

HARBOR KEY THIRD ANNUAL REPORT

DEP Permit No. 41-01666973-001
FERC Docket No. CP00-6-000

DECEMBER 2004

Prepared for:

Gulfstream Natural Gas System, L.L.C.
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INTRODUCTION

Harbor Key was selected as an environmental mitigation site as part of the Gulfstream Natural Gas Pipeline project. Harbor Key enhancement has been undertaken in order to meet public interest requirements DEP Permit No. 41-01666973-001 and FERC Docket No. CP00-6-000. Harbor Key consists of a 60 to 90 foot wide and 1.5-mile long coastal strand community with a narrow mangrove fringe. Tampa Bay is to the west and a basin mangrove forest to the east (Figure 1). Exotic plants impacted the coastal strand, primarily Brazilian pepper (*Schinus terebinthifolius*) at moderate to high densities.

Harbor Key contains three archaeological sites:

- 1) Site 8MA13- a temple mound on the east side of the property.
- 2) Site 8MA14- a sand burial mound located in the middle of Harbor Key.
- 3) Site 8MA15- a shell midden ridge that stretches along the upland ridge and submerged and intertidal areas that run north-south along Harbor Key (Figure 2).

The Seminole Tribe of Florida, the Seminole Nation of Oklahoma, the Florida Division of Historical Resources, and Janus Research approved the methodology for the eradication of exotics.

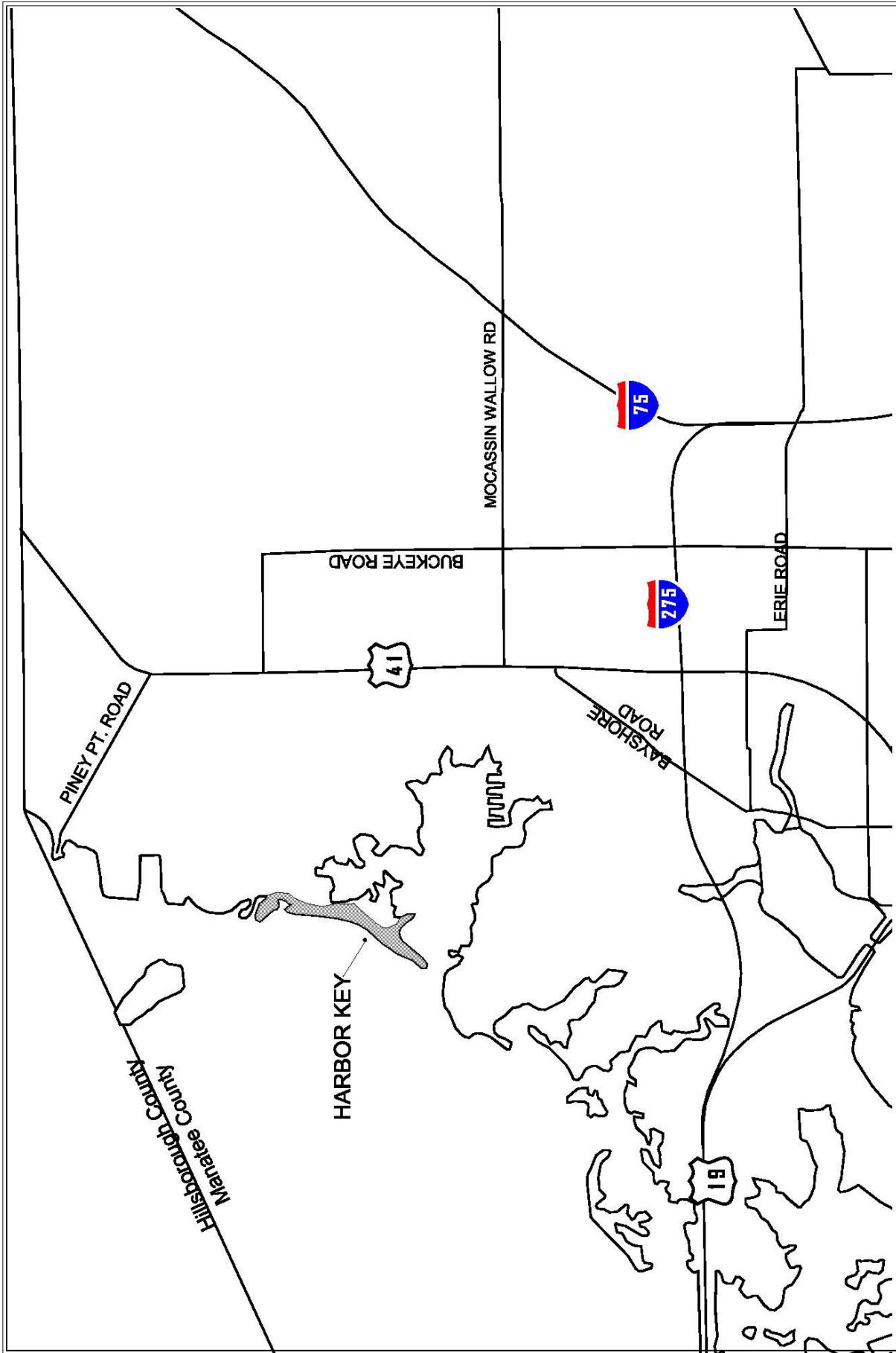
The Caretaker, Inc. under the supervision of a qualified ecologist from Kevin L. Erwin Consulting Ecologist, Inc., and a qualified archaeologist under contract with Janus Research carried out exotic removal from April 11 through May 11, 2001. The Caretaker conducted subsequent exotic vegetation maintenance activities during July 2001, September 2002, October 2003, and June 2004. Previous reports for this project include the Harbor Key Time Zero Report June 2001 and the First and Second Annual Reports December 2002 and 2003. Monitoring for the third annual report was conducted on December 27, 2004.

Pursuant to permit requirements, Gulfstream has completed exotic species removal at the Harbor Key site in Tampa Bay.

METHODOLOGY

Permanent Photo Stations

Panoramic photographs were taken from permanently established photo stations along Harbor Key. These photographs provide additional documentation of the existing conditions (Appendix A).

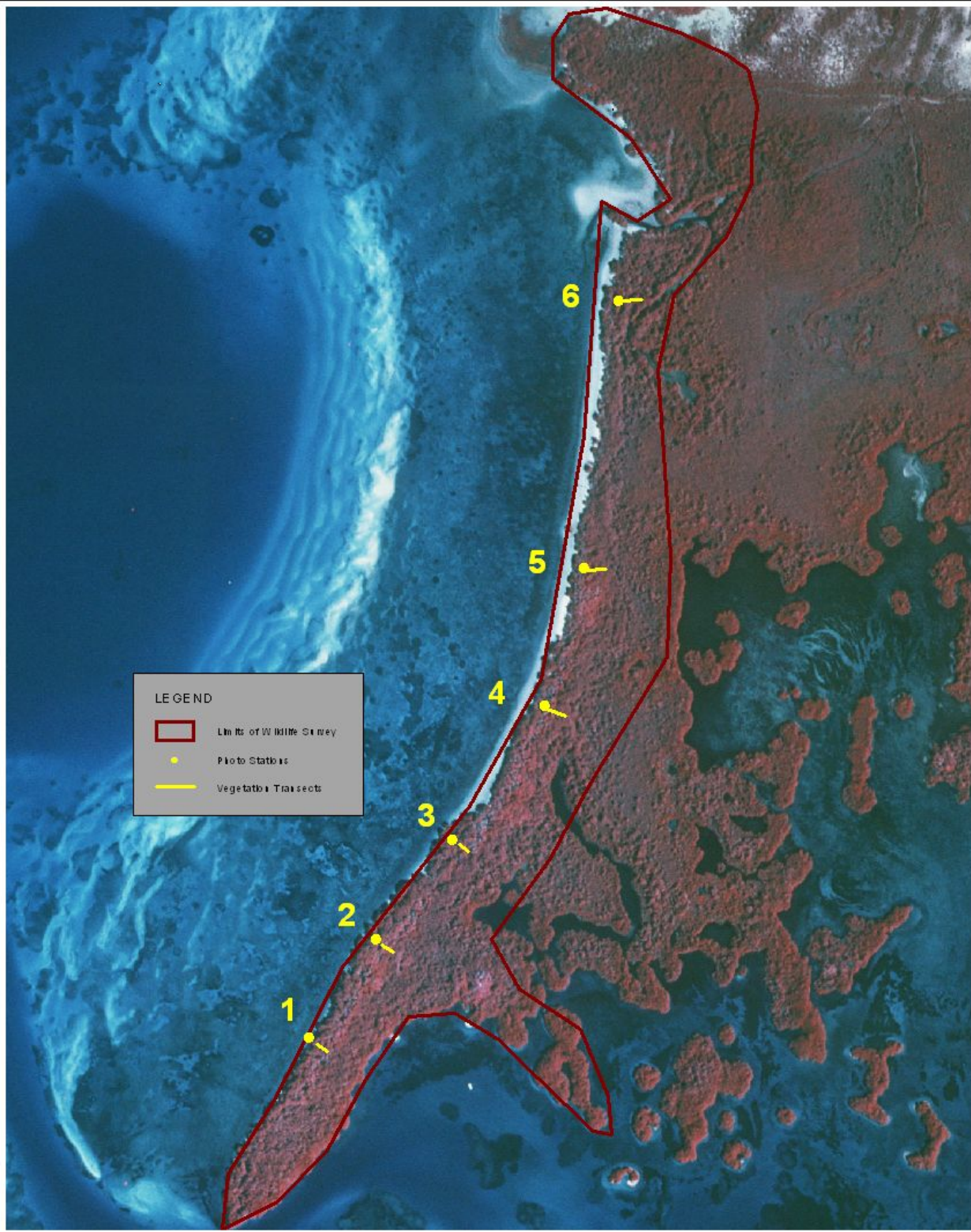


Note: Location map produced with
FGDL CORE Data Disk V2, 1999.

Project Location
Sections 11, 12, 13, 14; Township 33 South; Range 17 East
Manatee County, Florida

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Figure 1. Harbor Key Location Map



LEGEND

- Limits of Wildlife Survey
- Photo Stations
- Vegetation Transects

200 0 200 Feet



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Figure 2. Harbor Key Photo Station and Vegetation Transect Locations

Vegetation

Six vegetation transects were established, each adjacent to one of the six existing photo stations (Figure 2). The vegetation was monitored using the line intercept methodology. The transects are orientated across the midden ridge from the edge of the mangrove ridge to the west and the edge of the mangrove basin to the east. Due to the variable width of the midden ridge, transects vary in length from 33 feet to 50 feet. A measuring tape was stretched along the transect and the plant occurring directly below (ground cover) and above (canopy) was recorded at 4± inches for the 33 foot transects, and every 6± inches for the 50 foot transects. This allows for 100 data points on each transect and equates directly to percent cover. Over the 2004 season a strong storm surge(s) over-washed the central ridge, and destroyed the transect stakes. In 2004, Transects 1,2,4,5, and 6 were monitored (using established distance and direction) beginning at the base of the ridge just north of the photo station, the photo station for Transect 3 was not found but a transect and photo were recorded in the immediate vicinity based on the transect location map and baseline photos.

Wildlife Utilization

During the December 2004 vegetation monitoring, incidental observations of wildlife utilizing Harbor Key were recorded. These observations consisted of direct sightings, scat, tracks, or vocalizations.

RESULTS AND DISCUSSION

Prior to the exotic plant eradication, the coastal strand of Harbor Key was dominated by Brazilian pepper in high densities (average of 394 stems per acre). The eradication of exotics on the midden ridge consisted of cutting the trees down, piling, and chipping the debris, and treating the stumps with an appropriate herbicide. During the June 2004 maintenance event scattered exotics including carrotwood (*Cupaniopsis anacardioides*), java plum (*Syzygium cumini*), China-berry (*Melia azedarach*), seaside maho (*Thespesia populnea*), and wedelia (*Wedelia trilobata*) were treated in addition to small Brazilian pepper (*Schinus terebinthifolius*) seedlings. The exotics treated in June were widely scattered and were estimated to comprise about one percent of the overall vegetative cover. The exotic vegetation removal and maintenance program has been successful in significantly reducing the presence of the targeted exotic/invasive vegetative species, and currently the presence of these species is less than one percent of the overall vegetative cover. Additionally, the native vegetation is increasing in coverage and diversity.

During the December 2004 monitoring of Harbor Key there was evidence that a major storm surge hit the ridge. On the southern portion of Harbor Key (south of Transect 5) a thick line of debris was deposited near the center of the ridge. On the northern third of Harbor key significant deposits of sand were observed. It is believed that the storm surge was associated with the active 2004 Florida hurricane season. Photos of the debris and sand deposits are included in Appendix B.

The monitoring conducted in December 2004 documents that the exotic vegetation treatment and maintenance of the Harbor Key site has been successful with the average percent of targeted exotic/nuisance species comprising less than one percent cover (not sampled in transects). Additionally, the percent cover and number of native vegetative species have increased, despite disturbance associated with the intense 2004 storm surge. While exotics were not sampled along the transects, it was noted that several non-desirable species are presently scattered across Harbor Key at very low levels.

For each monitoring transect a table has been prepared to document the vegetation present in 2004 and to show the change in vegetation cover following the time zero report in 2001. Tables 1 through 6 contain the current and historic vegetation monitoring information for the Harbor Key restoration project. Photo documentation of the transect areas is presented in Appendix A.

The majority of areas that were near pure stands of Brazilian pepper prior to the exotic treatment/maintenance activities are now shrubby areas dominated by grey nickerbean (*Caesalpinia bonduc*), morning glory (*Ipomoea sp.*), and coastal grasses. Throughout Harbor Key there are tropical hammocks, which are dominated by native tree species such as cabbage palm (*Sabal palmetto*), white stopper (*Eugenia axillaries*), marlberry (*Ardisia escallonoides*), Florida privet (*Forestiera segregata*), and buttonwood (*Conocarpus erectus*) these areas are expected to expand. Harbor Key monitoring has shown an approximate 44 percent increase in ground cover since the time zero monitoring, as well as an average increase of 5.3 species per transect (Table 7).

Wildlife species observed during the 2004 exotic re-treatment and third annual vegetation monitoring events included white ibis (*Eudocimus albus*), great blue heron (*Ardea herodias*), tri-colored heron (*Egretta tricolor*), osprey (*Pandion haliaetus*), black vulture (*Corgyps atratus*), gray catbird (*Dumetella carolinensis*), fish crow (*Corvus ossifragus*), raccoon (*Procyon lotor*), and Southern black racer (*Coluber constrictor*). Additionally, a large number of fiddler crabs (*Uca pugilator*), mangrove crabs (*Scylla serrata*), and snails were observed in the mangroves.

Table 1. Transect 1 Vegetation Data

Common Name	Scientific Name	Third Annual Monitoring			Second Annual Monitoring			First Annual Monitoring		Time Zero Monitoring	
		% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Canopy Cover	% Ground Cover	% Canopy Cover
Bare ground/open sky		40			50		65	57	65	88	68
Black mangrove	<i>Avicennia germinans</i>	1			3						
Buckthorn	<i>Bumelia spp.</i>	2	8	23		5	25		25	4	24
Camphorweed	<i>Pluchea odorata</i>	1						1			
Glasswort	<i>Salicornia spp.</i>	5								4	
Marlberry	<i>Ardisia escallonoides</i>	1	7	4	4	10	5	5			
Marsh elder	<i>Iva frutescens</i>	2	3					1			
Morning glory	<i>Ipomoea sp.</i>	11			6						
Moon vine	<i>Ipomoea alba</i>				5			1			
Railroad vine	<i>Ipomoea pes-caprae</i>				6			3			
Scorpion-tail	<i>Heliotropium angiospermum</i>	28			9			30			
Silverhead	<i>Philoxerus vermicularis</i>	6			10			2			
Varnish leaf	<i>Dodonaea viscosa</i>	1	3		2	2					
White mangrove	<i>Laguncularia racemosa</i>	2			5						
White stopper	<i>Eugenia axillaris</i>		4	8		2	10		10	4	8
Total Vegetation		60	25	35	50	19	40	43	35	12	32

Note: Transect length is 50 feet. Transect direction is 120 degrees.

Table 2. Transect 2 Vegetation Data

Common Name	Scientific Name	Third Annual Monitoring			Second Annual Monitoring			First Annual Monitoring		Time Zero Monitoring	
		% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Canopy Cover	% Ground Cover	% Canopy Cover
Bare ground/open sky		33			36		96	62	98	58	72
Beach pea	<i>Canavalia rosea</i>				3			5			
Black mangrove	<i>Avicennia germinans</i>	2			5						
Cabbage palm	<i>Sabal palmetto</i>			8							20
Dog fennel	<i>Eupatorium capillifolium</i>	1								4	
Glasswort	<i>Salicornia spp.</i>									4	
Gray nicker	<i>Caesalpinia bonduie</i>	41	3		5					4	
Marlberry	<i>Ardisia escallonoides</i>				4	5		5			
Marsh elder	<i>Iva frutescens</i>		2								
Morning glory	<i>Ipomoea spp</i>	6			5					10	
Railroad vine	<i>Ipomoea pes-caprae</i>	1			15			10			
Saltbush	<i>Baccharis halmifolia</i>	3	6			15					
Scorpion-tail	<i>Heliotropium angiospermum</i>	8			15			10		12	
Sea blites	<i>Suaeda spp</i>	2			5					8	
Silverhead	<i>Philoxerus vermicularis</i>	2			5			3			
Spanish needles	<i>Bidens alba</i>							5			
White mangrove	<i>Laguncularia racemosa</i>	1			2						
White stopper	<i>Eugenia axillaries</i>		1			4	4		2		8
Total Vegetation		67	12	8	64	24	4	38	2	42	28

Note: Transect length is 50 feet. Transect direction is 136 degrees.

Table 3. Transect 3* Vegetation Data

Common Name	Scientific Name	Third Annual Monitoring			Second Annual Monitoring			First Annual Monitoring		Time Zero Monitoring	
		% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Canopy Cover	% Ground Cover	% Canopy Cover
Bare ground/open sky					32		85	64	85	70	85
Bushy bluestem	<i>Andropogon glomeratus</i>				5						
Black mangrove	<i>Avicennia germinans</i>				10			10		15	
Buckthorn	<i>Bumelia spp.</i>	1	2		2						
Buttonwood	<i>Conocarpus erectus</i>		9	4			15	3	15		15
Christmas berry	<i>Lycium carolinianum</i>	2	4								
Finger grass	<i>Eustachys sp.</i>	36									
Marlberry	<i>Ardisia escallonoides</i>				4	2		3			
Moon vine	<i>Ipomoea alba</i>				5			5			
Morning glory	<i>Ipomoea spp</i>	1			5						
Paspalum	<i>Paspalum sp.</i>	2									
Railroad vine	<i>Ipomoea pes-caprae</i>				5						
Saltbush	<i>Baccharis halmifolia</i>				2						
Scorpion-tail	<i>Heliotropium angiospermum</i>				10			10			
Sea blites	<i>Suaeda spp</i>	3								15	
Sea purslane	<i>Sesuvium aizoaceae</i>	4									
Silverhead	<i>Philoxerus vermicularis</i>	13			15			5			
White mangrove	<i>Laguncularia racemosa</i>				5						
Total Vegetation		62	15	4	68	2	15	36	15	30	15

Note: Transect length is 33 feet. Transect direction is 130 degrees.

* In 2004 the actual photo station and transect location could not be located, a transect 33 feet in length running at 130° was monitored in the general vicinity of the original transect based on aerial map and initial photos.

Table 4. Transect 4 Vegetation Data

Common Name	Scientific Name	Second Annual Monitoring			Second Annual Monitoring			First Annual Monitoring		Time Zero Monitoring	
		% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Canopy Cover	% Ground Cover	% Canopy Cover
Bare ground/open sky								55	85	90	15
Black mangrove	<i>Avicennia germinans</i>	3			2						
Brazilian pepper (dead)	<i>Schinus terebinthifolius</i>								5		70
Cabbage palm	<i>Sabal palmetto</i>	1		8			10		5		10
Frogs fruit	<i>Phyla sp.</i>	8									
Giant bristlegrass	<i>Setaria magna</i>	16						10			
Morning glory	<i>Ipomoea spp</i>	4			10						
Nicker bean	<i>Caesalpinia bonduc</i>	52	2								
Saltbush	<i>Baccharis halmifolia</i>	1	4		10	10	5	10			
Scorpion-tail	<i>Heliotropium angiospermum</i>	3			15					10	
Sea grape	<i>Coccoloba uvifera</i>		1			2	2				
Silverhead	<i>Philoxerus vermicularis</i>	3			25			25			
White mangrove	<i>Laguncularia racemosa</i>				2						
White stopper	<i>Eugenia axillaries</i>	1	4				5		5		5
Total Vegetation		92	11	8	64	12	22	45	15	10	85

Note: Transect length is 50 feet. Transect direction is 122 degrees

Table 5. Transect 5 Vegetation Data

Common Name	Scientific Name	Third Annual Monitoring			Second Annual Monitoring			First Annual Monitoring		Time Zero Monitoring	
		% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Canopy Cover	% Ground Cover	% Canopy Cover
Bare ground/open sky					43		55	75	75	90	100
Brazilian pepper (dead)	<i>Schinus terebinthifolius</i>										70
Cabbage palm	<i>Sabal palmetto</i>			17			20		10		10
Coin vine		2									
Florida privet			27	8							
Giant bristlegrass	<i>Setaria magna</i>	12			10			10			
Juba's bush	<i>Iresine diffusa</i>				5						
Marine vine	<i>Ciccus trifoliata</i>				10			5			
Marlberry	<i>Ardisia escallonooides</i>	14	9	2	20	3	5	10	5		
Myrsine	<i>Myrsine floridana</i>									10	10
Scorpion-tail	<i>Heliotropium angiospermum</i>	4			10						
Sea grape	<i>Coccoloba uvifera</i>	2	1		2						
White stopper	<i>Eugenia axillaries</i>	3	16				20		10		10
Total Vegetation		37	53	27	57	3	45	25	25	10	100

Note: Transect length is 50 feet. Transect direction is 107 degrees.

Table 6. Transect 6 Vegetation Data

Common Name	Scientific Name	Third Annual Monitoring			Second Annual Monitoring			First Annual Monitoring		Time Zero Monitoring	
		% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Shrub Cover	% Canopy Cover	% Ground Cover	% Canopy Cover	% Ground Cover	% Canopy Cover
Bare ground/open sky					28		70	68	75	100	75
Hairy pod Cowpea	<i>Vigna luteola</i>				10						
Black mangrove	<i>Avicennia germinans</i>		2	12	10		15		10		10
Cabbage palm	<i>Sabal palmetto</i>			8			15		15		15
Flat sedge	<i>Cyperus ligularis</i>	14									
Juba's bush	<i>Iresine diffusa</i>				10			5			
Moon vine	<i>Ipomoea alba</i>				2			2			
Railroad vine	<i>Ipomoea pes-caprae</i>	6			10						
Saltbush	<i>Baccharis halmifolia</i>				5						
Sea grape	<i>Coccoloba uvifera</i>	1									
Seashore dropseed	<i>Sporobolus virginicus</i>	16									
Sea purslane	<i>Sesuvium sp.</i>	7									
Scorpion-tail	<i>Heliotropium angiospermum</i>				15			10			
Silverhead	<i>Phloxerus vermicularis</i>	4			10			15			
Wild lettuce	<i>Lactuca intybacea</i>	2									
Total Vegetation		50	2	20	72	0	30	32	25	0	25

Note: Transect length is 33 feet. Transect direction is 107 degrees.

Table 7. Change in Ground Cover from Time Zero to Third Annual Monitoring

Transect	Change in Percent Recorded Ground Cover		Change in the Number of Native Species Recorded	
	From 2003	From Time Zero	From 2003	From Time Zero
1	10	48	0	8
2	3	25	0	2
3	(-6)	32	(-1)	7
4	28	82	2	8
5	(-20)	27	0	5
6	(-22)	50	0	7
Average	(-1.2)	44	0.2	5.3

CONCLUSION

The environmental enhancement activities at Harbor Key, which were identified under the Gulfstream Natural Gas Systems permit, have been accomplished. The initial exotic vegetation treatment and three years of maintenance activities have successfully minimized the presence of targeted exotic/nuisance vegetation to less than one percent of the overall vegetative cover and allowed native vegetative species to become better established. However, the presence of a small amount of scattered exotic species still exists and, as is recommended for all Florida conservation lands, periodic maintenance activities should be conducted to prevent re-establishment of exotic species. A June 2004 maintenance event was conducted based on agency comments about a potential exotic problem but this activity found only widely scattered problematic vegetation. As discussed with the agencies following the 2003 report, Harbor Key will be re-assessed after one-year without maintenance (June 2005) and if the presence of exotic species remains at the identified low levels, a request will be made to discontinue monitoring under this permit.