

ANNUAL REPORT FOR 1999



Pea Island Mitigation Site
Dare County
Project No. 6.051029
TIP No. R-3113 WM



Prepared By:
Natural Systems Unit &
Roadside Environmental Unit
North Carolina Department of Transportation
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SUMMARY

The following report summarizes the monitoring activities that have occurred in the past year at the Pea Island Mitigation Site. This site was established in March of 1996 and vegetative monitoring began in June of the same year. 1999 marks the 4th year of monitoring on this site. Mitigation plan specifications require this site to produce vegetative and hydrological success for at least three growing seasons.

The Pea Island site contains four wells, one surface gauge, and one rain gauge. Three of the four wells have been working without evidence of problems. Well number PI-5 had several malfunctions throughout the season. Data from mid May until the end of September was not recorded from this well.

The site's rain gauge, number PI-4, was noticed missing and was presumed to have been washed out in mid-October. It will be replaced prior to the 2000 growing season.

Hydrologic monitoring indicated that this site has met success criteria; the site was completely inundated for most of the growing season. Neither Hurricane Dennis nor Floyd harmed the mitigation site. Both pre-hurricane and post-hurricane hydrologic success data is included in this report. Vegetation monitoring yielded a successful coverage of 73% across 10 planting transects. Because the site has met apparent success after four years, NCDOT proposes to discontinue all monitoring activities.

1.0 INTRODUCTION

1.1 Project Description

The Pea Island Mitigation Site, TIP# R-3113WM, is located in Dare County approximately 3.5 miles south of Pea Island Refuge maintenance facility, immediately west of NC 12 (Figure 1). The site consists of approximately 37.6 acres of wetland establishment and is designed as mitigation for the relocation of NC 12.

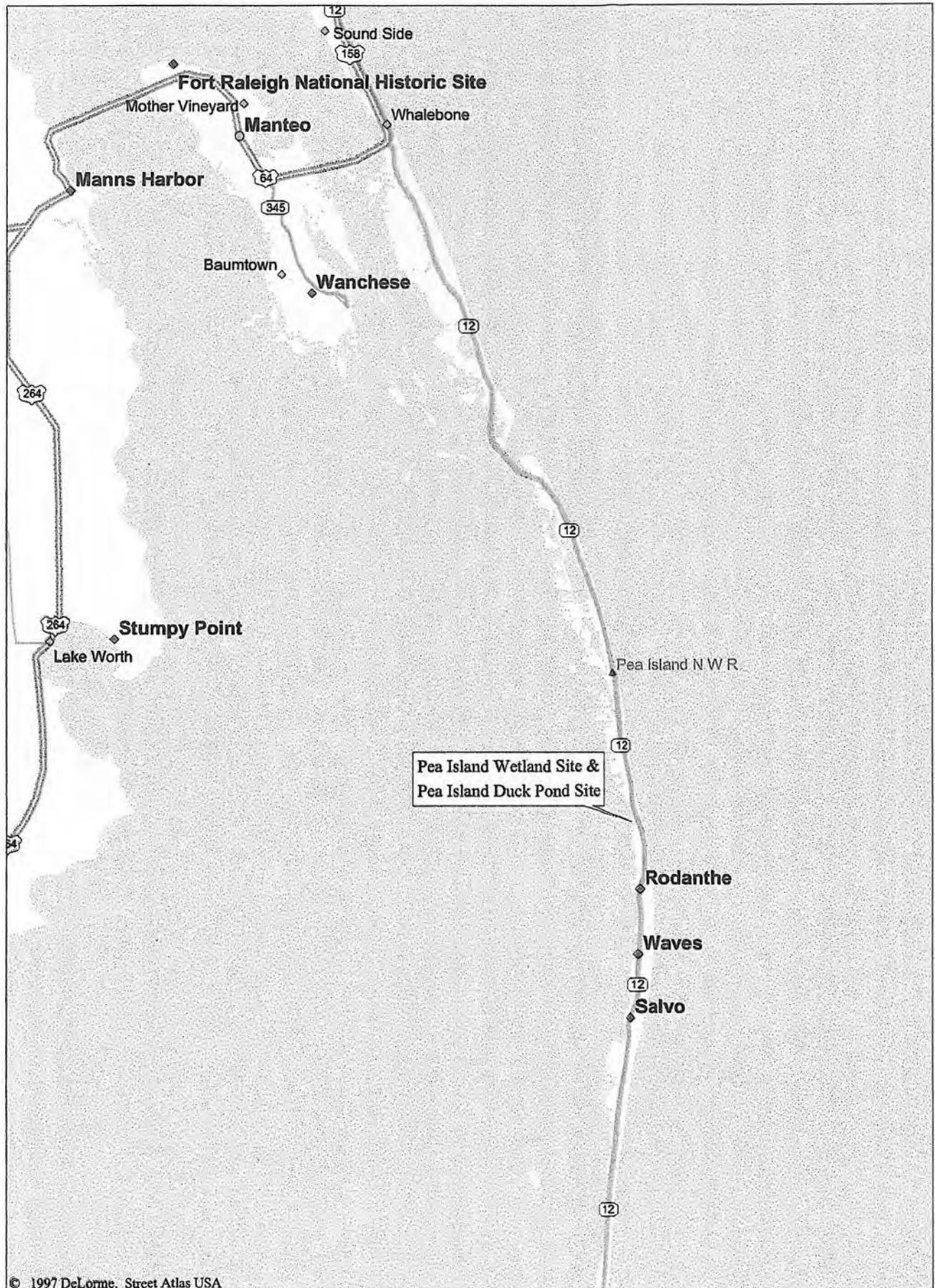
1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of three consecutive years. Success criteria are based on the federal guidelines for wetland mitigation. This guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report describes the results of the hydrologic and vegetative monitoring during the 1999 growing season at the Pea Island Mitigation Site.

Activities in 1999 reflect the 4th year of monitoring. Included in this report are analyses of both hydrologic and vegetative monitoring results as well as local climate conditions throughout the growing season.

1.3 Project History

March 1996	Site planted
June 1996	Vegetation Monitoring (1 mo.)
October 1996	Vegetation Monitoring (1 yr.)
June 1997	Monitoring Wells Installed
June- November 1997	Hydrologic Monitoring (1 yr.)
September 1997	Vegetation Monitoring (2 yr.)
March- November 1998	Hydrologic Monitoring (2 yr.)
August 1998	Vegetation Monitoring (3 yr.)
March- November 1999	Hydrologic Monitoring (3 yr.)
October 1999	Vegetation Monitoring (4yr.)



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FIGURE 1
SITE LOCATION MAP

2.0 HYDROLOGY

2.1 Success Criteria

In accordance with federal guidelines for wetland mitigation, a site meets hydrologic criteria if it is inundated or saturated (within 12" of the surface) by surface or ground water for at least 12.5% of the growing season. However, discussions between NCDOT and natural resource agencies have determined that, due to the unique character of this site, the normal guidelines for hydrologic success may not apply. Groundwater levels may vary significantly on a daily basis due to a sandy substrate that is in close proximity to a tidally influenced body of water.

The growing season in Dare County begins March 13 and ends November 25. These dates correspond to a 50% probability that air temperatures will drop to 28° or lower after March 13 and before November 25.¹ Thus the growing season is 258 days; optimum wetland hydrology requires 12.5% of this growing season, or 32 days. The site must also experience average climatic conditions in order for the hydrologic data to be considered valid.

2.2 Hydrologic Description

Four monitoring wells, one rain gauge, and one surface water gauge were installed on site in June 1997 (Figure 2). The automatic monitoring wells and rain gauges record the depth to groundwater and rainfall, respectively. Data was collected on a daily basis throughout the growing season.

Appendix A contains a plot of the water depth for each monitoring well and surface water gauge in 1999. Precipitation events are included on each graph as bars. The maximum number of consecutive days is noted on each graph. The individual precipitation events, shown on the monitoring well graphs as bars, represent data collected from a Manteo weather station, maintained by the NC State Climate Office. These graphs include rain data from March to August of 1999.

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

The largest number of consecutive days in which the groundwater was within twelve inches of the surface was determined for each well. The number of days was then converted into a percentage of the 258-day growing season. The results are presented in Table 1 and Table 2. With Hurricanes Dennis and Floyd this past fall, groundwater

¹ Soil Conservation Service. Soil Survey of Dare County, North Carolina, p.69.

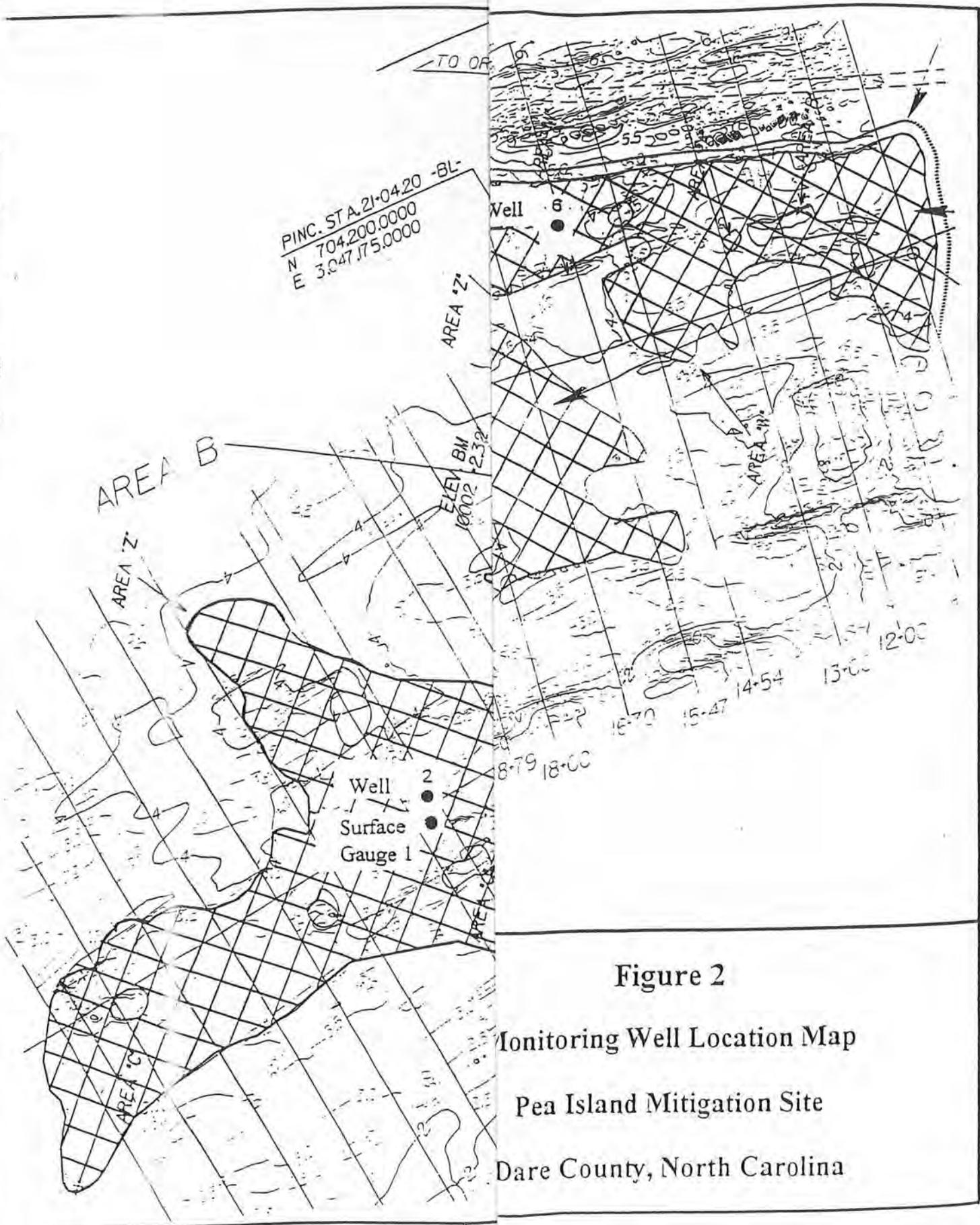


Figure 2

Monitoring Well Location Map

Pea Island Mitigation Site

Dare County, North Carolina

levels were abnormally influenced during the early part of September. Therefore pre-hurricane data and post hurricane data was analyzed separately.

TABLE 1
HYDROLOGIC MONITORING RESULTS
FOR MARCH 13, 1999-AUGUST 31, 1999 (PRE-HURRICANE INFLUENCE)

Monitoring Well	< 5%	5% - 8%	8% - 12.5%	> 12.5%	Actual %	Success Dates
PI-2				✓	66.6	March 13 – August 31
PI-3				✓	16.6	March 13 – April 24
PI-5			✓		8.1	April 23 – May 13
PI-6				✓	15.1	March 13 – April 20

TABLE 2
HYDROLOGIC MONITORING RESULTS
SEPTEMBER 1-NOVEMBER 25, 1999 (POST HURRICANE INFLUENCE)

Monitoring Well	< 5%	5% - 8%	8% - 12.5%	> 12.5%	Actual %	Success Dates
PI-2				✓	33.3	September 1 – November 25
PI-3				✓	33.3	September 1 – November 25
PI-5				✓	19.4	September 25 – November 13
PI-6				✓	29.1	September 1 – November 14

This site data shows a record of saturation for more than 12.5% of the growing season in three of the four wells. Both pre-hurricane and post hurricane success supports the conclusion that this site continues to meet jurisdictional success. The surface gauge has shown a consistent level of surface water throughout the growing season.

Due to a malfunctioning monitoring well, the groundwater data for one well is incomplete. Data from well number PI-5 is missing data from May 16 through September 24. The well was replaced on the 25th of September and is now functioning properly. Rain gauge number PI-4 was noticed missing, in an October site visit. It was presumed to be washed out and will be replaced prior to the start of the 2000 season.

2.3.2 Climatic Data

Figure 3 represents an examination of the local climate in comparison with historical data in order to determine whether 1999 was “average” in terms of climate conditions. The figure compares the rainfall from 1998 and 1999 with that of historical rainfall (data collected between 1966 and 1997).

The two lines represent the 30th and 70th percentiles of historical monthly precipitation for Manteo, NC. The bars represent the monthly rainfall totals for the winter months of 1998 and the available months of this year. All rainfall data was collected from the NC State Climate Office. The graph shows rainfall totals through August 1999. Rainfall data for the winter of 1999 will be presented in the 2000 Annual Monitoring Report.

Pea Island 30-70 Percentile Graph
Manteo, NC

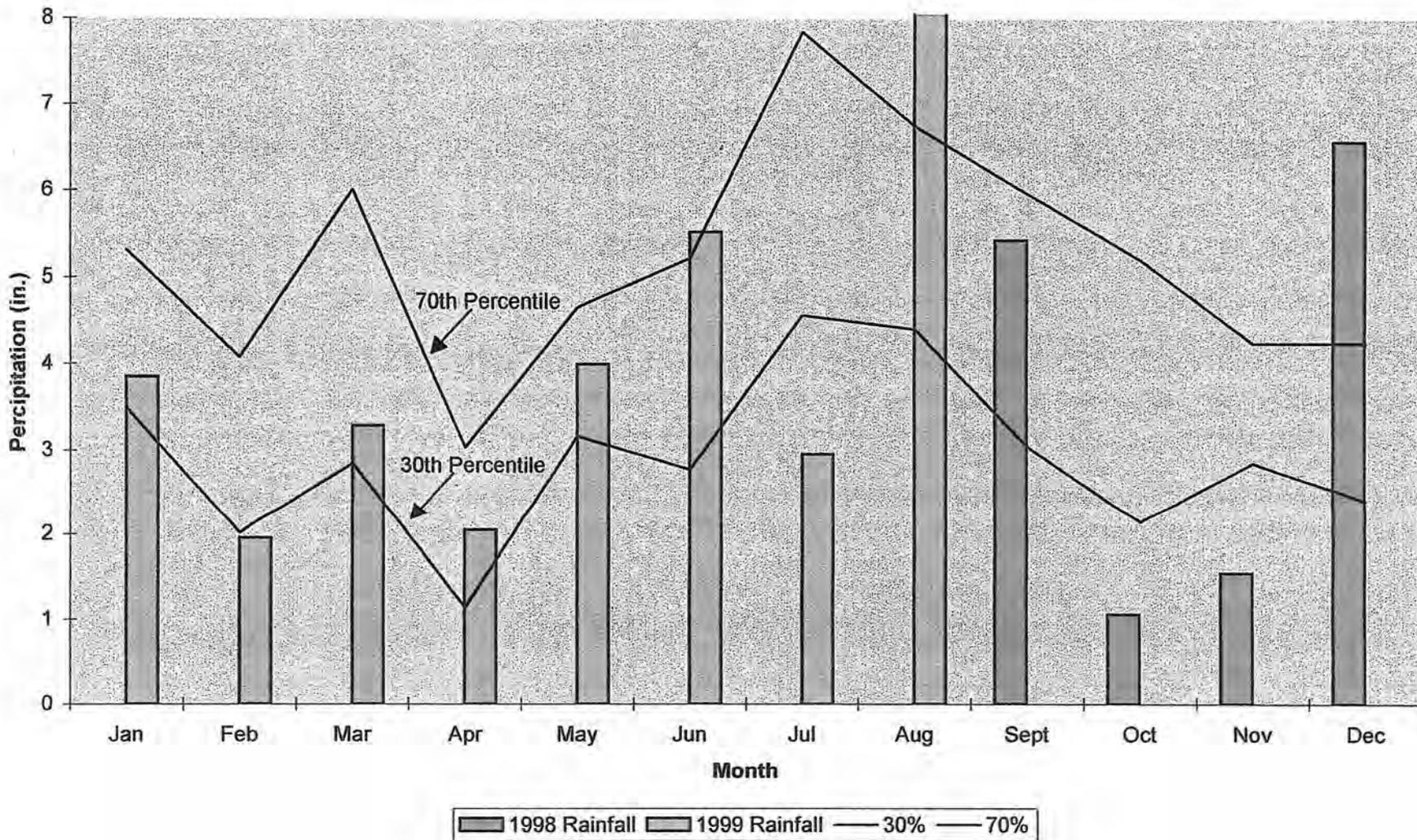


FIGURE 3
30-70 PERCENTILE GRAPH

This growing season's climate was average for the area. Even with an excessive amount of rain during September, the site experienced no extended periods of abnormally dry or wet weather.

2.4 Conclusions

This site has exceeded success criteria again this season; the site showed surface water for the majority of the season. Three of the four monitoring stations yielded wetland hydrology; the remaining well malfunctioned, thus not taking readings the entire growing season.

Pea Island was not adversely affected by Hurricanes Dennis or Floyd, which hit the state in September 1999. The site's integrity was maintained, and the wells were not disturbed. The rain gauge, which was missing and presumed to be washed out in mid October was not due to the hurricanes.

3.0 VEGETATION

3.1 Success Criteria

Success Criteria states that there should be > 50% areal coverage of grasses and other herbaceous vegetative species for a period of at least three years.

3.2 Description of Species

The following species were planted in the Wetland Restoration Area:

- Panicum amarum*
- Panicum amarulum*
- Scirpus americanus*
- Scirpus robustus*
- Scirpus olneyi*
- Bidens aristosa*

3.3 Results of Vegetation Monitoring (4 year)

Area "A"

Plot #	<i>Panicum amarum</i>	<i>Panicum amarulum</i>	<i>Scirpus americanus</i>	<i>Scirpus robustus</i>	Bullrush	<i>Echinochloa walteri</i>	<i>Bidens</i>	Other	% Coverage (4 year)
1	15%			30%	20%			10%	75%
2	20%	8%	25%	25%	5%	2%	5%		90%
9				35%	20%	15%		10%	80%
AVERAGE COVER (%)									82%

Area "B"

3		40%	15%			5%		60%
4		20%	20%		35%		5%	80%
5		10%	25%		25%			60%
6		5%	50%		15%			70%
7		5%	30%		30%		5%	70%
8	20%	20%	40%			5%	5%	90%
10		25%		20%			5%	50%
AVERAGE COVER (%)								69%
TOTAL AVERAGE COVER (%)								73%

3.4 Conclusions

There are 36.7 acres of marsh established on this site. There were 10 monitoring plots established throughout the site, three within the area "A" and seven within area "B". The average aerial coverage of grasses in area "A" is 82%. The average aerial coverage of the grasses in area "B" is 69%. The total average cover is 73%, which exceeds the Success Criteria for this site.

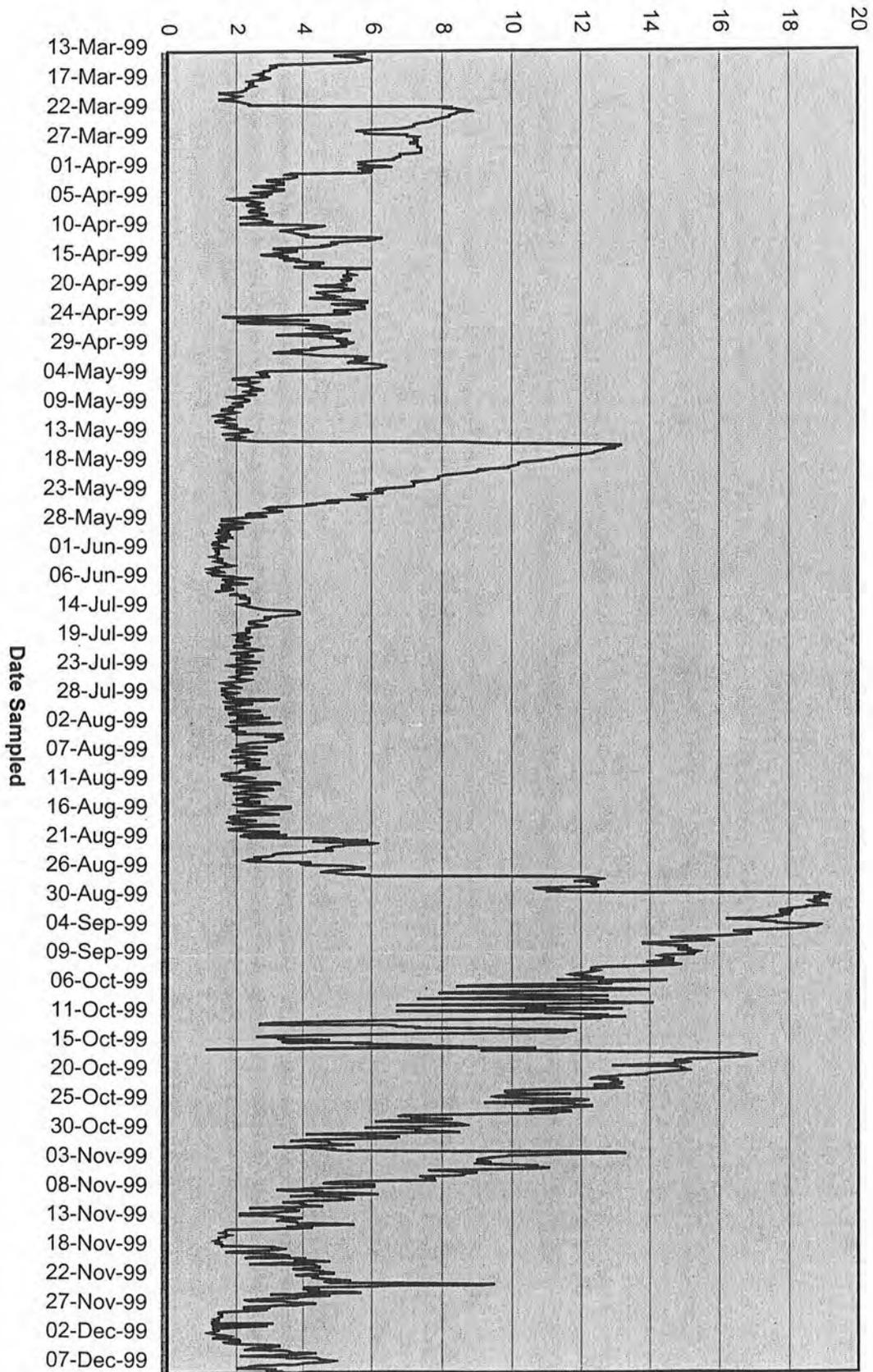
4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

After four years of vegetation monitoring and three years of hydrologic monitoring, the site has met success criteria. The site showed successful hydrologic conditions as well as an average plant coverage of 73%.

NCDOT recommends discontinuing all monitoring activities at the site.

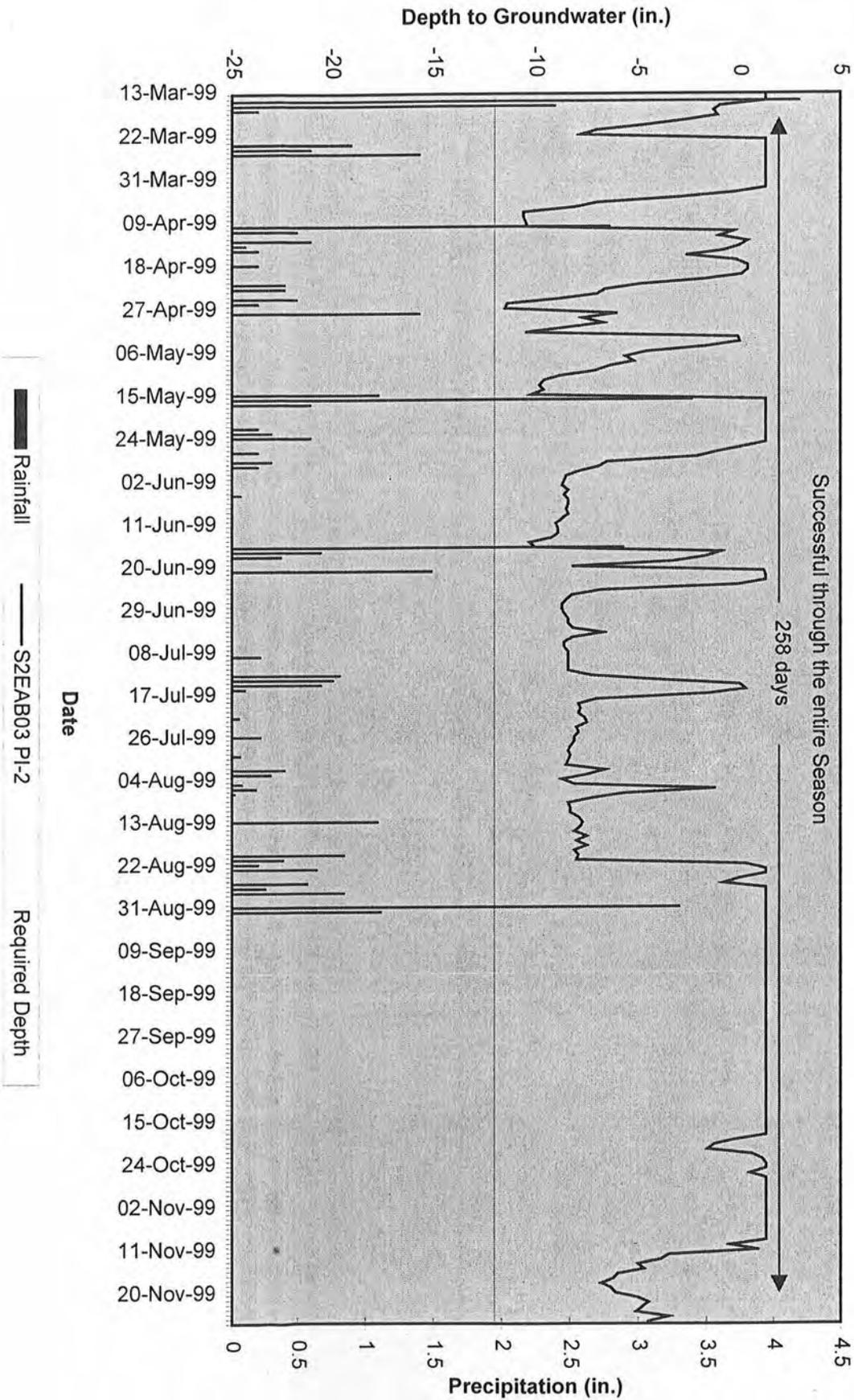
APPENDIX A
DEPTH TO GROUNDWATER PLOTS

Surface Water Depth (in.)

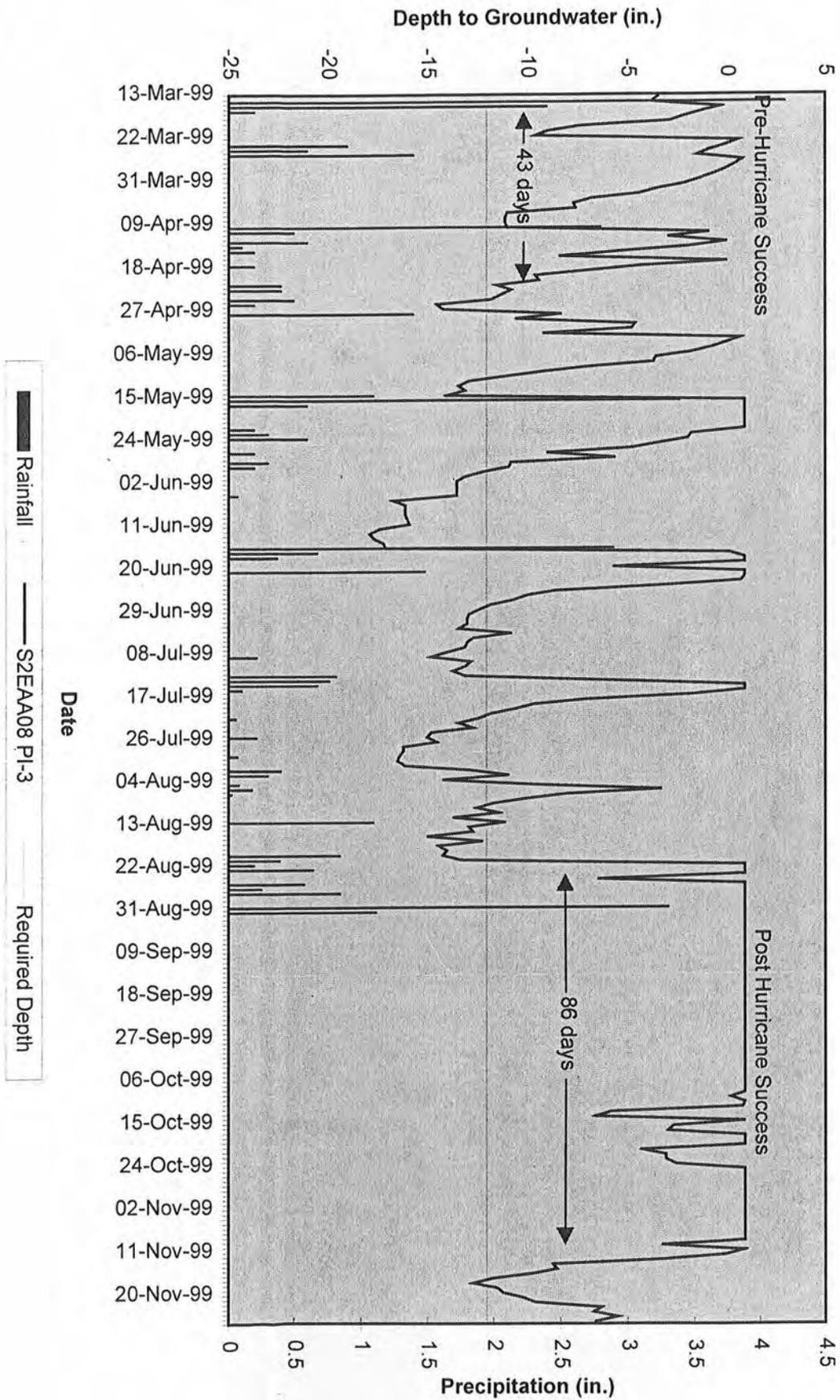


Pea Island
Surface Gauge

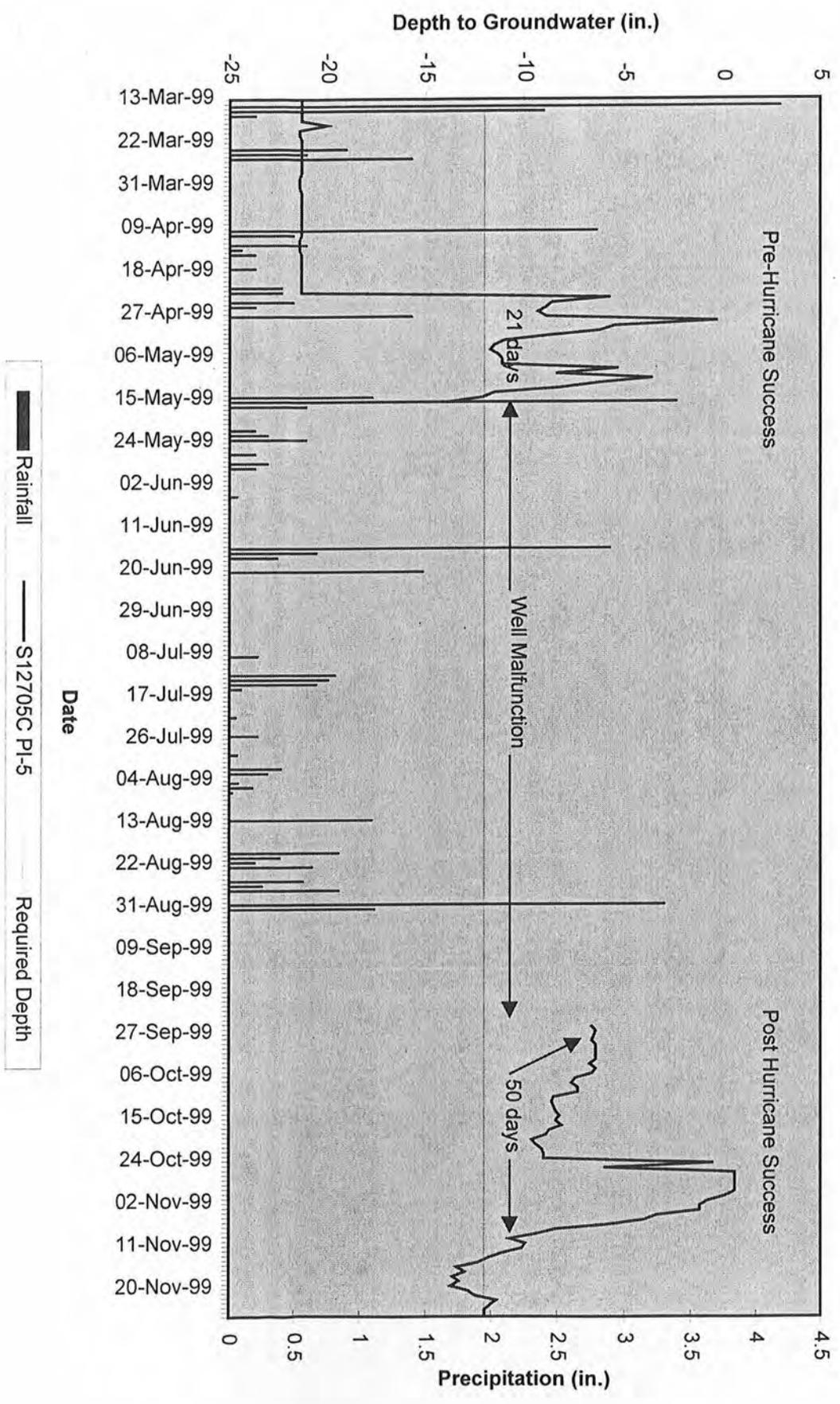
Pea Island PI-2



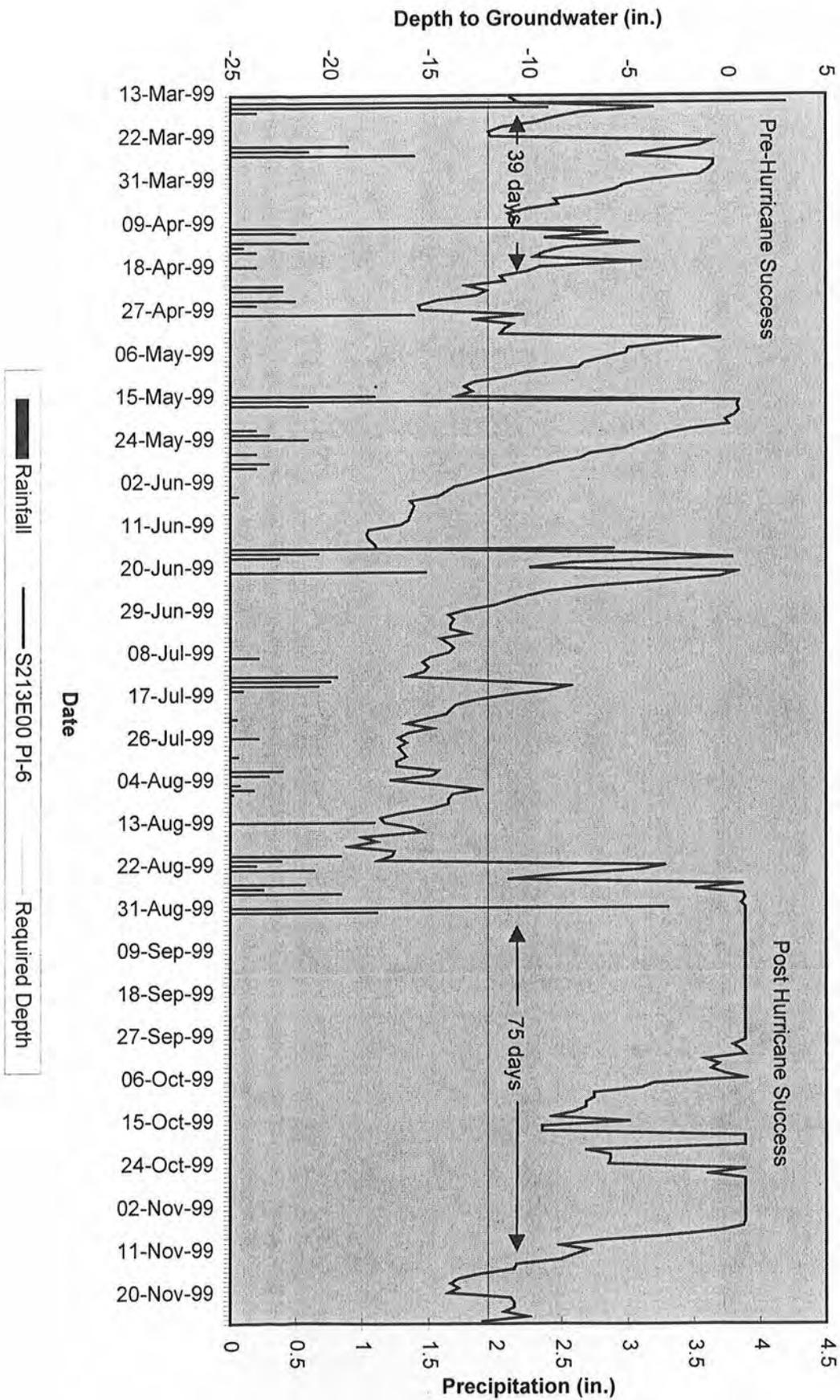
Pea Island PI-3



Pea Island PI-5



Pea Island PI-6



APPENDIX B

SITE PHOTOS

PEA ISLAND



Photo 1: Eastern side of site facing West



Photo 2: Middle of site facing NW at Plot 8



Photo 3: Middle of site facing NW at Plot 7

PEA ISLAND



Photo 4: Facing East at Plot 1



Photo 5: Facing East at Plot 4

