Otter Mound Preserve

DRAFT

Land Management Plan

Managed by

Conservation Collier Program
Collier County
[September 2006 – September 2016 (10 yr plan)]

Prepared by: Collier County Conservation Collier Staff

Prepared for: Conservation Collier Program

March 2007

Otter Mound Preserve

Land Management Plan Executive Summary

Lead Agency: Conservation Collier Program, Collier County Facilities Management Department

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

Acreage Breakdown: 1.78 acres

Management Responsibilities: Collier County Environmental Services Department has oversight responsibility with day to day responsibilities shared by the City of Marco Island under Interlocal Agreement attached as (Appendix -).

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 Needs:

- Exotic plant management
- Supplemental native planting
- Listed wildlife and vegetation species monitoring
- Trash removal
- Trail, signage, historic outhouse, and shell terracing maintenance
- Site security
- Storm damage/debris action plan

Acquisition Needs: Karen property to the southwest

Surplus Lands: None

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

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List of Maps

Master Site Plan including (much or all may be covered in the map(s) of current and proposed uses):

Master site plan drawn to scale provided.
Boundary of the Project Site clearly identified.
Identify existing physical improvements and their approximate location on a master site plan.
Identify proposed recreational improvements and their approximate location on a master site plan.
Locate the upland areas to be restored on a site map.
Locate the wetland areas to be restored on a site map.

Site plan of publicly owned lands adjacent to the Project Site provided. Show approximate location of existing and proposed facilities (if applicable).

Gopher Tortoise burrow map

Plant Communities map

LIDAR Topography - Elevation Map

List of Tables

List of Appendices

If the project has FCT funding, appendices must also include:

- Florida Natural Inventory report forms for listed species - listed animal species and listed plant species
- Exotic Pest Council's List of Florida's Most Invasive Species
- A copy of the Grant Award Agreement or the Grant Contract
- Interagency Agreement (if applicable)
- Photos of Historical Resources (if applicable)

1.0 Introduction

The Otter Mound Preserve is a 1.78-acre urban preserve located in southwestern Collier County in a residential area of Marco Island. Largely comprised of native, tropical hardwood hammock species, the preserve also contains examples of non-native historical vegetation. The entire preserve site is a Calusa shell mound that contains artifacts of both archaeological and historical significance. Access to the preserve is from Addison Court with parking available within the Addison Court right of way.

The preserve is open to the public and will be managed for the conservation, protection, and enhancement of natural and historical resources. Educational tours for local schools and groups will most likely be conducted at the preserve. A nature trail, bench, and educational interpretive signs are provided for visitors.

The property was purchased with funds from the Conservation Collier Program in July 2004, and Collier County holds fee simple title. 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 2).

Conservation, restoration, and passive public use are the designated uses of the property. Management activities allowed are those necessary to preserve, enhance, restore, conserve, and maintain 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.

1.1 Purpose and Scope of Plan

The purpose of this management plan is to provide management direction for the Otter Mound Preserve that balances resource protection with passive public use. This text is a working document that establishes the foundation for a 10-year plan by identifying appropriate management techniques for the preserve. The plan is divided into the following sections: introduction; descriptions of the natural and cultural resources; projected uses of the property; and management issues, goals, and objectives.

This management plan is submitted to the Collier County Board of County Commissioners (BCC) for its approval. When approved, this plan will replace the Interim Management Plan prepared by the Collier County Environmental Services Department in September 2004 and approved by the BCC on September 21, 2004, and subsequently extended by the BCC until June 2007.

1.2 Location

The Otter Mound Preserve is located at 1831 Addison Court within the City of Marco Island, Collier County, Florida. It is bounded on the north by Addison Court, on the south by developed and undeveloped residential lots, and on the east and west by developed residential lots. The site location is shown in (******). The legal description is attached as Appendix 3.

1.3 Regional Significance

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 hammocks, xeric oak scrub, coastal strand, native beach, riverine oak, high marsh (saline), and tidal freshwater marsh. The 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 three federally endangered plant species: giant wild pine *(Tillandsia utriculata)*, Florida thatch palm *(Thrinax radiata)*, 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 globally.

1.4 Land Acquisition

The property 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.

An initial site assessment of the preserve was conducted on September 22, 2003. This and other management activities are identified in Table 1 below.

Table 1: Acquisition History and Status for

Year	Benchmark
2003	Initial Assessment
2004	Purchase of Gionet Otter Mound property
2004	Develop Interim Management Plan
2005	Rename Gionet Otter Mound property Otter Mound Preserve
2005	Initial exotic plant and debris removal
2006	Start exotics maintenance (contracted)
2006	Develop Interlocal Agreement with City of Marco Island
2006	Create trails from Hurricane Wilma debris and install post and rope fence
2006	Plant over 200 native plants
2007	Install bench, garbage cans, plant identification signs, three interpretive signs, entrance sign, sidewalk, and three parking spaces (all contracted except plant ID signs)
2007	Open preserve to the public in March
2007	Completion of final management plan

1.5 Nearby Public Lands and Designated Water Resources

The closest preserve to Otter Mound Preserve is the Rookery Bay National Estuarine Research Reserve (NERR), a 28-acre preserve located at the mouth of the Cocohatchee Creek as it joins the Wiggins Pass Estuary, two miles to the Northwest. 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		N and E	State
		N and E	Collier County
		NW	Lee County
		S and E	Collier County/Conservation Collier
		S and E	National

1.6 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 the Otter Mound Preserve, as identified in the Interlocal Agreement (Appendix 2).

1.7 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). 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.

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 revealed 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. The portions of at least four linear depressions ("canals") and four ridges are present in the extreme western portion of the preserve. The middle portion 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 middens found in the region. Three deep, historic borrow pits also exist within the eastern section of the preserve (See Contour Map ????).

2.1.2 Geology

The geology of the area is characterized by these 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, in combination with their coastal location, often permits tropical or subtropical species of plants on shell mounds to grow much further north than their normal range on other substrates permits. Figure ???? shows the substrate profile of one 3-meter trench dug by AHC at Otter Mound Preserve.

2.1.4 Hydrology/Water Management

2.2 Climate

The 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 2: Summary of Natural Communities

FNAI Natural Community Type	# Acres	% of Area	Global Rank	State Rank	Comments
Shell Mound	1.78	100%	G2	S2	2 gopher tortoise burrows located, 0 gopher tortoise seen Florida tree snail population present

2.4 Native Plant and Animal Species

The 1.78-acre Otter Mound Preserve comprises a small area of shell mound uplands dominated by gumbo limbos, soapberries, mastics and various stoppers that provide food and cover for resident and migratory species of animals that typically use such habitat.

One hundred and six (106) plant species have been recorded at Otter Mound (Appendix 2). Data was collected by Jim Burch in January and February 2007. Of these 106 species, 76 (71.7%) are native to the site and 30 are exotic (28.3%).

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 Collier County personnel during site visits, 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,
- 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*), nine-banded armadillo (*Dasypus novemcinctus*), raccoon (*Procyon lotor*), and eastern gray squirrel (*Sciurus carolinensis*).

Bird observations by staff from the Collier County Environmental Services Department are included as Appendix ???? As many as ??? species are probable breeders at the Otter Mound Preserve site.

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 the site (in the Marco Island USGS quadrangle) that may be present at Otter Mound Preserve (Table 4).

Table 4: Breeding bird species recorded in the Marco Island Quadrangle in the vicinity of Otter Mound Preserve.

Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Pied-billed Grebe	*Podilymbus podiceps*	Mangrove Cuckoo	*Coccyzus minor*
Brown Pelican	*Pelecanus occidentalis*	Great Horned Owl	*Bubo virginianus*
Double-crested Cormorant	*Phalacrocorax auritus*	Burrowing Owl	*Athene cunicularia*
Anhinga	*Anhinga anhinga*	Common Nighthawk	*Chordeiles minor*
Great Egret	*Ardea alba*	Chimney Swift	*Chaetura pelagica*
Snowy Egret	*Egretta thula*	Red-bellied Woodpecker	*Melanerpes carolinus*
Little Blue Heron	*Egretta caerulea*	Downy Woodpecker	*Picoides pubescens*
Tricolored Heron	*Egretta tricolor*	Northern Flicker	*Colaptes auratus*
Reddish Egret	*Egretta rufescens*	Pileated Woodpecker	*Dryocopus pileatus*
Cattle Egret	*Bubulcus ibis*	Great Crested Flycatcher	*Myiarchus crinitus*
Green Heron	*Butorides striatus*	Eastern Kingbird	*Tyrannus tyrannus*
Black-crowned Night-Heron	*Nycticorax nycticorax*	Gray Kingbird	*Tyrannus dominicensis*
Glossy Ibis	*Plegadis falcinellus*	White-eyed Vireo	*Vireo griseus*
Black Vulture	*Coragyps atratus*	Black-whiskered Vireo	*Vireo altiloquus*
Osprey	*Pandion haliaetus*	Blue Jay	*Cyanocitta cristata*
Swallow-tailed Kite	*Elanoides forficatus*	American Crow	*Corvus brachyrhynchos*
Bald Eagle	*Haliaeetus leucocephalus*	Fish Crow	*Corvus ossifragus*
Red-shouldered Hawk	*Buteo lineatus*	Purple Martin	*Progne subis*
Short-tailed Hawk	*Buteo brachyurus*	Carolina Wren	*Thryothorus ludovicianus*
American Kestrel	*Falco sparverius*	Northern Mockingbird	*Mimus polyglottos*
Northern Bobwhite	*Colinus virginianus*	Brown Thrasher	*Toxostoma rufum*
Common Moorhen	*Gallinula chloropus*	European Starling	*Sturnus vulgaris*
Snowy Plover	*Charadrius alexandrinus*	Yellow Warbler	*Dendroica petechia*

Wilson's Plover	*Charadrius wilsonia*	Prairie Warbler	*Dendroica discolor*
Killdeer	*Charadrius vociferus*	Eastern Towhee	*Pipilo erythrophthalmus*
Willet	*Catoptrophorus semipalmatus*	Northern Cardinal	*Cardinalis cardinalis*
Least Tern	*Sternula antillarum*	Red-winged Blackbird	*Agelaius phoeniceus*
Black Skimmer	*Rynchops niger*	Common Grackle	*Quiscalus quiscula*
Mourning Dove	*Zenaida macroura*	Boat-tailed Grackle	*Quiscalus major*
Common Ground Dove	*Columbina passerina*	Brown-headed Cowbird	*Molothrus ater*
Yellow-billed Cuckoo	*Coccyzus americanus*	House Sparrow	*Passer domesticus*

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

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*). Although two gopher tortoise (*Gopherus polyphemus*) burrows have been located on the preserve, no live tortoises have been observed. One dead gopher tortoise was observed in July 2005. Neighbors have also reported observing coral snakes (*Micrurus fulvius*) near the property.

Invertebrates observed at the preserve include cloudless sulphur butterfly (*Phoebis sennae*), eastern swallowtail butterfly (), whip scorpion (), ground nesting hornet (), wasp (), and Florida tree snail.

Other wildlife species that have not been recorded undoubtedly occur at Otter Mound 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, 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

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 (FFWCC) and the Florida Department of Agriculture and Consumer Services. The Florida Natural Areas Inventory (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 ?? plant species at Otter Mound that are listed by the Florida Department of Agriculture and Consumer Services (FDACS), () as Endangered, () as Threatened, and () as Commercially Exploited. FNAI lists () species as Imperiled to Rare in Florida. The Institute for Regional Conservation (IRC) lists () species as Critically Imperiled in South Florida (Gann et al. 2002). There are () species listed as Endangered or Threatened by the U.S. Fish and Wildlife Service. In total there are () plants at Otter Mound that are listed by at least one of these groups (Table 5).

Table 5: Rare Plant Species at Otter Mound Preserve.				
Scientific Name	**Common Names**	**IRC**	**State**	**FNAI**

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

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 Wildlife Species

Within Otter Mound Preserve, FNAI has documented the occurrence of ????? listed wildlife species (Appendix 4, FNAI Managed Area Tracking Record and Element Occurrence Summary). In addition, the FNAI database report indicated ???? other listed species that have the potential to occur at the preserve based on their known or predicted range. They are the ????. The tropical hammock community at the site provides habitat for all these species. A brief description of these species and their status is [illegible]uded in the following paragraphs.

Table 5: Rare Wildlife Species at Otter Mound 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 (EPPC). Although Florida does not have an official invasive non-indigenous animal species list, at lea[illegible]0 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

Thirty introduced plant species have been found at Otter Mound, making up 28.3% of the plant species recorded there. Of these, ???? are considered Category I: Invasive and ???? are considered Category II: Potentially Invasive by the Florida Exotic Pe[illegible]lant Council (FLEPPC) (see Table 6).

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 is present throughout the preserve. Most of the other species in Table 6 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. Management actions may cause some species to become problematic (see section 4.5.7).

Table 3: Invasive Non-native Species Known to Occur at Otter Mound Preserve

Scientific Name	Common Name	EPPC Cat. (2005 list)	County Listed?	Degree Of Infestation
Acalypha wilkesiana	Copperleaf			
Aloe vera	Aloe			
Amaranthus blitum	Amaranth			
Antigonon leptopus	Coral vine	II		
Bauhinia sp.	Orchid tree	I		
Blechum pyramidatum	Browne's blechum	II		
Capsicum frutescens	Tabasco pepper			
Carica papaya	Papaya			
Catharanthus roseus	Madagascar periwinkle			
Citrus aurantifolia	Key lime			
Cocos nucifera	Coconut			
Crinum asiaticum	Poisonbulb			
Cupaniopsis anacardioides	Carrotwood	I		
Delonix regia	Royal poinciana			
Dioscorea bulbifera	Air-potato	I		
Eugenia uniflora	Surinam cherry	I		
Kalanchoe pinnata	Walking plant	II		
Lucaena leucocephala	Leadtree	II		
Mangifera indica	Mango			
Melia azedarach	Chinaberry	II		
Momordica charantia	Bitter gourd			
Persea americana	Avocado			
Psidium guajava	Guava	I		
Rhoeo discolor	Oyster plant	I		
Rhynchelytrum repens	Natal grass	I		
Sanseverina hyacinthoides	Bowstring hemp	II		
Schinus terebinthifolius	Brazilian pepper	I		
Syzygium cumini	Java plum	I		
Tecoma stans	Yellow elder			
Wedelia trilobata	Wedelia	II		

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 this site, and the extraction of minerals is not appropriate for this site.

2.9 Archaeological, Historical and Cultural Resources

Otter Mound Preserve is a small part of the Caxambas Point 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 mound appears to be relatively undisturbed. The preserve also contains a historic outhouse and whelk shell terracing. By all accounts, the shell terracing was constructed by former owner Mr. Ernest 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.

3.0 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 provides a place for visitors to experience the feeling of being alone in nature in an urbanized area. Public access to the preserve is facilitated by a mulched trail approximately 640 feet long, that gives a clear view of the shell terracing. In addition, a 5 feet wide, 375 feet long sidewalk that is accessible by wheelchair and compliant with the American Disabilities Act (ADA) will be installed along the north edge of the property. An ADA compliant parking area will connect to both the mulched trail and the sidewalk (Master Site Plan).

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 last structure left from when the preserve was a homesite. Nearly all the land surrounding the preserve has been developed.

3.2 Current Public Use and Land Uses

The preserve is currently open to the public for use of the walking trail. Three 32" X 40" signs interpreting the history of the site are present 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.

3.3 Planned Uses and Assessment of their Impacts

Easements, Concessions, and Leases – There are no easements, concessions, or leases.
Landscaping – Small native groundcover species may be planted in front of the shell wall facing Addison Court. Large, dense native species will be planted along the western property line to screen the neighboring house 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 will be accessible by wheelchair, for public access to the parcel. The ADA sidewalk trail installation will be coordinated with a qualified archaeologist.

3.4 Adjacent Land Uses – Single-family residential developed lots surround the preserve on all sides. A road, Addison Court, runs along the entire north edge of the preserve. The Karen property, an undeveloped lot zoned single-family residential, is adjacent to the preserve along the southwestern edge. This property is on the current Conservation Collier Acquisition List that was approved by the Board of County Commissioners on ????? (See Table 4).

3.5 Potential Surplus Lands

No potential surplus lands exist at Otter Mound Preserve.

3.6 Prospective Land Acquisitions

Table 4: Recommended Acquisition Priorities

Parcel Folio #	Acres	Property Description	Acquisition Reason
Karen property	0.68	Karen Property	Habitat

3.7 Analysis of Multiple-Use Potential

Table 5: 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		Y	
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)			

3.8 Proposed Single - or Multiple-use Management

Management of this parcel for public use will focus on maintenance of the trail, signage, and picnic area. Uses are restricted to those consistent with the conservation of plants, animals, and historical/archaeological features and visitors' passive enjoyment of these resources.

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: rare habitat, aquifer recharge, flood control, water quality protection, and listed species habitat to qualify for further consideration. 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 shall be managed only for conservation, protection, and enhancement of natural and historical/archaeological resources and for passive, outdoor public recreation that will be compatible with the conservation, protection, and enhancement of the site and surrounding lands.

4.1.3 Management Activities to Preserve, Enhance, Restore, Conserve, Maintain and Monitor 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."

4.1.4 Manager

The Site Manager for Otter Mound Preserve is

Melissa Hennig, Environmental Specialist, Collier County Facilities Management Department.
Phone: (239) 213-2957
Fax: (239) 793-3795
E-mail: Melissahennig@Colliergov.net or ConservationCollier@Colliergov.net

4.1.5 Preserve Rules and Regulations

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

4.2 Desired Future Conditions

This section includes a description of the proposed future condition for the site's natural areas. Management techniques to achieve these goals are in section 4.5.

Following recommended management actions, and the results of adaptive management where needed, 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 6: 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 200 plants planted)	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 years period

A set of goals and objectives for the 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 the Otter Mound Preserve based on the purposes for which the lands were acquired, the condition of the resources present, and management issues for the property. On-site managers should be familiar with the 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 the Otter Mound Preserve:

4.4.1. Eliminate or reduce human impacts to indigenous plant and animal life and on historical/archaeological resources.

- Do not allow vehicle use in the preserve.
- Enforce regulations prohibiting trash and landscape debris dumping in or near the preserve.
- Encourage visitors to stay on trail.

4.4.2. Implement a biological monitoring program.

- Conduct periodic wildlife surveys.
- Install permanent vegetation monitoring plots.
- Install permanent photo points.

4.4.3. Remove populations of exotic plants to restore natural habitats.

- Cut, chemically treat, and remove vegetative debris of all shrub and tree-like species identified as nuisance exotics.
- Chemically treat populations of vine and groundcover species of identified nuisance exotics.
- Avoid off-target damage to native plants and animals, especially rare species.

4.4.4. Conduct additional measures to restore native vegetation.

- If necessary, plant native vegetation to restore native habitat where it was lost in 2005 after invasive exotic removal and Hurricane Wilma damage.

4.4.5 Maintain facilities for public use.

- Keep trail area open and free of weedy species.
- Keep picnic table, benches, and post/rope fence in repair.
- Maintain interpretive signage and plant signage to educate the preserve's visitors.

4.5 Resource Management and Protection

4.5.1 Soil Management

Soil management at Otter Mound Preserve is primarily concerned with prevention of erosion and disturbance of the ancient shell mound substrate. Visitor use of the preserve should be limited to designated trail areas. The mulched trail should be maintained at a minimum depth of 3". Bicycle use of the trails should be monitored. If it appears that bicycle use of the trails is detrimental to the soil, bicycles should be prohibited from entering the preserve.

Managers and contractors should not walk within 6 feet of the edge of the shell terrace walls unless absolutely necessary. These areas are extremely fragile and subject to erosion and disturbance.

4.5.2 Hydrology/Water Management

No water management structures exist at the preserve, and no water management improvements are planned for the future.

4.5.3 Natural Communities Management

The control of invasive exotic species is critical for the preservation of Otter Mound's native natural community. The preserve has been overgrown with exotic plant species since the 1980s. Specific recommendations for management of exotic plant species are included below.

4.5.4 Native Wildlife Species Management

Preserving native habitat and evaluating impacts by urban domestic species, both feral (i.e., cats and dogs) and tame (i.e., leashed dogs) will benefit native wildlife species.

4.5.5 Listed Wildlife Species Management

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). Protection of the Florida tree snail population at Otter Mound Preserve will be achieved through the following management activities:

- Protection and restoration of existing hammock vegetation.
- Protection against collection – an educational sign will be posted along the trail describing the snail, highlighting its listed status and prohibiting its collection.
- Reduction of 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 midstory cover should reduce some effects of the pesticide by reducing the amount of pesticide entering the preserve.

Two 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 will evaluate whether Otter Mound Preserve will serve as an adequate gopher tortoise relocation site. If the site is deemed acceptable, staff will pursue all actions necessary to become recognized as a relocation site with the (FFWCC) (See Attachment ???).

Because FFWCC guidelines for management identify a viable gopher tortoise population as consisting of 40-50 individuals requiring 25-50 acres of appropriate habitat, relocated tortoises on Otter Mound Preserve would be considered a remnant population requiring access to surrounding lands for long-term viability.

4.5.6 Invasive Non-native Species Management

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 (Phase 1) will be treated first. 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. (See Table ???)

Common Name	**Scientific Name**	**Phase**	**Historic**
Brazilian pepper	*Schinus terebinthifolius*	1	
air-potato	*Dioscorea alata*	1	
coral vine	*Antigonon leptopus*	1	X
bitter gourd		1	
bowstring hemp	*Sansevieria hyacinthoides*	1	X
carrotwood	*Cupaniopsis anacardioides*	2	
chinaberry	*Melia azedarach*	2	
paper mulberry	*Broussonetia papyrifera*	2	
java plum	*Syzygium cumini*	2	
walking plant		3	
wedelia	*Sphagneticola trilobata*	3	
natal grass	*Rhynchelytrum repens*	3	
orchid tree	*Bauhinia variegata*	4	
leadtree	*Leucaena leucocephala*	4	
oyster plant	*Tradescantia spathacea*	4	X
Surinam cherry	*Eugenia uniflora*	4	X

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

Following are the recommended management techniques for the invasive exotic plants listed in Table ????:

Brazilian pepper, carrotwood, chinaberry, paper mulberry, java plum, orchid tree, lead tree, Surinam cherry – Large trees should be cut, stumps treated with Garlon 3A or Garlon 4, 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 Garlon 3A or Garlon 4, 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.

Bowstring hemp – This herbaceous plant will require multiple treatments. The cuticle should be cut with a machete before herbicide is applied. Round-up and Garlon 4 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.

Air-potato – The vines should be cut and the root end sprayed with Garlon 4 if they are growing over the top of native vegetation. If caught early in the spring, the emerging vines can be

sprayed with Garlon 4 foliar mix or Round-up. Potatoes should be collected in winter if possible.

Coral vine and bitter gourd – Vines should be carefully sprayed with roundup or carefully pulled out at the root.

Walking plant, wedelia, natal grass – These plants should be sprayed with Round-up. 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.

4.5.7 Problem Species Management

There are currently no major native plant or animal species that are problematic at Otter Mound Preserve.

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.

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 control attractants (i.e., refuse bins, dumpsters, and supplementary feeding by humans). A similar approach shall be taken to control feral dog populations through the elimination of the elements that sustain the population.

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.

4.5.8 Forest Resources Management

n/a

4.5.9 Fire Management

n/a

4.5.10 Mineral Resources Management

n/a

4.5.11 Archaeological, Historical and Cultural Resources Management

The Archeological and Historical Conservancy, Inc. (AHC) conducted a phase one archaeological survey and assessment at the preserve in April 2000 for the previous owner (See Attachment ???). AHC recommendations for management of the site stipulate 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 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. In regards to the

outhouse structure, staff, in conjunction with a historian and/or historical architect, will assess and determine how and whether to maintain it and whether it should remain on site or be relocated. In the event that the outhouse remains on site, it will be clearly marked for display purposes only, and it will be protected from use by the public.

The management of the resources present on the Otter Mound property 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 Otter Mound property 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.

4.5.12 Scenic Resources Management

The vegetation should be kept lush, and the view should be focused on blocking out the urban environment. Vines and weedy vegetation should be removed from shell terracing that is in view of the public.

4.5.13 Security Management

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. Conservation Collier staff will research the possibility of installing a streetlight near the parking area for the safety of residents.

4.5.14 Disaster Preparedness

The Conservation Collier Program has a plan in place to examine the preserve after storms. Collier County also has several vendors under contract for disaster debris removal.

4.6 Research and Monitoring

The long-term management of Otter Mound Preserve 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.

Otter Mound currently has a thorough plant inventory, based on data collected by Jim Burch in 2007. 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.

Permanent vegetation monitoring plots will be established. 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 have been established at each plot and at other random locations on the property. Photo point locations are marked with small white plastic signs and will also be marked with a rebar and the position recorded with a GPS. All photo points will be taken at a standard height and angle of view.

4.7 Education and Training

Three interpretive signs that present the history of the preserve have been installed along the trail. A brochure outlining the native ecosystem and wildlife present at the preserve will be created. The Marco Island Historical Society is currently encouraging the development of a Junior Archaeology Club. Members of this club along with members of the Southwest Florida Archaeological Society will be asked to volunteer during plantings or other substrate-disrupting management.

4.8 Public Access and Visitor Use

The primary visitor use at the preserve will be passive recreation. A bench, picnic table, and two garbage cans are present along the trail for visitor use. Local birding groups will frequent the preserve during migration season, and members of the Marco Island Historical Society have showed interest in leading guided tours through the preserve in the future.

4.8.1 Public Access / Parking / Handicap Facilities

A parking area consisting of three parking spaces will be installed in May 2007. One parking space will be ADA compliant and connect to the ADA compliant sidewalk trail. Because of the sensitivity of the shell mound substrate, an ADA compliant path would not be feasible through the preserve.

4.8.2 Education Facilities

No education facilities will be erected at the preserve.

4.8.3 Hiking / Biking

Hiking in the preserve will be allowed on designated trail areas. A bicycle rack will be located at the entrance of the preserve to discourage bicycle riding within the preserve. Bicycle use of the trails will be monitored. If it appears that bicycle use of the trails is detrimental to the soil, bicycles will be prohibited from entering the preserve.

4.8.4 Other Potential Uses (Boating,Fishing, Hunting, Camping)

Historical presentations and gatherings would be encouraged at the preserve and would be coordinated with the Marco Island Historical Society and/or The Southwest Florida Archaeological Society.

4.9 Operations and Facilities

The historic outhouse will be inspected by a qualified historical architect. Renovations will be made in accordance with these recommendations. Grant funding for the restoration will be sought.

4.9.1 Estimated Annual Costs and Funding Sources

Table 8: Estimated Annual Land Management Budget (Amount in thousands of dollars; includes staff time.)										
Activity	**2007**	**'08**	**'09**	**'10**	**'11**	**'12**	**'13**	**'14**	**'15**	**'16**
Resource Management										
Exotic species control	12	12	8	8	6	6	5	5	4	4
Cultural resource management	1	2	0	0	0	0	0	0	0	0
Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Administration										
Units/Projects										
Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Support										
Land management planning										
Land management reviews										
Training/staff development										
Vehicle purchase										
Vehicle operation and maintenance										
Other										
Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Capital Outlay										
New facility construction (incl. fencing)										
Facility maintenance										
Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Visitors services/Recreation										
Information/Education programs										
Operations										
Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Law enforcement										
Law enforcement services										
Subtotal	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Total	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

4.10 Partnerships and Regional Coordination

4.10.1 Interlocal Partnerships and Agreements

City of Marco Island (See Attachment ???)

4.10.2 Cooperating Agencies

City of Marco Island
US Fish and Wildlife Service

4.10.3 Cooperating Organizations

Marco Island Historical Society

Southwest Florida Archaeological Society
Naples Chapter of the Florida Native Plant Society
Florida Humanities Council
Calusa Garden Club
Boy Scouts

4.10.4 Land Use Coordination

4.11 Prospective Land Acquisitions

The Karen property to the southwest of the preserve is on the current Collier County Land Acquisition A List.

4.12 Compliance with State and Local Government Requirements

4.13 Land Management Review and Revision Summary

4.14 Priority List of Management, Research, and Information Needs

5.0 Literature Cited

Appendices

Appendix 1: Trustees Lease Agreement (if applicable)

Appendix 2: Public Involvement in the Land Management Plan Preparation

Appendix 3: Soils Descriptions

Appendix 4: Florida Natural Areas Inventory Managed Area Tracking Record and Element Occurrence Summary; FNAI ranking system explanation

Appendix 5: Florida Natural Areas Inventory Natural Communities Descriptions for Occurring Natural Communities

Shell Mound - (synonyms: midden, Indian mound, tropical hammock, maritime hammock, coastal hammock). Shell Mound is unusual among the biological communities in that it is largely a result of the activities of Indians, 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. In some cases, a sparse shrubby community, sometimes with cactus, may develop in lieu of hammock vegetation. Typical plants include gumbo-limbo, cabbage palm, mastic, red cedar, hackberry, live oak, forestiera, coral bean, marlberry, saffron plum, sagaretia, coontie, and others.

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, in combination with their coastal location, often permits tropical or subtropical species of plants to grow much further north on Shell Mounds than their normal ranges on other substrates. 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.

Shell Mound is often associated with and grades into Rockland Hammock, Coastal Berm, or Maritime Hammock. It is often so similar in species composition to these communities that it may be difficult to differentiate. Some Shell Mounds may also be very similar to Coastal Rock Barren communities. Because they are constructed of archaeological remains, Shell Mounds are vulnerable to damage by artifact-seekers and archaeological excavations. Sites where visitor use is not monitored should not be publicized. Archaeological investigations should be conducted with care to protect important botanical features.

Appendix 6: Goals, Objectives, Project Priorities, Timelines, Cost

TABLE A-X: GOALS AND OBJECTIVES FOR THE 10-YEAR PLAN [E.G., 2007-2016]

Goal/Objective	Previous Plan	Percent Complete	Proposed Timeline (fiscal year) '07 08 09 10 11 12 13 14 15 16	Estimated Cost ($)
Resource Management and Protection				
Soil Management				
Goal xx:				
Objective xx: Assess preserve to identify major erosion areas				
Objective xx: Implement erosion control measures such as berms and plantings				
Hydrology/Water Management				

Appendix 7: Land Management Rules - Chapters 18-2 Florida Administrative Code

Appendix 8: Management Procedures for Archaeological and Historical Sites and Properties On State-owned or Controlled Lands and/or Collier County requirements

Appendix 9: Verification of Compliance with Local Comprehensive Plans

Appendix 10: Interdepartmental Agreements / Memoranda of Understanding

Appendix 11: Florida Natural Inventory report forms for listed species - listed animal species and listed plant species

Appendix 12: Exotic Pest Council's List of Florida's Most Invasive Species

Appendix 13: Copy of the Grant Award Agreement or the Grant Contract

Appendix 14: Interagency Agreement (if applicable)

Appendix 15: Photos of Historical Resources (if applicable)