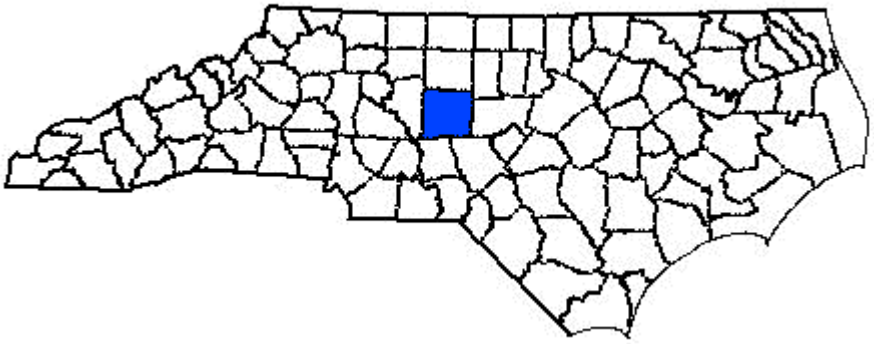
ANNUAL REPORT FOR 2001



SANDY CREEK MITIGATION SITE
RANDOLPH COUNTY
PROJECT NO. 8.U492301
TIP NO. I-2402WM

Prepared By:
Natural Systems Unit & Roadside Environmental Unit
North Carolina Department of Transportation
December 2001

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2001 REPORT – 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 2001 represent the first 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 contains six groundwater monitoring gauges, one rain gauge, and three vegetation plots.

For 2001, rainfall data has been acquired from 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 consistently meeting the success criteria. All six gauges met jurisdictional hydrologic success of at least 12.5% during the growing season.

Two of three vegetation monitoring plots indicated an average tree density of over 240 trees per acres. Average tree density across all three plots was 361 trees per acre.

Based on the monitoring results from the 2001 growing season, NCDOT recommends that monitoring continue.

1.0 INTRODUCTION

1.1 Project Description

The Sandy Creek Wetland Mitigation Site is located approximately four miles southwest of Liberty in Randolph County (Figure 1). It is sited 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, and was converted to hay production.

The site encompasses 12.9 acres, of which 10 acres were planted, and was designed originally 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 2001 at the Sandy Creek Mitigation Site.

Activities in 2001 reflect the first 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)

Figure 1. Sandy Creek Mitigation Site Location

1.4 Permit Related Requirements

The Sanford Bypass permit has not been completed so no special requirements currently exist for the Sandy Creek mitigation site.

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 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 23 and ends November 7. 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 upgradient areas. After an extensive study of the site's hydrology, it was concluded that placement of impermeable plugs along drainage structures 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 acquired from 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.

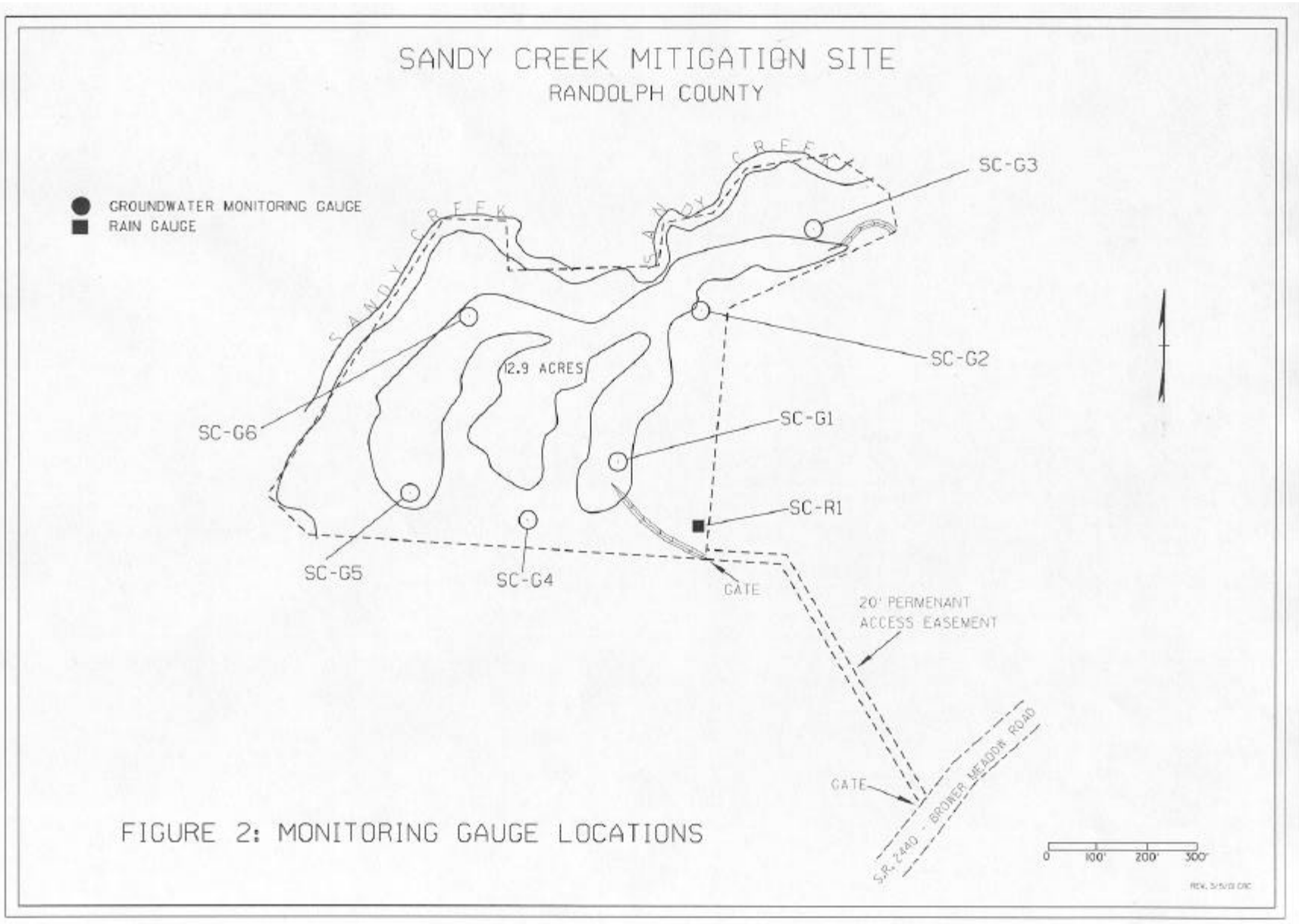


FIGURE 2: MONITORING GAUGE LOCATIONS

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 1 presents the 2001 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. Graph data determined to be erroneous was omitted; therefore, some gaps appear in the plots. Local precipitation events are included on each graph as bars.

Table 1
2001 HYDROLOGIC MONITORING RESULTS
(MARCH 17 – NOVEMBER 12)

Monitoring Gauge	< 5% (<12 dy)	5 - 8% (12-18 dy)	8 - 12.5% (19-29 dy)	> 12.5% (>30 dy)	Actual %	Dates Meeting Success
SC-G1				✓	12.7	3/23-4/20
SC-G2				✓	38.6	8/12-11/7
SC-G3				✓	21.1	9/21-11/7
SC-G4				✓	13.6	3/23-4/22
SC-G5				✓	100.0	3/23-11/7
SC-G6				✓	38.6	8/12-11/7

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 season; a red dot indicates hydrology between 8% and 12.5%; a green dot represents hydrology between 5% and 8%. It is this hydrologic data that will indicate success for the site.

For this period from March to November, all six gauges met jurisdictional hydrologic success of at least 12.5% during the growing season.

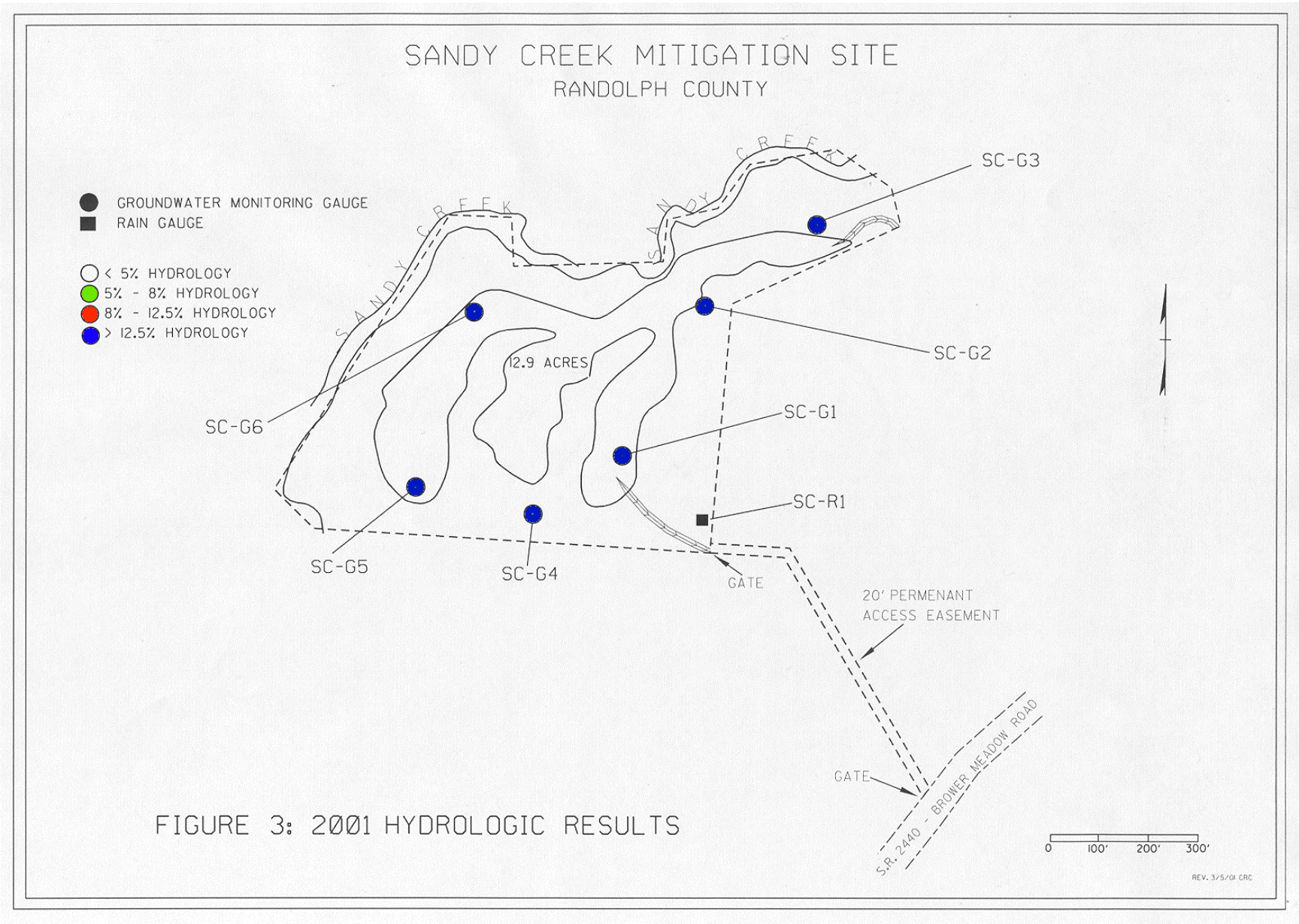


FIGURE 3: 2001 HYDROLOGIC RESULTS

2.3.2 Climatic Data

Figure 4 represents an examination of the local climate in comparison with historical data in order to determine whether 2001 was “average” in terms of climate conditions. The figure compares the rainfall from 2001 with that of historical rainfall (data collected between 1931 and 2001). All rainfall data was collected from the NC State Climate Office. The graph shows 2000 totals from December and 2001 rainfall totals through November 2001. Rainfall data for December 2001 will be presented in the 2002 Annual Monitoring Report.

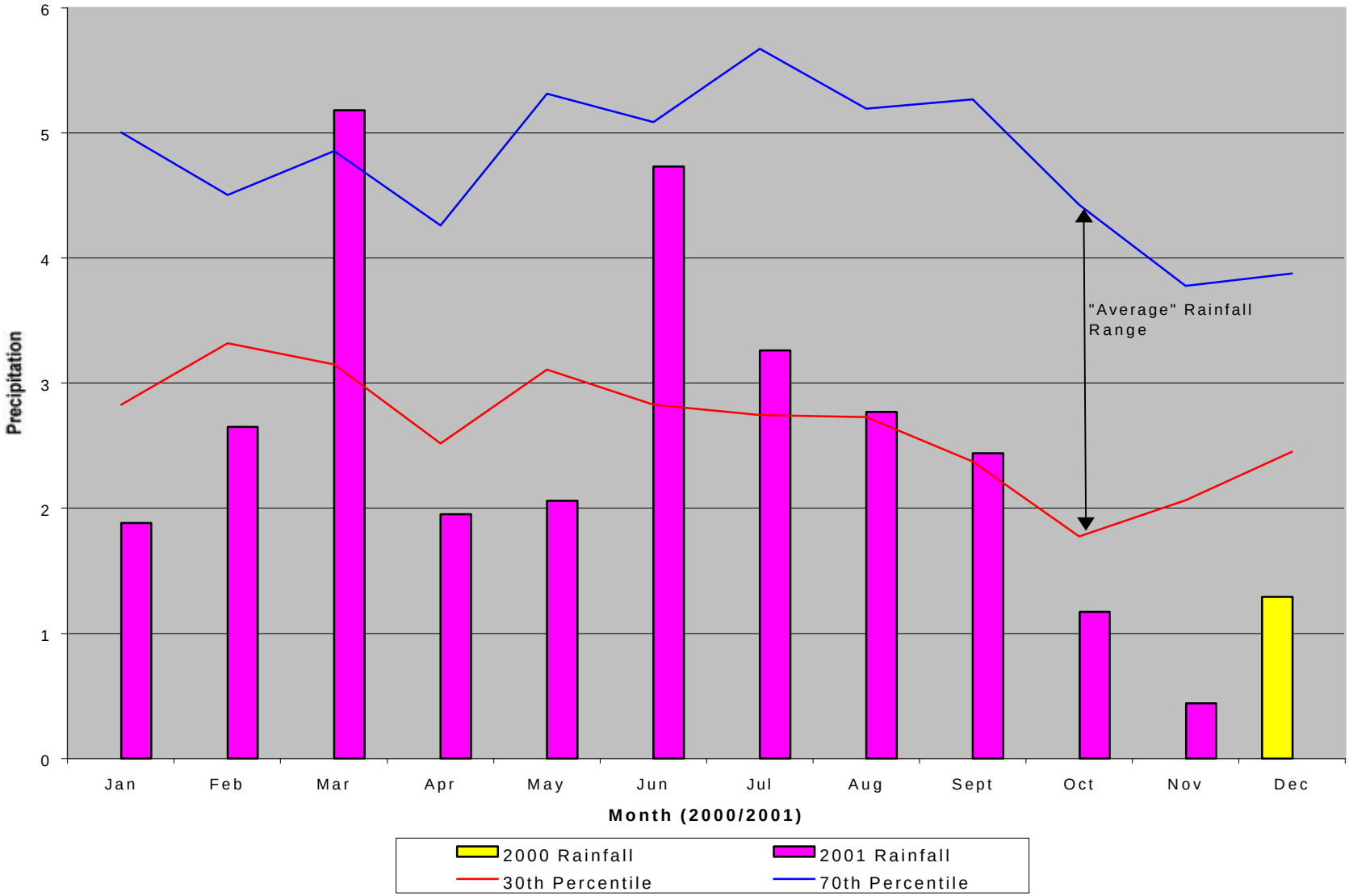
For 2000 December was below average. For 2001, only March had above average rainfall. All other months had at or below average rainfall.

2.4 Conclusions

2001 represents the first full growing season that the hydrologic data has been examined. All six monitoring gauges met the jurisdictional wetland hydrology for 12.5% of the growing season.

Despite 2001 being a much drier year than average, hydrologic monitoring has indicated that the site is consistently met the success criteria.

Figure 4: Sandy Creek 30-70 Percentile Graph
Randolph County



3.0 VEGETATION: SANDY CREEK MITIGATION SITE (YEAR 1 MONITORING)

3.1 Success Criteria

Success Criteria states that there must be a minimum of 240 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, 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, Southern Red Oak

3.3 Results of Vegetation Monitoring

Table 2. 2001 Vegetative Monitoring Results

Plot #	Blackgum	Green Ash	Willow Oak	River Birch	Cherrybark Oak	Water Oak	Southern Red Oak	Total (1 year)	Total (at planting)	Density (Tree/Acre)
1	6	4	10	5	3		1	29	53	372
2	2		4	8	1			15	54	189
3	6	8	6	8	8			36	47	521
	AVERAGE DENSITY									**361**

Site Notes: Other species noted: smartweed, fescue, barnyard grass, various grasses, sedges, and jewelweed. Site was very wet. Standing water was present on majority of site at time of monitoring.

3.4 Conclusions

Of the 12.9 acres on this site, approximately 10 acres involved tree planting. There were 3 vegetation monitoring plots established throughout the planting areas. The 2001 vegetation monitoring of the site revealed an average tree density of 361 trees per acre. This average is above the minimum success criteria of 240 trees per acre. NCDOT will continue to monitor this site.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

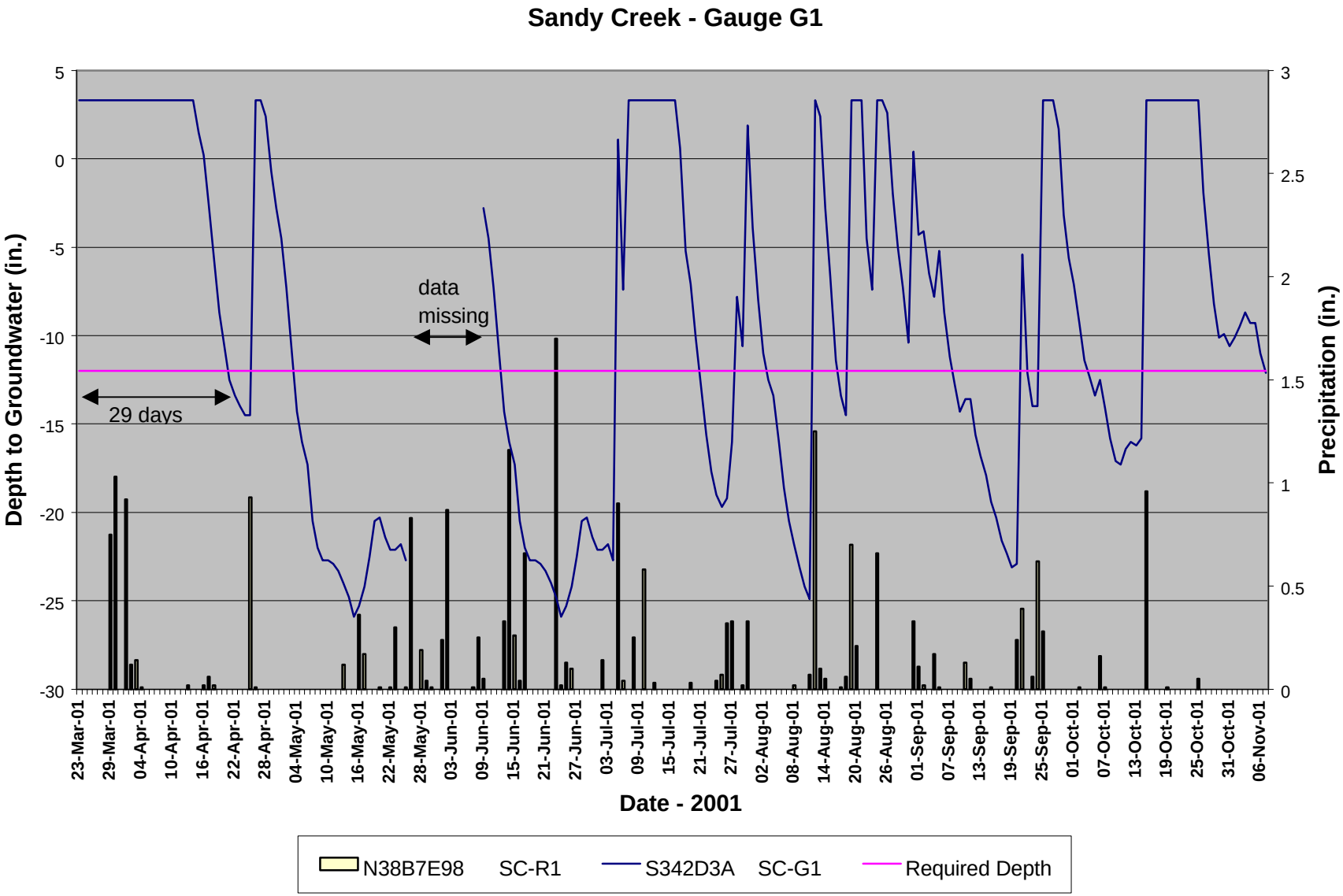
Hydrologic monitoring indicated that the site is consistently meeting the success criteria. The shortest period of inundation/saturation was 12.7 percent of the growing season but most gauge locations exhibited much longer periods of inundation/saturation.

Two of three vegetation monitoring plots indicated an average tree density of over 240 trees per acres. Total average tree density across all three plots was 361 trees per acre.

NCDOT will continue to monitor the site for hydrologic success and vegetative success.

APPENDIX A

DEPTH TO GROUNDWATER GRAPHS


Sandy Creek - Gauge G1
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Precipitation (in.)
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-5
-10
-15
-20
-25
-30
3
2.5
2
1.5
1
0.5
0
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29-Mar-01
04-Apr-01
10-Apr-01
16-Apr-01
22-Apr-01
28-Apr-01
04-May-01
10-May-01
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09-Jun-01
15-Jun-01
21-Jun-01
27-Jun-01
03-Jul-01
09-Jul-01
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01-Sep-01
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13-Sep-01
19-Sep-01
25-Sep-01
01-Oct-01
07-Oct-01
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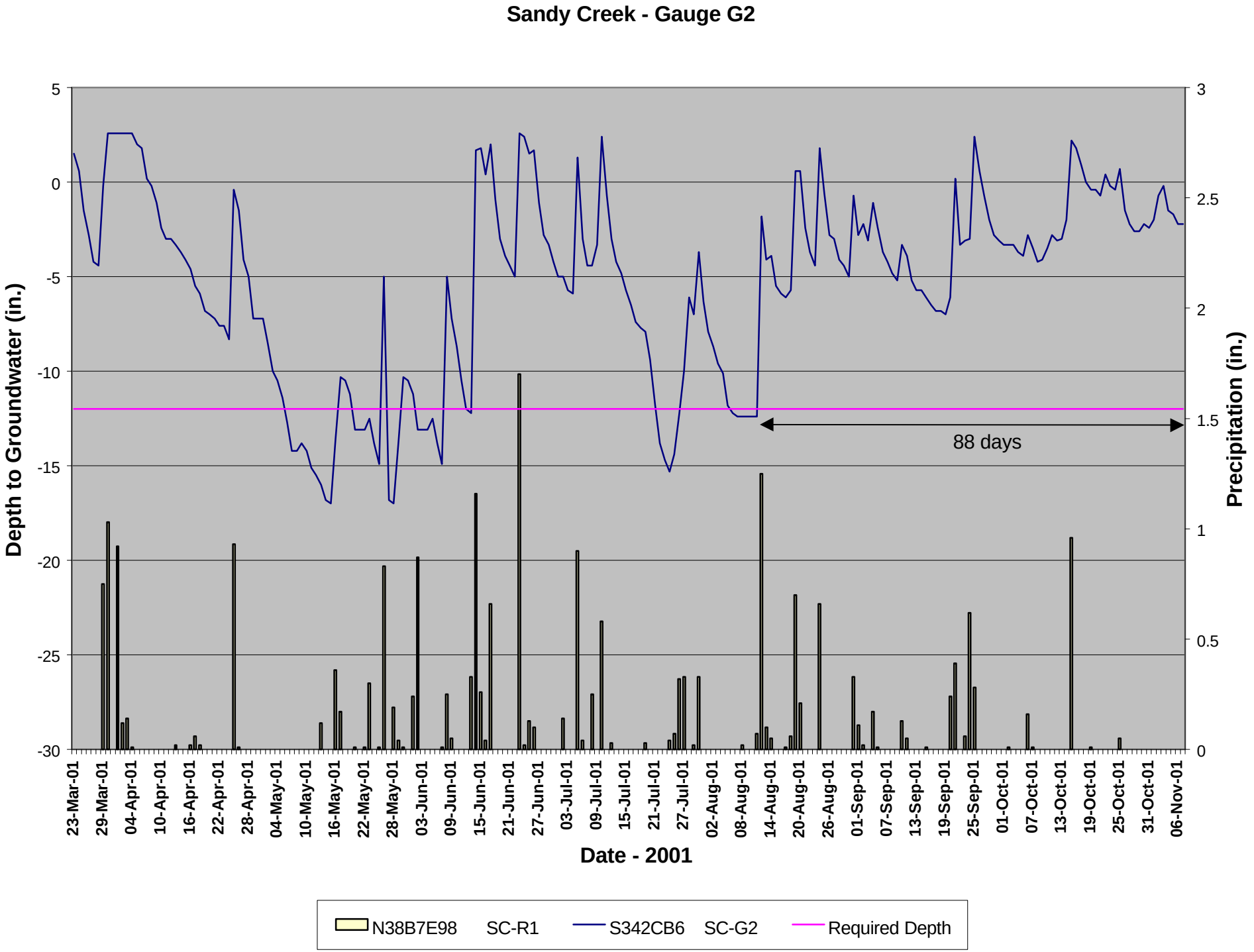
06-Nov-01
N38B7E98 SC-R1
S342D3A SC-G1
Required Depth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Precipitation (in.)
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-5
-10
-15
-20
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-30
3
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2
1.5
1
0.5
0
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29-Mar-01
04-Apr-01
10-Apr-01
16-Apr-01
22-Apr-01
28-Apr-01
04-May-01
10-May-01
16-May-01
22-May-01
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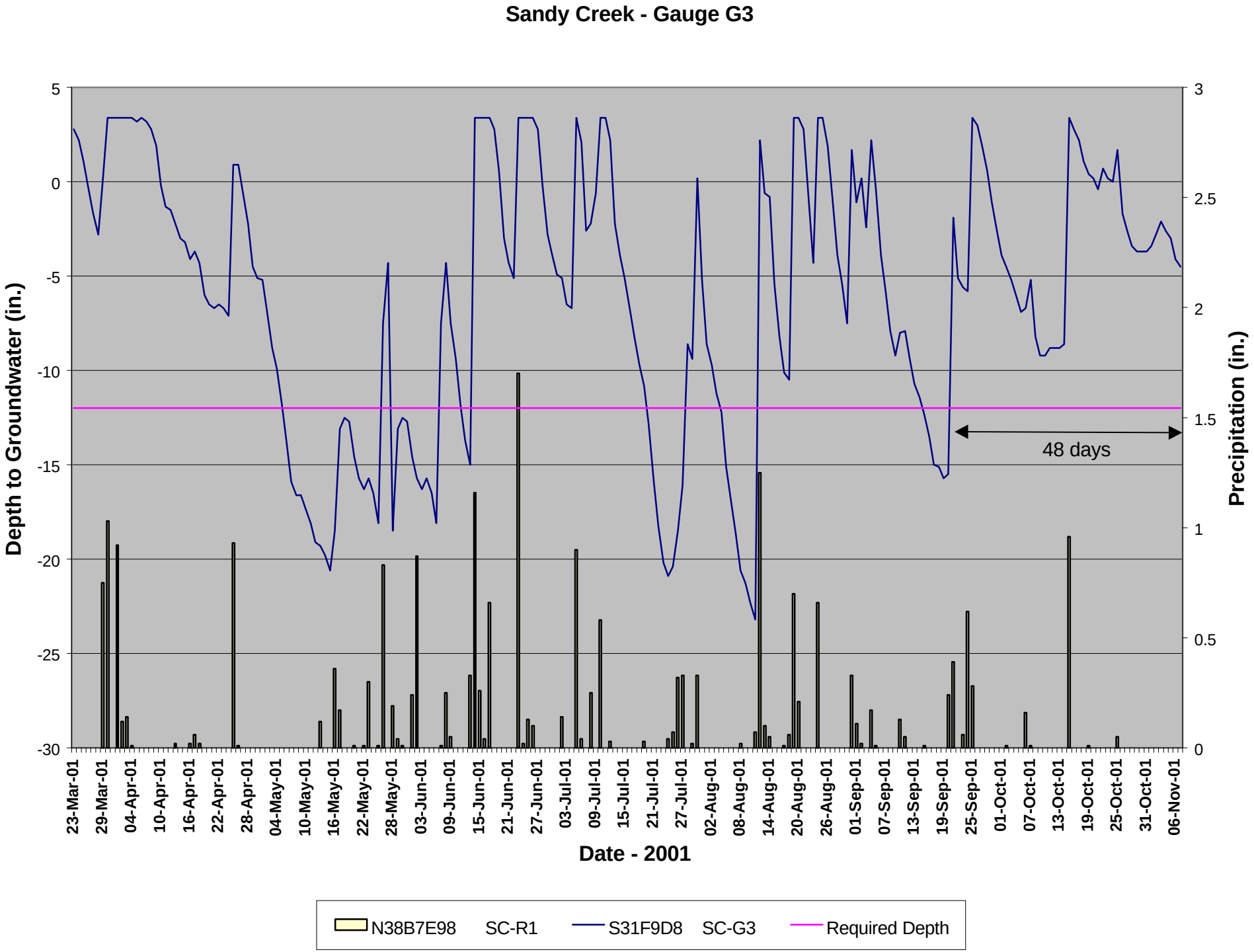
Required Depth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Precipitation (in.)
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-10
-15
-20
-25
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3
2.5
2
1.5
1
0.5
0
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29-Mar-01
04-Apr-01
10-Apr-01
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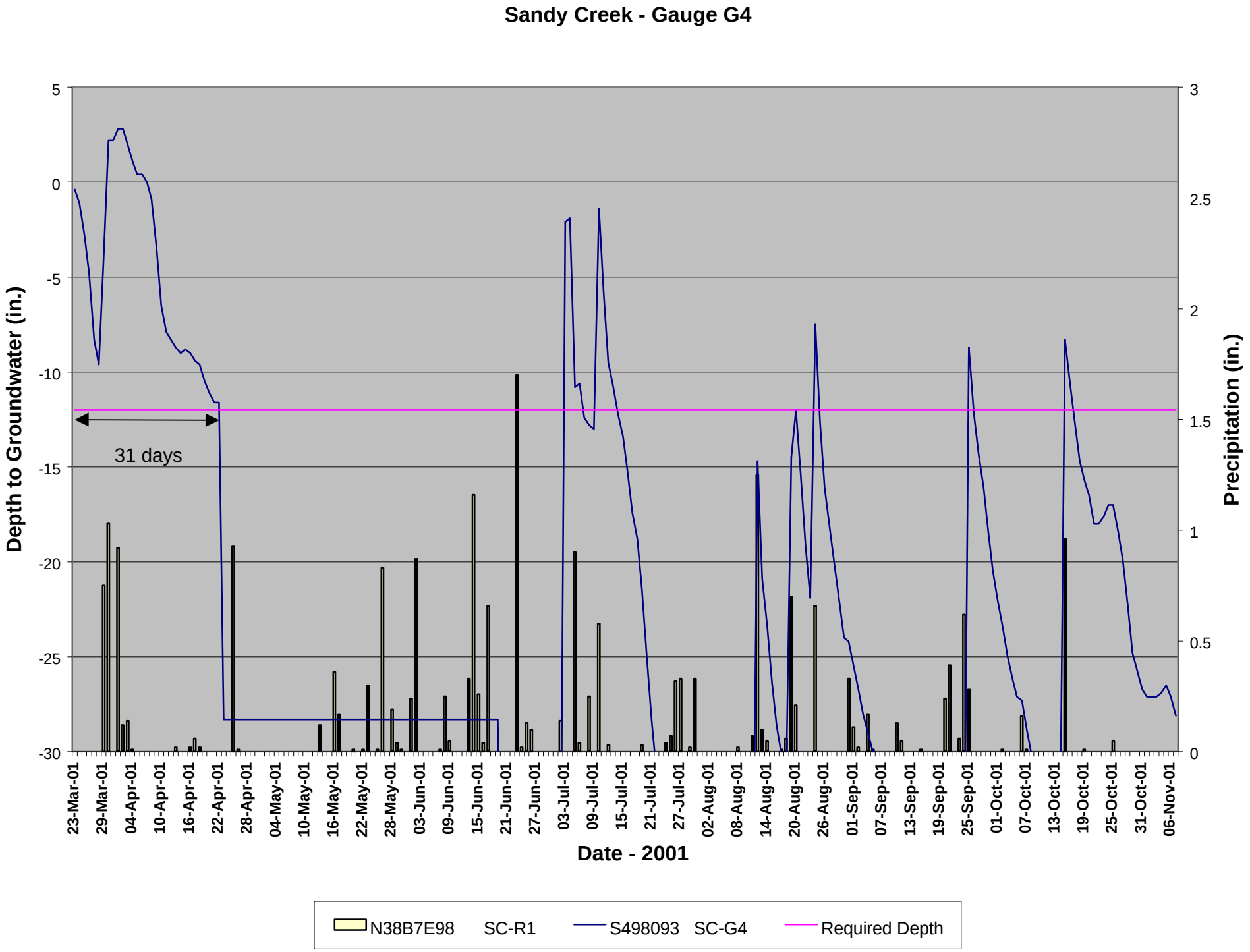
Required Depth


Sandy Creek - Gauge G4
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Precipitation (in.)
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-10
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-20
-25
-30
3
2.5
2
1.5
1
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0
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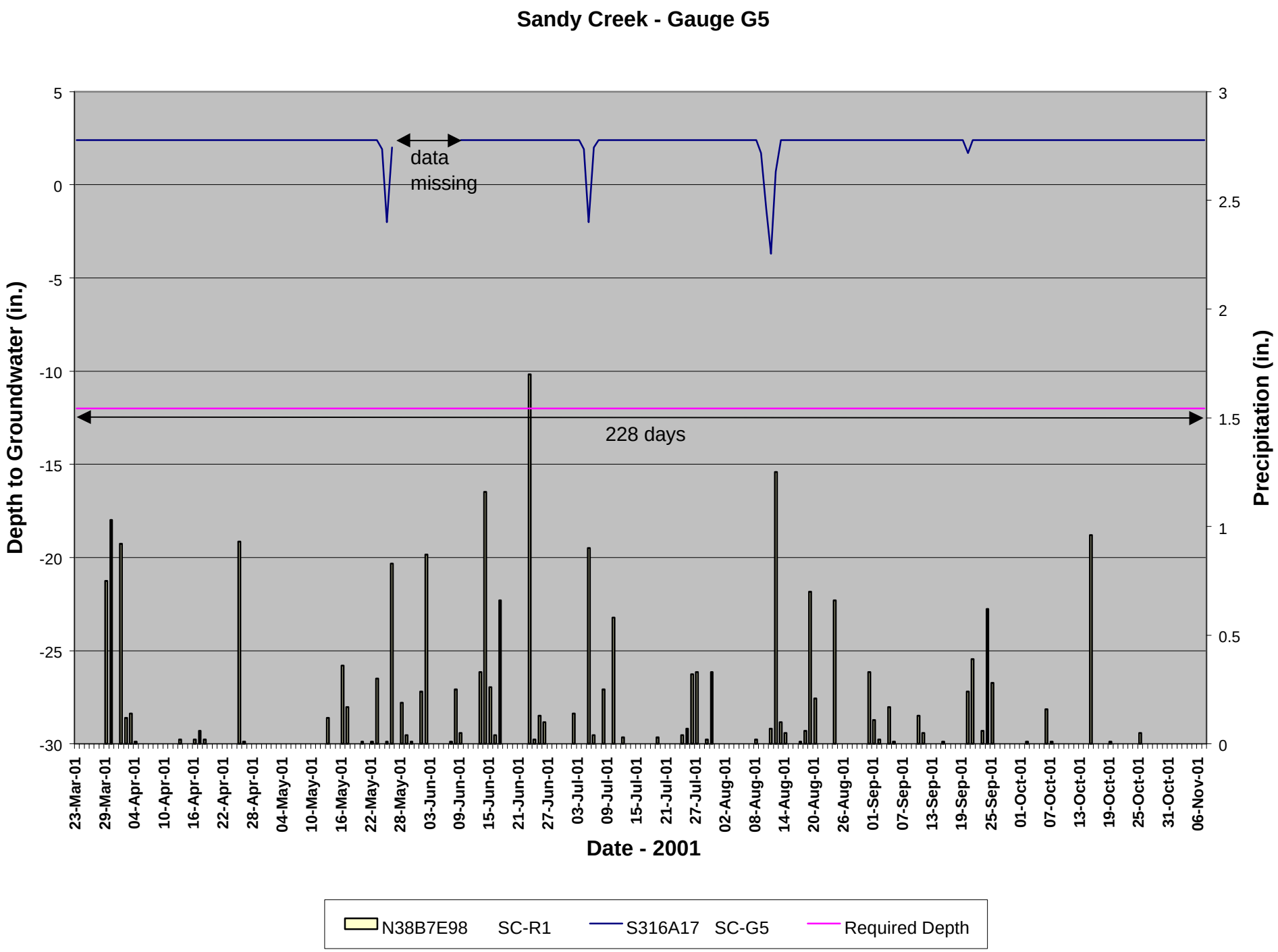
Required Depth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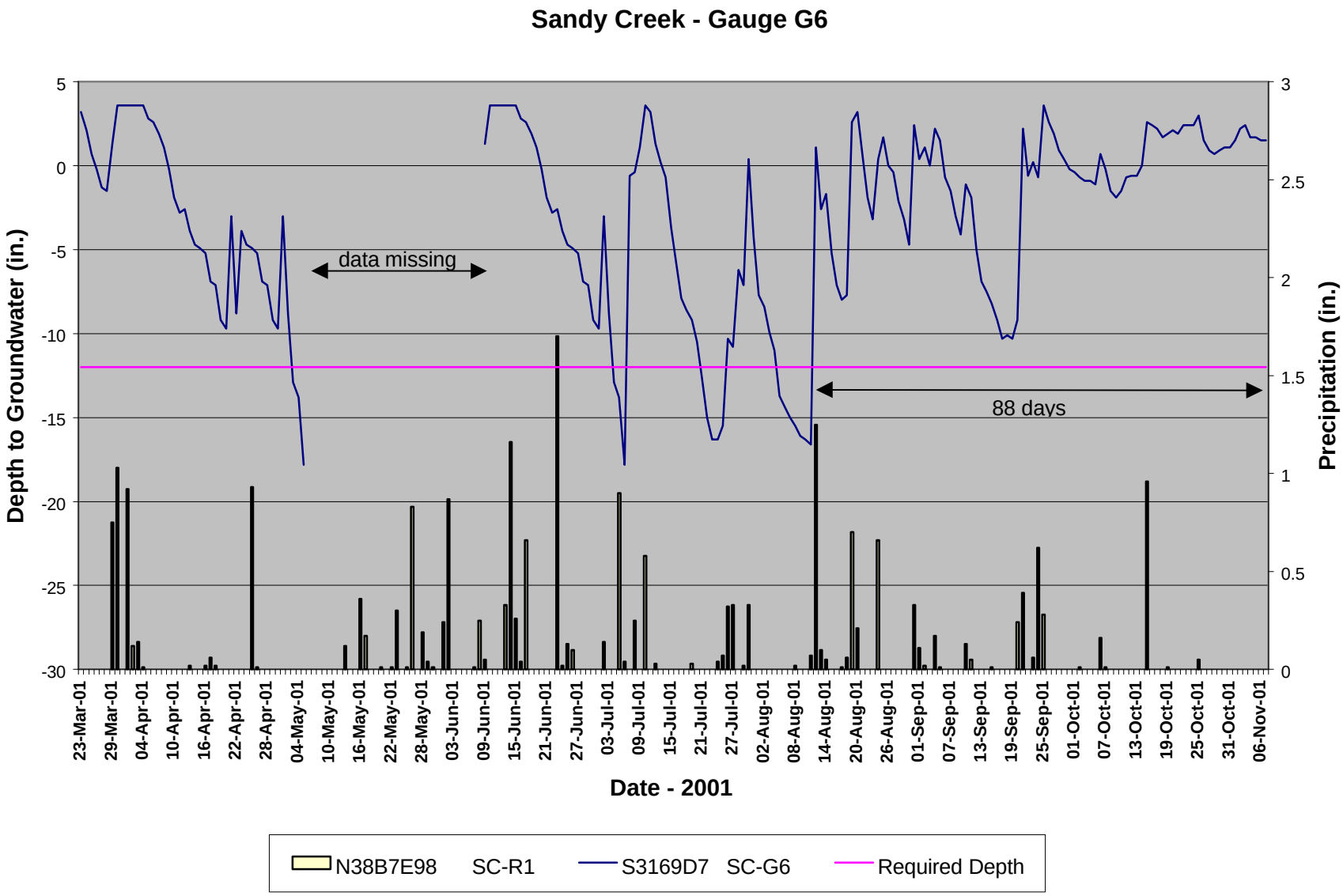
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Precipitation (in.)
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N38B7E98 SC-R1
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Required Depth

APPENDIX B

PHOTO AND VEGETATION PLOT LOCATIONS, SITE PHOTO

SANDY CREEK MITIGATION SITE

Photo and Plot Locations

2001

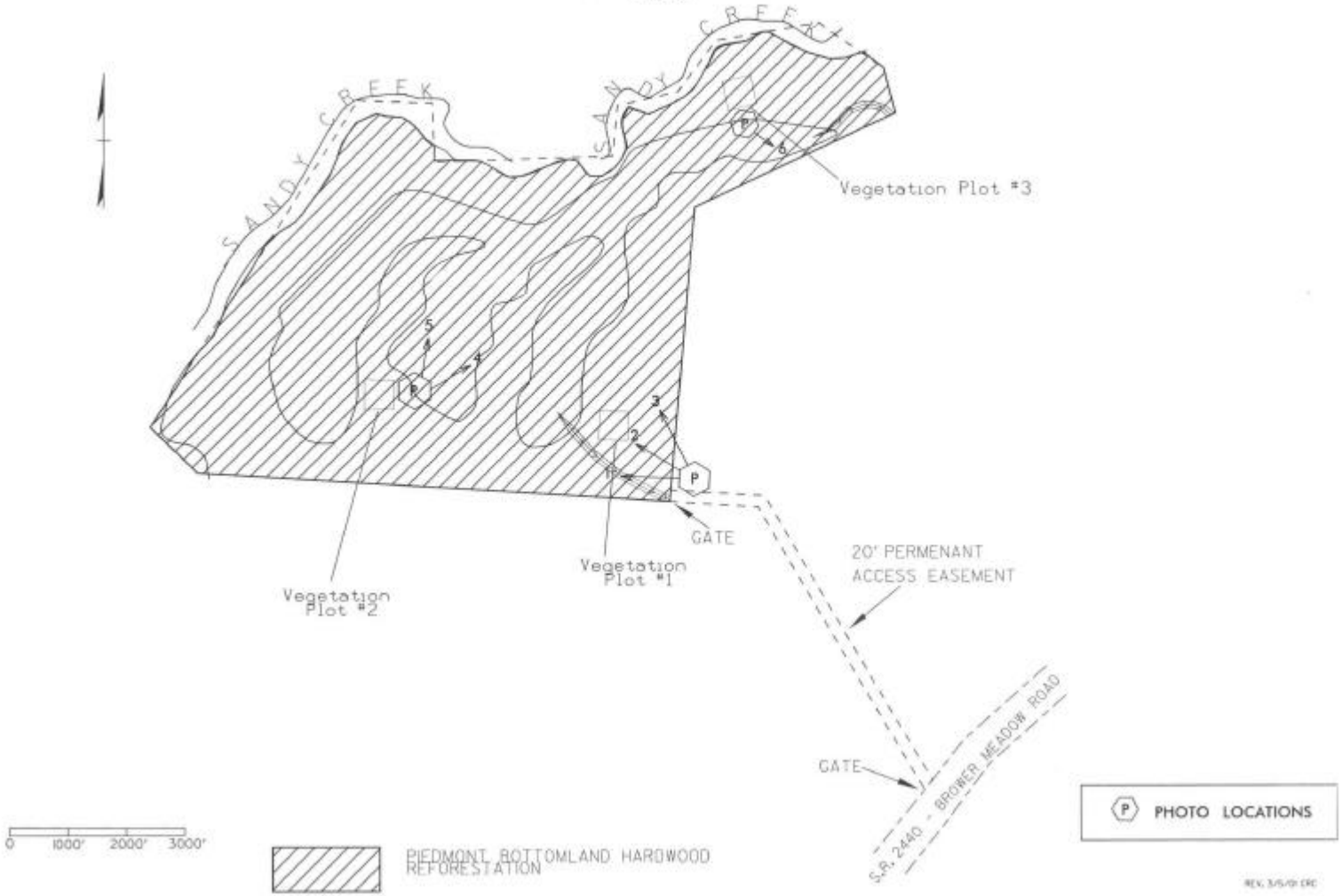

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6