CONSERVATION PLANNING:
FIELD AND PASTURE EROSION CONTROL PRACTICES

Definition and Nutrient and Sediment Reduction Effectiveness Estimates

For use in calibration and operation of the
Chesapeake Bay Program's Phase 5.0 Watershed Model

Synthesis by

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And

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Summary

Conservation Plans: are a combination of practices, other than conservation tillage or no-till, that reduces soil loss to or below tolerance, defined as the maximum amount of erosion at which the quality of a soil as a medium for plant growth can be maintained. Nutrient and sediment reductions vary by the land use, e.g. conventional tillage, conservation tillage, hayland or pastureland, in the model that a conservation plan is applied to.

Landuse	TN Reductions	TP Reductions	TSS Reductions
Conventional Tillage	8%	15%	25%
Conservation Tillage	3%	5%	8%
Hayland	3%	5%	8%
Pastureland	5%	10%	14%

Introduction

The Mid-Atlantic Water Program (MAWP) housed at the University Of Maryland (UMD) led a project during 2006-2007 to review and refine definition and effectiveness

estimates for BMPs implemented and reported by the Chesapeake Bay watershed jurisdictions prior to 2003. The objective is to develop definitions and effectiveness estimates that reflect the average operational condition representative of the entire watershed. The Chesapeake Bay Program (CBP) historically assigned effectiveness estimates based on controlled research studies that are highly managed and maintained by a BMP expert. This approach is not reflective of the variability of effectiveness estimates in real-world conditions where farmers and county stormwater officials, not BMP scientists, are implementing and maintaining a BMP across wide spatial and temporal scales with various hydrologic flow regimes, soil conditions, climates, management intensities, vegetation, and BMP designs. By assigning effectiveness estimates that more closely align with operational, average conditions modeling scenarios and watershed plans will better reflect monitored data.

One important outcome of the project is the wealth of documentation compiled on the BMPs. To provide precise documentation the UMD/MAWP designed a robust practice development and review process utilizing literature, data, and best current professional judgment. The initial step was a literature and knowledge synthesis. Available scientific data were compiled and analyzed for quality and applicability and included in a report that summarizes all decisions on how effectiveness estimates were developed. The process for incorporating both science and best professional judgment to estimate average operational effectiveness is also well documented.

Another objective of the project was to initiate an adaptive management approach for BMP effectiveness for the CBP. An adaptive management approach allows forward progress in implementation, management and policy, while acknowledging uncertainty and limits in knowledge. The adaptive management approach to BMP development incorporates the best applicable science along with best current professional judgment into definition and effectiveness estimate recommendations. With adaptive management it is necessary to include a schedule that allows for revisions as advances knowledge and experience becomes available. UMD/MAWP recommends continued monitoring of BMPs, with revision of definitions and effectiveness estimates scheduled for every three to five years to incorporate new data and knowledge.

Attached to these definitions and efficiencies is a full accounting of the Chesapeake Bay Program's discussions on this BMP, who was involved, and how these recommendations were developed, including data, literature, data analysis results, and discussions of how various issues were addressed. All meeting minutes are included in Appendix B.

Name Change

The original name of the Conservation Plans BMP will be changed to *Conservation Planning: Field and Pasture Erosion Control Practices* since the credited practices may encompass only a limited portion of the elements contained in a conservation plan.

Definition/Description

Conservation Planning: Field and Pasture Erosion Control Practices are a combination of practices, other than conservation tillage or no-till, that reduces soil loss to or below tolerance. Practice components meet criteria standards under the USDA-NRCS National Handbook of Conservation Practices (NHCP) (http://www.nrcs.usda.gov/technical/standards/nhcp.html) and associated Field Office Technical Guides (http://www.nrcs.usda.gov/technical/efotg/) for each state. The practices help to control erosion and nutrient runoff by modifying cultural or structural practices. Cultural practices may change from year to year and include changes to crop rotations. This practice does not include reduction credits to certain cultural practice changes on crop or hay land, such as conservation tillage or cover crop practices which are credited as individual BMPs. However, cultural practice changes are reflected in pastureland reduction efficiencies. Structural components consisting of longer term conservation measures included in the *Field and Pasture Erosion Control Practices* include, but may not be limited to the following USDA-NRCS conservation practices. Note that credit cannot be taken for each practice implemented under a farm erosion and sediment plan or a NRCS Conservation Plan; the suite of practices listed in the plan are prescribed to meet a USDA-NRCS Revised Universal Soil Loss Equation, Version 2 (RUSLE2) prediction of soil losses at or below the soil loss tolerance value (T) for the accredited land acreage.

- Access Road (560)
- Alley Cropping (311)
- Animal Trails and Walkways (575)
- Conservation Cover (327)
- Conservation Crop Rotation (328)
- Contour Buffer Strips (332)
- Contour Farming (330)
- Critical Area Planting (342)
- Diversion (362)
- Field Border (386)
- Filter Strip (393)
- Grade Stabilization Structure (410)
- Grassed Waterway (412)
- Lined Waterway or Outlet (468)
- Residue Management, Seasonal (344)
- Rock Barrier (555)
- Row Arrangement (557)
- Sediment Basin (350)
- Stripcropping (585)
- Structure for Water Control (587)
- Terrace (600)
- Underground Outlet (620)
- Water and Sediment Control Basin (638)
- Windbreak/Shelterbelt Establishment (380)

EFFECTIVENESS ESTIMATE

The reduction credits attributed to structural practices in the *Field and Pasture Erosion Control Practices*, also including cultural practice changes for pasture only, are estimated as follows:

Landuse	TN Reductions	TP Reductions	TSS Reductions
Conventional Tillage	8%	15%	25%
Conservation Tillage	3%	5%	8%
Hayland	3%	5%	8%
Pastureland	5%	10%	14%

These effectiveness estimates are the same as the current efficiencies assigned to this practice. Effectiveness estimates were recently (2003) reviewed by the Chesapeake Bay Program's Agricultural Nutrient Reduction Workgroup and no new data is available that warrants a change. The effectiveness estimates are divided according to the different land uses conservation planning is applied to in the Chesapeake Bay Watershed Model. The first two land uses, conventional and conservation tillage, represent different levels of tillage where the impact of conservation planning varies due to the loading rates associated with the land use. The type of tillage technique applied to a land use will impact erosion rates. Erosion is reduce with less invasive tillage techniques (see report on conservation tillage). When combined with conservation tillage conservation planning has less soil to erode compared to conservation planning on conventionally tilled land (a clean inversion tillage). The next two land uses, pastureland and hayland, produce less nutrient runoff compared to cropland where tillage techniques such as conventional or conservation tillage are applied to. Thus, with less nutrients to reduce from the baseline conservation planning does not reduce the same percentage of nutrients on hayland or pastureland compared to cropland. For these reasons conservation planning is divided among the various land uses it can be applied to.

When reviewing the data and protocol used in 2003 to develop the conservation planning definitions and effectiveness estimates the CBP followed a rigourous scientific and technical review process. This defensible process, along with no new data to evaluate, lead to the decision to maintain the definition and effectiveness estimate for conservation planning.

Future Research Needs

The statement in the BMP description, "However, cultural practices changes are reflected in pastureland reduction efficiencies" may need to be revised based upon the final decisions on pasture management systems for Year 2 of the CBP/UMD BMP project. If these cultural practices are credited as stand-alone BMPs, their influence on the effectiveness of this practice will need to be considered.

Appendix A: Reviewer Comments

In an email response to Sarah Weammert, Russ Perkinson said the following, "I have reviewed the "conservation plan" BMP and find the recommended efficiency numbers and practice description to be reasonable."

Appendix B. Meeting Minutes
Agricultural Nutrient and Sediment Reduction Workgroup
Maryland Department of Agriculture
Annapolis, Maryland
May 10, 2007

Conservation Plans

- For conservation plans, UMD is not recommending any changes to the efficiencies because they feel that there is not enough data to warrant a change. Conservation plans were last reviewed and adjusted in 2003.
- Q: Is simply tracking that a farmer has a conservation plan, regardless of whether or not the plan is implemented, a good way to track this practice?
    - A: This is a broader issue that goes beyond just this BMP. Documenting the level and degree of implementation is important. However, this is not something that should be figured into this practice's efficiency. The efficiency number assumes that this practice is being implemented.
- Workgroup recommendations:
    - The definition of this practice should be modified so that it specifies exactly what is included in this efficiency. When finalizing this definition, it was suggested that the project team get input from NRCS.
    - The name of the practice should also be changed since the efficiency does not include all parts of a soil conservation plan, just the plan's erosion control practices.
    - This efficiency should be based on literature. It should include documentation on how the AgNSRWG determined this efficiency in 2003.
    - All practices have a lifespan that needs to be taken into account in tracking and reporting. This will be added to the future research needs list for this practice.

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Agricultural Nutrient and Sediment Reduction Workgroup
Conference Call
May 24, 2007
10:00 AM - 12:00 PM

Field and Pasture Erosion Control Practices

Questions raised by Beth Horsey are the following:

- How many of the NRCS practices must be implemented to count as field and pasture erosion control practice?
- How does this change in definition affect change in way states are tracking the BMP?

ACTION: Beth Horsey, MDA, asked for additional time to evaluate this practice and resolve the confusion.

ACTION: Sarah Weammert will send the former definition of the practice, before the name and definition change, to the workgroup electronically so that they can evaluate the differences.

Participants:
Herb Reed, UMD
Beth Horsey, MDA
Kelly Shenk, EPA CBPO
Jeff Sweeney, UMD/CBPO
Kari Cohen, NRCS
Sarah Weammert, UMD
Peter Tarby, PA DEP
Tom Juengst, PA DEP
Becky Thur, CRC
Mark Dubin, UMD MAWP/CBPO - could not get on call due to technical difficulties with conference line.

Minutes: Nutrient Subcommittee Meeting
June 6, 2007
10:00 AM to 3:00 PM
Fish Shack—Chesapeake Bay Program Office

Field and Pasture Erosion Control Practices

- Field and Pasture Erosion Control Practices received a major adjustment in 2003 and there are no additional data since then to consider. Efficiencies were therefore recommended to remain at their current levels.
- Jurisdictions at the AgNSRWG meeting requested the name and description change. Maryland was not supportive and has requested more time to review. The status of these practices is pending Maryland's review.
    - NRCS is on board with the name change.
    - UMD MAWP has no position on the name change.
    - Mark Dubin is leading the effort to ensure the list of practices is appropriate and tied to NRCS's practices.
    - The NSC will discuss this issue another time.

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Meeting Minutes
Agricultural Nutrient and Sediment Reduction Workgroup
Adams County Agricultural and Natural Resource Center
Gettysburg, Pennsylvania
July 12th, 2007

Field and Pasture Erosion Control Practices:

1. Keep title as "Farm Conservation Plans" with a subtitle of Field and Pasture Erosion Control Practices". Beth Horsey will provide some edits to the definition to clarify the components of the plans.

General Recommendation

1. Unless the scientific research indicates differently, as a general rule set phosphorus efficiencies 5% lower than sediment efficiencies to account for dissolved phosphorus losses not associated with soil losses.

Participants

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Becky Thur	CRC

Calling In

Tom Simpson	UMD

Agricultural Nutrient and Sediment Reduction Workgroup
Conference Call
August 2, 2007

- The workgroup recommended that phosphorus efficiencies be set 5% lower than sediment efficiencies as a general rule to account for dissolved phosphorus losses not associated with soil losses, unless the scientific research indicates differently.
    - UMD supports the recommendation that TP efficiencies be set lower than TSS efficiencies; however they suggest that the TP efficiencies be lowered by 10% rather than by 5%. They favor 10% because it implies that there is a significant difference and because it does not indicate a greater level of precision than we have. However, they will defer to the workgroup regarding what percentage is used.
    - Some members voiced concern that subtracting 10% from TP will affect some BMPs more than others. For example, if the original efficiency is 40% and it is lowered to 30% than it is only reduced by 25%, whereas if the original efficiency is 20% and it is lowered to 10% than it will be reduced by 50%.
    - DECISION: In order to make the reductions more proportional, UMD and the workgroup agreed to reduce TP by 25%, rather than simply subtracting 10%. This was based on research findings which suggest that 25% of TP are attributable to Dissolved Reactive Phosphorus (DRP) according to the UMD.

- The workgroup decided to accept the UMD recommendations with the agreed upon adjustments for the agricultural practices. The only exception was for the cover crop practices which will require additional revisions prior to final review by the workgroup.

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Minutes: Tributary Strategy Workgroup
August 6, 2007
Chesapeake Bay Program Office—Fish Shack

- DECISION: The TSWG has approved all of the AgNSRWG recommendations, with the exception of Cover Crops which is dependent upon further refinement and information.

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Nutrient Subcommittee Meeting
Chesapeake Bay Program Office; Annapolis, MD
August 15, 2007

Highlights and Action Items

- Efficiency recommendations for urban, forestry, wetland, and agricultural BMPs were reviewed and approved by the Nutrient Subcommittee with the exception of the off-stream watering practices and cover crop BMPs. These two BMPs will be reviewed on a joint NSC, TSWG, AgNSRWG, MAWP conference call scheduled for August 24, 2007.

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Don VanHassent, FWG Chair
Jennifer Volk, DNREC
Sarah Weammert, UMD MAWP
Mary Lynn Wilhere, ACB

Chesapeake Bay Program
Water Quality Steering Committee
Conference Call
August 27, 2007

Water Quality Steering Committee Approval of Year 1 MAWP BMP Efficiencies

Issue: At the Water Quality Steering Committee's June 20-21, 2007 meeting, the Steering Committee agreed that they would conduct the final review all of the Nutrient Subcommittee's recommended BMP definitions and efficiencies and take action on any BMPs that the Nutrient Subcommittee (NSC) could not agree on an efficiency for. Definitions and efficiencies for twelve of the thirteen Year 1 BMPs were approved by the Nutrient Subcommittee and determined to be consistent with the available data by the MAWP. The Cover Crop BMP was not resolved. The Steering Committee was asked by the Nutrient Subcommittee to approve the package of the 12 consensus-supported BMP efficiencies and make the final decision on the cover crop BMP efficiencies based on three options.

DECISION: The Water Quality Steering Committee approved the 12 BMP definitions and efficiencies, described in the advance briefing papers, as recommended by the Nutrient Subcommittee and its workgroups for use in Phase 5 Chesapeake Bay Watershed Model.

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