

A Conceptual Management Plan

for

THOMAS M. GOODWIN

WATERFOWL MANAGEMENT AREA

INCLUDING THE BROADMOOR

MARSH UNIT

2004 – 2014



Brevard County, Florida



Florida Fish and Wildlife Conservation Commission

620 South Meridian Street

Tallahassee, Florida

32300-1600

A Conceptual Management Plan
For
Thomas M. Goodwin Waterfowl Management Area

Brevard County, Florida

Owned by the St. Johns River Water Management District
and
Managed by the Florida Fish and Wildlife Conservation Commission



April 2004

Approved _____

Frank Montalbano III, Director
Division of Wildlife

LAND MANAGEMENT PLAN EXECUTIVE SUMMARY

Land Agency: Fish and Wildlife Conservation Commission (FWC)
 Common Name of Property: T. M. Goodwin Waterfowl Management Area
 Location: Brevard County, Florida

Acreage Total: 6,270

Acreage Breakdown:	Land Cover Classification	Acreage
<i>Natural Communities</i>	Hardwood Swamp	0
	Pineland	0
	Hardwood Hammock	0
	Freshwater Marsh / Wet Prairie	5,400
	Cypress Swamp	0
	Sand Hill	0
	Hardwood/Pine	0
	Open Water	870
<i>Disturbed Areas</i>	Shrub/Brush	0
	Grassland	0
	Barren	0

Lease/Management Agreement No.: Goodwin Lease #90106 Broadmoor Lease #01183

Use: Single _____ Multiple <u> X </u>	Management Responsibilities: Agency Responsibilities <u>FWC</u> <u>LEAD, SUBLESSEE (Wildlife management, resource protection, law enforcement)</u>
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Designated Land Use: Waterfowl Management Area
 Sublease (s): None
 Contract(s): None
 Encumbrances: None
 Type Acquisition: Goodwin-Save Our Rivers, Broadmoor-Preservation 2000 and Wetland Reserve Program
 Unique Features: Natural: Floodplain Marsh
 Archaeological/Historical: One known site which includes a partially exposed midden
 Management Needs: Control of exotic pasture grasses to improve wetland habitat
 Acquisition Needs/Acreage: None
 Surplus Lands/Acreage: None
 Public Involvement: Commission meetings, District meetings, District RAC meetings, state and local Ducks Unlimited meetings

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ARC Approval Date _____ BTIITF Approval Date: _____

Comments: _____

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I. GENERAL INFORMATION

The Thomas M. Goodwin Waterfowl Management Area (WMA), also known as the C-54 Retention Area, is owned by St. Johns River Water Management District (District) and comprises 3,870-acres in southern Brevard County (Figure 1). In May 1991, the District leased this property to the Florida Fish and Wildlife Conservation Commission (Commission) for the purpose of establishing a waterfowl management area.

The Commission began developing the area in 1990 as a joint project between the District, Ducks Unlimited (DU) through their Matching Aid to Restore States Habitat (MARSH) program, and the North American Wetlands Conservation Council. Project construction was complete in fall 1995, and in December 1995, the area was established as a Public Waterfowl Area.

As required in the Goodwin lease (Item 6.A., Appendix A), a Conceptual Management Plan (CMP) was developed for the WMA and approved in May 1993. That plan provided a general concept of how the WMA would be managed over a 10-year period. Prior to revising the CMP in 2003, the District and the Commission entered a second lease agreement in April 2002 for the Broadmoor Marsh, a 2,400-acre tract of land immediately north of the WMA. As a condition of the Broadmoor lease (Item 6., Appendix B) a separate land management plan shall be developed by the Commission and approved by the District. After the Broadmoor lease agreement was signed, the Commission re-established the WMA as a Public Small Game Hunting Area to incorporate Broadmoor Marsh. The WMA now comprises 2 units: the T. M. Goodwin Unit (Goodwin) and the Broadmoor Marsh Unit (Broadmoor). Combining both units allows for one set of regulations to be developed under a single establishment order.

Instead of revising the Goodwin CMP and preparing a new management plan for Broadmoor, this CMP will address both units and reflect a 10-year revision of the Goodwin CMP. The format and content were drafted in accordance with Acquisition and Restoration Council requirements for management plans. Throughout this document, the 2 units collectively will be referred to as the WMA and where appropriate, independently referred to as Goodwin and Broadmoor.

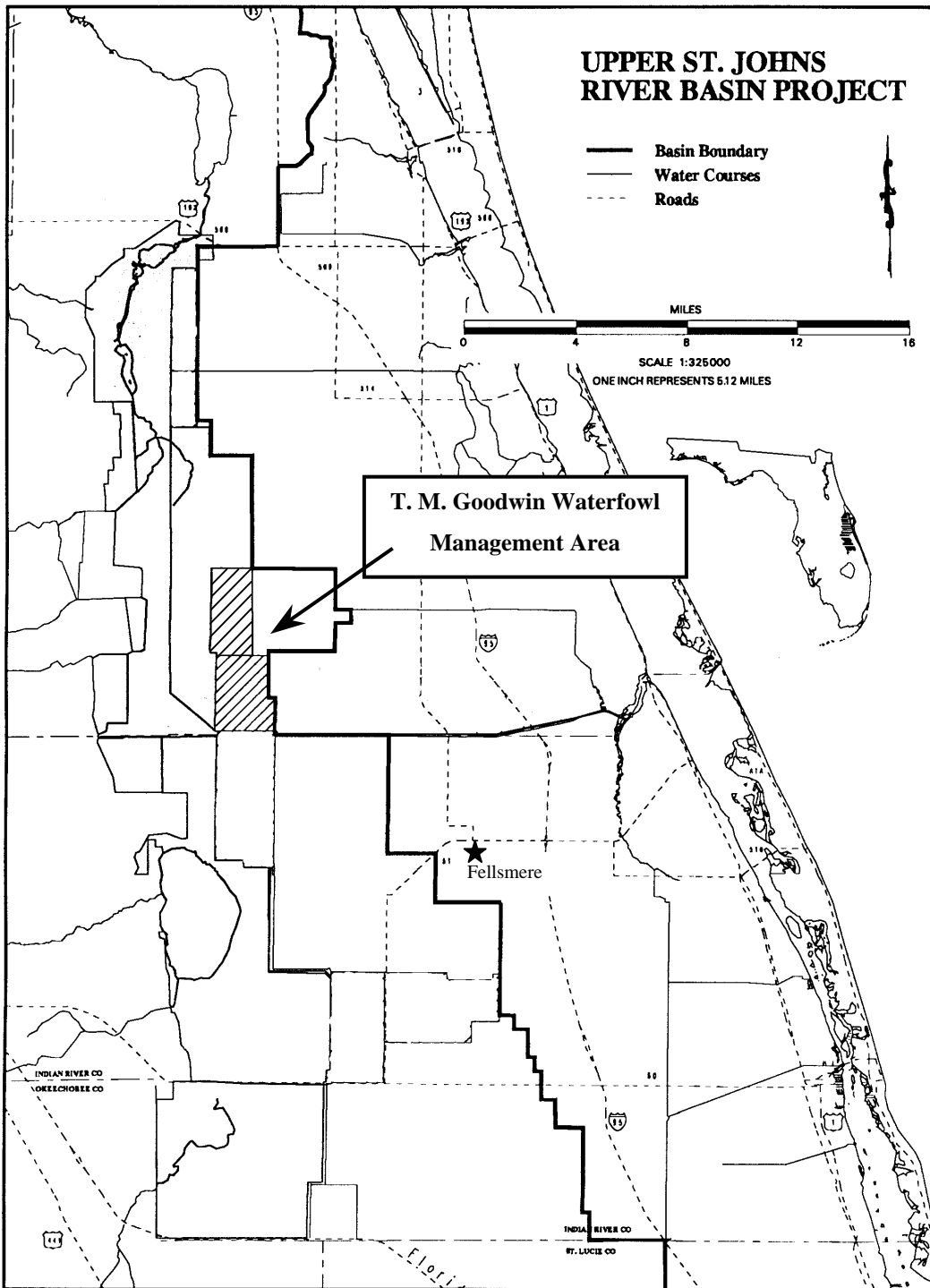


Figure 1. Location of T. M. Goodwin Waterfowl Management Area within the Upper St. Johns River basin, Brevard County, Florida.

A. Land Acquisition

1. Location: The WMA comprises 6,270-acres in southern Brevard County about 7 miles northwest of Fellsmere, Florida (Figures 1 and 2).

2. Purchase: The District purchased Goodwin in 1988 for \$6.3 million using state Save Our River Program funds. The District and the Natural Resources Conservation Service (NRCS) purchased Broadmoor in 1998 for approximately \$11.5 million. The District contributed \$7.3 million using state Preservation 2000 funds and the NRCS contributed \$4.2 million using federal Wetland Reserve Program (WRP) funds. The use of federal funds to acquire Broadmoor resulted in the NRCS obtaining a 30-year conservation easement.

3. Management Authority: Two separate lease agreements convey management authority to the Commission: (1) the Goodwin lease, a 30-year, non-fee, renewable agreement (Appendix A), and (2) the Broadmoor lease, a 5-year, non-fee, renewable agreement (Appendix B).

4. Management Directives: The Goodwin lease directs the Commission to “provide a diversity of wintering and breeding habitats for various waterfowl species, as well as benefiting many species of wading and shore birds, and a number of endangered species; and provide public recreational benefits, including hunting, birding, fishing, and environmental education.” The Broadmoor lease directs the Commission to “manage the habitat on the property for waterfowl and other wetland wildlife and take specific management actions including, but not limited to, construction of office and maintenance facilities, improving internal levees, on site water level manipulation, controlled burning, disking, and planting and mowing, along with other allowable uses as described herein and in the (Conceptual) Management Plan to be developed pursuant to this Agreement.”

5. Title Interest and Encumbrances: The District holds the fee title interest to the WMA with one encumbrance. This encumbrance is a NRCS Wetlands Reserve Program

easement and is placed on the Broadmoor Marsh Unit.

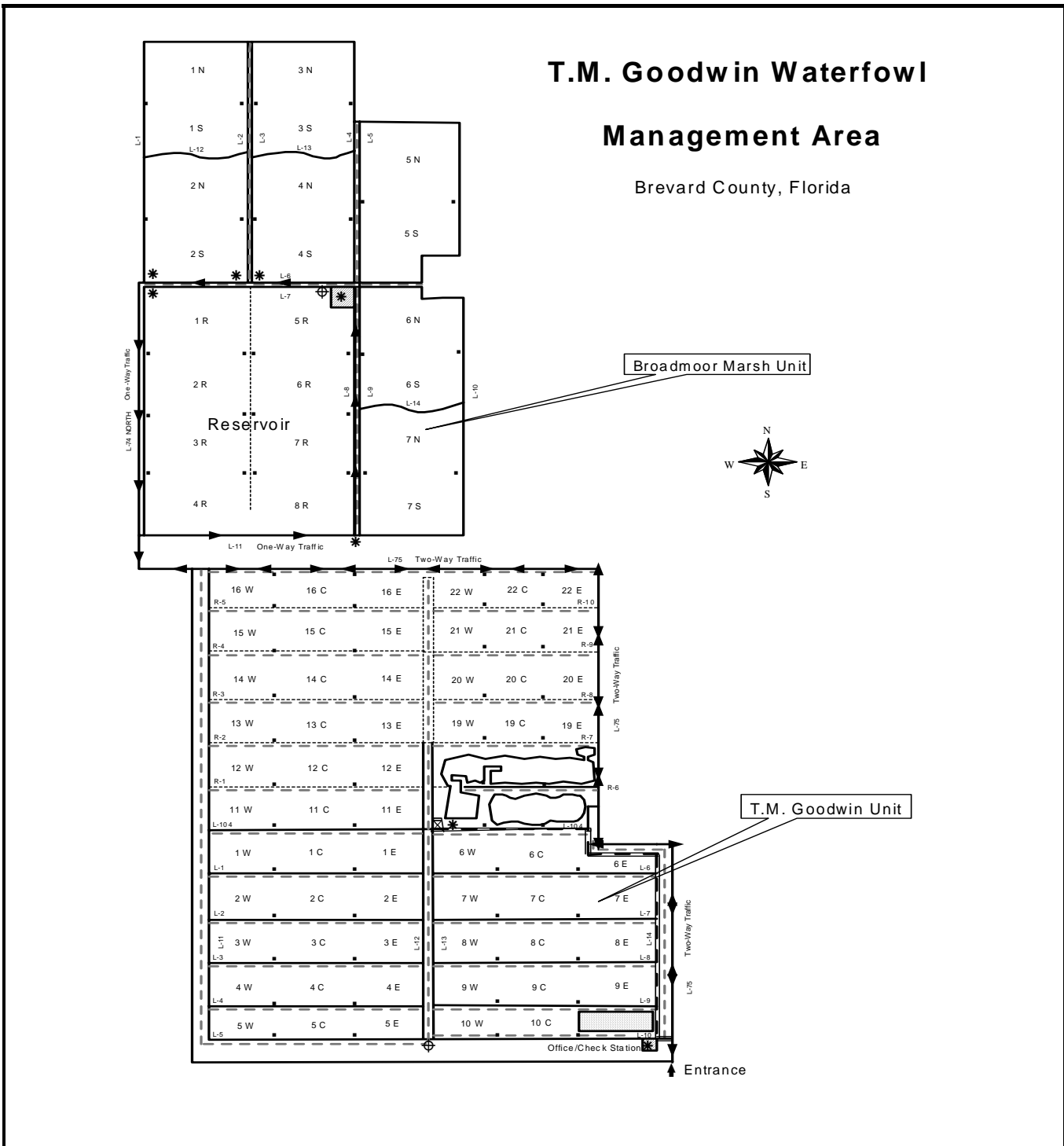


Figure 2. Map of T. M. Goodwin Waterfowl Management Area, Brevard County, Florida

B. Proximity to Other Public Properties:

Several state and federal properties lie in close proximity to the WMA. Managing agencies for these properties are listed in Table 1.

Table 1. Conservation lands in proximity to WMA

Federal	Managing Agency
Merritt Island National Wildlife Refuge	U. S. Fish and Wildlife Service
St. Johns River National Wildlife Refuge	U. S. Fish and Wildlife Service
Pelican Island National Wildlife Refuge	U. S. Fish and Wildlife Service
Archie Carr National Wildlife Refuge	U. S. Fish and Wildlife Service
Cape Canaveral National Seashore	National Park Service
State of Florida	Managing Agency
St. Johns River Wildlife Management Area	Florida Fish & Wildlife Conservation Comm.
Three Lakes Wildlife Management Area	Florida Fish & Wildlife Conservation Comm.
Fort Drum Marsh Conservation Area	St. Johns River Water Management District
St. Sebastian River State Buffer Preserve	Florida Department of Environmental Protection
Sebastian Inlet State Park	Florida Department of Environmental Protection
Blue Cypress Conservation Area	St. Johns River Water Management District
Bull Creek Conservation Area	Florida Fish & Wildlife Conservation Comm.
Three Forks Marsh Conservation Area	St. Johns River Water Management District
Triple N Ranch Wildlife Management Area	Florida Fish & Wildlife Conservation Comm.

C. Prospective Land Acquisitions

There are no private inholdings within the WMA to be considered for acquisition.

D. Public Involvement

The Commission receives input from public and private stakeholders through the District’s regularly scheduled Recreational Advisory Council (RAC) meetings. RAC meetings are held twice a year, usually in the spring and fall. Commission staff actively participates at the RAC meetings to provide updates on special projects and solicit input on public use.

II. NATURAL AND CULTURAL RESOURCES

A. Physiography

1. Topography: Natural ground elevation ranges from 17 to 20.5 feet National Geodetic Vertical Datum (NGVD) on Goodwin and 14 to 17.5 feet NGVD on Broadmoor. Broadmoor's lower elevation may be due to previous intensive farming practices that contributed to a higher rate of subsidence as opposed to Goodwin, which was managed less intensively as an improved pasture. Natural landscape features include numerous low-lying, shallow depressions that occur throughout the WMA and vary in size from less than 1 acre up to about 10 acres.

The lowest elevations, about 6.1 feet NGVD, are found at the bottom of the drainage ditches while elevations up to 25.1 feet NGVD include the tops of some spoil levees. Top elevation of the perimeter levee varies between 25.7 and 30.1 feet NGVD.

2. Soils: According to the USDA Soil Survey of Brevard County, 4 soil types exist on the WMA. These soil types and their approximate percentage of coverage include the Montverde Series (60%), the Micco Series (26%), the Canova Series (13%), and the Oldsmar Series (1%). All but the Oldsmar Series are described as nearly level, very poorly drained, organic soils. Formation of the organic soils occurred from the deposition of fibrous, non-woody material underlain by loamy marine sediments.

The primary difference among the 3 organic soils is the depths of the organic layers. A representative profile of the Canova, Micco, and Montverde Series indicated that the depths of the organic layers were 9, 30 and 54 inches, respectively. Below the organic layer is a layer of sand ranging from 8 to 13 inches, followed by a layer of sandy clay loam 16 to 23 inches. Permeability is rapid in the organic and sandy layers and moderate to moderately rapid in the loamy layers. The water table is generally within 10 inches of the surface for 9 to 12 months during most years. Flooding may occur from up to 3 months in the Canova Series to greater than 6 months for the Micco and Montverde Series.

The Oldsmar Series is described as nearly level, poorly drained, sandy soil. Formation of the series occurred from the deposition of sandy marine sediments over loamy material. The sandy layers extend to a depth of about 53 inches and vary in color from black to light gray.

Between 53 and 93 inches are stratified, mixed pockets of sandy loam and sandy clay loam material. Permeability is rapid to a depth of about 36 inches and moderately rapid between 36 and 93 inches. The water table is within 10 inches of the surface for 1 to 3 months and between 10 and 40 inches for more than 6 months. This soil is generally flooded once every 5 years, lasting from 2 to 7 days.

3. Climate: The climate for Brevard County and the Upper St. Johns River Basin (USJRB) is described as humid sub-tropical. The average annual temperature is 72° F. July and August are the warmest months and the average daily maximum temperature is 92° F; however, temperatures can exceed 100° F between June and September. January is typically the coldest month and the average daily minimum temperature is 48° F. Temperatures falling below 32° F occur on average about four days a year from December through February. Temperatures can fall below freezing for partial days from November through March. Annual rainfall generally ranges between 52 and 56 inches. Approximately 55% of the rainfall occurs between June and October with the greatest amounts falling in September (about 8.75 inches). For the remainder of the year, monthly rainfall averages between 1.9 and 3.7 inches. April and May are the driest months due to high evapotranspiration, which usually exceeds rainfall.

B. Vegetation

The natural vegetative community on the WMA was severely altered due to past drainage practices and previous land use. However, wetland management activities initiated on Goodwin during the past 10 years have restored a majority of the native vegetative communities. Some portions of the managed impoundments are still dominated by invasive exotic pasture grasses. Other exotics are found in the drainage ditches and permanently flooded water bodies. Below is a detailed list of plants that are known to occur on the WMA. This list was derived from a vegetation inventory conducted on Goodwin in 1997. All common and scientific names are derived from R. K. Godfrey and J. W. Wooten's, *Aquatic and Wetland Plants of Southeastern United States*, 1981.

1. Trees and Shrubs:

cabbage palmetto (Sabal palmetto)

wax-myrtle (Myrica cerifera)

willow (Salix spp.)
red maple (Acer rubrum)
groundsel-tree (Baccharis spp.)
bald-cypress (Taxodium distichum)

2. **Emergent Species:**

cat-tail (Typha spp.)
arrowhead (Sagittaria spp.)
para grass (Brachiaria purpurascens)
paspalum (Paspalum spp.)
torpedo grass (Panicum repens)
maidencane (Panicum hemitomon)
fall panic grass (Panicum dichotomiflorum)
panicum (Panicum spp.)
wild millet (Echinochloa spp.)
knotroot bristlegrass (Setaria geniculata)
bluestem (Andropogon spp.)
flat sedge (Cyperus polystachyos)
flat sedge (Cyperus odoratus)
flat sedge (Cyperus surinamensis)
flat sedge (Cyperus compressus)
bulrush (Scirpus spp.)
saw-grass (Cladium jamaicense)
pickerelweed (Pontederia cordata)
smartweed (Polygonum spp.)
pigweed (Amaranthus spp.)
fragrant white water-lily (Nymphaea odorata)
spatter-dock (Nuphar spp.)
St. Johns-wort (Hypericum spp.)
meadow beauty (Rhexia virginica)
primrose willow (Ludwigia peruviana)

water pennywort (Hydrocotyle spp.)
water-hemlock (Cicuta spp.)
water-hyssop (Bacopa spp.)
beggar-ticks (Bidens spp.)
dog-fennel (Eupatorium capillifolium)
Carolina mosquito fern (Azolla caroliniana)
buttonweed (Diodia virginiana)
dayflower (Commelina erecta)
limpoglass (Hemarthria altissima)
Bermuda grass (Cynodon dactylon)
American cupscale (Sacciolepis striata)
loosestrife (Lythrum spp.)
alligator weed (Alternanthera philoxeroides)
spikerush (Eleocharis spp.)
frog's bit (Limnobium spongia)
pale straw sedge (Carex albolutescens)
buttonbush (Cephalanthus occidentalis)
water spider orchid (Habenaria repens)
bog hemp (Boehmeria cylindrical)
Virginia saltmarsh mallow (Kosteletzkya virginica)
Guadeloupe cucumber (Melothria pendula)
false daisy (Eclipta alba)
turkey tangle fogfruit (Phyllanthus nodiflora)
stiff marsh bedstraw (Galium tinctorium)
carpetgrass (Axonopus furcatus)
Egyptian paspalidium (Paspalum geminatum)
mock Bishop's weed (Ptilimnium capillaceum)
soft rush (Juncus effusus)
marsh fern (Thelypteris spp.)
marsh-fleabane (Pluchea odorata)
cowpea (Vigna luteola)

fireweed (Erechtites hieracifolia)
 coffeeweed (Sesbania macrocarpa)
 stalked water-horehound (Lycopus rubellus)
 cogon grass (Imperata cylindrica)
 star grass (Cynodon nlemfuensis)

3. Submergent and Floating Species:

naiad (Najas guadalupensis)
 hydrilla (Hydrilla verticillata)
 water-lettuce (Pistia stratiotes)
 duckmeat (Spirodela spp.)
 duckweed (Lemna spp.)
 water-hyacinth (Eichhornia crassipes)
 bladderwort (Utricularia spp.)
 oblong mudmidget (Wolffiella oblonga)
 floating moss (Salvinia rotundifolia)

C. Fish and Wildlife

1. Resident and Migratory Birds

Although a comprehensive survey of resident and migratory fauna has not been completed on the WMA, observations by Commission staff are documented in Tables 2-6.

Table 2. List of bird species on the T. M. Goodwin WMA, Brevard County, Florida.

Common name	Scientific name
pied-billed grebe	<u>Podilymbus podiceps</u>
common merganser	<u>Mergus merganser</u>
canvasback	<u>Aythya valisineria</u>
gadwall	<u>Anas strepera</u>
cinnamon teal	<u>Anas cyanoptera</u>
redhead	<u>Aythya americana</u>
ruddy duck	<u>Oxyura jamaicensis</u>

bufflehead	<u>Bucephala albeola</u>
mallard	<u>Anas platyrhynchos</u>
mottled duck	<u>Anas fulvigula</u>
northern pintail	<u>Anas acuta</u>
American wigeon	<u>Anas americana</u>
Northern shoveler	<u>Anas clypeatus</u>
blue-winged teal	<u>Anas discors</u>
green-winged teal	<u>Anas crecca</u>
fulvous whistling-duck	<u>Dendrocygna bicolor</u>
black-bellied whistling-duck	<u>Dendrocygna autumnalis</u>
wood duck	<u>Aix sponsa</u>
ring-necked duck	<u>Aythya collaris</u>
lesser scaup	<u>Aythya affinis</u>
hooded merganser	<u>Lophodytes cucullatus</u>
snow goose	<u>Chen caerulescens</u>
turkey vulture	<u>Cathartes aura</u>
black vulture	<u>Coragyps atratus</u>
swallow-tailed kite	<u>Elanoides forficatus</u>
osprey	<u>Pandion haliaetus</u>
marsh hawk	<u>Circus cyaneus</u>
wild turkey	<u>Meleagris gallopavo osceola</u>
bobwhite quail	<u>Colinus virginianus</u>
great white heron	<u>Ardea occidentalis</u>
common egret	<u>Casmerodius albus</u>
cattle egret	<u>Bubulcus ibis</u>
great blue heron	<u>Ardea herodias</u>
black-crowned night heron	<u>Nycticorax nycticorax</u>
green heron	<u>Butorides striatus</u>
yellow-crowned night heron	<u>Nycticorax violaceus</u>
American bittern	<u>Botaurus lentiginosus</u>
least bittern	<u>Ixobrychus exilis</u>

glossy ibis	<u>Plegadis falcinellus</u>
white ibis	<u>Eudocimus albus</u>
common moorhen	<u>Gallinula chloropus</u>
purple gallinule	<u>Porphyryla martinica</u>
American coot	<u>Fulica americana</u>
black-necked stilt	<u>Himantopus mexicanus</u>
killdeer	<u>Charadrius vociferus</u>
common snipe	<u>Capella gallinago</u>
mourning dove	<u>Zenaida macroura</u>
common ground dove	<u>Columbina passerina</u>
smooth-billed ani	<u>Crotophaga ani</u>
common nighthawk	<u>Chordeiles minor</u>
belted kingfisher	<u>Ceryle alcyon</u>
tree swallow	<u>Tachycineta bicolor</u>
eastern meadowlark	<u>Sturnella magna</u>
bobolink	<u>Dolichonyx oryzivorus</u>
red-winged blackbird	<u>Agelaius phoeniceus</u>
boat-tailed grackle	<u>Quiscalus major</u>
common grackle	<u>Quiscalus quiscula</u>
common myna	<u>Acridotheres tristis</u>
sora	<u>Porzana carolina</u>
red-tailed hawk	<u>Buteo jamaicensis</u>
red-shouldered hawk	<u>Buteo lineatus</u>
peregrine falcon	<u>Falco peregrinus</u>
wood stork	<u>Mycteria americana</u>
snail kite	<u>Rostrhamus sociabilis</u>
eastern American kestrel	<u>Falco sparverius</u>
Florida sandhill crane	<u>Grus canadensis pratensis</u>
sandhill crane	<u>Grus canadensis</u>
whooping crane	<u>Grus americana</u>

bald eagle	<u>Haliaeetus leucocephalus</u>
Audubon's crested caracara	<u>Polyborus plancus audubonii</u>
least tern	<u>Sterna antillarum</u>
roseate spoonbill	<u>Ajaia ajaja</u>
limpkin	<u>Aranus quarauna</u>
little blue heron	<u>Egretta caerulea</u>
reddish egret	<u>Egretta rufescens</u>
snowy egret	<u>Egretta thula</u>
tricolored heron	<u>Egretta tricolor</u>
black skimmer	<u>Rynchops niger</u>
American white pelican	<u>Pelecanus erythrorhynchos</u>
anhinga	<u>Anhinga anhinga</u>
double-crested cormorant	<u>Phalacrocorax auritus</u>
barred owl	<u>Strix varia</u>
merlin	<u>Falco columbarius</u>
king rail	<u>Rallus elegans</u>
Virginia rail	<u>Rallus limicola</u>
greater yellowlegs	<u>Tringa melanoleuca</u>
lesser yellowlegs	<u>Tringa flavipes</u>
least sandpiper	<u>Calidris minutilla</u>
solitary sandpiper	<u>Tringa solitaria</u>
short-billed dowitcher	<u>Limnodromus griseus</u>
long-billed dowitcher	<u>Limnodromus scolopaceus</u>
eastern phoebe	<u>Sayornis phoebe</u>
Canada goose	<u>Branta canadensis</u>
northern mockingbird	<u>Mimus polyglottos</u>
loggerhead shrike	<u>Lanius ludovicianus</u>
white-eyed vireo	<u>Vireo griseus</u>
common yellowthroat	<u>Geothlypis trichas</u>
northern cardinal	<u>Cardinalis cardinalis</u>

eastern towhee	<u>Pipilo erythrophthalmus</u>
savannah sparrow	<u>Passerculus sandwichensis</u>

Table 3. List of amphibians and reptiles on T. M. Goodwin WMA, Brevard County, Florida.

Common name	Scientific name
American alligator	<u>Alligator mississippiensis</u>
cottonmouth	<u>Agkistrodon piscivorus</u>
eastern diamondback	<u>Crotalus adamanteus</u>
striped mud turtle	<u>Kinosternon bauribauri</u>
greater siren	<u>Siren lacertina</u>
peninsula cooter	<u>Pseudemys floridana peninsularis</u>
Florida softshell turtle	<u>Trionyx ferox</u>
green tree frog	<u>Hyla cinerea</u>
southern leopard frog	<u>Rana sphenocephala</u>
pig frog	<u>Rana grylio</u>
Cuban tree frog	<u>Osteopilus septentrionalis</u>
corn snake	<u>Elaphe guttata</u>
brown water snake	<u>Nerodia taxispilota</u>
pygmy rattlesnake	<u>Sistrurus miliarius</u>
Florida snapping turtle	<u>Chelydra serpentina osceola</u>
Southern black racer	<u>Coluber constrictor priapus</u>
Eastern garter snake	<u>Thamnophis sirtalis</u>
Eastern coral snake	<u>Micrurus fulvius</u>
Eastern indigo snake	<u>Drymarchon corais couperi</u>

Table 4. List of mammals on T. M. Goodwin WMA, Brevard County, Florida.

Common name	Scientific name
marsh rabbit	<u>Sylvilagus palustris</u>
raccoon	<u>Procyon lotor</u>

river otter	<u>Lutra canadensis</u>
bobcat	<u>Lynx rufus</u>
white-tailed deer	<u>Odocoileus virginiana</u>
feral hog	<u>Sus scrofa</u>
Florida water rat	<u>Neofiber alleni</u>
armadillo	<u>Dasypus novemcinctus</u>
Virginia opossum	<u>Didelphis virginiana</u>

Table 5. List of fish on T. M. Goodwin WMA, Brevard County, Florida.

Common name	Scientific name
white catfish	<u>Ameiurus catus</u>
brown bullhead	<u>Ameiurus nebulosus</u>
bowfin	<u>Amia calva</u>
warmouth	<u>Chaenobryttus gulosus</u>
walking catfish	<u>Clarias batrachus</u>
gizzard shad	<u>Dorosoma cepedianum</u>
threadfin shad	<u>Dorosoma petenense</u>
bluespotted sunfish	<u>Enneacanthus gloriosus</u>
lake chubsucker	<u>Erimyzon sucetta</u>
chain pickerel	<u>Esox niger</u>
Seminole killifish	<u>Fundulus seminolis</u>
western mosquitofish	<u>Gambusia affinis</u>
least killifish	<u>Heterandria formosa</u>
brown hoplo	<u>Hoplosternum littorale</u>
flagfish	<u>Jordanella floridae</u>
brook silverside	<u>Labidesthes sicculus</u>
longnose gar	<u>Lepisosteus osseus</u>
Florida gar	<u>Lepisosteus platyrhincus</u>
redbreast sunfish	<u>Lepomis auritus</u>

bluegill	<u>Lepomis macrochirus</u>
redeer sunfish	<u>Lepomis microlophus</u>
spotted sunfish	<u>Lepomis punctatus</u>
bluefin killifish	<u>Lucania goodei</u>
largemouth bass	<u>Micropterus salmoides</u>
golden shiner	<u>Notemigonus crysoleucas</u>
black shiner	<u>Pomoxis nigromaculatus</u>
vermiculated sailfin catfish	<u>Pterygoplichthys disjunctivus</u>
Atlantic needlefish	<u>Strongylura marina</u>
blue tilapia	<u>Oreochromis (Tilapia) aurea</u>

2. Endangered, Threatened and Species of Special Concern

Table 6. List of threatened (T), endangered (E), and species of special concern (SSC) occurring on T. M. Goodwin WMA, Brevard County, Florida.

Common name	Scientific name	Protection Status	
		State	Federal
peregrine falcon	<u>Falco peregrinus</u>	E	
wood stork	<u>Mycteria americana</u>	E	E
snail kite	<u>Rostrhamus sociabilis</u>	E	E
American alligator	<u>Alligator mississippiensis</u>	SSC	T
eastern indigo snake	<u>Drymarchon corais couperi</u>	T	T
eastern American kestrel	<u>Falco sparverius</u>	T	
Florida sandhill crane	<u>Grus canadensis pratensis</u>	T	
whooping crane	<u>Grus americana</u>	SSC	T
bald eagle	<u>Haliaeetus leucocephalus</u>	T	T
Audubon's crested caracara	<u>Polyborus plancus audubonii</u>	T	T
least tern	<u>Sterna antillarum</u>	T	
roseate spoonbill	<u>Ajaia ajaja</u>	SSC	

limpkin	<u>Aramus quarauna</u>	SSC
little blue heron	<u>Egretta caerulea</u>	SSC
reddish egret	<u>Egretta rufescens</u>	SSC
snowy egret	<u>Egretta thula</u>	SSC
tricolored heron	<u>Egretta tricolor</u>	SSC
white ibis	<u>Eudocimus albus</u>	SSC
black skimmer	<u>Rynchops niger</u>	SSC

D. Forest, Mineral, Scenic and Water Resources

1. Forest resources

No forest resources exist on the WMA.

2. Mineral Resources (geological conditions)

Mineral resources are limited to a 184 acre borrow pit in the east-central portion of Goodwin (Figure 2). The District retains the right for use of borrow material in maintaining or constructing levees in the USJRB Project; however, the Commission also may use fill material for development and maintenance of the WMA.

3. Scenic Resources

Although no scenic resources (i.e., vistas, caves, large sinkholes, rivers, streams) exist on the WMA, the area is part of the USJRB Project, which is a unique, important resource that has ecological, agricultural, and historical significance. As a result, the project provides many forms of recreational activities to the public.

4. Water Resources

Waters of the USJRB, excluding water management areas and the WMA, are considered waters of the state for jurisdictional purposes and are classified as Class I (potable) and Class III (recreational) waters by the Department of Environmental Protection (DEP). Class I waters occur from Lake Washington upstream to State Road 60, and Class III waters occur downstream from Lake Washington. All water management areas, including the WMA, are not considered

waters of the state and therefore are not classified by the DEP.

E. Beaches and Dunes

No beach or dune resources exist on the WMA.

F. Native Landscapes

A description of the native landscapes, including flora and fauna, can be found in Sections II. B. (Vegetation) and II. C. (Fish and Wildlife).

G. Archaeological and Historic Resources

One archeological site has been identified on the WMA and is listed with the Florida Department of State, Division of Historical Resources, (Site File No. BR1614). This site is a partially exposed midden, which contains some ceramic artifacts, mostly pottery fragments. Appendix C describes the procedures that will be followed for properties where archeological or historical resources are found.

III. USAGE OF THE PROPERTY

A. Previous Use and Development

Goodwin: During the 1960's, Gulf Western Food Products, a division of Gulf Western Industries, purchased approximately 58,000 acres of fresh water marshlands from South Puerto Rican Sugar Corporation. Most of this land was within Brevard and Indian River counties. Gulf Western Industries began draining much of this land for agricultural purposes, primarily citrus, sod and cattle production. Between 1972 and 1980, Goodwin was quarter-drained, which involved dredging lateral ditches in an east-west direction every one-quarter mile. These ditches connect to larger, slightly deeper ditches dredged in a north-south direction every mile. This facilitated the quick removal of surface and shallow ground water, which was pumped offsite to keep the area relatively dry. The area was planted with numerous pasture grasses (i.e., bahia grass, para grass, and bermuda grass) and stocked with cattle at a rate of about 1 cow per 2 acres

for a total of about 2,000 head of cattle.

In January 1988, the District acquired the property from the Fellsmere Farm Company and subsequently named the tract the C-54 Retention Area in recognition of its intended purpose within the USJRB Project. The C-54 Retention Area was one of many land purchases made by the District in their efforts to restore the upper basin. The District's RAC recommended that recently acquired properties should be available for public use. After discussing this issue with the Commission's waterfowl management section, in April 1988, the RAC endorsed the concept of managing one of the tracts for wetland wildlife. After evaluation of several options, the waterfowl management section concluded that the C-54 Retention Area had the best potential for intensive wetland management. The District's Governing Board approved the concept of the Commission managing the C-54 Retention Area in January 1989. A site-specific agreement to use MARSH funds from DU was signed in December 1990. State matching funds for development were approved by the 1990 Florida legislature. Shortly thereafter, the Commission entered into an agreement with the District thereby designating the Commission as the lead management agency.

Broadmoor: Similar to Goodwin, Broadmoor was quarter-drained beginning in the mid-1950's by the Sottile family. In the late-1970's, the Sartori family bought the property, known as Willowbrook Farms, which included the Broadmoor Marsh. Broadmoor was not farmed until 1981, when the Sartori family began clearing the area and constructing additional lateral drainage ditches for row crop production, primarily feed corn for dairy cows. In the mid- to late-1980's, portions of Broadmoor were leased to A. Duda and Sons for vegetable production. Broadmoor was farmed until the District and the NRCS purchased the property in March 1998 as part of wetland restoration efforts in the USJRB.

Through the WRP Program, the NRCS allocated funding to modify Broadmoor's existing drainage system into a wetland management system similar to Goodwin's. In doing so, the NRCS consulted with Commission and District staff for operational design and contracted with DU for engineering design and project construction.

During construction, the District and the NRCS expressed interest in having the Commission manage Broadmoor for wetland wildlife similar to Goodwin. The District and the

NRCS provided cost-share funding for restoration activities for the first 3 years after development and convinced the Florida state legislature to allot a full-time FTE staff position for Broadmoor. Shortly thereafter, the Commission entered into a third-party agreement with the District and the NRCS to designate the Commission as the lead management agency (Appendix B). For further details on cost estimates and funding sources see Section VIII of this document.

B. Purposes for Acquisition of the Property

Since the early 1900's, about 70% of the floodplain marshes in the Upper St. Johns River Basin were diked and drained for urbanization and agriculture, including the site of the WMA. These largely unregulated developments destroyed valuable wetlands, decreased water supply during the winter dry season, increased flood peaks, and created critical water quality problems (Campbell et al. 1984).

The U.S. Army Corps of Engineers (COE) and the District have been engaged in an effort to reverse environmental degradation in the upper basin while considering agricultural interests. The main components of this effort include floodplain preservation and restoration through land acquisition and construction of agricultural irrigation and stormwater management reservoirs.

The C-54 Retention Area was purchased to provide 11,600 acre-feet of flood storage capacity within the USJRB, and alleviate interbasin diversion and discharge to the Indian River lagoon. The District and the NRCS purchased Broadmoor jointly as part of the District's ongoing efforts to restore wetlands in the USJRB. Unlike Goodwin however, Broadmoor will not be used for flood storage.

C. Assessment of the Impact of Planned Uses

Commission policy, as expressed in the Agency Strategic Plan (Appendix D), is to provide a diversity of recreational opportunities that are fish and wildlife oriented and that do not adversely impact the long-term well being of fish and wildlife populations or habitats. Such opportunities are developed based upon public interests, usually as expressed during public involvement efforts of the agency. Uses planned for T. M. Goodwin WMA comply with the Conceptual State Lands Management Plan and represent "balanced public utilization", as

described in that document.

D. Acreage that should be declared surplus

No portion of T. M. Goodwin WMA should be considered or declared surplus.

E. Proposed Single- or Multiple-Use Management

The Commission will continue to manage the WMA as a multiple use property. In order to accomplish the array of resource management and public use objectives advocated by the agency and addressed in the Strategic Plan, the Commission has developed specific goals and objectives (See Section V, below) for the WMA. These goals and objectives also demonstrate agency intent to comply with the various purposes for land acquisition, as well as the desires of various user constituencies.

F. Analysis of Multiple-use Potential

The following actions or activities have been considered under the multiple-use concept as possible uses to be allowed on the WMA. “Approved” uses are deemed to be in concert with the District’s purposes for acquisition and with the Commission’s objectives as expressed in the Strategic Plan. "Conditional" means the use may be acceptable, but will be allowed only if approved through a process other than the plan development and approval process. “Rejected” means the item is not in concert with one or more of these various forms of guidance available for decision-making:

	Approved	Conditional	Rejected
• Protection of endangered and threatened species	Y		
• Ecosystem maintenance	Y		
• Soil and water conservation	Y		
• Hunting	Y		
• Fishing	Y		

	Approved	Conditional	Rejected
• Wildlife observation	Y		
• Hiking	Y		
• Bicycling	Y		
• Horseback riding	Y		
• Timber harvest	Y		
• Cattle grazing	Y		
• Camping		Y	
• Apiaries		Y	
• Linear facilities			Y
• Off road vehicle use			Y
• Environmental education	Y		
• Citriculture or other agriculture		Y	
• Preservation of archeological and historical sites	Y		
• (Other uses as determined on an individual basis)	Y		

G. Cooperating Agencies' Responsibilities

The District's responsibilities, as they pertain to Goodwin and Broadmoor, are explicitly defined in their respective lease agreements (Appendices A and B). Briefly, these include maintaining perimeter levees, providing technical and administrative assistance, controlling exotic plants such as water lettuce and hyacinths on Goodwin, and providing operational and management funds for Broadmoor.

**IV. ACCOMPLISHED OBJECTIVES FROM THE 1993 T. M. GOODWIN WMA
CONCEPTUAL MANAGEMENT PLAN**

	<u>Percent and date accomplished</u>
Goal 1: Establish and maintain wetland habitat for waterfowl and other wetland wildlife using integrated wetland management techniques.	
<u>Objective 1:</u> Insure the WMA is adequately designed and developed to allow controlled manipulation of water levels.	100% December, 1995 and July, 2002
<u>Objective 2:</u> Manage wetland habitat using integrated wetland management techniques such as water level manipulation, controlled burning, and selected mechanical techniques to create a diversity of habitat conditions.	Ongoing
Goal 2: Provide forms of consumptive and non-consumptive recreational opportunities to the general public at levels which will minimize environmental impacts and disturbance to wildlife.	
<u>Objective 1:</u> Insure that adequate public access is provided to and within the WMA to accommodate limited, controlled public use.	Ongoing
<u>Objective 2:</u> Provide forms of consumptive use activities that are compatible with resource availability.	Ongoing
<u>Objective 3:</u> Provide non-consumptive opportunities such as hiking and biking, birdwatching, canoeing, etc., and encourage development of environmental educational facilities on the WMA.	Ongoing
Goal 3: Preserve the integrity of wetland habitats on the WMA and conserve the existing natural resources.	
<u>Objective 1:</u> Manage the WMA to maintain and enhance wetland habitat conditions suitable to a variety of wetland wildlife including those species which are listed as endangered, threatened or species of special concern.	Ongoing
<u>Objective 2:</u> Identify special and/or critical areas and provide adequate protection from public use.	Ongoing

V. RESOURCE MANAGEMENT GOALS AND OBJECTIVES

The following goals and objectives have been developed specifically for the WMA and represent ideas of Commission staff, cooperating partners, user groups, and other stakeholders from outside the Commission. The Commission believes these goals to be consistent with the various forms of guidance provided to managers. Target dates for completion of objectives represent the end of the calendar year, and collectively reflect the priorities and work schedule for the area. “Ongoing” objectives are long-term, continuing objectives, and are thus presented first since they contribute to the basis for the management program of the area.

Goal 1: Control invasive exotic pasture grasses (i.e., para grass).

- Objective 1: Continue implementing effective wetland management techniques (e.g., control burning following a freeze) **(ongoing)**.
- Objective 2: Utilize chemical treatments followed by prescribed burning and mechanical manipulations to reduce biomass **(ongoing)**.
- Objective 3: Implement management recommendations from ongoing para grass research project **by 2006**.

Goal 2: Improve water management system to allow for proper drainage and flooding of impoundments.

- Objective 1: Improve drainage by clearing existing drainage ditches and creating new drainage ditches where necessary **(ongoing)**.
- Objective 2: Maintain or increase efficiency of pump stations to maximize pumping capabilities and minimize energy consumption **(ongoing)**.
- Objective 3: Ensure all water control structures provide adequate water level control capabilities **by fall 2004**.

Goal 3: Ensure adequate staffing and financial resources are available for continued long-term management of the WMA.

- Objective 1: Continue to seek additional funds as needed to support ongoing management and research through legislative budget requests and other funding sources (e.g., grants and cooperative partnerships) **(ongoing)**.

Objective 2: Justify management and operational costs with the District as per item #3 in the Broadmoor Lease Agreement (Appendix B) **by December 2005.**

Objective 3: Ensure adequate staffing needs are addressed and provided for as the result of the Commission's re-organization **by 2005.**

Goal 4: Continue to restore, enhance and maintain wetland habitat for waterfowl and other wetland wildlife using integrated wetland management techniques.

Objective 1: Manage wetland habitat using integrated wetland management techniques such as water level manipulation, control burning, selected mechanical techniques, herbicide application, and other scientifically accepted techniques to create a diversity of habitat conditions **(ongoing).**

Objective 2: Manage the WMA to maintain and enhance wetland habitat conditions suitable to a variety of wetland wildlife including those species that are listed as endangered, threatened, or species of special concern **(ongoing).**

Goal 5: Continue to provide consumptive and non-consumptive recreational opportunities to the general public at levels that minimize environmental impacts and detrimental disturbance to wildlife.

Objective 1: Ensure adequate public access is provided to and within the WMA to accommodate limited, controlled public use **(ongoing).**

Objective 2: Provide forms of consumptive use that are compatible with resource availability **(ongoing).**

Objective 3: Provide non-consumptive opportunities such as hiking and biking, birdwatching, canoeing, etc., and encourage environmental educational opportunities **(ongoing).**

Goal 6: Continue to promote and conduct scientific research to control exotic pasture grasses and improve management techniques that encourage the growth of native wetland plants.

Objective 1: Maintain and foster relationships with the University of Florida, other universities, and cooperating agencies to ensure future scientific research needs are met and adequately funded **(ongoing).**

Objective 2: Expand upon techniques used to monitor vegetative structure over time using aerial photogrammetry **(ongoing).**

Objective 3: Monitor and document vegetative response to management **(ongoing).**

VI. RESOURCE MANAGEMENT PROBLEMS AND STRATEGIES

Problem: Restoration of native hydrophytes is threatened by invasive, non-native pasture grasses.

Strategy: Implement cost-effective habitat management techniques following recommendations resulting from cattle grazing/herbicide study.

Strategy: Expand cattle grazing leases and evaluate effects.

Strategy: Increase the use of herbicide control strategies.

Strategy: Consider other alternatives, including introduction of native and benign non-native plant species commonly accepted in wildlife management.

Problem: Wetland habitat on the WMA has been severely altered due to past agricultural drainage practices.

Strategy: Reestablish wetland habitat conditions through controlled management of water levels.

Strategy: Implement accepted wetland management techniques to enhance habitat conditions.

Strategy: Maintain and improve water management system to allow for adequate water conveyance into and out of the impoundments.

Strategy: Monitor the results of management techniques used to manage wetland habitat conditions and direct management activities on those techniques that optimize wetland resource production.

Problem: Goodwin is subject to inundation because of floodwaters diverted by the District during severe storm events.

Strategy: Coordinate with the District to ensure that the removal of storm water is conducted in a timely manner.

Strategy: Establish sufficient communications with the District to ensure that proper notification is given to the Commission so that necessary and feasible management actions can be taken to mitigate detrimental effects.

VII. MANAGEMENT ACTIVITIES AND INTENT

The Commission is responsible for reestablishing and maintaining wetland habitat for the benefit of waterfowl and other wetland wildlife and providing for public use activities. The Commission administers public hunting, as well as other wetland-oriented recreational opportunities.

Public vehicle access within the WMA is restricted to levees with a top width of 15 feet (two-way traffic) or 12 feet (one-way traffic), and prohibited on all remaining levees. Small public parking areas can be established where access levees intersect non-access levees (Figure 2). Commission staff maintains all interior levees. The District maintains the perimeter levees and the access levee leading to the WMA. Interior levees are maintained by mowing along the tops and sides of the levees with a large bat-wing mower. Woody or noxious vegetation that cannot be maintained with the mower are controlled by manipulation of water levels in the impoundments, controlled burning or spot treating with hand tools or herbicide application. Furthermore, the Commission will deploy heavy equipment (i.e., backhoe tractor) to control severe erosion problems and/or minor breaches.

The District has retained the right to use Goodwin for the temporary storage of floodwater when acting under the guidelines of the District's Water Control Manual (WCM). According to the District's preliminary hydrological evaluation of the WMA, the area may be flooded at a frequency of about 1 in 12 years (long-term average), during which time, public use may be prohibited. Also, the District cannot guarantee the availability of water to the WMA for management purposes. As a result, water will be stored and managed on-site. The District, however, will use its best efforts to provide water for the WMA subject to availability and consistency with the District's WCM.

A. Water Level Control

Integrated wetland management techniques are implemented to restore and maintain wetland habitat on the WMA. Water level management is the primary habitat management tool. The southern half of Goodwin is divided into 10 impoundments, each averaging about 150 acres (Figure 2). A central canal bisects the 10 impoundments, with 5 impoundments on either side of the canal. A small levee and a drainage ditch separates the impoundments. Two water control structures (WCS) are installed in each impoundment; one being connected to the central canal and the other connected to a canal extending around Goodwin's perimeter. In addition, 2 10,000 gallon per minute (gpm), electric, bi-directional pumps are located on the southern end of the central canal.

The northern half of Goodwin is used as a reservoir to store water for managing the impoundments (Figure 2). The reservoir is directly connected to the canal extending around the perimeter of the impoundments on the southern half. Two WCS's also connect the reservoir to the central canal; one on the northern end of the central canal, and the other on the southern end of the central canal, adjacent to the electric pump station.

Broadmoor is divided into 7 impoundments, each averaging about 214 acres (Figure 2). A central canal bisects 5 impoundments to the north and 2 impoundments plus an 875-acre reservoir to the south. Previous farming practices on the property dictated the need for numerous lateral drainage ditches, oriented in an east-west direction and spaced approximately 220 feet apart, for precise water level manipulations within each impoundment. The ditches have been left intact and will be maintained to facilitate the conveyance of water. Two WCS's are installed in each impoundment. One is a flashboard riser and the other is a screwgate. Both are connected to the lateral ditches via a drainage ditch oriented in a north-south direction. The WCS's convey water to a slightly deeper secondary drainage ditch that is connected to the central canal and the pump station. The pump station consists of 2 bi-directional electric pumps (one-50 hp and one-100 hp), capable of pumping 10,000 gpm and 20,000 gpm, respectively.

The manipulation of water levels in the impoundments is accomplished either by adding or removing flashboards from the appropriate WCS (s) or by raising or lowering a screwgate on

the appropriate WCS (s) to permit the gravity flow of water into or out of the impoundments. If gravity flow is not possible, the pump station is operated to facilitate gravity flow within the central canal. For instance, if water level in the reservoir pool and the central canal are too low to permit the flooding of an impoundment, the pump station will be operated to discharge water from the reservoir pool into the central canal. The appropriate WCS can then be adjusted to permit the gravity flow of water from the central canal into the selected impoundments. Conversely, if water level in the reservoir and the central canal are too high to permit the dewatering of an impoundment, water from the central canal can be discharged into the reservoir pool. By either opening the screwgate or removing flashboards from the selected WCS, water can then gravity flow from the impoundment into the central canal. Excess water in the central canal is then discharged into the reservoir.

The precise manipulation of water level within each impoundment is the most important technique used to effectively manage plant communities. Water levels in and among the impoundments vary seasonally, particularly during the growing season and range from about 0 to 18 inches. As a general guide, the impoundments are flooded at the higher end of the range (about 9 to 18 inches) from late fall through the winter, and at the lower end of the range (about 0 to 9 inches) during the spring and summer season.

For the reservoirs, water level will fluctuate based on the amount of rainfall the WMA receives and management of water levels in the impoundments. Generally, water level is typically highest during the summer as a result of seasonal rainfall and lower water levels maintained in the impoundments. Water level in the reservoir is typically lowest during the spring when evapotranspiration exceeds rainfall.

Ultimately, water level in Goodwin and Broadmoor reservoirs will be sufficient to maintain a semi-permanent flooded marsh, with water level ranging between 24 to 36 inches. However, because Goodwin serves as a storm water retention area, water level in the Goodwin reservoir cannot exceed an overall mean elevation of 22.0 feet NGVD. This elevation is based on the Engineering Design Plan (Appendix E) and the management and storage of surface water permit issued for Goodwin. Maintaining water level at or below this elevation will provide approximately 11,610 acre-feet of floodwater storage when Goodwin is flooded to an elevation of 25.0 feet NGVD. Currently, no water level restrictions exist for Broadmoor.

B. Vegetation

Habitat management is accomplished by manipulating water level in the impoundments to promote the production of native, moist-soil, wetland plants. Moist soil conditions created during the growing season promote the establishment of native seed producing plants such as panic grass, smartweed, wild millet, and sedges. The timing, speed and length of the drawdowns, and subsequent reflooding influence the species of plants that respond and grow in moist soil conditions. Different manipulations among the impoundments promote specific types of plant response, provide diverse habitat, and result in favorable conditions for a variety of wetland wildlife. Generally, management includes lowering water levels in the impoundments during spring with complete dewatering by summer. Some form of disturbance (i.e., disking, roller chopping, controlled burning) is used as necessary to reduce undesirable vegetation and encourage germination of desirable plants. Shallow reflooding occurs in late summer followed by a gradual increase in water levels up to about 18 inches in the fall and winter. Ten independent impoundments on Goodwin and 7 independent impoundments on Broadmoor allow for the implementation of various management strategies to create diverse habitat. Site-specific management techniques have been developed and are implemented as needed for each impoundment to create a diversity of high quality wetland habitat.

Goodwin reservoir is managed as a semi-permanently flooded open marsh with water depths of 2 feet or more. Permanent flooding has promoted the growth of submersed and floating leaved plants. Management activities have encouraged the growth and production of desirable species such as white waterlily, watershield, and southern naiad. Drawdowns, mechanical manipulations, and controlled burning are used periodically to maintain wetland habitat values.

Broadmoor reservoir also is managed as a semi-permanently flooded open marsh with water depths ranging from 2 to 5 feet. Currently, little emergent or submergent vegetation exists in the reservoir. Management activities in the future will focus on encouraging the growth of submersed and floating leaved plants.

In addition to water level manipulations and soil disturbances, other management

techniques are implemented as needed to improve wetland habitat. Controlled burning is used to help increase food plant production, create or maintain openings, and discourage woody plant production. Undesirable plants (e.g., willows, cattails, etc.) are controlled through burning, herbicide application, or mechanical manipulations such as disking or roller chopping during drawdowns. The District is responsible for controlling exotics such as water lettuce and hyacinths on Goodwin because Goodwin is part of the Upper St. Johns River Federal Flood Control Project. On Broadmoor, the Commission is responsible for controlling exotics, as specified in item 7.j. of the Broadmoor Lease Agreement (Appendix B).

Future management goals and research needs for Goodwin were presented in an unpublished report titled “Wetland Habitat Assessment and Research Needs for the T. M. Goodwin Waterfowl Management Area” (Appendix F). This report followed a comprehensive vegetation inventory conducted on Goodwin in 1997 by a private consulting firm. The purpose for the vegetation inventory was to obtain baseline data to quantify vegetation changes resulting from the implementation of habitat management techniques. The inventory consisted of the identification of signature types (plant assemblages in each of the 10 impoundments and the reservoir (Figure 2)) using low-level aerial infrared photography. Signature types were assigned to the fourth level of classification based on the Florida Land Use, Cover, and Forms classification system (Florida Department of Transportation 1985) and verified in the field. The report documents that within the impoundments, 28 signature types were identified. Of these, 23 (82%) contained at least 1 exotic or noxious plant (defined as an aggressive invader forming dense monotypic stands) with a minimal percent coverage ranging from 0 to 5% and 10 (36%) contained at least 1 exotic or noxious plant that was dominant ($\geq 25\%$ coverage). All of the impoundments contained at least 1 signature type that was dominated by an exotic or noxious plant. The reservoir contained 13 signature types, 6 of which (46%) were dominated by exotic or noxious plants. Furthermore, the report identifies 2 primary study needs: 1) Control exotic/noxious vegetation and 2) Provide an acceptable level of open water habitat interspersed with native wetland plant communities. Based on these needs, several topics have been identified to consider for future investigations. These include studies to assess methods for improving vegetative structure and the effects on aquatic invertebrate and seed availability, controlling noxious and exotic vegetation, evaluating the effects of impoundment treatments on

water quality, and monitoring vegetative structure over time using aerial photogrammetry.

The control of exotic and noxious plants currently poses the greatest habitat management challenge on the WMA. Previous land use led to the establishment of a number of exotic grasses, with para grass being the most invasive. Para grass was initially established on Goodwin as a pasture grass for cattle production and though not intentionally introduced in Broadmoor, has become established in a number of impoundments. Dense, monotypic stands of para grass exist in a number of impoundments on Goodwin and Broadmoor. Para grass out-competes native plants and provides little to no wildlife habitat value.

In response to the management challenges posed by controlling para grass, the Commission began a 3-year cooperative research project with the University of Florida (UF) and a local cattle rancher in March 2003 to examine the effects of traditional herbicide treatments in combination with cattle grazing to control para grass. Three impoundments on Goodwin were selected based on their extensive, monotypic stand of para grass. Each impoundment is divided into 2 sections. One section serves as a control and the other will be subjected to grazing during the growing season (April-November). During the winter (December-March) cattle will be moved off the impoundments to the northern half of Goodwin (Figure 2) that will serve as winter pasture. After the cattle are moved to winter pasture, herbicide (glyphosate-based) will be applied to 3 1-acre experimental plots established in the grazed and un-grazed sections of each impoundment. Approximately 2 weeks after herbicide application, the 3 impoundments will be flooded. Researchers will monitor the vegetation growth and the interspersions of open water until spring, when the cattle will be moved back into the impoundments. The cycle will then begin again and continue until the project is complete in spring 2006.

WMA staff obtained \$37,500 from Florida's Conserve Wildlife Tag Grant Program for this project. These funds will be used to support a UF research assistant and to purchase other miscellaneous materials, field equipment, and to cover travel expenses. In April 2003, the Commission signed a revenue-generating contract with Crescent TS Cattle Company to provide cattle grazing for the para grass research project (Appendix G). The term of the contract is for 3 years with an option to renew it for an additional 3 years.

C. Wildlife

The WMA is managed to provide a diversity of wetland habitat for a variety of wetland wildlife; however, an emphasis is placed on migrating, wintering and resident waterfowl. The diverse habitats range from mud flats to moist-soil and shallow water impoundments to more deeply flooded marsh. Generally, management focuses on implementing the techniques and procedures mentioned in the previous sections. Portions of the WMA (levees, islets, etc.) provide nesting and brood-rearing habitat for resident mottled ducks and black-bellied whistling ducks. Management activities such as roller chopping, disking, and prescribed burning are minimized and public access restricted in areas where active duck nests are detected.

Management is also directed to provide foraging and resting habitat for wading birds and shorebirds. Water management schedules for selected impoundments are specifically designed to provide shallow feeding areas (1 to 3 inches) and exposed mud flats during migratory periods. Selected impoundments also may be managed exclusively to provide essential habitat for endangered or threatened species such as the wood stork.

Since 1995, Commission staff have banded approximately 950 Florida mottled ducks on Goodwin and Broadmoor. Data obtained from hunters reporting these bands are used to help determine the population status of Florida mottled ducks throughout their native range in central and southern Florida.

In July 2002, WMS biologists completed a 3-year project studying the habitat use, movements, and survival of the Florida mottled duck within the USJRB. Adult female Florida mottled ducks were captured for this project and were implanted with an abdominal radio transmitter. Ducks were then monitored on a daily basis using trucks mounted with radio signal receivers and antennae as well as from aircraft similarly equipped. Data from this project indicate that marsh habitats are very important to Florida mottled ducks. However, data also indicated that canals and ponds in urban areas provide valuable habitat, especially during drought conditions. Another aspect of this project was to gather information on nesting habitat preferences, timing of nesting, and movements. Florida mottled ducks preferred nest sites with vegetation heights taller than the immediate area surrounding the nest. Nest initiation occurred between the months of March and July, with the median number of nests being initiated during

April. Data also suggest that Florida mottled ducks tend to have smaller home ranges than previously thought. Since the amount of scientific data available for the Florida mottled duck is extremely sparse, this study is a step towards acquiring necessary information to better manage Florida mottled duck populations and the critical habitats on which they depend.

D. Fisheries

To help meet the demand for sport fishing opportunities on the WMA, approximately 2,000 largemouth bass were stocked in Goodwin Lake in the mid 1990's. Goodwin Lake is a 37-ha borrow pit in the east-central portion of Goodwin. Beginning in November 2000, fishing was regulated on Goodwin Lake to allow limited fishing opportunities. Bank fishing is permitted year-round and boat fishing is permitted on Mondays and Thursdays.

Plans are also being made to stock largemouth bass in the Broadmoor reservoir. However, water level fluctuations and low dissolved oxygen in the reservoir may prohibit the establishment of a sport fish population. If a viable sport fish population becomes established, fishing in the Broadmoor reservoir would be available on a limited basis to both bank and boat fishing, excluding hunt days.

For Goodwin and Broadmoor impoundments, on-going management is incompatible with maintaining a sport fishery. However, management activities provide numerous fish species important as prey to wading birds.

E. Recreation

Morning-only waterfowl hunts are conducted on a limited basis during the established waterfowl seasons. A daily quota permit allows hunting on Tuesdays and Saturdays. A maximum of 30 permits (maximum of 4 hunters per permit) are issued during a telephone reservation process every Wednesday prior to each hunt. The waterfowl hunting program on the area will be modified as appropriate to maximize hunting opportunities while maintaining a quality hunting experience compatible with the sustained welfare of waterfowl populations using the area. Additional consumptive recreation, such as frog gigging or fishing may be considered

based on public demand, availability of a harvestable resource, and compatibility with waterfowl management objectives.

Morning-only snipe hunts are also conducted following the youth waterfowl hunt held in late-January or early-February. Snipe hunts are offered on Tuesdays and Saturdays. The number of snipe hunt permits (maximum of 4 hunters per permit) is determined by WMA staff 1 week prior to the start of snipe hunting on the area, based on the amount of suitable habitat available, and is limited to no less than 50 acres of hunting area per permit. Snipe hunt permits are issued on a first-come first-served basis the morning of each hunt at the headquarters check station.

Non-consumptive recreational opportunities are available year-round, except during public hunts. Parking facilities are provided for the general public; however, motorized vehicle access beyond parking facilities is prohibited. Recreational opportunities such as hiking and biking on designated roads or levees, bird watching, canoeing, and boating are available. The WMA is part of the Great Florida Birding Trail and provides excellent viewing opportunities for waterfowl, shorebirds, and wading birds. Visitors can expect to observe between 50-60 different bird species on the WMA during fall and spring migrations. Also, there is considerable potential for using the area for environmental education. An information kiosk has been placed near the office. The kiosk contains informational brochures for the WMA and details public recreational opportunities available on the WMA. A birding/observation tower was built in June 2001, which provides excellent viewing opportunities of the impoundments and reservoir on Goodwin. Development of additional information kiosks with boardwalks and/or interpretative trails would provide an excellent opportunity to inform and educate the general public on a variety of wetland resource topics.

VIII. COST ESTIMATES AND FUNDING SOURCES

Development of Goodwin began in 1990 and was completed by 1995. Development activities included repairing approximately 15 miles of levees, installing 22 water control structures and 1 pump station, and building an office and maintenance facility. Development costs totaled \$1,340,500, which included the above mentioned construction activities as well as operating capital (equipment cost), 1 full-time staff position plus an assistant, and operating expenses.

In September 1991, the Commission contracted with the District's engineering staff to prepare a detailed design plan for Goodwin construction activities. This design plan was based on the Commission's design concept and operating criteria for Goodwin. The design plan was completed by the District in August 1992 and presented in Appendix E.

Funding for development of Goodwin was derived from the DU MARSH program, the North American Wetlands Conservation Act (NAWCA), and the Commission. DU contributed \$461,500 for project development, which was equally matched by the Commission for a total of \$923,000. Collectively, these funds were used to match 4 grants totaling \$417,500 from the North American Wetlands Conservation Council under the auspices of the NAWCA. Funding from all 3 sources totaled \$1,340,500 for project development.

Development of Broadmoor began during the winter of 2001 and was completed in August 2002. Broadmoor's design was patterned after Goodwin's and included a complex of 7 moist-soil management units and a reservoir. Development activities included repairing/building approximately 14 miles of levees, installing 20 water control structures and a pump station. Construction costs totaled \$1,700,000, which were provided by NRCS from WRP funds. In addition, NRCS and the District entered a 3-year agreement to provide a total of \$346,000 of matching funds (25% District : 75% NRCS) to the Commission for restoration.

The following represents the actual and unmet budgetary needs for managing the WMA. This budget was developed using data from the Commission and other cooperating entities, and is based on actual costs for land management activities, equipment purchase and maintenance, and for development of fixed capital facilities. The budget below, although exceeding what the Commission has been receiving through the appropriations process, is consistent with the direction taken by current operational planning for the WMA. Budget categories are those currently recognized by the Commission.

T. M. Goodwin WMA Conceptual Management Plan Budget

FY 2001-2002

ALLOTMENT

Expense Category	\$3,718.00
OCO	\$14,500.00
Rollerchoppers	
Special Category	<u>\$66,272.00</u>

TOTAL ALLOTMENT **\$84,490.00**

EXPENDITURES

Resource Management

Wetlands Management	\$22,672.62
Other	\$2,712.87
Subtotal	\$25,385.49

Administration

General Administration	\$3,829.94
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Support

Training/Staff Development	\$3,521.03
Vehicle/Farm Equipment Purchase	\$25,600.00
Rollerchoppers and Bush Hog mower	
Vehicle/Farm Equipment Operation and Maintenance	\$17,206.05
Includes: 2 tractors, 2 ATVs, 1 Bush Hog mower, 1 disk, 1 rollerchopper, 3 trucks, 1 dumptruck, 1 backhoe	
Wetland Research	\$997.39
Other	\$3,840.28
Subtotal	\$51,164.75

Capital Improvements

Facility Maintenance	<u>\$4,405.93</u>
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TOTAL EXPENDITURES **\$84,786.11**

T. M. Goodwin WMA Conceptual Management Plan Budget

FY 2002-2003

ALLOTMENT

Expense Category	\$9,302.00
OCO	\$63,681.00
Truck and 6420 tractor	
Special Category **	<u>\$96,272.00</u>

TOTAL ALLOTMENT **\$169,255.00**

**** Includes \$30,000 from Appropriation
Category #109940 00 for new disk**

**** Includes \$20,000 for Mottled Duck
Production Area, not reflected in
Total Expenditures below**

EXPENDITURES

Resource Management

Wetlands Management	\$18,154.61
Other	\$1,971.00
Subtotal	\$20,125.61

Administration

General Administration	\$4,979.33
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Support

Training/Staff Development	\$4,223.63
Vehicle/Farm Equipment Purchase	\$97,395.44
F-250 P/U truck, 6420 tractor, disk, airboat hull	
Vehicle/Farm Equipment Operation and Maintenance	\$7,000.12
Includes: 4 tractors, 2 ATVs, 1 Bush Hog mower, 2 disks, 2 rollerchoppers, 3 trucks, 1 dumptruck, 1 backhoe, 1 PTO pump	
Wetland Research	\$15,952.47
Other	\$1,051.23
Subtotal	\$125,622.89

Capital Improvements

Facility Maintenance	<u>\$56.00</u>
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TOTAL EXPENDITURES **\$150,783.83**

T. M. Goodwin WMA Conceptual Management Plan Budget
2003-2008 five-year projection

Resource Management

Wetlands Management	\$128,260.98
Other	\$10,466.01
Subtotal	\$138,726.99

Administration

General Administration	\$26,440.24
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Support

Training/Staff Development	\$22,427.48
Vehicle Purchase	\$265,000.00
Includes: 3 trucks, 1 tractor, 1 disk, 1 ditch spinner, 1 herbicide tank and boom	
Vehicle Operation and Maintenance	\$64,814.13
Wetland Research	\$10,620.00
Other	\$5,582.03
Subtotal	\$368,443.63

Capital Improvements

Facility Maintenance	<u>\$23,395.49</u>
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<u>TOTAL</u>	\$557,006.35
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IX. ANALYSIS OF POTENTIAL FOR CONTRACTING PRIVATE VENDORS FOR RESTORATION AND MANAGEMENT ACTIVITIES

The following management and restoration activities have been considered for outsourcing to private entities. It has been determined that items selected as “approved” below are those that the Commission either does not have in-house expertise to accomplish that can be done at less cost by an outside provider of services. Those items selected as “rejected” represent those for which the Commission has in-house expertise, and/or which the agency has found it can accomplish at less expense than through contracting with outside sources. “Conditional” items are those that could be done either by an outside provider or by the agency at virtually the same cost or with the same level of competence:

	Approved	Conditional	Rejected
• Road development and maintenance		Y	
• Dike and levee maintenance		Y	
• Prescribed burning			Y
• Vegetation inventories		Y	
• Public contact and educational facilities development		Y	
• Exotic species control		Y	

X. COMPLIANCE WITH STATE, FEDERAL, AND LOCAL GOVERNMENT REQUIREMENTS

The operational functions of Commission personnel are governed by the agency's Internal Management Policies and Procedures (IMPP) Manual. This IMPP Manual provides internal guidance regarding many subjects affecting the responsibilities of agency personnel, including personnel management, safety issues, uniforms and personal appearance, training, as well as accounting, purchasing and budgetary procedures.

When public facilities are developed on areas managed by the Commission, every effort is made to comply with Public Law 101-336, the Americans with Disabilities Act. As new facilities are developed, the universal access requirements of this law are followed in all cases except where the law allows reasonable exceptions (e.g., where handicap access is structurally impractical, or where providing such access would change the fundamental character of the facility being provided).

Uses planned for the WMA are in compliance with the mission of the Commission as described in its Agency Strategic Plan (Appendix D). Such uses also comply with the authorities of the Commission as derived from Article IV, Section 9 of the Florida Constitution as well as the guidance and directives of Chapters 372, 253, 259, 327, 370, 403, 870, 373, 375, 378, 487, and 597 of the Florida Statutes.

X. LITERATURE CITED

Campbell, D., D. A. Munch, R. Johnson, M. P. Parker, B. Parker, D. V. Rao, R. Marella, and E. Albanesi. 1984. St. Johns River Water Management District. Pages 158-177 *in* E. A. Fernald and D. J. Patton, eds. Water resources atlas of Florida. Fla. State Univ., Tallahassee, Fla.

XII. APPENDICES

Appendix A

T. M. Goodwin Lease Agreement

Appendix B

Broadmoor Marsh Lease Agreement

Appendix C

Archaeological and Historic Resources on T. M. Goodwin WMA and Guidelines
for the
Management of Archaeological and Historic Resources

Appendix D

Commission Strategic Plan

Appendix E

T. M. Goodwin Engineering Design Plan

Appendix F

Wetland Habitat Assessment and Research Needs
for the
T. M. Goodwin Waterfowl Management Area

Appendix G

T. M. Goodwin WMA Cattle Grazing Contract

