

BICY Brazilian Pepper Management Plan

Introduction and Background

Subject: Control of Brazilian pepper (*Schinus terebinthifolius* Raddi, Anacardiaceae) in Natural and Altered Natural Areas

Brazilian pepper (aka Florida holly, pepper tree, pepper bush, pepper hedge,) is a small tree or shrub that is native to South America. Ewel (1986) indicated this plant as native to Brazil, Paraguay, and Argentina, occurring sparsely as a shrub that does not tend to dominate communities. ***** (2005) however, described this plant as commonly ruderal and dominating disturbed areas in its native range, much as it does in southern Florida. This plant was introduced from Brazil into southern Florida in large numbers around the turn of the 20th century as a landscape plant, and was noted as a naturalized part of floral communities in the 1950s (Workman 1978). Brazilian pepper now occurs as a cultivar throughout much of the tropics (Barkley 1944). This plant is now a common component of mesic (intermediate between wet and dry growing conditions) biological communities in Big Cypress National Preserve, and is especially common in areas with soil disturbance. Brazilian pepper is commonly found on roadsides, canal banks, fill pads, abandoned agricultural development, and other areas with significant human interaction. Its growth is rapid, sprawling, aggressive, and competitive compared to most native plants; often it forms nearly monocultural stands, especially in areas that have been disturbed.

Disturbance and BP—Dense growth of Brazilian pepper is almost always associated with ecological disturbance, especially disturbance to substrates. Rapid colonization, recruitment, and reproduction is a common suite of responses by ruderal (weedy) organisms to environmental changes; in our area these changes are frequently disturbances to the natural habitat that have been mediated by human activities. Most often these activities involve manipulating substrates, so that disturbances to soils produce opportunity for Brazilian peppers. In BICY, creating elevated land for roads, buildings, or other human activities made areas available for many weeds, and Brazilian pepper is well adapted to capitalize on this partly vacant niche. Areas that were altered for agriculture and subsequently abandoned commonly became dominated by Brazilian pepper; these are mostly areas that occur in mesic or short hydroperiod communities. Many extensive abandoned agricultural fields that occur in marl prairies have not become dominated by BP, and have recovered as marl prairies dominated by native plants; these appear to have been moderately affected by changes to hydroperiod. Other agricultural areas that became dominated by BP and native woody vegetation appear to have been more significantly affected by changes to hydroperiod, suggesting that this may be another important change to these habitats.

Naturally occurring disturbances—tidal ecotones—storms

Table 00. Table of common BP locations and general priorities for removal. Explanations partly indicate rationale for plans to manage Brazilian pepper in BICY.

Roadsides. High priority. These are areas observed by almost all visitors, so that control of plants in these areas is important for the visitor experience and overall impression of BICY. These areas are easily accessed, so that treatment can take place efficiently.

Fill Pads. Intermediate priority. These are generally small areas that are surrounded by native communities; they are sources of seeds for the surrounding areas, but often do not spread quickly. Restoration to natural conditions should accompany exotic control in these areas.

Spoil Piles. Intermediate priority. These are generally small areas that are surrounded by wetlands that do not support Brazilian pepper. They are sources of seeds for the surrounding areas, but often do not spread quickly. Removing these piles with the associated Brazilian pepper typically is followed by natural recovery of the native communities; removal in upland systems requires consideration of habitat restoration.

Canal Banks. High priority. These are areas that commonly occur adjacent to roads, so that they are observed by almost all visitors. Control of plants in these areas is important for the visitor experience and overall impression of BICY.

Landscaped areas. Low priority. Many non-native plants occur in human-inhabited areas. These exotics occur in limited numbers and are often controlled. Brazilian pepper should be eliminated from these areas and replaced by native or non-problematic exotic landscape plants. Abandoned or acquired residential properties should be considered as 'Fill Pads' (above).

Drained native wetlands. Intermediate priority. These are areas that have been disturbed by a change in hydroperiod, so that they now can support significant populations of Brazilian pepper. The resident native organisms have been compromised, so that removal of Brazilian pepper is important to improve the health of these populations. Hydrologic restoration should accompany exotic control to minimize re-infestation and maintain community health.

Mangrove ecotone. Low priority. Mangrove ecotonal communities appear to be areas of natural disturbance that support BP and are significant ecological problems in some parts of southern Florida. However, this is not common in BICY.

Natural communities (without significant disturbance). Low priority. Assigning limited priority to natural areas may be counter intuitive as protection measures for native biological communities. Most healthy natural communities, however, do not support rapid colonization and dense Brazilian pepper populations. Control of this exotic should occur in these areas to eliminate competition with native plants, with care not to cause disturbance that could promote colonization and recruitment of these or other exotics.

Natural communities (with significant disturbance). High priority. Natural communities that have been altered by hurricanes, fires, or other natural perturbations may support recruitment of BP or other exotic plants because of this disturbance. Addressing BP infestations in these areas should be accomplished in these areas within two years of a major disturbance. Control of this exotic should occur in these areas to

eliminate competition with native plants, with care not to cause disturbance that could promote colonization and recruitment of these or other exotics.

Abandoned agriculture. High priority. These are areas that are often extensive and produce large amounts of seeds that are carried to adjacent natural communities. These natural communities are often mesic areas that will support BP well. Healthy native communities may resist rapid infestation by BP (above), but with large amounts of seeds arriving from nearby, significant exotic colonization is inevitable.

Problems associated with Schinus

Loss of native plant and animal diversity. Exotic organisms always displace native organisms in natural systems. Populations of native organisms are altered when exotics infest natural systems. This may not significantly affect large, stable populations of natives, but can compromise limited populations of rare, unique, or unusual organisms (e. g., epiphytic plants and commensal insects) and habitat communities (e. g., tropical hardwood hammocks. Brazilian pepper produces fruits that are consumed by many native animals. Scat with emerging BP seedlings that have been deposited by raccoons or other mammals are common; big red piles left by large bears are unmistakable and almost completely composed of BP seeds and berry hulls during BP fruiting season. Birds (particularly robins) crowd BP bushes in early winter when the fruits are ripe and ready for dispersal. Clearly BP seeds are providing nutrient for these animals, but whether this is good for the animals' habitats is questionable. Mutualistic symbiosis occurs in this situation, so that the nourished animal becomes the plant's dispersal vector, sewing seeds in virtually all areas of the Preserve, and promoting growth and recruitment of exotic competition with natives. Presumably these animal populations were here and able to survive with native resources before the arrival of BP less than a hundred years ago. Problems occur for native organisms when 1) natives are not able to make use of resources provided by exotics, 2) exotic organisms displace native resources, and 3) exotics remove resources that native organisms depend on. In this situation, the exotics population successfully out-competes natives and populations of natives decline. When this happens to small populations, or with organisms with specific habitat requirements, the health of these populations is likely to be negatively affected.

-allelopathy may exacerbate loss of diversity

Exotics often indicate problems with the landscape. BP commonly inhabits areas of human disturbance (above) and may be good indicators of previous disturbance to soils or hydrology. In this sense they may be useful as indicators of previous activities, but have had no part in causing the change. As organisms well adapted to capitalize on perturbed biological communities, they often compound the disturbance by dominating these systems to the exclusion of native plants. This displaces native communities, and may affect populations of rare, threatened, or endangered plants or animals.

Health problems. Brazilian pepper is in the vascular plant family Anacardiaceae. This is a moderately large family that also contains plants such as poison ivy, poison oak, mangos, poisonwood, sumac, pistachio, and cashews. BP, like many members of this

plant family can cause unpleasant dermatitis with some people. This is not as common as reactions with poison ivy or poisonwood that also frequently occur in our area, but happens enough to be considered a potential health problem. The sap from BP is viscous and sticky, and may contain allergenic compounds; foliage may also bear allergens as do the related poison ivy. Pollen from male BP plants could potentially contain allergens, but *Schinus* pollen is large and sticky, and well adapted for insect transport. These pollen grains are unlikely to be encountered in significant amounts by people.

Disrupts natural fire cycle. Mesic to hydric communities are often dominated by open-canopied slash pines (*Pinus elliottii*); these communities cover about 20% of Big Cypress National Preserve. Mesic pine flatwoods are usually co-dominated by saw palmetto (*Serenoa repens*) shrubs, and hydric pine flatwoods are usually co-dominated with graminoid ground cover. Myers and Ewel (1990) and Wade et al. (1980) indicated much variation of fire frequencies in these communities. These communities are often adjacent to frequently burning prairies, and may be subject to ignition by those fires, so that more frequent fires can occur. Duever et al (1986) cited studies of fire frequencies in pine forests at three to seven years, and studies that demonstrated succession to hardwood communities after 15 to 25 years without fire. Clearly fire is a commonly occurring and important ecological factor for these communities. Fire is a necessary component in maintaining pine flatwoods communities. This is an important consideration for managing areas for listed animals that may depend on Pine flatwoods communities, such as red-cockaded woodpecker (*Picoides borealis*), fox squirrel (*Sciurus niger avicennia*), or Florida panther (*Puma concolor coryi*). Stands of BP do not burn well, and may effectively form a fire break in areas that could be expected to burn every few years. Eliminating these colonies of BP will contribute to more effective and natural fire occurrence in BICY.

Invades communities that lack human significant disturbance. Communities with significant human disturbance are commonly associated with BP populations. However, human alterations are not required for this plant. BP is commonly found in many communities that appear to be undisturbed, although usually it is more naturalized and not likely to become a tree or shrub dominant. These areas are likely to receive disturbances from storms, fires, or other natural occurrences, so that changes to the communities can occur that will allow BP to become established. In coastal mangrove ecotones areas that are only affected by extreme high tides have become densely populated by BP. In these places, the occasional influence by extreme tides may cause chemical changes in the soils (i. e., disturbance) enough to allow germination and recruitment of BP in these areas. Large areas of this community have become dominated by BP, apparently facilitated by the chemical disturbance in coastal soils.

Bird dispersal compounds problems by creating remote infestations. Fruits produced by BP contain one seed. These fruits are appealing to many vertebrate dispersal agents (above). These animals, especially birds can move these seeds miles away from parent trees, depositing them to establish BP colonies in virtually all parts of the preserve. All upland communities or mesic parts of wetlands are subject to colonization by BP, and native residents will be displaced by exotics.

In BICY, Brazilian pepper can be found in nearly all plant communities. The degree of infestation varies from habitat to habitat. The most significant Brazilian pepper infestations occur on abandoned agricultural fields. These fields were previously used for vegetable farming or cattle grazing and often have soil disturbance associated with leveling or planting. Old fields are also frequently bordered by irrigation or drainage ditches. Soil disturbance coupled with hydrological modification seems to favor heavy to monocultural infestations in these areas. Primarily in the addition lands, also in the Ochopee area.

Figure 00. BICY Vegetation Map.

Shell mounds or middens, hardwood hammocks and old homesites are also susceptible to heavy infestations of Brazilian pepper. This is assumed to be based on soil disturbance and hydrological conditions found in these habitats. Transitional habitat between undisturbed hammocks and prairies are frequently infested. These infestations probably remain fairly stable until some disturbance occurs. This could be human induced clearing for construction of camps activities or naturally occurring disturbance such as that caused by hurricanes. When canopy cover is compromised, Brazilian pepper rapidly regrows allowing plants to occupy a larger proportion of the canopy than before the disturbance. Seedlings also grow slowly and persist in the understory of native habitats. When light gaps are created, seedlings begin to grow rapidly causing infestations to become progressively worse (Ewel, et al. 1982).

Figure 00. BiCY Vegetation map with Schinus dominated areas highlighted.

In pinelands, Brazilian pepper is often found throughout the community at varying density levels. Infestation densities probably depend on hydroperiod, fire frequency and past disturbance. Drier, fire suppressed pinelands are more likely to have heavier infestations than wetter communities. Drained pinelands generally support denser infestations than those that have not been drained. Pinelands that have been planted with Bahia grass (*Paspalum notatum*) or other forage crops eventually succeed to a monocultural understory of Brazilian pepper or a mixture of Brazilian pepper and other exotic and ruderal species.

The lowest level infestations occur in prairies, cypress communities and other habitats with a long hydroperiod. In these habitats, Brazilian pepper plants are restricted to the bases of trees, slightly higher exposed rocks or other similar microhabitats. These small, widespread infestations are probably not significantly impacting the native vegetation of the communities in which they are found. However, they act as a source of seeds for the continuous re-infestation of surrounding communities.

Table 00. Percent of Communities with Schinus. Percents of communities in which Schinus was noted during Systematic Reconnaissance Flights (SRFs) north of I-75 in 2005. This is an example of an area with Schinus infestation in plant communities nearly throughout. Disturbed areas are usually mesic communities that were altered by human activities.

Community	Perc. Schinus Occurance
Mesic pines	34.9
Mesic hardwoods	24.1
Disturbed	29.7
Sabal hammock	3.8
Cypress	3.3
Hydric pines	0.9
Hydric hardwoods	2.4
Prairie	0.9

Requirements and Authority for Management GMP, RMP, legislative support

Federally owned areas in southern Florida that are managed by the National Park Service (NPS) are a part of more than 350 national park units occurring throughout the United States. Much of the authority related to National Park Service (NPS) management of natural systems in federally owned lands is derived from the 1916 National Park Service Organic Act. This legislation enables the NPS to apply appropriate conservation measures to natural and historic features within parks or preserves, so that they may be left “unimpaired for the enjoyment of future generations.” The General Authorities Act of 1970 identified the importance of individual legislation specific to each National Park unit in establishing direction for management specific to the parks. An Act that expanded Redwood National Park in 1978 provided general authority to limit activities within all National Park units that could compromise natural resources and their associated values within areas managed by the NPS. A primary management objective of the NPS is maintaining natural resources and associated natural values in a consistent, systematic, and professional way, so that these features will be available in the future. Park features with natural values include native flora and fauna, water, air, geologic features, historic features, and the natural processes that are part of these natural systems.

Federal legislation, approved 11 October, 1974 “P.L 93-440, AN ACT TO ESTABLISH BIG CYPRESS NATIONAL PRESERVE, AS AMENDED BY P.L 100-301, THE BIG CYPRESS NATIONAL PRESERVE ADDITION ACT” established BICY, and outlined purposes and functions of activities important and appropriate for proper management of the area as a Federal Preserve. The opening paragraph of this law established the fundamental purpose of BICY “to assure the preservation, conservation, and protection of

the natural, scenic, hydrologic, floral and faunal, and recreational values of the Big Cypress Watershed”.

The federal statute further identified responsibilities at the local level to produce policies and programs to effectively manage the preserve’s natural resources: “In administering the Preserve, the Secretary shall develop and publish in the Federal Register such rules and regulations as he deems necessary and appropriate to limit or control the use of Federal lands and waters...”(An Act to establish the Big Cypress National Preserve in the State of Florida and for other purposes. [88 Stat. 1225] [P. L. 93-440] October 11, 1974; Sec. 4 (b)). This document is not intended for publication as an administrative rule or regulation, but may be considered as part of the development process for related regulations that are produced as management documents for Big Cypress National Preserve.

Strategic planning for the National Park Service indicated “Long Term Goals” for control of exotic plants throughout the park system from 2001 to 2005 (National Park Service 2001). These goals are effectively in place in perpetuity by way of GPRA (Government Performance and Results Act) and subject to revision every five years. This is planning that is valuable, but is limited (i.e., short term) in its planning horizon; longer term (20 – 30 years) should be established to provide more comprehensive direction for exotics control planning. Goals Ia1A and Ia1B in the strategic planning document identified disturbed areas and park land in general as areas for exotic plant control and restoration.

Goal Ia1A - 10.1% of targeted parkland, disturbed by development or agriculture as of 1999...are restored;

Goal Ia1B – exotic vegetation on 6.3% of targeted acres of parkland is contained.

These goals both are related to protection and restoration of natural resources and natural processes, but refer to different restoration or rehabilitation activities. Goal Ia1a is more specific to areas that are likely to have been disturbed by recent human activities, so that removal of exotics and native habitat will be restored. In BICY this would commonly occur in areas with former agricultural activity or filled areas formerly associated with residences and associated roads, where highly significant disturbances have occurred and dominance by exotic plants is common. This goal refers to “targeted parklands...restored” so that much work will be directed at relatively limited areas for restoration.

Goal Ia1B more specifically references exotic vegetation treatment in “targeted areas of parkland contained.” This goal probably reflects more appropriately the exotic control activities that occur in most of the areas in BICY, especially natural areas. Natural areas often contain exotic plants that require treatment, but their populations are usually not concentrated, as in areas with former human activity. In these places exotic plants occur as individuals or sparse to dense populations. Early in the exotics management program, BICY began considering treatment of all exotic plants within one square kilometer areas as a square kilometer contained (above: “areas of parkland contained”) regardless of the number of exotics present. This has resulted in occasional confusion in reporting exotics

controlled, as other park service units prefer to report areas of infestation clearly dominated by exotics. The advantage, however, of reporting total areas of exotic containment is that this indicates the area of the preserve that has undergone scrutiny and treatment for exotic plants. These contained areas are correctly considered free of the exotic plant(s) subject to treatment and containment; subsequent treatment of contained areas is necessary to remove exotic plants introduced after initial containment.

General Management Plan, Proposed Action Section with Alternatives

Priorities for exotic plant control were listed as: 1- Melaleuca, 2- Australian Pine, 3- Brazilian pepper. Brazilian pepper was considered so widespread in southern Florida that it “would be impossible to eliminate it from the preserve”. Control was anticipated as a continuous process, with the following areas to be treated:

- Areas where important resource values were threatened, particularly essential habitat for protected species and significant cultural sites,
- Areas where infestations conflicted with visitor use, particularly along major road corridors where scenic quality was being adversely affected.

Treatments outlined for exotics generally included cutting, chemical treatment, and prescribed fire. Conservative use of chemicals was anticipated to protect non-target plants, wildlife, visitors, water quality, and employees. Herbicide use conforms with NPS integrated pest management policies and regulations of the US Environmental Protection Agency, Occupational Safety and Health Administration, and other federal and state agencies. Biological controls for exotic plants had not been developed then, but their use was anticipated and welcomed providing it was clear that no threats to non-target organisms were indicated.

Exotic plant control on state and county roads were coordinated with appropriate agencies.

Volunteer labor for exotic plant control was encouraged. NPS staff continued to coordinate volunteer efforts in the preserve, and coordinated health and safety measures for volunteers.

Resource Management Plan. The BICY Resource Management Plan (Big Cypress National Preserve 1998) indicated exotic plants as problematic with native biological communities, and identified the National Park Service mandate to control and eradicate exotics when they threaten preserve resources. Then the priorities for exotic plant control were Australian pine and Melaleuca trees. Reference to Brazilian pepper also indicated these trees as problem exotics, but they were considered lower priority, partly because of limited success for control with the technology then available, and virtually no ability to control introduction of seeds into the preserve. Since then Australian pine and Melaleuca trees have been brought under control, so that more emphasis will be focused on controlling Brazilian pepper. Improved methods for control of this tree have been

developed in the last several years so that effective and efficient control regimens have been implemented. Introduction of Brazilian pepper seeds will be a source if this tree indefinitely, but a strong, continuous maintenance program will help control establishment of these introduced trees.

BICY map with management areas- use current management units + kms

SRF information

Schedule – January 2006, annually, transects flown in fixed wing aircraft at 500', 1km apart, on north/south bearing. GPS point taken when exotic species encountered. Includes species and can include estimate of area, density of infestation and other notes.

Sketch mapping – January 2006, transects flown with touch screen laptop running GIS software. Points are recorded for single trees and polygons drawn around clusters of trees as they appear in the GIS base map. Density estimates are also made for polygons.

Areas with known infestations- JS- Propose listing infestations by management unit; also proposed treating roadsides as separate from management units-; using current and historical maps to infer infested areas as upland areas- include map with all treatments to date here?

Degrees of infestation-

propose quantitative study similar to floristic inventory to estimate infestation level in each upland type. Start with pilot study of a single management unit.

Need to verify that veg map layer that I have is the correct one.

Road out to L-28 interceptor, n of I75 and found that most of the infestation is along the roadside, extending in at homesites and old fields.

Thinking we might want to prioritize roads as #1 due to the heaviness of infestation, accessibility and visibility to public

Photos of light, moderate and severe infestations

Also can collect data when conducting other control projects (Lygodium, Melaleuca, etc.)

Square km exotics management units-

JS would like additional info on what is wanted here. We could use km cells rather than treatment units to estimate infestation levels.

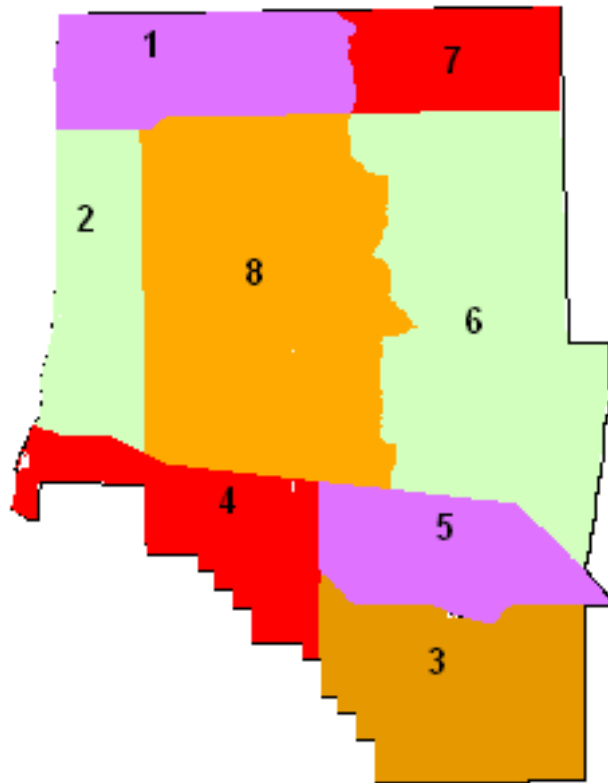
Strategy for Control of Brazilian Pepper in Big Cypress National Preserve

The overall plan to control Brazilian pepper in Big Cypress National Preserve is to eliminate all known Brazilian pepper trees within the limits of the preserve. Treatments will occur around the perimeter of the preserve to isolate the BP population, and then move toward the interior of the preserve to control these trees throughout the preserve. Initial treatments will be followed by maintenance to keep areas exotic-free.

Southern Florida has developed significant populations of many exotic plants, so that surrounding areas will be available as seed sources almost indefinitely; also vegetative an seeds in these areas will re-populate treatment sites with BP after initial treatments. Therefore, areas that have received exotics control will require additional treatments to insure that as many exotic plants as possible have been removed from all areas. Follow-up treatments will occur at two to five years after initial treatments to eliminate individuals that have grown vegetatively or from seed after the initial treatment. After primary and follow-up treatments, we expect to have all parts of the preserve in a maintenance situation, so that the entire preserve may be routinely patrolled to eliminate problematic exotics.

Figure 00. Map of BICY General Management Units.

Figure 00. Map of Brazilian Pepper Management Units in BICY.



Treatment Area 1. Schinus Control in Northwestern BICY

General Description: This area is north of I-75 and west of Noble's Grade, and includes the Bear Island Management Unit and part of the Addition Management Unit areas.

Area: About 104.2 mi² (269.9 km²).

Biological Communities: Much of this area is mesic upland; pine flatwoods and hardwood hammocks on slightly elevated sandy substrates commonly occur, especially in the Bear Island (western) part of this area. Freshwater wetlands dominate other parts of this area.

<u>Community</u>	<u>Estimated Area (Ac.)</u>
Mesic Communities	
Hardwood/Palm Hammocks	5704.8
Pine/Palmetto Flatwoods	13168.3
Disturbed Mesic	1455.6
Other	
Hydric Communities	
Cypress Forest	15336.2
Swamp Forest	6182.9
Hydric Hammock	20.1
Hydric Pine Flatwoods	1367.9
Scrub Cypress	1329.7
Marl Prairies	18448.2
Marsh	3584.6
Mangroves/Brackish Marsh	0
Open Water	67.8
Disturbed Wetland	0
Other	1.9

Map of BICY Management Units and treatment area identified

Map of treatment area with vegetation.

Disturbance: Significant alteration to natural systems by human activities has occurred in much of this area. Several miles of trails, including elevated trails have developed here during decades of occupation and use by hunters and other visitors to the area; these have produced additional areas of mesic disturbance. Several large areas of mesic communities apparently were altered for agricultural development, hunting, or other recreational camps (see Fig. 00. Map of Some Disturbed Areas in BICY). Significant disturbance to mesic tree communities occurred with 2005 hurricanes, especially in the southeastern part of the Preserve, where stronger winds were imposed on

tree canopies (see Fig. 00. Alterations to Hammock communities from Hurricane Wilma, 2005). Much of this area received disturbance to soils and associated biological communities with off-road vehicle traffic, but the area has been closed to vehicles for several decades. Recovery of the wetland communities appears to be progressing, but abandoned vehicle trails are evident from the air.

Occurrence of Schinus: Schinus is a common dominant or co-dominant shrub in many mesic communities here. This exotic forms nearly monocultural stands in some large areas and has created perhaps the most severely infested area in BICY. Most of the areas significantly affected with BP are mesic sites that have been altered by human activities.

Anticipated Control Methods: BP was treated within 50 feet of SR29 and its associated borrow canal from the northern boundary of the preserve to I-75 in 2003. In 2004 the western side of Turner River Road was treated from Wagon Wheel Road north, and Roadsides to 50 feet were treated in Bear Island. BICY Fire Management began mechanical control of BP in some of the area west of Nobles grade to eliminate hazardous fuels with GyroTrack machines. This also physically reduced BP shrub structure in about 500 acres, so that crews were able to efficiently follow and chemically treat re-growth of BP; this required smaller amounts of chemical control agent and labor. Fire Management anticipated burning the slash created by the GyroTrack activities here, but this may not occur. Control of BP will primarily be accomplished with basal bark application of ***** to all BP individuals encountered that are too large to be pulled from the soil; small individuals will be pulled by hand and left so that no roots contact the soil.

Access: Access to this area is limited. The southern limit of this area is bounded by the I-75 borrow canal and wildlife fence; SR 29 and associated borrow canal with wildlife fences along part of the road form the western boundary; private properties and the Big Cypress Seminole Reservation occur along the northern boundary. These physical, ownership, and management entities limit access to a few roads that access this area. These accesses are: Turner River Road (south), Perocchi Grade/Bear Island (west), Bundschu Grade through private properties (north), and Nobles Grade north from the I-75 mile 60 rest area (west). Logistical considerations should include planning for daily travel through areas with limited access.

The Addition Lands management unit part of this area is not addressed in the BICY General Management Plan. Therefore, recreational off-road vehicle use has been discontinued in this area until a general management plan that includes policy related to this area is completed. Administrative relief to allow vehicles into this area for exotic plant control has routinely been issued, and will be sought for this work until management policy concerning vehicles in this area is approved.

Anticipated Start and Completion: A contract was let in 2004 to treat BP along roads in the Bear Island area; BICY Fire Management began hazardous fuel reduction along the western side of Noble's Grade in the 2004-05 dry season; exotics control contracted crews began treatments west of Noble's Grade in 2005 and continue treatments westward toward SR29. Treatment of BP in this area is expected to be completed by late 2007.

Special Considerations:

1- Large areas of very dense BP occur in this area; about 1500 acres of disturbed land dominated by BP occurs in this area, so that significant expense will be incurred to

control exotics in these areas. Concomitantly, significant amounts of herbicide are expected to be introduced into the biological communities at these locations; however, herbicide amounts are expected to be within limits recommended for the chemicals that will be used.

2- Part of this area is bordered by the Seminole Reservation to the north. This area is managed by the Bureau of Indian Affairs (BIA) and contains significant populations of exotic plants, including BP. This will be a source of BP seeds into adjacent BICY for an indefinite period; re-treatment and maintenance of exotic plant populations in this area will be necessary will be necessary for an indefinite period.

3- Drainage and associated habitat alterations has been undertaken by previous owners and property managers in many parts of this area. This will maintain conditions that promote growth and recruitment of BP through much of the area. Hydrologic restoration of this area should be undertaken to minimize opportunities for re-establishment of BP in this part of the preserve.

4- This area is used intensively by hunters; work here should be avoided during hunting season. If exotic plant management here occurs during hunting season, precautions including wearing blaze orange safety vests, should always be part of work protocols.

Treatment Area 2. Schinus Control West of Turner River Road

General Description: This area is west of Turner River Road, south of I-75, and north of US41. This includes the Deep Lake Management Unit and parts of the western Addition Lands Management Unit and Turner River Management Unit.

Area: About 88 mi² (228km²)

Biological Communities: This area is mostly wetland communities with scattered uplands that form hardwood hammocks or flatwoods; hydric pine flatwoods are very common. Marl prairies are expansive in this area, but significant swamp forests (e. g., Deep Lake Strand) occur throughout.

<u>Community</u>	<u>Estimated Area (Ac.)</u>
Mesic Communities	
Hardwood/Palm Hammocks	2279.4
Pine/Palmetto Flatwoods	3431.0
Disturbed Mesic	510.4
Other	0.7
Hydric Communities	
Swamp Forest	4756.5
Cypress Forest	7863.8
Hydric Hammock	0
Hydric Pine Flatwoods	7970.7
Scrub Cypress	772.9
Marl Prairies	30419.7
Marsh	958.1
Mangroves/Brackish Marsh	0.9
Open Water	68.6
Disturbed Wetland	0
Other	0

Map of BICY Management Units and treatment area identified

Map of treatment area with vegetation.

Disturbance: Most of this area is relatively undisturbed. Prairies still show areas of Off Road Vehicle traffic, but this has been discontinued and these prairies have partly recovered and are mostly dominated by native prairie plants. Roads, associated canal banks, and building pads have created disturbed mesic soils (see Fig. 00. Map of Some Disturbed Areas in BICY). Several square miles immediately north of US41 between SR29 and Bass Lake Road were drained and developed for agriculture several decades previous. This has created large areas of disturbed, hydric to mesic soil (see Fig. 00. Map of Some Disturbed Areas in BICY). Significant disturbance to mesic tree communities occurred with 2005 hurricanes, especially in the southeastern part of the Preserve, where

stronger winds were imposed on tree canopies (see Fig. 00. Alterations to Hammock communities from Hurricane Wilma, 2005). Much of this area received disturbance to soils and associated biological communities with off-road vehicle traffic, but the area has been closed to vehicles for several decades. Recovery of the wetland communities appears to be progressing, but abandoned vehicle trails are evident from the air.

Occurrence of Schinus: Schinus is common in this area, occurring as dominant or co-dominant shrub in many mesic communities. Much of this treatment area is hydric so that these communities are relatively sparsely populated with BP. Data and observations from SRFs suggest that BP may be more common within a mile of SR 29. Several locations on the eastern side of SR29 are sites of former habitations or businesses; dense BP populations may be encountered in these places. Significant areas north of US41 that were developed for agriculture (above) have dense Schinus communities. Much of this area between Birdon Road and Bass Lake Road has been cleared by Fire management in 2004-05; BP specifically was chemically treated by Resource Management in this area to remove re-growth of this exotic.

Anticipated Control Methods: BP was treated with Velpar on both sides of Birdon Road and Wagon Wheel Road in 2001. BP was treated within 50 feet of SR29 and its associated borrow canal from I-75 to Tamiami Trail in 2003. BICY Fire Management began mechanical control of BP in some of the area between Birdon Road and Bass Lake Road to eliminate hazardous fuels with GyroTrack machines. This also physically reduced BP shrub structure in about 400 acres, so that crews were able to efficiently follow and chemically treat re-growth of BP; this required smaller amounts of chemical control agent and labor. Fire Management anticipated burning the slash created by the GyroTrack activities here, but this may not occur. Fire management has indicated that prescribed burning in the southeastern part of this area may occur in 2006; this will be followed within one year by chemical treatment of BP to eliminate this exotic from the burned area. Control of BP will primarily be accomplished with basal bark application of ***** to all BP individuals encountered that are too large to be pulled from the soil; small individuals will be pulled by hand and left so that no roots contact the soil.

Access: Access to this area is limited. The southern limit of this area is bounded by the US41 (Tamiami Trail) borrow canal; SR 29 and associated borrow canal with wildlife fences along part of the road form the western boundary. The Deep Lake Management Unit is closed to motorized vehicles. Turner River Road, Birdon Road, and Wagon Wheel Road provide access by foot into the Deep Lake Unit. Consideration should be made for helicopter flights to parts of that Unit that are too far from access roads to allow reasonable time to walk and carry equipment to treatment areas. Whenever possible, BICY will grant administrative approval to use motorized vehicles for exotic plant control in restricted areas. The rationale for administrative approval is ongoing exotics maintenance, whereas closure of the management unit is primarily associated with recreational activities.

The Addition Lands management unit part of this area is not addressed in the BICY General Management Plan. Therefore, recreational off-road vehicle use has been discontinued in this area until a general management plan that includes policy related to this area is completed. Administrative relief to allow vehicles into this area for exotic plant control has routinely been issued, and will be sought for this work until management policy concerning vehicles in this area is approved.

Anticipated Start and Completion: Removal of BP along Birdon and Wagon Wheel Roads was completed in 2003; removal of BP along the eastern side of SR29 and the associated canal banks to about 50 feet east of the canal was accomplished in 2003. Treatment of BP in this area is expected to be completed by late 2008.

Special Considerations:

- 1- Much of this area is closed to motorized vehicles (above: Access), so that travel time, equipment transport, and other things related to access logistics should be considered.
- 2- Large areas of abandoned agricultural fields north of US41 support BP and other ruderal hardwoods; formerly these areas were prairie communities. Topographic and substrate restoration should be considered to help minimize re-establishment of BP in these areas.
- 3- Drainage and hydroperiod alteration have contributed to the substrate disturbance that supports BP populations in the abandoned agricultural fields immediately north of US41. Hydrologic restoration of these areas should be considered to help minimize re-establishment of BP in these areas.

Treatment Area 3. Schinus Control in the Stairsteps Management Unit

General Description: This is the area south of US41 and Loop Road to the boundary with Everglades National Park. It is the Stairsteps Management Unit with the southern part of the western Addition Lands to the west.

Area: 89491.9 ac.

Biological Communities: Much of this area is ecotonal wetland that is a transition from freshwater dominated inland communities to brackish, tidally influenced coastal communities to the south. Hydric prairies and marshes, and cypress communities dominate much of this area. Hardwood hammocks are common, especially in the southeastern part of the Stairsteps area.

<u>Community</u>	<u>Estimated Area (Ac.)</u>
Mesic Communities	
Hardwood/Palm Hammocks	2294.8
Pine/Palmetto Flatwoods	2899.0
Disturbed Mesic	168.4
Other	0
Hydric Communities	
Swamp Forest	546.8
Cypress Forest	13250.4
Hydric Hammock	1287.8
Hydric Pine Flatwoods	6053.2
Scrub Cypress	8538.0
Marl Prairies	51119.1
Marsh	3273.9
Mangroves/Brackish Marsh	44.8
Open Water	4.2
Disturbed Wetland	9.7
Other	1.8

Map of BICY Management Units and treatment area identified

Map of treatment area with vegetation.

Disturbance: Alterations associated with humans are usually associated with US41 or Loop Road, essentially the only accesses to this area. Several camps or abandoned camps exist in remote upland islands, with associated disturbance. South of US41, several abandoned agriculture operations may be seen. Most of these appear to be dominated by native prairie community, but near Ochopee some areas may be dominated by exotics. See Fig. 00. Map of Some Disturbed Areas in BICY. Significant disturbance to mesic tree communities occurred with 2005 hurricanes, especially in the southeastern

part of the Preserve, where stronger winds were imposed on tree canopies (see Fig. 00. Alterations to Hammock communities from Hurricane Wilma, 2005). Other tree communities sustained damage to canopies, but this was apparently not as severe as alteration that occurred in hardwood hammocks.

Occurrence of Schinus: This part of the preserve has generally a sparse population of BP throughout, but several areas contain significant populations. These are generally mesic communities with disturbance. The margins of US41 and Loop Road, and associated borrow canal banks are disturbed mesic sites that commonly support BP; several abandoned domiciles or camps with access roads occur adjacent to these roads, and usually are dominated by Schinus. Remote camps on upland islands commonly are associated with BP. In 2005, many hardwood hammocks received significant alteration with hurricane Wilma; this has produced disturbance that is likely to promote growth and recruitment of BP throughout most of these mesic communities.

Anticipated Control Methods: BP was treated within 50 feet south of Tamiami Trail in 2002 and 2004 from SR29 to Turner River Road. Control of BP will primarily be accomplished with basal bark application of ***** to all BP individuals encountered that are too large to be pulled from the soil; small individuals will be pulled by hand and left so that no roots contact the soil.

Access: Most places that were disturbed by human activities are near US41 or Loop Road so that access is not constrained. Many parts of this area are submerged most of the time, so that access by airboat is practical several months of the year. During the dry season much of this area can be accessed by swamp buggy. Properties owned by citizens, or occupied by members of the Miccosukee Tribe of Indians of Florida and The Seminole Indians of Florida occur on the southern side of US41; access through these properties is probably not necessary and should be avoided unless permission by the property owner is granted in writing. Several ORV access points and designated trails have been established in this area, so that access and trail use may be constrained to areas outlined in the ORV Management Plan (1999).

The Addition Lands management unit part of this area is not addressed in the BICY General Management Plan. Therefore, recreational off-road vehicle use has been discontinued in this area until a general management plan that includes policy related to this area is completed. Administrative relief to allow vehicles into this area for exotic plant control has routinely been issued, and will be sought for this work until management policy concerning vehicles in this area is approved.

Anticipated Start and Completion: BP was treated on the road margin on the south side of US41 in 2004; re-growth has occurred here so that some treatment will have to be done here again. Some treatment of exotics along Loop Road is expected in association with changes caused by hurricane Wilma (2005). Large-scale systematic treatment for the rest of this Management Unit will begin in late 2008 and continue through late 2010.

Special Considerations:

- 1- Tribal members living in the area.
- 2- Hardwood hammocks and other mesic communities in this area received significant alteration with hurricane Wilma in 2005. Physical disturbance to substrates is common where trees were uprooted in high winds. This provides opportunity for establishment of Brazilian pepper plants in these mesic communities. Elimination of large

amounts of tree canopy in these communities from high winds contributes to conditions favorable to recruitment of BP and other invasive exotics. Removal of native trees from the hammock canopy allows increased sunlight reaching the forest floor, so that seedlings recently established in disturbed soils (including exotics) will have enhanced opportunity to become established as part of the hammock community. This is likely to increase the BP populations in these areas, so that these communities will require particular attention within two to five years after hurricane alterations.

3- Significant populations of red-cockaded woodpeckers inhabit pinelands in this area. Particular care will be taken to insure that slash pine trees or other native organisms are not compromised by BP management activities.

Treatment Area 4. Schinus Control in the Loop Management Unit

General Description: The Loop Management Unit is the area in eastern BICY that is bounded on the north and east by US41 (Tamiami Trail) and on the west and south by Loop Road (CR94).

Area:

Biological Communities: This area is almost all freshwater wetlands. Much of the area is cypress forest or mixed hardwood and cypress forest that form sloughs extending from northeast to southwest. Between these sloughs are open marshes, marl prairies, and hatrack cypress prairies. Hardwood hammocks are more common in the eastern part of this unit.

<u>Community</u>	<u>Estimated Area (Ac.)</u>
Mesic Communities	
Hardwood/Palm Hammocks	1160.8
Pine/Palmetto Flatwoods	805.7
Disturbed Mesic	508.9
Other	0
Hydric Communities	
Swamp Forest	4322.6
Cypress Forest	12030.4
Hydric Hammock	4356.4
Hydric Pine Flatwoods	3741.4
Scrub Cypress	8355.4
Marl Prairies	19735.4
Marsh	2046.8
Mangroves/Brackish Marsh	2618.8
Open Water	1320.4
Disturbed Wetland	52.9
Other	1.6

Map of BICY Management Units and treatment area identified

Map of treatment area with vegetation.

Disturbance: Alterations associated with humans are usually associated with US41 or Loop Road, essentially the only accesses to this area. In the Pinecrest area, an access road to a radio tower and several residences near the roads have created mesic disturbances (see Fig. 00. Map of Some Disturbed Areas in BICY). Significant disturbance to mesic tree communities occurred with 2005 hurricanes, especially in the southeastern part of the Preserve, where stronger winds were imposed on tree canopies (see Fig. 00. Alterations to Hammock communities from Hurricane Wilma, 2005). Much

of this area received disturbance to soils and associated biological communities with off-road vehicle traffic, but the area has been closed to vehicles for several decades. Recovery of the wetland communities appears to be progressing, but abandoned vehicle trails are evident from the air. Exploration for petroleum occurred in the eastern part of this management unit several decades previous, but was subsequently abandoned. Evidence of this activity can be found south of US41.

Occurrence of Schinus: This part of the preserve has generally a sparse population of BP throughout, but several areas contain significant populations. These are generally mesic communities with disturbance. The margins of US41 and Loop Road, and associated borrow canal banks are disturbed mesic sites that commonly support BP; several abandoned domiciles or camps with access roads occur adjacent to these roads, and usually are dominated by Schinus. Residences and abandoned camps in the Pinecrest area commonly contain BP. In 2005, many hardwood hammocks received significant alteration with hurricane Wilma; this has produced disturbance that is likely to promote growth and recruitment of BP throughout most of these mesic communities.

Anticipated Control Methods: Control of BP will primarily be accomplished with basal bark application of ***** to all BP individuals encountered that are too large to be pulled from the soil; small individuals will be pulled by hand and left so that no roots contact the soil.

Access: Most places that were disturbed by human activities are near US41 or Loop Road so that access to these areas is not constrained. However, access to the Loop Management Unit is closed to motorized vehicles. Tamiami Trail and Loop Road provide access by foot into the Loop Unit. Consideration should be made for helicopter flights to parts of that Unit that are too far from access roads to allow reasonable time to walk and carry equipment to treatment areas. Whenever possible, BICY will grant administrative approval to use motorized vehicles for exotic plant control in restricted areas. The rationale for administrative approval is ongoing exotics maintenance, whereas closure of the management unit is primarily associated with recreational activities.

Anticipated Start and Completion: BP was treated on the road margin on the south side of US41 in 2003; re-growth has occurred here so that some treatment will have to be done here again. Some treatment of exotics along Loop Road is expected in association with changes caused by hurricane Wilma (2005). Large-scale systematic treatment for the rest of this Management Unit will begin in late 2010 and continue through late 2011.

Special Considerations:

1- This area is closed to motorized vehicles (above: Access), so that travel time, equipment transport, and other things related to access logistics should be considered.

2- Tribal members in the area – corn dance site

3- Hardwood hammocks and other mesic communities in this area received significant alteration with hurricane Wilma in 2005. Physical disturbance to substrates is common where trees were uprooted in high winds. This provides opportunity for establishment of Brazilian pepper plants in these mesic communities. Elimination of large amounts of tree canopy in these communities from high winds contributes to conditions favorable to recruitment of BP and other invasive exotics. Removal of native trees from the hammock canopy allows increased sunlight reaching the forest floor, so that seedlings recently established in disturbed soils (including exotics) will have enhanced opportunity to become established as part of the hammock community. This is likely to increase the

BP populations in these areas, so that these communities will require particular attention within two to five years after hurricane alterations.

Treatment Area 5. Schinus Control in the Corn Dance and Southeastern Addition Land Management Units

General Description: This area is north of US41 (Tamiami Trail) and south of I-75 (Alligator Alley) on the eastern boundary of the Preserve, East of the Turner River Management Unit, including the Corn Dance Management Unit and the southeastern Addition Lands Management Unit.

Area:

Biological Communities: This area is adjacent to the saw grass-dominated everglades slough system to the east and is dominated by freshwater wetlands with short hydroperiods. These are marl prairies or prairies with hatrack cypress trees between longer hydroperiod cypress strands and mixed hardwood and cypress sloughs. Mesic and hydric pine woodland islands make up much of the area about halfway between US41 and I-75. Hardwood hammocks are common throughout.

<u>Community</u>	<u>Estimated Area (Ac.)</u>
Mesic Communities	
Hardwood/Palm Hammocks	1047.4
Pine/Palmetto Flatwoods	235.4
Disturbed Mesic	333.4
Other	0
Hydric Communities	
Swamp Forest	309.0
Cypress Forest	28443.3
Hydric Hammock	1135.0
Hydric Pine Flatwoods	1668.1
Scrub Cypress	20982.4
Marl Prairies	2355.8
Marsh	1410.9
Mangroves/Brackish Marsh	0
Open Water	17.3
Disturbed Wetland	19.0
Other	0

Map of BICY Management Units and treatment area identified

Map of treatment area with vegetation.

Disturbance: Most of this area is relatively free of disturbance, but significant alterations have occurred in discrete locations. Petroleum exploration and production has been ongoing for several decades in the Raccoon Point area; Eleven Mile Road connects

this operation with US41. On the eastern boundary several sections in which construction was initiated as the Dade-Collier International Airport is now managed by the Miami-Dade Airport Authority. Part of the L28 Interceptor Canal drains the northeastern part of this management unit. Residences and sites of previously occupied residences and businesses occur intermittently along US41; a borrow canal and associated embankment are apparent on the northern side of US41 (see Fig. 00. Map of Some Disturbed Areas in BICY). Significant disturbance to mesic tree communities occurred with 2005 hurricanes, especially in the southeastern part of the Preserve, where stronger winds were imposed on tree canopies (see Fig. 00. Alterations to Hammock communities from Hurricane Wilma, 2005). Much of this area received disturbance to soils and associated biological communities with off-road vehicle traffic.

Occurrence of Schinus: Moderate populations of BP occur in this management unit, mostly associated with disturbances and in mesic natural communities. These are generally mesic communities with disturbance. The margins of US41, and associated borrow canal banks are disturbed mesic sites that commonly support BP; several abandoned domiciles or camps with access roads occur adjacent to these roads, and usually are dominated by Schinus. Remote camps on upland islands commonly are associated with BP. In 2005, many hardwood hammocks received significant alteration with hurricane Wilma; this has produced disturbance that is likely to promote growth and recruitment of BP throughout most of these mesic communities.

Anticipated Control Methods: Control of BP will primarily be accomplished with basal bark application of ***** to all BP individuals encountered that are too large to be pulled from the soil; small individuals will be pulled by hand and left so that no roots contact the soil.

Access: Access to this area is limited. The northern limit of this area is bounded by the I-75 wildlife fence; the Florida State Miccosukee Indian Reservation forms the northeastern boundary with Water Conservation Area 3A (SFWMD) on the southern east boundary; US41 and its associated borrow canal on its north side forms the southern boundary. These physical, ownership, and management entities limit access to a few roads that access this area. A service road adjacent to the L28 interceptor canal north of I-75 and Nobles Grade north from the I-75 mile 60 rest area (west) allow access into the northeastern part of this area. Eleven-mile Road and associated ORV trails provide access from US41 to the Raccoon Point uplands, and the access road with associated trails to the jetport (Dade-Collier Training and Transition Airport).

Properties owned by citizens, or occupied by members of the Miccosukee Tribe of Indians of Florida and The Seminole Indians of Florida occur on the northern side of US41; access through these properties is probably not necessary and should be avoided unless permission by the property owner is granted in writing. Several ORV access points and designated trails have been established in this area, so that access and trail use may be constrained to areas outlined in the ORV Management Plan (1999). Logistic considerations should include planning for daily travel through areas with limited access.

The Addition Lands management unit part of this area is not addressed in the BICY General Management Plan. Therefore, recreational off-road vehicle use has been discontinued in this area until a general management plan that includes policy related to this area is completed. Administrative relief to allow vehicles into this area for exotic plant control has routinely been issued, and will be sought for this work until

management policy concerning vehicles in this area is approved. Access to this area is limited.

Anticipated Start and Completion: BP was treated on the road margin on the south side of US41 in 2003; re-growth has occurred here so that some treatment will have to be done here again. Large-scale systematic treatment for the rest of this Management Unit will begin in late 2011 and continue through late 2012.

Special Considerations:

1- Tribal members living on the northern side of US41, and locations that may be occupied by tribal members in the future. Corn Dance Site

2- Hardwood hammocks and other mesic communities in this area received significant alteration with hurricane Wilma in 2005. Physical disturbance to substrates is common where trees were uprooted in high winds. This provides opportunity for establishment of Brazilian pepper plants in these mesic communities. Elimination of large amounts of tree canopy in these communities from high winds contributes to conditions favorable to recruitment of BP and other invasive exotics. Removal of native trees from the hammock canopy allows increased sunlight reaching the forest floor, so that seedlings recently established in disturbed soils (including exotics) will have enhanced opportunity to become established as part of the hammock community. This is likely to increase the BP populations in these areas, so that these communities will require particular attention within two to five years after hurricane alterations.

3- Significant populations of red-cockaded woodpeckers inhabit pinelands in this area. Particular care will be taken to insure that slash pine trees or other native organisms are not compromised by BP management activities.

Treatment Area 6. Schinus Control in Northeastern BICY

General Description: This area is north of I-75 and east of Noble's Grade, and includes the Looneyville (Big Cypress Sanctuary) area and other parts of the northeastern Addition Management Unit area.

Area:

Biological Communities: Much of this area is mesic upland; pine flatwoods and hardwood hammocks on slightly elevated sandy substrates commonly occur. Freshwater wetlands dominate between upland communities, and the eastern part of this area is ecotonal with the large sawgrass marsh system that makes up much of the greater Everglades system to the east.

<u>Community</u>	<u>Estimated Area (Ac.)</u>
Mesic Communities	
Hardwood/Palm Hammocks	
Pine/Palmetto Flatwoods	
Disturbed Mesic	
Other	
Hydric Communities	
Swamp Forest	
Cypress Forest	
Hydric Hammock	
Hydric Pine Flatwoods	
Scrub Cypress	
Marl Prairies	
Marsh	
Mangroves/Brackish Marsh	
Open Water	
Disturbed Wetland	
Other	

Map of BICY Management Units and treatment area identified

Map of treatment area with vegetation.

Disturbance: Significant alteration to natural systems by human activities has occurred in much of this area. Several miles of trails, including elevated trails have developed here during decades of occupation and use by hunters and other visitors to the area; these have produced additional areas of mesic disturbance. Several large areas of mesic communities apparently were altered for agricultural development, hunting, or other recreational camps. Many temporary residences and camps were built in the northeastern part of BICY in an area called Looneyville (a.k.a. Big Cypress Sanctuary);

borrow pits, roads, fill pads, and other alterations associated with these structures remain as disturbance to natural communities. Significant disturbance to mesic tree communities occurred with 2005 hurricanes, especially in the southeastern part of the Preserve, where stronger winds were imposed on tree canopies (see Fig. 00. Alterations to Hammock communities from Hurricane Wilma, 2005). Much of this area received disturbance to soils and associated biological communities with off-road vehicle traffic, but the area has been closed to vehicles for several years. Recovery of the wetland communities appears to be progressing, but abandoned vehicle trails are evident from the air.

Occurrence of Schinus: Schinus is a common dominant or co-dominant shrub in many mesic communities here. This exotic forms nearly monocultural stands in some large areas and has created some of the most severely infested area in BICY. Most of the areas significantly affected with BP are mesic sites that have been altered by human activities. These are generally mesic communities with disturbance. Several abandoned domiciles or camps with access roads occur adjacent to these roads, and usually are dominated by Schinus. Remote camps on upland islands commonly are associated with BP. In 2005, many hardwood hammocks received significant alteration with hurricane Wilma; this has produced disturbance that is likely to promote growth and recruitment of BP throughout most of these mesic communities.

Anticipated Control Methods: BICY Fire Management began mechanical control of BP in some of the area around Nobles grade to eliminate hazardous fuels with GyroTrack machines. This also physically reduced BP shrub structure of BP, so that crews were able to efficiently follow and chemically treat re-growth; this required smaller amounts of chemical control agent and labor. Fire Management anticipated burning the slash created by the GyroTrack activities here, but this may not occur. Most of this fuel reduction occurred west of Noble's Grade. Control of BP will primarily be accomplished with basal bark application of ***** to all BP individuals encountered that are too large to be pulled from the soil; small individuals will be pulled by hand and left so that no roots contact the soil.

Access: Access to this area is limited. The southern limit of this area is bounded by the I-75 borrow canal and wildlife fence; the Florida State Miccosukee Indian Reservation forms the eastern boundary; and the Big Cypress Seminole Reservation occurs along the northern boundary. These physical, ownership, and management entities limit access to a few roads that access this area. A service road adjacent to the L28 interceptor canal north of I-75 and Nobles Grade north from the I-75 mile 60 rest area (west) allow access from the south and west; other roads through BIA (reservation) lands may allow access with appropriate permission. Several trails and roads within the area that were made by former property owners will allow access through much of this area.

Properties owned by citizens, or occupied by members of the Miccosukee Tribe of Indians of Florida and The Seminole Indians of Florida occur on the northern side of US41; access through these properties is probably not necessary and should be avoided unless permission by the property owner is granted in writing. Logistical considerations should include planning for daily travel through areas with limited access. Several ORV access points and designated trails have been established in this area, so that access and trail use may be constrained to areas outlined in the ORV Management Plan (1999).

The Addition Lands management unit part of this area is not addressed in the BICY General Management Plan. Therefore, recreational off-road vehicle use has been

discontinued in this area until a general management plan that includes policy related to this area is completed. Administrative relief to allow vehicles into this area for exotic plant control has routinely been issued, and will be sought for this work until management policy concerning vehicles in this area is approved.

Anticipated Start and Completion: BICY Fire Management began hazardous fuel reduction along Noble's Grade in the 2004-05 dry season. Large-scale systematic treatment for the rest of this Management Unit will begin in late 2012 and continue through late 2013.

Special Considerations:

1- Large areas of very dense BP occur in this area; about 500 acres of disturbed land dominated by BP occurs in this area, so that significant expense will be incurred to control exotics in these areas. Concomitantly, significant amounts of herbicide are expected to be introduced into the biological communities at these locations; however, herbicide amounts are expected to be within limits recommended for the chemicals that will be used.

2- Part of this area is bordered by the Big Cypress Seminole Reservation to the north and the Florida State Miccosukee Indian Reservation on the east. These areas are managed by the Bureau of Indian Affairs (BIA) and contain significant populations of exotic plants, including BP. This will be a source of BP seeds into adjacent BICY for an indefinite period; re-treatment and maintenance of exotic plant populations in this area will be necessary will be necessary for an indefinite period.

3- Drainage and associated habitat alterations has been undertaken by previous owners and property managers in many parts of this area. This will maintain conditions that promote growth and recruitment of BP through much of the area. Hydrologic restoration of this area should be undertaken to minimize opportunities for re-establishment of BP in this part of the preserve.

4- Several privately owned camps still exist in this area, so that private property in-holdings may be encountered. A detailed map with descriptions of properties should be produced to identify and avoid these properties in the field.

Treatment Areas 7, 8. Schinus Control in the Turner River Management Unit and Western Addition Lands South of I-75

General Description: This is the interior part of BICY, and is located south of I-75 (Alligator Alley) and north of US41 (Tamiami Trail) between Turner River Road on the west and the Florida Trail/Corn Dance Management Unit on the east.

Area:

Biological Communities: This area is west of the large marl prairie and slough systems that dominate the Deep Lake Management Unit that occurs to the west. Much of this part of the preserve is dominated by freshwater wetlands with short hydroperiods. These are marl prairies or prairies with hatrack cypress trees between longer hydroperiod cypress strands and mixed hardwood and cypress sloughs. Mesic and hydric pine woodland islands make up much of the area about halfway between US41 and I-75. Hardwood hammocks are common throughout.

<u>Community</u>	<u>Estimated Area (Ac.)</u>
Mesic Communities	
Hardwood/Palm Hammocks	
Pine/Palmetto Flatwoods	
Disturbed Mesic	
Other	
Hydric Communities	
Swamp Forest	
Cypress Forest	
Hydric Hammock	
Hydric Pine Flatwoods	
Scrub Cypress	
Marl Prairies	
Marsh	
Mangroves/Brackish Marsh	
Open Water	
Disturbed Wetland	
Other	

Map of BICY Management Units and treatment area identified

Map of treatment area with vegetation.

Disturbance: Most of the significant habitat alteration in this area has occurred near US41 (Tamiami Trail) and Turner River Road, where many residences, businesses, and temporary residences were constructed. Most of these are no longer inhabited or privately owned, but the fill pads, roads, borrow pits, canals and other alterations

associated with previous owners remain. A borrow canal and associated embankment are apparent on the northern side of US41 (see Fig. 00. Map of Some Disturbed Areas in BICY). Much of this area received disturbance to soils and associated biological communities with off-road vehicle traffic. However, several ORV access points and designated trails have been established in this area, so that access and trail use is constrained to areas outlined in the ORV Management Plan (1999). Significant disturbance to mesic tree communities occurred with 2005 hurricanes, especially in the southeastern part of the Preserve, where stronger winds were imposed on tree canopies (see Fig. 00. Alterations to Hammock communities from Hurricane Wilma, 2005).

Occurrence of Schinus: Moderate populations of BP occur in this management unit, mostly associated with disturbances and in mesic natural communities. These are generally mesic communities with disturbance. The margins of US41, Turner River Road, and associated borrow canal banks are disturbed mesic sites that commonly support BP; several abandoned domiciles or camps with access roads occur adjacent to these roads, and usually are dominated by Schinus. Remote camps on upland islands commonly are associated with BP. In 2005, many hardwood hammocks received significant alteration with hurricane Wilma; this has produced disturbance that is likely to promote growth and recruitment of BP throughout most of these mesic communities.

Anticipated Control Methods: BP was treated within 50 feet of the north side of Tamiami Trail and its associated borrow canal in 2003. In 2004 the eastern side of Turner River Road and associated borrow canal to 50 feet east of the canal was treated from Wagon Wheel Road north. Control of BP will primarily be accomplished with basal bark application of ***** to all BP individuals encountered that are too large to be pulled from the soil; small individuals will be pulled by hand and left so that no roots contact the soil.

Access: The northern limit of this area is bounded by the I-75 wildlife fence; an entrance to the Florida Trail from an I-75 rest area will allow access into the northeastern part of this area. The Florida Trail forms the eastern boundary and will allow ORV access to the eastern part of the area. US41 and its associated borrow canal on its north side forms the southern boundary, so that access to the southern extent of this area is limited to ORV access points and a few old bridges. The western boundary of this area is the borrow canal and adjacent Turner River Road. Several ORV access points and crossings will allow access to the western part of this area.

Properties owned by citizens, or occupied by members of the Miccosukee Tribe of Indians of Florida and The Seminole Indians of Florida occur on the northern side of US41 and the eastern side of Turner River Road; access through these properties is probably not necessary and should be avoided unless permission by the property owner is granted in writing. Logistical considerations should include planning for daily travel through areas with limited access. Several ORV access points and designated trails have been established in this area, so that access and trail use may be constrained to areas outlined in the ORV Management Plan (1999).

The Addition Lands management unit part of this area is not addressed in the BICY General Management Plan. Therefore, recreational off-road vehicle use has been discontinued in this area until a general management plan that includes policy related to this area is completed. Administrative relief to allow vehicles into this area for exotic plant control has routinely been issued, and will be sought for this work until

management policy concerning vehicles in this area is approved. Access to this area is limited.

Anticipated Start and Completion: BP was treated on the road margin on the south side of US41 in 2003; re-growth has occurred here so that some treatment will have to be done here again. Large-scale systematic treatment for the rest of this Management Unit will begin in late 2013 and continue through late 2015.

Special Considerations:

1- Tribal members living on the northern side of US41, and locations that may be occupied by tribal members in the future. Corn Dance Site

2- Hardwood hammocks and other mesic communities in this area received significant alteration with hurricane Wilma in 2005. Physical disturbance to substrates is common where trees were uprooted in high winds. This provides opportunity for establishment of Brazilian pepper plants in these mesic communities. Elimination of large amounts of tree canopy in these communities from high winds contributes to conditions favorable to recruitment of BP and other invasive exotics. Removal of native trees from the hammock canopy allows increased sunlight reaching the forest floor, so that seedlings recently established in disturbed soils (including exotics) will have enhanced opportunity to become established as part of the hammock community. This is likely to increase the BP populations in these areas, so that these communities will require particular attention within two to five years after hurricane alterations.

3- Significant populations of red-cockaded woodpeckers inhabit pinelands in this area. Particular care will be taken to insure that slash pine trees or other native organisms are not compromised by BP management activities.

Figure 00. Map of Some Disturbed Areas in BICY

Coordination with Neighboring Management Entities

Almost all inland biological communities in southern Florida have been affected by invasive exotic plants. Much of the area surrounding BICY contains significant populations of BP and other problem exotics that can disperse progeny into parts of the preserve that have received successful exotic plant control. This will require additional resources from BICY to maintain control of exotic plants in these areas. Clearly, external sources of exotic plants will occur in southern Florida indefinitely and removal of exotics from such sources will be a major part of exotics maintenance programs, and efforts to minimize outside sources of these plants will be supported. BICY encourages neighboring entities to control these exotics, especially in areas that border BICY to minimize dispersal of propagules from these populations into BICY. BICY Exotic Plant Management will consider aiding management entities through loans of equipment, personnel, contract management, shared funding, or other resources as appropriate.

Everglades National Park. Big Cypress National Preserve commonly coordinates exotic plant control efforts with Everglades National park, and maintains cooperative management activities to control exotic plants throughout the contiguous Park Service units. No strategies addressing control of BP in both units have been identified, as current activities occur away from this boundary area. However, as an upstream management entity, Big Cypress National Preserve will manage BP to minimize the likelihood that propagules will be produced that can increase infestation in neighboring EVER.

Miami-Dade County. BICY has established relations with Miami-Dade County with agreements that allows BICY to receive funding from Miami Dade County that can be used to manage exotic plants. This provides Miami-Dade County with opportunity to complete mitigation requirements associated with program commitments undertaken by Miami-Dade County. Between 1999 and 2003, at least four proposals were submitted by BICY to Miami-Dade County for habitat restoration and exotic plant management. For these projects the proposed agreement indicated BICY responsible for management of the project, with Miami-Dade County providing part of the project funding. In 2005, four of these proposed projects were revised and submitted to Miami-Dade County for consideration again.

Broward County. No agreements or interactions concerning exotic plant control that are specific to Broward County are known.

Hendry County. No agreements or interactions concerning exotic plant control that are specific to Hendry County are known.

Collier County. Collier County ordinances outline requirements for exotic plant removal and control, primarily addressing properties associated with commercial or residential planned unit development (PUD) projects. This generally does not affect activities associated with BICY. Collier County Highway Department, however, maintains BP on the shoulders of SR29 south of US41. Treatment of these roadside populations usually is

mechanical trimming; chemical treatment to eliminate these trees should be accomplished.

Miccosukee Tribe of Indians of Florida. No agreements or interactions concerning exotic plant control that are specific to the Miccosukee Tribe of Indians of Florida are known. Consultation with the Miccosukee tribe should be pursued to determine what considerations should be taken for sites that may be important to tribal members related to traditional use and occupancy (P.L 93-440).

Seminole Indians of Florida. Informal talks with the Seminole Indians of Florida suggest that environmental managers with this reservation to the north have interest in controlling exotic plants within the reservation. BICY Exotic Plant Management recommends, as highest priority, control of Brazilian pepper and other exotic plants in the Big Cypress Seminole Indian Reservation within one mile of the boundary with Big Cypress National Preserve. Consultation with the Seminole tribe should be pursued to determine what considerations should be taken for sites that may be important to tribal members related to traditional use and occupancy (P.L 93-440).

Florida Panther National Wildlife Refuge. The National Fish and Wildlife Service manages the Florida Panther Refuge, and actively removes exotic plants from this area. No interactions with BICY have specifically addressed control of BP.

Fakahatchee Strand State Preserve. The State of Florida Department of Environmental Protection manages Fakahatchee Strand State Preserve, and actively removes exotic plants from this area. BICY Exotic Plant Management has cooperated with DEP in early 2002, providing Systematic Reconnaissance Flights (SRFs) over FSSP, to collect data on locations of exotic plants, and help Fakahatchee locate and map populations of these trees. No interactions with BICY have specifically addressed control of BP.

Methods for control

Several methods of control of Brazilian pepper have been employed in BICY and elsewhere. Generally, physical control refers to the cutting or breaking of trees at or near the ground surface. Chemical control refers to control methods that herbicides, alone or in combination, to treat Brazilian pepper. Biological control refers to methods that use organisms such as insects or pathogens for treating Brazilian pepper. Methods of physical, chemical and biological control used or planned for use at BICY are detailed below.

Gyrotrack

Brazilian pepper trees are essentially ground down to the stump with the large, cylindrical cutting head on the gyrotrack. The machine itself is a self propelled tracked vehicle capable of operating on dry or moist ground. The tracks disperse the weight of the machine minimizing soil disturbance. The gyrotrack is used in dense stands of Brazilian pepper, Brazilian pepper mixed with other exotics or in areas where both Brazilian pepper control and hardwood reduction can be conducted simultaneously. The gyrotrack can be used for selective treatment in areas where native and exotic species grow together, but it generally is not useful for Brazilian pepper control in intact natural communities.

Areas treated with the gyrotrack need follow up treatment to kill resprouting stumps and seedlings. Herbicide application is used as a follow up treatment. Reintroduction of fire to gyrotracked areas has also been discussed, but to date, no coordinated post treatment burning has occurred in BICY. In addition, studies have not been conducted to determine the utility of this method. Research into the use of fire to kill resprouting trees and seedlings and to prevent reinfestation by Brazilian pepper needs to be conducted.

Cutting and Pulling

In this method, Brazilian pepper trees are either cut at the base or pulled up by the roots. Cutting is either by machete or chainsaw, depending on the size of the tree and is followed by the application of herbicide. Cutting followed by the application of herbicide prevents resprouting and decreases the amount of herbicide used to treat an infestation. On the other hand, it is more time consuming and therefore has the potential to be more costly. Hand pulling is also size dependent and is restricted to seedlings and saplings under 1 inch in diameter. Hand pulling is carried out without the need for herbicide treatment. With hand pulling, care must be taken to ensure that the plant is not broken off at the ground level leaving the stem to thicken and resprout.

Fire

Fire has not been employed at BICY specifically for the purpose of Brazilian pepper control. Research indicates that periodic fires in abandoned agricultural fields may slow the rate at which infestations progress but it does not prevent them from occurring (Doren, et al 1991). On the other hand, Brazilian pepper infestations in pinelands in Everglades National Park are kept at low levels due to prescribed fire frequency. In addition, qualitative observations at BICY suggest that pinelands with frequent fires have Brazilian pepper cover levels lower than those which appear to be fire suppressed.

Chemical treatment

Chemical treatment of Brazilian pepper is a very cost effective means of controlling infestations. Several highly effective herbicides are available and the use of each one is dictated by factors including site conditions, size of infestation and the potential for non-target damage. BICY currently uses two herbicides to treat Brazilian pepper: triclopyr ester (ie. Garlon4) and hexazinone (ie. Velpar). Only herbicides that have an approved, current pesticide use proposal (PUP) on file with the regional Integrated Pest Management coordinator are permitted to be used. In addition, all herbicide applications are made under the supervision of a pesticide applicator licensed by the State of Florida. In general, herbicide applications will be made in strict accordance with the pesticide application label. Applications are made in such a way to minimize damage to non-target organisms. Site specific instructions made by the contracting officer's representative assigned to the project are used to notify contracted pest management removal teams of sensitive plant or animal resources in the treatment area. In addition, any herbicide restrictions that may be needed are given to the supervisor of contracted crews. Applicators are required to wear personal protection equipment at all times when handling herbicides in any context. At a minimum, the following PPE is required for all applicators: leather shoes or rubber boots; long pants; long sleeved shirt; eye protection;

and rubber gloves. In addition to minimum PPE stated above, any additional equipment required by the pesticide label is also required.

Hexazinone – (Example: Velpar) Hexazinone acts by inhibiting the ability of plants to photosynthesize. In BICY, hexazinone granules are applied around the base of Brazilian pepper trees at labeled rates. Treated trees slowly yellow and decline making this herbicide ideal for roadsides and other areas where visibility and views are a concern. The granular formulation used in BICY offer the advantage of being premixed and easily transported. The granular formulation does create the potential for non-target damage to adjacent plants. As a result, this herbicide is used in non-sensitive areas with light Brazilian pepper infestation.

Triclopyr ester – (Example: Garlon4) Triclopyr ester is a chemical that mimics the growth hormone auxin and causes uncontrolled growth leading to the death of treated plants. It is one of the most effective and widely used herbicides to treat Brazilian pepper and other woody exotic species. In BICY, Triclopyr ester solution is applied as a cut-stump application, a basal bark application or a foliar spray. The application rate used is 15% or less in a suitable oil carrier. Examples of suitable oil carriers include JLB oil, Impel or methylated seed oil. When available, a premixed solution will be used. Premixed solutions remove the possibility that incorrect solution concentrates are mixed by contractors. In addition, spillage that may occur during onsite mixing will be avoided.

Biological control

Currently, no effective biological control agent has been approved and released for the control of Brazilian pepper. In Florida, one accidentally introduced wasp species, *Megastigmus transvaalensis*, feeds on the fruit of Brazilian pepper and is a significant seed predator. Initial studies indicate that it may inhibit Brazilian pepper from spreading but the long term effect of this species on Brazilian pepper is not known (Hight, et al. 2002). In addition, several other species have been identified as potential biocontrol agents. Host specificity testing is currently underway and releases will be made when approval has been secured. The possibility of a release occurring in BICY or in natural spread of biocontrol agents into BICY will be revisited when releases are scheduled by the appropriate agency. If a biocontrol is approved for release, BICY Resource Management staff will review and approve plans for release into the preserve. Currently, no action involving a biocontrol release is anticipated, but changes in approval status of any agent will result in a subsequent reevaluation of this management plan.

Re-treatment and maintenance

Inspection – Inspection of treatment sites will occur within 1 month of treatment. Percent of trees not killed will be estimated. If the number of trees not killed exceeds 5%, then contractors will be required to retreat the site to obtain the 95% kill rate required by the exotic plant treatment contracts used by BICY. Annual inspections will occur for at least three years thereafter.

Time frame

Number of retreatments required for long term control – this is a big question to me, can long term control ever be achieved without restoring hydrology or soil disturbance?

Treatment Data Collection

Data collected by contractors, but ultimately it is the responsibility of NPS staff to ensure that correct data is being collected. Required information: UTM GPS point for population center or multiple points for boundary of treated area or GPS track for boundary of area treated in NAD83 datum. Chemical name(s), diluent name, concentration of herbicide mixture, amount of mixture applied. Area surveyed, area treated, density estimate, stem estimate. Data collected on standard data sheet. Entered into BICY exotic plant database.

Implementation of Control Methods

Ground crews

NPS

SCA, volunteer workdays, other...

Research

Myrica mulch

Faunal surveys – UF Percival/Mazzoti

Biocontrol updates

Additional research needed

Time labor required

JS time estimates will depend on results of infestation estimates

General Figures for Labor and Time in 2005 Dollars

If treating 2 km² grid cells (494 acres) per day, then treatment will take one five man crew approximately 7.5 years (based on 3144 km²) to complete initial treatment. Currently, labor costs for a five person crew are \$1467 per 10 hour day (\$53/hour for supervisor and \$18.75/hour for labor). Estimated total cost for the entire preserve is about \$2.5 million. The cost per acre for treatment of Brazilian pepper varies significantly with amount of herbicide used. In areas with minimal infestation, costs will be as low as \$5.00/acre. In heavily infested areas, costs can exceed \$450/acre.

Other resources required – JS

- heavy equipment, fill, gyro, fire

Costs associated with required resources JS/JB

-Maintenance for equipment costs, fill costs—fire may be able to in kind their services

Proposed Schedule of treatments with associated costs

2006- Treatment will continue in the Bear Island Unit and the Addition Lands, from Nobles Grade west to Turner River Road. This area includes about 45,000 acres, of which an estimated 1000 are heavily infested, 500 have moderate infestation levels and

the remaining 43,500 are lightly infested. Costs associated with treating this area, provided treatments proceed at an average of 500 acres/day (roughly 2 kms/day), are approximately \$225,000 (150,000 labor and 75,000 herbicide). This funding has been secured through the South Florida/Caribbean Exotic Plant Management Team and NPS Challenge funds. It is anticipated that initial treatment will be completed in all preserve lands north of Interstate 75 and west of Nobles Grade (Florida Trail).

Maps- mgt areas –JS- same as above or should we consider using different management units for BP control?

Contracted Labor to Fulfill Exotic Plant Control Requirements

Most field-oriented control of exotic vegetation is done through contractual agreements; these agreements comply with NPS contracting requirements.

Agreements that involve resources provided by the State of Florida Department of Environmental Protection (DEP) comply with requirements as laid out in the State's DEP Upland Invasive Plant Management Program. Contractors must have proven safety and performance records and are required to achieve 95% control of exotics in treatment areas.

The goal of Brazilian pepper management is to bring the Brazilian pepper population in BICY to a maintenance level. This will help maintain the integrity of native plant communities and increase the amount of useable wildlife habitat by eliminating Brazilian pepper and will help prevent it from re-establishing within BICY which, if allowed to happen, would negate past efforts. Benefits of the project include:

- 1- Native plant communities and more natural fire regimes will be restored;
- 2- Controlling Brazilian pepper will enhance plant diversities and help insure the integrity of native plant communities, thus increasing useable wildlife habitat;
- 3- Enhancement of wildlife habitat in this and surrounding areas will support the recovery of the endangered Florida Panther (*Felis concolor-coreyi*), red-cockaded woodpecker (*Picoides borealis*), wood stork (*Mycteria americana*), and the Endangered everglades kite (*Rosterhamus sociabilis*).

Administrative Considerations

Environmental (NEPA etc.) compliance.

Control and maintenance of exotic vegetation is done with all known required permits and authorization. The approved BICY Management Plan outlines and addresses control and maintenance of exotic organisms.

Continued work on established restoration/exotic control programs.

Control and maintenance of exotic vegetation has been an ongoing, aggressive, and successful part of Resource Management in BICY for over 20 years.

Commitment to ongoing project maintenance.

Maintenance of exotic control, as re-treatment or secondary treatment of areas with exotics is underway and will continue indefinitely.

Use of current control technology (CCT) or proposes to improve CCT's.

Control and maintenance of exotic vegetation is provided through a cost-effective approach, using the most current control methods.

Public outreach and education.

To improve public understanding of the importance of exotic plant management on public natural areas, a portion of the funding from this project will be used to create descriptive brochures. Brochures will be made available to the general public at the main visitor's center and other existing public interface areas within the preserve. BICY interpretive personnel will be provided materials that describe exotic removal and habitat restoration so this information may be provided to visitors.

Coordination with Fire and Aviation Management.

References

Barkley, F. A., 1944. *Schinus* L. Brittonia 5(2):160-98.

Big Cypress National Preserve. 1991. General Management Plan Final Environmental Impact Statement. Volume 1. Branch of Publications and Graphic Design of the Denver Service Center. NPS D-54A. USDOL. 427 pp.

Big Cypress National Preserve. 1998 Resource Management Plan, Big Cypress National Preserve. National Park Service, USDOL.

Big Cypress National Preserve. 1999. Draft Recreational Off-Road Vehicle Management Plan, Supplemental Environmental Impact Statement. Big Cypress National Preserve, National Park Service, USDOL. 176 pp.

Doren, R.F., L.D. Whiteaker, and A.M. LaRosa. 1991. Evaluation of fire as a management tool for controlling *Schinus terebinthifolius* as secondary successional growth on abandoned agricultural land. Environmental Management 15: 121-129.

Duever, M. J., J. E. Carlson, J. F. Meeder, L. C. Duever, L. H. Gunderson, L. A. Riopelle, T. R. Alewxander, R. L. Myers, and D. P. Spangler. 1986. The Big Cypress National Preserve. Research Report No. 8 of the National Audubon Society. National Audubon Society, New York. 445 pp; 1 map.

Ewel, J. J., D. S. Ojima, K. A. Karl, and W. F. DeBusk. 1982. *Schinus* in Successional Ecosystems of Everglades National Park. South Florida Research Center Report T-676. U.S. Department of Interior, National Park Service, Washington, DC, USA

Ewel, J. J. 1986. Invasibility: lessons from south Florida. In: Mooney, H. A. and J. A. Drake (eds.) 1986. Ecology of Biological Invasionsof North America and Hawaii. Ecological Studies, Vol. 58. Springer-Verlag, New York.

Hight, S.D., J.P. Cuda and J.C. Medal 2002. Brazilian Peppertree. In: Van Driesche, R., *et al.*, 2002, Biological Control of Invasive Plants in the Eastern United States, USDA Forest Service Publication FHTET-2002-04, 413 p.

Myers, R. L. and J. J. Ewel. 1990. Ecosystems of Florida. University Presses of Florida, Gainesville. 765 pp.

National Park Service. 2001. National Park Service Strategic Plan, FY 2001-2005. U. S. Department of the Interior.

Wade, D., J. Ewel, and R. Hofstetter. 1980. Fire in South Florida Ecosystems. USDA Forest Service General Technical Report SE-17. 125 pp.

Workman, R. W. 1978. History of Schinus in Florida. In: Workman, R. W. (ed.), 1978. Schinus. Technical proceedings of techniques for control of Schinus in South Florida: a workshop for natural area managers. The Sanibel-Captiva Foundation, Inc., Sanibel, FL.

Wunderlin, R. P. 1998. Guide to Vascular Plants of Florida. University Press of Florida. 806 pp.

Goals, Objectives, Policies.

Goal 00. BICY will control Brazilian pepper throughout the preserve and will maintain all areas without Brazilian pepper plants as much as possible.

Objective 00.00. By December 2015 BICY will have completed initial treatments of all area for Brazilian pepper plants. Initial treatments are elimination of all known Brazilian pepper plants within treatment areas identified in subsequent Objectives.

Policy 00.00.00. BICY will consider contracting professionals outside the Park Service with qualifications and experience in management of exotic plants for removal and control of BP.

Policy 00.00.00. BICY will consider contracting professionals outside the Park Service that are listed as appropriate contractors by the State Department of Environmental Protection for contracted exotic management work that is supported by funding or other resources provided by the State of Florida.

Policy 00.00.00. NPS personnel and personnel contracted by NPS for BP management will not enter properties owned by others without permission from the appropriate property owner.

Policy 00.00.00. In areas of BP treatment and elimination no more than 5% survival of BP after treatment will be considered acceptable. Elapsed time from treatment to determination of plant survival will be determined based on methods used and will be agreed upon by all persons or parties involved before treatment commences.

Policy 00.00.00. Whenever possible, BICY will grant administrative approval to use motorized vehicles for exotic plant control in restricted areas. The rationale for administrative approval is ongoing exotics maintenance, whereas closure of the management unit is primarily associated with recreational activities.

In areas known to contain organisms listed for protection by state or federal agencies, consideration relation to BP management will be made for each listed organism.

Objective 00.00. BICY will have at least one release site for experimental biological controls for BP.

Policy 00.00.00. BICY will support State and Federal programs that work on developing biological controls for BP.

Objective 00.00. By December 2007 BICY will eliminate all know BP plants north of I75 and west of Nobles Grade.

Policy 00.00.00. When exotic plant management activities that occur during hunting season, precautions including wearing blaze orange safety vests, will be part of work protocols.

Objective 00.00. By December 2008 BICY will eliminate all known BP plants west of Turner River Road.

Policy 00.00.00. Topographic and substrate restoration should be considered to help minimize re-establishment of BP in these areas

Policy 00.00.00. Hydrologic restoration of these areas should be considered to help minimize re-establishment of BP in these areas.

Objective 00.00. By December 2009 BICY will eliminate all known BP plants in the eastern half of the Stairsteps Management Unit.

Objective 00.00. By December 2010 BICY will eliminate all known BP plants in the western half of the Stairsteps Management Unit.

Objective 00.00. By December 2011 BICY will eliminate all known BP plants in the Loop Management Unit.

Objective 00.00. By December 2012 BICY will eliminate all known BP plants in the Corn Dance Management Unit.

Objective 00.00. By December 2013 BICY will eliminate all known BP plants north of I75 and east of Nobles Grade.

Objective 00.00. By December 2015 BICY will eliminate all known BP plants in the Turner River Management Units.

Objective 00.00. BICY Exotic Plant Management will secure funding from agencies or other sources outside BICY to increase annual funding used for exotic plant removal field activities by at least 50%.

Policy 00.00.00. Exotic plant control on state and county roads will be coordinated with appropriate agencies.

Goal 00. BICY will obtain data and information about changes to native biological communities that occur because of exotic plant populations.

Objective 00.00. By June 2007 an agreement will be in place to engage at least one research scientist to collect information related to native organisms and relations with exotic plants.

Policy 00.00.00. BICY will support scientific investigations related to exotic plant populations as appropriate.

Goal 00. Work associated with BP management will be conducted safely.

Objective 00.00. Safety: All NPS personnel and personnel contracted by NPS for BP management will maintain safe working conditions, the occurrence of accidents will be minimized, and no work hours will be missed because of preventable accidents.

Safety: All NPS personnel and personnel contracted by NPS for BP management will comply with safety and handling recommendations for chemicals that are part of labeling that accompanies each chemical.

Safety: All NPS personnel and personnel contracted by NPS for BP management will comply with requirements for Personal Protective Equipment as appropriate.

Safety: All NPS personnel and personnel contracted by NPS for BP management will comply with safety policies adopted by NPS and BICY, as outlined by the adopted BICY Safety Manual.

Objective 00.00. Within two years of damage to hammocks or other upland mesic communities by hurricanes or other weather activity, BICY will initiate treatment of exotic plants in altered communities containing invasive exotics.

Policy 00.00.00. Observations and analysis of hammocks and other mesic communities will be completed as soon as possible after serious storms to determine amounts of change to these communities and estimate the potential for compromise to these communities by invasive exotic plants.

Objective 00.00. By December 2008 BICY will have in place agreements with the Miccosukee Tribe of Indians of Florida and the Seminole Indians of Florida, agreements to control BP in reservation (BIA) lands adjacent to BICY.

Policy 00.00.00. Consultation with the native American tribes will be pursued to determine what considerations should be taken for sites that may be important to tribal members related to traditional use and occupancy (P.L 93-440).