creating the Delaware Nutrient Management Commission (DNMC). Made up of state and federal advisors, representatives of environmental organizations, scientists, and active farmers, the DNMC is tasked with carrying out the Act. The DNMC is required by the Act to annually report on nutrient management training that was offered during the past year, best management practices (BMPs) implemented, the number of acres under nutrient management plans, and critical areas that will be targeted for action. It is also required to recommend incentives to promote BMPs.

Bill Rohrer, program administrator for the Delaware Department of Agriculture and an advisory member of the DNMC, says that meeting this first 20 percent deadline "would not be difficult due to the number of early cooperators already in the program." With the addition of 1,400 operators notified this summer by the commission and finalizing implementation plans, Delaware will already be managing almost 50 percent of the affected community, well ahead of the 20 percent target. The challenge, according to Mr. Rohrer, is getting all of the producers, applicators, and handlers of nutrients certified by the end of 2004. He is optimistic on this front also because of cooperation in the program by the U.S. Department of Agriculture (USDA), the Delaware Department of Natural Resources and Conservation (DNRC), University of Delaware Cooperative Extension Service, and the major poultry companies.

The University of Delaware Cooperative Extension office is leading the nutrient management training and certification effort. Their training sessions have reached more than 1,600 people and have produced more than 1,000 certifications. Certifications are for nutrient generators, nutrient handlers, and nutrient consultants. As of October 2002 there were 52 certified private nutrient consultants and 14 certified agency nutrient consultants. Commercial handlers and nutrient consultants must take 12 credits of educational coursework and pass written tests. Nutrient management consultants are available for consulting on nutrient management procedures and developing nutrient management plans for those who have not taken the training.

The DNMC adopted BMPs for nutrients including one for soils that test high for phosphorus (high-P). High-P soils would be subject to a "3-year crop removal rate" which would require that phosphorus applied over a 3-year period be balanced with crop harvests that are designed to utilize all of the applied phosphorus. As an alternative, manure and fertilizer applicators can also base their use of phosphorus on a P-Site Index. This index, originally developed by the USDA Natural Resources Conservation Service and several agricultural universities, was further developed and refined for Delaware conditions by the DNMC and the University of Delaware. The index accounts for soil erosion potential, drainage characteristics, pre-existing phosphorus levels, and other factors.

In areas where it is no longer possible to apply manure without creating water quality problems, the Act requires farmers to sell or move the manure. The state already exports about 70,000 tons of manure per year to alternative-use projects or to land in need of nutrients. The DNMC has participated in the larger effort to manage excess manure by channeling state and federal section 319 grant funds to applicators to help pay for transportation of excess manure when they need it, as well as to prepare educational materials, including a video on nutrient management.

The level of implementation of nutrient management practices using other federal funds from USDA is likely to increase as new conservation program funds from the 2002 Farm Bill become available. Also, recent EPA regulations governing animal wastes may pose new challenges to producers (see *EPA Publishes Updated CAFO Rule* on page 6). The Delaware nutrient management program is well-prepared to respond to these opportunities and challenges given the progress of the DNMC.

[For more information, contact William Rohrer, Delaware Department of Agriculture, at (302) 698-4500 or by e-mail at William.Rohrer@state.de.us. Descriptions of additional program elements and technical fact sheets can be found at www.state.de.us/deptagri/nutrients/nm_anrpt.htm.]

EPA Publishes Updated CAFO Rule

Christine Todd Whitman, EPA Administrator, signed the updated Concentrated Animal Feeding Operations (CAFO) Rule on December 15, 2002. The new rule helps EPA work with the agriculture community to control water pollution from the Nation's largest livestock operations, while at the same time keeping this sector of American agriculture economically viable.

The 2002 rule replaced prior technology requirements and permitting regulations that were more than 25 years old. The previous regulations were out of date and did not establish adequate expectations for environmental performance. According to Whitman, "This new rule is an historic step forward in our efforts to make America's waters cleaner and purer." These rules will protect the Nation's waters by controlling runoff from agricultural feeding operations thereby preventing billions of pounds of pollutants from entering America's waterbodies every year.

New Classifications

An agricultural facility is considered an animal feeding operation (AFO) if it confines animals for at least 45 days in a 12-month period and if no grass or vegetation is sustained in the confinement area during the normal growing season. An AFO is considered a CAFO if it meets the definition of an AFO and meets one of the definitions of a large, medium, or designated CAFO.

Once an operation meets the CAFO definition, it must apply for a state permit by contacting the state permitting authority. A permit is designed to ensure that CAFOs control pollutants to keep them from entering surface waters. Under the new rules, an operation must apply for a permit even if it discharges only during large storms. Operators currently holding a permit will be subject to the new rules only when their current permit expires.

Animal Thresholds

Animal	Large CAFO	Medium CAFO
Mature Dairy Cows	700	200
Beef Cattle/Heifers	1,000	300
Swine (≥ 55 lbs)	2,500	750
Swine (< 55 lbs)	10,000	3,000
Ducks (other than liquid manure handling system)	30,000	10,000
Ducks (liquid manure handling system)	5,000	1,500
Chickens (liquid manure handling system)	30,000	9,000
Chickens (other than liquid manure handling systems)	125,000	37,500
Laying Hens (other than liquid manure handling systems)	82,000	25,000
Veal Calves	1,000	300
Horses	500	150
Sheep/Lambs	10,000	3,000
Turkeys	55,000	16,500

Designated CAFOs: No matter what size your operation is, if it is an AFO, it may be designated a CAFO. If your permitting authority inspects your operation and finds that it's adding pollutants to surface waters, you might need a CAFO permit.

To help livestock operators meet the rule's requirements, Congress increased funding for land and water conservation programs in the 2002 Farm Bill by $20.9 billion, bringing total funding for these programs to $51 billion over the next decade (see *Farm Bill* article on page 2 for more information). The Environmental Quality Incentives Program was authorized at $200 million in 2002 and will ultimately increase to $1.3 billion by 2007; 60 percent of the funds must go to livestock operations.

In addition, states will have significant flexibility to find geographically appropriate means of implementing the rule. For example, states retain the authority to determine the type of permit—general or individual (a general permit authorizes a category of discharges under the Clean Water Act within a geographical area and is not specifically tailored for an individual discharger)—to be issued to a given operation. This enables states to develop permits that take into account the size, location, and environmental risks that may be posed by various operations. States will also be able to tailor nutrient management plans for CAFOs and may authorize alternative performance standards for existing and new CAFOs that will help promote the use of innovative technologies.

The rule provides substantial and measurable environmental and public health benefits by significantly improving the way animal manure is to be managed at large CAFOs. Agriculture Secretary Ann Veneman said, "The

EPA Publishes Updated CAFO Rule (continued)

new rule is unique in that it comes after unprecedented cooperation between EPA and the U.S. Department of Agriculture (USDA) to find a way to help producers meet their own, and society's goals for environmental quality and profitability." Together with the USDA voluntary programs, the rule will help protect the Nation's water from nutrient over-enrichment and eutrophication, which can cause algal blooms and fish kills. The rule will also reduce pathogens in drinking water supplies and improves coastal water quality. Veneman added that the USDA "stands ready to provide assistance in an incentive-based approach combining information and education, research and technology transfer, direct technical assistance, and financial assistance through farm bill programs."

For more information, visit www.epa.gov/npdes/caforule.

Idaho OnePlan Makes Conservation Plans Easy and Accessible

In Idaho, developing a farm conservation plan is now as easy as connecting to the Internet. This was not the case in the past, when farmers needed to call upon numerous agencies, were forged with contradicting requirements and many different regulations. Because conservation plans are for the most part voluntary, a simple approach is helpful to ensure that everyone who wants to develop one can do so easily. A coalition of diverse partners developed the Web-based Idaho OnePlan to consolidate all the information and forms distributed by federal, state, and local agencies into a clearinghouse for farmers to easily find the documents pertinent to their farm planning needs. Idaho's farmers can now visit www.oneplan.org, download conservation plan development software, and be on their way to creating an appropriate conservation plan that is feasible and affordable.

Combined Involvement and Partnerships

The Idaho OnePlan was born through a collaboration of twenty federal, state, and local agencies, commodity groups, and association partners. The business vision behind creating the Idaho OnePlan is to have a single planning and implementation process that will meet all agency requirements. Two committees, an executive committee and a steering committee, handle the project logistics, from funding to software development decisions. EPA, U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS), USDA Cooperative State Research, Education, and Extension Service (CSREES), Idaho State Department of Agriculture, Idaho Department of Environmental Quality, and participating associations and commodity groups fund the collaboration, with multiagency staffing of the two decision-making committees.

What is a Conservation Plan?

A conservation plan is a comprehensive guide for a farming or ranching operation that identifies resource problems and suggests solutions. A conservation plan provides resource development opportunities over a five- to ten-year period, helping a farmer make short-term decisions that will be compatible with his or her long-term goals.

Reaching the Audience

Well over half of Idaho farmers use the Internet, making it the simplest and most effective way to explain and distribute a computer-based approach that integrates multiagency programs and opportunities in a single location. In fact, 80 percent of Idaho farmers use computers and 62 percent use the Internet, compared with 55 percent and 43 percent of farmers nationwide, respectively.

At present, the Web site offers more than 320 linked pages containing information relevant to Idaho farmers and more than 350 links for general agriculture practices nationwide. The site provides information about the federal, state, and local regulations and resources that address agriculture and conservation in a variety of areas, including:

- Nutrient and pest management
- Water management
- Best management practices (BMPs)
- Air and water quality
- Financial assistance
- Endangered species
- Petroleum storage tanks

- Waste management
- Wetlands

Using OnePlan

Once the Web site is finalized, a farmer will be able to develop a conservation farm plan by entering the Web site, downloading the OnePlan software, downloading farm data, and answering questions. The farmer will download data specific to his or her farm, including digital images (e.g., aerial photos), soil data, hydrology maps, roads, and borders. The OnePlan software will incorporate this data and then ask the farmer a series of questions about the farm's operation. The software will then offer a report and plan of action, also known as a conservation farm plan. This plan will suggest BMPs for particular areas and allow the farmer to estimate costs to determine which BMPs would work best. The software will also allow the farmer to record which BMPs and specific activities (e.g., pesticide application, cultivation methods, equipment) were implemented over time to see what turns out to be most effective.

The Future of Conservation Planning in Idaho

Because this is a voluntary program, farmers are not required by the state to use the Idaho OnePlan. However, those who have developed a conservation plan using the OnePlan method are immediately qualified for federal and state financial assistance when needed and available. The partners behind the effort hope that the financial and environmental stewardship incentives offered for those using the OnePlan method will make on-farm conservation planning and implementation much more efficient than in years past.

The Idaho OnePlan Conservation Planner is well on its way to becoming a success. As part of the overall OnePlan vision the Idaho Partnership has also developed a Nutrient Management Planning Tool. The prototype for the Web-based Conservation Planner is complete and will soon be piloted and tested in the Fifteen Mile Watershed. The PC-based Nutrient Management Planner is up and running, and is being tested by NRCS conservationists and engineers, as well as Idaho State Department of Agriculture engineers throughout the state. It offers downloadable aerial maps and numerous GIS layers and site specific data relevant to each identified location statewide.

Nutrient Management Plans will be required for all concentrated animal feeding operations and animal feeding operations by the end of 2005. Dairy producers in the state of Idaho self imposed similar rules in 2001. Statewide, over 800 Dairy nutrient management plans have been completed, more than 200 with the OnePlan Nutrient Management Planning Tool. The partners hope that the ease of using OnePlan will prompt farmers throughout Idaho to develop Conservation Management Plans that include Comprehensive Nutrient Management component plans where appropriate, as well as any other necessary components.

The Conservation Planning Tool will assist Idaho's agricultural producers to address any regulatory requirement such as Clean Water Act Total Maximum Daily Load implementation requirements, Safe Drinking Water Act, and the Endangered Species Act. A watershed-level pilot project is currently underway in the Fifteen Mile Creek drainage, a major tributary of the Boise River, just west of Boise. Producers are being encouraged to implement best management practices (BMPs) with Environmental Quality Incentives Program and section 319 funds. Ongoing water quality monitoring will evaluate results.

[For more information, contact Wayne Newbill, OnePlan Coordinator, Idaho Association of Soil Conservation Districts, Boise, ID 83702. Phone: (208) 338-4321; e-mail: wnewbill@agri.state.id.us; Internet: www.oneplan.org.]

Phytase is Becoming a Familiar Face on the Farm

Many farmers are turning to the enzyme phytase to reduce the amount of phosphorus in the manure applied to their land. Phytase is not present in large quantities in livestock animals with single stomachs (e.g., poultry, swine) but is needed to break down a common form of phosphorus known as phytate. Because 55 to 85 percent of the phosphorus found in cereal grains and oilseed

Phytase is Becoming a Familiar Face on the Farm (continued)

meals is in this non-available, organic form of phytate, the lack of phytase in the animal's stomach prevents it from breaking down and utilizing much of the phosphorus in its feed. To compensate, some producers add an inorganic form of phosphorus to the feed that is readily available to the animal for uptake. Although this provides the phosphorus the animal needs, it also leads to the excretion of excess undigested inorganic phosphorus in manure, which often leads to water quality problems.

Excess phosphorus in manure often impacts water quality because fertilizer applications are frequently based on the amount of nitrogen, not phosphorus, that is needed by the crop. In general, when animal waste is the source of the fertilizer, there is a greater excess of phosphorus than nitrogen. Therefore, when fertilizer is applied to fields on a nitrogen basis, excess phosphorus is applied to the soil. Phosphorus binds to the soil particles and can be carried into waterbodies when a runoff event occurs. An overabundance of phosphorus in a waterbody can stimulate the rapid growth of aquatic plants such as algae. The decomposition of these plants can deplete the water of oxygen and can cause the death of aquatic life.

Turning to Phytase

To reduce high phosphorus levels in manure and levels in soil where it is land-applied, many producers are now adding the FDA-approved phytase to livestock feed. The phytase allows increased organic phosphorus absorption by the animal, effectively decreasing the amount of phosphorus excreted. Studies have shown that adding phytase decreases the amount of phosphorus excreted by the animal by approximately 30 percent. For example, in a study by Lorimor et al. (2001), researchers discovered that Phytase addition did not impair pig performance, diet costs were not increased, and that with a 22 percent reduction in liquid manure phosphate level, a manure management plan based on phosphorus that required 100 acres would now need only 78 acres.

Adding phytase to feed requires some care. Studies have shown that phytase increases the animal's uptake of phytate-phosphorus from 15 to 45 percent, and also slightly increases their uptake of trace minerals. Because of this, producers must adjust the levels of the minerals and nutrients in phytase-enriched feed. When done properly, manipulating phytase and nutrient levels in feed should not increase the feed's price. And some of the conservation assistance programs funded by the 2002 Farm Bill, such as the Environmental Quality Incentives Program, may offer producers financial assistance to purchase phytase. Using phytase to prevent phosphorus pollution at its source is not only environmentally friendly, but is also cost-effective and reliable.

Mention of commercial products or publications does not constitute endorsement, or recommendation for use, by EPA.

[For more information, contact Katie Flahive, U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, 4503T, Washington, DC 20460. Phone: (202) 566-1206; e-mail: flahive.katie@epa.gov.]

Demonstrating Proper Equine Waste Management

Think of Kentucky horse farms and you imagine clean, beautiful expanses of grassy rolling hills dotted by graceful racehorses. However, behind this clean image is a dirty secret: lots of manure.

Every day, close to 1,000 tons of equine waste mixed with soiled bedding are produced in stables on horse farms in five counties comprising the Kentucky Bluegrass region: Bourbon, Fayette, eastern Franklin, southern Scott, and Woodford Counties. The U.S. Department of Agriculture estimates that about 75 percent of the farms in the area dispose of this waste, known as "stable muck," in unmanaged piles on remote parts of these farm, often in sinkholes or adjacent to streams. Runoff from stable muck contains high levels of nitrogen and bacteria and is contributing to water quality impairments and threatening local groundwater quality in the region. Fortunately, a recently launched demonstration project is educating many farmers on nonpoint source pollution issues and convincing them to begin implementing better manure management practices.

Demonstrating Proper Equine Waste Management (continued)

In 1996 the Thoroughbred Resource Conservation and Development Council (Council) received a section 319 grant of $205,000 to demonstrate practical, effective, and affordable horse manure management over a 5-year period. Project partners contributed an additional $123,000 in matching funds as well as an enormous amount of in-kind services. Project partners included state environmental agencies, local governments, local conservation districts, Kentucky Thoroughbred Association, University of Kentucky, Kentucky Geological Survey, and of course, the landowners themselves. The Council and a committee with members from all partners provided general management and oversight of the project. "Our project succeeded because of the dedication and support of all of our partners," noted Carolyn Oldfield with the Council.

The Equine Waste Best Management Practice (BMP) Demonstration Project featured four volunteer farms showcasing onsite composting and two volunteer farms showcasing offsite disposal. The demonstration farms were located in the heart of the Kentucky Bluegrass horse farming region, an area that supports nearly 1,300 farms with more than 28,000 horses.

Composting

Onsite composting of stable muck has the potential to meet the waste treatment needs of many farms in the region, transforming the waste into a valuable soil amendment. The majority of farm operators in this region had not considered this option because they lacked financial assistance and were not aware of the available technology. Previously, equipment for managing compost was suited only to large, commercial cattle operations and not the smaller horse farms typical of this region. However, smaller and more affordable composting options have recently become available that better meet the needs of the farms in this region.

Compost piles on a horse farm in Kentucky's Bluegrass region.

On the four composting demonstration farms, stable muck was cleaned out of the stalls daily and hauled from the barns in a manure spreader to the composting site. The landowners, with help from project staff, established rows of stable muck (called windrows) that eventually grew to be 600 to 1,500 feet long. On average, each row was 6 feet tall and 10 feet wide but would slowly shrink as it decomposed. Farm operators and project assistants monitored temperature, odor, and moisture to help determine the proper turning time of the composting stable muck. When appropriate, the farm staff would use a tractor to pull a composting turner along the windrow (see photo). The Council purchased a used composting turner and leased two more compost turners from Midwest Bio-Systems for the project. Midwest Bio-systems estimates that, given ideal composting conditions, stable muck could degrade into compost in as little as six weeks.

Off-site Disposal

Two farms demonstrated the process of roll-baling stable muck. These farms roll-baled stable muck with the same type of baler typically used to roll bale hay. Newer models of roll balers have been designed to roll materials with higher moisture content and can therefore bale stable muck more effectively. To bale the muck, farm employees cleaned the stalls each day and placed the muck in a row down the barn hallways.

Finished horse waste compost.

The roll baler was pulled through the material to roll up the muck. The bales were then hauled by conventional farm equipment such as tractors to a designated area for pickup. Because many farmers clean their stalls daily, the muck often contains large amounts of uneaten Bluegrass hay, which has value as winter forage for local cattle farms. Thus, both demonstration sites were able to develop agreements with local cattle producers to pick up the bales.

Outreach and Education

To spread the word about the project, the Council developed a project video and brochure promoting the composting and alternative handling technologies, conducted three field day events to demonstrate the techniques, and published three news articles. The project was also featured in several horse industry publications. The Council distributed more than 500 copies of the video to horse industry operations in the area. Although the project has ended, the Council continues to receive requests for the video.

Spreading finished compost (approximately 12 cubic yards/acre).

Oldfield expects many local farmers to quickly adopt similar BMPs. Already, eight farms have voluntarily adopted the BMPs. "Both management options were well-received within the community," explained Oldfield. "The horse farmers want the horse industry as a whole to have a good public image when it comes to environmental stewardship. Many horse farmers have been wanting to do the right thing but didn't know how. This project provided them new alternatives and ideas."

Spin-off Successes

The project's success has sent ripples of positive change through the local community:

- Both of the roll-baling demonstration farms have invested in equipment and have made long-term plans to continue roll-baling muck.
- Three of the four composting farmers plan to continue composting.
- A local race track, Keeneland Race Course, invested in a biofermentation facility to manage their horse muck. The track provided additional education about management of stable muck by offering public demonstrations of its facility.
- The company from which the composting equipment was leased, Midwest Bio-Systems, relocated a technical specialist to the area as a result of interest generated by this project. The company's continued presence in the area is expected to result in increased composting by additional farms.
- One project cooperator, Creech Services, started a new business in the region to increase large-scale composting. The facility processes stable muck from a number of local horse farms. Once processed into compost, the compost is returned for use on the horse farms or sold to local landscape suppliers.
- The Kentucky Horse Park, a state park devoted to horses, initiated a composting operation and hosted a workshop attended by representatives from five states (California, Illinois, Ohio, Pennsylvania, and West Virginia).

The project also spurred the University of Kentucky to research the benefits of applying compost to horse pastures. If this research yields the expected positive results, it should help change attitudes in the horse industry from perceiving muck as a waste to valuing it as a nutrient-rich soil amendment. Ultimately, the research will hopefully encourage widespread beneficial reuse of stable muck,

Demonstrating Proper Equine Waste Management (continued)

which will reduce water pollution and should result in increased emphasis on proper nutrient management across Kentucky and beyond.

[For more information on the demonstration project, contact Carolyn Oldfield, Thoroughbred RC&D Council Coordinator, 401 Washington Street, Georgetown, Kentucky 40324. Phone: (859) 863-6010; e-mail: coldfiel@ky.nrcs.usda.gov. For more information on the agricultural components of Kentucky's nonpoint source program, contact Peggy Jackson, Kentucky Department for Environmental Protection, 14 Reilly Road, Frankfort, KY 40601. Phone: (502) 564-3410; e-mail: peggy.jackson@mail.state.ky.us.]

News from States, Tribes, and Localities

Phosphorus Reduction in the Everglades

The Florida Everglades, a vast expanse of sawgrass wetlands, are the aquatic backbone of south Florida. This vital habitat supports a wide variety of plants and wildlife not found anywhere else in the world. Once covering 4 million acres, the Everglades have been drained, ditched, and modified for years, greatly reducing its size and decreasing its health. The wetland acres that remain are further threatened by water control structures and urban and agricultural nonpoint source runoff. All the hydrological changes in the Everglades have led to losses of desirable plants and animals. Fortunately the Everglades Best Management Practice (BMP) project developed by the University of Florida Institute of Food and Agricultural Services (IFAS) and the Florida Department of Environmental Protection (FDEP) is working to reduce agricultural runoff in a key effort to restore the Everglades.

The major purpose of this project is to reduce nutrient loading (particularly from phosphorus) from farms in the Everglades Agricultural Area (EAA). Nearly 590,000 acres of this 690,000-acre region located south of Lake Okeechobee are dedicated to agricultural use by private farmers. Much of the agricultural success of this area can be attributed to the extensive network of canals and levees that have made farming possible on more than 691,358 acres of Everglade's marshland.

This project is jointly funded by the EAA growers and the FDEP. The project began in 1992 with $400,000 funding from the Everglades Agricultural Area Environmental Protection District (EAA-EPD). In May 2000 the FDEP added their funding with $750,000 over a 40-month period. The current annual operational cost is about $800,000 ($575,000 from EAA-EPD and $225,000 from FDEP section 319 funds).

The phosphorus targeted by this project is a major cause of ecosystem change throughout the Everglades. Over time, high phosphorus concentrations have caused native plants—sawgrass and spike rush—to die off, and undesirable vegetation such as cattail have taken their place.

Adding Agricultural BMPs

Under law, every grower in the EAA is obligated to implement a certain number of BMPs, the amount and kind of BMPs depending on the specific circumstances of the farm location, configuration, and cropping practices. The South Florida Water Management District (SFWMD) has historically worked with farmers to establish a base level of BMPs on privately owned farmland and ensure consistency between farms.

In 1992, the project began with evaluating the effectiveness of agricultural BMPs. Ten target farms were monitored for a number of discharge parameters, including canal flow, field and canal water levels, rainfall amounts, evapotranspiration, water turbidity, suspended solids, temperature, pH and conductivity, phosphorus concentrations, and phosphorus speciation. The physical parameters were monitored with remote sensing, data collection, and telemetry systems. Chemical parameters were monitored using automated sample collection systems that are integrated with the flow monitoring system. Demonstration and evaluation of new BMPs continues on two fully monitored farm plots set up by the University of Florida Everglades Research.

Phosphorus Reduction in the Everglades (continued)

The project continues to assist growers in BMP implementation to keep pace with their changing farm configurations and to develop additional BMPs as conditions change. A significant change was seen after research showed that a large fraction of the farm particulate phosphorus load originated not from soil erosion but from biological growth in the farm channel networks. BMP development now focuses on particulate phosphorus reduction by control and removal of biological growth and reduction of organic matter transport.

Phosphorus Reduction Achieved

Although the phosphorus reduction efforts are officially measured by regulatory agencies on a basin-wide scale, each grower is monitored locally for individual contribution to the overall watershed load. Each grower collects samples and flow data according to an approved protocol and submits periodic phosphorus load reports to the SFWMD. Achieving basin-wide compliance is the result of considerable cooperation among the growers. Through the BMP program and the regular information exchange sessions that are sponsored by the program, the growers have joined together to achieve the phosphorus reduction goal.

All of the program's work over the past 6 years has proven successful. To date the reduction has averaged more than 50 percent, and in some years has exceeded 70 percent. This surpasses the goal set by the Everglades Forever act of 1994 requiring farmers to reduce their phosphorus load by 25 percent from historic baselines. BMP application has become an integral part of every grower's operating mode, and there is an extremely strong emphasis on continuing education of farm personnel to insure continued compliance.

[For more information, contact Samira Daroub, Assistant Professor, University of Florida, 3200 E. Palm Beach Road, Belle Glade, FL 33430. Phone: (561) 993-1593. Also contact Taufiqul Aziz, Florida Department of Environmental Protection, 2600 Blairstone Road, Tallahassee, FL 32399. Phone: (850) 245-8415.]

Implementing the Phase II Stormwater Rule—One City's Experience

The City of Franklin, Tennessee, is working to prevent flooding while also meeting the requirements of the new Phase II stormwater program rule (visit cfpub.epa.gov/npdes/stormwater/swphase2.cfm for more information). Franklin is an historic city of 43,000 that has experienced rapid population growth since the 1960s. The construction associated with the city's rapid expansion has resulted in polluted runoff and increased sediment in nearby Harpeth River and its tributaries. In fact, many segments of the Harpeth River are currently included on Tennessee's 303(d) list of impaired waters because of sedimentation problems. By developing a strict stormwater ordinance, implementing a stormwater user fee, educating its citizens, and better tracking the generation and discharge locations of stormwater, the city hopes to reduce stormwater's impact on its local waterways.

Although Franklin was already trying to address its sedimentation problems before EPA finalized the Phase II rule in 1999, the rule provided an extra incentive. In early 2000 the city formed a task force to develop a strategy that would not only comply with the Phase II requirements, but also help to prevent future flooding, thereby enhancing the livability of their city.

Now complete, the task force's strategy includes several elements:

- A stormwater ordinance (Completed and approved by the city in April 2002)
- A stormwater utility fee as a revenue source (Complete—effective January 2003)
- A stormwater master plan to help address flooding concerns. The plan will include information such as infrastructure inventory, basin hydrology modeling results, flood potential information, and potential solutions to flooding problems.
- The hiring of a stormwater coordinator to oversee the elements of the strategy (hired in March 2002)

Meeting the Phase II Requirements

Reaching the Public

To meet the public involvement and participation requirements of the Phase II rule, the city carefully chose task force members who represented the diversity of the city's population, and could effectively transform people into stormwater stakeholders. Although the task force has completed its initial mission of developing a stormwater strategy for the city, many of the members remain active in city stormwater issues. "We may reactivate the task force later if we need input," explained Don Green, the city's stormwater coordinator.

To meet the public education and outreach requirements, the city posts stormwater program information on its Web site and has held televised workshops informing citizens about the city's latest regulations and programs. Green is currently developing an education strategy to determine the most effective way to reach particular segments of the public once the city's Phase II permit is finalized in mid-2003. "One of my goals is to form an Education Committee to help develop a strategy to guarantee, as much as possible, that we have reached our target audience and have some means of evaluating our success," explained Green.

Green is also working with the organization Nonpoint Education for Municipal Officials (NEMO) and local partners to initiate a "Tennessee Growth Readiness" program in his county. This pilot program will inform and enable the target audience—planning professionals, public works managers, opinion leaders, and elected officials—to choose new growth management practices.

Illicit Discharge Detection and Elimination

The city plans to address illicit discharges through education and enforcement. When the new stormwater user fee was implemented in January 2003, the city inserted educational leaflets in the utility bills to educate the public and help to inform them about why it was justified. To identify existing and future illicit discharges, the city plans to conduct surveys using the eyes and ears of its building code and street inspectors. "Our building inspectors are always out in the community. We will be training them to recognize and report any illicit discharges that they see," explained Green. To better meet their inspection needs, the city hopes to hire two additional stormwater management inspectors for the street department. The city also plans to provide training to other city staff who spend their time out in the community, such as police and fire department staff.

Construction Site and Post-Construction Runoff Control

To address construction-related requirements of Phase II, the city will enforce its new stormwater ordinance, which includes provisions for construction activities. The ordinance sets up new and more restrictive stormwater design standards and erosion prevention and sediment control requirements that affect anyone who develops land in Franklin. To support the requirements outlined in the ordinance, the stormwater task force, with assistance from contractor Camp, Dresser & McKee, Inc (CDM), developed a Best Management Practice (BMP) manual to help developers, business owners, and contractors prevent erosion, control sedimentation, and manage runoff. The manual recommends BMPs that serve both short-term (during construction) and long-term (post-construction) needs such as grassy swales, sediment ponds, and detention ponds.

Pollution Prevention & Good Housekeeping

To meet the pollution prevention requirements of Phase II, the city will control erosion, install riparian buffers along the Harpeth River and its tributaries, and build and maintain regional retention ponds to reduce the volume of runoff currently reaching the streams during and after precipitation events. The city is also considering assuming responsibility for the maintenance of retention ponds currently under the jurisdiction of homeowners associations.

Mapping and Inventorying

Phase II requires cities to inventory and map their watersheds to help identify and control stormwater issues. To meet these requirements, as well as to support the development of the city's

stormwater master plan, the city is using a geographic information system (GIS) to map stormwater routes in basins throughout the city. "The GIS will not only help us manage our stormwater over the long term, it will also allow us to look at where spills or illicit discharges occur in the city and respond more quickly and effectively to minimize the damage," explained Green.

To expand on the mapping effort, the City of Franklin Engineering Department and its contractor have been inventorying stormwater structures and hydrology in the city's watersheds since 1999. The inventory, performed one basin at a time, provides information about basin hydrology that can be fed into a water modeling program. The results of the modeling will be incorporated into the stormwater master plan, and will assist in developing future recommendations for stormwater management, such as whether to implement regional detention areas. To date the project team has inventoried three basins and expects to complete work on one additional basin every year until the major watersheds are addressed.

Supporting the Stormwater Program

The city's new stormwater utility fee mentioned above is expected to generate an estimated $1.5 million a year, which will fund the stormwater management program. The fee will be directed into a dedicated stormwater fund to be used for all stormwater related activities undertaken by the city. The costs to the public will vary; city residents will be charged a monthly fee of $4, while commercial entities will be charged $4 for every 2,714 square feet of impervious surface.

For more general information about Phase I and II, visit www.epa.gov/npdes/stormwater. Information is also provided in News-Notes Issue #69, September 2002.

[For more information, contact Don Green, City of Franklin, 109 Third Avenue South, Franklin, TN 37064. Phone: (615) 791-3293; e-mail: dongr@franklin-gov.com; Internet: www.franklin-gov.com/engineering/STORMWATER/stormwater.htm.]

Phosphorus? No Thanks!

Last year Minnesota took a big step toward significantly reducing phosphorus in lawn runoff. In April 2002 Minnesota passed a law limiting the amount of phosphorus allowed in lawn fertilizers. The law completely bans the use of phosphorus on lawns in seven counties in the Minneapolis/St. Paul area. In the rest of the state, lawn fertilizers are limited to 3 percent phosphorus at most. The law, which takes effect on January 1, 2004, applies only to fertilizers used on lawns and not to fertilizers used on farms, flower or vegetable gardens, golf courses, new lawns, or cases where a soil test indicates that phosphorus is needed.

The Driving Force

In recent years, more than a dozen Twin Cities communities, including St. Paul and Minneapolis, passed laws restricting the use of phosphorus-containing fertilizers on lawns. The trend began after the City of Plymouth enacted the first phosphorus ban in 1996. "City residents were complaining because their lakes were green," explains John Barten with the Three Rivers Park District, an independent special park district based in Plymouth. For years Barten has worked closely with the City of Plymouth to try to resolve local water quality problems. "In 1992 the City hired a consultant who developed a plan for reducing phosphorus inputs to Plymouth's Parkers Lake by 240 pounds per year. The consultant's plan called for condemning and tearing down buildings, rerouting stormwater flow, and building a nutrient-reducing retention pond, at a cost of $840,000. However, we determined that by simply banning the application of phosphorus in lawn fertilizer, we could reduce the same amount of phosphorus input for virtually no cost."

Why is Phosphorus a Problem?

In freshwater systems (e.g., lakes, rivers, and streams), phosphorus is a limiting nutrient, which means that if all phosphorus in the water is absorbed by plants, plant growth will cease, no matter the amount of other nutrients that are available. When unnaturally high levels of phosphorus reach freshwater systems, plants can grow unchecked. Excess plant growth in a freshwater system can have many detrimental consequences, including unpleasant appearance and odors, oxygen depletion due to microbial breakdown of decaying plant matter, and interference with navigation by aquatic animals.

After the ban in Plymouth went into effect, the water clarity in Parkers Lake dramatically improved. "We were able to take this

information to other municipalities in the area to show the benefits of reducing phosphorus application," notes Barten. As a result, municipalities around the region, including the cities of Minneapolis and St. Paul, began passing their own ordinances restricting or banning phosphorus.

Keeping track of which communities had restrictions became cumbersome. "Also, having each municipality develop their own ordinance seemed foolish. To avoid this, the state Department of Agriculture went to the legislature with the idea of imposing limitations statewide," explains Barten. "A number of the localities with existing ordinances recognized the benefits of restrictions and successfully lobbied to help push the legislation through." The new law will be enforced at the local level and will be supported through education and outreach efforts by state and local agencies. For complete language of the legislation, visit www.revisor.leg.state.mn.us/stats/18C/60.html.

Since the law doesn't go into effect until next year, fertilizer retailers have plenty of time to comply. "Thanks to the media attention surrounding passage of the law, lawn and garden centers and other fertilizer retailers already know about the new restrictions. We expect to see a big increase in compliance with the law well before the 2004 deadline," explains Carrol Henderson with the Minnesota Department of Natural Resources (DNR).

Educating the Public

Organizations across the state are already working to incorporate the "no phosphorus" message into their outreach efforts. DNR hosts workshops around the state on lakescaping—the process of restoring a vegetated buffer along a shoreline to mitigate an erosion problem and intercept pollutants carried in runoff. Participants learn about the benefits of limiting phosphorus applied to lawns during every workshop. "We emphasize that although shoreland buffers can help remove excess phosphorus, the best solution is to not apply any in the first place. People are usually very surprised to learn that one pound of excess phosphorus that reaches the lake translates into approximately 500 pounds of algal growth," says Henderson.

If homeowners are still skeptical, "we encourage them to get their soil tested," explains Henderson. "Because many of the soils in Minnesota already have enough phosphorus to maintain a healthy green lawn, a soil test usually proves to homeowners that they don't need to apply more."

The Minnesota Cooperative Extension Service and Soil and Water Conservation Districts throughout the state also provide lakescaping and phosphorus education efforts through meetings, workshops, and demonstration projects. "We have a great collaborative education effort underway across the state. The participants in these diverse events have already helped to spread the word to their friends and neighbors," notes Henderson. "We've begun to see a real domino effect; more and more people are aware of the problems created by phosphorus in fertilizer. As the public continues to gain more knowledge, we expect them to reinforce the "no phosphorus" message with their dollars as they shop for fertilizer throughout the state."

[For more information contact Carrol Henderson, Minnesota Department of Natural Resources, 500 Lafayette Road, St. Paul, MN 55155-4040; Phone: (651) 296-0700, E-mail: carrol.henderson@dnr.state.mn.us; or John Barten, Three Rivers Park District, 12615 County Road 9, Plymouth, MN 55441-1299; Phone: (763) 476-4663; E-mail: jbarten@threeriversparkdistrict.org.]

Banning Phosphorus Can Make a Difference

Although the City of Plymouth enacted a phosphorus ban in 1996, the neighboring city of Maple Grove did not. "Since the two cities have comparable watersheds, we saw this as a good opportunity to assess whether the ban would have an impact," explains Barten. In 2001, using funds they received from an EPA Environmental Monitoring for Public Access and Community Tracking (EMPACT) grant, the Three Rivers Park District worked with the University of Minnesota, Duluth, to monitor the phosphorus in runoff in both the City of Plymouth and the City of Maple Grove watersheds. To date, only the data for 2001 has been completely analyzed. "In 2001, we saw a 23 percent reduction in the amount of phosphorus reaching the lakes in the City of Plymouth as compared to those in Maple Grove—a dramatic difference." For more information about the study, see www.lakeaccess.org/lakedata/lawnfertilizer/mainlawn.htm.

Maine Department of Environmental Protection has been promoting the use of phosphorus-free fertilizer since 1999. At that time, most consumers and retailers had never heard of phosphorus-free fertilizers. Since 1999, sales of phosphorus-free fertilizer have continued to increase. Sales have grown from 56,445 pounds in 1999 to 134,590 pounds in 2001. For more information, contact Christine Smith, Lakes Education Coordinator, Maine Department of Environmental Protection, at (207) 287-7734 or Christine.P.Smith@state.me.us.

Sales Taxes Save the Soil

Every day, the citizens of Missouri use their purchasing power to help protect Missouri's natural resources. Missouri is the only state in the Nation relying on a portion of retail sales tax revenues to fund soil conservation programs. One-tenth of one percent of the retail sales tax is divided equally between the state park system and soil conservation. Voters originally approved the Parks and Soils Sales Tax as an amendment to the Missouri Constitution in 1984 for five years. The voters renewed it for another ten years in 1988 and again in 1996. Thanks to the citizens' continued support of the tax, soil erosion rates are down considerably.

The tax is the sole funding source for the Missouri Department of Natural Resource's (DNR) Soil and Water Conservation Program (SWCP). In 1985 the tax generated almost $17 million for the SWCP. "The tax revenue has increased steadily since then. Increases have ranged from 2 percent to 5 percent annually depending on the state of the economy," explains Bill Wilson, Environmental Manager for the SWCP. "This year our program is receiving approximately $36.9 million in tax revenue."

Making a Difference

This dedicated funding source has been in place for almost two decades and has made a significant difference. Prior to passage of the tax, Missouri had the second worst erosion rate in the Nation. Data collected by the USDA Natural Resources Conservation Service (NRCS) during its 1982 National Resources Inventory (NRI) showed that Missouri was losing 10.9 tons of soil per acre of cultivated cropland. Since then, Missouri has reduced erosion from its agricultural land more than any other state. The most recent NRI (1997) showed that an average of 5.6 tons of soil eroded from each acre of Missouri's cultivated cropland. Although this is the sixth highest rate in the country, it represents a 54 percent reduction in the state's erosion rate over a 15-year period. Moreover, recent trend data from 2000 outlined in Missouri's 2002 Needs Assessment document indicate that the erosion rate is continuing to decrease (available at www.dnr.state.mo.us/wpscd/swcp/homeswcp.htm).

The USDA NRCS conducts a National Resources Inventory (NRI) every five years to evaluate the conditions and trends of the Nation's soil and water. More information about the NRI is available at www.nrcs.usda.gov/technical/NRI.

How has Missouri achieved this reduction? For the past 17 years, Missouri's soil and water conservation districts educated the public and provided financial incentives and technical assistance to individual landowners. Between fiscal years 1986 and 2001, the tax provided landowners direct cost-share incentives to implement erosion-reducing best management practices (BMPs) on more than two million acres of land. Landowners also reduced erosion on their land without direct cost-share funding thanks to ongoing public education efforts, availability of demonstration practices, and a general acceptance of practices due to their more widespread use. The DNR SWCP continues to work through the local soil and water conservation districts to reduce erosion through the following voluntary soil and water conservation programs:

- Cost-Sharing: Tax funds are used to reimburse landowners for up to 75 percent of the cost of implementing erosion-reducing BMPs.
- Loan Interest-Sharing: Landowners receive a refund for most of the annual interest costs on bank loans they have assumed for erosion control practices and conservation equipment such as no-till drills and planters.
- Special Area Land Treatment (SALT) program: A watershed-based program where the SWCDs direct technical and financial assistance to landowners within prioritized watersheds to reduce agricultural nonpoint source pollution.
- Soil Surveys: DNR soil scientists, with assistance from the USDA NRCS, map the state's soils, interpret data, and identify problem areas.
- District Assistance: DNR supports the local boards of the 114 SWCDs in Missouri. The SWCDs provide technical support to landowners and administer funds for soil conservation from local, state and federal sources.

Sales Taxes Save the Soil (continued)

"Thanks to the successes of the soil conservation and parks efforts in our state," Wilson said, "the citizens have shown strong support for the tax each time it has come up for renewal. Last time two-thirds of voters said yes. We take that as a major endorsement for these programs."

The Future

Although Missouri's conservation partners have made great strides in erosion reduction, they are still not satisfied. "The state has a plan in place to reduce erosion even further in the near future," notes Wilson. The plan is outlined in the Missouri 2002 Needs Assessment document and includes efforts such as further targeting erosion reduction on agricultural land, expanding the SALT program, strengthening the role of SWCDs, and others. "We have done a lot of good work with the tax funds in the past," explains Wilson, "and we are well on our way to accomplishing the erosion-reduction goals outlined in the current plan."

[For more information, contact Bill Wilson, Environmental Manager, Department of Natural Resources, Soil and Water Conservation Program, P.O. Box 176, Jefferson City, MO 65102. Phone: (573) 751-4932; e-mail: nrwilsb2@mail.dnr.state.mo.us; Internet: www.dnr.state.mo.us/wpscd/swcp/homeswcp.htm.]

Missouri Hosts Urban Erosion Control Workshops

The Missouri Department of Natural Resources (DNR) and the U.S. Department of Agriculture Natural Resources Conservation Service are working with homebuilder associations, contractors, the Missouri Department of Transportation, and local city and county governments to conduct two-hour Urban Erosion Control Workshops across the state. The workshops are geared toward contractors, builders, and development planners in urban areas, with the goal of increasing awareness of erosion prevention techniques and practices. The workshops began in 2002 when DNR management planned to provide technical assistance to the regulated community before an increase in enforcement actions. Since then, DNR has facilitated 56 workshops with approximately 2,500 participants.

Workshop topics include an overview of general erosion problems, guidance from the EPA and DNR for storm water management, permitting, and erosion Best Management Practices (BMPs). The workshops conclude with an interactive slide show to demonstrate both positive and negative practices and a question and answer session. All participants are provided with free copies of *Protecting Water Quality: A Field Guide to Erosion, Sediment and Storm Water Best Management Practices for Development Sites.* The field guide provides additional information to developers, contractors, site managers, and inspectors regarding the installation and maintenance of construction site erosion and storm water control practices in Kansas and Missouri.

The workshop and the manual are designed to assist those communities that are trying to comply with Phase II regulations. These regulations require the implementation of appropriate sediment and erosion control practices on construction sites as well as the development of plans to conserve urban storm water quality. Participants will be able to prepare a better Storm Water Pollution Prevention Plan, obtain a storm water permit easily, and avoid enforcement action by properly installing and maintaining erosion control devices onsite.

[For more information, contact Glenn Lloyd, Missouri Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102. Phone: (800) 361-4827 or (573) 526-6627; e-mail: nrlloyg@mail.dnr.state.mo.us.]

Notes on Watershed Management

Native Plants Save Water and Prevent Polluted Runoff

More and more gardeners are turning to native plants for their landscaping needs. Native plant species have evolved and adapted to local conditions over thousands of years and are usually much more tolerant of the prevailing weather extremes at a given location. Once established, most native species usually require no irrigation beyond normal rainfall, and, because they typically grow more slowly, generate much less yard waste. Native plant species are also well adapted to local soil conditions, thriving without added fertilizers. Native plants are generally more resistant to local pests and diseases and require less pesticide application than ornamental plants. All of these advantages add up to a lesser need for chemical and water application, which leads to a reduced potential for nonpoint source pollution.

What is a Native Plant?

Native plants are usually defined as those naturally in the area before humans introduced plants from distant places. Thousands of plant species, known as invasive plants, have been brought to

North America in the past 300 years. "In Florida, for example, botanists consider plants native if they were present in the state before the mid-16th century, when the first Spanish colonists arrived," explained Sandy Wilson, an assistant professor of environmental horticulture with UF's Institute of Food and Agricultural Sciences.

While most nonnative species are "well behaved" and rarely penetrate natural areas, some invasive nonnative species have no natural controls present in their new environment and are able to outcompete and gradually displace native plants. The loss of the native plants also threatens the wildlife that evolved to depend on those plants. The ongoing fight against invasive plants across the nation is expensive. "Last year, the state of Florida spent $127.6 million to control invasive exotic species," said Wilson.

Integrating Native Plants into the Landscape

Once overlooked in the marketplace, native plants are now gaining popularity with environmentally aware gardeners and landscapers. Since 1995 severe droughts have affected much of the country periodically and have resulted in serious economic, social, and environmental impacts. Frequent drought conditions have encouraged homeowners to look for drought-resistant native plants in their home and garden stores. "The only disadvantage to native plants is that many species are hard to find in retail stores," said Wilson. "But by promoting their use for the home landscape we can increase demand, giving growers and retailers incentive to carry them." For more information on how Florida is promoting the use of native plants in the landscape, see the Florida Yards & Neighborhoods article, *Beautiful Yards and Clean Water—It is Possible*, below.

Organizations in many states are finding innovative ways to promote native plant use and incorporate them into the landscape. The Potomac Watershed Partnership (PWP) and Ford Motor Company recently developed a new program, called Growing Native, to help supply state tree nurseries in Maryland and Virginia with native plant seedlings. Because of the increased number of trees and shrubs needed for ecological restoration projects implemented as part of the effort to restore Chesapeake Bay, the state nurseries had been experiencing a shortage of native seedling stock. On Saturday, October 12, 2002, more than 4,000 volunteers throughout the Potomac River and Chesapeake Bay region searched the grounds of parks, schools, churches, backyards, and other locations and collected native tree seeds. Volunteers contributed more than 7,000 hours of their time at approximately 250 sites to gather more than 130,000 seeds. The seeds collected will be grown in state nurseries and should be ready to plant in about 2 years.

Interest in native plants is rising nationwide, thanks to a broader trend toward exploring and preserving America's natural heritage, says Robert Breunig, executive director of the Lady Bird Johnson Wildflower Center in Austin, Texas. "Native plants provide the foundation for a healthy ecosystem," Breunig said, "They cleanse the air and water, hold soil in place, provide food and cover for animals, and do all these things naturally." Founded in 1982 by former First Lady, Lady Bird Johnson, and actress Helen Hayes, the center serves as a national clearinghouse for native plant information. The center's Web site, www.wildflower.org, allows users in all 50 states to identify native plants and find local sources for plants and seeds.

[Portions of this article were excerpted from UF News, March 2002 Article, Native Plants Can Help Gardeners Save Water*, by Tom Nordlie (tfnordlie@mail.ifas.ufl.edu). For more information about the University of Florida Horticulture program, contact Sandy Wilson, University of Florida, at (561) 468-3922, ext.132, or by e-mail at sbwilson@gnv.ifas.ufl.edu. For more information on Growing Native, visit www.growingnative.org or contact Rob Carey, Growing Native Coordinator, at (703) 276-2777 or by e-mail at carey@potomac.org. For more information on the Lady Bird Johnson Wildlife Center, contact Robert Breunig at (512) 292-4200 or by e-mail at pipho@wildflower.org.]*

Beautiful Yards and Clean Water—It is Possible

A Florida program is encouraging suburban homeowners to protect the environment while enjoying their home landscape. The Florida Yards & Neighborhoods (FY&N) Program was developed by the University of Florida (UF) Cooperative Extension Service in 1994 to help reduce the amount of nutrients reaching Tampa Bay. Although initially focused in the Tampa Bay watershed,

the program has grown considerably and now is a major statewide program directed by the University of Florida (UF). FY&N, implemented on the local level by local UF Cooperative Extension agents, provides residents with education and outreach activities to help them reduce pollution and enhance their environment by improving home and landscape management.

How Does it Work?

FY&N educates homeowners about environmentally friendly lawn and landscape practices and provides the homeowners with the opportunity to have their yard certified as a "Florida Yard." UF Cooperative Extension offers two key educational resources to help residents learn about and implement FY&N practices in their yards—*A Guide to Environmentally Friendly Landscaping: Florida Yards and Neighborhoods Handbook* and its companion, the *Florida Yardstick Workbook*. Both documents are available online at hort.ufl.edu/fyn. The *Handbook* covers yard care topics such as selecting plants, managing landscape pests, managing a septic system, attracting wildlife, composting, fertilizing, watering, and how soil components impact yard management.

After reviewing the *Handbook*, the homeowner turns to the *Florida Yardstick Workbook* to evaluate his or her yard and yard care practices. For each beneficial practice the homeowner implements (or has already implemented), he or she earns "inches" on the "Florida Yardstick." A yard that "measures up" to at least 36 inches qualifies as a Florida Yard. The evaluation covers 9 key categories – watering, mulching, recycling, wildlife, controlling yard pests, placing plants appropriately, fertilizing, controlling stormwater runoff, and managing landscapes along shorelines or streambanks. Each category contains multiple benchmarks. Of the 49 benchmarks outlined, the homeowner must receive full or partial credit on 13 particular benchmarks to qualify as a Florida Yard.

Homeowners with yards that "measure up" to the FY&N criteria receive a sign like this one.

The homeowner receives between 1 and 6 inches for each benchmark he or she meets, depending on the overall importance of the issue. For example, replenishing mulch once or twice a year to maintain 2 to 3 inch depth receives 1 inch of credit, while designing and maintaining a landscape that exists predominantly on rainfall once plants are established receives a 6-inch credit. In total, homeowners can qualify for more than 230 inches if they meet all benchmarks, although the actual maximum number of inches available varies depending on the location of the yard and the water source used.

My Yard Qualifies—Now What?

If the self-evaluation reveals that a yard qualifies as a Florida Yard, the homeowner can then contact the local cooperative extension service to arrange a visit from a Florida Yard Adviser. The Adviser will review the evaluation checklist and make additional recommendations. If the Adviser finds that the yard meets all requirements, it is officially certified as a Florida Yard and the homeowner receives a Florida Yard sign to post. "Typically once a sign goes up in a neighborhood it creates a stir," explained Carol Keiper-Bennett with the FY&N statewide office in Gainesville. "Other homeowners then come forward to have their yards certified." Pictures of certified yards are available on the FY&N web site at hort.ufl.edu/fyn.

Besides relying on the interest generated by the signs in the neighborhoods, the local Cooperative Extension agents seek many avenues to inform the public about the program. They speak to homeowners associations and civic groups, provide educational information to landscape professionals, offer courses and workshops, and generate public service announcements for the radio, television, and newspaper outlets. Cooperative Extension frequently partners with local government, nonprofit, and private organizations to help advertise the program or support the implementation of demonstration projects. For example, the University of Florida/ Miami-Dade County Extension FY&N program partnered with Frank C. Martin Elementary School in Richmond Heights, the Nature Conservancy, and the South Florida Audubon Society in April 2002 to implement a FY&N demonstration project on school grounds. For photos of this and other demonstration projects see miami-dade.ifas.ufl.edu/programs/fyn/fynphotos.htm.

Going Statewide

Currently, 43 Florida counties actively participate in the FY&N program. The UF Cooperative Extension Service serves as the program's lead agency, with local Cooperative Extension agents

implementing the program. Because federal, state, and local governments share the funding responsibility for local Cooperative Extension service offices, the number of counties with active programs sometimes varies because of local funding availability. Some local programs seek grant funding or other funding support from local organizations to help offset costs.

Despite the current economic recession, the program's popularity is growing and more and more counties are starting programs. "Currently most of our participating counties are in the southern and coastal areas, but we are making progress in the central and panhandle regions as well," explained Christine Kelly-Begazo, statewide coordinator of the FY&N program. "We also are in the process of assisting other states in creating their own Yards & Neighborhoods projects that are modeled after our Florida program." Ms. Kelly-Begazo feels that the principles and concepts of this model program can be utilized in every state to reduce the impact of nonpoint source pollution and water issues that currently face urban planning and development.

[For more information contact Christine Kelly-Begazo, FY&N Statewide Coordinator, University of Florida, 1515 Fifield Hall, P.O. Box 110670, Gainesville, FL 32611-0670. Phone: (352) 392-1831, e-mail: ckelly@mail.ifas.ufl.edu, Internet: hort.ufl.edu/fyn.]

Manistee Watershed Project Comes to a Close

Spring 2002 marked the completion of another successful Clean Water Act section 319 project in Michigan's Manistee River basin. Thanks to the section 319 funds, sedimentation is now reduced in the Lower Manistee River watershed, a 1.4-million-acre watershed in northwest Michigan. This rural watershed is primarily in public ownership and is made up of approximately 41 percent forest, 39 percent agriculture, 13 percent wetlands, and 7 percent other land types. Since 1989 the Upper Manistee River Partnership has spent more than $1 million to address sedimentation by stabilizing streambanks, improving road stream crossings, and constructing in-stream sand traps in the Upper Manistee River watershed. The Manistee River section 319 watershed project extended this comprehensive restoration effort into the Lower Manistee River watershed in 1999.

The goals of the 319 project were two-fold: preventing sediment delivery at its source and establishing a framework for long-term, watershed-based projects through the formation of the Lower Manistee River Partnership (the Partnership). Led by Michigan's Conservation Resource Alliance (formerly the Northwest Michigan Resource Conservation and Development Council), the project received a total of $200,000 in section 319 funds and another $241,000 in matching funds provided by diverse project partners including soil and water conservation districts, private companies, nonprofit organizations, and federal, state, and local governments.

Reducing Sediment

A series of BMP restoration efforts were used to reduce sediment delivery to the river. First, the project partners stabilized 2,500 feet of streambank in seven different locations—well beyond their initial goal of 1,600 feet. They incorporated fieldstone and bioengineering techniques such as brush bundles (bundles of dead branches) and bio-logs (coconut fiber enclosed in twine) to stabilize the streambanks.

Three inadequate road crossings were replaced. For the new road crossings, project staff installed timber bridges at two sites to allow for natural stream bottoms through the crossings and used a concrete box culvert matching the existing stream width at the third site. Additionally, new paving controlled road runoff and sand delivery from gravel road surfaces at two road crossing sites. Both efforts included engineering practices such as check dams, rip rap, curbing, and mulching to help control runoff and sediment delivery.

The 319 project sought to encourage sustainable watershed stewardship by establishing the Partnership. Initially, the Conservation Resource Alliance (CRA) formed a steering committee consisting of staff and representatives from the CRA, the Partnership, and the Michigan Department of Environmental Quality. The committee invited and encouraged the public to attend its meetings, where potential partnerships were identified and a written partnership agreement was developed.

Manistee Watershed Project Comes to a Close (continued)

The partnership agreement is a statement of intent, support, and willingness by various units of government, businesses, and private sector organizations to participate in efforts to protect and restore the Lower Manistee River watershed at a level appropriate to their respective interests. The steering committee invited more than 100 entities to sign the agreement. "Currently we have 35 signatures, which is about average for a partnership. We expect more organizations to sign on in the future as they hear about it," explained Mark Johnson with the CRA.

Project Outcomes

One of the project's goals—reducing sediment delivery to waterways—had an immediate impact on both the economy and water resources. Increased sand load in streams increases navigation costs and impairs fish and wildlife populations. The impacts are particularly noticeable in the sportfishing and tourism economies. By stabilizing 2,500 feet of streambank, the project partners prevented approximately 200 tons of sediment per year from entering the Manistee River. Further, the combined road crossing sites have prevented an additional estimated 110 tons per year from entering the system. The total sediment delivery reduction for the project will translate into increased fish productivity and decreased channel dredging costs.

The formation of the Partnership will benefit the watershed in the long-term by providing an important framework for future initiatives. The steering committee will continue to meet regularly to prioritize and plan future watershed projects and will seek funding for these projects as appropriate. "The Partnership steering committee will continue to serve as an avenue for the public to provide input and shape the future of the watershed," explained Johnson. "By forming the Partnership we have brought a new sense of cooperation to the Lower Manistee."

[For more information contact Mark Johnson, Conservation Resource Alliance, 10850 Traverse Highway, Suite 1111, Traverse City, MI 49684. Phone: (231) 946-6817; e-mail: cramark@chartermi.net.]

Technical Notes

Do Stormwater Retention Ponds Contribute to Mosquito Problems?

Stormwater retention ponds have received much press of late regarding their potential as breeding grounds for mosquitoes. Concerned parties are raising questions about whether the benefits of these ponds are worth the potential risks associated with mosquitoes that rely on water for hatching grounds. The answer usually depends on the type of pond and how well it is managed.

Ponds represent one class of controls that are used to regulate stormwater runoff. Nationally, tens of thousands of these ponds exist, owned and operated primarily by local governments. For example, the City of Chesapeake, Virginia, operates and maintains 140 ponds in its community of 200,000 people; Portland, Oregon, operates and maintains 365. These ponds, depending on their design, serve three main purposes: to capture stormwater to prevent flooding, to detain and slow the rate of runoff to reduce stream channel erosion and habitat degradation; and to capture and hold sediment and other pollutants that are present in runoff. Many of these ponds are aesthetically-pleasing and boost nearby property values.

Are Stormwater Ponds Required by Law?

While EPA's stormwater permitting regulations are designed to control runoff from urban, industrial, and construction sources, these regulations do not require the use of ponds. Rather, EPA's program promotes the use of appropriate location-specific controls as selected, designed, operated, and maintained by the permittee. The National Pollutant Discharge Elimination System (NPDES) permittees, whether they are municipalities or industrial entities, are required to develop stormwater management programs or stormwater pollution prevention plans that identify the management practices that they elect to use to manage stormwater. Ponds may be among the practices that they select. While EPA does not mandate the use of ponds, some counties and municipalities have developed local ordinances as part of their stormwater management programs that require stormwater treatment ponds for certain types of developments within their jurisdiction. To provide assistance for stormwater management, EPA, states, and municipalities have

developed numerous guidance manuals on proper design, inspection, operation, and maintenance of stormwater ponds. South Carolina Department of Health and Environmental Control distributes the *Citizen's Guide to Stormwater Pond Maintenance* both online and in hard copy. In Virginia, Fairfax County posts a *Quick Reference Guide for Stormwater Management Ponds* on its Web site at www.co.fairfax.va.us/gov/DPWES/environmental/SWM_QuickRef.htm.

Mosquito Control

Discussion of mosquito control in guidance manuals written to date has been sparse, although that should not imply that mosquito control is not being addressed. Properly designed, operated, and maintained ponds are not conducive to standing water and as such should not be fertile breeding grounds for mosquitoes. To help control mosquitoes in their wet ponds, some localities introduce mosquito predators such as mosquito fish.

Types of Ponds

Wet Ponds (Retention ponds)

Wet ponds are storm water control structures that provide both retention and treatment of contaminated storm water runoff. A wet pond consists of a permanent pool of water into which stormwater runoff is directed. Runoff from each rain event is detained and treated in the pond until it is displaced by runoff from the next storm. By capturing and retaining runoff during storm events, wet detention ponds control both storm water quantity and quality.

Dry Ponds (Detention ponds)

A dry pond is designed to capture and slowly release runoff water for a period of 72 hours or less after a precipitation event. Dry ponds do not treat the storm water and are typically constructed in areas where flood control is the greatest concern.

Mosquito breeding potential depends on the depth and location of the standing water. To prevent proliferation of mosquitoes in wet ponds, guidance manuals often contain recommendations for minimum pool depths and the establishment of habitats that promote colonization of the facility by mosquito predators both aquatic and terrestrial (e.g., dragonflies and mosquito fish). Improperly maintained dry ponds, however, may contribute to mosquito problems. In cases where the dry ponds are improperly designed or maintained and do not drain within 72 hours after a precipitation event, increased mosquito populations have been observed.

The Florida Cooperative Extension Service reported in *Mosquitoes Associated with Stormwater Detention/ Retention Areas*, one of a series of fact sheets by the University of Florida's Entomology and Nematology Department (http://edis.ifas.ufl.edu/mg338), that properly functioning, extended detention wet ponds are not a significant mosquito problem, but that dry pond systems holding standing water as a result of improper design, construction, or maintenance (or neglect) are a problem. As a result, Florida requires these dry ponds to be designed to drain within 72 hours to prevent the creation of mosquito habitat.

Relying on Pesticides

Pesticides, thought of by many as the best deterrent for mosquitoes, are often used as a last resort for insect control on these ponds. As a result of the recent West Nile Virus outbreaks, EPA is paying more attention to mosquito control and will continue to use its educational materials and research to promote proper design, operation, and maintenance of stormwater ponds and routine inspection of those ponds as a way to ensure adequate control. EPA hosts a Web site for citizens on pesticide use and provides several fact sheets on mosquito control at www.epa.gov/pesticides.

In the past, officials responsible for mosquito control programs made decisions on pesticide use based on evaluations of the nuisance level that communities would tolerate from a mosquito infestation. Increasingly, however, these decisions are being made based on the risks to the general public from diseases transmitted by mosquitoes. Based on surveillance and monitoring, mosquito control officials select specific pesticides and other control measures that best suit local conditions in order to achieve effective control of mosquitoes with the least impact on human health and the environment. It is especially important to conduct effective mosquito prevention programs by eliminating breeding habitats or applying pesticides to control the early life stages of the mosquito. Prevention programs, such as elimination of any standing water that could serve as a breeding site, help reduce the adult mosquito population and the need to apply other pesticides for adult mosquito control.

State and local agencies in charge of mosquito control typically employ a variety of techniques in an Integrated Pest Management (IPM) approach, which include surveillance, source reduction,

Do Storm Water Retention Ponds Contribute to Mosquito Problems? (continued)

larvicides, and adulticides to control mosquito populations. Since mosquitoes must have water to breed, reducing opportunities for breeding can be as simple as turning over trapped water in a container to large-scale engineering and management of marsh water. The use of larvicides involves the application of chemicals to habitats to kill pre-adult mosquitoes (see box). Larvicides can reduce overall pesticide usage in a control program by reducing or eliminating the need for ground or aerial application of chemicals to kill adult mosquitoes.

Use Alternative Stormwater Controls When Practical

Reducing our reliance on stormwater ponds for runoff control is another way to reduce potential mosquito breeding habitat. More people are turning to alternative non-structural techniques, such as rain gardens, bioinfiltration, infiltration, and vegetative swales, that slow down water and help it infiltrate without extended periods of ponding. These techniques are successfully minimizing or eliminating the need for stormwater ponds or significantly reducing the pond size requirements. Care must be taken to ensure that these alternative controls drain all standing water as designed over the years.

Similarly, efforts to reduce the amount of impervious surface in communities can reduce the need for stormwater ponds. Narrower streets, sidewalk-less communities, and elimination of cul-de-sacs are just a few of the ways that communities are now reducing the need for stormwater controls. That is not to imply that stormwater ponds can be eliminated easily. Retention/detention ponds use less space than many other types of stormwater controls and are often found to be the best and cheapest way to control runoff—especially when flooding is a concern.

Mosquito proliferation in stormwater ponds is a concern, especially when so many wet and dry ponds are in place and continue to be installed across the country. Many ponds are not properly maintained, particularly in cases where they are installed in subdivisions and other developments where the entity responsible for long-term maintenance is not clearly defined once the construction is complete. However, if inspected regularly and maintained properly, ponds can effectively reduce flooding and remove pollutants without allowing proliferation of large mosquito populations.

Using Larvicides

Larvicides include biological insecticides, such as the microbial larvicides *Bacillus sphaericus* and *Bacillus thuringiensis israelensis*. Larvicides also include other chemicals used for controlling mosquito larvae, such as temephos, methoprene, oils, and monomolecular films. Larvicide treatment of breeding habitats helps reduce the adult mosquito population in surrounding areas. For more information about mosquito control see the American Mosquito Control Association (AMCA) Web site at www.mosquito.org or your state health department (a listing of Web sites is available at www.cdc.gov).

Notes on Education

Stormwater Education in Schools—Planning for the Future in Colorado

Today's youth are tomorrow's decision makers. This motto is the driving force behind the Fort Collins Stormwater Utility's Stormwater Habitat Education Development (WaterSHED) program, an environmental education program targeting students in kindergarten through eighth grade. The WaterSHED Program teaches students about science by taking them on field trips to streams, ponds, and wetlands near their schools. By educating students about watershed issues, the Utility hopes to influence their future environmental habits, particularly those that contribute to nonpoint source pollution.

The Utility developed the program in the mid-1990s as a part of a comprehensive watershed program adopted by the Fort Collins City Council. The plan, called the Watershed Approach to Stormwater Quality, included three main goals:

- preventing pollution through education and regulation;
- protecting water quality by using stormwater treatment technology; and
- restoring and protecting habitats in receiving waters through master planning.

In 1995 the Stormwater Utility hired a nonpoint source pollution educator, Marcee Camenson, to develop and implement a program to meet the plan's need for education. "Adults' habits are often difficult to change," explained Camenson. "We decided to focus our science education efforts on

the children." In 1996, after a year of planning and development, the WaterSHED program was born. Currently the program is staffed by Camenson and one half-time water quality specialist.

Spreading the Word

This past year the WaterSHED staff led programs for classes in 27 schools throughout the district, and participation grows as the word spreads. "We find that if one teacher in the grade level participates and talks about it with the other teachers, then the other teachers will also ask us to present to their classes," explained Camenson. "Once the teachers begin in our program they typically continue each year. When teachers in multiple grade levels in the same school participate, we have the added benefit of working with the same students from year to year. We have the opportunity to build on what they've learned in the past."

The program provides some classroom instruction but focuses mainly on educating the students outside. "Some of these children have never experienced science outdoors and this provides a great opportunity to get them interested and excited." The program provides field equipment and activities, and arranges the site for each class. Each grade level focuses on a different aspect of water and how the students' everyday activities affect local water quality and habitats. Program topics include basic water chemistry, the water cycle, environmental pollutants, stream morphology, stream flow, ecology studies, and more. "We are always trying new ideas to make the program more interesting and enjoyable for the students," said Camenson. "By far the students' favorite activity is sampling for macroinvertebrates, no matter what grade they are in or the focus of the day's activity. Luckily we can always tie the sampling results in with what we are trying to communicate that day, whether it is stream flow, water pollution, or something else."

The WaterSHED program is designed to comply with each grade level's applicable academic standards. For instance, 3rd grade students in Colorado study water as part of the science curriculum. The WaterSHED activities for the 3rd grade include learning about visible and non-visible substances in the water, and discovering what macroinvertebrates live in the water. The 5th grade math curriculum addresses graphs and data tables, so the WaterSHED program requires the children to develop tables and graphs for water flow studies conducted in the stream.

The staff provides teacher training annually for those teachers who wish to be closely involved in the program. "We are also developing a Web site where teachers can download information to use to help prepare their students for our field days," notes Cameson. The staff also works to educate the general public through educational signs and occasional meetings, explained Camenson, "but our main success and focus has been in the schools."

"The program's goal is to ultimately improve water quality by changing students' habits," explained Camenson. "We also hope to influence the parents' habits, either directly or through their child. Many parents attend field trips and learn the information first-hand. Other parents have mentioned to us that their children have talked about what they learned in the program."

A Minimal Investment

The Stormwater Utility's education program is funded by a very small (less than 1 percent) portion of the monthly stormwater fees collected for all developed properties within the city limits. The majority of the Utility's funding is directed to construction and financing of stormwater projects. The education program portion of the funding typically ranges from $50,000 to $70,000 each year and pays for equipment, such as sampling resources and microscopes, and one full-time and one part-time staff member.

Sharing the Idea with Others

The WaterSHED program serves as a model for other municipalities interested in educating their youth about environmental water quality. "Our program is extremely popular with the teachers, parents, and students," notes Camenson. "People outside of our area have expressed interest in the program as well. We have spoken at many meetings and conferences, and frequently share information about our program with others." The Fort Collins WaterSHED program proves that a mu-

Stormwater Education in the Schools—Planning for the Future in Colorado (continued)

nicipal organization can take the lead on local youth environmental education – making a minimal investment that will yield big returns in the future.

[For more information contact Marcee Camenson, City of Fort Collins Utilities, WaterSHED Education Coordinator, P.O. Box 580, Fort Collins, CO 80522. Phone: (970) 224-6141; e-mail: mcamenson@fcgov.com; Internet: fcgov.com/utilities/watershed.php.]

Watershed Outreach Gets Personal

A partnership of local governments, citizen groups, and The Empowerment Institute has developed a plan to restore an impaired urban watershed one home at a time. Four Mile Run drains a 20-square-mile urban watershed just south of Washington, DC. The stream runs through three Northern Virginia localities—Arlington County and the cities of Alexandria and Falls Church—and is home to more than 180,000 residents. The watershed's high population density and development and paving have created typical urban stream issues, including the replacement of headwater streams by storm drains, an unstable flow regime, blown-out stream channels, litter problems, and high bacteria counts. Some sections of the stream have been artificially channelized for flood control and reinforced for protection of private property, but fortunately a wooded stream-valley park system preserves much of the stream with its natural rugged charm. Although Four Mile Run has been the focus of several restoration efforts over the years, a series of recent events has mobilized the community and brought the vision of a restored waterway much closer to reality.

In May 2001, 120 citizens attended a workshop designed to help them look beyond Four Mile Run's current existence and envision how the stream could look and function if the citizens and local governments implemented correct restoration and protection efforts. In May 2002 the Commonwealth of Virginia completed a Total Maximum Daily Load (TMDL) study on Four Mile Run to address a bacteria impairment. While the TMDL was being developed, Northern Virginia Congressman Jim Moran secured $1 million from the federal government to improve the aesthetics and ecological functionality of a bare flood control channel, which had been designed and built by the U.S. Army Corps of Engineers in the 1970s in the lower portion of the watershed. Local film producer David Eckert released a stirring documentary about Four Mile Run on the heels of the funding news. The film focuses on Four Mile Run's history and the newly shared vision for the stream developed during the 2001 workshop.

The momentum of these events led to a coalition of seven partner organizations and governments that pooled together modest resources and secured a Small Watershed Grant from the National Fish and Wildlife Federation. The $74,000 project, called "Citizen Tools for Watershed Protection in Four Mile Run," will spend the next year building up stakeholders' connections with watershed stewardship through a multi-pronged strategy.

Headed by Arlingtonians for a Clean Environment (ACE), the coalition will use a variety of strategies, including "Eco-Teams," to build personal connections. "We are excited about the outreach potential for the Eco-Teams, especially in reaching out to new audiences," explained Elenor Hodges, ACE's Executive Director. Developed by The Empowerment Institute (formerly known as Global Action Plan, www.globalactionplan.org), the Eco-Team approach is a structured program designed to help small groups of households work together to adopt environmentally sustainable lifestyle practices. In the Four Mile Run watershed, the Institute will work with the three Northern Virginia government partners to create nine Eco-Teams. Each will consist of five or six households. Beginning in early 2003, these households will meet four times over the course of a year and, with the help of a workbook and a trained volunteer coach, select a series of practical actions to reduce nonpoint source pollution and improve water quality. The project partners hope to educate the neighborhood "influentials," with the idea that they will then share information with their neighbors via word of mouth and by modeling positive behaviors. "We believe a cascading effect will spread behavior changes for increased environmental sustainability through local neighborhoods," noted Hodges.

Watershed Outreach Gets Personal (continued)

Aileen Winquist, a watershed outreach specialist with Arlington County, points out that "each person chooses the set of actions they feel most attracted to, which helps them make concrete behavioral changes in their lifestyle." A hallmark of the Institute's approach is to train community leaders to work individually with each family in its team to determine and track behavior changes that work best for them. The benefits from these behavior changes are then tracked carefully among each Eco-Team. Similar Eco-Teams are being set up along the Rappahannock River near Fredericksburg, Virginia, and Weems Creek in Annapolis, Maryland.

The coalition is working to educate the public through other means as well, including:

- Road Signs: A common design will be used at 20 locations where residents enter the watershed and cross a stream.
- Educational Watershed Signs: A set of three existing signs, "From Arlington to the Chesapeake," "Flow of Time," and "We All Live Upstream," will be customized for use at three new locations at popular stream access points, one in each of the watershed's three localities. Each set of signs will include a brochure rack for distributing information about upcoming volunteer opportunities and educational programs.
- Four Mile Run Web Portal Site: The project team plans to launch a new Web site for Four Mile Run, which will serve as a central portal for promoting Four Mile Run stewardship activities and provide links to information about educational resources, organizations, and volunteer opportunities. The Web site will be publicized on the signs and during all of the educational outreach programs conducted within the watershed. Arlington County, the largest local government in the watershed, will develop and maintain the site.
- Stream Steward Training Program: Arlington County has developed a new volunteer training program that prepares citizens to lead educational presentations and implement volunteer projects. Upon completing the training, stream stewards commit to leading 5 events per year, including stream cleanups, watershed walks and bike tours, and educational presentations to schools, scout groups, and gardening clubs. This program is expanding to the neighboring cities of Alexandria and Falls Church that share the stream, with a goal of training 45 volunteer stream stewards by this summer. These stream stewards will conduct 225 watershed presentations and volunteer projects within the Four Mile Run watershed.
- Watershed-Friendly Landscaping Training Sessions: Three watershed-friendly landscaping and gardening seminars will be organized in cooperation with the Virginia Native Plant Society.
- Mini-grant Program: Ten mini-grants of $500 each will be offered as incentives to schools, businesses, or homeowners to develop watershed-friendly habitat on their property. The goal of these mini-grants is to increase the amount of wildlife habitat in the watershed, educate citizens, and improve water quality. The Northern Virginia Conservation Trust will administer the grants and will encourage funding for purchasing plants and promoting landscaping techniques that minimize water pollution.
- Demonstration Gardens: From the mini-grant recipients, three will be selected to serve as demonstration gardens: a school; a business; and a house, apartment, or condominium. A press release about the demonstration gardens will be distributed, and each of the gardens will be made available for visits and tours.

With perseverance, the Four Mile Run outreach plan will achieve its objectives of reviving a stream one household at a time. It might also serve as a model for other like-minded communities.

[For more information, please contact Elenor Hodges, Arlingtonians for a Clean Environment, 3308 S. Stafford St., Arlington, VA 22206. Phone: (703) 228-6427; e-mail: office@arlingtonenvironment.org.]

Reviews and Announcements

Online Databases Provide Onsite Wastewater System Information

The National Small Flows Clearinghouse (NSFC) maintains five databases that provide information about all aspects of sewage treatment. Three of these online databases can be queried at www.nesc.wvu.edu/nsfc/nsfc_databases.htm. They are:

- Regulations Database, which contains copies of regulations for onsite wastewater treatment systems in 48 states. Users may search for information for a particular state or may compare the regulations that exist in different states.
- Bibliographic Database, which contains thousands of articles dealing with onsite and small community wastewater issues. Users can access copies of the latest literature on a particular topic or technology.
- Manufacturers and Consultants Database, which contains a list of industry contacts for wastewater products and consulting services.

The NSFC maintains two additional databases that are not available online due to the confidential nature of some information, including a Facilities Database, containing information about approximately 1,000 facilities that use conventional, innovative, and alternative wastewater treatment technologies, and a Contacts and Referrals Database, listing organizations involved in onsite and small community wastewater infrastructure at the national, state, and local levels. For more information, or to access the Facilities or Contacts and Referrals Databases, call the NSFC at (800) 624-8301 or (304) 293-4191.

Methods for Evaluating Wetland Condition Modules Available

EPA recently released a series of 12 modules, collectively titled *Methods for Evaluating Wetland Condition*, to help states and tribes build capacity to monitor and assess the biological and nutrient conditions of wetlands. Water quality managers can learn about ecological assessments, biological and nutrient assessment techniques, and biological and nutrient criteria development. The modules will serve as a basis for developing future EPA guidance for wetlands water quality. EPA expects to develop 8 additional modules as part of this series.

The modules currently available include:

- Introduction to Wetland Biological Assessment
- Study Design for Monitoring Wetlands
- Developing Metrics and Indexes of Biological Integrity
- Wetlands Classification
- Volunteers and Wetland Biomonitoring

Modules are available on the Web at www.epa.gov/waterscience/criteria/wetlands. To order the entire set or specific copies, contact the National Service Center for Environmental Publications (NSCEP) by phone at (513) 489-8190 or toll-free (800) 490-9198, or by e-mail to: ncepiwo@one.net.

Urban and Agricultural Communities: Opportunities for Common Ground

The changing role of agriculture in urban settings is considered in this comprehensive report written by a 12-member task force of the Council for Agricultural Science and Technology (CAST) and released in May 2002 at the Urban Agriculture Symposium. CAST, an international consortium of 37 scientific and professional societies, assembles, interprets, and communicates science-based information on food, fiber, agricultural, natural resource, and related issues to its stakeholders: legislators, regulators, policymakers, the media, the private sector, and the public.

Urban and Agricultural Communities: Opportunities for Common Ground (continued)

The report provides guidance to policymakers, planners, and diverse agricultural interest groups as they address the needs and interests of rural and urban communities. It proposes ways in which agriculture can make significant contributions to tough issues such as urban growth, environmental protection, and human and community health. It also offers suggestions on how to build positive interactions between urban and rural people for better communication.

The report frames urban agriculture in both historical and contemporary American society, providing a picture of geographic, demographic, and economic changes in rural and metropolitan life. Policy issues such as land preservation, alternative market opportunities, sprawl, taxation, and food security are considered. Research and educational challenges are presented for consideration by those at institutions of higher education, including land-grant universities.

"In many people's minds, rural and urban groups are pitted against one another," said report Co-Chair Lorna Michael Butler, Iowa State University College of Agriculture and Henry A. Wallace Endowed Chair for Sustainable Agriculture. "This report focuses on the role agriculture can play in serving as a common denominator between rural and urban sectors. As America's population increases and its farmland decreases, there are good reasons to coalesce the interests and goals of rural and urban people."

"We need a new vision for agriculture. A broader view of agriculture can help solve some of our daily concerns," said report Co-Chair Dale M. Maronek, Oklahoma State University Department of Horticulture and Landscape Architecture. "In fact, agriculture already is offering many solutions to the needs of city dwellers, but we must change the way rural and urban leaders work together, share resources and develop creative policy options to solve common problems."

To download or order the 132-page report, visit www.cast-science.org. Hard copies are $50.00 each. For more information, contact Dr. Lorna Michael Butler at (515) 294-6066 or by e-mail at lmbutler@iastate.edu.

Web Sites Worth a Bookmark

Rocky Mountain Institute: www.rmi.org

The Rocky Mountain Institute (RMI) is an entrepreneurial, nonprofit organization that fosters an efficient, restorative use of resources. They have a section on their site devoted to water quality issues. RMI works in the following water-related areas: household water efficiency and watersheds, stormwater, and stream restoration.

EPA Ag Center: www.epa.gov/agriculture

The Ag Center is the first stop for people in the agricultural community who need information on compliance with environmental regulations. The Ag Center's services are offered to growers, livestock producers, other agribusinesses, various agricultural information/education providers, and federal and state agencies. Through its site and other outreach channels, the Center provides comprehensive information about approaches that are both environmentally protective and agriculturally sound.

NRCS Electronic Field Office Technical Guide: www.nrcs.usda.gov/technical/efotg

This technical guide is the primary scientific reference for Natural Resources Conservation Service (NRCS). The technical guide is tailored for each NRCS field office's geographic area. Available online, each *Field Office Technical Guide* contains technical information about the conservation of soil, water, air, and related plant and animal resources.

Datebook

DATEBOOK is prepared with the cooperation of our readers. If you would like a meeting or event placed in the DATEBOOK, contact the NPS News-Notes editors. Notices should be in our hands at least two months in advance to ensure timely publication.

Meetings and Events

May 2003

1-4 — *American Wetlands Conference*, Minneapolis, MN. For more information, visit www.iwla.org/sos/awm/conference, or contact Leah Miller at (301) 548-0150, extension 219 or awm@iwla.org.

12-14 — *AWRA's 2003 Spring Specialty Conference: Agricultural Hydrology and Water Quality*, Kansas City, MO. Contact Ramesh Kanwar, Iowa State University, IA. Phone: (515) 294-1434; e-mail: rskanwar@iastate.edu.

13-15 — *Annual Northeast Nonpoint Source Conference*, Hancock, MA. For more information, contact Jeremy Pare, New England Interstate Water Pollution Control Commission, at jpare@neiwpcc.com.

19-21 — *River Rally 2002*, Stevenson, WA. This workshops provide training in organizational development, watershed science, self-care, and more. For more information, visit www.rivernetwork.org.

29-30 — *Greening Rooftops for Sustainable Communities: The First North American Green Roof Infrastructure Conference, Awards, and Trade Show*, Chicago, IL. Register online at www.greenroofs.ca/grhcc/register.htm or contact Ireen Wieditz, Director, Green Roofs for Healthy Cities, The Cardinal Group Inc., at (416) 971-4484 or by e-mail at iwieditz@cardinalgroup.ca.

June 2003

2-4 — *National Source Water Protection Conference*, Washington, DC. Over 165,000 source water assessments are nearing completion. The National Source Water Protection Conference will build upon this effort by promoting protection planning and coordination, fostering partnerships, and identifying opportunities that lead to successful implementation of drinking water protection. For more information, contact Sylvia Malm at swpconf@epa.gov or visit www.epa.gov/safewater/protect/swpconf.html.

7-11 — *Eighth National Watershed Conference*, Council Bluffs, IA. For more information, contact John W. Peterson, National Watershed Coalition, 9304 Lundy Court, Burke, VA 22015. Phone: (703) 455-6888; e-mail: jwpeterson@erols.com.

8-13 — *Society of Wetland Scientists 24th Annual Meeting*, New Orleans, LA. For more information, contact Doug Meffert (dmeffert@tulane.edu) or Robert Twilley (ceet@louisiana.edu).

11-13 — *Florida Stormwater Association's 10th Anniversary Annual Conference*, Duck Key, FL. For more information, call the Florida Stormwater Association at (888) 221-3124 or visit www.florida-stormwater.org/conference2003.asp.

16-20 — *Coastal America Retreat,* San Diego, CA. This is an annual meeting of Coastal America federal agencies, Corporate Wetlands Restoration Partnership, Coastal Ecosystem Learning Centers, and other state, local, and nongovernmental partners. The purpose is to assess status and progress and identify priorities and action items for the coming year. For more information, contact Vicki Dixon, Coastal America, at (202) 208-7461 or by e-mail at vicki_s_dixon@ios.doi.gov. Also visit their Web site at www.coastalamerica.gov.

28–July 13 — *Great American Secchi Dip-In.* The concept of the Dip-In is simple: individuals in volunteer monitoring programs take a transparency (usually with a secchi disk or transparency tube, or a meter) measurement on one day in a period surrounding Canada Day and July Fourth. Individuals may be monitoring lakes, reservoirs, estuaries, rivers, or streams. These Secchi transparency values are used to assess the transparency of volunteer-monitored lakes in the United States and Canada. For more information, visit dipin.kent.edu.

29–July 2 — *AWRA's 2003 International Congress Watershed Management for Water Supply Systems,* New York, NY. Contact Peter E. Black, SUNY ESF, 1 Forestry Drive, Syracuse, NY 13210. Phone: (315) 470-6571; e-mail: pebchair@esf.edu.

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