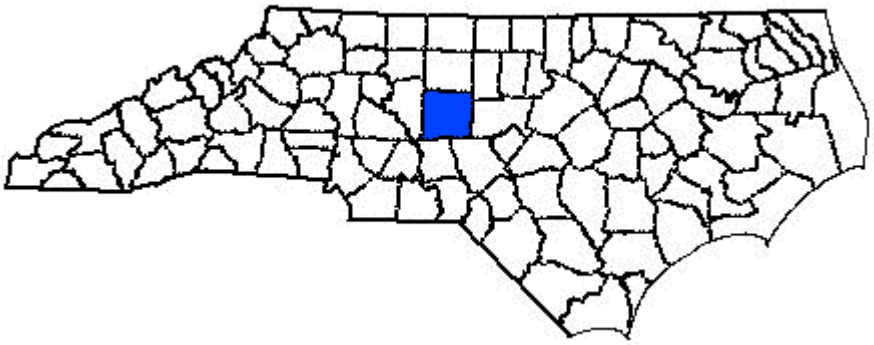
ANNUAL REPORT FOR 2003



Sandy Creek Mitigation Site
Randolph County
Project No. 8.U492301
TIP no. I-2402WM

Prepared By:
Office of Natural Environment & Roadside Environmental Unit
North Carolina Department of Transportation
December 2003

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

The following report summarizes the monitoring activities that have occurred in the past year at the Sandy Creek Mitigation Site. This site was constructed in 2000. Monitoring activities in 2003 represent the third year of monitoring following construction. The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the project is deemed successful.

The site is monitored with six groundwater-monitoring gauges, one rain gauge, and three vegetation plots.

For 2003, rainfall data has been collected by an onsite rain gauge. Also, daily rainfall data recorded from a rain gauge maintained by the NC State Climate Office in Randleman, NC was used for comparison.

Hydrologic monitoring indicated that the entire site is meeting the success criteria. All six monitoring gauges exceeded the jurisdictional wetland criteria of saturation within twelve inches of the surface for 12.5% of the growing season. Three of the gauges recorded saturation for 100% of the monitoring period. The 2003-monitoring year experienced above average rainfall.

The three vegetation-monitoring plots revealed an average density of 522 trees per acre. This average is well above the minimum success criteria of 260 trees per acre.

NCDOT will continue to monitor the Sandy Creek Mitigation Site for hydrology and vegetation.

1.0 INTRODUCTION

1.1 Project Description

The Sandy Creek Mitigation Site is located approximately four miles southwest of Liberty in Randolph County (Figure 1). It is situated on the south floodplain of Sandy Creek, 1.5 miles upstream of SR 2442. Prior to construction, the site was a nearly level floodplain with ditching and raised beds. It had been converted for hay production.

The site encompasses 12.9 acres, of which 10 acres were planted. Originally, it was designed as a mitigation site primarily for the Greensboro Outer Loop (I-2402). However, it is now intended to provide mitigation for the Sanford Bypass (R-2417, COE Action I.D. No. 199502036).

1.2 Purpose

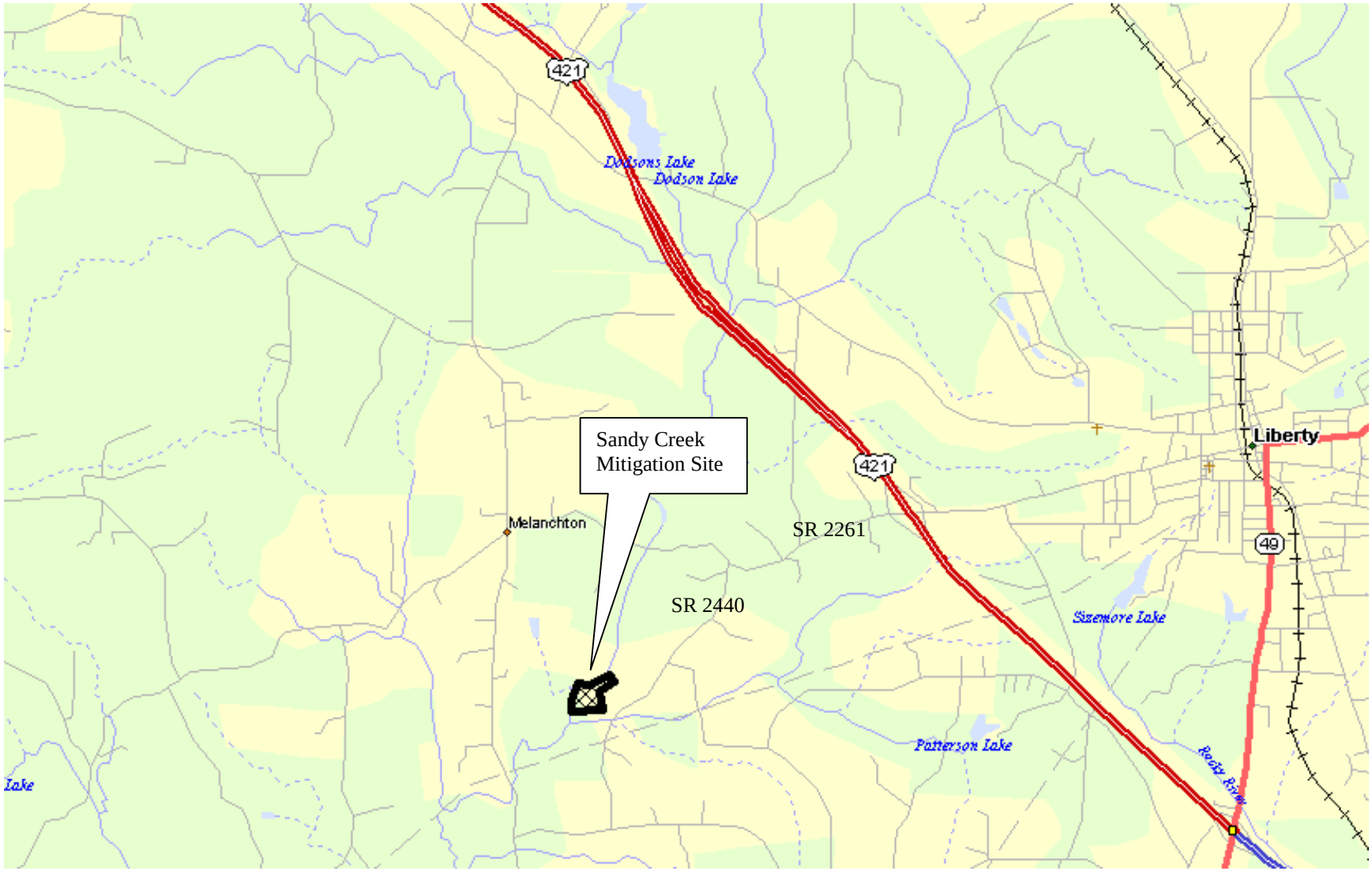
In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years or until success criteria are fulfilled. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrologic conditions and vegetation survival. The following report details the results of hydrologic and vegetative monitoring during 2003 at the Sandy Creek Mitigation Site.

Activities in 2003 reflect the third year of monitoring following the construction. 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

June 2000	Construction Completed
March 2001	Tree Planting
March-November 2001	Hydrologic Monitoring (Year 1)
July 2001	Vegetation Monitoring (Year 1)
March 2002	Supplemental Planting
March-November 2002	Hydrologic Monitoring (Year 2)
June 2002	Vegetation Monitoring (Year 2)
March-November 2003	Hydrologic Monitoring (Year 3)
June 2003	Vegetation Monitoring (Year 3)

Figure 1. Sandy Creek Mitigation Site Location



1.4 Debit Ledger

Table 1. SANDY CREEK MITIGATION SITE DEBIT LEDGER

Site Habitat	Mitigation Plan			TIP Debit	TIP Debit
	Acres at Start	Acres Remaining	% Remaining	R-2417	U-2524 BA/BB
BLH Restoration	10	4.3	43%	2.2	3.5

2.0 HYDROLOGY

2.1 Success Criteria

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology state that the area must be inundated or saturated (within 12" of the surface) by surface or ground water for at least 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.

There is no published soil survey for Randolph County. The growing season for Moore County (directly southeast of Randolph County) was determined to be the best comparison to the Randolph County growing season. The Moore County growing season begins March 23rd and ends November 7th. The dates correspond to a 50% probability that temperatures will drop to 28^{o} F or lower after March 23 and before November 7. The growing season is 228 days; therefore, the optimum duration for wetland hydrology is 29 days. Local climate must represent average conditions for the area.

2.2 Hydrologic Description

Historically, wetlands on the tract were created by a combination of rainfall, runoff, and groundwater seepage from upgradient areas. After an extensive study of the site's hydrology, it was concluded that the placement of impermeable plugs along drainage features and removal of the raised beds would elevate the groundwater to a level that would saturate the soil stratum within the required twelve inches. It was predicted that this, in addition to surface water and runoff, would be sufficient to restore wetland hydrology.

Six groundwater-monitoring gauges were installed in February 2001 (Figure 2). The automatic monitoring gauges record daily readings of groundwater depth.

Rainfall data was collected by an onsite rain gauge. Also, daily rainfall data recorded from a rain gauge maintained by the NC State Climate Office in Randleman, NC was used for comparison.

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 gauge. This number was converted into a percentage of the 228-day growing season. Table 2 presents the 2003 results.

Appendix A contains a graph of the groundwater depth for each monitoring gauge. The maximum number of consecutive days is noted on each graph. Local precipitation events are included on each graph as bars.

Table 2. 2003 HYDROLOGIC MONITORING RESULTS

Monitoring Gauge	< 5%	5 - 8%	8 - 12.5%	> 12.5%	Actual %	Dates Meeting Success
SC-G1				✕	36.8	March 24-June 15
SC-G2				✕	100	March 24-Nov 6
SC-G3				✕	35.1	March 24-June 11
SC-G4				✕	100	March 24-Nov 6
SC-G5				✕	39.9	August 8-Nov 6
SC-G6				✕	100	March 24-Nov 6

The 2003 year experienced an above average rainfall year.

Specific Gauge Problems:

- Gauges (G1) and (G3) could not be downloaded after June due to inundation at the gauge locations.

During the 2003-monitoring year, standing water was reported at the majority of the gauge locations. This increased the difficulty involved in downloading the gauges.

Figure 3 is a graphical representation of the hydrologic monitoring results for this year. A blue dot represents wetland hydrology for more than 12.5% of the growing season; a red dot indicates hydrology between 8% and 12.5%; and a green dot represents hydrology between 5% and 8%.

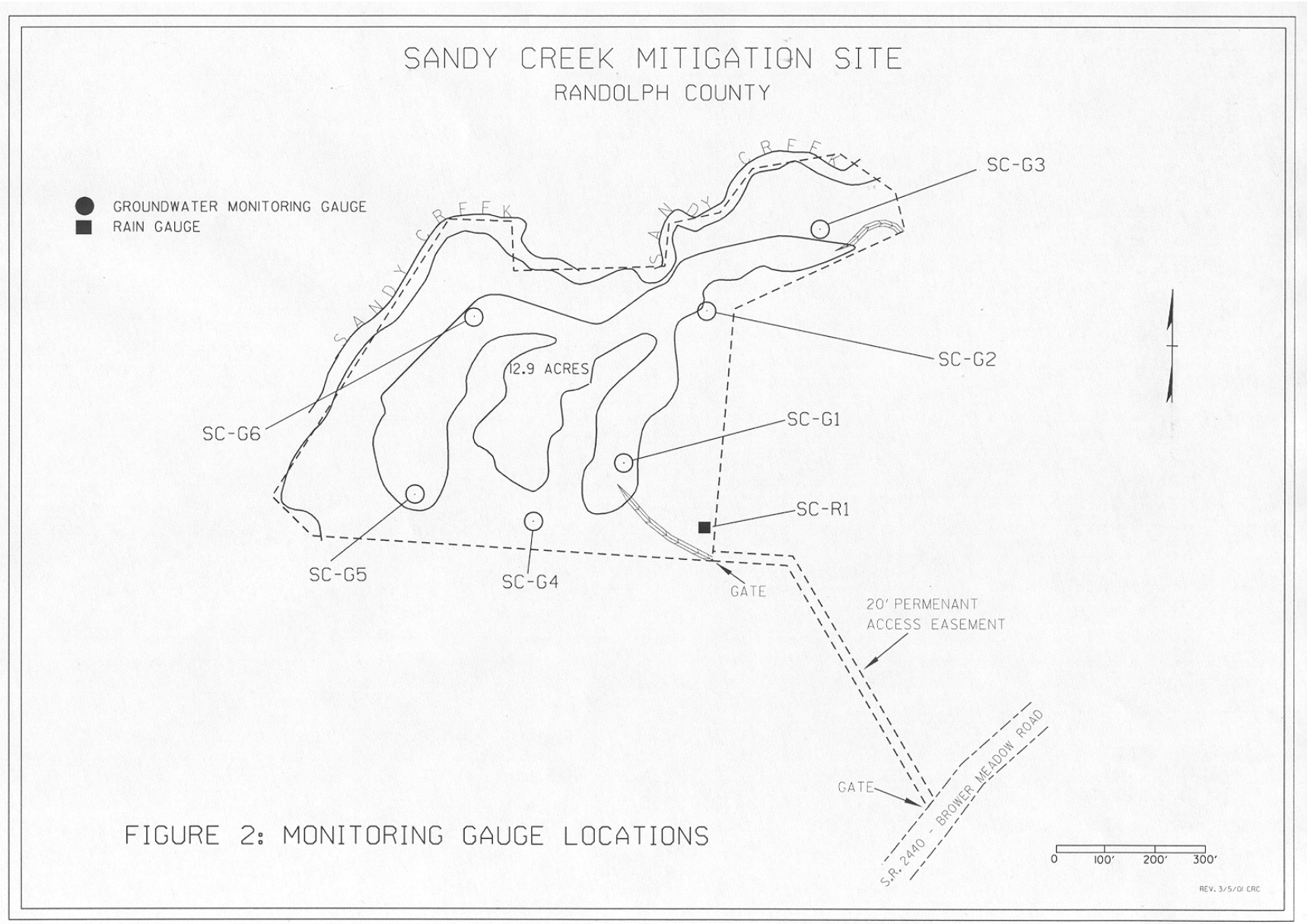
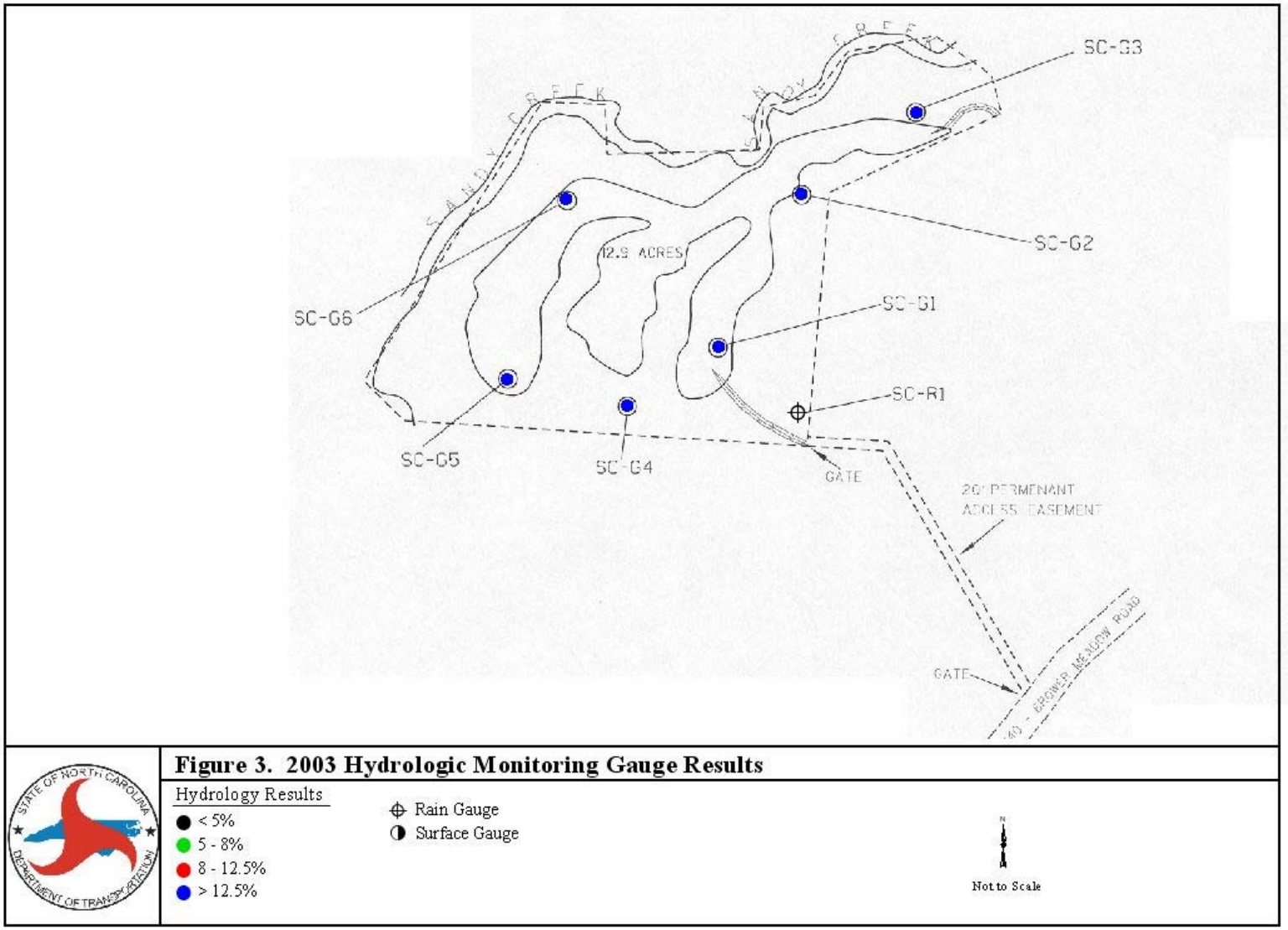


FIGURE 2: MONITORING GAUGE LOCATIONS

FIGURE 3. 2003 HYDROLOGIC RESULTS



2.3.2 Climatic Data

Figure 4 represents an evaluation of the 2003 rainfall in comparison with historical rainfall data in order to determine whether 2003 was “average” in terms of precipitation. The historical rainfall data was collected from 1972 through 2003 (30 years). No rainfall data was collected from the weather station for September-November 2003. All rainfall data used in this analysis was obtained from the NC State Climate Office, Randleman weather station.

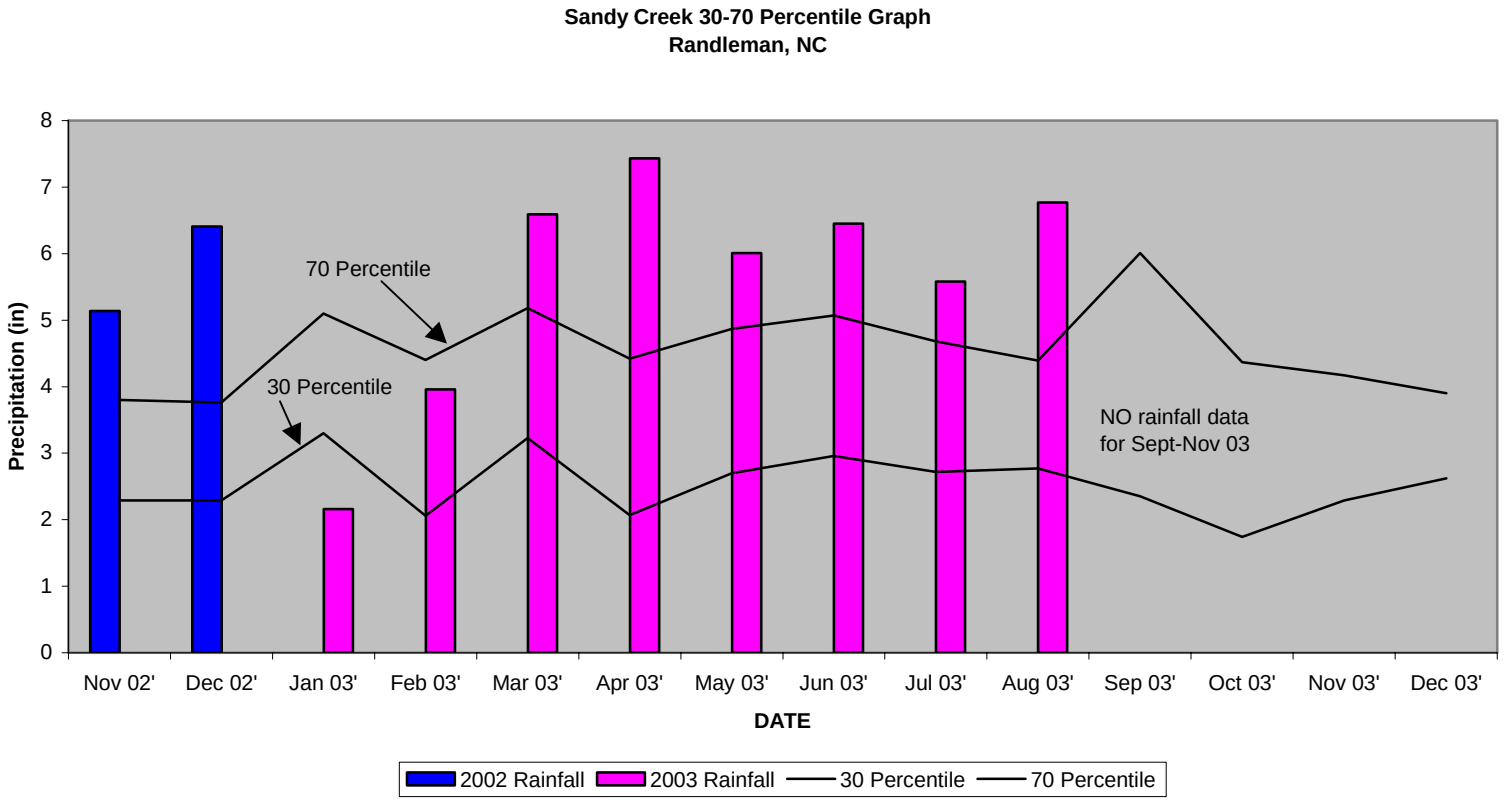
For the 2003-year, the only month to experience below average rainfall was January. February recorded average rainfall for the site. November (02’), December (02’), March, April, May, June, July, and August experienced above average rainfall. No data is available for the months of September-November 2003. Overall, 2003 experienced an above average rainfall year.

2.4 Conclusions

The 2003-monitoring year represents the third full growing season that the hydrologic data has been examined. All six monitoring gauges exceeded the jurisdictional wetland criteria of 12.5% of the growing season. The 2003 monitoring year experienced an above average rainfall year. Hydrologic monitoring has indicated that the site is consistently meeting the success criteria.

NCDOT will continue to monitor hydrology at the Sandy Creek Mitigation Site.

Figure 4: 30-70 Percentile Graph



3.0 VEGETATION: SANDY CREEK MITIGATION SITE (YEAR 3 MONITORING)

3.1 Success Criteria

Success criteria state that there must be a minimum of 260 trees per acre living for at least five consecutive years.

3.2 Description of Species

The following species were planted in the Wetland Restoration Area: Approximately 10 acres

Nyssa sylvatica var*. sylvatica*, Blackgum

Fraxinus pennsylvanica, Green Ash

Quercus phellos, Willow Oak

Betula nigra, River Birch

Quercus falcata var*. pagodaefolia*, Cherrybark Oak

Quercus nigra, Water Oak

Quercus falcata var*. falcata*, Southern Red Oak

Liriodendron tulipifera, Tulip Poplar

3.3 Results of Vegetation Monitoring

TABLE 3: **VEGETATIVE MONITORING RESULTS**

Plot #	Blackgum	Green Ash	Willow Oak	River Birch	Cherrybark Oak	Water Oak	Tulip Poplar	Southern Red Oak	Total (3 year)	Total (at planting)	Density (Trees/Acre)
1	2	19	10	10	4	2			47	56	571
2		16	8	11	1	1			37	55	457
3	5	12	7	13	5	4			46	58	539
								AVERAGE DENSITY			522

Site Notes: Other species noted: smartweed, fescue, barnyard grass, various grasses, sedges, jewelweed, volunteer sycamore, multiple volunteer green ash, fennel, horse-nettle, box elder, *Baccharis* sp., and sweetgum. Standing water was present on the majority of site at the time of monitoring.

3.4 Conclusions

Of the 12.9 acres on this site, approximately ten acres involved tree planting. There were three vegetation-monitoring plots established throughout the planting areas. Supplemental planting was performed in March 2002. The 2003 vegetation monitoring of the site revealed an average density of 522 trees per acre. This average is well above the minimum success criteria of 260 trees per acre.

NCDOT will continue vegetation monitoring at the Sandy Creek Mitigation Site.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

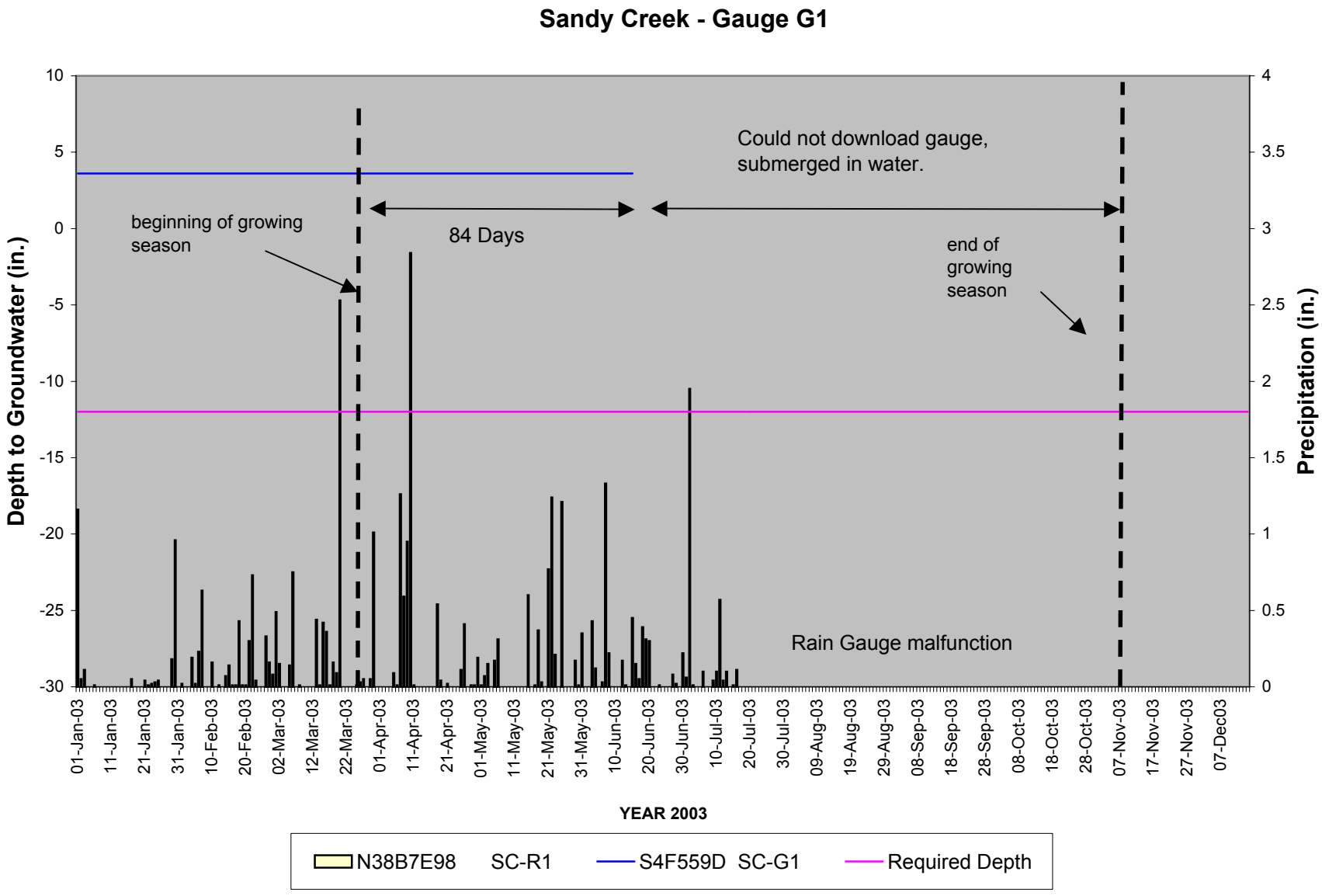
Hydrologic monitoring indicated that the entire site is meeting the success criteria. All six monitoring gauges exceeded the jurisdictional wetland criteria of saturation within twelve inches of the surface for 12.5% of the growing season. Three of the gauges recorded saturation for 100% of the monitoring period. The 2003-monitoring year experienced above average rainfall.

The three vegetation-monitoring plots revealed an average density of 522 trees per acre. This average is well above the minimum success criteria of 240 trees per acre.

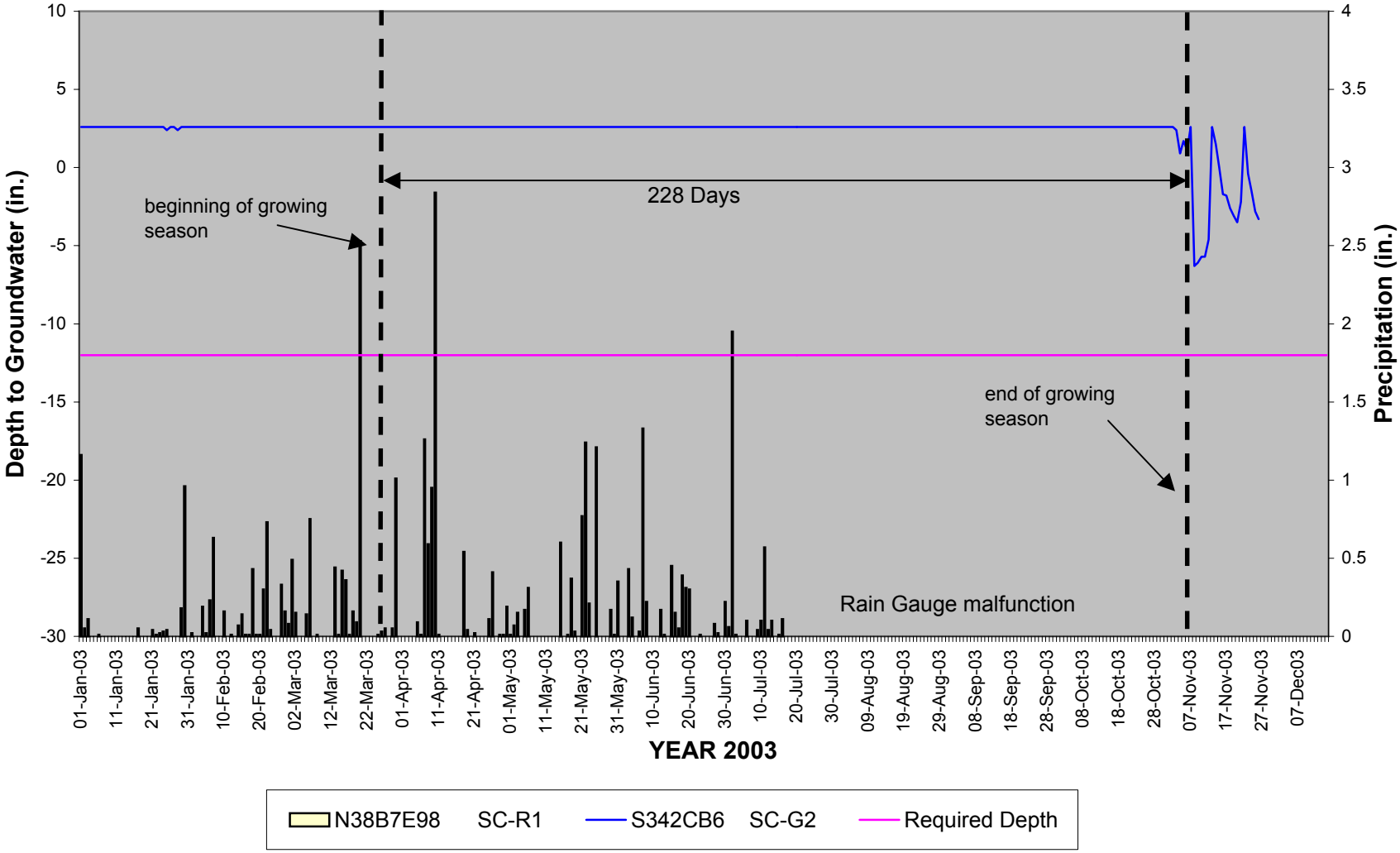
NCDOT will continue to monitor the Sandy Creek Mitigation Site for hydrology and vegetation.

APPENDIX A

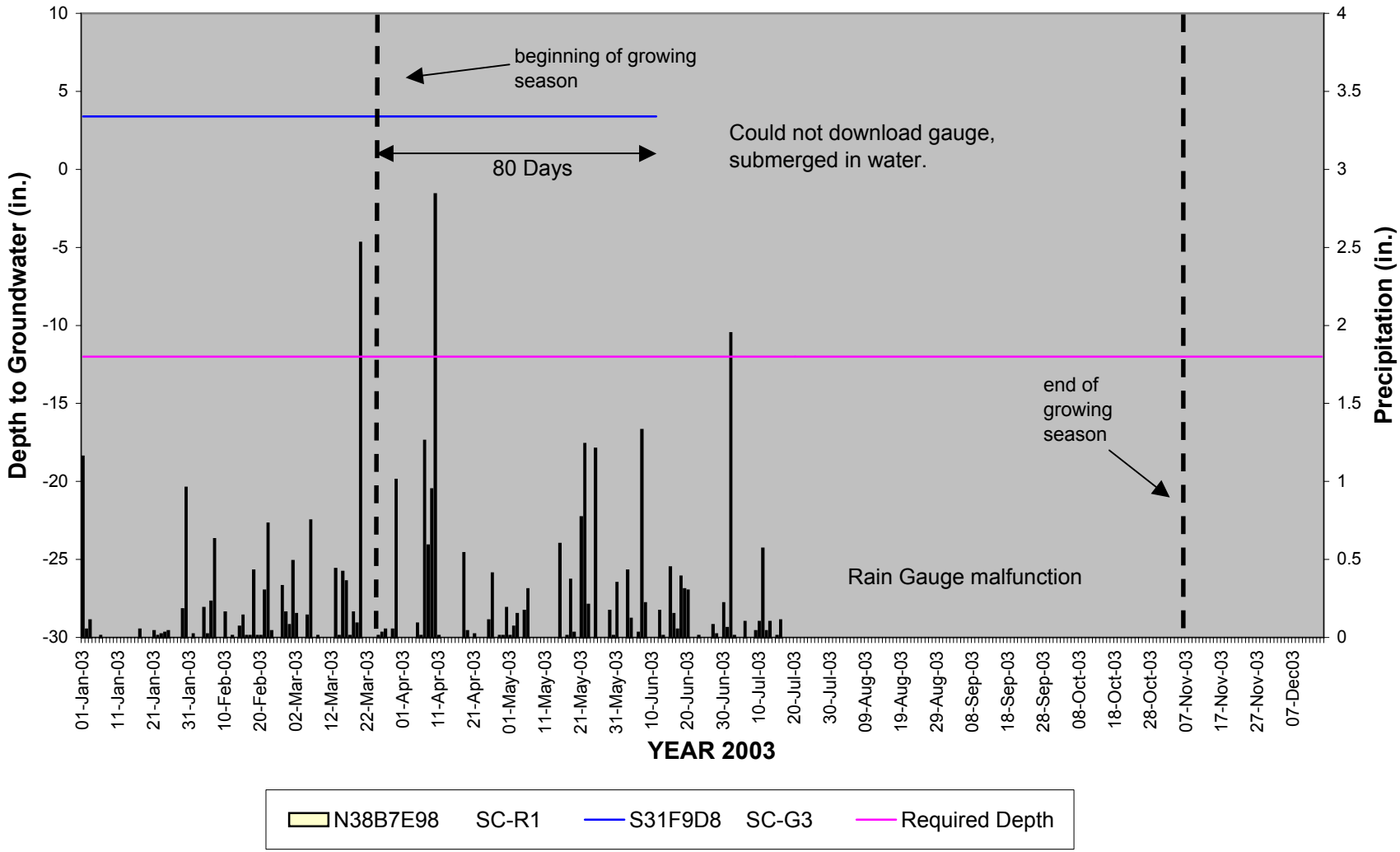
GAUGE DATA GRAPHS


Sandy Creek - Gauge G1
Depth to Groundwater (in.)
Precipitation (in.)
10
5
0
-5
-10
-15
-20
-25
-30
4
3.5
3
2.5
2
1.5
1
0.5
0
Could not download gauge, submerged in water.
beginning of growing season
84 Days
end of growing season
Rain Gauge malfunction
01-Jan-03
11-Jan-03
21-Jan-03
31-Jan-03
10-Feb-03
20-Feb-03
02-Mar-03
12-Mar-03
22-Mar-03
01-Apr-03
11-Apr-03
21-Apr-03
01-May-03
11-May-03
21-May-03
31-May-03
10-Jun-03
20-Jun-03
30-Jun-03
10-Jul-03
20-Jul-03
30-Jul-03
09-Aug-03
19-Aug-03
29-Aug-03
08-Sep-03
18-Sep-03
28-Sep-03
08-Oct-03
18-Oct-03
28-Oct-03
07-Nov-03
17-Nov-03
27-Nov-03
07-Dec03
YEAR 2003
N38B7E98 SC-R1
S4F559D SC-G1
Required Depth

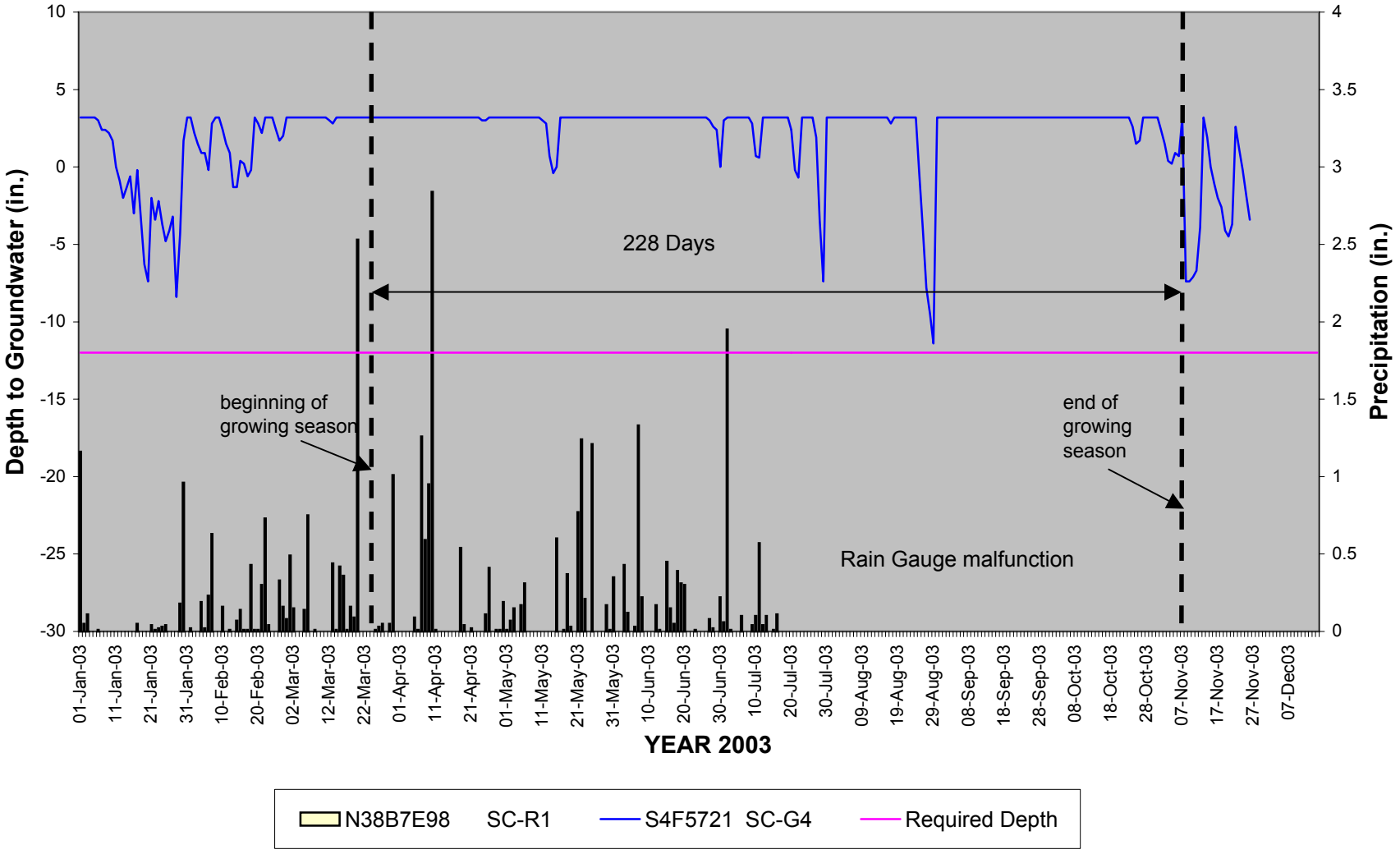
Sandy Creek - Gauge G2



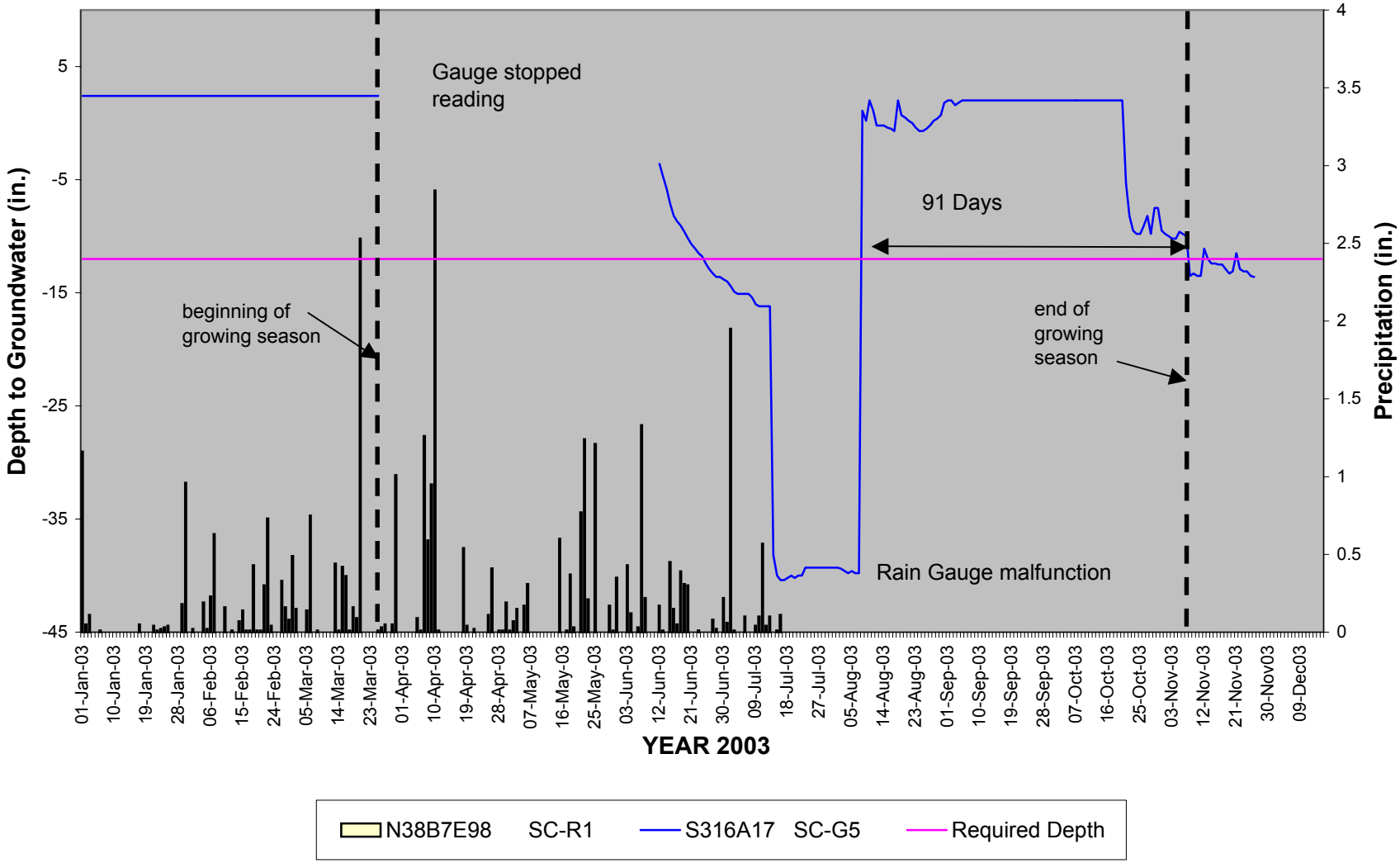
Sandy Creek - Gauge G3

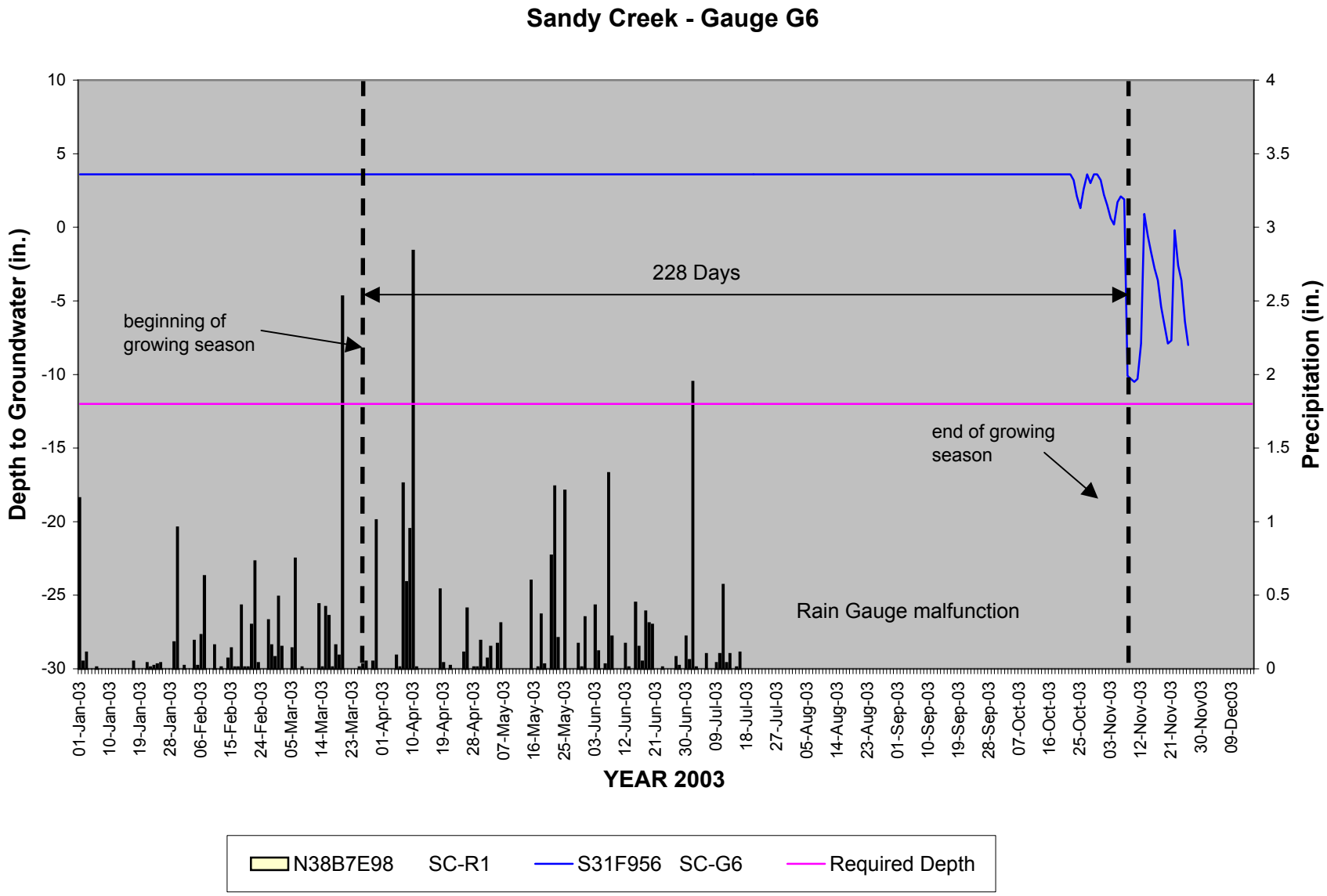


Sandy Creek - Gauge G4



Sandy Creek - Gauge G5

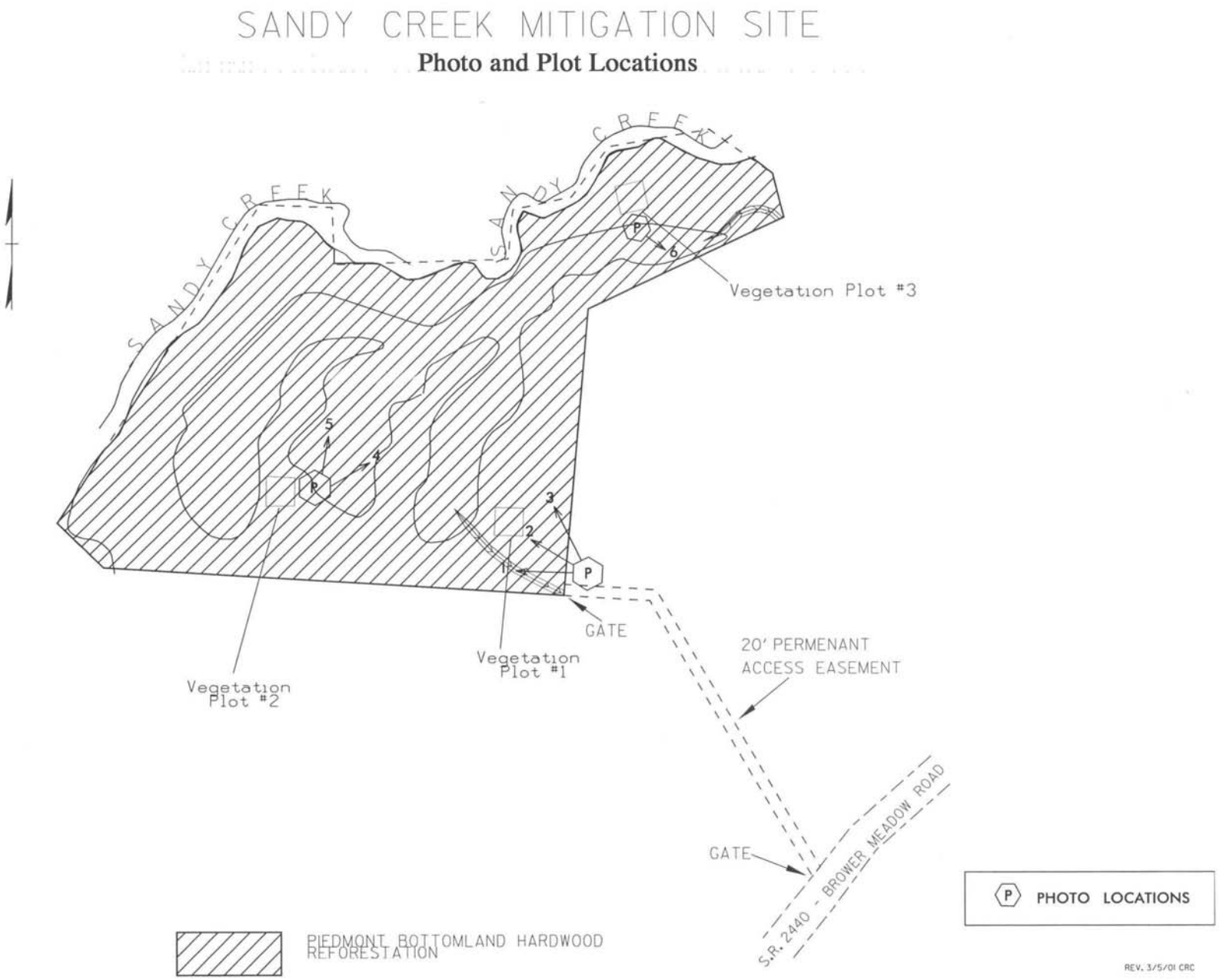



Sandy Creek - Gauge G6
Depth to Groundwater (in.)
Precipitation (in.)
YEAR 2003
228 Days
beginning of growing season
end of growing season
Rain Gauge malfunction
N38B7E98 SC-R1
S31F956 SC-G6
Required Depth

APPENDIX B

PHOTO AND VEGETATION PLOT LOCATIONS/SITE PHOTOS

Sandy Creek


SANDY CREEK MITIGATION SITE
Photo and Plot Locations
SANDY CREEK
SANDY CREEK
Vegetation Plot #3
Vegetation Plot #2
Vegetation Plot #1
GATE
20' PERMENANT ACCESS EASEMENT
GATE
S.R. 2440 - BROWER MEADOW ROAD
PHOTO LOCATIONS
PIEDMONT BOTTOMLAND HARDWOOD REFORESTATION
REV. 3/5/01 CRC

Sandy Creek

Photo 1

Photo 2

Photo 3

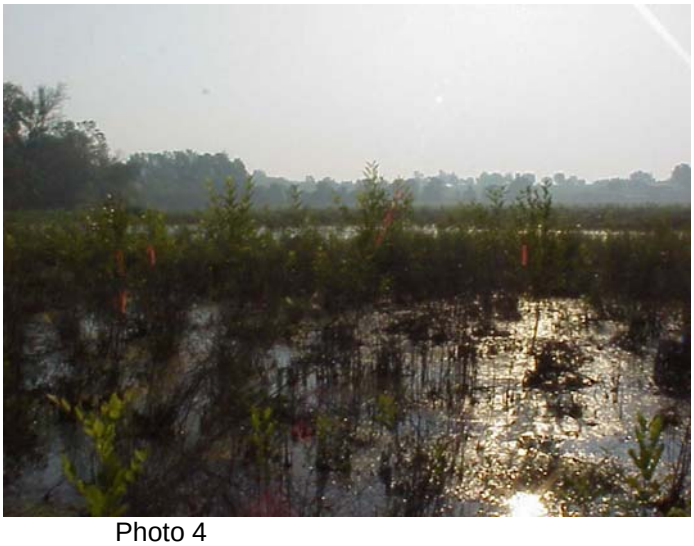


Photo 4

Photo 5

Photo 6

2003