TECHNICAL MEMORANDUM

May 1983

PLANT COMMUNITIES OF WATER CONSERVATION AREA 3A; BASE-LINE DOCUMENTATION PRIOR TO THE OPERATION OF S-339 AND S-340

DRE - 164

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PLANT COMMUNITIES OF WATER CONSERVATION AREA 3A; BASE-LINE DOCUMENTATION PRIOR TO THE OPERATION OF S-339 AND S-340

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DRE - 164

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
RESOURCE PLANNING DEPARTMENT
ENVIRONMENTAL SCIENCES DIVISION

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ACKNOWLEDGEMENTS

The original program was designed by Gary Pesnell under the direction of J. Walter Dineen. Initial field site selections and documentation were performed under the supervision of Gary Pesnell.

Installation of four water level recorders, monthly collection of charts and compilation and tabulation of the stage data was accomplished by the Data Management Division under the direction of Mr. Art Nelson.

Robb Startzman provided computer programming assistance for the storage, retrieval and manipulation of daily stage data from nine water level recorders. Steve Guzman contributed considerable field and office technical support to the project.

NOTE

This report contains a mixture of English and Metric measurements. An attempt to convert from one system to the other was not performed. Field transects were established using a metric base. However, water depth, water elevation, ground and bedrock contours were measured and reported in feet and feet above mean sea level since this is the system employed by water managers concerned with operating the system.

Multiply feet x 0.3048 to obtain meters

Multiply meters x 3.2808 to obtain feet

Multiply miles x 1.6093 to obtain kilometers

INTRODUCTION

Water Conservation Area 3 (WCA-3) consists of 915 square miles of impounded Everglades marshland in southeast Florida. A variety of water control structures, canals, and levees have altered the basic hydrologic patterns of the area. Two additional water control structures, designated S-339 and S-340, were recently designed and constructed for the sole purpose of environmental enhancement. This program was initiated in September 1977 to document the relationships among water depth, duration of flooding, land elevation, and soil depths to the existing plant communities in WCA-3. In addition, this program will provide a basis for evaluating changes in the plant communities which may occur after the two structures become operational.

This status report presents information on the initial documentation of the plant communities in WCA-3.

BACKGROUND INFORMATION

Description

Water Conservation Area 3 (Figure 1), the largest of the impounded wetlands within the South Florida Water Management District, measures 40 miles from north to south and about 25 miles from east to west. Although drainage activities have impacted the Everglades region since the early 1900's, the most comprehensive flood control and water management alterations were initiated in the early 1950's, following Congressional approval of the Central and Southern Florida Flood Control Project.

Construction of levees encircling the area was begun in the 1950's and was completed by 1962. Two major project canals bisect the area. The Miami Canal traverses WCA-3 from northwest to southeast enroute from Lake Okeechobee

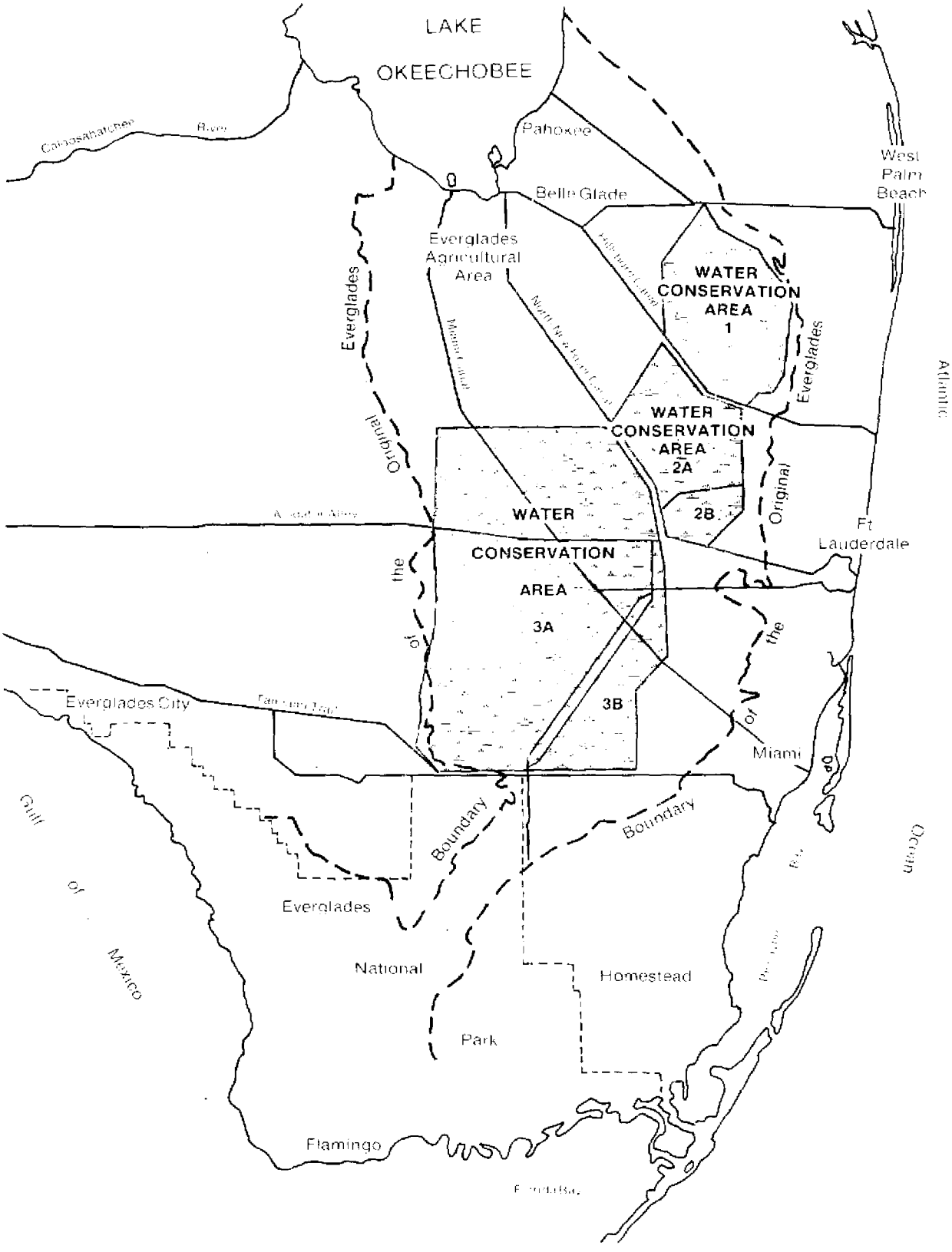

Figure 1 LOCATION OF EVERGLADES WATER CONSERVATION AREAS IN SOUTH FLORIDA

to Miami. L-67A runs southwestward toward Everglades National Park (ENP) and forms the boundary between WCA-3A (752 mi^2) and WCA-3B (163 mi^2). Additionally, the Alligator Alley borrow canal crosses the northern half of WCA-3A from east to west.

Hydrology

Direct rainfall is the major contributor of water to WCA-3A, accounting for over 60 percent of the measured inflows during the 1975-80 time period. The primary surface water inflows to WCA-3A include S-11 discharges from WCA-2A and pumped inflows from the north at S-8, from the east at S-9, and from the west at S-140. Other inflow points include S-150, L-3, L-28 gap, and L-28 interceptor (See Figure 2).

Major surface water outflows are made to the east coast and southwest Dade County through S-151 and S-333. Water is released to ENP through the S-12 structures. Table 1 summarizes inflow and outflow average annual volumes of these structures for the period 1975-1980.

Maximum water levels in WCA-3A are regulated by a schedule which ranges from 9.5 to 10.5 ft msl. Because of the vast size of WCA-3A, the area "stage" is defined as the average of three indicator gauges throughout the area (3-3, 3-4, and 3-28). The regulation schedule specifies maximum allowable water levels throughout the year.

When stages exceed the schedule, releases are made to ENP through the S-12 structures. When water levels fall below schedule, releases are made to meet only the ENP minimum annual allotment of 315,000 acre-feet (or 16.5% of the total WCA-3A deliveries during droughts), and to maintain canal stages in southeast coast canals.

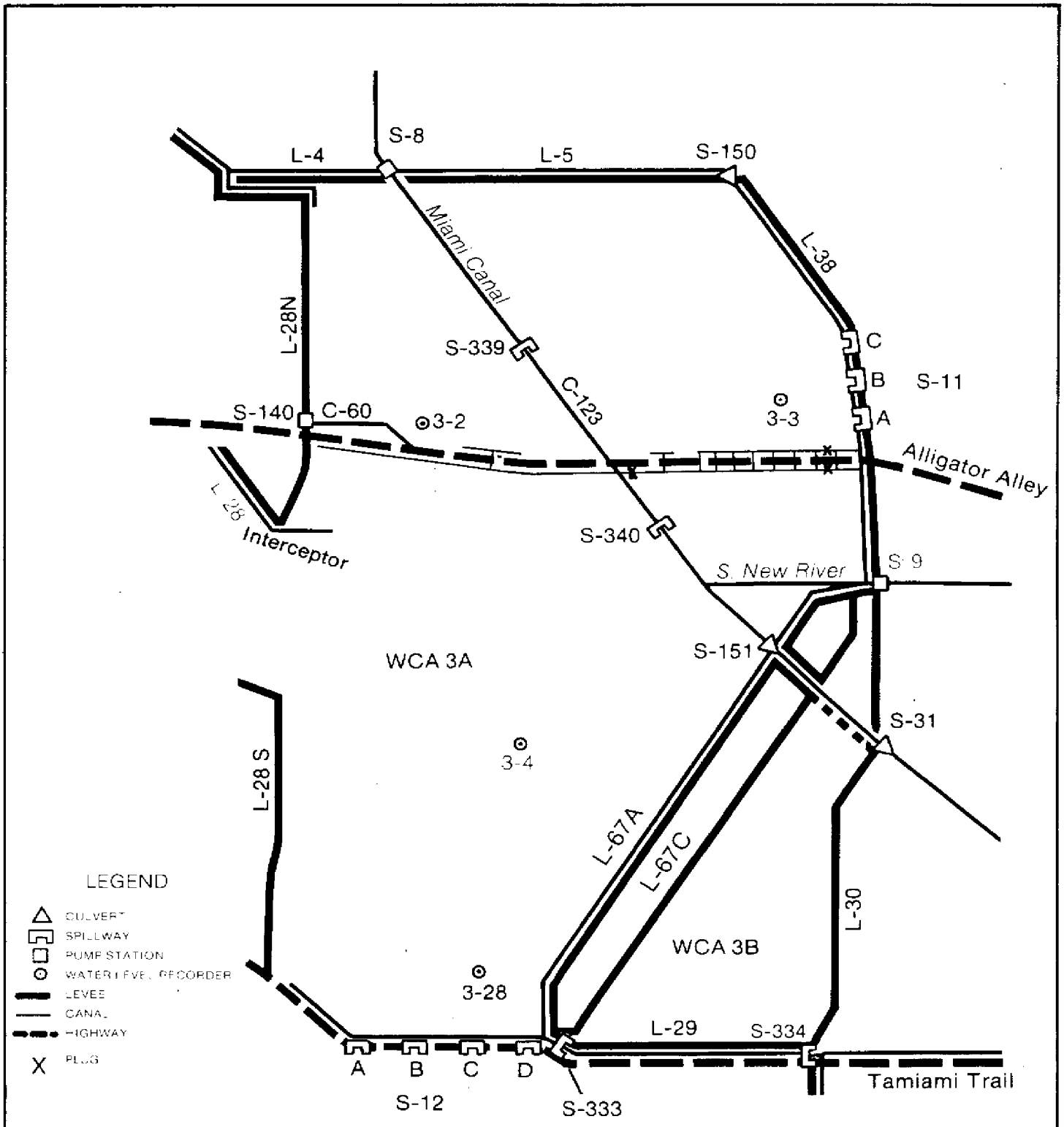

Figure 2 MAJOR WATER CONTROL AND STRUCTURAL FEATURES OF WATER CONSERVATION AREA 3

TABLE 1. SUMMARY OF AVERAGE ANNUAL INFLOW AND OUTFLOW VOLUMES FOR WATER CONSERVATION AREA 3A, 1975-1980.

INFLOW STRUCTURES	AVERAGE ANNUAL* DISCHARGE (ac)	PERCENT OF TOTAL
S-11A,B,C	287,000	12%
S-8	268,200	12%
S-9	133,350	6%
S-140	103,690	4%
L-3	174,240	8%
S-150	58,640	2%
L-28 Interceptor	62,620	3%
Seepage Inflow	42,740	2%
Rainfall	1,191,000	51%
Total	2,321,480	
OUTFLOW STRUCTURES		
S-151	62,200	3%
S-12A,B,C,D	379,500	18%
S-333**	-	-
Seepage Outflow	420,200	19%
Evapotranspiration***	1,300,000	60%
Total	2,161,900	

* SFWMD Water Resources Water Budgets 1975-1980
** Structure constructed 1980
***Calculated from pan evaporation

The seasonal and areal distribution of water throughout WCA-3 has been affected by a number of physical alterations within the area during the past 20 years. The completion of L-29 across the southern end of WCA-3 in 1962 interrupted the southerly flow of water and caused ponding in the south end of WCA-3. Additionally the construction or improvement of three other canals hastened the flow of water from the northern end of WCA-3 to the south. The canal adjacent to L-67A, constructed in 1962, was designed to deliver water to ENP. L-38W canal, completed in 1968, collects discharges from S-11 structures and routes water to L-68A south of Alligator Alley (Figure 2). Finally, the capacity of the Miami Canal was increased by the construction of C-123 during 1967-70. With a capacity of 1000 cfs, C-123 can convey water to the Lower East Coast and to ENP during periods of low rainfall.

These alterations have had the overall effect of rapidly removing water from the northern marshes and impounding water in the southern portion of the area. During the dry seasons, the canals tend to reduce groundwater levels and increase the probability of severe muck fires in the northern portion of WCA-3A.

A comparison of stage duration curves for two stragetically located water recorders in WCA-3A shows spatial differences in marsh hydroperiods. The 3-2 gauge, located in the northwest quadrat of WCA-3A, demonstrates some effects attributed to the completion of C-123 in 1970. Figure 3 shows that the inundation frequency at the 3-2 gauge averaged 85% for the period 1963-70 and declined to only 38% during the period 1971-1980. Mean water depth (defined as the difference between the water stage and ground elevation at the 50% exceedence level) was 0.65 feet above ground prior to the completion of C-123 and was reduced to 0.25 feet below ground after completion of C-123. Conversely, at the 3-28 gauge, located in the southern portion of WCA-3A,

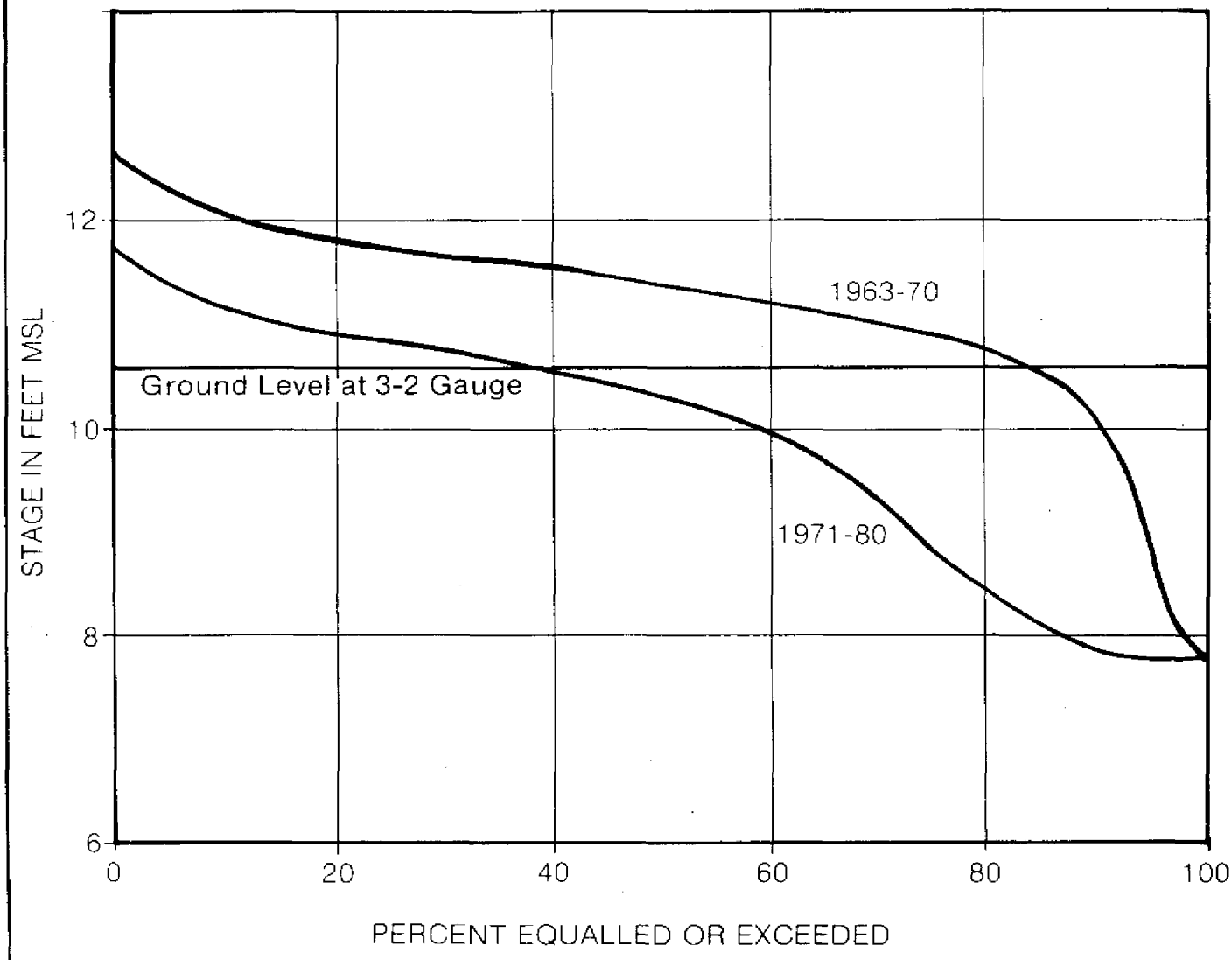

Figure 3 STAGE DURATION CURVES FOR 1963-70 AND 1971-80 TIME PERIODS AT THE 3-2 GAUGE IN WATER CONSERVATION AREA 3A

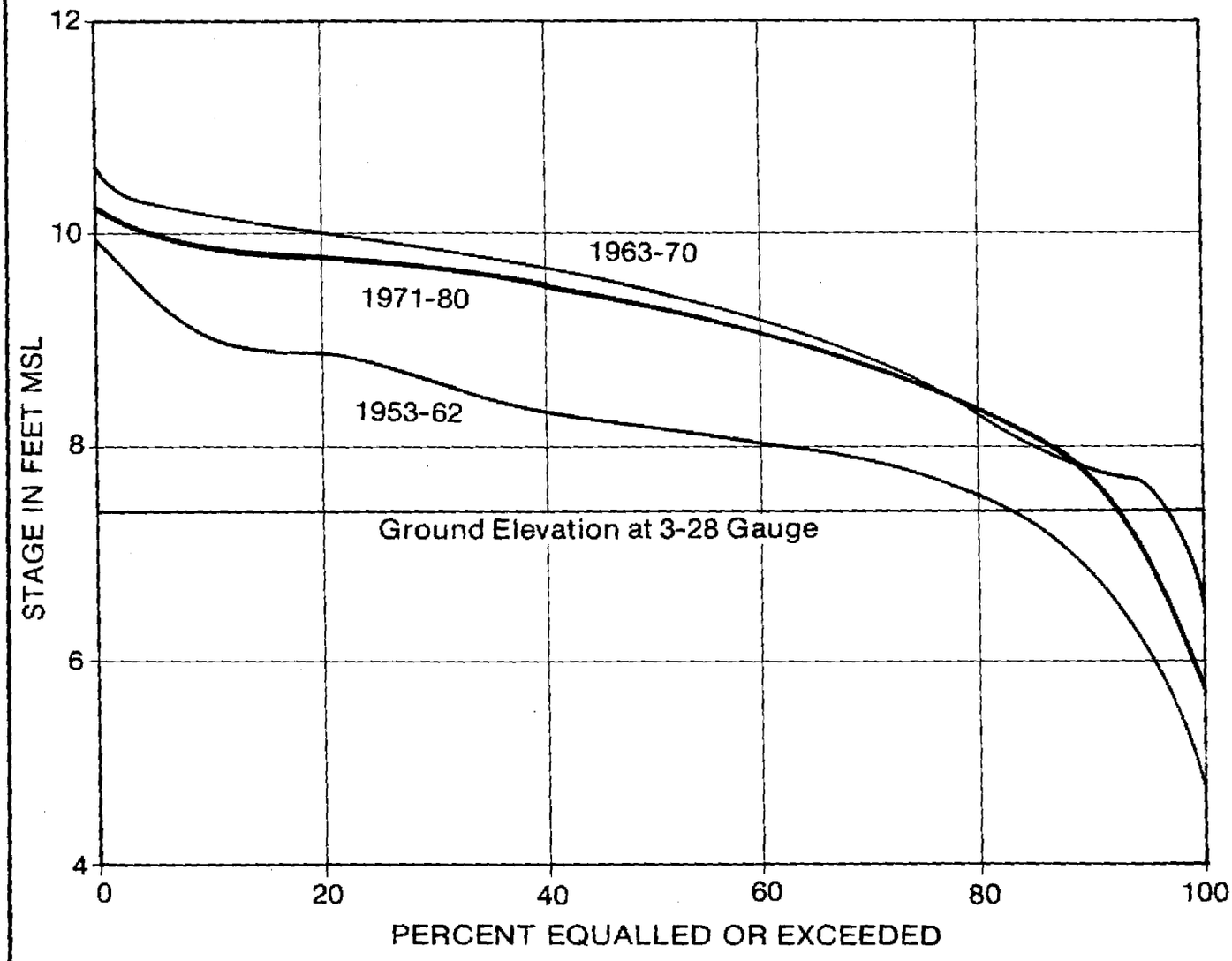

Figure 4 STAGE DURATION CURVES FOR 1953-62, 1963-70 AND 1971-80 TIME PERIODS AT THE 3-28 GAUGE IN WATER CONSERVATION AREA 3A

stage duration curves for both of these time periods are very similar, and represent the deep, ponded conditions which resulted from earlier impoundment due to the completion of L-29 (1962) across the southern boundary of WCA-3 (Figure 4).

Environmental Structures

Two double gated vertical lift water control structures, S-339 and S-340, were constructed in C-123 in an effort to back water up on the northern marshes, causing water to flow overland across the area and thereby prolonging the inundation period in the north and reducing water depths in the south. During the dry season, these structures would help maintain higher ground water levels throughout the northern area.

S-339 is located six miles north of Alligator Alley and 500 feet north of the buggy bridge at a ground elevation of about 10 ft msl. The southern structure (S-340) is located about 2.7 miles south of Alligator Alley at a ground elevation of about 8 ft msl. Water entering C-123 at S-8 will be prevented from flowing directly down the canal by the two structures. When C-123 was constructed, 100 foot gaps were left at 500 foot intervals in the spoil piles. As the stage rises upstream of S-339, water will back up and flow laterally into the marsh through the spoil island gaps. At structure S-340 water will also be forced east and west into the marsh, and westward within the Alligator Alley borrow canal. To prevent the eastward flow of water in Alligator Alley canal and down L-68A, three earthen plugs were installed in the borrow canal east of C-123. The two structures will remain closed except at times of extreme high water or when increased conveyance capacity is needed to deliver water for the Everglades National Park and/or the lower east coast. The two structures were completed and became operational in October 1980.

METHODS

In 1977, prior to the construction of S-339 and S-340, a number of study areas were selected in WCA-3A to document existing plant communities and to establish a data base of present vegetation patterns.

A total of nine study areas were selected during 1977 and 1978. Most of these sites were located adjacent to existing stage recorders, thereby providing long term hydroperiod data for each local study site.

Four additional stage recorders were installed in the northwest quadrat of WCA-3A where the most severe effects of overdrainage were evident and where benefits from the proposed structures would be maximized. Three gauges, 3-8, 3-10, and 3-11 were located north of Alligator Alley, while the fourth gauge, 3-9, is located just south of the highway.

Herbaceous plant communities were documented annually during spring and summer months at each study site along a permanently established transect. Each transect line was oriented in a general east-west direction at right-angles to the normal water flow. This orientation provided the greatest variation in elevation at each site and established a representative cross section of different vegetative communities.

The beginning of each transect line was marked by a one foot diameter steel plate flush with the substrate, with a pointed shaft extending to bedrock. The heading and distance from the transect bench mark to the corresponding water level gauge is on file at South Florida Water Management District in West Palm Beach.

The transects averaged about 100 meters in length (ranging from 84 to 144 meters), and are subdivided into 3 meter sections marked by wooden stakes. Ground surface elevation, soil depths, and rock elevation profiles were measured

at each station together with an inventory of each plant species present within a 2m x 3m quadrat. The distribution of plant species at each transect was expressed as percent occurrence (based on the proportion of total quadrats in which each species was found). Distribution was further defined by the frequency of utilization by each species within the elevation range (and subsequent inundation range) of each transect. A generalized description of the plant community at each transect line was prepared from observed abundance and dominance.

Tree island vegetation was documented at seven locations in WCA-3A, several of which were located near water level gauges and vegetation transects. A plot 24m x 3m was established within each tree island, and subsequently subdivided into thirty-six 1x2m plots, marked with metal pipes. All trees within these plots were identified with numbered metal tags. The height of each individual tree was measured and recorded to the nearest 0.1m. A species presence list, ground elevations, soil depths, and rock elevations were recorded at each station.

RESULTS

Vegetation Transects

Figure 5 shows the location of water level recorders, vegetation transects, tree island study plots, and approximate ground level contours in WCA-3A. A generalized written description of each plant transect is presented in Appendix A, while Appendix B depicts the ground and water elevation profiles and percent occurrence of the predominant species at each transect. Appendix C lists all plant species encountered in WCA-3A and their general distribution.

The nine vegetation transects were located throughout WCA-3A from the northwest corner to just north of Tamiami Trail, with a corresponding decrease

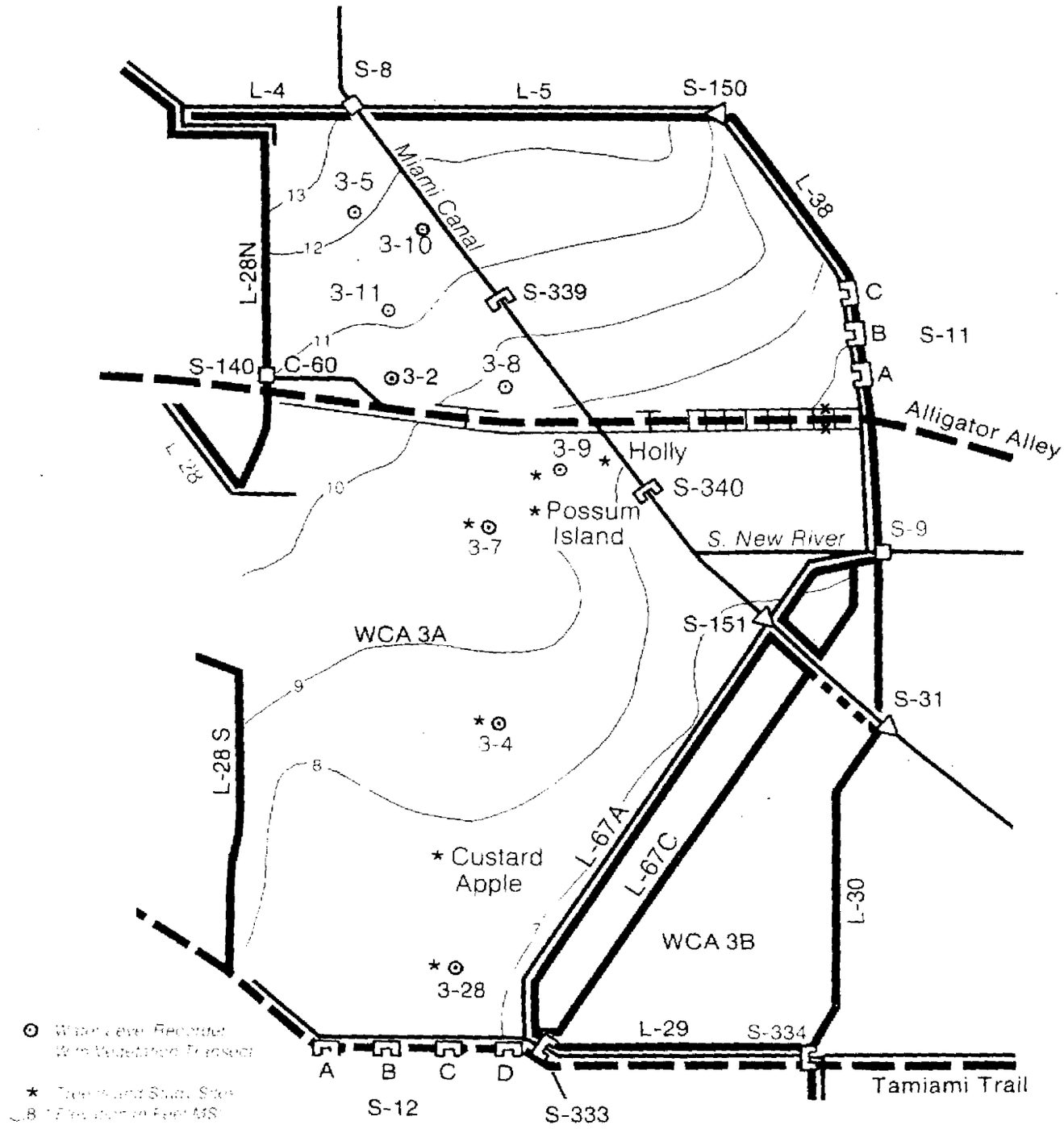

Figure 5 LOCATION OF VEGETATION TRANSECTS, CORRESPONDING WATER LEVEL RECORDERS AND TREE ISLAND STUDY SITES IN RELATION TO GENERAL TOPOGRAPHY IN WATER CONSERVATION AREA 3A

in ground elevation and subsequent increase in the frequency of inundation. Three basic plant community types were represented by these transects, ranging from aquatic sloughs at the lower elevations to wet prairies in the central portion of the area and terrestrial dominated plant communities in the north. Many of the transects represented a transition between community types, and all of the transects contained sawgrass as a common component.

Table 2 summarizes the pertinent information collected from each transect. Generally, the 3-28 transect represents an aquatic slough community, the 3-4 transect is a spikerush dominated wet prairie, the 3-7 and 3-9 transects are beakrush dominated wet prairies, while the 3-2, 3-8, and 3-11 gauges are maidencane wet prairies. Plant communities at the 3-5 and 3-10 gauges are transitional between wet prairie and terrestrial habitats.

Five of the transects were originally documented in 1978; three were installed and documented in 1979; and a final transect was established in 1980. Data presented in this report are based on the initial documentation.

Community Indicator Species and Frequency of Inundation

Indicator species were used to delineate plant communities. Indicator species are those species which give each community its characteristic appearance through its abundance or dominant growth form. The occurrence of the indicator species for the various plant communities encountered in WCA-3A exhibited a gradual trend from aquatic slough to mixed wet prairie-terrestrial habitat as the period of inundation decreased (Table 3).

Species data from all of the transects were combined to provide better categorization of the various indicator species. The corresponding inundation ranges at which each species was found were calculated. This information is summarized in Table 4.

TABLE 2. SUMMARY OF PHYSICAL CHARACTERISTICS AND PLANT COMMUNITIES AT NINE VEGETATION TRANSECTS IN WATER CONSERVATION AREA 3A.

Transect	Transect Length(m)	Ground Elev.(ft msl)Gauge	Ground Elevation on Transect (ft msl) Range	Mean	Soil Depth (ft) Range	Mean	Frequency of Inundation*	Plant Community
3-28	84	7.4	6.9- 7.6	7.2	3.1-4.2	3.5	93%	Aquatic slough
3-4	90	8.2	7.8- 8.5	8.2	3.1-5.0	3.7	82%	Aquatic slough/wet prairie
3-7	93	9.3	9.1-10.0	9.6	1.4-2.5	1.9	76%	Beakrush/maidencane wet prairie
3-9	129	9.6	9.2-10.1	9.6	1.1-2.1	1.6		Beakrush wet prairie
3-8	132	9.9	9.6-10.0	9.8	0.9-2.7	1.5		Maidencane wet prairie
3-2	108	10.6	9.8-10.4	10.2	0.7-1.8	1.3	32%	Mixed wet prairie
3-11	141	11.2	10.7-11.7	11.2	0.3-4.2	1.2		Maidencane wet prairie
3-10	90	9.8	9.7-12.8	11.1	0.2-1.9	1.0		Mixed wet prairie/saw-grass/terrestrial shrubs
3-5	90	11.6	10.9-11.1	11.0	0.6-5.9	2.9	14%	Mixed wet prairie/saw-grass/terrestrial shrubs

*For the period 1972-78; not available for 3-8, 3-9, 3-10 and 3-11 gauges

TABLE 3. DISTRIBUTION OF COMMUNITY INDICATOR SPECIES AND PERCENTAGE OF OCCURRENCE ALONG NINE VEGETATION TRANSECTS IN WATER CONSERVATION AREA 3A.

	Transect Gauge Number								
	3-28	3-4	3-7	3-9	3-8	3-2	3-11	3-5	3-10
Average Transect Elevation[1]	7.2	8.2	9.3	9.6	9.9	10.6	11.2	11.0	11.1
Aquatic Slough Indicators									
Nymphaea odorata	75[2]	53	35	20	-	-	-	-	-
Utricularia spp.	71	87	35	40	20	44	45	-	-
Eleocharis elongata	75	57	-	-	-	-	-	-	-
Bacopa caroliniana	96	70	55	24	11	67	51	-	-
Wet Prairie Indicators									
Eleocharis cellulosa	61	83	45	60	84	42	53	-	-
Panicum hemitomon	43	63	58	63	100	94	98	37	17
Paspalidium paludivagum	36	50	26	35	70	36	36	-	-
Rhynchospora tracyi	-	53	58	67	59	47	55	-	-
Rhynchospora inundata	-	40	45	21	18	19	43	-	-
Wet-Dry Tolerant									
Cladium jamaicensis	43	43	71	65	34	67	36	100	80
Terrestrial Indicators									
Eupatorium capillifolium	-	53	71	30	59	-	81	-	23
Andropogon sp.	-	-	-	-	25	44	96	13	60
Baccharis sp.	-	-	-	-	11	-	47	100	57

[1]Elevation in feet msl

[2]Percent occurrence in transect quadrats

TABLE 4. OVERALL DISTRIBUTION OF COMMUNITY INDICATOR SPECIES ACCORDING TO ASSOCIATED INUNDATION CHARACTERISTICS AND TRANSECT LOCATIONS IN WATER CONSERVATION AREA 3A.

Species	Inundation Range	Transects Present
Eleocharis elongata	80-94%	3-28 and 3-4
Utricularia sp.	52-94%	3-28, 3-4, 3-7, 3-9, 3-8, 3-2 and 3-11
Nymphaea odorata	60-94%	3-28, 3-4, 3-7 and 3-9
Bacopa caroliniana	50-94%	3-28, 3-4, 3-7, 3-8, 3-9, 3-11 and 3-2
Panicum paludivagum	47-94%	3-28, 3-4, 3-7, 3-8, 3-9, 3-11 and 3-2
Eleocharis cellulosa	50-94%	3-28, 3-4, 3-7, 3-8, 3-9, 3-11 and 3-2
Rhynchospora tracyi	50-82%	3-4, 3-7, 3-9, 3-8, 3-11 and 3-2
Rhynchospora inundata	50-82%	3-4, 3-7, 3-8, 3-9, 3-11 and 3-2
Panicum hemitomon	15-94%	All Transects
Cladium jamaicensis	15-94%	All Transects
Eupatorium capillifolium	10-78%	3-7, 3-9, 3-11 and 3-10
Andropogon sp.	15-52%	3-2, 3-8, 3-11, 3-10 and 3-5
Baccharis sp.	10-42%	3-11, 3-10, 3-5 and 3-8

Aquatic slough indicator species Eleocharis elongata, white water lily (Nymphaea odorata), and bladderwort (Utricularia sp.) are associated with high inundation rates (60-94%). Wet prairie indicators spikerush (Eleocharis cellulosa), beakrush (Rhynchospora tracyi), and maidencane (Panicum hemitomon) are related to middle inundation frequencies (50-82%). Sawgrass (Cladium jamaicensis) can tolerate wide ranges of inundation (15-94%) and occurred throughout the area. Finally, saltbush (Baccharis sp.) and broomsedge (Andropogon sp.) represent terrestrial species with inundation frequencies of 10-42%. The wide range in inundation frequencies for dog fennel (Eupatorium sp.) is misleading. Dogfennel germinates when soils dry, but the remnant plant stems will persist long after reflooding.

Tree Study Sites

The elongated tree islands in the south-central portion of the area are scattered among extensive sloughs. They are well defined and may reach 200 acres or more in size. These islands are oriented north to south, are generally teardrop shaped, with the blunt end upstream and the south end tapering into an elongated tail. The margins and downstream sections are generally composed of sawgrass interspersed with low stature, brushy vegetation. Many of the tree island strands in the north-central portions of the area are dominated by brushy vegetation - sawgrass mixtures. At the dryer elevated sites on some of these islands, large strangler figs (Ficus aurea), southern hackberry (Celtis laevigata), papaya (Carica papaya), and Florida trema (Trema micrantha) are commonly encountered. The understory vegetation includes swamp fern (Blechnum serrulatum), leather fern (Acrostichum danaeaefolium), firebush (Hamelia patens), rouge plant (Rivina humilis),and Dicliptera assurgens. In the southernmost tree islands, willows (Salix caroliniana) become increasingly

dominant and often form pure stands. Islands composed of dense growths of pond apples (Annona glabra) and coco plums (Chrysobalanus icaco) are also quite common. Other tree species found in this area include dahoon holly (Ilex cassine), buttonbush (Cephalanthus occidentalis), red bay (Persea borbonia), sweet bay (Magnolia virginiana), and wax myrtle (Myrica cerifera). Many signs of tree stress and recession are evident on these islands. Dead trunks of large trees are often encountered throughout these stands, indicating that some trees may have been killed by excessive flooding.

All of the seven woody shrub and tree island study plots are located south of Alligator Alley and west of C-123. Four of the sites are situated relatively close to stage recorders and vegetation transects. The following description summarizes the composition and physical characteristics of these study plots.

Tree island site 3-28 is located in the north end of a large tree island southwest of the gauge, and north of S-12C. Tree species at this site are dahoon holly, buttonbush, willow, and a few wax myrtles and red bays. Numerous dead tree stumps are found throughout this island. These are probably remains of old trees that were drowned out, but some of these stumps are resprouting around the bases. The understory of this island consists of dense growths of ferns such as royal fern (Osmunda regalis), leather fern, swamp fern, and marsh fern (Thelypteris sp.). Other common plants include arrow arum (Peltandra virginica), sawgrass, glades morning glory (Ipomea sagittata), white vine (Sarcostema clausa), bamboo vine (Smilax laurifolia), bladderwort, arrowhead (Sagittaria lancifolia), and pickerelweed (Pontederia lanceolata). The average soil depth at this site is 3.5 ft and the ground elevation ranges from 8.2 to 8.6 ft msl with an average elevation of 8.5 ft msl, 1.3 ft higher than the nearby slough transect.

The 3-4 tree site is located in a large island west of the gauge. This site is composed mainly of wax myrtles and dahoon holly, although buttonbush is common in the understory and a few scattered willow trees are present. The understory plants at this site include royal fern, swamp fern, sawgrass, arrow arum, pickerelweed, arrowhead, bamboo vine, and cut grass (Leersia hexandra). The ground elevations at this location are about one foot higher than the adjacent slough transect, ranging between 8.9 to 9.8 ft msl. Soil depths remain fairly consistent with an average of 3.4 ft, just slightly less than the slough soils.

The tree site near the 3-7 gauge is located southeast of the recorder. It is composed primarily of medium density sawgrass interspersed with low stature buttonbush and wax myrtles. Other plants in this strand include arrow arum, glades morning glory, and pickerelweed. Ground elevations and soil depths are only slightly higher with an average elevation of 9.8 ft msl and soil depths of 2.2 ft compared to 9.6 ft msl and 1.9 ft, respectively, for the slough transect.

The 3-9 tree study site located 1.5 miles south of Alligator Alley is placed in a small strand just northwest of the recorder. The trees present at this site are wax myrtle, dahoon holly, and buttonbush. The understory is composed mainly of sawgrass, while other species present include pickerelweed, arrowhead, arrow arum, glades morning glory, hemp vine (Mikania scandens), and dogfennel. The soil depths in this site average 2.3 ft compared to 1.6 ft average for the wet prairie transect. Average ground elevations are somewhat higher at 9.9 ft msl compared to 9.6 ft for the transect.

Three additional tree tagging sites were installed south of Alligator Alley. These sites are not in the vicinity of stage recorders, so elevations and stage data were interpolated from the nearest gauges, 3-9 to the north

and 3-28 and 3-4 to the south. Although these gauges are quite a distance from the sample site, examination of the stage data shows that water surface elevations are generally uniform over most of the southern sections of the area due to the impounding effect of L-67 and Tamiami Trail.

The Custard Apple Tree site is located between gauges 3-28 and 3-4, southwest of a very large tree island known as Custard Apple Hammock. The predominant trees found here are dahoon holly, wax myrtle and buttonbush; red bay and pond apple are also present. A dense understory consists of royal fern, swamp fern, marsh fern, bamboo vine, arrow arum, bladderwort, musk grass (Chara sp.), sawgrass, pickerelweed, arrowhead, and white water lily. There are also indications of tree stress and mortality from high water at this site with numerous dead trunks present. A large number of the trees have one or more dead trunks with new growth around the base of the old trunks (dahoon holly, red bay, wax myrtles, and willow). Elevations at this site range from 8.2 to 8.4 ft msl and soil depths average 4.0 ft.

Located between the 3-9 gauge and a large island known as Possum Head is another tree study site. This site is oriented north to south through a dense sawgrass ridge. Buttonbush is the most prevalent species, followed in abundance by wax myrtle and dahoon holly. Due to the dense growth of sawgrass the understory vegetation is very sparse, consisting mainly of scattered swamp fern, marsh fern, and arrow arum. Elevations range from 9.8 ft to 10.5 ft msl with an average soil depth of 2.0 ft.

The northernmost tree study site is located south of the Alligator Alley and Miami Canal intersection, northwest of S-340. The dominant tree species are dahoon holly and wax myrtle while understory composition is dominated by fairly dense sawgrass with scattered ferns such as marsh, swamp and royal ferns. Other species include arrow arum, hemp vine, and arrowhead. Elevations

TABLE 5. PHYSICAL CHARACTERISTICS OF TREE ISLAND STUDY SITES IN WATER CONSERVATION AREA 3A

Site Location	Elevation (ft msl) Gauge	Tree Site	Mean Soil Depth (ft)	Mean Rock Elevation (ft msl)	Average * Inundation	Major Species Present
3-28	7.40	8.47	3.50	4.98	68%	Dahoon holly, buttonbush, red bay, willow, wax myrtle, royal fern, swamp fern
3-4	8.20	9.07	4.04	5.03	51%	Wax myrtle, buttonbush, dahoon holly, willow, royal fern, swamp fern
Custard Apple	7.40	8.32	3.99	4.32	73%	Dahoon holly, wax myrtle, buttonbush, royal fern, swamp fern
3-7	9.30	9.76	2.15	7.59	45%	Buttonbush, wax myrtle, sawgrass, swamp fern
3-9	9.60	9.91	2.25	7.66	**	Buttonbush, wax myrtle, dahoon holly, sawgrass
Possum Island	9.60	9.92	2.04	7.88	**	Buttonbush, wax myrtle, dahoon holly, sawgrass, swamp fern
Holly Site	9.60	9.96	2.54	7.42	**	Dahoon holly, wax myrtle, buttonbush, sawgrass, swamp fern

* Percent equalled or exceeded (ground level) 1972-78
** No inundation frequency calculated since the 3-9 gauge was not installed until 1978

at this site range from 9.8 to 10.2 ft msl with an average soil depth of 2.5 ft.

Table 5 summarizes the pertinent information from the tree island study sites.

Water Records

Of the nine stage recorders correlated with this study, only five (3-2, 3-4, 3-5, 3-7 and 3-28 gauges) provide any record for the time period prior to the documentation of the associated plant communities. The longest period of record is for the 3-28 gauge which began in 1953. The 3-4 and 3-2 records began in 1963 and the 3-5 and 3-7 gauge records began in 1972.

The seven year period from 1972 to 1978 was selected to represent the water level conditions prior to plant documentation. Figure 6 compares the stage duration curves for these five gauges for this time period.

Water levels were above ground level only 14% of the time at the 3-5 gauge during those years. The frequency of inundation increased to 32% at the 3-2 gauge, 76% at the 3-7 gauge, 82% at the 3-4 gauge, and 92% at the 3-28 gauge.

DISCUSSION

The depth and duration of flooding, as well as seasonal variation in water levels, appear to be the main factors determining the distribution of the various vegetation communities. The hydroperiod exerts direct influence on plant distribution by eliminating species intolerant of extended inundation and increased water depth, in addition to controlling the distribution, viability, and germination of seed sources. The hydroperiod also influences

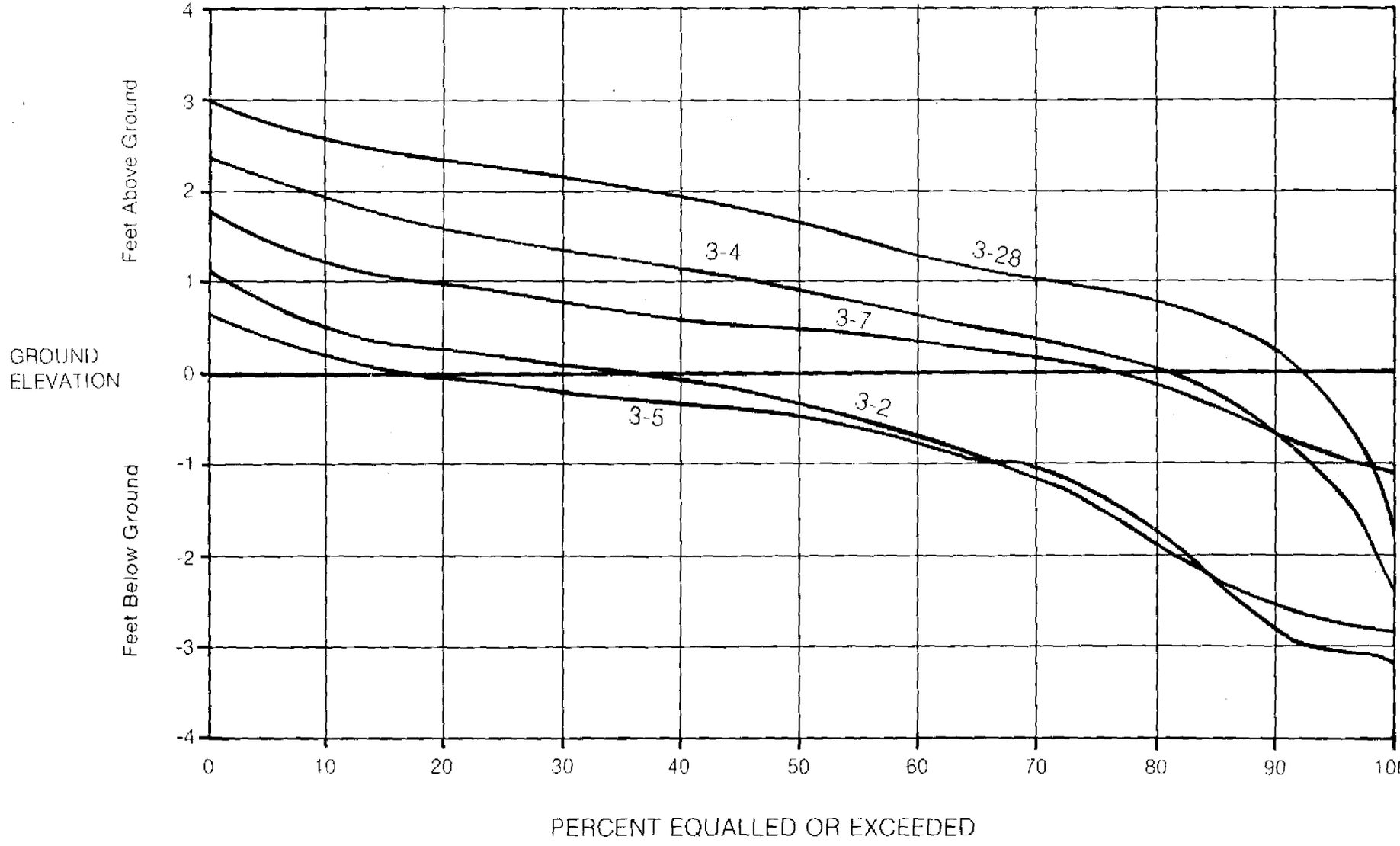

Figure 6 STAGE DURATION CURVES IN RELATION TO GROUND ELEVATION AT LONG TERM WATER LEVEL RECORDERS (1972-1978)

the frequency and intensity of fires; selecting for species that are fire tolerant. Other factors which may influence vegetation patterns are depth and type of soil, degree of disturbance, and nutrient availability.

The distribution of water has had a significant effect on the vegetation patterns which have developed in WCA-3. Recent plant community changes have become most pronounced in the over-drained northwest corner and in the deeper areas of the southeastern portion of WCA-3A. The shortened hydroperiods and faster water recession rates north of Alligator Alley have favored a succession to terrestrial weeds such as salt bush which was present in 100% of the sites at the 3-5 gauge. Dog fennel and broomsedge were also very common.

Fire is an important factor in maintaining and perpetuating the typical Everglades vegetation patterns (Robertson, 1954). Periodic fires favor fire adapted species such as sawgrass and maidencane, pruning back woody and brush vegetation. Increasingly long, dry periods with water levels dropping 3 feet or more below the ground surface increase the chance and severity of fires in the area. Severe fires which occur during very dry conditions burn into the organic soils and destroy sawgrass by burning its roots. Tree islands are particularly susceptible to fire damage. Fire easily starts in the downstream sections of the tree islands which are composed largely of dense sawgrass and brush species. A hot fire can spread into the central portion of the island where it may cause extensive damage to susceptible hardwood species.

During the first two weeks in June 1981, severe fires burned thousands of acres south of Alligator Alley extending towards the 3-4 gauge. Water levels were well below ground at this time and peat fires became widespread. Fires swept through all the tree study sites north of the 3-4 gauge causing extensive peat losses at three of the sites. Soil elevation and depth profiles

were resurveyed. The tree study site at the 3-9 gauge had the most extensive peat burn, with soil losses up to 11 inches and an average soil loss of 3.6 inches. At the Holly tree site there was an average soil depth decrease of two inches with greater soil losses (about 12 inches) around the bases of some trees. At the Possum Island site south of the 3-9 gauge soil losses averaged nearly two inches, with some areas losing up to six inches of soil. This site was previously composed of very dense sawgrass, but five months after the fires sawgrass regrowth remained sparse with numerous dead tussocks remaining on large patches of bare soil.

Tree mortality was 100% for wax myrtles and holly trees at the 3-9 and the Possum Island sites. Mortality was 77% for all trees at the Holly site and 57% for the 3-7 site. New growth was appearing on buttonbush at all sites. New growth was also present around the bases of burned trunks of wax myrtles and holly trees at the 3-7 site and at the Holly site.

Increased frequency of tree island fires appears to favor the proliferation of willows (Craighead, 1971). Willows readily invade freshly burned islands and other disturbed areas, and once established, are better adapted to subsequent fires and higher water levels resulting from peat losses. As a result of reduced hydroperiods in the northern sections of WCA-3A, large areas have become exposed to soil oxidation and peat fires, resulting in changes in the vegetation patterns and extensive soil losses. In this section soil loss averaged 0.25 ft over 5000 acres from one fire in 1977 (Schortemeyer, 1980). Other significant peat fires also occurred in 1971, 1973, and 1974.

The hydroperiod and vegetation patterns that are probably most representative of pre-project conditions are found in the central sections of the area, where wet prairie communities predominate between extensive sawgrass stands. These wet prairies are sensitive to water level fluctuations

and depths and require frequent drying periods with moist soil conditions for seed germination and establishment of new seedlings. This area remains inundated for most of the year but occasionally dries during the spring months. Water levels rarely recede more than a foot below ground level. These low stature "flats" as described by Loveless, (1959) are characterized by three main indicator species: spikerush (Eleocharis cellulosa), beakrush (Rhynchospora tracyi), and maidencane (Panicum hemitomon). These communities appear to attain their optimum development between gauges 3-4 and 3-8. The dominance of these indicator species varies depending upon hydrological conditions. As the wet prairie becomes exposed to higher water levels, spikerush increases in density over the other two species. Spikerush reaches its highest percentage of occurrence in areas with inundation frequencies of about 85%. Beakrush appears to reach its optimum development between the 3-8 and 3-9 gauges, with an average inundation frequency of about 75%, and was not found at sites with inundation rates greater than 85%. Maidencane dominance increases as the period of inundation decreases. Maidencane appears to be able to withstand dryer conditions and periodic burning. Wet prairies generally have insufficient fuel for burning unless there is a high percentage of maidencane present (VanArman and Goodrick, 1979). Of the three wet prairie indicator species, maidencane was present at the greatest range of elevations, but it attained the highest percentage occurrence at the 3-8, 3-2 and 3-11 gauges.

The extended hydroperiod and increased water depths resulting from the ponding effects caused by the completion of L-29 and L-67 has led to the displacement of wet prairies from the southern third of WCA-3A. The well defined sloughs now present in this area are dominated by submergent and floating vegetation typical of slough-aquatic communities. These stations were exposed to 80 to 100% inundation frequencies and maximum water depths

of over three feet. There are fewer species at these sites compared with the wet prairies. Plant composition was dominated by white water lily, water hyssop (Bacopa caroliniana), bladderwort, and Eleocharis elongata which are all associated with increased hydroperiods and water depths. White water lily was most abundant at the lower elevation transects with high inundation frequencies. It was present in 75% of the quadrats at the 3-28 gauge, decreasing to 53% at the 3-4 gauge and 35% at the 3-7 gauge, but was not found in any significant numbers north of Alligator Alley. Eleocharis elongata is also associated with high inundation rates. This species was found only at the two southernmost transects with average inundation frequencies between 80 and 94% and occurred in 75% of the quadrats at the 3-28 gauge and 57% of the quadrats at the 3-4 gauge. Peppergrass (Potamogeton illinoensis) was encountered at some of the southernmost locations, particularly in the deeper water in the vicinity of L-67. This species is normally associated with 100% inundation rates (Ager and Kearce, 1970).

The plant community composition is variable within a localized area with tree islands occupying the highest elevations, followed by sawgrass ridges, wet prairies, and sloughs at the lowest elevations. These elevation differences may be slight, but they can result in significant changes in the hydroperiod at a site. The greatest elevation differences were found between the sloughs and the tree islands in the southern third of the area. Tree islands were usually 10 to 13 inches higher than the surrounding sloughs. The elevation differences decreased to 3 to 5 inches in the northern tree strand areas.

Soil depths generally increased toward the south. Depths averaged between three and four feet at the three southernmost locations but were less than two feet at the northern transects. Soils in the tree island plots were

somewhat deeper than the vegetation transects and this difference in soil depths increased to the north.

Bedrock elevations were found to be higher in the southern tree islands than in the surrounding sloughs. This supports the theory of tree island formation on elevated ridges in the rock floor as postulated by Loveless (1959). These conditions, however, change in the northern tree strands where bedrock elevations decrease, indicating different formation processes in this area.

The variable soil depths found throughout the area may influence the establishment of woody species by providing sufficient substrate depth to support tree growth. The proximity of the limestone rock strata to the soil surface can determine the soil reaction (pH) which, in turn, may influence the vegetative composition at the site (Loveless, 1959). Soil characteristics, elevations, and drainage conditions (water retention) may also influence the development of plant communities. The vegetation that becomes established will, in turn, affect the mode of development of those soils (Davis, 1943).

Finally, the increased nutrient loads in water flowing into the Water Conservation Areas, along with other factors such as altered water levels and disruption of existing communities (particularly along canals and structures), have displaced the natural vegetation in many of these locations (McPherson, 1976). Stewart (1974) found that sawgrass had very low nutrient requirements and demonstrated that enrichment of this community with phosphorus and potassium resulted in phytoplankton blooms, sawgrass stress, and disappearance of submerged vegetation such as musk grass and bladderwort. Dense stands of cattails become established near these canals, structures, airboat trails, and other disturbed areas, displacing natural sawgrass communities. Extensive cattail invasions may be good indicators of disruption and stress of sawgrass (McPherson, 1973).

SUMMARY

This report summarizes the present species composition at nine transects installed throughout WCA-3A in 1978-1980, and also documents a variety of tree island and woody shrub communities.

This is the initial baseline documentation of WCA-3A plant communities prior to the construction and operation of two water control structures, S-339 and S-340 in the northern portion of the Miami Canal. These structures are designed to divert water over the northern marshes, thereby prolonging the inundation period in this area while reducing the hydroperiod and water depths in the southern portions.

Future reports will examine short and long term changes at permanent transects in relation to hydroperiod and the influence of these two structures.

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APPENDIX A

GENERALIZED DESCRIPTION OF PLANT COMMUNITIES AND TRANSECTS IN WATER CONSERVATION AREA 3A

3-28: The southernmost transect line is located adjacent to the 3-28 gauge and telemetry tower, 3.5 miles north of S-12C. This 84 meter line is oriented through an aquatic slough area and terminates in a sawgrass ridge. This line is characterized by sparse aquatic vegetation including white water lily (Nymphaea odorata), water hyssop (Bacopa caroliniana), and bladderwort (Utricularia sp.). Other common species include spikerushes (Eleocharis cellulosa and E. elongata) and floating heart (Nymphoides aquatica) with sawgrass (Cladium jamaicensis) and maidencane (Panicum hemitomon) at the higher elevations. The soil depth averages 3.5 feet deep and is covered with a fairly thick layer of accumulated organic detritus. The ground elevation at this gauge is 7.4 ft msl but elevations across the transect range from 6.9 to 7.6 ft msl. These are the lowest elevations for any of the study areas.

3-4: The 3-4 gauge and telemetry tower is located approximately 12 miles south of Alligator Alley. The transect near this gauge also passes through a slough area into a sawgrass ridge on the east side. Aquatic slough vegetation is predominant at this site, but sparse emergent vegetation is also present. Common plants at this site include white water lily, bladderwort, water hyssop, spikerushes, beakrushes (Rhynchospora tracyi and R. inundata), sawgrass, maidencane, arrowhead (Sagittaria lancifolia), and pickerelweed (Pontederia lanceolata).

The soil depth at this site averages 3.7 ft and ground elevations range from 7.8 to 8.5 with an average of 8.2 ft msl.

3-7: The 3-7 gauge is located adjacent to an area of long tree island strands 4.5 miles south of Alligator Alley. This 91 meter transect crosses through a sawgrass ridge into a wet prairie community. Vegetation in this area is transitional between the slough and wet prairie communities. The dominant plants at this site are sawgrass, maidencane, beakrushes, spikerush, water hyssop, and swamp lily (Crinum americanum).

The soil depth at this site averages about 1.9 ft. The gauge ground elevation is 9.3, ft while elevations along the transect ranged from 9.1 to 9.6 ft msl.

3-9: The 3-9 gauge is located near the intersection of Miami Canal and Alligator Alley. The dominant communities in this area are wet prairies interspersed among extensive sawgrass-brush strands. The most representative species found along this line include beakrush, maidencane, and spikerush. These were found in 60% or more of the plots. Other common species include sawgrass, Paspalidium paludivagum, bladderwort, and dogfennel (Eupatorium sp.). The ground elevation at this guage is 9.6 ft msl, while elevations along the line are between 9.2 ft and 10.1 ft msl. Soil depths averaged 1.6 ft across the transect.

3-8: The 3-8 gauge is approximately 1.75 miles north of Alligator Alley and 1.5 miles west of Miami Canal. This 132 meter transect extends across a wet prairie community into sawgrass ridges at both ends. This area is characterized by extensive strands of dense sawgrass interspersed with wet prairie communities. The dominant species at this site are maidencane, spikerush, beakrush, R. inundata, Paspalidium paludivagum, and smartweed

(Polygonum sp.). The ground elevation at this gauge is 9.9 ft msl, with elevations ranging from 9.6 to 10.0 ft msl across the transect line. The average soil depth at this site is 1.5 ft and varies from 0.9 ft to 2.7 ft.

3-2: The deer gauge (3-2) is located 0.5 mile north of Alligator Alley. The transect at this site extends 108 meters east to west. The ground elevation at this site is 10.6 ft msl at the gauge, with elevations ranging from 9.9 to 10.4 ft msl across the transect. Soil depths along the line ranged from 0.6 ft to 2.0 ft. Some of the common species found at this site were maidencane, sawgrass, water hyssop, beakrush, smartweed, and Ludwigia alata.

3-11: The 3-11 gauge is just north of the pipeline crossing WCA-3 and is 3.5 miles west of the Miami Canal. Some of the dominant species found along this transect were maidencane, sawgrass, Paspalidium paludivagum, spikerush, beakrushes (Rhynchospora tracyi, R. inundata and R. globularis), broomsedge (Andropogon sp.), dog fennel, water hyssop, swamp lily, and saltbush. The elevation recorded for this gauge is 11.2 ft msl with elevations across the transect ranging from 10.7 to 11.4 ft msl. Soil depths at this site were highly variable ranging from 0.3 to 4.2 ft with a 1.2 foot average.

3-10: The 3-10 gauge is approximately 0.5 mile west of Miami Canal and 4 miles north of S-339. The 3-10 gauge has a ground elevation of 9.8 ft msl, but the elevation at the transect line was considerably higher with an average of 11.1 ft msl. This 90 meter transect displayed the greatest variation of ground contours ranging from 9.7 ft to 12.7 ft msl. Soil depths at the site

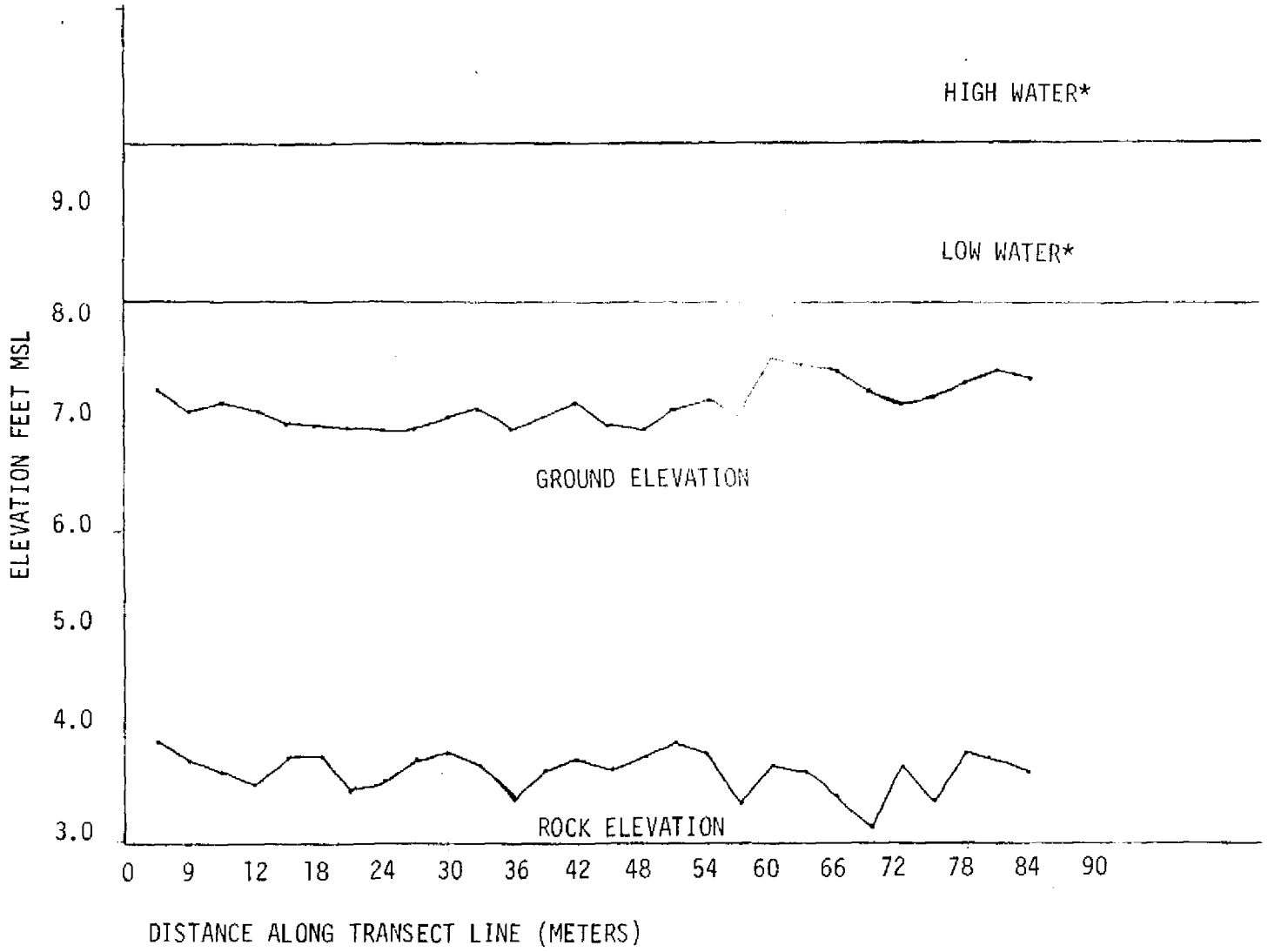
were rather shallow, averaging only 1.4 foot in depth, with a range from 0.3 to 1.9 ft. The vegetation patterns at this location undergo a gradual change from mixed wet prairie community to a more terrestrial habitat as the ground elevations increase to the west of the line. Some of the common species along this transect include sawgrass, saltbush, broomsedge, dog fennel, Ludwigia repens, maidencane and various grasses.

3-5: The northernmost gauge is the 3-5, located approximately 4.5 miles south of the S-8 pump station. The transect line extends 90 meters in a southwest direction. Soil depth was highly variable at this station ranging, from 0.65 to almost 6 feet in depth. Ground surface elevations were fairly consistent with an overall average of 11.0 ft msl, about 0.6 foot lower than the ground elevation at the gauge (11.6 ft msl). This station had a high incidence of terrestrial vegetation. Some of the species found along this line included sawgrass, saltbush, Ludwigia repens, maidencane, smartweed, hempvine (Mikania scandens), cattail, Cyperus spp., and broomsedge.

APPENDIX B

PLANT TRANSECT GROUND SURFACE AND BEDROCK PROFILES AND MAJOR SPECIES COMPOSITION

3-28 GAUGE

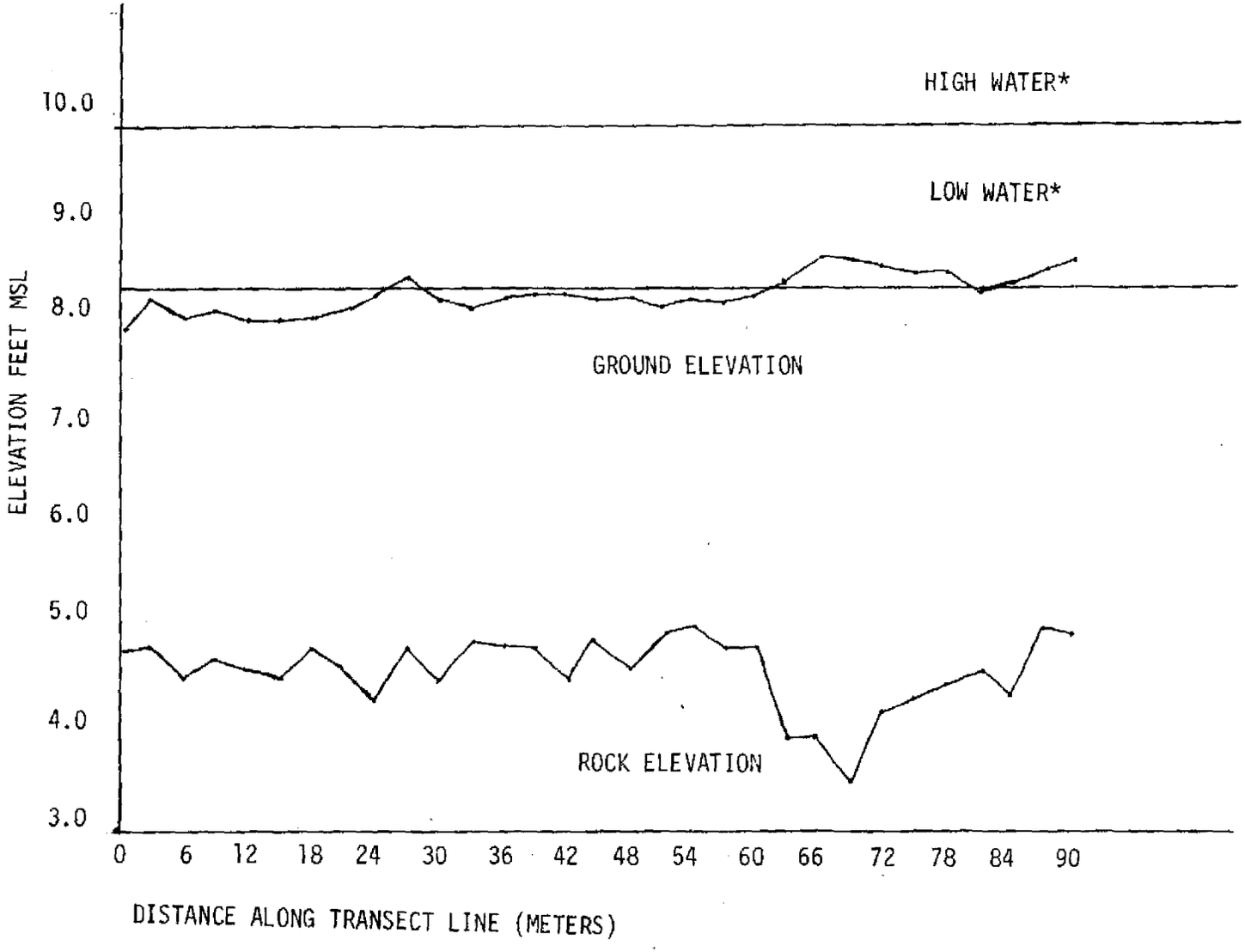


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1979)

Bacopa caroliniana	96%
Eleocharis elongata	75
Nymphaea odorata	75
Utricularia sp.	71
Eleocharis cellulosa	61
Cladium jamaicensis	43
Crinum americanum	43
Panicum hemitomon	43
Panicum paludivagum	36
Hymenocallis sp.	32
Nymphoides aquatica	32

*High water is considered the water elevation equalled or exceeded 20% of the period (1972-78)
Low water is considered the water elevation equalled or exceeded 80% of the period (1972-78)

3-4 GAUGE

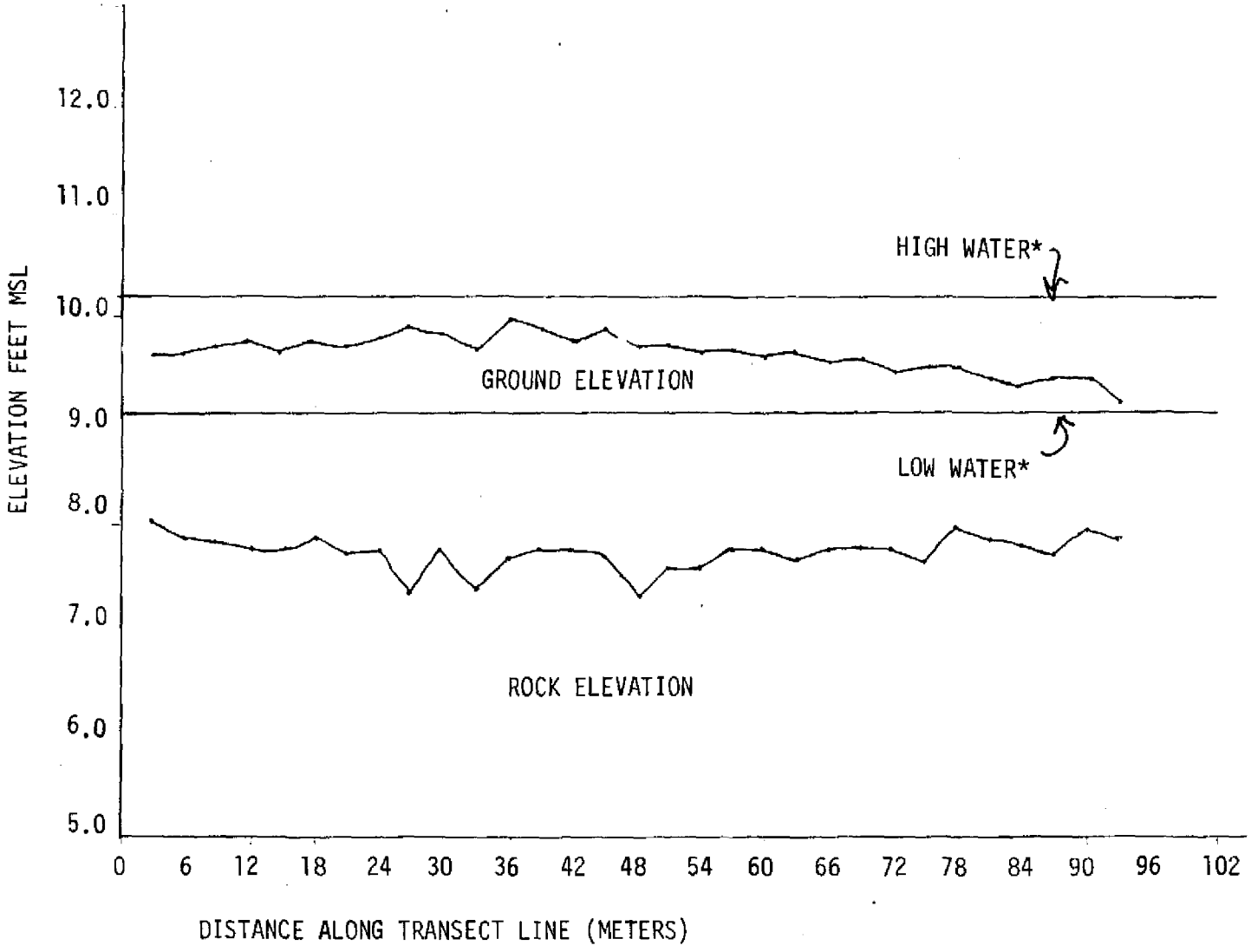


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1979

Utricularia sp.	87%
Eleocharis cellulosa	83
Sagittaria lancifolia	77
Bacopa caroliniana	70
Panicum hemitomon	63
Eleocharis elongata	57
Pontederia lanceolata	57
Nymphaea odorata	53
Rhynchospora tracyi	53
Panicum paludivagum	50
Cladium jamaicensis	43
Rhynchospora inunda	40
Hymenocallis sp.	37
Chara sp.	33
Nymphoides aquatica	20

*High water is considered the water elevation equalled or exceeded 20% of the period (1972-78)
Low water is considered the water elevation equalled or exceeded 80% of the period (1972-78)

3-7 GAUGE

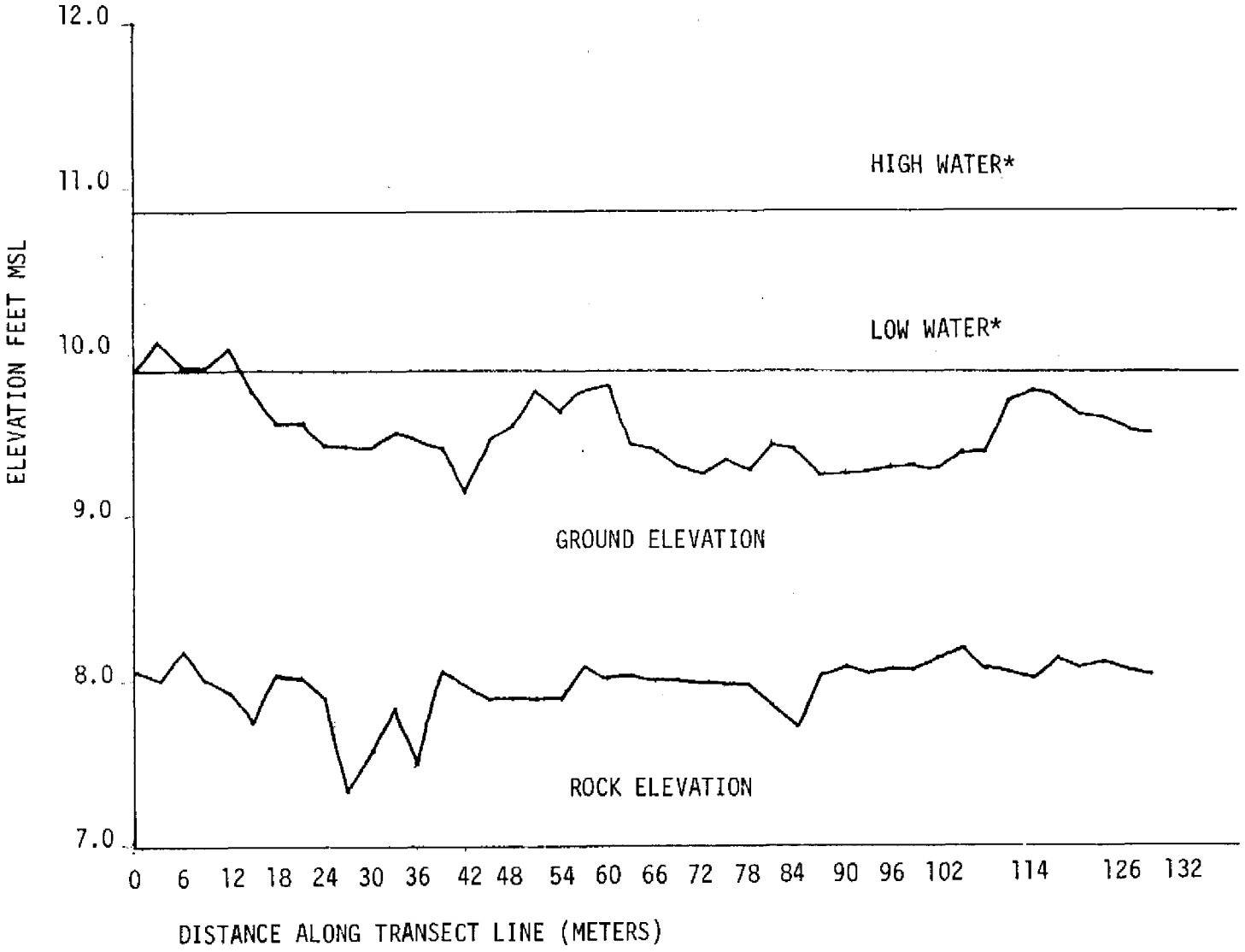


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1978)

Cladium jamaicensis	71%
Eupatorium capillifolium	71
Ipomea sagittata	68
Pluchea sp.	68
Crinum americanum	61
Panicum hemitomon	58
Rhynchospora tracyi	58
Bacopa caroliniana	55
Eleocharis cellulosa	45
Rhynchospora inundata	45
Nymphaea odorata	35
Utricularia sp.	35
Panicum paludivagum	26

*High water is considered the water elevation equalled or exceeded 20% of the period (1972-78)
Low water is considered the water elevation equalled or exceeded 80% of the period (1972-78)

3-9 GAUGE

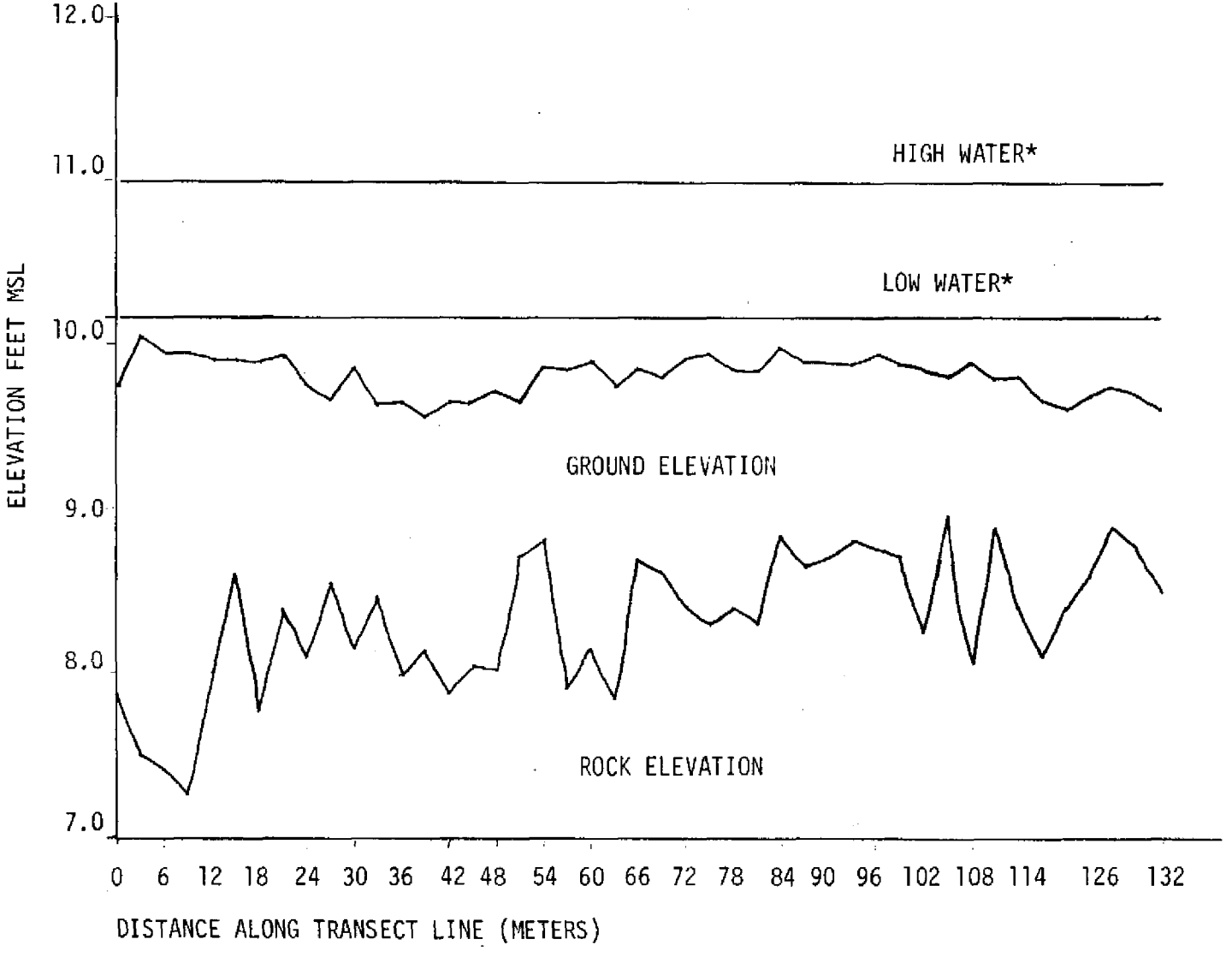


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1978)

Rhynchospora tracyi	67%
Cladium jamaicensis	65
Panicum hemitomon	63
Eleocharis cellulosa	60
Utricularia sp.	40
Pluchea rosea	37
Panicum paludivagum	35
Eupatorium capillifolium	30
Myrica cerifera	21
Nymphoides aquatica	21
Rhynchsopora inundata	21

*High water is considered the water elevation equalled or exceeded 20% of the period (1978-80)
Low water is considered the water elevation equalled or exceeded 80% of the period (1978-80)

3-8 GAUGE

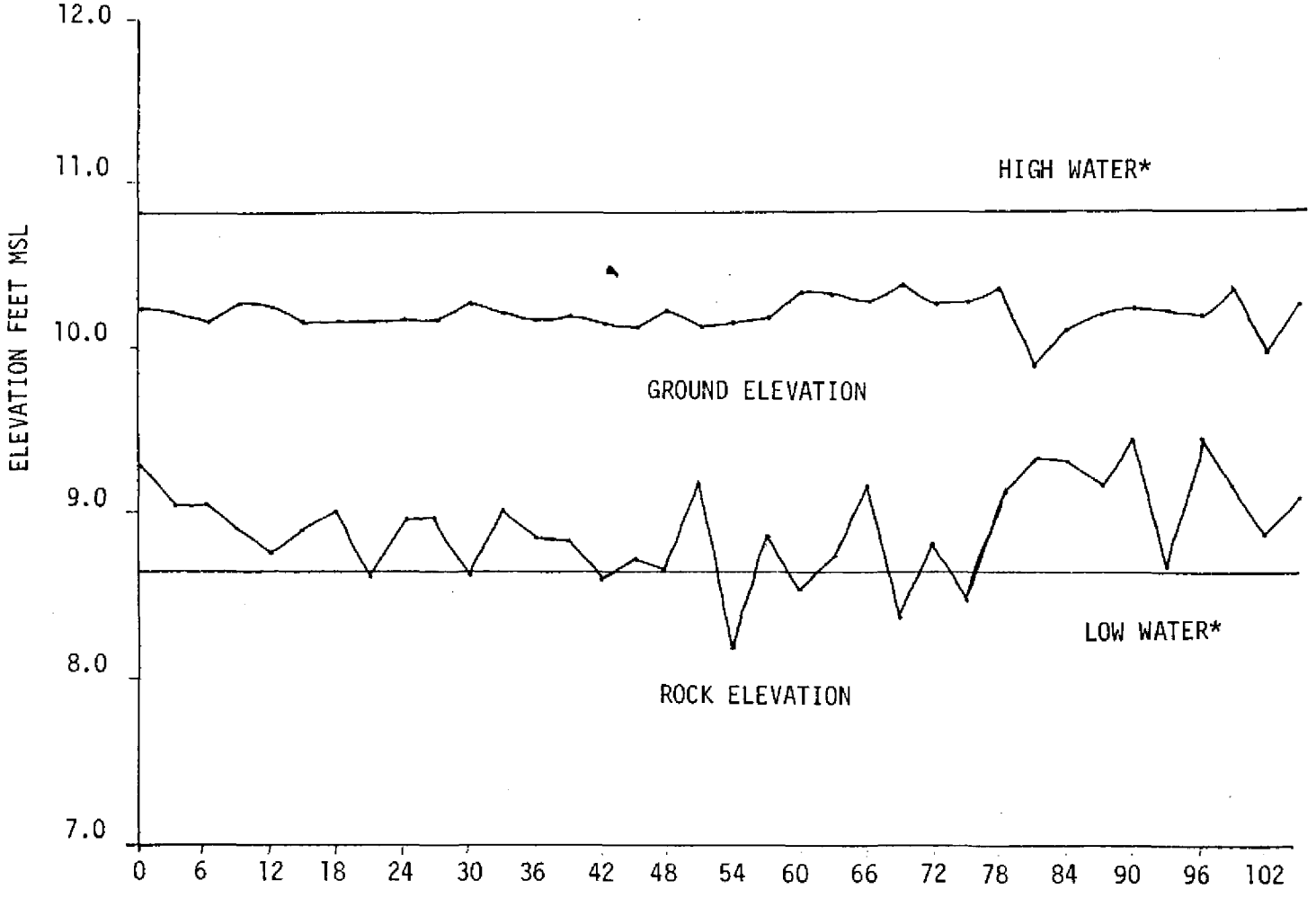


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1978)

Panicum hemitomon	100%
Eleocharis cellulosa	84
Panicum paludivagum	70
Rhynchospora tracyi	59
Diodia teres	55
Cladium jamaicensis	34
Polygonum sp.	30
Andropogon sp.	25
Pluchea rosea	20
Utricularia sp.	20
Rhynchospora inundata	18
Sagittaria lancifolia	16
Baccharis sp.	11

*High water is considered the water elevation equalled or exceeded 20% of the period (1978-80)
Low water is considered the water elevation equalled or exceeded 80% of the period (1978-80)

3-2 GAUGE (USGS)

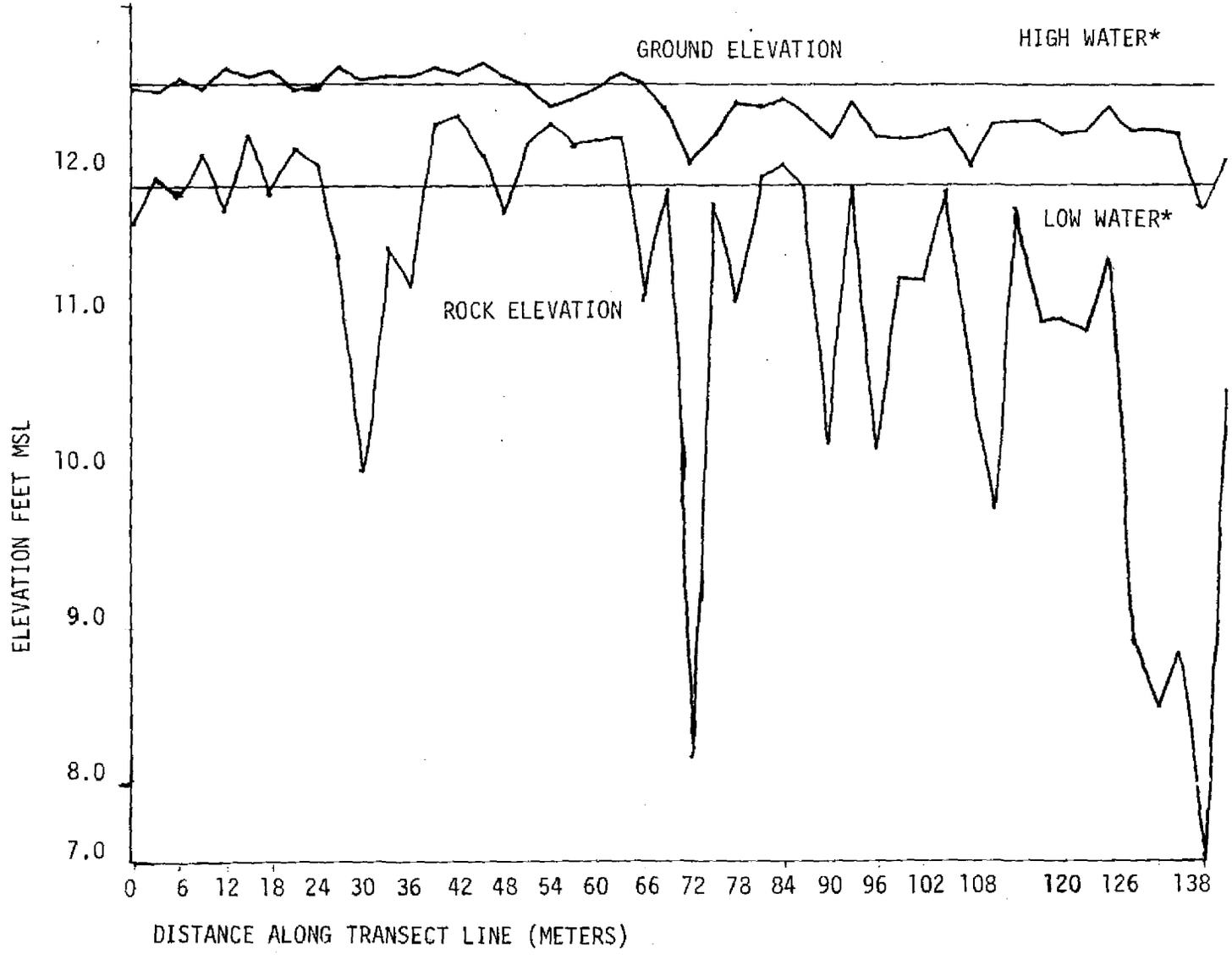


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1980)

Panicum hemitomon	94%
Ludvigia alata	75
Cladium jamaicensis	67
Bacopa caroliniana	67
Polygonum sp.	50
Rhynchospora tracyi	47
Andropogon sp.	44
Utricularia sp.	44
Eleocharis cellulosa	42
Sagittaria sp.	39
Panicum paludivagum	36
Justicia ovata	36
Ludvigia repens	33
Mikania scandens	31
Cyperus haspan	28
Nymphaea odorata	28
Cynoctonum mitreola	25
Leptochloa domingensis	25
Rhynchospora inundata	19

*High water is considered the water elevation equalled or exceeded 20% of the period (1972-78)
Low water is considered the water elevation equalled or exceeded 80% of the period (1972-78)

3-11 GAUGE

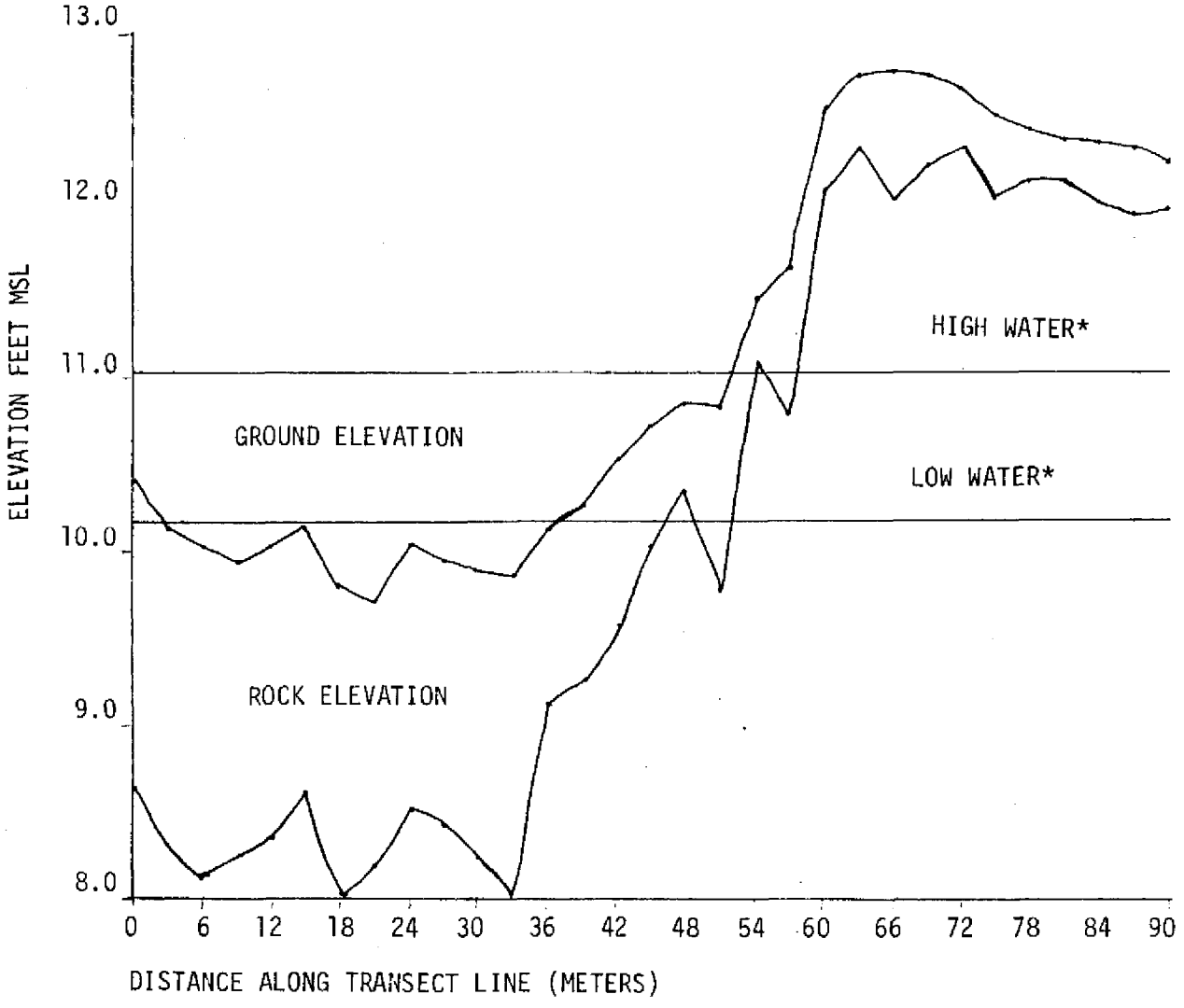


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1978)

Panicum hemitomon	98%
Andropogon sp.	96
Mikania scandens	96
Eupatorium capillifolium	81
Pluchea sp.	81
Diodia teres	77
Sagittaria sp.	70
Crinum americanum	68
Rhynchospora tracyi	55
Eleocharis cellulosa	53
Bacopa caroliniana	51
Justicia ovata	51
Baccharis sp.	47
Pontederia lanceolata	45
Utricularia sp.	45
Rhynchospora globularis	43
Rhynchospora inundata	43
Cladium jamaicensis	36
Panicum paludivagum	36

*High water is considered the water elevation equalled or exceeded 20% of the period (1978-80)
Low water is considered the water elevation equalled or exceeded 80% of the period (1978-80)

3-10 GAUGE

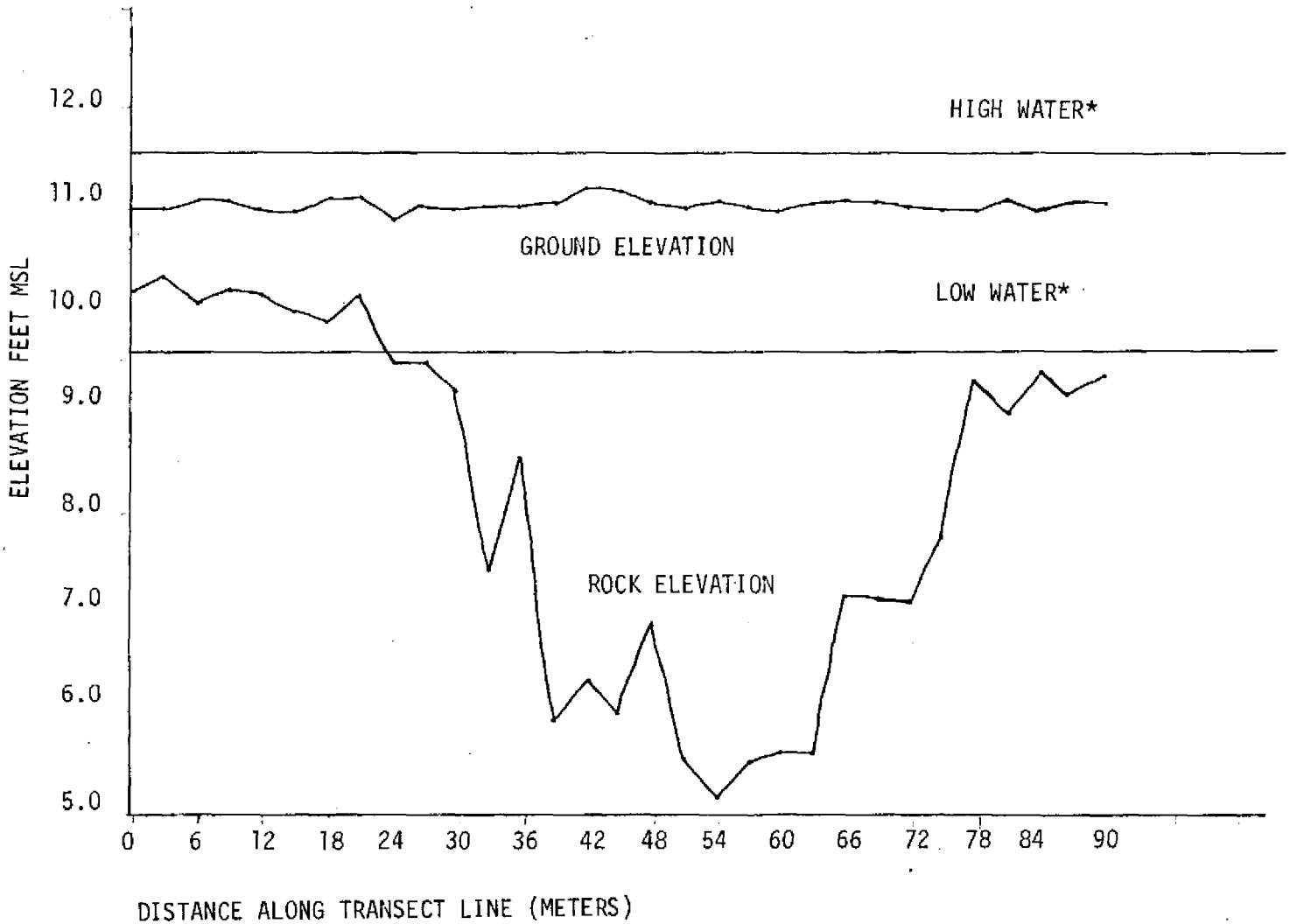


SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1979)

Cladium jamaicensis	80%
Ludwigia repens	67
Erigeron quercifolius	63
Polygonum sp.	57
Rhynchospora sp.	57
Andropogon sp.	50
Hydrochloa caroliniensis	50
Hydrocotyle umbellata	50
Mikania scandens	50
Cynoctonum mitreola	47
Echinochloa paludigena	47
Xyris sp.	47
Baccharis sp.	43
Eupatorium capillifolium	43
Eupatorium coelestinum	43
Juncus megacephalus	40
Leptochloa domingensis	40
Sagittaria lancifolia	40
Pluchea rosea	37
Teuchrium canadense	30
Panicum hemitomon	17

*High water is considered the water elevation equalled or exceeded 20% of the period (1978-80)
Low water is considered the water elevation equalled or exceeded 80% of the period (1978-80)

3-5 GAUGE



SPECIES COMPOSITION
PERCENTAGE OF OCCURRENCE
(1978)

Baccharis sp.	100%
Cladium jamaicensis	100
Polygonum sp.	100
Mikania scandens	90
Ludwigia repens	83
Cyperus haspan	70
Cyperus polystachyos	47
Panicum hemitomon	37
Pontederia lanceolata	27
Andropogon sp.	13

*High water is considered the water elevation equalled or exceeded 20% of the period (1972-78)
Low water is considered the water elevation equalled or exceeded 80% of the period (1972-78)

APPENDIX C

ALPHABETIC LISTING OF PLANT SPECIES ENCOUNTERED IN WATER CONSERVATION AREA 3A AND TYPICAL COMMUNITY COMPOSITION

	Common Name
Acer rubrum	Red maple
Acrostichum danaeafolium	Leather fern
Agalinis purpurea	False foxglove
Alternanthera philoxeroides	Alligatorweed
Amaranthus cannabinus	Pigweed
Andropogon glomeratus	Broomsedges
Andropogon tracyi	"
Andropogon virginicus	"
Andropogon sp.	"
Annona glabra	Pond apple
Asclepias incarnata	Milkweeds
Ascelpias lanceolata	"
Aster carolinianus	Climbing aster
Aster sp.	-
Baccharis glomeruliflora	Saltbush
Baccharis halimifolia	"
Baccharis sp.	"
Bacopa caroliniana	Water hyssop
Bacopa monnieri	"
Blechnum serrulatum	Swamp fern
Boehmeria cylindrica	False nettle
Canna flaccida	Golden canna
Carica papaya	Papaya
Cassia ligustrina	-
Celtis laevigata	Hackberry
Centella asiatica	Coinwort
Cephalanthus occidentalis	Buttonbush
Ceratophyllum demersum	Coontail
Chara sp.	Musk grass
Chrysobalanus icaco	Coco plum
Cirsium horridulum	Thistle
Cladium jamaicensis	Sawgrass
Crinum americanum	String lily

CA-3 SPECIES LIST

Sawgrass Comm.	Wet Prairie Comm.	Slough Comm.	Tree Island Comm.	Other
			X	
			X	
	X			
	X			X
X	X			
X	X			
X	X			
X	X			
X	X			
			X	
			X	
	X		X	
X			X	
X				
			X	
			X	
X				
X	X	X		
	X			X
X			X	
X			X	
			X	
			X	
			X	
			X	
	X			
X	X		X	
		X		
		X		
			X	
X			X	X
X				
X	X	X		

	Common Name
Cynoctonum mitreola	Miterwort
Cyperus haspan	Nut grass
Cyperus erythrorhizos	"
Cyperus odoratus	"
Cyperus polystachyos	"
Cyperus sp.	"
Dichromena colorata	White-top sedge
Dichromena floridensis	"
Dichromena latifolia	"
Dichromena sp.	"
Dicliptera assurgens	-
Diodia teres	Buttonweed
Diodia virginiana	"
Echinochloa crusgalli	Barnyard grass
Echinochloa paludigena	"
Echinochloa walteri	"
Eichornia crassipes	Water hyacinth
Eleocharis cellulosa	Spikerush
Eleocharis elongata	"
Eleocharis equisetoides	"
Eleocharis sp.	"
Erianthus giganteus	Plume grass
Erigeron quercifolius	Fleabane
Eriocaulon compressum	Hat pin
Eupatorium capillifolium	Dog fennel
Eupatorium ceolestinum	Mist flower
Eupatorium mikanoides	Semaphore eupatorium
Ficus aurea	Strangler fig
Fuirena scirpoidea	Umbrella grass
Fuirena sp.	"
Galium obtusum	-
Hamelia patens	Fire bush
Habeneria repens	Creeping orchid

3 SPECIES LIST

Sawgrass Comm.	Wet Prairie Comm.	Slough Comm.	Tree Island Comm.	Other
	X			
X	X			
X	X			
X			X	
X	X			
X	X			
X	X			
	X			
X	X			
X	X			
			X	
X	X			
X	X			
	X			
	X			
X	X			
	X			X
	X			
		X		
	X			
	X	X		
X	X		X	
X	X			
	X			
X	X		X	
	X		X	
	X			
			X	
	X			
	X			
			X	
			X	
			X	

	Common Name
Hibiscus grandiflorus	Swamp hibiscus
Hydrochloa caroliniensis	Water grass
Hydrocotyle umbellata	Marsh penneywort
Hymenocallis sp.	Spider lily
Hymenocallis palmeri	"
Hymenocallis latifolia	"
Hyptis alata	Musky mint
Ilex cassine	Dahoon holly
Ipomea sagittata	Glades morning glory
Juncus biflorus	Rush
Juncus megacephalus	"
Juncus marginatus	"
Juncus sp.	"
Justicia ovata	Water willow
Kostelezkya virginica	Marsh mallow
Leersia hexandra	Rice cut grass
Leptochloa fascicularis	Sprangle top
Lippia nodiflora	Capeweed
Ludwigia alata	-
Ludwigia peruviana	Primrose willow
Ludwigia repens	-
Lythrum lanceolatum	Loosestrife
Manisuris rugosa	Necklace grass
Magnolia virginiana	Sweet bay
Melaleuca quinquenervia	Cajeput tree
Melothria pendula	Creeping cucumber
Mikania scandens	Hemp vine
Momordica charantia	Wild balsam apple
Morus rubra	Mulberry
Myrica cerifera	Wax myrtle
Nephrolepis exaltata	Boston fern
Nuphar luteum	Spatterdock
Nymphaea odorata	White water lily

3 SPECIES LIST

Sawgrass Comm.	Wet Prairie Comm.	Slough Comm.	Tree Island Comm.	Other
X	X		X	
X	X			
X	X			
	X	X		
	X	X		
	X	X		
X	X			
			X	
X			X	
	X			
	X			
	X			
	X			
X	X			
X				
X				
	X			
	X			X
	X			
X			X	
	X			
	X			
	X			
			X	
X	X		X	
X			X	
X			X	
X			X	
			X	
X	X		X	
			X	
		X		X
	X	X		

	Common Name
Nymphoides aquatica	Floating heart
Osmunda regalis	Royal fern
Oxypolis filiformis	Water dropwort
Panicum bartowense	-
Panicum dichotomiflorum	Fall panicum
Panicum hemitomon	Maidencane
Panicum rigidulum	-
Panicum repens	Torpedo grass
Panicum tenerum	-
Paspalidium paludivagum	-
Peltandra virginica	Arrow arum
Passiflora suberosa	Passion flower
Parthenocissus quinquefolia	Virginia creeper
Persea borbonia	Red bay
Phragmites australis	Reed grass
Pistia stratiotes	Water lettuce
Pluchea purpurascens	Camphorweed
Pluchea rosea	Marsh fleabane
Polygonum densiflorum	Smartweed
Polygonum punctatum	"
Polygonum hydropiperoides	"
Polygonum sp.	"
Pontederia lanceolata	Pickerelweed
Potamogeton illinoiensis	Peppergrass
Proserpinaca palustris	Mermaid weed
Psidium quajava	Guava
Psilocarya nitens	Bald rush
Psychotria nervosa	Wild coffee
Ptilinmium capillaceum	Mock bishop weed
Rhynchospora globularis	Beakrush
Rhynchospora inundata	-
Rhynchospora tracyi	"
Rhynchospora sp.	"

CA-3 SPECIES LIST

Sawgrass Comm.	Wet Prairie Comm.	Slough Comm.	Tree Island Comm.	Other
	X	X		
X			X	
	X			
	X			
X	X			
X	X	X		
	X			
	X			
	X			
	X	X		
X	X	X		
			X	
			X	
			X	
			X	X
	X			X
X	X			X
X	X			X
X	X			
X	X			
X	X			
X	X			
X	X			
		X		
	X			
			X	
	X			
			X	
			X	
	X			
	X			
	X	X		
X	X	X		

	Common Name
Rivina humulis	Rouge plant
Sacciolepis striata	-
Sagittaria lancifolia	Arrowhead
Sagittaria latifolia	"
Sagittaria subulata	-
Salix caroliniana	Willow
Sarcostema clausa	White vine
Sambucus simpsonii	Elderberry
Saururus cernuus	Lizard's tail
Scirpus validus	Bulrush
Scleria reticularis	Nut rush
Senecio glabellus	Golden ragwort
Setaria magna	Foxtail
Setaria gemiculata	"
Setaria sp.	"
Sida rhombifolia	Teawood
Solidago sp.	Goldenrod
Smilax laurifolia	Bamboo vine
Taxodium ascendens	Pond cypress
Taxodium distichum	Bald cypress
Thalia geniculata	Arrowroot
Trema floridana	Florida trema
Thelypteris interrupta	Marsh fern
Thelypteris palustris	"
Thelypteris sp.	"
Teucrium canadense	Wood sage
Tripsacum dactyloides	Gama grass
Typha domingensis	Southern cattail
Typha latifolia	Common cattail
Utricularia biflora	Bladderwort
Utricularia foliosa	"
Utricularia inflata	"
Utricularia purpurea	"

CA-3 SPECIES LIST

Sawgrass Comm.	Wet Prairie Comm.	Slough Comm.	Tree Island Comm.	Other
			X	
X	X			
X	X			
X	X	X		
		X		
X			X	
X				
			X	
			X	
		X		
		X		
				X
	X		X	
	X		X	
	X		X	
			X	
	X		X	
			X	X
			X	
			X	
		X		
			X	
X			X	
X				
X			X	
X			X	
			X	
X	X			
X	X			
		X		
		X		
		X		

WCA-3 SPECIES LIST

	Common Name	Sawgrass Comm.	Wet Prairie Comm.	Slough Comm.	Tree Island Comm.	Other
Utricularia sp.	Bladderwort			X		
Verbena scabra	Vervain	X	X			
Vicia acutifolia	Sand vetch	X				
Vigna luteola	Cow pea	X				
Vitis shuttleworthii	Calusa grape				X	
Woodwardia virginica	Chain fern	X			X	
Xyris jupicai	Yellow-eyed grass		X			
Xyris sp.	"		X			
Zizanopsis miliacea	Giant cut-grass					X