

ANNUAL REPORT FOR 2002



Dutchman's Mitigation Site
Wake County
Project No. 8.U401721
TIP No. R-2000 WM



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TABLE OF CONTENTS

| | |
|---|-----------|
| SUMMARY | 1 |
| 1.0 INTRODUCTION | 2 |
| 1.1 PROJECT DESCRIPTION | 2 |
| 1.2 PURPOSE | 2 |
| 1.3 PROJECT HISTORY | 2 |
| 1.4 DEBIT LEDGER | 4 |
| 2.0 HYDROLOGY | 4 |
| 2.1 SUCCESS CRITERIA..... | 4 |
| 2.2 HYDROLOGIC DESCRIPTION | 4 |
| 2.3 RESULTS OF HYDROLOGIC MONITORING..... | 6 |
| 2.3.1 Site Data | 6 |
| 2.3.2 Climatic Data..... | 9 |
| 2.4 CONCLUSIONS | 9 |
| 3.0 VEGETATION: DUTCHMAN’S CREEK MITIGATION SITE | 11 |
| 3.1 SUCCESS CRITERIA..... | 11 |
| 3.2 DESCRIPTION OF SPECIES..... | 11 |
| 3.3 RESULTS OF VEGETATION MONITORING..... | 12 |
| 3.4 CONCLUSIONS | 12 |
| 4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS | 12 |

LIST OF TABLES

| | | |
|----------|--|----|
| Table 1. | Dutchmans Creek Hydrologic Monitoring Results..... | 7 |
| Table 2. | Vegetation Monitoring Statistics, by plot..... | 12 |

LIST OF FIGURES

| | | |
|------------|---|----|
| Figure 1. | Site Location Map | 3 |
| Figure 2. | Monitoring Gauge Location Map..... | 5 |
| Figure 3 . | Monitoring Gauge Hydrologic Results | 8 |
| Figure 4. | Dutchman’s Creek 30-70 Graph | 10 |

APPENDICES

APPENDIX A - DEPTH TO GROUNDWATER GRAPHS

APPENDIX B - SITE PHOTOS & PLANTING PLAN

Summary

The following report summarizes the monitoring activities that have occurred in the past year at the Dutchman's Creek Mitigation Site. This site was originally constructed in 2000. Monitoring activities in 2002 represent the second year of monitoring for the site. The site must demonstrate both hydrologic and vegetation success for a minimum of three years.

The site contains seven monitoring gauges, one rain gauge, and three vegetation plots.

This report utilizes rainfall data from both a local weather station and from an on-site rain gauge. Historical data is provided by the NC State Climate Office for the Raleigh/Durham weather station. Hydrologic monitoring indicated that four of the seven monitoring gauges met the hydrology success criteria of 5.0% for the 2002-growing season.

In March 2002, the site was replanted. There are 3 vegetation-monitoring plots established throughout the site. Based on the results of the first year of monitoring, the site revealed an average tree density of 624 trees per acre, well above the minimum required by the success criteria.

Based on the monitoring results from the 2002 growing season, NCDOT recommends that hydrologic and vegetation monitoring continue.

1.0 Introduction

1.1 PROJECT DESCRIPTION

The Dutchman’s Creek Mitigation Site is located between SR 1386 (Graham Newton Road) and SR 1377 (Blaney Franks Road) immediately above the confluence with Lake Wheeler in Wake County. This site mitigates for wetland impacts associated with the Raleigh Outer Loop (R-2000).

The site, totaling 87 acres in size, consists of shrub-scrub wetland restoration, bottomland hardwood creation, marsh (littoral zone) and open water creation, and floodplain wetland preservation components. The site was constructed in 2000 and planted in 2001.

1.2 PURPOSE

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five consecutive years. 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 2002 growing season at the Dutchman’s Creek Mitigation Site.

Activities in 2002 reflect the second year of monitoring following the restoration efforts. Included in this report are analyses of both hydrologic and vegetative monitoring results, as well as local climate conditions throughout the growing season, and site photographs.

1.3 PROJECT HISTORY

| | |
|----------------------|---------------------------------------|
| December 2000 | Construction Completed |
| Spring 2001 | Site Planted |
| March 2001 | Monitoring Gauges Installed |
| March- November 2001 | Hydrologic Monitoring (1 yr.) |
| October 2001 | Vegetation Monitoring (1 yr.) |
| March 2002 | Replanted Plants and Shrubs |
| June 2002 | Vegetation Monitoring (1 yr. Restart) |
| March-November 2002 | Hydrologic Monitoring (2 yr.) |

Figure 1. Site Location Map



1.4 DEBIT LEDGER

The entire Dutchman's Creek mitigation site was used for projects R-2000D and R-2000CB to compensate for unavoidable wetland impacts related to roadway projects.

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 groundwater for at least a consecutive 5% of the growing season during a normal precipitation year. Area inundated for less than 5% of the growing season are always classified as non-wetlands.

A site may be found to meet the hydrology performance criteria on the basis of comparison of monitoring data taken from the site with monitoring data taken from an established reference site approved by the Corps. The Corps retains the discretion to find that the hydrology criteria are met if such monitoring data from the mitigation site and the reference site are substantially the same.

The growing season in Wake County begins March 26 and ends November 10. These dates correspond to a 50% probability that temperatures will not drop to 28°F or lower after March 26 and before November 10.¹ The growing season is 229 days; therefore, optimum hydrology requires 5% of this season, or at least 12 consecutive days. Local climate must also represent average conditions for the area.

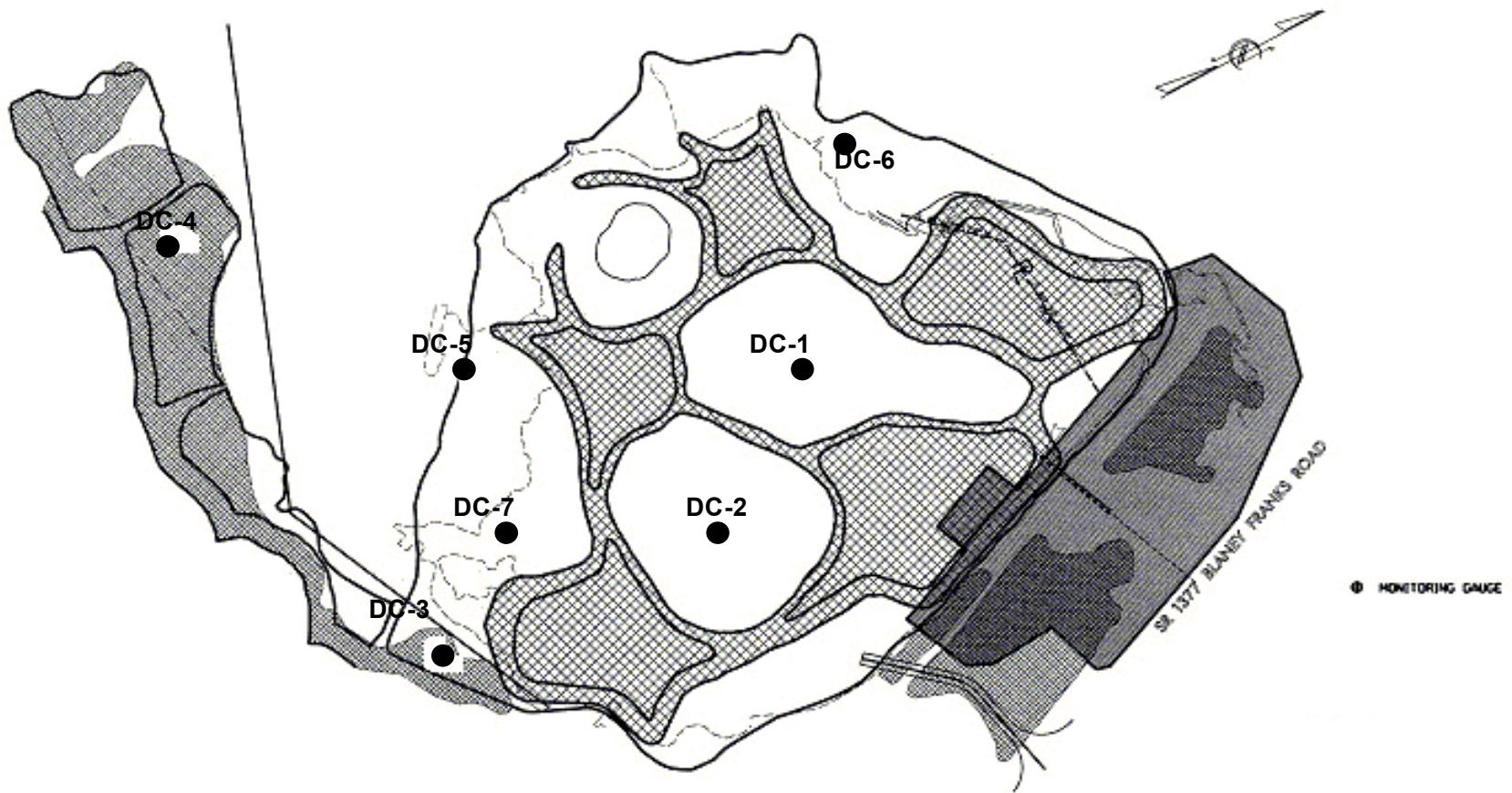
2.2 HYDROLOGIC DESCRIPTION

In March of 2001, six monitoring gauges were installed across the site (Figure 2). An additional groundwater gauge was installed March 2002 based on an on-site agency review meeting. The automatic monitoring gauges record daily readings of groundwater depth.

The Dutchman's Creek site was designed to receive hydrologic input from rainfall and water accessing the floodplain. The hydrologic monitoring should show the reaction of the groundwater level to specific rainfall events.

¹ Natural Resources Conservation Service, Soil Survey of Wake County, North Carolina, p. 79.

Figure 2. Monitoring Gauge Location Map



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 229-day growing season (March 26 – November 10). The results are presented in Table 1.

Appendix A contains a plot of the groundwater depth for each monitoring well. If the gauge shows saturation for greater than 5% of the growing season, the maximum number of consecutive days is noted on each graph. The individual precipitation events are shown on the monitoring well graphs as bars.

Figure 3 represents a graphical representation of the hydrologic results. Gauges highlighted in blue indicate wetland hydrology for more than 12.5% of the growing season. Gauges highlighted in red show hydrology between 8% and 12.5% of the season, while those in green indicate hydrology between 5% and 8% of the season. Gauges highlighted in black indicate no wetland hydrology (less than 5% of the growing season).

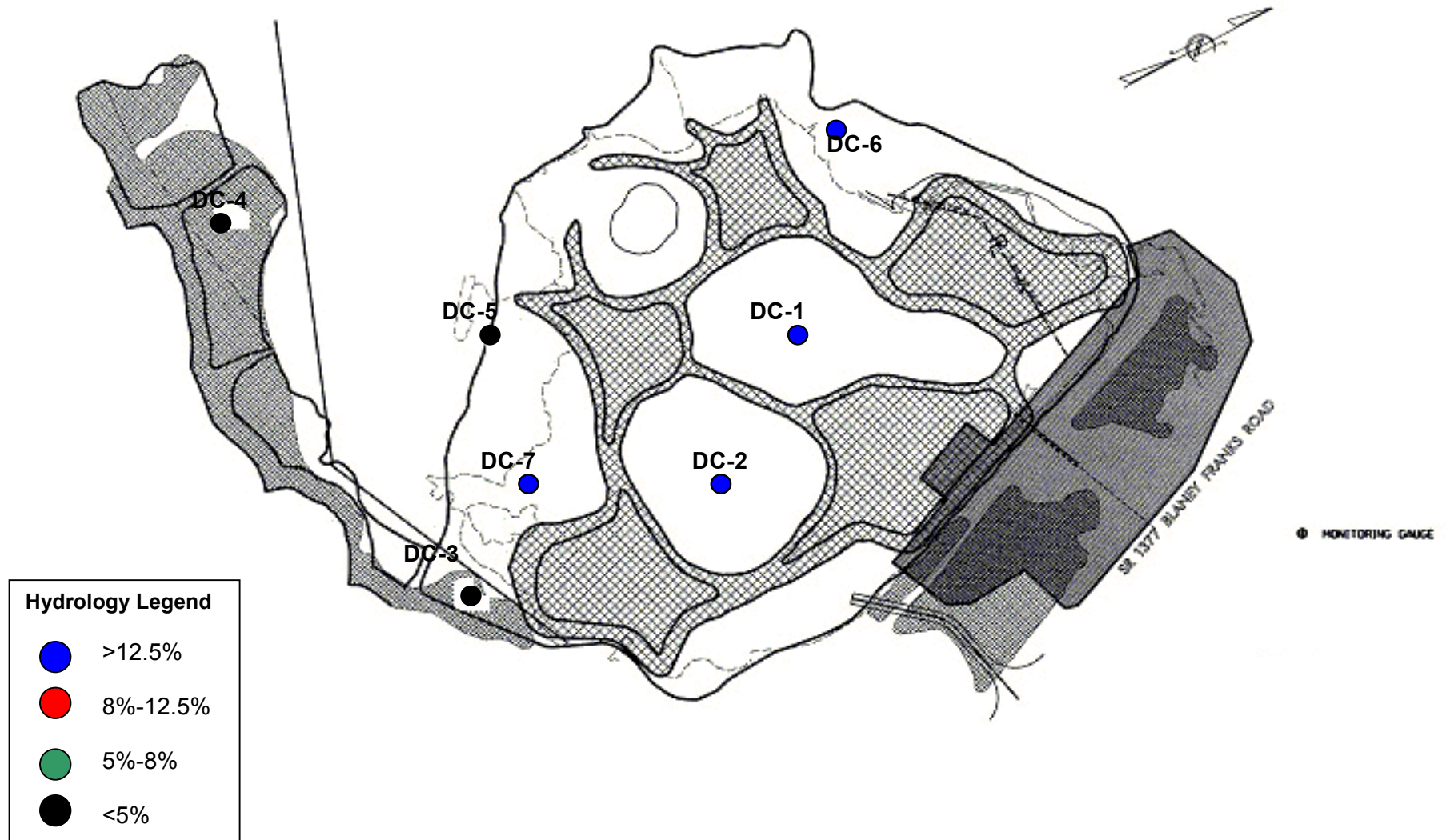
Table 1. Dutchman’s Creek Hydrologic Monitoring Results

| Monitoring Well | <5% | 5-8% | 8-12.5% | >12.5% | Actual % | Success Dates |
|-----------------|-----|------|---------|--------|----------|--|
| DC-1 | | | | ✓ | 13.1 | March 26-April 22 Oct 12-Nov 10 |
| DC-2 | | | | ✓ | 13.1 | March 26-April 22 Oct 12-Nov 10 |
| DC-3 | ✓ | | | | 1.3 | |
| DC-4 | ✓ | | | | 2.6 | |
| DC-5 | ✓ | | | | .44 | |
| DC-6 | | | | ✓ | 26.2 | March 26-May 24 Aug 28-Sept 9 Sept 16-Sept 29 Oct 11-Nov 10 |
| DC-7 | | | | ✓ | 15.3 | March 26-April 29 |

* Gauges met the success criteria during an above average rainfall for the month of October, however these gauges also met criteria at the beginning of the growing season at an average month of rainfall.

The gauges for the 2002-year relatively stayed the same compared to 2001 data. Gauge DC-3 declined from 9.2% to 1.3%, while gauge DC-2 improved from 9.6% to 13.1% for the 2002 year.

Figure 3 . Monitoring Gauge Hydrologic Results



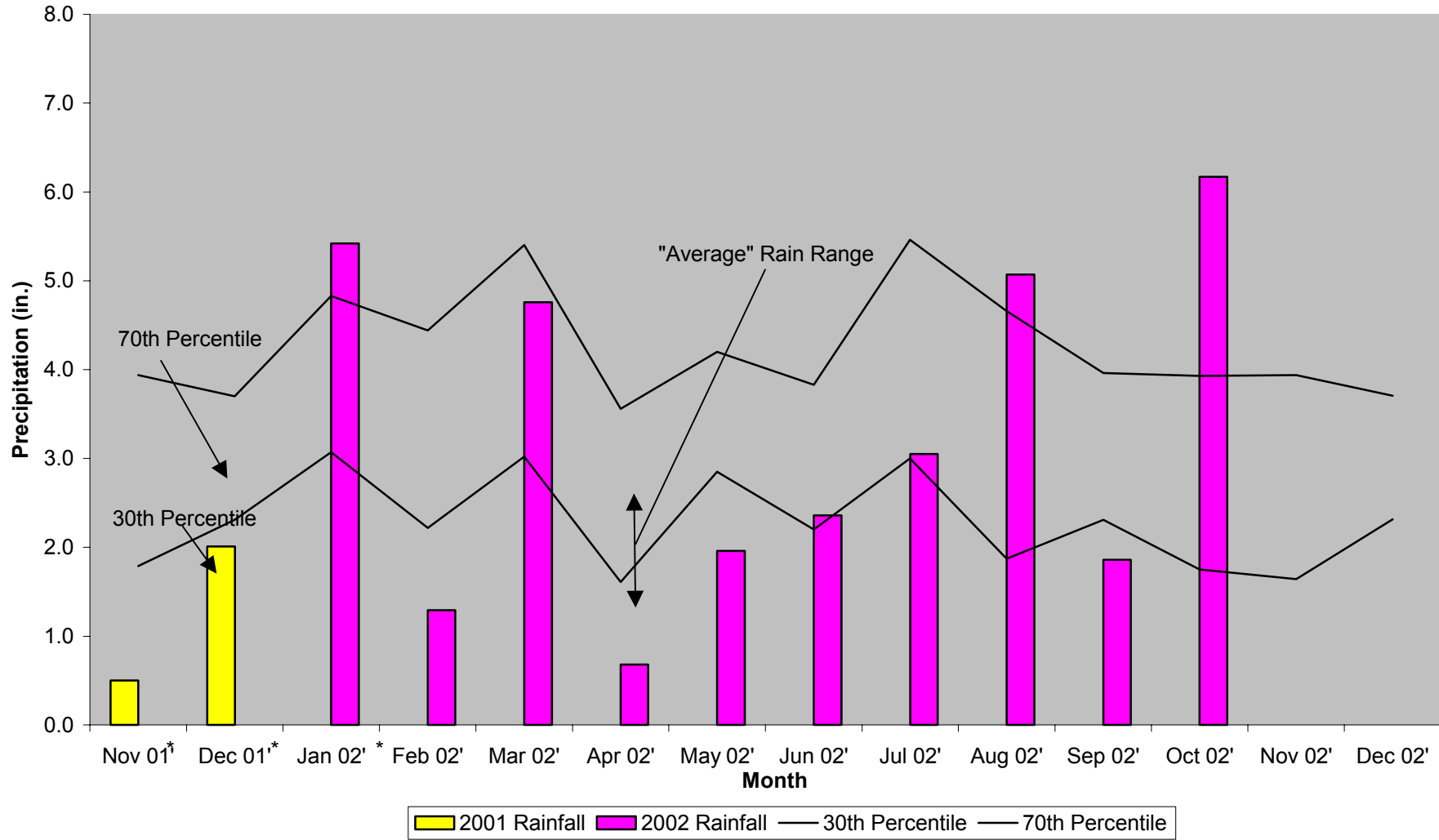
2.3.2 Climatic Data

Figure 4 represents an examination of the local climate in comparison with historical data in order to determine whether 2002 was “average” in terms of climate conditions. The two lines represent the 30th and 70th percentiles of monthly precipitation for Raleigh. The bars are the monthly rainfall totals for November 2001 through October 2002. The historical data was collected by the NC State Climate Office for the Raleigh/Durham weather station. Months with below average rainfall include November (2001), December (2001), March, April, May, July, and September. January and August experienced normal rainfall. February experienced above normal rainfall. No data is available for November or December 2002. Overall the site experienced below average rainfall in 2002.

2.4 CONCLUSIONS

2002 represents the second full growing season that the hydrologic data has been examined. Four of the seven gauges showed saturation within 12” of the ground for greater than 5% of the growing season. Four gauges, DC-1, DC-2, DC-6, and DC-7 have met the success criteria of consecutive days exceeding at least 5.0% of the growing season. Gauges DC-3, DC-4, DC-5 do not indicate successful hydrology, at this time. This may be due to the below average rainfall experienced during the growing season.

FIGURE 4
Dutchman's 30-70 Percentile Graph 2002 Raleigh, NC



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

3.1 Success Criteria

Success criteria are defined, as 320 tree species/acre of the target species must be surviving for at least five years after initial planting. In interior floodplains, at least five character tree species must be present, and no species can comprise more than 20% of the 320 stem/acre total. In unconsolidated sediment areas, the 320 stem/acre total may be achieved by a combination of tree and shrub species.

3.2 Description of Species

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

(Bottomland Hardwood Area)

Quercus falcata var. *pagodaefolia*, Cherrybark Oak

Quercus falcata var. *falcata*, Southern Red Oak

Fraxinus pennsylvanica, Green Ash

Carya cordiformis, Bitternut Hickory

Quercus phellos, Willow Oak

Nyssa sylvatica var. *sylvatica*, Blackgum

Quercus lyrata, Overcup Oak

Quercus nigra, Water Oak

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

(Shrub Area)

Cornus amomum, Silky Dogwood

Cornus stricta, Swamp Dogwood

Cornus sericea, Redosier Dogwood

Alnus serrulata, Tag Alder

Salix purpurea, Streamco Willow

Cephalanthus occidentalis, Buttonbush

Celtis laevigata, Sugarberry

3.3 Results of Vegetation Monitoring

| Plot # | Cherrybark Oak | Green Ash | Overcup Oak | Southern Red Oak | Water Oak | Blackgum | Buttonbush | Sugarberry | | | Total | Total (at planting) | Density (Trees/Acre) |
|-----------------------------|----------------|-----------|-------------|------------------|-----------|----------|------------|------------|--|--|-------|---------------------|----------------------|
| 1 | 5 | 14 | 5 | 9 | 1 | | | | | | 34 | 39 | 593 |
| 2 | 4 | 19 | 13 | 3 | 1 | 1 | | | | | 41 | 44 | 634 |
| 3 (shrub) | | | | | | | 23 | 16 | | | 39 | 41 | 647 |
| AVERAGE TREE DENSITY | | | | | | | | | | | | 624 | |

Site Notes: Species noted: alder, arrowhead, elderberry, microstegium, *Juncus* sp., silky dogwood, switch grass, black willow, *Baccharis* sp., and fennel.

3.4 Conclusions

Site was replanted in March 2002 with the species that have been highlighted on the second page of the report. The shrub area was not completely replanted due to plant availability. Three plots were set on site where the vegetation was replanted. The 2002 vegetation monitoring of the site revealed an average density of 624 trees per acre, well above the minimum required by the success criteria. Additional shrub planting is scheduled for 2003.

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

4.0 Overall Conclusions/Recommendations

Four of the seven gauges met the hydrologic success criteria of 5.0% for the 2002-growing season. The 2002 vegetation monitoring of the site revealed an average density of 624 trees per acre. The island that plot 3 is located on was replanted with shrubs in 2002. Additional shrub planting is scheduled for 2003 throughout the remainder of the shrub area except for areas that have already become established with black willow.

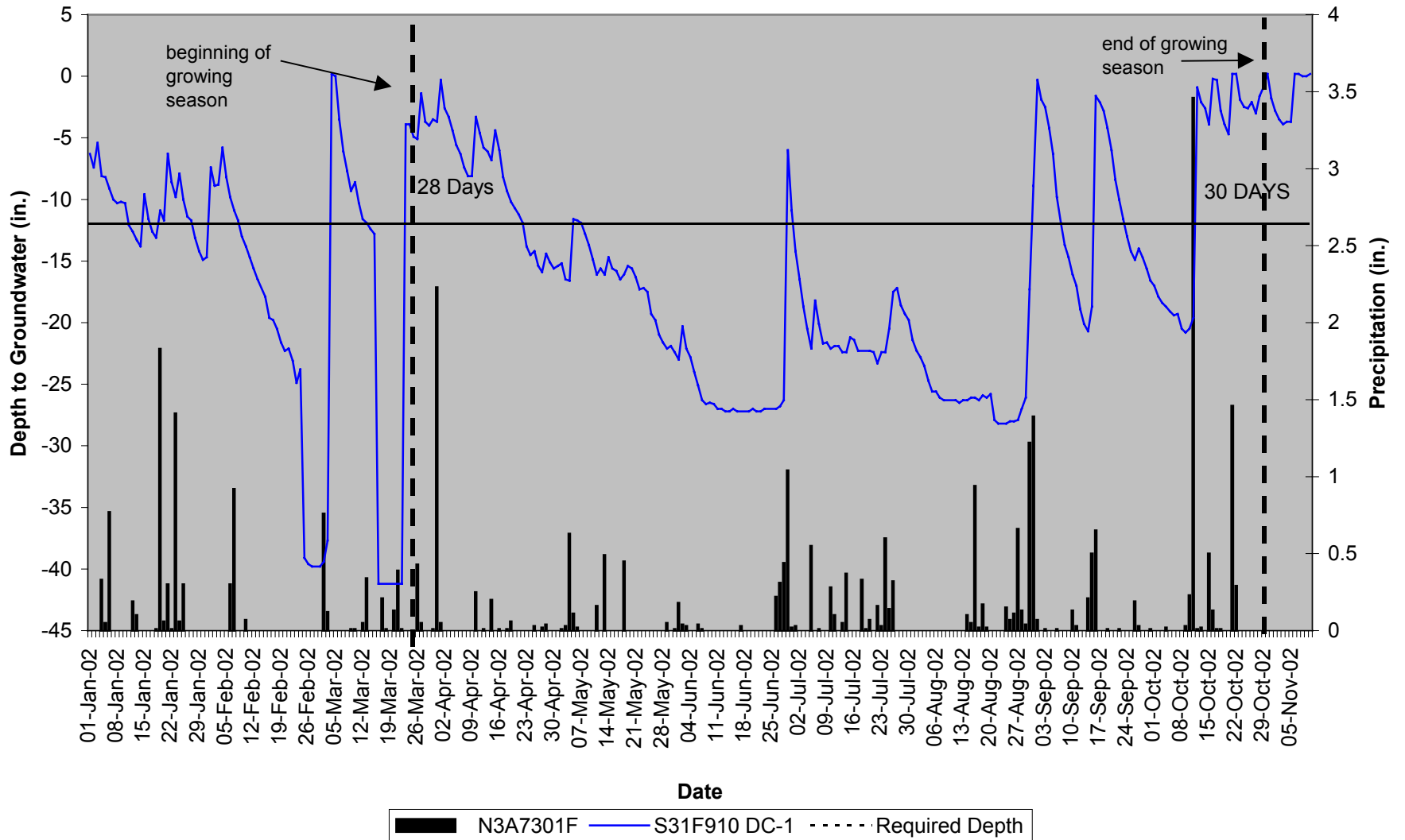
NCDOT will continue hydrologic and vegetation monitoring at the site for 2003.

APPENDIX A

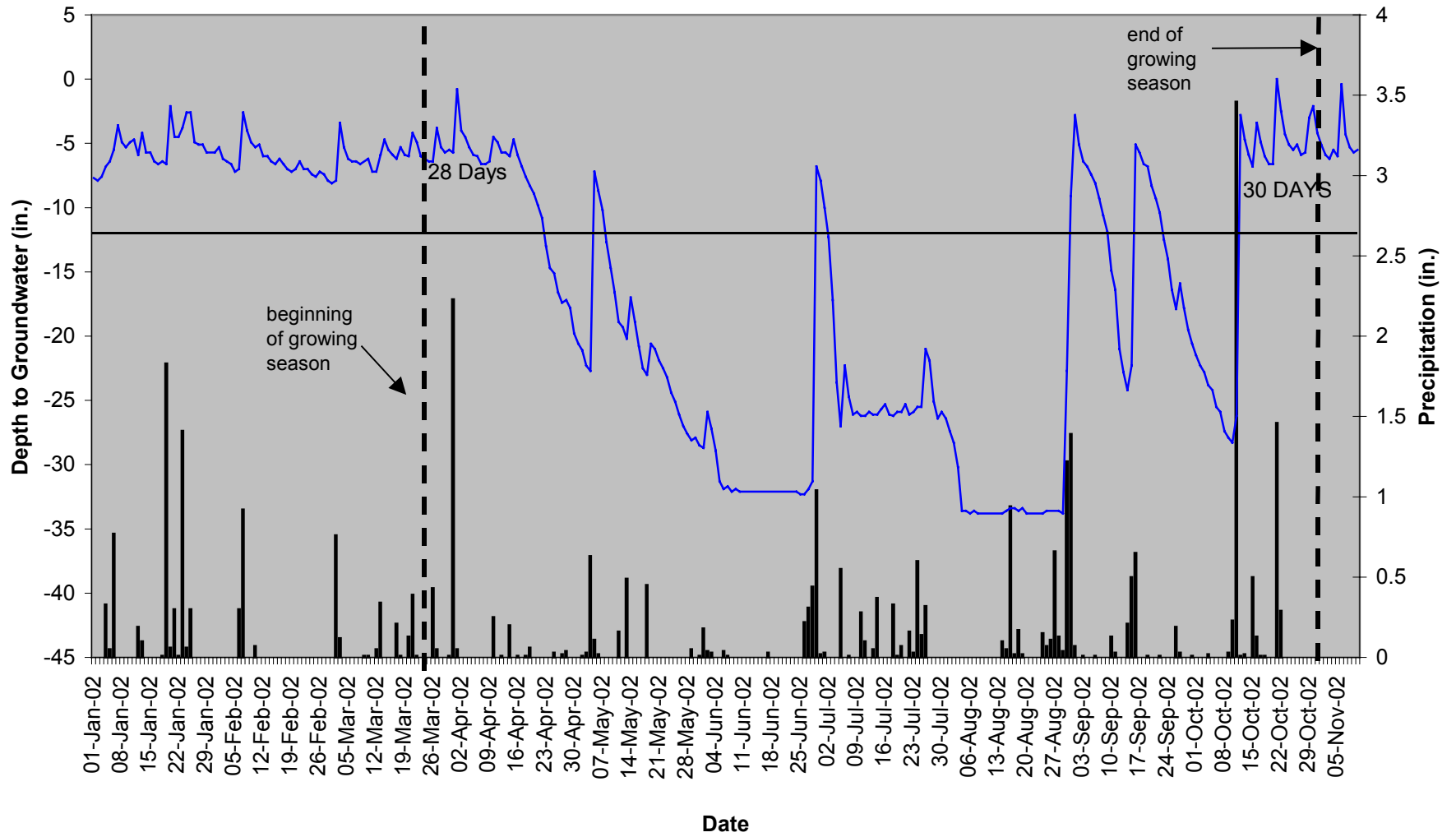
DEPTH TO GROUNDWATER GRAPHS

DUTCHMANS'S CREEK GROUNDWATER GAUGE GRAPHS

Dutchman's Creek DC-1

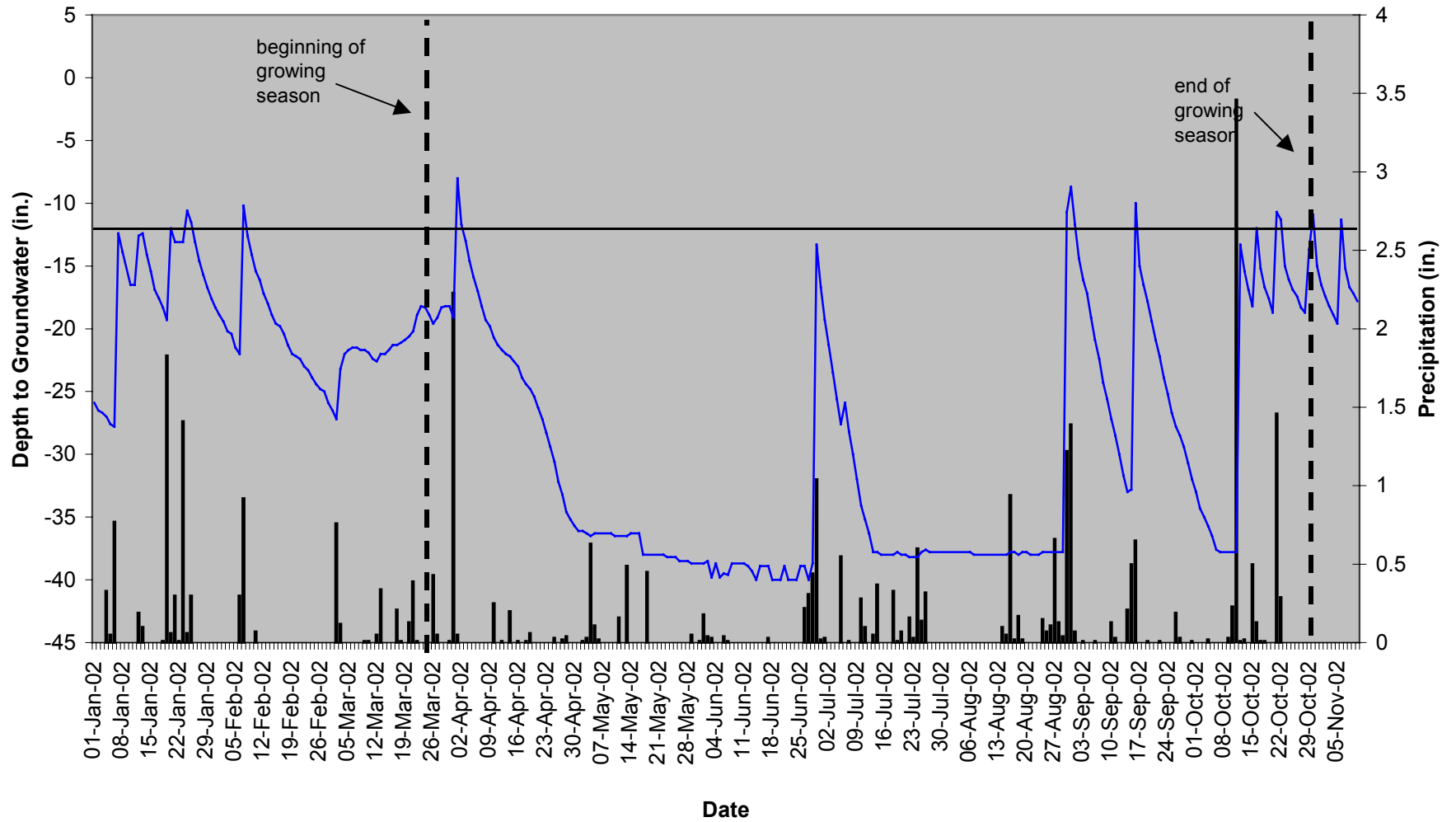


Dutchman's Creek DC-2



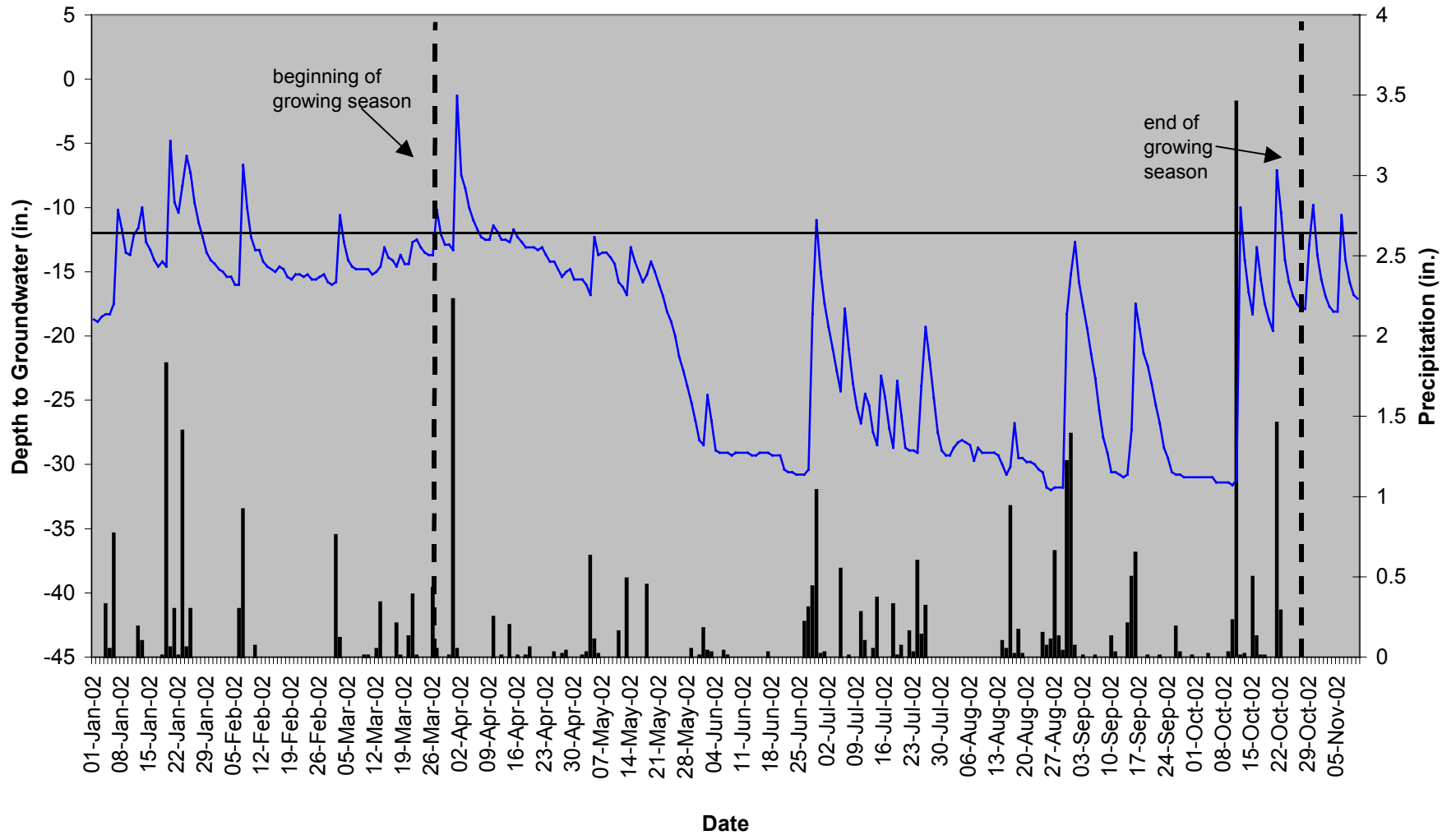
N3A7301F
 S49424F DC-2
 Required Depth

Dutchman's Creek DC-3



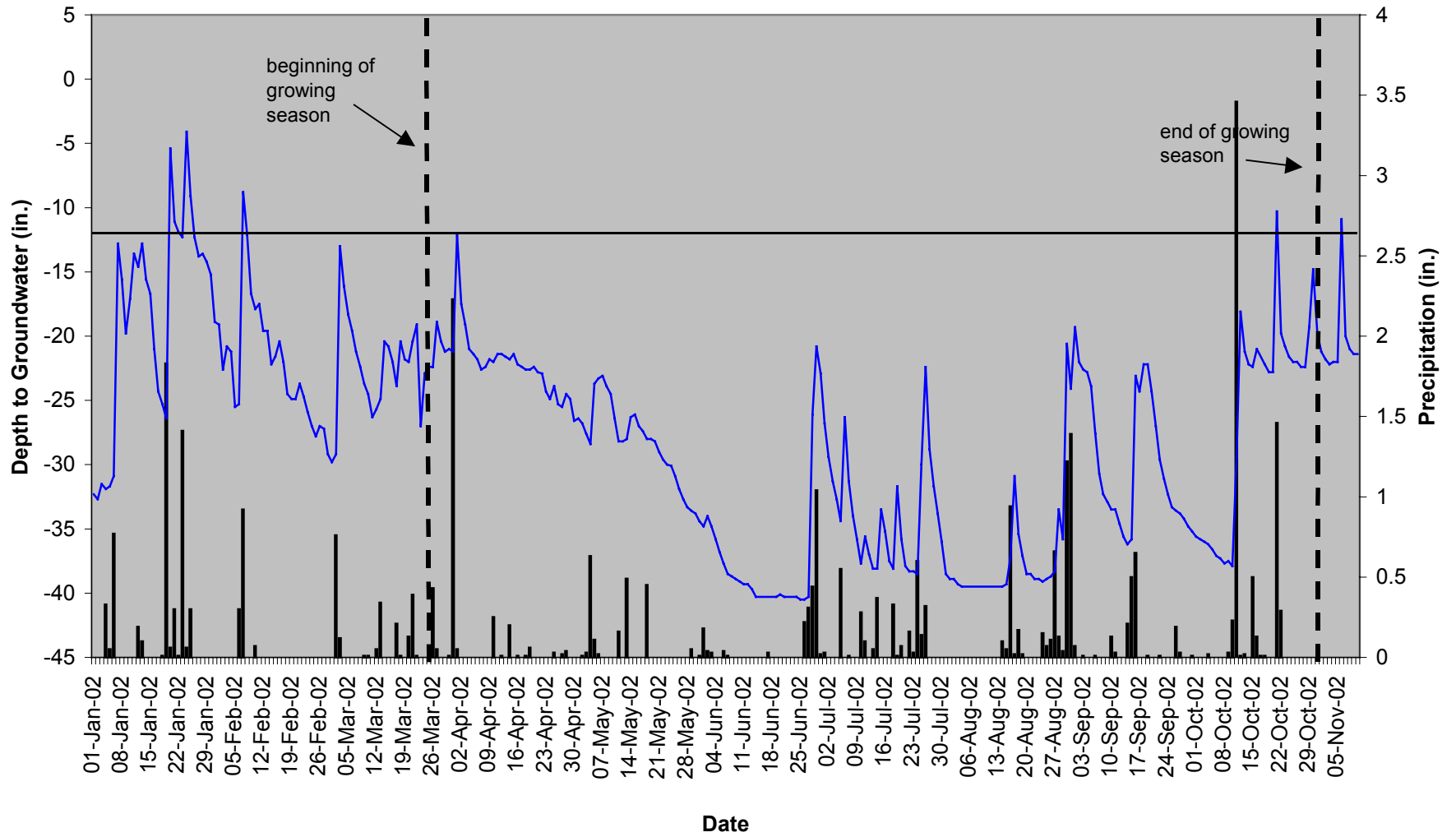
■ N3A7301F — S4CDA41 DC-3 - - - - Required Depth

Dutchman's Creek DC-4



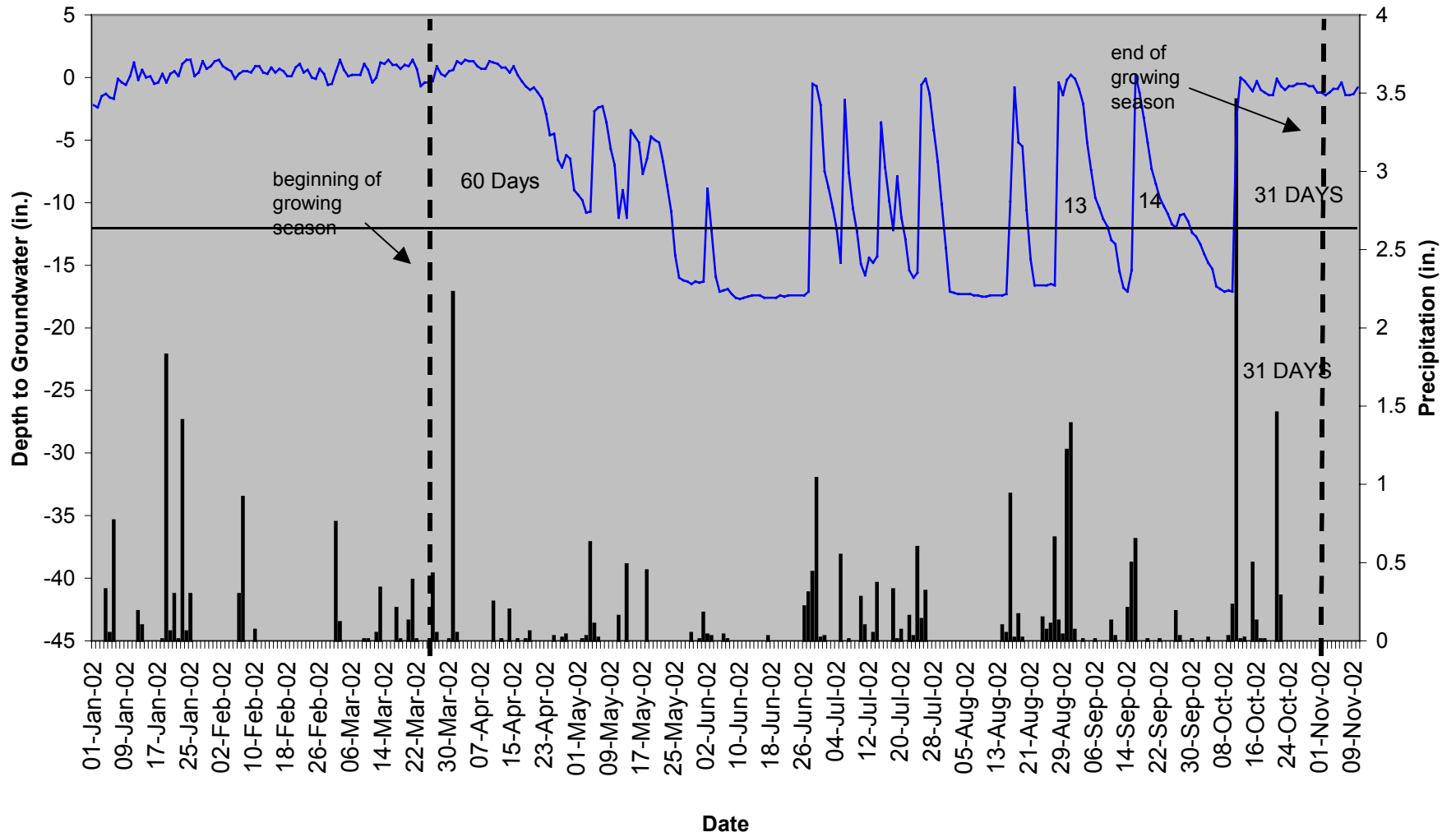
■ N3A7301F — SD0100 DC-4 - - - - Required Depth

Dutchman's Creek DC-5



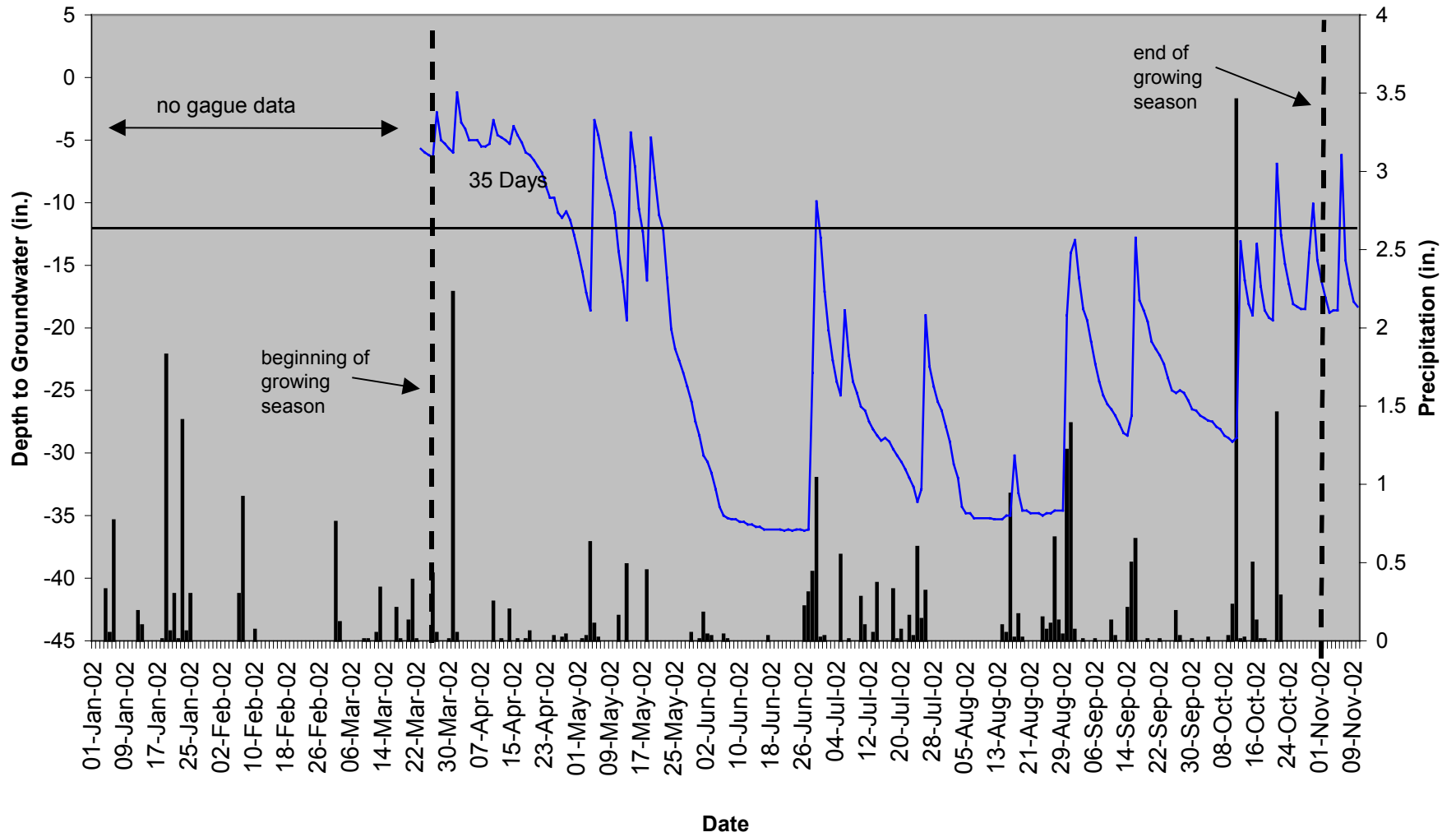
■ N3A7301F — S4940C5 DC-5 - - - - Required Depth

Dutchman's Creek DC-6



N3A7301F
 S320393 DC-6
 Required Depth

Dutchman's Creek DC-7



N3A7301F
 S213E28 DC-7
 Required Depth

APPENDIX B

SITE PHOTOS & PLANTING PLAN

Dutchman's Creek



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

Dutchman's Creek



PHOTO 7

