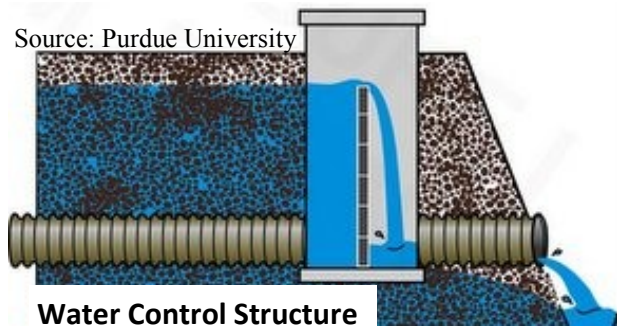


Woodchip Bioreactor Implementation in the Diamond Lake Subwatershed



Woodchip bioreactors are an effective tool to remove excess nutrients from agricultural drainage. In 2012 and 2013, the Middle Fork Crow River Watershed District worked with landowners in the Diamond Lake subwatershed to implement a woodchip bioreactor. While woodchip bioreactors are a relatively new method to improve water quality, their effectiveness has quickly caught the attention of producers and conservationists across the Midwest.

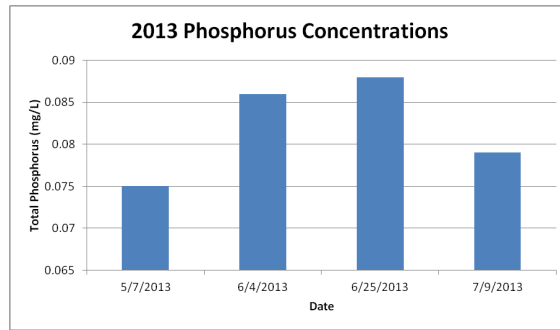
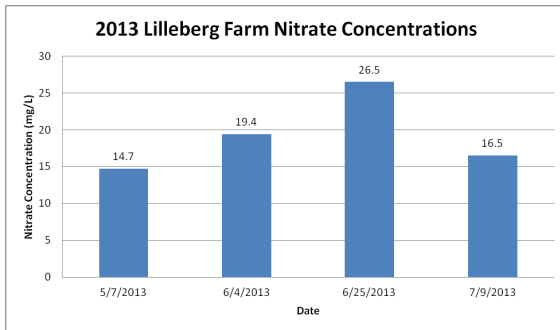


Woodchip bioreactors are covered trenches filled with woodchips. Water is diverted into the bioreactor and is retained with a control structure to ensure adequate saturation of the woodchips. The saturated conditions provide insufficient oxygen for bacteria feeding on the woodchips. As a result, the bacteria begin to respire nitrate, effectively removing it from the water. By selecting hard, high quality woodchips, the bioreactor can last up to twenty years. Careful management of the water levels in the bioreactor will improve the efficiency of nitrate removal while prolonging its lifespan.



The woodchip bioreactor installed in the Diamond Lake subwatershed covers a 2000 square foot area and is 4 feet deep. The trench was lined with plastic, and a 2" weep hole was cut in the lowest stop log on the capacity structure to prevent the production of methylmercury.

Prior to the project installation in the Fall of 2013, Watershed District staff collected water chemistry samples of the field drainage. On 5/30/2013, an application of 120-35-65 fertilizer was applied. Below are the lab results showing nutrient concentrations prior to the bioreactor installation. Continuous monitoring and chemistry sampling in subsequent years will allow District staff to calculate the bioreactors effectiveness.



	Height in Inches above tile invert (bottom of control structure)	
	Diversion Stop Logs	Downstream Stop Logs
1-Nov	54	42
Two weeks before planting (March 16-April 16)	24	12
Two weeks after the end of spring agro-technical practices (May 16-June 1):	36	24

Displayed above are the approximate seasonal stop-log levels to maximize the effectiveness of the bioreactor while providing adequate field drainage. A 12” difference in stop log elevation is maintained to ensure proper hydraulic residence time of 6-8 hours. The area above the bioreactor will be converted into a conservation buffer, and will not be mowed or driven over to avoid compaction. The District hopes this will become one of many more successful projects to address nutrient issues in the Diamond Lake subwatershed. Please contact the MFCRWD about cost-share opportunities at 320-796-0888 or visit us on the web at www.mfcrow.org.

