Agricultural Ditch BMP Panel Pre-proposal

Problem:

Already existing and soon to be approved NRCS BMPs related to ditches are not credited in the Chesapeake Bay Model for Progress Scenarios. Currently, only water control structures and ditch filters are credited in Model Planning Scenarios as a result of interim status. Agricultural BMPs installed in ditch systems represent a significant source of nutrient loss reduction credit in the Chesapeake Bay, as 70% of Delaware's tax ditches are in the Chesapeake Bay Watershed. In Maryland, 821 miles of ditches drain approximately 183,000 acres of land, most of which is located within the Chesapeake Bay watershed.

BMPs to Review:

Some of the BMPs this panel will examine for nutrient management credit in the Chesapeake Bay Model are included with brief descriptions below. However, this is not a comprehensive list and we will be seeking input from the panel as well as the Agriculture workgroup at large.

Drainage Water Management

NRCS Code 554
NRCS Definition: The process of managing water discharges from surface and/or subsurface agricultural drainage systems.
Applicable NRCS Purposes:

- Reduce nutrient loading from drainage systems into downstream receiving waters.
- Reduce oxidation of organic matter in soils.
- Reduce wind erosion or particulate matter emissions.

Channel Bed Stabilization

NRCS Code 584
NRCS Definition: Measure(s) used to stabilize the bed or bottom of a channel.
Applicable NRCS Purposes:

- Modify sediment transport or deposition.
- Manage surface water and groundwater levels.

Structure for Water Control

NRCS Code 587
NRCS Definition: A structure in a water management system that conveys water, controls the direction or rate of flow, maintains a desired water surface elevation or measures water.
Applicable NRCS Purposes:

- Control the elevation of water in drainage ditches.
- Provide silt management in ditches.

Subsurface Drain

NRCS Code 606
NRCS Definition: A conduit installed beneath the ground surface to collect and/or convey excess water.
Applicable NRCS Purposes:

- Remove or distribute excessive soil water.
- Erosion and nutrient loss control.

Denitrifying Bioreactors

The current NRCS standard applies only to subsurface flow, the panel will be examining the same technology applied to open agricultural ditches.

NRCS Code 605

NRCS Definition: A structure that uses a carbon source to reduce the concentration of nitrate nitrogen in subsurface agricultural drainage flow via enhanced denitrification.

NRCS Purpose:

> Improve water quality by reducing the nitrate nitrogen content of subsurface agricultural drainage flow.

Vegetated Subsurface Outlet

NRCS Code 739

NRCS Definition: A water control structure and subsurface distribution pipe capable of diverting drainage system discharge to create an elevated zone of soil saturation.

Applicable NRCS Purposes:

> To reduce nitrate loading from subsurface drain outlets.

Open Channel (Two-Stage Ditch)

NRCS Code 582 (Indiana NRCS FOTG)

NRCS Definition: Constructing or improving a channel, either natural or artificial, in which water flows with a free surface.

Applicable NRCS Purpose:

> To provide discharge capacity required for flood prevention, drainage, other authorized water management purposes, or any combination of these purposes.

Phosphorus Removal System

NRCS Code 782

NRCS Definition: A system designed to remove dissolved phosphorus (P) from surface runoff, subsurface flow, or groundwater. The system should generally consist of a filter media with a high affinity for dissolved phosphate P, a containment structure that allows flow through the media and retains the media so that it does not move downstream, and a means to remove and replace the filter media.

NRCS Purpose:

> This standard establishes the minimum requirements to design, operate, and maintain a flow-through P removal system. The system is intended to improve water quality by reducing dissolved phosphorus loading to surface water through the sorption of phosphate P from drainage and runoff water.

Gypsum Curtain

NRCS Standard in Development

Description: A vertical wall of gypsum installed running parallel to an agricultural ditch, designed to intercept groundwater flowing to the ditch. The gypsum in this system removes dissolved phosphorus from the groundwater.

Ditch Dipouts

Description: The removal of accumulated sediments in the ditch bottom. The panel will look into new technologies for performing the dipouts and possible mitigation of effects of reapplication of sediment spoil.

Schedule and scope of Work:

Delaware Department of Agriculture's Nutrient Management Program will be responsible for coordinating the panel as well as organizing the literature review. This staff is supported by the suite of pass through grants from the Department of Natural Resources and Environmental Control related to the Chesapeake Bay.

Maryland Department of Agriculture's Watershed Implementation Program will be responsible for providing support staff for coordination and BMP Protocol compliance. This staff is supported by Chesapeake Bay Regulatory and Accountability Program grant funds.

The coordination of the panel is expected to involve:

- 1 public meeting via webinar to collect comment surrounding the component practices.
- 4 technical conference calls to determine potential credit and extenuating issues.
- 1 public meeting via webinar to share the findings and location of the draft report for comment.
- Necessary meeting attendance for BMP Protocol Approval Process

Panel Expert Qualifications:

In searching for experts to populate this panel, we are looking for persons who have direct knowledge and expertise involving one or more of the BMPs that will be considered. This includes individuals responsible for writing the NRCS standards, researchers who have studied the BMPs and persons who have technical knowledge of how these BMPs are and will be installed and implemented. Listed below are suggestions garnered from NRCS standards as well as researchers currently working on the above BMPs. We are soliciting additional experts from the Agriculture Workgroup.

Potential Panel Experts:

Amy Shober, University of DE
Brooks Cahall, DNREC Drainage Program
Melissa Hubert, DNREC Drainage Program
Ann Baldwin, NRCS
Tom Barthelmeh, DNREC Conservation Programs
Chad Penn, OK State University
Dan Jaynes, ARS
Andy Ward, Ohio State University
Jessica D'Ambrosio, Ohio State University
Jennifer Volk, University of DE
Matt Grabowski, DNREC Drainage Program
Brian Jennings, USF&WS
David Baird, Sussex Conservation District
Josh McGrath, University of KY
Ray Bryant, ARS
Laura Christianson, Iowa State University
Jonathan Witter, Ohio State University

References:

Christianson, L.E., A. Bhandari, M.H. Helmers and M St. Clair. 2009. Denitrifying Bioreactors for Treatment of Tile Drainage. In: Proceedings of World Environmental and Water Resources Congress, May 17-21, 2009.

Jaynes, D.B. and T. Isenhart. 2011. Re-saturating Riparian Buffers in Tile Drained Landscapes. A Presentation of the 2011 IA-MN-SD Drainage Research Forum. November 22, 2011. Okoboji, IA.

Penn, C.J., J.M. McGrath, J. Bowen and S. Wilson. 2014. Phosphorus removal structures: a management option for legacy phosphorus. J. Soil Wat. Cons. 69:51A-56A.

Piorko, F.M. and B Cahall. 2014. Delaware Tax Ditch Organizations, Drainage Projects and Water Management Construction. A Presentation Prepared for the Delaware Wetland Advisory. January 8, 2014.

USDA, NRCS. Stream Restoration Planning and Design, Fluvial System Stabilization and Restoration Field Guide.

USDA, NRCS. 2001. National Engineering Handbook, Part 624, Chapter 4, Subsurface Drainage.

USDA, NRCS. 2001. National Engineering Handbook, Part 624, Sec. 16, Drainage of Agricultural Land.

USDA, NRCS. 2007. National Engineering Handbook, Part 624, NRCS Stream Restoration Design Handbook.