LAKE OKEECHOBEE WATERSHED PERMEABLE REACTIVE BARRIER TECHNOLOGY PROJECT

Background:

The extensive ditch network in the Lake Okeechobee Basin (LOB) acts as a rapid transport conduit for water and associated solutes, including phosphorus from the watershed to the Lake. This project proposes to use permeable reactive barriers (PRBs) for interception and long-term sequestration of phosphorus (P) before it enters on farm ditches. Permeable reactive barrier is a proven technique extensively used for groundwater remediation. An advantage of this technology is that PRBs are completely passive and do not require continual maintenance after installation. Furthermore, because PRBs are installed in the subsurface, they are transparent to the land user and do not require any land use concessions.

Project Overview:

The research objective is to incorporate water treatment residuals (WTRs) capable of long-term sequestration of P into PRBs in the Lake Okeechobee Basin to reduce P loads to Lake Okeechobee. The specific objectives of the project are: (1) asses the quantity of Al-WTRs in the LOB and surroundings regions, (2) provide an estimate of the costs and benefits of using Al-WTRs to reduce P loadings to Lake Okeechobee, and (3) field installation and monitoring of P load reduction of the PRB pilot study.

The proposed location for this study is the 85-acre former high intensive area of the Candler Ranch, formerly known as Rofra Dairy which is located in the S-191 (Taylor Creek) basin in Okeechobee County, Florida (Figure 1). This is one of the former dairies that participated in the SFWMD buy-out program in the late 1980's. At the proposed site, wells and pressure transducers will be installed where the groundwater phosphorus concentration has been measured to be greater than the desired threshold. Groundwater hydraulic gradients will be assessed to determine the groundwater discharge into nearby ditches and the buried-wall PRB will be installed (Figure 2).

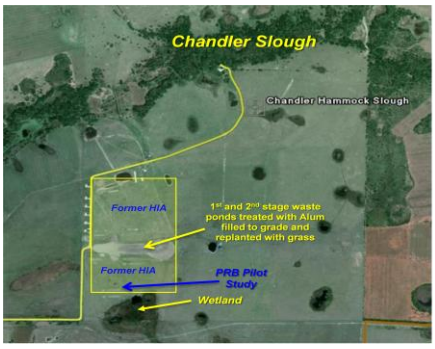

Figure 1. Site location.

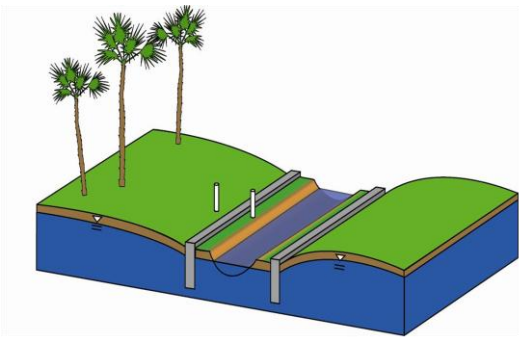

Figure 2. Buried-wall PRB diagram.

Project Status:

The feasibility assessment of using PRB technology to reduce P loads to Lake Okeechobee was completed in December 2009. The next phase, PRB design and laboratory testing of materials for PRB construction will be completed by September 2010. Pre-PRB monitoring period is underway to identify the most suitable location for PRB installation. Some of the chemical sorbents to be tested for their phosphorus sorption capacity and kinetics and hydraulic properties include water treatment residuals (WTRs), aluminum and iron oxide compounds, and low cost materials available locally. Laboratory work will include testing on site specific soils and locally available amendments to assess the kinetics of P retention, the reversibility of P retention, and the stability of immobilized P as a function of various soils and environmental factors. Mixtures of the materials will be tested to find the optimal combination of these criteria for both short-term water quality improvements in the Lake Okeechobee Basin, as well as long-term sustainability. This project is expected to be completed by September 2011.