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 are management actions to restore, rehabilitate, enhance or create 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 nontidal wetland BMPs 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, with additional clarifications and examples provided in Table 1.

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

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.

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 BMPs and Examples for the Phase 6 Watershed Model

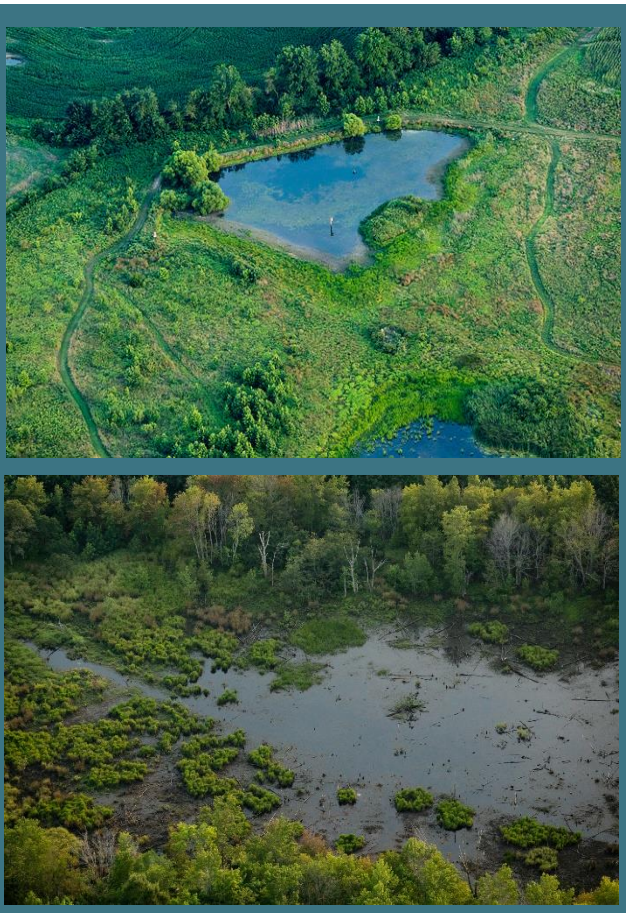
BMP Category	CBP will count the BMP acres as...		Practice and Project Examples	NRCS Practice Code
	Acreage gain? (Y/N)	Functional gain? (Y/N)		
Restoration	Y	N	Restore hydrology to prior-converted agricultural land (cropland or pasture); elevate subsided marsh and re-vegetate; ditch plugging on cropland; 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

ESTIMATING THE POLLUTANT REMOVAL CREDIT FOR WETLAND RESTORATION

Nontidal wetland BMPs may provide considerable nitrogen, phosphorus and sediment reduction estimates in the Chesapeake Bay Watershed Model. Similar to riparian forest buffers, wetland restoration and creation practices convert an existing land use (e.g., cropland) to a wetland land use, which has the lowest loading rate in the Watershed Model. In addition, restored or created wetlands reduce the amount of nutrients and sediment

delivered from the catchment draining to it. The Watershed Model calculates both of these steps when simulating the net reduction from wetland restoration or creation activities. For wetland rehabilitation and enhancement activities where the existing land use is wetland, only reductions of nutrients and sediment delivered from the catchment draining to it are calculated in the Watershed Model. Anyone interested in a more specific understanding of the efficiency values and ratios of upland acres treated by nontidal wetland BMPs may consult the Wetland 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 restoration or other BMPs to the state.

Communities and others implementing nontidal wetland BMP practices are not required to calculate the pollution removal estimates to report project implementation. The Chesapeake Assessment Scenario Tool (CAST), listed under Resources below, may be used to obtain more accurate estimates of the reductions for a specific area or project since CAST is now equivalent to the Watershed Model. However, a rough estimate of the pollution removal credit may also be derived for planning purposes as in the following example.



Restored wetlands on the Eastern Shore of Maryland.
Photos by Chesapeake Bay Program

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 restored natural functions to a former wetland and met the definition of wetland restoration. The wetland restoration project totaled 15.4 acres on former marginal cropland and includes a watershed 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 at edge-of-tide (EOT). *These numbers are state average reductions (Chesapeake Bay Watershed portion only) per acre of Wetland Restoration implemented (average of Floodplain and Headwater). Values for TN and TP are rounded to nearest tenth; values are rounded to nearest whole number for TSS. The TN, TP and TSS lbs reduced per unit of all BMPs are available by state and by county on CAST, under "Cost Effectiveness of BMPs." Version: July 13, 2018. http://cast.chesapeakebay.net/Documentation/DevelopPlans***

	Total Nitrogen (TN) (lbs per acre wetland restoration per year)	Total Phosphorus (TP) (lbs per acre wetland restoration per year)	Total Suspended Solids (TSS) (lbs per acre wetland restoration per year)
Delaware	**76.6***	**0.2***	**354***
Maryland	**42.5***	**1.4***	**1,327***
New York	**10.2***	**0.3***	**349***
Pennsylvania	**33.0***	**0.7***	**817***
Virginia	**21.4***	**1.1***	**592***
West Virginia	**12.4***	**0.4***	**294***

Acreage Gains: **15.4 acres**

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

15.4 acres * 42.5 lbs/acre/yr TN = **654.5 lbs**/acre/yr **TN**

15.4 acres * 1.4 lbs/acre/yr TP = **24.6 lbs**/acre/yr **TP**

15.4 acres * 1,327 lbs/acre/yr TSS = **20,436 lbs**/acre/yr **TSS**

****The net reductions for Wetland Restoration vary by watershed. Please consult CAST if you need estimated reductions specific to your project and watershed. For example, this 15.4 acre project entered into CAST would reduce edge-of-tide loads by 571.4 lbs TN, 13.6 lbs TP, and 23,457 lbs TSS when compared to a no-action scenario. As in this case, the load reductions in the Watershed Model vary from the values in Table 2, but the estimates are useful as a back-of-the-envelope approximation.

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. 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
Interactive online mapping tool	Watershed Resources Registry	https://watershedresourcesregistry.org/index.html
More Tools & Resources	Chesapeake Bay Program Quick Reference Guide to Nonpoint BMPs	https://www.chesapeakebay.net/bmpguide
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/