Pennsuco Mitigation Area Overview

The South Florida Water Management District's (SFWMD/District) regional mitigation area known as the Pennsuco Mitigation Area (Site/Mitigation Area) is part of the Pennsuco wetlands or Cell 26, of the East Coast Buffer (ECB). The Pennsuco wetlands/Cell 26 covers an area of approximately 13,000 acres in Miami-Dade County. Pennsuco is bordered on the west and north by Krome Avenue, to the south by Tamiami Trail (US 41) and to the east by the Dade-Broward Levee.

The Pennsuco wetlands were identified in the District's Northwest Dade Freshwater Lake Belt Plan. In 1988, this area was added as a Save Our Rivers project under the name of Dade-Broward Levee. In 1996, it was incorporated into the ECB project. The ECB consists of approximately 66,400 acres of marshes, reservoirs, and recharge areas in Palm Beach, Broward and Dade counties. Benefits of the ECB include providing an environmental buffer to the Everglades, seepage reduction for the water conservation areas, water supply benefits through groundwater recharge and the enhancement of thousands of acres of wetlands that once comprised the Everglades. The initial East Coast Buffer analysis by the consultants CH2MHill et al (1994) titled *Analysis of Water Supply Potential for Area B, The Everglades Buffer Strip, and The Hillsboro Basin: Phase #B - East Coast Buffer Implementation* grouped the buffer cells into categories of wetlands, reservoirs, or recharge basins according to their potential water management use. The Mitigation Area as part of Cell 26 is proposed for management as a wetland marsh. The primary management objective is to preserve or enhance the wetland quality. Proposed modifications to the Central and Southern Flood Control Project will attempt to reduce seepage loss, currently through the Dade-Broward levee, to avoid an artificially accentuated drydown.

In 1995, the SFWMD began utilizing Pennsuco as a regional off-site mitigation area, allowing permit applicants to make mitigation contributions for the acquisition, enhancement, and long-term management of Pennsuco lands as compensation for permitted wetland impacts. The environmental benefit will provide protection, enhancement and management of the floral, faunal, and hydrologic resources of Pennsuco parcels. Pennsuco emphasizes the enhancement of a degraded ecosystem that likely will continue to degrade and further impact adjacent natural areas, unless actions are taken to reduce the spread of exotics. The site provides an opportunity to address a broad range of functions and values including habitat enhancement, groundwater recharge, water quality improvement and increased flood storage capacity. The enhancement of Pennsuco has the potential to yield regional ecological benefits and contribute to the goals of Everglades restoration.

Land Acquisition

The District began purchasing private lands through a willing seller program in 1995. Lands in Pennsuco have been acquired using funding sources from Preservation 2000 (P2000), federal grant funds originating out of the Farm Bill Act and the Land and Water Conservation Fund, the Florida Division of State Lands - primarily CARL, and funding

received from developers through the mitigation program. Lands acquired with mitigation funding will be preserved and protected in perpetuity using a restrictive covenant.

Existing Conditions

The 1994 map of existing vegetation is dominated by sawgrass marsh with scattered spikerush slough and areas of melaleuca infestation. The sawgrass marsh provides such diverse functions as water storage, water transport, nutrient removal and habitat value. The dominant native species is sawgrass. Other species include spikerush, arrowheads, pickerelweed, buttonbush, and coastal plain willow. Interspersed within the sawgrass marsh at the lower elevations are depressional sloughs that support an abundance of fish and aquatic invertebrates. The dominant vegetation includes bladderwort, white water lily, floating heart, spikerush and spatterdock. This community type provides habitat to wildlife species such as pig frogs and alligators, as well as a number of rare and endangered animals such as woodstorks, snowy egrets and snail kites.

Due to adverse hydrologic changes and disturbances in the region, melaleuca have steadily invaded the area. Melaleuca negatively impacts wetland function, changing the ecosystem structure and dynamics. Monocultures or dense stands of melaleuca replace historic tree islands and sawgrass marsh, affecting wildlife use. Leaf litter and vegetative debris can change soil elevation and hydrology also increasing fuel loads that lead to very hot fires. Melaleuca invasion of sawgrass marsh measurably and visibly changes the vegetative structure of an area although it is not as clear to what extent melaleuca invasion also changes the hydrologic characteristics of an area. As melaleuca coverage increases in an area, the added tree structure increases the wildlife diversity and benefit up to the point the melaleuca becomes a dense monoculture, which limits wildlife use. Canopy closure occurred when melaleuca cover increased beyond 75%, reducing sunlight penetration to the ground plain and the primary productivity of periphyton and submerged macrophytes.

Exotic infestation is greatest in the areas impacted by the drainage effects of the canals, road and levee. Conditions on the Site will continue to deteriorate if the effects of exotic vegetation, fire exclusion and hydrologic changes are left unmitigated. Exotic plants will likely continue to spread into the remaining natural areas adversely affecting the ecosystem and the viability of those native species now existing on site.

Hydrology

In the Pennsuco wetlands, the hydroperiod ranges from six to nine months. Under current conditions, ground water is moving from the Everglades Protection Area (EPA) towards the east due to a higher surface water elevation in the EPA than on the east side of the Dade-Broward Levee. This translates into a very high groundwater seepage rate. The average annual rate of seepage from the Everglades area to the lower East Coast increases substantially during wet years, resulting in declining water levels and hydroperiods in Pennsuco. In the CERP formulation, the plan for the Dade-Broward Levee / Pennsuco is to reduce seepage to the east from Pennsuco wetlands and Southern Water Conservation Area 3B, enhance hydroperiods in the Pennsuco and enhance recharge to Miami-Dade

County's NW wellfield. The CERP benefits will complement the mitigation effort and contribute to long-term sustainable ecological benefits in Pennsuco.

Soils
The soils are generally organic sediments categorized by the United States Department of Agriculture, Natural Resource Conservation Service as Everglades peat. The Geographic Information Systems shows Lauderhill Muck, Depressional and Pahokee Muck, Depressional as the predominant soil types. Lauderhill and Pahokee Muck, are typically black and very dark brown mucky soils underlain by soft, porous limestone bedrock. Lauderhill soils occur to a depth of about 30 inches and Pahokee soils occur to a depth of about 46 inches. These soil types are typically ponded for 9 to 12 months in most years in broad open areas within sawgrass marshes. The native vegetation is sawgrass, willows, and cattails. Melaleuca trees have invaded many of the areas.

Topography
The topography is flat with micro-topographic changes in elevation that influence the wetland associations. The ground surface elevation is approximately 5 feet and generally slopes from north to south with an average gradient of 0.15 feet per mile.

Mitigation Plan

Site Posting
The District takes appropriate steps to discourage unauthorized access to all newly acquired mitigation land following acquisition and prior to initiating exotic removal, including posting the site with signage stating "No Trespassing." The signage meets statutory requirements pursuant to Section 810.011, F.S. regarding posting signs no more than 500 feet apart around the perimeter and at the property corners. In addition, signage that states "Restoration Site Exotic Treatment in Progress" is posted on each major visible reach of the tract.

Work Plan
The work plan is limited to exotic removal, therefore federal and state permits are not required. The goal is to provide improved habitat functions through exotic removal and the restoration of a higher quality sawgrass community. The enhancement effort primarily targets the elimination of melaleuca although all exotic invasive species are included in the eradication program. The treatment program involves a multi-year herbicidal and manual removal program with a follow-up controlled burn. The exotic eradication effort effectively manages melaleuca by containing and progressively reducing the population. The control program consists primarily of a ground based herbicide application and limited aerial application in the dense monocultures. The application method follows a three phased effort. The first phase focuses on the initial elimination of seed bearing trees and seedlings. During the second phase, the treatment focuses on the missed areas and seedlings that resulted from the previous years treatment. The third phase involves a long-term program to monitor the effectiveness of the eradication program and assessment for follow-up treatments. The District Vegetation Management Department uses a five year schedule, where treatment cost estimates are

reduced by 50 percent for each succeeding year, until the seed source is brought under control. At the end of year five it is expected that the exotics will attain a level of control where it can be contained, utilizing the long-term management fund. On any future acquisitions in Pennsuco, the District will respond within 12 months of a parcel"s acquisition with the completion of an initial ground based and aerial application for exotic treatments (first phase treatment).

The ground based elimination methods include girdle treatment for isolated individuals and hand pulling smaller trees less than one inch in diameter. The melaleuca chemical treatments will consist of a mixture of arsenal and rodeo utilizing 25 percent each with 50 percent water. Conditions for optimal treatment are a wet/wet year when airboats can easily access the treatment area or during a dry/dry year when a buggy can provide access. The most appropriate time for treatment is typically the beginning or end of the rainy season. Prior to conducting the treatment, an on-site assessment should occur to appropriately time the treatment and method of access.

Prescribed Fire
Fire is a critical component in the management of the sawgrass community. The alteration of historic fire regimes is one of the factors that may have contributed to the invasion of sawgrass by exotic plant species. Periodic natural fire in freshwater marsh communities prevents invasion by woody shrubs and trees and encourages development of a diverse sawgrass marsh community. Fire management will support the chemical control of melaleuca by reducing the emerging melaleuca seedlings. This will require fire frequencies every one-four years for the sawgrass community. Routine prescribed burns will be performed in response to weather, water level and vegetative conditions using licensed personnel. Prescribed burns will occur on tracts in increments of 200-300 acres. Establishment of control lines and prescribed fire operations will be conducted from airboats with possible aerial/helicopter support. Implementation of the burn plans will be closely coordinated with the chemical control efforts. Following chemical control efforts and when there has been sufficient regeneration of sawgrass such that there are adequate fuel levels to support a fire, SFWMD staff will conduct a prescribed burn when there are appropriate water levels and wind directions. Presently, the regenerating sawgrass and fuel levels are still inadequate to support a prescribed burn.

Monitoring and Management

The monitoring program will evaluate the success of exotic plant species control activities, prescribed burn techniques and regeneration of desirable plant species in accordance with Environmental Monitoring Report Guidelines published by the South Florida Water Management District Natural Resource Management Division. Monitoring data and an evaluation of success criteria will be provided in the Annual Report.

The management plan will focus on the control of exotic invasive plants (primarily melaleuca) and the application of prescribed fire. All monitoring will be conducted to demonstrate success in achieving this goal. Overall, management goals include the following:

1. prevent encroachment of woody vegetation through periodic controlled fires;
2. provide timely control of exotic invasive vegetation;
3. provide photographic documentation of restoration progress; and
4. preserve existing populations and enhance recruitment of native species

Vegetation will be monitored semi-annually, by a SFWMD hired consultant for which funds are budgeted, to provide a timely, adaptive response with exotic treatment and control. Monitoring will provide both qualitative and quantitative assessments of vegetative systems. Qualitative assessments will be based primarily on aerial and on ground surveys of landscape changes resulting from management activities while quantitative assessments will be conducted along on-ground transects.

Monitoring will include the following objectives:

1. document the success of vegetative restoration by monitoring the diminution of exotic species and recruitment of target native species, primarily sawgrass;
2. document the effect of prescribed burn on the elimination of exotic seedlings, woody shrub control and sawgrass regeneration; and
3. provide graphic and photographic documentation of the restoration progress.

Success Criteria
Five years after execution of this Agreement, it is expected that the exotics will attain a level of control where they can be contained to meet the success criteria set forth below:

1. maintain exotic invasive plant species at 5 percent or less of the vegetative cover on site; and
2. recruit and maintain coverage of a minimum 80 percent native plant herbaceous obligate and facultative wetland (primarily sawgrass) species and a maximum of 20 percent open water and obligate and facultative wetland woody shrub species as listed in Section 62-340 F.A.C. within the available area.

Environmental Audit Summary

Disclosure Statement
The purpose of the assessment was to identify the presence of on-site environmental concerns, as well as potential off-site contaminant sources that could adversely impact the subject property. This assessment was designed to serve as an overall reconnaissance of the project area, to eliminate areas from further evaluation that exhibit no evidence of environmental impairment.

The parcels comprising the Mitigation Area are in natural vegetation. Based upon review of historical aerial photographs, no prior land uses of the site were identified. The Site was evaluated via aerial reconnaissance and ground survey. There was no evidence of hazardous waste discharge, which could potentially result in extensive soil or groundwater contamination. No soil staining or other indicators of contamination were observed. There was no evidence of promiscuous solid waste dumping in the interior of

the parcels, or at the access points. There is no indication of any underground storage tanks or surface anomalies, which would suggest illicitly buried material. To summarize, there is no evidence of environmental impairment associated with the site and additional investigation is unwarranted.