VEGETATIVE RESISTANCE TO FLOW IN SOUTH FLORIDA: SUMMARY OF VEGETATION SAMPLING AT SITES NESRS3 AND P33, SHARK RIVER SLOUGH, NOVEMBER, 1996

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VEGETATIVE RESISTANCE TO FLOW IN SOUTH FLORIDA: SUMMARY OF VEGETATION SAMPLING AT SITES NESRS3 AND P33, SHARK RIVER SLOUGH, NOVEMBER, 1996

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ABSTRACT

The U.S. Geological Survey is one of many agencies participating in the effort to restore the South Florida Everglades. We are sampling and characterizing the vegetation at selected sites in the Everglades as part of a study to quantify vegetative flow resistance. The objectives of the vegetation sampling are (1) to provide detailed information on species composition, vegetation characteristics, vegetation structure, and biomass for quantification of vegetative resistance to flow, and (2) to use this information to classify the vegetation and to improve existing vegetation maps for use with numerical models of surface-water flow. Vegetation was sampled at two sites in the Shark River Slough in November, 1996. The data collected and presented here include those for live and dead standing sawgrass, other dead material, periphyton biomass, vegetation characteristics and structure, and leaf area index.

INTRODUCTION

The Florida Everglades is a vast, diverse wetland ecosystem characterized by small ground-surface slopes, slowly moving surface waters, and dense aquatic vegetation. The South Florida ecosystem has been greatly altered during the last 100 years. A complex water-management system that includes levees, canals, pumps, and water-control structures now regulates flooding and provides a steady supply of fresh water to urban areas and agriculture. Drainage projects have diverted much of the water that originally flowed slowly southward from Lake Okeechobee through the Everglades. Restoration and management of the Everglades ecosystem requires understanding and manipulation of the amount and timing of water flows throughout the ecosystem.

The spatial and temporal distribution of water and water-borne contaminants in the Everglades must be understood if degradation of the ecosystem is to be halted and reversed. To understand how water moves through the Everglades ecosystem, it is necessary to quantify the forces affecting the flow. The vegetative resistance exerted on the water flow is one of the most important but least understood forces affecting Everglades surface-water flows. The aquatic vegetation affects both the depth of water and the rate at which it moves. The presence of living and dead plant material in the water column creates drag forces on the moving water. Water flows most slowly and the surface-water slope is largest in areas where the vegetation is the most dense.

We are sampling and characterizing the vegetation at selected sites in the Everglades as part of a study to quantify vegetative flow resistance. This information will be used to improve numerical models of surface water flow. The objectives of the vegetative sampling are:
(1). To provide detailed information on species composition, vegetative characteristics, vegetative structure, and biomass for quantification of vegetative resistance to flow, and
(2) To use this information to classify the vegetation and to improve existing vegetation maps for use with models of surface-water flow.

This is the second in a planned series of data reports summarizing the vegetation information collected in the South Florida Everglades. The first report in the series was published as U. S. Geological Survey Open-File Report 99-187 (Carter and others, 1999).

STUDY METHODS

NESRS3 and P33 sites in the Shark River Slough were selected to provide sawgrass communities of varying densities for the purpose of making water velocity and surface slope measurements (Figure 1). At both sites, a grid composed of 15 m x 15 m squares was established on the first sampling trip in April, 1996 — the grid at the NESRS3 site had 12 squares and the grid at P33 had 16 squares (Figures 2 and 3). In November, 1996, samples were collected in seven of the grid cells at each site and at additional sites to characterize cattail and rush communities (Table 1).

Water velocity and water surface slope were measured, and vegetation was sampled at each site (Lee and Carter, 1996). An 0.5 m x 0.5 m quadrat was delimited by poles, and the vegetation was cut and bagged in layers starting with the layer >100 cm above the sediment/water interface. Layers were 20 cm in height between 60 to 100 cm and were 10 cm in height between 0 and 60 cm above the sediment/water interface. All periphyton was collected in layers below the water surface. The water depth, plant height, and depth of the litter layer (the dense layer of decomposed plant material just above the sediment/water interface) were recorded. Water depth was meansured to the contact with peat or marl.

Plant material in each layer was sorted by species after all dead material not standing erect and periphyton were separated out. Sawgrass was separated into leaves and culms: leaves were separated into small, medium, and large leaves and culms into small and large culms and counted. Dead standing sawgrass leaves and culms were counted separately. The widths of six leaves in each live group were measured. Rushes and grasses were separated into live leaves or stems and dead standing leaves or stems and their widths estimated. All other plants were counted as individual stems with attached leaves. Numbers of leaves, culms, or stems were normalized to a square meter. Leaf area index (LAI) was calculated for the standing material (live or dead) in each layer as square meters of plant material per square meter using the formula:

$LAI = LL \times AW_{LL} + ML\ AW_{ML} + SL \times AW_{SL} + LC \times AW_{LC} + SC \times AW_{SC} \times$ height of layer,

where LL = number of large leaves, ML = number of medium leaves, SL = number of small leaves, LC = number of large culms, SC = number of small culms, and AW = average width in meters. When the widths of the dead leaves and culms were not measured, we used the average width of the live leaves or culms in the same layer. In this case, LAI accounted only for the resistance of the live and dead standing leaves. In order to account for the resistance of the remaining dead material, we determined the ratio of dead material/standing biomass for each layer and then multiplied the LAI by the ratio to calculate a litter LAI. This litter LAI was added to the standing LAI to form a corrected LAI for each layer.

Individual sawgrass plants vary considerably in size; larger, older plants have much more variable culm and leaf widths than smaller, younger plants. Additionally, sawgrass culms are primarily circular in shape, whereas the leaves are flattened. In this study, LAI provides a measure of the maximum area of plant material resisting flow through a 1-meter block. The detailed measurements reported herein were considered necessary to provide maximum flexibility in correlating plant characteristics with roughness coefficients.

The sorted and measured plant material, the periphyton, and the dead litter were dried at 105 °C for 8 to 12 hours and then weighed. Biomass was expressed as grams dry weight per square meter (gdw/m^2). Quadrats were sorted into vegetative communities based on species composition. Plant communities were further subdivided into density classes based on total biomass minus periphyton: sparse = 0-500 gdw/m^2; medium = 500-1000 gdw/m^2; dense = 1000-2000 gdw/m^2; and very dense = >2000 gdw/m^2.

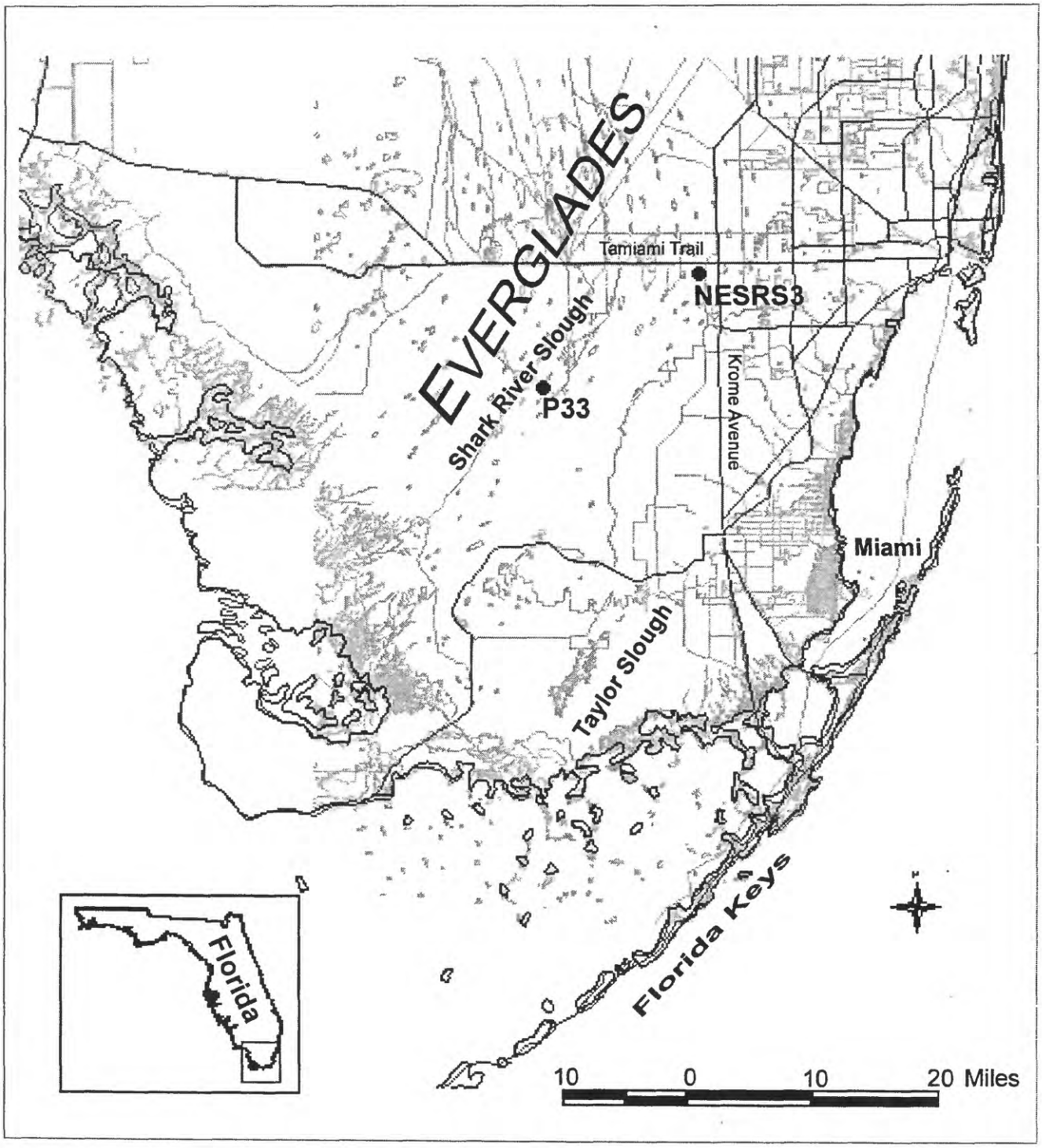


Figure 1. Site map showing the locations of sites P33 and NESRS3 in Shark River Slough, South Florida Everglades.

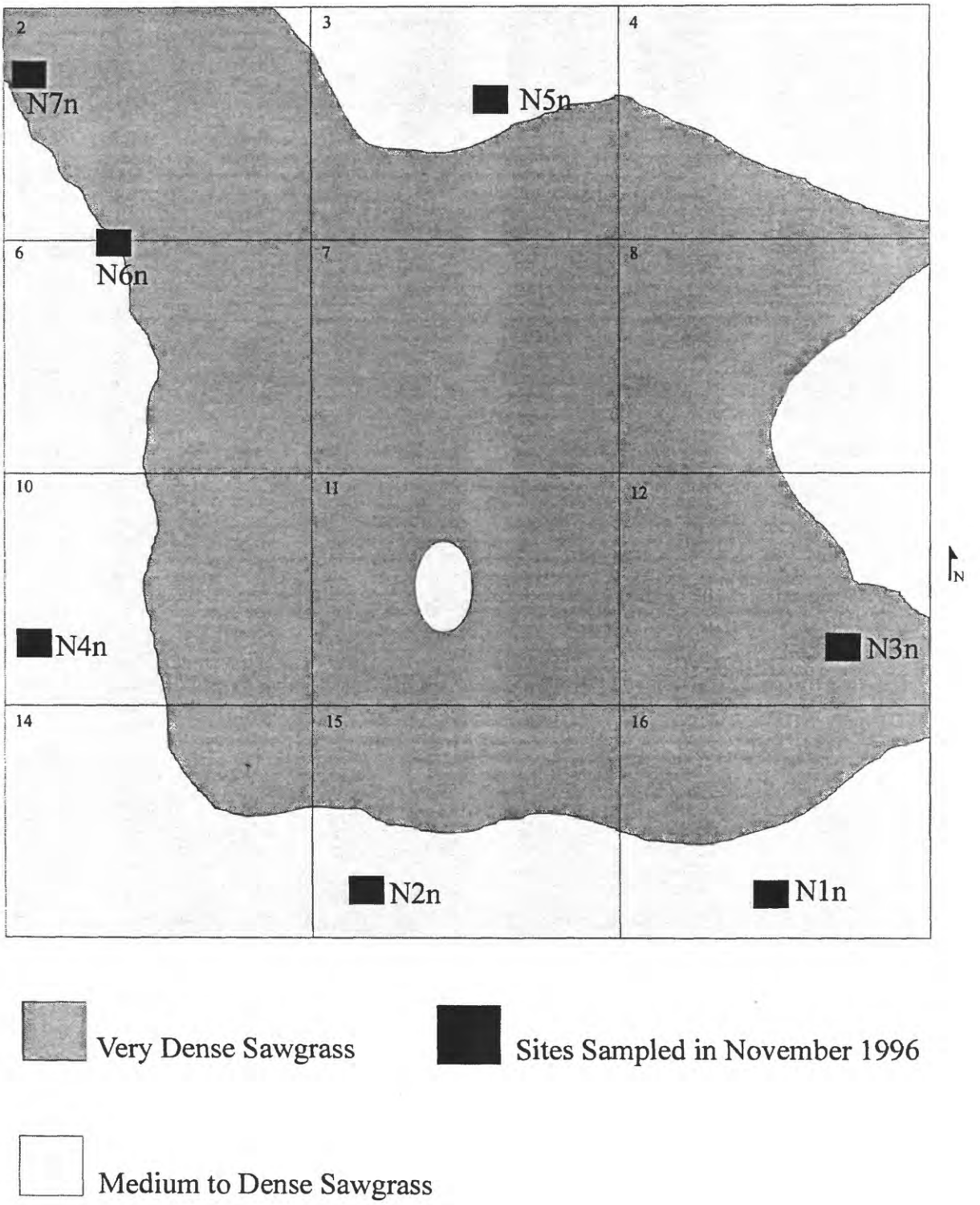


Figure 2. Site map of NESRS3 showing locations of vegetation sampling quadrats for November, 1996. (In the quadrat names, the numbers correspond to the sample number; the lower case 'n' denotes a November sample.)

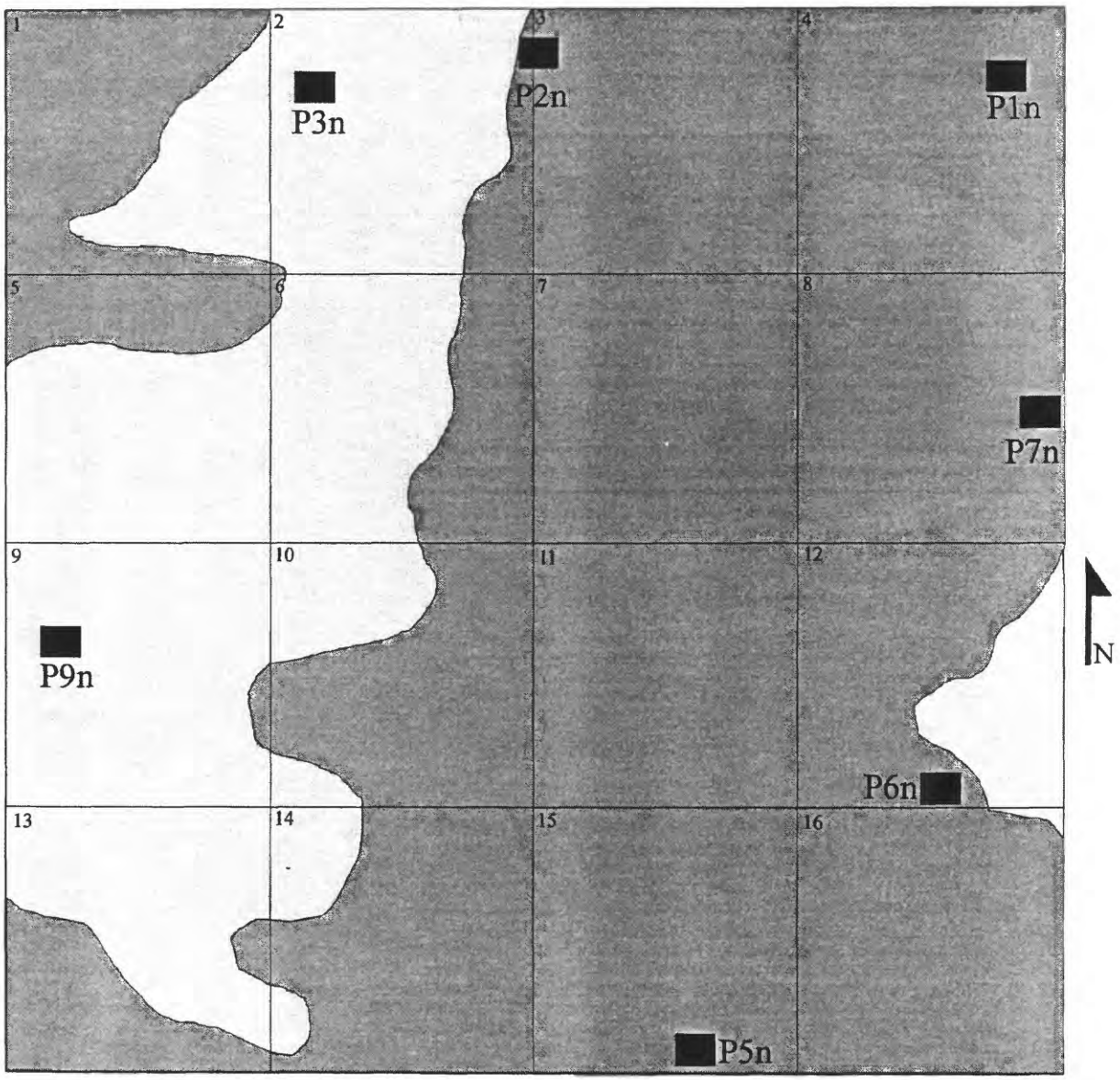


Figure 3. Site map of P33 showing location of vegetation sampling quadrats for November 1996. (In the quadrat names, the numbers correspond to the sample number; the lower case 'n' denotes a November sample.)

RESULTS OF SAMPLE ANALYSES

The results of the analyses of vegetation samples from two sites in the Shark River Slough, South Florida Everglades, are summarized in the tables and illustrations that follow the text of this report. Table 3 gives the biomass-based and plant community-based class, total biomass minus periphyton biomass, periphyton biomass, and live biomass of the NESRS3 and P33 quadrats in November, 1996. Table 4 summarizes the mean biomass of the six classes found in the quadrats sampled in November. Appendix A contains the individual layer-by-layer biomass for each quadrat sampled in November and figures illustrating the biomass of the major vegetation components and details of the sawgrass biomass. Appendix B contains the individual layer-by-layer vegetative characteristics of each quadrat and figures illustrating the vegetative composition of the quadrats. Appendix C contains the individual layer-by-layer live vegetation characteristics of each quadrat and figures illustrating the live vegetation components. Appendix D contains the layer-by-layer LAIs and the corrected LAIs. Appendix E summarizes the periphyton by vegetation class.

REFERENCES CITED

Carter, Virginia, Ruhl, Henry A., Rybicki, Nancy B., Reel, Justin T., and Gammon, Patricia T., 1999, Vegetative resistance to flow in South Florida: summary of vegetation sampling at sites NESRS3 and P33, Shark River Slough, April, 1996: U. S. Geological Survey Open-File Report 99-187, 73 p.

Lee, J. K. and Carter, Virginia, 1996, Vegetation affects water movement in the Florida Everglades: U. S. Geological Survey Fact Sheet FS-147-96.

----------, 1997, Vegetative resistance to flow in the Florida Everglades: U. S. Geological Survey Open-File Report 97-385, p. 49-50.

Table 1. Scientific names of plants referred to in the tables 2-4 and found at sites P33 and NESRS3 in Shark River Slough, South Florida Everglades

Scientific name	Name used in tables
Peltandra virginia	Arrow arum
Bacopa caroliniana	Bacopa
Cladium jamaicense	Sawgrass
Crinum americanum	Lily
Eleocharis cellulosa	Rush
Muhlenbergia filipes	Bunchgrass
Potamogeton spp.	Potamogeton
Rhizophora mangle	Mangrove
Sagittaria lancifolia.	Sagittaria
Typha latifolia	Cattail
Utricularia spp.	Utricularia

Table 2. Description of vegetation in sampling quadrats at sites P33 and NESRS3 in Shark River Slough, South Florida Everglades, November, 1996
[Litter layer refers to the dense layer of decomposed plant material just above the sediment/water interface; water depth is measured to contact with peat or marl; n.d. = no data; m = meter; cm = centimeter]

Quadrat	Description of Vegetation	Plant height (m)	Litter layer (cm)	Water depth (cm)
P1	Sparse sawgrass. Periphyton cover 90%.	1.53	10	47
P3	Rush. Periphyton cover 85%.	0.9	12	52
P5	Sawgrass and rush. Periphyton cover 95%.	1.9	11	45
P6	Sawgrass and rush. Periphyton cover 20%. Vertical stems covered with periphyton.	1.7	13	48
P7	Sawgrass and rush. Periphyton cover 60%.	1.67	11	n.d.
P2	Sawgrass. Periphyton cover 0%.	2.2	11	55
P9	No sawgrass, sparse rush. Periphyton cover 75%.	0.8	12	52
P8	Dense cattail island off cells 2 and 3. Periphyton cover 0%.	3.5	10	44
N1	Dense sawgrass. Periphyton cover 15%.	2.1	n.d.	46
N3	Very dense sawgrass. No periphyton.	2.9	6	37
N5	Very dense sawgrass. No periphyton.	2.4	9	38
N7	Sparse sawgrass. Periphyton cover 50%.	2.1	15	44
N2	Medium dense sawgrass. Periphyton cover 5%.	2.2	12	45
N4	Medium dense sawgrass. Periphyton cover 80 %.	2.4	10	46
N6	Medium-sparse sawgrass. Periphyton cover 90%. Vertical stems covered with periphyton.	2.0	18	50
N8	Prairie. Rushes and grass. Periphyton cover 85%.	0.9	15	40

Table 3. Vegetative composition-based and biomass-based classification of quadrats sampled November, 1996, at P33 and NESRS3, Shark River Slough, South Florida Everglades [Biomass in grams dry weight per m^2 (gdw/m^2); sawgrass classes based on total biomass excluding periphyton: sparse = 0-500 gdw/m^2, medium = 500-1000 gdw/ m^2, dense = 1000-2000 gdw/ m^2 and very dense = >2000 gdw/ m^2]

Class	Quadrat	Total biomass minus periphyton	Periphyton biomass	Rush/ grass biomass	Sawgrass biomass (live)	Other biomass	Sawgrass biomass (live plus dead standing)
Medium sawgrass	P1	583.1	233.8	34.1	208.8	0	369.5
Medium sawgrass	P5	977	318.3	62.6	221.5	0	614.7
Medium sawgrass	N7	858.1	325.4	21.2	289.0	0	517.4
Medium sawgrass	N4	794.5	0	0	411.4	0	520.4
Dense sawgrass	P2	1409.1	0	2.64	443.5	63.5	841.4
Dense sawgrass	P7	1258.8	158.0	29.1	501.1	0	770.3
Dense sawgrass	N1	1760.9	65.2	0	564.0	74.8	967.5
Dense sawgrass	N2	1948.7	0	0.14	543.2	1.37	1123.8
Dense sawgrass	N6	1010.0	524.0	27.8	568.3	0	700.3
Very dense sawgrass	N3	2907.4	0	0	988.3	0	1630.7
Very dense sawgrass	N5	2265.5	0	7.1	1288.6	5.0	1496.5
Rush	P3	669.6	239.8	244.0	0	147.9	0
Rush	P9	152.6	139.2	77.8	0	1.36	0
Rush	N8	294.4	298.3	81.5	0	58.1	0
Mixed rush/sparse sawgrass	P6	738.7	114.1	196.7	130.1	0	266.6
Cattail	P8	5683.1	0	0	200	3802.3	0

Table 4. Mean biomass in NESRS3 and P33 quadrats sampled November, 1996 in Shark River Slough, South Florida Everglades

[Biomass in grams dry weight per square meter (gdw/m^2±1 standard deviation); sawgrass classes based on total biomass excluding periphyton: sparse = 0-500 gdw/m^2, medium = 500-1000 gdw/m^2, dense = 1000-2000 gdw/m^2, very dense = >2000 gdw/m^2; n = number of quadrats]

Class	Total biomass minus periphyton	Total periphyton biomass	Total live sawgrass biomass	Total live plus dead standing sawgrass	Total rush/grass biomass
Medium sawgrass (n = 4)	800.4±165.37	272.8± 57.24	282.7±92.75	505.5± 101.3	29.5±26.16
Dense sawgrass (n = 5)	1445.9±406.95	149.4±219.16	524.02± 52.29	880.7± 168.00	18.7±17.26
Very dense sawgrass (n = 2)	2660.6±349.08	0	1138.4± 212.34	1637.7±9. 93	3.5±5.010
Sparse to medium rush/grass (n = 3)	372.2±267.14	225.8±80.50	0	0	203.6± 165.88
Medium mixed rush/sawgrass (n = 1)	770.9	114.1	130.1	266.6	196.7
Very dense cattail (n = 1)	5683.1	0	0	200	0

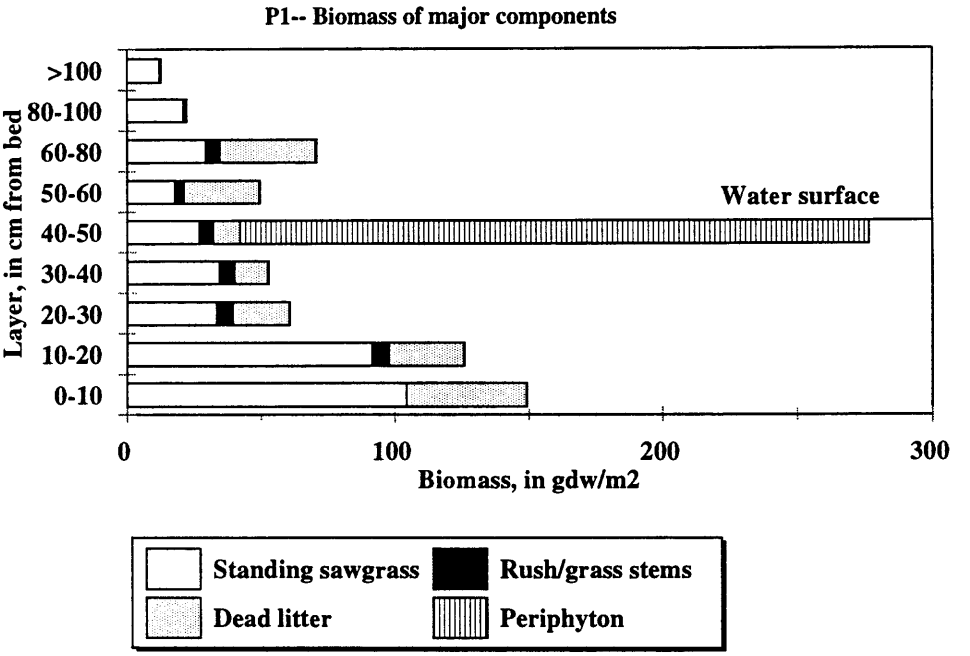
Appendix A: Biomass by Individual Quadrat Sampled at Sites P33 and NESRS3 in Shark River Slough, South Florida Everglades

Table A-1. Summary of biomass in quadrat P1, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = medium sawgrass; water surface = 47 cm; plant height = 1.53 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Peri	Total biomass	Total biomass minus Peri	Total live biomass
>100		12.00			12.00			12.00	12.00	12.00
80-100		20.92			20.92	0.92		21.84	21.84	21.84
60-80		29.08		35.52	29.08	5.68		70.28	70.28	34.76
50-60		17.60		27.88	17.60	3.68		49.16	49.16	21.28
40-50	8.20	10.36	8.16	9.88	26.72	5.48	233.84	275.92	42.08	24.04
30-40	6.92	14.60	12.80	12.36	34.32	5.68		52.36	52.36	27.20
20-30	8.96	9.64	14.68	20.92	33.28	6.20		60.40	60.40	24.80
10-20	17.52		73.84	28.16	91.36	6.40		125.92	125.92	23.92
0-10	52.96		51.24	44.80	104.20	0.03		149.03	149.03	52.99
Totals	94.56	114.20	160.72	179.52	369.48	34.07	233.84	816.91	583.07	242.83


P1-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Standing sawgrass
Rush/grass stems
Dead litter
Periphyton

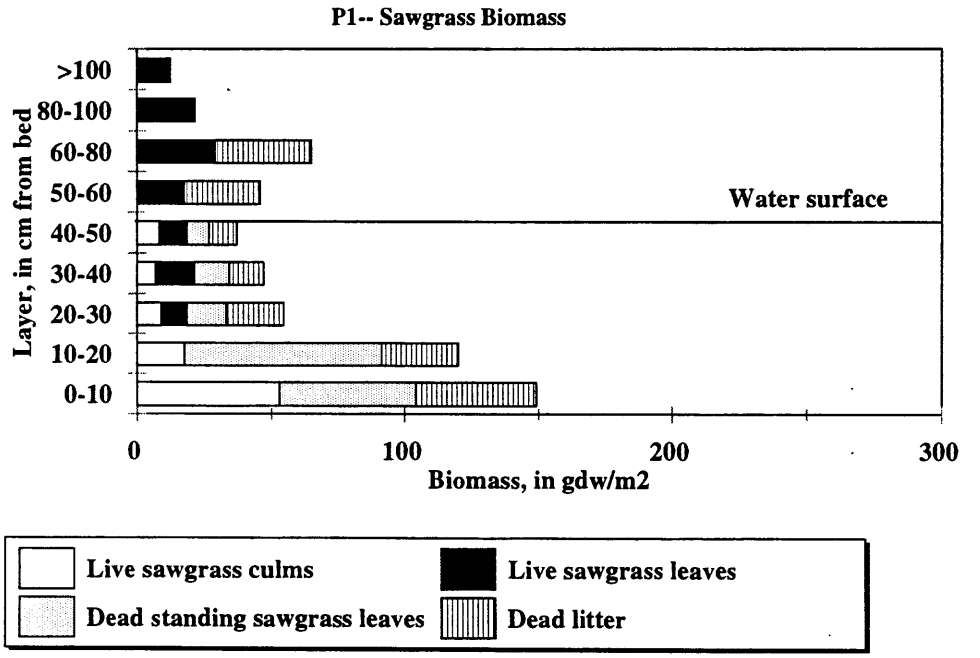
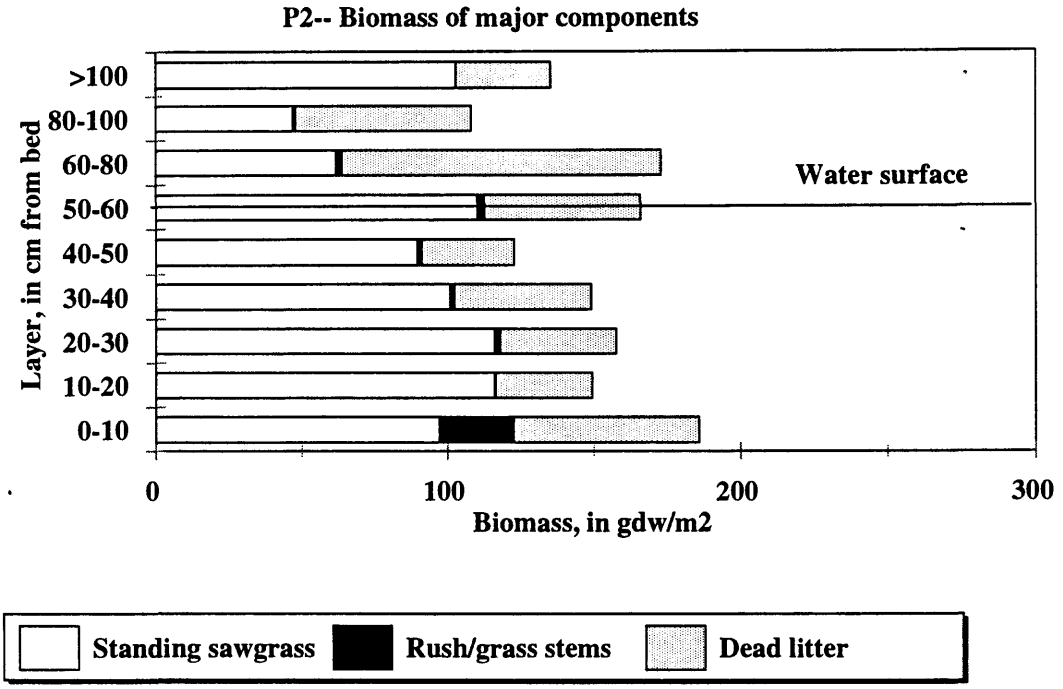

P1-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-2. Summary of biomass in quadrat P2, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Peri = periphyton; Utric = utricularia]

Class = dense sawgrass, water surface = 55 cm, plant height = 2.2 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Utric	Bacopa	Total biomass	Total biomass minus Peri	Total live biomass
>100		102.92		32.08	102.92				135.00	135.00	102.92
80-100		47.04		60.12	47.04	0.72			107.88	107.88	47.76
60-80		61.68		108.48	61.68	2.20			172.36	172.36	63.88
50-60		24.52	85.80	53.00	110.32	2.24		29.88	195.44	195.44	56.64
40-50	27.48	12.04	50.00	31.32	89.52	1.60	24.52	3.20	150.16	150.16	68.84
30-40	33.52		67.28	46.68	100.80	1.40		2.00	150.88	150.88	36.92
20-30	26.52		89.52	39.24	116.04	1.96		1.36	158.60	158.60	29.84
10-20	43.32		72.72	32.64	116.04	0.44		1.28	150.40	150.40	45.04
0-10	64.44		32.60	63.08	97.04	25.64		1.28	187.04	187.04	91.36
Totals	195.28	248.20	397.92	466.64	841.40	36.20	24.52	39.00	1407.76	1407.76	543.20


P2-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Standing sawgrass
Rush/grass stems
Dead litter

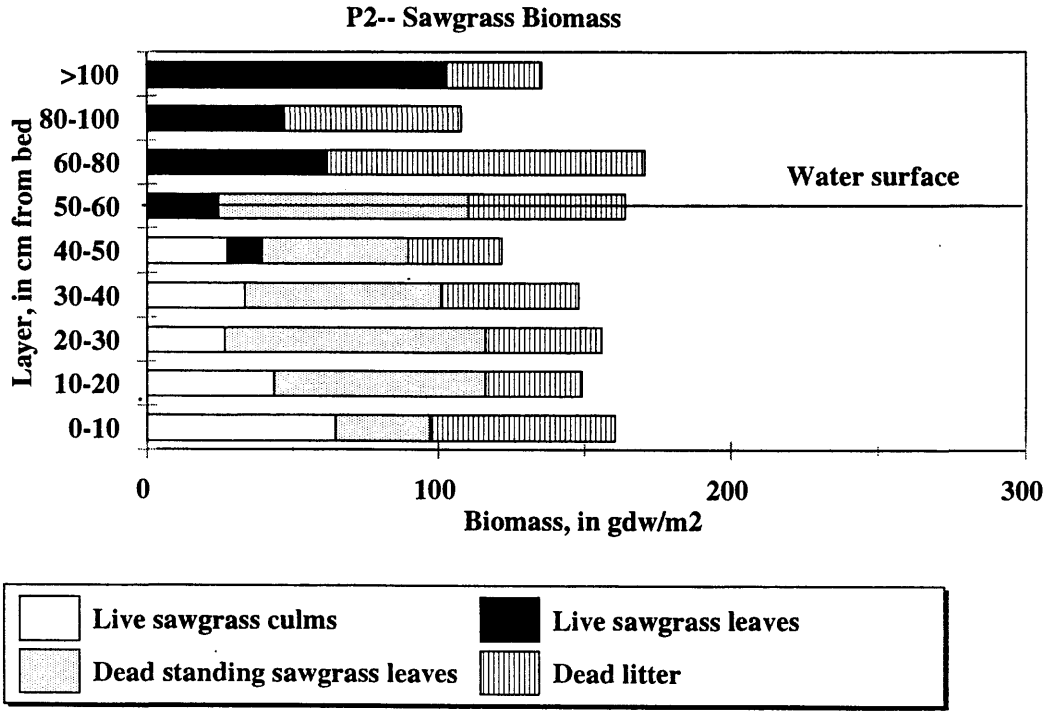

P2-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-3. Summary of biomass in quadrat P3, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square (gdw/m^2) meter of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Rsh/gr = rush and grass stems; Peri = periphyton]

Class = sparse rush; water surface = 52 cm; plant height = 0.9 m

Layer	Rsh/gr	Dead litter	Peri	Total biomass	Total biomass minus Peri	Total live biomass
80-100	4.16	2.12		6.28	6.28	4.16
60-80	27.20	34.68		61.88	61.88	27.20
50-60	63.24		239.76	303.00	63.24	63.24
40-50	38.60	44.92		83.52	83.52	38.60
30-40	64.84	9.16		74.00	74.00	64.84
20-30	48.96	24.72		73.68	73.68	48.96
10-20	58.52	82.56		141.08	141.08	58.52
0-10	86.36	79.52		165.88	165.88	86.36
Totals	391.88	277.68	239.76	909.32	669.56	391.88

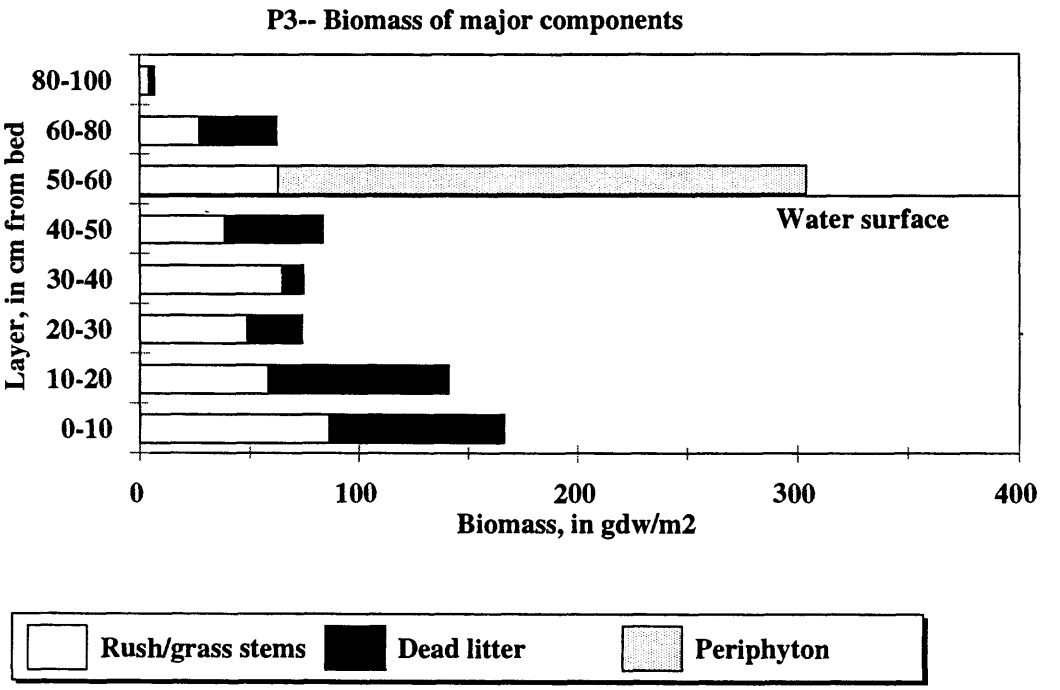
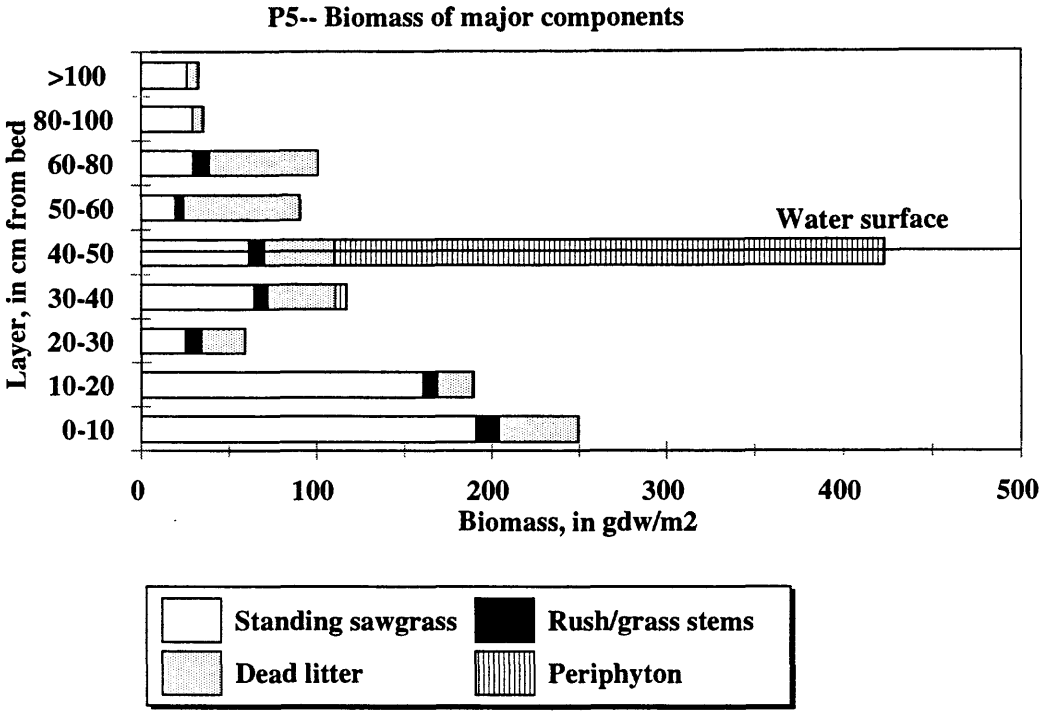


Table A-4. Summary of biomass in quadrat P5, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = medium sawgrass; water surface = 45 cm; plant height = 1.9 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Peri	Total biomass	Total biomass minus Peri	Total live biomass
>100		26.12		6.08	26.12			32.20	32.20	26.12
80-100		29.32		5.56	29.32			34.88	34.88	29.32
60-80		29.60		62.12	29.60	9.20		100.92	100.92	38.80
50-60		19.28		65.96	19.28	5.12		90.36	90.36	24.40
40-50	7.56	12.40	41.04	39.64	61.00	9.56	312.28	422.48	110.20	29.52
30-40	12.32	8.92	43.00	38.28	64.24	8.12	6.00	116.64	110.64	29.36
20-30	14.28	11.20		24.28	25.48	9.36		59.12	59.12	34.84
10-20	22.56		138.40	20.28	160.96	7.92		189.16	189.16	30.48
0-10	20.36		170.80	45.08	191.16	13.28		249.52	249.52	33.64
Totals	77.08	136.84	393.24	307.28	607.16	62.56	318.28	1295.28	977.00	276.48


P5-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
500
Biomass, in gdw/m2
Standing sawgrass
Rush/grass stems
Dead litter
Periphyton

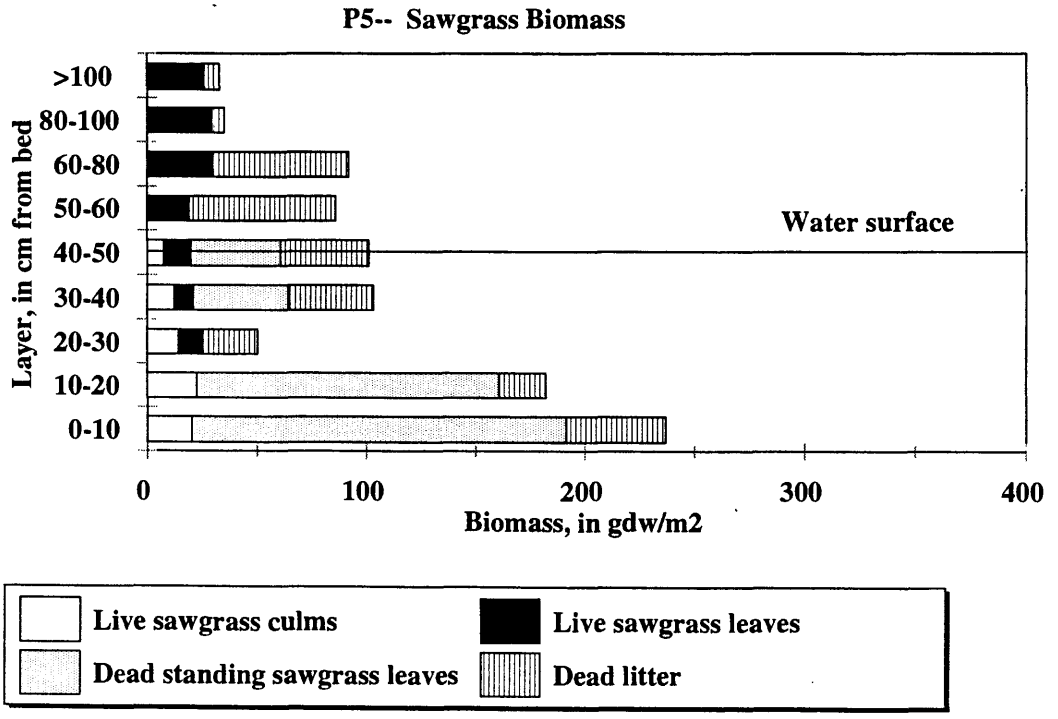
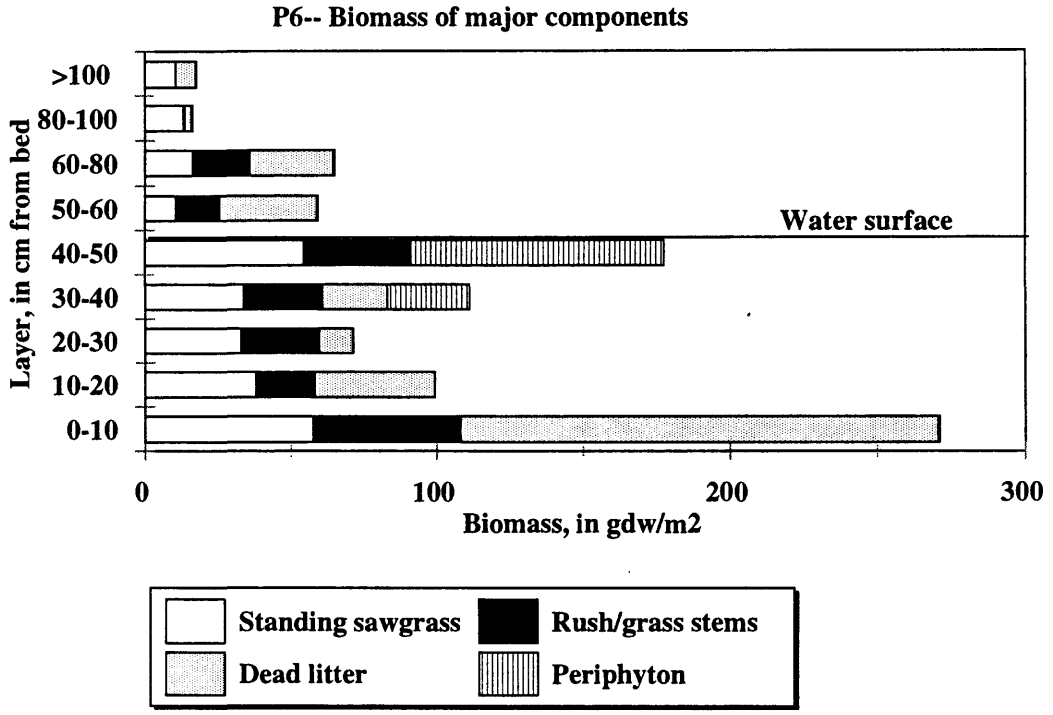

P5-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-5. Summary of biomass in quadrat P6, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = mixed rush/sawgrass; water surface = 48 cm; plant height = 1.7 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Peri	Total biomass	Total biomass minus Peri	Total live biomass
>100		10.60		6.80	10.60			17.40	17.40	10.60
80-100		13.16		2.36	13.16	0.40		15.92	15.92	13.56
60-80		16.28		28.48	16.28	19.56		64.32	64.32	35.84
50-60		10.48		33.32	10.48	15.04		58.84	58.84	25.52
40-50		20.12	34.20		54.32	36.80	86.28	177.40	91.12	56.92
30-40	6.48	9.20	17.88	22.12	33.56	27.12	27.80	110.60	82.80	42.80
20-30		12.48	20.36	11.28	32.84	26.80		70.92	70.92	39.28
10-20	13.68		24.16	40.92	37.84	20.36		99.12	99.12	34.04
0-10	17.60		39.96	162.28	57.56	50.60		270.44	270.44	68.20
Totals	37.76	92.32	136.56	307.56	266.64	196.68	114.08	884.96	770.88	326.76


P6-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Standing sawgrass
Rush/grass stems
Dead litter
Periphyton

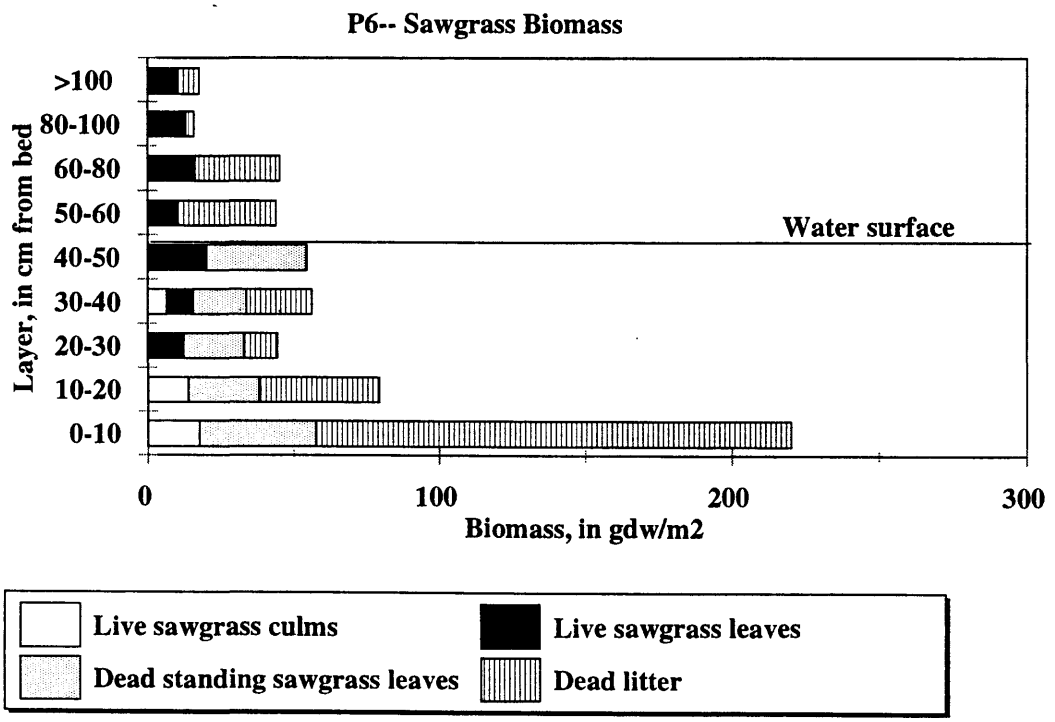
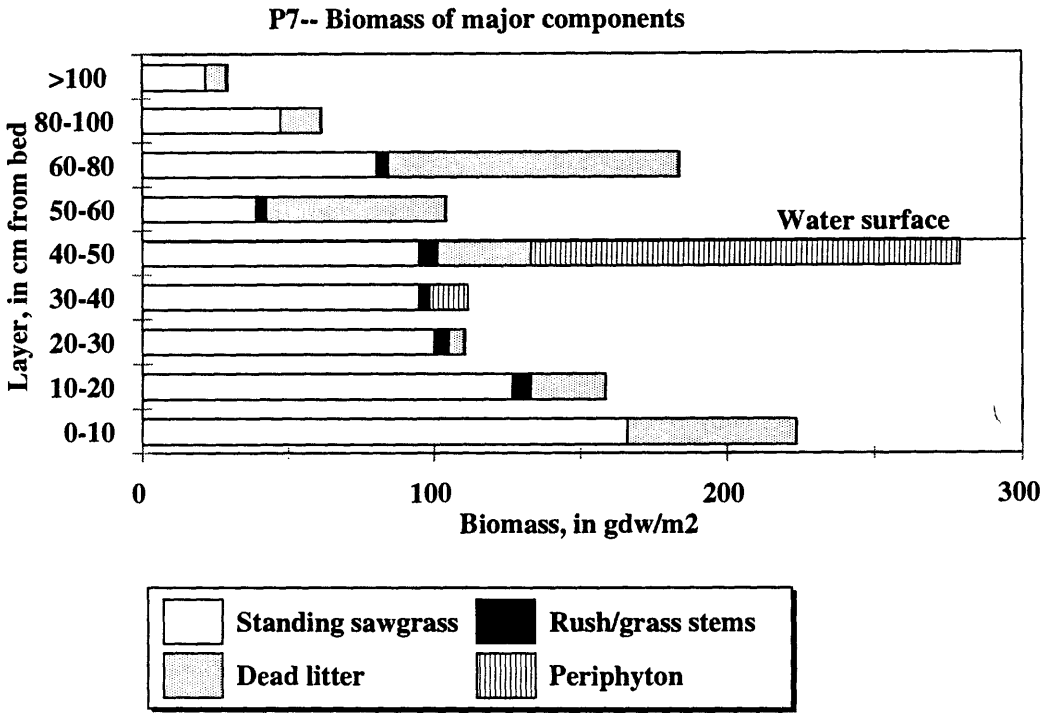

P6-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-6. Summary of biomass in quadrat P7, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = dense sawgrass; water surface = 47 cm; plant height = 1.67 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Peri	Total biomass	Total biomass minus Peri	Total live biomass
>100		21.64		7.12	21.64			28.76	28.76	21.64
80-100		47.36		13.80	47.36			61.16	61.16	47.36
60-80		80.24		99.24	80.24	4.08		183.56	183.56	84.32
50-60	2.80	36.00		61.36	38.80	3.60		103.76	103.76	42.40
40-50	17.80	38.76	38.24	31.92	94.80	6.40	145.36	278.48	133.12	62.96
30-40	22.88	27.16	44.76		94.80	3.60	12.60	111.00	98.40	53.64
20-30	29.20	23.24	47.56	5.08	100.00	5.08		110.16	110.16	57.52
10-20	47.76	4.04	74.96	25.36	126.76	6.32		158.44	158.44	58.12
0-10	102.24		63.68	57.56	165.92			223.48	223.48	102.24
Totals	222.68	278.44	269.20	301.44	770.32	29.08	157.96	1258.80	1100.84	530.20


P7-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Standing sawgrass
Rush/grass stems
Dead litter
Periphyton

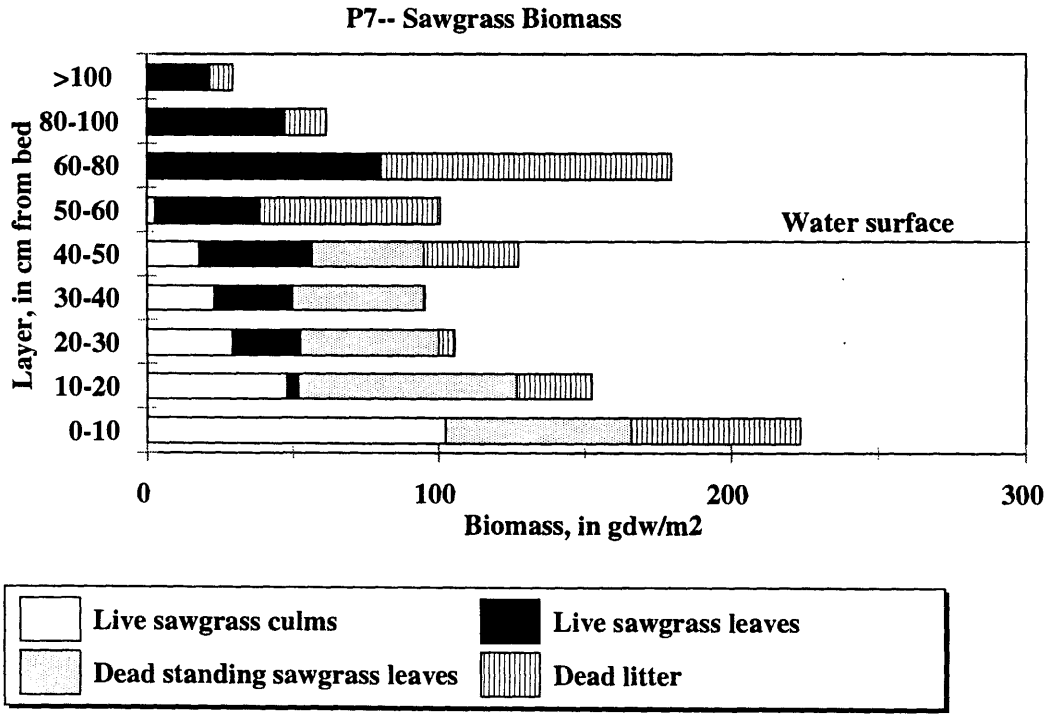
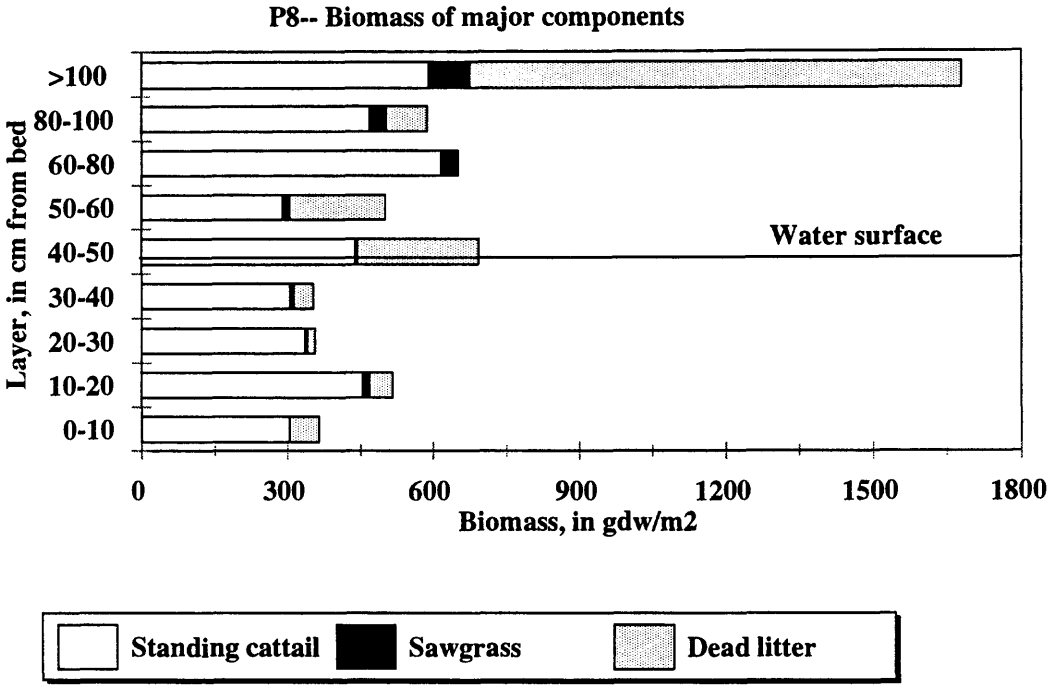

P7-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-7. Summary of biomass in quadrat P8, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Peri = periphyton]

Class = cattail; water surface = 44 cm; plant height = 3.5 m

Layer	Live cattail	Dead St cattail	Dead litter	Total St cattail	Sg and other	Total biomass	Total biomass minus Peri	Total live biomass
>100	590.20		1001.60	590.20	85.04	1676.84	1676.84	675.24
80-100	77.72	390.52	84.60	468.24	34.28	587.12	587.12	112.00
60-80	65.12	551.76		616.88	32.72	649.60	649.60	97.84
50-60	77.80	211.88	193.08	289.68	15.76	498.52	498.52	93.56
40-50	131.40	307.48	247.00	438.88	5.20	691.08	691.08	136.60
30-40	86.12	219.16	37.16	305.28	7.04	349.48	349.48	93.16
20-30	99.56	236.20	14.12	335.76	5.80	355.68	355.68	105.36
10-20	173.56	281.04	44.76	454.60	14.16	513.52	513.52	187.72
0-10	123.12	180.64	57.48	303.76		361.24	361.24	123.12
Totals	1424.60	2378.68	1679.80	3803.28	200.00	5683.08	5683.08	1624.60


P8-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
300
600
900
1200
1500
1800
Biomass, in gdw/m2
Standing cattail
Sawgrass
Dead litter

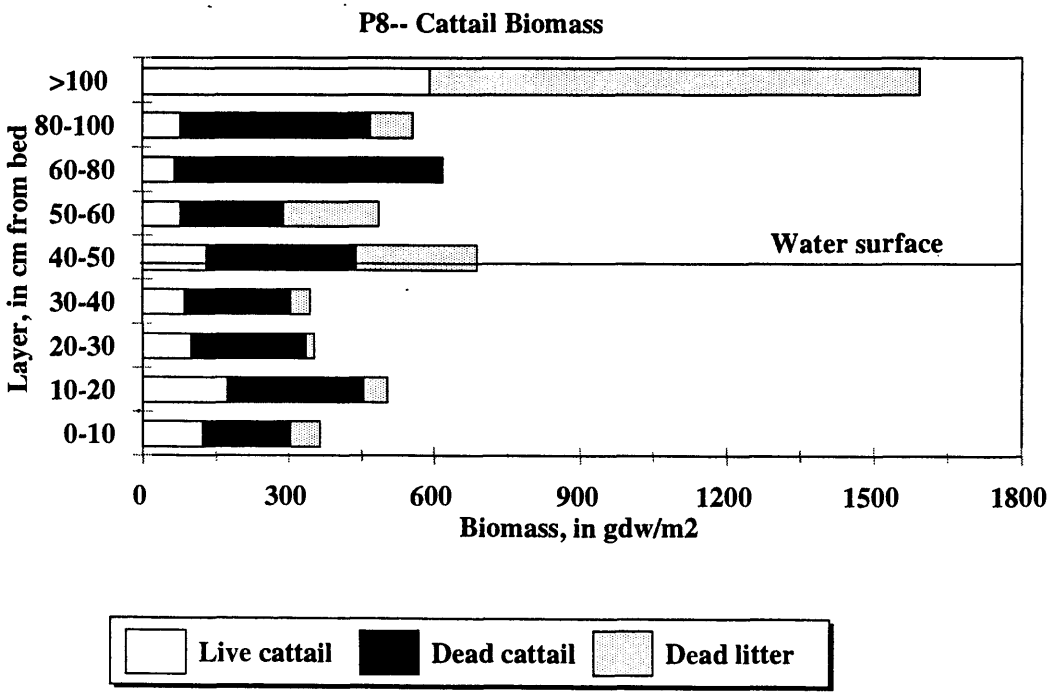

P8-- Cattail Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
300
600
900
1200
1500
1800
Biomass, in gdw/m2
Live cattail
Dead cattail
Dead litter

Table A-8. Summary of biomass in quadrat P9, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Rsh/gr = rush and grass stems; Peri = periphyton]

Class = rush; water surface = 52 cm; plant height = 0.8 m

Layer	Rsh/gr	Dead litter	Peri	Total biomass	Total biomass minus Peri	Total live biomass
60-80	15.68	11.28		26.96	26.96	15.68
50-60	6.88	8.76	139.20	154.84	15.64	6.88
40-50	12.40	12.96		25.36	25.36	12.40
30-40	10.88	3.16		14.04	14.04	10.88
20-30	12.20	2.32		14.52	14.52	12.20
10-20	10.36	8.40		18.76	18.76	10.36
0-10	10.76	26.56		37.32	37.32	10.76
Totals	77.80	73.44	139.20	290.44	151.24	79.16

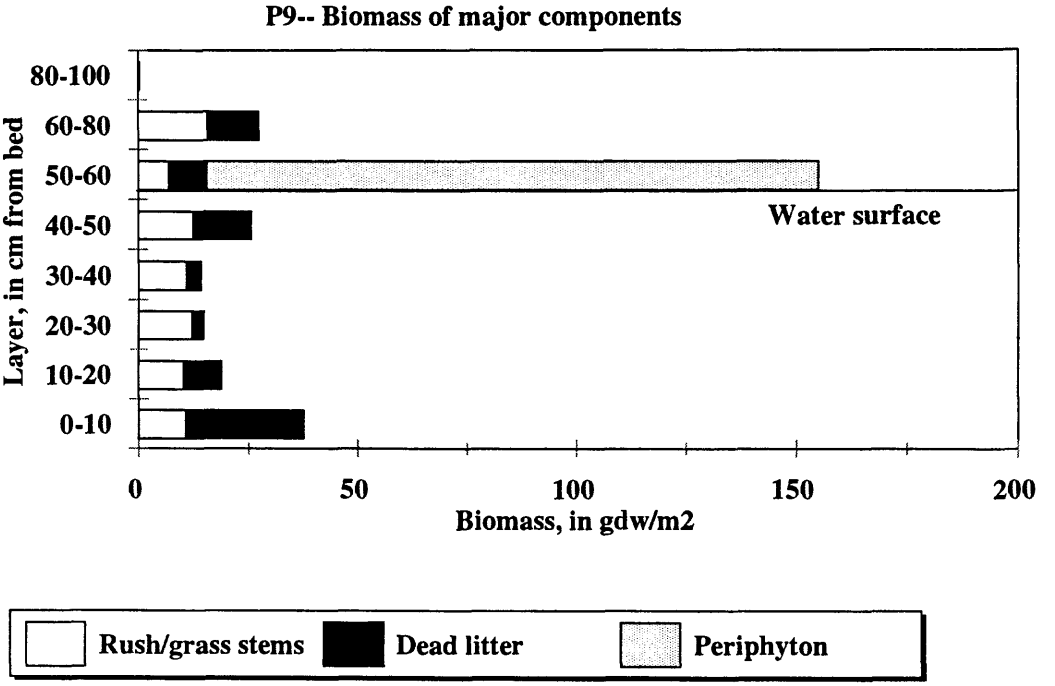
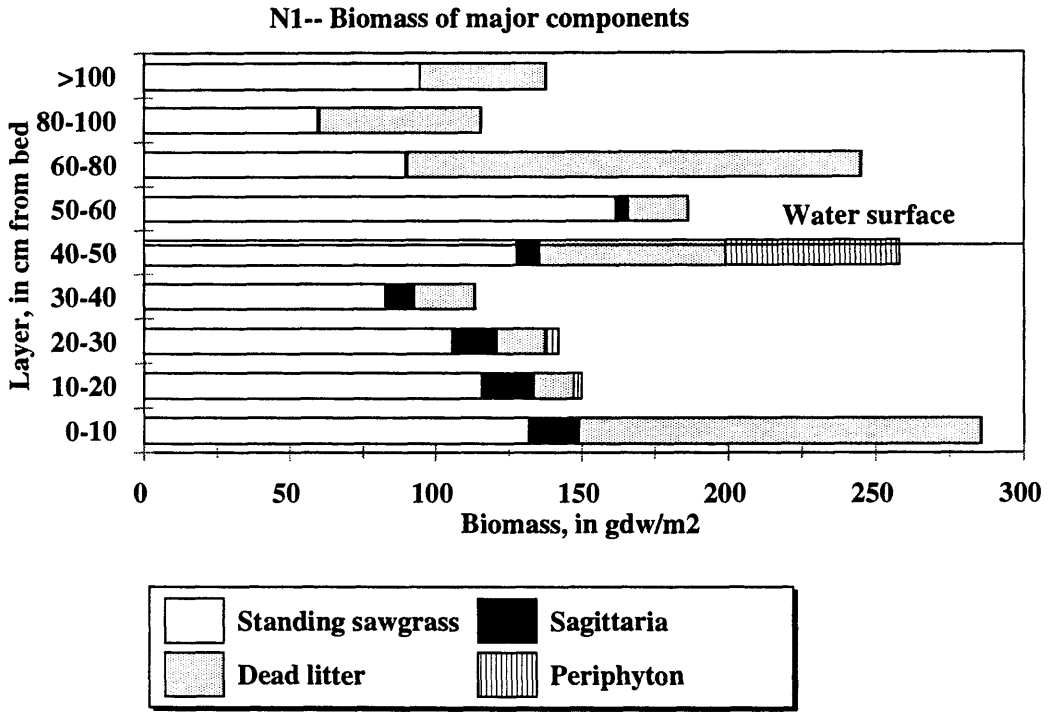


Table A-9. Summary of biomass in quadrat N1, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = dense sawgrass; water surface = 46 cm; plant height = 2.1 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Peri	Sagittaria	Total biomass	Total biomass minus Peri	Total live biomass
>100		94.64		42.80	94.64			137.44	137.44	94.64
80-100	4.48	54.88		55.32	59.36		0.64	115.32	115.32	60.00
60-80	11.88	77.44		154.40	89.32		0.92	244.64	244.64	90.24
50-60	15.20	35.16	111.04	20.44	161.40		4.32	186.16	186.16	58.24
40-50	21.48	21.28	84.88	63.40	127.64	58.79	7.88	257.71	198.92	50.64
30-40	23.64	23.84	35.00	20.44	82.48		10.16	113.08	113.08	57.04
20-30	30.64	25.32	49.60	16.24	105.56	4.19	15.48	154.04	149.85	71.44
10-20	44.16		71.32	13.64	115.48	2.26	18.04	156.20	153.94	62.20
0-10	79.92		51.68	136.20	131.60		17.40	285.20	285.20	97.32
Totals	231.40	332.56	403.52	522.88	967.48	65.24	74.84	1630.44	1565.20	638.80


N1-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
50
100
150
200
250
300
Biomass, in gdw/m2
Standing sawgrass
Sagittaria
Dead litter
Periphyton

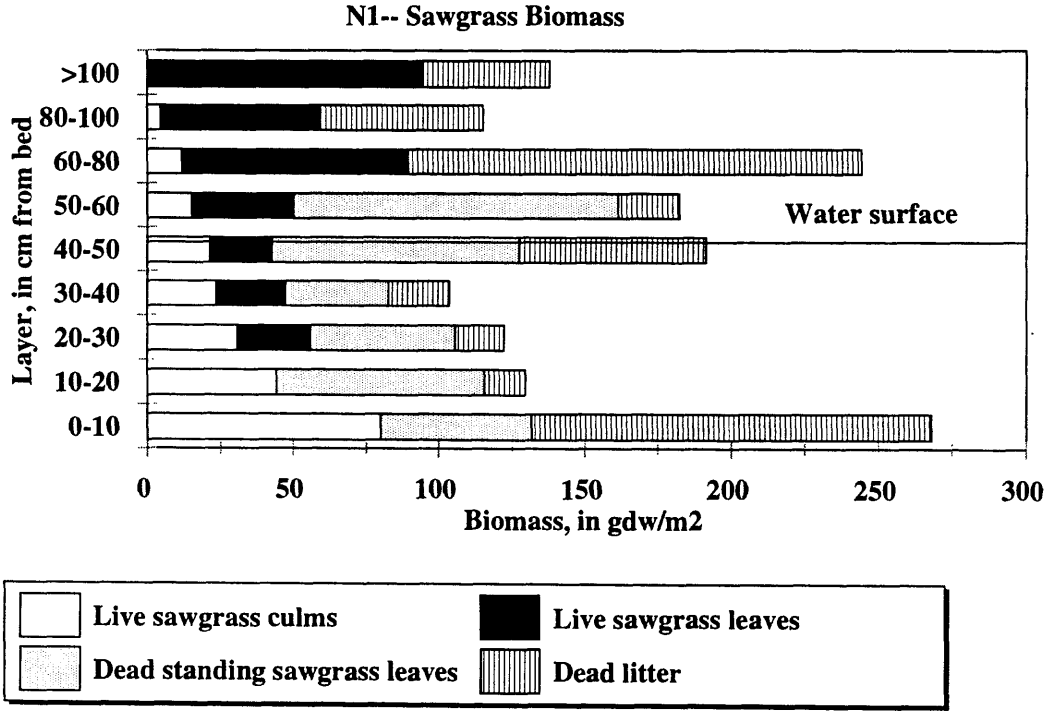
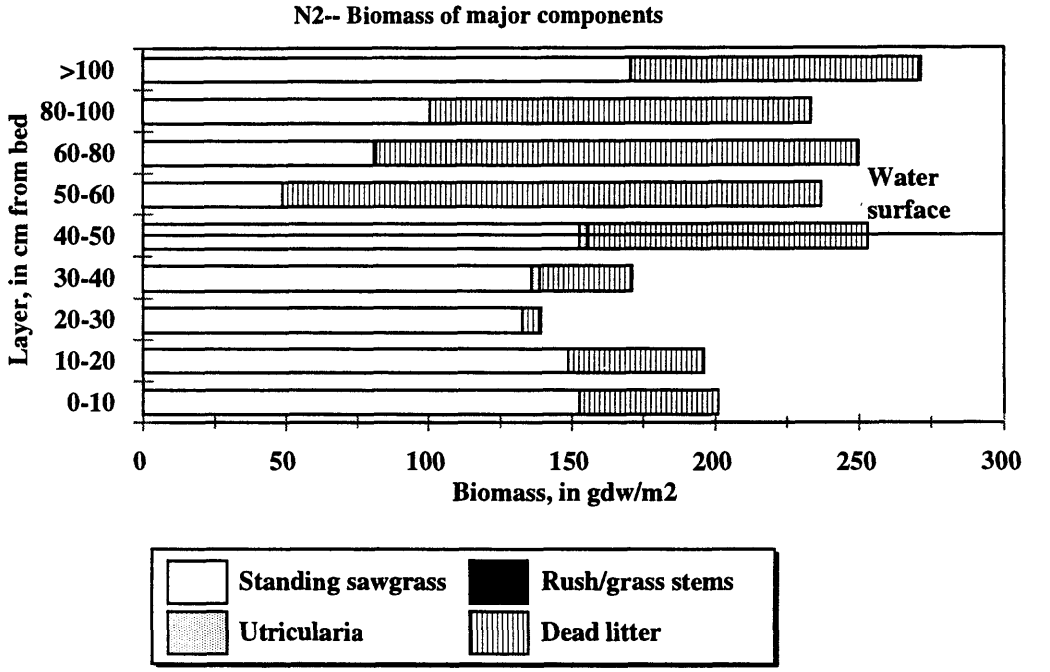

N1-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
50
100
150
200
250
300
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-10. Summary of biomass in quadrat N2, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Utric = utricularia]

Class = dense sawgrass; water surface = 45 cm; plant height = 2.2 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Utric.	Total biomass	Total biomass minus Peri	Total live biomass
>100		170.68		100.68	170.68			271.36	271.36	170.68
80-100		100.60		132.80	100.60			233.40	233.40	100.60
60-80	16.20	64.72		168.00	80.92	0.56		249.48	249.48	81.48
50-60	13.88	34.96		187.60	48.84			236.44	236.44	48.84
40-50	26.84	23.64	102.12	97.32	152.60		2.84	252.76	252.76	53.32
30-40	22.84	7.24	105.92	32.08	136.00		2.64	170.72	170.72	32.72
20-30	25.68		107.00	6.00	132.68			138.68	138.68	25.68
10-20	18.84		130.00	46.52	148.84			195.36	195.36	18.84
0-10	17.04		135.60	47.84	152.64			200.48	200.48	17.04
Totals	141.32	401.84	580.64	818.84	1123.80	0.56	5.48	1948.68	1948.68	549.20


N2-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
50
100
150
200
250
300
Biomass, in gdw/m2
Standing sawgrass
Rush/grass stems
Utricularia
Dead litter

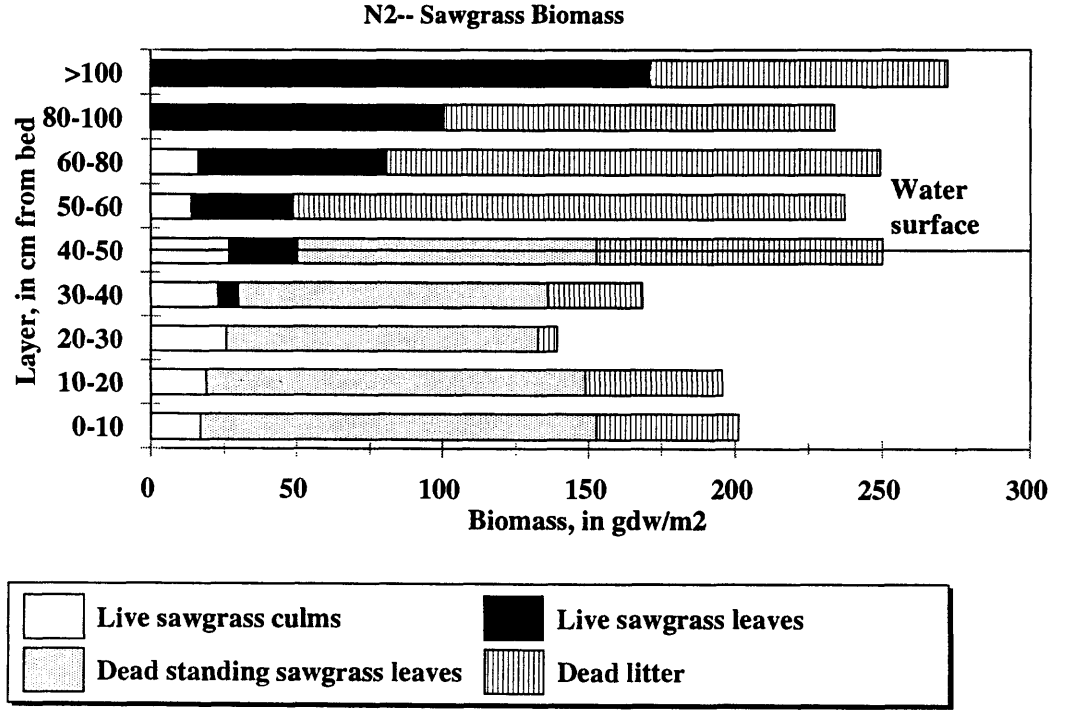
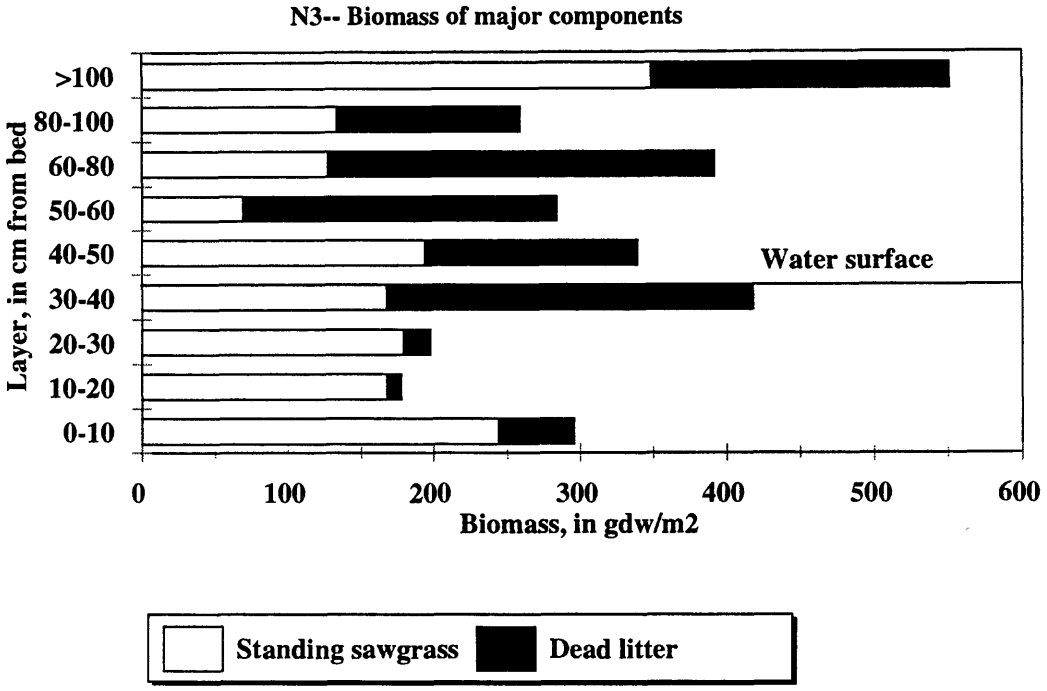

N2-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
50
100
150
200
250
300
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-11. Summary of biomass in quadrat N3, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = very dense sawgrass; water surface = 37 cm; plant height = 2.9 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Total biomass	Total biomass minus Peri	Total live biomass
>100		348.80		201.56	348.80	550.36	550.36	348.80
80-100	15.60	117.80		124.80	133.40	258.20	258.20	133.40
60-80	33.20	94.00		264.40	127.20	391.60	391.60	127.20
50-60	22.40	46.80		214.00	69.20	283.20	283.20	69.20
40-50	23.80	48.12	122.08	144.76	194.00	338.76	338.76	71.92
30-40	44.72	21.76	100.92	249.36	167.40	416.76	416.76	66.48
20-30	45.52	6.64	126.64	18.12	178.80	196.92	196.92	52.16
10-20	43.32		124.40	8.84	167.72	176.56	176.56	43.32
0-10	75.80		168.36	50.92	244.16	295.08	295.08	75.80
Totals	304.36	683.92	642.40	1276.76	1630.68	2907.44	2907.44	988.28


N3-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
500
600
Biomass, in gdw/m2
Standing sawgrass
Dead litter

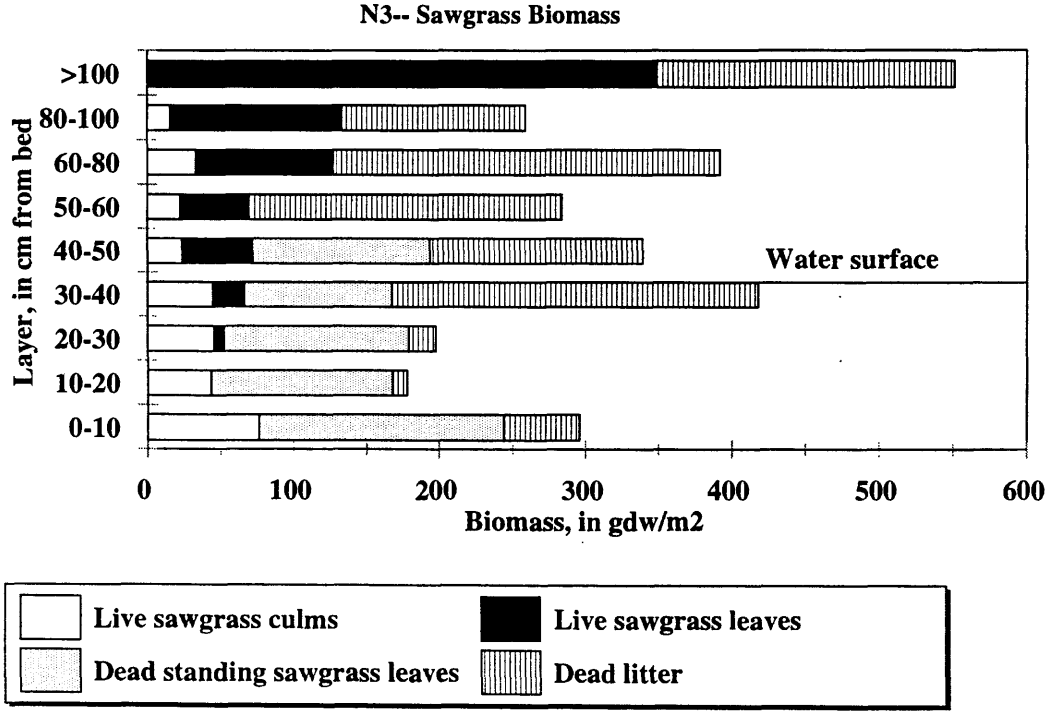
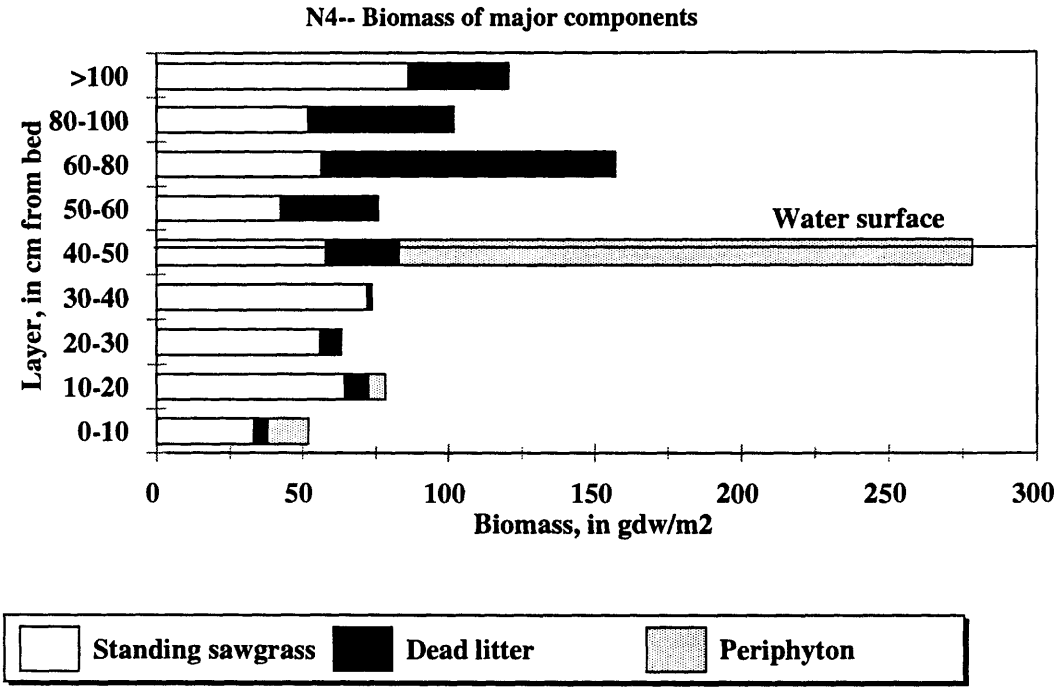

N3-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
500
600
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-12. Summary of biomass in quadrat N4, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = medium sawgrass; water surface = 46 cm; plant height = 2.4 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Peri	Total biomass	Total biomass minus Peri	Total live biomass
>100		86.28		33.72	86.28		120.00	120.00	86.28
80-100		51.84		49.60	51.84		101.44	101.44	51.84
60-80		56.40		100.40	56.40		156.80	156.80	56.40
50-60	15.68	26.76		32.80	42.44		75.24	75.24	42.44
40-50	20.48	15.24	22.28	24.92	58.00	194.80	277.72	82.92	35.72
30-40	22.32	27.56	22.08	1.48	71.96		73.44	73.44	49.88
20-30	26.92		29.08	6.96	56.00		62.96	62.96	26.92
10-20	37.12		27.12	8.20	64.24	5.44	77.88	72.44	37.12
0-10	24.84		8.40	4.76	33.24	13.60	51.60	38.00	24.84
Totals	147.36	264.08	108.96	262.84	520.40	213.84	997.08	783.24	411.44


N4-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
50
100
150
200
250
300
Biomass, in gdw/m2
Standing sawgrass
Dead litter
Periphyton

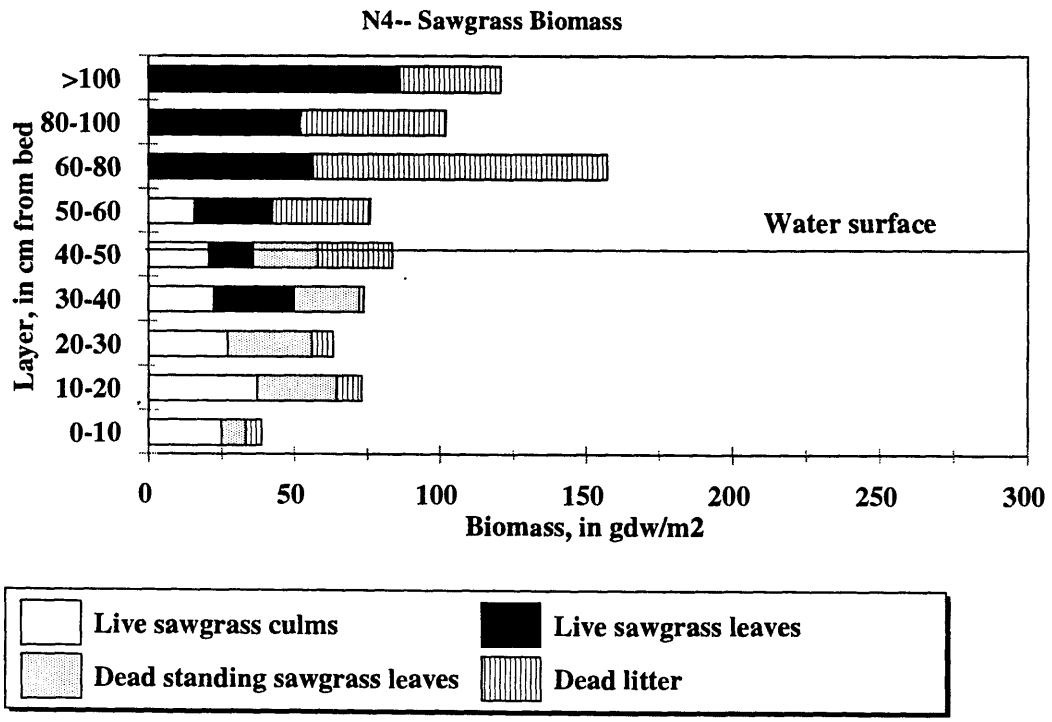
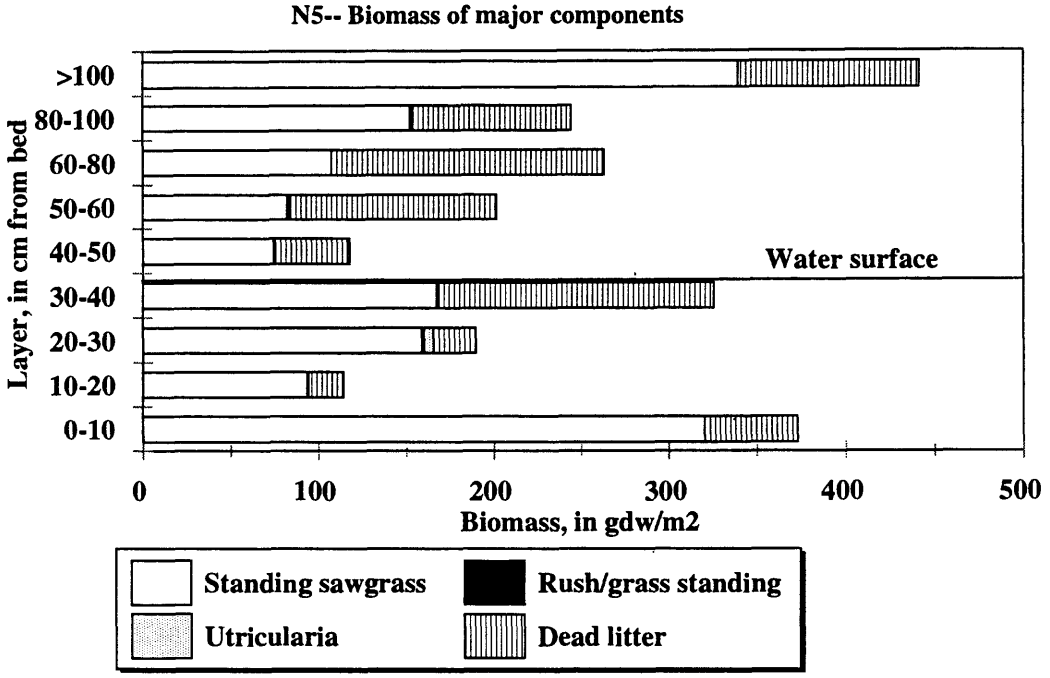

N4-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
50
100
150
200
250
300
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-13. Summary of biomass in quadrat N5, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Utric = utricularia]

Class = very dense sawgrass; water surface = 38 cm; plant height = 2.4 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Utric	Total biomass	Total biomass minus Peri	Total live biomass
>100		339.08		101.48	339.08			440.56	440.56	339.08
80-100		152.48		89.20	152.48	1.60		243.28	243.28	154.08
60-80		107.60		155.24	107.60			262.84	262.84	107.60
50-60	16.36	65.80		116.84	82.16	1.92		200.92	200.92	84.08
40-50	19.56	54.96		42.40	74.52	0.40		117.32	117.32	74.92
30-40	39.40	48.64	79.52	156.44	167.56	1.00		325.00	325.00	89.04
20-30	59.72		99.48	23.60	159.20	1.44	5.04	189.28	189.28	66.20
10-20	148.24		93.56	19.56	93.56	0.72		262.08	262.08	148.96
0-10	236.76		83.56	52.16	320.32			372.48	372.48	236.76
Totals	520.04	768.56	356.12	756.92	1496.48	7.08	5.04	2413.76	2413.76	1300.72


N5-- Biomass of major components
Layer, in cm from bed
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Water surface
0
100
200
300
400
500
Biomass, in gdw/m2
Standing sawgrass
Rush/grass standing
Utricularia
Dead litter

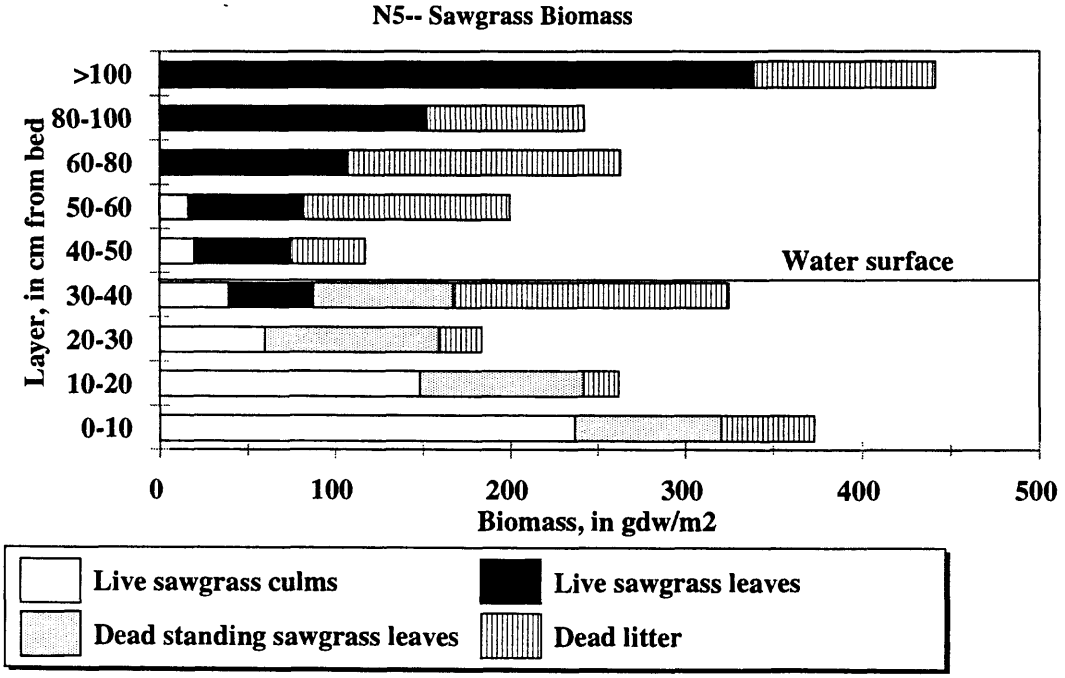
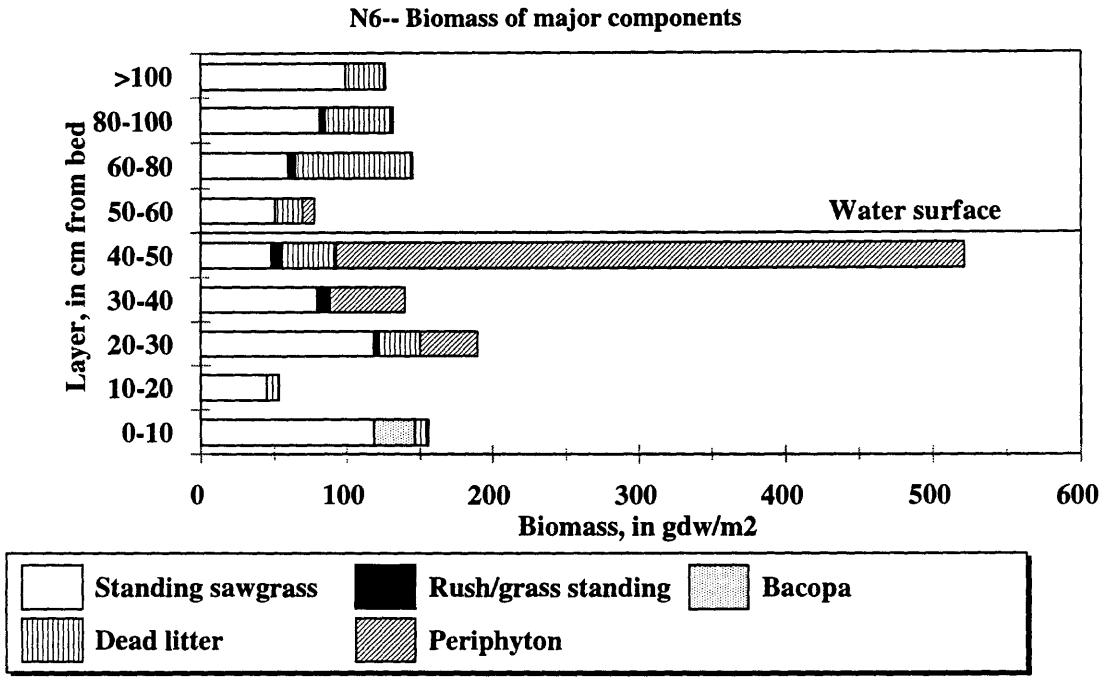

N5-- Sawgrass Biomass
Layer, in cm from bed
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Water surface
0
100
200
300
400
500
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-14. Summary of biomass in quadrat N6, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = dense sawgrass; water surface = 50 cm; plant height = 2.0 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Peri	Bacopa	Total biomass	Total biomass minus Peri	Total live biomass
>100		98.92		26.80	98.92				125.72	125.72	98.92
80-100		81.60		45.60	81.60	3.68			130.88	130.88	85.28
60-80	1.80	57.60		79.60	59.40	5.20			144.20	144.20	64.60
50-60	14.88	21.32	14.40	18.84	50.60		7.72		77.16	69.44	36.20
40-50	28.00	20.12		36.84	48.12	7.84	427.80		520.60	92.80	55.96
30-40	32.92	12.16	34.76		79.84	8.32	50.12	0.60	138.88	88.76	54.00
20-30	61.00		57.56	28.68	118.56	2.80	38.32		188.36	150.04	63.80
10-20	31.80		13.20	8.28	45.00				53.28	53.28	31.80
0-10	106.20		12.08	8.80	118.28			27.84	154.92	154.92	134.04
Totals	276.60	291.72	132.00	253.44	700.32	27.84	523.96	28.44	1534.00	1010.04	624.60


N6-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
500
600
Biomass, in gdw/m2
Standing sawgrass
Rush/grass standing
Bacopa
Dead litter
Periphyton

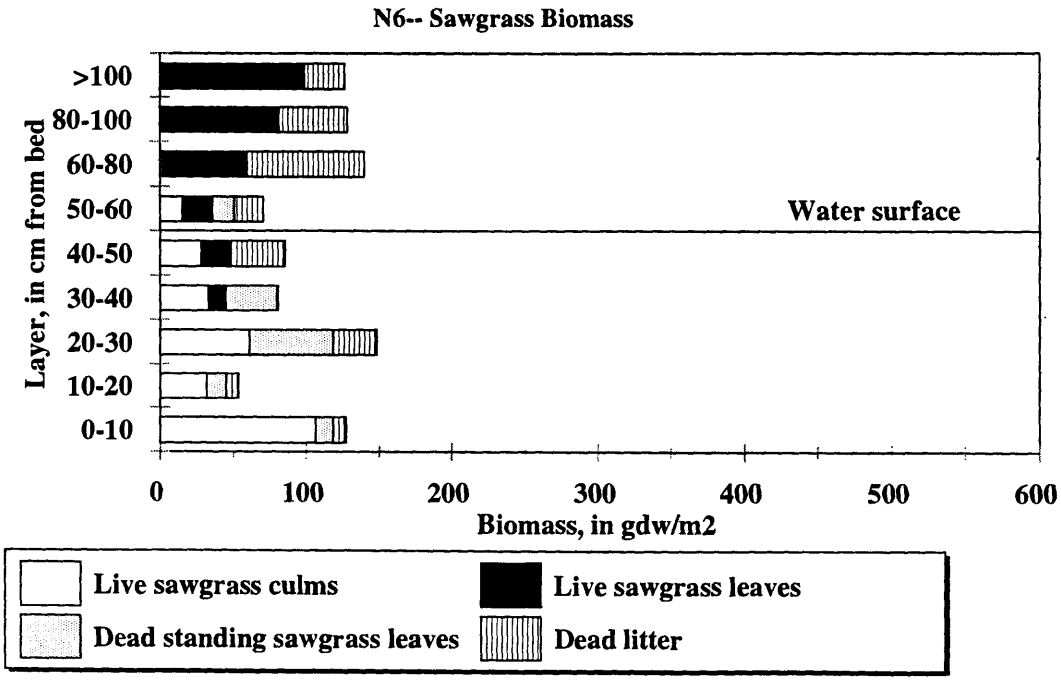
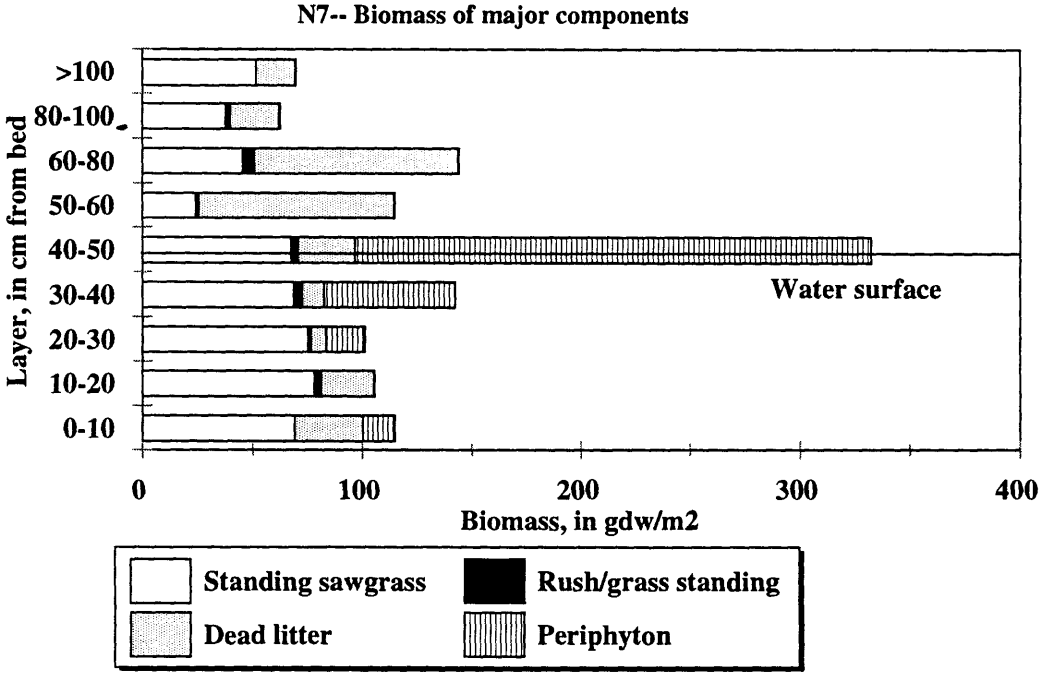

N6-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
500
600
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-15. Summary of biomass in quadrat N7, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Sg = sawgrass; St = standing; Rsh/gr = rush and grass stems; Clm = culms; Lvs = leaves; Peri = periphyton]

Class = medium sawgrass; water surface = 44 cm; plant height = 2.1 m

Layer	Live Sg Clm	Live Sg Lvs	Dead St Sg Lvs	Dead litter	Total St Sg	Rsh/gr	Peri	Total biomass	Total biomass minus Peri	Total live biomass
>100		51.80		17.68	51.80			69.48	69.48	51.80
80-100		37.76		22.04	37.76	2.20		62.00	62.00	39.96
60-80		45.60		92.80	45.60	5.36		143.76	143.76	50.96
50-60	3.56	20.36		89.20	23.92	1.56		114.68	114.68	25.48
40-50	14.36	14.40	38.72	25.76	67.48	3.28	235.08	331.60	96.52	32.04
30-40	16.44	7.12	45.04	10.08	68.60	4.08	58.96	141.72	82.76	27.64
20-30	26.64		48.56	6.68	75.20	1.52	17.00	100.40	83.40	28.16
10-20	34.40		43.52	23.96	77.92	3.24		105.12	105.12	37.64
0-10	16.60		52.52	31.28	69.12		14.36	114.76	100.40	16.60
Totals	112.00	177.04	228.36	319.48	517.40	21.24	325.40	1183.52	858.12	310.28


N7-- Biomass of major components
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
Biomass, in gdw/m2
Standing sawgrass
Rush/grass standing
Dead litter
Periphyton

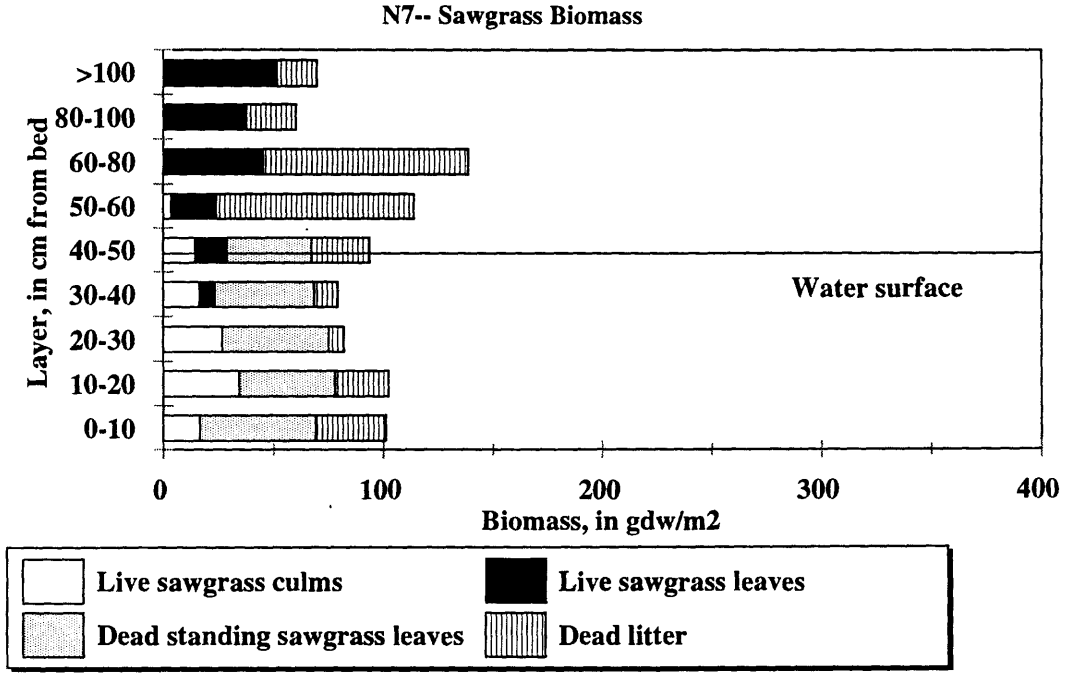
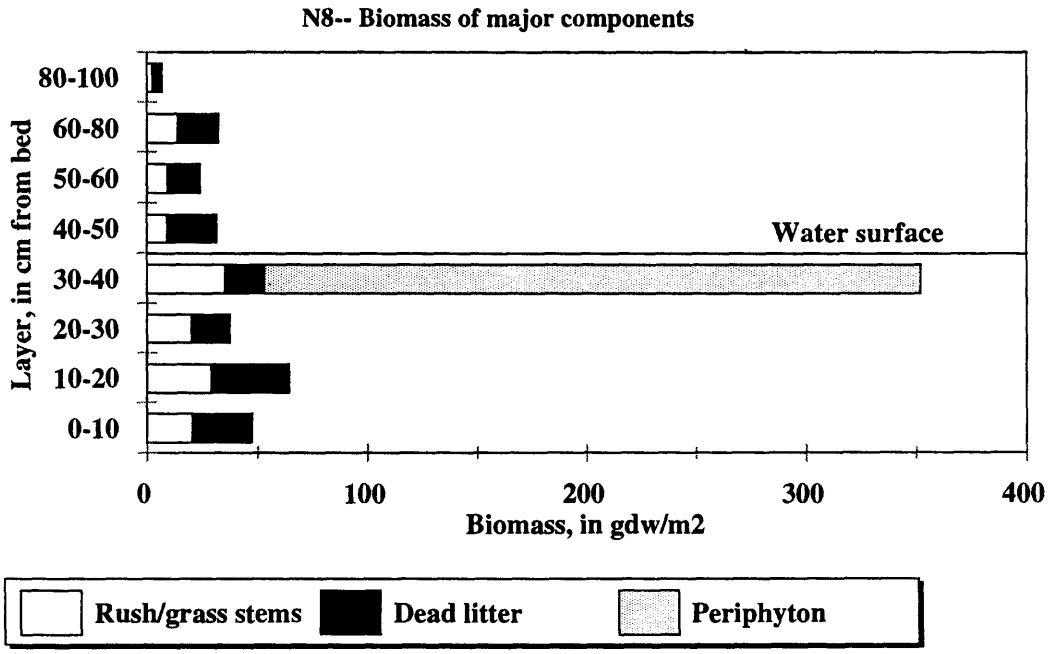

N7-- Sawgrass Biomass
>100
80-100
60-80
50-60
40-50
30-40
20-30
10-20
0-10
Layer, in cm from bed
Water surface
0
100
200
300
400
Biomass, in gdw/m2
Live sawgrass culms
Live sawgrass leaves
Dead standing sawgrass leaves
Dead litter

Table A-16. Summary of biomass in quadrat N8, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes biomass in grams dry weight per square meter (gdw/m^2) of both live and dead standing sawgrass leaves or culms, rush/grass stems, and other material; Rsh/gr = rush and grass stems; Peri = periphyton]

Class = rush; water surface = 40 cm; plant height = 0.9 m

Layer	Rsh/Gr	Dead litter	Peri	Total biomass	Total biomass minus Peri	Total live biomass
80-100	2.24	3.76		6.00	6.00	2.24
60-80	13.76	18.00		31.76	31.76	13.76
50-60	9.12	14.40		23.52	23.52	9.12
40-50	8.80	21.88		30.68	30.68	8.80
30-40	35.12	18.08	298.32	351.52	53.20	35.12
20-30	20.00	17.04		37.04	37.04	20.00
10-20	28.88	34.76		63.64	63.64	28.88
0-10	20.24	26.84		47.08	47.08	20.24
Totals	138.16	154.76	298.32	591.24	292.92	138.16



Appendix B: Vegetation Characteristics by Individual Quadrat Sampled at Sites P33 and NESRS3 in Shark River Slough, South Florida Everglades

Table B-1. Summary of vegetation in quadrat P1, P33 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = medium sawgrass; water surface = 47 cm; plant height = 1.53 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100					56	3.67						
80-100					84	3.67					28	2
60-80			8	5.00	92	3.50					68	2
50-60			8	5.00	76	3.50					92	2
40-50					76	4.50			24	4.17	156	2
30-40			80	6.75	20	4.33			20	4.80	172	2
20-30			48	7.67	48	3.75			20	6.40	160	2
10-20	16	10.75	88	7.33	84	3.83	12	11.00	24	4.17	132	2
0-10			44	8.67	52	4.83	24	22.88	20	7.40	24	2

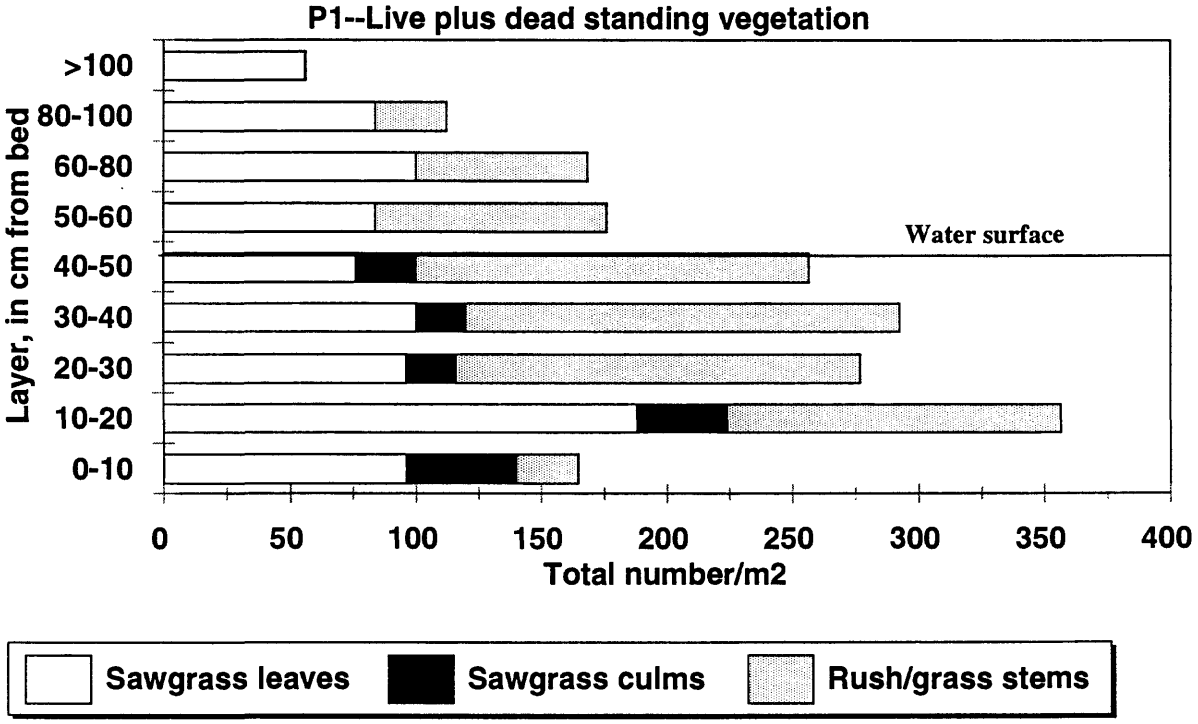


Table B-2. Summary of vegetation in quadrat P2, P33 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; Lvs = leaves; Lrg = large; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface = 55 cm; plant height = 2.2 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width	Bacopa stems
>100					192	3.67							
80-100					184	3.33					16	2	
60-80			36	5.83	160	3.17			8	3.00	32	2	
50-60			220	6.50	232	3.58	4	10.00	44	5.17	56	2	4
40-50			228	6.50	32	3.88			52	7.17	64	2	36
30-40			208	7.00			32	10.88	48	7.88	36	2	28
20-30	36	11.17	168	7.83	16	4.75	32	12.00	44	6.90	52	2	24
10-20	20	14.40	124	8.00	28	4.50	36	13.33	44	7.17	52	2	16
0-10	8	16.50	20	7.40	8	4.50	32	16.83	32	8.70			12

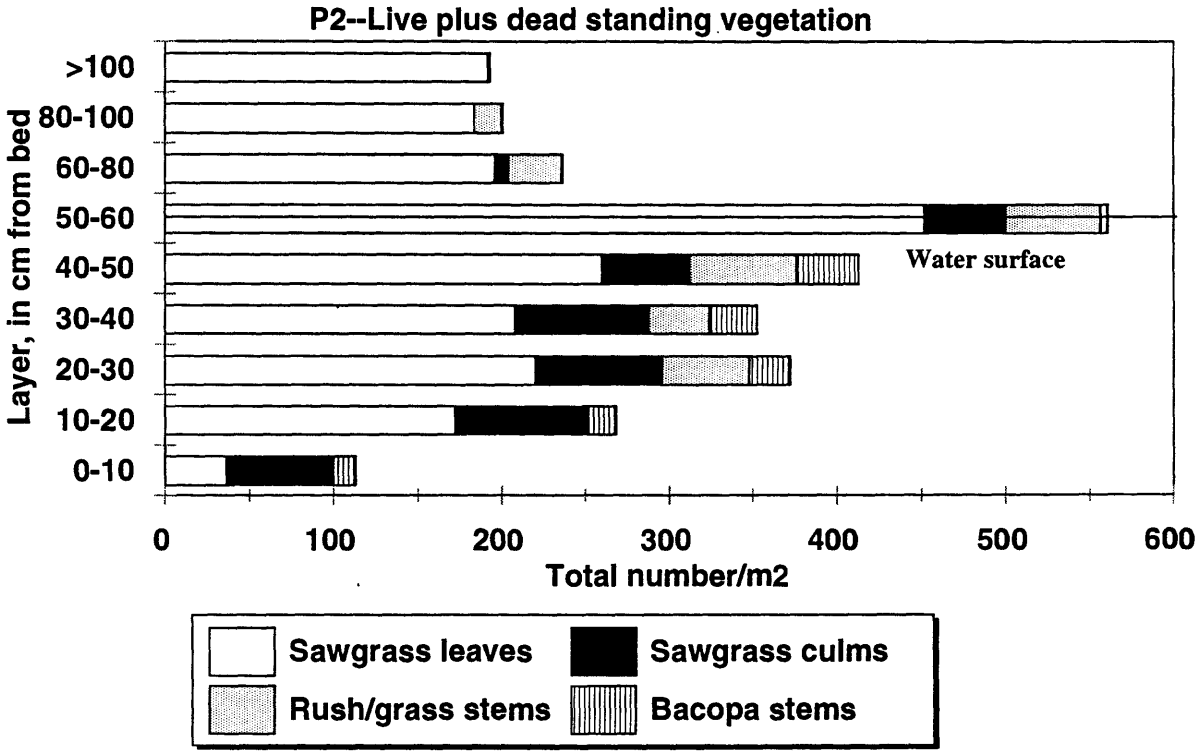


Table B-3. Summary of vegetation in quadrat P3, P33 site, Shark River Slouth, South Florida Everglades, November, 1996
[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Avg = average; Rsh/gr = rush/grass]

Class = sparse rush; water surface = 52 cm; plant height = 0.9 m

Layer	Rsh/gr	Avg Rsh/gr width
>100		
80-100	132	2
60-80	304	2
50-60	1548	2
40-50	1056	2
30-40	2140	2
20-30	1144	2
10-20	1148	2
0-10	1092	2

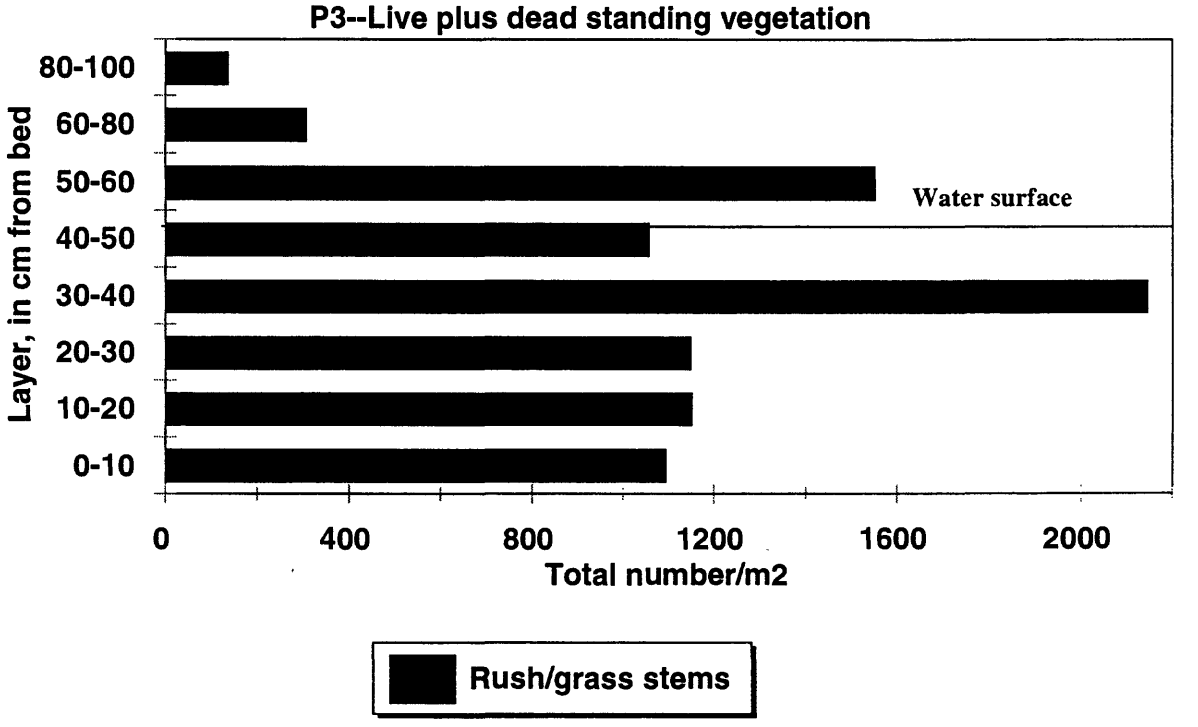


Table B-4. Summary of vegetation in quadrat P5, P33 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = medium sawgrass; water surface = 45 cm; plant height = 1.9 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			16	5.50	40	3.00						
80-100			16	5.75	84	3.83						
60-80			16	5.50	64	3.33					156	2
50-60			24	5.67	44	3.67					120	2
40-50			28	6.33	132	4.42			36	3.25	420	2
30-40			104	6.33	120	4.42			32	4.83	288	2
20-30			212	7.33	108	4.00			36	6.83	312	2
10-20			196	7.83	124	3.33			36	7.33	256	2
0-10	60	12.00	220	7.83	32	4.50	24	13.88	20	7.50	276	2

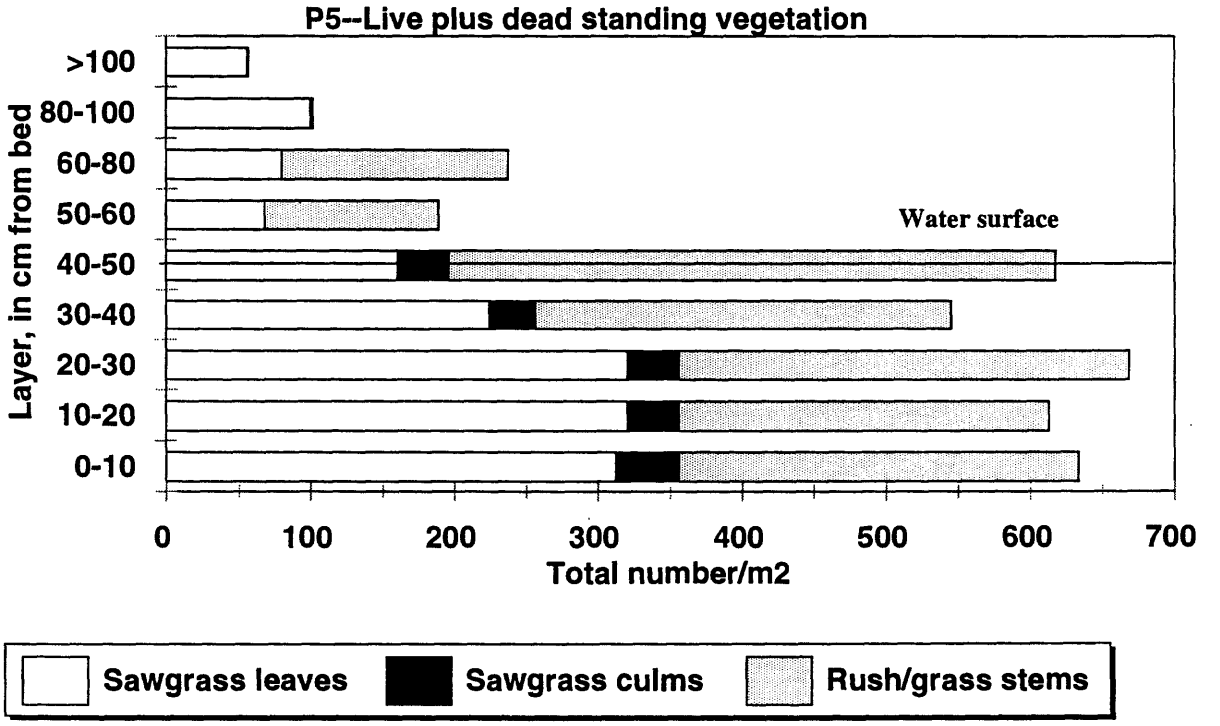


Table B-5. Summary of vegetation in quadrat P6, P33 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = mixed rush/sawgrass; water surface = 48 cm; plant height = 1.7 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			4	5.00	24	2.67						
80-100					48	3.50					20	2
60-80			12	5.67	32	3.67					324	2
50-60			12	6.00	32	3.33			4	4.00	388	2
40-50			12	6.67	36	4.00			16	5.00	800	2
30-40			52	7.54	36	3.95			12	6.00	856	2
20-30			60	7.70	52	3.33			12	6.67	880	2
10-20			40	8.67	32	3.83	12	11.33	4	5.00	536	2
0-10	20	11.80	16	7.75	20	4.40	16	15.50			600	2

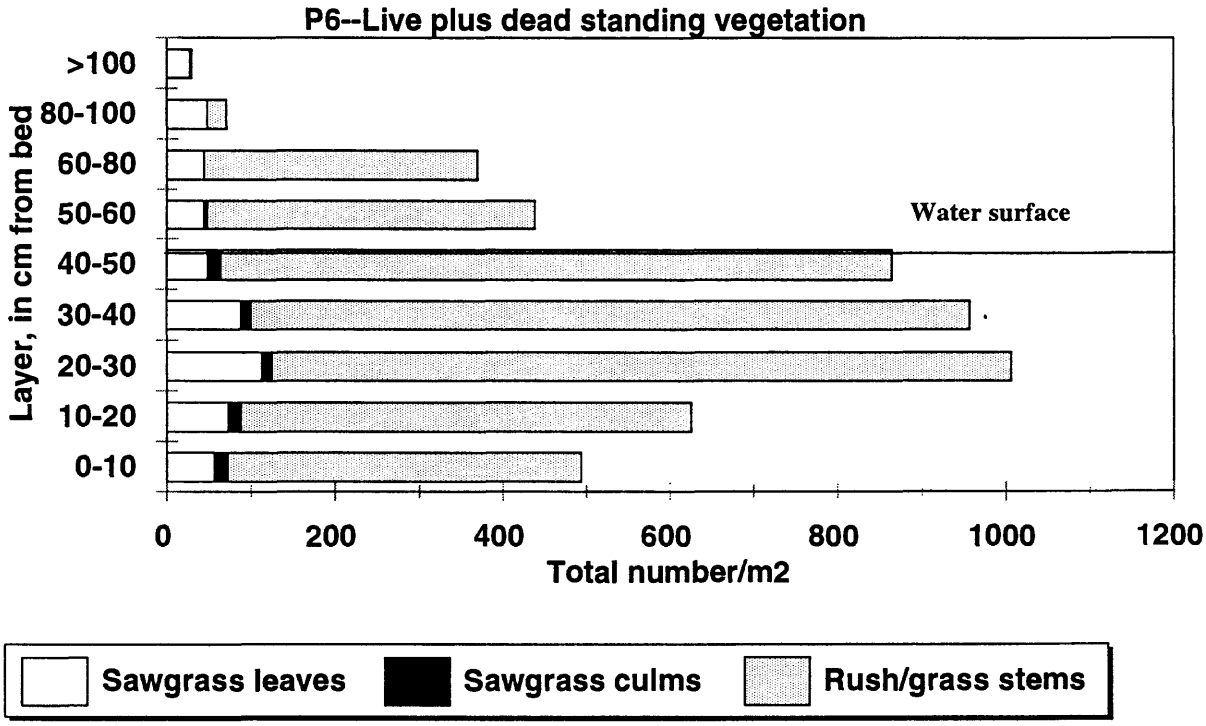


Table B-6. Summary of vegetation in quadrat P7, P33 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface = 47 cm; plant height = 1.67 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100					88	3.00						
80-100			28	5.46	216	2.33						
60-80			28	5.66	232	2.83			28	3.16	48	2
50-60			20	6.20	232	3.16			12	3.66	80	2
40-50			64	5.66	132	3.83			64	4.16	104	2
30-40	8	11.50	80	7.16	48	3.83			76	4.50	96	2
20-30			36	6.33	80	3.83			64	6.00	92	2
10-20			20	6.00			16	12.00	68	7.33	108	2
0-10							44	14.16	52	5.16		

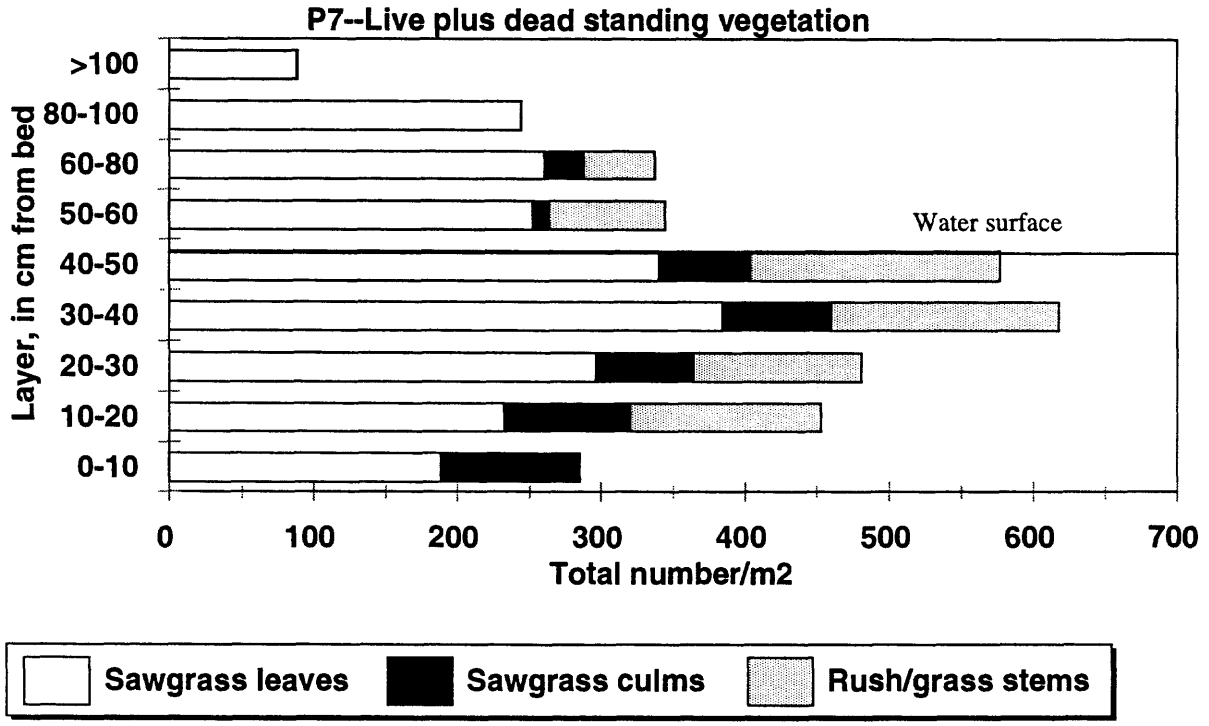


Table B-7. Summary of vegetation in quadrat P8, P33 site, Shark River Slouth, South Florida Everglades, November, 1996
[Summary includes number of both live and dead standing cattail leaves or culms; St = standing]

Class = cattail; water surface = 44 cm; plant height = 3.5 m

Layer	Live leaves	Dead St leaves	Total leaves	Live culms	Dead St culms	Total culms
>100	60		60			
80-100	28	336	364	8		8
60-80	8	60	68	4	40	44
50-60		68	68	4	48	52
40-50		200	200	24	40	64
30-40		36	36	16	52	68
20-30		48	48	16	72	88
10-20		20	20	20	60	80
0-10		36	36	20	44	64

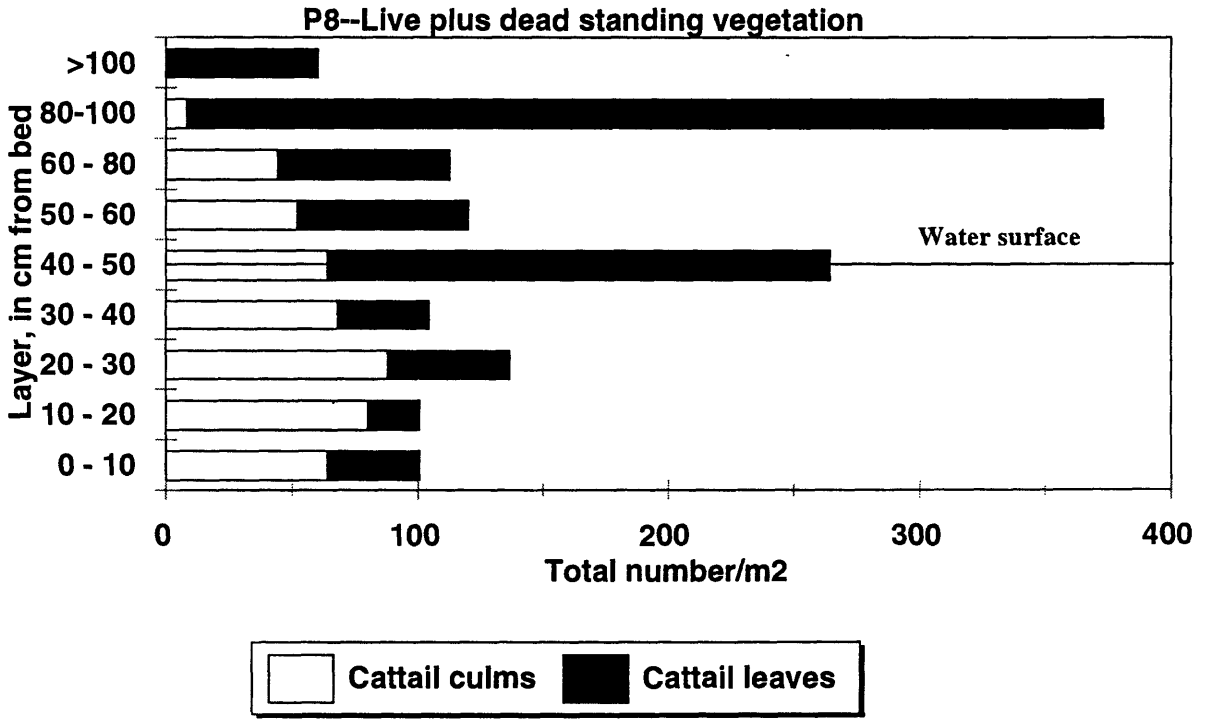


Table B-8. Summary of vegetation in quadrat P9, P33 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; SC = small culms; Rsh/gr = rush/grass]

Class = rush; water surface = 52 cm; plant height = 0.8 m

Layer	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100				
80-100				
60-80			180	2
50-60			472	2
40-50			384	2
30-40			376	2
20-30			356	2
10-20			224	2
0-10	4	10.00	228	2

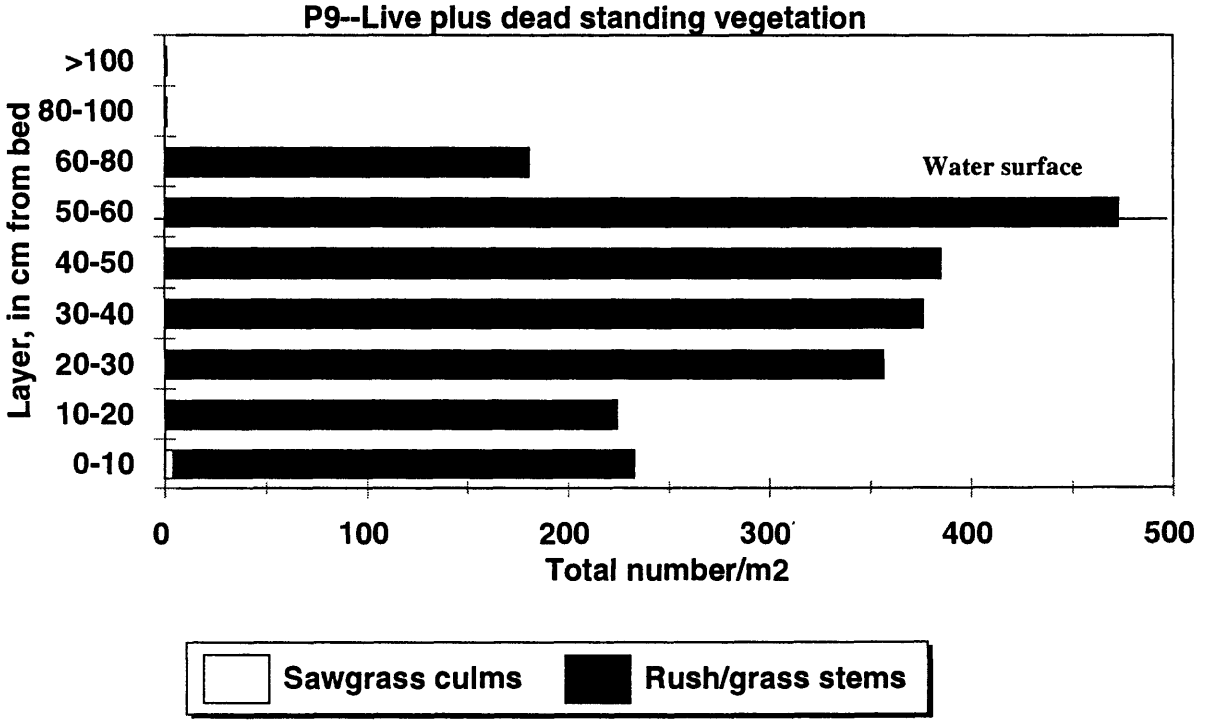


Table B-9. Summary of vegetation in quadrat N1, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface = 46 cm; plant height = 2.1 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width	Arrow arum
>100			48	6.67	56	3.83							
80-100			72	7.50	48	2.67			12	4.00			4
60-80	16	9.50	108	6.83	32	2.67			28	3.83			4
50-60	12	10.00	80	7.17	28	2.83			40	5.67	4	2	20
40-50	32	10.07	248	7.75	192	4.38	12	10.67	24	5.50			36
30-40	24	10.67	160	7.17	72	4.40	16	11.50	40	5.17			56
20-30	8	12.00	176	7.75	36	4.47	16	11.75	24	5.50			48
10-20	52	12.67	108	7.83	44	4.17	20	15.80	16	6.50			44
0-10	52	13.50	4	8.00	16	2.75	28	26.83	12	7.00			40

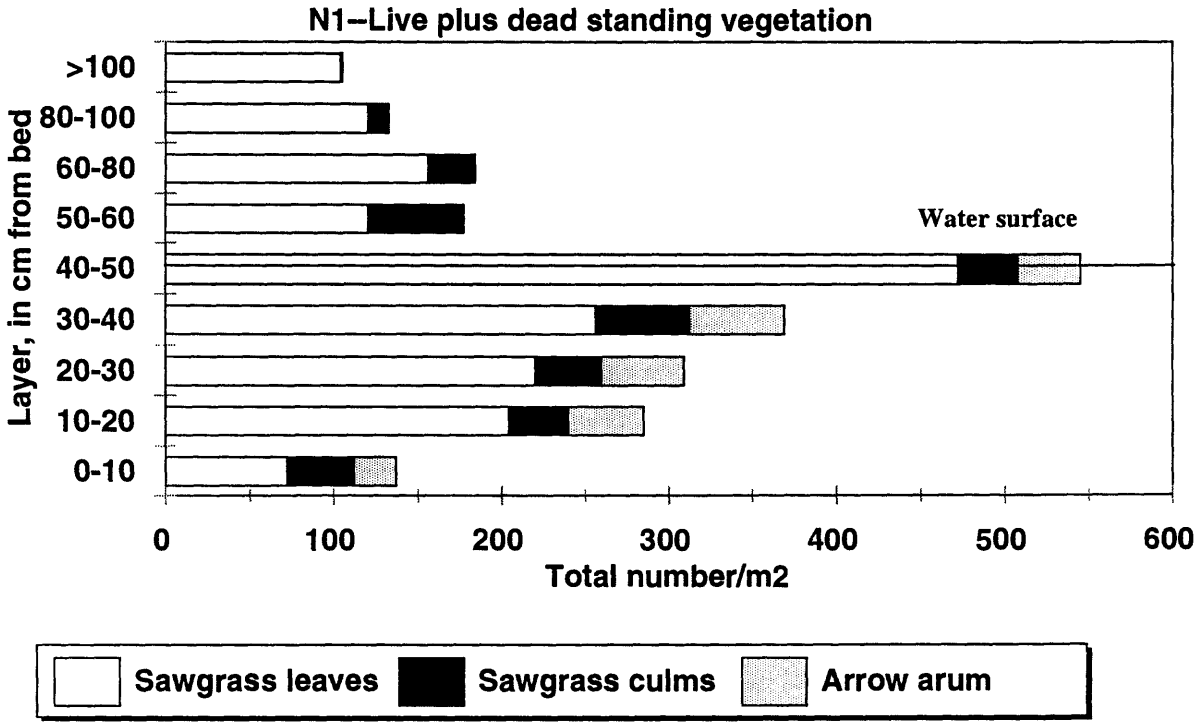


Table B-10. Summary of vegetation in quadrat N2, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface = 45 cm; plant height = 2.2 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			48	6.50	244	2.33						
80-100			136	6.50	44	3.17			20	3.40		
60-80			96	6.83	100	3.67	4	8.00	16	4.50	4	2
50-60	4	11.00	72	7.33	52	4.17	4	11.00	12	5.00		
40-50	24	11.25	344	7.33	92	3.42			48	5.50		
30-40	12	13.00	252	8.17	108	4.13	4	12.00	56	6.28		
20-30	20	12.80	276	9.17	48	5.00	28	11.70	36	7.58		
10-20			160	7.67	84	4.67	56	12.04	8	4.00		
0-10	28	12.83	16	8.25			24	14.33	24	5.33		

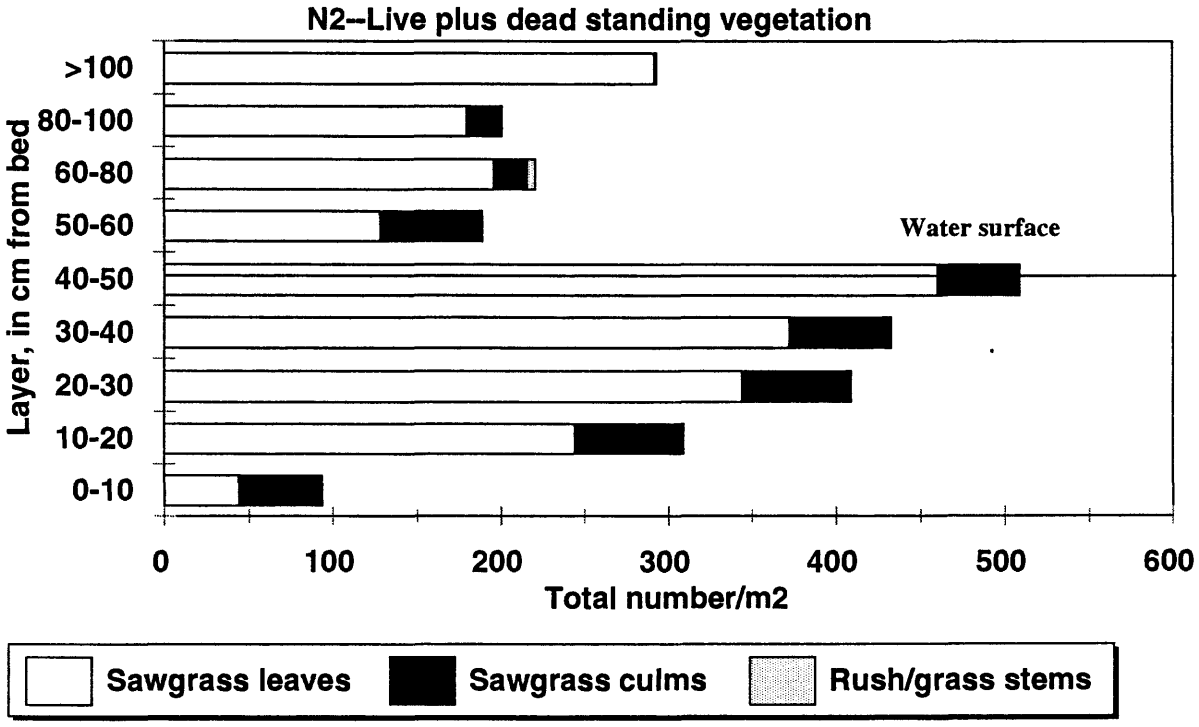


Table B-11. Summary of vegetation in quadrat N3, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms]

Class = very dense sawgrass; water surface = 7 cm; plant height = 2.9 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width
>100	36	9.67	116	6.33	60	3.17				
80-100	40	11.17	128	7.50	56	3.50	8	10.00	4	
60-80	44	11.00	100	7.83	12	2.33	12	10.00	12	5.67
50-60	48	12.17	104	8.33			12	11.33	24	5.00
40-50	160	12.58	164	8.33	20	5.00	12	18.75	24	7.60
30-40	64	12.68	140	8.08	20	4.40	16	16.17	16	7.75
20-30	144	14.08	80	9.25	56	5.50	28	16.29	16	8.83
10-20	144	18.83	80	8.33			32	21.97	12	10.25
0-10	92	21.00	48	7.67			20	27.25	20	13.33

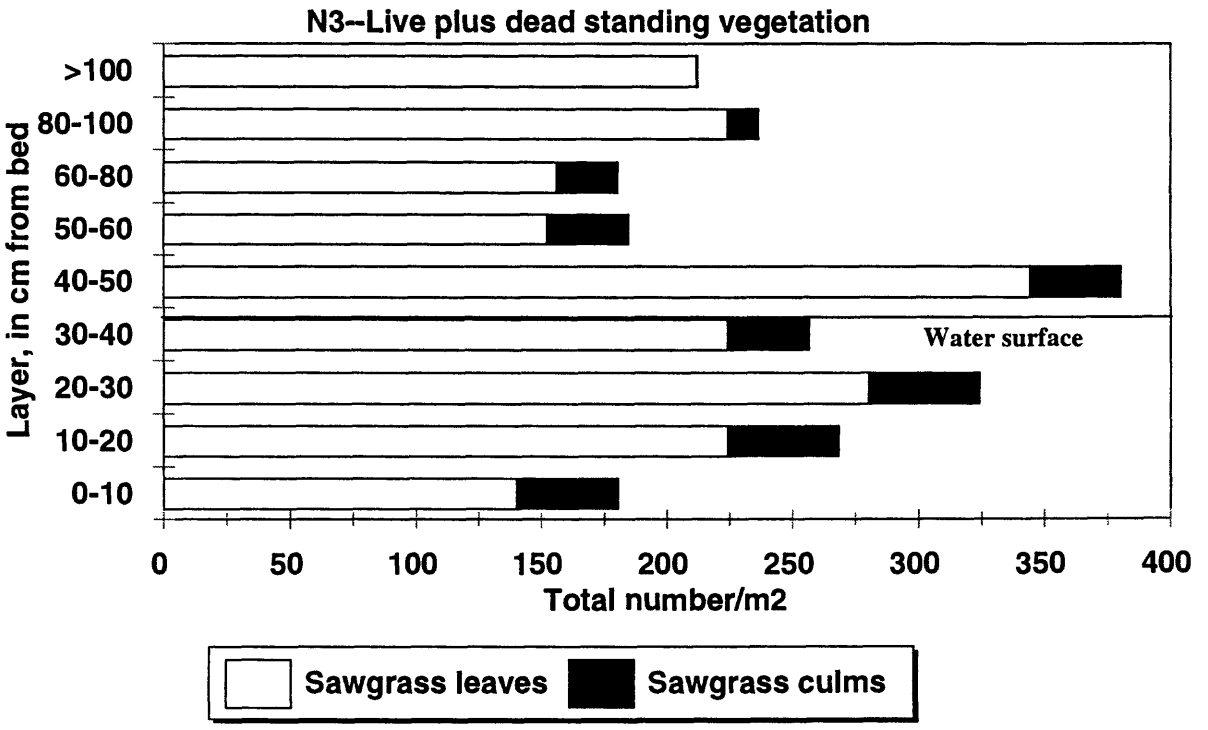


Table B-12. Summary of vegetation in quadrat N4, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms]

Class = medium sawgrass; water surface = 46 cm; plant height = 2.4 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width
>100			56	6.00	56	2.67				
80-100			72	6.83	44	3.33			4	3.50
60-80			76	7.33	16	2.00			8	4.50
50-60			52	8.33	20	3.80	4	10.00	20	5.00
40-50			96	7.92	12	5.00	8	14.00	20	4.75
30-40	36	11.92	52	8.33	36	3.83	24	11.33	4	5.00
20-30	20	12.40	48	8.50	24	4.83	24	12.50	8	3.50
10-20	20	13.20	36	8.17	20	4.60				
0-10	24	11.33	4	7.00			36	17.53	16	4.83

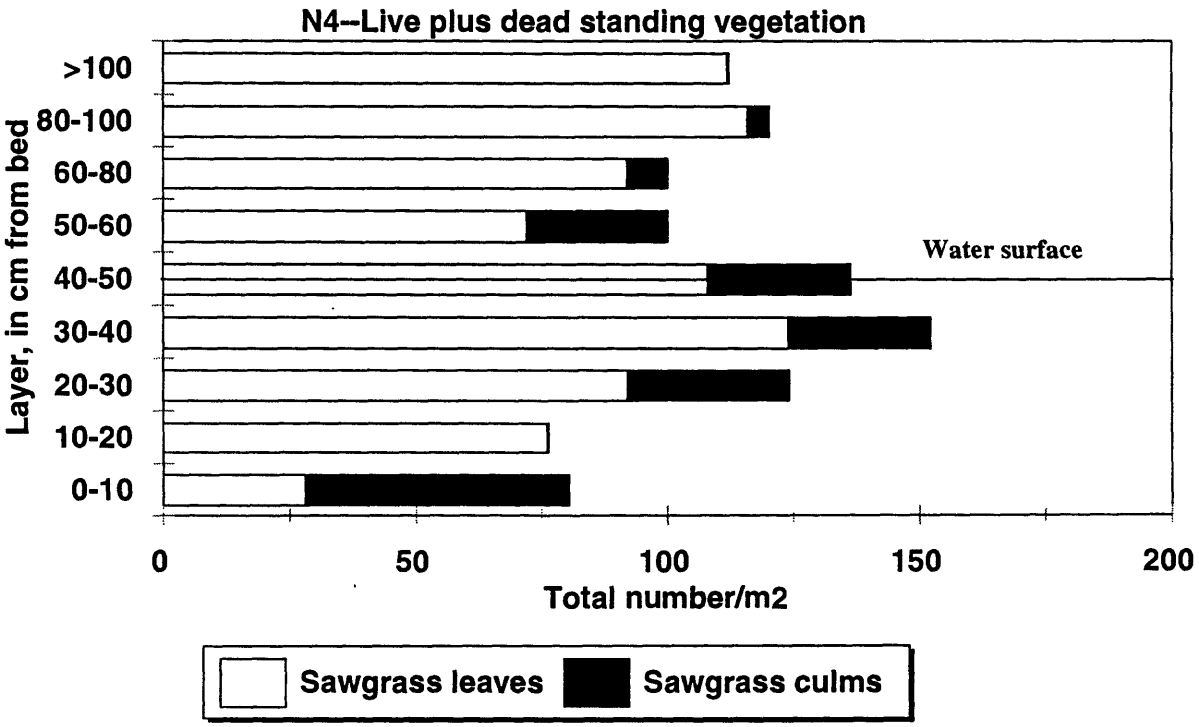


Table B-13. Summary of vegetation in quadrat N5, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996
[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = very dense sawgrass; water surface = 38cm; plant height = 2.4 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100	24	9.67	132	7.00	180	3.17						
80-100			184	8.67	20	3.40			8	5.00	12	2
60-80	20	10.20	140	7.50	40	2.83			12	6.67		
50-60	80	10.33	100	7.67	16	3.75	8	9.00	28	4.00	20	2
40-50	56	10.83	120	8.33	8	5.00	16	10.50	20	4.00	16	2
30-40	104	11.92	220	8.25	16	3.50	16	14.00	20	6.83	40	2
20-30	168	13.00	88	7.60			32	15.92	8	7.50	16	2
10-20	108	16.50	112	9.17	4	5.00	28	19.50	8	10.50		
0-10	44	22.17	64	7.83			48	21.25				

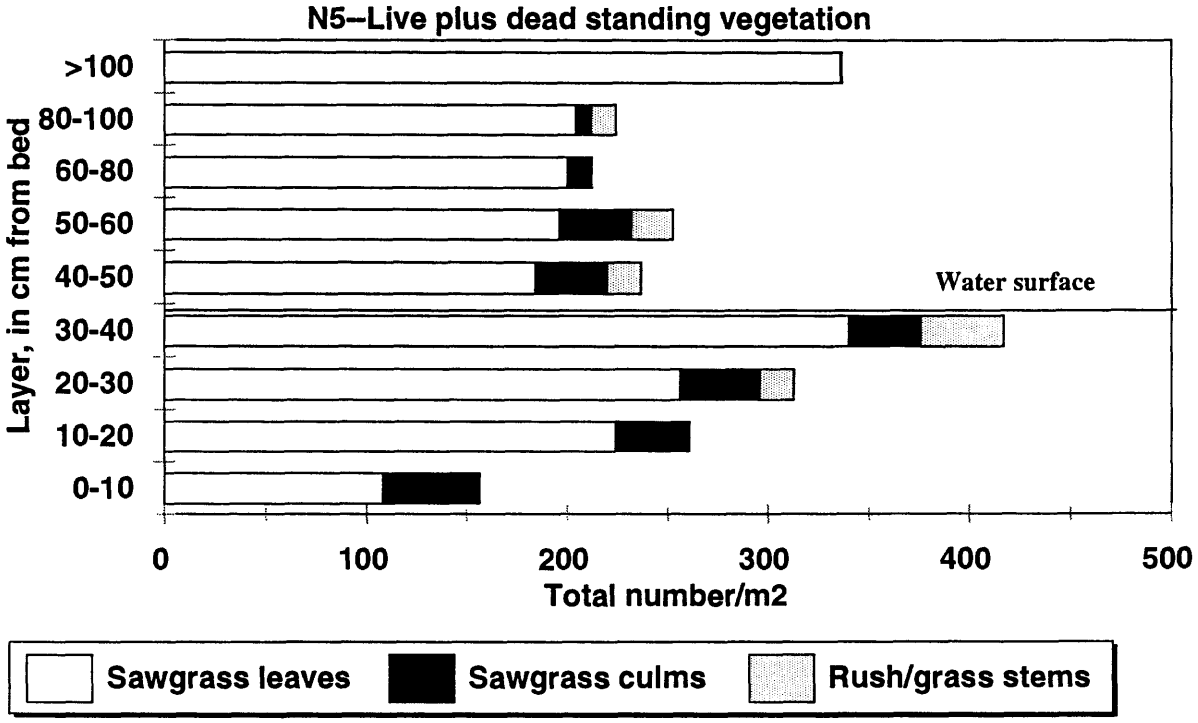


Table B-14. Summary of vegetation in quadrat N6, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface = 50 cm; plant height = 2.0 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			32	6.16	148	2.67						
80-100			76	6.83	120	3.50			4	6.00		
60-80			64	6.83	64	2.50	4	10.00	16	2.75	48	2
50-60			108	8.16	32	3.83	8		24		124	2
40-50			40	8.50	24	4.33			36	7.50	96	2
30-40	32	12.33	40	8.00	60	4.33	16	11.00	20	6.20	168	2
20-30	48	12.67	32	7.83	8	4.50	12	17.67	20	9.40	64	2
10-20	8	12.00	20	7.20	12	4.00	20	16.60	4	6.00		
0-10	16	17.75			8	5.00	32	20.33	4	7.00		

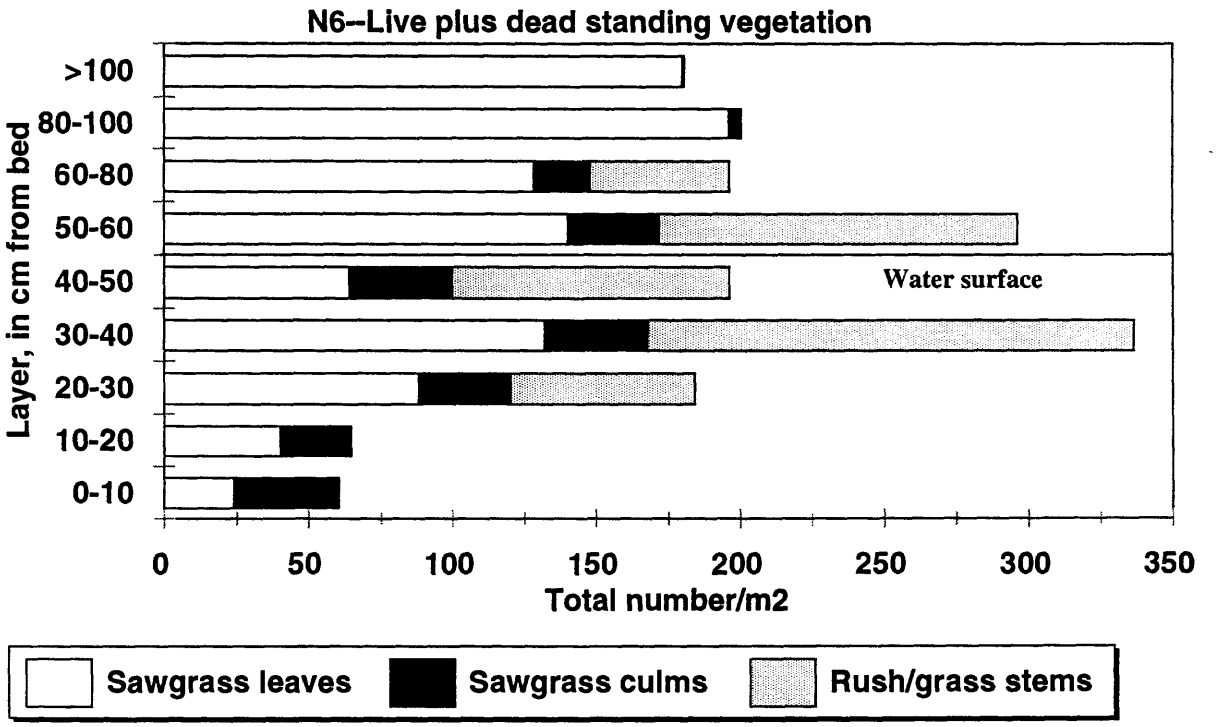


Table B-15. Summary of vegetation in quadrat N7, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996

[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = medium sawgrass; water surface = 44 cm; plant height = 2.1 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			32	5.83	32	4.16						
80-100			56	7.16	44	2.67					20	2
60-80			52	7.67	56	3.50			8	5.00	40	2
50-60			36	7.67	36	4.16			20	3.80	32	2
40-50			108	8.67	28	4.00			24	6.16	76	2
30-40	16	12.00	100	8.00	20	4.33	8	13.00	16	6.00	76	2
20-30	44	10.67	24	8.00	24	4.33	8	17.50	16	5.33	56	2
10-20	44	13.67	32	8.00			16	14.75	16	7.00	56	2
0-10	24	13.67	16	8.75			20	19.00	12	7.50		

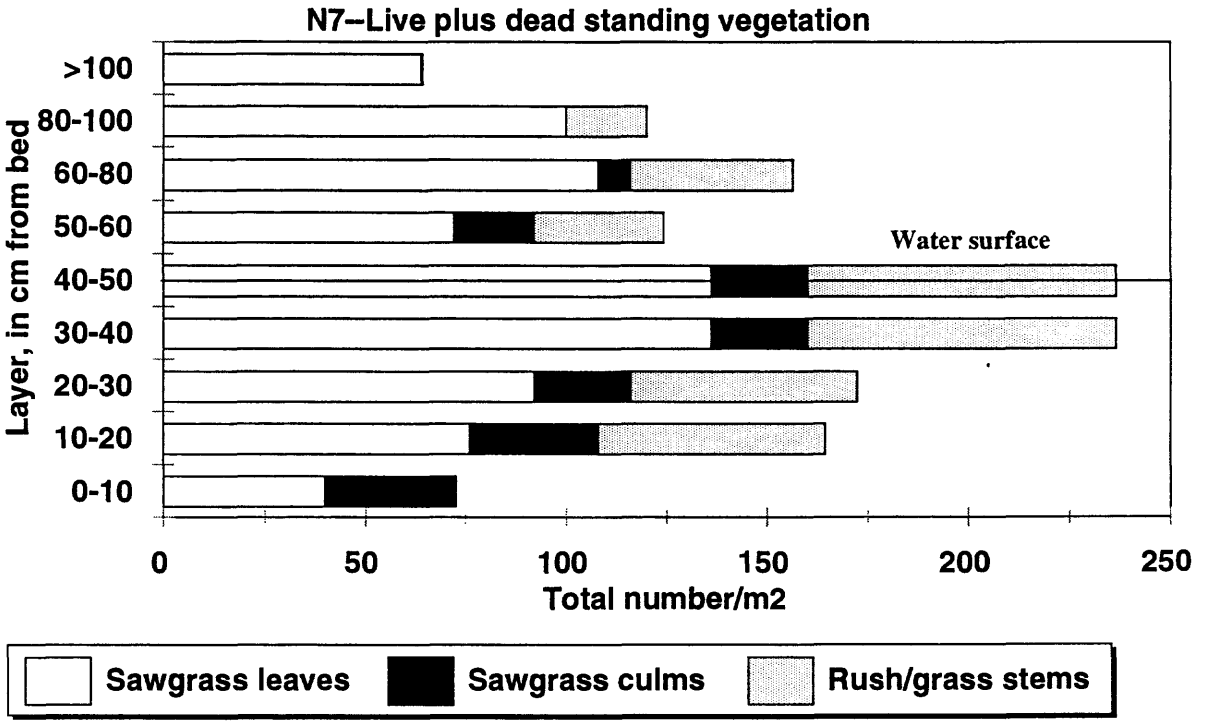
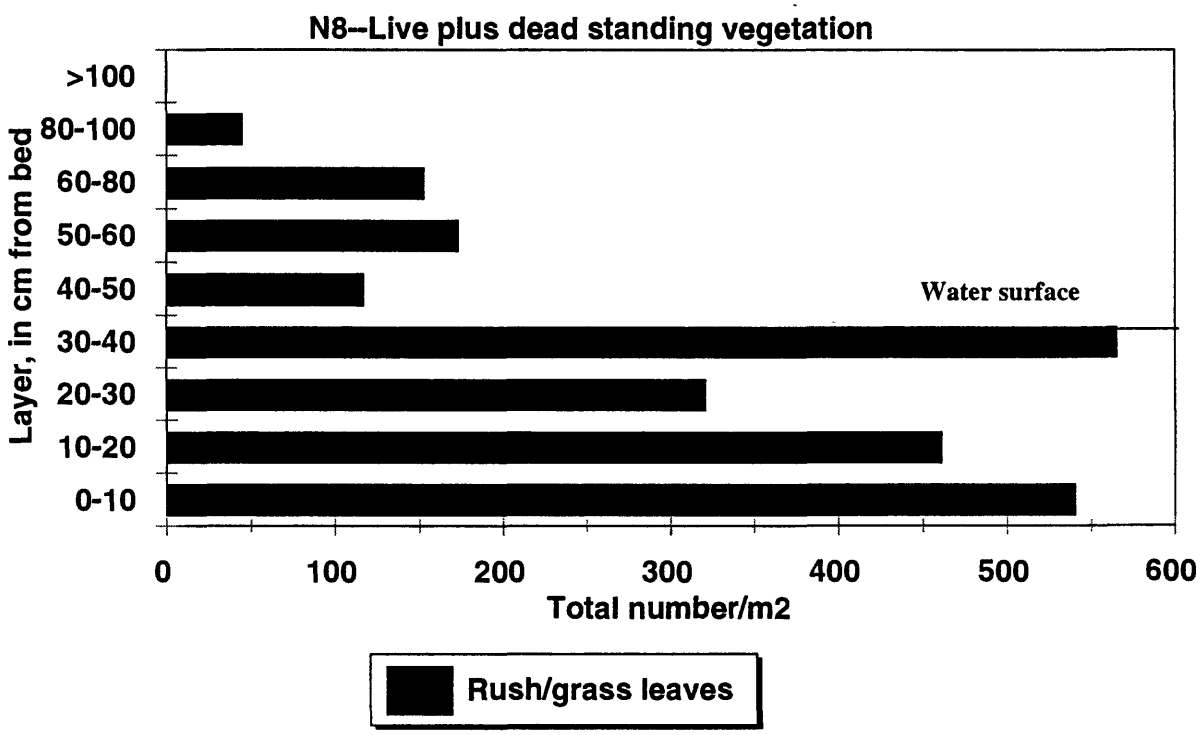


Table B-16. Summary of vegetation in quadrat N8, NESRS3 site, Shark River Slouth, South Florida Everglades, November, 1996
[Summary includes number and average width of both live and dead standing sawgrass leaves or culms and rush leaves, and number of stems of other species; width in millimeters; Avg = average; Rsh/gr = rush/grass]

Class = rush; water surface = 40 cm; plant height = 0.9 m

Layer	Rsh/gr	Avg Rsh/gr width
>100		
80-100	44	2
60-80	152	2
50-60	172	2
40-50	116	2
30-40	564	2
20-30	320	2
10-20	460	2
0-10	560	2



Appendix C: Live Vegetation by Individual Quadrat Sampled at Sites P33 and NESRS3 in Shark River Slough, South Florida Everglades

Table C-1. Summary of live vegetation in quadrat P1, P33 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = medium sawgrass; water surface = 47 cm; plant height = 2.2 m

Layer	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			56	3.67						
80-100			84	3.67					28	2
60-80	8	5.00	92	3.50					68	2
50-60	8	5.00	76	3.50					92	2
40-50			44	4.33			24	4.17	156	2
30-40	40	6.17	12	4.67			20	4.80	172	2
20-30			36	4.83			20	6.40	160	2
10-20			4	4.00	12	11.00	12	4.33	132	2
0-10					8	31.00	20	7.40	24	2

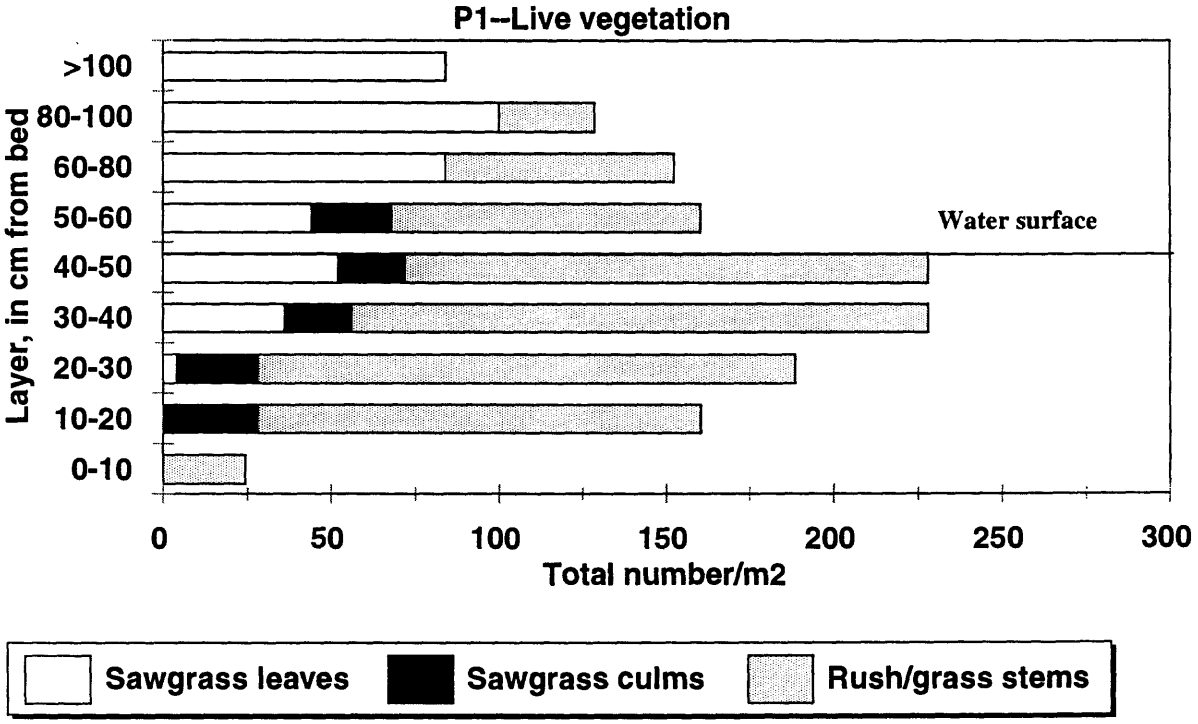


Table C-2. Summary of live vegetation in quadrat P2, P33 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface = 55 cm; plant height = 2.2 m

Layer	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width	Bacopa stems
>100			192	3.67							
80-100			184	3.33					16	2	
60-80	36	5.83	160	3.17			8	3.00	32	2	
50-60	12	6.33	92	3.67	4	10.00	44	5.17	56	2	4
40-50	40	5.83	16	3.25			52	7.17	64	2	36
30-40					16	10.50	32	8.00	36	2	28
20-30					12	12.00	20	6.80	52	2	24
10-20					16	14.25	28	7.33	52	2	16
0-10					24	16.67	20	8.40			12

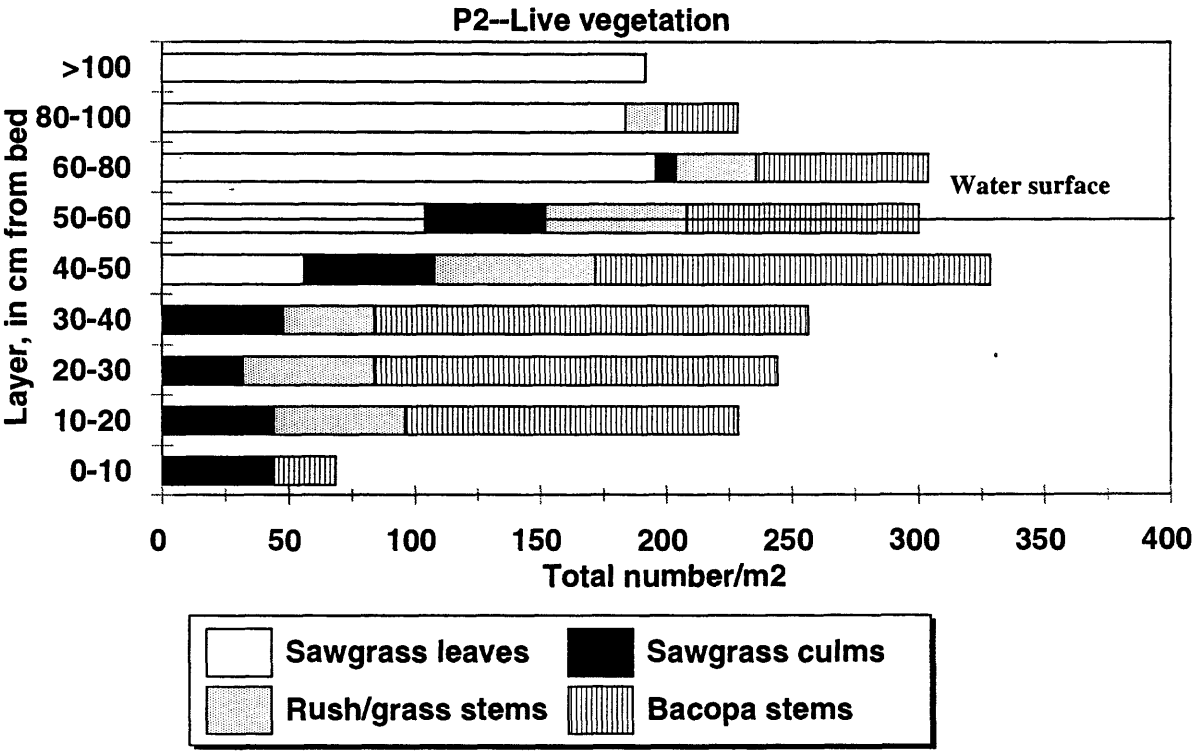


Table C-3. Summary of live vegetation in quadrat P3, P33 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Avg = average; Rsh/gr = rush/grass]

Class = rush; water surface = 52 cm; plant height = 0.9 m

Layer	Rsh/gr	Avg Rsh/gr width
80-100	28	2
60-80	220	2
50-60	368	2
40-50	840	2
30-40	972	2
20-30	916	2
10-20	672	2
0-10	610	2

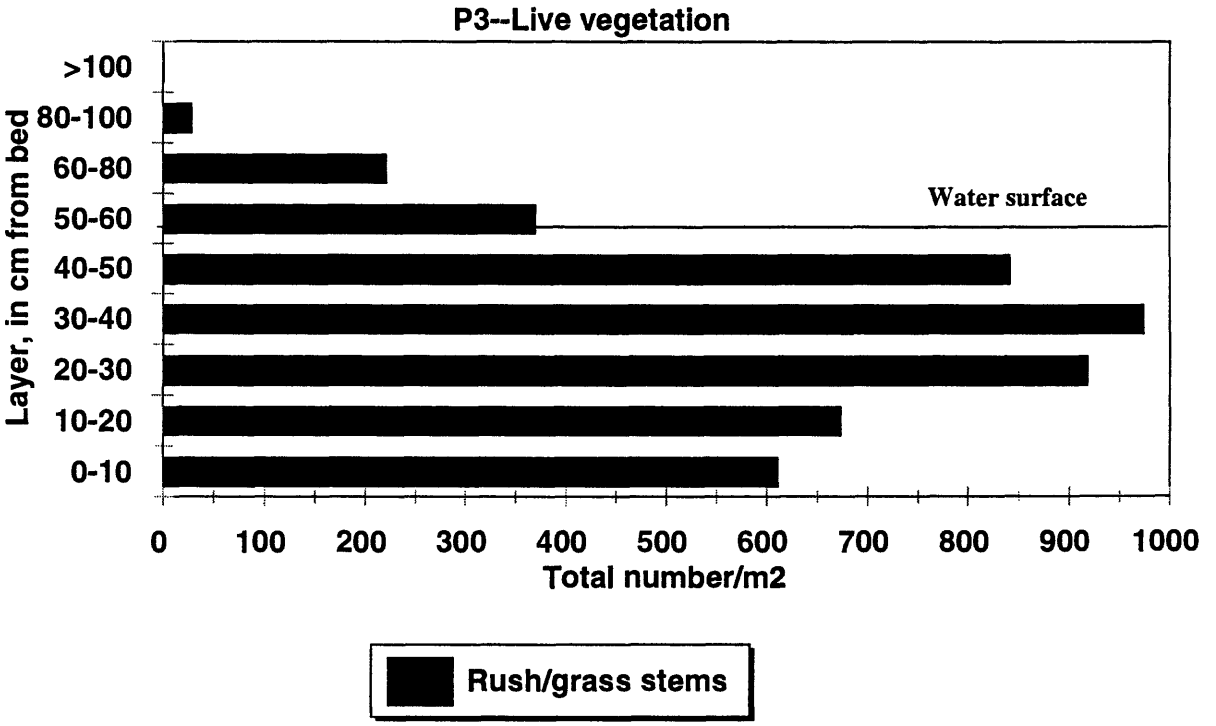


Table C-4. Summary of live vegetation in quadrat P5, P33 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = medium sawgrass; water surface = 45 cm; plant height = 1.9 m

Layer	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100	16	5.50	40	3.00						
80-100	16	5.75	84	3.83						
60-80	16	5.50	64	3.33					156	2
50-60	24	5.67	44	3.67					120	2
40-50			56	4.83			24	4.50	420	2
30-40	24	6.00	16	4.00			32	4.83	288	2
20-30			48	4.00			28	5.17	312	2
10-20			8	4.00			36	7.33	256	2
0-10					8	15.50	8	7.00	276	2

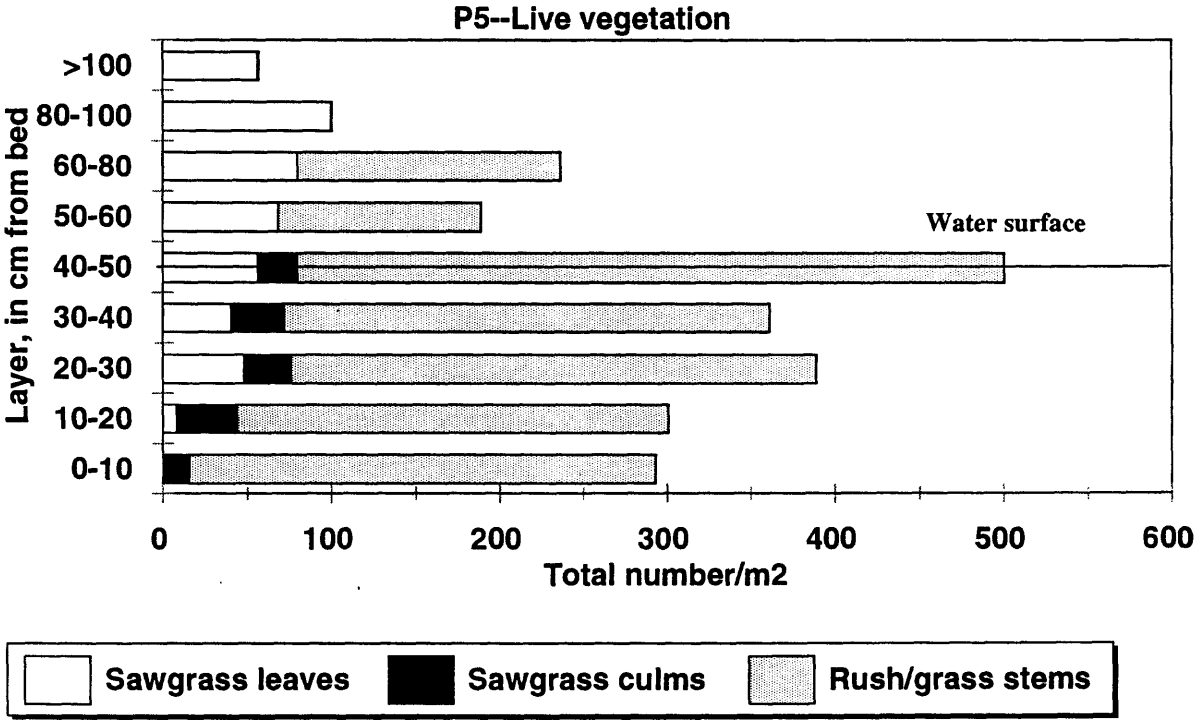


Table C-5. Summary of live vegetation in quadrat P6, P33 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = mixed rush/sawgrass; water surface = 48 cm; plant height = 1.7 m

Layer	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100	4	5.00	24	2.67						
80-100			48	3.50					20	2
60-80	12	5.67	32	3.67					324	2
50-60	12	6.00	32	3.33			4	4.00	388	2
40-50	12	6.67	16	4.00			16	5.00	800	2
30-40	16	6.75	16	3.50			12	6.00	856	2
20-30	12	7.00	12	3.00			12	6.67	880	2
10-20					12	11.33	4	5.00	536	2
0-10					8	16.50			420	2

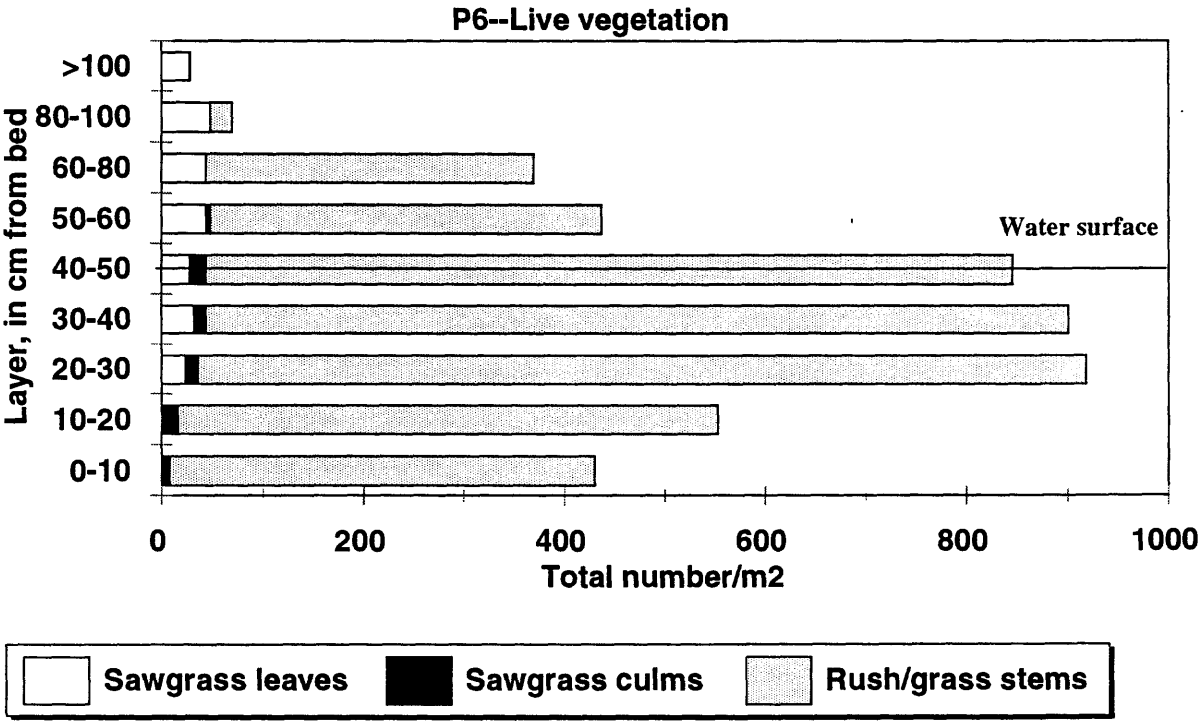


Table C-6. Summary of live vegetation in quadrat P7, P33 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass)

Class = dense sawgrass; water surface = 47 cm; plant height = 1.67 m

Layer	Sg LL	Avg LL Width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100					88	3.00						
80-100			28	5.46	216	2.33						
60-80			28	5.66	232	2.83			28	3.16	48	2
50-60			20	6.20	232	3.16			12	3.66	80	2
40-50			64	5.66	132	3.83			64	4.16	104	2
30-40	8	11.50	80	7.16	48	3.83			76	4.50	96	2
20-30			36	6.33	80	3.83			64	6.00	92	2
10-20			20	6.00			16	12.00	68	7.33	108	2
0-10							44	14.16	52	5.16		

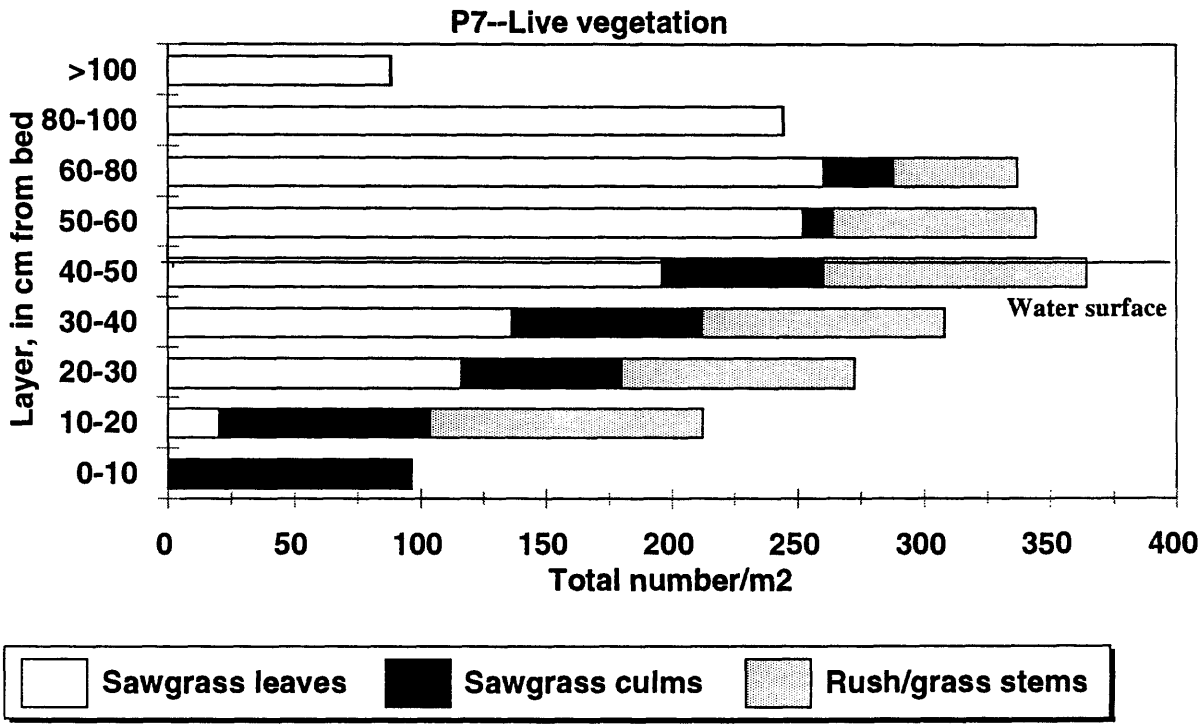


Table C-7. Summary of live vegetation in quadrat P8, P33 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live cattail leaves or culms.]

Class = cattail; water surface = 44 cm; plant height = 3.5 m

Layer	Live culms	Live leaves
>100		60
80-100		28
60-80	4	16
50-60	4	16
40-50	24	96
30-40	16	64
20-30	16	64
10-20	20	80
0-10	20	80

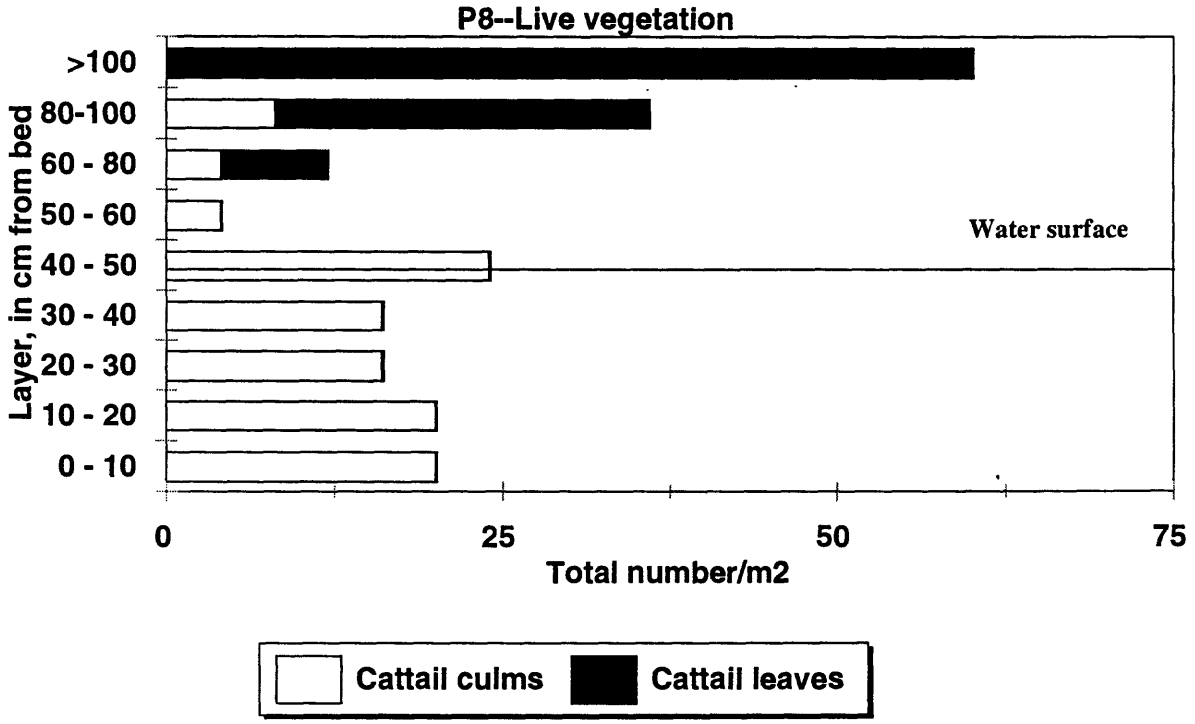


Table C-8. Summary of live vegetation in quadrat P9, P33 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Avg = average; Rsh/gr = rush/grass]

Class = rush; water surface = 52 cm; plant height = 0.8 m

Layer	Rsh/gr	Avg Rush/gr width
60-80	180	2
50-60	472	2
40-50	384	2
30-40	376	2
20-30	356	2
10-20	224	2
0-10	228	2

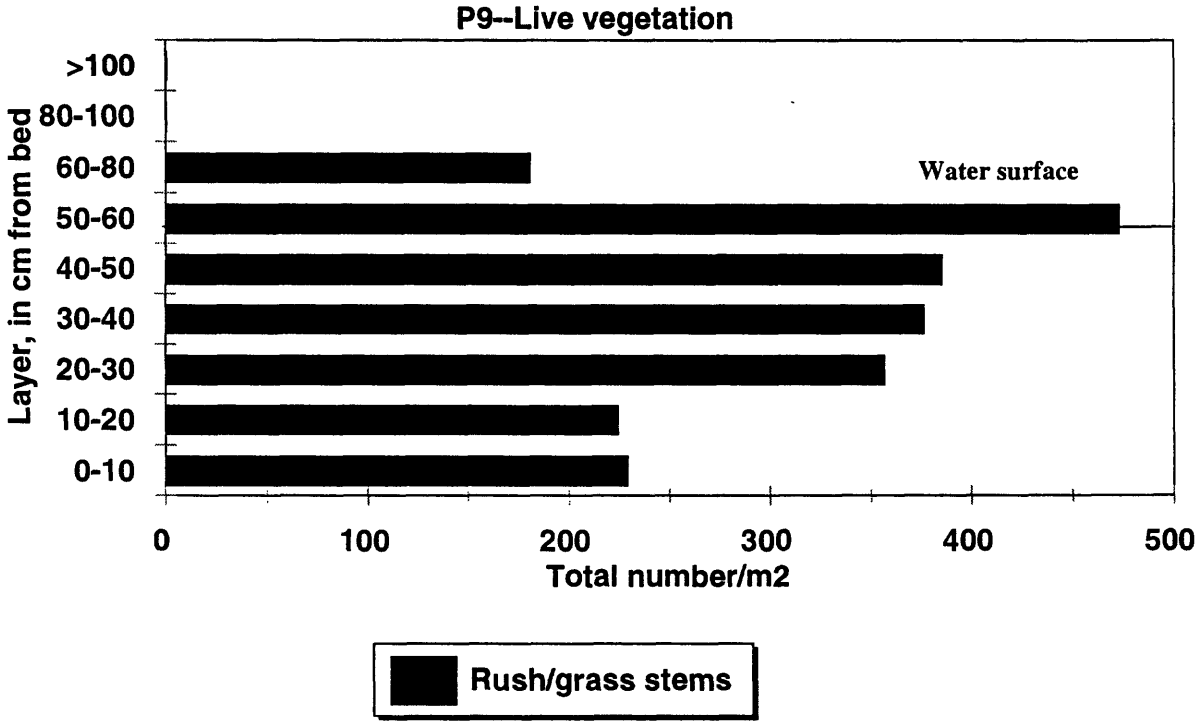


Table C-9. Summary of live vegetation in quadrat N1, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996

[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface = 46 cm; plant height = 2.1 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			48	6.67	56	3.83						
80-100			72	7.50	48	2.67			12	4.00		
60-80	16	9.50	108	6.83	32	2.67			28	3.83		
50-60	12	10.00	80	7.17	28	2.83			40	5.67	4	2
40-50	12	10.33	52	8.00	16	4.25	12	10.67	24	5.50		
30-40	24	10.67	44	7.00	20	4.80	16	11.50	40	5.17		
20-30			52	8.50	12	4.33	16	11.75	24	5.50		
10-20							20	15.80	16	6.50		
0-10							24	21.67	12	7.00		

Layer	Sagit-taria	Arrow arum live	Avg width	Arrow arum dead	Avg width
>100					
80-100	4				
60-80	4				
50-60	20				
40-50		12		24	
30-40		28	10	28	15
20-30		28	15	20	1
10-20		32	20	12	7
0-10		24			

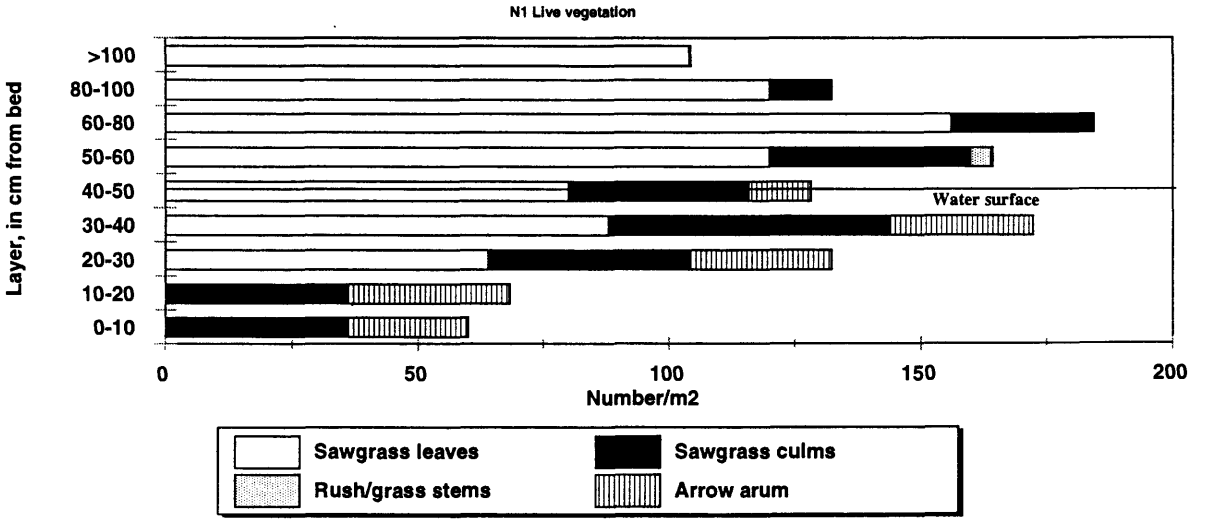


Table C-10. Summary of live vegetation in quadrat N2, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass water surface = 45 cm; plant height = 2.2 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100			48	6.50	244	2.33						
80-100			136	6.50	44	3.17			20	3.40		
60-80			96	6.83	100	3.67	4	8.00	16	4.50	4	2
50-60	4	11.00	72	7.33	52	4.17	4	11.00	12	5.00		
40-50	8	11.50	56	6.33	48	3.00			44	6.00		
30-40	4	14.00	12	8.67	16	4.25	4	12.00	36	6.17		
20-30						0.00	20	11.40	16	8.75		
10-20							16	12.25	8	4.00		
0-10							12	14.33	12	5.33		

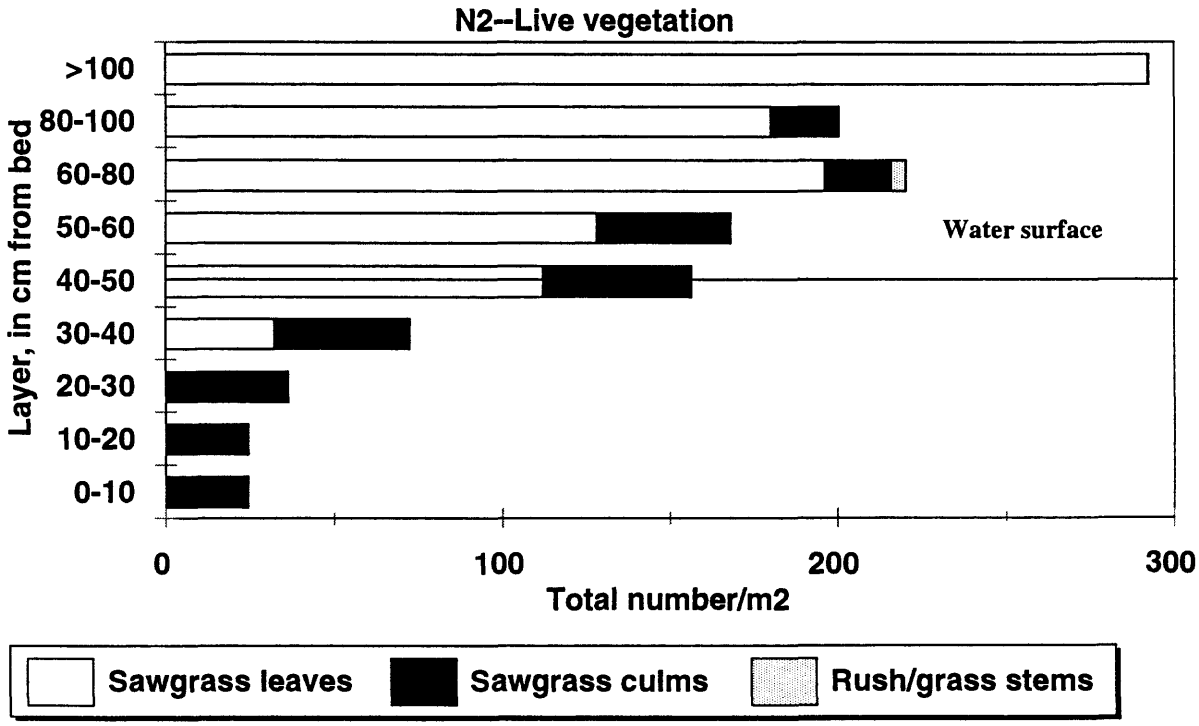


Table C-11. Summary of live vegetation in quadrat N3, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; Lvs = leaves; Lrg = large; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms]

Class = very dense sawgrass; water surface = 37 cm; plant height = 2.9 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width
>100	36	9.67	116	6.33	60	3.17				
80-100	40	11.17	128	7.50	56	3.50	8	10.00	4	
60-80	44	11.00	100	7.83	12	2.33	12	10.00	12	5.67
50-60	48	12.17	104	8.33			12	11.33	24	5.00
40-50	52	12.50	48	8.50	4	5.00	8	14.50	20	6.20
30-40	20	13.20	12	7.67			12	13.33	8	8.00
20-30	12	13.33	4	10.00	4	1.00	16	18.25	12	9.67
10-20							20	23.60	8	10.50
0-10							12	28.00	8	15.00

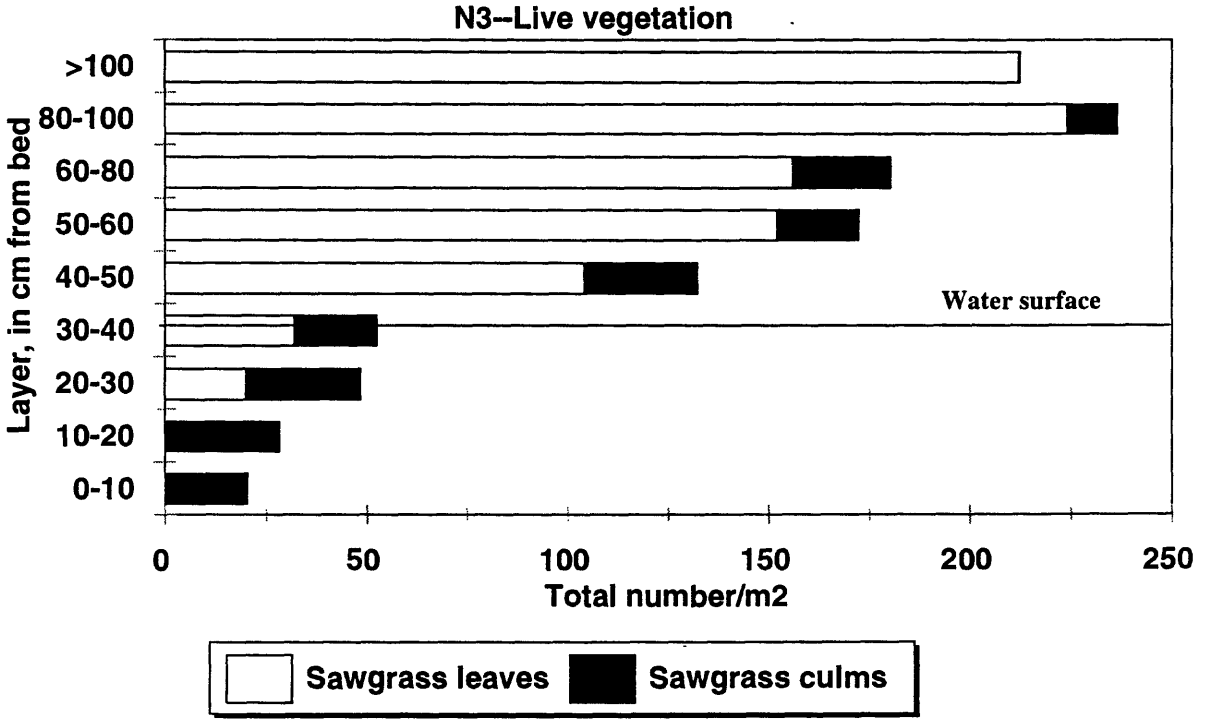


Table C-12. Summary of live vegetation in quadrat N4, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms]

Class = medium sawgrass; water surface = 46 cm; plant height = 2.4 m

Layer	Sg LL	Avg LL width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width
>100			56	6.00	56	2.67				
80-100			72	6.83	44	3.33			4	3.50
60-80			76	7.33	16	2.00			8	4.50
50-60			52	8.33	20	3.80	4	10.00	20	5.00
40-50			40	7.67	4	5.00	8	14.00	20	4.75
30-40	28	10.83			4	4.00	24	11.33	4	5.00
20-30							24	12.50	8	3.50
10-20										
0-10							16	19.25	4	5.00

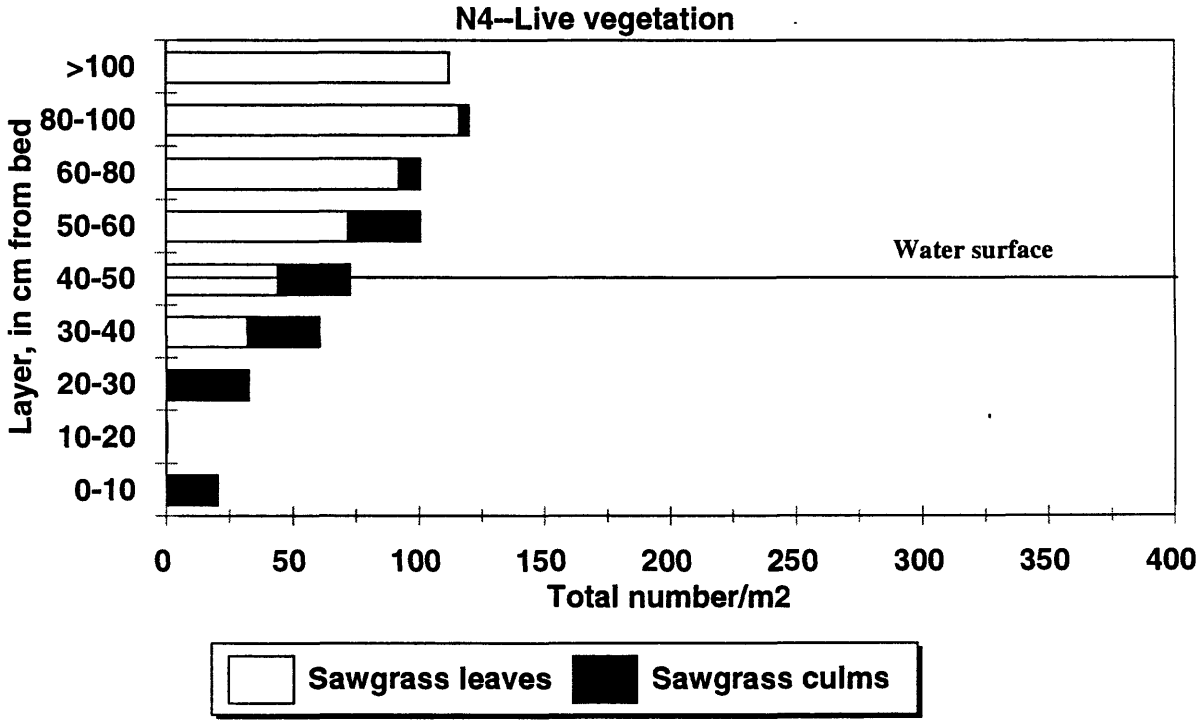


Table C-13. Summary of live vegetation in quadrat N5, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; LL = large leaves; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = very dense sawgrass; water surface = 38 cm; plant height = 2.4 m

Layer	Sg LL	Avg LL Width	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100	24	9.67	132	7.00	180	3.17						
80-100			184	8.67	20	3.40			8	5.00	12	2
60-80	20	10.20	140	7.50	40	2.83			12	6.67		
50-60	80	10.33	100	7.67	16	3.75	8	9.00	28	4.00	20	2
40-50	56	10.83	120	8.33	8	5.00	16	10.50	20	4.00	16	2
30-40	40	11.33	92	7.67	4	2.00	16	14.00	20	6.83	36	2
20-30	28	12.83	20	8.20			28	15.83	8	7.50	16	2
10-20							28	19.50	8	10.50		
0-10							40	28.00				

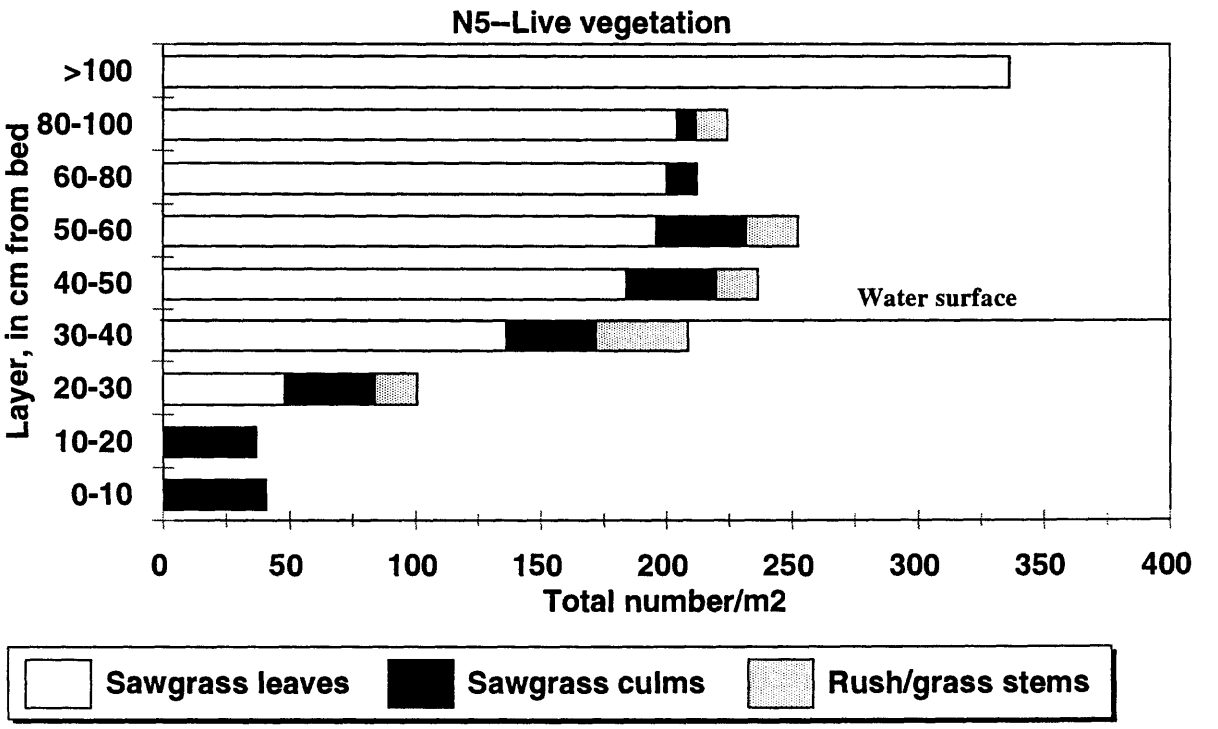


Table C-14. Summary of live vegetation in quadrat N6, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = dense sawgrass; water surface 50 cm plant height = 2.0 m

Layer	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width	Bacopa
>100	32	6.16	148	2.66							
80-100	76	6.83	120	3.50			4	6.00			
60-80	64	6.83	64	2.50	4	10.00	16	2.75	48	2	
50-60	60	8.16	32	3.83	8		24		52	2	
40-50	40	8.50	24	4.33			36	7.50	96	2	
30-40	16	8.00	24	4.33	16	11.00	20	6.20	96	2	4
20-30					12	17.67	20	9.40	64	2	
10-20					20	16.60	4	6.00			
0-10					32	20.33	4	7.00			

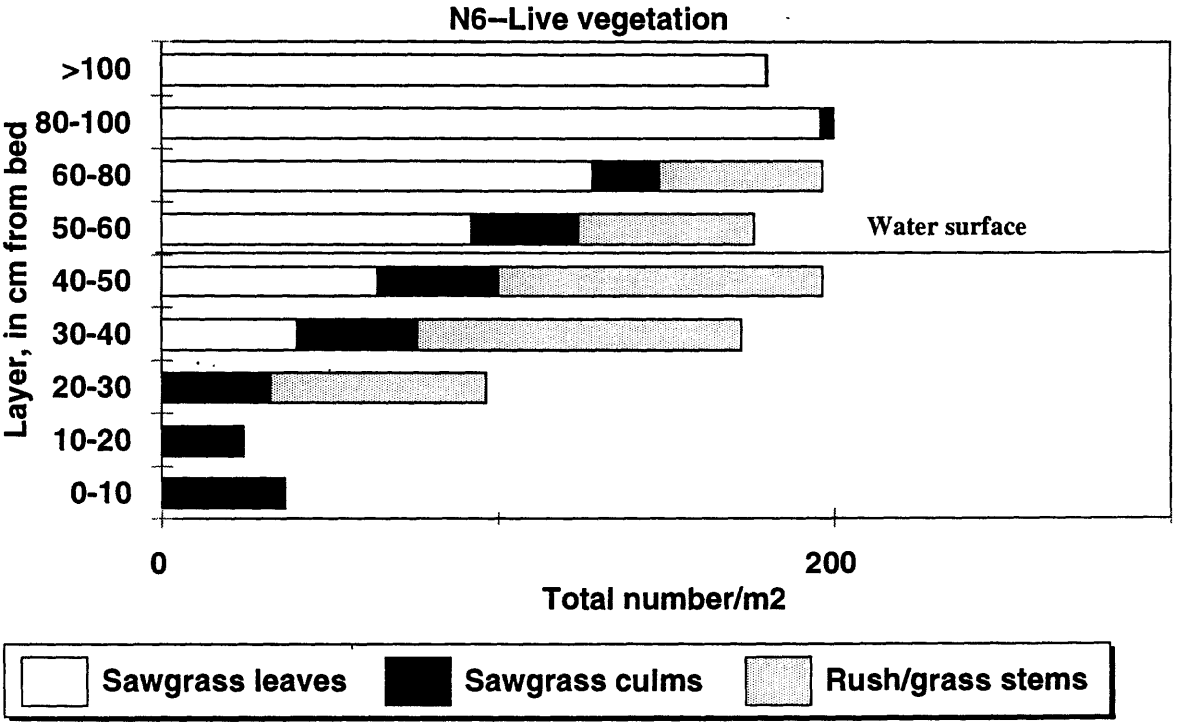


Table C-15. Summary of live vegetation in quadrat N7, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Sg = sawgrass; Avg = average; ML = medium leaves; SL = small leaves; LC = large culms; SC = small culms; Rsh/gr = rush/grass]

Class = medium sawgrass; water surface = 44 cm; plant height = 2.1 m

Layer	Sg ML	Avg ML width	Sg. SL	Avg SL width	Sg LC	Avg LC width	Sg SC	Avg SC width	Rsh/gr	Avg Rsh/gr width
>100	32	5.83	32	4.16						
80-100	56	7.16	44	2.66					20	2
60-80	52	7.67	56	3.50			8	5.00	40	2
50-60	36	7.67	36	4.16			20	3.80	32	2
40-50	32	8.67	12	4.00			24	6.16	40	2
30-40	20	8.00	12	4.33	8	13.00	16	6.00	52	2
20-30					8	17.50	12	5.33	44	2
10-20					16	14.75	8	7.00	40	2
0-10					8	9.00	8	7.50		

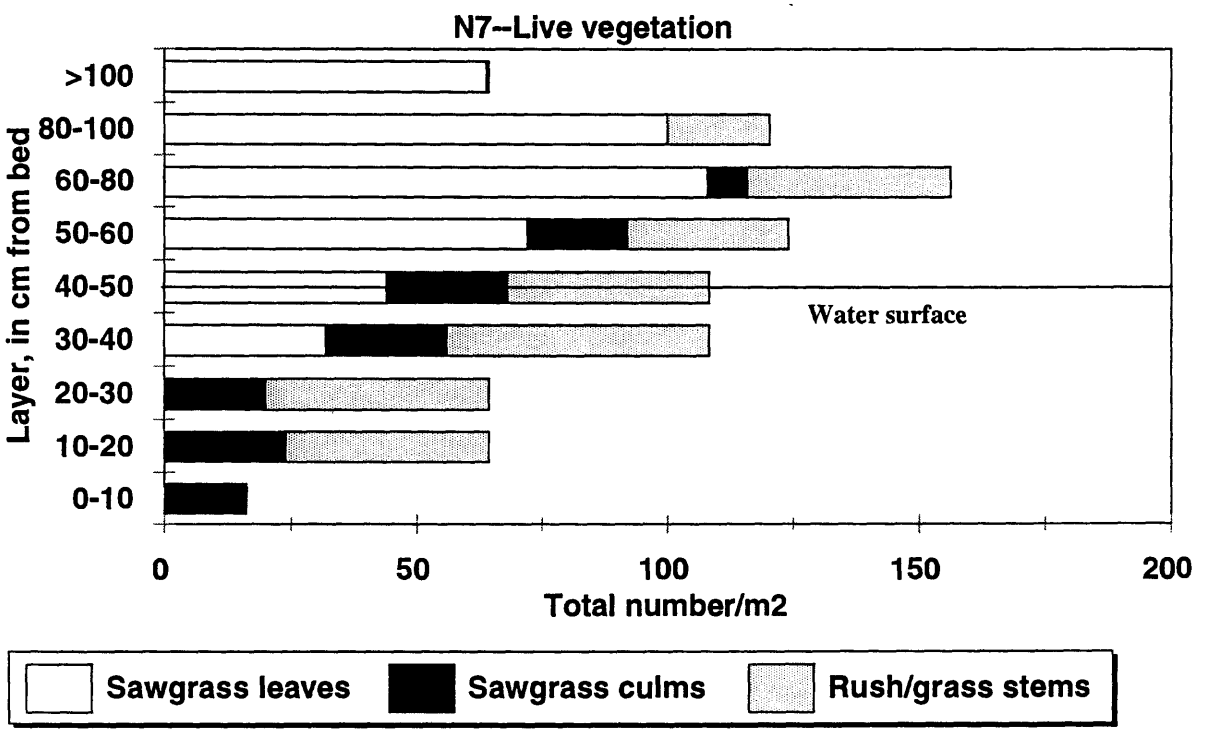
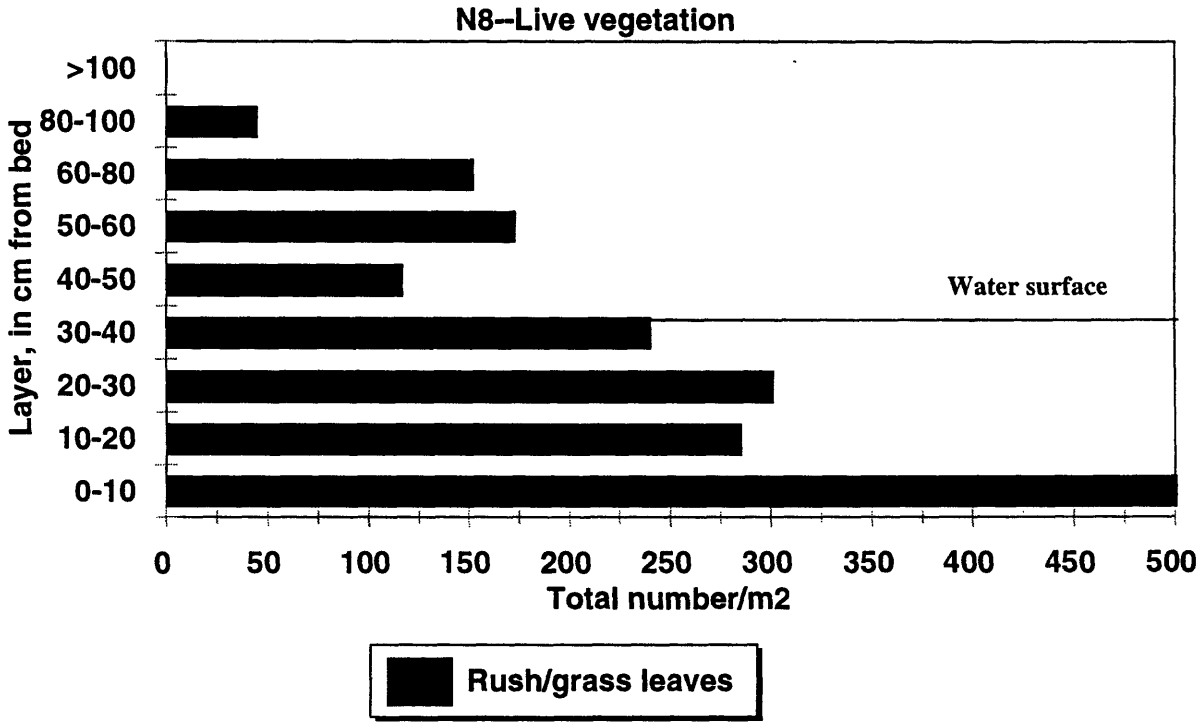


Table C-16. Summary of live vegetation in quadrat N8, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
[Summary includes only live sawgrass leaves or culms, rush leaves, and stems of other species; width in millimeters; Avg = average; Rsh/gr = rush/grass]

Class = rush; water surface = 40 cm; plant height = 0.9 m

Layer	Rsh/gr	Avg Rsh/gr width
80-100	44	2
60-80	152	2
50-60	172	2
40-50	116	2
30-40	240	2
20-30	300	2
10-20	284	2
0-10	500	2



Appendix D. Leaf Area Index by Layer for Quadrats Sampled at Sites P33 and NESRS3 in Shark River Slough, South Florida Everglades

Table D-1. Leaf area index by layer for P1, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.0728	0.0728
60-80	0.0996	0.2156
50-60	0.0490	0.1228
40-50	0.0752	0.1016
30-40	0.1068	0.1437
20-30	0.1022	0.1636
10-20	0.1623	0.2114
0-10	0.1313	0.1877
Total	0.7991	1.2192

Table D-2. Leaf area index by layer for P2, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.1291	0.2915
60-80	0.1609	0.4342
50-60	0.2669	0.3653
40-50	0.2205	0.2787
30-40	0.2256	0.3267
20-30	0.2586	0.3436
10-20	0.2303	0.2942
0-10	0.1128	0.1702
Total	1.6048	2.5044

Table D-3. Leaf area index by layer for P3, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.0528	0.0797
60-80	0.1216	0.2766
50-60	0.3096	0.3096
40-50	0.2112	0.4570
30-40	0.4280	0.4885
20-30	0.2288	0.3443
10-20	0.2296	0.5535
0-10	0.0624	0.1199
Total	1.6440	2.6291

Table D-4. Leaf area index by layer for P5, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.0828	0.0985
60-80	0.1227	0.3191
50-60	0.0537	0.1990
40-50	0.1724	0.2693
30-40	0.1975	0.3019
20-30	0.2823	0.4791
10-20	0.2653	0.2971
0-10	0.3611	0.4408
Total	1.5378	2.4047

Table D-5. Leaf area index by layer for P6, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.0416	0.0488
60-80	0.1667	0.2991
50-60	0.0971	0.2238
40-50	0.1824	0.1824
30-40	0.2336	0.3188
20-30	0.2510	0.2985
10-20	0.1697	0.2891
0-10	0.1536	0.3841
Total	1.2957	2.0445

Table D-6. Leaf area index by layer for P7, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.1297	0.1675
60-80	0.2001	0.4357
50-60	0.1063	0.2601
40-50	0.2263	0.2977
30-40	0.2847	0.2847
20-30	0.2225	0.2333
10-20	0.2733	0.3254
0-10	0.2310	0.3111
Total	1.6740	2.3155

Table D-7. Leaf area index by layer for P8, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	1.1373	1.2459
60-80	0.4795	0.4993
50-60	0.2773	0.3103
40-50	0.5711	0.8887
30-40	0.3477	0.5675
20-30	0.4664	0.4664
10-20	0.4252	0.4968
0-10	0.3298	0.8190
Total	4.0343	5.2939

Table D-8. Leaf area index by layer for P9, P33 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
60-80	0.0720	0.1238
50-60	0.0904	0.2055
40-50	0.0768	0.1571
30-40	0.0752	0.0970
20-30	0.0712	0.0847
10-20	0.0448	0.0811
0-10	0.0496	0.1720
Total	0.4800	0.9213

Table D-9. Leaf area index by layer for N1, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.1432	0.2752
60-80	0.2165	0.5870
50-60	0.1007	0.1132
40-50	0.3326	0.4882
30-40	0.2109	0.2575
20-30	0.1888	0.2142
10-20	0.2108	0.2323
0-10	0.1510	0.2890
Total	1.5546	2.4566

Table D-10. Leaf area index by layer for N2, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.2183	0.5064
60-80	0.2253	0.6899
50-60	0.0901	0.4360
40-50	0.3619	0.5888
30-40	0.2930	0.3607
20-30	0.3618	0.3782
10-20	0.2320	0.3045
0-10	0.0963	0.1265
Total	1.8787	3.3911

Table D-11. Leaf area index by layer for N3, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.3365	0.6514
60-80	0.2967	0.9133
50-60	0.1707	0.6985
40-50	0.3841	0.6708
30-40	0.2427	0.6043
20-30	0.3706	0.4082
10-20	0.4219	0.4441
0-10	0.3108	0.3756
Total	2.5340	4.7661

Table D-12. Leaf area index by layer for N4, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996
(See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.1305	0.2554
60-80	0.1251	0.3477
50-60	0.0649	0.1151
40-50	0.1031	0.1474
30-40	0.1266	0.1292
20-30	0.1100	0.1237
10-20	0.0650	0.0733
0-10	0.1000	0.1143
Total	0.8252	1.3061

Table D-13. Leaf area index by layer for N5, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996 (See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.3485	0.5503
60-80	0.3055	0.7462
50-60	0.1901	0.4543
40-50	0.2047	0.3205
30-40	0.3670	0.7076
20-30	0.3522	0.4024
10-20	0.3571	0.4311
0-10	0.2713	0.3154
Total	2.3963	3.9279

Table D-14. Leaf area index by layer for N6, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996 (See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.1927	0.2957
60-80	0.1555	0.3470
50-60	0.1237	0.1697
40-50	0.0906	0.1502
30-40	0.1585	0.1585
20-30	0.1423	0.1759
10-20	0.0644	0.0762
0-10	0.1003	0.1063
Total	1.0278	1.4796

Table D-15. Leaf area index by layer for N7, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996 (See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.1117	0.1734
60-80	0.1429	0.4032
50-60	0.0566	0.2547
40-50	0.1365	0.1861
30-40	0.1476	0.1681
20-30	0.1109	0.1206
10-20	0.1321	0.1711
0-10	0.0856	0.1243
Total	0.9240	1.6016

Table D-16. Leaf area index by layer for N8, NESRS3 site, Shark River Slough, South Florida Everglades, November, 1996 (See text for formulas.)

Layer	Leaf area index	Corrected leaf area index
80-100	0.0176	0.0471
60-80	0.0608	0.1403
50-60	0.0344	0.0887
40-50	0.0232	0.0809
30-40	0.1128	0.1645
20-30	0.0640	0.1185
10-20	0.0920	0.2027
0-10	0.0120	0.0269
Total	0.4168	0.8696

Appendix E: Periphyton Sampled at Sites P33 and NESRS3 in Shark River Slough, South Florida Everglades

Table E-1. Summary of periphyton biomass by vegetation class, Shark River Slough, South Florida Everglades, November, 1996
[Biomass in grams dry weight per square meter (gdw/m^2); bws = below water surface]

	Rush/grass	Standard deviation	Medium sawgrass	Standard deviation	Sparse sawgrass	Standard deviation	Dense sawgrass	Standard deviation
Water Surface	152.7	119.05	179.13	104.93	40	63.3	111.47	166.49
10-20 bws	5.56	12.4	36.9	41.14	22.6	39.8	45.15	41.41
20-30 bws	11.5	25.7	12.8	23.89	60.9	52.95	37.61	54.26
30-40 bws			12.52	25.06	15.2	0	11.58	24.67
40-50 bws			6.99	8.08				