

# ANNUAL REPORT FOR 2001



**Spring Branch Mitigation Site**

**New Hanover County**

**Project No. 8.2250109**

**TIP No. U-92 WM**



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## **SUMMARY**

The following report summarizes the monitoring activities that have occurred in 2001 at the Spring Branch Mitigation Site, representing the fourth year of monitoring.

The site is equipped with 3 groundwater-monitoring gauges, 2 surface gauges, and 1 rain gauge. The rain gauge, an automatic recording tipping bucket type, was installed on May 18, 2000. The data from the rain gauge was utilized for this report.

Hydrologic monitoring results were similar to the previous years. The site was saturated to the soil surface or inundated for the entire growing season.

Four vegetation-monitoring plots are located on the site. The site met the vegetation success criteria with an average of 489 trees per acre.

Based on monitoring results of 2001, NCDOT recommends that monitoring of the site be continued.

## 1.0 Introduction

### 1.1 Project Description

The Spring Branch Mitigation Site is located in New Hanover County, adjacent to the U-92C (Corps AID No. 199300597) alignment project in Wilmington (Figure 1). Approximately 11 acres in size, the site provides compensatory mitigation for a portion of the U-92C wetland impacts. The site consists of swamp and bottomland forest and an open water habitat. This establishes a wetland system including a creek, open water, and an associated floodway.

### 1.2 Purpose

In order to demonstrate successful mitigation, the Spring Branch site is monitored for both hydrology and vegetation. 2001 marks the fourth year of monitoring for the site. The following report describes the results of both hydrologic and vegetation monitoring for 2001.

### 1.3 Project History

December 1997	Site Constructed
March 1998	Site Planted
March 1998	Monitoring Wells Installed
March- November 1998	Hydrologic Monitoring (1 yr.)
August 1998	Vegetation Monitoring (1 yr.)
March- November 1999	Hydrologic Monitoring (2 yr.)
October 1999	Vegetation Monitoring (2 yr.)
March- November 2000	Hydrologic Monitoring (3 yr.)
September 2000	Vegetation Monitoring (3 yr.)
March- November 2001	Hydrologic Monitoring (4 yr.)
September 2001	Vegetation Monitoring (4 yr.)

## 1.4 Debit Ledger

Spring Branch	Mit. Plan		TIP DEBIT
New Hanover			
Habitat	Acres at Start:	Acres Remaining	U-92C
SPH/BLH Restoration (1:1) Enhancement, Preservation	11	0	11
TOTAL		0	



FIGURE 1 - Site Location Map

## **2.0 Hydrology**

### **2.1 Success Criteria**

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology states that the area must be inundated or saturated (within 12" of the surface) by surface or ground water for a consecutive 12.5% of the growing season. Areas inundated less than 5% of the growing season are always classified as non-wetlands. Areas inundated between 5% - 12.5% of the growing season can be classified as wetlands depending upon factors such as the presence of hydrophytic vegetation and hydric soils.

The growing season in New Hanover County begins February 27 and lasts until November 26. These dates correspond to a 50% probability that air temperature will drop to 28° F or lower after February 27 and before November 26.<sup>1</sup> Thus the growing season is 271 days; optimum hydrology requires 12.5% of this season, or 34 days. Local climate must represent average conditions for the area.

### **2.2 Hydrologic Description**

Three monitoring wells, two surface gauges, and one rain gauge were installed in March of 1998 (Figure 2). Because of the amount of surface water on the site, each groundwater well was installed to record water levels both above and below ground level. Daily readings are taken throughout the growing season.

Appendix A contains a plot of the water depth for each monitoring well and surface gauge. Monitoring results are shown from February 27 to November 26. Daily precipitation data is provided on each graph.

### **2.3 Results of Hydrologic Monitoring**

#### **2.3.1 Site Data**

The maximum number of consecutive days that the groundwater was within twelve inches of the surface was determined for each well. This number was converted into a percentage of the 271-day growing season. Because it is uncertain if all wetlands impacted by NCDOT highway projects meet the 12.5% criteria, the monitoring well results are segmented into percentage ranges. Table 1 presents the monitoring results for the 2001 growing season as a range of percentages, actual percentage, and success dates of the longest hydroperiod on the site

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<sup>1</sup> Soil Conservation Service, Soil Survey of New Hanover County, North Carolina, 1977.

Table 1. HYDROLOGIC MONITORING RESULTS

Monitoring Well	< 5%	5% - 8%	8% - 12.5%	> 12.5%	Actual %	
SB-1				✓	100	Feb 27 – Dec 6
SB-3				✓	100	Feb 27 – Dec 6
SB-5				✓	92.6	Feb 27 – Dec 6

The three well sites recorded the water table within 12 inches of the surface for more than 12.5% of the growing season. The surface water gauges indicated a consistent presence of surface water throughout the growing season. Figure 3 is a graphic representation of the 2001 monitoring results.

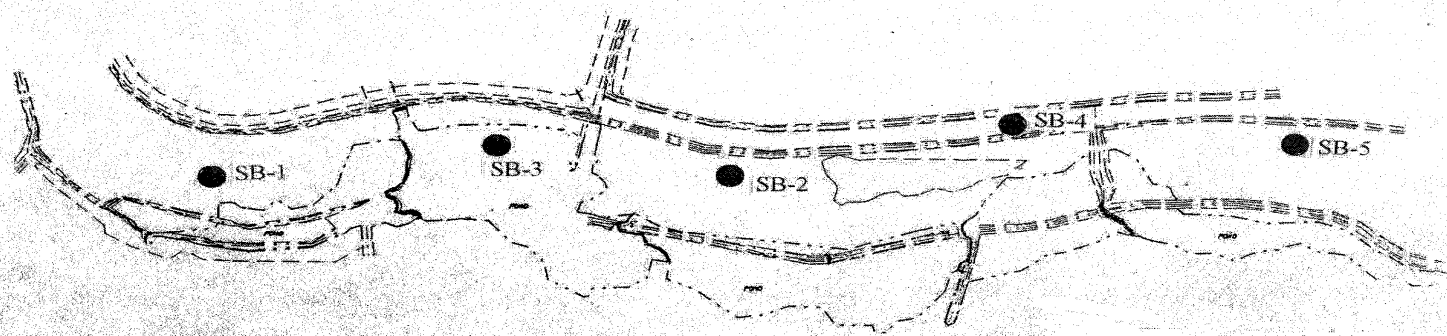
### 2.3.2 Climatic Data

Figure 4 represents an examination of the local climate in comparison with historical data to determine if 2001 rainfall falls within the average rainfall range of the area. The historical data was provided by the National Climatic Data Center; the recent rainfall data was provided by the on-site rain gauge.

March and June were the two months that experienced greater than average rainfall for the Wilmington area. Monthly rainfall totals for the majority of the growing season were within or below the average monthly range.

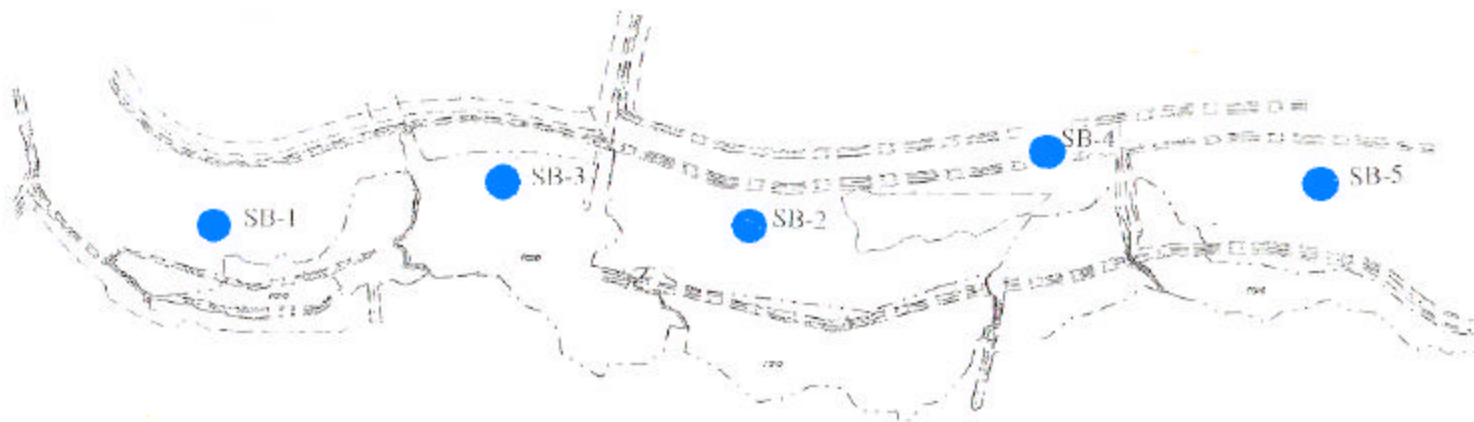
## 2.4 Conclusions

The Spring Branch Mitigation site met the hydrologic success criteria during 2001. The hydrologic monitoring results were consistent with results from 1999 and 2000, with the soil saturation at the surface or inundation of the site throughout the majority of the growing season.



- SB-1 GROUNDWATER GAUGE
- SB-2 SURFACEWATER GAUGE
- SB-3 GROUNDWATER GAUGE
- SB-4 SURFACEWATER GAUGE
- SB-5 GROUNDWATER GAUGE

FIGURE 2  
SPRING BRANCH  
GAGE LOCATION MAP



Spring Branch Monitoring Gauges

- Less than 5%
- 5% - 8%
- 8% - 12.5%
- Greater than 12.5%

FIGURE 3  
Spring Branch Mitigation Site  
2001 Hydrologic Monitoring Results

2001 Spring Branch 30 - 70 Percentile Graph

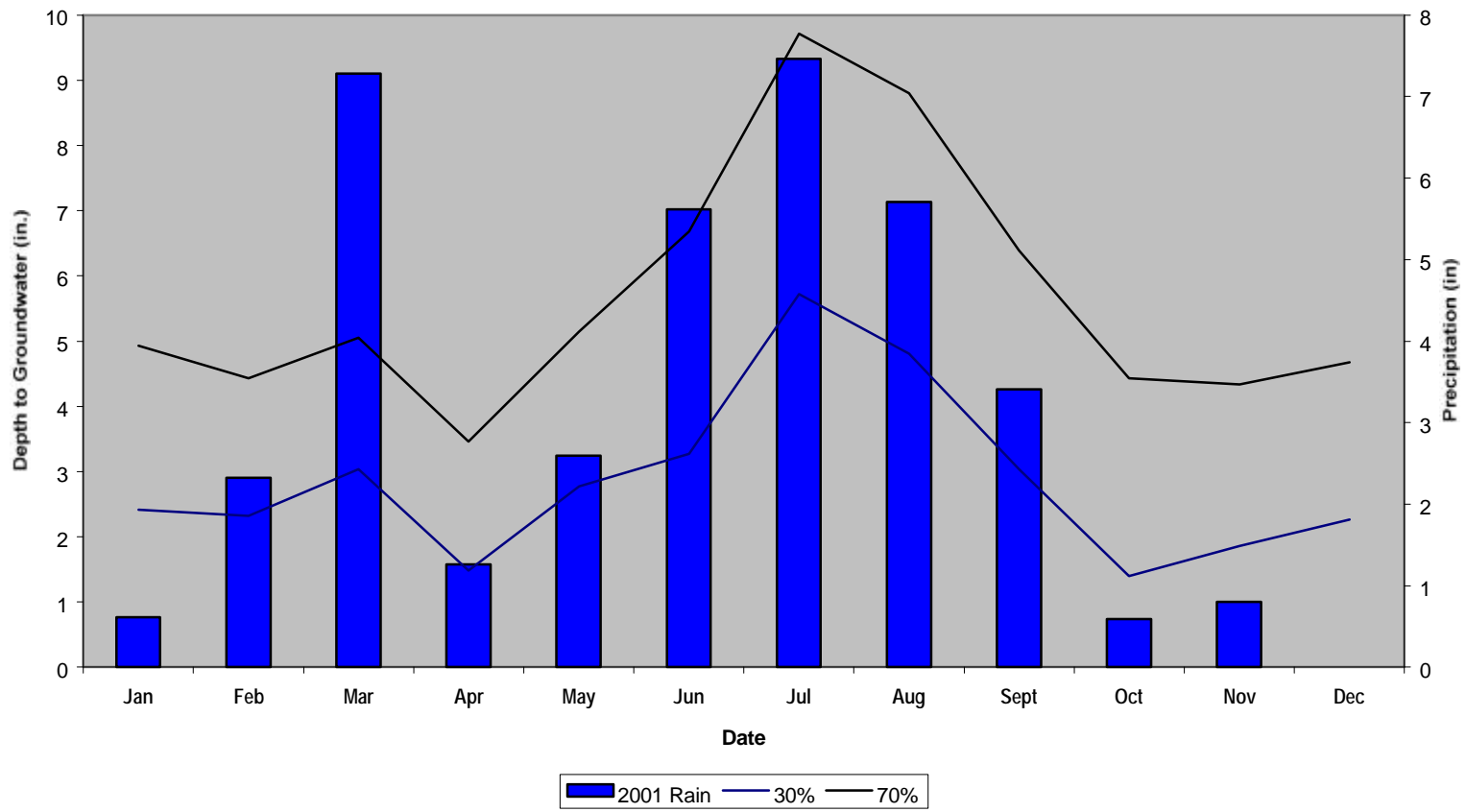


FIGURE 4

### 3.0 Vegetation: Spring Branch Mitigation Site

#### 3.1 Success Criteria

Success Criteria states that there must be a minimum of 320 trees per acre surviving for three consecutive years. NCDOT has agreed to monitor this site for 5 years or until success criteria is met. The required survival criterion will decrease by 10% per year after the third year of vegetation monitoring (i.e., for an expected 290 stems per acre for year 4, and 260 stems per acre for year 5).

#### 3.2 Description of Species

The following tree species were planted in the Wetland Restoration Area:

- Nyssa aquatica*, Tupelo Gum
- Quercus lyrata*, Overcup Oak
- Taxodium distichum*, Bald Cypress
- Quercus pagoda*, Cherrybark Oak
- Cephalanthus occidentalis*, Buttonbush

#### 3.3 Results of Vegetation Monitoring (4 year)

Table 2. Vegetation Monitoring Results

Plot # (Type)	Baldcypress	Tupelo Gum	Buttonbush	Overcup Oak	Total (4 year)	Total (at planting)	Density (Tree/Acre)
1 (BLH)	2	22			24	29	563
2 (BLH)	8	19	2		29	44	448
3 (BLH)	11	6		4	21	40	357
4 (BLH)	8	21	2	1	32	37	588
<b>AVERAGE DENSITY</b>							<b>489</b>

**Site Notes:** Other species noted: black willow, *Juncus* sp., *Cyperus* sp., cattail, smartweed, woolgrass, *Pluchea* sp., cardinal flower, and *Bidens* sp. 4" of standing water noted in Plot 1. 8" to 20" of standing water noted in Plot 2. 10" to 20" of standing water noted in Plot 3. 6" to 20" of standing water noted in Plot 4. Several oaks noted outside of Plot 2 in higher elevations. Beaver activity was noted on site. Trees do not appear to have been damaged. Beaver dam was removed by NCDOT in October 2001.

### 3.4 Conclusions

A total of 9.5 acres on this site involved tree planting. Four vegetation-monitoring plots were established in the planting area. The 2001 vegetation monitoring of these plots revealed an average density of 489 trees per acre, which is well above the success criteria requirement of 320 trees per acre.

SPRING BRANCH MITIGATION SITE  
 New Hanover County  
 Photo and Plot Locations  
 2001

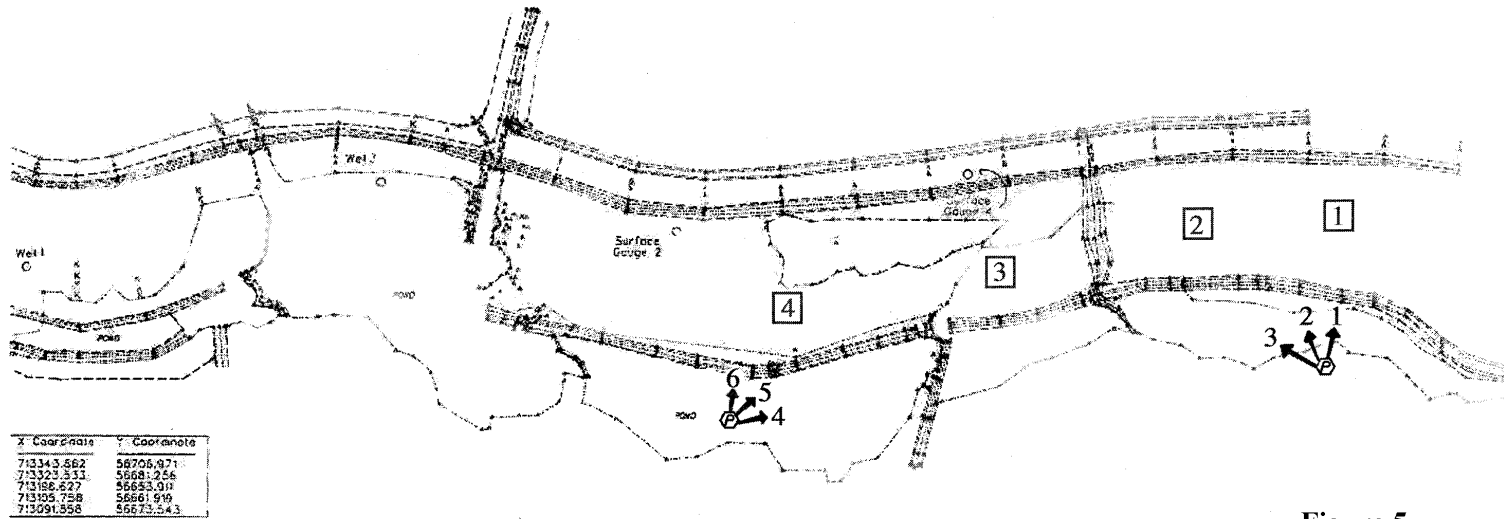


Figure 5

#### 4.0 Overall Conclusions/ Recommendations

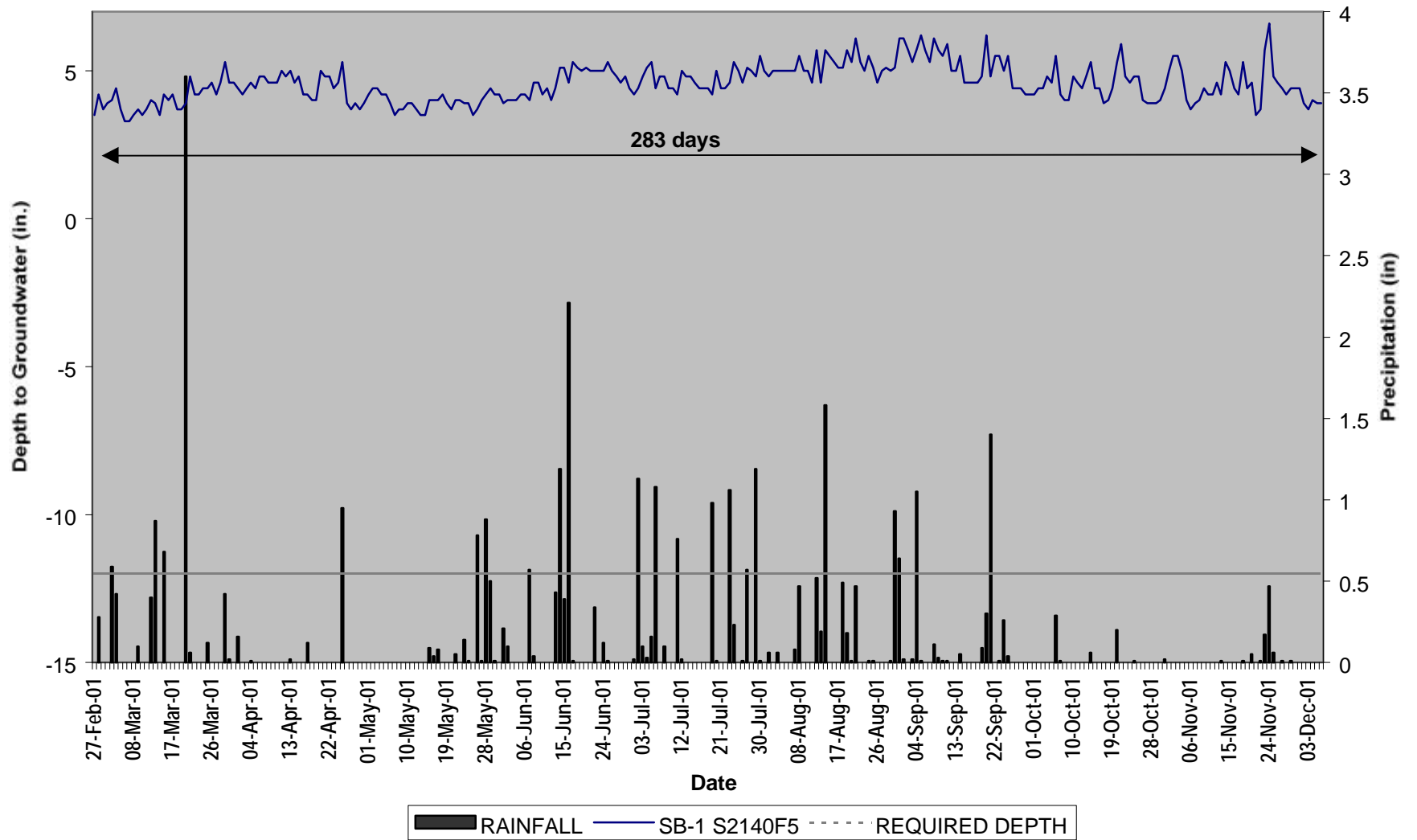
Though originally proposed for a three-year monitoring period, it was agreed to modify the monitoring period to five years. During the fourth year of monitoring, the Spring Branch Site showed saturation or inundation for the entire season. Vegetation monitoring yielded an average density of 489 trees per acre.

Based on these results, NCDOT recommends that monitoring be continued. The site has met the hydrological and vegetative success criteria for four consecutive years, and the site will be monitored for the fifth year in 2002 to determine success.

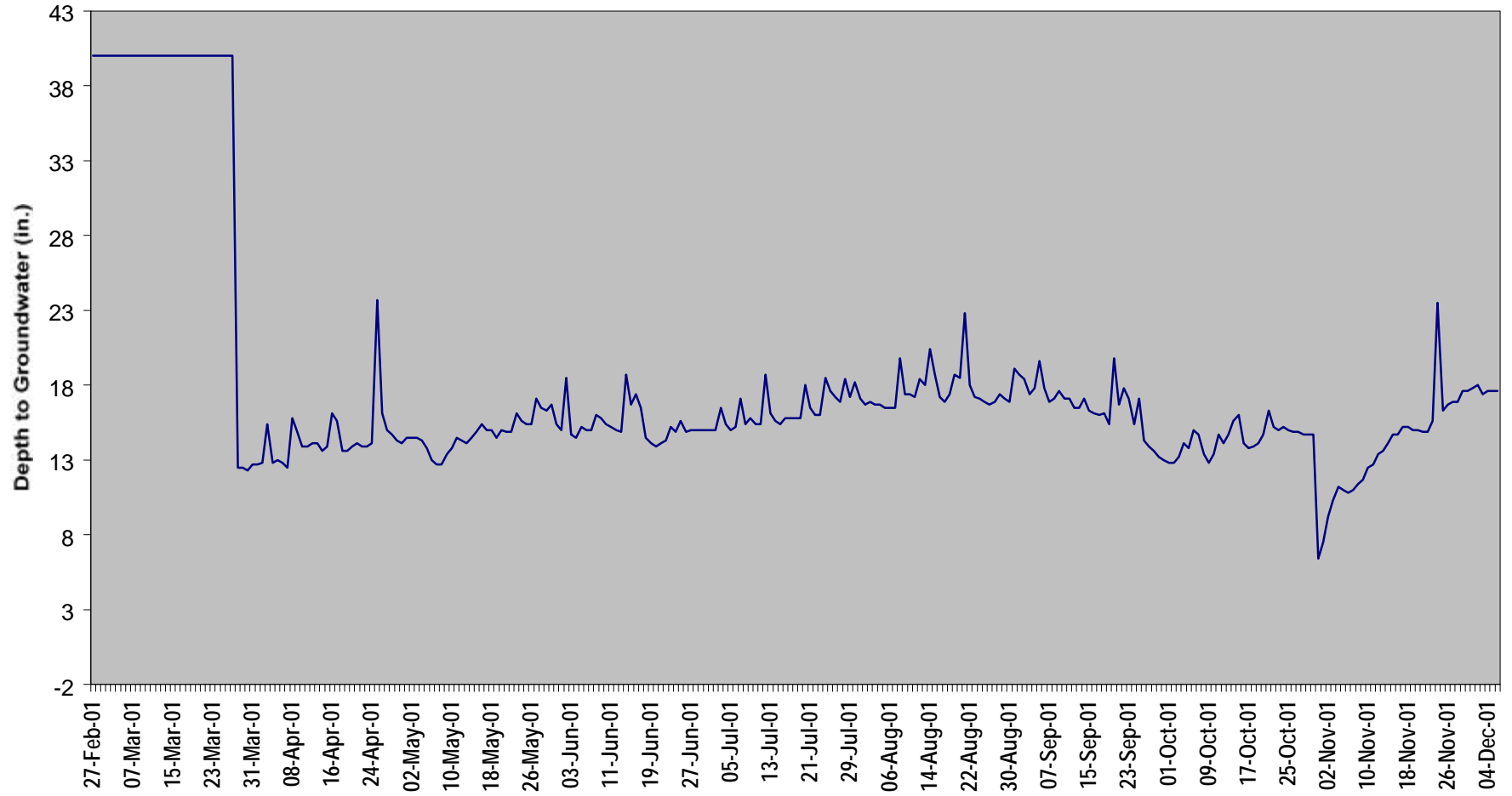
## **APPENDIX A**

### **Depth to Groundwater / Surfacewater Plots**

### 2001 Spring Branch SB-1



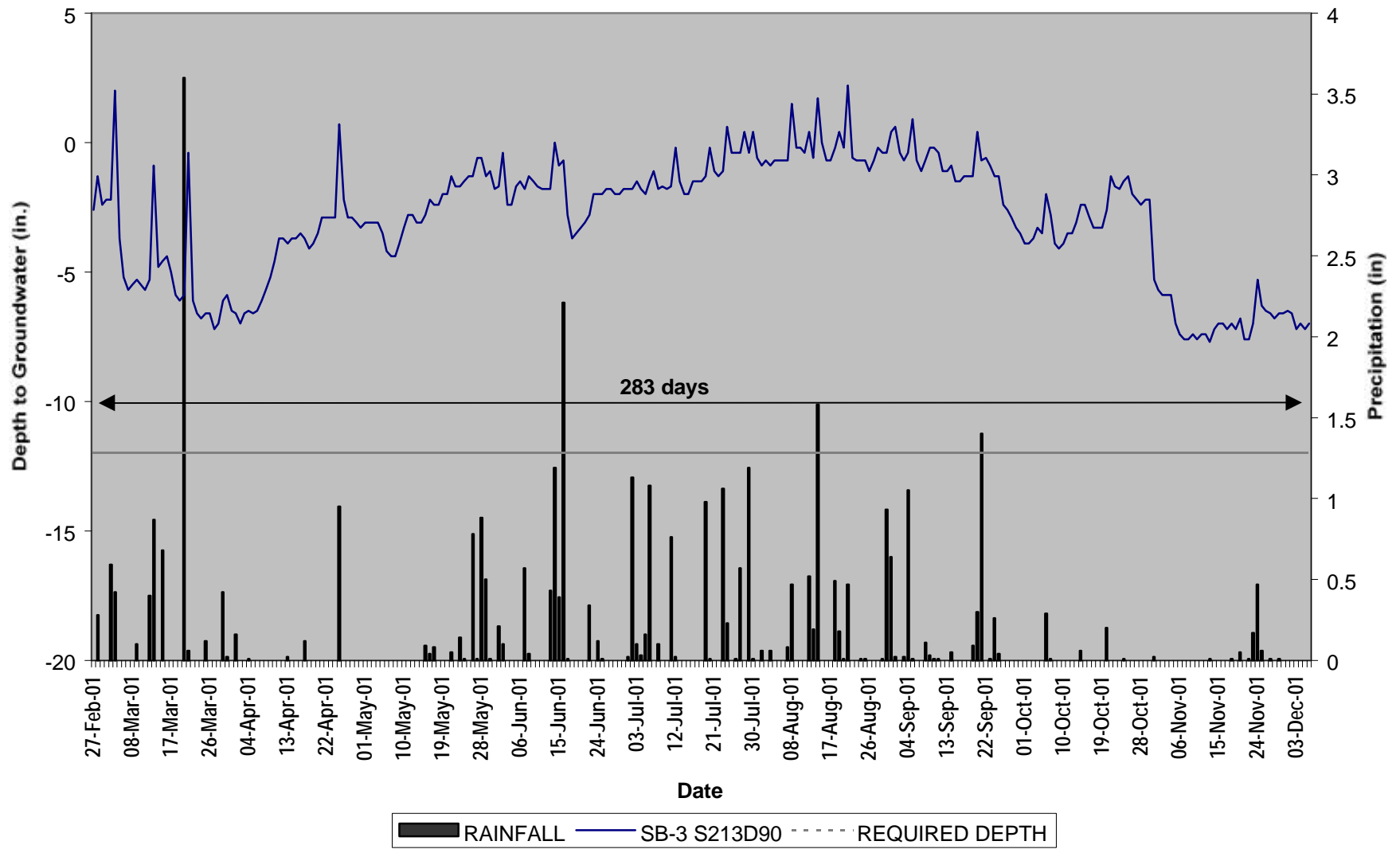
### 2001 Spring Branch SB-2



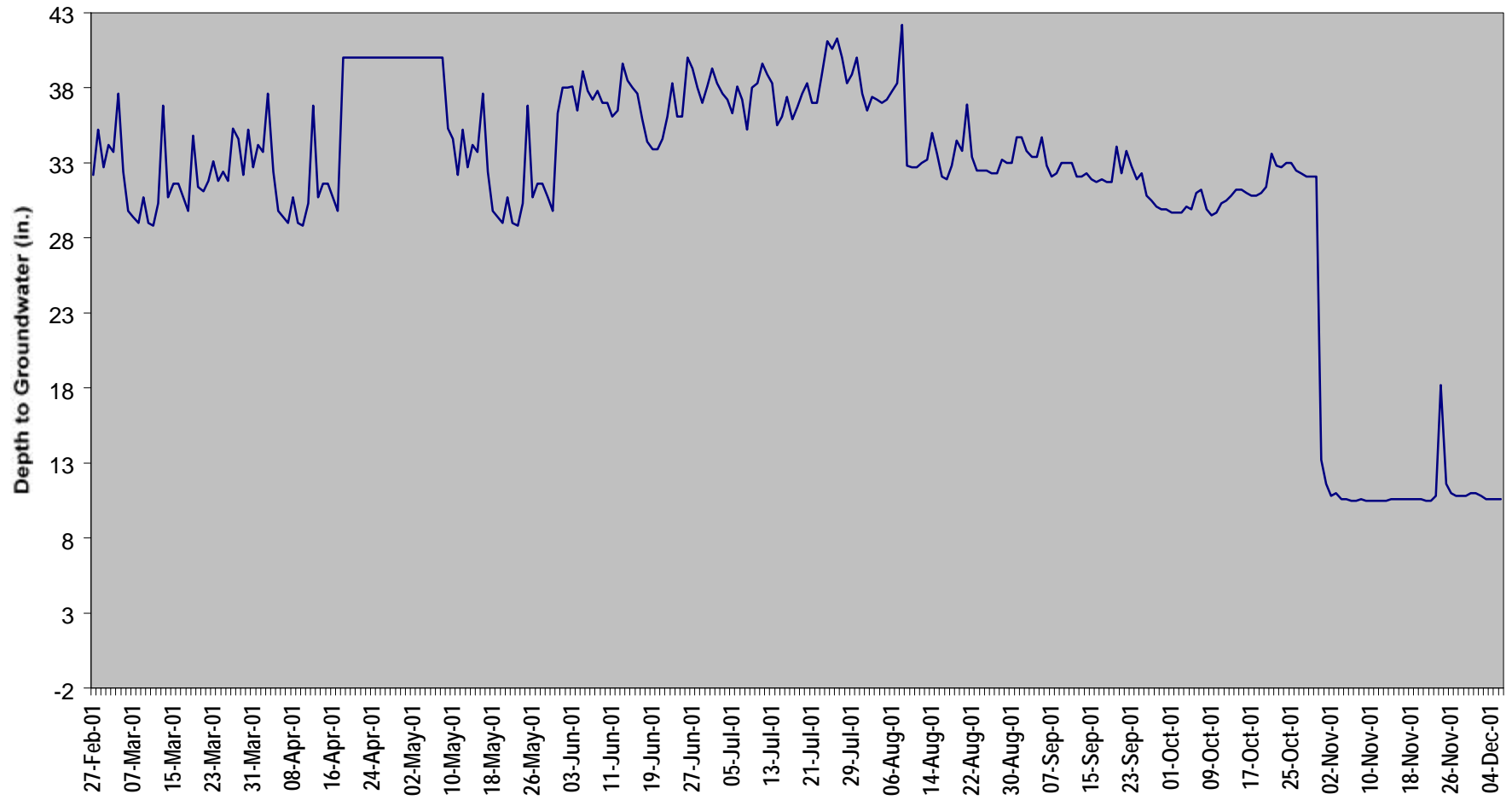
Date

— SB-2 S2140B3

### 2001 Spring Branch SB-3

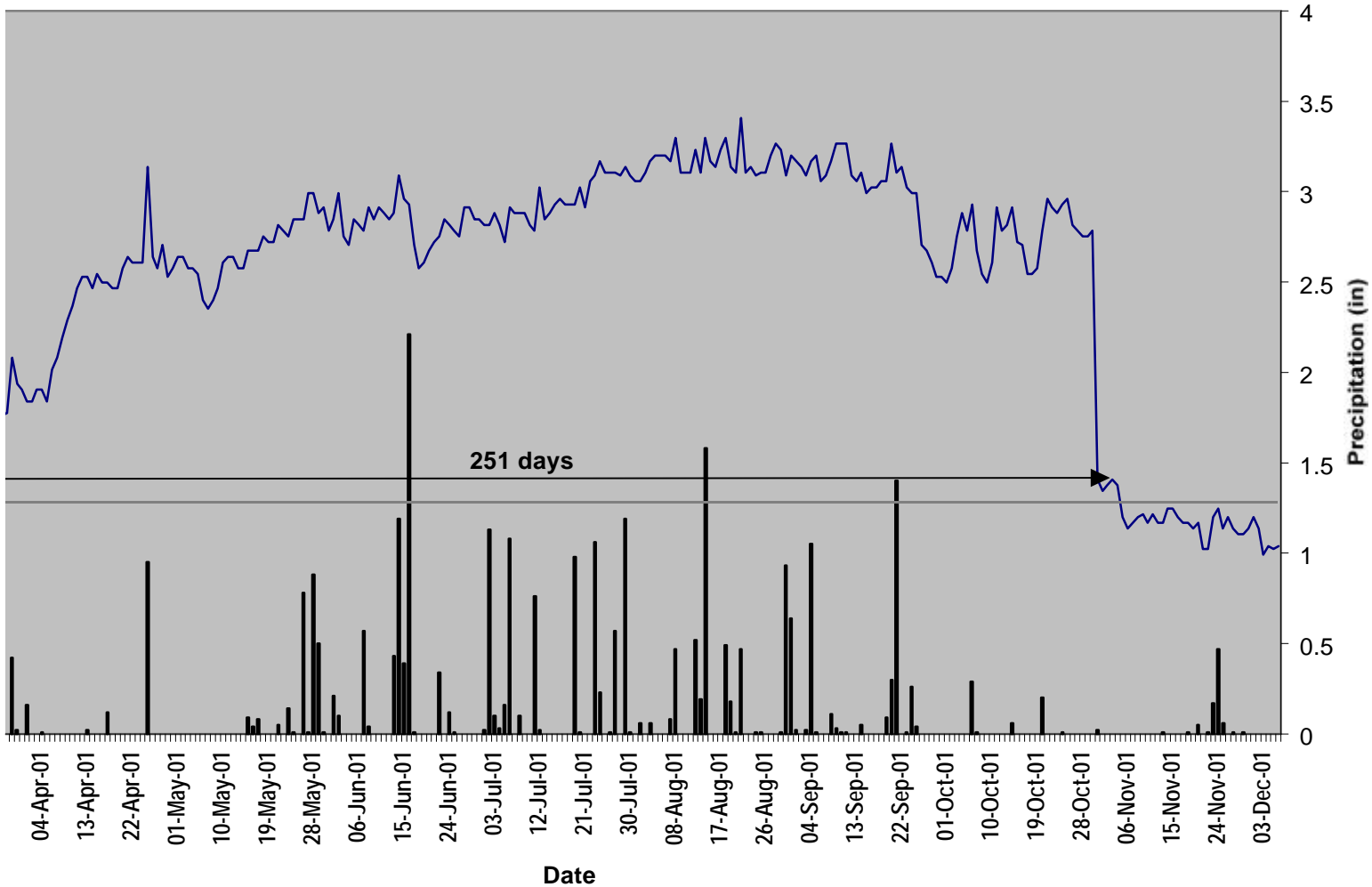


### 2001 Spring Branch SB-4



— SB-4 S317335

# 2001 Spring Branch SB-5



■ RAINFALL    — SB-5 S2140E9    - - - - - REQUIRED DEPTH

## **APPENDIX B**

### **Site Photos**

# Spring Branch



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

(Photograph locations are shown on Figure 5)