DANIEL'S FARM
WETLAND RESTORATION
MONITORING YEAR 2 REPORT
DECEMBER 2005

FULL DELIVERY PROJECT

PROVIDER: KCI

EXECUTIVE SUMMARY

The Daniels Farm Wetland Restoration Project is located on the Clyde Daniels Farm, south-southeast of Louisburg in Franklin County, North Carolina. The restoration of 31.72 acres of non-riverine wetlands was completed following construction in March 2004. The site will be monitored for five years or until the success criteria are met.

This first year monitoring report presents the data and findings developed following the first growing season. Activities in 2005 reflect the second year of monitoring following construction. Included in this report are analyses of both hydrologic and vegetation monitoring results, as well as local climate conditions throughout the growing season. Monitoring activities included sampling vegetation survivability at nine locations, monitoring ground water elevations at eight locations and documenting general site conditions at five permanent photo documentation points within the wetland restoration area. In addition, project site daily precipitation was recorded. This data was evaluated and verified using the North Carolina climatic data for Louisburg, North Carolina. Field investigations were conducted in September 2005. Supporting data and site photographs are included in the report appendices.

The 31.72-acre wetland restoration site was initially planted at a density of 436 trees per acre. Supplemental planting occurred during the winter of 2004-2005. There were nine (9) vegetation-monitoring plots established throughout the planting areas instead of the eight originally discussed in the as-built. The additional plot was established to monitor the survival and growth of the bald cypress and water tupelo. Vegetation survival rates at the site are above the minimum success criteria. The 2005 vegetation monitoring of the planted areas revealed an average density of 604 trees per acre, which is well above the minimum requirement of 260 trees per acre needed to meet the success criteria at the end of the five year monitoring period. The average density for the Low Elevation Seeps species (Zone 1) was 540 trees per acre after two years and the Non-Riverine Wet Hardwood Forest species (Zone 2) was 623 trees per acre. This increase over the 2004 vegetation monitoring results is due to the maintenance planting that occurred during the winter of 2004/2005. The maintenance planting was conducted to supplement the previous years vegetative success and increase tree diversity.

During the 2005 monitoring year wetland hydrology was achieved at all eight wells at the site; ground water was within 12 inches of the soil surface in excess of 12 days (5 % of the growing season) at each well. Based upon this data the site has exceeded the minimum duration of near surface saturation of 12 days with the water table within 12 inches of the soil surface for the 2005 growing season. The result of this monitoring also indicates that the water table is within 12 inches of the soil surface for greater than 12.5 percent of the growing season.

The daily rainfall data depicted on the gauge data graphs was obtained from the onsite precipitation gauge. The precipitation gauge was installed on the site in 2003 prior to project implementation. The daily rainfall data obtained from the NC climatic data for Louisburg, North Carolina shows that in 2005 Louisburg experienced below average rainfall during the growing season.

Soils in the restoration portion of the site have been determined to be Roanoke and Toisnot. Since these soils are already considered hydric, no success criteria or monitoring is required.

Site photographs were taken from five (5) permanent photo documentation points established along the property boundary. Photo documentation is intended to facilitate the qualitative evaluation of the conditions or changes in the restored wetland. The photo point locations were selected in order to document representative site conditions.

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1.0 SUMMARY

1.1 Vegetation

The 31.72-acre wetland restoration site was originally planted at a density of 436 trees per acre. Supplemental planting occurred during the winter of 2004-2005. Originally there were eight vegetation-monitoring plots established throughout the planting areas, covering both vegetative communities however a ninth plot was established in 2004 to monitor the bald cypress and water tupelo community. The 2005 vegetation monitoring of the planted areas revealed an average density of 604 trees per acre, which is well above the minimum requirement of 260 trees per acre (Appendix A). The average density for the Low Elevation Seeps species (Zone 1) was 540 trees per acre after one year and Non-Riverine Wet Hardwood Forest species (Zone 2) 623 trees per acre. Vegetation-monitoring plots # 6, 7 and 8 showed the highest number of trees surviving (13, 13, and 14, respectively) while only eight surviving trees were counted in vegetation-monitoring plots # 3, 4 and 5. Eight surviving trees per plot represent a density of 320 trees per acre. A total of 6.5 trees per vegetation-monitoring plot are needed to meet the 260 trees per acre minimum requirement.

Table 1: Vegetation Monitoring Results

Planting Zone	Plot #	Willow Oak	Swamp Chestnut Oak	Laurel Oak	Yellow Poplar	Swamp Blackgum	Water Tupelo	Bald Cypress	Overcup Oak	Green Ash	Cherry bark Oak			Total (Year 2)	Total (at planting)	Density-Year 2 (Trees/Acres)
1	1	3	6	1							3			13	15	520
	8	2	6	4	2									14	16	560
												Zone 1 Average				540
2	2	1	5	2					7	2	1			18	22	720
	3		3				5		3	4	1			16	17	640
	4	1	5				4		2					12	12	480
	5		3			5			3	5	3			19	20	760
	6	4	4	1		4			3	1	2			19	21	760
	7		10						1		3			14	18	560
	9			1			3	7						11	11	440
												Zone 2 Average				623
												Total Average				604

Table 2: Vegetation History (Trees/Acre)

Plot #	Year 1	Year 2	Year 3	Year 4	Year 5
1	360	520			
2	360	720			
3	320	640			
4	320	480			
5	320	760			
6	520	760			
7	560	560			
8	520	560			
9	360	440			

1.2 Hydrology

Wetland hydrology was achieved at all eight wells at the site; ground water was within 12 inches of the soil surface in excess of 12 days (5 % of the growing season) at each well (Table 2). Based upon this data the site has exceeded the minimum duration of near surface saturation of 12 days with the water table within 12 inches of the soil surface for the 2005 growing season (Appendix B). The result of this monitoring also indicates that the water table is within 12 inches of the soil surface for greater than 12.5 percent of the growing season. The maximum number of consecutive days that the groundwater was within 12 inches of the surface was determined for each groundwater gauge. This number was converted into a percentage of the 235-day growing season. Table 3 presents the hydrological monitoring results for 2005.

Table 3: Hydrologic Monitoring Results

	Hydroperiod					
Well #	<5%	5% - 8%	8% -12.5%	>12.5%	Number of Consecutive Days	Dates Meeting Success
1				X	171	March 20 – September 6
2				X	167	March 20 – September 2
3				X	93	March 20 – June 20
4				X	96	March 20 – June 23
5				X	75	March 20 – June 2
6				X	92	March 20 – June 19
7				X	101	March 20 – April 25
8				X	71	March 20 –May 29

Table 4. Hydroperiod History

Well #	Pre-Restoration	Year 1	Year 2	Year 3	Year 4	Year 5
1	<5%	>12.5%	>12.5%			
2	<5%	>12.5%	>12.5%			
3	<5%	>12.5%	>12.5%			
4	<5%	>12.5%	>12.5%			
5	<5%	>12.5%	>12.5%			
6	<5%	>12.5%	>12.5%			
7	<5%	>12.5%	>12.5%			
8	<5%	>12.5%	>12.5%			

2.0 DATA ANALYSIS

2.1 Vegetation

The soil surface appeared dry during the vegetation monitoring in September. Additionally, many areas of the site were vegetated with herbaceous species at a density that competed with tree growth. The 2004 vegetation monitoring showed successful vegetation survival, but fewer trees, due to herbaceous competition and the "damping off" of some trees, were counted than expected. Maintenance planting, discussed in Section 3.0, and the resprouting of planted trees that had died back lead to an increase in the trees counted during the 2005 monitoring. The 2005 vegetation monitoring is a continuation of the vegetation success demonstrated in 2004.

2.2 Hydrology

Wetland restoration on the site focused on the removal of hydrologic alterations including the filling of the primary ditches and grassed waterways, plugging the lateral ditches, removing ditch spoil to restore natural seepage areas, placing water diversion features to redistribute the surface hydrology, placing restrictive berms to reduce runoff and enhance infiltration and recreating microtopography across site to enhance surface water retention and storage. Based on the hydrological results, this site has met and exceeded the criteria outlined in the wetlands restoration plan. Ditch plugging, filling and the other hydrogical restoration methods have resulted in increased short-term surface and subsurface water storage and subsequent increase in the duration and elevation of the seasonally high water table.

2.3 Soils

Soils in the restoration portion of the site have been determined to be Roanoke and Toisnot, both hydric soils on the state and federal hydric soils lists. NRCS verified the limits of hydric soils and confirmed their status as Prior Converted wetland. As soils are already considered hydric, no success criteria or monitoring are required.

3.0 MAINTENANCE/MANAGEMENT ACTIONS

Maintenance planting was conducted during the winter of 2004/2005, adding trees to areas of the site that exhibited high rates of seedling mortality. The DWQ pre-approved species green ash and overcup oak were incorporated into the plantings in the wetter areas since they are more tolerant of standing water than other species. Green ash seedlings did not exceed 15 percent of the total species planted. Since cherry bark oak was available from the North Carolina Forest Service this year it was incorporated in the plantings to achieve greater diversity. Cherry bark oak was planted on the higher areas of the site and high spots within the wetter areas. More of the previously planted species, specifically laurel oak, willow oak, and swamp chestnut oak were also added to the site.

A pre-emergent was sprayed in mid-March to control the herbaceous vegetation. This allows 6 weeks for at least an inch of rainfall to settle the soil around the roots of the newly planted seedlings but before the buds begin to swell in the spring. Herbicide was also sprayed to control isolated areas of invasive vegetation.

Hydrology for the site has met and exceeded the restoration criteria for the second year monitoring.

4.0 CONCLUSIONS

Findings from this monitoring event indicate that the project site is a success. The success criteria for the survival of the planted species must be 260 stems/acre at the end of five years of monitoring. The 2005 vegetation monitoring of the planted areas revealed an average density of 604 trees per acre, which is well above the minimum requirement of 260 trees per acre. Non-target species do not constitute more than 20 percent of the woody vegetation based on permanent vegetation-monitoring plots. The long-term success of the wetland restoration project was improved by incorporating several additional maintenance activities to enhance vegetation survival growth and diversity throughout the year. This included replanting areas that exhibited decreased seedling survivability with more water tolerant species such as green ash and overcup oak.

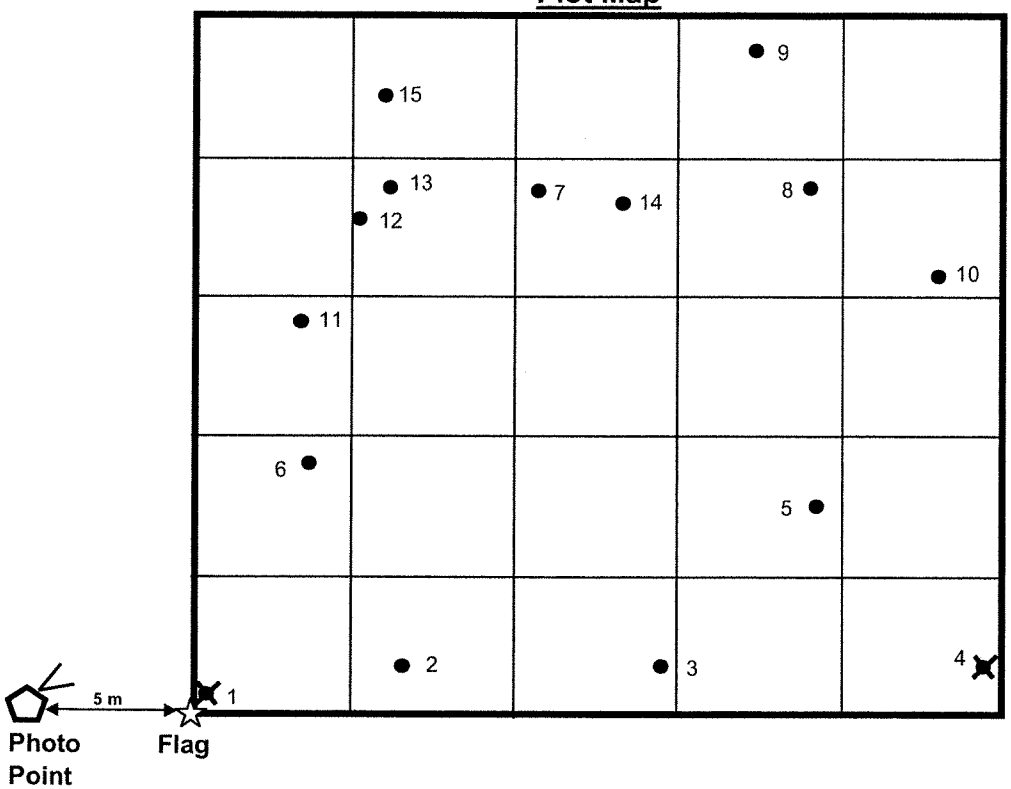
For the 2005 monitoring year, all eight gauges met the hydrologic success criteria of at least 5 % of the growing season. Additionally, all eight gauges exceeded the hydrological success criteria for more than 12.5% of the growing season.

Appendix A
Vegetation Monitoring Plot Data Sheets

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 1 **Date:** 9/8/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Swamp Chestnut Oak (*Quercus michauxii*)			dead
2	Willow Oak (*Quercus phellos*)	0.46	0.91	healthy
3	Swamp Chestnut Oak (*Quercus michauxii*)	0.82	1.22	healthy
4	Swamp Chestnut Oak (*Quercus michauxii*)			dead
5	Swamp Chestnut Oak (*Quercus michauxii*)	0.70	1.22	healthy
6	Swamp Chestnut Oak (*Quercus michauxii*)	0.88	1.83	healthy
7	Swamp Chestnut Oak (*Quercus michauxii*)	1.19	2.44	healthy
8	Swamp Chestnut Oak (*Quercus michauxii*)	0.88	1.83	healthy
9	Willow Oak (*Quercus phellos*)	0.76	1.52	healthy
10	Cherrybark Oak (*Quercus pagoda*)	0.27	0.61	healthy
11	Willow Oak (*Quercus phellos*)	0.46	0.61	healthy
12	Swamp Chestnut Oak (*Quercus michauxii*)	0.40	0.91	healthy
13	Laurel Oak (*Quercus laurifolia*)	0.27	0.61	healthy
14	Cherrybark Oak (*Quercus pagoda*)	0.82	0.91	healthy
15	Cherrybark Oak (*Quercus pagoda*)	0.49	0.91	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	46%
Willow Oak (*Quercus phellos*)	23%
Cherrybark Oak (*Quercus pagoda*)	23%
Laurel Oak (*Quercus laurifolia*)	8%

Density:

Total Number of Trees 13 / 0.025 acres = 520 trees / acre

Survivability:

Total Number of Trees 13 / 15 trees x 100 = 86.7 % survivability

Number of New Recruits : _____

Note : Flag located W 72° N, 16' from monitoring well

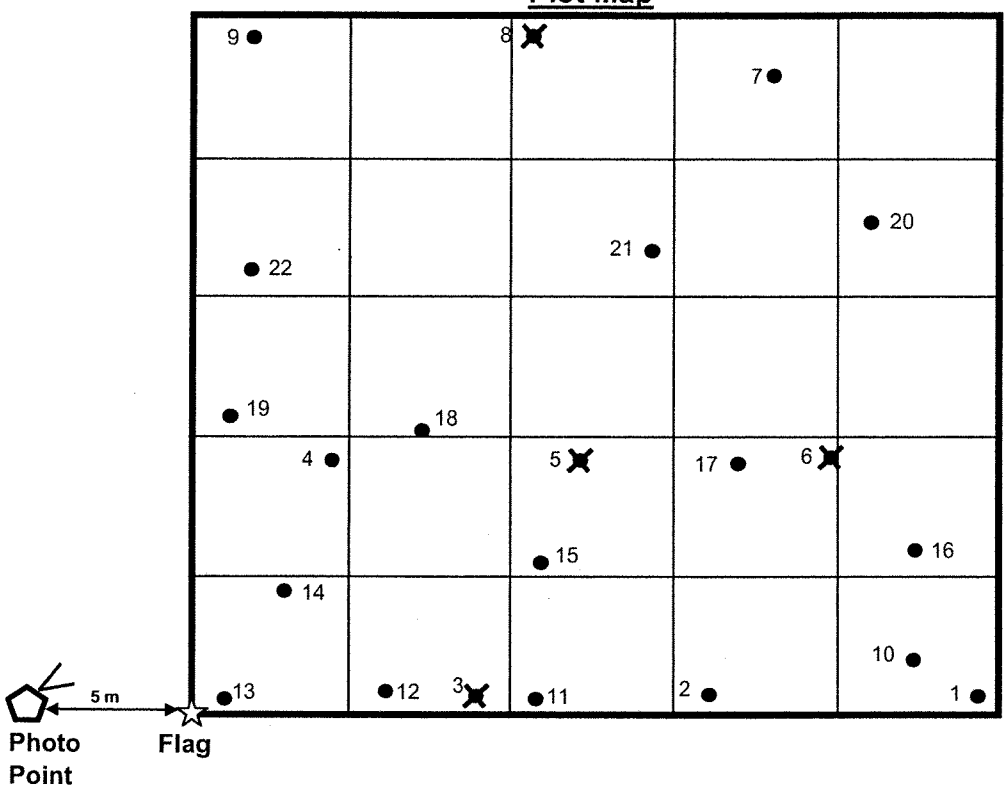
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 2 **Date:** 9/8/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Laurel Oak (*Quercus laurifolia*)	0.91	0.91	healthy
2	Swamp Chestnut Oak (*Quercus michauxii*)	1.10	2.13	healthy
3	Swamp Black Gum (*Nyssa sylvatica*)			dead
4	Swamp Chestnut Oak (*Quercus michauxii*)	1.10	2.44	healthy
5	Swamp Black Gum (*Nyssa sylvatica*)			dead
6	Swamp Chestnut Oak (*Quercus michauxii*)			dead
7	Willow Oak (*Quercus phellos*)	0.70	1.22	healthy
8	Laurel Oak (*Quercus laurifolia*)			dead
9	Laurel Oak (*Quercus laurifolia*)	0.43	0.91	healthy
10	Green Ash (*Fraxinus pennsylvanica*)	0.70	0.91	healthy
11	Swamp Chestnut Oak (*Quercus michauxii*)	0.34	0.30	healthy
12	Swamp Chestnut Oak (*Quercus michauxii*)	0.67	0.91	healthy
13	Cherrybark Oak (*Quercus pagoda*)	0.46	0.61	healthy
14	Overcup Oak (*Quercus lyrata*)	0.88	0.91	healthy
15	Overcup Oak (*Quercus lyrata*)	0.67	1.52	healthy
16	Green Ash (*Fraxinus pennsylvanica*)	1.07	1.22	healthy
17	Overcup Oak (*Quercus lyrata*)	0.88	2.13	healthy
18	Overcup Oak (*Quercus lyrata*)	1.01	1.22	healthy
19	Swamp Chestnut Oak (*Quercus michauxii*)	0.64	0.91	healthy
20	Overcup Oak (*Quercus lyrata*)	1.13	2.13	healthy
21	Overcup Oak (*Quercus lyrata*)	0.91	1.83	healthy
22	Overcup Oak (*Quercus lyrata*)	0.58	0.91	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	28%
Laurel Oak (*Quercus laurifolia*)	11%
Swamp Black Gum (*Nyssa sylvatica*)	0%
Green Ash (*Fraxinus pennsylvanica*)	11%
Overcup Oak (*Quercus lyrata*)	39%
Cherrybark Oak (*Quercus pagoda*)	6%
Willow Oak (*Quercus phellos*)	6%

Density:

Total Number of Trees **18** / **0.025 acres** = **720** **trees / acre**

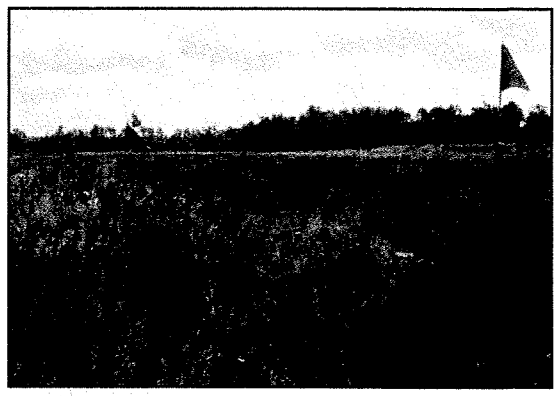
Survivability:

Total Number of Trees **18** / **22 trees** x **100** = **81.8** **% survivability**

Number of New Recruits : _____

Note : Flag located E 104° S, 43' from monitoring well

1st Year Monitoring

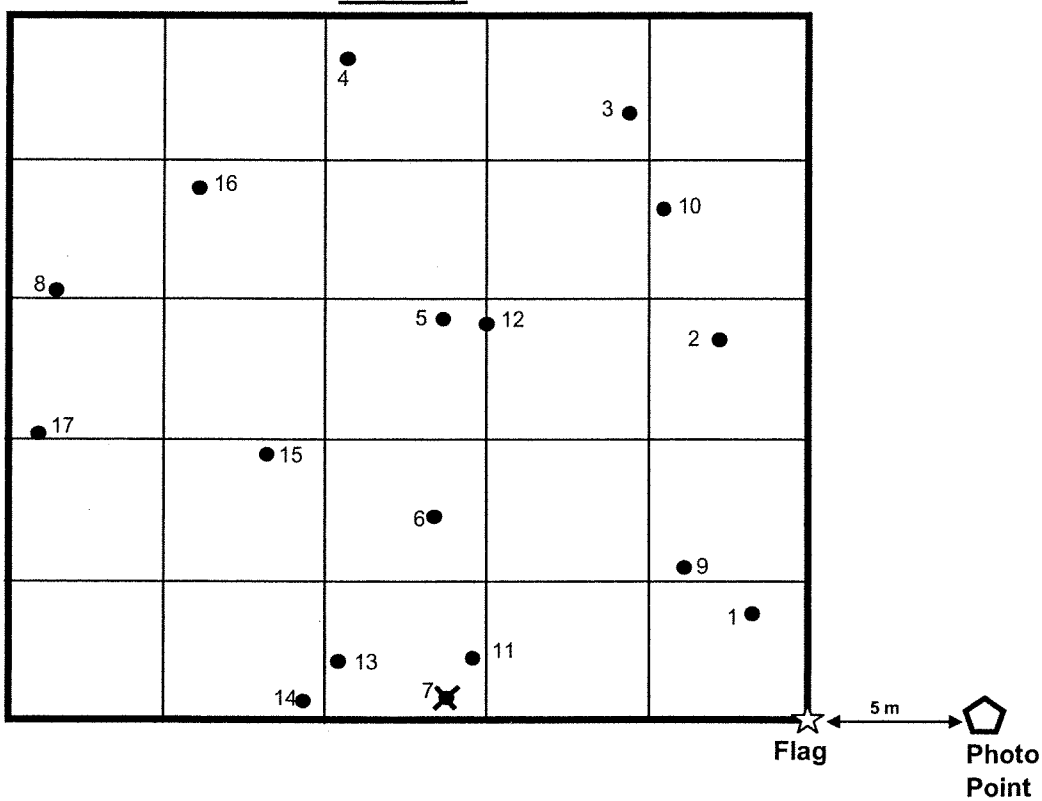


2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 3 **Date:** 9/8/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.79	1.22	healthy
2	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.79	0.91	healthy
3	Swamp Chestnut Oak (*Quercus michauxii*)	1.13	1.22	healthy
4	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	1.28	1.83	healthy
5	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.46	1.52	died back to half size
6	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.82	1.83	healthy
7	Water Tupelo (*Nyssa sylvatica* var. *biflora*)			dead
8	Swamp Chestnut Oak (*Quercus michauxii*)	0.79	0.91	healthy
9	Overcup Oak (*Quercus lyrata*)	0.88	0.91	healthy
10	Green Ash (*Fraxinus pennsylvanica*)	0.98	1.52	healthy
11	Overcup Oak (*Quercus lyrata*)	0.85	0.91	healthy
12	Green Ash (*Fraxinus pennsylvanica*)	0.79	1.22	healthy
13	Overcup Oak (*Quercus lyrata*)	0.98	1.52	healthy
14	Swamp Chestnut Oak (*Quercus michauxii*)	0.52	0.91	healthy
15	Green Ash (*Fraxinus pennsylvanica*)	0.76	1.52	healthy
16	Cherrybark Oak (*Quercus pagoda*)	0.85	0.91	healthy
17	Green Ash (*Fraxinus pennsylvanica*)	0.88	1.22	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	19%
Water Tupelo (*Nyssa sylvatica* var. *biflora*)	31%
Green Ash (*Fraxinus pennsylvanica*)	25%
Overcup Oak (*Quercus lyrata*)	19%
Cherrybark Oak (*Quercus pagoda*)	6%

Density:

Total Number of Trees **16** / **0.025 acres** = **640** **trees / acre**

Survivability:

Total Number of Trees **16** / **17 trees** x **100** = **94** **% survivability**

Number of New Recruits : _____

Note : Flag located S 220° W, 63' from monitoring well

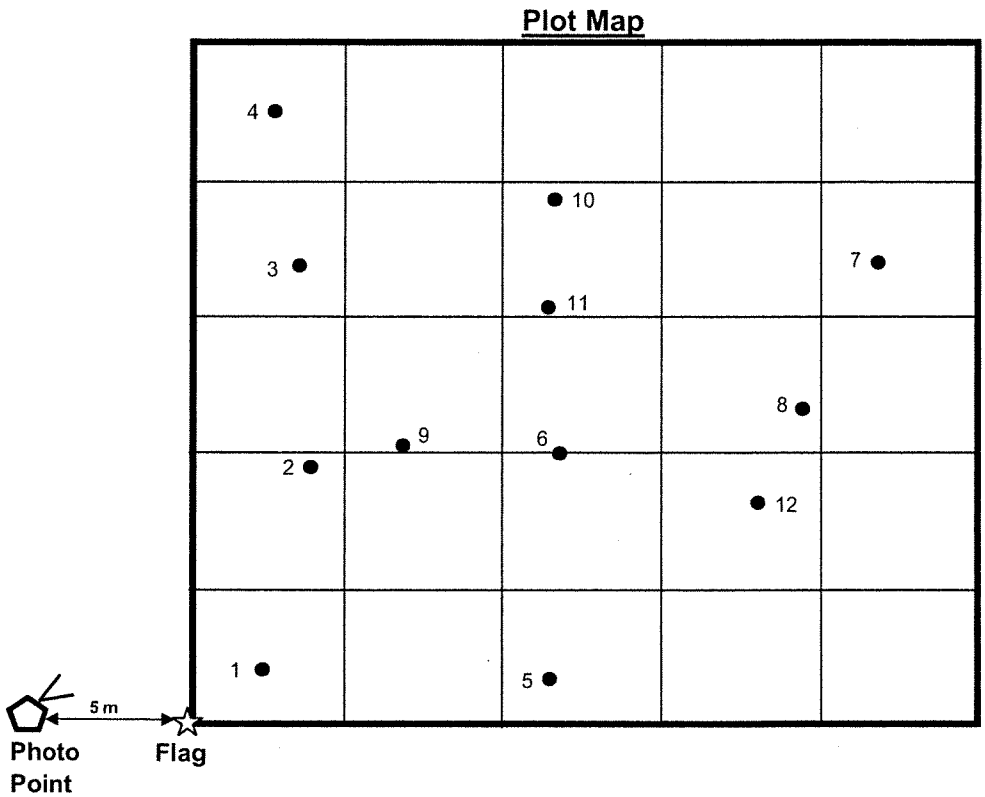
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 4 **Date:** 9/7/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Swamp Chestnut Oak (*Quercus michauxii*)	0.76	0.91	healthy
2	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.85	1.22	healthy
3	Swamp Chestnut Oak (*Quercus michauxii*)	0.21	0.30	orig. stem dead, resprout from root
4	Willow Oak (*Quercus phellos*)	0.85	1.83	healthy
5	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.73	1.22	healthy
6	Swamp Chestnut Oak (*Quercus michauxii*)	0.79	0.91	healthy
7	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.91	1.52	healthy
8	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.64	1.52	no leaves, almost dead
9	Overcup Oak (*Quercus lyrata*)	0.82	0.91	healthy
10	Overcup Oak (*Quercus lyrata*)	0.85	0.91	healthy
11	Swamp Chestnut Oak (*Quercus michauxii*)	0.64	0.91	healthy
12	Swamp Chestnut Oak (*Quercus michauxii*)	0.58	1.22	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	42%
Willow Oak (*Quercus phellos*)	8%
Water Tupelo (*Nyssa sylvatica* var. *biflora*)	33%
Overcup Oak (*Quercus lyrata*)	17%

Density:

Total Number of Trees **12** / **0.025 acres** = **480** **trees / acre**

Survivability:

Total Number of Trees **12** / **12 trees** x **100** = **100** **% survivability**

Number of New Recruits : _____

Note : Flag located N 45° E, 99' from monitoring well

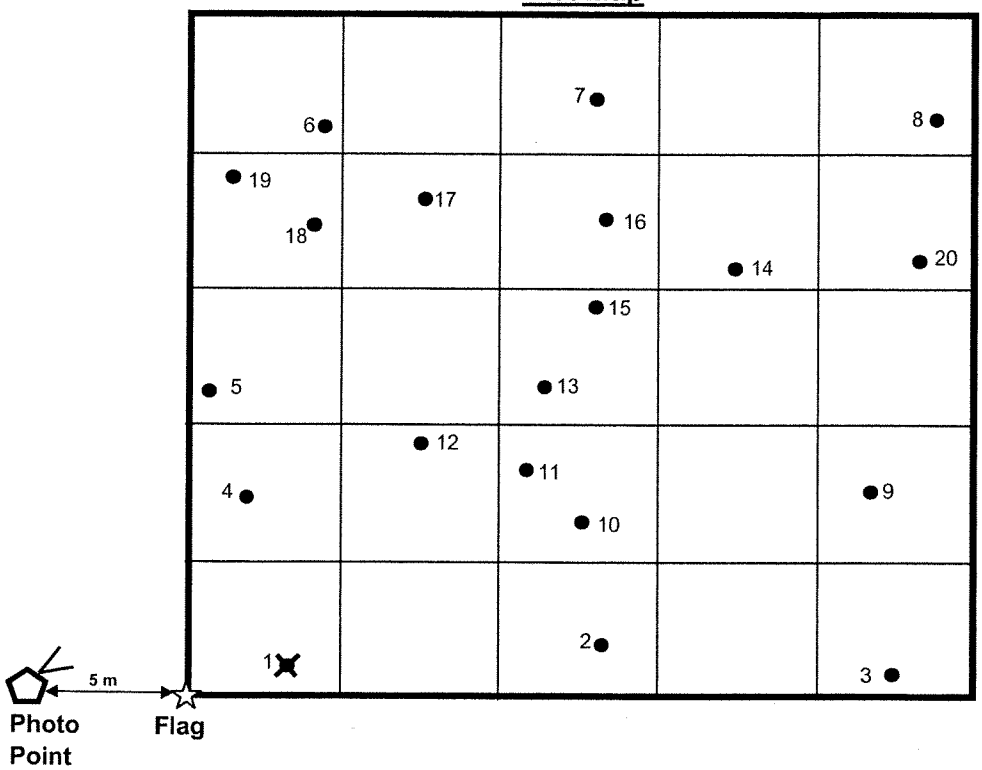
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 5 **Date:** 9/7/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Swamp Black Gum (*Nyssa sylvatica*)			dead
2	Swamp Black Gum (*Nyssa sylvatica*)	0.61	0.91	healthy
3	Swamp Black Gum (*Nyssa sylvatica*)	1.22	1.22	healthy
4	Swamp Chestnut Oak (*Quercus michauxii*)	1.04	0.91	healthy
5	Swamp Black Gum (*Nyssa sylvatica*)	0.64	0.91	healthy
6	Swamp Chestnut Oak (*Quercus michauxii*)	0.91	1.22	very few leaves
7	Swamp Black Gum (*Nyssa sylvatica*)	0.49	0.91	healthy
8	Swamp Chestnut Oak (*Quercus michauxii*)	0.76	0.91	healthy
9	Green Ash (*Fraxinus pennsylvanica*)	1.19	1.22	healthy
10	Green Ash (*Fraxinus pennsylvanica*)	0.88	1.22	healthy
11	Green Ash (*Fraxinus pennsylvanica*)	1.04	1.52	healthy
12	Cherrybark Oak (*Quercus pagoda*)	0.55	0.91	healthy
13	Swamp Black Gum (*Nyssa sylvatica*)	0.46	1.22	healthy
14	Green Ash (*Fraxinus pennsylvanica*)	0.76	1.52	healthy
15	Overcup Oak (*Quercus lyrata*)	0.76	1.22	healthy
16	Cherrybark Oak (*Quercus pagoda*)	0.49	0.91	healthy
17	Green Ash (*Fraxinus pennsylvanica*)	0.98	1.52	healthy
18	Cherrybark Oak (*Quercus pagoda*)	0.15	0.61	resprout from root
19	Overcup Oak (*Quercus lyrata*)	0.88	1.52	healthy
20	Overcup Oak (*Quercus lyrata*)	0.85	0.91	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	16%
Swamp Black Gum (*Nyssa sylvatica*)	26%
Overcup Oak (*Quercus lyrata*)	16%
Green Ash (*Fraxinus pennsylvanica*)	26%
Cherrybark Oak (*Quercus pagoda*)	16%

Density:

Total Number of Trees 19 / 0.025 acres = 760 trees / acre

Survivability:

Total Number of Trees 19 / 20 trees x 100 = 95 % survivability

Number of New Recruits : _____

Note : Flag located N 38° E, 27' from monitoring well

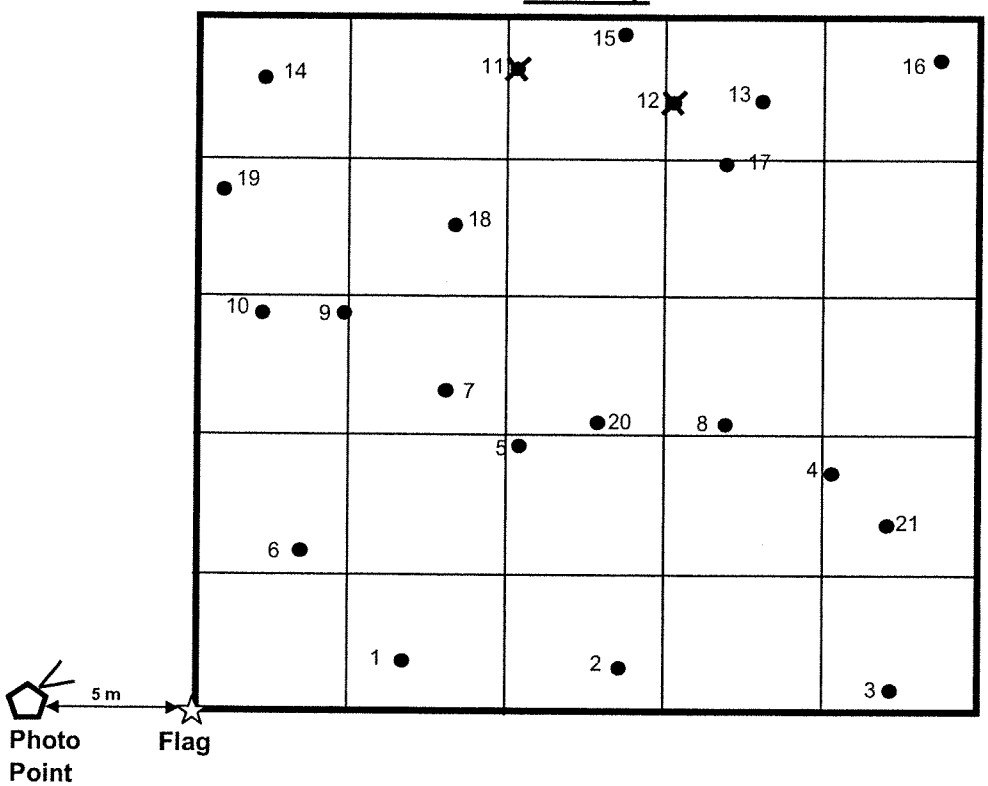
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 6 **Date:** 9/7/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Willow Oak (*Quercus phellos*)	0.61	0.91	healthy
2	Willow Oak (*Quercus phellos*)	0.79	0.91	healthy
3	Willow Oak (*Quercus phellos*)	0.88	1.22	healthy
4	Swamp Black Gum (*Nyssa sylvatica*)	0.61	1.22	healthy
5	Swamp Chestnut Oak (*Quercus michauxii*)	0.88	0.91	healthy
6	Swamp Black Gum (*Nyssa sylvatica*)	0.61	0.91	healthy
7	Swamp Chestnut Oak (*Quercus michauxii*)	0.91	1.22	healthy
8	Willow Oak (*Quercus phellos*)	0.91	1.83	healthy
9	Swamp Chestnut Oak (*Quercus michauxii*)	1.01	1.52	healthy
10	Swamp Black Gum (*Nyssa sylvatica*)	0.58	1.22	healthy
11	Swamp Black Gum (*Nyssa sylvatica*)			dead
12	Swamp Chestnut Oak (*Quercus michauxii*)			dead
13	Swamp Black Gum (*Nyssa sylvatica*)	0.61	2.13	healthy multistem
14	Laurel Oak (*Quercus laurifolia*)	0.30	0.61	healthy
15	Swamp Chestnut Oak (*Quercus michauxii*)	0.82	0.91	healthy
16	Overcup Oak (*Quercus lyrata*)	0.64	0.91	healthy
17	Green Ash (*Fraxinus pennsylvanica*)	0.82	1.83	healthy
18	Overcup Oak (*Quercus lyrata*)	0.91	2.44	healthy
19	Overcup Oak (*Quercus lyrata*)	0.64	1.22	healthy
20	Cherrybark Oak (*Quercus pagoda*)	0.55	0.91	healthy
21	Cherrybark Oak (*Quercus pagoda*)	0.37	0.61	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	21%
Willow Oak (*Quercus phellos*)	21%
Swamp Black Gum (*Nyssa sylvatica*)	21%
Cherrybark Oak (*Quercus pagoda*)	11%
Overcup Oak (*Quercus lyrata*)	16%
Green Ash (*Fraxinus pennsylvanica*)	5%
Laurel Oak (*Quercus laurifolia*)	5%

Density:

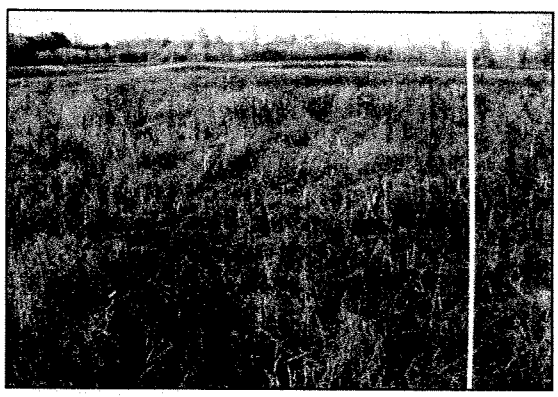
Total Number of Trees 19 / 0.025 acres = 760 trees / acre

Survivability:

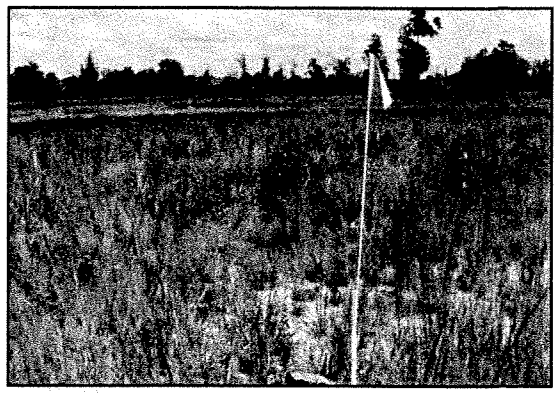
Total Number of Trees 19 / 21 trees x 100 = 90 % survivability

Number of New Recruits : _____

Note : Flag located E 174° S, 150' from monitoring well



1st Year Monitoring

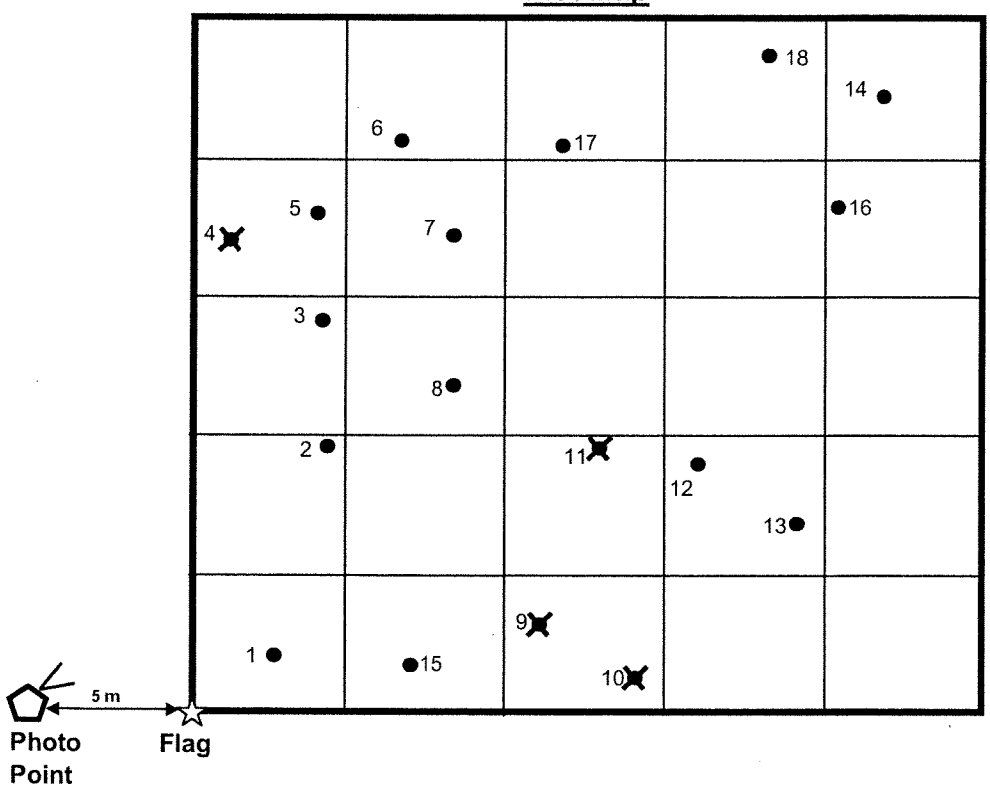


2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 7 **Date:** 9/7/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Swamp Chestnut Oak (*Quercus michauxii*)	0.91	0.91	healthy
2	Swamp Chestnut Oak (*Quercus michauxii*)	0.88	1.22	healthy
3	Swamp Chestnut Oak (*Quercus michauxii*)	0.30	0.61	resprout from root
4	Swamp Chestnut Oak (*Quercus michauxii*)			dead
5	Swamp Chestnut Oak (*Quercus michauxii*)	0.76	1.52	healthy
6	Swamp Chestnut Oak (*Quercus michauxii*)	0.98	1.22	healthy
7	Swamp Chestnut Oak (*Quercus michauxii*)	0.58	0.61	healthy
8	Swamp Chestnut Oak (*Quercus michauxii*)	1.07	1.22	healthy
9	Swamp Chestnut Oak (*Quercus michauxii*)			dead
10	Swamp Black Gum (*Nyssa sylvatica*)			dead
11	Swamp Black Gum (*Nyssa sylvatica*)			dead
12	Swamp Chestnut Oak (*Quercus michauxii*)	0.67	1.22	healthy
13	Swamp Chestnut Oak (*Quercus michauxii*)	0.88	1.22	healthy
14	Swamp Chestnut Oak (*Quercus michauxii*)	0.61	1.22	healthy
15	Cherrybark Oak (*Quercus pagoda*)	0.76	0.61	healthy
16	Overcup Oak (*Quercus lyrata*)	0.61	0.91	healthy
17	Cherrybark Oak (*Quercus pagoda*)	0.52	0.61	healthy
18	Cherrybark Oak (*Quercus pagoda*)	0.27	0.61	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	71%
Swamp Black Gum (*Nyssa sylvatica*)	0%
Cherrybark Oak (*Quercus pagoda*)	21%
Overcup Oak (*Quercus lyrata*)	7%

Density:

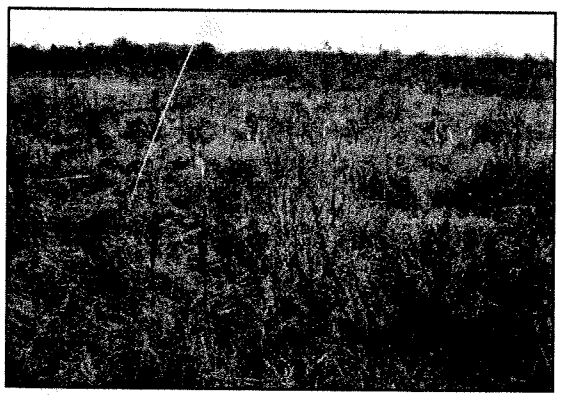
Total Number of Trees 14 / 0.025 acres = 560 trees / acre

Survivability:

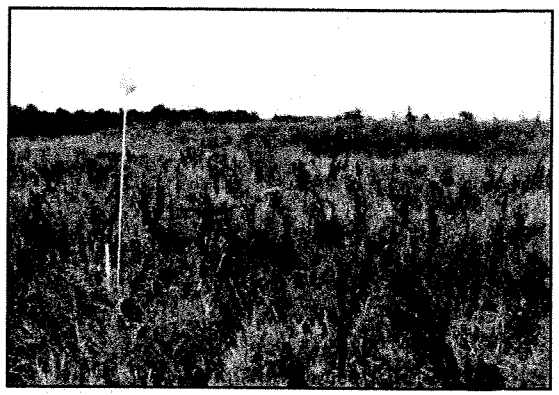
Total Number of Trees 14 / 18 trees x 100 = 78 % survivability

Number of New Recruits : _____

Note : Flag located N 12° E, 42' from monitoring well



1st Year Monitoring

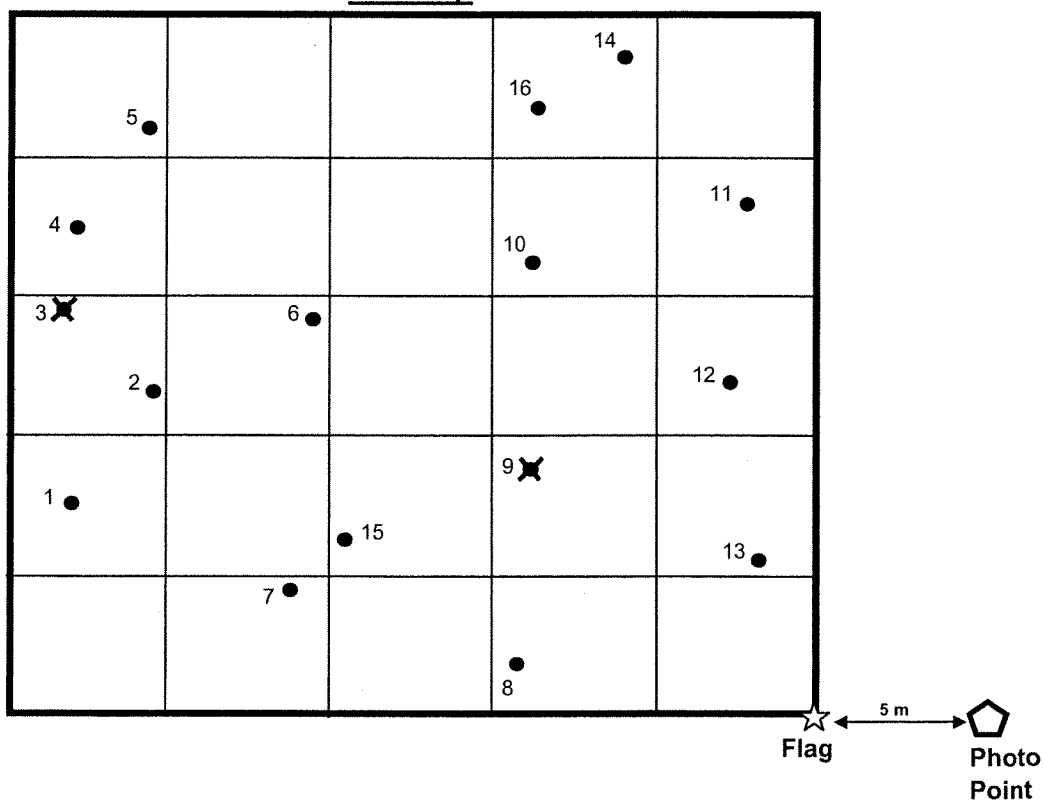


2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 8 **Date:** 9/7/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Willow Oak (*Quercus phellos*)	0.73	0.91	healthy
2	Swamp Chestnut Oak (*Quercus michauxii*)	0.85	1.83	healthy
3	Yellow Poplar (*Liriodendron tulipifera*)			dead
4	Yellow Poplar (*Liriodendron tulipifera*)	0.30	0.61	healthy
5	Laurel Oak (*Quercus laurifolia*)	0.91	1.22	healthy
6	Swamp Chestnut Oak (*Quercus michauxii*)	1.40	1.83	healthy
7	Swamp Chestnut Oak (*Quercus michauxii*)	1.04	1.22	healthy
8	Swamp Chestnut Oak (*Quercus michauxii*)	1.49	2.13	healthy
9	Yellow Poplar (*Liriodendron tulipifera*)			dead
10	Swamp Chestnut Oak (*Quercus michauxii*)	0.37	0.61	healthy
11	Laurel Oak (*Quercus laurifolia*)	1.13	1.83	healthy
12	Swamp Chestnut Oak (*Quercus michauxii*)	0.94	1.52	healthy
13	Yellow Poplar (*Liriodendron tulipifera*)	0.61	0.61	healthy
14	Laurel Oak (*Quercus laurifolia*)	0.67	1.22	healthy
15	Laurel Oak (*Quercus laurifolia*)	0.46	0.61	healthy
16	Willow Oak (*Quercus phellos*)	0.55	0.91	healthy

Species	Percent of Total
Swamp Chestnut Oak (*Quercus michauxii*)	43%
Willow Oak (*Quercus phellos*)	14%
Laurel Oak (*Quercus laurifolia*)	29%
Yellow Poplar (*Liriodendron tulipifera*)	14%

Density:

Total Number of Trees **14** / **0.025 acres** = **560** **trees / acre**

Survivability:

Total Number of Trees **14** / **16 trees** x **100** = **87.5** **% survivability**

Number of New Recruits : _____

Note : Flag located W 328° N, 27' from monitoring well

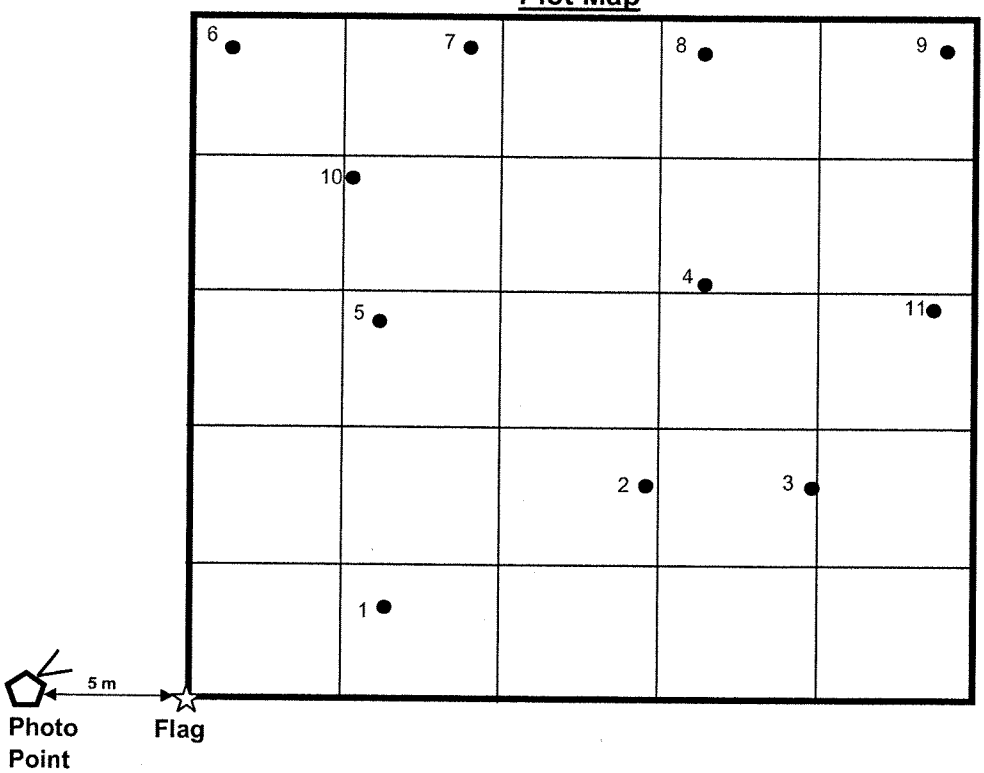
1st Year Monitoring

2nd Year Monitoring

Vegetation Monitoring Worksheet

Site: Daniels **Plot:** 9 **Date:** 9/7/2005

Plot Map



ID	Species	Height (m)	Collar Diameter (cm)	Comments (insect damage, disease, browsing)
1	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.70	1.83	healthy
2	Bald Cypress (*Taxodium distichum*)	0.82	1.83	healthy
3	Bald Cypress (*Taxodium distichum*)	0.64	1.22	healthy
4	Bald Cypress (*Taxodium distichum*)	0.76	1.52	healthy
5	Bald Cypress (*Taxodium distichum*)	0.98	2.13	healthy
6	Bald Cypress (*Taxodium distichum*)	0.79	1.83	healthy
7	Bald Cypress (*Taxodium distichum*)	0.91	2.13	healthy
8	Bald Cypress (*Taxodium distichum*)	0.67	1.52	healthy
9	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.76	1.52	healthy
10	Laurel Oak (*Quercus laurifolia*)	0.73	1.22	healthy
11	Water Tupelo (*Nyssa sylvatica* var. *biflora*)	0.73	1.52	healthy

Species	Percent of Total
Water Tupelo (*Nyssa sylvatica* var. *biflora*)	27%
Bald Cypress (*Taxodium distchum*)	64%
Laurel Oak (*Quercus nigra*)	9%

Density:

Total Number of Trees **11** / **0.025 acres** = **440** **trees / acre**

Survivability:

Total Number of Trees **11** / **11 trees** x **100** = **100** **% survivability**

Number of New Recruits : _____

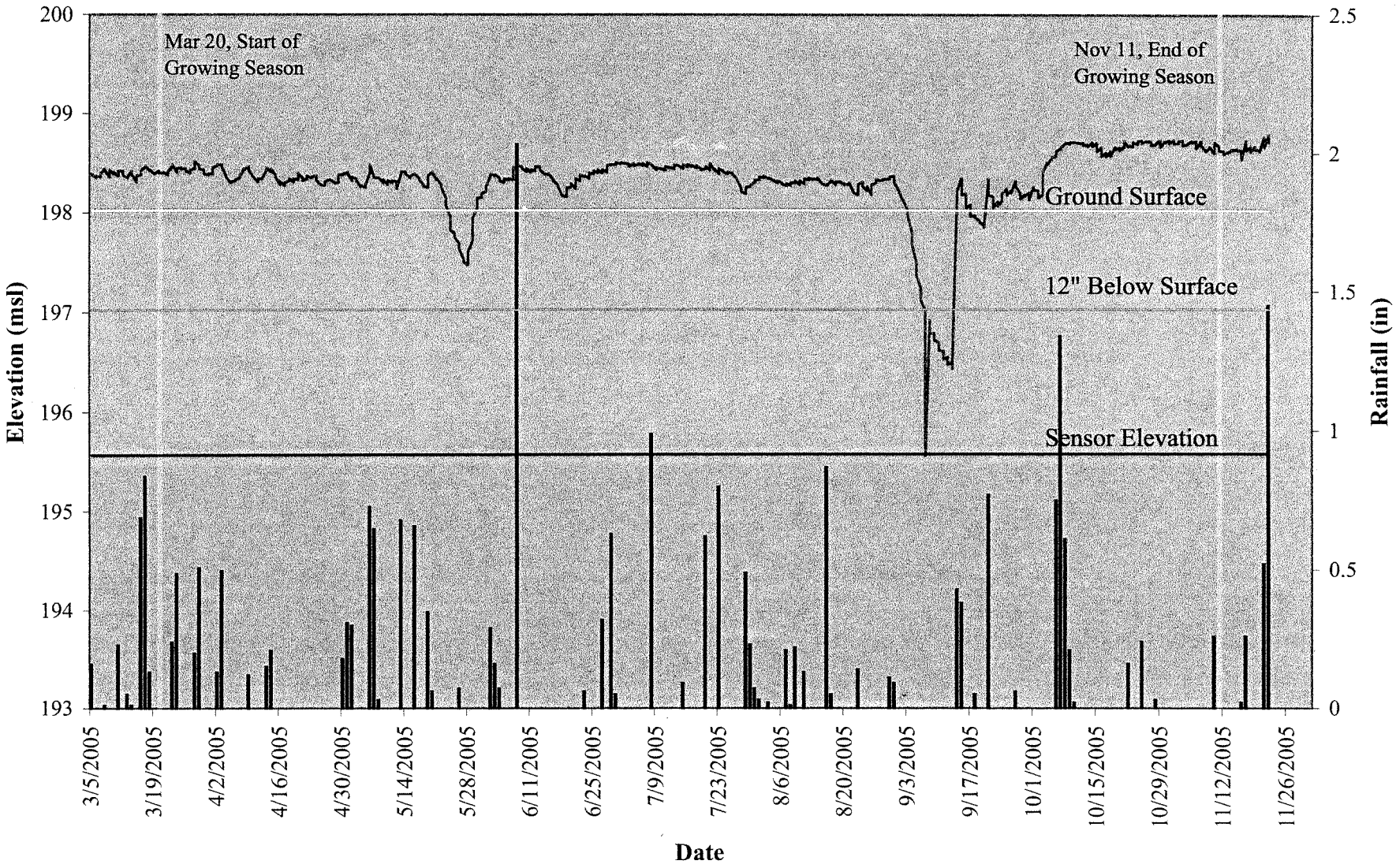
Note : Flag located W 72° N, 16' from monitoring well

1st Year Monitoring

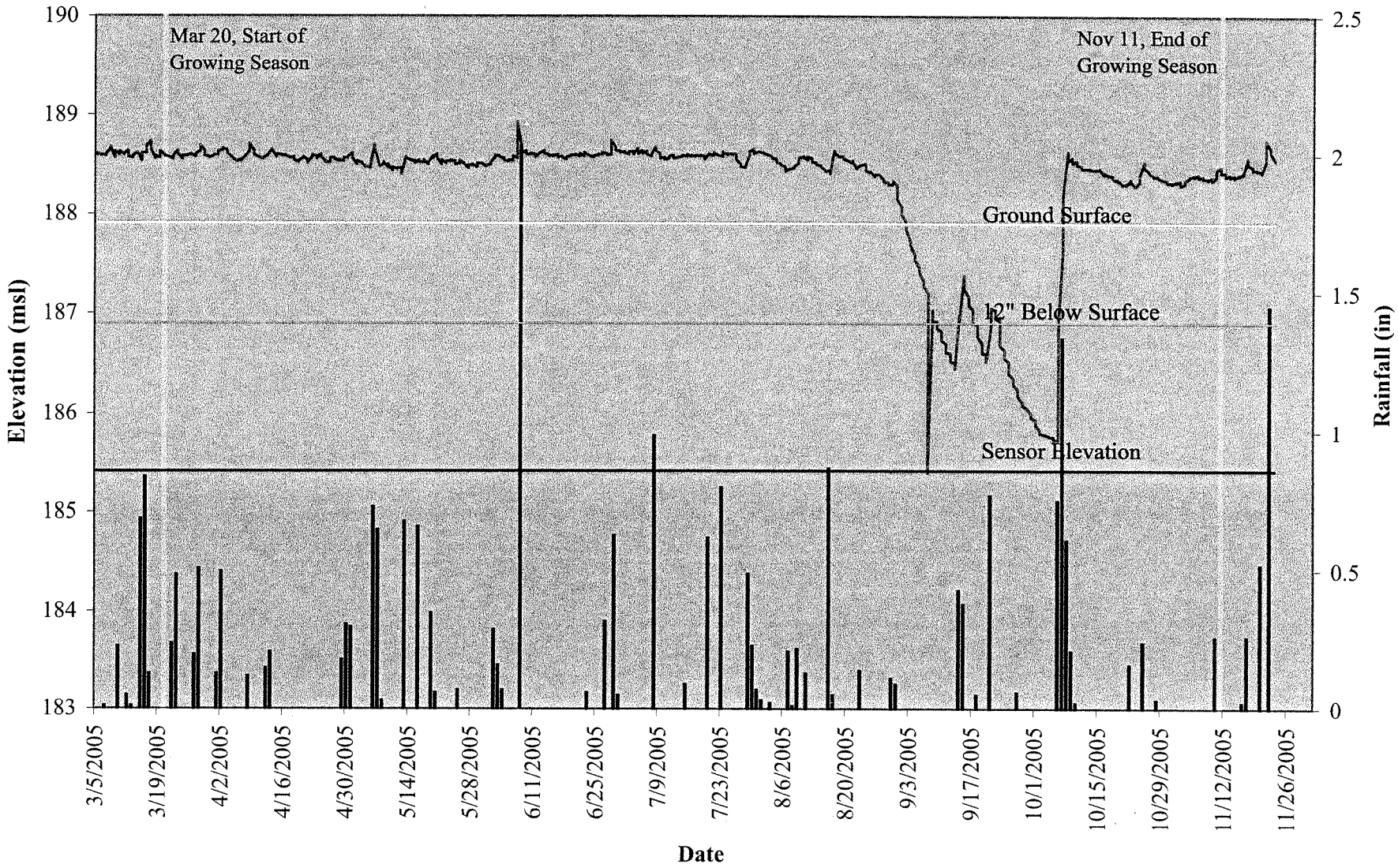
2nd Year Monitoring

Appendix B
Hydrologic Monitoring and Hydroperiod

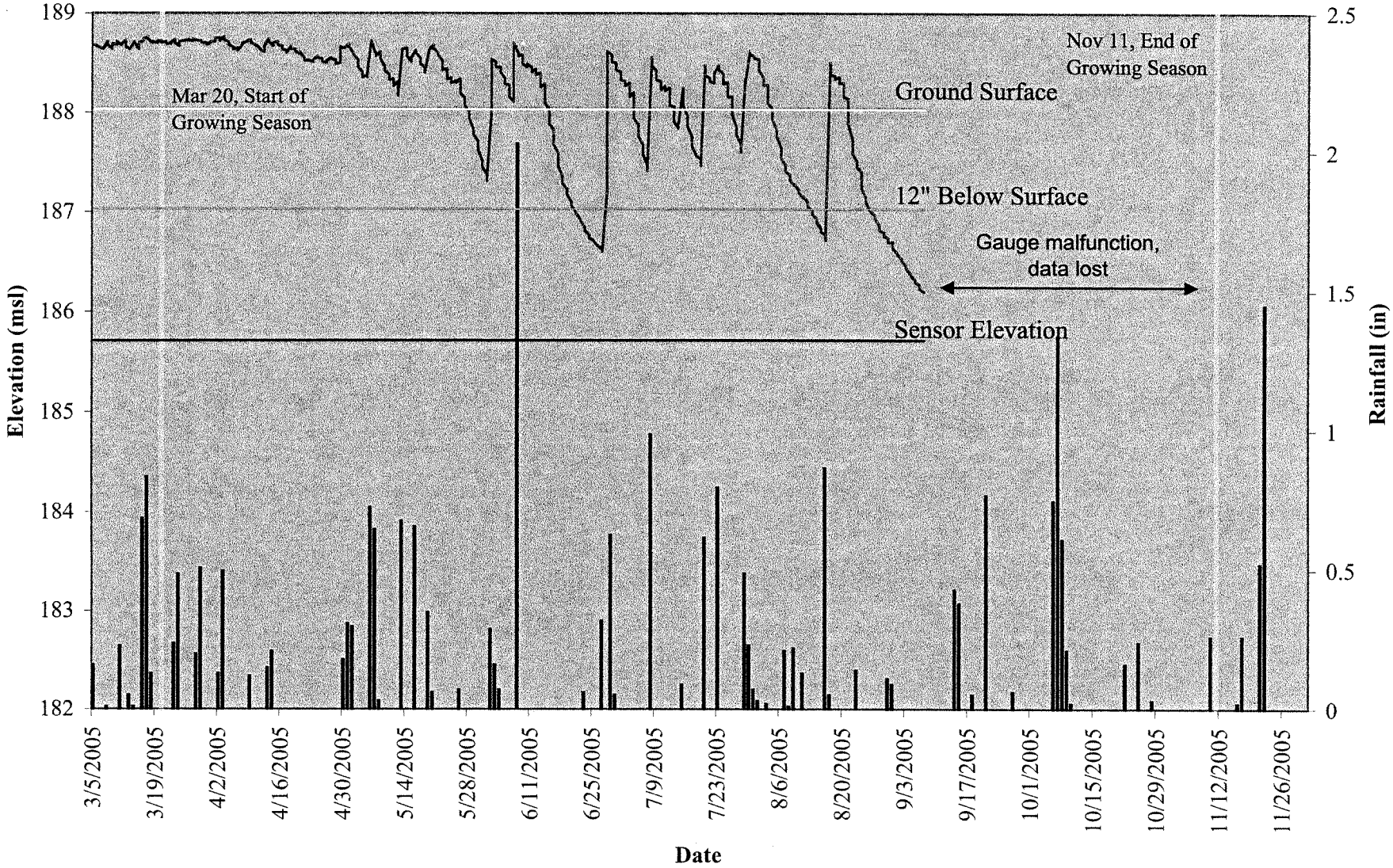
Daniels Farm Gauge 1



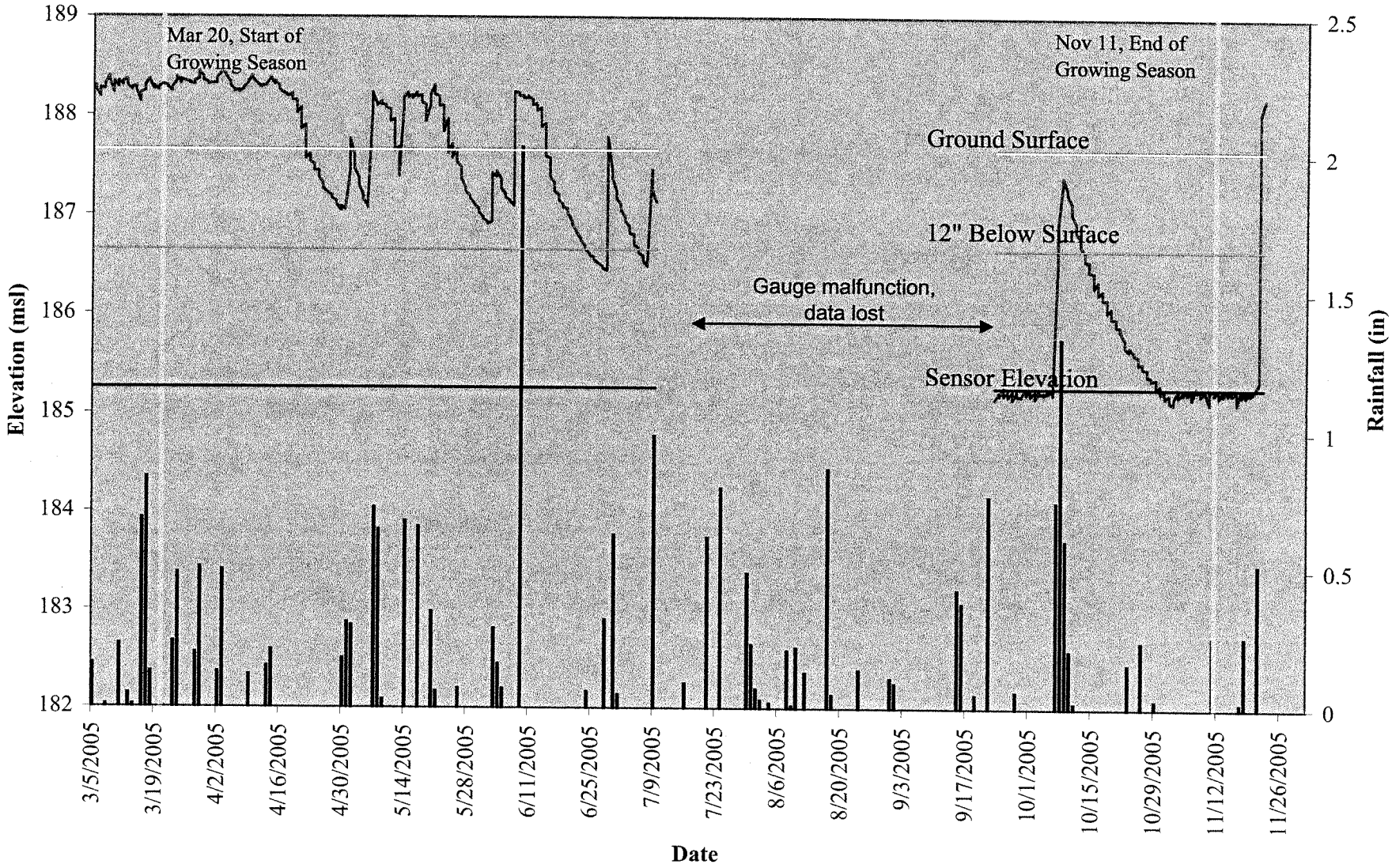
Daniels Farm Gauge 2



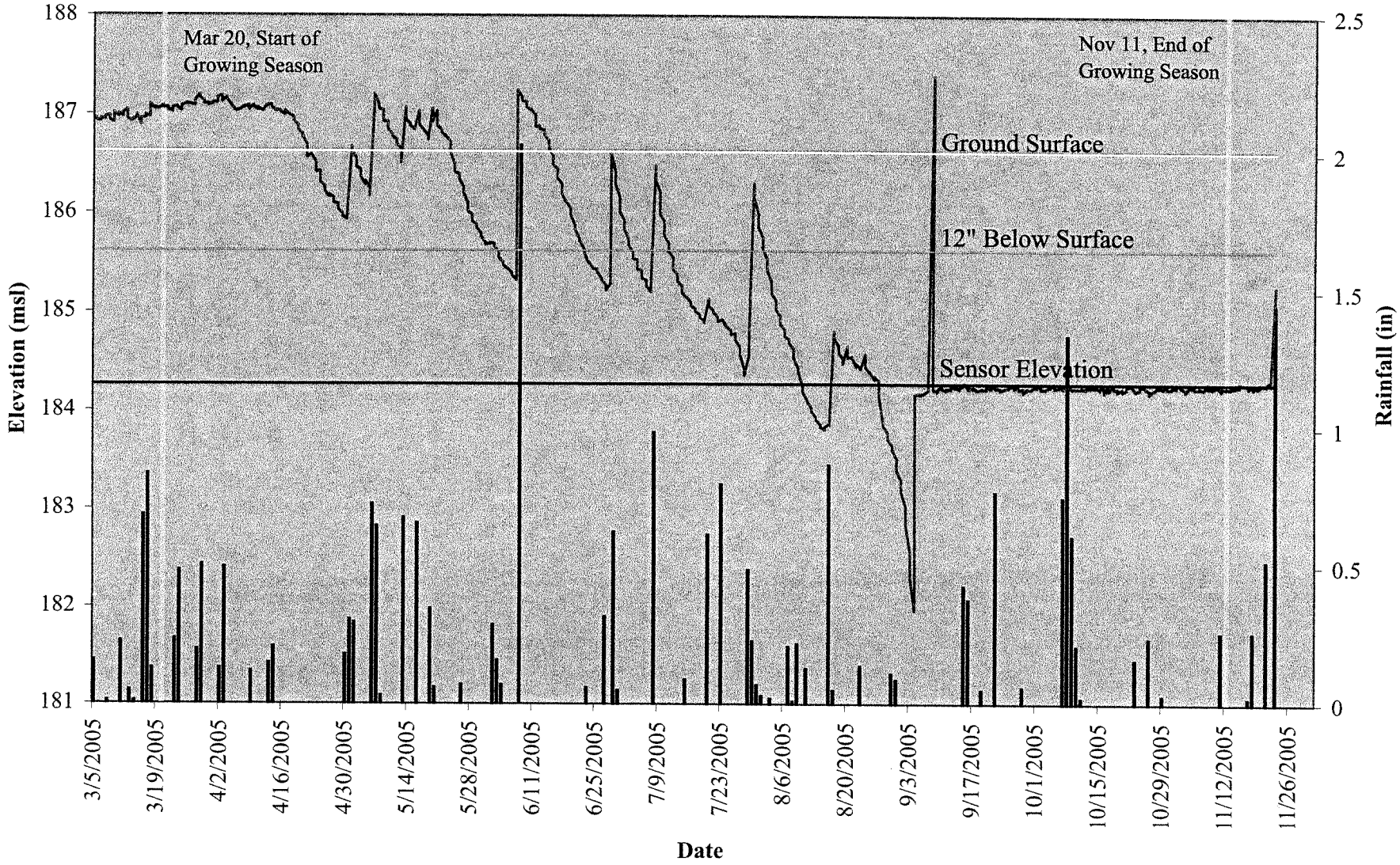
Daniels Farm Gauge 3



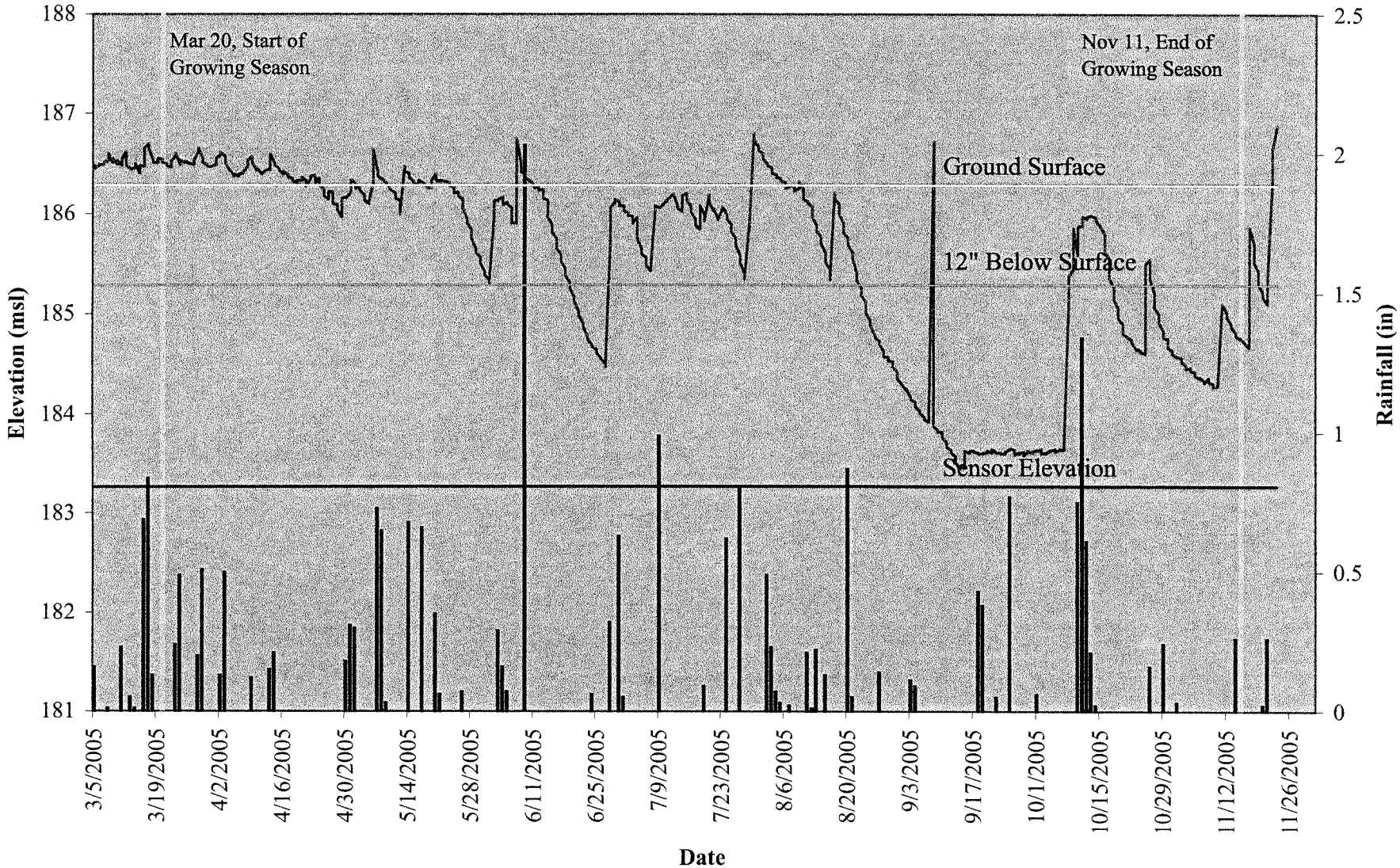
Daniels Farm Gauge 4



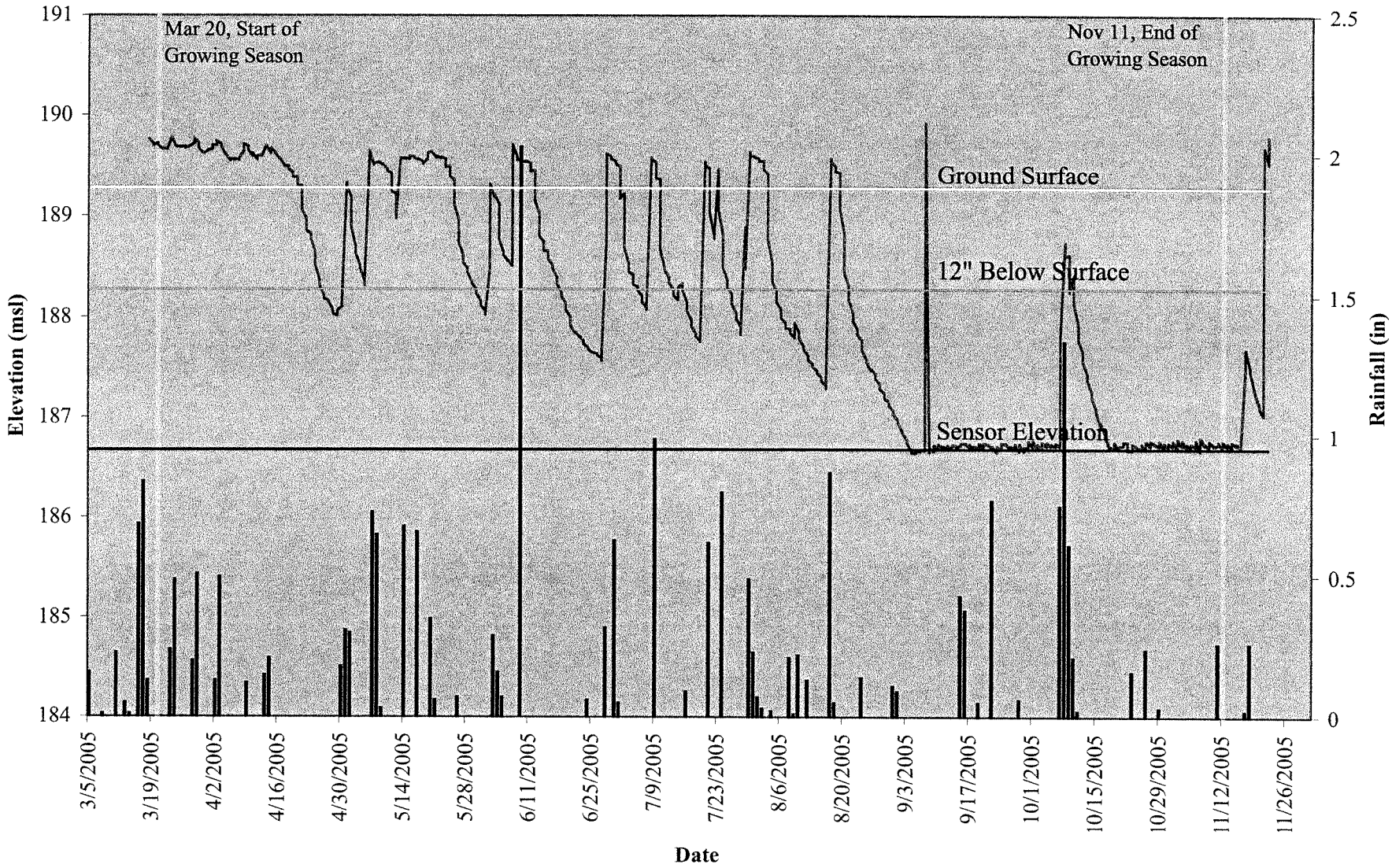
Daniels Farm Gauge 5



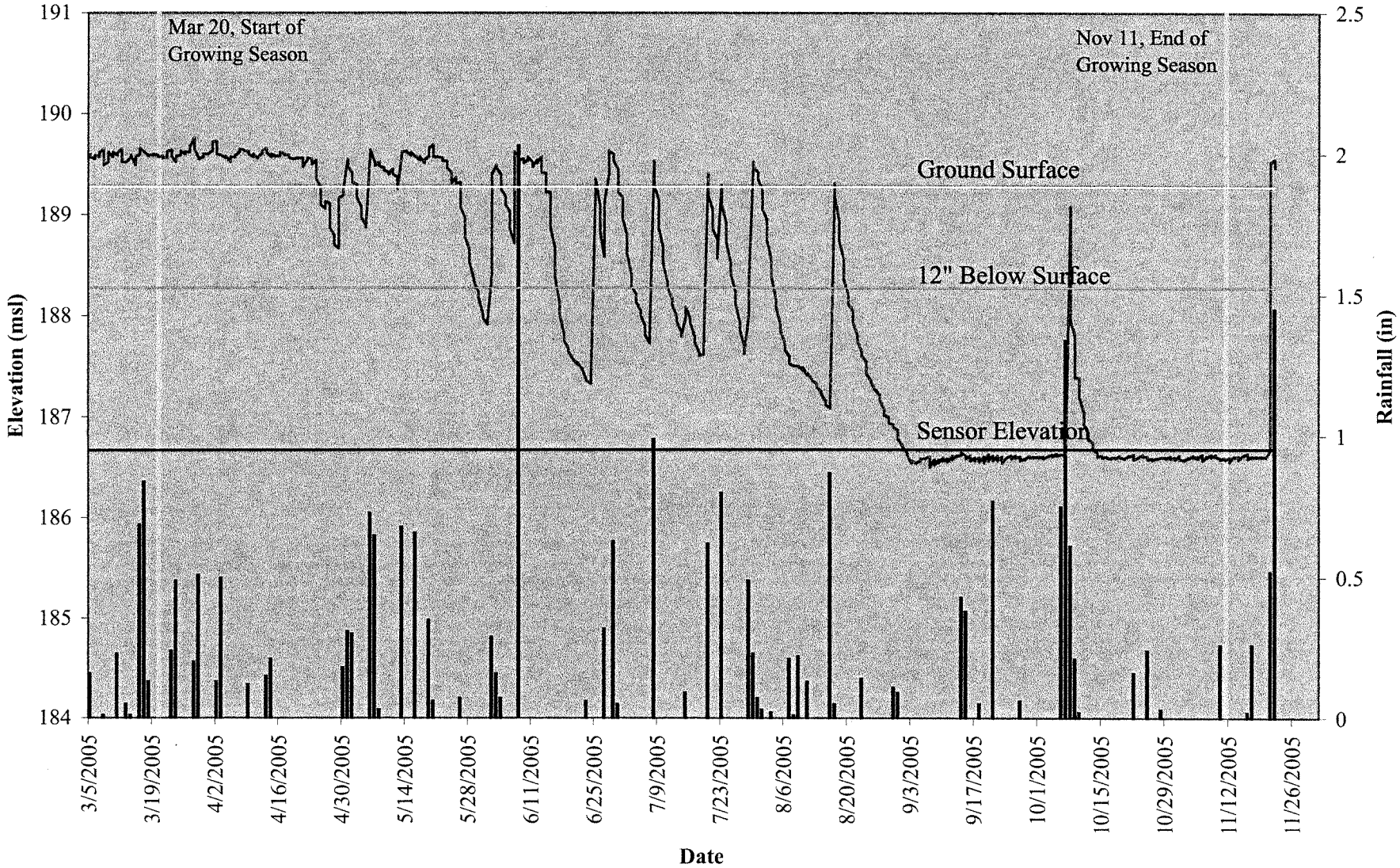
Daniels Farm Gauge 6



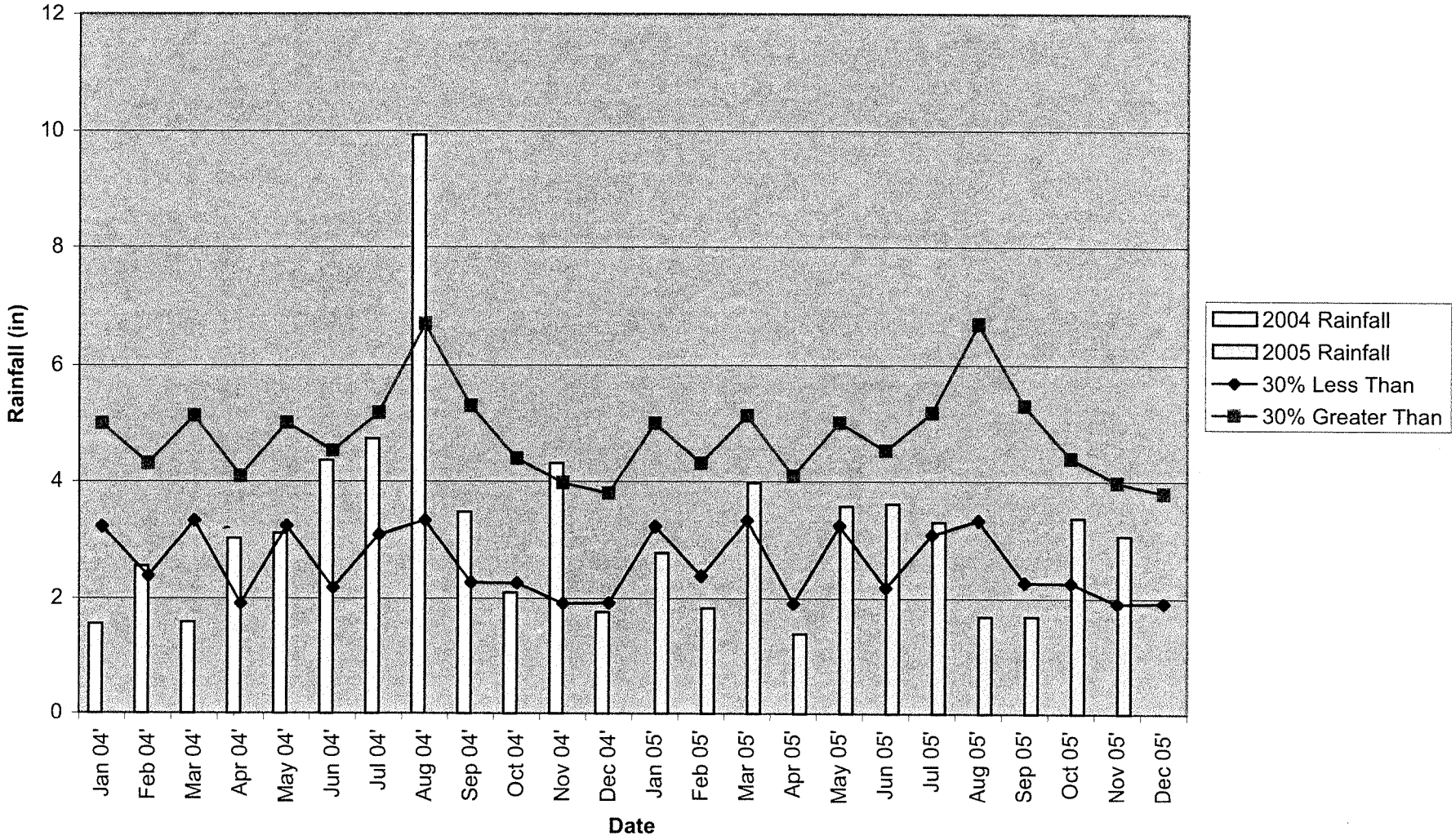
Daniels Farm Gauge 7



Daniels Farm Gauge 8



Daniels Property 30-70 Percentile Graph 2004-2005
Louisburg, NC Monthly Rainfall



Appendix C
Permanent Photo Documentation Points

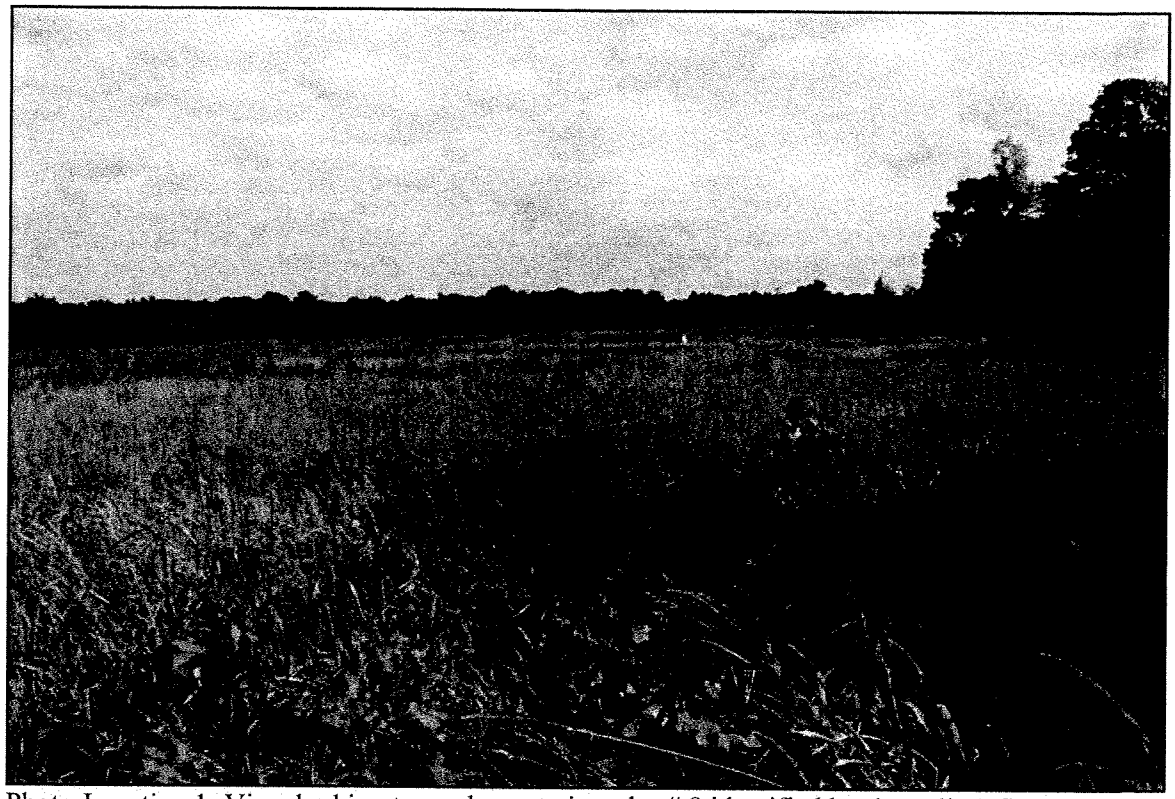


Photo Location 1: View looking toward vegetation plot # 8 identified by the yellow flag.

Photo Location 2: View looking toward vegetation plot # 1 identified by the yellow flag.

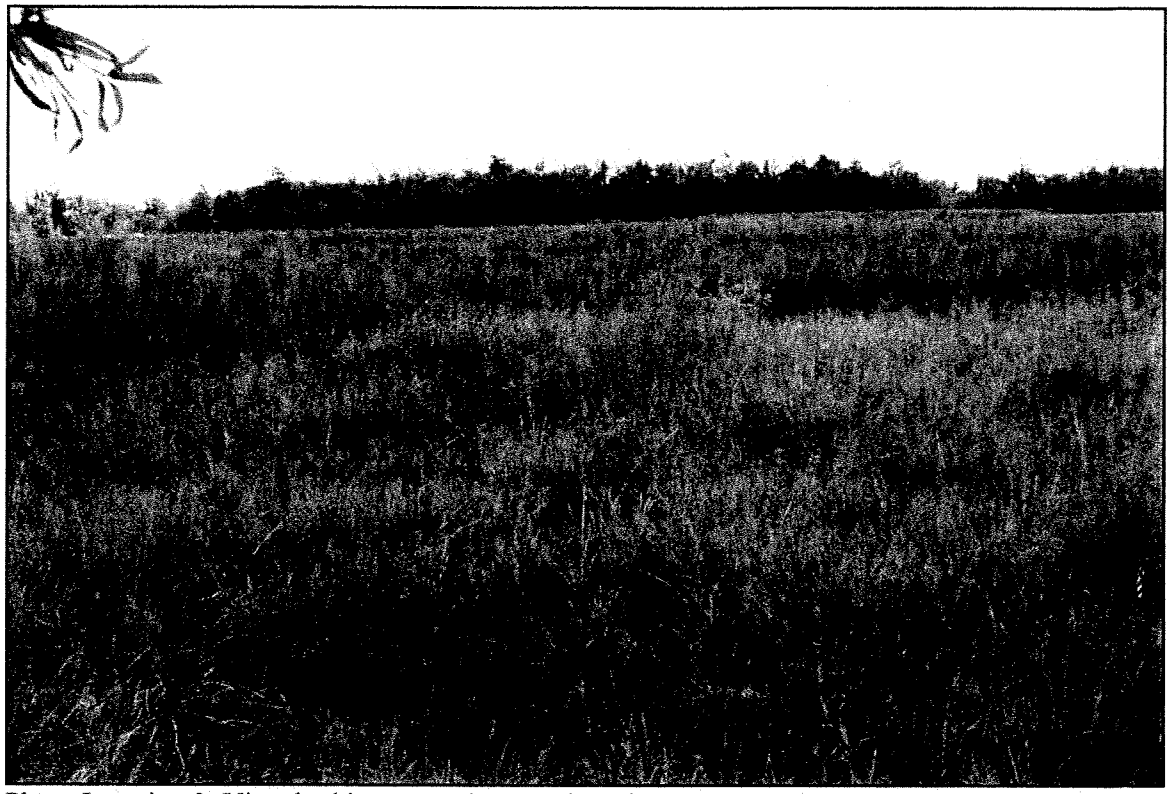


Photo Location 3: View looking toward vegetation plot # 4.

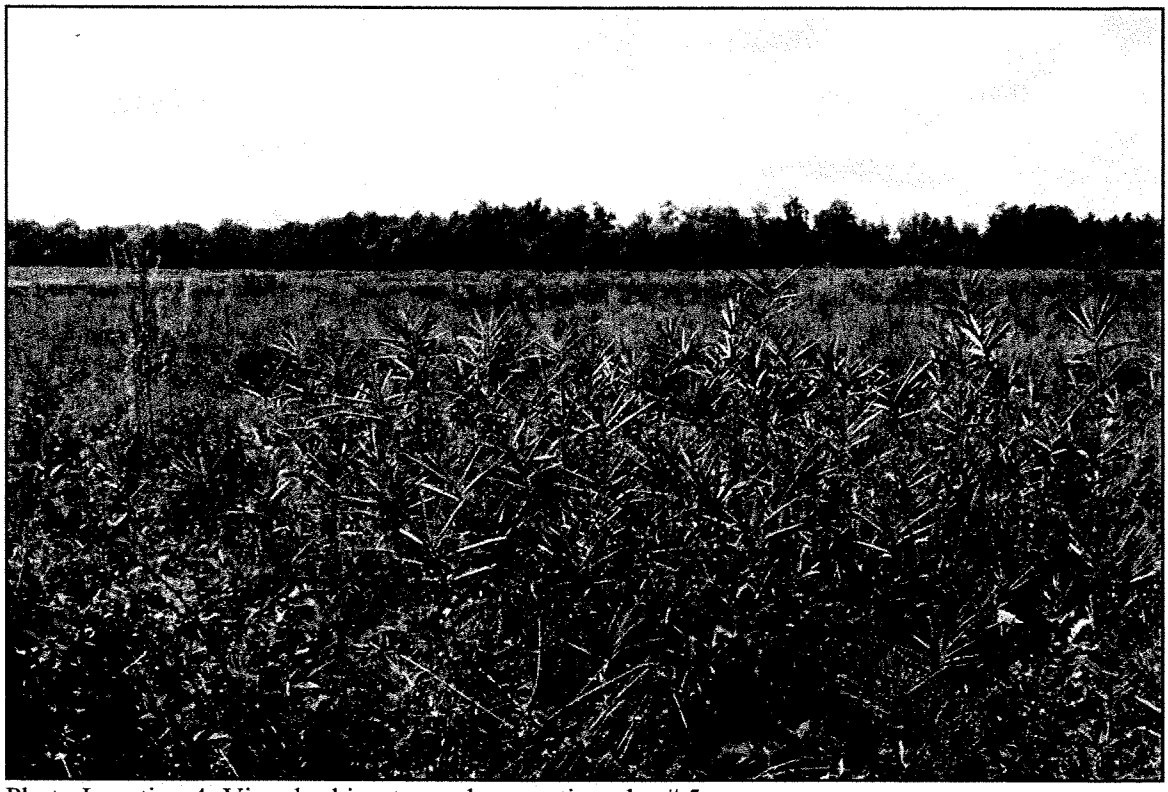


Photo Location 4: View looking toward vegetation plot # 5.

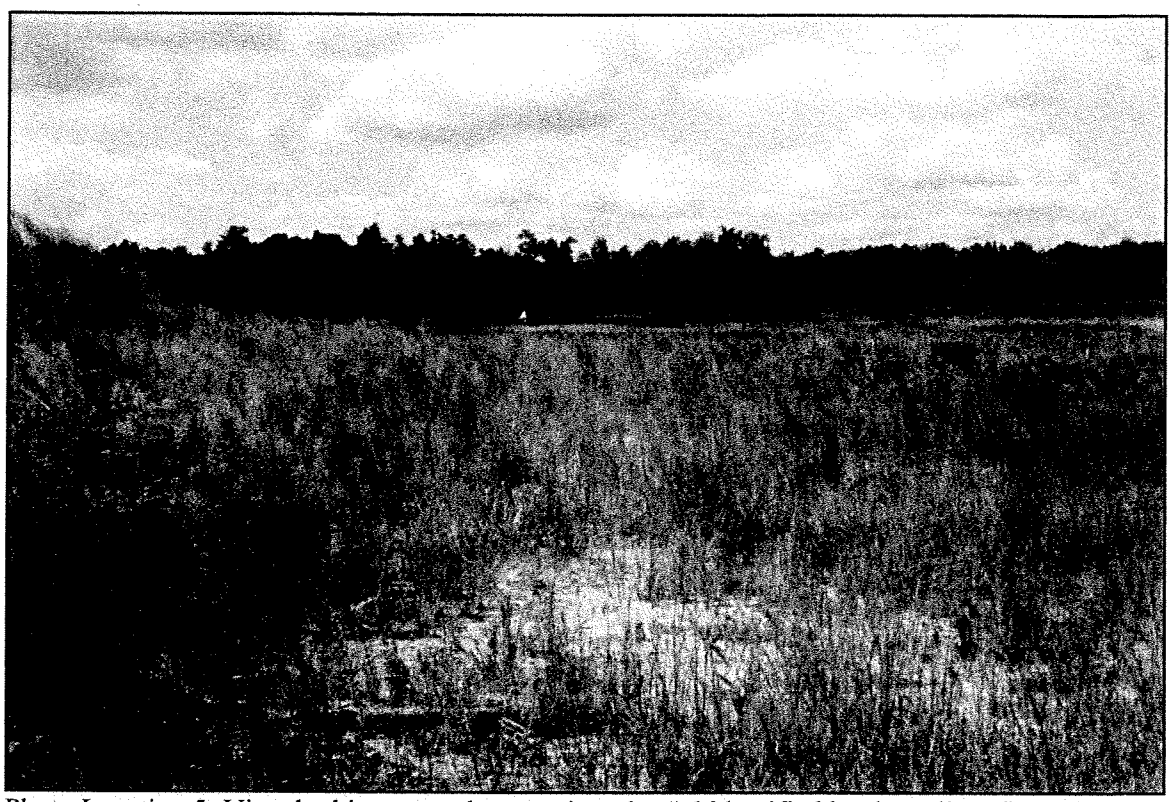


Photo Location 5: View looking toward vegetation plot # 6 identified by the yellow flag. The upland area shown to the left of the yellow flag is non-wetland.