PLUM CREEK RESTORATION ANNUAL MONITORING REPORT (2010)

Impacts: SR 79 Open Creek Bridge; Washington Co.; NW26; 1.82-acre impact; USACE Permit SAJ-2005-8649 IP-DEB issued (8/10/06)
SR 79 Holmes Creek Bridge; Washington Co.; NW27; 8.04-acre impact per FDOT Inventory; USACE Public Notice SAJ-2006-4627 IP-DEB (8/24/06)

Mitigation: Plum Creek
Monitoring Date: October 28, 2010

SCOPE

Bridge repair and construction at two sites have resulted in impacts that are being mitigated at this site. Plum Creek is a 130-acre tract located approximately 600 feet north of Holmes Creek in Washington Co., and is contiguous with extensive NWFWMD land holdings. In consultation with USACE, it is estimated that 12.07 credits will be obtained from implementation of this mitigation effort.

MITIGATION PROJECT

The uplands on this site consist of FLUCCS 441 – Coniferous Plantation [Polygon D, E & F] (i.e., mature, bedded, slash pine plantation with a moderately diverse understory), whereas the wetlands are characterized as FLUCCS 630 – Mixed Forested Wetlands [Polygon A & C] (~30 acres), FLUCCS 640 – Non-Forested Wetlands [Polygon B] (~30 acres), and a small, previously un-delineated connection consisting of FLUCCS 625 – Hydric Pine Flatwoods [Polygon D] (0.88 acre). The existing forested wetlands are generally of high quality. Historic aerials demonstrate that the currently non-forested wetlands once had a mature, closed-canopy wetland forest. Beaver activity (damming and deforestation) and possible timber harvesting likely caused this loss of forested habitat. Wetland and upland polygons on the attached maps were delineated from 2004 DOQs and then overlaid on the 1955 aerial. Based on historic Palmer Hydrologic Drought Index data, the Plum Creek parcel was experiencing extreme drought when the 1955 aerials were taken, thus obscuring portions of wetland areas in the image.

Conversion of the upland forested buffers to pine plantation and hydrologic alteration from beaver activity/timber removal are the primary impacts to the natural vegetation communities of this site. Regional development pressures (e.g., the planned Panama City airport, anticipated four-laning of nearby SR 79, large-scale housing projects proposed for the nearby town of Vernon, etc.) and expected population growth suggest a high likelihood that without preservation this site will be developed.

The goal of this project is the acquisition, preservation, restoration and management of the 130-acre Plum Creek tract. Approximately 70 acres pine plantation will be restored to native pine forest (FLUCCS 411), coupled with preservation and restoration/enhancement of approximately 60 acres of forested wetlands. The restored site will be owned and managed in perpetuity for ecological integrity by the NWFWMD. The connectivity of this parcel to extensive NWFWMD

holdings along the Holmes Creek floodplain greatly increases its restoration and preservation value.

RESTORATION ACTIVITIES

In the native pine forest (FLUCCS 411) areas of the site, restoration has been started with tree thinning in fall 2009. Actual restoration techniques implemented will be dependent upon site-specific conditions and adaptive management. In both upland and wetland polygons, management strategies for nuisance and exotic species will be implemented as necessary. Forested wetland areas (FLUCCS 625 & 630) are being preserved in their existing condition, whereas the impacted non-forested wetlands will be hydrologically restored and planted with appropriate species, including cypress and tupelo. Hydrologic restoration of the site is being accomplished through removal of an extensive network of beaver dams and further hydrologic enhancement downstream. A properly sized culvert will replace an improvised culvert on NWFWMD lands ~500 feet south of the Plum Creek property boundary. Acquisition of this tract has eliminated the high probability of future rural/residential development and ensures its perpetual preservation.

MONITORING

The 2010 monitoring event took place on October 28, 2010. There were no signs of trespassing or abuse. Site was clear along roads. Small patches of Japanese climbing fern (*Lygodium japonicum*) was observed along the main road in the southeastern portion of the property (FLUCCS 441 – Coniferous Plantation [Polygons D & E]).
Wetlands are in an appropriate and healthy condition relative to the mitigation targets. The eastern and western forested wetlands (FLUCCS 630 – Mixed Forested Wetlands [Polygon A & C]) are in good health with the appropriate species composition and cover. The eastern forested wetlands exhibit good quality bottomland forest with many large cypress and tupelo present. Firebreaks around the outer edge of this community have created vegetation and soil disturbance in the natural upland ecotone. These disturbances should be addressed re-habbing the firebreaks and, in the future, by allowing fire to naturally extinguish at the wetland edge and/or using narrower firebreaks.

The impacted forested wetlands (FLUCCS 640 – Non-Forested Wetlands [Polygon B]) were successfully drained this year and the soils were saturated to the surface, but not inundated, at the time of monitoring. The draining of Polygon B is on target to the re-establishment of cypress and other hydrophytic species and the eventual restoration of a closed canopy.

The uplands (FLUCCS 441 – Coniferous Plantation [Polygon D, E & F]) are still in a transitional phase from silvicultural operations to the native sandhill community. The fuel load is moderate, consisting primarily of medium sized woody debris from clearing and herbaceous fine fuel. Wiregrass is sparse but present. Longleaf pine is also very sparse, although some seedlings were observed. The presence of longleaf pine seedlings indicates that the area is trending towards re-establishment of the historical canopy. Prescribed fire and the future planting of wiregrass and longleaf pine will keep this area on the path to successful restoration.

WORK SCHEDULE

Plantation thinning: **Completed Fall 2009**

Annual monitoring performed: **completed 10/28/2010**

Site purchase: **completed December 2009**

Beaver control and culvert placement: completed **June 2010**

SUCCESS CRITERIA

The project success criteria are:

1. No observable decline in vegetation community health **– No decline observed**
2. Species diversity is, at a minimum, stable in each wetland polygon **- Yes**
3. No more than 1% coverage of invasive exotics and 5% coverage of nuisance native and non-invasive exotic species **– No more than 1% cover of invasive exotic species were observed, however *Lygodium japonicum* was present along the main road and should be treated. Early successional native ground cover species are common in the upland polygons, but will decline over time with appropriate management regimes (i.e. prescribed fire).**
4. No more than 200 pine (longleaf or slash) trees per acre in upland areas **– No more than 200 pines per acre are present**
5. Not less than 300 trees per acre in Polygon B (cypress, tupelo or other species) **– Less than 300 trees per acre are present in Polygon B; however, this area was recently drained by removing beaver dams in an effort to restore a natural hydroperiod that over time will lead to the re-establishment of the target tree density.**

CONCLUSIONS

Based on the October 2010 monitoring event, the success criteria are being met or are in the process of completion to date and the project is trending toward success. Subsequent monitoring events will address the criteria annually as more work is completed.

Figure 1. Location Map

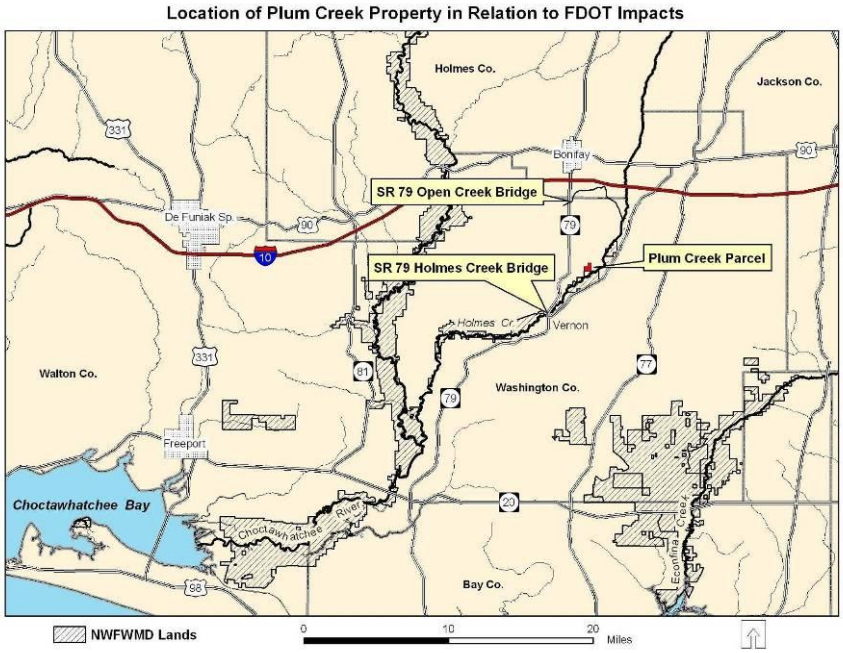

Figure 2. Plum creek restoration plan polygons.

Figure 3. Polygon A: Forested wetland, good species composition and cover.

Figure 4. Polygon B: Drained wetland, beaver dam recently removed.

Figure 5. Polygon E/A edge: Damage in ecotone from large firebreak.

Figure 6. Polygon E: Upland, undergoing restoration.

Table 1. Plant Species observed, 2010.

Scientific Name	**Common Name**	**Polygon A**	**Polygon B**	**Polygon D**	**Polygon E (Upland)**
Ambrosia artemesifolia	annual ragweed				X
Andropogon virginicus	broom sedge			X	
Aristida stricta var. beyrichiana	qiregrass				
Andropogon virginicus var. *glaucus*	chalky bluestem			X	
Aristida stricta	pineland threeawn				X
Arundinaria gigantea	switchcane	X	X	X	
Asclepias humistrata	milkweed				
Asimina angustifolia	slimb-leaved paw paw				X
Aster reticulates	pinewood aster				
Baptisia lanceolata	pineland wild indigo				
Baptisia lecontii	pineland wild indigo				
Bidens mitis	smallfruit beggarticks		X		
Berlandiera pumila	green eyes				
Callicarpa Americana	beauty berry			X	X
Carex elliottii	Elliot's sedge	X	X		
Carex sp.	sedge	X			
Centella asiatica	spadeleaf	X			
Cladium jamaicense	Jamaica swamp sawgrass		X		
Cladonia sp.	lichen				X
Clethra alinfolia	sweet pepper bush	X	X	X	
Cliftonia monoplylla	black titi	X	X	X	
Cnidoscolus stimulosus	tread softly				X
Conyza canadensis	Canadian horseweed				X
Cornus florida	flowering dogwood				
Croton argyranthemus	healing croton				X
Croton michauxii	Michaux's croton				
Cyrilla racemiflora	red titi				
Dalea pinnata	summer-farewell				
Decodon verticillatus	swamp loosestrife				
Dichanthelium aciculare	needleleaf rosette grass				X
Dicanthelium spp.	panic grass	X	X	X	
Diospyros virginiana	persimmon				X
Dulichium arundinaceum	three-way sedge				
Elephantopus alatus	tall elephantsfoot				X
Elephantopus carolinianus	Carolina elephant's foot				
Erigonum tomentosum	wild buckwheat				X
Eriocaulon decangulare	pipewort		X		
Eupatorium capillifolium	dogfennel	X		X	
Eupatorium compositifolium	yankeeweed	X	X	X	X
Eupatorium mohrii	Mohr's thoroughwort				
Gaylussacia frondosa	blue huckleberry			X	
Gelsemium sempervirens	yellow jessamine			X	X
Gnaphalium pensylvanicum	cudweed				
Hibiscus aculeatus	comfort root				
Hibiscus arctatus	rosemallow				
Hypericum gentinoides	Pineweed	X	X		
Hypericum tetrapetalum	fourpetal St. Johnswort			X	
Ilex coriacea	large gallberry	X	X	X	
Ilex glabra	inkberry			X	X
Ilex opaca	American holly				
Ilex vomitoria	yaupon				X

Scientific Name	Common Name	Polygon A	Polygon B	Polygon D	Polygon E (Upland)
Itea virginica	Virginia willow	X	X		
Juncus effuses	soft rush	X	X		
Juncus repens	lesser creeping rush				X
Juncus sp.	rush	X	X	X	
Lachnanthes caroliana	red root	X	X	X	
Leucothoe axillaris	coastal dog hobble	X	X		
Leucothoe racemosa	swamp dog hobble	X	X		
Liatris elegans	pinkscale blazing star				X
Liatris graminifolia	shaggy blazing star				X
Liquidambar styraciflua	sweet gum	X	X	X	X
Limnobium caroliniana	spongeplant		X		
Ludwigia sp.	primrose willow	X	X	X	
Lycopus amplectens	clasping waterhorehound				
Lycopus virginicus	Virginia water horehound	X			
Lygodium japonicum	Japanese climbing fern				X
Lyonia lucida	fetterbush	X	X	X	
Lyonia lucida	fetterbush lyonia	X			
Magnolia grandiflora	southern magnolia				
Magnolia virginiana	silver bay	X		X	
Myrica cerifera	wax myrtle	X	X	X	
Myrica heterophylla	southern bayberry	X			
Myrica inodorata	odorless wax myrtle	X		X	
Nymphaea odorata	fragrant water lily		X		
Nyssa biflora	swamp tupelo	X	X		
Nyssa sylvatica var. *biflora*	black gum				
Osmanthus americanus	wild olive	X			
Osmunda cinnamomea	cinnamon ferm	X			
Osmunda regalis	royal fern				
Panicum verrucosum	warty panicgrass	X		X	
Paspalum notatum	bahiagrass				X
Persea borbonia	red bay	X	X	X	
Persea paulistris	silk bay	X	X	X	
Photinia pyrifolia	red chokeberry				
Pieris phillyreifolia	climbing fetterbush	X			
Pinus elliottii	Slash pine	X	X	X	
Pinus palustris	longleaf pine				X
Pinus taeda	loblolly pine		X		X
Polygala nana	wild bachelor's button		X		
Polypremum procumbens	juniper leaf			X	X
Prunus angustifolia	chickasaw plum				
Prunus serotina	black cherry				
Pteridium aquilinum	bracken fern			X	X
Quercus falcate	red oak				
Quercus geminate	sand live oak				
Quercus hemisphaerica	laurel oak	X	X		
Quercus incana	bluejack oak				X
Quercus laevis	turkey oak				
Quercus margaretta	runner oak				X
Quercus nigra	water oak	X	X		X
Quercus velutina	black oak				X
Rhexia sp.	meadowbeauty			X	
Rhododendron viscosum	swamp azalea	X	X		

Scientific Name	Common Name	Polygon A	Polygon B	Polygon D	Polygon E (Upland)
Rhus copallinum	winged sumac				X
Rhynchosia reniformis	dollarleaf				X
Rhynchospora chapmanii	Chapman's beaksedge	X		X	
Rhynchospora fascicularis	fascicled beaksedge	X			
Rhynchospora nitens	shortbeak beaksedge		X		
Rhynchospora oligantha	featherbristle beaksedge	X			
Rubus argutus	sawtooth blackberry	X			
Rubus cuneifolius	sand blackberry		X	X	
Salvia azurea	azure blue sage				X
Sassafras albidum	sassafras				X
Schizachyrium sp.	bluestem				X
Schrankia microphylla	sensitive briar				
Scirpus cyperinus	woolgrass	X			
Scleria triglomerata	whip nutrush	X		X	
Serenoa repens	saw palmetto				
Smilax bona-nox	saw greenbrier				X
Smilax glauca	greenbriar				
Smilax laurifolia	laurel greenbrier	X			
Smilax sp.	greenbriar	X	X	X	
Solidago odora	anisescented goldenrod				X
Sphagnum sp.	sphagnum moss	X	X		
Stillingia sylvatica	queen's-delight				X
Symplocos tinctoria	common sweetleaf	X			
Taxodium ascendens	pond cypress	X	X		
Toxicodendron radicans	poison ivy	X		X	
Triadenum virginicum	marsh St. John’s wort				
Trichostema dichotomum	forked bluecurls				
Trichostema dichotomum	blue curls				
Vaccinium arboreum	sparkleberry				
Vaccinium corymbosum	highbush blueberry	X	X	X	
Vaccinium elliottii	Elliott's blueberry			X	
Vaccinium stamineum	deerberry				
Vitus rotundifolia	muscadine grape	X		X	
Woodwardia areolata	netted chain fern	X	X	X	
Woodwardia virginica	Virginia chain fern	X	X	X	
Xyris ambigua	coastal plain yelloweyed grass	X			
Xyris fimbriata	fringed yelloweyed grass	X	X	X	
Xyris flabelliformis	savannah yelloweyed grass		X		
Yucca filamentosa	Adam's needle				

X=newly observed in 2010

Site Inspection Field Form	
Project: Plum Creek	Date: 10/28/10
Name(s) of Data Collectors: Caitlin Elam and Alex Barth	Weather: 70's, cloudy with a light drizzle
Environmental Description: cleared upland and preserved mixed forested wetland	

Qualitative Assessment

1. No observable decline in vegetation community health-Yes, met
2. Species diversity is, at a minimum, stable in each wetland polygon-Yes
3. No more than 1% coverage of invasive exotics and 5% coverage of nuisance native and non-invasive exotic species-Yes
4. No more than 200 pine (longleaf or slash) trees per acre in upland areas-Yes
5. Not less than 300 trees per acre in Polygon B (cypress, tupelo or other species)-Not yet, re-establishment of canopy is in progress

On at least a yearly basis, the site will be inspected as follows:

A: Perimeter for signs of trespassing, fencing and signage integrity and infestation by exotic or nuisance vegetation;

No signs of trespassing or abuse. Site was clear along roads. Small patches of *Lygodium japonicum* on main road.

B: Internal Roads (Both public and maintenance) for signs of dumping or trespassing, erosion, bridges and road integrity, and exotic or nuisance species infestations;

Main gate locked. No observable sign of trespassing. Some minor erosion along road.

C: All construction areas for stabilization and re-vegetation, structure, operation, and integrity;

N/a.

D: Representative polygons for each UMAM community for fuel load, exotic or nuisance species, planted material survival, groundcover, and shrub condition.

Wetlands exhibit appropriate species composition and cover. Polygon B (impacted wetland) has been drained and will show an increase in desired species cover; the species composition is currently appropriate. Uplands are transitioning from silvicultural operations; need longleaf pine and wiregrass plantings, and a prescribed burn.

Vegetation Assessment Field Form Qualitative Assessment: Plum Creek

Project: Date: 10/28/10

Name(s) of Data Collectors: Caitlin Elam and Alex Barth Weather: 70's, overcast and intermittently raining

Environmental Description: cleared upland and preserved mixed forested wetland

Nuisance Species: Small patches of *Lygodium japonicum* along main road in southeastern portion of property. Fuel Load: Moderate, medium sized shrubs and herbaceous fine fuel in upland polygon, dense medium sized living shrubs in preserved mixed forested wetland, low aside from organic soil horizon in impacted wetland (Polygon B).

- Wildlife Observations: None.
- Water depth: Wetlands are saturated to soil surface but not inundated.
- Is the community observed along the walk path representative of the community being measured? Yes.
- To what degree is the restoration in this area trending towards success? The area is trending towards success. The uplands have been cleared of planted pine and exhibit appropriate species composition with a moderate shrub layer and a sparse herbaceous layer. Polygon B has been drained; this will allow for the re-establishment and increase of native canopy cover.
- Potential Problems and solutions: The firebreak at the junction of polygons A and E is very wide and has disturbed the soil in the natural ecotone. The firebreak may be able to be narrower allowing fire in the part of the ecotone that would increase characteristic native herbaceous cover.

Scientific Name	**Common Name**	**Polygon A Site 1**	**Polygon A Site 2**	**Polygon B Site 3**	**Polygon B Site 4**	**Polygon D Site 5**
Andropogon virginicus	Broom sedge					X
Aristida stricta var. *beyrichiana*	Wiregrass					
Arundinaria gigantea	Switchcane	X	X	X	X	X
Asclepias humistrata	Milkweed					
Asimina angustifolia	Slimb-leaved paw paw					
Aster reticulatus	Pinewood aster					
Baptisia lanceolata	Pineland wild indigo					
Berlandiera pumila	Green eyes					
Callicarpa americana	Beauty berry					X
Carex elliottii	Elliot's sedge	X	X	X		
Clethra alinfolia	Sweet pepper bush	X	X	X	X	X
Cliftonia monoplylla	Black titi	X	X	X	X	X
Cnidoscolus stimulosus	Tread softly					
Cornus florida	Flowering dogwood					
Cyrilla racemiflora	Red titi					
Dalea pinnata	Summer-farewell					
Decodon verticillatus	Swamp loosestrife					
Dicanthelium spp.	Panic grass	X	X	X	X	X
Diospyros virginiana	Persimmon					
Dulichium arundinaceum	Three-way sedge				X	
Elephantopus carolinianus	Carolina elephant's foot					
Erigonum tomentosum	Wild buckwheat					
Eriocaulon decangulare	Pipewort			X	X	
Eupatorium compositifolium	Dog fennel	X	X	X	X	X
Gelsemium sempervirens	Yellow jessamine					X
Gnaphalium pensylvanicum	Cudweed					
Hibiscus aculeatus	Comfort root					
Hypericum gentinoides	Pineweed	X		X		
Ilex coriacea	Large gallberry	X	X	X	X	
Ilex glabra	Gall berry					X
Ilex opaca	American holly					
Ilex vomitoria	Yaupon					

Scientific Name	**Common Name**	**Polygon A Site 1**	**Polygon A Site 2**	**Polygon B Site 3**	**Polygon B Site 4**	**Polygon D Site 5**
Itea virginica	Virginia willow			X	X	
Juncus effusus	Soft rush	X	X	X		
Juncus sp.	Rush	X	X	X		X
Lachnanthes caroliana	Red root	X	X	X	X	X
Leucothoe axillaris	Coastal dog hobble	X	X		X	
Leucothoe racemosa	Swamp dog hobble	X	X	X		
Liquidambar styraciflua	Sweet gum	X	X	X	X	X
Ludwigia sp.	Primrose willow	X	X	X	X	X
Lycopus amplectens	Clasping waterhorehound					
Lyonia lucida	Fetterbush	X	X	X	X	X
Magnolia grandiflora	Southern magnolia					
Magnolia virginiana	Silver bay	X	X			X
Myrica cerifera	Wax myrtle	X	X	X	X	X
Myrica inodorata	Odorless wax myrtle	X	X			X
Nymphaea odorata	Fragrant water lily			X	X	
Nyssa sylvatica var. *biflora*	Black gum					
Osmanthus americanus	Wild olive					
Osmunda regalis	Royal fern					
Persea borbonia	Red bay	X	X	X	X	X
Persea paulistris	Silk bay	X	X	X	X	X
Pinus elliottii	Slash pine	X	X	X	X	X
Pinus palustris	Longleaf pine					
Pinus taeda	Loblolly pine			X	X	
Polygala nana	Wild bachelor's button			X	X	
Prunus angustifolia	Chickasaw plum					
Prunus serotina	Black cherry					
Pteridium aquilinum	Bracken fern					
Quercus falcata	Red oak					
Quercus geminata	Sand live oak					
Quercus hemisphaerica	Laurel oak	X	X	X	X	
Quercus nigra	Water oak	X	X	X	X	
Rhododendron viscosum	Swamp azalea			X	X	
Rhus copallinum	Winged sumac					
Rubus cuneifolius	Sand blackberry			X	X	X
Schrankia microphylla	Sensitive briar					
Serenoa repens	Saw palmetto					
Smilax glauca	Greenbriar					
Smilax sp.	Greenbriar	X	X	X	X	X
Sphagnum sp	Sphagnum moss	X	X	X	X	
Taxodium ascendens	Pond cypress	X	X	X	X	
Toxicodendron radicans	Poison ivy	X	X			X
Triadenum virginicum	Marsh St. John's wort					
Trichostema dichotomum	Blue curls					
Vaccinium arboreum	Sparkleberry					
Vaccinium corymbosum	Highbush blueberry	X		X	X	X
Vitus rotundifolia	Muscadine grape	X	X			X
Woodwardia areolata	Netted chain fern	X	X	X	X	X
Woodwardia virginica	Virginia chain fern	X	X	X	X	X