Nontidal Wetland BMPs in the Phase 6 Chesapeake Bay Watershed Model

OVERVIEW

As a part of its 2017 Midpoint Assessment efforts to improve its modeling and management tools for the Chesapeake Bay Total Maximum Daily Load (TMDL), the Chesapeake Bay Program (CBP) approved an updated set of definitions for wetland best management practices (BMPs). The new definitions establish four categories of BMPs that encompass management actions to re-establish, establish, enhance or rehabilitate nontidal wetlands in the Chesapeake Bay Watershed. There are numerous benefits associated with nontidal wetlands aside from their potential to reduce nutrient and sediment pollution, including vital habitats for waterfowl, fish, other animals, and plants; flood control, water storage, storm abatement, and aquifer recharge; carbon sequestration; and reduction of toxic pollutants. For these and other reasons, implementing wetland enhancement, restoration, and creation as a BMP in the Chesapeake watershed will provide many benefits, especially in urban and agricultural areas.

This fact sheet provides an overview of the four nontidal wetland BMPs , including definitions, how to get started with implementing these BMPs, calculating nitrogen, phosphorus and sediment reductions, and how to report progress to be credited in the Bay model.

WETLAND BMP DEFINITIONS

Definitions for wetland practices are used by the Chesapeake Bay Program to document progress toward biological and water quality goals. They do not affect regulatory or other legal definitions that exist for federal, state or local programs. To allow for a simple schema that can properly account for the range of nontidal wetland practices that occur in the Chesapeake Bay Watershed, four BMP categories have been established: restoration, creation, enhancement and rehabilitation. The basic descriptions for these categories are provided here, while the complete definitions are provided in Table 1.

Wetland restoration - The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former wetland.

Wetland Rehabilitation - The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded wetland.

Wetland Enhancement - The manipulation of the physical, chemical, or biological characteristics of a wetland to heighten, intensify, or improve a specific function(s).

Wetland Creation - The manipulation of the physical, chemical, or biological characteristics present to develop a wetland that did not previously exist at a site.

Restored wetland in New Berlin, NY.
Photo by Chesapeake Bay Program

Restored wetland using an earthen ditch plug in marginal cropland.
Photo by USDA NRCS

In addition to the BMP definitions, Table 1 notes how implemented acres of the four categories relate to outcomes under the 2014 Watershed Agreement as well as the annual BMP implementation progress reported by the six states and District of Columbia to the EPA. The practice and project examples listed in Table 1 are not intended to be comprehensive – nor are they limiting or restrictive – as some projects or practices could count under a

different category depending on the design, site location, or other specific factors of the project. The table is intended to help clarify how a type of practice is most likely to be categorized under the Phase 6 BMP definitions.

Table 1 - Chesapeake Bay Program Wetland BMP Category Definitions for the Phase 6 Watershed Model

BMP Category	CBP will count the BMP acres as...		Practice and Project Examples	NRCS Practice Code
	Acreage gain? (Y/N)	Functional gain? (Y/N)		
Restoration	Y	N	Restore hydrology to prior-converted agricultural land (cropland or pasture); elevate subsided marsh and re-vegetate; ditch plugging on cropland; Legacy Sediment Removal	NRCS Practice 657
Rehabilitation	N	Y	Restore flow to degraded wetland; ditch plugging in a forested wetland area; moist soil management; invasive species removal; floodplain reconnection; re-establishing needed vegetation on cropland with wetland hydrology; native wetland meadow planting	May include some NRCS Code 657 practices.
Enhancement	N	Y	Flood seasonal wetland for waterfowl benefit; regulate flow velocity for increased nutrient uptake	NRCS Practice 659
Creation	Y	N	Modifications to shallow waters or uplands to create new wetlands. Placement of fill material or excavation of upland to establish proper elevations for wetlands; Hydrologic measures such as impoundment, water diversion and/or excavation of upland to establish nontidal wetlands	NRCS Practice 658

CONSIDERING HABITAT AND WATER QUALITY BENEFITS OF WETLANDS

Nontidal wetland practices are critical to meeting the Chesapeake Bay's water quality 2025 goals under both the Chesapeake Bay TMDL and the 2014 Watershed Agreement. However, wetland BMP projects only earn nutrient and sediment reductions if they are implemented at appropriate sites which do not damage existing ecological conditions. The conversion or alteration of high quality wetlands for the purposes of nitrogen, phosphorus or

sediment load reductions should be avoided. While improvements to water quality and other functions can mutually benefit one another, this requires careful planning and implementation by multiple stakeholders at the local, state and federal levels.

Changing the functions and/or values of existing high quality wetland systems and high quality non-wetland ecosystems that already provide denitrification and phosphorous or sediment trapping should not be pursued. Also, important ecosystems such as rare and endangered species habitat, older growth forests, unique ecotones (i.e. Delmarva Bays, Magnolia bogs, critical fish spawning areas, among others) should not be priorities for wetland practices solely for the nutrient and sediment reductions under the Bay TMDL. Each project should be assessed based on federal, state, and local regulatory requirements, according to best professional judgments in the field, and supported by benchmarks presented in state and federal guidance documents. practitioners should be aware of wetland types that are classified as key wildlife habitats in State Wildlife Action Plans, and follow recommendations for preserving or enhancing these areas for wildlife purposes. Furthermore, each project that may require a permit to work in “waters of the US” or “waters of a state” may want to pursue a pre-application meeting to discuss project specific information with the Federal and state regulatory agencies. This will allow for a more efficient regulatory review of the proposed project.

COMPUTING THE POLLUTANT REMOVAL CREDIT FOR WETLAND RESTORATION

The wetland restoration BMP can provide significant nitrogen, phosphorus and sediment reductions in the Chesapeake Bay Watershed Model. Similar to riparian forest buffers, the wetland restoration and creation practice first convert an area from one type of land (e.g., cropland) into a wetland, which has the lowest loading rate in the Watershed Model. Second, the presence of the restored wetland reduces the amount of nutrients and sediment delivered from upland acres. The Watershed Model calculates both of these steps when simulating the net reduction from a wetland restoration and creation BMPs and only the second step for wetland rehabilitation and enhancement BMPs. Anyone that wants to understand the specific efficiency values and ratios of upland acres treated by the wetland BMPs can consult the Expert Panel report and model documentation listed under Resources below. Fortunately, communities do not need to calculate the pollution removal themselves in order to report wetland BMPs to the state.

However, if a community would like to estimate their pollution reduction credit for planning purposes, they may use the following example to get a rough estimate. The Chesapeake Assessment Scenario Tool (CAST), listed under Resources below, can be used to obtain more accurate estimates since CAST is now equivalent to the Watershed Model.

Example. Wetland Restoration Project Calculations:

A wetland restoration project was planned and implemented on a Harford County, Maryland farm in the Deer Creek watershed. The project was restoring functions to a former wetland and therefore classified as a restoration BMP. The project acreage totaled 15.4 acres on former marginal cropland and has a drainage area of approximately 30 acres.

Step 1. Identify the location and land use types.

State = Maryland
County = Harford
Watershed = Deer Creek
Physiographic region: Piedmont
Prior landuse of restored wetland = marginal cropland

Wetland restoration acreage = 15.4 acres
Wetland type = nontidal depression (Other Wetland – non-floodplain wetland)
Wetland drainage area (for restored wetland) = 30 acres
BMP type = restoration (restoring wetland hydrology and plants on existing wetland soils)

Step 2. Calculations:

Table 2 - Baywide average nitrogen, phosphorus and sediment reductions per acre of implementation. *Pounds reduced edge-of-stream (EOS). TN rounded to nearest pound; TP rounded to nearest tenth of a pound; TSS rounded to nearest 100 lbs. Values derived in Phase 6 version of CAST and provided as useful but unofficial estimates.*

	Total Nitrogen (TN) (lbs per acre re-established per year)	Total Phosphorus (TP) (lbs per acre re-established per year)	Total Suspended Solids (TSS) (lbs per acre re-established per year)
Average	**X***	**Y***	**Z***
*These numbers are Chesapeake Bay watershed-wide average benefits for the Wetland Restoration BMP. [Editor's Note: these simplified estimates will be available in April 2018 and will be inserted here at that time]			

Acreage Gains: **15.4 acres**

Acreage gains * estimated per-acre reductions in Table 2 = Estimated net pollutant reductions**

15.4 acres * X lbs/acre/yr TN = **--- lbs**/acre/yr **TN**

15.4 acres * Y lbs/acre/yr TP = **--- lbs**/acre/yr **TP**

15.4 acres * Z lbs/acre/yr TSS = **---- lbs**/acre/yr **TSS**

****The net reductions for Wetland Restoration vary by 8-digit watershed. Please consult CAST if you need estimated reductions specific to your project and watershed.

Examples are not provided here for wetland rehabilitation, enhancement and creation practices. These BMP categories can be tracked and reported for simulation in the Phase 6 Watershed Model. However, the effectiveness of these three categories may change based on the forthcoming recommendations of a new expert panel.

HOW TO REPORT PRACTICES TO THE STATE

Data elements and reporting requirements vary by jurisdiction and the entity implementing a wetland project should reach out to the appropriate state wetland office for information and guidance on what information should be kept on record and what data needs to be reported to the state. [Editor's Note: Does the Wetland Workgroup want edits or supplemental information with the highlighted statement? E.g., list of state wetland contacts or other resources?] Wet ponds or constructed wetlands that are engineered strictly for purposes of collecting and treating stormwater runoff are treated as separate BMPs and should not be reported under any of the wetland practice categories described in this fact sheet.

Wetland restoration project information reported to Chesapeake Bay Program includes County, Watershed, prior landuse (cropland, pasture, etc.), the acreage draining to the wetland project, project partners, project completion

date, and wetland acreage gains. Depending on the project, these gains are assigned as either acreage gains or functional gains (see Table 1).

Property ownership is kept private and is not reported to Chesapeake Bay Program. The more complete the wetland restoration project information reported, the more accurately we can track the progress toward the Wetland Outcome goals.

WHAT IS REQUIRED TO VERIFY THE PRACTICE OVER TIME

All Chesapeake Bay Watershed states have verification protocols for reporting wetland BMP's. Initially, the installing agency confirms that the BMP was installed according to design plans, and is functioning as designed in terms of hydrology and plant cover. The installing agency keeps records of all wetland restoration projects. Ongoing monitoring of plants and hydrology is recommended for 3-5 years. Invasive species should be managed early to prevent further invasion. After 5 years, annual observations are recommended to document the continued success of the project. If on-site observations are not possible, other methods such as aerial imagery can be used as a proxy. Any issues or concerns with projects implemented on private lands are typically reported by the landowner to the installing agency and addressed as needed.

Existing BMP verification guidance for wetlands is available online as part of the CBP's adopted BMP Verification Framework at: http://www.chesapeakebay.net/about/programs/bmp/verification_guidance

RESOURCES

Type of Resource	Title or Description of Resource	Web link
Expert Panel Report	Recommendations of the Wetland Expert Panel for the incorporation of non-tidal wetland best management practices (BMPs) and land uses in the Phase 6 Chesapeake Bay Watershed Model (2016)	http://www.chesapeakebay.net/publications/title/24978
Archived webcast	Archived webcast and related materials from December 2016, presentation and overview of the expert panel recommendations	https://www.chesapeakebay.net/what/event/webinar_recommendations_from_the_bmp_expert_panel_for_wetlands
	[Wetland Workgroup: Any other suggested resources to add?]	
More Tools & Resources	Chesapeake Bay Program Quick Reference Guide to Nonpoint BMPs	TBD
Indicator, Management Strategy and Workplan	2014 Chesapeake Bay Watershed Agreement Outcome for Wetlands (Vital Habitats)	http://www.chesapeakeprogress.com/abundant-life/wetlands
Tools and documentation	Chesapeake Assessment Scenario Tool (CAST)	http://cast.chesapeakebay.net/