Railhead Scrub Preserve

Land Management Plan

Managed by

Conservation Collier Program
Collier County

[March, 2007 – March, 2017]

Prepared by: URS Corporation, with the cooperation of
The Institute for Regional Conservation

Prepared for: Conservation Collier Program

February 2006

Railhead Scrub Preserve

Land Management Plan Executive Summary

Lead Agency: Conservation Collier Program

Properties included in this Plan: Railhead Scrub Preserve

Acreage Breakdown:

Natural Community	Acreage
Xeric Uplands	38.8
Mesic Flatwoods	32.0
Dome Swamp	5.5
Depression Marsh	0.5
Disturbed Areas	3.5
TOTAL	80.3

Management Responsibilities:

Agency: Collier County - Conservation Collier Program
Program Coordinator: Alexandra J. Sulecki, Program Coordinator
Preserve Manager: Melissa Hennig, Environmental Specialist

Designated Land Use: Preservation

Unique Features: Xeric uplands Habitat

Archaeological/Historical: N/A

Management Needs:

Fencing and control of Off Road Vehicle (ORV) trespass;
Solid waste removal and dumping control;
Monitoring of biological resources;
Exotic plant removal and maintenance;
Restoration of some areas after exotic removal;
Restoration of extirpated native plant and animal species;
Implementation of a prescribed fire management program;
Habitat management to enhance protection of native and listed species population; and
Planning for public use.

Acquisition Needs: None

Surplus Lands: None

Public Involvement:
Working with Mediterra Community, Railhead Industrial Park property owners and Collier County Sheriff's Department to control trespass issues.

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1.0 Introduction

The Railhead Scrub Preserve is an 80-acre natural area located in the northwest corner of Collier County, south of the Railhead Industrial Park and East of Old US 41 (Section 10 Township 48 Range 25). The preserve protects significant areas of xeric upland habitat surrounded by industrial and commercial developments to the west and north, a residential community to the east, and undeveloped land to the south. Current physical access to the preserve is from Old US 41 through Sun Century Road, a private road.

The Conservation Collier Program acquired the Railhead Scrub Preserve in 2004. The Preserve includes approximately 70 acres of upland habitats, primarily Xeric Uplands (Scrub/Scrubby Flatwoods) and Mesic Flatwoods, and 10 acres of wetland habitats including Dome Swamp and Depression Marsh. The Preserve was purchased with funds from the Conservation Collier Program. The County holds fee simple title to the Railhead Scrub Preserve. The Conservation Collier Program manages these lands under authority granted by the Conservation Collier Ordinance (2002-63) (Appendix 1). Conservation, preservation and public use and enjoyment consistent with conservation are the designated uses of the property.

Management activities allowed include those necessary to preserve, enhance, restore, conserve, and maintain environmentally sensitive lands for the benefit of present and future generations. Uses of the site must be consistent with these management goals.

This is the initial management plan for the Railhead Scrub Preserve. This 10-year land management plan departed from the Interim Management Plan prepared by the Collier County Environmental Services Department in September 2004. Grant funding will continue to be sought for post acquisition funding and management. This management plan has been developed to comply with general State Grant Award Agreements and may be modified if required to further the goals of specific grant applications.

This site management plan is divided into four main sections including an introduction, which describes the location, zoning, land acquisition, significance, management authority, and extent of public participation. Section two describes the current condition of natural resources existing in the preserve; section three discusses the historic, existing and proposed use of the property; and finally section four presents the set of goals and objectives of the plan and describes the management actions needed to meet those goals and objectives.

1.1 Purpose and Scope of the Plan

The purpose of the plan is to manage the environmentally sensitive lands in the Railhead Scrub Preserve for the preservation of some of Collier County's most threatened habitats. Those lands are important for ensuring the long-term survival of endemic and listed species, protecting water resources and enhancing local ecological awareness. The preserve will be managed for conservation, protection, and enhancement of natural resources and for compatible types of public outdoor recreation. The scope of this plan is to provide management direction for the Railhead Scrub Preserve by identifying the goals and objectives necessary to eliminate or

minimize any threats to the resource base and integrity of the site, and to identify management actions to achieve those goals and objectives. Key management objectives outlined below are provided in order of priority:

- Securing boundaries to eliminate trespass by ORVs, dumping and to facilitate Collier county Sheriff's Office (CCSO) monitoring;
- Removal and exclusion of invasive exotic plants;
- Removal of solid waste;
- Restoration of damage caused by ORV use on the site;
- Wildlife management, including surveys and habitat management to benefit wildlife;
- Application of prescribed fire to mimic natural fire frequency in fire dependent communities;
- Determine public use needs; and
- Promote maximum habitat diversity.

Acquisition and management of this site for conservation purposes and passive public recreation furthers key Collier County Comprehensive Growth Management Plan directives in the Conservation and Coastal Management Element, including:

- Goal 1 – Plan for protection, conservation and appropriate use of natural resources;
- Goal 6 – Identify, protect, conserve and appropriately use native vegetation and communities and wildlife habitat; and
- Goal 7 – Protect and conserve fisheries and wildlife, with emphasis on listed species known to inhabit a site.

The current and future land-use designation is Industrial; however, Conservation Collier lands are considered similar to Essential Services in the Land Development Code (Section 2.01.03) and conservation uses on acquired lands are permitted in all zoning districts. A "protection" in the Conservation Collier Ordinance (2002-63, Section 14.7) permanently extinguishes development rights on a parcel once purchased under the Conservation Collier Program. These actions were taken to avoid the need for and cost of rezoning individual properties.

Should funds be provided from any State funding program, all literature associated with the site shall identify the funding source and, advertise the site as publicly owned and operated as a natural conservation area.

This management plan is a working document that establishes the foundation for the ten-year management plan, which is submitted to the Collier County Board of County Commissioners for its approval. Upon approval, this plan shall replace the interim management plan prepared by the Collier County Environmental Services Department in September 2004. No use, infrastructure, or improvement shall be permitted on any property acquired or managed under the Conservation Collier Program that is inconsistent with the purposes of the program or that is not provided by an approved management plan for the property.

This format is intended to comply with the State Lands Management Plan, adopted March 17 1981 by the Board of Trustees of the Internal Improvement Trust Fund and is considered

balanced public utilization, specific agency statutory authority, and other legislative or executive constraints.

All development and resource alteration encompassed in this plan are subject to the granting of appropriate permits, development plan approvals, easements, licenses, and other required legal instruments. Approval of the management plan does not constitute an exemption from complying with the appropriate local, state, or federal permitting agencies.

1.2 Regional Significance of the Railhead Scrub Preserve

Collier County has approximately 64% of its area (more than 867,000 acres) protected in conservation areas (Figure 1). Despite this vast acreage of protected land, Collier County has lost most of its xeric upland habitats. Most preserve areas are dominated by wetlands or mesic uplands. Xeric habitats such as Scrubby Flatwoods and scrub have always been rare in Collier County. The Vegetation Map of South Florida by Davis (1943) shows only about 2,217 acres of "scrub" in the county (Figure 2), although he seems to have not mapped some areas, including Railhead Scrub Preserve.

Because of its high elevation, scrub is well suited for development. Most of the scrub and Scrubby Flatwoods of Collier County have been developed. Less than 200 acres are protected in the Rookery Bay National Estuarine Research Reserve. Rookery Bay and Railhead Scrub Preserve contain the last significant areas of Xeric Uplands in the county.

Xeric uplands in Collier County contain several species of rare plants and animals, including showy dawnflower (*Stylisma abdita*) which is a rare Florida endemic, Lakela's pinweed (*Lechea lakelae*) which was probably endemic to Marco Island and may now be extinct, and gopher tortoises (*Gopherus polyphemus*). Protection and management of their habitat is critical to their long-term existence not only in Collier County, but globally.

1.3 Land Acquisition

In November, 2002, the voters of Collier County approved the referendum that created Conservation Collier, intended to pay for a conservation land buying program for environmentally sensitive land (Appendix 1: Ordinance 2002-63). America's Business Park was purchased by Conservation Collier on September 10, 2004 and renamed Railhead Scrub Preserve. A site assessment to determine compliance with the initial screening criteria was conducted in 2003. Table 1 below summarizes relevant acquisition benchmarks.

Table 1: Acquisition History and Status for Railhead Scrub Preserve

Year	Benchmark
2003	Appraisal and Assessment to Determine Compliance with Initial Screening Criteria, including Biological and Hydrological Characteristics
2004	Railhead Scrub Preserve property purchased by Conservation Collier

Figure 1: Natural Preserves and Designated SFWMD Conservation Easements Existing in Collier County

Figure 2: Previous Distribution of Scrub Habitat in Collier County

1.4 Nearby Public Lands and Designated Water Resources

The closest preserve to Railhead Scrub Preserve is Barefoot Beach Preserve, a coastal park 2.3 miles to the west. Other preserves, in order of increasing distance, are provided in Table 2. Figure 1 shows the locations of these preserves. Many areas identified as South Florida Water Management District Conservation Easements are very close to Railhead Scrub Preserve. No nearby public lands contain Xeric Uplands (scrub or scrubby flatwoods). The closest preserve that does is Rookery Bay National Estuarine Research Reserve 14 miles away.

Table 2: Public Lands Located near the Railhead Scrub Preserve

Preserve	Distance (miles)	Direction	Type
Barefoot Beach Preserve	2.3	W	Collier County
Delnor-Wiggins Pass State Park	2.4	SW	State
Corkscrew Regional Ecosystem Watershed	2.9	E	State
Imperial River Preserve	3.2	E and NE	Lee County
Pine Lake Preserve	3.3	NE	Lee County
Estero Bay State Buffer Preserve	3.7	NW	State
Picayune Strand State Forest	12.7	SE	State
Rookery Bay National Estuarine Research Reserve	14.0	S	State

1.5 Management Authority

Lands acquired with Conservation Collier funds are titled to "COLLIER COUNTY, a political subdivision of the State of Florida, by and through its Conservation Collier Program." The Board of County Commissioners of Collier County established the Conservation Collier Program to implement the program and to manage acquired lands. As such, Conservation Collier holds management authority for the Railhead Scrub Preserve. Collier County Parks and Recreation Department may participate in site management in the future, as defined through specific Interdepartmental Management Agreements. The Conservation Collier Program was originally approved by voters in November 2002 and subsequently confirmed in the November 2006 ballot referendum.

1.6 Public Involvement

Neighborhood involvement will be supported by meetings with the community organized by the County. Meeting topics may include proposed uses, management actions, progress reports, and implementation of site management activities. Staff will seek to coordinate management actions, such as exotic plant removal and prescribed fire with owners of any adjoining lands.

2.0 Natural and Cultural Resources

This section briefly describes the existing conditions at the Railhead Scrub Preserve. It includes general descriptions of the natural and cultural resources of the Preserve giving particular attention to the issues that are relevant for conservation. A general view of the Preserve is included in Figure 3.

2.1 Physiography

The Railhead Scrub Preserve lies within the Gulf Coastal Lowlands physiographic province, characterized by low elevations and poor drainage. The landforms that make up these coastal lowlands include coastal and sand dune ridges and relic spits and bars with intervening coast-parallel valleys consisting of poorly drained swampy areas with little recharge. Relic coastal dune ridges are the most prominent geographic feature in the general vicinity of this site.

2.1.1 Topography and Geomorphology

The site is located in the Southwestern Slope region of the South Florida Water Management District. According to the Bonita Springs, Florida USGS 7.5 Minute Topographic Quadrangle, the topography of the area is relatively flat with an average elevation of 15 feet above sea level and slopes gently westward toward the Gulf of Mexico. Surface water percolates directly into the uncovered ground or it collects in natural depressions and man made ponds on adjacent properties.

2.1.2 Geology

The geology of northern Collier County, where the Railhead Scrub Preserve is located, is characterized by complex sequences of interbeded sands, clays, and limestones. Closest to the surface is the Holocene aged Pamlico Sand Formation, approximately 10 feet thick and composed primarily of unconsolidated quartz sand and some silt. The Pamlico Sand unconformably overlies the Pleistocene aged Fort Thompson and Caloosahatchee Formations, which vary from a few feet to more than 20 feet in thickness and are characterized by shelly and sandy limestones with vugs and solution cavities (Miller, 1986).

Further below are the Ochopee and Buckingham Members of the Pliocene aged Tamiami Formation, which is at least 200 feet thick in the surrounding areas (Oaks and Dunbar, 1974). The Ochopee Limestone unconformably overlies the Buckingham Limestone and/or the equivalent Cape Coral Clay. This unconformity marks the bottom of the surficial aquifer separating it from the brackish underlying aquifer below. Then the Hawthorn Formation, rich in phosphate and other heavy minerals (Scott, 1988), overlies the Oligocene age Suwannee Limestone and Eocene age Ocala Limestone that form the Floridan Aquifer System in Southwestern Florida.

Figure 3: General View of the Railhead Scrub Preserve - Existing Conditions

2.1.3 Soils

According to the Soil Survey of the Collier County Area, soils mapped at the Railhead Scrub Preserve include (in descending order by extent) Satellite fine sand, Basinger fine sand, Riviera fine sand, and Immokalee fine sand (Figure 4). The areas mapped as Satellite fine sand units are situated on low-lying coastal ridges and correspond to the Xeric Uplands habitat located at the site. Basinger and Riviera fine sands are hydric soils typical of slightly depressional drainage-ways with poorly defined outlets such as flats and sloughs. Areas mapped as Immokalee fine sand units are associated with pine flatwoods habitats.

2.1.4 Hydrology/Water Management

Near the surface, the aquifer is highly permeable and the groundwater flows toward the west. However, permeability decreases downward from a porous limestone into poorly indurated sandstone cemented by micrite. The aquifer grades from freshwater downward into brackish water due to the proximity of the Gulf of Mexico to the west and the brackish water in the intermediate aquifer made primarily of Miocene aged sediments. Below that, the Hawthorne formation typically marks the upper boundary of the Floridan aquifer, which is contained within the underlying Oligocene age Suwannee Limestone.

Groundwater levels have gone down during the recent decades due to drainage on a regional scale and water management for development purposes. This trend may be very difficult to control and will gradually reduce the extent of the preserve that floods during the summer months and reduce the period of time the preserve wetlands are flooded during the year.

2.2 Climate

The Railhead Scrub Preserve is located in an area of Florida where humid subtropical and tropical savanna climatic patterns overlap, with temperatures moderated by winds from the Gulf of Mexico and the Atlantic Ocean. Sharply delineated wet and dry seasons and average monthly temperatures greater than 64º Fahrenheit characterize a tropical savanna climate. Monthly rainfalls may exceed ten inches during the wet season. On the other hand, humid subtropical climates typically show less extreme rainfall fluctuations between wet and dry seasons and average monthly temperatures is less than 64º Fahrenheit in some months.

The average annual temperature for the coastal portion of Collier County is approximately 75º Fahrenheit. The warmest months are usually July and August. The humidity is high during these months but frequent afternoon thunderstorms prevent excessively high temperatures.

Two-thirds of the annual rainfall occurs in the wet season from May to October. Thunderstorms are frequent during the wet season occurring every two out of three days between June and September. Rainfall records for the area indicate that there is not significant variation in the annual rainfall throughout much of the county; however, large variations often occur during a single year. The hurricane season extends from June through November with peak activity occurring in September and October when ocean temperatures are highest.

Figure 4: Soil Units at the Railhead Scrub Preserve

2.3 Natural Communities

Following the vegetation classification scheme of Florida Natural Areas Inventory (FNAI) and Florida Department of Natural Resources (FDNR) (1990), four natural community types, as well as disturbed areas, exist at Railhead Scrub Preserve. Historical aerial photos from 1952, 1962, and 1980 were georeferenced and examined to understand historical vegetation types and changes in the last 54 years. Each plant community on the site is discussed below and the general descriptions provided by FNAI & FDNR (1990) are provided in Appendix 2. Site-specific history and conditions for each community are discussed and a summary of relevant information is included in Table 3. The distribution of these natural communities in the Railhead Scrub Preserve is depicted in Figure 5.

Table 3: Summary of Natural Communities in the Railhead Scrub Preserve

FNAI Natural Community Type	# Acres	% of Area	Global Rank	State Rank	Comments
Xeric Uplands	38.8	48.3	G2-G3	S2-S3	
Mesic Flatwoods	32.0	39.9	G4	S4	
Dome Swamp	5.5	6.8	G4	S4	
Depression Marsh	0.5	0.6	G4	S4	Most examples are very small and unmapped
Disturbed Areas	3.5	4.4			
TOTAL	80.3	100.0			

G2: Imperiled globally because of rarity (6 to 20 occurrences or less than 3,000 individuals) or because of vulnerability to extinction due to some natural or man-made factor;
G3: Either very rare and local throughout its range (21-100 occurrences or less than 10,000 individuals) or found locally in a restricted range or vulnerable to extinction from other factors;
G4: Apparently secure globally (may be rare in parts of range);
S2: Critically Imperiled in Florida; **S3:** Imperiled in Florida; **S4:** Apparently secure in Florida (may be rare in parts of range).

2.3.1 Scrub/Scrubby Flatwoods

At Railhead Scrub Preserve, the Xeric Uplands are intermediate between scrub and Scrubby Flatwoods, as defined by FNAI & FDNR (1990). These two communities are closely related and can be found in association along elevation gradients, with scrub occupying higher elevations. At Railhead Scrub Preserve, the Xeric Uplands do not develop into classic scrub as is found on Florida's high sand ridges, such as the Lake Wales Ridge or the Atlantic Coastal Ridge. The sands at Railhead Scrub Preserve, while well drained, are very close to the water table at the peak of the summer-wet season. Because of this, South Florida slash pine (*Pinus elliottii* var. *densa*) is present at the Preserve instead of sand pine (*Pinus clausa*), and some Mesic Flatwoods species are present in the herb layer (e.g. *Lachnocaulon anceps*). Some of the higher elevations lack these Mesic Flatwoods species, and more closely approach the composition of scrub flora, except for the absence of sand pine. The Xeric Uplands at Railhead Scrub Preserve are typical of ecosystems that have been classified as "scrub" in much of Collier County.

There are two distinct areas of this habitat, a large section covering much of the southern half of the property and a smaller area covering the northern end. The vegetation in both of the areas is similar.

Aerial photographs from 1952 show that conditions in the site's Xeric Uplands have become much denser in the past 54 years. A continuous density increase as seen on a series of aerials since 1952 (Figure 6) indicates that no fires have burned this ecosystem during this period. Fires appear to have burned adjacent Mesic Flatwoods during this same period, but probably could not burn the Xeric Uplands because of off-road vehicle (ORV) trail scars and open sand areas, and probably insufficient winds and fire intensity to carry a fire through this ecosystem. Despite the lack of fire, Xeric Uplands at Railhead Scrub Preserve are in fairly good condition. These areas are free of exotic pest plants and there are many areas of open sand and little organic accumulation. Pine stumps scattered throughout the Xeric Uplands provide evidence of past logging activities.

2.3.2 Mesic Flatwoods

Mesic flatwoods occur in several portions of the property, most notably from the southeastern corner and north along the eastern edge, embedded in the southern section of Xeric Uplands in the center of the property, and west of the cypress dome. Inspection of 1952 and 1962 aerial photographs (see Figure 6) does not conclusively reveal historical vegetation types in areas now occupied by Mesic Flatwoods. Most flatwoods areas on the site (except those south of the cypress dome) occurred between Xeric Uplands and wetlands (marshes or cypress dome - i.e., occurring on slopes intermediate between xeric and hydric plant communities). The photos show mostly treeless areas and very uniform vegetation. The most likely scenario, based on current conditions, is that a saw palmetto (*Serenoa repens*) dominated flatwoods community, probably with slash pines in the canopy, dominated the slope between uplands and wetlands. Saw palmetto often forms dense stands in such areas, which do not burn frequently because of their proximity to two communities which burn very infrequently. Logging activities before 1952 probably removed most slash pines, leaving only a few scattered seed trees. Pine stumps observed in the Xeric Uplands provide evidence of past logging, even though no logging roads were seen on historical aerials.

Figure 5: Distribution of Main Natural Communities in the Railhead Scrub Preserve

Mesic flatwoods are now quite variable on the property. The flatwoods in the center of the property, surrounded by Xeric Uplands on three sides and a cypress dome/melaleuca (*Melaleuca quinquenervia*) forest on the north is in very good condition. The area seems to have experienced some localized fires, as evidenced by burn scars and the understory conditions, which have kept the height and cover of understory saw palmettos and hardwoods low. The herb layer is diverse and dense.

Other flatwoods areas on the property, those that occur on slopes, consist of a very dense saw palmetto understory reaching 5 – 10 feet tall, and almost no herbaceous layer. Brazilian-pepper and melaleuca have invaded some spots, forming dense stands. Virtually no herbaceous layer of forbs and graminoids exists.

2.3.3 Dome Swamp

A heavily disturbed cypress dome is in the center of the property. Inspection of 1952 and 1962 aerials show that the dome was historically about 0.9 acres. It was ringed with depression marsh and probably a fringe of saw palmetto against Xeric Uplands. This dome is now dominated by a dense canopy and understory of melaleuca. The melaleuca invasion probably occurred as the result of drainage and fire suppression. Grazing, once common in such habitats in Collier County, may have also occurred here. Few native plant species persist in this habitat. Even pond cypress (*Taxodium ascendens*) densities are very low with only a few large canopy trees. The dome is too small to be attractive for logging operations and no evidence of past logging was observed.

Figure 6: Historical Aerial Photographs

2.3.4 Depression Marsh

Large depression marshes formerly occurred at the northwest and southeast corners of the Railhead Scrub Preserve, as well as surrounding the cypress dome and at the south edge of the property. These are now primarily dominated by melaleuca. Several, mostly very small (<0.1 acre) depression marshes are the only ones with native plant species, including marsh fern (*Blechnum serrulatum*), bloodroot (*Lachnanthes caroliana*), giant whitetop (*Rhynchospora latifolia*), and Virginia chain fern (*Woodwardia virginica*). Melaleuca is invading some of these small marshes. The 1952 aerial photography of the property shows that the depression marsh along the southern property line, was connected hydrologically to the west, probably only during peak summer water levels, to a large marsh which ended at the southwest corner of the site. This marsh along the south edge has been used for many years by off road vehicle riders, is now almost completely devoid of vegetation, and forms a small pond when water levels are high. Larger depression marshes at the southeast corner, the northwest corner, and around the cypress dome are now dominated by dense stands of melaleuca.

2.4 Native Plant and Animal Species

The approximate 80-acre Railhead Scrub Preserve comprises a large area of Xeric Uplands dominated by xeric oaks and saw-palmetto that, along with pine flatwoods communities, wetland communities dominated by melaleuca, seasonal ponds, and small areas of herbaceous wetland, provides habitat for resident and migratory species of animals that typically uses such habitats.

Three hundred and four (304) plant species have been recorded at Railhead Scrub Preserve (Appendix 3). Data has been collected by Bradley in 2006 (one spring and one summer visit) and by Jim Burch in 1990, 1991, and 1994. Of these 304 species, 252 (82.9%) are native to the site and 52 are exotic (17.1%). None are southern Florida endemics. Eighty one (81) families are represented, with the most species in the grass family (Poaceae) with 48 taxa, the sunflower family (Asteraceae) with 36 taxa, the sedge family (Cyperaceae) with 34 taxa, and the pea family (Fabaceae) with 18 taxa. There are 175 dicots, 114 monocots, 13 ferns and fern allies, and 2 gymnosperms.

Due to the dearth of specific surveys for the occurrence of animal species (in contrast to plants) and the lack of on-site staffing, little is recorded for actual occurrences of animals at the Preserve. Occurrences of fauna at the Preserve are based on direct visual and aural observations by URS personnel during site visits on May 11 – 12 and September 15 – 16, 2006 of animals or evidence of activity such as spoor, scat, or burrows, and from the site information available in documents such as:

- the site's initial criteria screening report;
- the property interim management plan;
- the Environmental Resource Permit (ERP) application;
- a report of a gopher tortoise survey conducted at the site in January 2005;
- bird observations by Collier County Environmental Services Department staff; and
- anecdotal information from persons with knowledge of the site.

Mammal species known to occur or individuals and/or evidence of activity directly observed within the Preserve include the Virginia opossum (*Didelphis virginiana*), eastern mole (*Scalopus aquaticus*), nine-banded armadillo (*Dasypus novemcinctus*), raccoon (*Procyon lotor*), feral domestic dog (*Canis familiaris*), gray fox (*Urocyon cinereoargenteus*), white-tailed deer (*Odocoileus virginianus*), eastern cottontail (*Sylvilagus floridanus*), marsh rabbit (*Sylvilagus palustris*), eastern gray squirrel (*Sciurus carolinensis*), and hispid cotton rat (*Sigmodon hispidus*). Tracks of an unidentified canid were observed on the sand trails present throughout the Preserve. The size and orientation of the tracks and characteristics of nearby scat are consistent with that of the coyote (*Canis latrans*) indicating that this canid may be present at the Preserve. In September 2006, an excavation that appeared to be an enlargement of an existing gopher tortoise burrow was observed in the Scrubby Flatwoods habitat in the northern portion of the Railhead Scrub Preserve. This excavation appeared to be large enough to accommodate an animal the size of a coyote and may have been enlarged to be utilized as a coyote den site, or may have been an attempt by some person(s) to dig out the gopher tortoise. Neighbors have also reported coyote sightings at the Preserve.

Bird species observed perching, foraging, or exhibiting nesting behavior at the preserve include the northern mockingbird (*Mimus polyglottos*), brown thrasher (*Toxostoma rufum*), eastern towhee (*Pipilo erythrophthalmus*), northern cardinal (*Cardinalis cardinalis*), shiny cowbird (*Molothrus bonariensis*), boat-tailed grackle (*Quiscalus major*), blue jay (*Cyanocitta cristata*), pine warbler (*Dendroica pinus*), blue-gray gnatcatcher (*Polioptila caerulea*), great crested flycatcher (*Myiarchus crinitus*) red-bellied woodpecker (*Melanerpes carolinus*), common nighthawk (*Chordeiles minor*), mourning dove (*Zenaida macroura*), common ground dove (*Columbina passerina*), belted kingfisher (*Ceryle alcyon*), Cooper's hawk (*Accipiter cooperii*), red-shouldered hawk (*Buteo lineatus*), and great egret (*Ardea alba*). In addition, several bird species were observed flying over the Preserve but were not observed utilizing the habitats within the Preserve, including red-winged blackbirds (*Agelaius phoeniceus*), fulvous whistling-ducks (*Dendrocygna bicolor*), mottled ducks (*Anas fulvigula*), great blue herons (*Ardea herodias*), tricolor herons (*Egretta tricolor*), and white ibis (*Eudocimus albus*).

Bird observations by staff from the Collier County Environmental Services Department were conducted in 2004 and 2006. The lists for each campaign are included in Appendix 4 with 36 species documented in 2004 and 42 species in 2006. As many as 19 species are probable breeders at the Railhead Scrub Preserve site.

The Florida Breeding Bird Atlas lists 44 bird species that have been recorded as confirmed, probable, or possible breeding in the vicinity of the site (in the Bonita Springs USGS quadrangle) that may be present at The Railhead Scrub Preserve (Table 4). The Breeding Bird Atlas documents breeding distributions of all bird species in Florida between 1986 and 1991. Some of these species may breed at the Railhead Scrub Preserve.

Table 4: Breeding Bird Species Recorded in the Bonita Springs Quadrangle in the Vicinity of the Railhead Scrub Preserve

Common Name	Scientific Name	Common Name	Scientific Name

Least bittern	*Ixobrychus exilis*	Great Crested Flycatcher	*Myiarchus crinitus*
Green Heron	*Butorides virescens*	Gray Kingbird	*Tyrannus dominicensis*
Muscovy Duck	*Cairina moschata*	White-eyed Vireo	*Vireo griseus*
Osprey	*Pandion haliaetus*	Black-whiskered Vireo	*Vireo altiloquus*
Bald Eagle	*Haliaeetus leucocephalus*	Blue Jay	*Cyanocitta cristata*
Cooper's Hawk	*Accipiter cooperii*	Florida Scrub-Jay	*Aphelocoma coerulescens*
Northern Bobwhite	*Colinus virginianus*	Fish Crow	*Corvus ossifragus*
Common Moorhen	*Gallinula chloropus*	Purple Martin	*Progne subis*
Limpkin	*Aramus guarauna*	Tufted Titmouse	*Baeolophis bicolor*
Killdeer	*Charadrius vociferus*	Carolina Wren	*Thryothorus ludovicianus*
Least Tern	*Sternula antillarum*	Blue-gray Gnatcatcher	*Polioptilia caerulea*
Rock Pigeon (Rock Dove)	*Columba livia*	Northern Mockingbird	*Mimus polyglottos*
Mourning Dove	*Zenaida macroura*	Brown Thrasher	*Toxostoma rufum*
Common Ground-Dove	*Columbina passerina*	European Starling	*Sturnus vulgaris*
Eastern Screech-Owl	*Megascops asio*	Common Yellowthroat	*Geothlypis trichas*
Barred Owl	*Strix varia*	Eastern Towhee	*Pipilo erythrophthalmus*
Common Nighthawk	*Chordeiles minor*	Northern Cardinal	*Cardinalis cardinalis*
Chuck-will's-widow	*Caprimulgus carolinensis*	Red-winged Blackbird	*Agelaius phoeniceus*
Red-bellied Woodpecker	*Melanerpes carolinus*	Eastern Meadowlark	*Sturnella magna*
Downy Woodpecker	*Picoides pubescens*	Common Grackle	*Quiscalus quiscula*
Northern Flicker	*Colaptes auratus*	Boat-tailed Grackle	*Quiscalus major*
Pileated Woodpecker	*Dryocopus pileatus*	House Sparrow	*Passer domesticus*

Source: Florida Breeding Bird Atlas, www.wildflorida.org/bba

Reptile and amphibian species observed at the Preserve include the gopher tortoise (*Gopherus polyphemus*), brown anole (*Anolis sagrei*), six-lined racerunner (*Cnemidophorus sexlineatus*), southern black racer (*Coluber constrictor priapus*), green treefrog (*Hyla cinerea*), chorus frog (*Pseudacris nigrita*), and oak toad (*Bufo quercicus*).

Invertebrates observed during the May 2006 site visit include two butterfly species: the Gulf fritillary (*Agraulis vanillae*) and white peacock (*Anartia jatrophae*). An additional two butterfly species were identified at the Preserve in September 2006: the cloudless sulphur (*Phoebis sennae*) and the soldier (*Danaus eresimus*). Florida harvester ants (*Pogonomyrmex badius*) were common in the Scrubby Flatwoods habitat at the Preserve. Cicadas (Cicadidae) were prevalent in the Scrubby Flatwoods habitats at the Preserve. Ant lion (Myrmeleontidae) funnels and evidence of mole crickets (*Scapteriscus* spp.) in the form meandering raised ridges in the sand were prevalent in Scrubby Flatwoods habitat. Arachnids observed include the black-and-yellow garden spider (*Argiope aurantia*) and an unidentified crab spider (Thomisidae).

Other wildlife species that have not been recorded undoubtedly occur at the Railhead Scrub Preserve. During the migration periods, transient bird species would be expected to utilize this area for short periods of time. The developed character of the adjacent areas may inhibit transient use by many mammal, reptile, and amphibian species limiting the utilization of the Preserve to resident individuals or inhibit the dispersal of many species to and from the Preserve.

2.5 Listed Species

Official listings of rare and endangered species are produced at the federal level by the U.S. Fish and Wildlife Service and the National Marine Fisheries Service, and at the state level by the Florida Fish and Wildlife Conservation Commission and the Florida Department of Agriculture and Consumer Services. FNAI produces a list of rare and endangered species, and maintains a database of occurrences of these species in Florida. The Institute for Regional Conservation (IRC) also ranks native plant species by conservation status in the 10-county area of South Florida.

2.5.1 Listed Plant Species

There are 10 plant species at Railhead Scrub Preserve that are listed by the Florida Department of Agriculture and Consumer Services (FDACS), five (5) as Endangered, four (4) as Threatened, and one (1) as Commercially Exploited. The Florida Natural Areas Inventory (FNAI) lists five (5) species as Imperiled to Critically Imperiled in Florida. The Institute for Regional Conservation (IRC) lists four (4) species as Critically Imperiled in South Florida (Gann et al., 2002). There are no species listed as Endangered or Threatened by the U.S. Fish and Wildlife Service. In total there are thirteen (13) plants at Railhead Scrub Preserve that are listed by at least one of these groups (Table 5).

One other rare plant that was reported for Railhead Scrub Preserve in the 2004 Interim Management Plan is fuzzy wuzzy airplant (*Tillandsia pruinosa*). The photo taken of this plant is a related, but common species, potbelly airplant (*Tillandsia paucifolia*). Fuzzy wuzzy airplant has not been confirmed to occur on the site, and is unlikely to be found there because it's preferred habitat, strand swamp, does not exist on the property. Wild coco (*Eulophia alta*) was also reported as a listed species in the 2004 Interim Management Plan. This species is present on the site but is not listed as rare by any agency or organization – it is widespread and frequent in peninsular Florida. Jim Burch reported two additional species of rare plants, *Polygala polygama*, and *Digitaria filiformis* var. *dolichophylla*, which were not confirmed by the URS Team during the site visits.

Many of the rare plant species are actually not particularly rare in Florida or in Collier County. The four *Tillandsia* species on the site, for example, are listed mainly because of the threat of infestation from an introduced weevil, the Mexican bromeliad weevil (*Metamasius callizona*). They are still quite common to abundant in most of South Florida. Each of the thirteen rare plant species is briefly described below.

Table 5: Rare Plant Species at Railhead Scrub Preserve

Scientific Name	Common Names	IRC	State	FNAI
Asclepias curtissii	Curtiss' milkweed		E	S3
Chamaesyce cumulicola	Sand-dune spurge; Coastal dune sandmat		E	S2
Encyclia tampensis	Florida butterfly orchid		C	
Lechea cernua	Nodding pinweed		T	S3
Lilium catesbaei	Cateby's lily		T	
Lipocarpha maculata	American halfchaff sedge	SF1		
Ophioglossum nudicaule	Slender adder's tongue	SF1		

Scleria ciliata var. *curtissii*	Curtiss' nutrush	SF1		
Stylisma abdita	Showy dawnflower	SF1	E	S2S3
Tillandsia balbisiana	Reflexed wild-pine, Northern needleleaf		T	
Tillandsia fasciculata var. *densispica*	Stiff-leaved wild-pine, Cardinal airplant		E	
Tillandsia flexuosa	Banded wild-pine, Twisted airplant		T	S3
Tillandsia utriculata	Giant wild-pine, Giant airplant		E	

E: Endangered, **T:** Threatened, **C:** Commercially Exploited, **SF1:** Critically Imperiled, **S2:** Critically Imperiled, **S3:** Imperiled

Curtiss' Milkweed *(Asclepias curtissii)*
This herb is endemic to peninsular Florida where it has been reported from 21 counties (Wunderlin and Hansen, 2006). It is apparently extremely rare in Collier County where it has only been reported from two preserves - Railhead Scrub Preserve and Rookery Bay National Estuarine Research Reserve (IRC, 2006). Jim Burch recorded this species at this site in Xeric Uplands in the early 1990s. It was recorded very rarely in Xeric Uplands on the site by Bradley.

Sand-dune spurge (*Chamaesyce cumulicola*)
This herb is endemic to Florida where it has been reported from 12 counties (Wunderlin and Hansen, 2006). In Collier County it has only been recorded from two preserves, Railhead Scrub Preserve and Rookery Bay National Estuarine Research Reserve (IRC, 2006). It has also been recorded in the past from Marco Island and Horr Island, but may no longer exist in those places due to habitat destruction. In southwest Florida it has also been recorded from Cayo Costa State Park in Lee County. Jim Burch recorded this species at Railhead in Xeric Uplands in the early 1990s. Bradley observed a small population in disturbed sand just inside the gate opposite Sun Century Road.

Florida butterfly orchid (*Encyclia tampensis*)
This epiphytic orchid is common throughout peninsular Florida. It is endemic to Florida where it has been recorded in 32 counties. It has been found at most preserves in Collier and Lee counties. It is listed as Commercially Exploited by the State of Florida because poachers frequently collect it for its showy flowers. At Railhead Scrub Preserve, it occurs in both Xeric Uplands and in the cypress dome. In Xeric Uplands, sparse populations exist on some larger scrub oaks, especially sand live oak (*Quercus geminata*). In the cypress dome it was found to be rare on melaleuca (*Melaleuca quinquenervia*).

Nodding pinweed (*Lechea cernua*)
This subshrub is endemic to peninsular Florida. It has been recorded in 18 counties (Wunderlin and Hansen, 2006), where it has declined due to development of scrub and Xeric Uplands other than Railhead Scrub Preserve. It has been recorded from a number of sites in Collier County, but only two preserves, Rookery Bay National Estuarine Research Reserve and Delnor-Wiggins State Park (IRC, 2006). While it was formerly known from Lee County, no populations are now known to exist there in preserves (it may still persist for now on private lands). This species is common in Xeric Uplands at Railhead Scrub Preserve.

Catesby's Lily (*Lilium catesbaei*)

This herb is endemic to the U.S. southeastern coastal plain and is found nearly throughout Florida (Wunderlin and Hansen, 2006). It has been recorded in 50 counties (Wunderlin and Hansen, 2006). In Collier County it has only been found at Railhead Scrub Preserve, Big Cypress National Preserve, Collier Seminole State Park, Florida Panther National Wildlife Refuge, and Picayune Strand State Forest. It was found at the Preserve by Alexandra Sulecki in October 2006 in Mesic Flatwoods.

American halfchaff sedge (*Lipocarpha maculata*)
This small sedge is widespread in the eastern United States but is Critically Imperiled in South Florida (Gann et al., 2002). It has been recorded in 41 counties nearly throughout Florida, but only in 3 counties in South Florida – Collier, Lee, and Hendry. At Railhead Scrub Preserve, Bradley observed it in disturbed ground on the edge of a trail in 2006.

Slender adder's tongue (*Ophioglossum nudicaule*)
This small terrestrial fern is known from the southeastern United States to South America and the old world. It is Critically Imperiled in southern Florida (Gann et al., 2002). It has been recorded from 23 counties nearly throughout in Florida (Wunderlin & Hansen, 2006). Prior to the discovery at Railhead Scrub Preserve by Bradley in 2006, it was previously extant in South Florida only at one site in Palm Beach County (Gann et al., 2002). It has never before been seen in Collier County. At Railhead Scrub Preserve it was found along the edges of a sandy trail next to disturbed flatwoods.

Curtiss' nutrush (*Scleria ciliata* var. *curtissii*)
This sedge is known from Florida, Georgia, and Cuba. In Florida, it has been found in only four counties, three of them in South Florida (Gann et al., 2002) and is considered Critically Imperiled. In Collier County it was formerly reported only from Marco Island where it was collected in 1966 and 1968. It was observed at Railhead Scrub Preserve in Mesic Flatwoods in the center of the site by Bradley in 2006.

Showy dawnflower (*Stylisma abdita*)
This tiny herb is endemic to peninsular Florida. It has been recorded in 10 counties (Wunderlin & Hansen, 2006). It has been recorded in a number of scrub fragments in Collier and Lee counties in the past, but may only remain at a few in Collier because of development. All populations in Lee County have probably been destroyed. It is known to be present in two preserves in Southwest Florida, Railhead Scrub Preserve and Rookery Bay National Estuarine Research Reserve. It is otherwise absent from South Florida, with the closest populations in Highlands County (Gann et al., 2002, Wunderlin & Hansen, 2006). This herb is rare in Xeric Uplands at Railhead Scrub Preserve. It is known to be present in both the northern and southern portions of the site. Railhead Scrub Preserve is extremely important to the long-term existence of this species in South Florida.

***Tillandsia* spp.**
Four species of wild pines have been found at Railhead Scrub Preserve, *T. balbisiana, T. fasciculata* var. *densispica*, *T. flexuosa,* and *T. utriculata*. All of these species except *T. flexuosa* are abundant throughout southern Florida. *T. flexuosa* is less common, but still frequent, especially in coastal habitats. They are threatened by the introduced Mexican bromeliad weevil.

T. flexuosa was recorded at Railhead Scrub Preserve by Jim Burch in the early 1990s, but has not been found by Bradley. The other three species, frequent at Railhead, often form dense colonies in larger sand live oaks in Xeric Uplands. Both *T. balbisiana* and *T. fasciculata* var. *densispica* were also found to be rare in cypress dome.

Additional rare plant species may be found at Railhead Scrub Preserve following further field surveys. Confirmation of rare plant identifications should be made by a qualified botanist.

2.5.2 Listed Animal Species

The Florida Natural Areas Inventory (FNAI) maintains a database of occurrences of rare, threatened, and endangered species in Florida. Within the Railhead Scrub Preserve, FNAI has documented the occurrence of the gopher tortoise (*Gopherus polyphemus*) (Appendix 5, FNAI Managed Area Tracking Record and Element Occurrence Summary). In addition, the FNAI database report indicated two other listed species that have the potential to occur at the Preserve based on the known or predicted range of the species. They are the eastern indigo snake (*Drymarchon couperi*) and the gopher frog (*Rana capito*). The xeric upland communities at the site provide habitat for all three species. A brief description of these species and their status is included in the following paragraphs.

Gopher tortoise (*Gopherus polyphemus*)
This medium-sized native land turtle is listed by the State as a Species of Special Concern (proposed for uplisting to Threatened). Gopher tortoises are typically found in dry upland habitats including scrub, xeric oak hammock, sandhills, and dry pine flatwoods. Burrows are excavated for protection from weather, fire, and predators; they also provide refugia for more than 300 other species of animals that have been recorded in them. More than half of the Railhead Scrub Preserve, primarily the Xeric Uplands community, provides habitat for the gopher tortoise.

A gopher tortoise burrow survey was conducted at the Preserve (Johnson Engineering, 2005) in November and December 2005. According to the report, a total of 85 active, 139 inactive, and 43 abandoned gopher tortoise burrows were identified within the Preserve boundary. Calculations based on the number of active and inactive burrows identified and the acreage of the Preserve indicated that 172 gopher tortoises occupied the property at a density of approximately 2.5 tortoises per acre. Current threats to the tortoise population include the illegal ORV activity that has taken place at the site during the recent past and potential poaching for pets or consumption.

Eastern indigo snake (*Drymarchon couperi*)
This large, Federally- and State-listed Threatened snake inhabits a broad range of habitats but requires very large tracts of appropriate natural habitat unfragmented by roads to support viable populations. Although it was not directly observed on the Preserve, it may occur at the site based on its range and habitat preferences (i.e., the close association with gopher tortoise burrows). If this species occurs in the Preserve, it is not likely that it can maintain a viable population due to the relatively small area of natural habitat available within an area surrounded by development that is relatively isolated from other natural habitats. According to USFWS

Multi-Species Recovery Plan for South Florida, contiguous tracks of land in order of 10,000 acres or greater are required for the maintenance of a viable indigo snake population.

Gopher frog (*Rana capito*)
This amphibian is listed by the State as a Species of Special Concern. The gopher frog is a chunky medium-sized, boldly spotted frog that normally inhabits gopher tortoise burrows in dry sandy uplands that are within one mile of ephemeral or seasonal ponds and wetlands. Although the frog was not directly observed, its presence is possible given its association with gopher tortoise burrows.

Gopher frogs migrate to ponds during the breeding season (summer in southern Florida). A seasonal pond located in the southern portion of the site may provide breeding habitat if this frog occurs at the Preserve. Maintaining the gopher tortoise population and enhancing the ephemeral wetland will benefit gopher frogs at the Railhead Scrub Preserve.

2.6 Invasive Non-native and Problem Species

Several invasive, non-indigenous species are known to occur within Railhead Scrub Preserve. A list of plant species is available from the Florida Exotic Pest Plant Council (FLEPPC). Although Florida does not have an official invasive non-indigenous animal species list, at least 400 exotic fish and wildlife animal species have been reported in Florida, and approximately 125 species are established.

2.6.1 Invasive and Problem Plant Species

A total of 52 introduced plant species have been found at Railhead Scrub Preserve, 17.1% of the existing flora. Of these, twelve are considered Category I: Invasive, and four are considered Category II: Potentially Invasive by the Florida Exotic Pest Plant Council (FLEPPC) (see Table 6).

Table 6: Invasive Plant Species at Railhead Scrub Preserve

Scientific Name	Common Names	FLEPPC
Abrus precatorius	rosary-pea, crab-eyes	I
Acacia auriculiformis	earleaf acacia	I
Bauhinia variegata	mountain ebony, orchidtree	I
Dioscorea alata	white yam	I
Ficus microcarpa	laurel fig, indian laurel	I
Lantana camara	shrubverbena	I
Melaleuca quinquenervia	melaleuca	I
Panicum maximum	guineagrass	II
Panicum repens	torpedo grass	I
Rhodomyrtus tomentosa	downy myrtle, rose myrtle	I
Rhynchelytrum repens	rose natalgrass	I
Sansevieria hyacinthoides	bowstring-hemp, mother-in-laws tongue	II
Schinus terebinthifolius	brazilian-pepper	I
Solanum viarum	tropical soda-apple	I
Urena lobata	caesarweed	II

Wedelia trilobata	creeping oxeye	II

The most problematic invasive plant species at Railhead Scrub Preserve are melaleuca (*Melaleuca quinquenervia*), Brazilian-pepper (*Schinus terebinthifolius*), and torpedo grass (*Panicum repens*). Melaleuca is abundant in some wetlands on the site, including the relict cypress dome and surrounding depression marsh in the center of the property and the depression marshes at the southeast and northwest corners of the property. In these areas, it forms very dense stands. Brazilian-pepper is abundant along the property edges and in other disturbed areas. Downy rose myrtle is beginning to invade Mesic Flatwoods areas, especially in the southwest corner. Torpedo grass is invading wetlands throughout the site. Most of the other species in Table 6 are either restricted to property edges and disturbed areas, not yet problematic in natural areas on the site, or occur at low densities.

Under certain conditions, especially following soil disturbance or drainage, some native plant species can become invasive. There are no native plants species at Railhead Scrub Preserve that are currently a management problem on the site. Management actions may cause some species to become problematic (see section 4.5.7).

2.6.2 Invasive and Problem Animal Species

An obvious problem with invasive and problem animal species was not observed at the Railhead Scrub Preserve. However, several species have the potential to impact the Railhead Scrub Preserve to varying degrees.

Feral domestic cat (*Felis catus*)
Domestic cats originated from an ancestral wild species, the European and African wild cat (*Felis silvestris*). The domestic cat is now considered a separate species. The impact of feral cats on wildlife is difficult to quantify, however, literature strongly indicates that feral cats are a significant factor in the mortality of small mammals, birds, reptiles, and amphibians. Because free-ranging cats often receive food from humans, they can reach population levels that may lead to abnormally high predation rates on wildlife in areas affected by feral cat presence. When the wildlife prey is a threatened or endangered species, the result may be extirpation or extinction. Regular monitoring should include the presence of feral cat colonies near the Railhead Scrub Preserve and their impacts to native fauna.

Feral dogs (*Canis familiaris*)
As with feral cats, feral dogs may impact native wildlife at the preserve through increased predation, possibly resulting in extirpation or extinction of native species.

Red imported fire ant (*Solenopsis invicta*)
The red imported fire ant (RIFA) was introduced into the U.S. from Brazil into either Mobile, Alabama or Pensacola, Florida between 1933 and 1945 (Collins and Scheffrahn, 2001). RIFA have been documented to cause harm to humans and wildlife as well as economic harm (Stimac and Alves, 1994; Collins and Scheffrahn, 2001; Willcox and Giuliano, 2006). RIFA are omnivorous, but they tend to prefer insects as their primary food source (Willcox and Guiliano, 2006). *S. invicta* have a number of impacts on wildlife. They have eliminated many areas of native ant populations through competition and predation and have eliminated food sources

utilized by some wildlife species. Ground-nesting wildlife is especially susceptible to RIFA. Within the Railhead Scrub Preserve, *S. invicta* have the potential to affect ground-nesting birds; small mammals; reptiles such as gopher tortoise and native lizard and snake species; and native invertebrates (Willcox and Giuliano, 2006).

Coyotes (*Canis latrans*)
Although coyotes are not an exotic species, they are not indigenous to Florida, having moved eastward from their original range in the western United States as a result of anthropogenic changes to the countryside favoring their habitat requirements. Evidence of the presence of coyotes has been observed at the Preserve in the form of tracks and scat, and recently, an excavation that appears to have been a former gopher tortoise burrow enlarged for use by coyotes was observed in the northern portion of the site. Coyotes commonly enlarge burrows made by other animals such as armadillos or gopher tortoises to use as dens. Coyotes may have a negative influence on indigenous wildlife as direct predators or as potential competitors for other predators that may occur at the Preserve such as foxes or bobcats; however, this species may prove beneficial in controlling potential problem species such as feral cats and raccoons.

Other potential problem species
Certain indigenous animals such as **raccoons** and **pine bark beetles** (*Dendroctonus frontalis, Ips* spp.) may exhibit nuisance tendencies as a result of anthropogenic or natural disturbances of the ecosystem. Lack of predators and a prevalence of artificial food sources in adjacent areas may result in an unnatural increase in raccoon populations that may impact certain small vertebrate species and/or create a nuisance to adjacent residential areas. Alterations of the existing community structure by disturbances may facilitate severe outbreaks by native species such as the pine bark beetle.

The **lobate lac scale** (*Paratachardina lobata lobata*), a scale insect native to India and Sri Lanka, was observed in the northeastern portion of the site in an area dominated by Brazilian pepper. The lobate lac scale infests the woody portions of twigs and small branches and less frequently main stems less than one inch in diameter. Fire will help to reduce infestations and chemical treatment can protect landscape and agricultural plants. Biological control would be the most likely management approach for natural areas, but biological control agents for this exotic insect are not available at this time. The lobate lac scale was first documented in Florida (Broward County) in 1999 and has since become widely spread in southern Florida.

A colony of **honeybees** (*Apis mellifera*) was observed within a cavity in a pond cypress located in a melaleuca-infested wetland in the north-central portion of the Preserve. The presence of this colony may represent a hazard to visitors, particularly if the bees are Africanized.

2.7 Forest Resources

No commercial forests exist and timber extraction is not appropriate for this site.

2.8 Mineral Resources

No particular minerals are reported for the site and the extraction of minerals is not appropriate for this site.

2.9 Archaeological, Historical and Cultural Resources

According to studies done for the County by Coastal Engineering Consultants, published April 2000, there are no known archaeological "finds" on this site. The property is not within an area of historical and archaeological probability, and no historical or archaeological sites appear to be present in the property.

The County will notify the Division of Historical Resources immediately if evidence is found to suggest any archaeological or historic resources are present at the Railhead Scrub Preserve. If any artifacts are observed on-site, staff shall cordon off the area, and a professional survey and assessment shall be instituted. The archaeologist shall prepare a report outlining results of the assessments and issue recommendations to County staff about management of any sites discovered, per provisions of the Land Development Code Section 2.2.25. This report shall be sent to the Division of Historical Resources. The County shall cooperate fully with direction from the Division of Historical Resources on the protection and management of archaeological and historical resources. The management of these resources will comply with the provisions of Chapter 267, Florida Statutes, specifically Sections 267.061 2 (a) and (b).

The collection of artifacts or the disturbance of archaeological and historic sites within the Railhead Scrub Preserve is prohibited unless prior authorization has been obtained from the Collier County Board of County Commissioners and the Department of State, Division of Historical Resources.

2.10 Scenic Resources

There are many scenic opportunities in the Preserve, including views of scrub and wetland communities which will be enhanced through time and appropriate management. The population of animal life may increase with time and add to the overall scenic character.

3.0 Use of the Property

3.1 Previous and Current Use

Aerial photography taken 1940, 1952, 1962, 1975, 1985, 1989, 1993, 1996, and 1997 and recent physical visits to the site show that there has never been any development of the site. The photographs are available in the public records and available at the Collier County Property Appraisers Office (see Figure 6).

Currently, there is no sanctioned public use of the site. The only paved roadway accessing the site is Sun Century Road, a privately owned roadway. Even if it were public, access could not legally be accomplished, as the railroad parcel presents a significant barrier. To allow the public to cross the railroad parcel would mean bringing any crossing up to federal railroad crossing standards, including grade elevation changes and installation of a railroad crossing signal. While not legally sanctioned, this entry is a major access point for ORVs and dumping. Signage clearly describes the site as off limits to trespassers, however, the use by vehicular traffic and the dumping of refuse continues.

3.2 Planned Uses and Assessment of their Impacts

Future planned use will be consistent with the primary goals of conservation, preservation, restoration and maintenance of the resource. Details of planned uses for the Railhead Scrub Preserve and an assessment of their potential impacts are provided in the following sections.

3.2.1 Identification of Public Uses Consistent with Preservation, Enhancement, Restoration, Conservation and Maintenance of the Resources

As defined in Ordinance 2002-63 Section 5.9 the following are uses consistent with the site's classification:

- **Hiking**: Consistent with the nature of the site and its purpose;
- **Nature Photography**: There is potential for photography of wildlife and plant life; and
- **Bird Watching**: There is potential for bird-watching on the site.

Other uses that may be in principle compatible with preservation goals that are not feasible in this preserve include:

- **Kayaking/Canoeing**: There is no potential for boating of any kind on this site;
- **Swimming**: There is no potential for swimming;
- **Hunting**: The site is not large enough or remotely located enough to allow hunting; and
- **Fishing**: There is no potential for fishing on this site.

3.2.2 Planned Public Uses and Assessment of Impacts

Trail Network: A trail network potentially including sections of raised boardwalk will be installed to allow for hiking and nature observation within the preserve. The elevation of the boardwalk will allow for the movement of the tortoise population and other small animals to prevent any impacts from the walkway acting as a barrier. The trails and raised boardwalk will incorporate former ORV trails where practical to minimize the impact of the construction and use which a boardwalk might create.

Parking Lot: A parking area shall be developed to facilitate public access to the site. This parking lot shall be located along the future Veterans Memorial Blvd. in a specific location to be determined in the future and which is least likely to require disturbance of the natural habitat. If access is developed sooner by creating a dirt road that can be used to access the site, the same "least disturbance" principle shall apply.

Easements, Concessions, and Leases: There are no existing easements, concessions, or leases at the Railhead Scrub Preserve. In accordance with the management goals of the Preserve, no future easements, concessions, or leases are appropriate in association with this site, other than conservation related easements.

Landscaping: Future landscaping and natural area restoration of Railhead Scrub Preserve should include only site-specific native plant material that has been determined to be non-problematic at the site and whenever possible, site-specific seed sources should be utilized. In addition, hardwoods that may invade the natural areas should not be planted. An appropriate list of native species is attached as Appendix 6.

3.3 Adjacent Land Uses

Surrounding the preserve is a mixture of industrial, residential and office properties. Within the residential properties there are a mixture of mobile home rental properties on the northwest corner and the residential community of Mediterra on the eastern perimeter. There is no access from the eastern side and as evidenced by aerial photos taken in 2005. However, there is a trail just south of the Preserve and Mediterra that connects to a network of access trails at the south end of the Preserve. There is a trail from the mobile home community on the northwest corner however; the community itself does not appear to be the source of the intrusion. On the south side of the site there is undeveloped property, which includes a future ROW for Veterans Memorial Blvd., anywhere from 130' to 200' wide. This is the principal point of intrusion for off road vehicles. The west boundary of the preserve is abutting a railroad parcel, which rail line is not currently in use. To the south and east, a high school is planned to open in 2016.

3.4 Potential Surplus Lands

There are no potential surplus lands at Railhead Scrub Preserve. The Conservation Collier Ordinance (2002-63, Section 6, 1(f)) states that any resale or lease of Conservation Collier lands must be in accordance with the goals of the Program, specifically, to conserve, protect, restore and manage environmentally sensitive lands.

3.5 Prospective Land Acquisitions

Sixteen parcels of land, totaling 56.67 acresm adjacent to and south of Railhead Scrub Preserve are currently under negotiations for acquisition (refer to Figure 7 and Table 7). These adjacent properties have areas of quality Xeric Uplands. Because of the small amount of Xeric Uplands left in Collier County, the acquisition of these properties will be important in the long-term "persistence" of plant and animal species that currently occur at Railhead Scrub Preserve by allowing for larger population sizes.

Table 7: Recommended Acquisition Priorities

Parcel Name/ID	Acres	Property Description	Acquisition Reason
152600002	3.76	RR Land Trust	Habitat
152640004	2.87	RR Land Trust	Habitat
152680006	4.25	RR Land Trust	Habitat
152720005	3.98	RR Land Trust	Habitat
152760007	4.73	RR Land Trust	Habitat
152800006	4.72	RR Land Trust	Habitat
152840008	4.22	RR Land Trust	Habitat
152880000	4.08	RR Land Trust	Habitat
152920009	2.57	RR Land Trust	Habitat
153000009	4.26	RR Land Trust	Habitat
153040001	3.33	RR Land Trust	Habitat
153080003	2.60	RR Land Trust	Habitat
153400007	2.98	RR Land Trust	Habitat
154360007	1.45	RR Land Trust	Habitat
154400006	5.43	RR Land Trust	Habitat
154440008	1.44	RR Land Trust	Habitat
TOTAL	56.67		

Figure 7: Properties Recommended for Acquisition

3.6 Analysis of Multiple-Use Potential

Although the Railhead Scrub Preserve encompasses lands that the public has historically accessed via trespass to use ORVs and to gather for recreational purposes, future potential uses of this site will be restricted to conservation, preservation and restoration with controlled public access primarily for passive recreation (Table 8). The Conservation Collier Ordinance (2002-63, Appendix 1) constrains the use of this property to "primary objectives of managing and preserving natural resource values and providing appropriate natural resource-based recreational & educational opportunities."

The Railhead Scrub Preserve will not provide opportunities for active outdoor recreation such as public camping, fishing, hunting, boating, or "sports," however, there is still opportunity for multiple public types of passive public use, such as hiking, nature photography, wildlife observation, bird watching, etc. The site may also serve as a learning lab to be used by local environmental educational programs and a research site for student environmental projects if such projects do not conflict with management goals.

4.0 Management Issues, Goals and Objectives

This section describes the main management issues, goals, and objectives for Railhead Scrub Preserve as well as the overall management framework. Central to the management of the Preserve is the mission of the Conservation Collier Program, and the goals and objectives set forth in this management plan. As a preamble to the specific set of goals and objectives for the next ten (10) years, a vision of the desired future conditions for the preserve was developed.

4.1 Management Framework

Each property purchased by Conservation Collier shall have its own management plan. The Conservation Collier Ordinance requires that an "Interim" Management Plan be developed within 60 days of purchase and that a "Final" management plan be developed within 2 years. After that, property management plans must be updated every 5 years. Interim plans shall be concerned with basic items such as removal of invasive exotics and trash, establishing site security, developing management partnerships and planning for public access. All management plans start in the Lands Evaluation and Management subcommittee and must be approved by both the Conservation Collier Land Acquisition Advisory Committee (CCLAAC) and the Board of County Commissioners.

This property shall be managed only for conservation, protection, and enhancement of natural resources and for public outdoor recreation that will be compatible with the conservation, protection, and enhancement of the site. Public use of the site will not be possible until legal public access can be created. Immediately after acquisition in October 2004, an Interim Management Plan was developed for the property under its previous name, the Americas Business Park Property (Collier County Environmental Services Department. November 2004). This Interim Management Plan identified the key management priorities and issues within the site, relating primarily to resource protection, and gave direction for management during the first two years.

Collier County will be solely responsible for managing the Railhead Scrub Preserve, but will seek to obtain grants and partnerships for management activities.

4.1.1 CARL/Florida Forever Management Prospectus

The Railhead Scrub Preserve was acquired entirely with Conservation Collier Program Funds, and is not subject to Florida Forever management requirements. However, the plan is intended to be consistent with the Division of State Lands (DSL) Management Plan format. The content of this plan is in accordance with the Acquisition and Restoration Council recommendations for management plans and the guidelines provided by the staff of DSL.

These lands are designated for use as conservation sites with passive recreation use. They are to be managed under the single-use concept of preservation and, as such, management activities should be directed toward the preservation of resources. Long-range plans shall generally be directed toward the restoration of disturbed areas and the perpetuation and maintenance of

natural communities. Management activities will also stress the protection of threatened and endangered species (2006 Florida Forever Five-Year Plan).

4.1.2 FCT Management Commitments

While the Railhead Scrub Preserve was acquired exclusively with funds from the Conservation Collier Program, funding from the Florida Communities Trust (FCT) may be sought for additions to the Preserve. In those cases, although these lands are managed under Collier County's authority, the matching funds provided by FCT carry with them certain obligations. The Florida Communities Trust, Florida Forever Program Rule 9K-7.011, F.A.C. requires all grant recipients to submit a Management Plan for approval prior to the release of grant funds.

This management plan ensures that any lands acquired with FCT funds will be developed in accordance with the grant award agreement and in furtherance of the purpose of the grant application. Additionally, management is guided by the purpose and intended use of the land described in the land acquisition project selection process. Other statutes and rules also control the use of the land. For lands acquired with FCT matching funds, an annual stewardship report will be prepared and submitted to FCT each year. The annual report will evaluate the implementation of this management plan.

4.1.3 Preserve Manager

The Site Manager for Railhead Scrub Preserve is:

Melissa Hennig, Environmental Specialist, Collier County Facilities Management Department.
Phone: (239) 213-2957
Fax: (239) 213-2960
E-mail: Melissahennig@Colliergov.net - or - ConservationCollier@Colliergov.net

4.1.4 Preserve Rules and Regulations

Until a specific ordinance is created to govern visitor use of Preserve land, this Preserve as well as other Conservation Collier sites will operate under Collier County Ordinance 76-48, as amended (the current version is 81-3), the Parks Ordinance (Appendix 7).

No dumping, use of unauthorized vehicles, or removal or destruction of natural resources shall be permitted within the preserve. The goal is to allow limited nondestructive public access to natural resource habitat and native plant communities and animal species.

4.1.5 Land Management Review and Revision Summary

Railhead Scrub Preserve was not acquired with any state or federal funds, and Collier County has not yet entered into any land management review process. Therefore, the only land management review to which the Railhead Scrub Preserve is constrained is the one required by the Conservation Collier Ordinance every 5 years.

4.2 Desired Future Conditions

This section includes a narrative of proposed future conditions for the site's natural areas. Management techniques to achieve these conditions are described in the following sections.

Following recommended management actions, and the results of adaptive management where needed, Railhead Scrub Preserve will have xeric upland (scrub/scrubby flatwood), mesic flatwood, cypress dome, and depression marsh habitats that have a similar structure and composition to those that existed before non-indigenous people settled the region.

Xeric uplands on the site will not be fragmented by a mosaic of trails, but instead will have larger blocks of vegetated areas, fragmented by only a few management trails. Most ORV trails will be restored (some left for management access), with vegetation structure and composition resembling intact Xeric Uplands areas. The community will have undisturbed ecotones with Mesic Flatwoods and other plant communities. Vegetation structure will vary naturally with time since fire; most shrubs will be topkilled or dead, with large areas of bare sand between hardwood patches. Shrub gaps will grow increasingly close together, reducing the size of open sand areas. When shrubs have grown sufficiently close together, fire will again be necessary.

Most Mesic Flatwoods in the Preserve will burn every 3-7 years. The Mesic Flatwoods area south of the cypress dome will be managed to keep saw palmettos at heights of less than 3 feet and hardwoods and palm cover sparse (< 25%), allowing for a diverse and dense herb layer. Mesic flatwoods on slopes around the edges of the property will have dense saw palmetto fringes, but fires will be used every 8-25 years, reducing the total area covered by dense palmettos to improve habitat for native herbs and grasses. Fires will be allowed to burn into surrounding plant communities, including Xeric Uplands and cypress domes, where they will extinguish themselves due to limiting vegetation structure and moisture levels.

The cypress dome will have a canopy of pond cypress trees, and an open canopy pond or marsh in the interior. Larger pond cypress trees and hardwoods will be present in the deeper water of the interior of the dome. The understory will consist of sparse native hardwoods and a diverse native herb layer. Melaleuca and other exotic plants will be eradicated. Fires will enter the edges of the dome from the adjacent plant communities but will be extinguished by standing water or soil moisture levels.

A diverse assemblage of native plants will dominate depression marshes, including the large depression marsh on the south edge of the property. Exotic plants will not be present. Fires will enter the depression marshes as they burn from surrounding plant communities.

4.3 Major Accomplishments during Previous Years

Major accomplishments that have been achieved at Railhead Scrub Preserve since acquisition are listed in Table 8.

Table 8: Major Accomplishments during Previous Years	
Accomplishment	**Year(s)**
Complete Interim Management Plan	2004
Install temporary signs	2004
Gopher tortoise surveys	2005, 2006
Coordinate with Parks and Recreation Department on partnership potential	2006

4.4 Goals for the 10 year period 2007-2017

A set of goals for Railhead Scrub Preserve were developed in conjunction with the drafting of this Management Plan. The goals in this plan are tailored specifically for the Railhead Scrub Preserve, based on the purposes for which the lands were acquired, the condition of the resources present, and management issues for the property. The preserve manager should be familiar with the entire Management Plan. Goals and objectives from the interim management plan for the Railhead Scrub Preserve were reviewed to determine if they remain meaningful and practical and should be included in this plan. The goals presented here reflect programmatic goals and ideas from Conservation Collier personnel in charge of managing and protecting the area, as well as input from cooperative managers, user groups, and other stakeholders from outside the program. Conservation Collier staff believes the goals are consistent with the various forms of guidance provided to managers.

Management issues are discussed below in separate sections. Within each section, approaches for dealing with these issues are described. The ability to implement the specific goals and objectives identified in this plan is dependent upon the availability of funding resources. The following goals have been identified for the Railhead Scrub Preserve:

Goal 1: Eliminate or significantly reduce human impacts;
Goal 2: Develop a baseline monitoring report;
Goal 3: Remove populations of exotic plants and animals to restore natural habitats;
Goal 4: Implement prescribed fire program;
Goal 5: Restore native vegetation;
Goal 6: Native and Listed Species management;
Goal 7: Evaluate potential for access and public use;
Goal 8: Establish an operations plan; and
Goal 9: Develop an emergency response plan.

4.5 Control of Human Impacts

The following objectives directly relate to Goal 1:

Objective 1a: Eliminate trespass off road vehicles (ORVs);

Objective 1b: Remove solid waste;

Objective 1c: Post and maintain no dumping and no trespass signs at all entry locations in preserve until the Preserve is opened to the public, then remove the no trespass signs; and

Objective 1d: When Veteran's Memorial Blvd. is constructed, place barrier fencing to reduce construction impacts and retain barrier fencing along the roadway to reduce animal mortality.

4.5.1 Security Management

The site is currently being vandalized by off road vehicles and used for illegal dumping. In order to provide for the safety of those who will be lawfully using the site for passive recreation and research, and to insure that the programs of ecological preservation and restoration can take place unabated, strong security measures should be put into effect as soon as possible.

Security recommendations are identified in the paragraphs below.

1. Site Security:

Currently the perimeter consists of open areas with only major dirt roads having gates. The gates are consisting of galvanized fence hung from 5' creosote poles. Trespassers have routinely breached even the chained entry and had no trouble to either entering the site after breaking in, or parking outside the property and driving their off road vehicles onto the site. To address this issue, the perimeter will be fenced with 4-foot field fencing and staff will work with the Collier County Sheriff's office to address trespass incursions.

As the preserve is formally opened and activity becomes commonplace, illegal dumping and trespassing should decrease. Establishing a site visit schedule will allow staff to monitor ongoing activity. However, if this is not effective, additional solutions will be sought, up to and including utilizing volunteers and Friends organizations and contracting private security.

2. Emergency Response Access:

Management shall coordinate emergency pathways with emergency entryways around the preserve. The pathways may have compacted subsurface to allow for fire equipment. EMT access may be accommodated either by widened boardwalks or on at-grade stabilized pathways.

4.5.2 Control Dumping

In addition to removing the debris and litter the site manager shall establish a strategy for the long-term control of illegal dumping. The strategy should include signs indicating the fines and penalties for illegal dumping, a phone number for reporting incidents, and other targeted enforcement efforts. In order to improve the effectiveness of the overall dumping control efforts all opportunities to increase community outreach and involvement shall be considered.

The key to controlling dumping successfully may be to increase public awareness of the problem and its implications. Illegal dumping control programs must use a combination of public education, citizen participation, site maintenance, and enforcement measures to address illegal waste disposal. Focusing on "win-win" scenarios may increase public interest and develop a neighborhood pride. For example, cleanup efforts followed by site appropriate landscaping and beautification efforts may discourage future dumping, as well as provide open space and increase property values.

4.5.3 Control Impacts from Adjacent Land Development

It will be necessary to ensure that all site development occurring adjacent to the Railhead Scrub Preserve is properly permitted prior to the commencement of any construction activities. All existing local, state, and federal regulations should be strictly followed and enforced during any site development adjacent to the preserve.

It shall be the responsibility of the developer to establish and utilize turbidity and erosion control measures (i.e., rock bags, silt fences, turbidity barriers, appropriate landscaping, etc.), wildlife protection measures (e.g., protective fencing or barriers), and vegetation protection measures (i.e., protective fencing or barriers). If any site developer working in areas adjacent to the preserve does not take the necessary control measures, construction shall be immediately halted until control measures are put into place and mitigation and/or remediation will be the sole responsibility of the developer.

4.6 Biological Monitoring

The following objectives directly relate to Goal 2:

Objective 2a: Establish a long-term biological monitoring program and conduct additional wildlife surveys.

Long-term management of should be based on biological data. Changes following baseline conditions should be assessed as negative or positive, and management strategies changed appropriately. This section discusses information needs and long-term monitoring needs.

Railhead Scrub Preserve currently has a thorough plant inventory, based on data collected by Jim Burch in the 1990s and in 2006 by Bradley. The site should be inspected at regular intervals (ca. 5-10 years), to detect new invasions (of natives or exotics), and extinctions. Areas undergoing extreme restoration should be assessed more frequently (at least annually). While some wildlife data has been collected, additional baseline data should be collected, especially on invertebrates, small mammals, reptiles, and amphibians. The site manager may contract this work out or enlist the assistance of local educators to coordinate student research projects. Wildlife sampling, like plant sampling, should take place at regular intervals (ca. 5-10 years) to detect long-term trends.

Particularly important is the monitoring of the gopher tortoise population and status. As a starting point for this monitoring program, a baseline survey shall be conducted to determine the actual number and structure of the gopher tortoise population and a gopher tortoise habitat assessment to determine the optimum population density habitats at the site.

Permanent vegetation monitoring plots will be established in each plant community. A sampling design should be established to detect changes in species composition and structure. These plots should be sampled annually to determine trends, especially where management is taking place.

Photo points will be established at each plot and at other random locations on the property. Photo point locations should be marked with a rebar and the position recorded with a GPS. All photo points should be taken at a standard height and angle of view.

4.7 Control Exotic, Invasive and Problem Species

The following objectives directly relate to Goal 3:

Objective 3a: Eliminate Brazilian-pepper around perimeter, disturbed areas, and Mesic Flatwoods;
Objective 3b: Remove by hand incipient populations of melaleuca in small depression marshes and other habitats;
Objective 3c: Remove dense populations of melaleuca;
Objective 3d: Ensure that control measures are not deleterious to native plants and animal species, particularly rare species;
Objective 3e: Develop and implement a surveillance program for potential problem species including invasive plant species; and
Objective 3f: Manage potential problem species populations.

4.7.1 Exotic Plant Control by Habitat

This section provides management recommendations for invasive non-native plant species, in each habitat type. In addition, specific control techniques suitable for the preserve are provided.

Scrub/Scrubby Flatwoods
There is currently almost no problem with invasive plants in the Xeric Uplands. Brazilian-pepper plants are rarely found. Other ruderal species may sometimes be found in areas with soil disturbance. Any exotic plants should be killed with herbicides. The community should be continually monitored for new populations of exotic plants and these should be treated with herbicides immediately.

Mesic Flatwoods
Brazilian-pepper and melaleuca are significant problems in some parts of this community. Downy rose myrtle is also starting to invade some areas. These species should be controlled with herbicides and removed from the site if possible. The herb layer should be monitored for other exotic species as the palm and shrub layer is opened (with removal of exotic hardwoods and after prescription fires). Torpedo grass (*Panicum repens*) and other exotic herbs and grasses may invade. They should be treated with herbicides.

Cypress Dome
The exotics in the cypress dome present the largest control problem. The dome and the surrounding historical basin marsh are now dominated by melaleuca. Restoration of this area to cypress dome will require removal of all melaleuca trees. Trees should be removed entirely, if possible. If this is too costly, the second alternative is cutting and stacking or mulching on site, leaving no more than 2-inches of mulch on the ground. A mechanical logging operation is probably the most feasible method. Logging machinery should be used in the winter dry season when no standing water is present (and preferably when soils are dry) to minimize soil disturbance. A track vehicle instead of a wheeled vehicle is preferred, as less rutting will occur.

Depression Marsh

Depression marshes at Railhead currently have only one exotic plant – melaleuca. They are otherwise dominated by native species. Melaleuca, depending on density should be treated with herbicides and removed by hand, or in dense forests should be logged (see cypress dome treatment above). Following removal, especially of dense stands, the herb layer should be monitored for establishment of other exotic species, especially torpedo grass.

4.7.2 Exotic Plant Control Methodology

Land managers in Florida have developed effective chemical control measures for most of the state's exotic plant species. Kline & Duquesnel (1996) provide a compilation of control techniques and appropriate herbicides for control of exotic plant species in Florida, and specifically discuss eight of the Florida Exotic Pest Plant Council (FLEPPC) listed plant species at Railhead Scrub Preserve. General control guidelines for exotic plants are provided below. Certain herbicides should not be used at Railhead Scrub Preserve, including Arsenal (imazapyr) and Velpar (hexazinone) unless absolutely necessary. These herbicides are soil active and can cause non-target damage and persist on the site for some time. More appropriate chemicals to use are Garlon 4 and 3a (triclopyr), RoundUp and RoundUp Pro (glyphosate), and Rodeo (glyphosate).

Some exotic plant species can be kept at low densities or killed entirely by application of prescribed fire. In addition, habitats, which have natural fire regimes, are more resistant to invasion by exotic pest plants. Prescribed fire following recommendations in Section 4.9 should be used as much as possible to control exotic plants. Mechanical treatments including roller chopping are usually not effective at controlling exotic pest plants. Roller chopping, while effective in the short-term at reducing hardwood cover, usually results in an increase in diversity and density of exotic plant populations due to soil disturbance. Roller chopping should not be conducted in natural areas at Railhead Scrub Preserve.

Trees and Shrubs

Exotic trees and shrubs that have been recorded at Railhead Scrub Preserve include Brazilian-pepper (*Schinus terebinthifolius*), downy rose myrtle (*Rhodomyrtus tomentosa*), earleaf acacia (*Acacia auriculiformis*), laurel fig (*Ficus microcarpa*), orchidtree (*Bauhinia variegata*), melaleuca (*Melaleuca quinquenervia*), royal Poinciana (*Delonix regia*), shrubverbena (*Lantana camara*), and yellow poinciana (*Peltophorum pterocarpum*). Only Brazilian-pepper, downy rose myrtle, earleaf acacia, melaleuca, and shrubverbena are or are expected to be invasive in the habitats at Railhead Scrub Preserve. These should be top priorities for removal. In general, saplings and adults of these species can be controlled with basal applications of Garlon 4; seedlings can be hand-pulled. Melaleuca should be controlled with a cut surface application of Garlon 3a. However, dense stands may be controlled with logging equipment as described in the previous paragraph for the cypress dome.

Vines

Exotic vines that have been recorded at Railhead Scrub Preserve include rosary pea (*Abrus precatorius*), white yam (*Dioscorea alata*), and wild balsam apple (*Momordica charantia*). While all are invasive species, they are not all expected to become especially problematic. They will persist as more common species in disturbed areas. Rosary pea and white yam can be controlled with application of Garlon 4 or Garlon 3a. Wild balsam apple can be hand pulled.

Perennial Forbs

Introduced perennial forbs that have been recorded at Railhead Scrub Preserve include bowstring hemp (*Sansevieria hyacinthoides*), Caesar weed (*Urena lobata*), century plant (*Agave angustifolia*), cochineal cactus (*Opuntia cochenillifera*), Colombian waxweed (*Cuphea carthagenensis*), common dayflower (*Commelina diffusa*), creeping oxeye (*Wedelia trilobata*), hairy indigo (*Indigofera hirsuta*), lima (*Sida cordifolia*), little ironweed (*Vernonia cinerea*), serpent fern (*Phymatosorus scolopendria*), shrubby false buttonweed (*Spermacoce verticillata*), smooth rattlebox (*Crotalaria pallida* var. *obovata*), threeflower ticktrefoil (*Desmodium triflorum*), tropical soda-apple (*Solanum viarum*), and wild bean (*Macroptilium lathyroides*). The most troublesome of these species at Railhead Scrub Preserve is caesarweed, which can invade fire suppressed Mesic Flatwoods, and increase in abundance after hardwood and exotic removal and fires. Caesarweed can be controlled with basal application of Garlon 4. The other species are primarily weeds of disturbed areas and are not expected to become especially problematic at Railhead Scrub Preserve (including tropical soda-apple). Century plant can be controlled by application of Garlon 4 to the terminal bud. Cochineal cactus can be hand pulled. Tropical soda-apple can be controlled with a basal application of Garlon 4. Common dayflower and creeping oxeye can be controlled with hand pulling and Roundup. There should be no need to treat the remaining species.

Annual and Short-lived Forbs

Introduced annual or short-lived forbs that have been recorded at Railhead Scrub Preserve include Dixie ticktrefoil (*Desmodium tortuosum*), flattop mille graines (*Hedyotis corymbosa*), grassleaf spurge (*Euphorbia graminea*), largeflower Mexican clover (*Richardia grandiflora*), lilac tassleflower (*Emilia sonchifolia*), Madagascar periwinkle (*Catharanthus roseus*), Malaysian false-pimpernel (*Lindernia crustacea*), spiny amaranth (*Amaranthus spinosus*), and tropical Mexican clover (*Richardia brasiliensis*). None of these is likely to become invasive in natural areas at Railhead Scrub Preserve. If control is ever desired, all can be treated with RoundUp.

Grasses and Sedges

Introduced grasses and sedges that have been recorded include: Awned halfchaff sedge (*Lipocarpha aristulata*), Bahia grass (*Paspalum notatum*), Bermuda grass (*Cynodon dactylon*), crow's foot grass (*Dactyloctenium aegyptium*), guineagrass (*Panicum maximum*), hurricane sedge (*Fimbristylis cymosa*), Indian crabgrass (*Digitaria longiflora*), low flatsedge (*Cyperus pumilus*), Piedmont flatsedge (*Cyperus distans*), red lovegrass (*Eragrostis secundiflora* subsp. *oxylepis*), rose natalgrass (*Rhynchelytrum repens*), signal grass (*Urochloa subquadripara*), thalia lovegrass (*Eragrostis atrovirens*), torpedograss (*Panicum repens*), and West Indian dropseed (*Sporobolus indicus* var. *pyramidalis*). Bermuda grass, crow's foot grass, rose natalgrass, and torpedograss are currently invasive or could become invasive following management activities. Control of all grasses can be achieved by application of RoundUp. Hand pulling of rose natalgrass or other species can be done in low density colonies.

4.7.3 Other Problem Species Management

There are currently no major native plant or animal species that are problematic at Railhead Scrub Preserve (see section 2.6). However, following restoration activities in cypress dome and

Mesic Flatwoods habitats some may become problematic. Which species will become problematic, if any, will not be known until after initial management activities are initiated.

In Mesic Flatwoods, vines may become abundant following burns or exotic plant removal, particularly muscadine grape (*Vitis rotundifolia*). This native vine, already present in Mesic Flatwoods at low densities, can be aggressive after disturbances and form dense colonies, killing hardwoods and palms, climbing into pines, and persisting for years. It should be controlled with herbicides if its populations start to grow. In flatwoods, bracken fern (*Pteridium aquilinum*) can also become problematic, especially after high intensity fires. It should be controlled with herbicides, especially Asulox which is specific to bracken fern, other ferns, and some grasses. It should be applied to new growth, either soon after disturbance (including fire), or after the plants are cut manually. More than one application may be required.

In cypress dome many plant species could potentially become pests following the recommended restoration activities, but it is hard to predict which will recruit after melaleuca removal.

Indigenous and non-native vertebrate and invertebrate species may become pests under certain conditions. Control of indigenous pest species is recommended if they interfere with management goals. Potential pest species mentioned before (section 2.6) should be monitored to determine if these organisms might develop into problem species.

If feral cat colonies are found near the Preserve, the element that sustains an undesirable population should be identified and efforts made to ask property owners to eliminate it (i.e., refuse bins, dumpsters, and supplementary feeding by humans). If any feral cats remain, they will be trapped and taken to Collier County Domestic Animal Services. A similar approach shall be taken to control feral dog populations.
Considerations should be made about the risk involved by the presence of honeybees in the cypress dome area. Particularly important is the risk that they are or may become Africanized and pose a threat to visitors using the proposed trail for bird and other wildlife watching. If management perceives it as a high-level hazard, the colony should be eliminated.

4.8 Prescribed Fire Program

The following objectives directly relate to Goal 4:

Objective 4a: Develop fire management plan for the property by taking the suggestions herein as a point of departure;
Objective 4b: Delineate fire management and rescue access routes, and provide this information to the police department and emergency services;
Objective 4c: Conduct one or more prescribed fires in Xeric Uplands;
Objective 4d: Conduct one or more prescribed fires in depression marshes when native vegetation is established following melaleuca removal;
Objective 4e: Conduct one or more prescribed fires in Mesic Flatwoods following melaleuca and Brazilian-pepper removal;
Objective 4f: Install firelines to facilitate fire management, utilizing practices to minimize impacts to ecotones and wildlife populations;

Objective 4g: Establish a system for notifying neighboring landowners in advance of prescribed burns (via email, phone trees, etc.) and use this system before each prescribed fire;
Objective 4h: Establish pre- and post-burning monitoring to assess fire effects
Objective 4i: Protect the Railhead Scrub Preserve from wildfires;
Objective 4j: Explore the use of alternatives to fire for those management units where prescribed burning appears impossible to achieve.

The use of prescribed fire as a management tool will be critical to the long-term health of the natural habitats and native species at Railhead Scrub Preserve. Xeric uplands, Mesic Flatwoods, and depression marshes all require periodic fires.

To prepare for fire management, fire lines will be established on the property. Many trails currently exist that can be used for fire lines and new fire lines will need to be created. A fire line will be created around the entire perimeter of the site after exotic removal. Additionally, management units can be established by consolidating the 5-acre management units as practical and as recommended by the prescribed fire contractor. The units can be assembled into appropriate fire management units prior to application of prescribed fire (see Figure 8 and Table 9 for suggested fire lines and fire units). Fortunately, the perimeter is dominated by exotic pest plants, especially Brazilian-pepper, so the creation of fire lines will help reduce exotic plant cover.

Figure 8: Preliminary Delineation of Fire Lines and Burn Units

Unless absolutely necessary, fire breaks should not be created along ecotones. Firebreaks along ecotones prevent fires from burning across the landscape between different habitat types, and the trails themselves destroy habitat for species that require a specific ecotonal habitats.

Xeric uplands should be burned at an interval of 8-25 years. Summer headfires will probably be needed to ensure that most vegetation ignites and that the fire moves across the habitat. For best results, prescribed fire management in Xeric Uplands at Railhead Scrub Preserve should begin after ORV activity has been eliminated and permanent firebreaks have been established. These trails would otherwise limit the ability of the fire to travel across the habitat.

Table 9: Burn Zones for Fire-Dependent Natural Communities

Burn Zone	Description	Acres	Fire Frequency (years)	Next Intended Burn
CD1	Melaleuca/Cypress Dome	5.5	NA	NA
ME1	Melaleuca/Depression Marshes	0.6	3-7	*
ME2		2.4	3-7	*
MF2	Mesic Flatwoods	4.9	3-7	2008
MF4		5.1	3-7	
MF5		2.9	3-7	
MF6		1.1	3-7	
MF7		5.3	3-7	
MF8		3.4	3-7	
MF9		1.9	3-7	
MF10		0.5	3-7	
MF11		1.3	3-7	
MF1	Mesic Flatwoods on slopes	2.9	8-25	2008
MF3		2.6	8-25	
PO1	Pond	0.4	3-7	*
XE1	Xeric Uplands	4.6	8-25	2009
XE2		2.1		
XE3		3.6		
XE4		2.4		
XE5		3.8		
XE6		4.0		
XE7		3.1		
XE8		4.8		
XE9		3.2		
XE10		3.1		
XE11		4.2		

* = Burns to be conducted following restoration of natural vegetation

Mesic flatwoods should be burned every 3-7 years, with the exception of those on slopes, such as along the south eastern edge (burn units MF1 and MF3), which should be burned every 8-25 years. The fire should be allowed to burn into Xeric Uplands.

Depression marshes should be burned following restoration and re-establishment of native vegetation. Prescribed fires should be conducted every 3-7 years in the wet season to prevent the destruction of organic soils.

Prior to any prescribed fires, burn teams should assess fuel loads and conduct fuel reduction where necessary, conduct risk assessment for the planned burn, obtain appropriate permits, and coordinate with local fire officials. Exotic plant species in particular should be removed prior to fires. Additionally, a plan of action to notify surrounding residents should be established.

If the application of prescribed fire is absolutely impossible there are several alternatives that are available, although much less desirable. These options include herbicide application, mechanical treatment, and grazing. Both herbicide application and mechanical treatments have the disadvantage of requiring that dead woody material be removed from the site following treatment, limiting the amount of decomposing vegetation that would create organic soils. Even with physical removal after treatment, organic matter from all plants on the sites will eventually accumulate, leaving an organic soil, and thereby reducing diversity of native herbs. Grazing, such as by goats, has the disadvantage in introducing trampling effects, nutrients from feces, and possible spread of exotic pest plant seeds.

4.9 Additional Measures to Restore Native Vegetation

The following objectives directly relate to Goal 5:

Objective 5a: Maintain a revised GIS map and description of FNAI natural communities and disturbed areas on the property;
Objective 5b: Reestablish soil levels and natural vegetation in the deep trails created by ORV use in the xeric upland habitat; and
Objective 5c: Plant native plant species their appropriate habitats.

4.9.1 Soil Management

Soil management at Railhead Scrub Preserve requires several strategies. The elimination of off road vehicles (ORV) is the most important. ORVs are destroying vegetation in Xeric Uplands and creating wide trails. Sand from these trails is eroding, creating linear depressions in the plant community. ORV use should be stopped and the trails should be replanted. Sand may have to be augmented in some areas.

Accumulations of leaf and pine needle litter in Mesic Flatwoods (and eventually in Xeric Uplands), changes soil chemistry and limits habitat quality for native herbaceous species. Periodic prescribed fires will eliminate organic soils and leaf litter, and prevent their accumulation. Where there is already excessive accumulation of organic matter, such as in Mesic Flatwoods in the southeastern portion of Railhead Scrub Preserve, prescription winter backing fires should be used. Restored depression marshes should only be burned when water is present to prevent burning of organic soils.

4.9.2 Natural Communities Management

Two management actions that are critical for preservation are the prevention of use of unauthorized ORVs and the control of exotic and invasive species. Specific recommendations applicable to each community type are included in the paragraphs below.

Xeric Uplands
Once ORV use is stopped, the trails and other areas they have impacted can be revegetated. If natural recruitment fails to occur, shrubs can be planted in trails, including sand live oak (*Quercus geminata*), myrtle oak (*Quercus myrtifolia*), Florida rosemary (*Ceratiola ericoides*), hog-plum (*Ximenia americana*), and coastalplain staggerbush (*Lyonia fruticosa*). The trails should be monitored for invasion of exotic plants and native weedy (ruderal) species, which should be removed when found.

The Xeric Uplands at Railhead Scrub Preserve have not burned in more than 54 years, much longer than the normal historical fire frequency. A summer prescription fire should be conducted (see section 4.8).

Continuous ORV use in the Xeric Uplands have left deep trails at lower elevations that are adjacent to undisturbed areas. These trail depressions are causing erosion and leaving plant roots exposed. Raking sand back into trails may assist in the reestablishment of vegetation in and along the edges of the trails. "Trials" should be conducted in a few places. These trial areas should be monitored for invasive plant species before this technique is carried out on a larger scale.

Mesic Flatwoods
Two management strategies will be applied to Mesic Flatwoods, one strategy for the flatwoods in the center of the property south of the cypress dome, and another for those on slopes. Exotic plants should be removed from all areas of Mesic Flatwoods. Exotics are particularly problematic on slopes, where dense stands of melaleuca and Brazilian-pepper have formed.

The center flatwoods are currently in good condition. They should be burned every 3-7 years. Burns should be allowed to move across ecotones into adjacent plant communities. Burns are recommended during natural peak season (i.e. spring), but burns should also be conducted at other times of year if logistically advantageous.

Mesic flatwoods on slopes on the site probably had historically dense understories of saw palmetto that occurred further down slope. Because of fire suppression at Railhead Scrub Preserve, the dense palmetto now reaches almost all the way upslope to Xeric Uplands. Prescription fires should be conducted to minimize saw palmetto densities upslope to improve habitat for herbs and grasses, but allow a dense zone of taller palmettos down slope. Prescribed fire crews should assess fuel loads before fires. Some areas may require manual removal of hardwoods. Fire frequency in these areas is probably similar to Xeric Uplands, about every 8-25 years.

Cypress Dome
Restoration of the cypress dome will require removal of a dense forest of melaleuca. See section 4.7 for removal recommendations.

Following melaleuca removal the area will have to be revegetated with native plants. Initial plantings should be targeted at restoration of the pond cypress (*Taxodium ascendens*) canopy. The herb layer should be monitored for recovery. If exotic plants recruit then they should be

treated with herbicides. Planting of native herbs and grasses may be required if they do not naturally recruit. An appropriate list of native species for the cypress dome habitat is included in Appendix 6.

Depression Marsh
Aside from drainage, which probably cannot be controlled, the two biggest threats to depression marsh habitats at Railhead Scrub Preserve are ORV activity and invasion of melaleuca. ORV activity has completely eliminated vegetation from the depression marsh at the southern edge of the property. Melaleuca has become dominant in other depression marshes at the southeast and northwest corners of the site, and the depression marsh surrounding the cypress dome.

After ORV activity has ended and melaleuca is removed, the herbaceous layer should be monitored. Native plant species may naturally recruit. Exotic species, including herbs and grasses (especially torpedograss) may also appear and should be treated with herbicides. If recruitment of suitable natives does not occur then native species should be planted. An appropriate list of native species for the depression marsh habitat is included in Appendix 6.

4.10 Enhance Native and Listed Species Management

The following objectives directly relate to Goal 6:

Objective 6a: Maintain an updated inventory and status of listed plant and animal species populations ;
Objective 6b: Re-establish extirpated populations in restored, formerly occupied sites, using plants and animals from nearby populations;
Objective 6c: Reintroduce the banded wild pine bromeliad if extirpation is confirmed or enhance its population if found; and
Objective 6d: Assess the presence and infestation level of upper respiratory tract disease in the gopher tortoise population.

4.10.1 Native Wildlife Management

Management of native animal species at the Railhead Scrub Preserve should correspond with the management goals of the Xeric Uplands, pine flatwoods, and wetland communities. Maintenance of viable populations of native animal species should be conducted by implementing management measures that maintain the viability of the natural communities at the Preserve. Evidence of use of the Preserve by white-tailed deer has been noted. Any fences constructed to exclude ORV use should be limited to a height that deer can jump over.

4.10.2 Listed Species Management

Railhead Scrub Preserve should be managed to provide habitat for listed species found (or potentially found) on the site. Some of the management recommendations for state and federally listed plant and animal species found on the Preserve are discussed below.

4.10.2.1 Management of Listed Plant Species

There are 13 rare plant species that have been recorded at Railhead Scrub Preserve (Table 5, Section 2.5.1). All rare plants on the site occur in Xeric Uplands, so management of this ecosystem is the highest priority for the management of rare plants. Management of rare plant species at the Preserve should in general consist of general vegetation management recommendations in 4.9.2, exotic species control in 4.7.1, and fire management in 4.8. Other special needs and recommendations are listed below.

Off road vehicles pose a threat to rare plant species that occur in Xeric Uplands, including all rare plants recorded from the site. The most critically threatened species is showy dawnflower, which is known from only one other preserve in South Florida. ORVs can easily kill these small plants, and since ORV users commonly break new trails in open sand, the only habitat for this species, it is particularly sensitive. Management recommendations include locating rare plants, and planning public and management access routes so as not to damage them.

Special care should be taken whenever management activities take place in the vicinity of rare plant populations. Herbicide applications should ensure that there is no off target damage. Vehicles or other machinery should not be used in Xeric Uplands off established trails.

Removal of melaleuca in the cypress dome will impact rare bromeliads, including *T. balbisiana* and *T. fasciculata* var. *densispica,* and the Florida butterfly orchid (*Encyclia tampensis*), which sometimes grow on this exotic tree. Plants of these species should be relocated prior to removal of melaleuca. It may also be desirable in Xeric Uplands to remove some populations of orchids and bromeliads prior to prescribed fires and replant them in the restored cypress dome community. Epiphytes are currently common in the community, especially on larger oaks. Fires will probably kill these epiphyte populations, but historically, they probably recruited back into the ecosystem from seed blown in from adjacent cypress communities. Establishment in the cypress dome may provide a seed source for recruitment after fires.

One rare plant species recorded previously on the site may no longer be present - banded wild pine. If the species is not found in subsequent surveys then it could be reestablished on the site. This species should be established in the Xeric Uplands habitat using germplasm from nearby localities.

4.10.2.2 Management of Listed Animal Species

The Railhead Scrub Preserve should be managed to maintain or increase populations of rare animal species as appropriate. Management of rare animal species at the Preserve should correspond with the natural communities' management goals.

The main priority shall be the management of the gopher tortoise population. Other priorities shall include monitoring of the occurrence of eastern indigo snake and gopher frog. The xeric upland communities at the Railhead Scrub Preserve provide suitable habitat for all three species and maintenance of habitat is the key for the protection of these listed species populations. Therefore, general management for this species at the site would be consistent with general

vegetation management recommendations in 4.8.2, exotic species control in 4.7.1, and fire management in 4.9.

To protect the tortoise population from direct take such as removal of tortoises for pets or consumption, the Railhead Scrub Preserve should be fenced in a manner that would inhibit easy access to more remote portions of the site occupied by gopher tortoise (e.g., the northern portion of the preserve). Limiting access by ORV would also ensure that tortoises are protected from collisions and burrow collapses by ORV use.

If any kind of transfer of individuals to the Railhead Scrub Preserve is anticipated as part of management action in the future, attention should be directed to the possibility of the occurrence of upper respiratory tract disease (URTD) in the tortoise population at the Preserve. URTD is a continuing concern for the conservation of the gopher tortoise. It is recommended that a percentage (to be determined as part of the baseline assessment) of the Preserve's tortoise population be tested for the presence of URTD during a baseline survey and at a frequency to be determined thereafter. If tortoises were tested serum-positive, coordination with the FWC would be implemented. A proper permit from the FWS is required prior to manipulation of any listed species such as the gopher tortoise.

Managing the Preserve for the benefit of the gopher tortoise will also benefit eastern indigo snakes and gopher frogs if these species are present.

4.11 Develop Required Facilities for Intended Public Uses

Once legal access can be established from the proposed future road to the south of the Preserve (Veterans Memorial Boulevard), proper facilities will be developed to provide the general public access to the Preserve. These facilities will be limited to an entrance road and gate, a parking lot, portable restroom, information kiosk and trail. These facilities are depicted in the conceptual level masterplan (Figure 9). The site shall adhere to ADA standards for pathways and facilities onsite. As permitting for each component of the preserve goes forward a review of ADA compliance should be done by the county.

The proposed trail is approximately 3,340 ft long and it will follow existing trails to the extent possible. Two small sections will be elevated (boardwalk) to provide the visitors an opportunity for observing scenery and wildlife at the wetlands habitat. The sections of the elevated trail (boardwalk) will be approximately 700 feet in length.

Figure 9: Railhead Scrub Preserve Conceptual Masterplan

4.12 Establish an Operational Plan for the Railhead Scrub Preserve

This section provides management recommendations for operation of the Railhead Scrub Preserve. It discusses maintenance and budgeting needs, the possibilities for contracting the restoration activities, coordination, and other management issues.

4.12.1 Maintenance

The primary maintenance activities for the preserve will include control of dumping and littering within and around the preserve and trail and facilities maintenance. Particularly important are the security measures to keep intruders out and keeping the fencing and signage in good conditions. Signs that effectively convey the desired message provide an opportunity for increasing environmental education and awareness.

4.12.2 Estimated Annual Costs and Funding Sources

Preliminary budget estimates for Railhead Scrub Preserve include cost breakdowns associated with resource restoration and management. The funding source identified for the restoration and management activities is the Conservation Collier Program Management Trust Fund. Table 10 shows the activities planned for the next ten years and the initial and annual cost estimate of each activity. Private conservation organizations may also provide funding for specific projects.

Funding already secured for management activities at Railhead Scrub Preserve include a grant from the state (FDEP - $65,300) to remove specifically melaleuca and a grant from USFWS Partners for Fish and Wildlife Program for $10,000 for general exotic removal. Similar alternative funding sources, such as mitigation and grant funds, will be sought to supplement existing funding.

The budget in Table 10 represents the actual and unmet budgetary needs for managing the lands and resources of the Preserve. This budget was developed using data from Conservation Collier and other cooperating entities, and is based on actual costs for land management activities, equipment purchase and maintenance, and for development of fixed capital facilities. The budget below considers available funding and is consistent with the direction necessary to achieve the goals and objectives for Railhead Scrub Preserve.

Table 10: Estimated Annual Land Management Budget (Amounts in $)													
			YEARS										
Item	**QTY**	**Cost ($)**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**	**2012-13[1]**	**2013-14**	**2014-15**	**2015-16**	**2016-17**	**Total**
Facilities Development													
Pavement/Parking (Sq. Ft) [1/]	12,000	4.5						54,000					**$54,000**
Trails (LF) [2/]	3,640	12						43,680					**$43,680**
Boardwalk (LF) [3/]	700	335						234,500					**$234,500**
Entry Gates [4/]	2	2,000	2,000					2,000					**$4,000**
Perimeter fence (4' field fence) (LF) [5/]	5,583	5.10	28,500										**$28,500**
Interior Info signage: Interpretative [6/]	5	500						2,500					**$2,500**
Small signs	50	100						5,000					**$5,000**
Plant signs	50	50						2,500					**$2,500**
Entry signage (set) [7/]	1	2,500						2,500					**$2,500**
Native Landscape for Parking Area [8/]	1	25,000						25,000					**$25,000**
Benches, table & trashcans [9/]	3 of each	1,000						3,000					**$3,000**
Kiosk (12'x20') [10/]	1	15,000						15,000					**$15,000**
			$30,500					**$389,680**					**$420,180**
Resource Restoration/Monitoring													
Debris and Litter Removal (Tons) [11/]	50	40	2,000										**$2,000**
Establish vegetation plots and photopoints [12/]	2	900	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	1,800	**$18,000**
Restore ORV Trails (LF) [13/]	12,670	0.75	3,168	3,168	3,168								**$9,503**
Remove exotics (acres) [14/]	23.5	3,919		30,700	30,700	30,700							**$92,100**
Install fuel breaks around perimeter (LF) [15/]	1	0	0										**$0**
Apply Prescribed Fire (treatment) [16/]	4	6,000		6,000	6,000				6,000		6,000		**$24,000**
Native Plant Restoration (acres) [17/]	8.46	38,720				32,757	32,757	32,758	32,758	32,758			**$163,788**
			$6,968	**$41,668**	**$41,668**	**$65,257**	**$34,557**	**$34,558**	**$40,558**	**$34,558**	**$7,800**	**$1,800**	**$309,391**
Regular Maintenance													
Reduce Fuel Loads [18/]	1	3,000		3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	**$27,000**
General Facilities Maintenance (month/yr) [19/]	12	200						2,400	2,400	2,400	2,400	2,400	**$12,000**
			$0	**$3,000**	**$3,000**	**$3,000**	**$3,000**	**$5,400**	**$5,400**	**$5,400**	**$5,400**	**$5,400**	**$39,000**

[1] Assumes legal access through Veterans Memorial Boulevard will become possible this year.

Table 10: Estimated Annual Land Management Budget (Amounts in $)													
			YEARS										
Item	QTY	Cost ($)	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13[1]	2013-14	2014-15	2015-16	2016-17	Total
Educational Materials	**$45,668**												
Brochures [20]	300/yr	3	**$1,000**	**$1,000**	**$1,000**	**$1,000**	**$1,000**	**$1,000**	**$1,000**	**$1,000**	**$1,000**	**$1,000**	**$10,000**
Grand Total			**$38,468**	**$45,668**	**$45,668**	**$69,257**	**$38,557**	**$430,638**	**$46,958**	**$40,958**	**$14,200**	**$8,200**	**$778,571**

Assumptions for Cost Estimates:

1. **Paving:** 12,000 SF at $4.50/SF = $54,000. The footage includes the parking lot and entrance road. The unit cost includes excavation of existing material to 19 inches; grading; 12" sub-base; 6" lime-rock base compacted and tested to 98% dry density, 1-inch thick S-1 asphaltic concrete, demarcation of parking spaces with thermoplastic material (10 ft. long and 4 in. wide); and installation of car stops made of plastic fiber-force material.
2. **Trails:** 3,640 LF at $12.00/LF = $43,680. Unit price includes only minor grading and demarcation with 4" posts and ropes. Non structural plastic posts will be spaced at 10'. Required materials, labor and equipment include: 728 4'-posts ($19,423); 728 60-lb concrete bags ($2,657); 7,280 feet of 3/4" thick rope ($7,280); labor – 2 men for two weeks ($12,000); and equipment – surface drill ($2,320)
3. **Boardwalk:** 700 LF at $335/LF = $234,500. Suggest the use of structural reinforced plastic (Fiber-force). Unit price includes required materials, labor and equipment as follows: 264 4"x4"-post 8' long ($17,931); 20 cy concrete 3,500 psi ($2,953); Sanotubes ($2,344); concrete pumping ($2,000); 2,800LF of 2"x 8"x 16'-structural fiber-force plastic ($22,036); 8,856LF of 2"x 4"x 12'-structural fiber-force plastic ($37,018); 6,160LF of 1"x 7.5" -structural fiber-force plastic slats ($35,297); labor – 1,350 hours ($101,250); equipment – surface drill ($3,670); bolts and other hardware ($10,000)
4. **Entry Gates:** 2 gates at $2,000.00 each
5. **Perimeter Fence:** Estimated at $28,500 or $5.11/LF
6. **Interior signage:** 5 interpretative signs (4'x6') at $500 each; 50 small signs at $100 each; and 50 plan signs at $50 each
7. **Entry signage:** 2 road signs indicating entrance to the preserve ($250 each) and 1 welcome sign (8'x6') estimated at $2,000
8. **Native Landscape:** Lump sum estimated at $25,000
9. **Tables, benches & trash cans:** Estimated at $3,000 for 3 of each
10. **Kiosk:** Consider a 240 SF at $ $62.5/SF
11. **Debris and Litter Removal:** Estimated a unit cost of $40/ton including tipping fee at the landfill and a rough estimate of 50 tons.
12. **Plots and Photo-points:** Assumes a team of two people for one day per year.
13. **Restoration of ORV Trails:** We estimated 12,670 feet of trails, half of that for restoration, and are suggesting plants at 5 foot centers, and using small plants that don't need to be watered - $2.50 each, and 3 times that cost for installation.
14. **Removal of Exotics:** For Melaleuca assume $10,000/acre and 8.46 acres= $84,600. For sparse Brazilian Pepper assume $500/acre and there are about 15 acres infested= $7,500. A total of 23.5 acres need treatment at an average cost of $3,919.15
15. **Install Fuel breaks:** Can probably get the Division of Forestry to install them for free
16. **Prescribed fires:** The team will cost about $6,000 for two days that they need to be there. In order to be safe do 50% of the site one year and 50% the following year. At least a second treatment should be conducted during the 10-year period of the plan.
17. **Native Plant Restoration in wetlands:** We estimate 8.46 acres and suggest using small plants, which would be about $1 each, and are suggesting planting on 2.5-foot centers and multiply by 2 for installation. This is expensive ($327,571), but is the worst case scenario, only if after Melaleuca removal natural recruitments is not enough. We suggest to budget for 50% of that and implement it gradually during a 5-year period.
18. **Reduce fuel loads:** After firebreaks have been established they will require mostly mowing, but in some cases, some brush hogging or herbicide application annually. We estimate a contractor with a bobcat or similar equipment and sprayer can do it in 2-3 days at a cost of $1,000/day.
19. **General Maintenance:** Estimated at $200 per month after it opens to public
20. **Brochures:** Estimated at 300 per year with a unit cost of $3.00

4.12.3 Potential for Contracting Restoration and Management Activities by Private Vendors

A significant number of Railhead Scrub Preserve management operations and restoration activities can be considered for outsourcing. Restoration and management activities that can be considered for outsourcing to private entities are listed in Table 11.

Table 11: Potential Contracting for Restoration and Management Activities

Activity	Approved	Conditional	Rejected
Prescribed fire application	X		
Minor fireline installation	X		
Fireline, fence, and trail maintenance	X		
Fence installation	X		
Plant and wildlife inventory and monitoring		X	
Listed species mapping and needs assessment		X	
Restore/enhance encroachment and ruderal areas		X	
Reduce exotic species	X		
Literature development and printing		X	
Interpretive signs development and installation		X	
Trail and boardwalk installation	X		
Law enforcement and patrol	X		

4.12.4 Management Zones

Management zones at Railhead Scrub Preserve were developed in such a way as to parallel the main natural communities and sub zones correspond with the boundaries proposed for the most important management tool, which is prescribed burning. The management units that are shown in Figure 8 help to identify existing and potential management concerns and to focus staff efforts to protect the integrity of natural areas.

Re-examination of these management zones should be done every time the plan is revised and updated. These revisions will allow staff to re-assess the overall situation, make any required adjustments, and to modify the zones to reflect changing conditions. One of the goals of this management plan is to utilize management zones around existing natural areas to identify potential management concerns, such as smoke dispersion, exotic and problem animal use, invasive non-indigenous plants, dumping, and other inappropriate uses.

4.12.5 Education and Training

One of the goals of this management plan is to educate the public and local governments concerning resources, issues, and management goals and objectives of Railhead Scrub Preserve. These objectives include:

- Interaction with adjacent landowners via phone, mail, and direct contact regarding management issues, such as exotics, prescribed fire, and dumping;
- Development of brochures and letters explaining the prescribed burning and exotic species removal programs;
- Development of natural resource educational materials;
- Encouragement of adjacent landowners to establish control programs for invasive exotic plants; and

- Providing of public service announcements to media contacts.

4.13 Emergency Response Preparedness

Because the site is devoted to the maintenance of natural conditions, there has been no disaster plan required for the preserve area itself. Staff will visit the site as soon as possible after storms or other types of natural disasters to evaluate and address any damage that may have occurred, with emphasis on making sure trees from the Preserve have not fallen and damaged properties on the perimeter. Second priority shall be on the trails to make sure they are still passable and undamaged.

1. Life Safety

A safety plan will be prepared for removal of visitors and personnel. The plan shall include specific actions when faced with a list of environmental and physical conditions such as wind, rain, fire and any physical danger arising from persons acting in an inappropriate manner.

2. Site Considerations

Because of the hazards of wind, water, and fire the site should be evaluated on a predetermined basis for the following items:

- Tree trimming plan for perimeter landscape to insure that the material does not present a hazard to surrounding properties. Interior natural material may also be considered for habitat improvement only.
- Inspections of entry points, including gates, and security equipment.
- Inspections for loose perimeter trash both natural and man made.

3. Recovery Plan

A plan should be developed for the period after the disaster to insure as little confusion as possible. The priority in this plan shall consider a site inspection for assessing damage to vegetation and addressing the needs for removal of debris from a parking area and trails.

4. Fire Department Emergency Response Plan

A plan will be developed to provide emergency fire responders with a map of access points and locations of listed species so they can avoid if possible. In addition, a strategy should be developed, such as, protect surrounding structures or specific areas first.

4.14 Partnerships and Regional Coordination

There may be opportunities to collaborate with the Collier County Parks and Recreation Department. Other potential partnerships may include, but not be limited to:

- Surrounding residential and commercial property owner associations;
- The Conservancy of Southwest Florida;
- The Audubon Society;
- Florida Wildlife Federation;
- Collier County Schools;
- Collier County Sheriff's Office;

- North Naples Fire Department;
- Florida Division of Forestry;
- U.S. Fish and Wildlife Service;
- Florida Department of Environmental Protection;
- South Florida Water Management District;
- Big Cypress Basin;
- Florida Fish and Wildlife Conservation Commission; and
- Other County Departments, as some goals and purposes will be similar.

4.14.1 Interdepartmental Partnerships and Agreements

Most, if not all, of the management activities on this preserve will be conducted through contract and by the Conservation Collier Program staff. Other Collier County Departments that may eventually be involved in management of Railhead Scrub Preserve include:

- Collier County Parks and Recreation Department; and
- Collier County Facilities Management Department

4.14.2 Cooperating Agencies

The preserve is managed in accordance with all applicable Florida Statutes and administrative rules. Agencies having a major or direct role in the management of the preserve are discussed in relevant portions of this plan. The Department of Agriculture and Consumer Services, Division of Forestry (DOF), will assist Conservation Collier staff in the development of wildfire emergency plans and provides some services and the authorization required for prescribed burning. In addition, the Florida Fish and Wildlife Conservation Commission (FFWCC) will aid Conservation Collier with wildlife management programs, including the development and management of Watchable Wildlife programs.

4.14.3 Land Use Coordination

The long-term health and connectivity of the preserve will be directly influenced by the surrounding land use. Conservation Collier will work with neighboring landowners and residents to inform the public, Collier County planning staff, and elected officials about the potential impact of proposed land use changes on the Preserve.

In order to educate neighbors as to what to expect living next to a Preserve, annual meetings shall be organized and printed materials (brochures) will be offered at those meetings or sent by mail. Goals and objectives of printed materials shall be to inform citizens about the Conservation Collier Program, define what a "Preserve" is, provide relevant history of a particular site and to educate citizens about the habitats and species present and why they are important.

5.0 Literature Cited

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