

## Riparian/Conservation Buffers

- Riparian/Conservation Forest Buffer: They are linear wooded areas with well-developed root systems, an organic surface layer, and understory vegetation adjacent to open water. Conservation buffers are linear wooded areas along field edges, down-slope of agricultural fields. Forest buffers help filter nutrients, sediments and other pollutants from runoff as well as remove nutrients from groundwater. The recommended buffer width for riparian forest and grass buffers (agriculture) is 100 feet, with a minimum width of 35 feet required. The wider the buffer is, the greater the variety and the higher the quality of benefits.

### *Efficiencies:*

TN: 19-65%; varies geographically

TP: 30-45%; varies geographically

TSS: 40-60%; varies geographically

- Riparian/Conservation Grass Buffer: Linear strips of grass or other non-woody vegetation maintained between the edge of fields and streams, rivers or tidal waters. Conservation grass buffers are located down-slope of an agricultural field but do not need to be on the edge of streams or rivers. The recommended buffer width for riparian grass buffers (agriculture) is 100 feet, with a 35 feet minimum width required. Grass buffers treat nitrogen from an upland area four times the acreage of the buffer and treat phosphorus from an upland area two times the acreage of the buffer. New buffer area is treated as a land use conversion from cropland to grass.

### *Efficiencies:*

TN: 13-46%; varies geographically

TP: 30-45%; varies geographically

TSS: 40-60%; varies geographically

## Fertilizer Application Setback

The Chesapeake Bay states either require or recommend using a certain setback standard for fertilizer application. For example in Maryland, no fertilizer applications are permitted within 15 feet of waterways. This setback is reduced to 10 feet if a drop spreader, rotary spreader with deflector or targeted spray liquid is used to apply the fertilizer.

## Wetland

Agricultural wetland restoration activities re-establish the natural hydraulic condition in a field that existed prior to the installation of subsurface or surface drainage. Project may include restoration, creation and enhancement acreage. Restored wetlands may be any wetland classification including forested, scrub-shrub or emergent marsh.

### *Efficiencies:*

TN: 7-25%; varies geographically

TP: 12-50%; varies geographically

TSS: 4-15%, varies geographically

## **Other Land use Conversion**

Intensively used agricultural land can be converted into grass or forest cover. Upland tree plantings, for example, convert crop or pasture land into forest. Hedgerow plantings or grassed swales are examples of land use conversions to grass.

## **Streambank Fencing/ Exclusion**

This BMP involves excluding a strip of land with fencing along the stream corridor to provide protection from livestock. The fenced areas may be planted with tree or grass, or left to natural plant succession, and can be of various widths. To provide modeled benefits of a functional riparian buffer, the width must be a minimum of 35 feet from top-of-bank to fence line. The implementation of stream fencing provides stream access control for livestock but does not necessarily exclude animals from entering the stream by incorporating limited and stabilized in-stream crossing or watering facilities. The modeled benefits of stream access control can be applied to degraded stream corridors in association with or without alternative watering facilities. The source of water supplied to the facilities can be from any source including pipelines, spring developments, water wells, and ponds.

## **Other Best Management Practices:**

### **1. Decision/Precision Agriculture**

Decision Agriculture is a management system that is information and technology based, is site specific and uses one or more of the following sources of data: soils, crops, nutrients, pests, moisture, or yield for optimum profitability, sustainability, and protection of the environment. This BMP is modeled as a land use change to a nutrient management land use with an effectiveness value applied to create an additional reduction. In Maryland, precision/decision agriculture requires the use of GPS guidance technology (such as lightbar, autosteer, variable rate fertilizer application).

*Efficiencies:*

TN: 3.5%

### **2. Sorbing Materials in Agricultural Ditches**

Use of phosphorus sorbing materials to absorb available dissolved phosphorus in cropland drainage systems for removal and reuse as an agricultural fertilizer. These in-channel engineered systems can capture significant amounts of dissolved phosphorus in agricultural drainage water by passing them through phosphorus-sorbing materials, such as gypsum, drinking water treatment residuals, or acid mine drainage residuals. The proposed practice is applied on a per acre basis, and can be implemented and reported for cropland on both lo-till and hi-till uses that receive or do not receive manure.

*Efficiencies:*

TP: 40%

### **3. Water Control Structures**

Water Control Structures involve installing and managing boarded gate systems in agricultural land that contains surface drainage ditches. The structure is placed in a drainage ditch receiving runoff from the production area to regulate and manage drainage water and to improve water quality by trapping sediment and nutrients. The benefits include total volume reduction, nutrient concentration reduction, and the reduction of inorganic nitrogen concentration through denitrification or recycled for plant growth

*Efficiencies:*

TN: 33%

#### **4. Soil Conservation and Water Quality Plans**

They are a combination of agronomic, management and engineered practices that protect and improve soil productivity and water quality, and to prevent deterioration of natural resources on all or part of a farm. Plans may be prepared by staff working in conservation districts, natural resource conservation field offices or a certified private consultant. In all cases the plan must meet technical standards.

*Efficiencies:*

TN: 3-8%

TP: 5-15%

TSS: 8-25%

#### **5. Horse Pasture Management**

Horse pasture management involves stabilizing overused small pasture containment areas (animal concentration area) adjacent to animal shelters or farmstead. Horse Pasture Management is mutually exclusive with Prescribed Grazing.

*Efficiencies:*

TP: 20%

TSS: 40%

#### **6. Prescribed Grazing**

This practice utilizes a range of pasture management and grazing techniques to improve the quality and quantity of the forages grown on pastures and reduce the impact of animal travel lanes, animal concentration areas or other degraded areas. PG can be applied to pastures intersected by streams or upland pastures outside of the degraded stream corridor (35 feet width from top of bank). The modeled benefits of prescribed grazing practices can be applied to pasture acres in association with or without alternative watering facilities. They can also be applied in conjunction with or without stream access control. Pastures under the PG systems are defined as having a vegetative cover of 60% or greater.

*Efficiencies:*

TN: 9-11%

TP: 24%

TSS: 30%

#### **7. Off stream watering without fencing:**

It incorporates both alternative watering and installation of fencing that involves narrow strips of land along streams to exclude livestock. Fenced areas to be planted with trees or grass. To

provide the benefits similar to a riparian buffer, the width must be a minimum of 35 feet from top-of-bank to fence line. Reduces the time livestock spend near and in streams and streambanks reducing direct manure deposition to streambeds and banks, reducing riparian area erosion.

### **Streambank Restoration**

A collection of site-specific engineering techniques used to stabilize an eroding streambank and channel. The objective is to prevent further streambank damage and cropland loss by correcting unstable eroding streambanks using a variety of techniques to improve water quality by reducing nutrients and sediment entering the stream. These are areas not associated with animal entry. This BMP is treated as a load reduction in the model, so nutrient and sediment contribution from the adjacent land is less than land adjacent to other streams.

### ***Animal Confinement BMPs:***

Animal waste management system: Practices designed for proper handling, storage, and utilization of wastes generated from confined animal operations. Reduced storage and handling loss is conserved in the manure and available for land application.

*Efficiencies:*

TN: 75%

TP: 75%

Mortality composting: A physical structure and process for disposing of any type of dead animals. Composted material land applied using nutrient management plan recommendations.

*Efficiencies:*

TN: 40%

TP: 10%

Plastic permeable lagoon cover:

Permeable plastic covers over liquid storage are composed of nonwoven fabric, thermally bonded, continuous polypropylene filaments. Covers create a physical barrier to prevent mass transfer of volatile chemical compounds from the liquid by covering manure storage facilities to decrease wind velocity (decrease surface area), and reduce radiation onto the manure storage surface (lower temperature).

*Efficiencies:*

TN: 15%

Phytase:

Phytase is an enzyme added to poultry-feed that helps poultry absorb phosphorus. The addition of phytase to poultry feed allows more efficient nutrient uptake by poultry, which in turn allows decreased phosphorus levels in feed and less overall phosphorus in poultry waste.

#### Dairy precision feeding:

Dairy Precision Feeding reduces the quantity of phosphorus and nitrogen fed to livestock by formulating diets within 110% of Nutritional Research Council recommended level in order to minimize the excretion of nutrients without negatively affecting milk production.

#### *Efficiencies:*

TN: 24%

TP: 25%

#### Barnyard runoff control:

Includes the installation of practices to control runoff from barnyard areas. This includes practices such as roof runoff control, diversion of clean water from entering the barnyard, runoff collection and infiltration from barnyards areas, and vegetated swales. Different efficiencies exist if controls are installed on an operation with manure storage or if the controls are installed on a loafing lot without manure storage.

Note: If you are in Maryland you will also have the option of selecting “Constructed Wetland” and “Water Control Structure” under this category of BMPs.

#### *Efficiencies:*

TN Efficiency: 20%

TP Efficiency: 20%

### **Poultry BMPs**

#### Animal waste management system:

Practices designed for proper handling, storage, and utilization of wastes generated from confined animal operations. Reduced storage and handling loss is conserved in the manure and available for land application.

#### *Efficiencies*

TN: 75%

TP: 75%

#### Mortality composting:

A physical structure and process for disposing of any type of dead animals. Composted material land applied using nutrient management plan recommendations.

#### *Efficiencies*

TN: 40%

TP: 10%

#### Poultry litter treatment:

Surface application of alum, an acidifier, to poultry litter to acidify poultry litter and maintain ammonia in the non-volatile ionized form (ammonium).

Ammonia Efficiency: 50%

Biofilters:

Poultry housing ventilation systems that pass air through a biofilter media that incorporates a layer of organic material, typically a mixture of compost and wood chips or shreds that supports a microbial population and reduces ammonia emissions by oxidizing volatile organic compounds into carbon dioxide, water, and inorganic salts. The biofilter must have sufficient detention time and fans that can accommodate pressure loss through the biofilter. It should also have either a permeable or impermeable cover, vegetative filter strip, and a litter treatment facility (e.g. aluminum sulfate).

*Efficiencies:*

TN: 60%

Heavy use pads:

A heavy use protection area provides a stabilized surface of crushed stone, oyster shells, concrete, or other suitable material that will protect the soil surface from erosion. Heavy use protection is used for manure handling in high traffic areas that are vulnerable to runoff. Heavy use concrete pads should be used in areas where litter is handled, such as poultry houses and manure storage sheds, to prevent soil contamination and provide a means for ease of clean up.

*Efficiencies:*

TN: 20%

TP: 20%

TSS: 40%

*BMP descriptions provided by the Chesapeake Bay Program.*