Otter Mound Preserve

2nd DRAFT

Land Management Plan

Managed by:

Conservation Collier Program
Collier County
September 2007 – September 2017 (10 yr plan)

Prepared by:
Collier County Facilities Management Department

September 2007

Otter Mound Preserve
Land Management Plan Executive Summary

Lead Agency: Collier County Board of County Commissioners, Conservation Collier Program

Properties included in this Plan: four parcels – Folio #21840000029, 21840000045, 21840000061, and 25830400004

Acreage: 2.46 acres

Management Responsibilities: Collier County Conservation Collier Program has oversight responsibility with day to day responsibilities shared by the City of Marco Island under an Inter-local Agreement attached as Appendix 3.

Designated Land Use: Conservation and natural resource-based recreation

Unique Features: Mature, tropical hardwood hammock

Archaeological/Historical: Calusa shell mound, historic whelk shell terracing, and historic outhouse

Management Goals:

- **Goal 1:** Maintain the property in its natural condition prior to modern development.
- **Goal 2:** Eliminate or reduce human impacts to indigenous plant and animal life.
- **Goal 3**: Maintain the trail to provide a safe and pleasant visitor experience.
- **Goal 4**: Protect Archaeological, Historical and Cultural Resources.
- **Goal 5**: Facilitate uses of the site for educational purposes.
- **Goal 6**: Provide a plan for security and disaster preparedness

Acquisition Needs: None

Surplus Lands: None

Public Involvement: Public meeting(s) to be held fall 2007 with residents from surrounding homes, the City of Marco Island, the Marco Island Historical Society, the Southwest Florida Archaeological Society, and the Archaeological and Historical Conservancy, Inc.

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1.0 Introduction

Otter Mound Preserve is a 2.46-acre urban preserve located in southwestern Collier County in a residential area of Marco Island. The entire preserve site is a Native American shell mound (c. 700 A.D.-1200 A.D.) that contains artifacts of both archaeological and historical significance. Access to the preserve is from Osceola Court and Addison Court - with public parking available within the Addison Court right of way.

The Conservation Collier Program acquired the bulk of the preserve in July 2004**.** Largely comprised of native, tropical hardwood hammock species, the preserve also contains examples of non-native historical vegetation. The Conservation Collier Program manages this parcel under authority granted by the Conservation Collier Ordinance 2002-63 (Appendix 1) with assistance from the City of Marco Island under an Interlocal Agreement signed February 28, 2006 (Appendix 3).

Conservation, restoration, and passive public use are the designated uses of the property. Management activities allowed are those necessary to preserve and/or restore this environmentally and historically endangered land for the benefit of present and future generations. Public use of this site must be consistent with these goals.

An initial site assessment of the preserve was conducted on September 22, 2003 and the northernmost section was purchased by the Conservation Collier Program on July 12, 2004. Previously known as the "Gionet Otter Mound" property for the former owners – Ernest and Gladys Otter and Michael, Mary, and Gary Gionet – it was renamed Otter Mound Preserve in May 2005. On June 18, 2007, the southernmost part of the preserve was purchased from Harvey and Lisa Karen. Initial preserve activities are identified in Table 1 below.

Table 1: Acquisition History and Status for Otter Mound Preserve

Year	Benchmark
2003	Gionet property initiallly assessed
2004	Gionet Otter Mound property purchased
2004	Interim Management Plan developed
2005	Gionet Otter Mound property renamed to Otter Mound Preserve
2005	Initial exotic plant and debris removed
2006	Exotics maintenance started (contracted)
2006	Inter-local Agreement with City of Marco Island developed
2006	Trails created from Hurricane Wilma debris and post and rope fence installed
2006	Over 200 native species planted
2006	Karen property initiallly assessed
2007	Bench, garbage cans, plant identification signs, three interpretive signs, entrance sign, sidewalk, and three parking spaces installed (all contracted except plant ID signs)
2007	Preserve opened to the public in March
2007	0.68 acre Karen parcel purchased
2007	Final management plan completed

1.1 Purpose of the Project and Scope of Plan

The purpose and scope of this management plan is to provide management direction for Otter Mound Preserve by identifying the goals and objectives necessary to eliminate or minimize any threats to the resources and integrity of the preserve. This text is a working document that establishes the foundation for the ten-year plan by identifying the appropriate management techniques necessary to preserve and/or restore the resource. This plan will balance resource restoration and protection with passive public recreational and educational use while looking at restoration needs, listed species protection, archaeological/historical feature protection, and invasive exotic plant and species maintenance. This plan is divided into sections that incorporate an introduction; descriptions of the natural and cultural resources; projected uses of the property; and management issues, goals, and objectives.

This management plan will be submitted to the Collier County Board of County Commissioners (BCC) for its approval. When approved, this plan will replace the Interim Management Plans prepared by Conservation Collier staff in September 2004 (Gionet section) and July 2007 (Karen section).

1.2 Location

Otter Mound Preserve is located at 1831 Addison Court within the City of Marco Island, Collier County, Florida. Lying in the middle of the semi-circle formed by East, West and South Inlet Drive, the preserve is bound on the north by Addison Court and on the southwest by Ocseola Court. The site location is shown in Figure 1. The legal description is attached as Appendix 4.

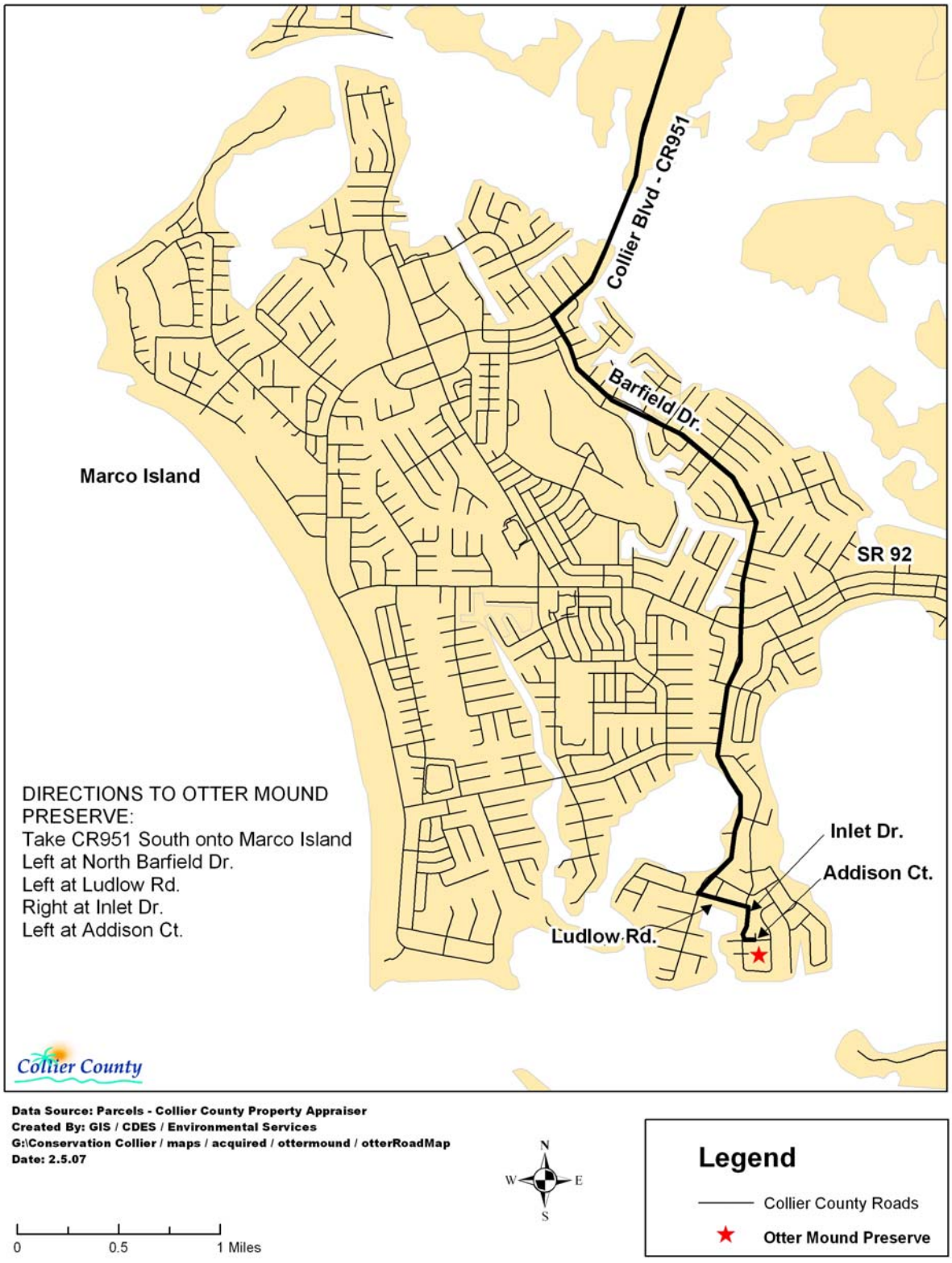


Figure 1: Otter Mound Preserve Location

Figure 2: Otter Mound Preserve 2006 Aerial View

1.3 Regional Significance of Otter Mound Preserve

Despite having 867,000, or 64%, of county lands protected by conservation status, Collier County has lost, and is losing, many of its rare and unique habitats. The Conservation Collier Ordinance (2002-63) identifies these specific habitats and gives preference to them in acquisition evaluations. These habitats include, in order of preference: tropical hardwood hammock, xeric oak scrub, coastal strand, native beach, riverine oak, high marsh (saline), and tidal freshwater marsh. Otter Mound Preserve was purchased because it contains tropical hardwood hammock habitat. In addition, the preserve contains the following features that make it an important archaeological and historical site: undisturbed Calusa shell mounds, a historic pioneer structure (outhouse), and historic man-made shell terracing that runs along the northern and western sections of the property. The location of the preserve in the urban area provides an opportunity for citizens, visitors, and school-age children to view this habitat type without traveling far.

The preserve serves as an important stopover site for a variety of migratory bird species, and it is home to the Florida tree snail *(Liguus fasciatus)* – a FFWCC Species of Special Concern. In addition, Otter Mound Preserve contains seven state listed plant species: Curacao bush *(Cordia globosa)*, giant wild pine *(Tillandsia utriculata)*, Florida thatch palm *(Thrinax radiata)*, Satin leaf *(Chrysophyllum oliviforme)*, Red stopper *(Eugenia rhombea)*, Lignum vitae *(Guaiacum sanctum)*, and dildo cactus *(Cereus pentagonus)*. The protection and management of these listed species and their habitat is critical to their long-term existence in Collier County and in Florida.

1.4 Nearby Public Lands and Designated Water Resources

The closest preserve to Otter Mound is Rookery Bay National Estuarine Research Reserve (NERR), a 110-acre preserve surrounding Marco Island. Other preserves, in order of increasing distance, are identified in Table 2 below.

Table 2: Public lands and designated water resources located near Otter Mound Preserve

Preserve	Distance (miles)	Direction	Type
Rookery Bay NERR	0.15	S	National
Ten Thousand Islands National Wildlife Refuge	3.0	E	National
Collier Seminole State Park	5.0	N and E	State
Picayune Strand State Forest	9.0	NE	State
Fakahatchee Strand Preserve State Park	11.5	NE	State
Everglades National Park	12.5	S and E	National
Gordon River Greenway Preserve	18.0	N	Conservation Collier

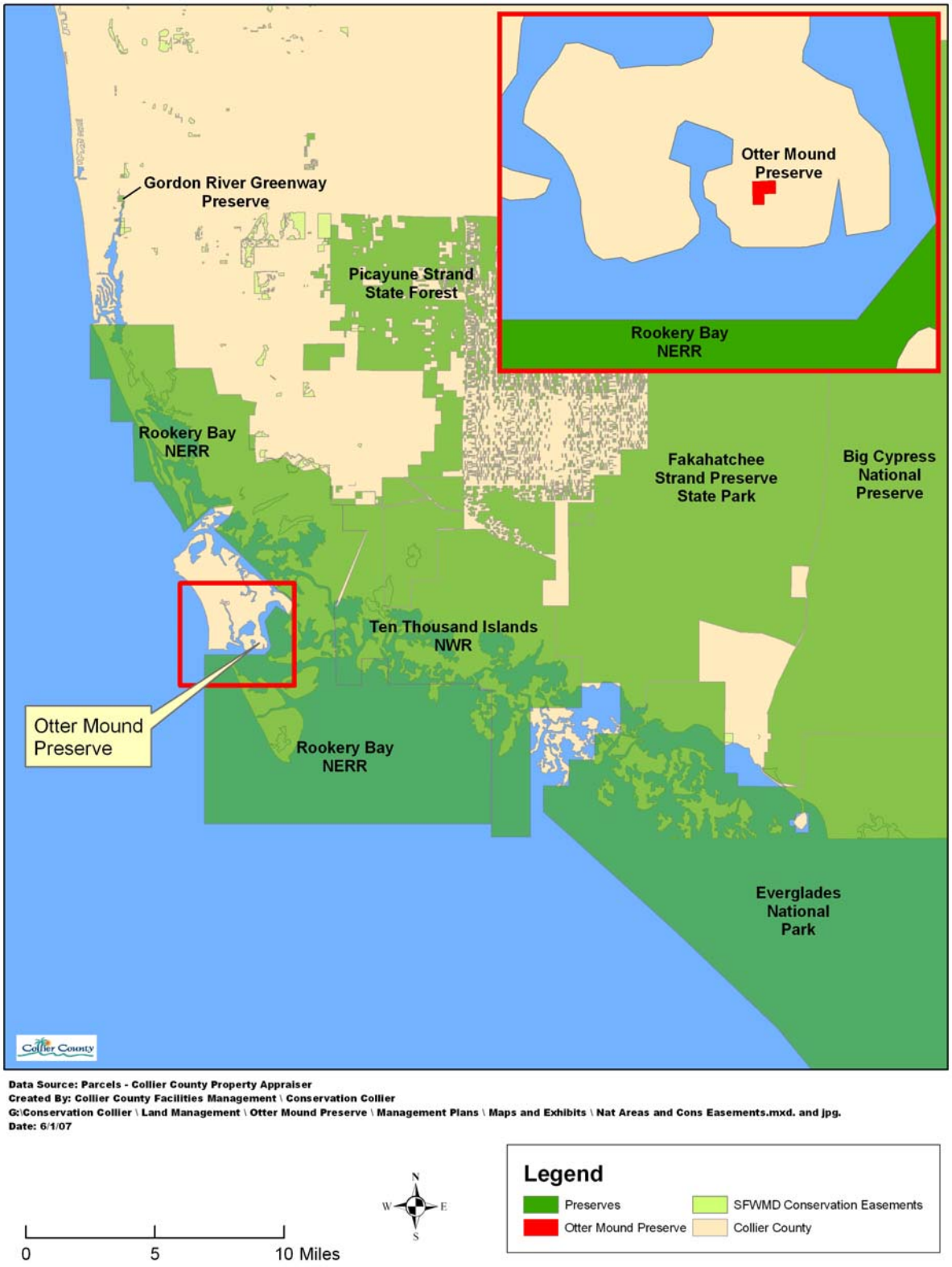


Figure 3: Natural Preserves and Designated SFWMD Conservation Easements Existing in Collier County

1.5 Management Authority

Lands acquired by Conservation Collier are titled to "COLLIER COUNTY, a political subdivision of the State of Florida, by and through its Conservation Collier Program." Under the Conservation Collier Ordinance, the Collier County Conservation Collier Program holds management authority for all Conservation Collier Program lands. The City of Marco Island assists with specific management tasks for Otter Mound Preserve, as identified in the Interlocal Agreement (Appendix 3).

1.6 Public Involvement

Neighborhood involvement will be sought through direct mailing notice for public meetings to residents within the surrounding area, owners of properties that border the preserve, and organizations with an interest in the preserve (City of Marco Island, Marco Island Historical Society, Southwest Florida Archaeological Society, Archaeological and Historical Society, Inc.). Any major changes or management activities that are likely to be intrusive or in some way affect neighboring properties will be reviewed with these contacts prior to conducting the activity. Staff will also seek volunteers through these contacts (Appendix 5).

2.0 Natural and Cultural Resources

2.1 Physiography

2.1.1 Topography and Geomorphology

A review of a United States Geologicial Survey (U.S.G.S.) 7.5 Minute Series map of the Marco Island area and on-site investigation reveals that a slight mounding exists on the preserve. The elevation is generally between 10 and 15 feet National Geodetic Vertical Datum (NGVD) for most of the site. Portions of at least five linear depressions ("canals") and five ridges are present in the extreme western portion of the preserve. The middle of the preserve is elevated, relatively flat ground. The eastern side of the preserve contains a complex of elevated knolls and lower zones resembling the central parts of most large shell mounds found in the region. Three deep, historic borrow pits also exist within the eastern section of the preserve (Figure 4).

2.1.2 Geology

The geology of the area is characterized by aboriginal shell deposits adjoining and intergrading with surrounding mangrove peat deposits. The peat deposits in turn intergrade and interlayer with marine marls, coastal sand deposits, and naturally occurring shell bar formations that are deposited and altered by sea level fluctuation, storm surge activity, and other coastal energetics. At even greater depths the Holocene deposits give way to elements of the Pleistocene Caloosahatchee formation and various Wisconsian sand terrace features. These marine marls or calcified "muds" contain lenses and deposits of clay intermixed with varying percentages of sand (Carr and Beriault, 2000).

2.1.3 Soils

Soils data is based on the Soil Survey of Collier County, Florida (USDA/NRCS, 1990, rev. 1998). Mapped soils on the preserve show the entire area to be urban land – aquents complex, organic substratum. This soil consists of urban land soil materials that have been dug from different areas in the county and have been spread over organic muck soils for coastal urban development.

Otter Mound Preserve lies on a slight topographic high that is associated with a Native American shell mound. Shell mound soils are composed of shells and shell fragments with an organic component derived from forest litter. The soil generally is circumneutral to slightly alkaline (pH = 7-8) and contains 1-20% organic materials. The loose collection of shells allows water to drain extremely rapidly. The calcareous substrate and coastal location of shell mounds often permit tropical or subtropical species of plants to grow much further north than their normal range on other substrates permits. Figure 5 shows the substrate profile of one 3-meter trench dug by AHC at Otter Mound Preserve.

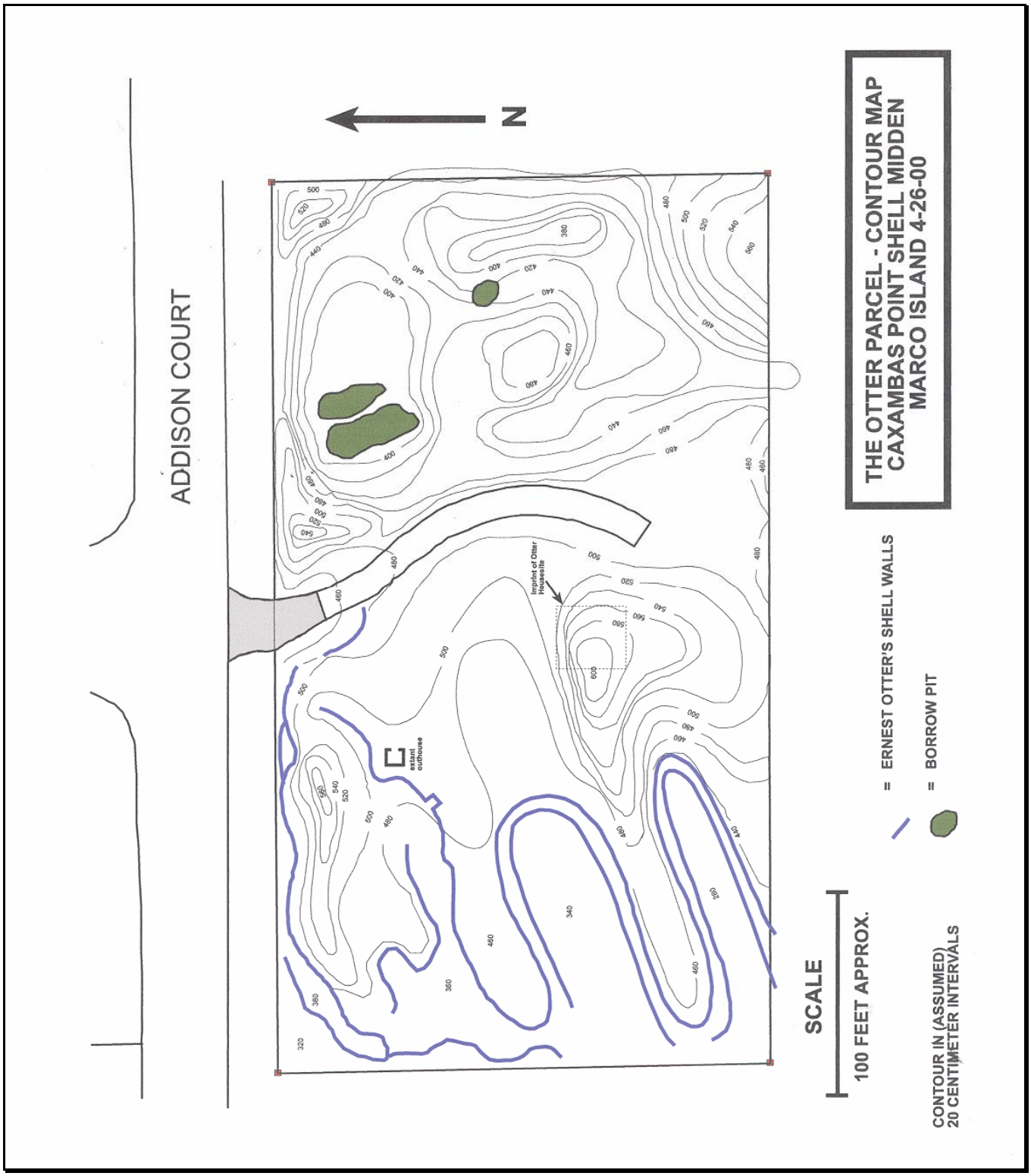
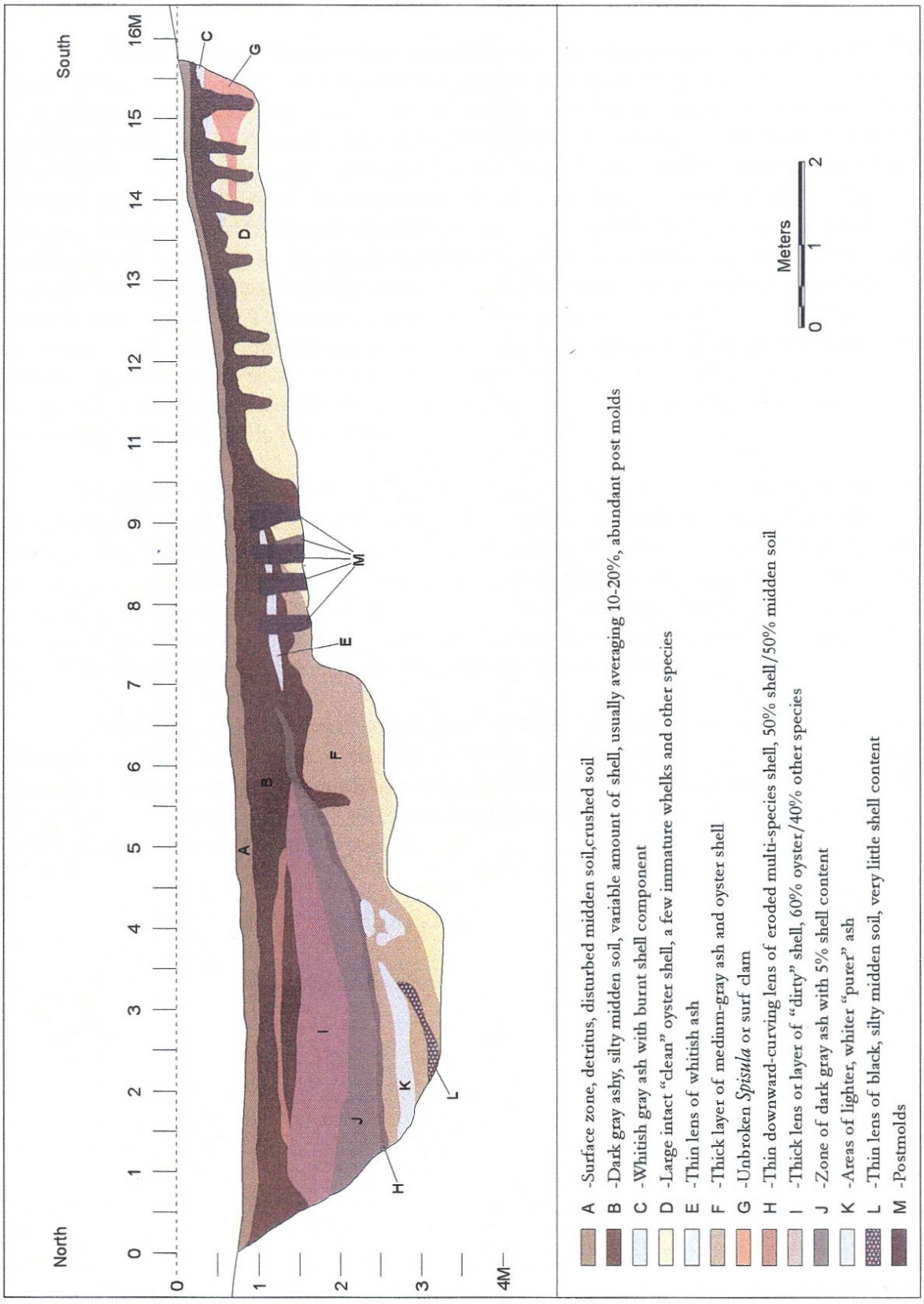


Figure 4: Otter Mound Preserve Contour Map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A -Surface zone, detritus, disturbed midden soil,crushed soil
B -Dark gray ashy, silty midden soil, variable amount of shell, usually averaging 10-20%, abundant post molds
C -Whitish gray ash with burnt shell component
D -Large intact "clean" oyster shell, a few immature whelks and other species
E -Thin lens of whitish ash
F -Thick layer of medium-gray ash and oyster shell
G -Unbroken *Spisula* or surf clam
H -Thin downward-curving lens of eroded multi-species shell, 50% shell/50% midden soil
I -Thick lens or layer of "dirty" shell, 60% oyster/40% other species
J -Zone of dark gray ash with 5% shell content
K -Areas of lighter, whiter "purer" ash
L -Thin lens of black, silty midden soil, very little shell content
M -Postmolds

Figure 5: Otter Mound Preserve Substrate Profile

2.1.4 Hydrology/Water Management

Surface water drains quickly through the Otter Mound Preserve soil/substrate. Water does not pool in any area of the site, even after heavy rain events. Water management does not appear to be an issue at the site.

2.2 Climate

Otter Mound Preserve is located in an area of Florida that is overlapped by a humid subtropical climate and a tropical savanna climate in which temperatures are moderated by winds from the Gulf of Mexico and the Atlantic Ocean. A tropical savanna climate is characterized by sharply delineated wet and dry seasons and average monthly temperatures greater than 64º Fahrenheit. Monthly rainfalls may exceed 10 inches during the wet season. Humid subtropical climates are characterized by less extreme rainfall fluctuations between wet and dry seasons and average monthly temperatures 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, which is from May to October. Thunderstorms are frequent during the wet season, occurring on average every two out of three days between June and September. Rainfall records for the area indicate that there is no significant variation in the annual rainfall throughout much of the county; however, large variations often occur within a single year. The hurricane season extends from June through November, with peak activity occurring in September and October when ocean temperatures are highest.

2.3 Natural Communities

Table 3: Summary of Natural Communities

FNAI Natural Community Type	# Acres	% of Area	Global Rank	State Rank	Comments
Shell Mound	2.46	100%	G2	S2	3 gopher tortoise burrows located, 0 live gopher tortoise seen Florida tree snail population present

2.3.1 Shell Mound

Otter Mound Preserve consists entirely of Shell Mound, as defined by FNAI & FDNR (1990). This natural community type, synonymous with tropical hardwood hammock, is largely a result of the activities of Native Americans, instead of natural physical factors. Shell Mound is generally characterized as an elevated mound of mollusk shells and aboriginal garbage on which a hardwood, closed-canopy forest develops. Their coastal, usually insular, location generally protects Shell Mounds from fire, but subjects them to marine influences, including high winds, salt spray, high insolation, and storm surge. Typical shell mound plants include: gumbo-limbo,

cabbage palm, mastic, red cedar, hackberry, live oak, Florida privet, coral bean, marlberry, saffron plum, sagaretia, coontie, and others. The Otter Mound Preserve vegetative composition varies slightly. While no red cedar, saffron plum, sagaretia, or coontie is present, species such as soapberry, strangler fig, Jamaican dogwood, and yellow elder are common. The previous use of the preserve as an early 1900's home-site also led to the introduction of many non-native species such as: mango, royal poinciana, guava, oyster plant, air potato, coral vine, and others. Aerial photographs from 1952 show that much of the present day preserve was wooded, while surrounding parcels were almost completely cleared. More recent development in the 1960s further affected the surrounding lands (Figure 6).

1952

2006

Figure 6: Historic Aerials

2.3.2 Existing Habitat Conditions 2007

In June 2005 a large amount of mature Brazilian pepper was removed from the northern section of the preserve, significantly reducing the canopy cover. Subsequently, in October 2005, Hurricane Wilma passed through Marco Island. The combined effect of invasive exotic removal and Hurricane Wilma damage resulted in 0% canopy coverage in some sections of the preserve. During June and July of 2006, 331 native plants (85 trees, 87 shrubs, and 159 groundcovers) were planted within the barest areas of the preserve (Figure 7). A planting list is attached as Appendix 8.

Irrigation supplement gel was planted with each plant to aid in establishment because no irrigation was available at the preserve. The gel, consisting of 95% water/5% cellulose, was planted with the root ball of each plant and provided supplemental irrigation for approximately 30 days.

All the soil material within each plant hole was sifted and surveyed for artifacts. All artifacts that were found are housed at the Collier County Museum in Naples. Because of the archaeological nature of the site, only plants in 3-gallon pots or smaller were planted. As a result, canopy coverage in the northern section of the preserve has been slow to recover, despite a high planting survival rate.

Sparse vegetation within planting area one year after planting. Photo by Melissa Hennig.

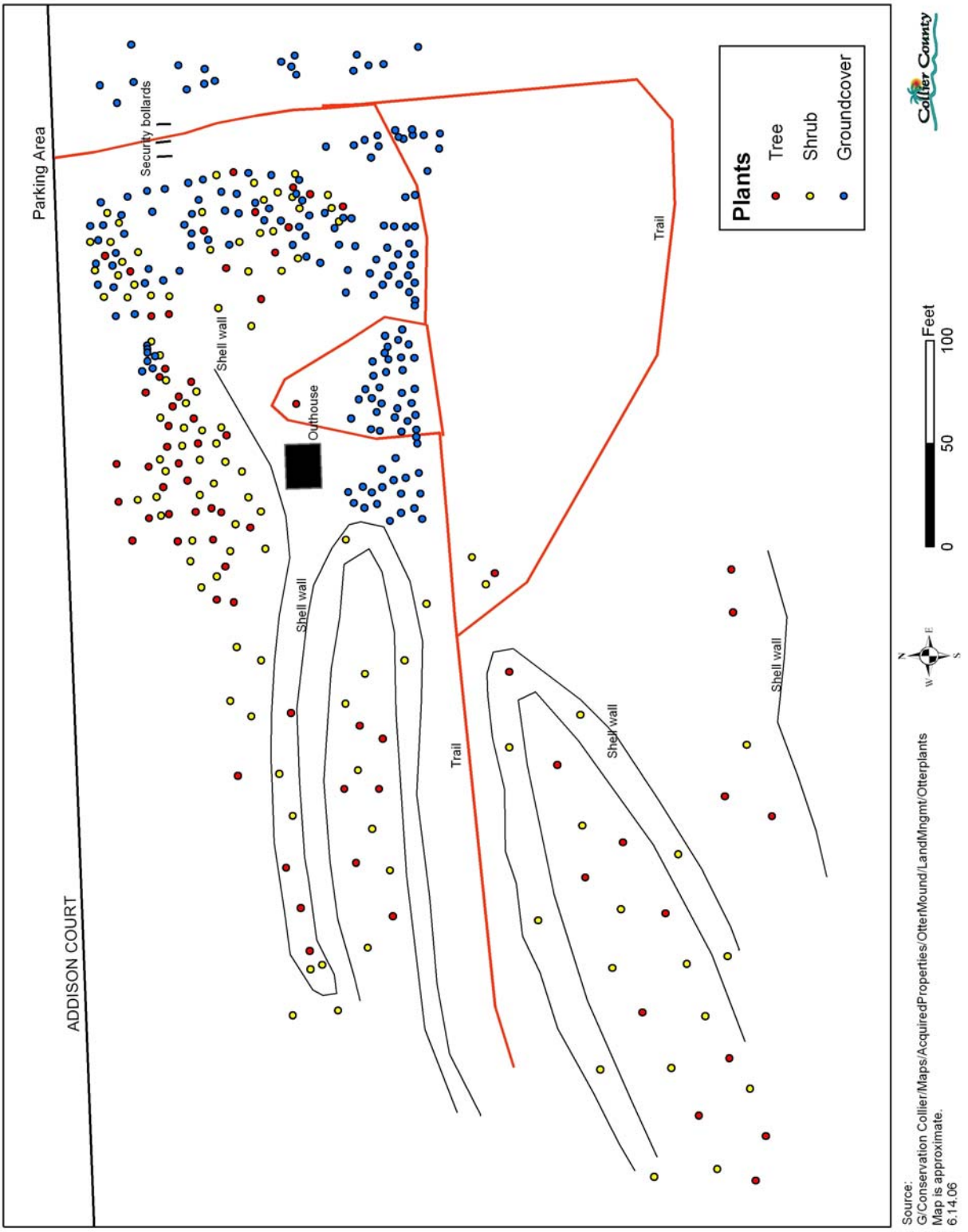


Figure 7: Otter Mound Preserve 2006 Summer Planting

2.4 Native Plant and Animal Species

The 2.46-acre Otter Mound Preserve shell mound tropical hardwood hammock uplands provide food and cover for resident and migratory species of animals that typically use such habitat.

One hundred and twenty-seven (127) plant species have been recorded at Otter Mound (Appendix 8). Data was collected by Jim Burch in January, February, and July 2007. Of these 127 species, 93 (73.2%) are native to the site and 34 are exotic (26.8%).

Occurrences of fauna at the preserve are based on direct visual and aural observations by Collier County personnel during site visits, evidence of activity such as spoor, scat, or burrows, and site information available. Mammal species known to occur or individuals and/or evidence of activity directly observed within the preserve include the Virginia opossum (*Didelphis virginiana*), nine-banded armadillo (*Dasypus novemcinctus*), raccoon (*Procyon lotor*), and eastern gray squirrel (*Sciurus carolinensis*).

Bird observations by Collier County staff are included in Table 4. Fifty-seven different species of birds have been observed to date.

Table 4: Otter Mound Preserve Bird Observations

Scientific Name	Common name
Accipiter cooperii	Cooper's Hawk
Accipiter striatus	Sharp-shinned Hawk
Archilochus colubris	Ruby-throated Hummingbird
Buteo lineatus	Red-shouldered Hawk
Cardinalis cardinalis	Northern Cardinal
Cathartes aura	Turkey Vulture
Catharus ustulatus	Swainson's Thrush
Coccyzus americanus	Yellow-billed Cuckoo
Columbina passerina	Common Ground-Dove
Contopus virens	Eastern Wood-Pewee
Coragyps atratus	Black Vulture
Corvus brachyrhynchos	American Crow
Corvus ossifragus	Fish Crow
Cyanocitta cristata	Blue Jay
Dendroica caerulescens	Black-throated Blue Warbler
Dendroica castanea	Bay-breasted Warbler
Dendroica discolor	Prairie Warbler
Dendroica fusca	Blackburnian Warbler
Dendroica magnolia	Magnolia Warbler
Dendroica palmarum	Palm Warbler
Dendroica pensylvanica	Chestnut-sided Warbler
Dendroica petechia	Yellow Warbler
Dendroica striata	Blackpoll Warbler
Dryocopus pileatus	Piliated Woodpecker
Dumetella carolinensis	Gray Catbird
Empidonax minimus	Least Flycatcher
Eudocimus albus	White Ibis
Fregata magnificens	Magnificent Frigatebird

Scientific Name	Common name
Geothlypis trichas	Common Yellowthroat
Hirundo rustica	Barn Swallow
Hylocichla mustelina	Wood Thrush
Lanius ludovicianus	Loggerhead Shrike
Melanerpes carolinus	Red-bellied Woodpecker
Mimus polyglottos	Northern Mockingbird
Mniotilta varia	Black-and-white Warbler
Myiarchus crinitus	Great Crested Flycatcher
Parula americana	Northern Parula
Passerina caerulea	Blue Grosbeak
Passerina cyanea	Indigo Bunting
Pelecanus occidentalis	Brown Pelican
Piranga olivacea	Scarlet Tanager
Piranga rubra	Summer Tanager
Polioptila caerulea	Blue-gray Gnatcatcher
Quiscalus major	Boat-tailed Grackle
Quiscalus quiscula	Common Grackle
Seiurus aurocapilla	Ovenbird
Setophaga ruticilla	American Redstart
Streptopelia decaocto	Eurasian Collared-Dove
Sturnus vulgaris	European Starling
Toxostoma rufum	Brown Thrasher
Tyrannus tyrannus	Eastern Kingbird
Vermivora chrysoptera	Golden-winged Warbler
Vermivora peregrina	Tennessee Warbler
Vireo flavifrons	Yellow-throated Vireo
Vireo griseus	White-eyed Vireo
Vireo olivaceus	Red-eyed Vireo
Zenaida macroura	Mourning Dove

The Breeding Bird Atlas documents breeding distributions of all bird species in Florida between 1986 and 1991. It lists 62 bird species that have been recorded as confirmed, probable, or possible breeding in the vicinity of Otter Mound Preserve (in the Marco Island USGS quadrangle). These species are listed in Appendix 9.

Reptile and amphibian species observed at the preserve include brown anole (*Anolis sagrei*), green anole (*Anolis carolinensis*), southern black racer (*Coluber constrictor priapus*), ring neck snake (*Diadophis punctatus*), and greenhouse frog (*Eleutherodactylus planirostris*). Neighbors have also reported observing coral snakes (*Micrurus fulvius*) near the property.

Invertebrates observed at the preserve include cloudless sulphur butterfly (*Phoebis sennae*), eastern tiger swallowtail butterfly *(Papilio glaucus)*, whip scorpion (*Mastigoproctus giganteus*), Florida tree snail (*Liguus fasciatus*), and various wasp species.

Other wildlife species that have not been recorded undoubtedly occur at Otter Mound Preserve. During migration periods, transient bird species utilize this area for short periods of time. The developed character of the adjacent properties may inhibit transient use by many mammal, reptile, and amphibian species, thus possibly limiting the utilization of the preserve to resident individuals or inhibiting the dispersal of many species to and from the preserve.

2.5 Listed Species

2.5.1 Listed Plant Species

There are 7 plant species at Otter Mound that are listed by the Florida Department of Agriculture and Consumer Services (FDACS), 5 as Endangered and 2 as Threatened. FNAI lists 1 species as Critically Imperiled in Florida, and 2 species as Imperiled in Florida. There are no species listed as Endangered or Threatened by the U.S. Fish and Wildlife Service (Table 5).

Table 5: Rare Plant Species at Otter Mound Preserve

Scientific Name	Common Names	State	FNAI
Acanthocereus tetragonus	Dildoe Cactus	T	
Chrysophyllum oliviforme	Satin leaf	T	
Cordia globosa	Curacao bush	E	
Eugenia rhombea	Red stopper	E	S1
Guaiacum sanctum	Lignum vitae	E	G2, S2
Thrinax radiata	Florida thatch palm	E	S2
Tillandsia fasciculata	Stiff-leaved wild pine	E	

E: Endangered, T: Threatened, C: Commercially Exploited, S1: Critically Imperiled in FL, S2: Imperiled in FL, G2: Imperiled Globally

Dildoe Catus *(Acanthocereus tetragonus)*

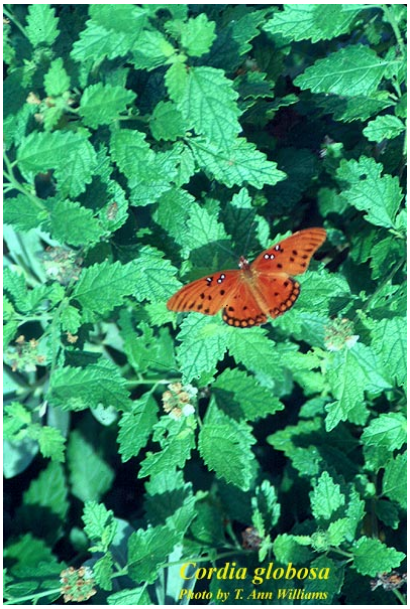
This cactus is endemic to peninsular Florida where it has been reported from 6 southern counties (Wunderlin and Hansen, 2006). This plant is present within the eastern portion of Otter Mound Preserve, located off the trail.

Dildoe Cactus *(Acanthocereus tetragonus)*
Photo by Shirley Denton

Satin leaf *(Chrysophyllum oliviforme)*
Photo by Shirley Denton

Satin Leaf (*Chrysophyllum oliviforme)*
This medium to large sized tree is endemic to peninsular Florida where it has been reported from 10 counties (Wunderlin and Hansen, 2006). Sixteen satin leaf trees were planted in June 2006. No other satin leaf trees were known to exist at Otter Mound prior to these plantings.

Curacao bush *(Cordia globosa)*
This rare understory shrub is endemic to peninsular Florida where it has been reported from 3 counties (Wunderlin and Hansen, 2006). Two curacao bushes were planted in June 2006. It is unknown whether any curacao bushes existed at Otter Mound Preserve prior to these plantings.



Curacao bush (*Codia globosa*)
Photo by T. Ann Williams

Red Stopper (*Eugenia rhombea*)
Photo by T. Ann Williams

Red Stopper *(Eugenia rhombea)*
This very rare understory shrub is endemic to peninsular Florida where it has been reported from 2 counties (Wunderlin and Hansen, 2006). Two red stoppers were planted in June 2006. No other red stoppers were known to exist at Otter Mound prior to these plantings.

Lignum vitae *(Guaiacum sanctum)*
Photo by Walter Hodge

Lignum vitae *(Guaiacum sanctum)*
This very rare small tree is endemic to South Florida and the Florida keys where it has been reported from 2 counties (Wunderlin and Hansen, 2006). One Lignum vitae was planted at the entrance of the preserve in July 2007. No other Lignum vitaes were known to exist at Otter Mound prior to this planting.

Florida Thatch Palm *(Thrinax radiata)*
This small palm is endemic to South Florida and the Florida keys where it has been reported from 3 counties (Wunderlin and Hansen, 2006). One palm is present near the entrance of the preserve.

Florida Thatch Palm (Thrinax radiata)
Photo by T. Ann Williams

Stiff-leaved Wild Pine *(Tillandsia fasciculata)*
Photo by Shirley Denton

Stiff-leaved Wild Pine *(Tillandsia fasciculata)*
This air plant is abundant throughout South Florida. Several are present within Otter Mound Preserve.

Additional rare plant species may be found at Otter Mound Preserve following further field surveys. Confirmation of rare plant identifications will be made by a qualified botanist.

2.5.2 Listed Wildlife Species

Listed wildlife species observed onsite include the Florida tree snail *(Liguus fasciatus)* and brown pelican *(Pelecanus occidentalis).* Although, no live gopher tortoises (*Gopherus polyphemus*) have been observed on site, three gopher tortoise burrows have been located. One crushed, dead gopher tortoise was observed near the center of the preserve in July 2005 after tall nuisance grass had been eradicated. A map has been prepared by staff showing locations of existing gopher tortoise burrows; however, it is not appended to this plan to protect the burrows from disturbance.

A brief description of observed species and their status is included in the following paragraphs.

Florida Tree Snails *(Liguus fasciatus)*
Photo by Paul Rebmann

Florida Tree Snail *(Liguus fasciatus)*

This large land mollusk - a species of Special Concern in Florida – is generally found on smooth-barked trees in native hammocks. The color patterns of the Florida tree snail are extremely variable. At this time, there are 58 named color forms in south Florida and the Florida Keys (Davidson 1965; Jones 1979; Diesler 1982), with others in Cuba.

The yearly life cycle of the *Liguus* begins in the spring with the first warm rains. Eggs hatch and adult snails wake up from their aestivation (hibernation). The snails grow, mate and lay eggs from spring thru fall, mid to end of May through November. Aestivation usually begins around the first cool weather in October or November. These events can be triggered or stopped by localized weather conditions.

Brown Pelican *(Pelecanus occidentalis)*

This bird – a species of Special Concern in Floirda - is a permanent resident of the coastal marine environment from central North America southward to northern South America. Brown Pelicans are found in shallow warm coastal marine and estuarine waters, particularly on sheltered bays (Shields, 2002). These birds occasionally use Otter Mound Preserve as a resting area.

Brown Pelican *(Pelecanus occidentalis)*
Photo by Michael Costello

Within Otter Mound Preserve, FNAI has no documented occurrence of any listed wildlife species (Appendix 6). However, the FNAI database report indicates that 20 listed species have the potential to occur at the preserve based on their known or predicted range. At least 13 of these 20 species could utilize the tropical hammock community at the preserve (Table 6).

Table 6: Rare wildlife species with the potential to occur at Otter Mound Preserve

Scientific Name	Common Names	Federal	State	FNAI
Haliaeetus leucocephalus	Bald eagle	T, PDL	T	G5, S3
Ardea herodias occidentalis	Great white heron			G5T2, S2
Athene cunicularia floridana	Florida burrowing owl		SSC	G4T3, S3
Dendroica discolor paludicola	Florida prairie warbler			G5T3, S3
Drymarchon couperi	Eastern indigo snake	T	T	G3, S3
Eumops floridanus	Florida bonneted bat		E	G1, S1
Gopherus polyphemus	Gopher tortoise		SSC	G3, S3
Mustela frenata peninsulae	Florida long-tailed weasel			G5T3, S3
Patagioenas leucocephala	White-crowned pigeon		T	G3, S3
Rallus longirostris scottii	Florida clapper rail			G5T3?, S3?
Rostrhamus sociabilis plumbeus	Snail kite	E	E	G4G5T3Q, S2
Sceloporus woodi	Florida scrub lizard			G3, S3
Ursus americanus floridanus	Florida black bear		T	G5T2, S2

E: Endangered, T: Threatened, PDL: Currently Threatened but proposed for de-listing, S1: Critically Imperiled in FL, S2: Imperiled in FL, S3: Very Rare in FL or Restricted in its FL range, G1: Critically Imperiled Globally, G2: Imperiled Globally, G3: Very Rare Globally or Restricted in its range, G4: Apparently Secure Globally, G5: Demonstrably Secure Globally, G#T#: Rank Globally and Rank of Taxonomic Subgroup, ?: Tentative Rank, Q: Questionable Subspecies, G#G#: Range of Rank

2.6 Invasive Non-native and Problem Species

Thirty introduced plant species have been found at Otter Mound, making up 28.3% of the plant species recorded there. Of these, 9 are considered Category I - Invasive and 7 are considered Category II - Potentially Invasive by the Florida Exotic Pest Plant Council (FLEPPC) (see Table 7).

The most problematic invasive plant species at Otter Mound are Brazilian pepper (*Schinus terebinthifolius*), air-potato (*Dioscorea bulbifera*), and bowstring hemp (*Sansevieria hyacinthoides*). Large amounts of Brazilian pepper were removed from the western section of the preserve in June 2005. Air potato and bowstring hemp are present throughout the preserve. Most of the other species in Table 7 are not yet problematic or only slightly problematic on the site.

Under certain conditions, especially following soil disturbance or drainage, some native plant species can become invasive. There are no native plants species at Otter Mound Preserve that are currently a management problem on the site.

Table 7: Invasive Non-native Species known to Occur at Otter Mound Preserve

Scientific Name	Common Name	EPPC Cat. (2005 list)	County Listed?	Degree Of Infestation
Antigonon leptopus	Coral vine	II		Heavy
Bauhinia sp.	Orchid tree	I		Light
Blechum pyramidatum	Browne's blechum	II		Light
Catharanthus roseus	Madagascar periwinkle			Light
Crinum asiaticum	Poisonbulb			Light
Cupaniopsis anacardioides	Carrotwood	I	Yes - remove	Light
Delonix regia	Royal poinciana			Medium
Dioscorea bulbifera	Air-potato	I	Yes - remove	Heavy
Eugenia uniflora	Surinam cherry	I		Medium
Kalanchoe pinnata	Walking plant	II		Medium
Lucaena leucocephala	Leadtree	II		Medium
Melia azedarach	Chinaberry	II	Yes – prohibited to plant	Light
Momordica charantia	Bitter gourd			Heavy
Psidium guajava	Guava	I		Medium
Rhoeo discolor	Oyster plant	I		Medium
Rhynchelytrum repens	Natal grass	I		Medium
Sanseverina hyacinthoides	Bowstring hemp	II		Heavy
Schinus terebinthifolius	Brazilian pepper	I	Yes - remove	Light
Syzygium cumini	Java plum	I	Yes - remove	Light
Tecoma stans	Yellow elder			Medium
Wedelia trilobata	Wedelia	II	Yes –restricted near preserves	Light

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 and mineral extraction is not appropriate for this site.

2.9 Archaeological, Historical and Cultural Resources

Otter Mound Preserve is a small part of the Caxambas Point archaeological site (8CR107), which was once a 70-80 acre complex of shell features constructed by Native Americans. The preserve appears to have been constructed and occupied from approximately 750 A.D.-1200 A.D., and the substrate of the ancient mound appears to be relatively undisturbed.

The preserve was also once part of Caxambas Village. In the early 1900's Caxambas Village was a thriving community which grew with the Marco Island clamming industry. Jim and Tommie Barfield, influential citizens in the history of Marco Island, once owned the property that is present day Otter Mound. They sold it

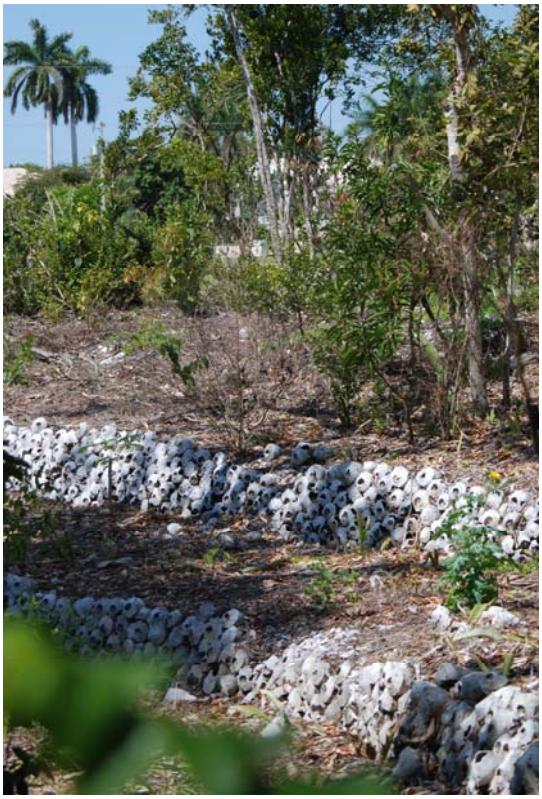
Historic Outhouse
Photo by Doug Suitor

to Charles Griner and his wife in 1919. In 1950, Ernest and Gladys Otter purchased the property from the Griners. The preserve contains historic. By all accounts, the whelk shell terracing throughout the preserve was constructed by Mr. Otter sometime in the 1940s, 50s and 60s. It has been reported that Mr. Otter used ancient Native American whelks (Busycon sp.) that he found buried in and around his property to construct the shell terracing. (Beriault and Carr, 2000).

A house built in 1923 once stood near the center of the preserve. The home, which was occupied by the Otters until 1977, burned down in 1978. The only structure left within the preserve is a historic out-house located approximately 75-feet north of the old home-site.

2.10 Scenic Resources

The primary scenic resources of this preserve are the whelk shell terracing and the mature hardwood trees. Additionally, the natural buffer created by the vegetation in the preserve allows visitors to experience the feeling of being alone in nature in an urbanized area.



Otter Mound Preserve Whelk Shell Terracing
Photos by Melissa Hennig

3.0 Use of the Property

3.1 Previous Use and Development

The preserve was a homesite dating back to the early 1900s. Previous owners had cleared and farmed much of the land, planting mango, guava, avocado, and Surinam cherry trees that are still present on the property. A home built in the 1920s occupied the site until it burned down in 1978. An old outhouse is the only structure left in the preserve. Nearly all the surrounding land immediately outside the preserve boundaries has been developed.

3.2 Current Public Use and Land Uses

The preserve is currently open to the public for use of a walking trail. Three 32" X 40" interpretive signs that present the history of the preserve have been installed along the trail. Small plant identification signs have also been placed within the preserve. These signs are intended to educate preserve visitors and school-age children about the preserve.

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

3.2.2 Planned Public Uses and Assessment of Impacts

Easements, Concessions, and Leases – A 4,051 square foot historical preservation easement exists along the southwestern boundary of the property – encompassing the man-made shell wall and the land surrounding it (Figure 8). An approximately 200-foot long ingress/egress easement exists along the southwestern boundary of the preserve which allows neighboring property owners access to their homes (Figure 9).

Landscaping – Large, dense native species will be planted along the western property line, and perhaps along the eastern property line, to screen the neighboring houses from the preserve. All planting will be coordinated with a qualified archaeologist.

Stormwater Facilities – There are no stormwater facilities on this parcel.

Trail Network – There are trails totaling approximately 1,000 feet in length, 375 feet of which are accessible by wheelchair, for public access to the parcel.

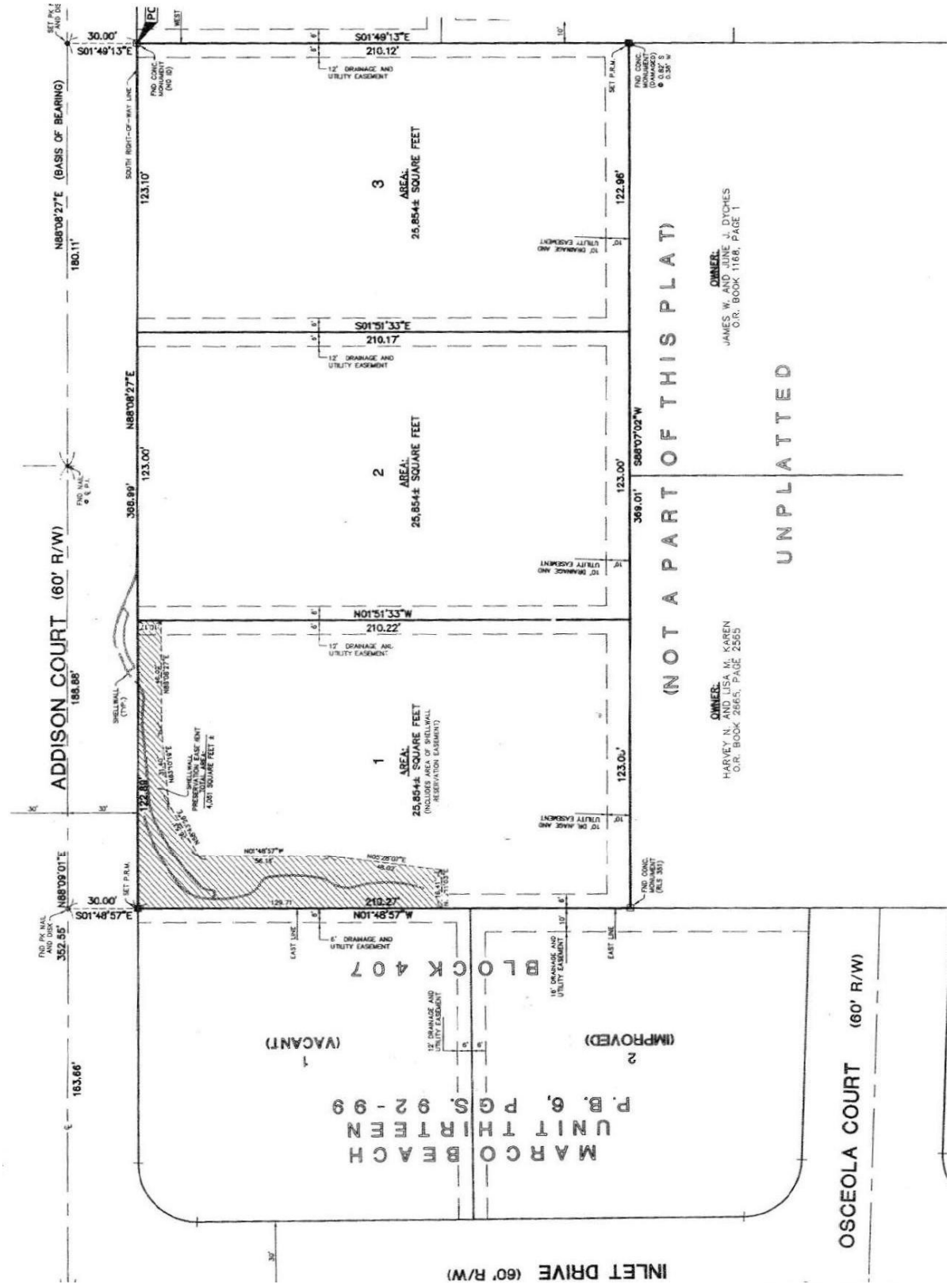


Figure 8: Shell Wall Preservation Easement

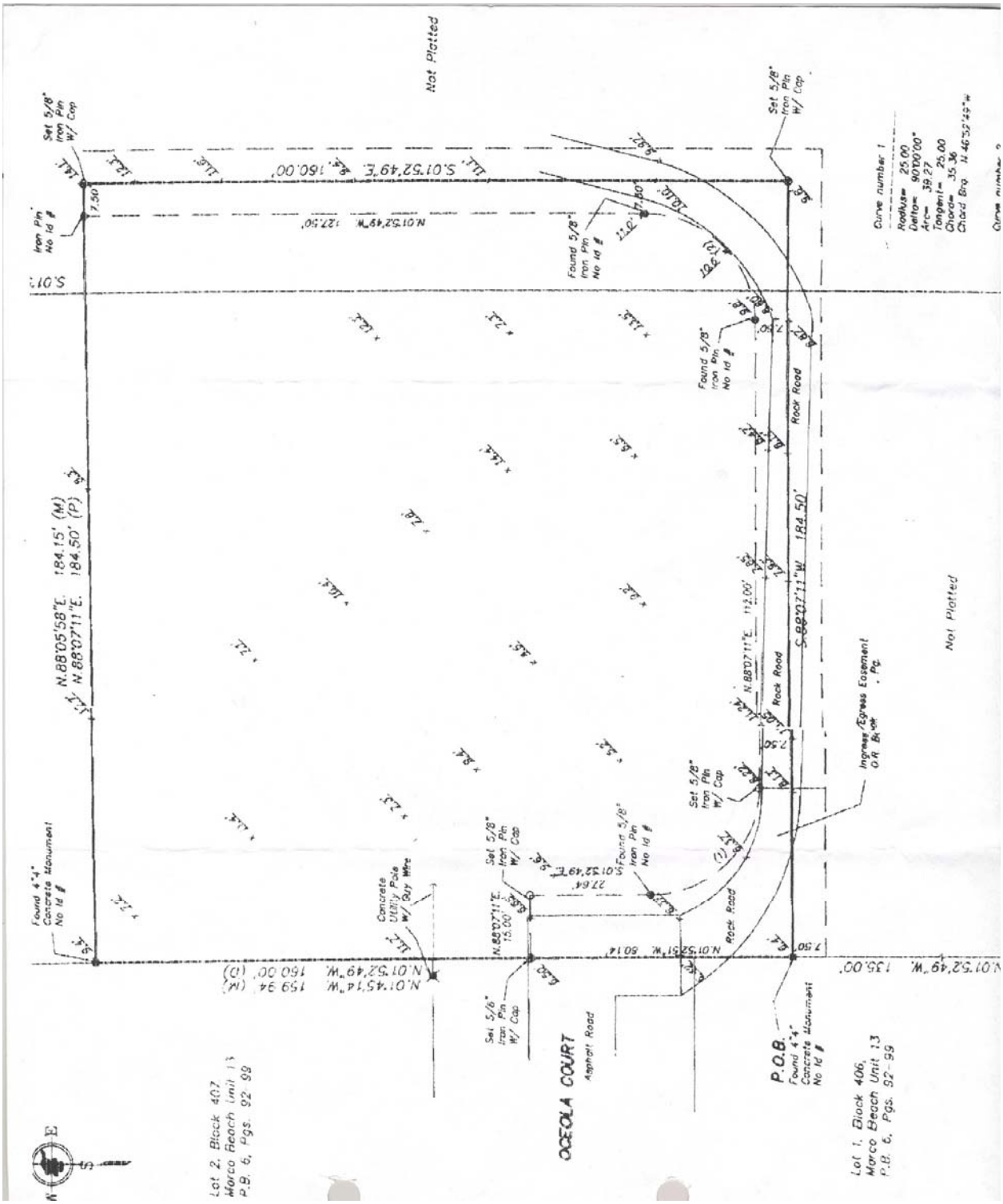


Figure 9: Ingress/Egress Easement

3.3 Adjacent Land Uses – Single-family residential developed lots surround the preserve on all sides. A paved road, Addison Court, runs along the entire north edge of the preserve, and a shell hash road, Osceola Court, runs through the southwestern edge of the preserve.

3.4 Potential Surplus Lands

No potential surplus lands exist at Otter Mound Preserve.

3.5 Prospective Land Acquisitions

Jim and June Dyches nominated their property to Conservation Collier in August 2007 for consideration in Conservation Collier Acquisition Cycle 5. The property is adjacent to Otter Mound Preserve along the southeastern border.

3.6 Analysis of Multiple-Use Potential

Table 8: Analysis of Multiple-Use Potential

Activity	Approved	Conditional	Rejected
Protection of endangered and threatened species	Y		
Ecosystem maintenance	Y		
Soil and water conservation	Y		
Hunting			N
Fishing			N
Wildlife observation	Y		
Hiking	Y		
Bicycling			N
Horseback riding			N
Timber harvest			N
Cattle grazing			N
Camping			N
Apiaries			N
Linear facilities			N
Off road vehicle use			N
Environmental education	Y		
Citriculture or other agriculture			N
Preservation of archeological and historical sites	Y		
(Other uses as determined on an individual basis)		Y	

4.0 Management Issues, Goals and Objectives

4.1 Program Framework and Goals

The Conservation Collier Program considers properties of high natural resource value throughout Collier County for acquisition from willing and voluntary participants. Properties must support at least two of the following qualities to qualify for further consideration: rare habitat, aquifer recharge, flood control, water quality protection, and listed species habitat. The Collier County Board of County Commissioners appointed a Land Acquisition Advisory Committee to consider any selected or nominated properties that an owner has indicated a willingness to sell. The committee recommends property purchases for final approval by the BCC.

This property will be managed only for protection/restoration of natural and historical/archaeological resources and for passive, outdoor public recreation that will be compatible with the protection/restoration of the site and surrounding lands.

4.1.1 Management Activities to Protect/Restore the Resource

"Each property purchased by Conservation Collier shall have its own management plan. The ordinance requires that an 'Interim' Management Plan be developed within 60 days of purchase and that a 'Final' management plan be developed within two years. After that, property management plans must be updated every five 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."

4.1.2 Manager

The Site Manager for Otter Mound Preserve will be a designated Collier County Environmental Specialist.

4.1.3 Preserve Rules and Regulations

No dumping, use of unauthorized vehicles, or removal or destruction of natural or historical/archaeological resources will be permitted within the preserve. The goal is to allow limited non-destructive public access to native plant communities and animal species. Currently, the preserve rules are those identified in Collier county Ordinance 76-48, as amended (Appendix 2). An ordinance specifically for "Preserves" is in the process of being drafted and is expected to be completed and presented to the Board of County Commissioners for approval during 2007.

4.2 Desired Future Conditions

This section includes a description of the proposed future conditions for the site's natural areas. Management techniques to achieve these conditions are outlined in section 4.4.

After managers complete recommended management actions, Otter Mound Preserve will consist of tropical hardwood hammock habitat that has a similar structure and composition to that which existed prior to modern settlement in the late 1800s. With the exception of the trail, the site will

be heavily vegetated with appropriate mature native vegetation that will provide suitable cover for a variety of wildlife species. The main canopy will be comprised of gumbo limbo, soapberry, and mastic. Mid-story will consist of a variety of natives including stoppers, black-bead, marlberry, wild coffee, and firebush. Groundcover will be native and include rouge plant, scorpion tail, and blue porterweed.

Some non-natives will remain in the preserve, depending upon their historical significance and relative invasiveness. Historic non-native, invasive plants will be limited to contained management areas along the trail and removed from all other areas of the preserve.

4.3 Major Accomplishments During Previous Years

Table 9: Major Accomplishments during previous years

Accomplishment	Year(s)
Initial removal of invasive exotic vegetative	2005
Hurricane Wilma debris clean-up	2006
Development of management agreement with City of Marco Island	2006
Native plant planting days (over 300 plants planted)	2006
US Fish and Wildlife Service grant for invasive exotic plant maintenance	2006
Development of 1,000-foot trail with a representative sidewalk portion built to be accessible to wheelchairs	2006-2007
Florida Humanities Council grant for historic interpretive signs and post/rope fence	2006-2007
Formal ceremony to open preserve for passive public use	2007

4.4 Goals and Objectives for 10 year period

A set of goals and objectives for Otter Mound Preserve were developed in conjunction with the drafting of this Management Plan. The goals and objectives in this plan are tailored specifically for Otter Mound Preserve based on the purposes for which the lands were acquired, the condition of the resources present, and the management issues for the property. On-site managers should be familiar with this entire Management Plan. Goals and objectives from the interim management plan for the Otter Mound Preserve were reviewed to determine if they remain meaningful and practical and should be included in this plan. The goals and objectives presented here reflect programmatic goals and ideas of Conservation Collier personnel in charge of managing and protecting the area. These goals shall not be modified, but specific application of management techniques may take into consideration input by user groups and other stakeholders from outside the program, accommodating user needs and desires where practicable and where overarching management goals are not violated.

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 Otter Mound Preserve:

Goal 1: Maintain the property in its natural condition prior to modern development.
Goal 2: Eliminate or reduce human impacts to indigenous plant and animal life.

Goal 3: Maintain the trail to provide a safe and pleasant visitor experience.
Goal 4: Protect Archaeological, Historical and Cultural Resources.
Goal 5: Facilitate uses of the site for educational purposes.
Goal 6: Provide a plan for security and disaster preparedness

GOAL 1: *MAINTAIN THE PROPERTY IN ITS NATURAL CONDITION PRIOR TO MODERN DEVELOPMENT*

Action Item 1.1 Remove populations of exotic plants to restore natural habitats.
Because of the severity of the infestation, the invasive exotic vegetation within Otter Mound Preserve will be treated in phases to avoid non-target damage to sensitive and recruiting native plant species. The densest and most invasive species will be treated first (Phase 1). Once the extent of these "Phase 1" species is evaluated and deemed to be at a manageable level, treatment of "Phase 2" species will begin. Next, "Phase 3" species will be eradicated and, finally, "Phase 4". In addition, some examples of invasive exotic plant species that are deemed to be historic will be left along the trail, visible to visitors (Table 10).

Table 10: Otter Mound Preserve Invasive Exotic Plant Species Control Plan

Scientific Name	Common Name	Phase	Historic	Recommended Control
Antigonon leptopus	coral vine	1	X	Vines should be carefully foliar sprayed with glyphosate or cut and the root end sprayed with glyphosate if they are growing over the top of native vegetation.
Broussonetia papyrifera	paper mulberry	1		Large trees should be cut, stumps treated with triclopyr, and trees removed from site or chipped on site and added to the mulched trail. Small trees and re-growth should be cut, the stumps treated with triclopyr, and the debris should remain on site if it is not extensive. Basal treatment may be used; however, it is not recommended near sensitive natives or native seedlings.
Dioscorea alata	air-potato	1		The vines should be cut and the root end sprayed with triclopyr if they are growing over the top of native vegetation. If caught early in the spring, the emerging vines can be sprayed with triclopyr foliar mix or glyphosate. Potatoes should be collected in winter if possible.
Momordica charantia	bitter gourd	1		Same as *Antigonon leptopus* .
Sansevieria hyacinthoides	bowstring hemp	1	X	The cuticle should be cut with a machete before herbicide is applied. Glyphosate and triclopyr have been used and have been moderately successful for control. If control becomes increasingly problematic, manual removal may be employed if coordinated with an archaeologist.

Scientific Name	Common Name	Phase	Historic	Recommended Control
Schinus terebinthifolius	Brazilian pepper	1		Same as *Broussonetia papyrifera*.
Cupaniopsis anacardioides	carrotwood	2		Same as *Broussonetia papyrifera*.
Melia azedarach	chinaberry	2		Same as *Broussonetia papyrifera*.
Sphagneticola trilobata	wedelia	2		The leaves should be sprayed with foliar glyphosate.
Syzygium cumini	java plum	2		Same as *Broussonetia papyrifera*.
Kalanchoe pinnata	walking plant	3		Same as *Sphagneticola trilobata*. Care should be taken not to disturb the walking plant. Any section that breaks from this plant and falls to the ground will produce roots.
Rhynchelytrum repens	natal grass	3		Same as *Sphagneticola trilobata*.
Bauhinia variegata	orchid tree	4		Same as *Broussonetia papyrifera*.
Eugenia uniflora	Surinam cherry	4	X	Same as *Broussonetia papyrifera*.
Leucaena leucocephala	leadtree	4		Same as *Broussonetia papyrifera*.
Tradescantia spathacea	oyster plant	4	X	Same as *Sansevieria hyacinthoides.*

If it appears that any other non-native species within the preserve, specifically royal poinciana or yellow elder, are showing invasive tendencies, that species will be controlled.

Because of the sensitivity of the native trees within the preserve, Imazapyr (i.e. Arsenal herbicide) or any other herbicide that demonstrates high soil persistence and is readily absorbed from the soil by plant roots will not be used at Otter Mound Preserve.

Action Item 1.2 Manage the property for the benefit of native and listed wildlife species.

Management actions to protect native bird species:

- Avoid off target damage to native plants and animals, especially rare species, during invasive exotic plant treatments.
- Require that any domestic animals brought onto the preserve lands are leashed.

A population of Florida tree snails exists at the preserve. Historically, the major causes of Liguus colony mortality have been habitat destruction and commercial exploitation of their shells. Pesticide spraying for mosquito control may also affect their survival (Emmel 1995).

Management actions to protect Florida tree snails:

- Protect and restore existing hammock vegetation.
- Protect against collection – a sign will be posted along the trail proclaiming all plants and animals in the preserve are protected.

- Reduce pesticide effects through increased tree canopy. Reducing mosquito pesticide applications within the preserve is not a tangible goal because the preserve is located in a highly residential area. However, an increased canopy and mid-story cover should reduce some effects of the pesticide by physically blocking the amount of pesticide entering the preserve.

Three gopher tortoise burrows have been located in the preserve and one deceased tortoise was observed on the property in July 2005. It is unknown whether this individual tortoise was re-located to the site by a human or naturally recruited to the site on its own.

Because of growing developmental pressures and the limited availability of natural areas, Conservation Collier and City of Marco Island staff contacted Florida Fish and Wildlife Conservation Commission (FFWCC) staff to evaluate whether Otter Mound Preserve would serve as an adequate gopher tortoise relocation site. FFWCC staff would be extremely reluctant to deem a heavily vegetated tropical hardwood hammock as an acceptable gopher tortoise relocation site (Attachment 12).

Action Item 1.3 Restore native vegetation as appropriate and necessary.

- Monitor native plant recruitment and re-growth in areas of invasive exotic removal and/or hurricane damage. *Plant appropriate native vegetation to restore tree canopy coverage to 85% - 95% and under story density to 50% - 75%.

  *All plantings should be done during rainy season in accordance with the Action Items set forth to attain *Goal 4: Protect Archaeological, Historical and Cultural Resources.* Supplemental irrigation may also be necessary with plantings. Irrigation supplement gel quart cartons were purchased through Rain Bird Corporation for the 2006 plantings:

  Phone: 1-877-727-8772
  Website: www.RainBird.com

Action Item 1.4 Monitor need for and success of management.

- Conduct periodic wildlife surveys - While some wildlife data has been collected, additional baseline data should be collected, especially on invertebrates, small mammals, reptiles, and amphibians. The Preserve Manager may contract this work out or enlist the assistance of local educators to coordinate student research projects. Wildlife sampling should take place at regular intervals (2-4 years) to detect long-term trends.

- A complete plant inventory was completed for the preserve in 2007. A new plant inventory by a qualified botanist should be performed every 2-3 years to detect long-term trends.

- Install permanent photo points - Photo points have been established at random locations on the property. Photo point locations are marked with small white plastic signs and rebar and their positions have been recorded with a GPS. All photo points will be taken annually at a standard height and angle of view.

GOAL 2: *ELIMINATE OR REDUCE HUMAN IMPACTS TO INDIGENOUS PLANT AND ANIMAL LIFE AND ON HISTORICAL/ARCHAEOLOGICAL RESOURCES.*

Action Item 2.1 Maintain bollards at north trail entrance to prevent unauthorized vehicle access.

Action Item 2.2 Identify locations of rare native plant species.

Action Item 2.3 Enforce regulations prohibiting trash and landscape debris dumping in or near the preserve.

Action Item 2.4 Encourage visitors to stay on trail with signs and fencing.

Action Item 2.5 Identify actual and potential locations of resident animal life and take steps such as locating visitor amenities away from animal nesting sites.

Action Item 2.6 Avoid non-target damage to native plants and animals, especially rare species, during invasive exotic plant treatments.

Action Item 2.7 Note and research all site development occurring adjacent to Otter Mound Preserve to determine that the proper site development permits have been obtained.

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 erosion control measures 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.

GOAL 3: *MAINTAIN THE TRAIL TO PROVIDE A SAFE AND PLEASANT VISITOR EXPERIENCE.*

Action Item 3.1 Keep trail area open and free of weedy species, debris, and litter.

Action Item 3.2 Inspect trail monthly for tripping hazards and fix immediately.

Action Item 3.3 Inspect trail monthly for overhead hazards such as broken or hanging tree limbs and fix immediately.

Action Item 3.4 Monitor hornets near trail.

A population of ground-nesting hornets was observed near the trail. If this population begins to pose a problem to visitors, it should be removed.

Action Item 3.5 Keep signs, benches, and post/rope fence in good repair.

Action Item 3.6 Empty garbage cans regularly.

At least once a week – more if necessary. This is the responsibility of the City of Marco Island.

Action Item 3.7 Mow Addison Court right of way regularly.
Once a week in rainy season; as needed during dry season. This is the responsibility of the City of Marco Island.

Action Item 3.7 Keep adjacent trail vegetation lush.
The view from the trail should be focused on blocking out the urban environment.

Action Item 3.8 Remove vines and weedy vegetation from shell terracing that is in view of the public.
Follow guidelines of Action Item 4.7 below.

GOAL 4: *PROTECT ARCHAEOLOGICAL, HISTORICAL AND CULTURAL RESOURCES.*

AHC included management recommendations in their phase 1 archaeological survey and assessment of the preserve in April 2000. Their recommendations for management of the site stipulated that "efforts should be made to minimize impacts to [the parcel's shell mound] features and the historic shell walls created by Ernest Otter that are found on the north and west sides of the parcel." Also, "the Otter shell walls that terrace the northern and western periphery of the parcel are historically significant and should be avoided during development." The County will follow these recommendations, as detailed in the Action Items below, and shall cooperate fully with any other direction from the Florida Division of Historical Resources on the protection and management of archaeological and historical resources, per provisions of the Land Development Code Section 2.2.25.

The management of the resources present on Otter Mound Preserve 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 the archaeological and historic sites within the preserve shall be prohibited unless prior authorization has been obtained from the Collier County Board of County Commissioners and the Department of State, Division of Historical Resources.

Action Item 4.1 Limit visitor use of the preserve to designated trail areas.
Signage that states, "FRAGILE Please do not walk on shell walls and terracing" and post and rope fencing have been placed along the trail in the most sensitive areas of the preserve to encourage visitors to stay on the trail.

Action Item 4.2 Maintain the mulched trail at a minimum depth of 3".
A layer of new mulch should be spread on the entire trail at least once a year and spread on thin areas as necessary throughout the year.

Action Item 4.3 Prohibit bicycle use within the preserve.
Bicycle riding is listed on the prohibited activities sign, and a bicycle rack is located at the entrance of the preserve to encourage visitors to park their bikes.

Action Item 4.4 Prohibit managers and contractors from walking within 6 feet of the edge of the shell terrace walls unless absolutely necessary.

These areas are extremely fragile and subject to erosion.

Action Item 4.5 Prohibit planting near the edge of the shell terracing walls.

Plant groundcovers and shrubs a minimum of 6' from the edge of the walls. Plant trees a minimum of 10' from the walls. All planting must be coordinated with a qualified archaeologist.

Action Item 4.6 Prohibit mechanical removal of vegetation.

Invasive exotic vegetation will be cut and stump sprayed with herbicide or foliar sprayed with herbicide. No plants or trees will be pulled out by the roots unless coordinated with a qualified archaeologist.

If native or invasive exotic debris is to be removed from site, large limbs will not be dragged across the floor of the preserve. Large limbs will be cut into manageable sections and carried so as not to disturb the surface substrate.

Action Item 4.7 Allow only minimal, careful weed/vine control along the shell walls.

Foliar spray vines and weeds. Once dead, carefully cut and/or brush dried vegetation away from walls. Live or dead plants will not be pulled out of shells.

Action Item 4.8 Maintain/restore historic outhouse structure.

Staff, in conjunction with a qualified historical architect, will assess and determine how best to restore and maintain the outhouse. Recommendations from the historical architect will be used to guide a qualified contractor (County staff or contractor) to make repairs and maintain the outhouse to the reasonable extent that management funds allow. A sign stating, "HISTORIC STRUCTURE do not disturb" is displayed in front of the outhouse, which is located near the trail behind the post and rope fence.

Reasonable recommendations made by partners for protection/maintenance of the outhouse will also be considered and coordinated with the historical architect.

Action Item 4.9 Maintain/restore historic shell wall terracing.

Vegetation is fundamental in erosion control (Glowacki et al., 2000). Native groundcover, such as scorpiontail rouge plant and blue porterweed, will be encouraged to grow along the tops and edges of the shell wall terracing. To guard against erosion If native groundcover is lacking in an area, seeds will be dispersed. Planting should be avoided unless absolutely necessary.

If the shell wall terracing is in need of restoration or maintenance a qualified archaeologist will survey the wall and provide recommendations. Staff will follow these recommendations to the reasonable extent that management funds allow.

Action Item 4.10 Discourage vandalism.

Maintain the preserve and encourage frequent site visits from partners (Marco Island Historical Society, Southwest Florida Archaeological Society, City of Marco, AHC, Inc., neighbors). Sites

that appear cared for, well maintained, clearly interpreted, and frequently visited, are seldom vandalized (Glowacki et al., 2000).

GOAL 5: *FACILITATE USES OF THE SITE FOR EDUCATIONAL PURPOSES.*

Action Items 5.1 Maintain interpretive signage and plant signage to educate preserve visitors.

One copy of each of the three large interpretive historic signs and nine replacement plexiglass sign covers were purchased with the original large interpretive historic signs in anticipation of damage and wear.

The small, white UV resistant signs throughout the preserve may also need to be replaced periodically due to discoloration and wear.

Original plant ID signs were purchased through:

Plant Signs
960 El Caminito, Fallbrook, CA 92028
Phone: (760) 723-1354
Fax: (760) 723-3220
www.PlantSigns.com

Original FRAGILE and HISTORIC STRUCTURE signs were purchased through:

Lykins Signtek, Inc.
5639 Taylor Rd.
Naples, FL 34109
Phone: (239) 594-8494

Action Item 5.2 Provide Preserve brochures in rainproof box on site.

A brochure outlining the native ecosystem and wildlife present at the preserve will be created and kept in a rainproof box near the preserve entrance. The box will be inspected monthly and refilled as necessary.

Action Item 5.3 Encourage historical presentations and gatherings.

Coordinate events with the Marco Island Historical Society and/or The Southwest Florida Archaeological Society. Volunteers from these organizations may provide trail tours for interested parties or for classes of school children upon teacher request.

Goal 6: Provide a plan for security and disaster preparedness

Action Item 6.1 Maintain an official presence at the preserve.

City of Marco Island Parks and Recreation staff will visit the preserve a minimum of once a week. City of Marco Island Police will perform routine patrols in the area.

Action Item 6.2 Discourage visitation to the park at night.

An LCEC streetlight was installed at the NE corner of Addison and Leo Courts. A sign designating park hours as dawn to dusk will be installed at the entrance of the preserve.

Action Item 6.3 Enforce regulations prohibiting trash and landscape debris dumping in or near the preserve.

Action Item 6.4 Survey trees along the trail and the perimeter of the property for damage annually

Staff will employee the services of a certified arborist to determine diseased or weak trees that should be removed prior to hurricane season.

Action Item 6.5 Visit preserve within 48 hours after a storm event to assess damages.

Staff will take photos of damage and fill out appropriate Collier County Risk Management Department forms. Staff will contact a qualified archaeologist if shell wall terracing or outhouse is damaged.

Action Item 6.6 Promptly clear storm debris from preserve.

A Collier County emergency debris removal contractor will be contracted as soon as possible after the storm to schedule clean-up. First priority will be the perimeter of the preserve, where trees may have fallen onto neighboring property. These trees will be removed as soon as possible, with highest priority of action for those that may have fallen onto a structure. Trails will be cleared next. Other downed trees and limbs that do not appear to be a public safety hazard will be cleared at the discretion of the Preserve Manager. As much hurricane debris as possible will be chipped and retained on-site – to be used as mulch for the trail. Debris removal will be carried out in accordance with Goal 4: Protect Archaeological, Historical and Cultural Resources.

Due to the archaeological sensitivity of the site, root systems of uprooted trees will not be removed, but will be pushed back into their original positions. If root systems are too large to move, they will be left in the position in which they fell.

4.5 Prescribed Fire Program

No Prescribed Fire Program is planned for Otter Mound Preserve.

4.6 Public Use Facilities

Public Access / Parking / Handicap Facilities/ Restrooms

There is one public entrance to the preserve, at the north end of the property along Addison Court. A parking area consisting of three parking spaces - one of which is Americans with Disabilities Act (ADA) compliant - exists at the entrance. Both a 375-foot ADA compliant sidewalk trail within the Addison Court right of way and a 625-foot mulched trail through the preserve connect to the parking area. Because of the sensitivity and slope of the shell mound, an ADA compliant path was not feasible through the preserve.

No restrooms exist at the preserve.

4.7 Operational Plan for Otter Mound Preserve

4.7.1 Maintenance

Monthly site visits will be made by County staff to inspect/control littering within and around the preserve, monitor exotic plant re-growth, maintain the trail in a safe and aesthetically pleasing way, refill brochure boxes, inspect signs and equipment (bench and trash cans) and review general site security.

The Preserve Manager will keep an electronic management log to record observations from the site visit, any contacts made or issues raised. Projects such as exotic removal, debris removal, and plantings will be carried out in accordance with Action Items listed in Section 4.4 Goals and Objectives for 10 year period

4.7.2 Estimated Annual Costs and Funding Sources

Preliminary budget estimates for the Otter Mound 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. Alternative funding sources, such as mitigation and grant funds, will be sought to supplement existing funding. Table 11 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.

Table 11: Management Activities Timeline and Cost

Activity	**'08**	**'09**	**'10**	**'11**	**'12**	**'13**	**'14**	**'15**	**'16**	**'17**	**'18**
Resource Management											
Exotic species control	$15,000	$10,000	$8,000	$5,000	$5,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000
Cultural resource management	$ 1,200	$ 1,200	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Debris removal	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Planting Projects	$ 500	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100	$ 100
Subtotal	***$17,200***	***$11,800***	***$8,100***	***$6,100***	***$6,100***	***$4,100***	***$4,100***	***$4,100***	***$4,100***	***$4,100***	***$4,100***
Visitors services/Recreation											
Parking and sidewalk	0	0	$1,000	0	0	$1,000	0	0	$1,000	0	$1,000
Equipment (bench, trash cans)	0	0	0	$3,000	0	0	0	0	$3,000	0	0
Trail maintenance	$ 700	$ 700	$ 700	$ 700	$ 700	$ 700	$ 700	$ 700	$ 700	$ 700	$ 700
Signs	$ 500	0	$ 500	0	0	$ 500	0	0	$ 500	0	0
Brochures	0	$ 500	$ 500	0	$ 500	0	$ 500	0	$ 500	0	$ 500
Addison Court streetlight	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150	$ 150
Subtotal	***$ 1,350***	***$ 1,350***	***$2,850***	***$3,850***	***$1,350***	***$2,350***	***$1,350***	***$ 850***	***$5,850***	***$ 850***	***$2,350***
Total	**$18,550**	**$13,150**	**$10,950**	**$9,950**	**$7,450**	**$6,450**	**$5,450**	**$4,950**	**$9,950**	**$4,950**	**$6,450**

4.7.3. Potential for Contracting Restoration and Management Activities by Private Vendors

Table 12: Potential Contracting for Activities			
Activity	**Approved**	**Conditional**	**Rejected**
Trail maintenance	X		
Storm debris removal	X		
Post and rope fence installation and maintenance			X
Wildlife inventory and monitoring		X	
Native plant restoration		X	
Archaeological / historical monitoring	X		
Reduce exotic species	X		
Education facilities, programs, and literature development and printing		X	
Education signs development and installation	X		
Law enforcement and patrol	X		

4.7.4 Management Zones

Due to the small size of the preserve (2.46 acres), the entire preserve is considered one management zone.

4.8 Partnerships and Regional Coordination

4.8.1 Interdepartmental Partnerships and Agreements

Collier County has an Interlocal Agreement with the City of Marco Island for certain aspects of management within the preserve (Appendix 3).

Collier County has entered into a management agreement with the US Fish and Wildlife Service Partnership for Fish and Wildlife Program. Under the agreement, Otter Mound Preserve must remain as habitat for wildlife for a minimum of 10 years.

4.8.2 Cooperating Agencies and Organizations

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 Florida Fish and Wildlife Conservation Commission (FFWCC) may aid Conservation Collier with wildlife management programs, including the development and management of Watchable Wildlife programs. In addition to the involvement of the Marco Island Historical Society, Southwest Florida Archaeological Society, Naples Chapter of the Florida Native Plant Society, Florida Humanities Council, Calusa Garden Club, Boy Scouts, and City of Marco Island, other potential partnerships may include, but may 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, Florida Department of Environmental Protection, South Florida Water Management District, Big Cypress Basin, and other County Departments, as some goals and purposes will be similar.

5.0 Literature Cited

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