

Big Cypress National Preserve
Designated Off-road Vehicle (ORV)
Trails Mitigation Plan

Proposed Wetlands Mitigation for Designated Off-Road Vehicle Trails

November 2003

Resource Management Division

Big Cypress National Preserve

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A. Introduction

As part of an Off-road Vehicle (ORV) Management Plan approved by the National Park Service (NPS), U.S. Department of the Interior, Big Cypress National Preserve has undertaken restoration activities in several areas that have been ecologically compromised by ORV activities. In 2000 the Preserve began designating a system of about 400 miles of ORV trails in response to contention between conservation organizations in southern Florida and groups that commonly use the Preserve for ORV recreation. The designated trail system will allow limited use of the Preserve by ORV users and help limit habitat alteration that occurred nearly throughout the Preserve. Restriction of ORV traffic to designated trails, however, has resulted in concentrated use of these trails, so that it was necessary to reinforce or stabilize the trails to accommodate the increased traffic.

As part of an agreement between the Preserve and the U.S. Environmental Protection Agency, this Mitigation Plan was developed to compensate for the filling of approximately 34 acres of wetlands. Additionally, this plan provides additional restoration and creation of native wetland communities to help replace wetlands that may be compromised by the designated ORV trail system (Table 1).

Table 1. Estimated Total Areas Affected by ORV Plan.

Disturbed area before trail designation (22,000 mi. x 8'):	21,333 ac.
Disturbed area after designated trails (184.5 mi. x 8' + 215.5 mi. x 12'):	493 ac.
Portion of designated trail to be stabilized (215.5 mi. x 12'):	314 ac.
Designated trail in undisturbed wetlands:	0 ac.
Recovery area after trail designation:	20,840 ac.
Wetland mitigation area to be restored concurrent with trail stabilization:	6,077 ac.

B. Mitigation Description

Although a ratio of 1:1, 2:1, or even 3:1 might be appropriate mitigation to implement the Preserve's ORV Plan, there exists an opportunity to restore more wetland areas previously disturbed by vehicle use than those ratios allow. While the trail stabilization work is underway, the Preserve will have the necessary equipment on site to accomplish needed restoration in areas immediately adjacent to the designated trails. The area of impact by past ORV use is approximately 21,333 acres. Within that area is 314 acres or 215.5 miles of ORV trails within wetlands to be stabilized for continued ORV use. Using the ratios above the Preserve would mitigate 314, 628, or 942 acres, depending on the ratio applied. Since the Preserve will have the equipment to conduct the restoration and mitigation work on site during the trail stabilization, we propose to conduct our mitigation and restoration concurrently. Also, because the Preserve has a desire to correct the wetland impacts resulting from past ORV use on areas larger than only those normally required for mitigation, the Preserve proposes to restore 6,077.91 acres of disturbed

wetlands. This represents 40.21 acres of fill pad removal, 9.70 acres by eliminating an obsolete drainage canal, and 6,028 acres of marl prairie restoration. Three major components thus make up this mitigation plan: removal of fill areas, restoring a borrow canal area with concomitant topographic and hydrologic restoration and wetland habitat creation, and restoration of marl prairies in which severe disturbance by ORV traffic has occurred.

1. Filled Areas for Restoration. Many areas within the Preserve were prepared for construction of residences, businesses, roads, or camps. Almost all of this activity occurred before 1974 when the Preserve was established, or occurred since then on properties within the Preserve that were privately held. Several of these fill sites are proposed for removal as part of this mitigation plan (Table 2).

Table 2. Fill sites proposed for removal in Big Cypress National Preserve, with surrounding biological communities and community types anticipated to develop after fill removal and topographic restoration.

Fill Site	Surrounding community	FLUCCS code	Anticipated community	FLUCCS code	Area (ac.)
Site 27	prairie, dwarf cyp.	643	prairie, dwarf cyp.	643	14.50
Site 77, 78	hyd. pine, cypress	624	hyd. pine, cypress	624	1.08
Site 88	hyd. pine, cypress	624	hyd. pine, cypress	624	2.51
Site 89	hyd. pine, cypress	624	hyd. pine, cypress	624	0.55
Site 90	hyd. pine, cypress	624	hyd. pine, cypress	624	0.25
Site 91	hyd. pine, cypress	624	hyd. pine, cypress	624	2.28
Site 92	cypress	621	cypress	621	2.25
Site 93	hyd. pine, cypress	624	hyd. pine, cypress	624	0.37
Site 94	hyd. pine, cypress	624	hyd. pine, cypress	624	2.80
Site 95	hyd. pine, cypress	624	hyd. pine, cypress	624	0.45
Site 99	prairie	643	prairie	643	1.81
Site 110	hyd. pine, cypress	624	hyd. pine, cypress	624	1.83
Site 111	hyd. pine, cypress	624	hyd. pine, cypress	624	0.70
Site 112	hyd. pine, cypress	624	hyd. pine, cypress	624	1.40
Site 113	hyd. pine, cypress	624	hyd. pine, cypress	624	0.80
Site 114	hyd. pine, cypress	624	hyd. pine, cypress	624	0.40
Site 119	prairie	643	prairie	643	2.73
Bass Lake	hyd. pine, cypress	624	hyd. pine, cypress	624	3.50
			Total		40.21

Typically, site preparation consisted of placing fill in wetlands so that construction or other activities could take place; fill was native limestone, sand, or marl that was mined nearby. As part of mitigation activities, the Preserve proposes to restore wetland habitats by eliminating the fill from some of these areas and allowing native wetlands to become re-established. Fill material consisting of boulders, sand, and other small mineral particles will be returned to borrow areas to create littoral areas on the margins of the borrow ponds that were created by fill-mining activities (Table 3). Fill removal activities will be accomplished primarily with heavy equipment, as these areas are disturbed and are not native biological communities. Precautions will be taken to minimize any effects on adjacent native biological communities.

Table 3. Procedure for Fill Site Restoration.

1. Mechanically remove fill material;
2. Grade the filled area to the level of mineral soils in the surrounding communities;
3. Replace the organic (surface) layer of soil with clean, native, organic soil if available;
4. Inspect materials for environmentally hazardous materials;
5. Place most of the fill material in borrow pits to create littoral zones on the margins of the ponds created by former mining activities;
6. Monitor restoration areas to determine whether native wetland communities are appropriate and native wetland succession is occurring.

2. Filling to Deactivate Birdon Road Drainage Canal. A canal drains much of the area north of Tamiami Trail near Birdon Road. This canal empties into the Tamiami borrow canal about 0.2 mi. west of Birdon Road and was constructed to the northeast, under Birdon Road and intersecting with the Birdon Road borrow canal, for about a mile into wetland communities. Much of the substrate that was excavated to construct this water delivery structure was piled adjacent to the canal and now supports a dense shrub community dominated by the exotic Brazilian pepper (*Schinus terebinthifolius*). Borrow material consisting of boulders, sand, and other small mineral particles will be returned to the canal to block drainage, and this fill will be graded and leveled to match the surrounding surface soil grades. If sufficient material occurs adjacent to the canal, the entire canal will be filled to surrounding grade. If less than sufficient fill occurs adjacent to the canal to fill the entire canal to surrounding grade, the canal will be plugged with fill at locations that will most effectively help restore the area's hydrology. Appropriate placement of these plugs will be determined by hydrology staff at the Preserve. Fill replacement activities will be accomplished primarily with heavy equipment, as these areas are disturbed and are not native biological communities. Precautions will be taken to minimize any effects on adjacent native biological communities. Table 4 summarizes the characteristics of the Birdon Road canal restoration area.

Table 4. Area of Birdon Canal fill removal and topographic reconstruction.

Location	Former community	FLUCCS code	Anticipated community	FLUCCS code	Area (ac.)
Birdon Canal (1 mi.)	prairie, cypress	643	prairie, cypress	643	9.7

3. Restoration of Marl Prairies. A preliminary study looked at areas rutted by ORV operations and areas rutted by ORV operations and subsequently leveled. After one year without ORV traffic, both areas are dominated by ground cover species commonly found in marl prairie communities. Ground cover in the leveled areas appears to be less dense than in the non-leveled areas and may be dominated more by ruderal (weed or early colonizing) species. Both areas appear to be undergoing succession of native plant communities after disturbances.

It will be important to establish detailed study of marl prairies and other communities so that when restrictions of ORV use occur, changes in biological communities can be monitored. As disturbance by ORV use abates, "ecological release" by many of the natural habitats in the Preserve can occur. When this happens, many species may proliferate in areas soon to be without the mechanical disturbance that has been part of the community for several decades. The suspension of soil alteration may allow abundant growth of many native species that are common soon after disturbances. This may be considered a natural, early successional part of re-

colonization by native species in a natural system. Succession in marl prairie communities is largely an unknown natural process that will allow much opportunity for descriptive ecology as the process occurs. It will also be very important for other areas with similar user concerns or other preserves with similar questions about successional changes in natural communities. However, as succession occurs, abundant opportunity also will exist for colonization by many non-native (and unnatural to this suite of habitats, i.e., “exotic”) species. Therefore it will be critical to monitor these areas for infestations by exotic species that are common to disturbed habitats in this area. As part of habitat recovery and resistance to potential displacement by exotic species, habitat restoration measures, including exotic removal and planting of appropriate native species should be considered.

Mitigation areas have been identified and preliminary data have been collected at three sites: George’s Prairie, Oasis Prairie, and Monroe Station Prairie. This year two more areas for ecological recovery data collection have been identified: Buckskin Prairie and Gator Hook Prairie. Virtually all of the Preserve has been affected by ORV traffic, so that additional ecological survey areas can be quickly identified. Places that are located in areas that will help facilitate the logistics of comparison site data collection include the Loop Road and Deep Lake management areas (Table 5).

Table 5. Marl prairie communities proposed for mitigation and studying the effects of restoration treatments in prairie habitats with severe alteration by ORVs.

<u>Mitigation areas:</u>	Habitat before disturbance	FLUCCS code	Habitat to be restored	FLUCCS code	Approximate area to be restored (ac.)	Area to be studied (ac.)
George’s Prairie	marl prairie	643	marl prairie	643	600	100
Oasis Prairie	marl prairie	643	marl prairie	643	1,657	100
Monroe Station Prairie	marl prairie	643	marl prairie	643	1,296	100
Gator Hook Prairie	marl prairie	643	marl prairie	643	1,513	100
Buckskin Prairie	marl prairie	643	marl prairie	643	962	100
<u>Comparison Sites:</u>						
Deep Lake Prairie*	marl prairie	643				50
Loop Unit*	marl prairie	643				50
				Total:	6,028	600

* Deep Lake Prairie has been closed to ORV traffic for about 10 years and is undergoing natural succession; the Loop Unit area has been closed to ORV traffic for about 30 years and is undergoing natural succession. These sites will be considered as comparison sites.

Many marl prairie communities have been severely compromised by ORV activities. These areas are now recovering, as swamp buggy traffic has been prohibited in prairies. We propose to conduct ground surface treatment in these disturbed areas to help insure native community recovery. The ground surface in rutted prairies will be made flat to approximate the ground level before change by ORV traffic. The Preserve’s Maintenance Division will treat rutted areas by driving rubber-tracked vehicles over these areas to create a more level ground surface. This will create more even surface topography so that low areas (ruts) that have longer hydroperiods than

normal for that area and associated ridges with shorter hydroperiods will be eliminated. This will also help eliminate channeling of water that may have occurred in these wetlands because of deeply worn trails. The sizes of these treatment areas are listed in column 6 of Table 5 for each of the affected prairies. We will also establish test plots adjacent to the treatment areas to compare succession of native plants in within study areas (column 7, Table 5). In this way treated areas will be compared to adjacent areas that have received no ground surface preparation. Establishing these plots close together in the same prairie communities will allow paired statistical comparisons. We will establish transects across the test plots to quantify the plants present at the plots.

4. Summary of Proposed Mitigation. Big Cypress National Preserve proposes three types of wetland restoration as mitigation for stabilizing an estimated 314 ac. (215.5 mi.) of existing ORV trails. The mitigation will consist of removal of fill pads and roads that were in place when the Preserve was created in 1974, filling part of a canal that has drained hundreds of acres of wetlands for at least 50 years, and restoration of marl prairies that have been altered by previous ORV traffic (Table 6).

Table 6. Summary of Mitigation at Big Cypress National Preserve.

<u>Mitigation Type</u>	<u>Community to be Restored</u>	<u>Area (ac.)</u>
Fill pad removal	marl prairie, cypress, hydric pines	40.21
Filling drainage canal	marl prairie, cypress	9.70
Marl prairie restoration	marl prairie	<u>6028.00</u>
Total		6077.91

C. Monitoring and Field Sampling Design

Restoration areas will be monitored to determine whether native wetland succession is occurring after fill removal and leveling mineral soils to the levels of mineral soils in the surrounding habitats. Community attributes will be measured to determine whether appropriate succession and native community composition are occurring in the restoration areas.

1. Fill Removal Area Monitoring. Areas from which fill is removed will be monitored by establishing square-meter quadrats to estimate cover and species diversities. The number of quadrats will vary with the area considered but will be representative of the restoration area. Quadrats will also be established in the natural communities adjacent to the restoration areas so that comparisons with naturally occurring areas can be done.

2. Filled Drainage Canal Monitoring. The area of the Birdon Road drainage canal that will be filled and the adjacent filled canal bank from which fill will be removed will be monitored by establishing square-meter quadrats to estimate cover and species diversities. At least ten quadrats will be placed in both the filled canal area and the canal bank from which the fill is taken. Quadrats will also be established in the natural communities adjacent to the restoration areas so that comparisons with naturally occurring areas can be done.

3. Marl Prairie Restoration Monitoring. At each mitigation area, a combination of quadrat and transect sampling areas will be established. Photodocumentation of 100 m x 100 m quadrats will

occur annually. Transects will cross the stabilized trail at representative locations and will be located across prairies on which habitat alteration by ORV traffic has occurred. In most places habitat alteration by ORV traffic is most severe closer to the trails and decreases with distance. Density and diversity of ground cover, shrub layer, and tree canopy will be determined at 5-m intervals on these transects. Surface topography, depth to cap rock, soil descriptions, root densities, soil pH, soil organic content, and other relevant environmental variables will be measured. These measures will be compared with communities having similar abiotic characters but with no apparent alteration by ORVs. Statistical analyses will compare the differences among these communities and differences between the test areas and areas with no apparent disturbance by ORV use. Multivariate analyses are anticipated to evaluate community changes and their differences with similar undisturbed communities over time. Changes in amounts of ruderal plants and wetland-dependent plants will be considered as a metric of succession. Recruitment of large numbers of invasive, non-native plants will receive two considerations: (1) the exotic plant removal program will consider this as a high priority area for treatment; and (2) as a high incidence of exotic recruitment often indicates a disturbance, restoration activities in the area will be evaluated for effectiveness.

4. Overall Monitoring Design.

Vegetative Sampling. Vegetative community compositions in the restoration areas will be estimated for the baseline (before restoration), time zero (at conclusion of physical restoration work), and year one (one year following physical restoration work) through year five. To monitor changes in the restoration areas, we will establish permanent quadrats to measure plant cover; these measures will occur at least once every six months for at least five years from the time of habitat restoration. Measures of plant cover will be considered as indicators of site conditions and will be compared with permanent quadrats that will be simultaneously established in the native communities surrounding the restoration areas. The quadrats in the surrounding natural communities will be established within 50 m of the edge of the restoration areas and will be examined once every six months, simultaneous with the restoration area plant cover measures (above) to estimate cover by vascular plant species. One-meter-by-one-meter, PVC quadrats divided into 100 dm² units will be placed in the restored community quadrat stations and in the surrounding natural community quadrat stations to estimate cover by all vascular plant and macro-algal species within the shadow of the quadrat.

Photographic Documentation. Permanent photopoints will be established at restoration areas.

Fish and Wildlife Observations. Fish and wildlife or signs of wildlife, such as tracks spoor, prey kills, tree rubs, etc., will be noted and recorded during data collection and other times observers are in the restoration areas.

Hydrology. Rainfall, water levels, and basic water quality are recorded at several locations within the Preserve. These data will be made available as appropriate for restoration studies. Measures of water flow beneath several locations at U.S. 41 are available from the South Florida Water Management District.

Exotic Species Removal. Almost all of the areas that are elevated with fill are infested with Brazilian pepper (*Schinus therbinthifolius*). These trees will be removed with the fill that allowed monocultural Brazilian pepper stands to develop. The lower ground elevations and restored hydroperiods that will be created in these restored areas will decrease the chances of re-establishment by Brazilian pepper; however, some colonization by this and other exotics can be expected. The Preserve has a strong and aggressive program of exotic removal and maintenance that includes ongoing Brazilian pepper containment and removal. We will provide this demonstrated ability to manage exotics by periodic maintenance to keep exotics at a minimum in the restoration areas.

5. Summary of Proposed Monitoring.

Monitoring parameters and frequencies are summarized in Tables 7 and 8.

Table 7. Summary of Monitoring for Fill Removal and Filled Drainage Canal Areas.

Parameter	Sample Type	Number of Samples	Monitoring/Reporting Frequency
Species Composition/Diversity	1-m ² quadrats	representative of area; $\geq$ 10 in canal	baseline, time 0, annually for 5 years
Plant Cover	1-m ² quadrats	representative of area; $\geq$ 10 in canal	baseline, time 0, semiannually for 5 years
Photographic Documentation	photopoints	to be determined	to be determined
Fish and Wildlife Observations	observations	as appropriate	as appropriate
Hydrology	stations	as appropriate	as appropriate
Exotic Species Observations/Removal	observations/removal	as appropriate	as appropriate

Table 8. Summary of Monitoring for Marl Prairie Restoration.

Parameter	Sample Type	Number of Samples	Monitoring/Reporting Frequency
Species Composition/Diversity	1-m ² quadrats	every 5 m along transects	baseline, time 0, annually for 5 years
Plant Cover	1-m ² quadrats	every 5 m along transects	baseline, time 0, semiannually for 5 years
Surface Topography; Soil Description, Depth, pH, Organic Content, Root Density; Other Environmental Variables	stations	every 5 m along transects	baseline, time 0, semiannually for 5 years
Photographic Documentation	100-m ² quadrats	to be determined	annually
Fish and Wildlife Observations	observations	as appropriate	as appropriate
Hydrology	stations	as appropriate	as appropriate
Exotic Species Observations/Removal	observations/removal	as appropriate	as appropriate

D. Mitigation Success Criteria

1. Fill Pad Removal. Areas from which fill is removed will be considered successfully restored when (1) 80% cover by native wetland vegetation occurs in the formerly filled area, and (2) less than 10% cover by exotic vegetation occurs in the formerly filled area.
2. Filling One Mile of Drainage Canal. The area of the drainage canal that is filled and the adjacent canal bank from which the fill is taken will be considered successfully restored when (1) 80% cover by native wetland vegetation occurs in the former canal and canal bank area, and (2) less than 10% cover by exotic vegetation occurs in the former canal and canal bank area.
3. Marl Prairie Restoration. Success of wetland restoration in marl prairies will be determined partly by statistical comparison of restoration areas with other marl prairies that are relatively undisturbed and with marl prairie communities that have had no ORV use for many years. These comparisons will be subjective, as these communities are not common outside the Big Cypress area, and marl prairies without disturbance are not known. We will consider the restoration successful when (1) the restoration areas are 80% covered with native wetland vegetation, and (2) less than 10% cover by exotic vegetation occurs in the restoration area.