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PLANT COMMUNITIES OF THE KISSIMMEE RIVER VALLEY

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#113

This public document was promulgated at an annual cost of $291.76 or $.58 per copy to document the existing condition of vegetation patterns in the Kissimmee River Valley. RPD 219 R586 150

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Gene Vaughn, Highlands County Tax Appraiser's Office, provided the majority of the aerial photography which was used as the basis of the vegetation mapping. The Land Resources Division staff undertook the tedious and demanding task of transferring the vegetation maps into a computerized storage and output system.

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INTRODUCTION

Historically, the Kissimmee River meandered through an approximately mile-wide floodplain between Lake Kissimmee and Lake Okeechobee in south-central Florida. The distance along the floodplain between these two lakes is about 56 miles, but the length of the main river channel was estimated to be more than 90 miles. The vegetation of the Kissimmee River floodplain prior to channelization was described by the United States Fish and Wildlife Service (1958), "In the lower basin, the Kissimmee River occupies a flood channel that is about one mile wide, and is characteristically a buttonbush shrub swamp. The succession of common plants, from the wetter to dryer sites are: pickerelweed, arrowhead, maidencane, water purslane, buttonbush, Bermuda grass, buttonweed, rushes, torpedo grass, carpet grass and cordgrass."

Flood protection of the agricultural and urban areas of the Kissimmee basin was part of the comprehensive Central and Southern Florida Flood Control Project presented to Congress in 1948 (House Document No. 643, 80th Congress, 2nd Session) and was authorized by the Flood Control Act (Public Law 858) in 1948. Included in this project was a plan to channelize the Kissimmee River from Lake Kissimmee southward to Lake Okeechobee. The primary purpose of this canal, C-38, was to transport floodwaters and reduce flood damage in the Upper Kissimmee Basin.

The original proposal for the design of C-38 was for a canal to be constructed along the general route of the Kissimmee River channel with continuous spoil banks placed along both sides of the canal, and secondary drainage structures to regulate local inflow (U.S. Army, 1956). Based upon recommendations provided primarily by the Florida Game and Fresh Water

Fish Commission (GFC) and the United States Fish and Wildlife Service, the Corps of Engineers modified the original design proposal to one which provided for the present alignment of C-38, the placement of spoil on alternate sides of the canal, and the preservation of some continuous oxbows (U.S. Army, 1958). Construction of C-38 and control structures required six years and was completed in 1971.

Six water control structures (S-65 series) in C-38 lowered the water levels between the canal segments in 6 or 7 foot increments, and created a series of impoundments, or pools, upstream of each water control structure (i.e., Pool A lies upstream of S-65A, Pool B is downstream of S-65A and upstream of S-65B, etc.). A tieback levee was built from each structure across the floodplain to higher ground to prevent water from flowing around the structure. Figure 1 shows the location of the Kissimmee River and C-38 in south-central Florida, the water control structures and the major tributaries.

Water levels were stabilized in the canal behind each water control structure. Consequently, the southern (downstream) portion of each pool was permanently inundated with as much as 3 feet of water, and the northern portion of each pool remained dry. The constant inundation and lack of water level fluctuation in the lower portions of each pool selected for only a limited number of marsh plant species that were adapted to these conditions. Other species that were intolerant of the flooded conditions were eliminated or outcompeted by tolerant species (Goodrick and Milleson, 1974). In the northern portion of each pool where the floodplain was drained, wetland vegetation was replaced by terrestrial species. Much of this dry area has been utilized for improved or unimproved pastures.

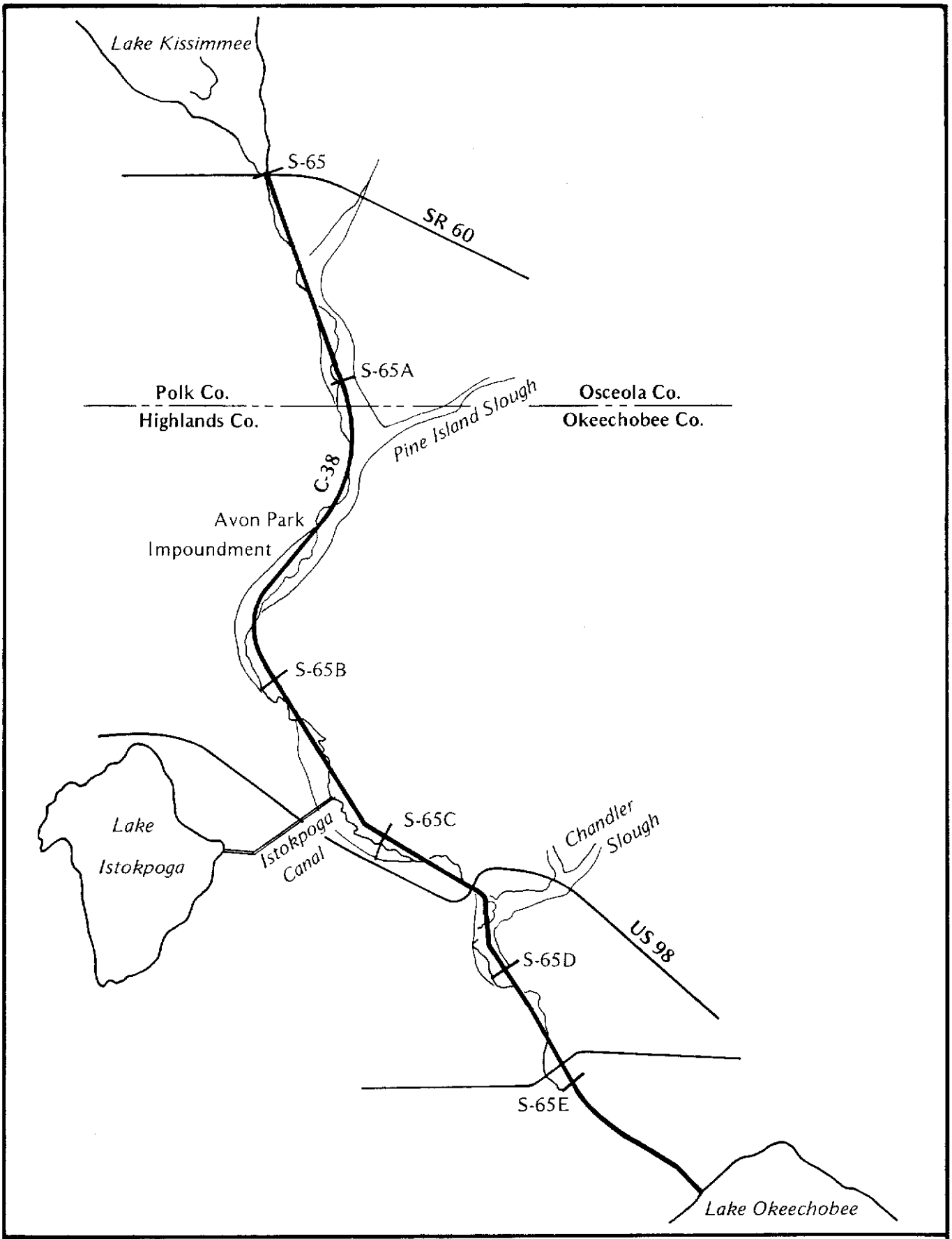


FIGURE 1: LOCATION OF KISSIMMEE RIVER, WATER CONTROL STRUCTURES AND MAJOR TRIBUTARIES

C-38 has had a pronounced effect on the ecology of the Kissimmee River floodplain. The aquatic habitat once available for small fishes, crustaceans and aquatic insects has been reduced. Because water levels are stabilized there is little or no seasonal concentration of forage organisms in the dry season for larger fish and wading birds (Dineen, et al., 1974).

Preliminary studies of the effects of C-38 on the Kissimmee River floodplain marshes were begun by the South Florida Water Management District (SFWMD) in 1970. The responses of marsh flora and fauna to water level fluctuations, fire, herbicide treatment and other management techniques were investigated (Goodrick and Milleson, 1974; Milleson, 1976; VanArman and Goodrick, 1979). Other field investigations by the SFWMD in the Kissimmee River valley have included measurements of the nutrient assimilation capability of freshwater marshes (Federico, et al., 1978).

Several additional investigations have been conducted since the excavation of C-38. Heaney and Huber (1975) conducted extensive resource management studies. Results obtained by the Special Project to Prevent Eutrophication of Lake Okeechobee (Florida Department of Administration, 1976) led, in part, to the creation of the Coordinating Council on the Restoration of the Kissimmee River Valley and Taylor Creek - Nubbin Slough Basin. The major purpose of this committee is to explore the means, methods, costs and benefits of the various alternatives to restore some or all of the Kissimmee River and adjacent marshes. As part of the Special Project, generalized land cover maps were prepared (Florida Department of Administration, 1976; Pruitt and Gatewood, 1976).

The primary purpose of the current study was to prepare a comprehensive and detailed map of the plant communities of the Kissimmee River

floodplain. This report and accompanying maps describe the floodplain vegetation after completion of C-38, and provides a baseline so that the effects of future alternative management plans can be meaningfully evaluated.

MATERIALS AND METHODS

The floodplain boundaries for mapping purposes were considered to be the more or less continuous tree lines of oaks or cabbage palms which parallel the river. Tributary sloughs, swamps and marshes were mapped to the first distinct upland feature, usually a road crossing. The north and south limits of the study area were S-65 at SR 60 and S-65E with its tieback levees, respectively (Figure 1).

Aerial photographs of the Kissimmee River valley were used as base maps. Two sets of photographs were required to completely cover the floodplain; U.S. Department of Agriculture ASCS photographs taken in 1974 (1:4800) and Mark Hurd photographs taken in 1973 (1:24,000).

Plant communities that were discernible on the photographs were delineated, and then checked in the field during 1978. Changes in vegetation which occurred since the photography were also incorporated in the mapping procedures. Ground truthing was accomplished by low altitude aerial inspection from a helicopter, and supplemented by numerous observations of selected areas by personnel using airboats, outboard motor boats, and on foot.

Descriptions of the plant communities were based on the predominant and common plant species observed which influenced the general community form. Some grouping of similar vegetation communities was necessary.

The original vegetation maps were entered into a Computervision[R] Automated Mapping System (Computervision Corp., Bedford, Mass.) by means of a large, highly accurate, table digitizer. The resulting data base was used to calculate the area of each vegetation community and to plot the vegetation maps.

RESULTS AND DISCUSSION

Twenty-five plant communities or land use categories were described, mapped and measured within the Kissimmee River floodplain. These communities include those which have been affected by the construction of C-38 and subsequent water impoundment and stabilization, and those located in upland and tributary areas which still respond to seasonal fluctuating hydroperiods.

The species composition of a plant community depends on a variety of environmental factors such as ground elevation, water depth, type of soil, amount of cattle grazing, and season of the year. For example, a wet prairie species like beakrush, Rhynchospora inundata, is a rather nondescript plant during most of the year; however, during the summer R. inundata puts out a distinctive inflorescence and becomes the apparent characteristic species in that particular wet prairie. Several other conspicuous species which are seasonally abundant in several of the other plant communities include bladderpods, Sesbania exaltata and Glottidium vesicaria, dogfennel, Eupatorium sp. and marsh hibiscus, Hibiscus grandiflorus.

The twenty-five communities are classified into five major categories; Agricultural and Urban, Terrestrial Forested, Wetland Forested, Marsh, and Spoil and Barren. Table 1 provides a summary of the area occupied by each plant community.

TABLE 1 . PLANT COMMUNITIES OF THE KISSIMMEE RIVER FLOODPLAIN AND TRIBUTARIES, 1978, SUMMARY TOTALS BY POOL

Vegetation Community	Pool A Acres	Pool A %	Pool B Acres	Pool B %	Pool C Acres	Pool C %	Pool D Acres	Pool D %	Pool E Acres	Pool E %	Total Acres	Total %
Agriculture and Urban												
Improved Pasture	3117	31.9	2046	17.1	4123	38.0	2684	31.8	2607	41.5	14577	30.8
Unimproved Pasture	1810	18.5	1802	15.0	527	4.9	586	6.9	249	4.0	4974	10.5
Citrus	-	-	-	-	-	-	126	1.5	13	0.2	139	0.3
Urban	68	0.7	4	0.1	13	0.1	124	1.5	36	0.6	245	0.5
Terrestrial Forested												
Oak and Cabbage Palm	-	-	18	0.2	132	1.2	213	2.5	308	4.9	671	1.4
Wax Myrtle	103	1.1	369	3.1	150	1.4	210	2.5	250	4.0	1082	2.3
Woody Shrub	1035	10.6	646	5.4	631	5.8	537	6.4	571	9.1	3420	7.2
Wetland Forested												
Willows (In Floodplain)	81	0.8	64	0.5	310	2.9	26	0.3	39	0.6	520	1.1
Willows (In Spoil Areas)	524	5.4	350	2.9	120	1.1	188	2.2	10	0.2	1192	2.5
Hardwood Trees	82	0.8	274	2.3	-	-	-	-	26	0.4	382	0.8
Cypress	-	-	63	0.5	21	0.2	121	1.4	12	0.2	217	0.5
Marsh												
Broadleaf Marsh	61	0.6	988	8.2	1164	10.7	646	7.6	197	3.1	3056	6.5
Maidencane Wet Prairie	528	5.4	999	8.3	834	7.7	-	-	13	0.2	2374	5.0
Rhynchospora Wet Prairie	-	-	1178	9.8	249	2.3	-	-	-	-	1427	3.0
Aquatic Grasses	407	4.2	267	2.2	263	2.4	306	3.6	134	2.1	1377	2.9
Buttonbush	354	3.6	42	0.4	-	-	365	4.3	4	0.1	765	1.6
Primrose Willow	115	1.2	206	1.7	372	3.4	135	1.6	3	0.1	831	1.8
Floating Tussocks	19	0.2	246	2.1	194	1.8	94	1.1	81	1.3	634	1.3
Switchgrass	117	1.2	216	1.8	59	0.5	84	1.0	-	-	476	1.0
Soft Rush Ponds	48	0.5	127	1.1	24	0.2	77	0.9	7	0.1	283	0.6
Sawgrass	-	-	77	0.6	-	-	-	-	-	-	77	0.2
St. Johns Wort	41	0.4	5	0.1	-	-	-	-	-	-	46	0.1
Spoil and Barren												
Spoil	682	7.0	1018	8.5	883	8.1	625	7.4	447	7.1	3655	7.7
Vegetated Spoil	-	-	171	1.4	116	1.1	427	5.1	545	8.7	1259	2.7
Levees	-	-	100	0.8	70	0.6	133	1.6	57	0.9	360	0.8
Open Water	574	5.9	721	6.0	585	5.4	742	8.8	670	10.7	3292	7.0
C-38 *	(302)	-	(379)	-	(299)	-	(457)	-	(361)	-	(1798)	-
Kissimmee River *	(272)	-	(342)	-	(286)	-	(285)	-	(309)	-	(1494)	-
Summary												
Agricultural and Urban	4995	51.1	3852	32.1	4663	43.0	3520	41.7	2905	46.3	19935	42.1
Terrestrial Forested	1138	11.7	1033	8.6	913	8.4	960	11.4	1129	18.0	5173	10.9
Wetland Forested	687	7.0	751	6.3	451	4.2	335	4.0	87	1.4	2311	4.9
Marsh	1690	17.3	4351	36.3	3159	29.1	1707	20.2	439	7.0	11346	24.0
Spoil and Barren	1256	12.9	2010	16.8	1654	15.3	1927	22.8	1719	27.4	8566	18.1
Total	9766	100.0	11997	100.1	10840	100.0	8449	100.1	6279	100.1	47331	100.0

* Estimated

Nearly one half (42.1%) of the total area was included in the Agriculture and Urban category. Urban development within the Kissimmee River floodplain was minimal, and pastures constituted the majority of this area. Improved pasture was the largest single designated plant community, comprising 14,577 acres (22.8 mi^2) or 30.8% of the total 47,331 acres of floodplain and tributaries that were mapped.

Terrestrial Forested vegetation communities accounted for 10.9% of the total area measured. Acreages of these communities were similar in the five pools and ranged from 913 acres (Pool C) to 1138 acres (Pool A). However, the 1129 acres of terrestrial forested vegetation in Pool E comprised 18.0% of that areas' total, compared with 8.4% to 11.7% in the other pools.

The Wetland Forested plant communities comprised the smallest portion of the floodplain. Cypress and swamp hardwoods each accounted for less than one percent of the total area, whereas willows comprised 3.6% of the total. About two-thirds of the willow community was located within the spoil retention areas alongside C-38.

Eleven communities of Marsh vegetation were described, which collectively included 11,346 acres, or 24.0% of the total area. Broadleaf marshes were the most abundant community (3056 acres; 6.5%) in this category. The wet prairie communities, characterized by maidencane (Panicum hemitomon), beakrush (Rhynchospora inundata), or aquatic grasses, especially torpedo grass (Panicum repens), collectively totalled 5178 acres (10.9%). Pools B and C contained the greatest amounts and largest percentages of Marsh plant communities in the Kissimmee River valley.

Spoil and Barren communities included the spoil deposited from the construction of C-38, levees and roadways, and open water. A

total of 5274 acres (8.2 mi^2) was occupied by spoil and levees. Open water within the floodplain totalled 3292 acres, of which an estimated 1798 acres (2.8 mi^2) or 54.6% was C-38.

Pool B was the only impoundment with less than one half of its area devoted to agricultural, urban, or spoil detention land uses. Nearly 43% of Pool B is still designated as wetland plant communities. In contrast, 63.0% of the area measured in Pool E is devoted to agriculture, urban, or spoil, while only 8.4% remains wetlands.

Figure 2 depicts a diagrammatic cross section from north to south through a Kissimmee River impoundment. Note that while the ground contours generally slope downward from north to south, impoundment of the water by the S-65 structures maintains a flat water level. Consequently, the southern portion of each pool is permanently flooded and the northern portion has been permanently drained.

Figure 3 is a conceptual illustration of the Kissimmee River floodplain and C-38 from west to east in the southern half of an impoundment. Neither of these figures is drawn to scale, and only a few of the indicator species from each plant community are depicted.

A description of each of the communities of the floodplain is provided below.

AGRICULTURAL AND URBAN

Improved Pasture (Plate 1)

Improved pastures in the Kissimmee River valley are generally located at elevations from about one foot above the stabilized water level of C-38 to the edge of the floodplain. Improved pastures are

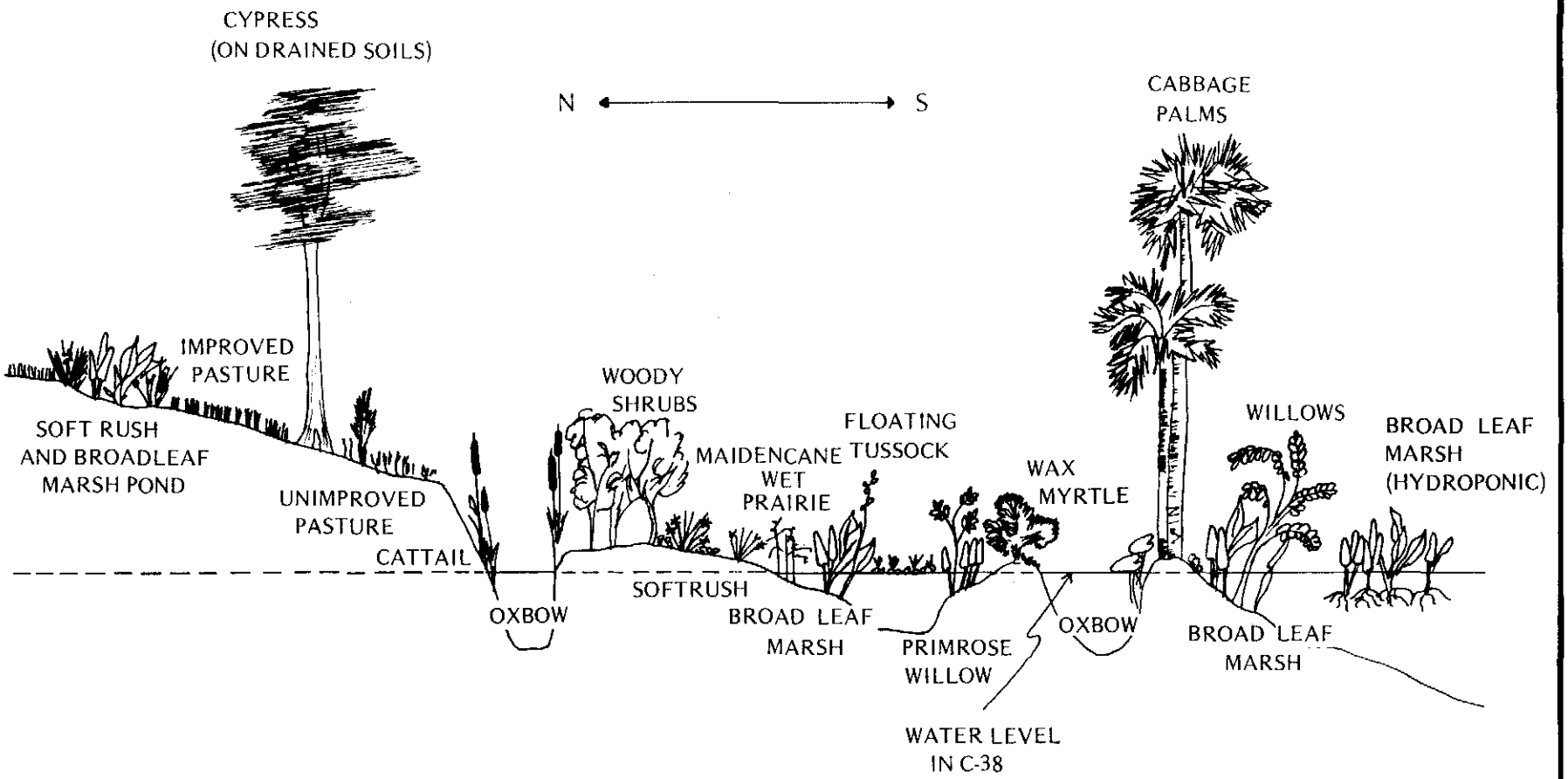


FIGURE 2: CONCEPTUAL CROSS-SECTION (NORTH TO SOUTH) THROUGH A KISSIMMEE RIVER IMPOUNDMENT (POOL), ILLUSTRATING GENERAL RELATIONSHIPS AMONG SOME OF THE PLANT COMMUNITIES AND COMMON SPECIES.

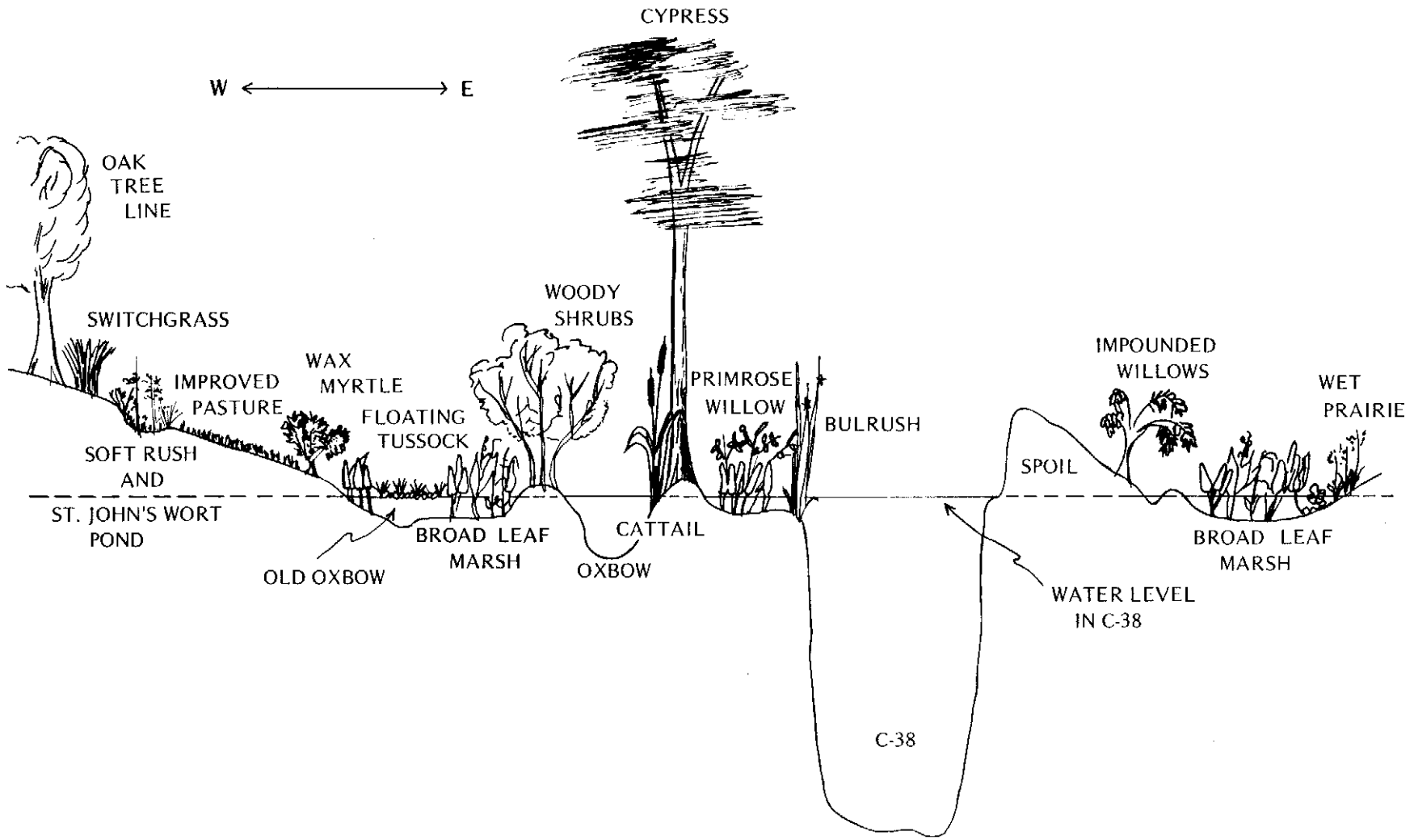


FIGURE 3: CONCEPTUAL CROSS-SECTION (WEST TO EAST) THROUGH THE KISSIMMEE RIVER FLOODPLAIN ILLUSTRATING GENERAL RELATIONSHIPS AMONG SOME OF THE PLANT COMMUNITIES AND COMMON SPECIES.

lands which have been altered to increase the growth of grasses and forbs for the purpose of feeding livestock. Some of the methods employed to create improved pastures include mechanical clearing of native vegetation, periodic burning or mowing of native vegetation, planting of specialized grasses for feed, supplemental additions of fertilizers and herbicides, and implementation of irrigation and/or drainage practices.

Probably the most abundant plant found in improved pastures is Bahia grass (Paspalum notatum). Other common plants include Panicum repens, soft rush (Juncus effusus), and bladderpod (Glottidium vesicaria).

Unimproved Pasture (Plate 2)

Unimproved pasture is a terrestrial habitat typified by a ground cover of grasses, sedges and small herbs, with low shrubs, and which is subjected to grazing by range cattle. The creation of unimproved pasture or rangeland within the Kissimmee River floodplain is a direct consequence of water level stabilization by the S-65 structures. Unimproved pastures are generally located in the central and northern portion of each impoundment where the floodplain has been permanently drained.

Towards the middle of each pool, and near C-38 and river oxbows where ground water levels are fairly close to the surface, vegetation in unimproved pastures consists of a ground cover of water tolerant species such as false pimpernel (Lindernia anagallidea), coinwort (Centella asiatica), Panicum repens, aromatic figwort (Bacopa caroliniana), Juncus effusus, pennywort (Hydrocotyle umbellata) and numerous sedges. These plants are associated with terrestrial species like Sesbania exaltata, Glottidium vesicaria, some terrestrial grasses, scattered wax myrtles (Myrica cerifera), broomsedges (Andropogan spp.) and switchgrass (Spartina bakerii). At higher elevations, native rangeland becomes dominated by

saw palmetto (Serenoa repens) and terrestrial grasses.

Range cattle are not restricted to unimproved pastures and graze in most of the other plant communities in the valley.

Urban (Plate 3)

Urban development in the Kissimmee River valley is limited and consists primarily of commercial fishing camps and resorts. There are also two small residential areas, one with an airstrip, located in Pool D. Locktender residences are also classified urban.

Citrus (Plate 4)

The only croplands encountered within the Kissimmee River valley floodplain were 139 acres of citrus groves in Pools D and E.

TERRESTRIAL FORESTED VEGETATION

Woody Shrub (Plate 5)

Assorted communities of woody shrubs are located on elevated ridges along Kissimmee River oxbows, low lying edges of spoil banks, and drained areas in the north and central portions of each pool. These communities are dominated by saltbush (Baccharis halimifolia) and elderberry (Sambucus simpsonii), although other species that are occasionally present include wax myrtle, guava (Psidium guajava), dahoon holly (Ilex cassine), willow (Salix caroliniana), and brazilian pepper (Schinus terebinthifolius). Saltbush, elderberry and wax myrtle are most common in the northern portion of the valley, but the exotic brazilian pepper is the predominant species in many portions of the lower valley, particularly Pools D and E.

Understory vegetation in this zone includes dogfennel (Eupatorium sp.) and terrestrial grasses and sedges. Some vines, such as muscadine grape

(Vitis rotundifolia), greenbrier (Smilax sp.), and morning glory (Ipomea sp.), are occasionally present and ferns are often abundant.

The woody shrub community generally occurs on drained soils, although it is sometimes found in transition zones and may contain some aquatic species such as Panicum repens, P. hemitomon, water primrose (Ludwigia peruviana), and arrowhead (Sagittaria lancifolia).

Wax Myrtle (Plate 6)

Wax myrtle (Myrica cerifera) is a shrubby tree that occasionally grows to heights of 20 feet or more in the Kissimmee River valley. Myrtles often occur in areas that had previously been flooded for part of the year but are now drained.

The largest concentrations of wax myrtle communities occur about midway in each pool, along the upper edges of the floodplain, or along river banks and spoil piles.

Wax myrtle communities usually take either of two forms. Along riverbanks and in well-drained sites, wax myrtle and other associated shrubs are quite dense and grow to heights of 10-20 feet. These plants are frequently associated with Vitis rotundifolia, Ipomea sp., Smilax sp., and white vine (Sarcostemma clausa), and have a limited understory due to the dense canopy. In the other form, stands of young wax myrtle plants or stunted individuals often cover several acres. Individual plants seldom exceed 3-4 feet in height, and form a less complete canopy. The associated plant species are more diverse and include Centella asiatica, Hydrocotyle umbellata, P. repens, frogbit (Lippia nodiflora), alligator weed (Alternanthera philoxeroides), Eclipta alba, meadow beauty (Rhexia sp.), Paspalum notatum, Sesbania exaltata, Juncus effusus, and Eupatorium

sp.. On occasion some of these areas may be covered with a few inches of standing water.

Wax myrtle prefers dry sites with adequate soil moisture. Established plants can tolerate seasonal flooding to some degree, and in some cases they have even been observed growing on floating tussocks of Scirpus cubensis.

Oaks and Cabbage Palm (Plate 7)

The boundaries of the Kissimmee River floodplain are defined as the tree line containing water oaks and live oaks (Quercus nigra and Quercus virginiana). In a few locations the floodplain is delineated by cabbage palms (Sabal palmetto) and saw palmetto. This tree line has not been included as part of the vegetation communities of the area, but is shown on the maps to define the floodplain.

Oaks and cabbage palms are found on elevated ridges and knolls and on high river banks within the limits of the floodplain.

When a distinct oak hammock is present, the nearly complete canopy formed by the leaves, and the leaf litter on the ground, limits the growth of other plant species. Understory vegetation usually consists of cabbage palm, saw palmetto, wild blackberry (Rubus cuneifolius), caeser weed (Urena lobata), and terrestrial grasses. Several species of vines (Smilax sp., Momordica charantia, Vitis rotundifolia) and ferns (Phlebodium aureum, Blechnum serrulatum) are common to these areas.

WETLAND FORESTED VEGETATION

Willows (Plate 8)

Salix caroliniana, southern coastal plain willow, is the dominant

plant in this community and grows to heights in excess of 20 feet.

Willows are found scattered throughout broadleaf marsh areas and may form willow heads of several acres in size. Two of the largest concentrations of willows occur in the southwest portion of Pools C and D. Understory vegetation includes most of the common broadleaf marsh plants.

The willows encountered in the inundated portions of each pool have been flooded for several years. These trees are stunted and have spindly trunks and few leaves. It was observed that experimental water level drawdowns in Pool C stimulated growth of the willows and increased their size and foliage.

Large willow heads may be used as rookeries for a variety of birds including cattle egret, snowy egret, American egret, great blue heron, Louisiana heron, little blue heron, anhinga, and cormorant. Rookeries in large willow heads were observed in the south end of Pool C in 1975 and 1978.

A considerable portion (1192 acres) of the willow community encountered in the Kissimmee River valley is located along the back portion of the spoil piles lining C-38. During the construction of C-38, spoil areas were designated and a small borrow canal and levee were built around the perimeter of these designated areas to contain the fill. In many areas the spoil did not completely fill these enclosures, leaving an impounded area near ground level. These impoundments have apparently provided environmental conditions favorable for the growth of Salix caroliniana. Impounded willow communities are found in all of the pools but are most abundant in the north end of the valley. In one such

impounded community, the density of willows was estimated at about 2000/acre. These plants range up to 20 feet in height and have a trunk diameter of 2 to 4 inches. Associated understory vegetation included ragweed (Ambrosia artemisiifolia), Urena lobata, buttonbush (Cephalanthus occidentalis), and ferns.

Cypress Community (Plate 9)

Bald cypress (Taxodium distichum) is the dominant plant in this zone. The most dense cypress stands occur in sloughs or strands which flow from the uplands into C-38. The density of cypress in one strand was estimated at 850/acre. Other cypress areas within the river floodplain are limited to a few strands alongside the original river channels in the southern portion of the valley.

Most of these cypress trees were established under natural fluctuating water levels that existed prior to the construction of C-38, and their distribution in the floodplain is not indicative of present water conditions. These cypress may be found in 1 to 2 feet of water, or may be growing on exposed river banks or on drained, improved pastures. The cypress community in upland sloughs and tributaries exists in a regime of naturally fluctuating water levels.

The understory vegetation in dense cypress zones is usually sparse, and includes Sagittaria spp., smartweed (Polygonum sp.), and prairie iris (Iris hexagona). Occasionally, water hyacinths (Eichhornia crassipes) become very dense and trapped among the cypress trunks and knees. Several species of epiphytes grow on the cypress, including Tillandsia spp. and Encyclia tampensis. Other trees that often occur in dense cypress strands are pop ash (Fraxinus caroliniana) and buttonbush.

Hardwood Trees (Plate 10)

Several species of swamp hardwood trees are found in the Kissimmee River valley. The most common of these trees are red maple (Acer rubrum), pop ash, tupelo (Nyssa sylvatica), persimmon (Diospyros virginiana) and dahoon holly. Groups of these hardwood trees that are large enough to be classified are usually located along elevated river banks, or in elongated strands in sloughs. The largest of these hardwood strands is in Pine Island Slough in the north end of Pool B. Other significant areas of hardwood trees occur in Pools A and E, although scattered, individual trees are present in all of the pools.

Under natural water conditions, most of these trees experience periodic flooding and drying. Once established, the trees will survive without being flooded if they have ample soil moisture. Several areas that are dominated by red maples occur in Pool E where ground elevations are about 3 feet above the stabilized water levels. Associated understory vegetation includes Urena lobata, Eupatorium sp., Sabal palmetto, pokeweed (Phytolacca americana), Rhexia sp., Vitis rotundifolia and Florida trema (Trema micrantha). In the upland sloughs and tributaries associated plants include many of the marsh and aquatic grass species.

AQUATIC VEGETATION

Broadleaf Marsh (Plate 11)

The largest wetland plant community in the Kissimmee River valley is the broadleaf marsh. This community is dominated by pickerelweed (Pontederia lanceolata) and arrowhead (Sagittaria lancifolia), and is comprised of several wetland plant associations. Species commonly

associated with pickerelweed and arrowhead include buttonbush, maidencane, torpedo grass, smartweed, Ludwigia leptocarpa, Hydrocotyle umbellata, Sagittaria latifolia, arrowroot (Thalia geniculata), and swamp hibiscus (Hibiscus grandiflorus). Spatterdock (Nuphar luteum), bulrush (Scirpus spp.), and cattail (Typha latifolia) often form large stands along the river's edge or in lagoon areas and are grouped in this category.

Most broadleaf marshes are found in the southern portion of each impoundment where water depths are between 1 and 3 feet. Prolonged inundation in some areas has led to a condition where this plant community is growing hydroponically, with the roots of the plant suspended above the substrate.

As water depths become more shallow, species composition in the broadleaf marsh zone shifts towards a greater percentage of grasses and sedges and fewer broadleaf plants.

Small depressions in upland pasture areas frequently contain broadleaf marsh plants. Because these depressions may be subjected to seasonal inundation, they often provide feeding habitat for wading birds when forage is concentrated.

Some pastures in the northern portions of Pools B, C and D contain a distinctive pattern of meandering swales marking old river channels and oxbows that have changed course. These swales receive local rainfall and runoff. Most of the species in these old oxbows are typical of broadleaf marsh communities and include pickerelweed, arrowhead, torpedo grass, maidencane, water grass (Hydrochloa caroliniensis), smartweed, and alligator-weed.

The lack of water level flucutations in the Kissimmee River pools has caused ecological changes in the majority of this marsh community.

These changes include a shift in species composition, reduction of annual plant growth, increase in undecayed plant litter, and a decrease in available habitat for aquatic invertebrates and small fishes. Some of these ecological changes can be minimized through the use of water level management techniques (Goodrick and Milleson, 1974).

Maidencane Wet Prairie (Plate 12)

Large wet prairies that are dominated by maidencane (Panicum hemitomon) are located in Pool C north of the Istokpoga Canal, in the Avon Park Wildlife Management Area of Pool B, and in the southeast portion of Pool A.

Field measurements have shown that maidencane comprises about 50-60% of the wet plant biomass in this community (VanArman and Goodrick, 1979). Associated plant species also include pickerelweed, arrowhead, floating orchid (Habenaria repens), Hydrocotyle umbellata, Polygonum sp., and Rhynchospora inundata.

The water depth in the maidencane wet prairies ranges from about 6 to 18 inches and averages about one foot. Panicum hemitomon generally grows from 1 to 3 feet in height.

The stabilization of water levels in C-38 has caused a considerable buildup of maidencane detritus in these wet prairies. VanArman and Goodrick (1979) found that a drawdown followed by burning was a useful management technique which did not alter the plant species composition, but increased secondary productivity of aquatic invertebrates.

Maidencane is a common constituent in the broadleaf marsh community, but is generally found in the more shallow portions of that zone. Maidencane is also a common component of the marsh areas of several tributaries to C-38 such as Chandler Slough and Pine Island Slough.

Aquatic Grasses (Plate 13)

Maidencane wet prairies were distinguished from the other aquatic grass communities primarily due to the distinct nature and appearance of Panicum hemitomon. Aquatic grass communities are often located in sloughs or marshes which drain into C-38, and are subjected to a seasonal cycle of flooding and drying. The dominant species is torpedo grass, with maidencane, broomsedges, cut grass (Leersia hexandra), and false maidencane (Sacciolepis striata) sometimes present. Understory vegetation is diverse and includes Hydrochloa caroliniensis, Aster sp., Bacopa caroliniana, Centella asiatica, Cyperus haspan, white top sedge (Dichromena colorata), Hydrocotyle umbellata, and Lindernia anagallidea. Scattered patches of broadleaf marsh vegetation or wax myrtles often occur.

In the southern portions of some of the pools, aquatic grass communities are comprised primarily of Panicum repens or Panicum paludivagum. Many of the depressions in upland pastures are also dominated by these aquatic grasses.

Rhynchospora (Beakrush) Wet Prairie

Rhynchospora inundata is a sedge that grows to about 3 feet in height, with a distinct seed head that may reach 5 feet in height. R. inundata wet prairies are similar to maidencane wet prairies and contain many of the same species such as maidencane, pickerelweed, arrowhead, torpedo grass, buttonbush, white water lily (Nymphaea odorata), and Dichromena colorata. It is during the summer months, when the Rhynchospora inundata inflorescence is present, that this community obtains its characteristic appearance.

Two major Rhynchospora inundata wet prairies exist in the Kissimmee

River valley. The western portion of Pine Island Slough in northeast Pool B contains an extensive R. inundata wet prairie about 800 acres in area. Another R. inundata wet prairie is located just north of a large maidencane wet prairie in Pool C. During the wet season in Pine Island Slough water may be several feet deep whereas in the stabilized portions of the pools, water depth is constantly only a few inches.

Buttonbush Community (Plate 14)

Buttonbush (Cephalanthus occidentalis) is a woody shrub with waxy leaves 2-4 inches in length and is the dominant plant species in this zone. Two extensive buttonbush communities occur in the Kissimmee River valley. One of these is in Chandler Slough, a tributary which flows into Pool D and the other is in the southeast portion of Pool A.

Buttonbush is commonly found in the broadleaf marsh zones throughout the valley, although most plants in that community tend to be small and spindly where water levels have been stabilized. Water levels in Chandler Slough are dependent on runoff from the upland watershed and exhibit characteristic seasonal fluctuations. Water levels generally range from below ground elevation in the winter to over 3 feet during the wet season. Buttonbush growing under a natural hydroperiod tends to be considerably larger and exhibits more vigorous growth than under stabilized conditions. In Chandler Slough buttonbush shrubs average 3 to 5 feet in height and the canopy measures 10 to 11 feet in circumference.

The understory in the buttonbush community contains many of the species found in the broadleaf marshes including pickerelweed, arrowhead, maidencane, Ludwigia repens, Polygonum sp., and Aster sp.

Climbing hempweed (Mikania scandens) is also frequently found growing on the buttonbush shrubs.

Cephalanthus occidentalis is deciduous and loses its leaves in the autumn and winter. New growth of the plant begins in the late winter or early spring and its biomass is greatest around the beginning of the wet season.

Primrose Willow (Plate 15)

The primrose willow (Ludwigia peruviana) and the water primrose (Ludwigia leptocarpa) are two species that are well adapted to the stabilized and continuously inundated water conditions in the southern portions of each Kissimmee River impoundment. Both species commonly inhabit roadside ditches, drainage ditches and other sites that are disturbed and full of water and water hyacinth. These two species develop long, slender, underwater adventitious roots as an adaptation to constant inundation.

Primrose willows are a dominant feature in some areas where they invade and become established in other plant communities, primarily broadleaf marshes and floating tussocks. In some instances, the broadleaf marsh communities that are invaded are growing hydroponically. The largest primrose willow community comprises about 100 acres, and is located just south of the Istokpoga Canal in Pool C. The water depth in this area averages about 1 foot.

From observations over the past several years in the Kissimmee River valley, it appears that primrose willow invasion may be a successional stage in the deep, stabilized marshes. Primrose willows readily become established in hydroponic pickerelweed and arrowhead marshes and grow on floating mats of water hyacinths and/or Scirpus cubensis.

Floating Tussocks (Plate 16)

Many old oxbows and river runs in the Kissimmee River valley are covered with floating mats of two species of exotic plants, water hyacinth and Scirpus cubensis. In the southern portion of the pools, the tussock communities often appear as light colored "grassy" areas winding through broadleaf marsh communities. Water depths in adjacent broadleaf marsh areas may be less than 3 feet whereas water depth under the tussock can be 6 to 8 feet.

In the northern portion of the pools where these floating tussocks cover old oxbows, the adjacent land area is dry and supports woody vegetation or unimproved pasture.

These floating tussocks are apparently created when water hyacinths accumulate, form a solid mat, and are then invaded by Scirpus cubensis. The Scirpus cubensis eventually covers the hyacinths and forms a dense floating mat of roots and decaying vegetation which forms the substrate for growth of a variety of other plants. The resulting community may be a monospecific mat of Scirpus cubensis or it may support a variety of other species including Ludwigia leptocarpa, Ludwigia peruviana, cattail, pickerelweed, arrowhead, willow, camphorweed (Pluchea purpurascens), or Eupatorium sp.. Sacciolepis striata is another invader of hyacinths and water lettuce (Pistia stratiotes), which in some areas forms rather extensive floating mats.

Water level manipulations that have been employed by SFWMD (1 to 3 foot drawdowns for 60-120 days) usually have little effect on these communities due to the water depths under the mats. Even in areas where Scirpus cubensis mats were drawn down to ground surface, sprayed

with diesel fuel and burned in experimental treatments, the matted roots persisted and some S. cubensis growth returned. However, seeds of other plant species also germinated on the exposed mat and those plants thrived (Goodrick and Milleson, 1974).

Floating tussocks completely cover the water surface, block sunlight, contribute decaying organic material, and provide virtually no useful aquatic habitat.

Switchgrass (Plate 17)

Switchgrass, Spartina bakerii, grows in large, spreading clumps up to 6 feet in height. Switchgrass will not tolerate flooding for long periods of time. Under natural conditions S. bakerii is located in areas which seasonally dry. The switchgrass community occurs most frequently along the edge of the floodplain in the southern and mid-portions of the stabilized pools. S. bakerii also occurs along the edge of some of the tributaries to C-38 which still experience fluctuating water levels.

Switchgrass is frequently covered with climbing hempweed. Associated ground cover includes small grasses and sedges, and Lindernia anagallidea, Hypericum mutilum, Hydrocotyle umbellata, water hyssop (Bacopa monnieri), and Centella asiatica. Small wax myrtles are sometimes scattered throughout the switchgrass communities.

Soft Rush (Plate 18)

Soft rush (Juncus effusus) grows in large, dense tufts up to 3 feet in height. Under natural fluctuating water conditions, J. effusus is frequently found growing at elevations which are occasionally inundated.

In the stabilized Kissimmee River pools, soft rush is usually located about 0.5 foot above the water level in areas where the soils are saturated and ground water is near the surface. In these zones J. effusus is fairly dense and understory vegetation consists of low growing, water tolerant species such as Hydrochloa caroliniensis, Lindernia anagallidea, Centella asiatica, Hydrocotyle umbellata, Bacopa caroliniana, Dichromena colorata, and Rhexia sp.

At higher elevations in the floodplain, J. effusus communities are often found in depressions in improved or unimproved pastures. In these areas, soft rush forms an outer ring around a deeper marsh area of broadleaf emergent vegetation. Due to seasonal rainfall and fluctuating water levels, these ponds retain several inches of water for part of the year, and J. effusus is growing under more natural inundation conditions. These intermittent upland J. effusus ponds provide feeding areas for wading birds when water levels are low and the forage is concentrated.

Sawgrass

Sawgrass (Cladium jamaicensis) occurs infrequently in the Kissimmee River valley and is found in only a few scattered areas in Pool B. Major sawgrass stands are located in the maidencane wet prairie in the Avon Park Wildlife Management Area and in the Rhynchospora inundata wet prairie of Pine Island Slough at the north end of the pool. These stands are dense, circular pockets that contain primarily sawgrass; however, other species present include Hibiscus grandiflora, Sagittaria lancifolia, Cephalanthus occidentalis, Ludwigia peruviana, and several ferns.

St. John's Wort (Plate 19)

St. John's wort, Hypericum fasciculatum, is a small, woody shrub which occupies shallow, sandy upland ponds in the northern portions of Pools A and B. Within the Kissimmee River floodplain this is the least abundant plant community, accounting for only 46 acres. In the palmetto upland areas to the east of the river, however, ephemeral ponds and wet prairies dominated by Hypericum fasciculatum are very common.

Vegetation in St. John's wort ponds is generally sparse, consisting of emergent species such as maidencane, spikerush (Eleocharis spp.), and yellow-eyed grass (Xyris sp.). Water levels in these upland ponds fluctuate seasonally and the ponds are usually dry, or nearly so, during much of the winter. Wading birds often feed on the concentrated forage of these ponds during periods of falling water levels.

SPOIL AND BARREN

Spoil (Plate 20)

C-38 ranges from about 200 to 350 feet in width and is approximately 30 feet deep. The dredging of this canal resulted in the deposition of a considerable amount of spoil along the side of the canal. The composition of this spoil is primarily sand, with some shell, clay and limerock which is alkaline in nature. Spoil is piled as high as 25 feet above the water level, resulting in a very dry and porous substrate.

Much of the spoil supports few, if any, species of terrestrial vegetation. In those locations where vegetation is present, the density of plants is low and the amount of barren land is high. The characteristic appearance of the spoil piles is white, bare, sandy mounds.

The starkness of the spoil piles lining C-38 is perhaps the most obvious feature discernible in high altitude aerial photography of the Kissimmee River valley.

Vegetated Spoil (Plate 21)

The spoil mounds which parallel C-38 reach their maximum height immediately adjacent to the canal and slope downward towards the floodplain (Figure 3). Vegetation is more likely to exist along the lower, back edges of the spoil piles, probably because soil moisture is higher than at the top of the mound.

Plants frequently encountered on spoil piles include natal grass (Rhynchelytrum repens), broom sedge, thistles, Aster sp., and some unidentified grasses and sedges.

Another factor affecting the amount of vegetation growing on spoil piles is the age of the spoil. The proportion of the mounds which have been vegetated is greatest in Pool E and decreases to the north. This corresponds with the construction sequence for C-38.

Levees

This category consists of tieback levees, service roads, and other filled areas constructed exclusively to enhance the operation and/or maintenance of C-38 and the S-65 water control structures. In addition, other levees were constructed throughout the floodplain by local ranchers prior to the channelization of the Kissimmee River. These levees were generally designed to dike the Kissimmee floodwaters off of pasture land.

Open Water

Open water areas include those portions of C-38, the Kissimmee River, and any backwater areas which are devoid of emergent aquatic vegetation. Submergent vegetation occurs in some of the shallow water areas of the Kissimmee River and consists of southern naiad (Najas guadalupensis) and eel grass (Vallisneria americana). Hydrilla verticillata, an exotic plant that is capable of attaining nuisance levels, is found in a few locations in the southern portion of Pool E.

SUMMARY

1. A total of 25 plant communities or land use categories were identified, described and mapped within the Kissimmee River floodplain and major tributaries during 1978.
2. These categories were grouped within five major classifications: Agriculture and Urban; Terrestrial Forested; Wetland Forested; Marsh; Spoil and Barren. Agricultural and Urban categories represented the largest portion of the study area and accounted for 19,935 acres (42.1%). Improved pastures alone comprised 14,577 acres and 30.8% of the total area. Marsh plant communities accounted for 11,346 acres (24.0%); Spoil and Barren categories covered 8566 acres (18.1%); Terrestrial Forested communities comprised 5173 acres (10.9%); and Wetland Forested areas accounted for 2311 acres (4.9%).
3. The descriptions and maps in this report represent the condition of the Kissimmee River floodplain after the construction and operation of C-38 and the five water control structures. Many of the plant communities have been influenced or altered by the channelization of the floodplain and consequent stabilization of water levels. Other plant communities, especially those in tributaries, still respond to seasonal fluctuating water levels.
4. These maps and descriptions will provide a reasonable data baseline from which to measure the effects of any future water management alternatives.

PLATES 1-21

PLANT COMMUNITIES OF THE

KISSIMMEE RIVER FLOODPLAIN

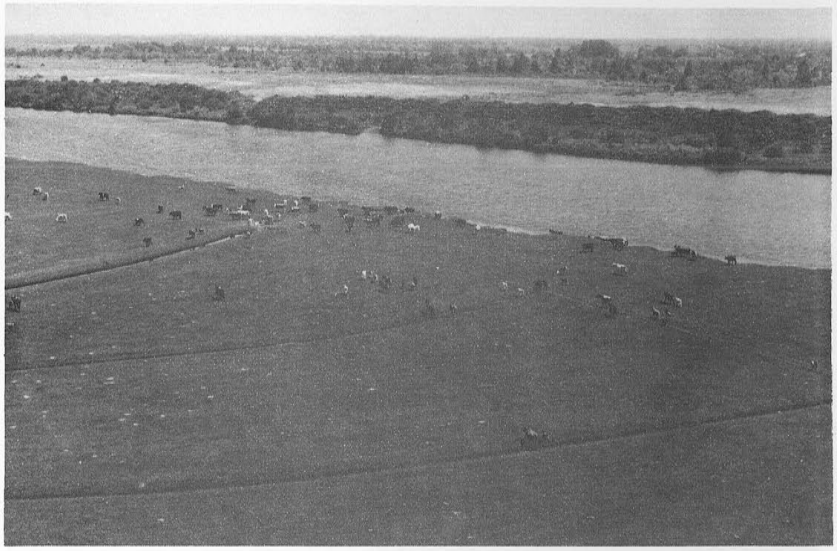


PLATE 1

IMPROVED PASTURES often contain grassed swale systems for irrigation and drainage. The pastures may be planted with forage grasses and maintained. Cattle density is generally high.

PLATE 2

UNIMPROVED PASTURES often result from permanently lowered water levels and generally occur in the central and northern portions of each pool. Broomsedges **(Andropogan sp.)** and scattered wax myrtles **(Myrica cerifera)** are common.

PLATE 3

Small residential areas, fish camps and buildings associated with water control structures are typical of URBAN land use categories found in the floodplain.

PLATE 4

A few groves of CITRUS trees are located near the edge of the historic river floodplain in pools D and E.

PLATE 5

WOODY SHRUBS such as elderberry **(Sambucus simpsonii)**, salt bush **(Baccharis halimifolia)** and wax myrtles **(Myrica cerifera)** have become dense in areas where the stabilization of water levels in the impoundments has exposed the ground in the north and central portions of each pool and in disturbed areas throughout the pools.

PLATE 6

WAX MYRTLE **(Myrica cerifera)** has colonized river banks that were left permanently exposed by the stabilization of water levels. Scattered broomsedge **(Andropogan sp.)** and bladderpods **(Glottidium vesicaria)** are evident in the photo.

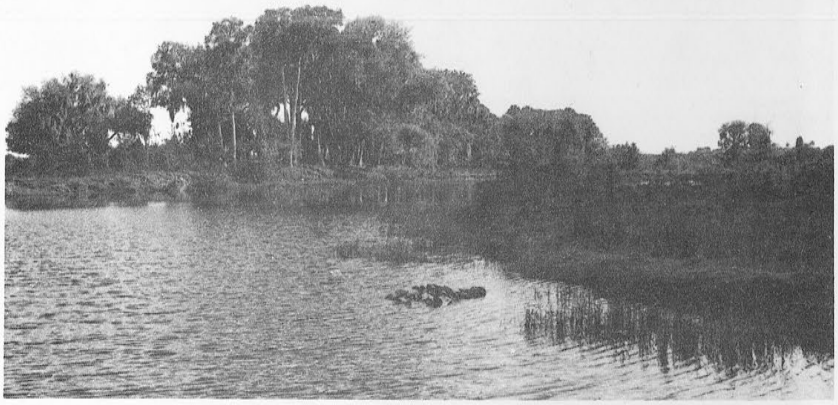


PLATE 7

OAKS **(Quercus spp.)** and CABBAGE PALMS **(Sabal palmetto)** occupy some natural ridges and riverbanks alongside the original river channels.

PLATE 8

WILLOW **(Salix caroliniana)** heads occur within various wetland communities, such as this broadleaf marsh.

PLATE 9

CYPRESS trees **(Taxodium distichum)** dominate some of the large watersheds, such as Chandler Slough. Understory marsh vegetation includes pickerelweed **(Pontederia lanceolata)**, smartweed **(Polygonum spp.)** and water hyacinth **(Eichhornia crassipes).**

PLATE 10

Maples **(Acer rubrum)** are common swamp HARDWOOD trees and are usually found in small heads or strands along Kissimmee River banks or tributaries.

PLATE 11

Pickerelweed **(Pontederia lanceolata)**, arrowhead **(Sagittaria lancifolia)** and cattail **(Typha latifolia)** are dominant species in this BROADLEAF MARSH. Due to stabilization of water levels in C-38 impoundments, excessive plant litter often accumulates.

PLATE 12

MAIDENCANE WET PRAIRIE is comprised of a vast, uniform growth of **Panicum hemitomon.** Some associated species are arrowhead **(Sagittaria lancifolia)** and pickerelweed **(Pontederia lanceolata).**

PLATE 13

The AQUATIC GRASS community includes torpedo grass **(Panicum repens)**, maidencane **(Panicum hemitomon)** and cutgrass **(Leersia hexandra).** Associated with the grasses are pickerelweed **(Pontederia lanceolata)** and buttonbush **(Cephalanthus occidentalis).**

PLATE 14

BUTTONBUSH **(Cephalanthus occidentalis)** shrubs grow to 12 feet in height. The understory includes broadleaf marsh plants such as pickerelweed **(Pontederia lanceolata)** pictured here.

PLATE 15

Thickets of PRIMROSE WILLOW **(Ludwigia peruviana)** often form a complete canopy over broadleaf marsh species such as **Sagittaria latifolia** and **Pontederia lanceolata.**

PLATE 16

Old river runs or oxbows sometimes become colonized by FLOATING TUSSOCKS composed primarily of **Scirpus cubensis** and water hyacinth **(Eichhornia crassipes).** Other species which have colonized the mats include **Ludwigia leptocarpa** and **Pontederia lanceolata.** Water lettuce **(Pistia stratoites)** is accumulating along the edge of the tussock.

PLATE 17

SWITCHGRASS **(Spartina bakerii)** forms a distinctive community slightly downgradient from the oak tree line along the floodplain edge. Ground cover in the foreground of the switchgrass tufts includes torpedo grass **(Panicum repens),** coinwort **(Centella asiatica)** and pennywort **(Hydrocotyle umbellata).**

PLATE 18

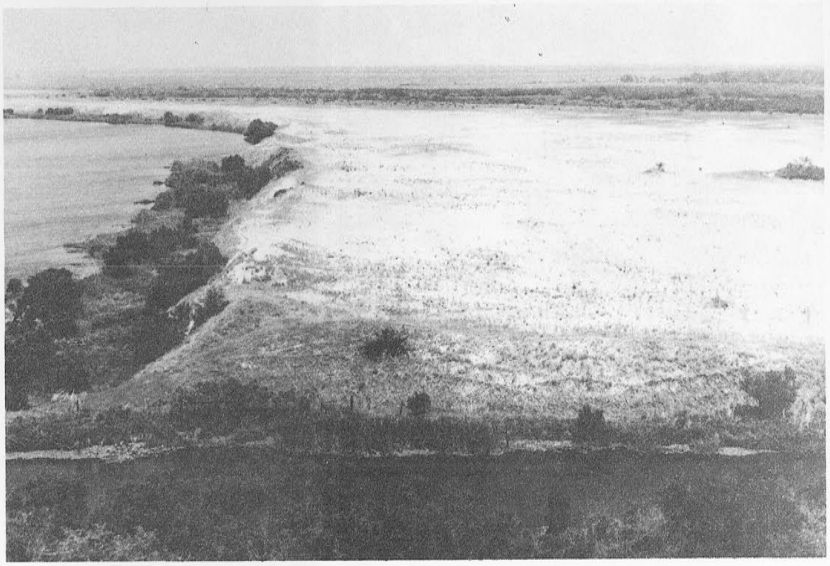
SOFT RUSH **(Juncus effusus)** is usually found at elevations slightly above the stabilized water levels in the Kissimmee River impoundments. The oak tree-line in the background marks the historical limits of the floodplain.

PLATE 19

ST. JOHNS WORT **(Hypericum fasciculatum)** grows in shallow, sandy ponds near the upland edge of the floodplain.

PLATE 20

Excavated sand, shell and limerock typify SPOIL PILES which occur along the edges of C-38. These spoil areas are a prominent feature of the Kissimmee River floodplain, and have displaced over 4900 acres of marsh.



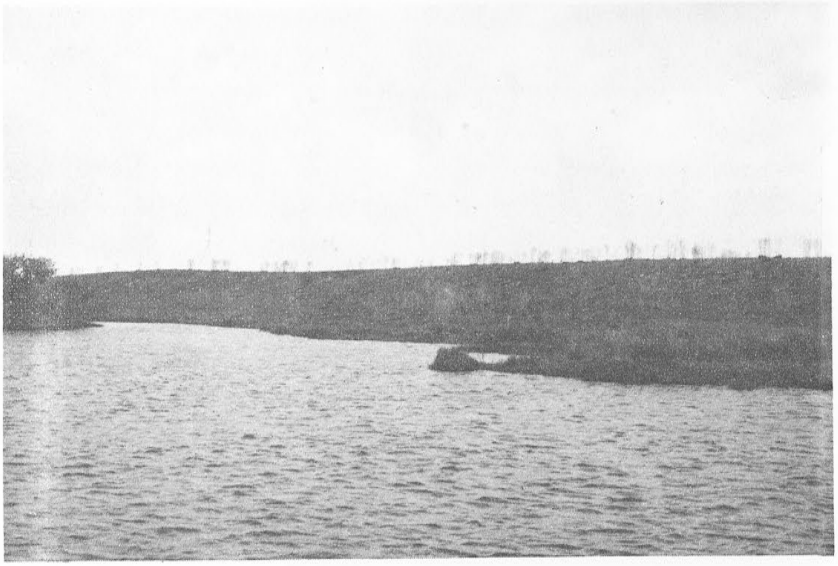


PLATE 21

VEGETATED SPOIL piles alongside C-38 have primarily become colonized with terrestrial species, such as grasses and dogfennel **(Eupatorium sp).**

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