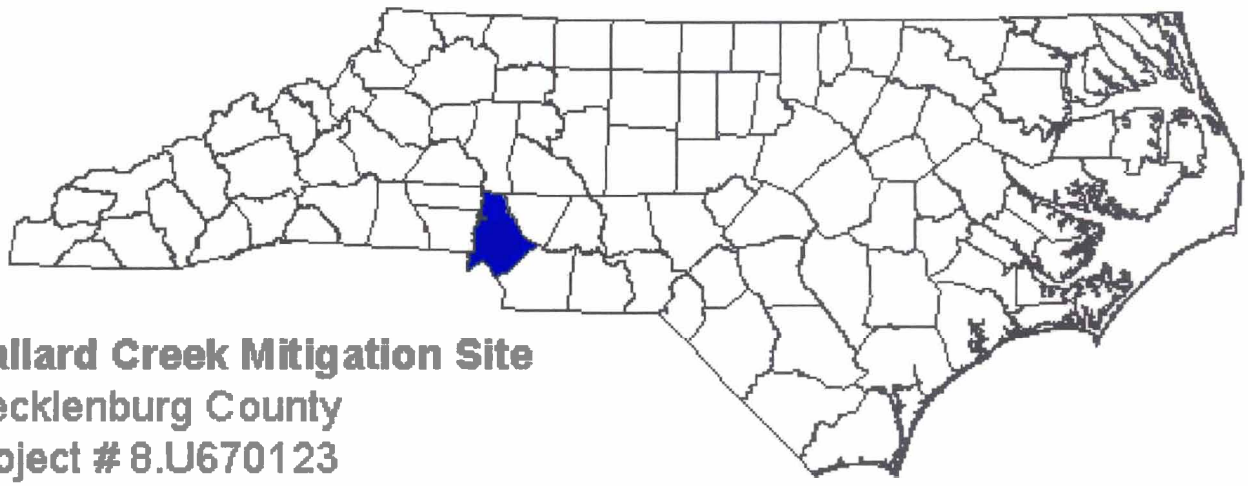
ANNUAL REPORT FOR 1998



Mallard Creek Mitigation Site
Mecklenburg County
Project # 8.U670123
TIP # R-211

Prepared By:
Natural Systems Unit
Planning and Environmental Branch
North Carolina Department of Transportation
December 1998

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1.0 INTRODUCTION

1.1 Project Description

The Mallard Creek Mitigation Site consists of two sites which encompass approximately 10 acres. Located in Mecklenburg County, it is situated on the east side of the intersection of SR 2833 (Mallard Creek Church Road) and US 29 (Figure 1). The two sites mitigate for bottomland hardwood impacts associated with the Charlotte Outer Loop (R-211 DA).

The site was initially constructed in 1994. However, due to both hydrologic and vegetation problems, NCDOT agreed to remediate the site. Remediation occurred in a series of three steps during 1997 and 1998.

1.2 Purpose

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of three years. Because of remediation activities, 1998 is considered the first year of both hydrologic and vegetative monitoring for the site. The following report details the results of hydrologic and vegetative monitoring during 1998 at the Mallard Creek Mitigation Site. Included is analysis of data on the site itself as well as local climate conditions during the growing season.

1.3 Project History

October 1994	Site 1 & 2: Grading Construction
February 1995	Site 2: Planted; Site 1: No planting (Standing Water)
September 1995	Vegetation Monitoring (1 yr.)
September 1996	Vegetation Monitoring (2yr.)
October 1997	Site 1 & 2: Re-mediation: Grading Construction
February 1998	Site 2: Boardwalk Construction
March 1998	Site 1: Under-drain installed at Sewer line
March 1998	Re-Planting of Site 1 & 2
May 1998	Monitoring Wells Installed
May- November 1998	Hydrologic Monitoring
September 1998	Vegetation Monitoring (1 yr.)

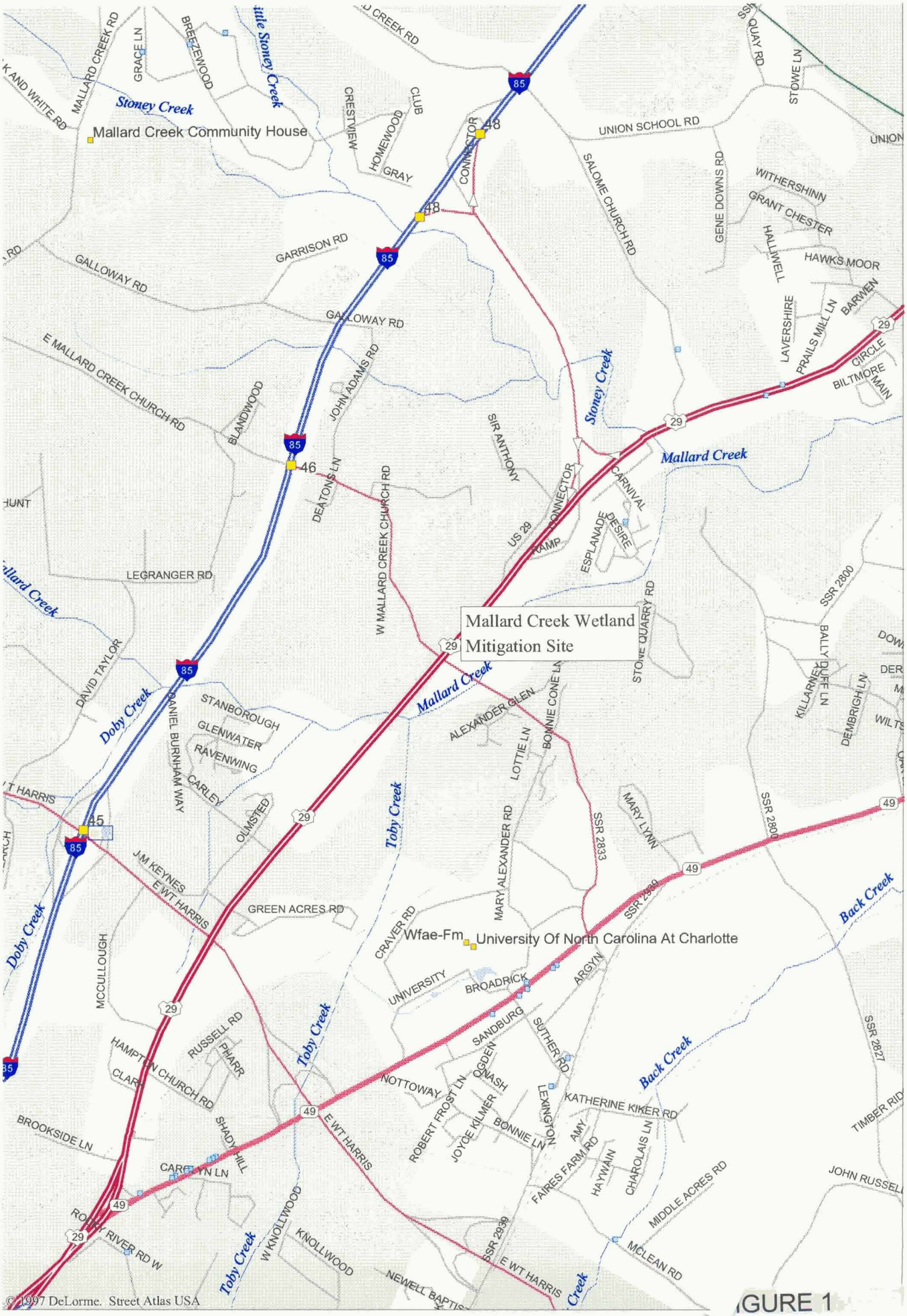


FIGURE 1
SITE LOCATION MAP

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 at least 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 Mecklenburg County begins March 22 and ends November 11. These dates correspond to a 50% probability that temperatures will drop to 28° F or lower after March 22 and before November 11.[1] The growing season is 233 days; therefore optimum hydrology requires 12.5% of this season, or at least 29 consecutive days. Also, local climate must represent average conditions for the area.

2.2 Hydrologic Description

The site was monitored for hydrology during 1996 and 1997 in order to establish the proper grading for the site. The monitoring wells were removed prior to construction in 1997. In May of 1998, nine monitoring wells, one rain gauge, and one surface water gauge were installed on the site. The automatic monitoring wells and rain gauges record daily readings of both depth to groundwater and rainfall, respectively. Because the wells were installed in May, the hydrologic data fails to incorporate the early part of the growing season, typically considered the "wettest" part of the growing season.

Appendix A contains a plot of the groundwater depth for each monitoring well. Data determined to be erroneous was omitted; therefore, some gaps appear in the plots. Precipitation events are included on each graph as bars.

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 233 day growing season. The results are presented in Table 1. The results represent data collected since May 1998.

[1] Soil Conservation Service, Soil Survey of Mecklenburg County, North Carolina, p.61.

Table 1
HYDROLOGIC MONITORING RESULTS

Monitoring Well	< 5%	5% - 8%	8% - 12.5%	> 12.5%	Actual %
MW-1	✓				1.7
MW-2			✓		9.4
MW-3		✓			6.9
MW-4	✓				0.9
MW-5	✓				1.7
MW-6			✓		8.6
MW-7			✓		8.2
MW-8	✓				4.3
MW-9	✓				0.9

The surface gauge on site has registered no appreciable surface water throughout most of the growing season.

2.3.2 Climatic Data

Figure 2 is a comparison of 1998 monthly rainfall to historical precipitation for the area. The two lines represent the 30th and 70th percentiles of monthly precipitation for the Charlotte area. These percentiles represent monthly rainfall data collected from 1948 to 1996. The bars are the monthly rainfall totals for 1998. The data was collected from a National Climatic Data Center rain gauge in Charlotte; because of data availability, the 1998 rainfall encompasses precipitation through September. The 1999 annual monitoring report will include a 30-70 percentile graph with the monthly rainfall from the winter of 1998.

With the exceptions of January and April, the precipitation in 1998 reflected average or below average rainfall. This was especially true in the summer months.

2.4 Conclusions

The site has not yet shown optimum wetland hydrology. However, several of the wells indicate "marginal" wetland tendencies, achieving saturated or inundated conditions for at least a 5% consecutive period during the growing season. It should be mentioned that the "wettest" part of the growing season was not monitored due to a delay in well installations.

Hydrologic monitoring should continue into 1999. Hydrologic data for an entire growing season would then be evaluated.

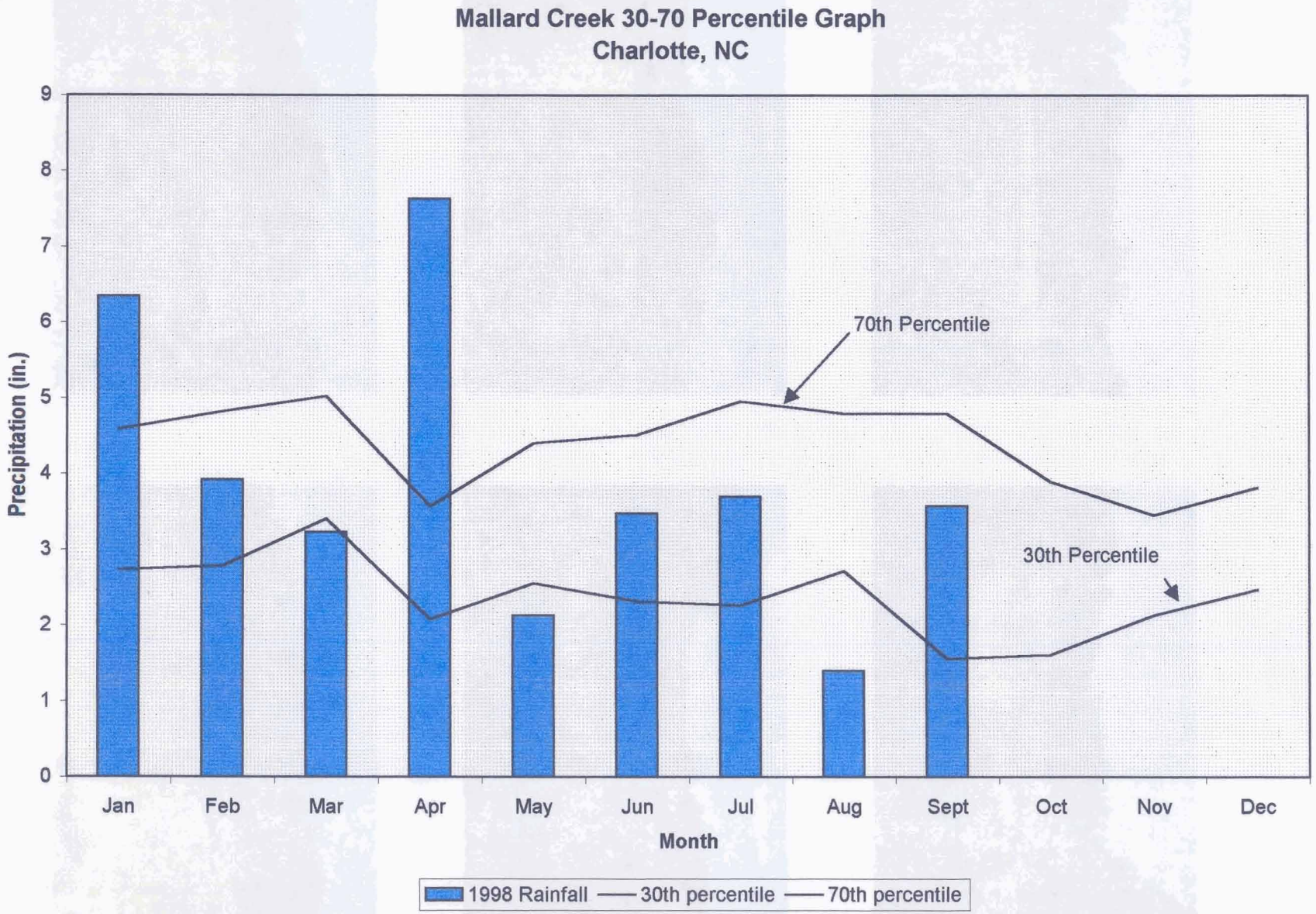


FIGURE 2
30-70 PERCENTILE GRAPH

3.0 VEGETATION

3.1 Success Criteria

Success Criteria states that there must be a minimum of 320 trees per acre surviving for three consecutive years.

3.2 Description of Species

The following tree species were replanted in the Wetland Creation Area:

Fraxinus pennsylvanica, Green Ash
Nyssa sylvatica, Blackgum
Quercus lyrata, Overcup Oak
Quercus nigra, Water Oak

3.3 Results of Vegetation Monitoring (1 year)

Table 2
VEGETATION MONITORING RESULTS

Plot #	Green Ash	Blackgum	Overcup Oak	Water Oak	Total (1 year)	Total (at planting)	Density (Tree/Acre)
1	8	1	4	1	14	31	307
2	4	3	10	10	27	27	680
3	7		13		20	35	389
4	16	3	11	1	31	31	680
5	5	4	9	8	32	38	573
6	17	1	2		20	36	378
		AVERAGE DENSITY					501

Heavy grass and sedge competition mitigation area #1. Seedlings are shaded, however continue to grow, as can be seen in plots 5 & 6. There were also a few cottonwood and sycamore trees volunteering in plots 3, 4, & 5.

3.4 Conclusions

Approximately 10 acres of this site was re-graded in the Fall, 1997. The total site is made up of two wetland mitigation areas. Wetland Mitigation Area #1 is a 2.80 acre site located in the southwest quadrant of the intersection of SR 2833 and Mallard Creek, while the remaining 7.20 acres is located directly across SR 2833 in the northwest quadrant. There were 6 vegetation monitoring plots established throughout the planting areas, 2 plots in mitigation area #1 and 4 plots in mitigation are #2. Based on the results of the stem counts for the one year monitoring period, we obtained an average tree density of 501 trees per acre. This average is above the minimum success criteria of 320 trees/ acre.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

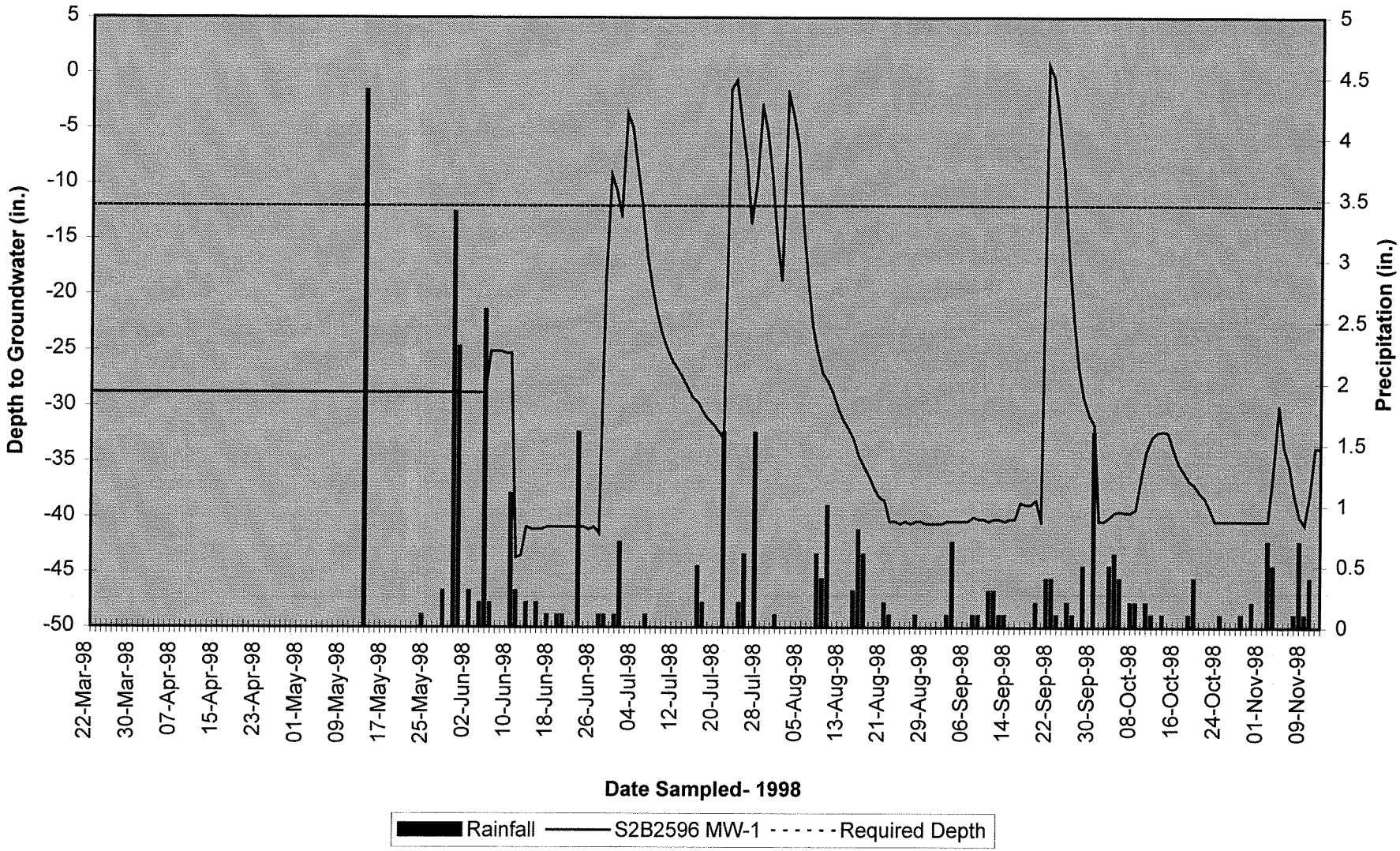
- Hydrologic data represents only a partial growing season; the wettest part of the season is not included in the data. It is hoped that an entire set of hydrologic monitoring data for 1999 will show more favorable results.

- Vegetation monitoring has revealed initially successful results. Vegetation monitoring will also continue in 1999.

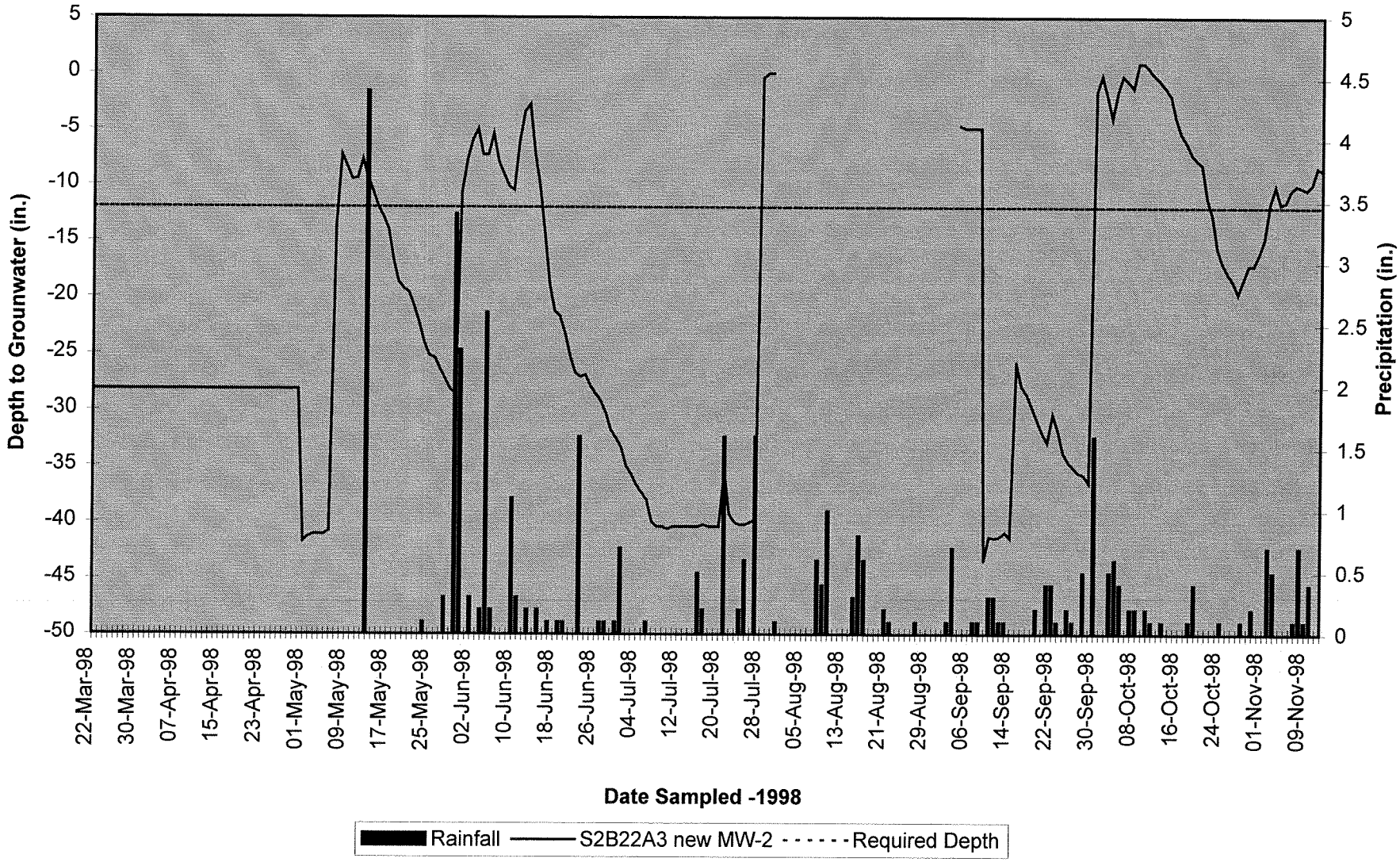
APPENDIX A

DEPTH TO GROUNDWATER PLOTS

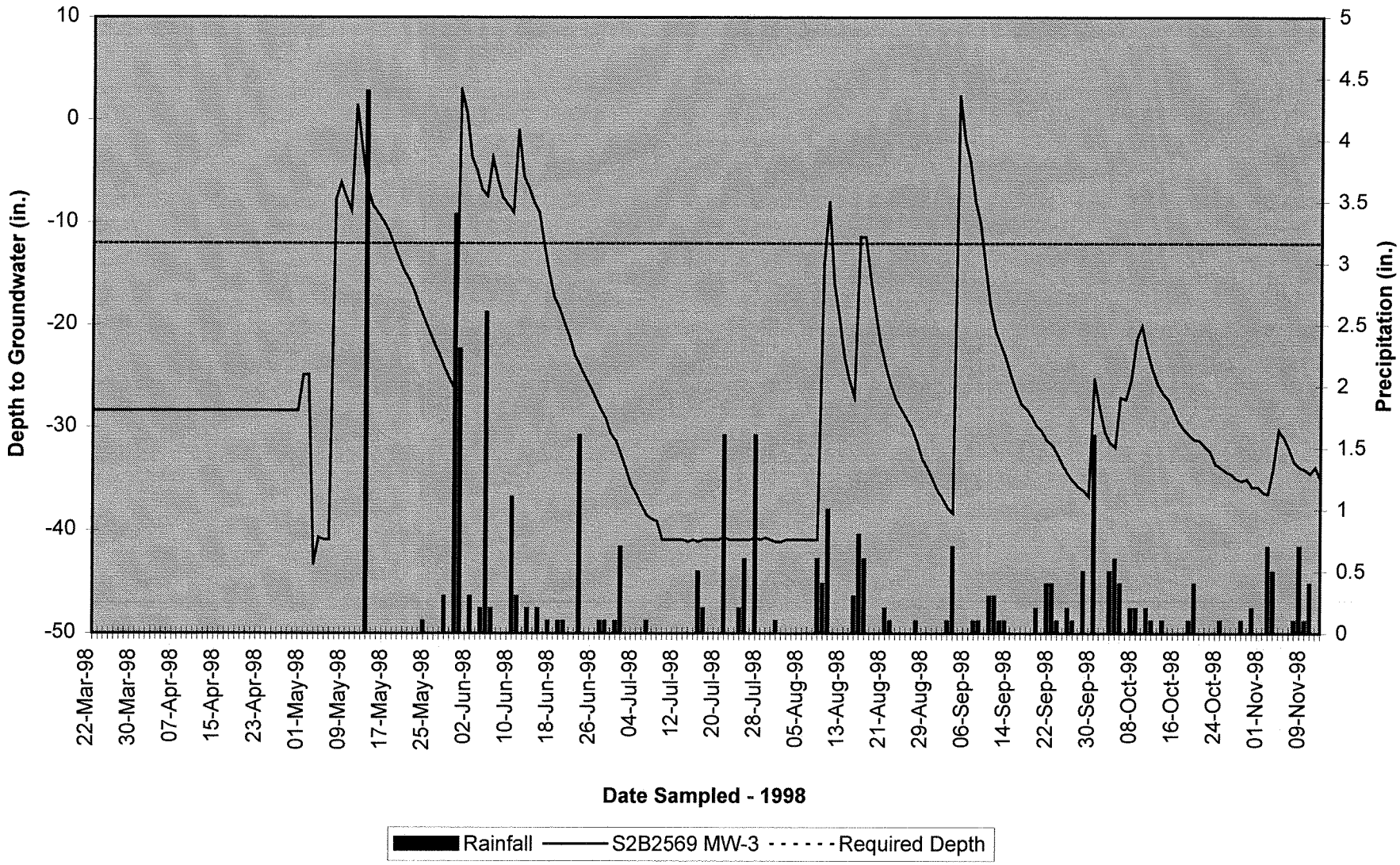
Mallard Creek- MW-1



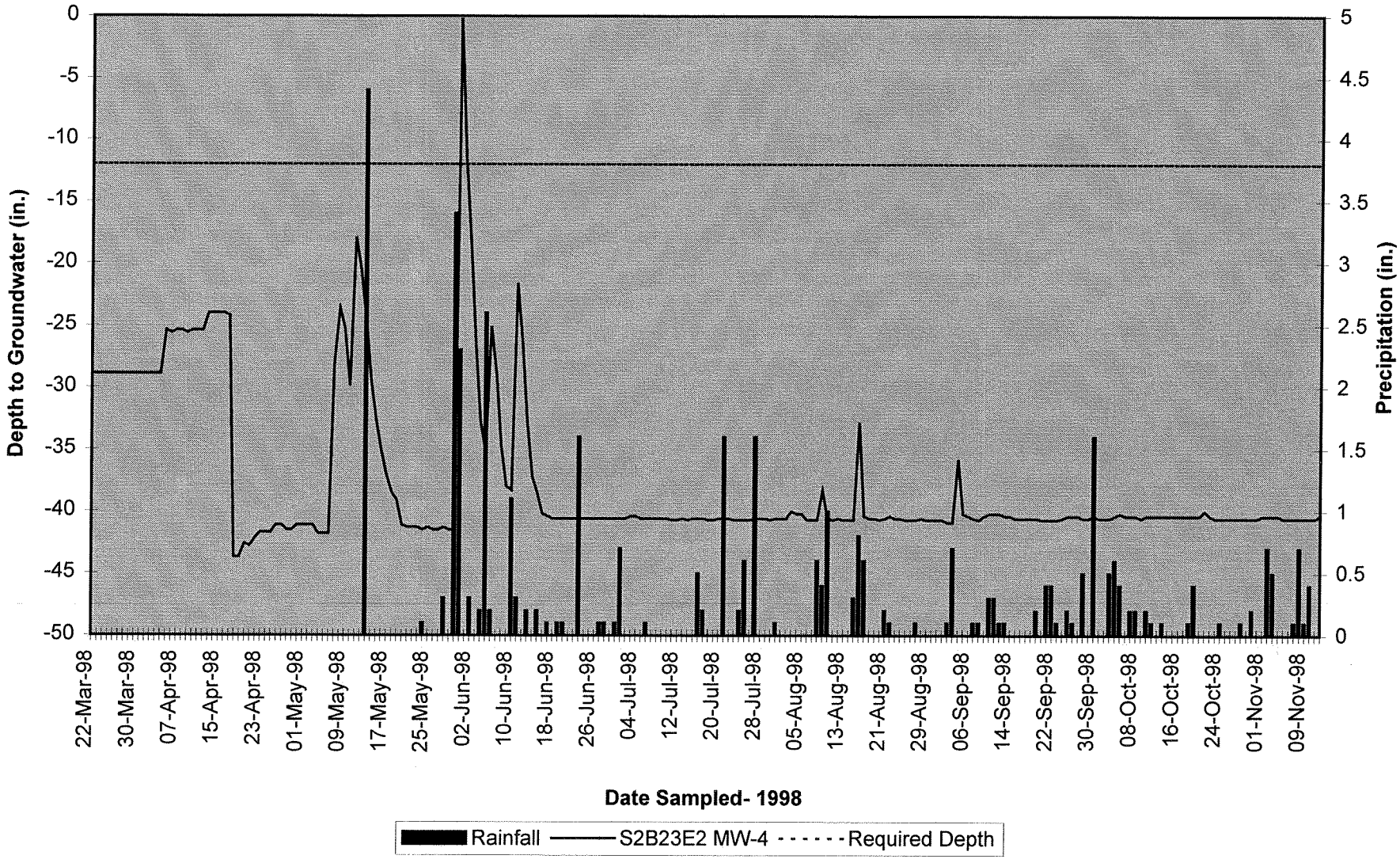
Mallard Creek- MW-2



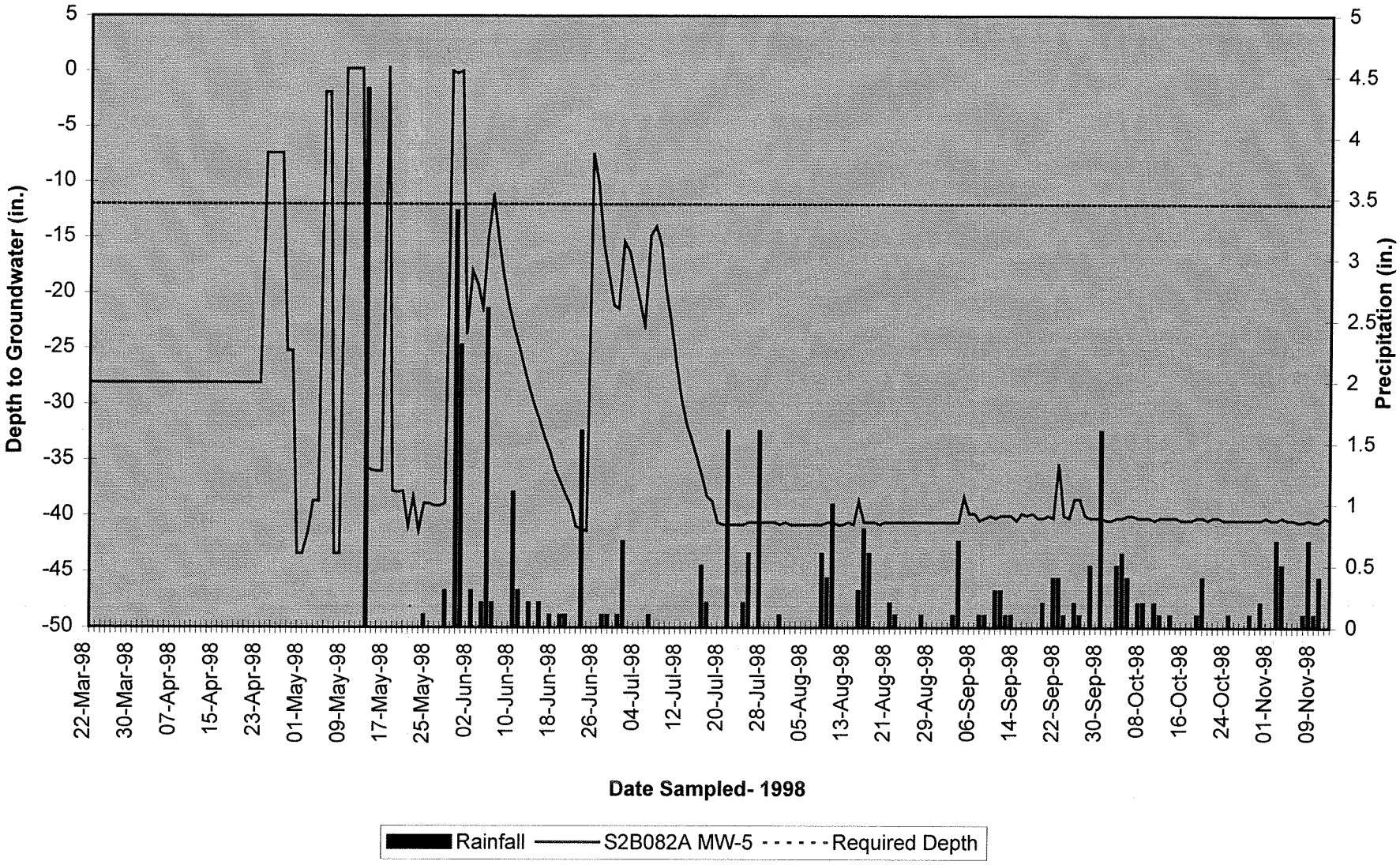
Mallard Creek- MW-3



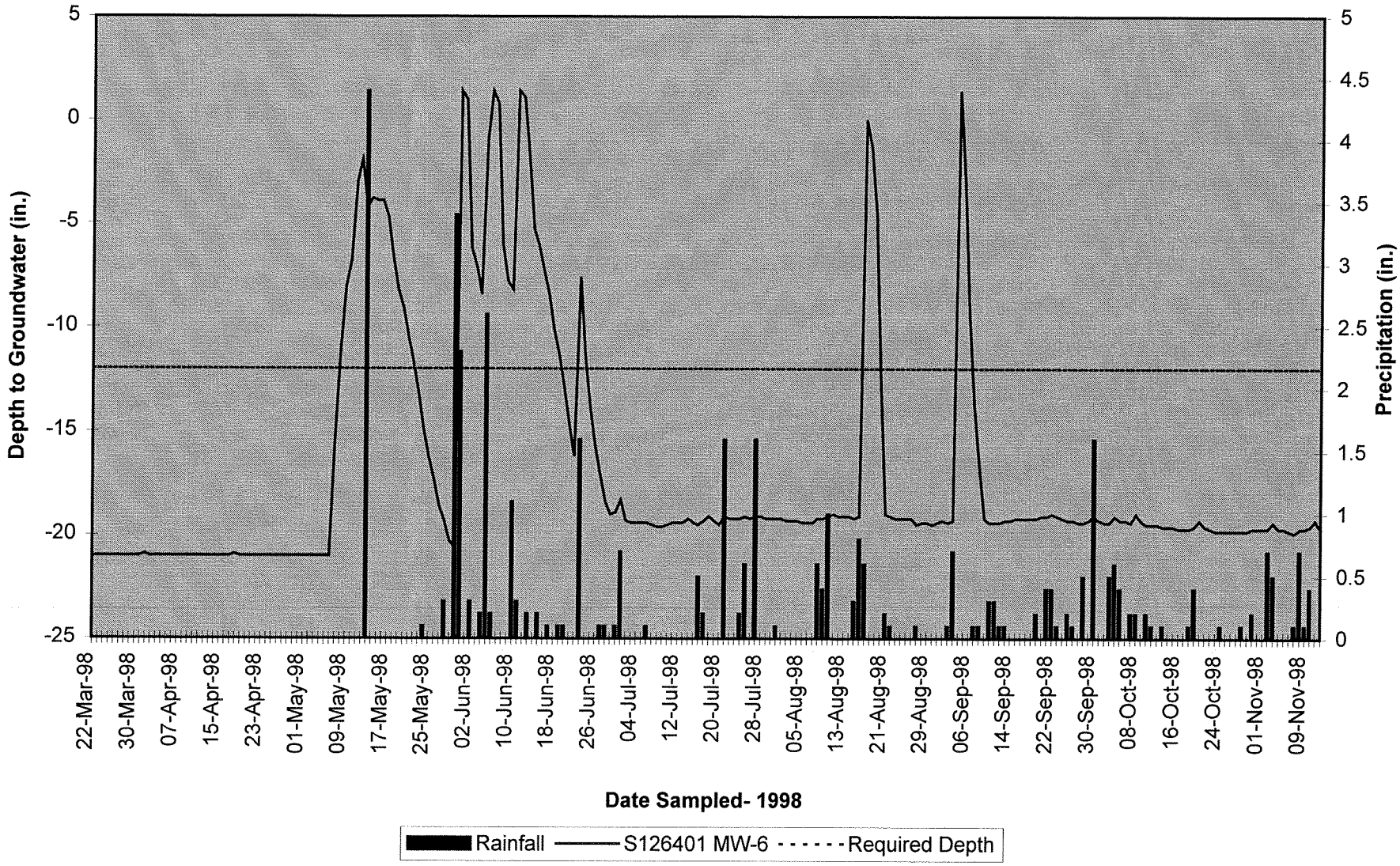
Mallard Creek- MW-4



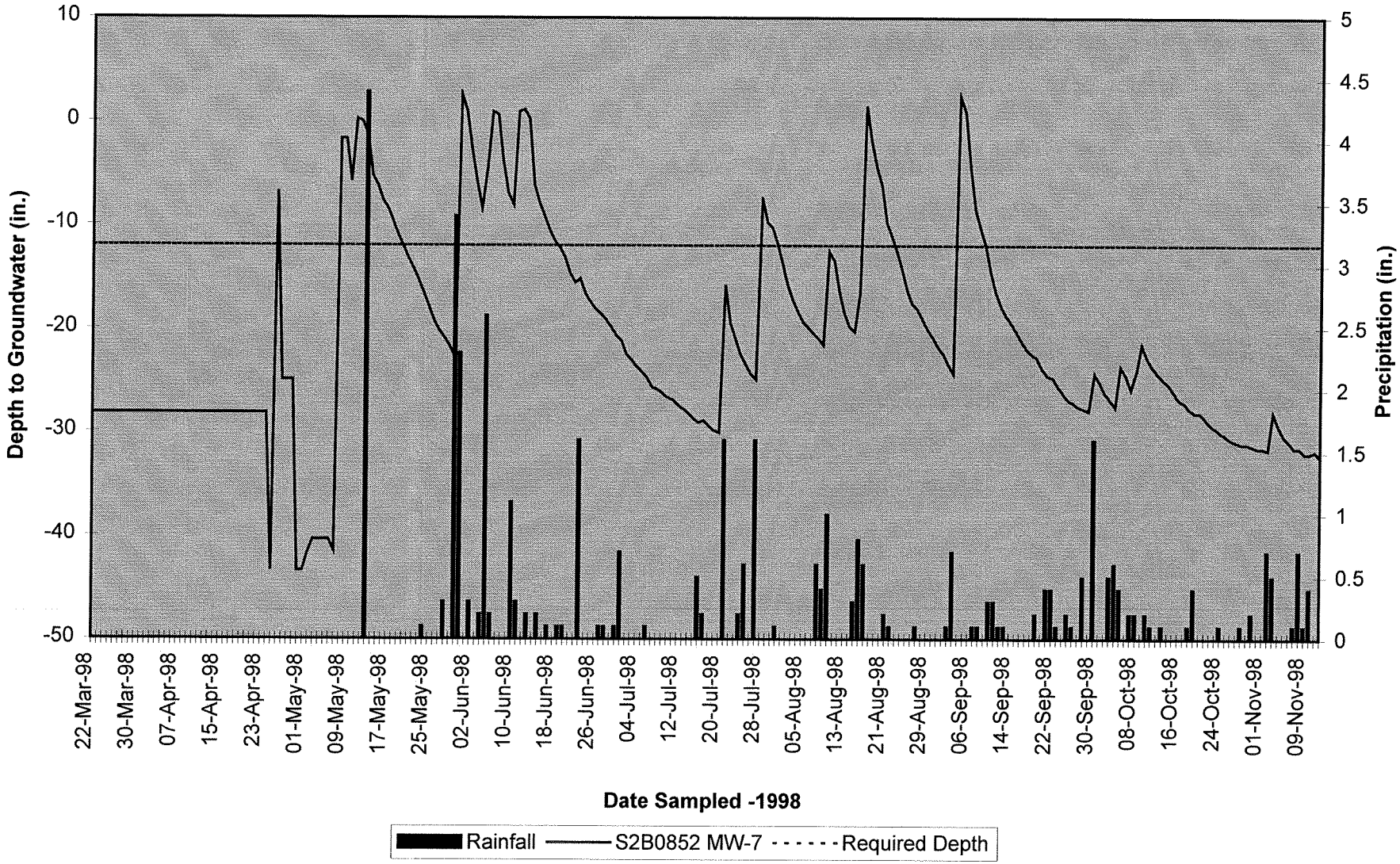
Mallard Creek- MW-5



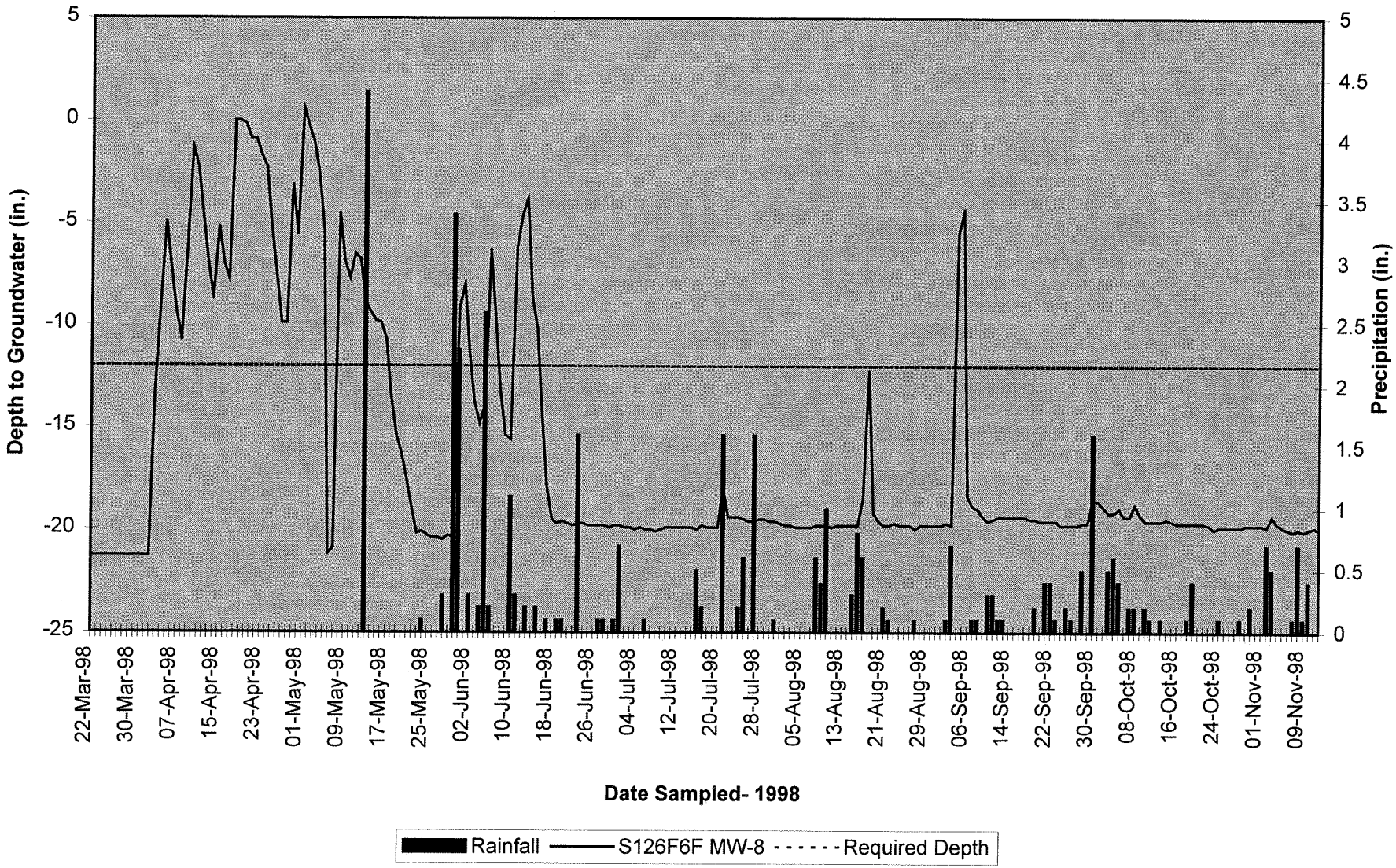
Mallard Creek- MW-6



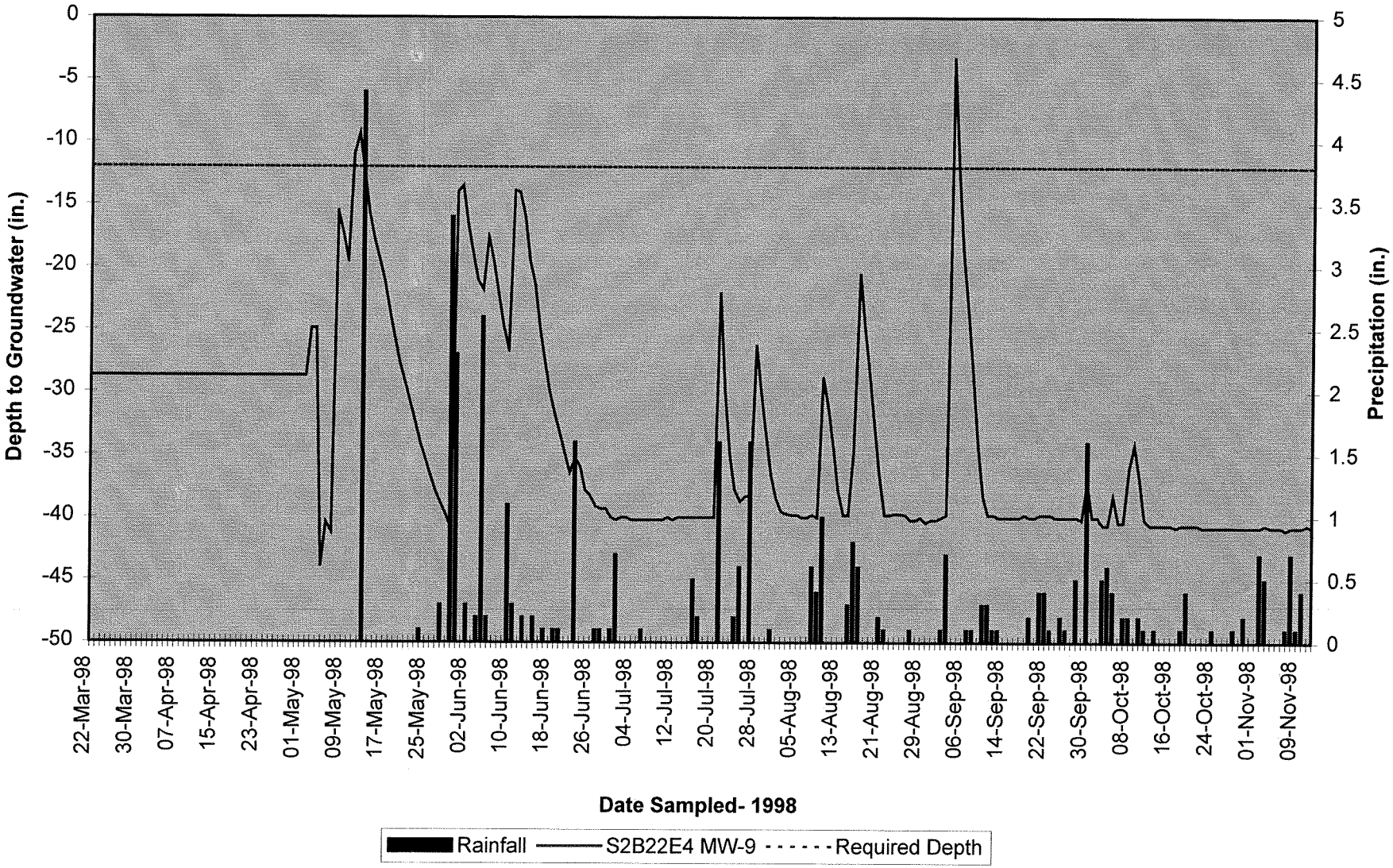
Mallard Creek- MW-7



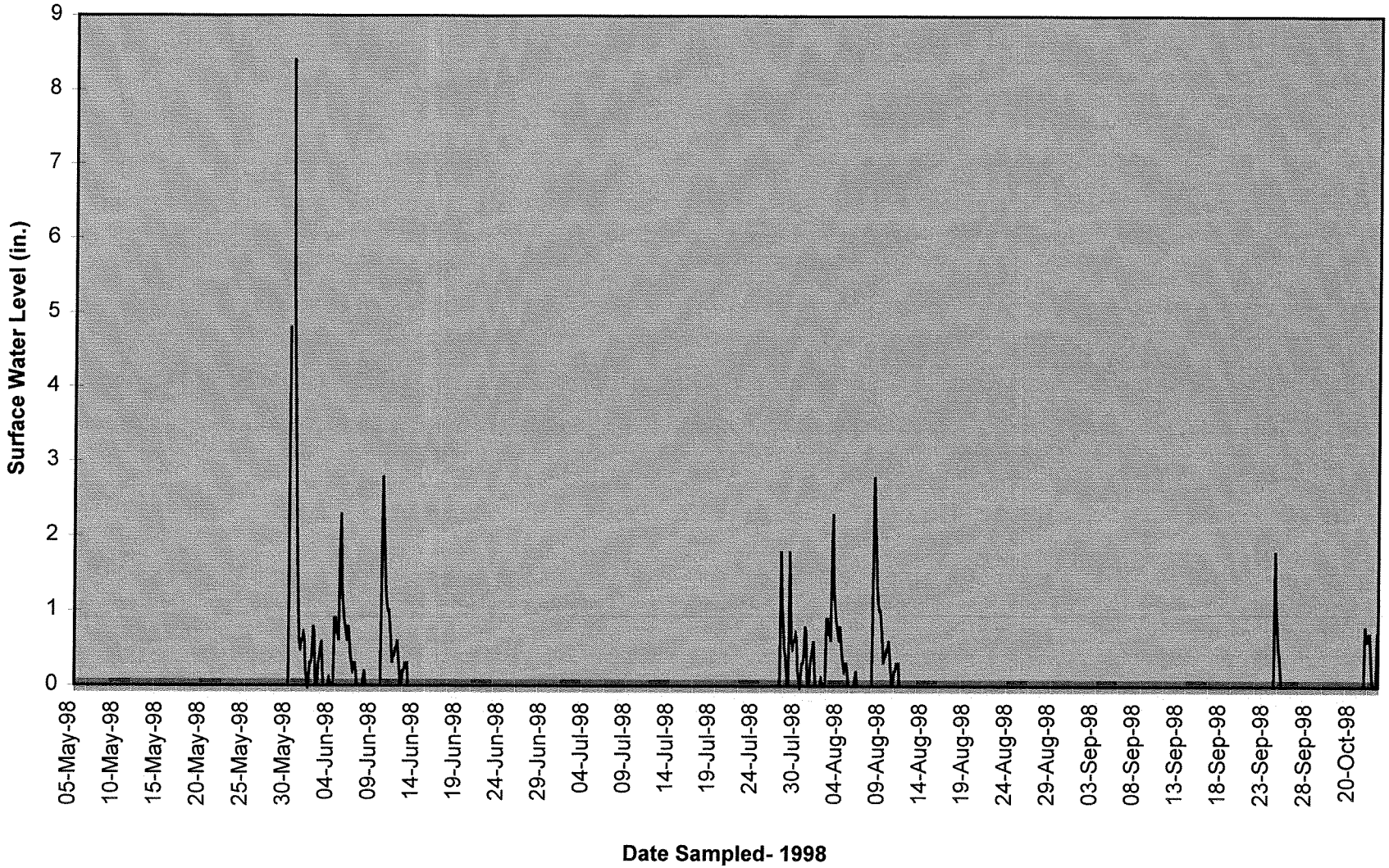
Mallard Creek- MW-8



Mallard Creek- MW-9



Mallard Creek Surface Gauge



APPENDIX B

SITE PHOTOS

Mallard Creek

APPENDIX C

MONITORING PARTNERING MEETING MINUTES

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

JAMES B. HUNT JR.
GOVERNOR

P.O. BOX 25201, RALEIGH, N.C. 27611-5201

E. NORRIS TOLSON
SECRETARY

December 4, 1998

Dr. G. Wayne Wright, Chief
Regulatory Branch
U.S. Army Corps of Engineers
Post Office Box 1890
Wilmington, North Carolina 28402

Dear Wayne:

Re: NCDOT/Resource Agency Partnering Meeting - Monitoring Guidelines

A meeting was held on July 22, 1998 in the NCDOT Photogrammetry Conference Room in Raleigh to discuss monitoring guidelines for the 1998 Annual Monitoring Reports. Please find attached a list of those in attendance and the meeting agenda. Following introductions, Charles Bruton described the purpose of the meeting and opened the floor to David Franklin for any opening comments. David said he looked forward to resolving any previous discrepancies in the 1997 Annual Monitoring Reports and discussing ways to better present monitoring results in this year's monitoring reports. Phil Harris moderated the meeting.

HYDROLOGIC MONITORING

NCDOT and the Corps agreed wetland mitigation sites must meet the guideline for hydrology (1987 Manual) using *consecutive* days and not cumulative days of the locally designated growing season. Wetland hydrology criteria in the 1987 Manual notes that a site must be seasonally inundated or saturated (within 12 inches of the surface) greater than 12.5 percent of the local growing season. NCDOT will re-evaluate the 1997 monitoring data to reflect consecutive days rather than cumulative days of the growing season.

Regarding monitoring well data, David wants to see compliance is met and that the sites are working. Phil noted that NCDOT is taking a close look at recurring problems associated with monitoring well installation and maintenance. In cases where hydrology was failing for a particular site, NCDOT would be unable to remediate the site until the following year due to seasonal constraints and the necessity to collect specific hydrographic information. In discussing what was considered to be hydrologic success,

David Franklin said the 1987 Manual was the official guideline. However, he went on to suggest that the Corps would be interested to see a more detailed breakdown of the well data and would not be opposed to hydrologic success based on a longer monitoring period with less than a 12.5 % success criteria. He also mentioned well data that falls below the 12 inch threshold may also be examined as a special case. Mike Bell suggested site remediation should occur now rather than waiting until December. NCDOT, in coordination with the Corps, will identify unsuccessful sites and work together to determine how the site is failing and the best remediation techniques to implement.

VEGETATION MONITORING ISSUES

Due to NCDOT's demand for hardwood seedlings there is a shortage of seedlings this year and there was none available for remediation efforts. There is a minimum one year lead time for ordering seedlings. In a situation on a site where the well data is good but the vegetation is not successful the Corps stated they would review it on a site by site basis. In cases of remediation, Charles said it was almost impossible to grade and plant a site before the winter deadline.

Randy Wise requested an extension of the August/September time period to obtain the vegetation monitoring data for the sites. After discussing this issue, it was agreed that the marsh sites would be evaluated in August and the hardwood sites could be evaluated as late as October and November before leaf drop. The NCDOT will send a "blanket" letter to the Corps to modify all permits to reflect the revised vegetation monitoring period. Phil mentioned that although there would be an extension of the monitoring period for vegetation, monitoring reports would continue to be completed and distributed by the end of December. Randy said they often perform random site visits throughout the year to see how vegetation is performing and would perform supplemental planting if noted early enough in the growing season.

Ken Jolly asked who was responsible for downloading wells and did they look at vegetation. Beth Smyre said the Geotechnical Unit downloaded well data and notified her of any vegetation issues. The Corps requested that proposed remediation for hydrology and vegetation be included in monitoring reports. NCDOT and the Corps will coordinate any remediation measures. Randy expressed their commitment to remediate vegetation as soon as possible.

The discussion turned toward planted versus volunteer species. The Corps does not want to see volunteer species included in survival rate calculations for planted species. Randy noted the survival rate is set at 50% or higher. David wanted to make sure that the sites meet the target species requirement in stems per acre, not a percentage (except for older sites set up for percentage). David also wanted to see the distribution of species planted and volunteer. Randy said it is often difficult to identify certain species during the first two years (several oak species often look alike as saplings). Generally it is easier to differentiate the species by the third year. The Corps wanted to know if there was a way to identify the planted species at planting. However, the planting procedure is

so labor intensive now it would make it impossible to do so. The 50 foot by 50 foot monitoring plots are chosen and staked in the field after planting has occurred. The Corps wants NCDOT to note the unwanted volunteer species and to identify possible remediation to make sure these species do not dominate the site. The NCDOT and the Corps agreed that the distribution of species is such that no species dominates more than 20 % of the distribution. Red maple and sweet gum are generally not to be planted to insure good numbers of target species.

HYDROLOGIC SUCCESS CRITERIA

The incorporation of reference systems in determining success was discussed. David concluded that if a particular site failed under the 1987 Manual guidelines, then NCDOT had the option of comparing site parameters to reference site parameters in determining success. The purpose of reference systems was to allow NCDOT a second option in achieving success. The determination of a reference system with its success criteria would need to be addressed in the mitigation plan. The use of the hydrogeomorphic system (HGM) was also discussed. The Corps is not going to use HGM as a reference system, but will probably look at it as a tool. There are no guidelines out yet on HGM.

The use of 20-80 versus 30-70 probability graphs, as defined by WETS. was discussed. These graphs compare the specific year rain data to the historical data for the mitigation site area. The NRCS and WETS use the 30-70 probability graphs and NCDOT would like to use these as well. It was decided to use the 30-70 information and to go to the nearest gage station as long as the source was cited. David determined that if a site's hydrology performs at 12.5%, then hydrologic success has been achieved. If a site performs in the 5% to 12.5% range, then there is "marginal" hydrologic success. If this trend continues, then the entire success criteria for the site will be reviewed.

The target percentage for hydrological success should be included in the permit and shown in the mitigation plan. The Corps will be willing to negotiate on the success of the site, but include adequate information in the permit and the mitigation plan.

Charles Bruton suggested placing monitoring wells in the impacted wetland areas to assess and compare to mitigation areas. David wanted to insure that the best mitigation site attainable is created. David also asked that well performance be broken out in the report.

An interim report was given on Mud Creek. It was noted that wells placed in the reference wetland and wells placed in the created wetland were an inappropriate method to determine hydrologic success because the difference in soil type, hydrology, and cover type.

Mike Bell discussed results of a workshop he attended on monitoring wells. He also discussed the use of piezometers.

There was no further discussion and the meeting adjourned. Please advise if you have any questions regarding the meeting, minutes, or agenda.

Sincerely,

V. Charles Bruton

V. Charles Bruton, Ph.D.
Assistant Branch Manager
Planning and Environmental Branch

VCB/el

Attachments

July 22, 1998—9:30 @ Century Center in Photographic Conference Room

NCDOT/Resource Agency Partnering Meeting to Discuss Monitoring Issues

AGENDA

Introductions

Purpose & Goals of Meeting
- Standardize the monitoring reports

Hydrologic Monitoring
- Consecutive vs. Cumulative days
- Data interpretation

Vegetation Monitoring Issues
- Planted vs. Voluntary plants
- Monitoring timeframe

Success Criteria
- Geographical considerations
- Reference systems

Monitoring Report Presentation
- Text
- Figures to be included
- Tables
- Photographs
- Submittal dates

1/22/98

NCDOT/RESOURCE AGENCY PARTNERING MEETING

NAME	AGENCY	PHONE NO.
Phil Harris	NCDOT - P&E	(919) 733-7844 (x-301)
Ed Lewis	NCDOT - P&E	" (240)
Hal Bain	P&E	(919) 733-7844 x 309
Scott McLendon	Corps of Engineers	910-251-4725
David Franklin	"	910 251-4955
Mike Bell	"	919-825-1616 x26
DAVE TOMLINSON	"	919-251-4634
David Cox	NCWRC	(919) 528-9886
Eric Alsmeyer	Corps - Raleigh	876-8441 x25
KEN SOLLY	" "	(919) 876-8441, x22
Beth Smyre	NCDOT - P&E	(919) 733-7844, x 35
Kendra Williamson	NCDOT - P&E	x335
LeiLani Paugh	NCDOT P&E	" X 332
Tanner Holland	NCDOT P&E	" X 280
[illegible]	[illegible]	
Randy K. Wise	NCDOT - REU	(919) 733-2920
Charles Tomlinson	NCDOT-REU	733-2920
RANDY GRIFFIN	NCDOT - REU	733-2920
Charles Euston	NCDOT - P&E	733-7844 x 308