

Nutrient Removal with Passive Floating Treatment Wetlands

Project Location: Elayn Hunt Correctional Facility, St. Gabriel, Louisiana, USA

This case study demonstrates the capabilities of Floating Island International’s patented floating treatment wetland (FTW) technology to clean water by substantially reducing nutrient levels. Constructed of post-consumer polymer fibers and vegetated with native plants, FTWs mimic the ability of natural wetlands to clean water by bringing a “concentrated wetland effect” to waterways. Over 4,800 FTWs have been installed worldwide over the past decade.

Overview

Martin Ecosystems of Baton Rouge, Louisiana, an FTW licensee, installed BioHaven® floating islands into the Elayn Hunt Correctional Facility oxidation pond in March 2011. The primary objective was to determine whether the islands could remove unwanted nutrients that were periodically creating noncompliance with the facility’s discharge permit. The goal is to have the facility continually achieve and maintain compliance.

Location	St. Gabriel, Louisiana USA
Parameters Studied	Chemical Oxidation Demand (COD), ammonia, phosphate
Environment	Municipal wastewater pond
FTW Size	Area of 1560 ft ² (145 m ²), thickness of 8 inches (20 cm)
Water Source	Elayn Hunt Correctional oxidation pond
Installation Date	March 2011
Flow Rate	208 gpm (47 m ³ /hr)
Water Body Depth	3 ft (1 m)
Water Body Area	5.1 acre (20,600 m ²)
% Coverage	0.7% of pond covered by FTWs

The FTWs installed at Elayn Hunt are BioHaven® passive islands without aeration (embodiments of FTWs that incorporate circulation and aeration have been shown in other studies to be even more effective for nutrient removal). The islands were planted with three types of vegetation. Most of the removal efficiency attributed to islands has been found to be due to biofilm attached to both the plant roots and the island matrix itself.

Table 1 shows concentrations of the three parameters of concern before and after the FTW installation. “Before” data were taken in January and March 2011, while “after” data are the averages of monthly data from April 2011 through September 2012. It is

assumed that the higher nutrient concentrations seen post-FTW were also seen periodically before FTW installation.

**Table 1. Contaminant Concentrations
(mg/L)**

Parameter	Before FTW		After FTW	
	In	Out	In	Out
COD	242	190	587	158
Ammonia	14.1	12.0	16.0	10.0
Phosphate	13.9	11.1	15.5	11.0

After FTW installation, the average percentage removal has been 73%, 38% and 29% for COD, ammonia and phosphate, respectively. This is significantly better than without the FTWs. Table 2 shows contaminant removal rates before and after FTW installation, along with the net removal rates that can be attributed to the islands.

**Table 2. Removal Rates
(lb/yr/ft³)**

Parameter	Before FTW	After FTW	Net
COD	46	376	331
Ammonia	1.8	5.3	3.4
Phosphate	2.5	3.9	1.5

The FTW removal rates are substantial and are even higher than those measured in other case studies. Based on these rates, FTWs can be sized to remove a given contaminant load (concentration and flow).

Conclusions

FTWs have a demonstrated capability to remove excess nutrients such as COD, ammonia and phosphate, along with total suspended solids and other parameters (data not shown). The total cost of this project was much less than other treatment alternatives, demonstrating that FTWs can help public facilities and private industry achieve and maintain compliance in a cost-effective manner. FTW technology can enhance existing waterways with the concentrated wetland effect, facilitating compliance with increasingly stringent wastewater nutrient, BOD/COD and TSS criteria.

The Louisiana Department of Environmental Quality provided funding for this project and the property owner is the Louisiana Department of Corrections.