

ANNUAL REPORT FOR 2001



Wiggins Mill Mitigation Site
Wilson County
Project No. 81330509
TIP No. R-1030WM



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

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Summary

The following report summarizes the monitoring activities at the Wiggins Mill Mitigation Site. This site was constructed in the fall of 2000 to provide wetland mitigation for U-3472 and R-1030. Planting activities were completed in March 2001. The site is monitored using eighteen hydrologic monitoring gauges and eleven vegetation plots. The year 2001 reflects the first complete year that monitoring has taken place on the site.

During the 2001 monitoring season, 12 of the 18 monitoring gauges showed saturation for more than 5% of the growing season. The site experienced below normal rainfall in 2001.

The vegetation plots yielded an average plot density of 463 trees per acre, with all but one of the eleven plots showing very successful stem counts.

The NCDOT recommends that all monitoring activities be continued at the Wiggins Mill site.

1.0 Introduction

1.1 PROJECT DESCRIPTION

The Wiggins Mill Mitigation Site is located in Wilson County south of the Wiggins Mill reservoir southwest of the City of Wilson and encompasses approximately 89 acres (Figure 1). The site's grading was completed in October 2000 and planting in March 2001. The first year of monitoring at the site has just been completed.

The site serves as mitigation for U-3472 and R-1030. The site includes 7,020 linear feet of stream restoration, 11.31 acres of buffer restoration, 84 acres of small stream swamp hardwood (1st and 2nd order streams), bottomland hardwood, swamp hardwood, and headwater forest/low elevation seep wetland communities restoration, and 5.3 acres of bottomland hardwood enhancement.

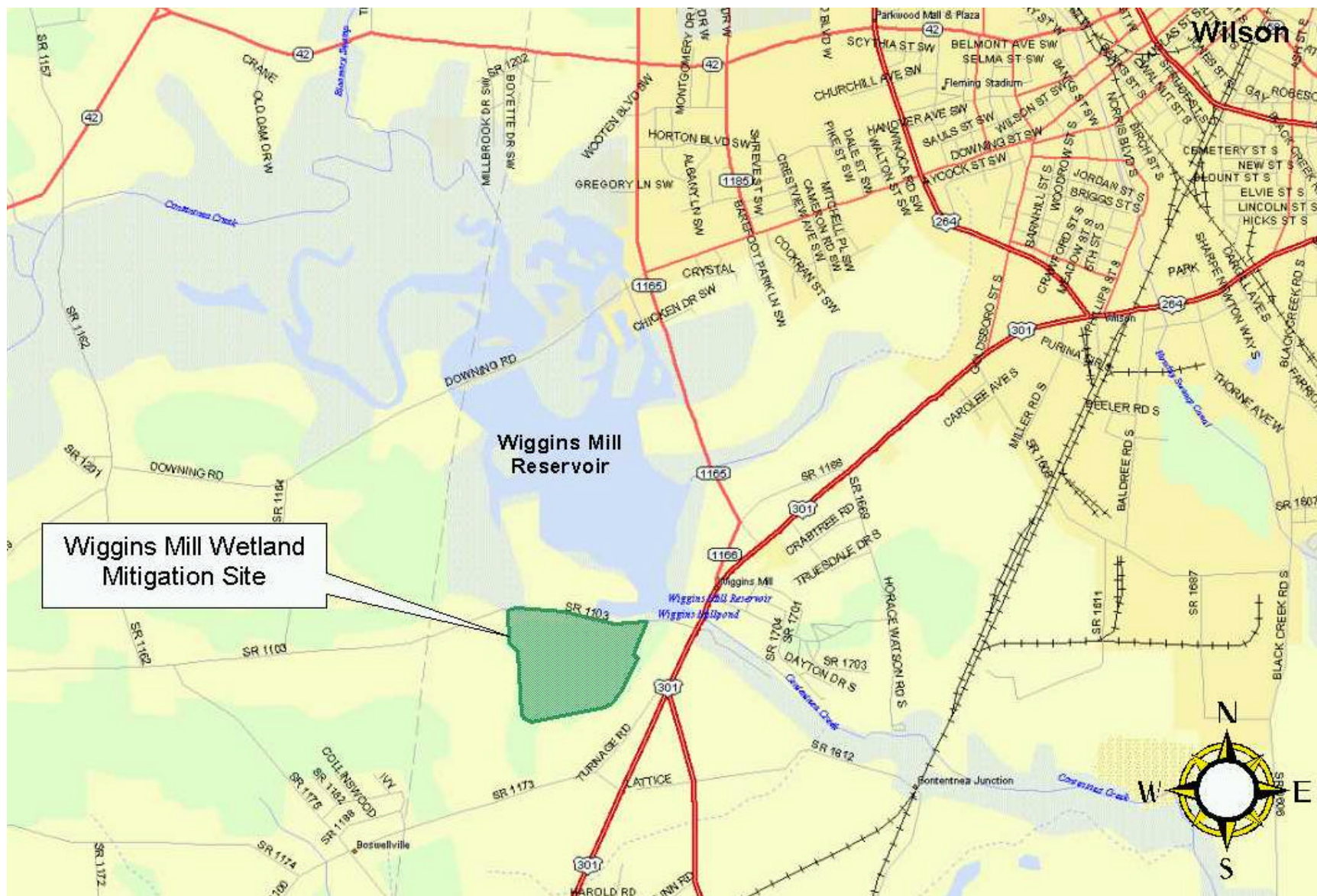
1.2 PURPOSE

In order to demonstrate successful mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five 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 the 2001 growing season at the Wiggins Mill Mitigation Site. 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

October 2000	Site Grading Completed
February 2001	Herbicide Application
March 2001	Monitoring Gauges Installed
March 2001	Site Planted
March- November 2001	Hydrologic Monitoring (1 yr.)
July 2001	Vegetation Monitoring (1 yr.)

Figure 1. Site Location Map



1.4 DEBIT LEDGER

Table 1. Wiggins Mill Mitigation Site Debit Ledger

Site Habitat	Mitigation Plan			TIP Debit	
	Acres at Start	Acres Remaining	% Remaining	U-3472	R-1030
SPH Restoration	45.00	8.44	18.76	0.00	36.56
BLH Restoration	39.00	4.52	11.59	0.44	34.04
BLH Enhancement	5.00	5.00	100.00		
Buffer	11.31	6.56	58.00	4.75	
Total	100.31	24.52	24.44		

SPH: Swamp Hardwood

BLH: Bottomland Hardwood

2.0 Hydrology

2.1 SUCCESS CRITERIA

In accordance with federal guidelines for wetland mitigation and the wetland mitigation plan (entitled “North Carolina Department of Transportation (NCDOT) Wiggins Mill Mitigation Plan Wilson County, North Carolina”, dated February 1, 1999) 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 5% of the growing season. This success criteria was agreed upon as part of the special conditions set forth by the Corps of Engineers (COE) through their issuance of permits for NCDOT’s TIP projects U-3472 and R-1030.

The growing season in Wilson County begins March 20 and ends November 12. The dates correspond to a 50% probability that temperatures will remain above 28° F or higher after March 20 and before November 12.¹ The growing season is 236 days; therefore, the minimum duration for 5% of the growing season to have wetland hydrology is 12 consecutive days.

2.2 HYDROLOGIC DESCRIPTION

Eighteen monitoring gauges were installed on site in March of 2001 (Figure 2). The automatic monitoring gauges record daily readings of the groundwater depth. The 2001 data represents the first full growing season for hydrologic monitoring.

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 236 day growing season (March 20 – November 12). It is this hydrologic data which will determine the hydrologic success of this mitigation site.

Table 2 shows the hydrologic results for 2001. Figure 3 is a graphical representation of the hydrologic monitoring results. No data is available for March 20–28 due to the timeliness of gauge installation; however, enough data was retrieved to indicate successful hydrologic periods for 12 of the 18 gauges. The 6 gauges not meeting hydrologic success criteria indicate saturation in the early growing season and most probably would have passed with the additional gauge data from March 20 through March 28.

¹ Soil Conservation Service, Soil Survey of Wilson County, North Carolina, p.79.

Figure 2. Wiggins Mill Site Gauge Location Map

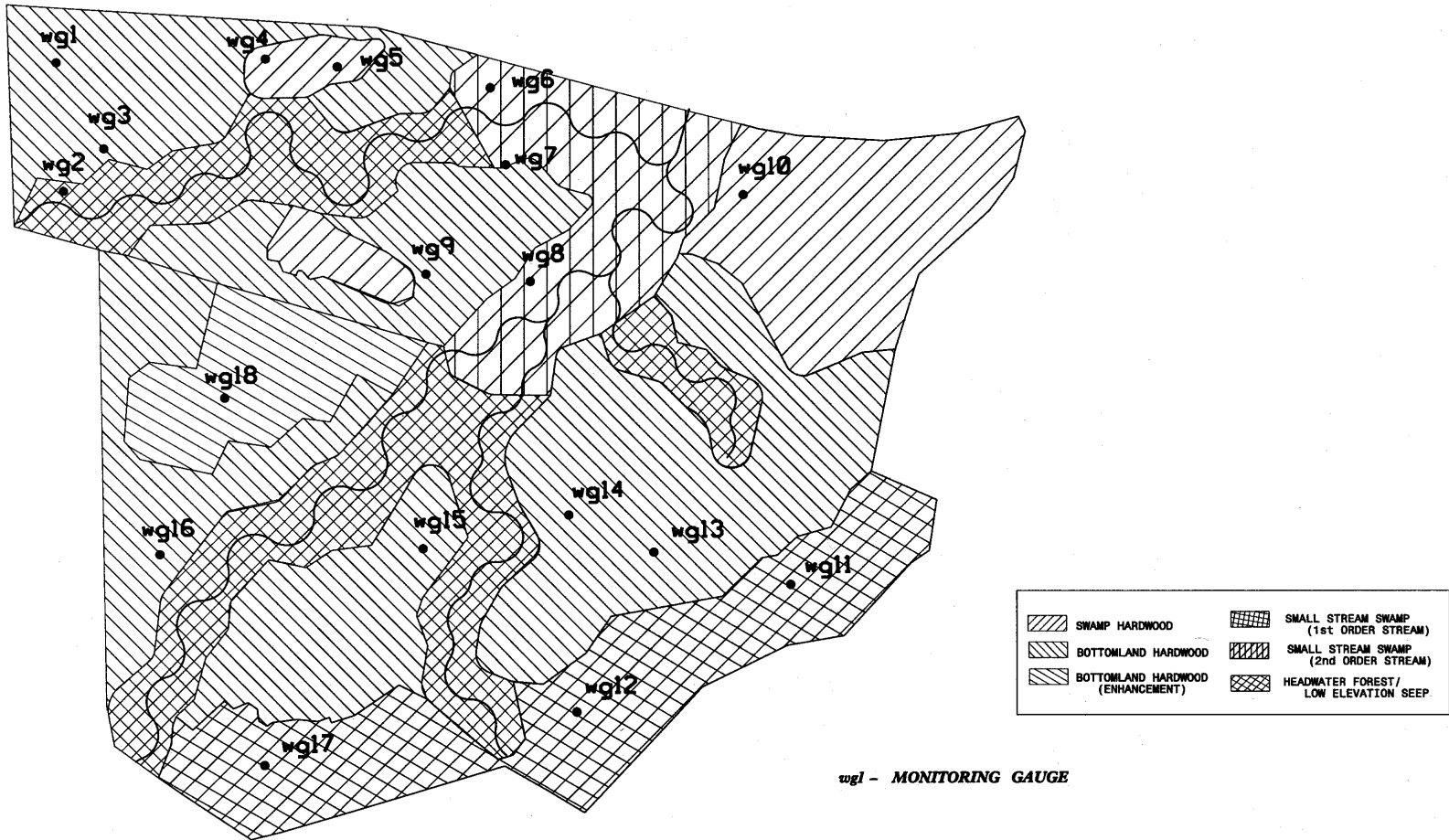


Table 2. 2001 Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 8%	8 – 12%	> 12.5%	Actual %	Success Dates
WM-G1	✓				3.8	Mar 30 – Apr 7
WM-G2	✓				3.0	Mar 30 – Apr 5
WM-G3	✓				3.4	Mar 30 – Apr 7
WM-G4		✓			6.8	Mar 29 – Apr 13
WM-G5		✓			6.4	Mar 29 – Apr 12
WM-G6		✓			5.1	Mar 29 – Apr 9
WM-G7	✓				4.2	Mar 30 – Apr 8
WM-G8			✓		10.2	Aug 12 – Sept 4
WM-G9	✓				4.2	Mar 30 – Apr 8
WM-G10		✓			7.2	Mar 29 – Apr 14
WM-G11				✓	38.6	Aug 12 – Nov 10
WM-G12			✓		10.2	Mar 29 – Apr 21
WM-G13			✓		8.0	Mar 29 – Apr 16
WM-G14		✓			5.9	Aug 12 – Aug 25
WM-G15	✓				4.7	Mar 30 – Apr 9
WM-G16		✓			5.1	Mar 29 – Apr 9
WM-G17				✓	39.0	Mar 29 – Jun 28
WM-G18			✓		10.2	Mar 29 – Apr 21

Appendix A contains charts of the groundwater depth for each monitoring gauge during 2001. These monitoring gauge graphs are designed to show the reaction of the groundwater level to specific rainfall events. If the gauge shows saturation for 5% or greater of the growing season, the maximum number of consecutive days is noted on each graph.

A rain gauge was installed prior to the 2001 growing season, thus eliminating the need for weather station data on the monitoring gauge graphs. Daily precipitation events, shown on each monitoring gauge graph, represent data from the onsite rain gauge.

2.3.2 Climatic Data

Figure 4 is a comparison of monthly rainfall for the period of November 2000 through October 2001 to historical precipitation (collected between 1931 and 2001) for Wilson, North Carolina. This comparison gives an indication of how 2001 relates to historical data in terms of average rainfall. The NC State Climate Office provided all historical data.

Monthly rainfall for the site fluctuated around the average rainfall for 2001. December (2000), January, April, and October experienced below average rainfall. The months of November (2000), February, May, June, July, and September all recorded average rainfall for the site. March and August experienced above average rainfall. Overall, the site experienced below average rainfall for 2001.

Gauge 6 and 18 meet the successful criteria twice; however, both periods of saturation were during months of above average rainfall. Gauge 13 and 16 only meet during a month of above average rainfall. Gauge 4, 5, 8, 10, 11, 12, 14, and 17 meet the success criteria during months of normal or below normal rainfall.

2.4 CONCLUSIONS

In 2001, 12 of the 18 monitoring gauges recorded saturation within one foot of the surface for at least 5% of the growing season.

The site experienced below normal rainfall and showed good hydrologic success for the first year of monitoring.

Figure 3. 2001 Wiggins Mill Site Hydrologic Monitoring Results

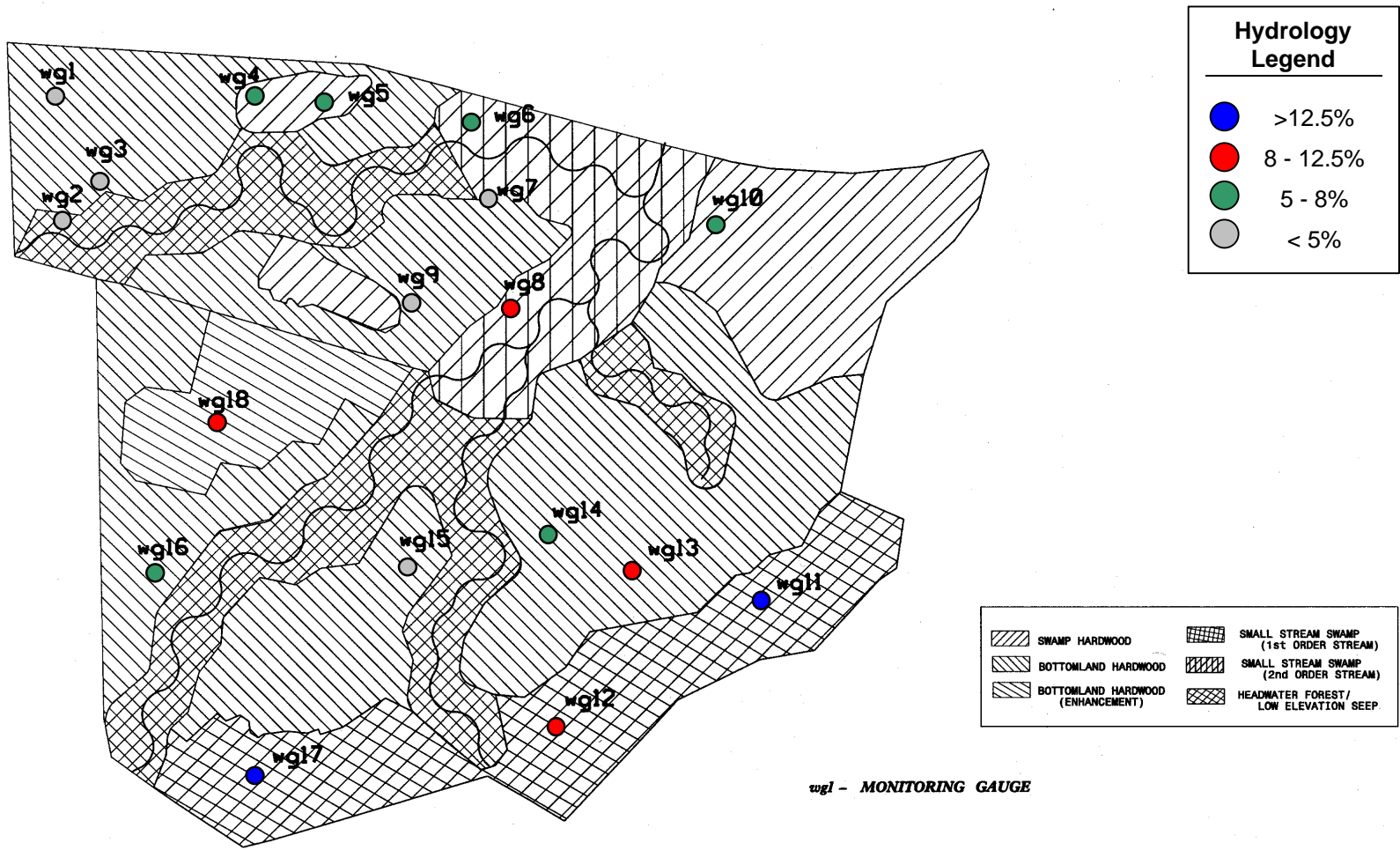
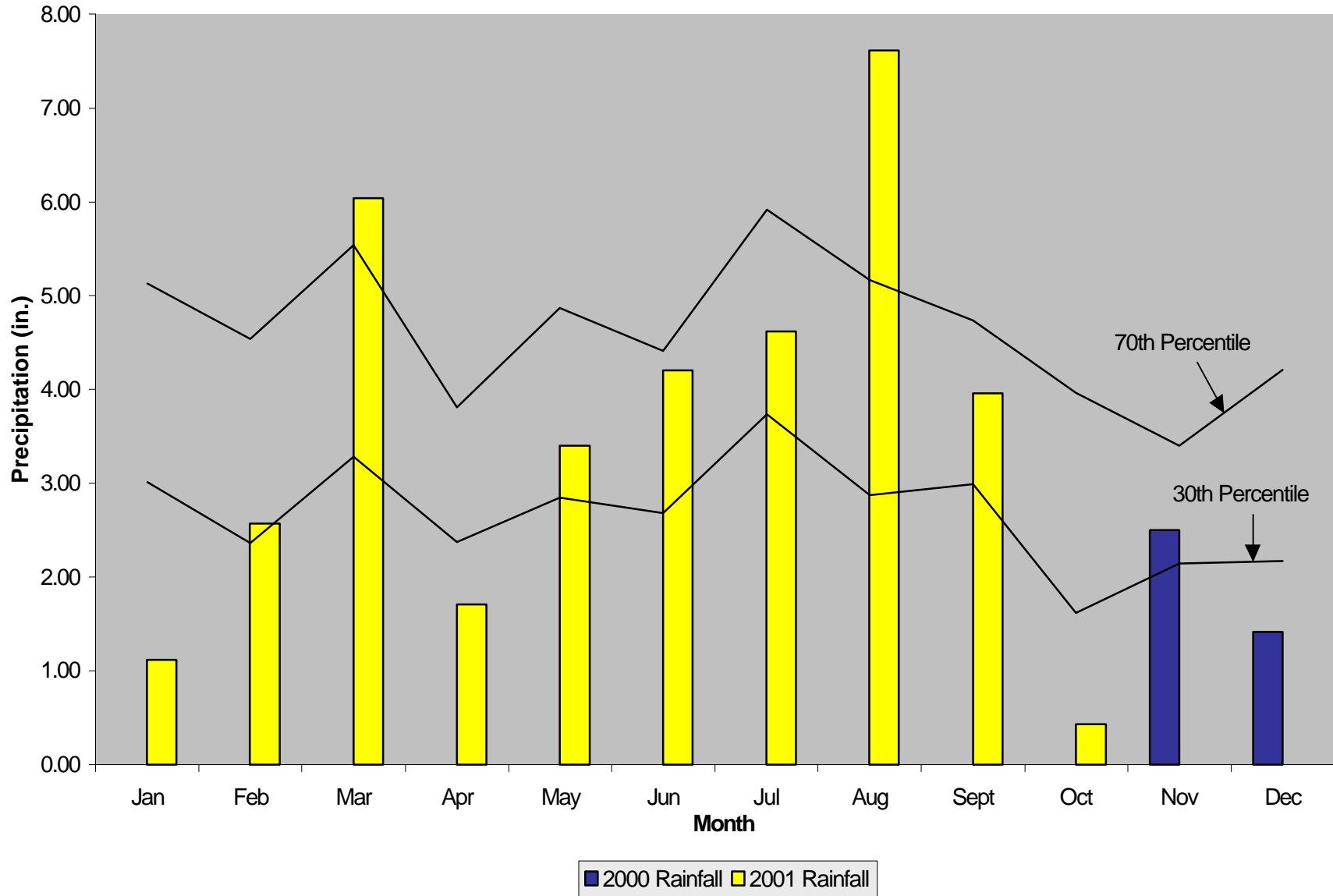


Figure 4. Wiggins Mill 30-70 Percentile Graph



3.0 Vegetation: Wiggins Mill Mitigation Site (Year 1 Monitoring)

3.1 SUCCESS CRITERIA

Success Criteria states that at least 320 stems per acre must survive after the completion of the third growing season and 240 stems per acre after the fifth growing season. If desired vegetation has not been established, NCDOT will notify the appropriate agencies and will implement corrective measures.

3.2 DESCRIPTION OF SPECIES

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

Zone 1: Headwater Forest (12 acres)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Betula nigra, River Birch
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Quercus nigra, Water Oak
Quercus phellos, Willow Oak

Zone 2: Bottomland Hardwood (39 acres)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Liriodendron tulipifera, Tulip Poplar
Quercus nigra, Water Oak
Quercus phellos, Willow Oak
Quercus lyrata, Overcup Oak

Zone 3: Swamp Hardwood (10 acres)

Taxodium distichum, Baldcypress
Quercus lyrata, Overcup Oak
Nyssa sylvatica var. *biflora*, Swamp Black Gum
Nyssa aquatica, Water Tupelo
Quercus laurifolia, Laurel Oak
Quercus phellos, Willow Oak

Zone 4: Small Stream Swamp (1st order)

Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Quercus nigra, Water Oak
Quercus phellos, Willow Oak
Liriodendron tulipifera, Tulip Poplar

Zone 5: Small Stream Swamp (2nd order)

Taxodium distichum, Baldcypress
Quercus lyrata, Overcup Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Fraxinus pennsylvanica, Green Ash
Quercus laurifolia, Laurel Oak
Quercus phellos, Willow Oak

3.3 RESULTS OF VEGETATION MONITORING

Table 3. Vegetation Monitoring Statistics, by zone and plot

ZONE	Plot #	Green Ash	Laurel Oak	River Birch	Swamp Blackgum	Water Oak	Willow Oak	Tulip Poplar	Baldcypress	Overcup Oak	Water Tupelo	Total	Total (at planting)	Density (Tree/Acre)
1	10		12			1	20					33	38	591
	11	6	5		2	4	8					25	32	531
Zone 1 Average														561
2	1	1	2		2		1	6		8		20	36	378
	7		20			3	10					33	41	547
	9	2	4			1	9	9				25	39	436
Zone 2 Average														454
3	2		3				1		5	19	2	30	38	537
	5				4				2		4	10	42	162
Zone 3 Average														349
4	3	1	1		10	1	8	8				29	29	680
	8	1	13		9	5	1					29	42	470
Zone 4 Average														575
5	4	3	7		1		4			6		21	38	376
	6	7	5		2		9			4		27	48	383
Zone 5 Average														379
Total Density Average														463

Site Notes:

Zone 1: Other species noted: trumpet creeper, morning glory, horse-nettle, and pokeberry.

Zone 2: Other species noted: horse-nettle, trumpet creeper, and pokeberry.

Zone 3: Other species noted: horse-nettle.

Zone 4: Other species noted: Plot 3 had various grasses that cover approximately 30% of the plot.

Zone 5: Bald cypress was noted around plot 4.

3.4 CONCLUSIONS

Of the 89 acres on this site, approximately 83.7 acres involved tree planting. There were 11 vegetation monitoring plots established throughout the planting areas. The 2001 vegetation monitoring of the site revealed an average tree density of 463 trees per acre. This average is above the minimum success criteria of 320 trees per acre. NCDOT will continue to monitor this site.

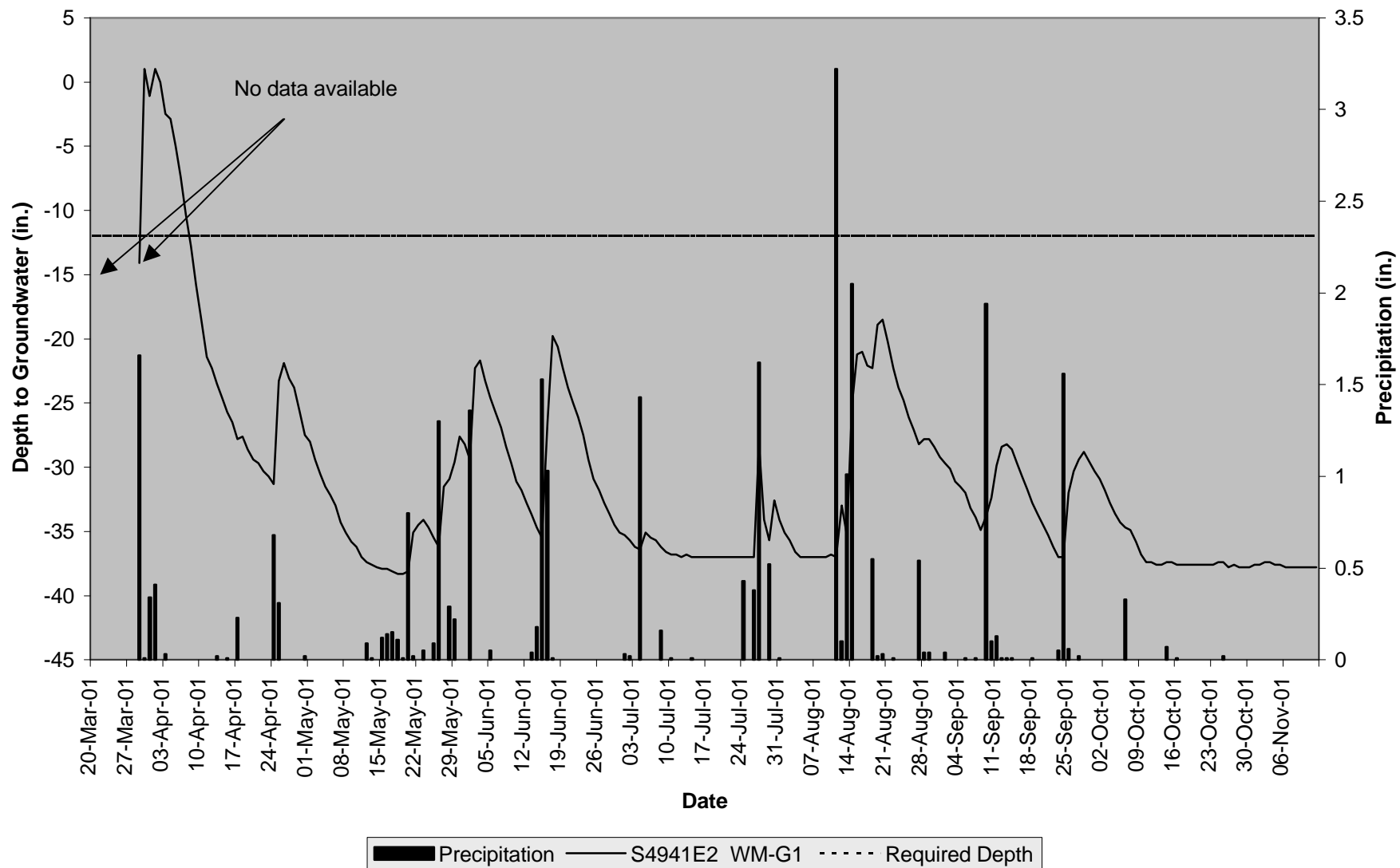
4.0 Overall Conclusions

- 12 of the 18 gauges show saturation for more than 5% of the growing season. The six gauges not meeting hydrologic success criteria may have met if the data set was complete. The site experienced below average rainfall for 2001.
- Vegetation monitoring yielded an average plot density of 463 trees per acre, with all but one of the eight plots showing successful stem counts.
- NCDOT will continue monitoring of the Wiggins Mill mitigation site.

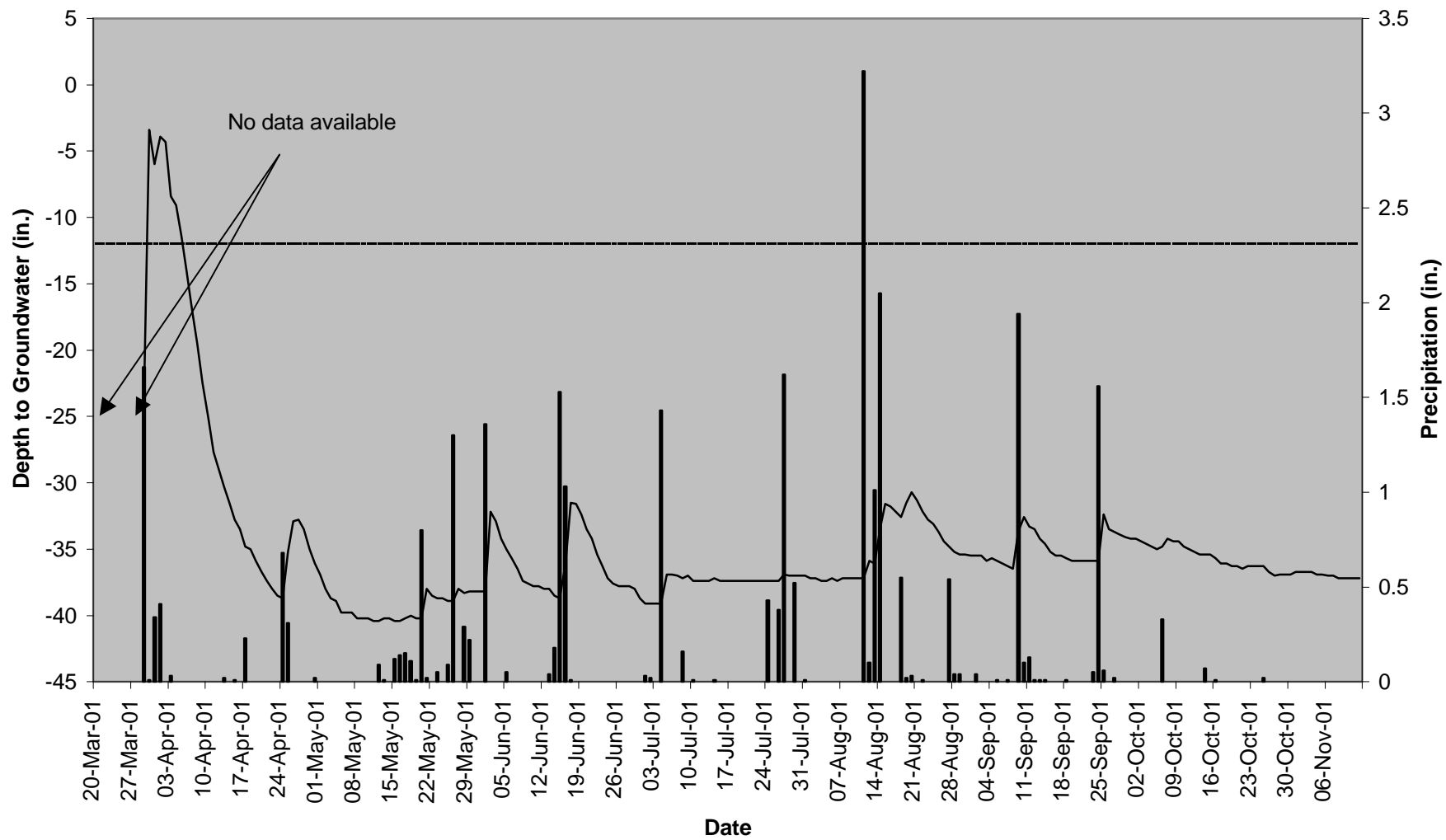
APPENDIX A

DEPTH TO GROUNDWATER CHARTS

Wiggins Mill-G1

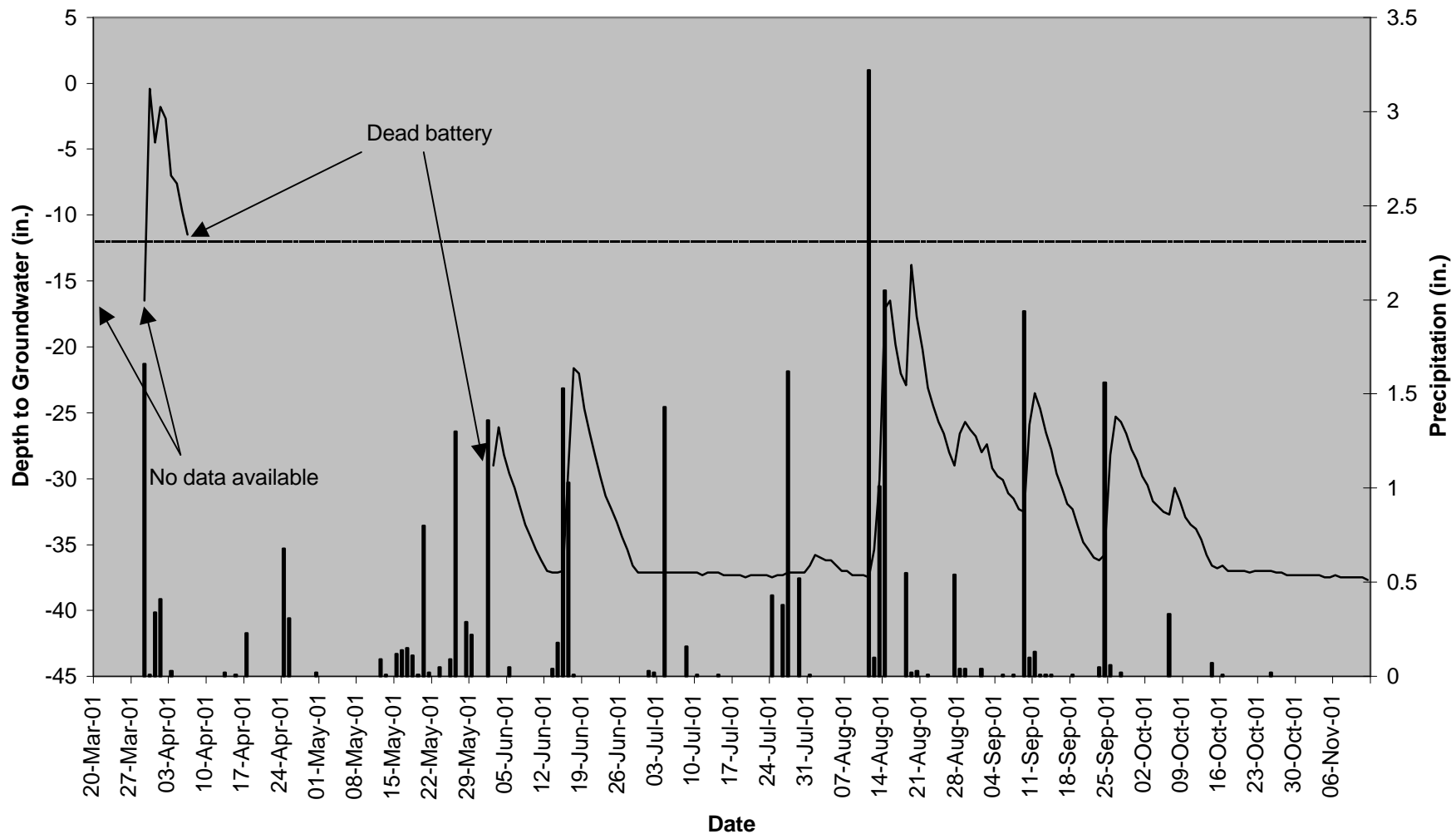


Wiggins Mill-G2



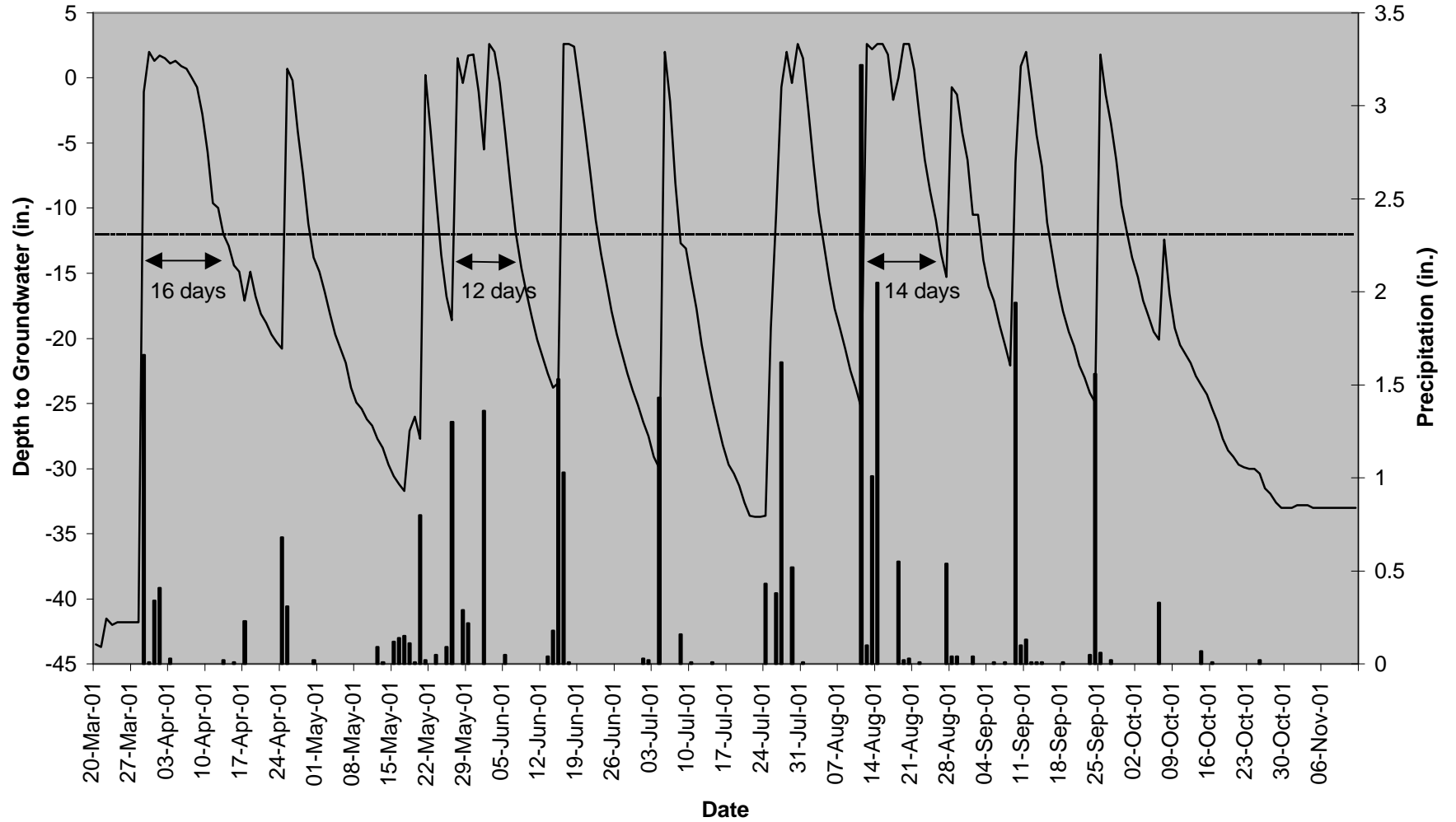
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Wiggins Mill-G3



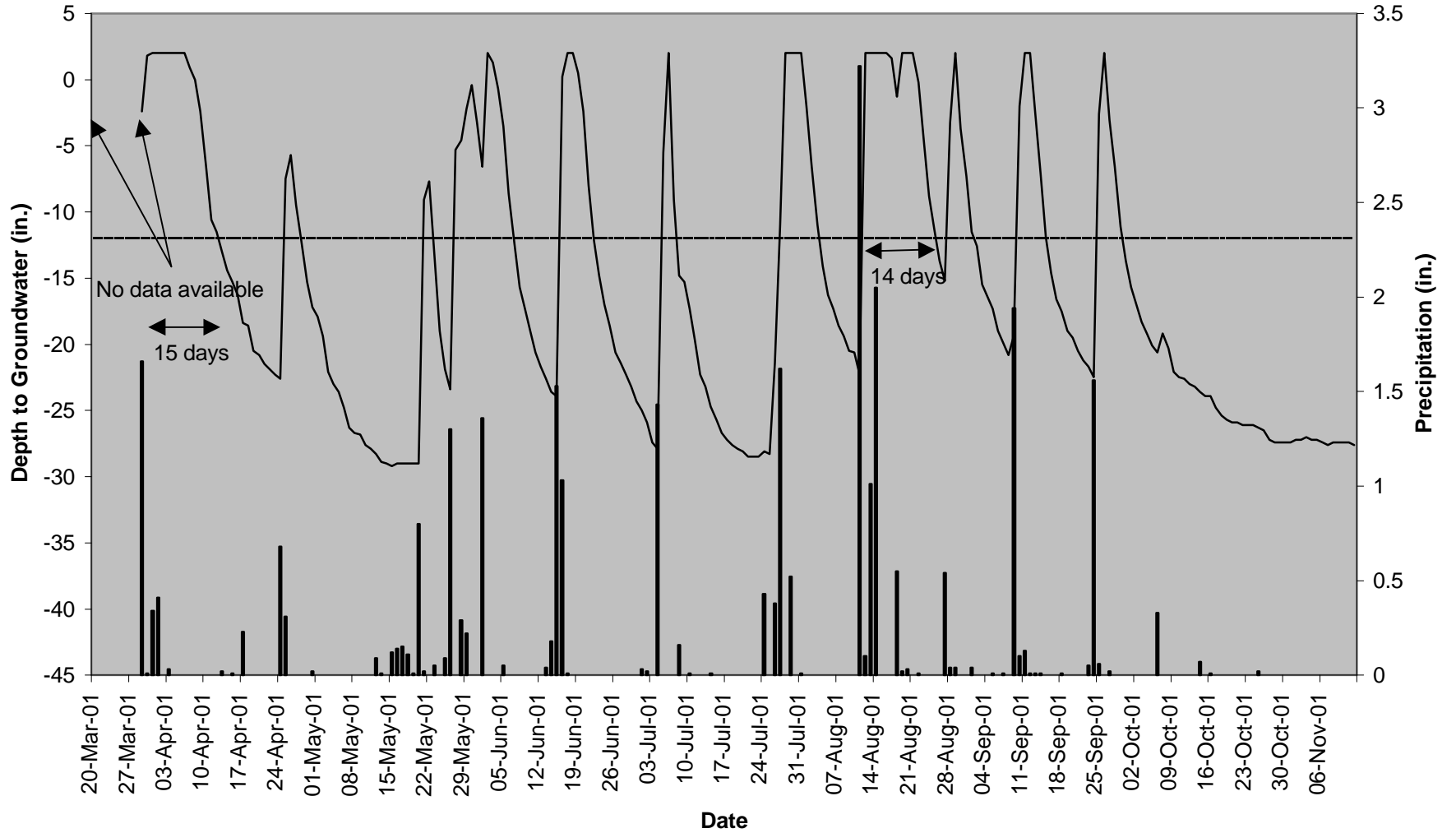
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Wiggins Mill-G4



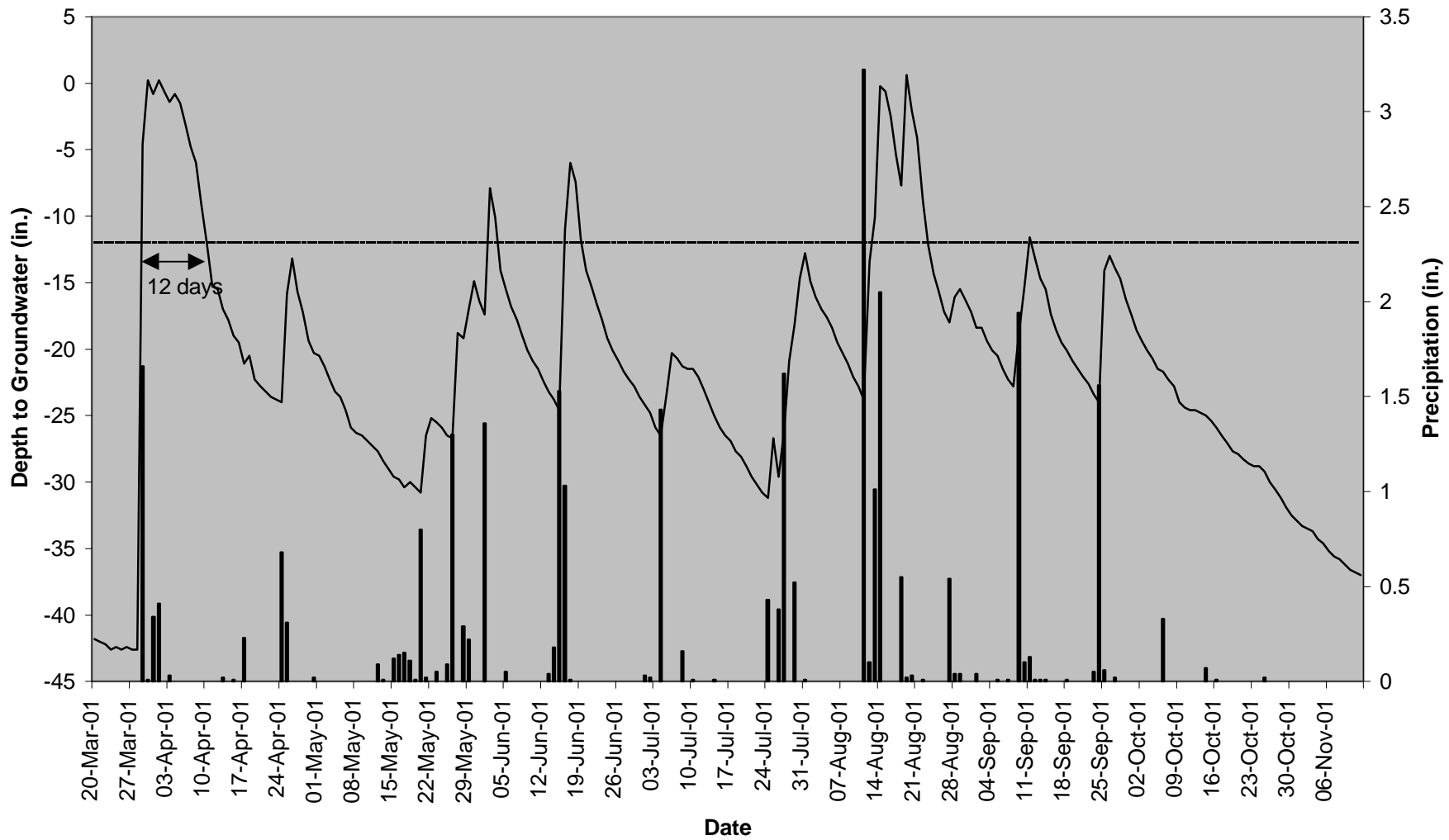
■ Precipitation — S37823A WM-G4 - - - - Required Depth

Wiggins Mill-G5



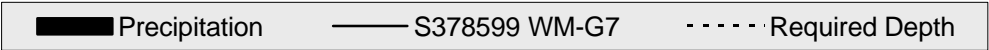
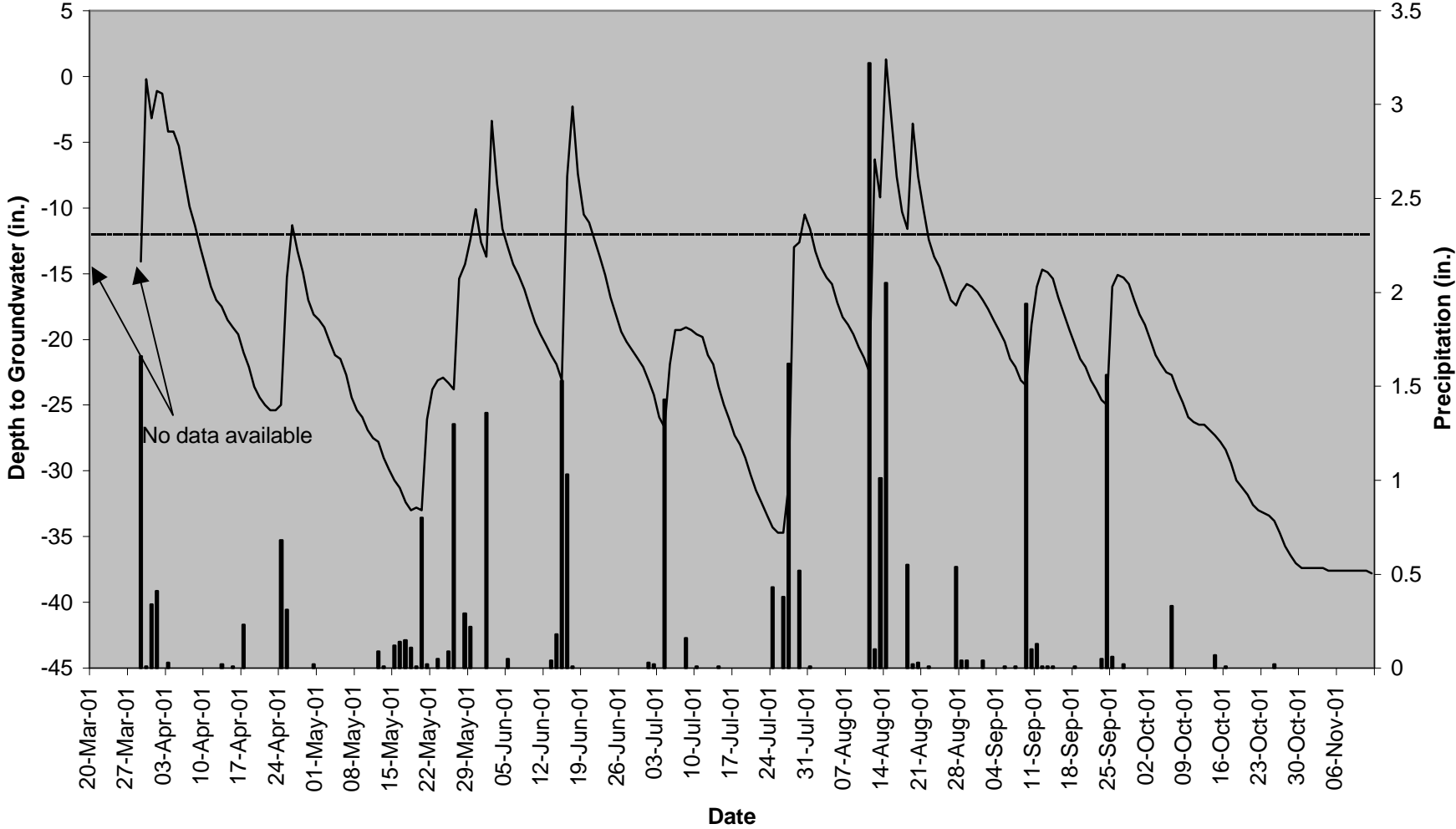
■ Precipitation — S494070 WM-G5 - - - - Required Depth

Wiggins Mill-G6

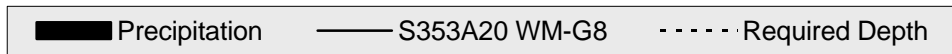
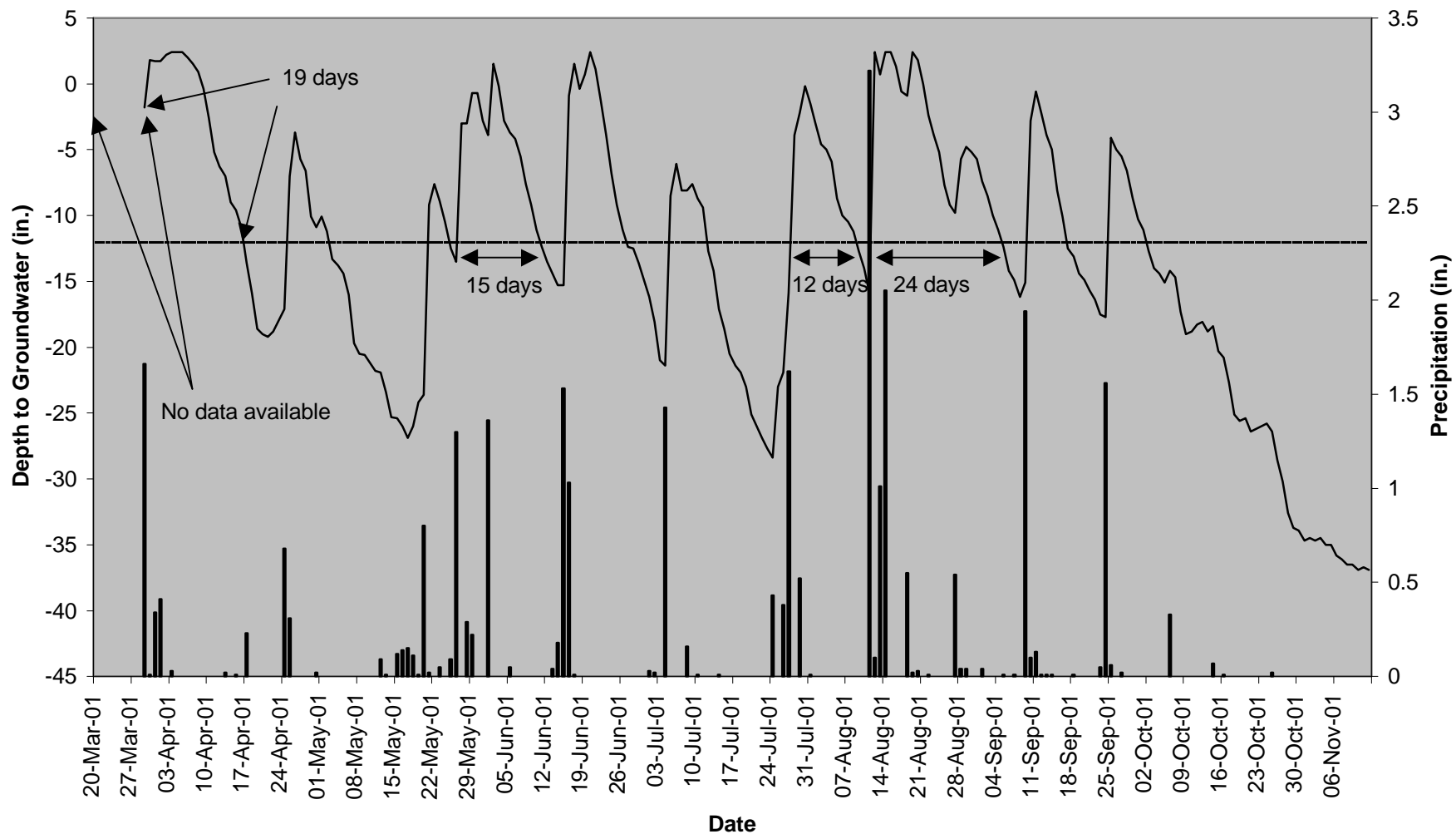


■ Precipitation — S494310 WM-G6 - - - - Required Depth

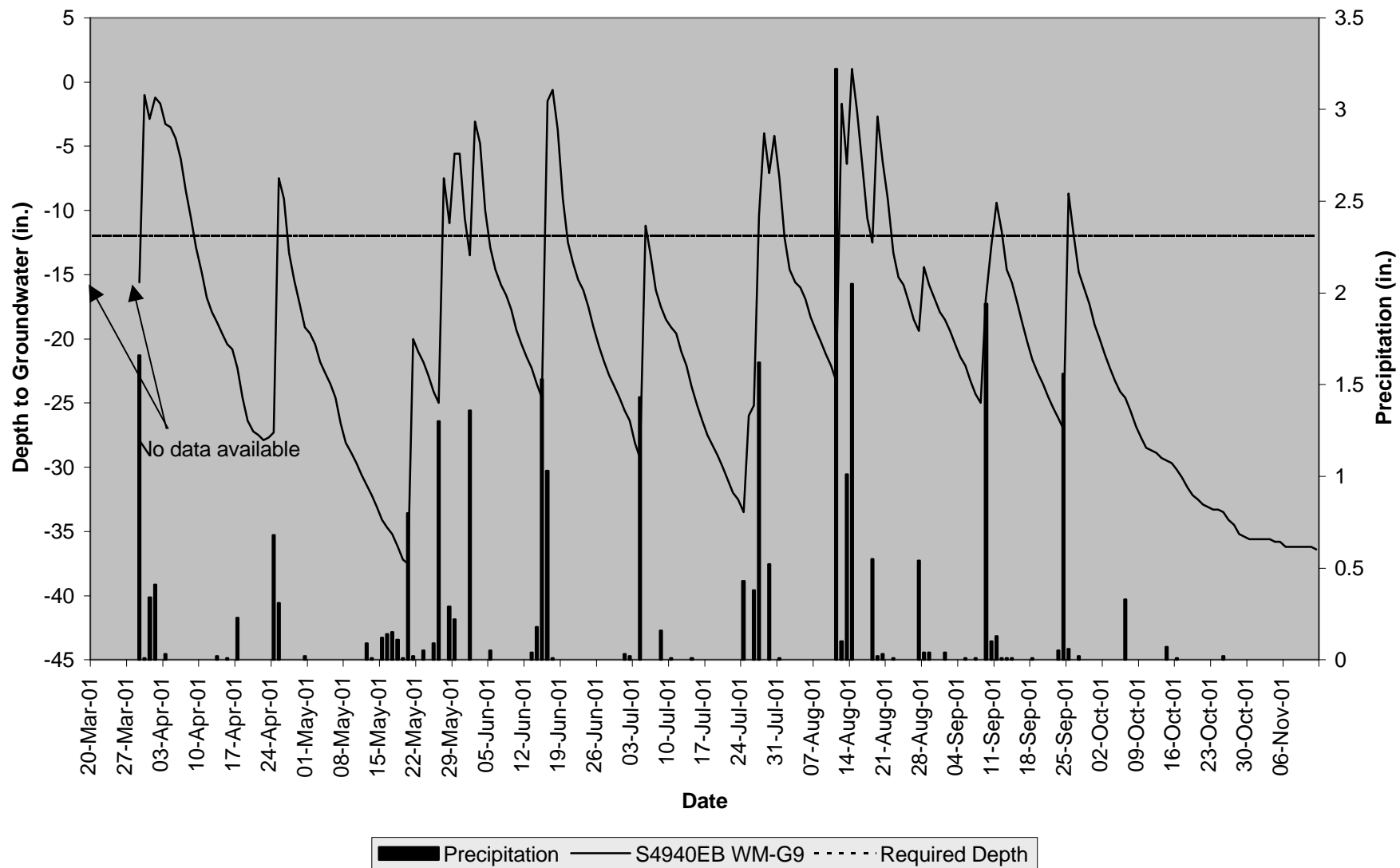
Wiggins Mill-G7



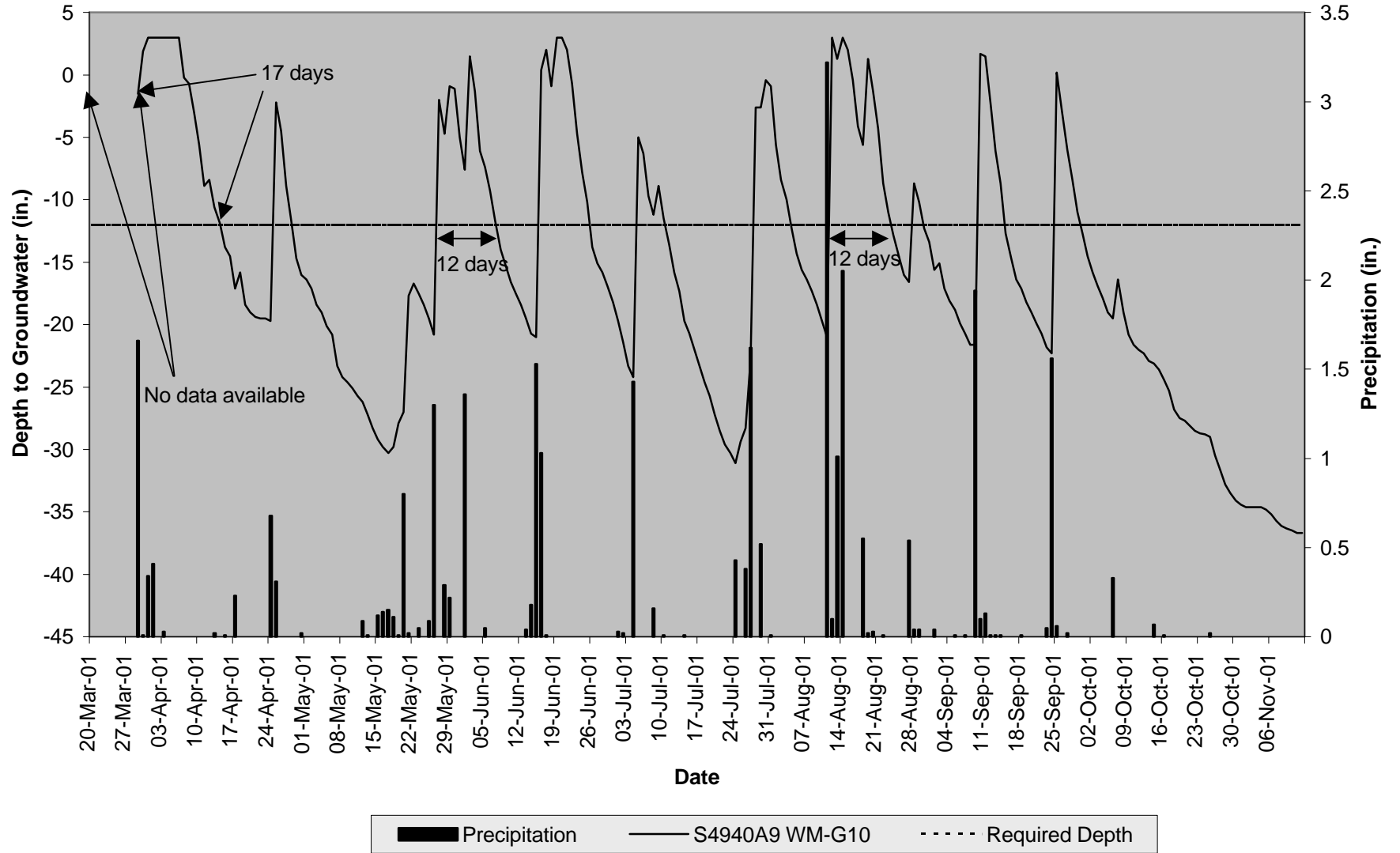
Wiggins Mill-G8



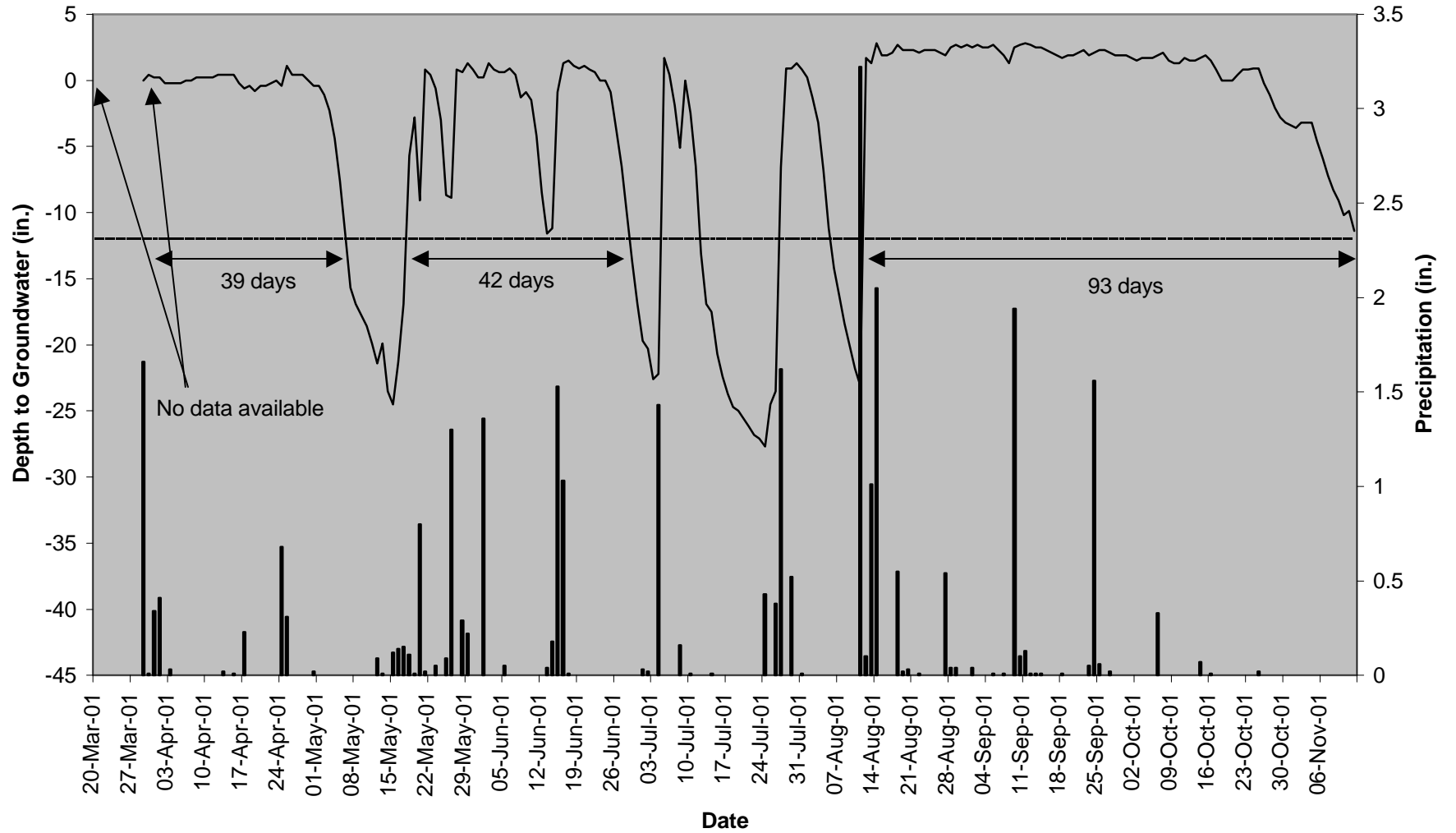
Wiggins Mill-G9



Wiggins Mill-G10

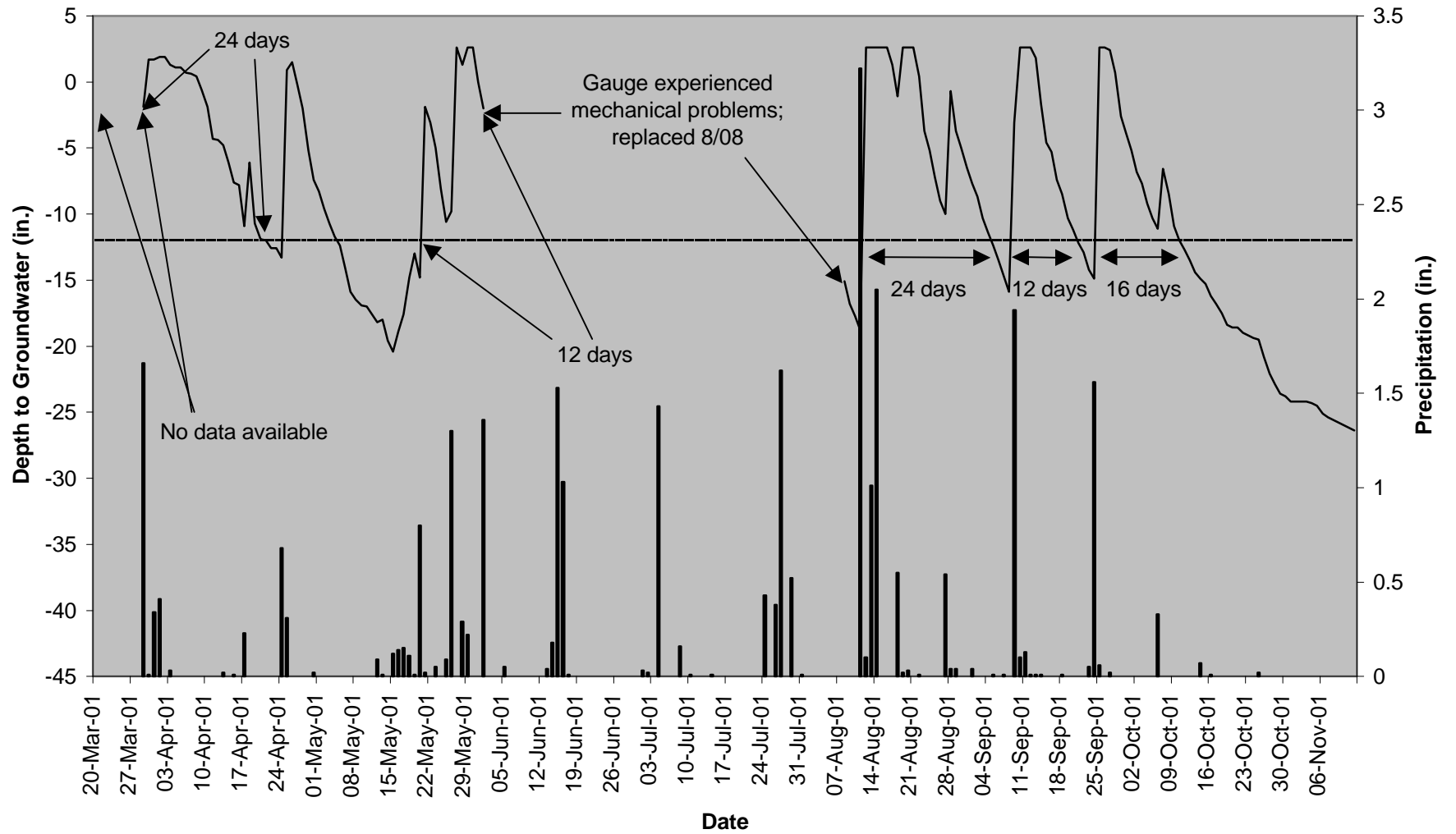


Wiggins Mill-G11



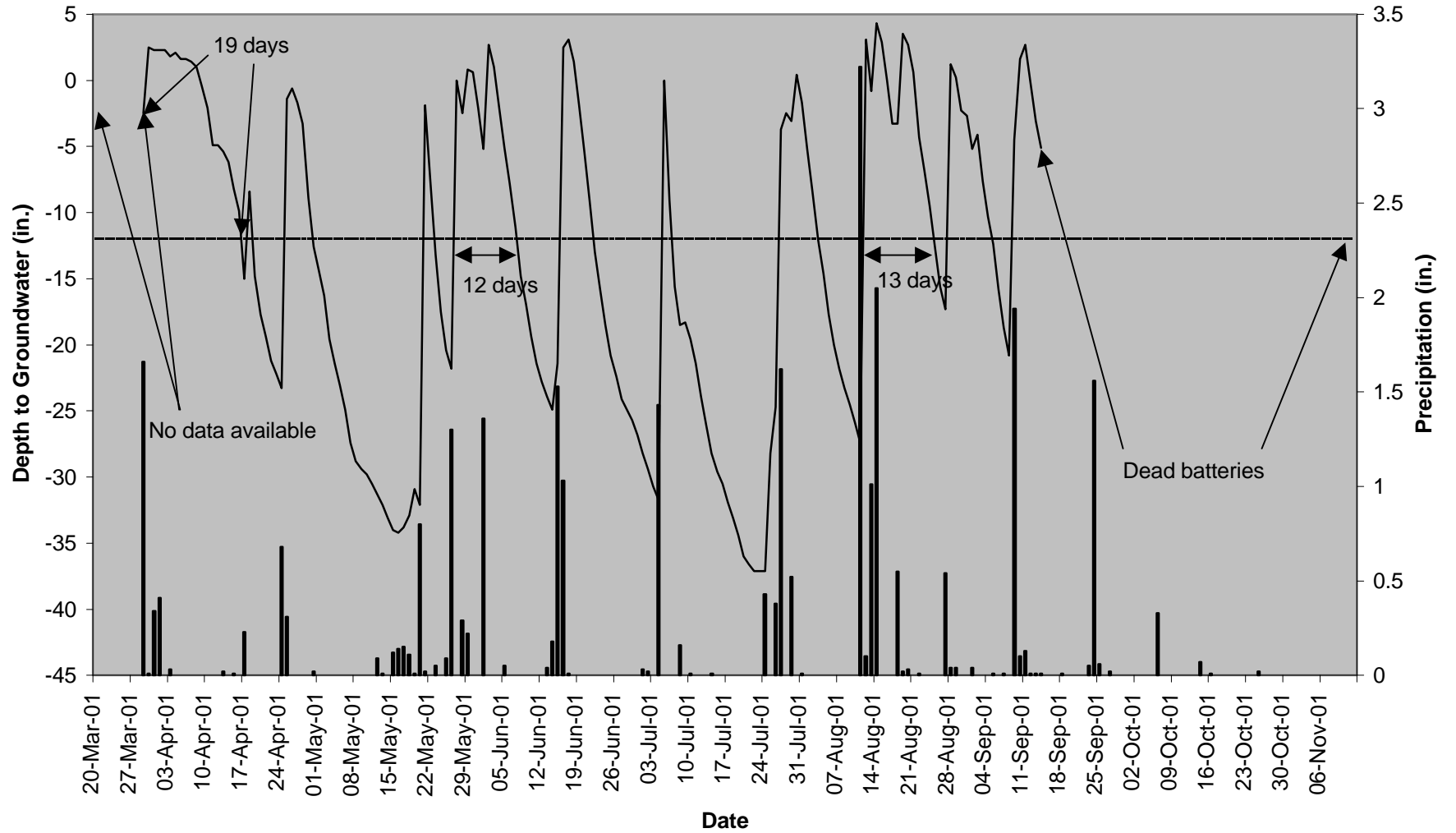
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Wiggins Mill-G12



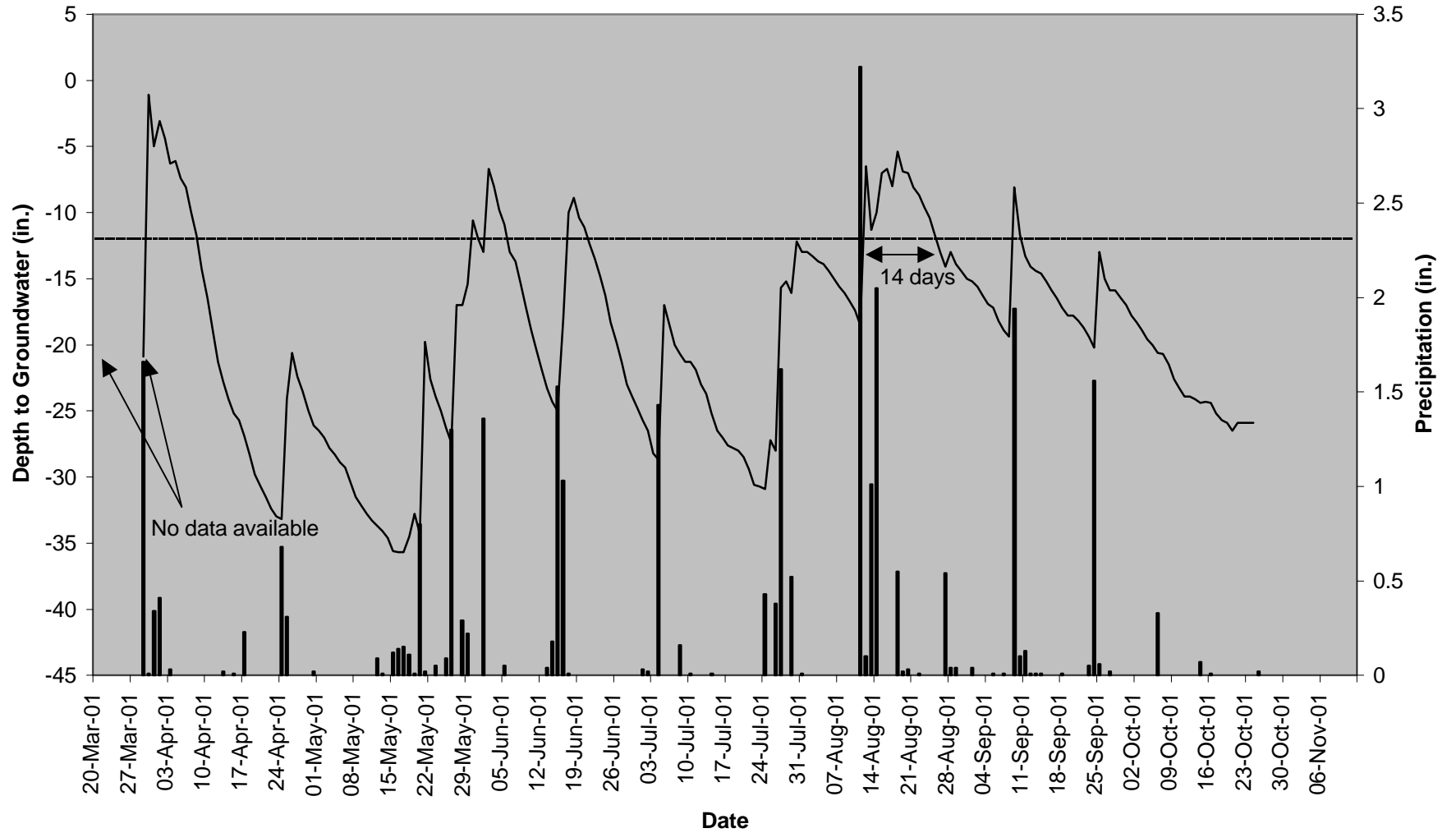
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Wiggins Mill-G13



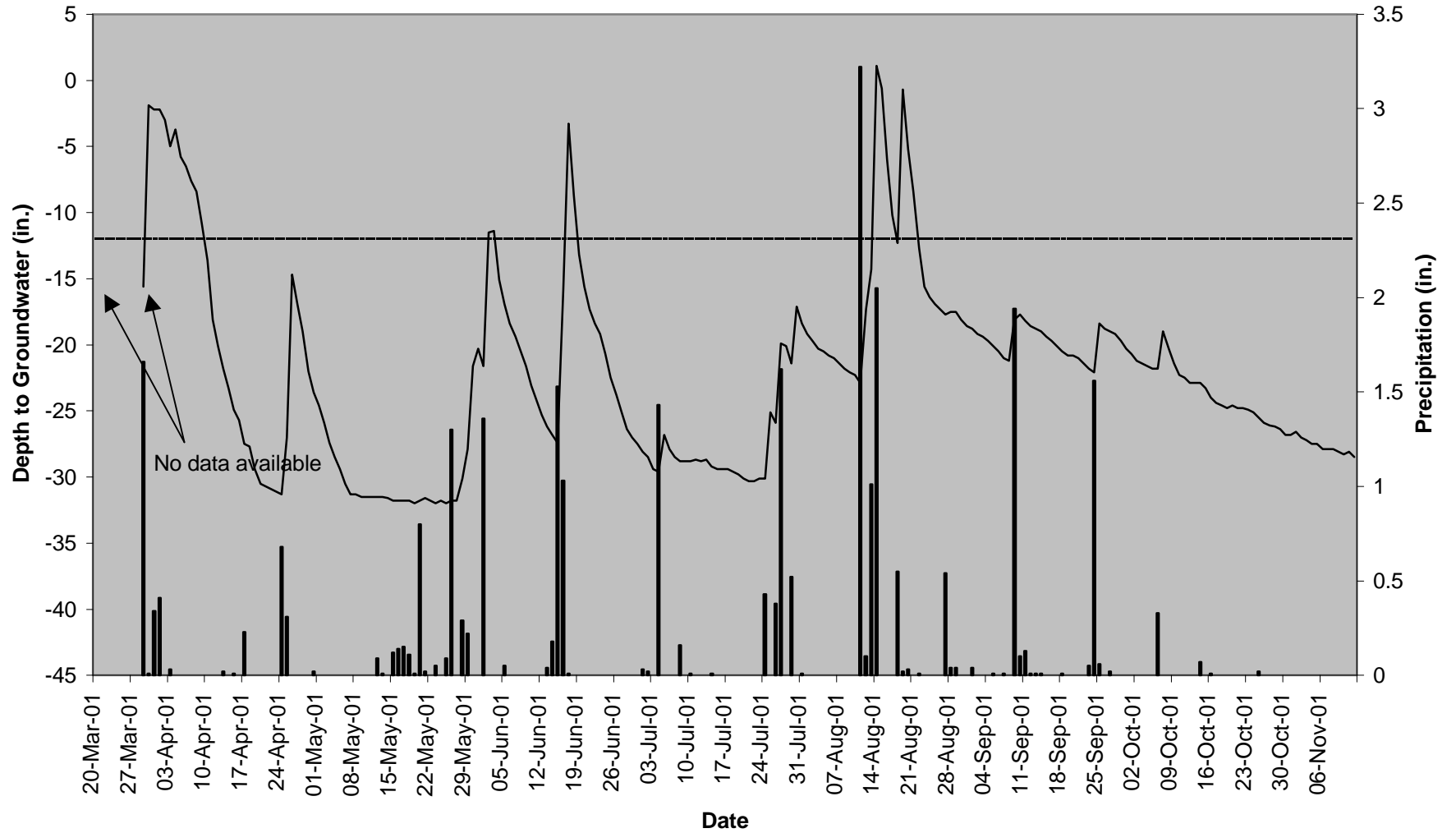
Precipitation
 S4940DE WM-G13
 Required Depth

Wiggins Mill-G14



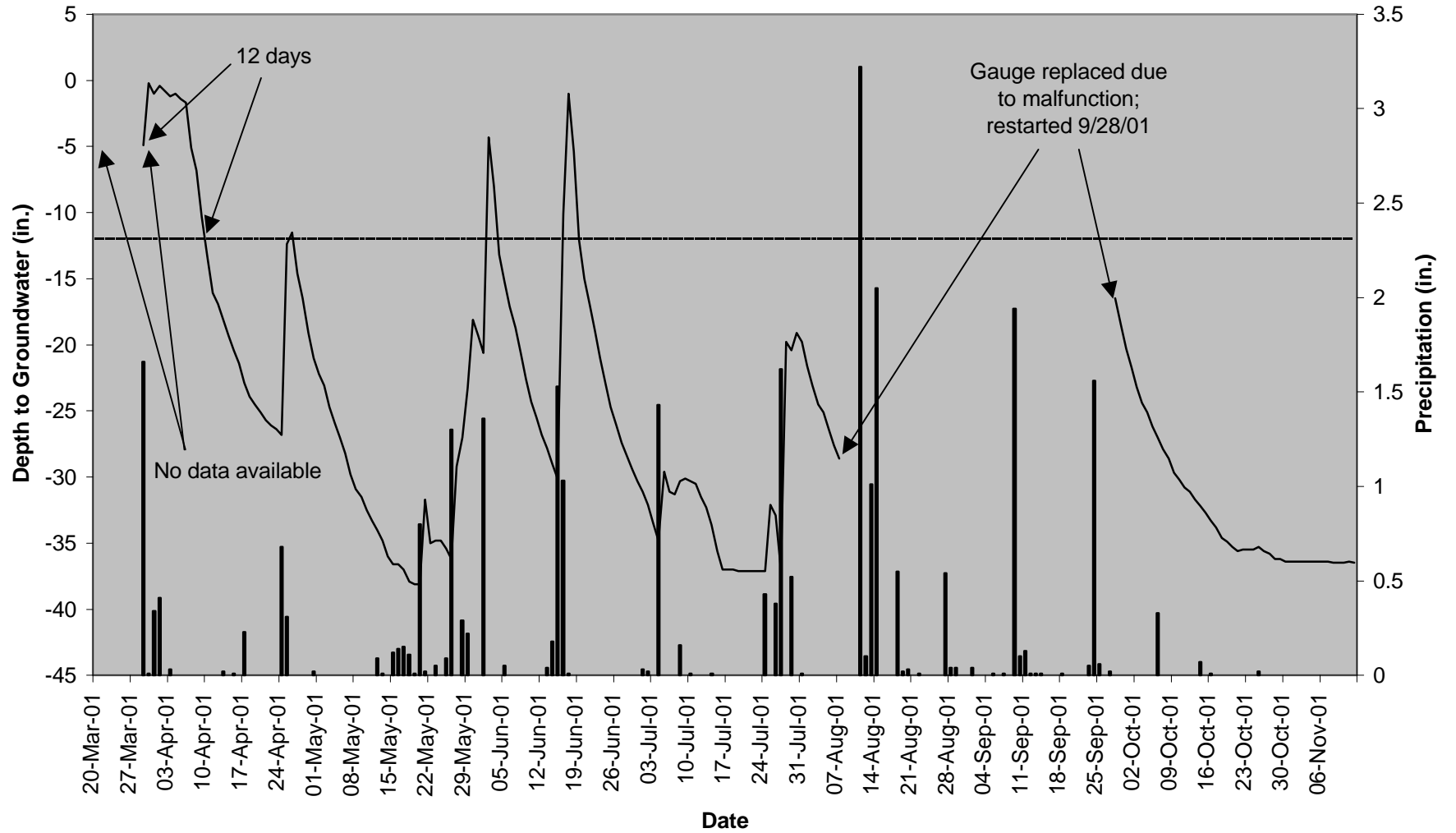
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Wiggins Mill-G15



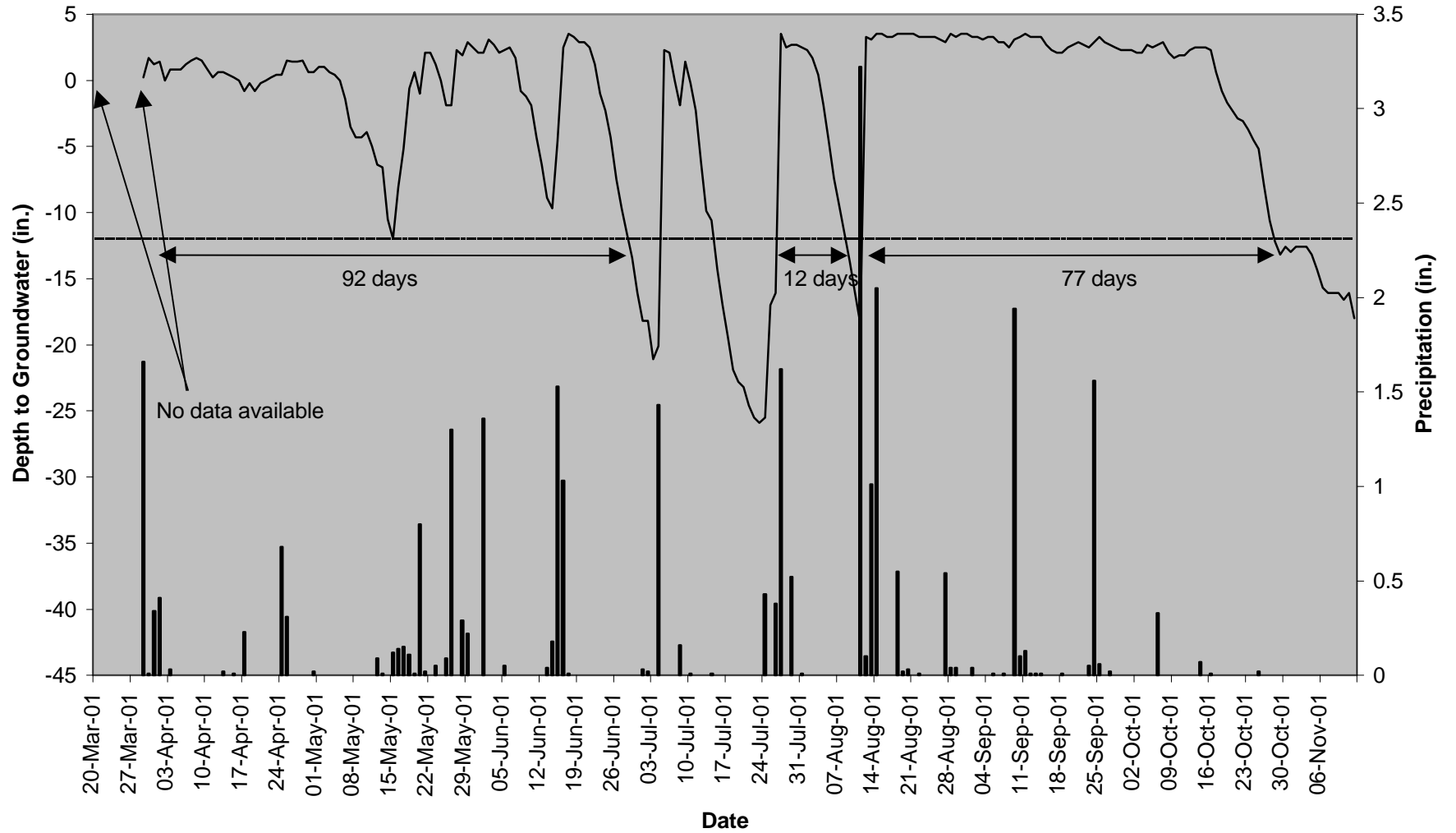
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Wiggins Mill-G16



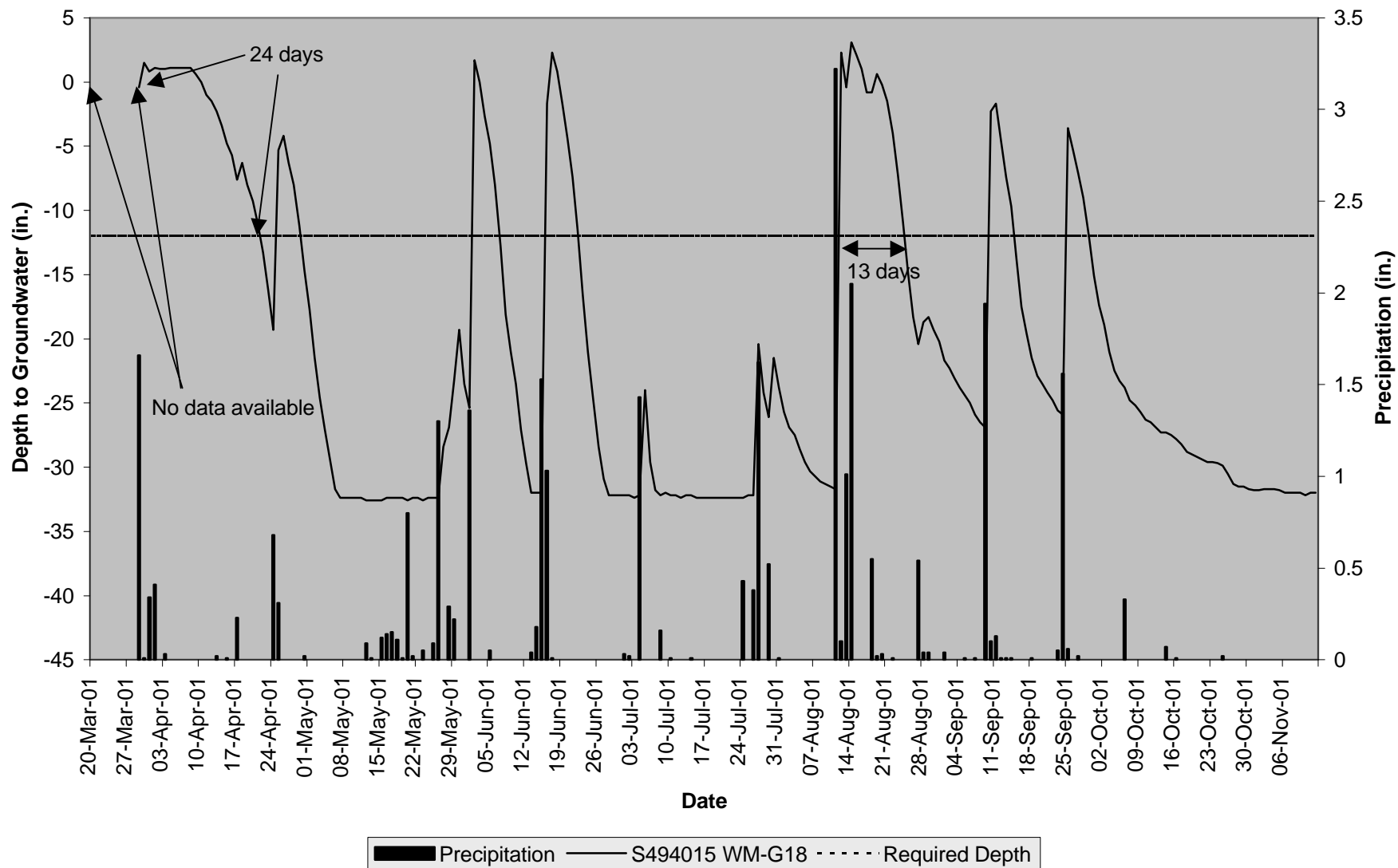
■ Precipitation — S31736F WM-G16 - - - - Required Depth

Wiggins Mill-G17



■ Precipitation — S494049 WM-G17 - - - - Required Depth

Wiggins Mill-G18



APPENDIX B

SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP

WIGGINS MILL



Photo 1



Photo 2



Photo 3



Photo 4



Photo 5



Photo 6

WIGGINS MILL



Photo 7



Photo 8

