Technical Memorandum
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ENVIRONMENTAL ASSESSMENT OF McARTHUR RANCH

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by

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INTRODUCTION

This report represents the environmental assessment of the McArthur Ranch, purchased by the South Florida Water Management District (District) in December 1988, through the "Save Our Rivers" (SOR) land acquisition program. This program was enacted in 1981 to acquire land for water supply, water management, and conservation and protection of water resources. The ranch represents a small fraction of the acreage in the Kissimmee River floodplain proposed for acquisition. District ownership of this land is essential to meet the objective of restoring natural ecological form, function and environmental values of the river system as directed in the Kissimmee River Restoration Alternative Plan Evaluation and Preliminary Design Report (Loftin et al. 1990).

This environmental assessment was initiated to identify environmental characteristics of the property and propose management recommendations to meet objectives set forth in Chapter 373.59 Florida Statutes, which mandates that SOR lands be managed with the intent to "restore and protect the natural state and condition." Management recommendations will also adhere to the goals established for Kissimmee River restoration which includes reestablishing hydrologic characteristics as they existed prior to channelization. Field work for this assessment was conducted on 11 April, 26 April, 15 May, 24 July and 8 August 1990.

McArthur Ranch encompasses nearly 7,940 acres (3,213 ha) in Highlands County, Florida, excluding the 400 acres (162 ha) of spoil material immediately east of C-38. The property is located in Pool C of the Kissimmee River, west of C-38, approximately 2.5 km from S-65B and less than 0.25 km east of Lorida, Florida (Fig. 1). State Road 98 and Bluff Hammock Road form boundaries to the south and west. The north boundary extends east from Bluff Hammock Road and generally follows section lines before transversing C-38 to the river channel. A less distinct southern boundary briefly follows Istokpoga Canal before winding in a northeast direction parallel to Istokpoga Creek. Access to the property is via two unpaved roads which enter the property from State Road 98. Adjoining land south of McArthur, including Istokpoga Creek, is currently under District ownership, while land immediately north of McArthur Ranch remains in private ownership.

Historically, the property was situated within an extensive wetland ecosystem dominated by the Kissimmee River (and floodplain) and Lake Istokpoga. A vast area of wet prairie, broadleaf marsh and wetland sloughs occurred between these two systems, providing sheet flow west to the lake and east to the river. The direction and degree of this sheet flow was probably influenced by river and lake water levels. Flow was concentrated in two prominent slough systems, the largest of which, Istokpoga Creek, formed a hydrologic connection between the lake and river, and represented a major tributary to the river. A second slough located north of the creek appears to have drained southwest towards Lake Istokpoga during periods when the river floodplain was inundated.

Istokpoga Canal, completed around 1940, provided the area's first man-induced drainage influence. By 1944 extensive clearing of palmetto prairie for pasture had already occurred on the property (Fig. 2). This was followed in the late 1940's by installation of a secondary drainage network to facilitate drainage and divert flow east to the river. The present drainage network was completed during the 1960's, concurrent with construction of C-38, and resulted in extensive conversion of wetland habitat to improved and native rangeland. Prior to District acquisition, the ranch

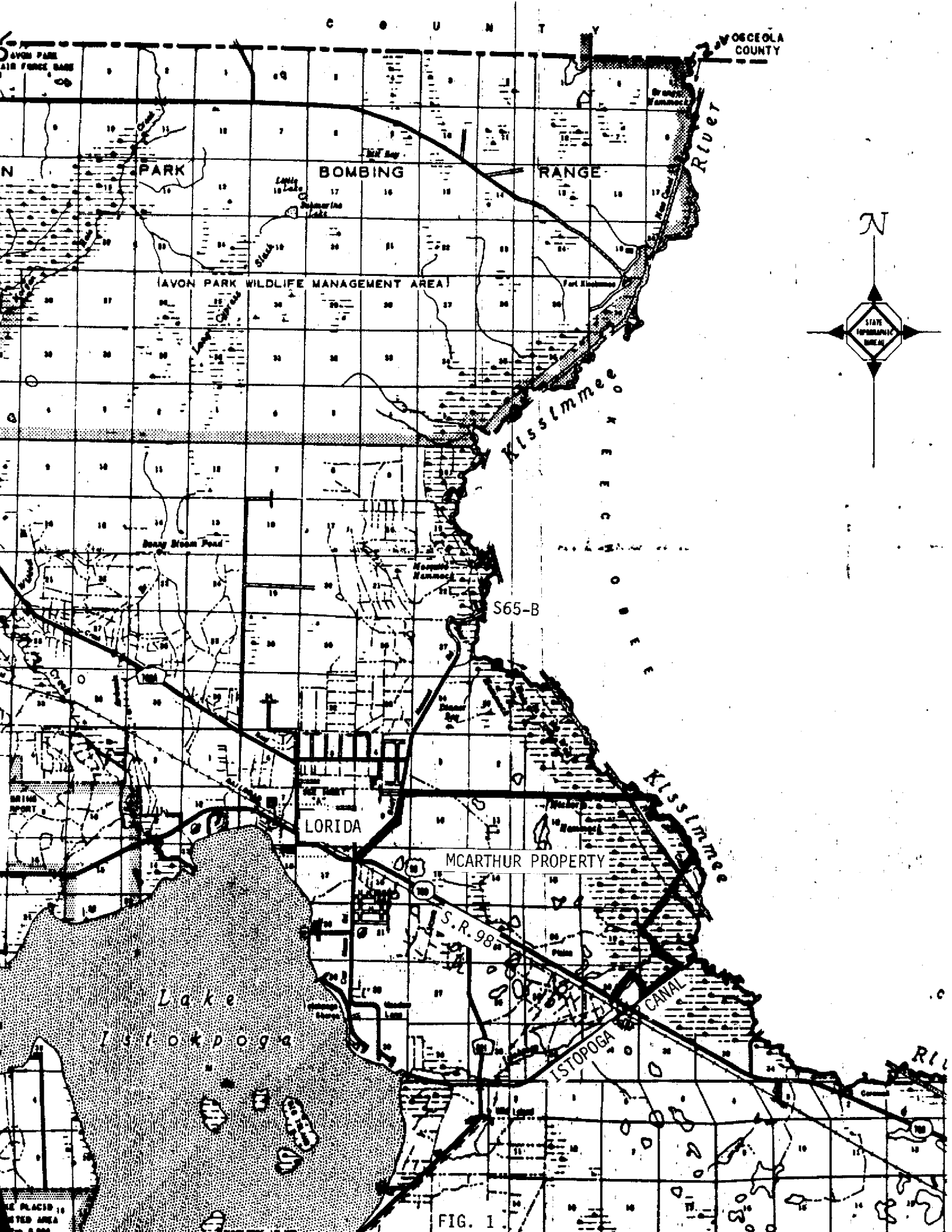

COUNTY
OSCEOLA COUNTY
PARK
BOMBING
RANGE
AVON PARK WILDLIFE MANAGEMENT AREA
Kissimmee River
N
S65-B
LORIDA
MCARTHUR PROPERTY
S.R. 98
Lake
Istokpoga
ISTOPOGA CANAL
Kissimmee

FIG. 1

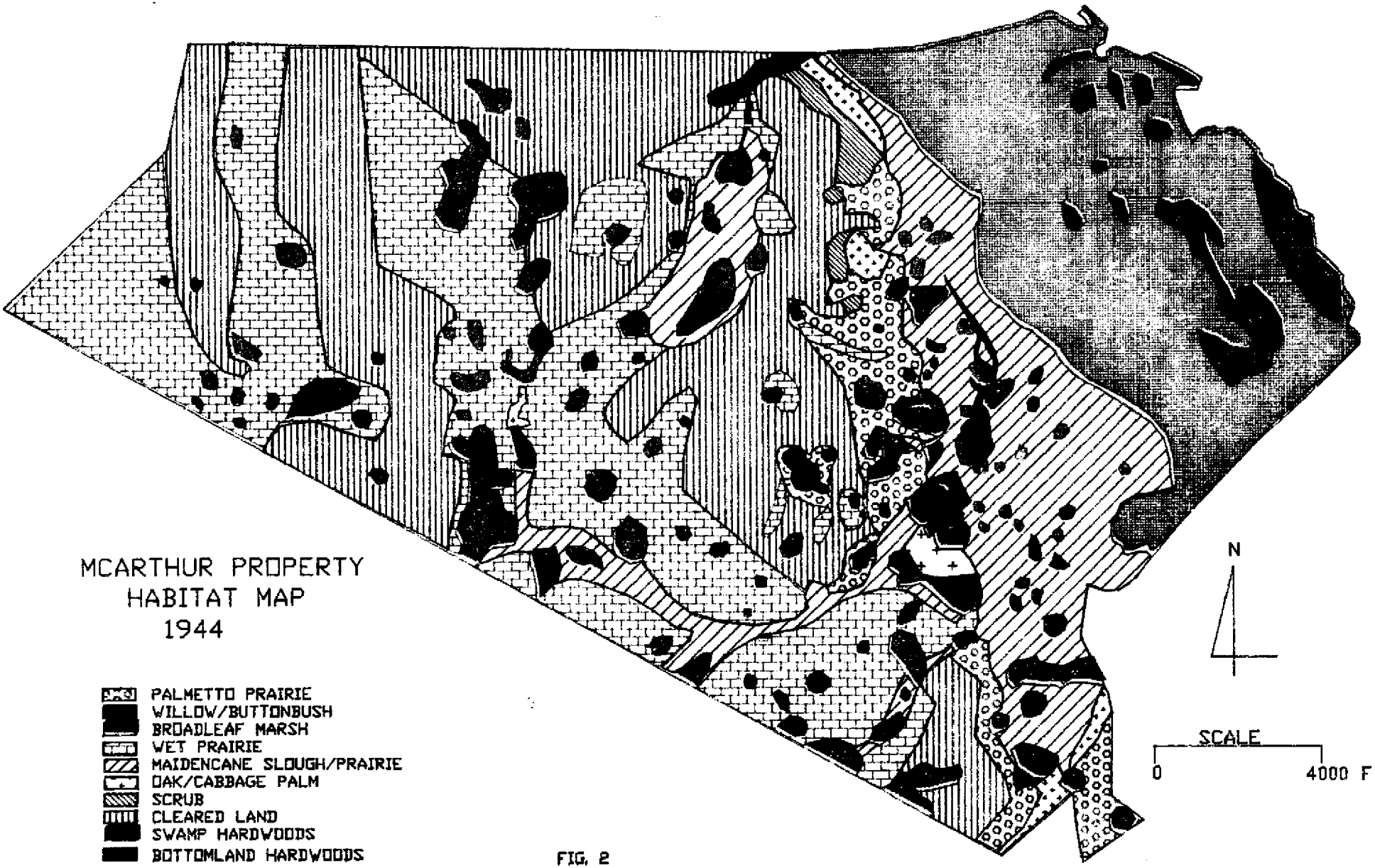

MCARTHUR PROPERTY
HABITAT MAP
1944
PALMETTO PRAIRIE
WILLOW/BUTTONBUSH
BROADLEAF MARSH
WET PRAIRIE
MAIDENCANE SLOUGH/PRAIRIE
OAK/CABBAGE PALM
SCRUB
CLEARED LAND
SWAMP HARDWOODS
BOTTOMLAND HARDWOODS
N
SCALE
0
4000 F

FIG. 2

was operated exclusively for production of beef cattle, supporting a herd of 2,200-2,500 cattle.

TOPOGRAPHY

Elevations decline rapidly from 55-60 ft NGVD in the northwest corner of the property to below 34 ft NGVD in the floodplain (Fig. 3). Minimum elevations of 33.4 to 33.7 ft NGVD occur in the central and southern portions of the floodplain. A gradual incline occurs between floodplain and treeline (38-40 ft) where elevations rise quickly to 50 ft. In general, elevations west of the treeline gradually increase in a west-northwest direction approaching 60 ft NGVD in the vicinity of Bluff Hammock Road. Additional variations in topography occur in sloughs and depressions which represent localized declines in elevation. Figure 3 is based on United States Geological Survey quadrangle maps at five foot intervals. More accurate topographic information (one foot intervals) is currently available only for the river floodplain.

HYDROLOGY

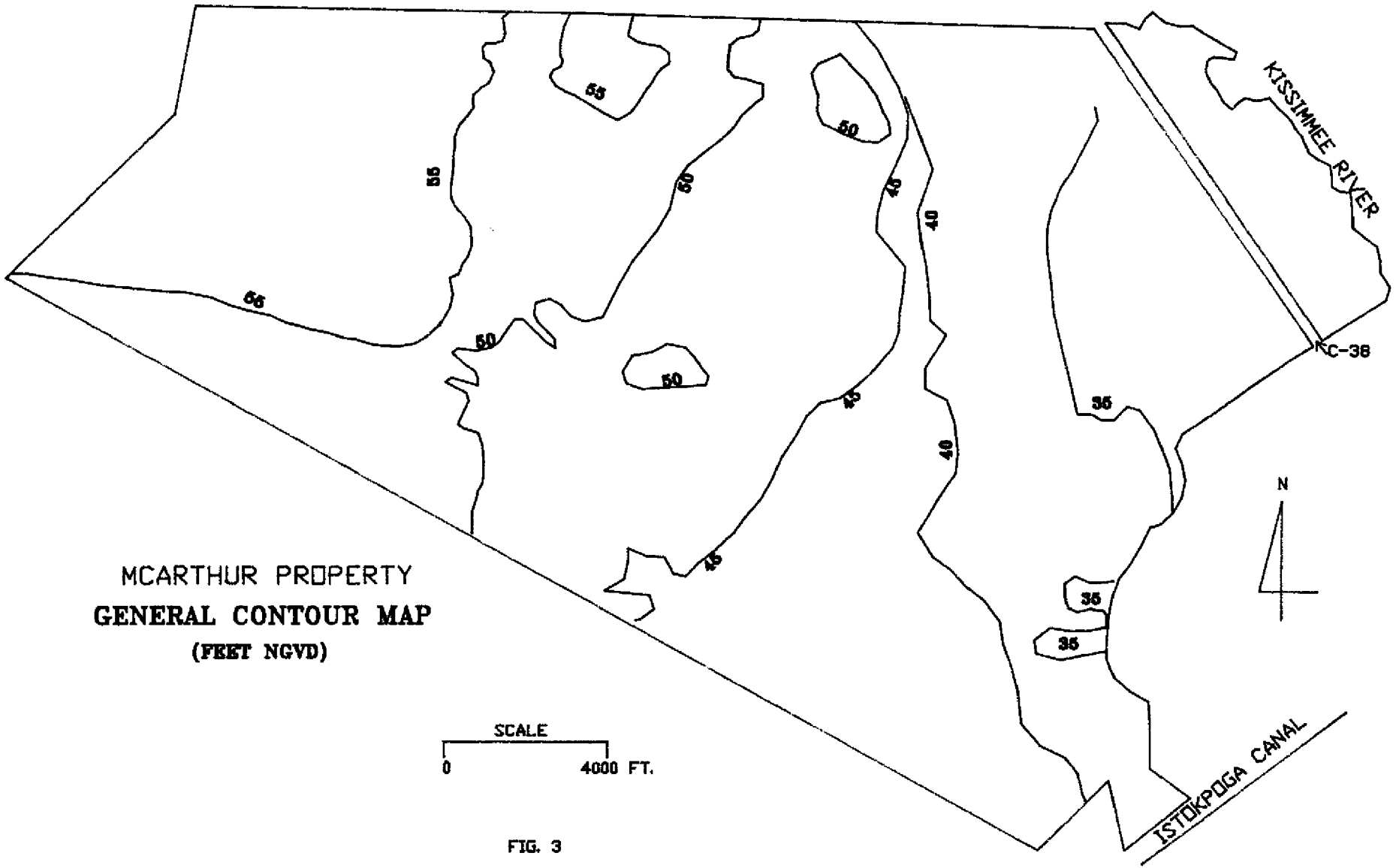
In general, the natural floodplain flow was to the southeast towards Istokpoga Creek. Under pre-channelization conditions, wet prairie west of the floodplain contributed sheet flow to several slough systems, including Istokpoga Creek and a second drainage to the north, which flowed west towards Lake Istokpoga. During normal to wet years, 75-94% of the floodplain was inundated virtually the entire year (Loftin et al. 1990). Aerial photography reveals that under these conditions a vast area of wet prairie and broadleaf marsh, west of the floodplain, was inundated for three to seven months depending on local topography and rainfall.

Presently, drainage of the property is augmented by two secondary ditches which convey water to Pool C, and ultimately C-38 (Fig. 4). Ditch 1 was constructed parallel to C-38 to facilitate drainage of the property's floodplain. The levee which accompanies this ditch bisects the floodplain, functioning as a barrier to river overflow. Subsequently, a series of east-west ditches were installed to expedite floodplain drainage. These ditches were later equipped with 36" diameter CMP (Corrugated Metal Pipe) culverts and riser structures, many of which are no longer functional for water control. Ditch 2 connects several wetland systems and extends from the northern boundary, nearly eight miles south and east to Pool C. It is apparent that this ditch conveys substantial volumes of water off the property during the wet season. Drainage from the property enters Pool C via water control structure B, a 72" diameter CMP culvert equipped with riser, located just south of the confluence of ditches 1 and 2. Another 72" diameter CMP with riser structure (Culvert A) regulates water draining north, from several peripheral sloughs, into the floodplain.

Currently, some drainage still occurs southwest towards Istokpoga Canal through several culverts beneath State Road 98. Although ditch 2 diverts most of this drainage east to the river, considerable overflow is conveyed south to Istokpoga Canal via a deep swale adjacent to SR 98. Volume and direction of this drainage may be influenced primarily by Lake Istokpoga regulation schedules.

SOILS

The predominant soils consist of Myakka fine sand and Immokalee sand, nearly level poorly drained soils which naturally supported wet prairie and native grassland



MCARTHUR PROPERTY

GENERAL CONTOUR MAP

(FEET NGVD)

FIG. 3

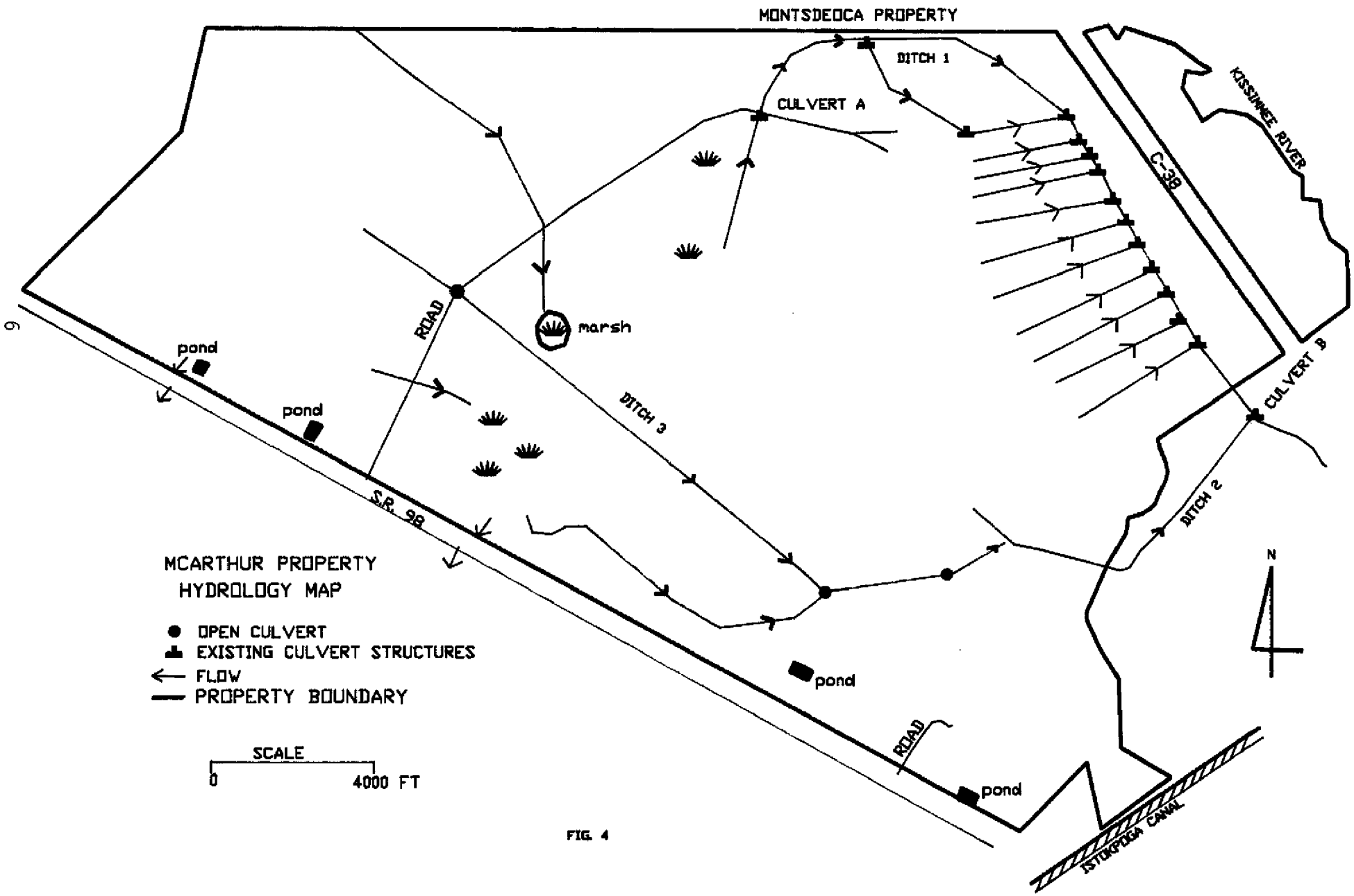

MONTSDEOCA PROPERTY
DITCH 1
CULVERT A
KISSIMMEE RIVER
C-38
CULVERT B
ROAD
marsh
pond
pond
DITCH 3
DITCH 2
S.R. 98
MCARTHUR PROPERTY
HYDROLOGY MAP
OPEN CULVERT
EXISTING CULVERT STRUCTURES
FLOW
PROPERTY BOUNDARY
SCALE
0
4000 FT
pond
ROAD
pond
N
ISTOKPOGA CANAL

FIG. 4

communities (Fig. 5). Dominant wetland soils include Gator muck and Tequesta muck, nearly level poorly drained soils characteristic of the Kissimmee River floodplain. Historically, Tequesta muck was inundated for almost the entire year and Gator muck was ponded for 6-9 months (Carter et al. 1989). Despite extensive drainage by C-38 and secondary ditches, these soils are still sufficiently inundated to maintain remnants of broadleaf marsh vegetation. Felda fine sand, depressional, occurs at slightly higher elevations creating a transitional zone between floodplain and treeline. Basinger fine sand, depressional, Placid fine sand, depressional and Samsula muck, are nearly level, very poorly drained soils found west of the treeline. Under natural conditions these soils were inundated for up to 12 months and contained major sloughs. Placid fine sand, depressional and Samsula muck are soils associated with shrub wetlands (willow) and hardwood swamp (bay, gum). Basinger fine sand, depressional had a slightly shorter hydroperiod (4-6 months) and supported wet prairie and maidencane communities. Bradenton and Basinger fine sands are nearly level, poorly drained soils that flood infrequently, although water levels are maintained at or near the ground surface during the wet season. These soils support hammocks and palmetto scrub at the floodplain periphery. More xeric soils include Pomello sand, a level to gently sloping, moderately well drained soil typical of sand ridge and scrub habitat.

VEGETATION

Figure 2 depicts habitat patterns as they existed in 1944 based on interpretation of aerial photography. This map confirms that distinct changes in vegetation have occurred following Kissimmee River channelization. Historically, long hydroperiods in the floodplain supported expansive broadleaf marsh communities mixed with dense stands of buttonbush and willow. Accelerated drainage converted broadleaf marsh and maidencane prairie communities in the floodplain to unimproved pasture dominated by more mesic species. Wetland shrub communities near the river were eliminated or invaded by dense stands of wax myrtle. The area exhibiting the greatest change in vegetative characteristics includes land west of the hammock line, where overdrainage, clearing, and introduction of exotic grass species were instrumental in converting vast areas of wet prairie to improved pasture. Depressional areas along the floodplain perimeter, and deeper sloughs west of the floodplain still contain natural wetland vegetation due to wet season inundation. However, much of the maidencane slough and wet prairie present in 1944 has been eliminated or severely reduced by channelization.

Drier conditions have resulted in intensified growth of hardwood shrubs in oak hammock and scrub communities. Much of the palmetto prairie extending west of the treeline was cleared for pastureland, with the remainder at the edge of the floodplain approaching advanced stages of succession (oak hammock) apparently due to increased drainage and fire suppression.

Ten habitat types were identified on the McArthur property including several that are unique to District Kissimmee River land acquisitions (Table 1). The property's vegetation will be discussed in three sections-Kissimmee River floodplain, the hammock line which represents the historic floodplain border, and the pasture dominated land west of the hammock line.

River floodplain

Kissimmee River floodplain encompasses nearly 2,000 acres (809 ha) from the hammock line to C-38. Drainage has resulted in the loss of expansive broadleaf

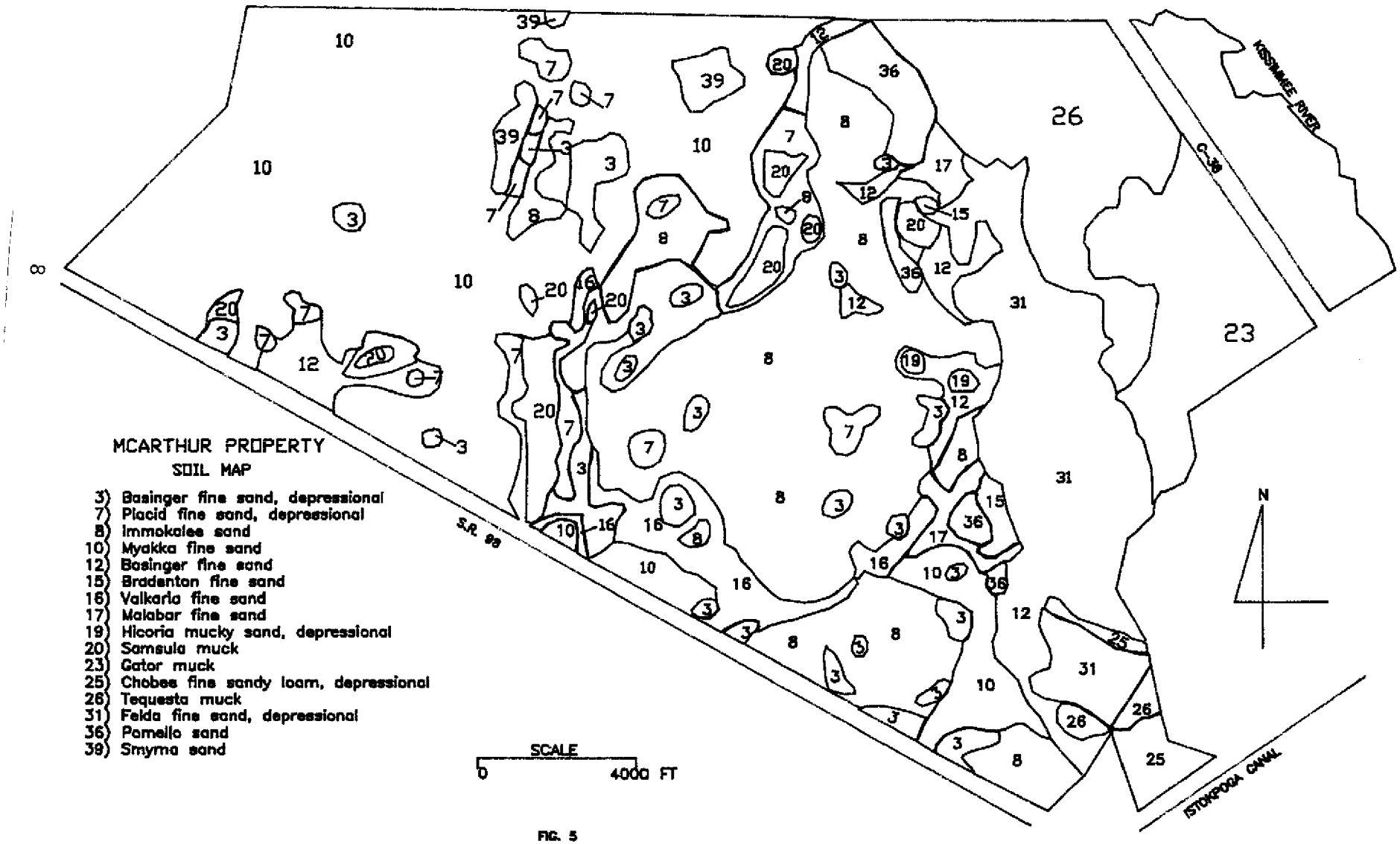

MCARTHUR PROPERTY
SOIL MAP
3) Basinger fine sand, depressional
7) Placid fine sand, depressional
8) Immokalee sand
10) Myakka fine sand
12) Basinger fine sand
15) Bradenton fine sand
16) Valkaria fine sand
17) Malabar fine sand
19) Hicoria mucky sand, depressional
20) Samsula muck
23) Gator muck
25) Chobee fine sandy loam, depressional
26) Tequesta muck
31) Felda fine sand, depressional
36) Pomello sand
39) Smyrna sand
S.R. 98
C-68
KISSIMMEE RIVER
ISTOKPOGA CANAL
SCALE
0
4000 FT
N

FIG. 5

TABLE 1. Habitat Types for McArthur Ranch

Habitat Type	Acres	Hectares	% of Total
Improved Pasture	4367	1767	55
Native Range	1136	460	14
Wet Prairie	596	241	8
Shrub Thicket - Wax Myrtle	591	239	7
Broadleaf Marsh	449	182	6
Oak/Cabbage Palm Hammock	379	153	5
Shrub Swamp-Buttonbush/Willow	157	63	2
Palmetto Scrub	133	54	2
Swamp Hardwoods	90	36	1
Sand Live Oak Scrub	39	16	<1
Bottomland Hardwoods	5	2	<1
TOTAL	7942	3214	100

marsh communities which have been converted to native pasture and shrub habitat. Those areas of the floodplain at lower elevations (generally below 34 ft NGVD) still retain fragments of broadleaf marsh (Fig. 6). However, the majority of floodplain is now dominated primarily by chalky bluestem (Andropogon capillipes), vasey grass (Paspalum urvellei) and broomsedge (Andropogon virginicus) with scattered willow (Salix caroliniana), buttonbush (Cephalanthus occidentalis) and wax myrtle (Myrica cerifera). The property east of drainage ditch 1 is composed exclusively of dense wax myrtle and willow. Immediately east of the hammock line is a transitional zone comprised of wet prairie species, white top sedge (Dichromena colorata), beaked rushes (Rhynchospora microcarpa, R. tracyi), and flatsedge (Cyperus polystachyos); mixed with bahia grass (Paspalum notatum).

Hammock line

The hammock line represents a series of oak hammocks between 40 and 50 ft NGVD in elevation and situated on a ridge just west of the floodplain. Scattered along the hammock margin are numerous depressional areas dominated by pickerelweed (Pontederia cordata) or prairie iris (Iris hexagona), and several shrub wetlands consisting of willow and buttonbush. The majority of vegetation along the hammock line consists of live oak (Quercus virginiana)/cabbage palm (Sabal palmetto) hammock (360 acres, 146 ha), 115 acres (46 ha) of saw palmetto (Serenoa repens) scrub and 39 acres (16 ha) of sand scrub dominated by sand live oak (Quercus virginiana maritima), chapman oak (Quercus chapmanii), saw palmetto and fetterbush (Lyonia spp.). Oak/cabbage palm hammock occurs on the east side of the ridge above 40 ft NGVD, changing to scrub as ground elevation approaches 50 ft NGVD.

West of the hammock line

Improved pasture comprises 55% of the property, occurring exclusively west of the hammock line. Floodplain drainage, and planting of bahia and pangola grass (Digitaria decumbens) have severely reduced the native wet prairie and grassland communities. Remnants of wet prairie consisting of native grasses, beaked-rush (Rhynchospora spp.), yellow-eyed grass (Xyris sp.) and meadow beauty (Rhexia nashii) are confined to lower elevations which flood seasonally. Drainageways and topographic depressions have longer hydroperiods and contain fragmented wetlands composed of pickerelweed, smartweed (Polygonum sp.), maidencane (Panicum hemitomon) and soft rush (Juncus effusus).

Several diverse slough systems bisect the overdrained pasture, the largest extends west to State Road 98 and is characterized by a mosaic of different vegetative communities, including swamp hardwoods, broadleaf marsh, sawgrass marsh, and shrub wetlands. Black gum (Nyssa sylvatica), sweet bay (Magnolia virginiana), and swamp bay (Persea palustris) comprise the slough perimeter, while several wetland communities including sawgrass (Cladium jamaicensis), buttonbush and golden canna (Canna flaccida) occupy the slough interior. Since they occur at lower elevations, these wetlands are maintained by wet season runoff. However, current hydroperiods are considerably shorter than pre-channelization conditions as indicated by heavy encroachment of wax myrtle, most noticeable in perimeter swamp hardwood stands. Another wetland hardwood community, dominated by water oak (Quercus nigra) and laurel oak (Quercus laurifolia), occurs on the extreme north end of the property and drains northeast to the floodplain through private land.

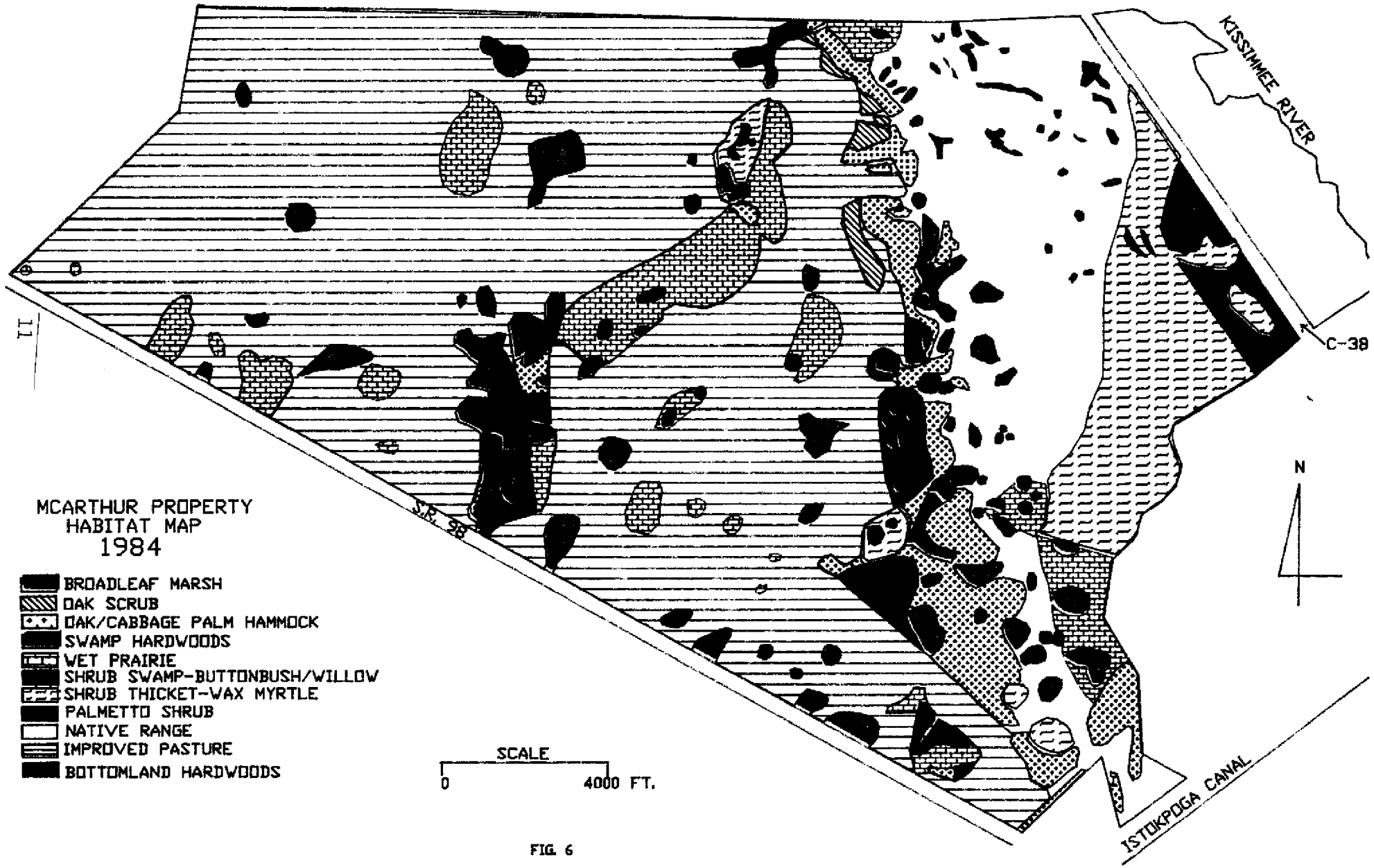

KISSIMMEE RIVER
C-38
I 1
S.R. 98
N
MCARTHUR PROPERTY
HABITAT MAP
1984
BROADLEAF MARSH
OAK SCRUB
OAK/CABBAGE PALM HAMMOCK
SWAMP HARDWOODS
WET PRAIRIE
SHRUB SWAMP-BUTTONBUSH/WILLOW
SHRUB THICKET-WAX MYRTLE
PALMETTO SHRUB
NATIVE RANGE
IMPROVED PASTURE
BOTTOMLAND HARDWOODS
SCALE
0
4000 FT.
ISTOKPOGA CANAL

FIG. 6

Encroachment of exotic species is minimal with the exception of introduced tame grasses, rattlebox (Sesbania punicea), an introduced perennial which has become quite abundant on disturbed pastureland, and Guava (Psidium quajava), a small tree scattered throughout the property. Cogongrass (Imperata cylindrica), considered one of the ten worst weeds in the world (Tanner and Drummond, 1985), has been observed on the property. The aggressive growth characteristics of this exotic species could create a management problem.

Several plant species designated as threatened by the Florida Department of Agriculture and Consumer Services, and listed in the Preservation of Native Flora of Florida Act, Section 581.185-187, Florida Statutes, were identified. These included Florida shield fern (Dryopteris ludoviciana), big yellow milkwort (Polygala rugelli) giant ladies tresses (Spiranthes praecox), and sand holly (Ilex ambigua).

Appendix 1 includes a partial list of flora occurring on the property and Appendix 2 lists additional plant species mostly endemic to scrub habitat.

FISH AND WILDLIFE

The natural biological diversity of the Kissimmee River ecosystem prior to channelization has been well documented (Perrin et al. 1982). Since channelization, degradation of natural wetland communities has resulted in a decrease in species numbers and diversity. However, despite overdrainage, the juxtaposition of upland and wetland communities attracts a variety of wildlife.

Historically, the area contained wet prairie, emergent broadleaf marsh and open water with submergent vegetation providing ideal conditions for shorebirds, wading birds and waterfowl. Wet prairie and peripheral marshes were most critical to wading birds and shorebirds. As water levels in the floodplain increased, peripheral wetlands were inundated creating an expanded nursery for fish and other aquatic organisms. Receding water levels in winter and early spring (corresponding to the wading bird nesting season) resulted in dense prey concentrations vital to successful reproduction in wading bird rookeries. Declining water levels in wet prairie also provided critical feeding areas for resident and migratory shorebirds. Shallow floodplain and deeper water adjacent to the river supported an abundant waterfowl population.

Loss of wetlands throughout the Kissimmee River valley has been detrimental to wading birds and waterfowl. Sixteen species of wading bird have been recorded in the Kissimmee River Basin, 12 of which are now designated as rare, endangered, threatened, or of special concern (Perrin et al. 1982). Although nesting was common prior to and shortly after channelization, wading bird rookeries are no longer active. Surveys of the river valley in 1979-80 revealed that cattle egret (Bubulcus ibis) comprised 96% of the wading birds recorded in Pool C (Perrin et al. 1982), possibly an indication of extensive conversion of wetlands to pasture. Perrin et al. (1982) also reported a 93% decrease in duck and coot populations throughout the river basin since channelization.

During this assessment, sightings of waterfowl and wading birds were infrequent, consisting of isolated small groups or individuals. Five species of wading birds (excluding cattle egret) and a mottled duck (Anas fulvigula) were observed, usually feeding adjacent to the river channel or in the deeper ditches and ponds with permanent water. Only green-backed heron (Butorides straitus) and black-crowned

night heron (Nycticorax nycticorax) may still breed, utilizing shrub thickets along the river.

Several game species occur on the property including wild turkey (Meleagris gallopavo), northern bobwhite (Colinus virginianus), white-tailed deer (Odocoileus virginiana) and feral pig (Sus scrofa). Turkey appear to be particularly abundant, with several flocks and breeding pairs inhabiting the property and subsisting on the plentiful oak mast crop. There did not appear to be a large feral pig population possibly due to localized hunting pressure.

A survey of scrub habitat revealed no additional threatened species other than gopher tortoise. Tortoise were frequently observed traveling between scrub and pasture, indicating the importance of adjacent areas for feeding. Due to the disjunct nature of this habitat and relative distance from recolonizing populations, it is unlikely to be inhabited by scrub jay.

Thirty-one species of wildlife were observed utilizing the property including four species designated in Florida as rare, endangered, threatened or of special concern and one species, swallow-tailed kite (Elanoides forficatus) which is currently under review for listing by the U.S. Fish and Wildlife Service (USFWS). In addition, Audubon's crested caracara (Caracara cheriway) is listed as threatened by USFWS and the gopher tortoise (Gopherus polyphemus) is under review for federal listing. Florida sandhill crane (Grus canadensis pratensis), a state threatened species, were observed regularly and may nest on the property.

Appendix 3 includes a partial wildlife species inventory for the property. A detailed description of Kissimmee River fisheries is available from Perrin et al. (1982).

MANAGEMENT RECOMMENDATIONS

Wetland and hydroperiod restoration

Recommendations in this section were developed with the intent of restoring the McArthur property as a separate entity, pending a decision for long term commitment of state and federal resources to the Kissimmee River restoration project. However, the goal of re-creating a natural hydroperiod to simulate pre-channelization conditions and restore, preserve or enhance remnant wetland communities on the property is consistent with Save Our Rivers and Kissimmee River ecosystem restoration objectives. Ultimately, the restoration of the McArthur floodplain and peripheral wetlands, west of the treeline, will re-establish 3,000+ acres of critical habitat for foraging wading birds, waterfowl, and shorebirds.

Hydroperiod restoration of the McArthur property can only be attained by removing or modifying the present drainage system. The majority of this drainage is conveyed by ditch 2 which extends nearly the entire length of the property, collecting runoff from ditch 3 and most of the wetlands west of the treeline. Another drainage influence is ditch 1, which accompanied by a secondary series of ditches, drains approximately 1100 acres (445 ha) of floodplain. Presently, the ditch 1 levee bisects the property, severing any hydrological connection between the river and outlying floodplain. Consequently, this levee has been proposed for degradation under the Kissimmee River restoration Level II backfilling plan. Two major water control structures are present; culvert B, a 72" culvert with dual 36" riser structures is located immediately downstream of the confluence of ditches 1 and 2. The integrity

of this structure has not been assessed; however, it is doubtful whether it could be used to meet restoration objectives. A second 72" culvert with riser structure (A) is situated just off the main access road and controls drainage flowing northeast to the floodplain. This culvert is structurally sound, and with the addition of riser boards is currently being utilized to retain water in several interior wetlands.

To restore the property it is recommended that the lower portions of ditches 1 and 2 be backfilled, immediately upstream of where the two intersect. Backfilling would be accompanied by operation of Culvert A, a stable structure capable of restoring several interior wetland systems south of the main access road. Ditch plugs (i.e. small backfilled sections), placed at strategic upstream locations in ditches 1 and 2, will encourage overland sheet flow. This option would closely simulate Level II backfilling by removing the major drainage influence, and result in restoring most of the floodplain and peripheral wetlands to the west. Depending on the degree of drainage west under State Road 98, ditch backfilling may also inundate vast areas of pasture, potentially re-creating native wet prairie communities. Supplementary topographic information, engineering, and hydrological analysis will be necessary to determine upstream impacts to private land and State Road 98. Since it already floods periodically during extreme storm events, additional work may be necessary to protect SR 98. Flowage easements may also be required for the adjacent property (Montsdeoca).

Partial backfilling of the lower ditches would represent only a fraction of the estimated cost of complete levee degradation, which will eventually be required under the Level II backfill plan. Fill material is available on site, and work could be completed by District personnel and equipment, thus reducing cost of the project. However, additional cost may be associated with protecting SR 98 from flooding.

This section of Pool C, including Istokpoga Creek, is one of numerous secondary Kissimmee River drainage systems being considered for additional contractual hydrologic and hydraulic study to estimate secondary drainage impacts associated with river restoration. Pending further hydrologic analysis, it appears that this recommendation would be the most efficient and cost-effective method available, while being consistent with Kissimmee River restoration plans and objectives. The alternative of replacing Culvert B with a new culvert or weir would result in construction of costly water control structures that would become obsolete under Level II backfilling.

Considering the time which may elapse before Level II backfilling operations can be initiated, it is highly recommended that interim restoration be actively pursued, contingent upon the District's continued ownership of the property.

Prescribed Burning

Historically, fire was an integral force influencing Florida's ecology. However, under natural hydrologic regimes in the Kissimmee River valley, wildfires were probably infrequent. Due to wet conditions, fire may have only reached the floodplain and scrub during drought periods, although wet prairie may have burned more frequently. Since channelization, fires have probably been more frequent in altered habitat due to overdrainage and use of burning by cattle operators as a range management practice.

Cattle were removed from the property during late summer of 1989, and a subsequent increase in vegetative fuel prompted initiation of a prescribed burning

program in January 1990. Approximately 1,000 acres (405 ha) of predominantly improved pasture, unimproved pasture and palmetto/wax myrtle shrub were burned by SOR staff to reduce fuel and protect the property's residential resources. An additional 1,200 acres (486 ha) of floodplain and 480 acres (194 ha) of improved pasture were burned in January 1991.

Prescribed burning is a cost effective management technique which benefits wildlife by reversing plant succession and creating a mosaic of habitat types. Fire also encourages growth of native plant species to replace homogeneous tame grass pastures. Prescribed burning should continue to be utilized for managing the property in conjunction with the implementation of hydroperiod restoration.

There are 40 acres of scrub on the property, and the dense understory and height of oaks indicates that this habitat has not burned in recent history. Scrub with similar structure occurs at Archbold Biological Station and has not burned for 70+ years (Menges, pers. comm.). Future prescribed burning plans should include small sections (5 acres) of scrub scheduled preferably for fall or winter burns. Several test plots should be burned the first year to monitor vegetative responses to these burns, since natural fire probably occurred during late winter or early spring. Due to the dense understory, fires may be intense, thus only small patches should be burned to avoid a more devastating fire.

Grazing

The quantity and quality of range at McArthur will depend on the degree of restoration effort. There are presently over 4,300 acres (1,740 ha) of improved pasture west of the treeline, some or all of which may convert back to wet prairie under Level II backfilling, thus decreasing the amount of available forage.

Currently, improved pasture has minimal value as wildlife habitat, a condition sustained by a continuous grazing operation. Furthermore, there is evidence that prolonged grazing may be detrimental to many wildlife species. If the District maintains ownership of this land, management should consist of prescribed burning and hydroperiod restoration, which would preclude the need for grazing management.

Sale of any "excess" land, resulting in renewed grazing on the property, should include adequate flowage easements to accommodate flooding, which may adversely impact cattle operations. Additional fencing would also be necessary to restrict cattle access to the Kissimmee River floodplain and major tributaries. Initiation of a restoration project would require a three-year suspension of cattle grazing in the floodplain following inundation, to assist reestablishment of wetland vegetation.

Wildlife Management

Under a broader perspective of Kissimmee River restoration the participation of the Florida Game and Freshwater Fish Commission (GFC) may be enlisted to provide the necessary wildlife management. However, with the exception of the KICCO tract, the District retains the responsibility of managing individual Kissimmee River SOR acquisitions. Therefore, this assessment will address general wildlife management objectives, with some specific recommendations for threatened species.

In general, good land management will benefit most wildlife species. Management emphasis should be on reestablishing native plant communities to replace introduced

species on improved habitat. Wetland and hydroperiod restoration will provide the conditions and habitat necessary for nesting wading birds and waterfowl. This combined with a controlled burning program will greatly enhance wildlife productivity.

Management for waterfowl and wading birds should focus on restoring wetland plant communities. Reductions in these bird populations have occurred due to the loss of adequate nesting and feeding areas. Hydroperiod restoration will increase productivity in wetlands and result in dense concentrations of wading bird prey during the spring recession of water levels. Although willow thickets and other favorable nesting sites are available, the lack of suitable water levels precludes use of these areas by breeding wading birds. Floodplain restoration will provide both feeding and nesting habitat for waterfowl and other species.

Sandhill cranes are relatively common throughout the Kissimmee River valley. Cranes were observed frequently along the periphery of the property floodplain, utilizing uplands and wetlands for feeding. If the District retains ownership of land west of the floodplain, management should consist of hydroperiod restoration and controlled burning, to produce conditions more conducive to nesting cranes. Although cranes utilize pasture, Hunt (1987) indicated that prolonged grazing was detrimental to sandhill cranes by reducing arthropod prey populations. In contrast, sandhill cranes in Texas appeared to prefer recently burned upland pastures (Hunt 1987). Therefore, a prescribed burning rotation should be established to manage these lands in conjunction with hydroperiod restoration. Since re-establishment of wet prairie will reduce fuel accumulation, a three to five year burning rotation may be sufficient.

Swallow-tailed kites have been observed frequently on the property and probably breed in the area. Ideal kite foraging habitat is characterized by a mosaic of wetlands diverse in structure and species composition. Smaller wetlands (<2 ha) are a critical component of good kite habitat (Meyer and Collopy 1990). Preservation of wetland hardwoods and cypress communities will continue to provide nesting sites, and restoration of wetland habitat will expand foraging opportunities for this potentially endangered species.

Fire is a natural component of south Florida ecosystems and can be used to manage most habitat types. Prescribed fire impedes plant succession, promotes growth of new forage and usually results in minimal disturbance to soil and wildlife. Controlled burning will be most critical in the scrub habitat which appears to need intense management. Presently, gopher tortoise have become dependent upon pasture areas for forage due to a dearth of adequate food in the scrub. Since hydroperiod restoration will result in making more areas unavailable to tortoises during certain times of the year, it is imperative that controlled burning of scrub be initiated to stimulate growth of herbaceous ground vegetation (e.g. wire grass) required by foraging tortoises. In addition, burning of small sections will create a mosaic of open patches favorable to hatchling tortoises. Reduction in understory fuel also will remove the threat of a more devastating fire.

The property contains healthy turkey and deer populations which thrive in part on a plentiful oak mast crop. Hydroperiod restoration and a three to five year burn rotation will protect oak hammocks from devastating fire, and stimulate native plant communities beneficial to these game species.

Additional wildlife management should include placing wood duck boxes in bottomland hardwood swamps to reestablish nesting populations of this species. Although nesting habitat is available, overdrainage has resulted in unfavorable water conditions and loss of adequate brood rearing habitat.

Other recommendations

Recommendations in this assessment were made with the assumption that the South Florida Water Management District will maintain ownership of all or most of the property. Due to an initial evaluation of the floodplain, only land between the treelines east and west of the river was being targeted for land acquisition. Consequently, much of the McArthur property west of the river was declared "excess." However, in the course of completing this assessment it has become apparent that secondary drainage impacts resulting from Kissimmee River restoration have not been adequately considered. The Istokpoga drainage basin has been designated for additional hydrologic analysis to assess secondary drainage impacts. Under the Level II backfill plan, these impacts may include inundation of vast areas of pasture during the wet season, potentially restoring these areas to wet prairie. Therefore, given the ecological significance of the property and potential hydrologic ramifications, it is recommended that the District retain ownership of at least the portion of the property south of the main access road, until the degree of flooding can be determined by further studies.

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APPENDIX 1. McArthur Property Species Inventory

GRASSES, RUSHES AND SEDGES	
Pangola grass	Digitaria decumbens
Low panicum	Dicanthelium sp.
Maidencane	Panicum hemitomon
Broomsedge	Andropogon virginicus
Chalky bluestem	Andropogon capillipes
Bahia grass	Paspalum notatum
Knot grass	Paspalum distichum
Vasey grass	Paspalum urvellei
White tops	Dichromena colorata
Carpetgrass	Axonopus sp.
Sand cordgrass	Spartina bakeri
Yellow-eyed-grass	Xyris sp.
Wire grass	Aristida stricta
Florida threeawn	Aristida rhizomophora
Smutgrass	Sporobolus poiretti
Beaked-rush	Rhynchospora microcarpa
Beaked-rush	Rhynchospora tracyi
Many-spiked flatsedge	Cyperus polystachyos
Sawgrass	Cladium jamaicense
Softstem bulrush	Scirpus validus
Soft rush	Juncus effusus
Large-headed rush	Juncus megacephalus
Ciliate bulbostylis	Bulbostylis ciliatifolia

APPENDIX 1. McArthur Property Species Inventory

HERBACEOUS

Pickerelweed	Pontederia cordata
Smartweed	Polygonum punctatum
Pokeweed	Phytolacca americana
Arrowhead	Sagittaria lancifolia
Spatterdock	Nuphar luteum
Canna	Canna flaccida
Water pennywort	Hydrocotyle umbellata
Mermaid weed	Proserpinaca palustris
Caesar-weed	Urena lobata
Meadow beauty	Rhexia nashii
Aster	Aster sp.
Canadian thistle	Cirsium horridulum
Prickley pear	Opuntia humifusa
Marsh fleabane	Pluchea rosea
Toadflax	Linaria floridana
Blackroot	Pterocaulon virgatum
Buchnera	Buchnera americana
Hatpins	Eriocaulon decangulare
Dog fennel	Eupatorium capillifolium
Coinwort	Centella asiatica
Alligator weed	Alternanthera philoxeroides
Prairie iris	Iris hexagona
Shield fern	Dryopteris ludoviciana*
Bracken fern	Pterdium aquilinum
Yellow bachelor's button	Polygala rugeli*
Milkwort	Polygala nana
Buttonweed	Diodia virginiana
Blue hyssop	Bacopa caroliniana
Primrose willow	Ludwigia peruviana
Slender stemmed ludwigia	Ludwigia virgata
Ladies tresses	Spiranthes praecox*
Bladderpod	Sesbania punica
Ball moss	Tillandsia recurvata
Spanish moss	Tillandsia usneoides
Milkweed	Asclepias pedicellata
Elephant's foot	Elephantopus elatus
Hedge hyssop	Gratiola ramosa
Yellow star grass	Hypoxis juncea
Seymeria	Seymeria pectinata
Goldenrod	Solidago chapmanii

* Listed by Florida Department of Agriculture and Consumer Services as endangered, threatened or commercially exploited.

APPENDIX 1. McArthur Property Species Inventory

TREES, SHRUBS AND VINES

Cabbage palm	Sabal palmetto
Red maple	Acer rubrum
Willow	Salix caroliniana
Live oak	Quercus virginiana
Laurel oak	Quercus laurifolia
Water oak	Quercus nigra
Saw palmetto	Serenoa repens
Black gum	Nyssa sylvatica
Swamp bay	Persea palustris
Sweet bay	Magnolia virginiana
Loblolly-bay	Gordonia lasianthus
Guava	Psidium guajava
Persimmon	Diaspyros virginiana
Wax myrtle	Myrica cerifera
Winged sumac	Rhus copallina
Salt bush	Baccharis halimifolia
Rosemary	Ceratiola ericoides
Brazilian pepper	Schinus terebinthifolius
Buttonbush	Cephalanthus occidentalis
Dahoon	Ilex cassine
Tallow wood	Ximenia americana
Gallberry	Ilex glabra
Shiny blueberry	Vaccinium myrsinites
Blackberry	Rubus sp.
St. John's-wort	Hypericum myrtifolium
St. John's-wort	Hypericum reductum
Tarflower	Befaria racemosa
Fetterbush	Lyonia lucida
Rusty lyonia	Lyonia ferruginea
Fetterbush	Lyonia fruticosa
Elderberry	Sambucus canadensis
Pepper vine	Ampelopsis arborea
Muscadine grape	Vitis rotundifolia

APPENDIX 2. McArthur Property Species Inventory

SCRUB COMMUNITY SPECIES	
Lichen	Cladonia evansi
Lichen	Cladonia leporina
Lichen	Cladonia subtenvis
Rushtail	Crotonopsis linearis
Milk pea	Galactia regularis
Milk pea	Galactia elliotti
Sand holly	Ilex ambigua*
Gopher apple	Licania michauxii
Palofoxia	Palofoxia feayi
Silk grass	Pityopsis graminifolia
Beakrush	Rhyncospora megalocarpa
Greenbrier	Smilex auriculata
Sand live oak	Quercus geminata
Chapman's oak	Quercus chapmanii
Myrtle oak	Quercus myrtifolia

* Listed by Florida Department of Agriculture and Consumer Services as endangered, threatened or commercially exploited.

APPENDIX 3. McArthur Property Species Inventory

BIRDS

Mottled duck	Anas fulvigula
Great blue heron	Ardea herodias
Snowy egret	Egretta thula*
Great egret	Casmerodius albus
Cattle egret	Bubulcus ibis
Black-crowned night heron	Nycticorax nycticorax
Sandhill crane	Grus canadensis*
White ibis	Eudocimus albus
Common moorhen	Gallinula chloropus
Killdeer	Charadrius vociferus
Northern bobwhite	Colinus virginianus
Wild turkey	Meleagris gallopavo
Swallow-tailed kite	Elanoides forficatus*
Audubon's crested caracara	Caracara cheriway*
Red-shouldered hawk	Buteo lineatus
Turkey vulture	Cathartes aura
Mourning dove	Zenaida macroura
Ground dove	Columbina passerina
Eastern kingbird	Tyrannus tyrannus
Crested flycatcher	Myiarchus crinitus
Fish crow	Corvus ossifragus
Northern mockingbird	Mimus polyglottos
Loggerhead shrike	Lanius ludovicianus
Common yellowthroat	Geothlypis trichas
Northern cardinal	Cardinalis cardinalis
Savannah sparrow	Passerculus sandwichensis
Green backed heron	Butorides striatus

Other Vertebrate Species

White-tailed deer	Odocoileus virginiana
Feral pig	Sus scrofa
Bobcat	Lynx rufus
Raccoon	Procyon lotor
Gopher tortoise	Gopherus polyphemus*
Black racer	Coluber constrictor

* State or federal listing as rare, threatened, endangered or species of special concern.