

**APPENDIX C**  
**MITIGATION BANK STATE PERMIT SUMMARIES**  
**WITH SUCCESS CRITERIA AND CREDIT RELEASE SCHEDULES**

An Evaluation of the Effectiveness of Mitigation Banking in Florida:  
Ecological Success and Compliance with Permit Criteria

Kelly Chinnners Reiss<sup>1</sup>, Erica Hernandez<sup>2</sup>, Mark T. Brown<sup>1</sup>

<sup>1</sup>Howard T. Odum Center for Wetlands  
University of Florida  
Gainesville, Florida 32611-6350

<sup>2</sup>Department of Environmental Protection  
Kissimmee Prairie Preserve  
Okeechobee, Florida 34972

Final Report

Submitted to the  
Florida Department of Environmental Protection  
Under Contract #WM881

United States Environmental Protection Agency Region Four  
Under Contract #CD 96409404-0

May 2007

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NOTE: The following pages present notes from permit files and supporting document(s) summaries. It is not intended to take the place of the mitigation bank permit files. All bank managers and state regulators were asked to review the following documentation to verify its accuracy. Readers are directed to the appropriate state regulatory agency for complete permit and file information.

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## C-1 Barberville Conservation Area Mitigation Bank

### Sources:

Barberville Monitoring Report 2003 and 2005

Environmental Law Institute. "Banks and Fees: The Status of Off-Site Wetland Mitigation In the United States" Washington, DC: Environmental Law Institute. <[www2.eli.org/wmb](http://www2.eli.org/wmb)>. July 2002.

SJRWMD Technical Staff Report 1996

Personal communication with Mark Brown, Volusia County 12/12/06

Site visit on 7/18/05

Bank location: St. Johns River Drainage Basin, Northern Volusia County. sections ,18 & 19, T15S, R29E

Bank owner: Public, Volusia County

Bank size: 366 acres

Credit potential: 84.3

Credits released: 54.2

Credits used: 35.1

MBI: No

Credit data from October 2006

### Summary:

The mitigation bank consists of areas of planted pine that were clear cut for enhanced pine flatwoods. The bank has some isolated marsh and depressions and is adjacent to some continuous forested wetland hardwoods. Ecological enhancement has consisted of removing planted pines and planting long leaf pine and cypress and managing the bank with prescribed fire.

### Fire

1996 Technical Staff Report suggests lightning-season burns with a "frequency selected for maintenance of longleaf pine (*Pinus palustris*)/wiregrass (*Aristida beyrichiana*) habitat. Fire mentioned as a management strategy but no specifics given.

Prescribed fire of unknown timing completed in 1998 on 365 acres of the bank. No other prescribed fires are known to have taken place to date. The site was at one time too wet to burn and then at a later date too dry. Planted areas will not be burned until they have been well established. Approximately 10 years of age for the slash and 15 for the cypress. The established longleaf areas can be burned now and hopefully if weather conditions are favorable we will be able to burn in the spring of 2007. The other areas of the banks have been too wet during recent management.

### Hunting

Hunting is currently not permitted on Barberville mitigation bank but the right has been reserved to allow it in the future if approved by the Board. The purpose of any proposed hunting would be to maintain the presence of a limited club to discourage poaching and vandalism. (Paraphrased from Technical Report)

### Reference Community

No mention of fauna dependant on natural communities. No references for natural communities given. Existing longleaf pines (*Pinus palustris*) and dead snags were permanently marked for retention in 2001. Monitoring report states that Gopher tortoise burrows were marked for retention in 2001.

A density of 400 trees per acre is intended to encourage native groundcover. Conventional silviculture practices are 760 trees per acre. It is unknown if 400 trees per acre has a natural community reference.

Success Criteria

Planted species	Target survival for planted longleaf is 400 trees/acre (minimum). Based on monitoring reports it appears that the number of trees per acre is also the standard for the cypress and slash pine planted after the wide spread mortality of the longleaf pine. Minimum height 8 feet, after 25 years must have 60 ft <sup>2</sup> basal area
Exotic and nuisance species	Exotic cover ≤ 5% ; Nuisance cover ≤ 10%

Credit Release Schedule

Record conservation easement	35.1 credits; 42%
Harvest non-target trees	19.2 credits; 23%
Achievement of a minimum of 1 year successful establishment per the success conditions	4 credits; 5%
Achievement of a minimum of 2 years successful establishment per the success conditions	4 credits; 5%
Achievement of a minimum of 3 years successful establishment per the success conditions	4 credits; 5%
Achievement of a minimum of 4 years successful establishment per the success conditions	4 credits; 5%
Achievement of a minimum of 5 years successful establishment per the success conditions	4 credits; 5%
Achievement of final success criteria after a minimum of 5 years of successful establishment	10 credits; 12%

Existing land cover	Proposed Land cover	Mitigation Type	Acreage	Credit ratio ac. mitigation: mitigation credit	Mitigation Credits
Wetlands	Same	Wetland preservation	144.66	15:1	9.6
Altered Uplands (Pine plantation & pasture)	Longleaf pine/wiregrass	Upland preservation and enhancement	199.93	2.67:1	73.8
Improved pasture (no cattle)	Same	Upland preservation	12	14:1	0.9
Power easement	Same	n/a	12.23	n/a	n/a

Information taken from Technical Staff Report SJRWMD 1996.

Monitoring

November 2003 monitoring report

Longleaf planted at 605 trees/acre 6x12 foot spacing

Planted longleaf pines (*Pinus palustris*) have had poor survival due to standing water in the past spring and winter.

53 acres met the 400 trees/acre goal, 27% of proposed area. Where or what is reference for natural flat woods community requiring 400 trees/acre? Monitoring report suggests possibly planting slash pine (*Pinus elliottii*) in the unsuccessful areas instead. Another suggestion is made to bed the site to ensure pine tree survival.

July 2005 monitoring report

Site becomes wetter.

The Cypress was chosen for planting for the lower pasture due to previous efforts of establishing Long Leaf and the extreme wet conditions. A lot of this was caused by record rain fall in the area and the plugging of our ditch on the 1400 acre Barberville conservation area outside the bank perimeter, but is owned by the County. This was completed due to historical/previous conditions of the entire site, not just the Bank, and other permit requirements.

Groundcover of nuisance and exotic species includes grape vines (*Vitis spp.*), bahia grass (*Paspalum notatum*) and other pasture grasses.

2006 monitoring report

Slash pine has recovered and the target planting of survival has been satisfactorily addressed with 400 trees per acre.

Monitoring reports report on ground water monitoring and ground cover composition. Groundcover categories were divided into bare ground, forbs, graminoids, trees, bahia, palmetto, wire grass, pasture and grapevine. Monitoring well charts are given although sometimes water levels exceeded the height of the gages.

Harvesting of the pines was completed by loggers and the site prepping for planting required the root raking and KG blading. The site was then disked to level the ground as much as possible. During the site visit on 7/18/05 some areas where trees were planted had very uneven ground and was difficult to walk on.

## C-2 Bear Point Mitigation Bank

### Sources:

FDEP Consolidated Notice of Intent application for Permit/Water Quality Certification and Authorization to Use Sovereign Submerged Lands. June 24, 2003

FDEP Consolidated Environmental Resource Permit/Mitigation Bank Permit and Sovereign Submerged Lands Authorization permit number 0175246-001. November 17, 2003

Site visit on July 5, 2005

Location: St. Lucie County Mosquito Control District Impoundment 1, South of the Ft. Pierce Inlet, in Sections 12 and 13, Township 35 South, Range 40 East

Bank Ownership: Public, St Lucie County

Bank size: 317 acres

Credit potential: 49.8

Credits released: 25.0

Credits used: 3.7

MBI: Yes

Credit data from October 2006

### Background Summary

The site is a mosquito impoundment on the eastern side of the Indian River Lagoon. The natural community was historically a high marsh with a mangrove fringe on the lagoon.

The site was ditched in the 1920's and 30's and impounded with a levee in 1936. Impoundments are flooded (by pumping) in the summer for insect control, which has allowed red mangrove, *Rhizophora mangle*, to dominate the site. In mid-September, the culverts through the levee impoundment are opened to equalize water levels and allow exchange between the impoundment and the lagoon. Following a severe freeze that killed many mangroves in 1989, Brazilian Pepper (*Schinus terebinthifolius*) began to infest the area, particularly on the mosquito ditch castings. Exotic vegetation was at 20-30% cover. The mitigation bank will enhance the site with installing additional twenty-four 36" culverts to the existing four and to add additional pumps. This will allow some culverts to be open even during the flooded season, improving circulation and water quality. During most of the fall, winter and spring seasons (and one draw down in the summer), all structures on the culverts will be in the open position to improve water quality and allow for a more natural hydroperiod. In this condition, water levels within the impoundment will equilibrate with tidal levels in the Indian River, providing unimpeded exchanges of water and aquatic wildlife. The bank is managing exotics. The increase in water and faunal exchange on the bank has increased species diversity and improved water quality on the once mostly isolated wetland.

Fire is not an appropriate management tool for this community type.

Hunting is not permitted on this bank.

### Reference community

Reference conditions for the bank's wetlands are not anticipated because it is controlled for mosquitoes and will always have an artificial control.

Baseline conditions were documented prior to bank activities. Hydrology is modeled to determine appropriateness of pumping volumes in maintaining insect control while optimizing circulation and exchange across the levee and water quality within the impoundment. Hydrology, water quality, wildlife, exotic vegetation, native vegetation, and seagrass are quantitatively and qualitatively monitored for responses to the mitigation activities. Management decisions are made with consideration of minimizing impacts to seagrass beds. Although the intent of the mitigation plan is to establish a healthy estuarine mangrove habitat, including naturally occurring high marsh or mudflat areas no reference conditions are given, however natural hydrology for the site has been modeled. The permit does describe the basic conditions for hydrology and water quality but does not specify where these reference conditions came from, presumably the literature. By enhancing water quality and the hydro-period available habitat and wildlife utilization will be improved on the bank.

Credit for the bank is based on the uplift provided during the culvert open period and the anticipated enhancement over previous conditions. Credit was not designed to be awarded for attaining reference conditions.

The credits were based on the uplift provided for the open period. Reference data for the hydrological uplift was based on testing during the development and analysis of the hydrological model (pre- and post-permit construction). The permit took a nearly isolated wetland system and connected it to tide. Species diversity and water quality were improved as a result. Exotics are also managed/controlled as part of the permitted uplift, as well.

Final Success criteria

Activity or process	Criteria
Pumps and culverts	Shall be installed and operational in accordance with Specific Conditions 10 and 13, and all of the construction areas in the site are stabilized. All pumps and culverts have been fully functional and operated in accordance with the permit and that these water levels have been attained for at least 3 years.
Volumetric exchange	During the pumped impoundment condition, the volumetric exchange shall be 80% of the exchange that would occur under natural conditions. During the open-culvert condition, the volumetric exchange shall be 90% of the modeled natural condition.
Impoundment maintenance	The impoundment shall be maintained at +1.8 ft. NGVD ( $\pm$ 0.2 ft.) during the pumping season and have at least one draw-down as demonstrated by water level data. During the non-pumping season, concurrent measurements of water levels between the Lagoon and impoundment perimeter shall differ by no more than 0.2 ft. under typical conditions.
Exotic vegetation	Category I exotic vegetation $\leq$ 2% cover per acre, and shall consist of only seedlings sprouted since the previous treatment.
Native vegetation	Within exotic vegetation treatment areas, document re-vegetation consisting of $\geq$ 50% cover of native, wetland, estuarine species, and show that the vegetation is reproducing naturally
Wildlife	At least $\frac{3}{4}$ of the sampling events over the two years prior to the request for success determination shall demonstrate that the bank is being used by at least 15 fish species and 15 wetland-dependent, non-fish, vertebrate species, where the sampling effort (time, # samples, etc.) is equal in both the northern and southern halves of the mitigation bank, and demonstrate that each half contributes $\geq$ 33 % of the species.
Seagrass	No evidence of loss of seagrasses associated with the project, as determined by interpretation of infrared aerial photographic surveys and monitoring of sample quadrats to be established at a minimum of five end-of-culvert locations in the Indian River.
Water quality	All water quality sampling locations shall maintain a non-reducing environment, as indicated by monthly water quality samples within the following limits for the two years prior to the success determination: Temperature 35 ° C max, Salinity 40 ppt max, pH 6.0 min, Dissolved Oxygen 2.0 ppm min, Eh 0.1 mv min
Jurisdictional wetland	The mitigation bank site waterward of the mosquito impoundment levee shall be determined to be jurisdictional wetlands pursuant to Section 373.421, F.S.
Technical requirements	The permittee shall have submitted all required reports to the satisfaction of the Department.

\* The bank shall be deemed to have achieved success when all of the following criteria have been met. No intervention in the form of major levee or culvert repair, erosion repair, eradication of undesirable vegetation or replanting of desirable vegetation other than permit-specified exotic vegetation control and any repairs necessitated by storms or other events beyond the control of the permittee, shall be conducted within the year prior to the success evaluation.

Interim Success Criteria

Progressive environmental enhancement or trending toward success provides environmental lift for which credit may be released incrementally prior to achieving all the final success criteria delineated in Specific Condition 21. The criteria for trending toward success includes all of the following:

Activity or process	Criteria
Pump Stations (7 pumps) for Impoundment 1	Function normally, with only routine maintenance, for the previous complete summer pumping cycle; all culverts permitted herein have been installed and have functioned, with only routine maintenance, for the complete summer pumping cycle; and target water levels have been attained
Water exchange	Targets for the volume of water exchange between the impoundment and the Indian River have been met
Exotic Vegetation	The fall monitoring event and December monitoring report have been completed and indicate <5% cover
Water quality	Water quality values that meet the criteria listed in Specific Condition 21g above or demonstrate a tendency toward improvement in most parameters Temperature 35 ° C max, Salinity 40 ppt max, pH 6.0 min, Dissolved Oxygen 2.0 ppm min, Eh 0.1 mv min
Wildlife	Meets the criterion in Specific Condition 21e. or demonstrates a tendency toward increased wildlife utilization.

Credit release

Forty percent of the credits will become available upon the recording of the Conservation Easement, establishment of Financial Assurances, successful completion of construction activities, and completion of the initial exotic vegetation treatment. A total of fifty percent of the credits, to be released incrementally, are reserved for the partial attainment of success criteria over time. The remaining credits are reserved for the final demonstration of success.

Activity	Percent Release	Credits
Initial release- acquire QMS, Conservation easement, Financial Assurance	10%	5
Earthwork Completion	10%	5
Development of Hydro Model	5%	2.5
Initial Exotic Treatment	15%	7.5
Interim Success Attained	10% 1 <sup>st</sup> year 10% 2 <sup>nd</sup> year	5 5
Annual monitoring indicating trending to success*	15% 3 <sup>rd</sup> year 15% 4 <sup>th</sup> year	7.5 7.5
Full success attainment	Remaining, ~ 10%	4
Total	100%	49.8

\*A maximum of 25 credits is allowed for the interim success attainment based on annual trending toward success. If monitoring and site inspections do not indicate that the site is trending toward success or meeting the criteria in Specific Condition 22, no credits would be released for that year and the schedule would be delayed a year.



## C-3 Big Cypress Mitigation Bank

### Sources:

SFWMD Individual Mitigation Banking Staff Report. Big Cypress Mitigation Bank Phase IV. Construction/Operation Modification. Permit number 26-00002-M, application number 020805-13. January 9, 2003  
SFWMD Wetland Mitigation Bank Permit Staff Report. Mitigation Bank Construction Approval. Permit application number 990308-7. October 14, 1999.

Site visit on March 21, 2006

Location: Hendry County (just north of the Collier County line), S 26 & 35/T48S/R31E  
Bank Ownership: Private, Ruby Red Equities Limited Partnership

Bank size: 1280 acres  
Credit potential: 1001.78  
Credits released: 559.2  
Credits used: 246.23  
MBI: Yes  
Credit data from October 2006

### Background Summary

Phases I – V of the bank are adjacent to Big Cypress Preserve. Phases I-III and V(?) are identified as Priority 2 Panther Habitat, Phase IV is a strategic habitat conservation area. The historic natural community was cultivated for citrus production. Some hammocks and cypress areas were left intact. The mitigation plan included removal of the citrus, grading of ditches and swales (some swale areas were just blocked and not graded to allow for wood stork feeding), exotic removal in the native cypress heads and hammocks, and retention area grading and enhancement. Most of the site was targeted as herbaceous wetlands – predominately at prairie/high marsh elevations, with some deeper emergent marsh areas in the previous retention ponds. Within some portions of the prairie, connections between the historic hammocks were planted with pine. Areas surrounding existing cypress and retention areas were planted with cypress. Native herbaceous species were anticipated to recruit naturally; the bank managers maintain that historically the soils were not drastically rearranged for citrus production. Phase IV has approximately 137 acres bedded.

### Fire

In terms of long term maintenance and management for the bank, the permit states that the first prescribed burn will take place 8-10 years after planting. Burns will be implemented on 3 to 7 year intervals and will be coordinated with the Florida Division of Forestry. To protect important wildlife species, such as tree snails, care will be taken to protect established mixed forested areas during controlled burns.

A copy of the fire management plan has not been acquired by this study. It appears in the permit that fire will be applied as a management tool and not as a restorative tool for the groundcover. There are limitations to utilizing prescribed fire because of the threat it poses to young planted pines and other canopy trees.

### Hunting

Deer can be controlled on site if deemed necessary. The permit does not specifically mention hunting. There are feral hogs on site but they are not trapped because they are prey base for Florida panthers.

### Reference community

Historic photography and soil maps were evaluated to determine what the historic natural communities were on the bank. The bank community types are defined with FLUCCS codes. It is expected that with the restoration of the natural hydrology that the natural communities will respond easily. The permit design emphasizes the establishment of the canopy and mid-story with the ground cover recruiting naturally. Composition of the hydric pine flatwoods shall consist of a relative comparison to the Range Site Interpretations for Everglades Flatwoods as indicated in the Soil Conservation Service [USDA NRCS] technical Guide Section II-E-Descriptions for Native Grazing Lands dated April 1987.

Hydric pine flatwoods will have 240 canopy stems and 30 shrub stems per acre surviving. Mixed forested wetlands will have 300 canopy stems per acre surviving.

Success Criteria

Groundcover is expected to regenerate naturally. A contingency plan will be implemented if the herbaceous ground cover is not trending towards success. The plan will be implemented if any level of success criteria is not obtained within 12 months of the estimated completion dates for these levels. The three alternatives are a possible time extension (dependant upon site conditions), the bank may collect or purchase seeds from a compatible natural community and spread them over the site, and finally the bank may plant the area on four-foot with bare root or three to four square inch plugs.

Level 5 criteria must be maintained for a period of three consecutive years.

Restoration Parameter	Herbaceous communities	Forested communities
Hydrology	Level 1, 2, 3, 4 & 5: Hydrological regime adequate to maintain a viable wetland exhibiting natural hydroperiod. Appropriate hydrological conditions inferred from the correlation to control data and from the vitality of vegetation comprising the vegetative community.	Level 1, 2, 3, 4 & 5: Wetlands shall demonstrate a hydrological regime adequate to maintain a viable wetland system exhibiting a natural hydroperiod. Appropriate hydrological conditions will be inferred from the correlation to control data and from the vitality of the vegetation comprising each strata of the vegetative community.
Desired Vegetation	Level 1: $\geq 15\%$ cover native wetland spp. and $\geq 3$ wetland herbaceous spp. Level 2: $\geq 25\%$ cover native wetland spp. and $\geq 10$ wetland herb. spp. Level 3: $\geq 40\%$ cover native wetland spp. and $\geq 15$ wetland herb. spp. Level 4: $\geq 60\%$ cover native wetland spp. and $\geq 20$ wetland herb. spp. Level 5: $\geq 80\%$ cover native wetland spp. and $\geq 20$ wetland herb. spp. The herbaceous vegetation shall cover $\geq 60\%$ with plant species listed FAC or wetter and be rooted for at least 12 months and be reproducing naturally.	Level 1: $\geq 80\%$ survival of all planted trees and shrubs. $\geq 15\%$ coverage by desirable ground cover plants. Level 2: $\geq 80\%$ survival of all planted trees and shrubs. $\geq 25\%$ coverage by desirable ground cover plants, including a diversity of $\geq 10$ herbaceous spp for hydric pine flatwoods. Level 3: $\geq 80\%$ survival of all planted trees and shrubs. $\geq 40\%$ coverage by desirable ground cover plants, including a diversity of $\geq 20$ herbaceous spp for hydric pine flatwoods. Level 4: $\geq 80\%$ survival of all planted trees and shrubs. $\geq 60\%$ coverage by desirable ground cover plants. Evidence of natural regeneration of planted species. Level 5: $\geq 80\%$ survival of all planted trees and shrubs. $\geq 70\%$ coverage by desirable ground cover plants, with $\geq 75\%$ of spp. being listed FAC or wetter. For hydric pine flatwoods, a diversity of $\geq 30$ herbaceous spp. shall be present. For each 5 species over 30 a 1% credit bonus will be given for hydric pine flatwoods. Evidence of natural regeneration of planted species.
Exotic Vegetation	Level 1: $\leq 10\%$ cover nuisance, $\leq 5\%$ cover exotic Level 2: $\leq 8\%$ cover nuisance, $\leq 3\%$ cover exotic Level 3: $\leq 5\%$ cover nuisance, $\leq 1\%$ cover exotic Level 4: $\leq 4\%$ cover nuisance, $\leq 1\%$ cover exotic Level 5: $\leq 3\%$ cover nuisance, $\leq 0\%$ cover exotic, nuisance species shall show a declining trend.	Level 1: $\leq 10\%$ cover by nuisance, $\leq 5\%$ cover exotic Level 2: $\leq 8\%$ cover by nuisance, $\leq 3\%$ cover exotic Level 3: $\leq 5\%$ cover by nuisance, $\leq 1\%$ cover exotic Level 4: $\leq 4\%$ cover by nuisance, $\leq 1\%$ cover exotic Level 5: $\leq 3\%$ cover by nuisance, $\leq 0\%$ cover exotic, and nuisance species shall show a declining trend.
Wildlife	Level 1, 2 & 3: wildlife utilization evidence including sightings, tracks, scat or other data. Level 4: Same as level 1 and in addition evidence of at least one species from amphibian, reptile, avian and mammal wildlife guilds. Level 5: Same as level 1 and in addition evidence of a minimum of four amphibian/reptile species, a minimum of ten wetland dependant bird species and at least two species of mammals, including one predator.	Level 1, 2 & 3: wildlife utilization evidence including sightings, tracks, scat or other data. Level 4: Same as level 1 and in addition include a minimum of five wetland dependent bird species and four species of reptiles or amphibians, including at least one tree frog. Level 5: Same as level 1 and to include a minimum of four wetland dependant mammals including one predator

Credit Release for each phase

Activity	Percent Release
Obtain Conservation Easement, Permit, Bond, and Trust	10 %
Clear/Grade	20 %
Plant trees Time Zero	10%
Success Level 1	12 %
Success Level 2	12 %
Success Level 3	12 %
Success Level 4	12 %
Success Level 5	12 %

## **C-4 Bluefield Ranch Mitigation Bank**

### Sources:

South Florida Water Management District Individual Environmental Resource Permit Wetland Mitigation Bank Staff Report Draft, December 2001

Olson, C. Bluefield Ranch Mitigation Bank- Of Corridors, Linkages and Leveraged Ecological Restoration BRMB Target Animal Species Habitat Restoration Projects Attachment "A" Bluefield Ranch Mitigation Bank Phasing Plan. No date

Notes from personal communication and site visit with Chuck Olson, consultant March 14, 2006

Bank location: St. Lucie County, S20, 21, 28, 29, 33/T37S/R37E  
Martin County, S1/T38S/R37E  
Taylor Creek Drainage Basin and C-23  
St Lucie and Lake Okeechobee watersheds

Bank owner: private, MitBank USA, Inc.

Total acres: 2,695

Credit potential: 1240 state credits and 1522 federal credits (same ratio of herbaceous to forested)

Credits released: 558.14

Credits used: 135.62

MBI: Yes

Credit information from October 2006

### Bank summary:

Bluefield Ranch mitigation bank consists of two parcels of land that drain into two major watersheds, St. Lucie River and Lake Okeechobee the land was formerly used for cattle ranching and some sod production. The bank is adjacent to county conservation areas and near other conservation lands. The bank is enhancing a forested slough, depression marshes, flatwoods, wet prairies and uplands. Major restoration activities include eradicating exotics species, seeding and planting native species, ditch filling and restoring natural fire regimes. The bank is also a Gopher tortoise relocation site.

Fire is being applied by bank managers as a tool for restoration and enhancement as well as for management of the bank's natural communities. Although our study does not have a copy of the fire management plan, fire rotation for different communities as well as firing techniques and frequency were discussed with bank managers at the time of visit. Each burn unit has a different fire plan. Fire breaks are actively maintained. Evidence of recent active fire was visible at the time of site visit.

This study does not have a copy of this bank's monitoring reports as year one monitoring begins September 2006. Copies of some before, after, and during photos of restoration activities on the bank were attained. A Baseline Monitoring Report was completed and submitted in 2002, as well as identical voluntary annual Monitoring Studies/Reports in 2003, 2004, 2005, to track the results of on-going restoration work. The 2005 annual Monitoring Report was done at the conclusion of the physical restoration work. The 2006 Monitoring Report – presently being done – will coincide with the First Year Success Criteria Monitoring Credit Release Phase.

Post restoration natural communities are based on descriptions provided by the Florida Natural Areas Inventory.

Attracting specific appropriate listed fauna and creating more available habitat for existing listed fauna is mentioned in the regional watershed significance portion of the ERP staff report. The bank is also an approved FFWCC Gopher Tortoise Relocation Site.

The bank manager is applying adaptive management strategies and vigorous monitoring to restore the natural communities. Varying techniques have been applied and noted for their effectiveness. The bank managers are also

interested in attracting further scientific research on restoration. One of their goals is to help establish a model for public agencies to use in reclaiming pasture back to natural communities.

Restoration and enhancement activities proposed for the bank are focused on restoring the natural patterns of hydrology and reconstructing the various extirpated habitats for this area through ditch filling, eradication of established exotic/nuisance plant and animal species, cessation of cattle grazing, replanting and seeding of desirable wetland and upland species, and re-introduction of natural fire regimes (SFWMD ERP DRAFT staff report).

Taken from Attachment "A" of the Bluefield Ranch Mitigation Bank Phasing Plan

Task	Acreage covered	Number of credits
Xeric Oak Dome Conservation easement	70 acres	10.3
Van Swearingen Creek Conservation Easement	194 acres	15.01
Bluefield Ranch Conservation Easement	2,411 acres	98.72
Successful Completion of all Ditch Filling	2,695 acres	186.04
Initial Exotic Species Removal Event	2,695 acres	124.03
Successful Completion of Planting Activities	2,695 acres	124.04
Successful Completion of First Year Performance Criteria	NA	186.04
Successful Completion of Second Year Performance Criteria	NA	124.04
Successful Completion of Third Year Performance Criteria	NA	124.04
Successful Completion of Fourth Year Performance Criteria	NA	124.04
Successful Completion of Fifth Year Performance Criteria	NA	124.02
TOTAL	2,675 acres	1240.32

Achievement success for interim monitoring and maintenance period from Bluefield Ranch mitigation plan.

Interim Period	Mitigation Activity	Success Criteria
All monitoring periods	Exotic Nuisance Removal	≤ 10 % exotic/nuisance <sup>1</sup> vegetation cover <sup>2</sup>
	Hydrologic Restoration and Enhancement	Wetland hydrology <sup>3</sup> for one or more months per year
First Year	Freshwater Marsh & Wet Prairie Restoration/ Enhancement Areas	≥ 20% of total groundcover strata consists of wetland vegetation
	Hydric & Upland Pine Flatwoods Restoration	≥ 20% survival of planted trees Graminoid vegetation in groundcover strata ≥ 10% of total coverage ≥ 20% of groundcover strata consists of wetland vegetation (hydric pine flatwoods only)
Second Year	Freshwater Marsh & Wet Prairie Restoration/ Enhancement Areas	≥ 40% of groundcover strata consists of wetland vegetation
	Hydric & Upland Pine Flatwoods Restoration	≥ 40% survival of planted trees Graminoid vegetation in groundcover strata ≥ 20% of total coverage ≥ 40 % total cover of wetland vegetation in groundcover stratum (hydric pine flatwoods only)
Third Year	Freshwater Marsh & Wet Prairie Restoration/ Enhancement Areas	≥ 70% of groundcover strata consists of wetland vegetation
	Hydric & Upland Pine Flatwoods Restoration	≥ 60% survival of planted trees Graminoid vegetation in groundcover strata ≥ 30% of total coverage ≥ 70% of total groundcover strata consists of wetland vegetation (hydric pine flatwoods only)

Fourth Year	Freshwater Marsh & Wet Prairie Restoration/ Enhancement Areas	≥ 70% of total groundcover strata consists of wetland vegetation
	Hydric & Upland Pine Flatwoods Restoration	≥ 80% survival of planted trees Graminoid vegetation in groundcover strata ≥ 50% of total coverage ≥ 70% of total groundcover strata consists of wetland vegetation (hydric pine flatwoods only)
Fifth Year	Freshwater Marsh & Wet Prairie Restoration/Enhancement Areas	Attainment of wetland vegetation conditions (≥ 80% of total groundcover strata FACW and/or OBL wetland vegetation or OBL vegetation > upland vegetation)
	Hydric & Upland Pine Flatwoods Restoration	≥ 80% survival of planted trees Graminoid vegetation in groundcover strata ≥ 50% of total coverage ≥ 70% of total groundcover strata consists of wetland vegetation (hydric pine flatwoods only) ≥ 70 % of hydric pine flatwoods area jurisdictional wetland pursuant to Rule 62-340, F.A.C.

1. Exotic/nuisance vegetation shall include all Class I invasive exotic species defined by the Florida Exotic Pest Plant Council and all noxious weeds as listed in the Florida Department of Agriculture & Consumer Services' Noxious Weed List at the time of permitting. Exotic/nuisance plant species shall also include the following: bahiagrass (*Paspalum notatum*) and pangolagrass (*Digitaria decumbens*).
2. Maximum allowable coverage of exotic/nuisance vegetation cover applies to all areas within the mitigation bank at all times. In addition, the vegetation cover of exotic/nuisance plant species cover shall not exceed 15% in any one ½ acre area at any time.
3. Hydrologic success will be measured by the automatic WLF during a "typical" rainfall year to reach the levels predicted to keep the soil saturated at or above the surface for one or more months of the year.
4. Wetland vegetation is defined as those species with a Facultative Wet or Obligate wetland status, as defined by Chapter 62-340.450 F.A.C.
5. Groundcover vegetation shall consist of a diverse representation of targeted species for each community type such that no one species represents > 40% relative cover of the groundcover stratum and that ≥ 60% of the total cover of groundcover vegetation consists of the species listed in Exhibit 10 (the study does not have a copy of Exhibit 10)
6. Groundcover vegetation shall consist of a diverse representation of targeted species for each community type such that no one species represents > 40% relative cover of the groundcover stratum and that ≥ 60% of the total cover of groundcover vegetation consists of the species listed in Exhibit 10.
7. Percent survivorship of planted trees must have been maintained at or above 80% for the duration of each of the final two monitoring periods without intervention including, but not limited to, irrigation or replanting efforts.

#### Monitoring status

As of October 2006, the three conservation easements, successful completion of ditch filling, initial exotic species removal event and the successful completion of planting activities described in the credit release schedule have been successfully completed and applicable credit released. At the end of 2006 the bank expected to achieve the successful completion of first year performance criteria in the credit release schedule.

## **C-5 Boran Ranch, Phase I Mitigation Bank**

### Sources:

Florida Environmental, Inc. Boran Ranch Mitigation Bank Perpetual Management and Monitoring Plan March 1998 (Revised October, 1999)

Florida Environmental Inc. Baseline Monitoring Survey Results Utilizing Joint State/Federal Mitigation Bank Crediting Procedure for Florida Boran Ranch Mitigation Bank Exhibit 2 submitted to U.S. Army Corps of Engineers June 2, 1997 (Revised March 1998)

Florida Environmental, Inc. Baseline Monitoring Survey Report Boran Ranch Mitigation Bank 1996 01134 (IP-ML) presented to U.S. Army Corps of Engineers June 2, 1997

SWFWMD Environmental Resource Mitigation Bank Permit No. 49026121.000 March 2004

SWFWMD Environmental Resource Individual Mitigation Bank Construction: Phase I Permit No. 4914074.02 August 1997

Site visit July 14, 2005

Bank location: Peace River Drainage Basin, DeSoto county 29/38S/23E

Bank owner: Private

Bank is 236.76 acres in Phase I and 170.24 acres in Phase II

Credits awarded for phase I: 108.59

Credits released: 100.78

Credits used: 99.19

Credit data from October 2006.

Restoration on Phase II had not been initiated at time of site visit.

### Summary

The bank is divided up into a series of polygons; polygons can represent different types of wetlands or natural community types. For example a marsh and its associated ecotone and transitional upland can be treated as separated polygons. There are no interim success criteria for this bank. A polygon has either reached final success or has not so there for there are no partial releases of credit. An interior marsh may be one polygon and it has reached final success and had its credit release however the ecotone might still have some groundcover issues with exotics or pasture grasses and therefore has not yet reached success. Only the interior marsh would receive its credit release. If a polygon is unable to meet final success then the permit and success criteria may need to be modified and the associated credit modified.

### Reference conditions:

Wetland No. 4 is an onsite marsh that will serve as reference conditions for MR1, MR2, and MR3 marshes.

At least one representative plant species shall be established for each vegetative zone within Wetland No. 4 so it then can be compared to the vegetative zonation observed within the restored areas of MR1, MR2 and MR3.

Percent relative density of the representative plants species for a particular vegetative zone can be established for reference wetland and used as a benchmark for restoration areas mentioned.

The mitigation bank was surveyed for upland/wetland boundary delineations and natural communities have been characterized by FLUCCS types. Each wetland is briefly described and its dominate vegetation listed.

### Exotic and Nuisance species

Species will be removed by hand or mechanically whenever possible. Herbaceous dominated upland and shallow marsh areas may be mowed in early spring of each year, as appropriate. Blades would be adjusted to minimum height of 12" to serve as a control for shrub species invasion but encouraging herbaceous species.

Herbicide will not be used as primary means of nuisance or exotic removal.

Cattle will be excluded from the mitigation bank by fences.

## Fire

Prescribed fire will be used for enhancement and management on the bank. It is named as the primary tool for bank management. If conditions preclude the use of fire then mowing will be implemented. If mowing is used it will be conducted in fall to late winter to avoid disrupting ground or near-ground nesting birds and small mammals. Mowing will not be conducted in spring to avoid potential disruption to nesting by mottled ducks, sandhill cranes or other migratory birds.

After reviewing other management units fire plans, the fire frequency interval for the flatwoods will be two to four year intervals. The wet prairie and marsh community goals for burning are at least every two to four years. Centers of herbaceous marshes will be burned every five to ten years. Fire in adjacent upland communities will not be precluded from entering herbaceous wetlands.

Management blocks or burn zones will be assessed on an annual cycle to determine a need for burning. Controlled burns can be held in both the dormant and growing seasons. Wildfire will be suppressed. Fire lines or breaks are established along existing trails, roads and natural barriers. Hard lines will not be used within 50 feet of wetlands. Hard lines will not exceed 15 feet in width. Plow lines will be restored to natural elevation as soon as possible if they are necessary.

Hunting: restricted to non-commercial use by the Owner and his guests. Limit is four hunter-units per day. A hunter unit is defined as one hunter for each day of the defined hunting seasons.

Feral pigs will be removed by hunting and/or trapping.

## Vehicular Access

Limited to fire-breaks. New trails will not be established by site access and wet portions of the site will not be traversed so soil rutting can be limited.

Monitoring will include species on permanent transects and quadrants to determine percent cover, expansion of wetlands since restoration and size of canopy species. Hydrologic monitoring will include rainfall, water levels and oxidation. Photo points will be utilized for documentation as well as anecdotal fauna sightings. Monitoring will occur annually in late fall or early winter until success is determined.

Restoration will not be deemed successful until after a period of at least one year without a major corrective action such as intervention in the form of irrigation, removal of undesirable vegetation or replanting of desirable vegetation.

## Optimal number of mitigation credits for Phase I

Proposed Action	Total Acreage	Anticipated Credits
Marsh Restoration Areas 1 & 2	32.96	32.96 *
Wet Prairie Restoration Area 2	33.06	33.06 *
Marsh Enhancement Area 1	23.74	2.37
Marsh Enhancement Area 2	8.98	2.24 *
Upland Enhancement Area 2	23.45	7.81 *
Upland Preservation	80.44	26.81
Wetland Preservation	33.84	3.34
TOTAL	236.11	108.59

\* Credits awarded upon meeting success criteria



Marsh Restoration Success Criteria, areas MR1 and MR2

Marsh should resemble reference conditions.	Topography, water depth, substrate, hydroperiods and vegetative zonation in the creation areas resemble those preserved in Wetland No. 4
Vegetation cover	Coverage of desirable wetland plant species, 90 %
Exotic/Nuisance cover	Less than 1 % within marsh restoration areas
Upland vegetation	Shall not exceed 10 % of restoration area during the dry season (October – May)
Hydrologic monitoring	Staff gauge/well points and oxidation rods must demonstrate a minimum of seven consecutive days of inundation and/or twenty consecutive days of saturation at ground surface throughout the restoration areas.
Reference conditions	Within 60 days of permit issuance, a baseline vegetative assessment of wetland No. 4 shall be conducted that includes a plant list, percent cover and percent relative density of plant species occurring within the wetland.

Wet Prairie Restoration Success Criteria area PR2

Wet prairie should resemble reference conditions.	Topography, water depth, substrate, hydroperiods and vegetative zonation in the wet prairie restoration areas resemble those preserved in Wetland No. 7
Vegetation cover	Cover of desirable wetland plant species 85%
Exotic/Nuisance cover	Less than 1% within prairie restoration areas
Upland vegetation	Shall not exceed 15 % during the dry season (October – May)
Hydrologic monitoring	Staff gauge/well points and oxidation rods must demonstrate a minimum of seven consecutive days of inundation and/or twenty consecutive days of saturation at ground surface throughout the restoration areas.
Reference conditions	Within 60 days of permit issuance, a baseline vegetative assessment of wetland No. 7 shall be conducted that includes a plant list, percent cover and percent relative density of plant species occurring within the wetland.

Upland Enhancement Success Criteria, Areas UE “A” and UE “B”

Upland should resemble reference conditions.	Topography, water depth, substrate, hydroperiods and vegetative zonation in the upland enhancement areas resemble a pine flatwood community with a dominant slash pine canopy and a understory dominated by saw palmetto
Tree canopy	<i>Pinus elliotti</i> of 10% or greater and a sub-canopy of <i>Serenoa repens</i> of 20% or greater
Exotic/Nuisance cover	Shall be less than 1% within the upland enhancement area

Marsh Enhancement Success Criteria, Area ME2

Marsh should resemble reference conditions.	Topography, water depth, substrate, hydroperiods and vegetative zonation in the wet prairie restoration areas resemble those preserved in Wetland No. 4
Vegetation cover	Cover of desirable wetland plant species 85%
Exotic/Nuisance cover	Less than 1% within marsh enhancement areas
Upland vegetation	Shall not exceed 15 % during the dry season (October – May)
Reference conditions	Within 60 days of permit issuance, a baseline vegetative assessment of wetland No. 2 shall be conducted that includes a plant list, percent cover and percent relative density of plant species occurring within the wetland.

Marsh Enhancement Success Criteria, Area ME1

Construction	Shall achieve success criteria upon construction of control structures depicted on the construction plans received by the District on March 27, 1997. Amount of mitigation credit is the equivalent ratio awarded for wetland preservation.
Specific conditions for ME2, UE “A” and “B”, PR2, MR1, MR2 must be achieved	
Perpetual management and maintenance plan approved by FL Fish and Wildlife Commission	

This bank receives and initial credit release for conservation easement but only receives additional credit for meeting success criteria, there is not a partial release for incremental criteria.

## C-6 CGW Mitigation Bank

Sources: SJRWMD Individual Environmental Resource Permit Technical Staff Report for CGW Mitigation Bank. June 4, 1998.

Chown, Gregory, Wilcox (CGW) Wetland Mitigation Bank Application State of Florida/USACOE Joint Application Part 6 Attachment. CGW Carter Associates, Inc. Environmental Consulting Group, Inc. 4-061-0165A-ERP

September 1997.

Site visit August 23, 2005

Location: Section 22 Township 32S Range 39E

The project site is located along the western shore of the Indian River Lagoon, just north of the City of Vero Beach in Indian River County.

Bank Ownership: Privately owned but contains two areas that are designated Indian River County Mosquito Control District Impoundments 24 and 25.

Bank size: 150 acres

Credit potential: 63.10

Credits released: 50.50

Credits used: 46.20

MBI: Yes

Credit data from October 2006

### Background Summary

Historically the property was a contiguous herbaceous dominated salt marsh on the Indian River Lagoon. A storm deposited sand bar fronted the lagoon edge of the marsh and small creeks connected the marsh to the lagoon. Between 1956 and 1958, perimeter dikes and ditches were constructed in order to allow the site to be impounded for mosquito control. These impoundments were subject to this seasonal flooding through the mid 1970's, at which time the landowner requested that such management activities cease. The site has not been actively managed (except with pesticides) by the Mosquito Control District since. A breach formed in each of the eastern dikes and is still present. Levels and rates of exchange are restricted by the dikes as compared to historic conditions but there is a hydrologic exchange with the lagoon. Vegetative composition of the property includes high marsh, low marsh and a forested upland community. Mitigation activities include exotic vegetation eradication, grade reduction in Brazilian pepper-dominated areas, filling ditches, dike removal and maintaining the breaches with culverts and flap gates and risers. Mosquito control will still be implemented through the use of rotary ditches, designing ditches and marshes to enhance habitat, creation of permanent ponds and pesticide application.

### Fire

Historically fire may have crept into the edge of the high marsh community from adjacent uplands and other fire adapted communities but this mitigation bank has very little natural adjacent lands. Prescribed fire would not be appropriate for the restored and enhanced community types on the bank.

Hunting is not mentioned in the mitigation bank permit.

### Reference Community

The bank is not being restored to a natural community because of the manipulation of hydrology for mosquito control. However, aerial photos were consulted for historic community types. Mosquito control has monitored tides for the site. No evidence was seen for what the resources were for defining the restored communities, the site was graded and ditched and vegetation allowed to recruit naturally. Resources cited for the mitigation bank application were almost all in reference to mosquito control.

During monitoring events favorable hydrologic conditions were presumed to exist if typical salt marsh vegetation recruitment was observed and there were no ruts created by construction that would affect the wetland hydrological conditions.

### Success Criteria

Successful establishment during any monitoring event will be indicated by the complete removal of Brazilian pepper via maintenance activities; a progressive increase in coverage by desirable salt marsh vegetation typical of the undisturbed, on-site, wetland communities; evidence of jurisdictional wetland condition throughout all wetland restoration and enhancement areas; and the stabilization of all excavated and filled areas.

Restoration parameter	Measurement of success
Hydrology	Provide viable and sustainable ecological and hydrological functions: The targeted hydrologic regime is dependent upon straightforward activities such as drainage reduction via the filling of ditches, and improved tidal influence via dike removal, breach maintenance, and culvert installation, and thus has a high likelihood of success.
Desirable vegetation	A determination of final success for purposes of release of credits must include a greater than 90% coverage by desirable, targeted, salt marsh vegetation throughout the excavated and filled marsh restoration and enhancement areas
Exotic vegetation	After an initial complete removal of exotic and nuisance vegetative species; there must have been a minimum of four successive six-month monitoring events that indicate no more than 1% coverage by exotic or nuisance vegetation within any acre of the site prior to performing maintenance/removal.

### Credit Release

Activity	Credits
Record conservation easement, submit title commitment & financial documents	17.9
Complete the removal of Brazilian pepper	8
Grade former pepper-dominated areas to marsh grade	2
Ditch maintenance, excavate tidal creeks & ponds	2
Grade impoundment 25 interior dikes, fill ditches	10.5
Grade impoundment 25 perimeter dike, excavate breaches, install culverts	5
Grade impoundment 24 perimeter dike, excavate breaches, install culverts	5.1
1 year of monitoring which indicates successful establishment	1
2 year of monitoring which indicates successful establishment	1
3 year of monitoring which indicates successful establishment	1
4 year of monitoring which indicates successful establishment	1
Achievement of final success after 5 years of monitoring which indicates successful establishment	8.6

### Monitoring results October 2006

Monitoring is conducted through photo points and vegetative transects. Sampling to determine the percent cover of herbaceous/shrub species was conducted along 2-meter wide 200-foot long belt transects. Six belt transects were used in Impoundment 24 and 8 belt transects were used in Impoundment 25. Wildlife observation were made at each transect and during the entire period of monitoring.

Vegetative cover along many transects met or exceeded the permit criteria for total cover (90%). The percentage of cover by salt marsh species has increased. Most of the bare spots and all the ruts that were observed during annual monitoring are a result of ATV use in the impoundment.

Cover by Brazilian pepper does not exceed 1% in any one acre area within the hammock. Torpedo grass was observed.

All breaches and culverts are open and appear to be functional. Some portions of the runnels excavated by the rotary ditcher may be shallow.

Evidence of favorable hydrological conditions include recruitment by native salt marsh vegetation; the ground surface is saturated; water level is contiguous with the Indian River Lagoon; white mangrove seedlings floated in

from elsewhere scattered throughout the Brazilian pepper removal areas; all breaches and culverts appear functional and allow water to exchange between the lagoon and the subject wetlands.

Continued herbicide treatment in the hammocks for Brazilian pepper and sickle pod is recommended. In addition treatment for torpedo grass is recommended.

## C-7 Colbert-Cameron Mitigation Bank

### Sources:

SJRWMD Individual Environmental Resource Permit Technical Staff Report for Colbert/Cameron Mitigation Bank. October 28, 1996.

SJRWMD Colbert/Cameron Volusia County Parcel Mitigation Bank Proposal Banking Instrument July 1997 revised August 1997 revised November 1997

Site visit June 5, 2006

Location: Section 24-29 T 20S R 33E, southern Volusia County

Bank Ownership: Private

Bank size: 2,604 acres

Credit potential: 718.8

Credits released: 560.3

Credits used: 364.6

MBI: Yes

Credit data from October 2006

### Background Summary:

The bank property has been owned for several generations by the same family. The natural communities on the property include interspersed upland and wetland forests, marshes and prairies. Historically the land has been used as native rangeland and timberland. Bank activities have included removing cattle, plugging ditches, repairing culverts and connections across unimproved roads, re-grading overflow swales, treating exotics and managing with growing season fire. Credit potential is assigned essentially for preservation. The bank is also a gopher tortoise relocation site but this study did not acquire any documentation related to this.

### Fire

Historically the bank was burned in the winter season. The bank's management is intended to shift the current burn program to a more naturally-occurring, lightning-season program. The bank permit reserves the right for selective timber harvest in the uplands within 90 years however the bank manager said that this was unlikely to occur.

A burn management plan has been prepared Long Leaf Forest Services, Inc. but was not acquired by this study. The bank was prepped with fire breaks at the time of the site visit.

A wildfire burned across the property in 1998, and did a lot of damage to some of the forested wetlands. There were muck fires in some of the cypress areas the soils were burned down to sand, some trees were killed. Historic bird rookeries were destroyed. Extensive DOF plow lines have been reworked and smoothed back to grade. The site has also been impacted by 2004 hurricanes.

### Hunting

The bank owners has a restricted hunting plan which provides for a maximum number of twenty hunters at any one time and also restricts vehicle and dog use. The bank has feeders that attract wildlife but also feral hogs that are removed from the property.

### Reference Community

Most of the natural communities on the bank have been left intact and are being preserved with hydrologic enhancements and growing season fire. Dominant vegetation is briefly discussed in the descriptions of the bank's community types' baseline conditions.

Hydrologic connection equilibrium will demonstrated by establishing staff gauges upstream and downstream of the connection and monitoring for one year, demonstrating equivalent water levels above and below the hydrologic connectors. Existing baseline hydrologic conditions will be based on data collected from recording piezometers on other similar measuring devices in each of the enhancement areas monitored for a period of one to three years until

average rainfall data is recorded or sufficient data is collected to demonstrate average hydrologic conditions under average yearly rainfall.

Success Criteria

Hydroperiod enhancement	Hydroperiod enhancement will be considered successful when a comparison of existing baseline hydrologic conditions to restored hydrologic conditions demonstrate an increase in hydroperiod previously reduced through a series of drainage activities.
Exotic/nuisance vegetation	< 10 % cover

Credit Release Schedule

Activity	Credits
Record conservation easement over Phase I, submit trust fund documents for Phase I management, remove cattle, construct applicable swales, demonstrate hydrological connection equilibrium at the end of 1 year monitoring	268.7
Record conservation easement over Phase II, submit trust fund documents for Phase II management, remove cattle, construct all applicable swales and culverts, construct all applicable ditch blocks, demonstrate hydrologic connection equilibrium, demonstrate hydroperiod enhancement	291.6
Record conservation easement over Phase III, submit trust fund documents for Phase III management, remove cattle, construct applicable ditch blocks, demonstrate hydrologic enhancement	158.5

Forested and herbaceous wetland preservation/enhancement/management 84.3 credits

Forested upland preservation/enhancement/management 634.5 credits

Monitoring results

According to the banking instrument activities requiring monitoring are minimal. Periodic bank inspections shall be performed and remedial action taken as required by the District and the Corps. Credits will not be released if the bank is not in compliance.

## C-8 Corkscrew Regional Mitigation Bank

### Sources

Florida Department of Environmental Protection. Environmental Resource/Mitigation Bank Permit. Permit number 0198035-001 June 4, 2004

Florida Department of Environmental Protection Notice of Intent to Issue Environmental Resource/Mitigation Bank Permit. April 20, 2004

Erwin, Kevin. Corkscrew Regional Mitigation Bank Progress Report. July 28, 2005.

Erwin, Kevin. Corkscrew Regional Mitigation Bank Progress Report. January 1, 2006.

Florida Department of Environmental Protection Personal correspondence regarding permit modification. November 8, 2006.

Site visit March 21, 2006.

Location: Lee County, Section 20, Township 46 South, Range 27 East

Bank Ownership: private, Mariner Properties Development, Inc.

Bank size: 635 acres

Credit potential: 351.37

Credits released: 0.00

Credits used: 0.00

MBI: Yes

Credit data from October 2006

### Background Summary

“The project is designed to enhance water quality and wetland function by eliminating agricultural drainage and removing cattle, by grading and planting pasture areas to restore or create natural communities, by treating and managing exotic and nuisance vegetation on native lands, and by implementing a long-term management program, including prescribed fires. The project will enhance and restore a mosaic of freshwater marsh, wet prairie, hydric pine flatwoods, cypress and mixed wetland forests to be used as mitigation for future impacts to wetlands typical of these historic or disturbed systems within the service area. The work will be conducted in phases, and is allowed a total of 351.78 potential mitigation bank credits.” (Language taken directly from FDEP permit 0198035-001)

### Fire

“Prescribed fire shall be implemented to attain the proposed enhancement and as a long-term management tool to sustain the proposed communities and function. The site has been divided into six burn units, which shall be burned in accordance with the approved fire management plan. A conceptual fire prescription is included in the fire management plan; however, each prescribed burn activity will be developed and supervised by a certified burn specialist. A successful burn shall be implemented in Cells 3 and 4 within 2 years after the initial exotic vegetation treatment, and prior to release of credits associated with that burn. Additionally, pursuant to Specific Conditions 23 and 24, a successful prescribed fire shall be implemented in at least one phase of restored farm fields prior to a final success determination for the bank. Following each prescribed burn activity conducted at the bank, the permittee shall submit documentation, signed by the QMS and certified burn specialist, that a burn was conducted, and provide a summary of the unit(s) and acres treated with assessment of burn success, including photographs. For the purposes of this permit, a successful burn shall mean the fire shall carry over a minimum of 70% of each targeted community within the phase, the herbaceous groundcover is regenerating (“greening up”) in the burned area, and tree mortality attributed to the fire is less than 5% within the native areas and 15% within the planted pine areas. Prescribed fire is also included in the management plan for the restored pastures, but will not be implemented until the newly established vegetation can both support and withstand a burn. For long term management, prescribed fires will be implemented on a 2-4 year cycle.” (Language taken directly from FDEP permit 0198035-001)

### Hunting

No hunting is permitted on the bank except to remove feral hogs.



### Reference Community

The permit mentions reference wetlands on site in describing wildlife utilization requirements for interim success criteria. Groundcover seed for restoration areas in pasture are collected from donor wet prairie and hydric pine flatwoods in the region. No other direct references are made regarding reference communities in the permit.

### Final Success Criteria

The bank shall enhance, restore or create the following communities: hydric and upland pine flatwoods, marsh and wet prairie, cypress heads and mixed wetland hardwoods. The Bank shall be deemed successful when all of the following criteria have been met.

All communities in all four phases (8 cells) have achieved 3<sup>rd</sup> level success for vegetation, wildlife utilization, and hydrology parameters, as identified in Specific Condition 23.

Wetlands	The communities listed above shall be enhanced or restored in the approximate configuration and acreage shown in Figure 5, with at least 530 acres determined to be wetlands or other surface waters pursuant to Chapter 62-340, F.A.C., based on as-built drawings, QMS certification and Department concurrence
Exotic and nuisance species	The bank shall maintain less than 2% cover per acre with exotic vegetation (as listed in the FEPPC's 2003 Category 1) and less than 5% cover per acre with nuisance vegetation (including, but not limited to <i>Typha spp.</i> , <i>Ludwigia peruviana</i> , <i>Eupatorium capillifolium</i> , and <i>Ambrosia spp.</i> ). Additionally, <i>Myrica cerifera</i> , <i>Baccharis halimifolia</i> , and <i>Salix caroliniana</i> within the hydric pine flatwoods and herbaceous communities shall be less than 25% combined cover per acre.
Prescribed fire	At least one successful prescribed burn as described in Specific Condition 13 and the Prescribed Fire Plan has been implemented within the native lands and within at least one phase of the farm field restoration
Hydrology	As-built documentation has been submitted for structures and graded areas in accordance with Specific Condition 10.f., and hydrological targets have been met in accordance with Specific Condition 23.
Compliance	The structures in the bank have operated as designed, and the permittee has conducted all monitoring, inspection and maintenance activities required and submitted all required reports to the satisfaction of the Department.
UMAM assessment	Using the monitoring data and reports and in conjunction with the permittee, the Department shall inspect the site and conduct an UMAM analysis of each predominant community type in each phase. The overall UMAM score derived from this assessment shall indicate that each phase has attained or is clearly trending toward the "with bank" scores, as shown in Attachment C, that were used to determine the potential credits for the bank.

Interim Success Criteria for the bank is very specific and has parameters addressing requirements for native vegetation, exotic vegetation, hydrology and wildlife within each of the different natural community types. Vegetation must meet height requirements for canopy and shrubs, there are also coverage requirements and evidence of natural recruitment. Groundcover must meet requirements for percent cover of wetlands species, minimum number of species and evidence of natural reproduction. Wildlife utilization criteria require qualitative evidence of wetland dependant birds, mammals, reptiles, and amphibians and the numbers in which these species must be present. Hydrologic requirements are based on a minimum number of days that soil must be saturated or inundated and that there appears to be no hydrologic stress in the vegetation.

### Credit Release Schedule

No credits will be released in a phase until the conservation easement and physical work has been completed.

Enhancement (Cells 3 and 4)

Activity	Percent Release
Conservation Easement and Financial Assurance	15 %
Initial exotic vegetation treatment	35 %
Implementation of successful prescribed burn	10 %
Attain Success Level 1	15 %
Attain Success Level 2	15 %
Attain Success Level 3	5 %
Attain Success Level 3 in all eight cells	5 %

Restoration and Planting (Cells 1, 2, 5, 6, 7 and 8)

Activity	Percent Release
Conservation Easement and Financial Assurance	15 %
Grade and plant farm field and install berms and weirs, Time Zero report	35 %
Attain Success Level 1	15 %
Attain Success Level 2	15 %
Attain Success Level 3	15 %*
Attain Success Level 3 in all phases	5 %

\* 15% plus creation retainage credits for cells 2, 7, and 8

Monitoring Results

Initial work has began at the mitigation bank, a combination of disking, burning and herbicide treatments has allowed the bank to avoid most earthwork in the pastures which may in the long term will have less associated risk for restoration success. Some areas will still be graded but this will be very limited, the permit has been modified because bank managers decided it wouldn't be necessary for most of the restoration areas. Some initial areas have been seeded and planted. The bank has already successfully burned some of the preservation and enhancement areas and has been treating the entire bank for exotics.

## **C-9 East Central FL Regional Mitigation Bank**

### Sources:

SJRWMD Individual Environmental Resource Permit Technical Staff Report April 30, 1996 Application No. 4-095-0514A-ERP

SJRWMD Permit with Conditions. Permit number 4-095-0514-ERP. May 14, 1996.

Ecosystems Land Management Bank III Corporation. Fourth Semiannual Monitoring Report for the East Central Florida Regional Mitigation Bank Phase I – Hunter Property. February 25, 2003

Site visit on June 19, 2006

A Natural Balance, Environmental Company. Long Term Management Plan for East Central Florida Regional Mitigation Bank (South Dike Area) July 1997

Location: sections 2-11 and 35 T 22S R 33E; Northeast corner of Orange County

Bank ownership: private, Ecosystems Land Mitigation Bank III Corporation

Bank size: 952 acres

Credit potential: 286.3

Credits released: 286.3

Credits used: 176.1

MBI: Yes

Credit data from October 2006

### Background Summary:

The bank's natural communities are comprised mostly of forested floodplain and hydric swamp along the St. Johns River and some associated uplands. Historically the bank was logged in the 1940s and has had additional logging since then. The property was also grazed by cattle. Bank restoration activities involved filing an existing canal system impacting Christmas Creek. Other hydrologic activities include removing an existing berm and removing other canals. The permit also states that nuisance vegetation will be controlled and restorative and maintenance burns will be implemented in the upland portions of the bank. Credit is also awarded for preservation.

### Fire

Permit states that restorative and maintenance burns will be implemented to a portion of the uplands where hardwoods have encroached due to the reduction of a natural fire return interval. Management activities are intended to promote natural ecological conditions; fire will be a tool to promote this. The long term management plan states forested wetlands will be on a 5 to 8 year rotation burn cycle. It is unclear which forested areas this refers to. Marsh areas are on a 2 to 3 year rotational burn cycle. Berm areas will be burned "as needed." Burn rotations will be variable so that maintenance burns don't promote any one species. The managers recommend a random burn schedule.

### Hunting

The bank owner retains the right to utilize the bank for hunting. The hunt club averages approximately fifteen to twenty deer per year. The club's presence is hoped to discourage poaching. No hen turkeys are allowed to be taken. All game taken by guests will count toward the owner's annual limit. There is no hunting with dogs is allowed. Existing roads and jeep trails will continue to be used to access and control the property. There is a hog contract on the bank.

### Reference Community

Bank activities will enhance the existing natural communities. There is some vegetation planting associated with the immediate areas filled in on the canal for stabilization but otherwise the natural communities are intact but will be managed by removing nuisance vegetation and applying fire where appropriate. The permit does not discuss the communities in detail but assumes that if hydrology is restored these natural areas will benefit and remain intact. The permit states that uplands are "relatively-minor element of the project, but its relationship to the wetlands is important for habitat contribution and buffer functions"; forested uplands (21-23% of total habitat) enhancement and management were awarded the most potential credits. (see text under credit release table) Bahia was planted for stabilization.

Success Criteria

Desirable vegetation cover	
Hydrology	Target hydrologic regimes can be achieved and maintained, based upon reversal of existing alterations
Exotics cover	≤ 10% exotics

Credit Release Schedule

Activity	Credits
Record conservation easement, remove cattle, construct fence along west boundary	158.7
Complete canal filling and install plants for stabilization;	95.1
Meet success criteria for planted areas	5.0
Complete ditch filing from seven “isolated” wetlands	1.1
Perform restorative burn of designated upland area	26.4
Total Credits	286.3

Forested wetland restoration and enhancement 96.2 credits

Forested wetland preservation – 68.7 credits

Forested upland enhancement and management 121.4 credits

Monitoring (text taken from 4<sup>th</sup> semiannual monitoring report, data taken in Fall 2002)

The monitoring includes quantitative and qualitative assessment of the vegetative conditions at four fixed transects and 19 piezometer locations.

Quadrates were established in the restoration planting areas on the canal plugs to establish baseline and subsequent monitoring starting in 1999.

Exotic and desirable vegetation cover, vitality, indicator status and composition is monitored however the target success criteria is unknown. Photo points were utilized as a monitoring technique. Wildlife monitoring appeared incidental with direct observations and signs of wildlife.

Post-construction monitoring data for hydrology will be compared to preconstruction monitoring data to evaluate overall hydrologic response to the canal being filled.

Maintenance consists of spot treating exotics, but specifically concerned with *Typha spp.*

Exotics in the Christmas Creek are not being treated, reasons sited were its connection to the St John River that back flows into the creek and is a constant source for exotics, especially water hyacinth. Caesar weed (*Urena lobata*) was also seen in the forested uplands and wetlands.

## C-10 Everglades Mitigation Bank/Phase I & II (FPL)

### Sources:

Florida Power and Light Company Everglades Mitigation Bank Phase I 6<sup>th</sup> Annual Progress and Mitigation Success Report. 2005

Florida Power and Light Company Everglades Mitigation Bank Phase I 4<sup>th</sup> Annual Progress and Mitigation Success Report. March 3, 2002

Personal communications with Vicki Tauxe 2005, 2006.

The site visit on December 7, 2005

Location: W -80° 26' 36.14" N25° 21' 52.25", southern Dade County

Bank Ownership: public, Florida Power and Light

Bank size: Phase I 4,125 acres; Phase II 9,026 acres

Credit potential: Phase I 424.5; Phase II 1769.53

Credits released: Phase I 382.0; Phase II 184.60

Credits used: Phase I 290.69; Phase II 80.64

MBI: Phase I Yes; Phase II not yet

Credit data from October 2006

### Background Summary

FPL bank is just north of the Florida Keys and is separated from Everglades National Park to the West by US 1. In between Phases I and II is Card Sound Road. The bank was impacted by exotic infestation and hydrologic alterations. Restoration and enhancement activities included removing exotic plant species, removing a berm by placing the spoil within an existing canal, rebuilding four historic tree islands and re-vegetating flats and islands with appropriate native vegetation. Australian pine (*Casuarina equisetifolia*) is the most pervasive of exotics on the bank existing in monocultures in some areas.

Phase II had not initiated any restoration activities during site visit, however a wetland assessment was conducted because the area had experienced wildfire and the investigators were interested to see how the assessment would compare to Phase I.

### Fire

The bank has experienced wildlife with good results for the habitat but has had difficulty obtaining permits to burn because of restrictions associated with Card Sound and US 1 roads.

In 2000 after the bank requested a credit release for incremental improvements, FDEP released the credits but stated "Specific Condition 27 requires regular systematic controlled burning as part of the management of the site. The Department suggests that you conduct a controlled burn on at least a portion of the site prior to your next request for release of credits."

From an FDEP August 2002 letter to the manager in response to a credit release request, "In May 2001, a wildfire occurred that covered about 75% of the bank property (~90% of the sawgrass marsh). Department staff conducted site visits in June 2001 and February 2002 to assess the effects of the fire. Within a few weeks, the marsh grasses were rapidly sprouting and growing with very good coverage. The tree islands were a little slower in recovering, as several had been severely scorched. However, herbaceous vegetation and ferns on the islands were also recovering well. By February, very little mortality was observed, with shrubs and trees exhibiting re-sprouting and healthy growth and herbaceous coverage approaching pre-burn levels. The burn eliminated much of the accumulated duff thus enabling greater light penetration for periphyton growth and greater mobility for fish and small animals."

### Hunting

Hunting is not permitted on the bank except for purposes of exotic removal.

### Reference Community

The bank has freshwater and salt water natural communities. The vegetation planting on the bank are associated with disturbance associated with the berm removal and canal filling. Planting will occur in saline areas and tree islands. Restored areas must attain the anticipated WATER scores developed for with bank scenarios. Bank

managers have conducted baseline vegetative analysis on the bank and are familiar with the native species and micro habitat changes on the bank. Care has been taken to avoid impacting the sites with vehicles and to repair ruts or other types of ground disturbance if they do occur.

According to the permit, "All plant materials shall be obtained from a local nursery or from a collector licensed to collect from the south Dade County area. All plant materials shall originate from within same Soil Conservation Service (SCS) sub-hardiness zone as Phase I of the Bank site. All plant materials shall be grown in similar soil to which they are to be planted. All plant material shall be free of plants which are defined as nuisance or exotic species." Specifications for planting are also described in the permit however nothing is cited to describe where these parameters come from. "Herbaceous plant materials shall be planted not more than 3 ft on center or more densely and placed in a triangular pattern. Hardwood trees shall be planted at approximately 15 ft on center. Woody shrubs shall be planted between 5 ft -10 ft on center. The tree locations shall be staggered to result in a natural spatial distribution and to avoid establishing straight rows of trees. Shrubs shall be interspersed between the trees. Specific locations for tree and shrub planting shall be determined in the field by the QMS. During the implementation stage of the project, the permittee shall provide supplemental water as necessary, adequate to insure survival of the materials." (Special Condition 25)

It is evident from reviewing the monitoring reports that the bank managers understand the natural communities occurring on the bank very well; the communities are briefly discussed in addressing different responses to restoration and enhancement on the bank.

Success Criteria:

Special Condition 29, "Success of the bank shall be determined by the degree of ecological improvement over baseline conditions as measured by the functional analysis methodology, Wetland Assessment Technique for Environmental Reviews (W.A.T.E.R.) prepared by Cotleur Hearing Inc. dated October 1995. The permittee shall demonstrate the extent to which targeted (post improvement W.A.T.E.R. analysis) ecological improvements are achieved."

Desirable vegetation	≥ 80% aerial coverage of vegetation, including both installed vegetation and native naturally recruited species.
Nuisance and Exotic vegetation	≤ 1 % cover of the aerial extent
Physical Feature Removal	specified physical features have been removed in accordance with the permit drawings, the disturbed soils stabilized

Credit Release Schedule:

Action	Percent release
4/97 Record conservation easement; Retain QMS; proof of financial assurance	10% (31.5 freshwater, 0.5 saltwater)
2/98 Physical feature removal	10% (31.5 freshwater, 0.5 saltwater)
5/98 Exotic removal, site visit by department on 3/98 determined exotic cover does not exceed 1%	10% (31.5 freshwater, 0.5 saltwater)
2/00 Determined to have met criteria for exotic vegetation cover, exhibited positive trending toward success with regard to revegetation and showed functional improvement with W.A.T.E.R. assessment method.	28.4% (121 freshwater and 1 saltwater)
8/02 Determined to meet required criteria for exotic vegetation coverage (<1%), exhibited positive trending toward success with regard to revegetation, and showed functional improvement using the W.A.T.E.R. functional assessment method. Ecological improvement over the baseline conditions in accordance with Specific Conditions 14, 29 and 30.	38.5% (135.5 freshwater herbaceous, 23.7 freshwater forested and 4.8 saltwater)

### Monitoring

The bank has been successful with removing Australian pine from Phase I but routine maintenance and management will be necessary to ensure exotics do not reinvade from neighboring seed sources. The Australian pine seed bank on the bank is considered depleted.

The site visit on December 7, 2005 was just prior to final success being released for Phase I, the final success criteria has since been deemed attained by the department.

## C-11 Florida Mitigation Bank

### Sources:

Florida Department of Environmental Protection. Notice of Intent to Issue Environmental Resource Permit Application for Permit/Water Quality Certification for Florida Mitigation Bank

Florida Mitigation Bank Year 2003 Monitoring Report FDEP permit number 492924779. December 2003.

Florida Mitigation Bank Environmental Resource Permit 492924779 May 28, 1997

Site Visit October 11, 2005

Location: Sections 15, 16, and 21, 25 South, 28 East. Osceola County

Bank Ownership: private

Bank size: 1,582

Credit potential: 847.5

Credits released: 847.5

Credits used: 729.8

MBI: Yes

Credit data from October 2006

### Background Summary:

Natural communities on the bank are primarily mixed hardwood swamp and sawgrass marsh; there are also small isolated bayheads, isolated freshwater marshes, isolated wet prairie, dry prairie and an upland hardwood hammock. The historic primary impacts to this landscape were severe hydrologic alterations and the use of cattle.

Bank does not control its water source the C-1 canal, bank managers do have a working relationship with Disney who does control the water levels in the canal. Bank activities consist of hydrologic enhancements through control structures for water entering and leaving the bank, cattle removal, and exotic and nuisance species removal.

### Fire

The permit states that natural fire patterns will be promoted as part of management activities. The 2003 monitoring plan states that the fire management program has been implemented and resulted in the minimization of woody species in certain habitat areas.

### Hunting

Hunting is not permitted on the property. During site visit there was evidence of hunting and human disturbance. It was unclear if a couple of deer stands seen were on the bank or if they were on an adjacent property which is part of the same hardwood wetland. This area was on the edge of the bank's North property line.

### Reference Community

The permit lists the natural communities on the bank and lists the dominant vegetative species associated with those communities. Primarily the bank hopes that enhancing hydrology will kill transitional and upland species and promote the native wetland species so that they are naturally recruiting and becoming healthier. Wildlife is observed anecdotally. Water quality is sampled at the point where it discharges from the bank. The permit states that it does not expect exotic species to be an issue on this bank but pressure from adjacent properties by highly invasive species was seen during the site visit in October 2005. Hydrologic enhancements will be manipulated to mimic "normal" seasonal conditions.



Success Criteria:

Jurisdictional wetland cover	≥ 1484.5 acres of Bank are determined by the Department to be jurisdictional pursuant to Section 373.421, F. S.
Nuisance and Exotic vegetation	≤ 1% of total cover
Desirable vegetation OBL, FACW and FAC	Percentage remains the same or is increasing, except in open water areas
Desirable vegetation canopy	OBL and FACW ≥ 90% of canopy; UPL and FAC < 10% of seedlings and saplings
Desirable vegetation groundcover	OBL and FACW ≥ 90% of groundcover; UPL and FAC < 10% of groundcover
Desirable wetland vegetation	Reproducing naturally, via seedling establishment, growth and survival or normal, healthy vegetative spread in ways that would be normal for each wetland species
Sawgrass marsh wood species	Woody species < 25% cover
Hydrology	Enhancement areas inundated through wet season. Water table within 10” of ground surface in dry season. Wetland hydrology variable in M-WRAP shall attain a value of 3
Wildlife	Wildlife Utilization variable in the M-WRAP shall attain a value of 3; Documented attraction of threatened and endangered species to the site, as defined in the Mitigation Bank Sitting Index; Documented increase in abundance of aquatic invertebrates
Water Quality	Florida Water Quality Index Values 15% above baseline

Credit Release Schedule:

Mitigation	Credits
Sawgrass marsh enhancement	184.76
Freshwater marsh preservation	2.85
Mixed hardwood forest and surrounding upland preservation	659.54
Bayhead and surrounding upland preservation	0.44

Activity	Percent Credit Release
Record conservation easement and construction and perpetual maintenance mechanisms.	15 %
Complete construction of berm and weir	20%
Complete first year of monitoring and demonstrate that bank is trending toward success as defined in Specific Condition 25 (success criteria)	15%
Complete second year of monitoring and demonstrate that bank is trending toward success as defined in Specific Condition 25 (success criteria)	15%
Complete third year of monitoring and demonstrate that bank is trending toward success as defined in Specific Condition 25 (success criteria)	10%
Complete fourth year of monitoring and demonstrate that bank is trending toward success as defined in Specific Condition 25 (success criteria)	10%
Demonstrate that bank is successful as defined in Specific Condition 25 (success criteria)	15%

“Trending to success means that, although full success has not yet been affirmed, the mitigation site has the required acreage of jurisdictional wetlands, cover by desirable species has significant increases annually, cover by nuisance species is within/less than the permitted range/percentage of cover, soils are not becoming less organic or are not subsiding, hydrology is sufficient to support the target wetland type, all of which indicate that success will be achieved.

Credit release shall be supported by documentation of degree of ecological improvement over baseline, as measured by the monitoring requirements in Specific Conditions 35-39, where applicable. When the permittee determines that enough information exists to demonstrate that one of the required activities is complete and successful as specified in Specific Condition 26 of this permit, the permittee shall submit this information to the Department as a minor

modification request, including the minor modification fee required by Rule 62-4.050 F.A.C. The Department shall review this information and conduct a compliance check to confirm.” (FMB permit p 9)

#### Monitoring

Permit has specific guidelines for monitoring and monitoring reports.

Monitoring and maintenance includes inspection and maintenance of water control structures and berms. Monitoring water quality during construction, quarterly removal of nuisance species, and patrolling for trespassing and poaching. Photo documentation of the bank is also required.

Vegetation monitoring shall occur at least once before commencement of construction, then annually, at a minimum, during the gradual hydrologic improvements to the site, and annually after the final water level has been set. Percent cover for herbaceous and subcanopy vegetation will be measured at one-meter square quadrats. Measurements of canopy vegetation, including diameter at breast height (dbh) and canopy cover shall be measured using the point-quarter sampling method at each point. The site will be qualitatively monitored through a description of the overall condition of each wetland during sampling described in part b above and through annual aerial photographs (Scale 1" = 400') to determine landscape level changes in vegetative communities. Wildlife monitoring: Observations of wildlife utilization, nesting, and foraging shall be made along all transects during each sampling event. Aquatic invertebrates shall be sampled at a minimum of two locations (chosen at random) along each transect. Sampling technique shall be the same technique used for initial determination of habitat value at the site.

The 2003 monitoring report states that vegetation and hydrology exceeds success criteria.

## C-12 Florida Wetlands Bank

### Sources:

Florida Wetlandsbank. Pembroke Pines Mitigation Bank Long Term Management Plan. January 2000.  
SFWMD Wetland Mitigation Bank Permit Staff Report Draft. February 9, 1995. permit application 941013-8

Site visits conducted on December 1, 2005 and June 27, 2005

Location: Broward County S11/T51S/R39E

Bank Ownership: City of Pembroke Pines and Private owner

Bank size: 420 acres

Credit potential: 370.00

Credits released: 367.37

Credits used: 367.37

MBI: Yes

Credit data from October 2006

### Background Summary:

Florida Wetlands Bank was one of the earliest permitted mitigation banks in Florida. It was an old field infested with melaleuca. The sight was impacted by hydrologic alterations in the landscape. Restoration involved removing the exotics and scrapping the site down to the limestone and controlling the hydrology which enters and leaves the site via a canal with control structures. Berms were planted with native upland vegetation; the wetlands were also either planted and/or allowed to naturally recruit with native vegetation. The bank is now a city park with passive recreation. Wetland natural communities include, cypress flats, wet prairie, sawgrass marsh, and open water, there are also some native hardwood tree islands and other native upland communities. The site has three known protected archaeological sites. The City is responsible for the long term maintenance of the bank, these responsibilities include exotic plant control, maintaining the hydrologic regime, restricting access, and fire management.

### Fire

The role of fire as future maintenance for the bank is briefly mentioned in the Permit Staff Report under long-term management, "The management plan consists primarily of exotic plant control, maintenance of the hydrologic regime, including structures, berms and waterways, in addition to access restrictions, and fire management."

However, fire is not mentioned in the long-term management report and no further detail was acquired on this subject.

### Hunting

No recreational hunting or fishing permitted. Hunting or trapping for the purposes of controlling nuisance or exotic wildlife will be determined by USFWS or FWCC.

### Reference Community:

This study did not acquire documentation that refers to reference communities. The permit staff report only refers to the community types that will be restored but with no specifics. The site was graded to encourage certain community types that are present in the greater Everglades ecosystem. There were approximately 1,317,433 plants installed on the bank, some areas had to be planted several times because of poor success in establishing. At least 129 native species were documented as recruiting naturally on the bank. Water levels are manipulated and controlled to keep the site hydrated. Wildlife was anecdotally observed and recorded in addition; several species were documented as breeding on the bank.

Success Criteria:

Hydrology	Water levels demonstrate an average water elevation of 4.0' NGVD or within an acceptable deviation of 0.25'
Exotic cover	No more than 5% of both planted and unplanted areas will support exotic or undesirable plant species.
Desirable vegetation, planted	80% survival of each planted species after 2 years with persistence of another 3 years after the date of time zero for each phase
Desirable vegetation recruited	80% cover for volunteer vegetation areas without planting after 2 years persistence for another 3 years after the date of time zero for each phase

Information from Bank Permit Staff Report Monitoring Plan Exhibit29 and Special Conditions.

Credit Release Schedule

Activity	Percent release
Record conservation easement	15%
Complete Melaleuca removal	25%
Site grading completed and verified by SFWMD Staff	40%
Planting and mulching completed	10%
Successful monitoring through first year	5%
Successful monitoring through second year	5%

Monitoring Results:

The last phase of the mitigation bank has 2.63 credits left for release and will be made available after monitoring for this phase is complete. The bank has been concluded to be functionally successful by the district and bank managers. The City of Pembroke Pines has a very specific document prepared by Wetlandsbank that describes how to maintain the bank with specific attention given to exotics. At the time of site visit it was observed that the City may not be as effective at maintaining low exotic cover as the previous bank managers.

## C-13 Garcon Peninsula Mitigation Bank

### Sources:

FDEP Garcon Peninsula Mitigation Bank Permit 017-880-001 April 16, 2001

FDEP Garcon Peninsula Mitigation Bank Notice of Intent to Issue Environmental Resource Permit

Joe A Edmisten, Inc. & Associates Garcon Peninsula Mitigation Bank Annual Monitoring Report 2003

Site visit September 6, 2006

Location: Sections 26, 27, and 35, Township 1 North, Range 28 West, Santa Rosa County

Bank Ownership: private

Bank size: 337 acres

Credit potential: 172.39

Credits released: 77.4

Credits used: 7.27

MBI: yes

Credit data from October 2006

### Background Summary

Historically a wet prairie habitat, the natural community was degraded by extensive ditching and management for cattle. Mitigation plans include removing cattle, blocking or filling ditches, stabilizing the bayou, removing roads, removing exotic vegetation and woody cover, and maintaining with a natural fire regime. There are also flatwoods on the property that were planted for timber that are being enhanced with fire and thinning the canopy. Two existing large ponds have been graded into shallow depressions to support wetland species instead of open water. The bank is hydrologically connected to Yellow River Marsh Aquatic Preserve and Blackwater Bay (an Outstanding Florida Water). The bank has three listed plant species. Initially mitigation activities were off to a good start with woody removal, exotic species removal and restoring hydrology. The bank has fallen behind with burning and exotic removal in recent years mainly due to weather conditions. The department is working with the bank to get it back on track so it can meet its obligations.

### Fire

Text taken from Notice of Intent, "In addition to controlling exotic vegetation, fire management is proposed at a frequency (every 2-4 years) and timing (growing season) to promote the viability and fertility of desirable native vegetation and to control the growth of woody vegetation within the wet prairie habitat. The fire management will require a minimum of disturbance of habitat because the entire site will be handled as a single burn unit with a single perimeter fire break consisting of a strip of bare ground."

### Hunting

No hunting on the bank except for nuisance species management. There was no feral hog damage documented during the site visit.

### Reference Community

Monitoring protocols and performance criteria are proposed based on recommendations by Andre F. Clewell. Dr. Clewell has performed similar work as part of a monitoring program associated with the restoration of wet-prairie habitat within the Mississippi Sandhill Crane National Wildlife Refuge. Upon visiting the Garcon Peninsula Mitigation Bank site, Dr. Clewell noted similarities between the bank and refuge sites, and suggested that his protocols (and baseline data) would be appropriately applied to the proposed restoration. Wet prairie vegetation monitoring will consist of two parameters: community structure and species abundance. Extensive observations of the wet prairie ecosystem [Clewell 1981, Norquest 1984, Erickson and Raymond 1988, Clewell and Raymond 1995] were used in the development of the protocols detailed in Clewell 1997, which, in turn, are adapted for use here. Wildlife is not mentioned in detail and observation is anecdotal.

Final Success Criteria

Exotic and nuisance species cover	<p><i>S. sebiferum</i> ≤ 1% in any polygon (except for seedlings that may have sprouted in the 12 months previous to the success determination when artificial manipulation is prohibited. Bahiagrass cover in any polygon ≤10%, or, if &gt;10%, shall display a trend over two or more years that strongly indicates that its cover will decrease below 10% under the permitted management plan.</p> <p>The collective cover of all other exotic species (excepting <i>S. sebiferum</i> and bahiagrass) shall not be &gt;1% in any polygon.</p> <p>In the cypress/hardwood swamp area invasive nuisance species, including but not limited to <i>Typha spp.</i>, shall not exceed 5% cover.</p>
Desirable species cover	<p>In the cypress/hardwood swamp and bayou areas, non-nuisance, native wetland groundcover species cover is ≥75% (except in open water area) and is reproducing naturally. Bare ground is ≤ 25%. Vegetation trends over at least three years show increasing cover.</p> <p>Each sampling quadrat except those located in the <i>S. sebiferum</i> eradication area and earthmoving areas (e.g. roads) shall contain ≥75 desirable species. Quadrats in the <i>S. sebiferum</i> and graded areas shall contain ≥50 desirable species. Desirable species are non-nuisance, native, fire adapted, wet prairie species. Some species not listed may be determined to be desirable for the purpose of this condition by providing a citation and/or third party professional botanist/ecologist determination, and, upon concurrence by the Department, will thereafter be added to the list.</p> <p>The average cover of graminoids shall be ≥75%, with no one quadrat having &lt; 50% cover, and the collective cover of pioneer <i>Andropogon spp.</i> (except <i>A. liebmanni</i>) shall not exceed 25% of the graminoids found in each polygon. Additionally, each quadrat shall either attain ≥ 85% coverage with graminoid species or shall exhibit a clear trend over time of increasing graminoid coverage.</p>
Woody species cover	<p>In wet prairie and flatwoods, gallberry, yaupon, wax myrtle, titi, and other woody shrubs shall be no taller than the coppice sprouts that could have arisen from root crowns following the most recent fire.</p>
Planted species	<p>&lt; 10% mortality of planted vegetation in cypress/hardwood swamp and bayou areas. In cypress/hardwood areas planted trees have doubled in height and have 30% canopy coverage at the end of the growing season.</p>
Wetlands	<p>The two depression restoration sites shall be a total of 7 - 8 acres in size, with ≤ 0.5 acres of non-vegetated, open water area in the middle.</p> <p>A minimum of 325 acres of the site shall be determined to be jurisdictional wetlands pursuant to Section 373.421, F.S. and with consideration of monitored hydrologic data.</p> <p>The four wetland community polygons shall each be within ten percent of their target acreages as listed in the WRAP acreage table.</p>
Compliance	<p>All of the graded areas in the bank are stabilized. The ditch block and ditch fill areas are effectively curtailing any channelized drainage from the site and have required no repairs beyond minor maintenance specified in Specific Condition 27e for at least three years.</p> <p>The permittee has submitted all required reports to the satisfaction of the Department.</p>

Utilizing the monitoring data and reports and in conjunction with the permittee and the Mitigation Bank Review Team, the Department shall inspect the site and conduct a WRAP analysis to determine that, under the permitted maintenance requirements, all polygons have reached, or are expected to reach and maintain, the criteria required to attain the “with bank” scores, as shown in Attachment D, that were used to determine the potential credits for the bank.

The bank shall be deemed successful when all of the following criteria have been met for a period of at least one full year without intervention in the form of artificial manipulation of water levels, prescribed burns, eradication of undesirable vegetation or replanting of desirable vegetation.

Interim Success Criteria

Exotic and nuisance species cover	<i>S. sebiferum</i> ≤ 1% in any polygon (except for sprouts and seedlings that may have grown up since previous fire or treatment) Bahia grass 10% or greater decrease in average cover from previous assessment year. All other exotic species cover ≤ 1% average in any polygon.
Desirable species cover	In the cypress/hardwood swamp, native desirable groundcover is demonstratively increasing over previous years; bare ground area is decreasing over previous years. In wet prairie and wet flatwoods areas, each shall demonstrate an increasing trend in the number of desirable species over previous sampling years that indicate that the success criteria will be met under permitted management activities within the expected timeframes. In wet prairie and wet flatwoods areas, The average cover of native graminoids shall demonstrate an increasing trend and the collective cover of pioneer <i>Andropogon spp.</i> (except <i>A. liebmanni</i> ) shall demonstrate a decreasing trend over previous years that indicates that the success criteria will be met under permitted management activities within the expected timeframes.
Woody species cover	In wet prairie and flatwoods, gallberry, yaupon, wax myrtle, titi, and other woody shrubs shall be no taller than the coppice sprouts that could have arisen from root crowns following the most recent fire.
Planted species	< 10% mortality of planted vegetation in cypress/hardwood swamp and bayou areas. In the cypress/hardwood swamp and bayou areas, planted trees must show an increase in height.
Wetlands	The two depression restoration sites in the cypress/hardwood swamp areas shall be a total of 7-8 acres in size.
Compliance	All of the graded areas in the bank are stabilized. The ditch block and/or ditch fill areas are effectively curtailing any channelized drainage from the site, and no major repairs have been required during the last 6 months. The permittee has submitted all required reports to the satisfaction of the Department.

Credit Release Schedule

Activity	Percent Release
Conservation easement and financial assurance	15%
Earthwork Completion	15%
Initial Exotic Treatment and Initial Prescribed Fire	10%
Interim Success Attainment years 1-5 (more or less)	Up to 40%*
Second Prescribed Burn	5%
Full Success Attainment	15%

The credit release timetable is for estimation purposes only. The actual credit release will be determined by when the specified activity is completed, which may be before or after the estimated date.

\*It is anticipated that success will be met in approximately four years, so for each year that the bank is determined to be trending toward success, it would receive one fourth of the interim credits (17.25 credits).

Monitoring Results:

Garcon initially was progressing well with hydrologic enhancements, exotic removal and some early prescribed fire. Several weather events and other factors have limited prescribed fire on the bank; it is currently more woody and has more exotics than it did after initial credit releases relating directly to management actions. Management of the bank has not always been timed appropriately but the bank continues to treat exotics. Primarily the bank needs more attention towards vegetative response to management and needs growing season fire. There are pockets on the bank where natural recruitment has been very positive with nice species composition but other areas still resemble overgrown pasture.

The Department of Environmental Protection has done several site visits since the bank began to have problems and stopped the release and sale of any additional credits. The Department is working closely with the bank managers to get the bank back on track.

## **C-14 Graham Swamp Mitigation Bank**

### Sources

Florida Department of Environmental Protection Graham Swamp Wetland Resource Permit 182313539

Site Visit September 16, 2005

Location: Flagler County, Section 16, Township 11S, 31E

Bank Ownership: private, ITT Community Development Corporation

Bank size: 66 acres

Credit potential: 32.5

Credits released: 29.25

Credits used: 5.5

MBI: Yes

Credit data from October 2006

### Background Summary

Graham Swamp is a hardwood swamp completely impounded on four sides. The swamp was impacted by losing connectivity and has suffered from severe soil subsidence. Connectivity to channeled water has been opened up with weirs and the bank also has a spill over when water levels are too high on the bank so it can connect back to the canals. Severe subsidence has allowed the bank to hold more water than it might have historically. Historically this swamp was head waters for Bulow Creek which flowed into Tomoka Bay; channelization in the landscape has reversed the flow of water and now the canals flow into an artificial inter-coastal waterway and makes its way into the Atlantic Ocean. The bank has also done some exotic removal work but primarily the bank is preservation with hydrologic enhancements.

### Fire

Prescribed fire would probably benefit properties to the West of the bank that is grown up from old field and was probably historically a more open flatwoods or prairie however Graham Swamp bank is not a community type that would benefit from prescribed fire. Historically fire would have been important in the landscape around the swamp but currently the bank is surrounded by an impoundment with mostly residential development around it and fire is no longer practical in these areas.

### Hunting

Hunting occurs on adjacent upland properties but is not allowed within the mitigation bank.

### Reference Community

The Graham swamp is mostly a preservation mitigation activity, the bank has had some difficulty in attaining appropriate groundcover for this community type. The canopy is fairly open due to historic mortality from an altered hydrology and therefore the ground cover receives more light and has a different groundcover composition than would be expected. Reference conditions for target hydrology and groundcover composition are unknown and are not mentioned in the bank's permit. This study has limited documentation on this bank and it is unknown if this information is documented elsewhere.



Success Criteria

Wetlands	Not less than 65.9 acres of the bank are determined by the Department to be jurisdictional pursuant to Section 373.421, F. S.
Nuisance and Exotic Vegetation	≤ 5% of total cover; If these species is > 5% of the total cover, their density and aerial coverage must be declining over several years, which would be considered a positive indication that the mitigation work will be successful
Desirable Vegetation	Wetland species are reproducing naturally, via seedling establishment, growth and survival or normal, healthy vegetative spread in ways that would be normal for each wetland species The percent cover of the Bank area of wetland species remains the same or is increasing, except in open water areas
Hydrology	area is either inundated for at least seven consecutive days or saturated for at least twenty consecutive days during a 12 month period which represents long-term hydrologic conditions

Credit Release Schedule

Activity	Percent Release
Record conservation easement (based on already completed construction and one year of monitoring)	60%
First annual monitoring report after permit issuance demonstrating the project is trending toward success as defined in Specific Condition 16 of permit	25%
Project is determined to be successful as defined in Specific Condition 16 of permit	15%

Monitoring Results

There had been some problems with the bank managers giving adequate monitoring to control structures. On one Department site visit, a compromised weir was observed that had probably been deteriorating for some time. The bank will never meet its final success criteria but has had considerable improvement to hydrology and vegetative response.

## C-15 Hole in the Donut/Everglades National Park

### Sources

Everglades Research Group, Inc. Biological Monitoring of Restored Wetlands in the Hole-in-the-Donut, Everglades National Park Year 6 Final Annual Report May 1, 2002 thru April 30, 2003. January 14, 2005

Everglades Research Group, Inc. Biological Monitoring of Restored Wetlands in the Hole-in-the-Donut, Everglades National Park Year 7 Final Annual Report May 1, 2003 thru June 30, 2004. November 7, 2003

FDEP Florida Department of Environmental Protection Environmental Resource Permit for Everglades National Park. Permit Number 132416479. February 15, 1995.

Site Visit June 20<sup>th</sup> and 21<sup>st</sup>, 2005

### Location

Everglades National Park, Miami Dade County

Section 21,28,33-36 T 58S R 36E

Section 15-21 T 58S R 37E

Section 7, 18, 30, 31 T 57S R 38E

Section 6, 7 T 58S R 38E

Bank Ownership: public, Everglades National Park and Miami Dade County in lieu fee

Bank size: 6,250 acres

Credit potential: 6250.00

Credits released: 6250.00\*

Credits used: 2111.37

MBI: Not traditional MBI but there is federal review and permitting

Credit data from October 2006

\*in-lieu-fee bank

### Background Summary

Hole in the Donut was a previously farmed area located within Everglades National Park. The land was historically rock plowed and then when left fallow became infested with *Schinus terebinthifolius*. Restoration involves clearing parcels sometimes down to the bedrock and then allowing it to naturally re-colonize with close monitoring of vegetation and wildlife. The site is actively managed with prescribed fire and spot treatment of exotics.

### Fire

Fire is integral in restoration and management of this bank. The bank monitors the response of the vegetation to fire and reports it in the monitoring reports. It appears from monitoring reports that prescribed fire is utilized in the growing season.

### Hunting

No hunting is permitted.

### Reference Community

One of the success criteria states that restored areas must be similar to an undisturbed natural wetland community; the bank has identified parameters of natural wetlands in Everglades National Park in great detail and monitored restored areas in comparison to the natural ones. The bank follows species dominance, distribution, structure, cover and more. Current monitoring reports believe it takes up towards 15 years for a restored area on the bank to begin to have the same species composition as the natural areas and even then they are not the same.

Success Criteria

Removal and control of non-native species (primarily Brazilian pepper)

Establishment of a plant community dominated by wetland plants

Establishment of a wetland community that is similar to an undisturbed, natural wetland community.

Hydrology	Presence of wetland species listed in Rule 63-340, F.A.C. is statistically similar to a mutually acceptable species list for each community based on the hydrologic pattern present to maintain the site(s) as wetland marsh or prairie defined in accordance with vegetation classification system detailed in attachment to permit.
Desirable vegetation	Native species are reproducing naturally via seedling establishment and recruitment, or vegetative spread typical of each species. The importance value, based on frequency and percent cover or density, for each area shall fall within the range of Whittaker curves for the naturally occurring communities in this area of ENP.
Jurisdictional wetlands	Not less than the total acreage of each parcel of freshwater wetlands are determined by Department staff to be jurisdictional pursuant to Rule 62-340, F.A.C.
Construction	The restored wetlands are constructed in accordance with the permit requirements, including any approved modifications.

Credit Release Schedule

Hole-in-the-Donut is an in-lieu-fee bank. It operates like a bank but credit is awarded up front when financial backing to implement the restoration becomes available. Therefore there is no credit release schedule. When the bank has met its success criteria they are no longer obligated to submit monitoring reports to FDEP.

Monitoring Results:

Monitoring reports are lengthy and very detailed in regards to vegetation, wildlife and hydrology on restored portions of the bank.

The bank has easily met criteria for one and two but the third may take as long as 15 years post construction.

Although restoration areas may not have the same percent cover and density as reference wetlands the restoration that has been completed the longest appears to have regained a lot of the function of a reference wetland, according to FDEP.

## C-16 Lake Louisa and Green Swamp Mitigation Bank

### Sources:

Ecobank Lake Louisa/Green Swamp Mitigation Bank Phase II Fourth Annual Monitoring Report. April 2005

Ecobank Lake Louisa/Green Swamp Mitigation Bank Phase I Baseline Monitoring Report. December 1996

Hartman and Associates Lake Louisa/Green Swamp Mitigation Bank Phase II Baseline Monitoring Report. April 2000

SJRWMD Management and Storage of Surface Waters Technical Staff Report for Lake Louisa and Green Swamp Mitigation Bank. September 20, 1995.

Site visit May 9, 2005

Location: Lake County; sections 1, 2, 11, 12 Township 24S Range 25E and section 35 Township 23S Range 25E

Bank Ownership: private

Bank size: 1,007 acres

Credit potential: 297.9

Credits released: 245.6

Credits used: 212.14

MBI: Yes

Credit data from October 2006

### Background Summary

Restoration plans on Lake Louisa are to convert citrus groves to longleaf pine sandhill, mesic upland forest and oak scrub vegetation and to enhance and preserve mixed forested and bay swamp wetlands on site. The citrus will be removed and the site will be planted, seeded and managed. Restoration activities include preservation and enhancement of the uplands, enhancing the hydroperiod, treating exotics, implementing a fish stocking program and enhancing water quality. This bank has historically had financial problems with bankruptcy and has fallen behind in management and restoration activities.

### Fire

Prescribed fire is mentioned as important in achieving final success as a management tool. The fourth annual monitoring report for Phase II states, "the herbicide maintenance program and prescribed burns are expected to aid in the reduction of nuisance and exotic species and further promote the establishment and recruitment of planted and indigenous upland species." Any further information regarding prescribed fire was not acquired.

### Hunting

Unknown but unlikely since there is no mention of it in any of the acquired documentation.

### Reference Community

Initially the technical staff report describes that the citrus groves will be restored to longleaf pine sandhill and oak scrub vegetation. Nancy Bissett is mentioned for making a similar effort at a site about 8 miles away, not sure of her actual involvement on this bank. Initial plans describe the planting effort as spaced at 20-foot centers, with multiple species to be planted including longleaf pine, turkey oak, sand live oak, myrtle oak, rusty lyonia, wiregrass, pink muhly grass, pineland dropseed, lopsided Indiangrass, blazing star, and gopher apple. Seed mix of appropriate species will be spread in rows between plantings. Existing microjet sprinklers are proposed to water plants during initial establishment. There are no references given for the choices of plants to seed and plant the uplands with. The report states that the restoration site is expected to be "weedy" initially and it will take decades for the restored uplands to "have the character of native communities."

Not much is known about the wetlands on site. The forested wetlands have been impacted by an altered hydrology and a muck fire. The baseline monitoring report post hydrologic improvements lists the existing species but there is no reference information.

This study attained no information about the fish restocking program. It is unknown what species of fish were intended to be restocked, for what purpose and if it was actually carried out.

Success Criteria

Hydrology	
Desirable vegetation	Minimum height requirement of eight feet for trees in densities appropriate for reaching targeted community types; herbaceous and shrub components that are reflective of the targeted community types Establishment and demonstrated regeneration of listed plant species Plant growth must be demonstrated to be occurring without supplemental watering
Vegetation Cover	Planted upland canopy and herbaceous species should experience 80% and 60% survival respectively in the 300 foot buffer area adjacent to forested wetlands.
Water Quality	Demonstrated water quality enhancement by reducing P and N levels below the baseline Total N = 1.81 ppm Total P= 0.6 ppm
Exotic vegetation	≤ 5% exotic
Wildlife	Successful fish restocking
Management	Demonstrated fire management

Phase I Credit Release Schedule

Activity	Percent Release
Record conservation easement on Phase I	15%
Record deed restrictions on Phases 2-5	
Complete hydrologic enhancement measures	10%
Remove citrus trees from Phase I	10%
Complete site prep., planting and seeding	20%
Achievement of a min. of 1 year of successful establishment per success conditions	5%
Achievement of a min. of 2 years of successful establishment per success conditions	5%
Achievement of a min. of 3 years of successful establishment per success conditions	5%
Achievement of a min. of 4 years of successful establishment per success conditions	5%
Achievement of a min. of 5 years of successful establishment per success conditions	5%
Achievement of final success criteria after a minimum of 5 years of successful establishment	20%

Phase II Schedule of Release

Activity	Percent release
Record conservation easement and submit financial documents for Phase II	15%
Remove or herbicide citrus trees	10%
Complete site prep & tree planting	15%
Complete herbaceous planting and seeding	15%
Achievement of a minimum of 1 year of successful establishment per the success conditions	5%
Achievement of a minimum of 2 years of successful establishment per the success conditions	5%
Achievement of a minimum of 3 years of successful establishment per the success conditions	5%
Achievement of a minimum of 4 years of successful establishment per the success conditions	5%
Achievement of a minimum of 5 years of successful establishment per the success conditions	5%
Achievement of final success criteria after a minimum of 5 years of successful establishment	20%

Monitoring Results

Monitoring reports quantify percent cover of desirable vegetation in the wetlands.

Wildlife utilization monitoring occurs during on site vegetation monitoring and is documented for direct observation, tracks, sign or other audible evidence. Water quality data was not seen in the acquired monitoring reports.

## C-17 Lake Monroe Mitigation Bank

### Sources:

Environmental Management Systems, INC. Lake Monroe Mitigation Bank Monitoring Plan.  
SJRWMD "Exhibit A" Conditions for Issuance of Permit Number 4-127-0284 September 12, 1995  
SJRWMD Management and Storage of Surface Water Technical Staff Report September 14, 1994  
SJRWMD Management and Storage of Surface Waters Individual Permit Number 4-127—0273C September 13, 1994  
SJRWMD Conceptual Lake Monroe Mitigation Bank Permit Application August 24, 1994  
Water & Air Research, Inc. Lake Monroe Mitigation Bank (Beck's Ranch) Report January 2001  
Personal communication letter from FDOT to Todd Gipe March 29, 2001

Site visit May 18, 2005

Location: Middle St. Johns Drainage Basin, Volusia County,  
Sections: 24, 30 Township: 19S Range: 31, 32E  
Bank Ownership: Public, FL Department of Transportation District 5

Bank size: 603 acres  
Credits potential: 199.9  
Credits released: 130  
Credits used: 110.9  
Credit data from October 2006.  
MBI: Yes

### Background Summary:

This bank is a public partnership between Florida Department of Transportation and the St John River Water Management District. The bank's natural communities include wet prairie, marsh, mixed hardwoods and cypress dominated wetlands as well as upland scrub and pine flatwoods. Some lands are in improved pasture and rangeland and were historically grazed by cattle. Some cypress and pine logging had also occurred. The bank was historically fire suppressed. Restoration and enhancement activities include removing the cattle, plugging and filling ditches, planting pines, planting cypress, implement prescribed fire and control exotic species.

### Fire

Permit requires a prescribed burn plan including short-term (restorative) elements and long-term (maintenance) elements for scrub and flatwoods communities. Prescribed fire is scheduled in phases; implementation is tied to some of the percent credit release. At time of site visit the prescribed burn plan was behind schedule due to various limitations including burn ban, weather and availability of DOF staff to apply prescribed fire.

Hunting is not mentioned as a proposed activity on the bank. Hiking and passive recreation were mentioned during the site visit as a proposed future activity.

### Reference community

The bank's goal is to restore the land to a more predevelopment state. FLUCFCS is used to define existing communities. Species composition or assemblages based on reference communities are not explicitly described but there is a statement that planted "oak plots" were designed to emulate the natural occurrence of oak pockets found in this area. "Restoration" in the pasture areas will consist of planting slash and longleaf pine (depending on hydrology) and maintaining with fire. There is an assumption that with proper management and hydrology the remnant native groundcover will out compete the established pasture grasses. Ground cover is not explicitly described except for monitoring species lists. The monitoring plan states that the goal of the bank's mitigation plan is to "increase and diversify the habitat for wildlife populations that presently use the property."

Permit to FDOT is for wetland enhancement, upland reforestation, preservation and removal of cattle grazing operation. The permit requests further detailed documentation about the property and the efforts that will be made on the bank to meet the permit authorization.

Technical staff report briefly names the major community types found on the bank. Historically the site has been used for cattle, and has had selective cypress harvesting. The site was not managed with an effective fire management plan. The restoration activities included in the staff report are as follows.

1. Remove cattle
2. Restore hydrologic regime to the degree possible by plugging or filling ditches or installing control structures.
3. Re-vegetate pine forest in the pasture areas.
4. Re-vegetate cypress in logged cypress-dominated wetlands.
5. Implement prescribed burn plan for flatwoods and scrub areas.

Management activities named

1. Control exotic and nuisance species as needed. Preliminary site assessment by SJRWMD did not reveal problem areas for exotics but a more thorough review will be preformed at a later time.
2. Limit access and use of the property for maintaining its ecological resources.
3. Implement an appropriate prescribed burn management plan after restorative burns are completed.

At the time of site visit on May 18, 2005 it appears that most of the hydrological work has been completed. Although there were areas planted with pine trees, most of the under-story in the pasture/flatwoods communities were still dominated by pasture grasses. More planting was requested by the SJRWMD although most credits for the bank are already released. It is unknown whether cypress had been planted. At time of site visit prescribed fire was still needed in the scrub areas. There was a lot of vertical structure in the scrub habitat. Apparently there are burn restrictions because of nearby residences and an airport.

Florida scrub jays were seen during site visit. The technical report has a preliminary list of listed species that have been seen on site and some that are expected to exist on site but that have not yet been documented.

Success Criteria:

1. Restoration of the natural hydrology on the site.
2. Upland plantings of longleaf pine, slash pine, and live oak maintain a minimum of 50% survival rate. Trees are planted at 100 per acre; a 50% survival rate is 50 trees per acre.
3. Planting of pond cypress maintain a minimum of 50% survival rate.
4. The wetland preservation and restoration areas have less than 5% coverage by nuisance or exotic plant species.
5. The restoration/enhancement areas exhibit hydrology indicative of wetlands, as defined by the 1987 USACOE manual. An example of this would be inundation or saturation for at least 21 days in the project vicinity during years of normal rainfall.
6. The natural burn cycle returned to the upland xeric systems.
7. Disturbance to native communities will terminate and ecological function will improve with the removal of cattle.

Credit Release:

Activity	Credits
Preservation (upon permit issuance since already accomplished)	30 (15%)
Complete hydrologic enhancement measures	30 (15%)
Complete Planting	20 (10%)
Complete Phase 1 burns	10 (5%)
Complete Phase 2 burns	10 (5%)
Complete Phase 3 burns	10 (5%)
Achievement of minimum of 2 years of successful establishment per the success conditions	10 (5%)
Achievement of minimum of 4 years of successful establishment per the success conditions	10 (5%)
Achievement of final success criteria after a minimum of 5 years of successful establishment	69.9 (35%)

## Schedule of release of credits from “exhibit A” conditions issuance of permit

### Bank Status as of January 2001

The conclusions of the January 2001 monitoring report state that with controlled burns and hydrologic modifications the bank will succeed in reaching the overall objectives of restoring the LMMB to pre-development conditions. It states the pasture areas restoration success is dependant on the pine canopy development. A pine over story with a bahia groundcover does indicate an appropriate pre-development natural community. A March 2001 letter to Todd Gipe states that these upland pasture areas are not meeting their success criteria because some plots have not met the success for pine tree survival. A suggestion was made by the WMD to plant 700 pine trees per acre to help shade out and eradicate the bahia grass. FDOT came up with some alternative suggestions. The wetland and hydrology standards were met but the prescribed fire and upland pasture areas have not met success criteria after year 5 of monitoring. The site will have permanent water control structures.

To date the groundcover in the reclaimed pasture areas are not meeting success criteria. There have also been hydrologic issues with some of the control structures blowing out. There has been discussion about who is responsible for fixing and maintaining these structures. Still difficulty in applying prescribed fire to the site. The district will be spending more time on this bank to address the current problems.



## C-18 Little Pine Island Mitigation Bank

### Sources

Florida Department of Environmental Protection Environmental Resource Permit for Little Pine Island Mitigation Bank permit number 362434779. February 6, 1996.

Kevin L. Erwin Consulting Ecologist, Inc. Fourth Annual Monitoring Report: Phases I, II, VA Third Annual Monitoring Report Phases VB, VC, VIIA April 2002

Kevin L. Erwin Consulting Ecologist, Inc. Reference Wetlands Monitoring Report Phases I, II, VA, VB, VC February 2003

Kevin L. Erwin Consulting Ecologist, Inc. Fifth Annual Monitoring Report Phases I, II, VA, Fourth Annual Monitoring Report VB, VC, VIIA June 2003

Kevin L. Erwin Consulting Ecologist, Inc. Sixth Annual Monitoring Report: Phases I, II, VA, Fifth Annual Monitoring Report VB, VC, VIIA April 2004

Kevin L. Erwin Consulting Ecologist, Inc. Seventh Annual Monitoring Report Phases I, II, VA, Sixth Annual Monitoring Report VB, VC, VIIA, First Annual Monitoring Report VI, VIIB June 2005

Site visit August 17, 2005

Location: Lee County, Sections 14, 15, 22, 23, 24, 25, 27, 34, 35, and 36 Township 88S Range 22 E

Bank owner: private entity but on public lands

Bank size: 1,565 acres

Credit potential: 807.00

Credit released: 279.40

Credits used: 161.09

MBI: Yes

Credit data from October 2006

### Summary

Little Pine Island is a 4,670 acre island in the Matlacha Pass Aquatic Preserve West of Cape Coral. Historical habitats include coastal marsh, salt flats, mangroves and pine flatwoods. Mitigation activities include removing exotic vegetation, primarily melaleuca, Brazilian pepper and Australian pine. Primarily the pre-restoration scenario is solid melaleuca forest to a post restoration native ground cover which is mostly herbaceous groundcover with little vertical structure. The bank will also enhance hydrology by plugging and backfilling 48.3 acres of mosquito ditches. All restored areas are allowed to revegetate naturally. All restoration work has guidelines for minimizing impact to the landscape. Temporary haul roads are constructed and removed to access restoration areas with low impact vehicles; there are also restrictions to site access other than on foot when standing water is present. Restoration on the bank has been conducted in seven phases with some activities occurring simultaneously.

### Burn plans

Prescribed fire is used as a restoration tool and management tool. The bank's manager can use prescribed fire during the restoration phases of the bank, once the bank is turned over for long term maintenance, prescribed fire will be implemented by the Buffer Preserve.

Hunting is not permitted on the bank.

### Reference conditions

Success criteria cites reference wetlands and published literature in regards to restoration standards for vertebrates, invertebrates, and vegetation. Hydrogeomorphic Classification of Wetlands was used to classify wetland types within the LPI mitigation bank and then FLUCCS further defines their classification. Reports for reference wetlands are submitted as are the monitoring reports. An extensive pre-restoration report was conducted by Kevin Erwin in regards to documenting existing communities and vegetation, wildlife utilization, and hydrology.

Success Criteria

Topography	Temporary roads, ditches and berm areas are restored to natural grade
Desirable vegetation	<p>Direct comparison between the restored wetland and identified reference wetland or published literature values is within the range of similarity values found when comparing replicate reference wetlands and/or published literature values</p> <p>Plant species richness is <math>\geq 75\%</math> of the richness of either reference wetland or published literature values</p> <p><math>\geq 15</math> non-nuisance, native wetland plant species present, contribute to <math>\geq 60\%</math> total cover, and remains increasing in percent total cover*</p> <p>All native wetland ground cover species and existing wetland trees are reproducing naturally via seeding establishment, growth and survival or normal, healthy vegetative spread in ways that would be normal for each species</p> <p>A viable seed bank of non-nuisance native wetland species has been established, as demonstrated by germination experiments that have been approved by the Bureau prior to their initiation</p> <p>A minimum of 3 macrophyte communities are established within each hydrogeomorphic wetland type</p> <p>Macrophyte communities are within the range of conditions occurring for similar hydrogeomorphic wetland types in south Florida based on the identified reference wetland literature values</p>
Exotic nuisance vegetation	Percent cover of exotic species (melaleuca, Brazilian pepper, and Australian pine) is maintained at or below one percent of the total cover without physical maintenance for one growing season
Vertebrate	<p>Utilization of <math>\geq 2</math> native wetland dependent mammal species</p> <p>Utilization of <math>\geq 3</math> wetland dependent wading bird species</p> <p>Utilization of <math>\geq 3</math> wetland dependent bird species other than wading birds</p> <p>Utilization of <math>\geq 2</math> native wetland dependent reptile species</p> <p>When water is present, fish assemblages <math>\geq 3</math> native species of fish or in harsh environments one abundant species of fish</p> <p>Native amphibians <math>\geq 2</math> species</p> <p>Species richness of fish and native amphibians is at least 75% of that found in the reference wetland or published literature</p> <p>Characteristic feeding guilds and trophic positions of fish are at least 75% of that found in the identified reference wetland or from published literature</p>
Invertebrate	<p>Species richness of aquatic macroinvertebrates are a minimum of 75% of that found in the literature or the identified reference wetland</p> <p>All characteristics functional feeding guilds, as described by Merrit and Cummins (1984) or 75% of all taxa of macroinvertebrates found in the restored site (taxonomic classification levels should be mutually agreed upon prior to using this criteria)</p> <p>A minimum of 3 classes, four orders, and ten species of aquatic macroinvertebrates are present in each herbaceous wetland type. At least 2 classes, 3 orders, and 6 species are present in a forested wetland type</p> <p>Weighted species abundance of aquatic macroinvertebrates are a minimum of 75% of that found in the literature or the identified reference wetland</p>
Soils	<p>Soils at the restored mosquito ditches and berms will have redox potential within 200 mV and pH within 1 unit of values measured in adjacent wetland soils</p> <p>Redox potential and pH is within the range of conditions occurring for similar types of wetlands in South Florida based on literature values</p> <p>Interstitial salinity is similar to adjacent wetland soils</p> <p>Interstitial salinity is within the range of conditions occurring for similar types of wetlands in South Florida based on literature values</p>

\* Percent cover shall be reported for the aggregate of these wetland species, relative to the total area, including a measure of percent cover by non-wetland species, bare ground and water.

Credit Release Schedule

Activity	Percent release
Removal of 95% of exotic vegetation	45%
Removal and restoration of temporary roads	10%
First annual monitoring report demonstrating that at least 8 of the 20 parameters listed in Specific Condition 30b* of the permit have been achieved or are trending toward success compared to baseline conditions documented in all LPI wetland mitigation bank assessment documents and all other parameters listed in Specific Condition 30b are remaining the same or trending toward success	15%
Second annual monitoring report demonstrating that at least 15 of the 20 parameters listed in Specific Condition 30b of the permit have been achieved or are trending toward success compared to baseline conditions documented in all LPI wetland mitigation bank assessment documents and all other parameters listed in Specific Condition 30b are remaining the same or trending toward success	15%
Attainment of success	10%
Full cash funding of the Preservation Trust Fund	5%

\*Success Criteria

Monitoring Results

Monitoring reports are very detailed and lengthy meeting the permit's specific guidelines for quantitative and qualitative monitoring. Monitoring on the bank looks at vertebrates, invertebrates, vegetation, soils, and hydrology. To date the bank is finding success with its restored areas in comparison with reference wetlands.

## C-19 Loblolly Mitigation Bank

### Sources

SJRWMD Technical Staff Report Loblolly Mitigation Bank August 27, 2003  
SJRWMD Permit for Loblolly Mitigation Bank Permit number 4-031-84706-2. September 9, 2003.  
USEPA Loblolly Mitigation Preserve, LLC, The US Department of the Army, The US Environmental Protection Agency and the US Fish and Wildlife Service. Mitigation Banking Instrument for Loblolly Mitigation Bank December 2, 2003.

Site visit 9/29/05

Location: Duval County, Sections 10, 11, 14, 15, 22, 23, 26, 27 & 28 Township 3S Range 23E

Bank Ownership: private  
Bank size: 6,247 acres  
Credit potential: 2034.30  
Credits released: 508.58  
Credits used: 315.52  
MBI: Yes  
Credit data from October 2006

### Background Summary

This bank was historically utilized by silviculture activities since the early 1900's. In the 1940s the land was cleared, root raked, bedded and drained to plant a pine for more intensive production. The clearing, bedding and planting of pine trees was ongoing through the 1990s and tree harvesting continued to the present day that the permit was written. The native cypress was also harvested. The site is almost half wetland and half upland, all the wetlands on the property were considered impacted by the District. Restoration activities include ceasing silviculture activities, remove planted pine, re-grade most beds and swales, restore hydrology, supplemental planting, and implementing prescribed fire. Historically the bank's natural communities include mesic and hydric flatwoods, cypress domes, wet prairie and marshes.

### Fire

The permit states that the bank will manage the mesic and hydric flatwoods with an ecologically-based prescribed fire plan to maintain native conditions with natural processes.

### Hunting

Hunting is prohibited except for nuisance fauna control.

### Reference Community

The bank's permit mentions a target vegetative community assemblage but specific natural community types or details about what that community assemblage is are not mentioned. Longleaf pine and turkey oaks will be re-introduced into the uplands and in some areas where appropriate cypress will be planted in some wetland reforestation areas. Additional native trees will be planted to "help create complete habitat types that mimic natural systems that historically dominated the site." (SJRWMD permit) Supplemental species include but are not limited to laurel oak, live oak, longleaf pine, sweet gum, in the uplands and cypress, red maple, black gum, dahoon holly, in the wetland reforestation areas. The goal is to reach 100 mast forming trees per acre in the wetland forest areas and 25 trees per acre in the uplands.

The Mitigation Banking Instrument states in the Success Criteria that the target wetlands must reasonably compare with the descriptions of known undisturbed control sites such as the USFWS's Eastern Florida Flatwoods. Some target species of plants are listed in the MBI.

Success Criteria for wetland restoration areas

Desirable canopy	Minimum height requirement of 6 feet for all trees and which are present in an assemblage that reflects the diversity in the target vegetative community assemblage. 100 trees per acre in the forested wetlands. Forested wetland canopy shall have an overall canopy coverage of $\geq 25\%$ by mast-forming trees with evidence of additional growth of mast-forming trees in the understory or groundcover. 25 trees per acre in the uplands
Exotic and nuisance species	$\leq 10\%$ cover (SJRWMD permit) $< 5\%$ aerial coverage (MBI) Feral pigs are controlled to insignificant numbers
Hydrology	No evidence of erosion or unnatural channelized water
Wetlands	Improved wetlands show a reduction of upland plant species by 20% of the total and an increase to at least 80% coverage by some combination of native species listed in MBI
Desirable groundcover	In uplands 80% coverage by native plants

Interim criteria for the bank states that “successful establishment during any monitoring event will be indicated by a minimum density of 100 surviving and growing trees per acre in an assemblage that reflects the diversity of the target community assemblage.” The “area must also exhibit wetland hydrology and have vegetative wetland jurisdictional status.” (SJRWMD Loblolly permit)

Credit Release Schedule

Activity	Percent Release
Conservation easement on the entire property	25 %
Remove planted pines	5 %
Flatten/cross-block the bedding	5 %
Complete tree plantings	5 %
Complete hydrologic enhancement construction	10 %
Document hydrologic enhancement (with a minimum of 3 years monitoring)	10 %
After 1 year monitoring indicates success	4 %
After 2 year monitoring indicates success	4 %
After 3 year monitoring indicates success	4 %
After 4 year monitoring indicates success	4 %
After 5 year monitoring indicates success	4 %
Final success achieved with minimum of 5 years monitoring	20 %

Monitoring Results

At the time of the site visit the bank had begun clearing stands of pine and had initiated some hydrologic work.

## C-20 Loxahatchee Mitigation Bank

### Sources

Florida Department of Environmental Protection. Mitigation Bank Permit for Loxahatchee Mitigation Bank. Permit Number 0140969-001. February 18, 2000.

Florida Department of Environmental Protection Notice of Intent to Issue Environmental Resource Permit for Loxahatchee Mitigation Bank. November 30, 1999.

Loxahatchee Mitigation Bank Time Zero Report on Baseline Conditions

Tetra Tech FW Inc. Loxahatchee Mitigation Bank Annual Monitoring Report Year Two. February 2005

Site visit June 29, 2005

### Location:

Palm Beach County, Sections 14, 23, 26, and 35, Township 46S and Range 41 E

Bank Ownership: private

Bank size: 1,264 acres

Credit potential: 641.6

Credits released: 320.8

Credits used: 221.58

MBI: Yes

Credit data from October 2006

### Background Summary

The bank is historically part of the eastern Everglades ecosystem and is adjacent to the Loxahatchee National Wildlife Refuge. The bank is surrounded by canals and berms on all boundaries. The site's disturbances include an improper "flashy" hydroperiod and a bad infestation by exotic species. The bank is battling several invasive exotic species including at least four or five tree and shrub species, 4 to 4 invasive species of grass and a few species of vines. Areas of the bank infested with Brazilian pepper have very little wildlife usage but in areas where some wetlands are intact many species associated with the greater Everglades are present, including listed wading bird species. The bank is battling several invasive species at least four or five tree and shrub species, 4 to 4 invasive species of grass and a few species of vines. Restoration includes improving the hydrology by making it rainwater and groundwater driven with a discharge system to mimic downstream sheet flow. Berms were enhanced and agricultural and residential runoff bypass the bank into a canal. Exotics are treated with herbicide, manually removal and flooding. The bank expects natural recruitment after exotics are removed and will have some supplemental planting.

### Fire

Prescribed fire is planned to promote natural ecological condition. Management and maintenance of the bank includes conducting prescribed burns, consisting of selective burning of areas congested with undesirable vegetation density or species, using licensed personnel and approved methodologies and in accordance with the fire management plan in the permit. Smoke management is a large concern for the bank.

### Hunting

Hunting is prohibited on the bank except for the removal of feral hogs.

### Reference Community

Notice of intent to issue includes a table of the amount of acres dominated by the major vegetation types on the bank. The final success criteria lists tables of appropriate flora species in canopy, mid-story and groundcover with percent cover values for each natural community type being restored. Water level targets for final success criteria were derived from average water levels found in healthy wetland systems of these types in the region. Final successful wildlife and fish usage shall be determined using reference wetland data. The reference wetland will be monitored for fish and wildlife usage every year and compared to the bank for number of wetland dependant species for each class.

Final Success Criteria

Hydrology	Water levels shall show seasonal variation with inundation or saturation for ten consecutive months of the year (14' NGVD $\pm$ 3 inches) and with at least one of these months having average monthly level of 1.5 ft. above the ground (~15.5' NGVD). Additionally, water levels shall fall to 14' NGVD or lower at least once during a 12 month period, demonstrating seasonal fluctuating water levels. These water level targets were derived from average water levels found in healthy wetland systems of these types in the region. Since this system is dependent on rainfall as its primary source of water, and since annual rainfall varies greatly, targets may not be met every year. For final success determination, there shall be at least three out of five years demonstrating water levels within these parameters and when there has been no manipulation of the 15.5' NGVD elevation at the control structure. All water level monitoring sites shall be required to demonstrate success.
Nuisance and exotic species	Invasive exotic and nuisance vegetation (Group I) $\leq$ 1% cover of any polygon, and potentially noxious exotic and nuisance vegetation (Group II) $\leq$ 3% cover of any polygon; these criteria shall be met after at least one full year with no plant eradication treatments.
Desirable vegetation percent cover and community composition	Marsh polygon 80 – 90 % cover of appropriate groundcover except in designated mudflats Willow polygon 80 – 90 % cover of appropriate wetland groundcover or shrubs Red maple, pond apple and cypress polygons shall each attain 50 – 90 % canopy cover and 50 – 90 % wetland groundcover appropriate to each community type 10 – 20 % of open water in the form of meandering watercourses and small depressions is considered desirable in each wetland types The marsh polygon shall exhibit at least 8 species, with appropriate density ranges, listed in the permit, with less than 25% coverage by woody species The willow polygon shall exhibit at least 4 species, with appropriate density ranges, listed in the permit Each of the remaining forested polygons shall exhibit at least 6 species, with appropriate density ranges, listed in the permit
Wildlife	The following target numbers, derived from reference wetlands data, shall be used to determine success for fish and wildlife usage. The Strazzula Tract marsh is the reference wetland for the bank's marsh polygon, and the cypress swamp located in the Loxahatchee Wildlife Refuge is the reference wetland for the bank's forested polygons. Each year, the total number of wetland dependent fish, amphibian, reptile, bird and mammal species recorded during all monitoring events will be tallied, by class, for the bank's marsh polygon, and for the bank's forested polygons. Each year, the bank shall be determined to be successful for that year if the herbaceous polygon and the grouped forested polygons have as many wetland dependant species in each class as the relevant reference wetland. Fish forested 3 herbaceous 4, Amphibians forested 7 herbaceous 6, Reptiles forested 1 herbaceous 2, Birds forested 3 herbaceous 16, Mammals forested 3 herbaceous 3. Because wildlife usage is linked to vegetation coverage, the bank's final success determination shall require that these annual success criteria are met for at least two years in which the vegetation coverage success criteria (Specific Condition 21c. above) are also met.
Wetlands	A minimum of 1,224 acres of wetlands within the perimeter berms shall be determined to be jurisdictional pursuant to Section 373.421, F.S. and the five wetland community polygons are each within ten percent of their target acreages as listed in the acreage table in Specific Condition 16.
Compliance	All of the structures in the bank have operated as designed and have required no repairs or maintenance beyond that specified in Specific Condition 24 for at least three years. The permittee has submitted all required reports to the satisfaction of the Department.
M-WRAP assessment	Utilizing the monitoring data and reports and in conjunction with the permittee, the SFWMD, and the Mitigation Bank Review Team, the Department shall inspect the site and conduct an M-WRAP analysis to determine that all polygons have reached the criteria required to attain the "with bank" scores, as shown in Attachment D, that were used to determine the potential credits for the bank. The M-WRAP score of 3 for the vegetation component requires that the site be completely free of exotic vegetation. Should the bank be determined to have between 0 and 1% cover, a M-WRAP score of 2.75 would be assigned. The difference between scores of 2.75 and 3 represents 26.4 credits. The final credit release would then be decreased by 26.4 credits.

“Appropriate” vegetation is considered to be non-nuisance, native wetland species, such as those listed in the tables in Specific Condition 21

Interim success criteria

Progressive environmental enhancement or trending toward success provides environmental lift for which credit may be released incrementally prior to achieving all the final success criteria delineated in Specific Condition 21. Fifty percent (320.8 credits) of the total potential credits are reserved for interim releases as indicated in Specific Condition 18. The interim releases shall be based on the environmental enhancement criteria hydrology through wildlife in above table in Specific Condition 21 above, each of which is assigned a potential of 64.2 credits. Each year that the bank attains any one of the criteria hydrology through wildlife (above), it will receive one third of that criterion’s potential credits (21.4). The next year the criterion is met, it would receive another third, and the third year would net the remaining third of that criterion’s credits. To allow for variation in ecological conditions (drought, freeze, storms, etc.), the criteria need not be met continuously for three years. Additionally, the bank may be determined to be fully successful in accordance with Specific Condition 21, without all of the individual criteria, hydrology through wildlife (above), having three years of success. In the latter case, any credits for an individual criterion not yet released would be added to the final success credit release.

Credit Release Schedule

Activity	Percent Release
Conservation easement and financial assurance	15%
Construction Completion	12.5%
Exotic eradication	12.5%
Interim Success Attainment Years 1 – 5 more or less	Up to 50%
Full Success Attainment	10%

Monitoring Results:

Although a significant amount of exotics have been removed the bank has had difficulty eradicating some exotics in portions of the bank up to success criteria requirements. Hydrologic restoration hasn’t responded like expected. A permit modification may be necessary. As mentioned in the bank’s background summary the effort to restore the natural communities on this bank has been a very difficult challenge with treating several different invasive exotic species in the ground cover, mid-story and canopy.

Monitoring reports give detailed accounts of vegetation cover and dominance, as well as fish, amphibian, reptile, mammal and bird abundance, water quality and water levels..

11/13/00 96.2 credits (15% Conservation easement)

4/02/02 10 credits (exotic eradication in North Parcel)

12/27/02 62 credits (57 south parcel 5 in SE parcel construction)

4/9/03 18.2 credits (North parcel construction)

1/9/04 70.2 credits exotic treatment (initial site inspection 6/03 denied credit but 12/03 reconsidered and had more significant die off)



## **C-21 Panther Island Mitigation Bank**

### Sources:

Panther Island Mitigation Bank Phase I – Report 5 SFWMD ERP # 11-00002-M Corps Permit #199705332.  
Prepared by Wilson Miller February 2005  
Panther Island Mitigation Bank Phase II – Report 2 SFWMD ERP # 11-00002-M Corps Permit #199705332.  
Prepared by Wilson Miller. November 2004  
SFWMD Ft Myers Wetland Mitigation Bank Permit Staff Report Draft Permit application number 981021-10.  
March 1999  
Documents provided by Wilson Miller, part of larger document, Operation of the Mitigation Bank p. 24-29  
Maintenance and Monitoring p. 30-36  
Phasing and Implementation Schedule: (Phasing Plan) Exhibit 19  
Notes taken by Vicki Tauxe on 05/05/05

Site visit on 8/16/05

Bank location: East Collier County, Sections 5, 6, 7, 18 and 19 Township 47 South, Range 27 East  
Bank owner: Private  
Bank size: 2,788 acres  
Credit potential: 934.64  
Credits released: 799.24  
Credits used: 588.72  
Credit information from October 2006.  
MBI: Yes

The bank is divided into seven phases. Each phase has its own time schedule, mitigation activities, management and associated credits.

### Background Summary:

Panther Island is dominated by pine flatwood, cypress sloughs and cypress domes with some altered agricultural lands. The bank has several invasive exotic plants including but not limited to Brazilian pepper, Japanese climbing fern and West Indian marsh grass. Some areas were heavily infested. The bank supports several listed fauna species including the Florida panther and Florida black bear. The bank's restoration and enhancement actions include restoring historic hydrology, reclaiming agricultural areas by creating hydric pine and marsh communities, eradicating exotic infestation and preventing a re-infestation, and managing the bank with appropriate prescribed fire.

### Hunting:

Recreational hunting will not be allowed on the mitigation bank. Hunting activities on the bank are only applied to control exotic and nuisance animals.

### Burn Plan:

A fire management program based on the natural fire regime for the native habitats on the bank will be developed according to the WMD technical staff report. Fire along with mechanical reduction is described in the technical report as a tool to rehabilitate fire suppressed natural communities. Exotic species including melaleuca and Brazilian pepper will be chemically treated first. A burn plan which describes goals and objectives along with fire prescriptions was submitted in October 1998 with the technical report. Seasonality of fires, frequency of fire and firing techniques are discussed with a natural fire regime in mind.

### Reference conditions

The technical staff report makes mention of reference communities in the landscape and specifically mentions that Corkscrew Swamp Sanctuary is a reference site. FLUCCS descriptions are used to define community types. Reference conditions in pine flatwoods based on the reference site composition is 96 pine trees per acre and on average 24 trees per acre (25%) in the subcanopy. Note, this may be the first time that a goal for trees per acre was specifically mentioned in context of what the reference condition's composition is. Unsure why there is an initial emphasis on pine tree survival and size in the success criteria post prescribed fire when this community type

maintains diversity in the groundcover layer. There are two types of pine-related success criteria: those for fire management of existing flatwood areas and pine restoration areas where minimal pre-bank native community existed.

Wildlife observations are not quantified in success criteria. Marsh reconstruction areas are specifically described as being foraging habitat for Wood storks but there is no specific design or monitoring information to this effect.

The success criteria were developed with the parameters of WRAP in mind. The thought was that since the existing and with-bank theoretical functional values of the site were scored using WRAP to determine lift (credits), then the same types of criteria should be used in the monitoring program.

Success criteria for a given area	Vegetation	Wildlife	Hydrology	Fire	Exotics	Action
Reconstructed Marsh Area Level 1	Min 80% survival planted spp. or min 50% aver. aerial cover by native wet-land flora for transitional and emergent marshes. Low pool marshes 30% cover.	Qualitative evidence of wildlife utilization based on direct or indirect observations.	Minimum of 60 days per year of inundation in combination of flora vitality and 90 days per year of inundation in enhanced cypress areas.	NA	≤ 5% cover by nuisance flora and ≤ 2% cover by exotic flora.	NA
MRA Level 2	Min. 80% survival planted species or min. of 70% aver. aerial cover by native wetland flora for transitional and emergent marshes. Low pool marshes 60% cover. Natural recruitment must be noted.	In addition to level 1 criterion, evidence of established or seasonal macroinvertebrate and fish populations in low pool and emergent marsh areas. Wading bird foraging activity.	Minimum of 60 days per year of inundation in combination of flora vitality and 90 days per year of inundation in enhanced cypress areas.	NA	≤ 3% cover by nuisance flora and 0% ** cover exotics	NA
Reconstructed Pine Flatwoods Area Level 1	Min. 90% survival planted canopy spp. 80% survival of planted sub-canopy spp. Min. 80% aver. survival planted ground cover spp. or 50% aerial cover by desirable ground cover plant spp. typical of S. FL hydric pine flatwoods.	Qualitative evidence of wildlife utilization.	NA	NA	≤ 15% cover of nuisance plant spp. ≤ 2% cover by exotic plant spp.	NA
RPFA Level 2	Same as level 1 but 70% aerial cover by desirable ground cover and groundcover recruitment.	Qualitative evidence of wildlife utilization including birds and mammals.	NA	NA	≤ 3% cover by nuisance plant spp. and ≤ 0% ** cover by exotic spp.	NA
RPFA Level 3	Same as level 1 and 2 but 25% pine have dbh ≥ 4"; and 50% pine have dbh ≥ 3"	Wildlife utilization of canopy strata for foraging, nesting or roosting.	NA	NA	≤ 3% cover by nuisance plant spp. and 0% ** cover by exotic spp.	NA

Success criteria for a given area	Vegetation	Wildlife	Hydrology	Fire	Exotics	Action
Exotic Vegetation Eradication and Fire Management Area Level 1	≤ 5% canopy trees with dbh>10" subjected to crown/canopy fire. Should more than 5% be subjected to canopy fire success shall be obtained when sufficient growth of smaller trees occurs to result in a count of canopy trees with dbh>10" ≥95% of pre-burn canopy tree count.	NA	NA	Fuel load reduction activities completed. Initial prescribed burn completed.	Initial exotic vegetation eradication completed.	Time zero monitoring report completed and submitted.
EVFM Level 2	≤ 5% canopy trees exhibit sustained damage one year following initial prescribed burn. Should more than 5% exhibit sustained damage success shall be obtained when sufficient growth of smaller trees occurs to result in a count of canopy trees with dbh>10" ≥95% of pre-burn canopy.	Qualitative evidence of wildlife including large mammals and reptiles.	NA	NA	≤ 3% cover by nuisance plant spp. and 0% ** cover by exotic plant spp.	NA
Johnson Polygon Area Level 1	NA	NA	North-South drainage canal into Johnson swamp polygon filled and artificial water input terminated.	NA	≤ 5% nuisance plant species and 1% exotic plant species.	NA
JPA Level 2	NA	NA	NA	NA	≤ 3% nuisance plant species and 0% exotic** plant species.	Unconsolidated sediment layer depth is between 80% and 120% of average depth in three reference domes.

\*\* Zero percent exotic coverage for the purposes of defining success shall mean the number of exotic plant species divided by the total plant species with the resultant rounded to the nearest whole number.

Credit release

Activity	Percent Release
Phase one fire management	8.6%
Phase two exotic eradication/control	0.9%
Phase two marsh reconstruction	26.1%
Phase three pine flatwoods reconstruction	6.8%
Phase three fire mgmt/exotic control	4.3%
Phase three marsh reconstruction	11.5%
Phase four pine flatwoods reconstruction	1.7%
Phase four fire mgmt/exotic control	5.4%
Phase four marsh reconstruction	8.2%
Phase five pine flatwoods reconstruction	0.3%
Phase five fire mgmt/exotic control	2.8%
Phase five marsh reconstruction	5.8%
Phase five pine flatwoods reconstruction	1.1%
Phase six preservation/management	7.8%
Phase seven preservation/management	8.7%
Total	100%

Criteria met:

Phase I success criteria achieved and reported in Phase I Report 5 February 2005  
 Level II success criteria was achieved for 0%  
 Level II fire management criteria.

Johnson Polygon Phase I Report 5 February 2005  
 Levels I & II success 0% exotics.  
 Levels I & II success for unconsolidated sediment.

Phase II second annual monitoring report in November 2004  
 Marsh Reconstruction Area exceeds the Level II success measures for hydrology and planted vegetation.  
 Marsh Reconstruction Area and the Pine Reconstruction Area are meeting the success criteria Levels I & II for exotic coverage.  
 Wildlife Utilization is also deemed successful.

## C-22 Reedy Creek Mitigation Bank

### Sources:

SFWMD Permit Modification No.: 53-00002-M December 1999  
SFWMD Wetland Mitigation Bank Permit Staff Report September 1998  
SFWMD Wetland Mitigation Bank Permit Staff Report August 1996

Site visit on 11/28/05 and 5/12/05

Bank Location: Osceola County, S7-9, 16, 17 & 20 /T26S/R28E  
Polk County, S7, 17, 18, 20, 29, 31, and 32/T26S/R28E

Bank owner: Private, American Equities

Total acres: 2992.98  
Credit potential: 908.9  
Credits released: 563.35  
Credits Used: 419.39  
MBI: Yes  
Credit information from October 2006

### Bank summary

Reedy Creek mitigation bank contains extensive bottomland hardwoods that have had some alterations due to historic logging and the placement of access roads. Bank activities have increased connectivity, removed roads and allowed them to re-vegetate. Extensive pasture areas have been restored in phases from xeric to hydric flatwoods. The bank controls exotics and has utilized direct seeding and planting techniques as well as maintaining some communities with prescribed fire.

### Burn plans

Upland restoration and preservation site preparation includes prescribed fire. A prescribed burn plan was submitted to SFWMD by the applicant. Prescribed fire will be used for long-term management as well as a tool for assisting in the restoration of ecotones between uplands and wetlands and to re-establish uplands.

Limited hunting is permitted mostly in Phase III of the bank.

### Reference Conditions

Natural communities are defined through FLUCCS codes. August 1996 Staff Report states that plantings for xeric, mesic and hydric flatwoods and scrub habitats are well planned and represent diverse vegetation but specific reference conditions are not yet mentioned. There are some small areas of upland preservation that may be used as a reference? Most wetland restoration and enhancement will be re-vegetated through natural recruitment. Although much of the swamp have been clear cut or select harvested there are areas that are mature and intact.

Flora species assemblages are described by the typical species associated by certain soil types found on the bank. Seed source for upland restoration will come from natural donor sites.

### Success Criteria

Success Criteria is vaguely mentioned in the documents collected for this study. The only specific criteria found were in reference to the wetland vegetation and exotic percent cover. Documentation mentions that there are hydrologic goals for the wetland construction areas. Success criteria for uplands focus on the elimination of bahia, establishment of planted specimens and a mosaic of vegetation typical of the system. The study did not obtain more specific criteria.

General goals are described as; 1) provide for restoration of the fundamental vegetative community associated with historic conditions; 2) undertake restoration in a manner that promotes greater species diversity and habitat heterogeneity; 3) restore the connectivity and inherent overlap of adjacent ecological communities as they transition

from the more xeric habitats through mesic and ultimately hydric conditions. 4) control and eradicate invasive exotic plant pest species to an acceptable level.

Vegetation – Wetlands	80% coverage of desirable wetland species
Exotics – Wetlands	< 10% cover of nuisance or exotic species
Hydrology – Wetlands	Hydroperiods are restored to mimic historic conditions
Ground cover – Uplands	Bahia grass cover and other nuisance species < 20 % cover Mean % cover by indigenous ground species >75% Ground strata dominated with indigenous grass species at >50% of total ground strata cover Ground strata biomass capable of carrying fire.
Shrub and semi shrub strata – Uplands	Mean % cover by nuisance shrub species is <5% Mean % cover by indigenous ground strata species is >5% but <30% Mean density of indigenous shrubs and semi-shrubs is >180 and < 400 per acre Shrub strata dominance <75% by any 2 species
Tree species – Uplands	Mean % cover by nuisance tree species is <1% Mean % cover by indigenous tree species is >5% and <25% Mean indigenous tree density is >5 and <50

#### Successes Achieved

According to a permit modification dated December 1999 the following accomplishments allowed for credits to be released.

1. Complete installation of low water crossings and culverts within railroad grade. (10.5 credits)
2. Complete installation of low water crossings and culverts within “dog-leg” road. (10.5 credits)
3. Complete removal of southern logging roads. (11.0 credits)
4. Complete construction activities in construction area no. 3. (10.5 credits)
5. Complete construction activities in construction area 1 and 2. (10.5 credits)
6. Complete exotic eradication program in Phases 1 and 2. (2.5 credits)
7. Commence flatwoods restoration Phase 1 and 2. (2.5 credits)
8. Commence herbicide plan (bahia grass control), Phases 1 and 2 (10.0 credits)
9. Remove sod and plant annual plant crop (plow and disk) Phase 1 and 2 (4.5 credits)
10. Install irrigation system Phases 1 and 2 (4.5 credits)
11. Wire grass seed and mulch Phases 1 and 2 (9.0 credits)
12. Install water level recording devices and establish vegetative transects Phases 1 and 2 (wetlands) (5.5 credits)

#### Monitoring Results

Since this study’s site visit, restoration of Phase III has begun with seeding and is expected to be finished in the winter of 2006-2007. The enhancement work has also been initiated and is expected to be complete soon.

SFWMD staff report (August 1996) states that credits will be released based upon significant milestones such as preservation, initiation of mitigation work, successful annual monitoring results, and accomplishment of annual management goals. Examples from a December 1999 Permit Modification for credit released include, installation of low water crossing, removal of a logging road, completion of construction activities, exotic eradication, commencement of flatwoods restoration and removal of sod and planting of annual plant crop.

Bank is composed of three Phases, phase III was where a site visit occurred in May 2005. Restoration for Phase III had not yet begun at the time of the site visit. A second visit occurred in November 2005 to the swamp along the railroad grade in Phase I where exotic eradication had been completed and low water crossing and culverts had been installed on the railroad grade for hydrologic restoration.

## C-23 R.G. Reserve Mitigation Bank

### Sources:

SFWMD DRAFT Individual Environmental Resource Permit Wetland Mitigation Staff Report. January 2003.  
Wetlands Management, Inc. Long-term Maintenance Plan for R.G. Reserve Mitigation Bank. November 2001.  
Wetlands Management, Inc. Monitoring Plan for R.G. Reserve Mitigation bank. November 2001.  
Wetlands Management, Inc. Comprehensive Mitigation Plan for R.G. Reserve Mitigation bank. November 2001.

Site visit and personal communication with Joe Gilio, consultant June 20, 2006.

Bank Location: Southern Martin County S7/T30S/R41E

Bank owner: Private, J.R. Stuart Land Corporation

Total acres: 638

Credit potential: 32.48

Credits released: 2.55

Credits Used: 1.22

MBI: No

credit documentation from October 2006

### Bank Summary:

RG Reserve has mostly intact flatwoods, marshes and cypress stands. It is surrounded on three sides by berms but is open on its Northern property line. There is a culvert in the south east corner of the bank that eventually connects to the Loxahatchee River through a series of canal. All other connectivity is through seepage under the berm. Hydrology on the site is other wise rain water driven. The bank has several exotics it must manage for Japanese climbing fern and melaleuca are abundant in the landscape. Other degradation on the bank are impacts from off road vehicles tearing up the natural areas. Ruts have been regarded, there may be problems with compaction in the marshes. If the marshes do not naturally re-vegetate the bank may have to plant native species. The bank is being managed with prescribed fire.

### Burn plans

Florida Division of Forestry and Florida Fish and Wildlife Commission land managers South of the bank help burn the bank property. There have been growing season and dormant season prescribed fires. Flatwoods areas seen during site visit looked open with nice groundcover diversity. The bank is maintained with fire breaks and is kept in burn units. The SFWMD staff report states that implementing a fire management plan is part of the conditions for the long-term management of the bank. Fire will be a tool to maintain the pine canopy cover, ground cover diversity and prevent wildfire. Natural fire regimes will be emulated for the specific natural community types on the bank. Burning is intended to be carried out by burning one unit a year on a four year rotation. Prescribed fire will be applied in the late "dry season." By looking at average rainfall on [www.weather.com](http://www.weather.com) it appears the dry season is November through February, April is also typically a drier month but it is unknown if this is considered part of the dry season. It is unknown why the land managers would prefer a cooler dormant season fire program to the growing season. A long term monitoring plan lists the month of June for when prescribed fire will be applied in the bank. The burn plan states that there will be before and after monitoring of vegetation in the burn units.

### Hunting

Hunting will be utilized as a management tool to eliminate exotic species and to control nuisance populations of native species. Only the permittee, permittee's family members and invited guests may engage in these activities.

### Reference Conditions

Mitigation bank credit is primarily for preservation of the natural communities present on the bank. The staff report characterizes the natural communities on the bank and names their characteristic plants and animals. The flatwoods owned by FWCC South of the bank are described by the FWCC as pristine and are a good example of reference conditions. The comprehensive plan for the bank submitted by its managers describes the major natural communities by their dominant plant species.



The comprehensive plan states that patchiness and thin vegetation cover is sometimes normal for marshes do to variables in the drought cycle. Undisturbed marshes on the property were studied with transects to determine what normal coverage should be.

Credit release

Activity	Percent release
Year 1 record conservation easement for phase I. Construct perimeter fence	7.9%
Year 1 record conservation easement for phase II. Prescribed burn in unit 4. Re-grade disturbed areas	34.2%
Year 1 exotic removal. Prescribed burn units 1, 2, 3.	15.7%
Year 2 monitoring report year 1	7.9%
Year 2 supplemental planting of enhancement areas	7.9%
Year 3 monitoring report year 2	7.9%
Year 3 prescribed burn unit 4	7.9%
Year 4 monitoring report year 3	5.5%
Year 4 monitoring report year 4	5.5%

Success Criteria

Credits released will be based on activity triggers such as preservation through a recorded conservation easement, exotic removal, perimeter fence construction and meeting success criteria.

Exotics and nuisance species	≤5% exotics and ≤10% nuisance total coverage, respectively with no more than 15% total cover in any ½ acre area Exotic infestation of 8.4 acres infestation to 0 acres, ≤1 acre long-term
Vegetation in flatwoods	Canopy cover ≤50%, shrub cover <20%
Wetland enhancement	≥50% of wetland groundcover vegetation in regarding areas in the 2 <sup>nd</sup> year; ≥80% of wetland groundcover vegetation in regarding areas in the 3 <sup>rd</sup> year, ≤1.5 acres of unsuitably vegetated for prairie and hydric pine. For denuded marsh vegetative cover of at least 50% by 2 <sup>nd</sup> year, and 75% in the 3 <sup>rd</sup> year. ≤5 acres unsuitably vegetated
Vehicular trespass	Average of <2 miles of off-track trespass evidence per year
Eliminate rutted vehicle tracks	0 acres
Fire	Penetration of at least 65% of surface acreage of given burn unit, 2 years to achieve.

Success criteria is also tied to the ability to apply prescribed fire to the bank.

The bank is primarily credited for preservation. There will be some enhancement to the bank through the introduction of a natural fire regime and the removal of exotic species.

An assumption was made that the herbaceous marshes impacted by off road vehicles would recruit native vegetation naturally in these gaps. Vehicle scars were still present and visible on the landscape at the time of the site visit. Vegetation cover was patchy and not indicative of reference conditions. Planting may need to be instituted for these areas but there may be other problems with a compacted substrate. At the time of the site visit the only activities on the bank were to continue burning. Prescribed fire will probably be the most effective tool for maintaining the health of the natural communities on the bank. There are many invasive exotic species in the landscape surrounding the bank and *Lygodium spp.* and *Schinus terebinthifolius* was discovered in one of the cypress domes on the bank. It was unclear how much maintenance and monitoring would be done to deal with exotic vegetation on the bank. The

sparsely vegetated marshes may not be enhanced with additional plantings because the manager believed that it would not affect the available credits. However, the staff report does state that planting and re-seeding will be implemented if the natural recruitment is not effective. Therefore we are unclear as to what will really be done in these marshes with the vegetation has not recovered from the vehicular impact. There were some small patches of hog rooting seen during the site visit but there was no hog control at the time of the site visit.

## C-24 Split Oak Mitigation Bank

### Sources:

Florida Game and Fresh Water Fish Commission, Orange County, Osceola County. Split Oak Forest Mitigation Park. Management Plan. No date.

Florida Game and Fresh Water Fish Commission, Orange County, Osceola County. Split Oak Forest Mitigation Park Fire Management Plan DRAFT. December 1994.

SFWMD Split Oak Forest Wetland Mitigation Staff Report DRAFT. May 1996

Site visit to Split Oak Forest Mitigation Park in August 2005.

Bank Location: S27, 33, 34 and 35/T24S/R31E in the Eastern portion of Orange and Osceola Counties

Bank owner: Public, Orange and Osceola Counties (although mitigation is only for Orange County) Bank is used for mitigation of wetlands as well as a gopher tortoise relocation site. The bank is open to the public for low impact recreation.

Total acres: 1049.26 (639.74 additional acres are part of the property but not available for mitigation credit)

Credit potential: 206.5

Credits released: 88.8

Credits Used: 88.8

(Credit documentation from September 2004)

### Bank Summary

The bank is a mosaic of the following community types scrubby flatwoods, pinelands, xeric oak scrub, hardwood hammock, freshwater marsh, cypress swamp, hardwood swamp, shrub swamp, open water and grassland.

Most restoration work on the bank has been done to return a natural fire interval to the landscape. Some hydrologic work has been done such as ditch filling but details are not known.

### Burn plans

Split Oak natural communities were fire suppressed for about 20 years prior to becoming a bank. The fire management plan breaks out the natural communities into ten distinct community types and has a brief description of the dominant plant species and the substrate it grows in. The fire plan includes notes on fuel models developed for the different fuel loads and considers the plant community's response to fire and fire return intervals. The reintroduction of fire at Split Oak mitigation bank is described in terms of returning the landscape to a historic fire regime and this will in turn benefit the flora and fauna adapted to these conditions. Mechanical reduction of fuels will not be encouraged because of impacts to soil. Growing season or lightning season prescribed fire is part of the fire plan for the bank. Prescribed fire objectives include the following (1) improve habitat for gopher tortoises (2) increase herbaceous component of flatwoods vegetation (3) reduce populations of invasive native species (4) manage scrub for optimal habitat recommendations for scrub jays. Objectives for fire are tied to habitat structure needs for listed species; the management plan states that vegetative surveys will be used to assess the effectiveness of management activities. The survey will include an evaluation of species composition, cover, and biomass. Photo monitoring will be implemented for immediately before prescribed fire, after prescribed fire and six months later. Other monitoring includes a qualitative follow up to the burn prescription and a report on the success of the burn based on the prescriptions objectives. Included in the fire plan is a letter to neighbors of the bank informing them of the importance of prescribed fire in a Florida landscape. There is considerable consideration given to the creation of smoke in the prescribed fires and how this will affect the people living in the area around the bank.

Native listed species of the bank are mentioned in the fire management plan and management objectives were developed to help the habitat meet the life history requirements of listed fauna.

Hunting is not allowed on the bank.

Reference conditions

Natural communities are given a brief description of dominant flora, soil type and a natural targeted fire regime. Although reference conditions are not explicitly described in the management document most of the natural communities on the bank are intact but were fire suppressed. Habitat enhancement for listed species is mentioned in the context that natural communities will be enhanced to meet the needs of the dependant species but specifics were not available from this document.

Success Criteria

Documentation of specific success criteria has not been acquired for this study but guidelines that might be used to develop success criteria from the management document have been included. Documentation acquired describes general goals for success without specific measures.

These goals are listed in the management plan and include:

- Goal 1 Maintain, increase and ensure the abundance and distribution of state listed wildlife within the project site.
  - Objective 1 Implement appropriate habitat management and restoration activities in order to satisfy the life history requirements of listed species populations.
  - Objective 2 Primary considerations will be directed to the needs of listed wildlife populations, even to the exclusion of the user considerations.
  - Objective 3 Establish techniques to monitor the status of listed species populations in order to evaluate and refine management activities.
- Goal 2 Provide recreational uses which are compatible with the protection and maintenance of listed wildlife populations, the retention of naturally occurring vegetative associations and protection of sensitive natural area resources.
  - Objective 1 Provide recreational uses that feature the area’s uniqueness as a diverse assemblage of high quality natural plant communities.
  - Objective 2 Reduce wildlife disturbances and enhance wildlife visibility by limiting unsupervised access to daylight hours only.
- Goal 3 Manage for the quality and productivity of the site’s xeric plant communities.
  - Objective 1 Promote management activities such as ecological burning which are necessary to the maintenance of the communities.
  - Objective 2 Provide protection to sensitive plant communities and individual plant species by controlling use of motorized vehicles and by directing pedestrian traffic along established hiking trails.
- Goal 4 Increase public awareness of the importance of protecting and managing listed species populations.
  - Objective 1 Provide information regarding the effectiveness of mitigation parks and other habitat protection techniques.
  - Objective 2 Demonstrate the interrelationships between listed wildlife populations and fire-adapted plant communities.
  - Objective 3 Provide self-interpretive hiking trails to listed species habitats and unique environmental features.

Credit Release Schedule

Activity	Percent Release
Demonstration through the submittal of an annual report that successful burning of 580 acres, and 27 months of site management has been accomplished, record conservation easement within three months of permit approval	43 %
Complete tri-part agreement revision within one year of the issuance of this permit	20 %
Successful monitoring* for two years subsequent to permit issuance	9 %
Successful monitoring* for three years subsequent to permit issuance	9 %
Successful monitoring* for four years subsequent to permit issuance	9 %
Successful monitoring* for five years as verified by district staff	10 %

\* Successful monitoring consists of district approved progression toward accomplishment of general and burn management goals as established in the general management plan and burn management plan.

Data taken from staff report for application # 950306-3 approved on 6/13/96

Monitoring - The bank is no longer selling credits.

## C-25 Sundew Mitigation Bank

### Sources

SJRWMD Permit for Sundew Mitigation Bank. Permit number 4-019-68522-1. August 7, 2001  
USEPA Sundew Mitigation Bank, LLC, The US Department of the Army, The US Environmental Protection Agency and the US Fish and Wildlife Service. Sundew Mitigation Bank Enabling Instrument.

Site visit September 30, 2005

Location: Clay County, Sections 26, 27, 34, 35 Township 7S Range 26E

Bank Ownership: private

Bank size: 2,107 acres

Credit potential: 698.3

Credits released: 194.2

Credits used: 101.54

MBI: Yes

Credit data from October 2006

### Background Summary

This bank has historically been used for turpentine production since the early 1900s. Later in the 1940s the entire property (including interior wetlands) was clear cut, root raked and bedded. Silviculture practices were active up until the property became a mitigation bank. Bank activities include ending silviculture activities, eliminating most bedding, restore hydrologic levels and patterns, restoring native forest tree types through enhancement and planting, creating small herbaceous wetlands and implementing prescribed fire.

The state permit and federal MBI are a little bit different for this bank. The federal permit has more detail and different success criteria and credit release. This information has been included in the summary if it goes beyond the state permit requirements.

### Fire

“Scrubby uplands” and mesic and hydric flatwoods will be managed with prescribed fire to “maintain native conditions and processes.”

### Hunting

Hunting is prohibited except to remove feral hogs.

### Reference Community

Success criteria summary in the MBI states, “Restored wetlands are, by analysis of transect data and sound scientific judgment, becoming similar to those systems on the site that were not subject to historic silvicultural disturbance.”

The MBI states that all wetlands on the bank were carefully identified and mapped with aerial imagery, and an unquantified “few” wetlands on site are relatively undisturbed, their dominate vegetation listed. Forested wetlands that were harvested for timber but not bedded for pine are disturbed but still have native species in the groundcover and shrub layers. The MBI goes on to describe other areas where some remnant native vegetation is still growing.

Native trees will be naturally recruited by reducing the pine dominance to “allow their release into the canopy.”

Longleaf pine and turkey oak will be reintroduced into the uplands and cypress will be planted in wetland reforestation areas. There is very little description of what was or what will be the natural communities on the bank. Six small herbaceous wetlands totaling 11.8 acres in size will be created in already altered uplands after excavating fill for filling drainage ditches. The marshes are expected to have natural recruitment. Supplemental planting will be implemented with cordgrass and maiden cane and possibly others if native species are not established after one year. The created wetlands will have a 1:1 credit ratio. No other detail is given. The bank is expected to offset many avian habitat functions associated with typical mixed forested wetlands within the watershed, there is no reference or detail to explain this statement from the SJRWMD report. The MBI lists focal species covered in “Closing the Gaps in Florida’s Wildlife Habitat Conservation System” that could utilize restored habitats represented at Sundew.

The MBI lists several endangered and threatened species that could utilize the bank once it is restored and describes what aspect of improving the bank will meet the needs of those species.

#### Success Criteria

MBI states that over all the mitigation banking plan will focus on reversing the damage caused by the years of silviculture practices on this piece of land. The MBI states that “the natural progression of landscape restoration is inevitable, once the disturbing affects of silviculture are reversed.” Success criteria is to include the survival and growth of planted and recruited trees, improvements to hydrology, control of exotic and nuisance flora and fauna and wetland creation in borrow areas.

Desirable canopy	<p>Minimum height requirement of 6 feet for all trees and which are present in an assemblage that reflects the diversity in the target vegetative community assemblage. 100 trees per acre in the forested wetlands. (based on visual estimates) Canopy strata is limited to mast forming trees.</p> <p>Forested wetland canopy shall have an overall canopy coverage of <math>\geq 25\%</math> by mast-forming trees with evidence of additional growth of mast-forming trees in the understory or groundcover.</p> <p>25 trees per acre in the uplands</p> <p>Planted tree survival in both uplands and wetlands is sufficient, when combined with natural colonization, to assure at least 100 appropriate native trees per acre in forested areas.</p>
Exotic and nuisance species	<p><math>&lt; 5\%</math> cover nuisance or exotic vegetation</p> <p>Feral pigs show no damage to the on-site habitats beyond initial minimal evidence</p>
Hydrology	<p>Within wetland restoration and enhancement areas shows measurable improvements in hydroperiod, when compared to baseline conditions and correlated to actual rainfall, as evidenced by vegetation succession.</p> <p>No evidence of erosion or unnatural channelized water</p>
Desirable vegetation	<p>Native target wetland plants cover <math>\geq 80\%</math> of improved wetlands, while uplands <math>&lt; 20\%</math> of aerial coverage</p> <p>Native target upland plants cover 80% or more of restored uplands</p>
Wetlands	<p>Restored wetlands are, by analysis of transect data and sound scientific judgment, becoming similar to those systems on the site that were not subject to historic silvicultural disturbance</p> <p>Wetland creation in borrow areas meet state and federal wetland definitions after 3 years</p>

Interim criteria for the bank states that “successful establishment during any monitoring event will be indicated by a minimum density of 100 surviving and growing trees per acre in an assemblage that reflects the diversity of the target community assemblage.” The “area must also exhibit wetland hydrology and have vegetative wetland jurisdictional status.” (SJRWMD technical staff report)

Credit Release Schedule from SJRWMD technical report

Activity	Percent Release
Conservation easement	20%
Cut planted pines	10%
Harrow the bedding	10%
Complete hydrologic enhancement construction	10%
Complete tree plantings	5%
Document hydrologic enhancement (with minimum 3 years monitoring)	5%
Document tree assemblage and densities met	
After 1 year monitoring indicates success	4%
After 2 year monitoring indicates success	4%
After 3 year monitoring indicates success	4%
After 4 year monitoring indicates success	4%
After 5 year monitoring indicates success	4%
Final success achieved with minimum 5 years monitoring (100% of created wetland credits will be released only after a min. 3 years monitoring indicates successful establishment)	20%

MBI Credit Release Schedule

Activity	Percent Release
Place conservation easement	15%
Eliminate planted pines per plan	15%
Eliminate and Cross-cut bedding	
Year one	10%
Year two	5%
Year three	5%
Eliminate unnatural drainage structures and washouts	10%
Supplemental canopy tree planting	
Year one	6%
Year two	5%
Year three	5%
Year four	5%
Year five	8%
Demonstrate Improved Wetland Hydrology	
Year one	2%
Year two	2%
Year three	2%
Demonstrate <5% exotic nuisance plant cover	
Year one	1%
Year two	1%
Year three	1%
Year four	1%
Year five	1%
Completion and Success of Created Herbaceous Wetlands	100%

Credit release schedules are very different MBI gives a lot of credit for construction type activities but very little for demonstrating an improvement in hydrology. Assumption is if you remove the pine trees and the bedding everything will eventually restore itself? Although SJRWMD lacks detail it does give credit for monitoring for success which may or may not result in ecological improvement.

Monitoring Results:

At the time of the site visit very little has been initiated on the bank. The only activity that was noted was some clear cutting of a small area. The ground was impacted with rutting by machinery and woody debris. Hydrologic alterations draining the site still appeared to be in place.

The MBI states that monitoring reports will be focused on changes to vegetation and hydrology. Cover estimates will be provided along with results from WRAP analysis. Discussion should address success criteria. Long term monitoring is intended to address how the bank is continuing to meet or not meet success criteria.

As of November 2006 the bank reported the completion of  
Conservation easement – 100 % complete phases I and II  
Removal of planted Pines – complete phases I and III  
Flattening/Restoration of Bedding Rows – 100% complete Phases I and III  
Planting of Native Tree Species – 100% in phases I and III  
Restoration of Hydrologic Levels and Patterns – 100% Phases I and III



## C-26 TM-Econ Mitigation Bank

### Sources:

TM Ranch 2004 Annual Report Environmental Management & Design, Inc. April 2005

SJRWMD Individual Environmental Resource Permit Technical Staff Report 4-095-84310-1 January 8, 2003

Site Visit and personal communication with James L. Clark, consultant August 11, 2005

Location: Orange county, T 24S R32E sections 15, 16, 21, 22, 27, 28, 33, 34

Bank Ownership: private

Bank size: 5,199 acres

Credits potential: 1568.6

Credits released: 227.97

Credits used: 150.31 Closed, 3.1 Reserved

MBI: Yes

Credit data from October 31, 2006.

### Bank summary

The bank's natural communities include pine flatwoods, hydric pine flatwoods, xeric scrub, marshes, wet prairie, and cypress dominated strands. Historically it was used for laser testing, cattle grazing, hunting and silviculture. Restoration activities have included habitat enhancement for Red Cockaded Woodpeckers, prescribed fire, exotic control, hydrologic enhancements by installing ditch blocks, culverts, low water crossings, and increasing hydrologic connections. Wetlands were created for water fowl and wading bird habitat. The headwaters for the Econlockhatchee River are on the bank.

### Fire

Prescribed fire plan has been developed for the bank, upland and prairie habitats will be burned on a three- to 10-year return interval depending on the vegetative communities to be maintained. Prescribed fire is used to enhance and maintain natural communities and ecotones to promote better habitat for wildlife (especially listed species).

Follow up and monitoring occurs after prescribed fire to evaluate the burn. Long-term monitoring will be critical in evaluating whether the fire management strategies and tactics are meeting the management goals. Continuing field surveys will document the recovery of desired vegetation in burn plots, long-term tree mortality or insect attacks, and effects of fire on hydrology. Plant species monitoring will be established and conducted through repeated inventories to evaluate stable or increasing populations of desirable plant species as well as identifying problem areas. All evaluations will help determine if the implementation of the fire management goals is effectively maintaining or modifying the structures and functions of the various ecosystems within the parcel.

Prescribed fire in the dormant season was used as a restorative technique because there were concerns that fuel build up could effects cavity trees for red cockaded woodpeckers.

### Hunting

The right to hunt has been reserved by the bank owners. Proposed hunting restrictions limit the maximum number of hunters at any one time to 20, limit the maximum number of dogs at any one time to 10, and restrict vehicles to the maintained roads. The use of dogs will be primarily for deer and hog hunting. Controlling the wild hog population is part of the management plan for the bank.

### Reference community

Vegetative data collected during Spring 2004 and Fall 2004 baseline monitoring surveys will be compared to vegetative data collected during all post-construction monitoring events. In addition, vegetative data for primary and secondary enhancement areas will be compared to control wetlands in the enhanced wetland preservation systems. Comparisons to control data and baseline data will help determine if the removal of hydrologic impairments have positively affected the enhancement wetlands. Baseline conditions are collected for total cover, desirable wetland species cover, desirable upland species cover, nuisance species cover and average water depths. Baseline data indicates a trend in the primary wetland enhancement areas for decreased herbaceous cover downstream from the

hydrologic impediments when compared to the upstream vegetative data. It is anticipated that the variation in the plant composition of the upstream and downstream communities in the primary enhancement areas will decrease over time in response to the changes in hydrology and land management activities.

Both gopher tortoises and red cockaded woodpeckers occur on the mitigation bank. The bank’s plan recognizes the appropriate habitat needs for those species. The bank also recognizes pre-restoration community types and notes the type of ecological disruptions and impacts. The gopher tortoise requires habitats with well-drained loose soil in which to excavate burrows, a low (fire-maintained) herbaceous ground cover for foraging, and open sunlit sites for placing nests. Typical habitats utilized include sandhill, scrub, upland pine flatwoods, and disturbed upland habitats. Red cockaded woodpeckers require old-aged living pines maintained by frequent fires. Native ground cover vegetation in the form of grasses and herbaceous plants appear to be of importance to produce the insect fauna necessary to support foraging red-cockaded woodpeckers. The understory in the flatwoods is sparse and includes a few turkey oak and sand live oak. The shrub layer includes saw palmetto, coastal plain staggerbush, fetterbush, and gallberry. The saw palmetto layer is generally less than two feet in height in most red-cockaded woodpecker habitats. In a few areas the palmetto is higher than desirable for conducting control burns. The open pine canopy promotes the development of a rich savannah-like ground cover of herbaceous species.

Success criteria

Criteria type	Wetland restoration	Wetland creation	Wetland enhancement
Cover and/or survivability	<p>≥ 70% aerial cover herbaceous spp. (herbaceous)</p> <p>Tree survival ≥ 80%, trees must show evidence of growth (height and/or canopy) for 2 consecutive growing seasons. (forested)</p>	<p>≥ 70% aerial cover herbaceous spp</p>	<p>Functional &amp; natural hydroperiod is restored as determined by vegetative monitoring.</p>
Desirable species	<p>≥ 80% herbaceous cover will be desirable (FAC or higher )</p>	<p>≥ 80% herbaceous cover will be desirable (FAC or higher )</p>	<p>Vegetation data meets or exceeds the % of desirable wetland vegetation in control wetlands or % of desirable vegetation increases significantly from baseline.</p>
Exotic and nuisance	<p>Complete removal of exotic and nuisance spp., minimum of four successive six-month monitoring events that indicate ≤ 10% cover (prior to maintenance)</p>	<p>Complete removal of exotic and nuisance spp., minimum of four successive six-month monitoring events that indicate ≤ 10% cover (prior to maintenance)</p>	<p>&lt; 10% cover</p>

Shrub islands in the created wetlands and restored wetlands within Fourmile Creek will be qualitatively monitored for rookery activity.

Primary and secondary enhancement wetlands are compared to control wetlands on site to determine success. Control wetlands consist of non-stressed wetlands and were selected from preservation wetlands of similar composition as the monitored enhancement wetlands. Enhanced wetlands shall be successful when the functional and natural hydroperiod is restored as determined by vegetative monitoring, based on a comparison of the enhancement areas to similar zones in the control wetlands. When vegetation data meets or exceeds the percentage of desirable wetland vegetation recorded for similar zones in the control or the percentage of desirable wetland vegetation increases significantly from the baseline data, the wetlands will be deemed successful.

Enhanced wetland preservation areas and enhanced upland preservation areas do not have success criteria but will be maintained and monitored for exotic species. Survival of planted pines in the uplands will be evaluated during monitoring surveys; supplemental plantings will be conducted if attrition of pine seedlings is high.

Number of credits broken out by action

Action	Acres and potential credit
Wetland restoration	29.79 acres = 29.8 credits
Wetland creation	3.23 acres = 3.2 credits
Wetland enhancement	1526.79 acres = 308.1 credits
Wetland preservation	883.04 acres = 112.5 credits
Upland enhancement	2756.05 acres = 1115.0 credits

Schedule of release of credits

Successfully completed activity	Percent credit release
Conservation easement, acceptable title insurance, construction/implementation bond and perpetual management trust fund	30%
Complete construction of hydrologic enhancements	15%
After a minimum of 1 year monitoring indicates success	10%
After a minimum of 2 years monitoring indicates success	10%
After a minimum of 3 years monitoring indicates success	10%
After a minimum of 4 years monitoring indicates success	10%
Final success achieved (with minimum 5 years monitoring) 100% of created wetland credits will be released only after a minimum of 3 years monitoring indicates successful establishment.	15%

Source: Staff Report SJRWMD 4-095-84310-1 January 2003

## C-27 Tosohatchee Mitigation Bank

### Sources:

SJRWMD Management and Storage of Surface Waters Technical Staff Report. Florida Department of Transportation District 5. October 10, 1995

SJRWMD Permit Tosohatchee Mitigation Bank Permit number 4-095-0499G October 10, 1995.

Site Visit 9/14/05

Location: Orange County, Section 15, 16, 21, 22, 27, 28, 33, 34, 04 Township 23S and 24S Range 34E

Bank Ownership: public land was owned by the Florida Park Service now managed by FWCC, bank applicant FDOT district 5

Bank size: 1,312 acres

Credit potential: 185.0

Credits released: 185.0

Credits used: 152.9

MBI: Yes

Credit data from October 2006

### Background Summary

The state owned Tosohatchee Reserve has 3.1 miles of canal that were filled by FDOT with the adjacent spoil berm and then re-vegetated. The foot print of the canal runs through various natural habitats in the reserve including mixed forest, marsh, wet prairie, and mixed pine and hardwood uplands. The property is cut in half by the Beachline Expressway connecting Orlando to the coast formerly known as the "Beeline". Although the canal footprint is approximately 56 acres, the expected hydrologic enhancements include 1,312 acres, the size of the bank. Shallow ponds of 2 to 3 feet are permitted on the canal because of a lack of spoil to completely fill the canal to grade. Ponds are spaced 200 feet apart. Vegetation for planting the disturbed areas will be taken from donor sites in the preserve.

### Fire

The management unit as a whole known as Tosohatchee Reserve has an active prescribed fire program.

### Hunting

Tosohatchee Reserve is open to the public for hunting of game animals.

### Reference Community

Planted species for the disturbed canal footprint are taken from donor sites in the reserve; planted species to be utilized are *Juncus effuses*, *Juncus roemerianus*, *Cladium jamaicense*, *Iris virginica*, *Panicum hemitomon*, *Pontederia cordata* and *Sagittaria lancifolia*.

### Success Criteria

Desirable vegetation	80 % cover of appropriate wetland herbaceous species and > 80 % survival of planted vegetation, planted vegetation must also show signs of normal annual growth, based upon standard growth parameters such as height and base diameter or canopy circumference after 3 years
Exotic and nuisance vegetation	< 10 % must monitor and control for a minimum of 5 years
Hydrology	Information about the target hydrology was not acquired by this project

#### Credit Release Schedule

Activity	Percent Release
Complete canal filling	31.4%
Complete planting of former canal and berm	18.6%
Planted area reaches 80% coverage by desired species	18.6%
Demonstration of hydrologic enhancement of entire 1328 acres via monitoring data	31.4%

#### Monitoring Results

Long term management for the bank has been turned over to the land managers where it is treated as part of the whole of the reserve. The staff at the reserve knew of the mitigation bank but had no documentation in regards to the activities there nor were there requirements for management goals different from that of the rest of the reserve.

## C-28 Tupelo Mitigation Bank

### Sources

SJRWMD Individual Environmental Resource Permit Technical Staff Report Tupelo Mitigation Company. August 11, 2004

SJRWMD Individual Environmental Resource Permit Technical Staff Report Tupelo Mitigation Company. November 2003

Site visit on 9/30/2005

Location: St. Johns County, Sections 14, 15, and 16 Township 7S Range 28E

Bank Ownership: private

Bank size: 1,525 acres

Credit potential: 459.7

Credits released: 144.85

Credits used: 144.52

MBI: Yes

Credit data from October 2006

### Background Summary

This bank has historically been used for silviculture since the early 1900s. Later in the century the entire property (including the wetlands) was clear cut, root raked and bedded. Native trees and planted slash pine have been harvested numerous times on the bank. The site was also drained. The bank proposes to end silviculture practices, remove the planted pine, enhance the hydrology, remove logging roads, and implement prescribed burning. Most of the planted pines are harvestable at the time this bank is being permitted. Pre 1994 bedding has eroded down to 6" or less, more recently bedded areas will be bull dozed flat. Less than 3% of pine trees will be left as a natural component to mesic and hydric flatwoods.

### Fire

"The mitigation plan includes the prescribed burning of all appropriate habitats, in a piecemeal fashion, to assure a high level of productivity for uplands." A certified burn specialist will create a "time-specific" burn plan. Prescribed fire will be used as a restoration tool and for management.

### Hunting

Hunting is prohibited except to remove feral hogs.

### Reference Community

The bank's technical report states that native plants and their historic communities will be nurtured through direct protection and by eliminating the planted pine. Habitat types will be completed by mimicking natural systems that once dominated the site by planting native tree species. The bank is expected to offset many avian habitat functions associated with typical mixed forested wetlands within the watershed. There are no sources mentioned or examples given of what the natural systems are being restored.

### Success Criteria

Desirable canopy	Minimum height requirement of 6 feet for all trees and which are present in an assemblage that reflects the diversity in the target vegetative community assemblage. 100 trees per acre in the forested wetlands. Forested wetland canopy shall have an overall canopy coverage of $\geq$ 25% by mast-forming trees with evidence of additional growth of mast-forming trees in the understory or groundcover. 25 trees per acre in the uplands
Exotic and nuisance species	$\leq$ 10% cover

Interim criteria for the bank states that “successful establishment during any monitoring event will be indicated by a minimum density of 100 surviving and growing trees per acre in an assemblage that reflects the diversity of the target community assemblage.” The “area must also exhibit wetland hydrology and have vegetative wetland jurisdictional status.” (SJRWMD technical staff report)

Credit Release Schedule

Activity	Percent Release
Conservation easement on the entire property	25 %
Remove planted pines	5 %
Flatten/cross-block the bedding	5 %
Complete tree plantings	5 %
Complete hydrologic enhancement construction	10 %
Document hydrologic enhancement (with a minimum of 3 years monitoring)	10 %
After 1 year monitoring indicates success	4 %
After 2 year monitoring indicates success	4 %
After 3 year monitoring indicates success	4 %
After 4 year monitoring indicates success	4 %
After 5 year monitoring indicates success	4 %
Final success achieved with minimum of 5 years monitoring	20 %

Monitoring Results

The bank was still in early stages of implementing restoration at the time of the sight visit. The bank has had some clear cutting of the pines but other restoration actions were unknown. Many forbs were flowering but there were not many graminoid species. The cut over area we visited still had drastic bedding with linear stratification of upland and wetland plant species across the rows. Wetlands were pretty impacted by the change in hydrology and the planted pine.