

Floating Aquatic Vegetative Tilling (FAVT)

FISHEATING CREEK FAVT PROJECT OVERVIEW

Technology Description

Floating Aquatic Vegetative Tilling (FAVT) systems utilize a novel approach to enhance nitrogen (N) and phosphorus (P) removal from surface waters. Many species of floating aquatic vegetation (FAV) are known to rapidly assimilate N and P, but their high nutrient uptake rate can only be sustained if the plants are maintained at an optimal density. The ideal coverage is usually achieved by periodic harvesting; however, since FAV are predominantly water, removal is costly and inefficient. FAVT overcomes these constraints in the following manner: (1) the FAV wetland is operated for an initial growing season, during which time the FAV assimilate nutrients and grow to a high density; (2) the wetland is drained during the dry season, thereby stranding the FAV on the soil; (3) after a natural drying process, the plant material is tilled into the soil; and (4) the wetland is reflooded, and FAV that are stored in deeper zones are used to repopulate the wetland for the subsequent growth period. FAVT systems therefore operate similarly to a conventional treatment wetland by storing P in the soil, but they accomplish P removal more efficiently and at a significantly faster rate. The technology uses the direct assimilation of nutrients from the water column through the use of floating plant roots (as compared to plants rooted in the soil), and all of the biomass is rapidly incorporated directly into the soil through tilling. The process thereby results in a reduction of up to 80% of land needed for treatment as compared to traditional wetland treatment systems.

Project Description

A ~50 acre approximately 30 cfs FAVT system would be deployed on an upland portion of the area known as Curry Island located on the western side of Lake Okeechobee, where Fisheating Creek enters the Lake. The project would consist of an FAVT wetland for removal of phosphorus and nitrogen. The system would receive water from Fisheating Creek that is destined for the Lake. The treated outflow water would be returned to the Lake via dispersed overland flow. The flow path traverses through the 2,700-acre marsh-dominated State submerged land, which is leased to the Lake Okeechobee Habitat Alliance, Inc. (LOHA). Treated water will assist in achieving the Lake's TMDL by reducing nutrient loads from Fisheating Creek. The project will also provide hydrological restoration and ecological enhancement to the Curry Island marsh, consistent with the purpose of the State lease and management objectives of the LOHA.

Efficiencies & Benefits

The patented FAVT concept was developed with the intent of enhancing the efficiency and sustainability of treatment wetlands. FAVT systems:

- ✚ Are approximately three to five times more efficient per acre of wetland than “conventional” treatment wetlands utilized for P removal.
- ✚ Utilize appropriate sequences and configurations of wetland unit processes to effectively transform/remove additional contaminants, such as nitrogen.
- ✚ Can be deployed in former farmlands or partially restored wetlands.
- ✚ Assist in achieving restoration goals.
- ✚ Provide environmental benefits via wetland and wildlife habitat restoration and creation.

Floating Aquatic Vegetative Tilling (FAVT)

Existing Facilities & Performance

FAVT is an integral component of three full-scale hybrid chemical treatment/wetland nutrient removal systems that have been constructed north of Lake Okeechobee. All of these are currently operational. The tilling approach has provided considerable savings, reducing the need for mechanical harvesting of the floating plant biomass. The floating aquatic vegetation “tilling” concept was independently evaluated by the University of Florida IFAS in 2009 (C. Catts, Master’s Thesis). The study concluded the tilling management strategy was efficient in reducing phosphorus and nitrogen, and the tilling process leads to improved long term storage of phosphorus in soils.

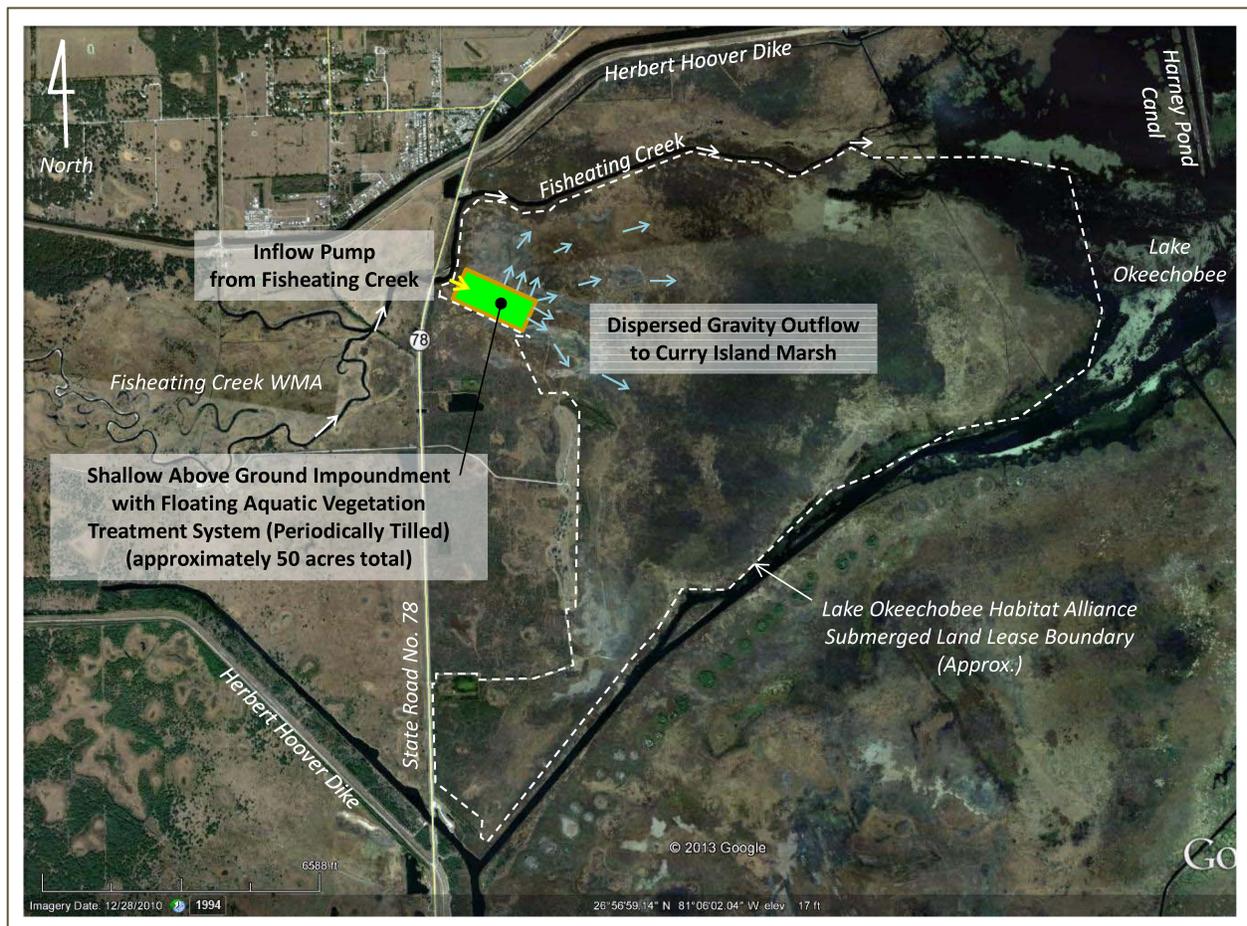


Figure 1. Schematic depicting the general location and flow path of the FAVT system within the Fisheating Creek – Lake Okeechobee watershed. The system would be designed to continuously treat Creek waters with the ability to discharge back to the Lake, and provide hydrological restoration and ecological enhancement to the Curry Island marsh.