

Good Recipes for the Bay Pollution Diet

U-12 FLOATING TREATMENT WETLANDS

PRACTICE AT A GLANCE

Stormwater retention ponds (wet ponds) are one of the most common stormwater management practices in the Chesapeake Bay watershed and are prime targets for retrofits.

Floating Treatment Wetlands (FTW) are buoyant rafts that hold aquatic plants whose roots extend below the surface of the water and can enhance the nutrient removal performance of existing wet ponds.

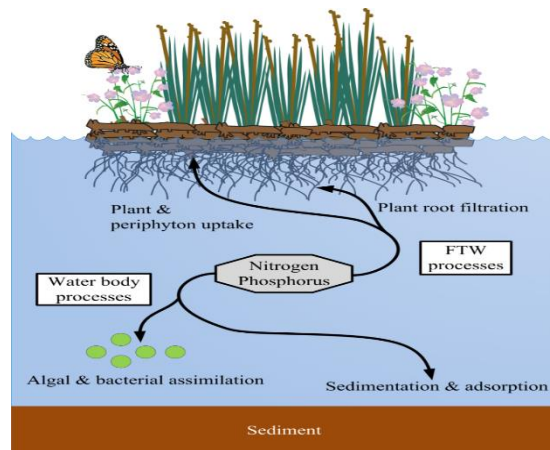
While FTWs have been implemented in open-water systems, nutrient reductions may only be earned if they are installed as a retrofit in wet ponds with drainage areas under 400 acres.

FTWs must cover at least 10% of a pond's surface area to improve their nutrient and sediment removal function. However, covering more than 50% of the pond detracts from pond performance and is not allowed.

Regular operation and maintenance tasks are essential to maintain the performance of FTW retrofits over time and may include shoot trimming, repairs to the tethering system and invasive species removal.

DESCRIPTION

Floating treatment wetlands are rafts of wetland vegetation that are deployed in stormwater ponds with a permanent pool of water. When installed in existing wet ponds with drainage areas under 400 acres, they improve the sediment and nutrient removal performance of the pond.



Nutrient processing of an FTW (Wang and Sample, 2013)

The FTWs consist of an artificial buoyant raft and growing media planted with aquatic plants whose roots extend well below the water surface. Each raft is tethered to the bottom of the pond to allow for easy retrieval and protect the pond's flood control functions. The rafts should have at least 80% wetland plant coverage by the end of the growing season.

The enhanced nutrient and sediment removal performance for FTWs is due to the improved settling conditions within the ponds. Nutrient removal is also driven by the microorganisms associated with the dense root network of the floating plants. The effectiveness of the FTWs improves when more raft coverage is added, but only up to 50% of the pond's surface area.

At this point, no nutrient reductions are available for FTWs in open tidal waters.

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OTHER BENEFITS OF FLOATING TREATMENT WETLANDS

Floating Treatment Wetlands provide several benefits beyond their water quality improvement, including:

- Enhanced wetland habitat and aesthetic qualities for existing stormwater wet ponds
- Habitat refuge for birds and waterfowl away from shoreline or aquatic benches
- Potentially effective technique to grow wetland plant species used for freshwater wetland establishment

WHERE TO FIND THE BEST OPPORTUNITIES IN YOUR COMMUNITY

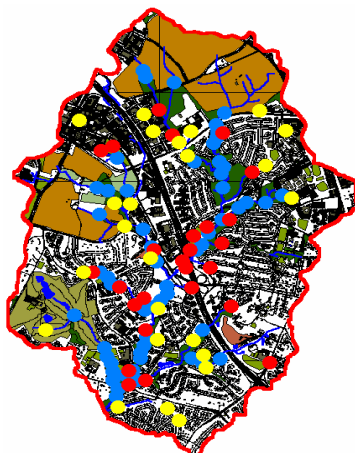
Most Bay communities have a large inventory of stormwater ponds, many of which are prime candidates for FTWs, since the land is already devoted to stormwater management.

If your community has an MS4 permit, your state stormwater agency often requires that you inspect all the stormwater practices within your community during each permit cycle. Complying with this requirement can be a headache, but it also can help you quickly assess which stormwater ponds are the best candidates for FTW retrofits.



When evaluating pond sites, be aware of the qualifying criteria and maintenance requirements for FTWs. Maintenance crews must be able to easily deploy the rafts and access them for invasive species removal, annual shoot trimming and repairs to the tethering system. It is also important that the pond's water depth be greater than 3.5 ft.

HOW TO GET STARTED



Retrofit Reconnaissance Map

The decision to implement FTWs in your community should align with your local watershed plan and your overall stormwater retrofit strategy. Traditionally, when you are making decisions about where to target stormwater retrofits, you would conduct a retrofit reconnaissance investigation. Through field inspections and desktop searches of your existing BMP inventory, you can identify a range of cost effective retrofit practices.

The Chesapeake Stormwater Network has developed visual indicators to assess the pollutant removal performance and dam safety issues of legacy wet ponds. This protocol is a great resource to identify cost effective retrofit options.

The field inspections are a good opportunity to make sure the pond meets the qualifying criteria for FTWs.

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Below Mat Root Biomass on a FTW on Maryland's Eastern Shore

There are currently no known environmental permitting requirements restricting the application of FTW retrofits. It is possible that state stormwater regulatory agencies may establish their own guidelines in the future if FTWs are deployed on a more widespread basis. It is a good idea to check with the appropriate state agency to ensure there are no restrictions on your chosen site.

GENERAL COST INFORMATION

One of the benefits of FTWs is that they have minimal up-front costs. These retrofits occur within existing private or public stormwater infrastructure, which means there are no land acquisition costs, and the FTWs require no major excavation or re-plumbing of the facility. A rough estimate is that FTW rafts cost about \$25 per square foot of raft.

Maintaining FTWs can be a significant ongoing expense. The expert panel recommended that the rafts be inspected quarterly. Plants should also be thinned, harvested and reinforced annually, and invasive species removed. Be sure to consider these maintenance costs when selecting FTW retrofits.

COMPUTING THE POLLUTANT REMOVAL CREDIT

Calculating the additional pollutant removal credit for an FTW retrofit is a simple 2-step process. Table D.1 is used to define the incremental TSS, TP and TN removal rate for each FTW retrofit, based on the amount of FTW coverage over the pond surface area.

Step 1: Measure the surface area of the pond and the FTW rafts to determine the percent raft coverage for the pond.

Step 2: Find the removal rates that correspond to the percent raft coverage achieved:

Practice Name	Raft Coverage in Pond	Pollutant		
		TN	TP	TSS
FTW-1	10%	0.80%	1.60%	2.30%
FTW-2	11-20%	1.70%	3.30%	4.70%
FTW-3	21-30%	2.50%	4.90%	7.00%
FTW-4	31-40%	3.30%	6.50%	9.20%
FTW-5	41-50%	4.10%	8.00%	11.50%

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HOW TO REPORT THE PRACTICE TO THE STATE

The following data reporting requirements are recommended for FTWs:

- Practice Name (ex. FTW-3)
- Acres treated by the wet pond within which the FTW is deployed
- Location in latitude/longitude
- Year the FTW was installed

Even though FTWs are always implemented within wet ponds, each FTW practice should be reported separately from the pond within which it is located. Your wet pond should be reported according to the Stormwater Performance Standards Expert Panel report (Fact Sheet U-2).

WHAT IS REQUIRED TO VERIFY THE PRACTICE OVER TIME

FTW pond retrofits have a shorter longevity than other types of stormwater retrofits and require frequent inspections and maintenance during the growing season to maintain their pollutant removal function. As a result, the duration of the pollutant removal credit is only 3 years. However, this credit can be renewed for an additional 3 years if it passes a field inspection.

At the end of its third growing season, the inspector assesses the structural integrity of the FTW raft to ensure that it still meets the performance criteria outlined below.

- FTW meets its design
- Minimum pond surface coverage by FTW
- Plant coverage within the FTW rafts is 80% or more
- Native wetland plant species are maintained
- FTW units are placed perpendicular to flow path, and are adequately tethered/anchored
- Depth from FTW raft to pond bottom is 3.5 feet or greater



Regular inspection and maintenance is required to maintain FTW performance

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RESOURCES

Type of Resource	Title of Resource	Web link
Expert Panel Report	Recommendations of the Expert Panel to Define Removal Rates for Floating Treatment Wetlands in Existing Wet Ponds (2016)	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2016/09/FINAL-FTW-EXPERT-PANEL-REPORT-072716-LONG.pdf
CSN Report	The Pond Protocols (2016)	http://chesapeakestormwater.net/wp-content/uploads/dlm_uploads/2016/09/FINAL-POND-PROTOCOL-101816.pdf
Archived Webcast	Crediting Floating Treatment Wetlands in the Chesapeake Bay (2016)	http://chesapeakestormwater.net/events/webcast-floating-treatment-wetlands/
Archived Webcast	The Pond Protocols (2016)	http://chesapeakestormwater.net/events/webcast-pond-protocol/
New Technologies Workshop Manual	New Technologies Workshop Presentations (2012) Urban Subwatershed Restoration Manual 3: Urban Stormwater Retrofit Practices (2007)	http://chesapeakestormwater.net/wp-content/uploads/downloads/2012/09/New-Technologies-Technical-Workshop_091812.pdf http://chesapeakestormwater.net/wp-content/uploads/downloads/2012/06/Urban-Stormwater-Practices.pdf
More Tools & Resources		http://chesapeakestormwater.net/training-library/urban-restoration-techniques/stormwater-retrofits/
