ANNUAL REPORT FOR 2001

SEVEN SPRINGS MITIGATION SITE
Wayne County
PROJECT NO. 6.804756
TIP NO. R-2422

North Carolina Department of Transportation
Division of Highways
Project Development and Environmental Analysis Branch

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SEVEN SPRINGS MITIGATION SITE
2001 REPORT - EXECUTIVE SUMMARY

The following report summarizes the hydrological monitoring activities that have occurred in the past year at the Seven Springs Mitigation Site. This includes work performed under the Professional Service Agreement dated November 16, 1994 between NCDOT and Triangle Wetland Consultants, L.L.C. (TWC). The site was constructed in 1993-1995. Monitoring activities in 2001 represent the **7th year** of hydrological monitoring following construction. Vegetation requirements have been met, and the USACE has approved the release of this project component from further monitoring requirements.

During the 2001 growing season, four out of the six gauges met the criteria (14 consecutive days) for wetland hydrology. Gauge data trends indicate that virtually the entire site exhibits wetland hydrology. Lower groundwater data in gauges A and D can be explained by the slightly higher landscape position of these gauges. It should be noted that these gauge locations and slightly higher elevations are not representative of the entire restoration project site.

Another explanation for lower groundwater data is from March 30th to May 15th the site only received 1.05 inches of rain. This amount is well below average and occurred at the beginning of the growing season, the time when the site is most likely to exhibit wetland hydrology. This is similar to the 2000 monitoring period when precipitation for February, March, and May were below the 30th percentile. This lack of rainfall was reflected in several of the groundwater gauges (including the reference gauge) not achieving hydrologic success.

Formerly an agricultural field, this wetland restoration project is functioning as a forested wetland and helping to protect and improve water quality in the Neuse River watershed. From data collected for this site over the last 7 growing seasons, it is evident this site has been restored to a functional wetland. A mature wetland forest is developing, wildlife habitat has been increased on the site, and a diverse plant and animal community has been established. We propose to discontinue monitoring and declare this project successful having met wetland restoration success criteria during the monitoring period.

1.0 INTRODUCTION

1.1 Project Description

The Seven Springs Mitigation Banking site is located in Wayne County, approximately 2 miles from Seven Springs, NC off SR 1730. The tract is approximately 26 acres and is a former agricultural PC field. The former field is contained within Bogue Marsh which is a large hardwood swamp on the Neuse River floodplain (Figure 3). The site was historically part of an extensive swamp hardwood area that was located between the confluence of Walnut Creek and the Neuse River floodplain. Vegetation and hydrology were restored on the 26.9-acre site to reestablish historical riverine wetland functions. The credits from this site were used as compensatory mitigation for unavoidable wetland impacts in the watershed (See 1.4 Debit Ledger). The wetland mitigation plan was first developed in November, 1992, approved by the US Army Corps of Engineers on February 10, 1993 and construction began in March, 1993.

1.2 Purpose

In order to demonstrate successful wetland mitigation, hydrologic and vegetative monitoring must be conducted for a minimum of five years and hydrologic monitoring must be conducted until success is demonstrated as stated in the Mitigation Plan. Since the vegetative monitoring is complete and accepted by regulatory agencies, the following report details the results of hydrologic monitoring during 2001 at the Seven Springs Mitigation Site.

1.3 Project History

March 1993	Site Planted
November 1993	Monitoring Gauges Installed
March - May 1994	Hydrologic Monitoring for Water Budget
May 1994	Grass Fire Burns Vegetation
January 1995	Supplemental Planting
February - May 1995	Hydrologic Monitoring (1 yr)
November 1995	Vegetation Monitoring (1 yr)
February - May 1996	Hydrologic Monitoring (2 yr)
November 1996	Vegetation Monitoring (2 yr)
November 1996	Perimeter Ditches Plugged
February - May 1997	Hydrologic Monitoring (3 yr)
October 1997	Vegetation Monitoring (3yr)
February - May 1998	Hydrologic Monitoring (4 yr)
December 1998	Vegetation Monitoring (4 yr)
February - May 1999	Hydrologic Monitoring (5 yr)
November 1999	Vegetation Monitoring (5 yr)
February - May 2000	Hydrologic Monitoring (6 yr)
October 2000	Vegetation Monitoring (6^{th} -final year)
February - May 2001	Hydrologic Monitoring (7yr)

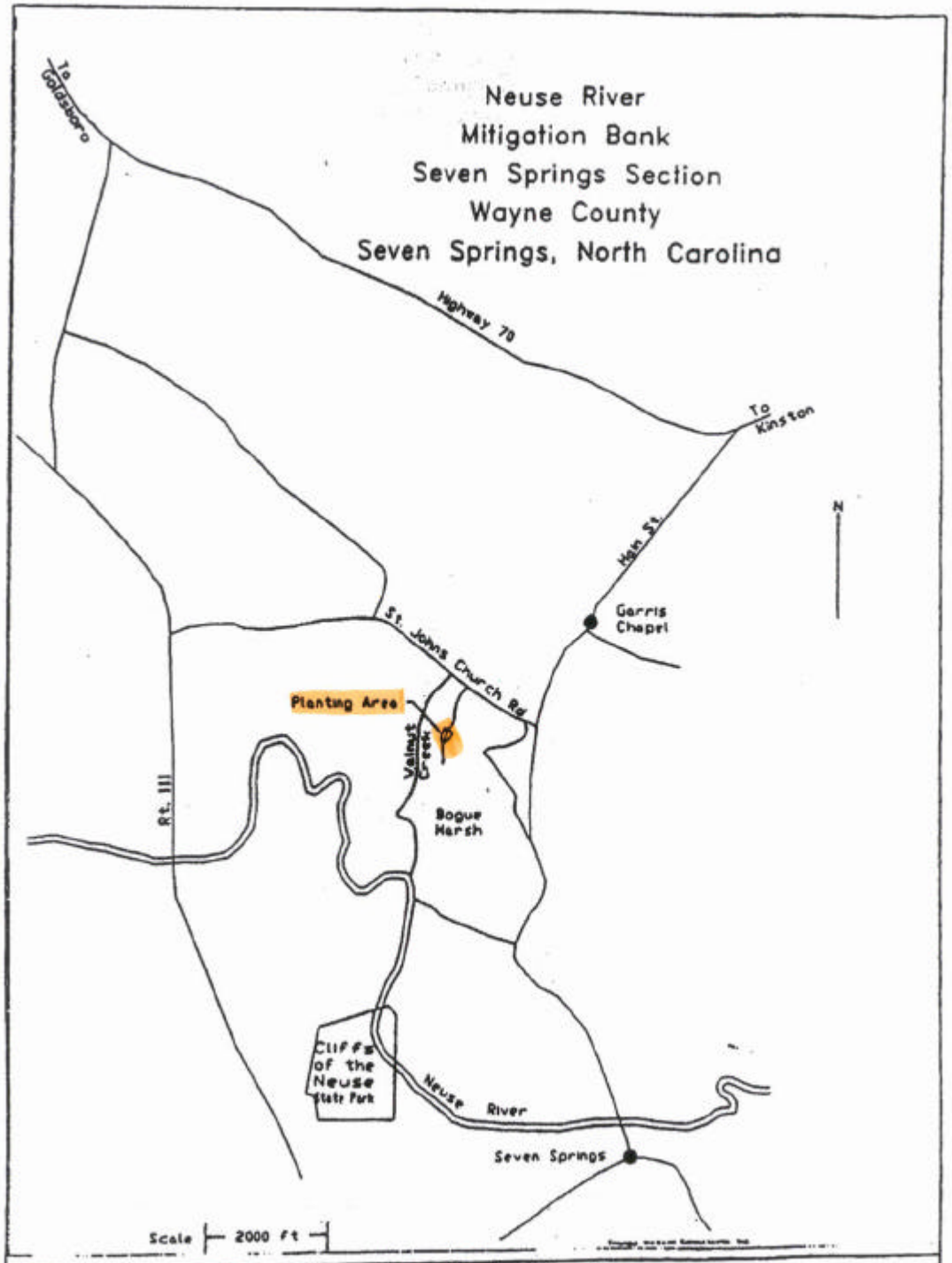


Figure 1: Project Location Map
Seven Springs Wetland Mitigation Site, Wayne County, NC

1.4 Debit Ledger

Wetland Type	Credits/Acres Available	Total Credits/Acres Debited	Project #: R-2422 USACE – Action ID #: (199301223) (Debit)	Project #: R-1023 AA USACE – Action ID #s: (199820019, 1992012119) (Debit)	Credits/Acres Remaining
BLH [1.] and SH [2.]	26.69 acres	26.69 acres	12.81	12.6	0

1. Bottomland hardwood wetland type
2. Swamp hardwood wetland type

2.0 HYDROLOGY

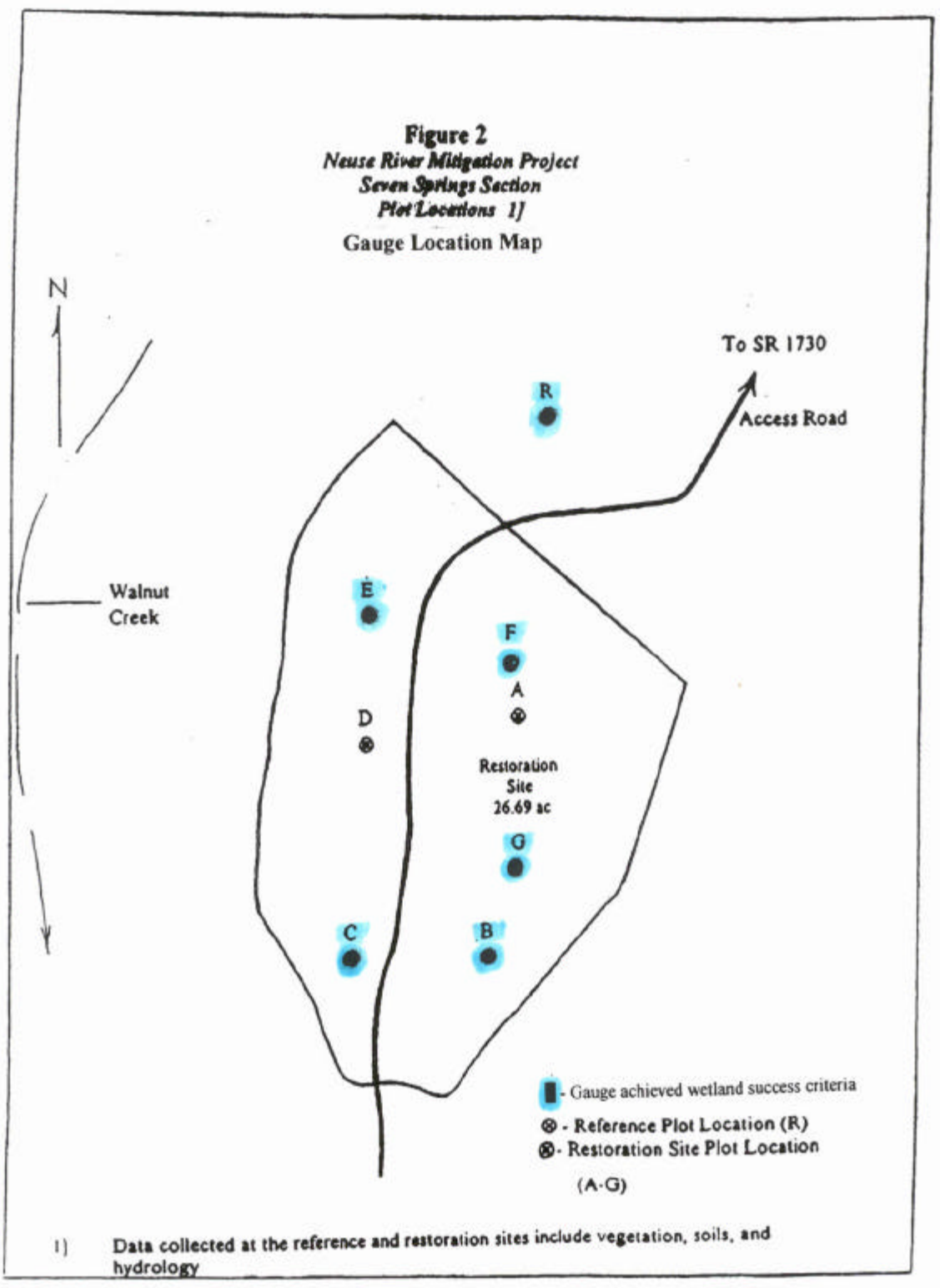
2.1 Success Criteria

As indicated in the Mitigation Plan, project specifications require saturation or inundation within 12 inches of the surface for at least 14 consecutive days during the early growing season (March – May). The success criteria must be achieved for a minimum of 5 years. However, areas may still be classified as wetlands even though the hydrology does not meet optimum wetland criteria.

2.2 Monitoring Procedure

Eight manual monitoring gauges were installed in 1993 including one reference gauge (Figure 2). At the time of approval for this wetland mitigation project, annual hydrological monitoring requirements were for the early growing season only (March – May). The early growing season reflected the most likely time for seasonal saturation for wetlands that are not inundated for the entire growing season. The summer months usually are times of water deficit in the soil and monitoring data would not indicate wetland hydrology during this time period. During the early growing season in 2001 five trips were made to record groundwater depth at the project site (Appendix – 2001 Gauge Hydrographs). The Appendix contains a plot of the water depth for each groundwater monitoring gauge during the growing season. Local precipitation data are included with each of the plots. The precipitation data was obtained from a nearby weather station in Goldsboro (Goldsboro 4 SE, NC UCAN:14118, COOP: 313510). The groundwater gauge hydrographs also include iron rod oxidation/reduction data as specified in the Mitigation Plan. This data provides additional information related to the presence of saturated conditions on the site and is supplemental to the groundwater gauge data.

Figure 2
Neuse River Mitigation Project
Seven Springs Section
Plot Locations 1)
Gauge Location Map



1) Data collected at the reference and restoration sites include vegetation, soils, and hydrology

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

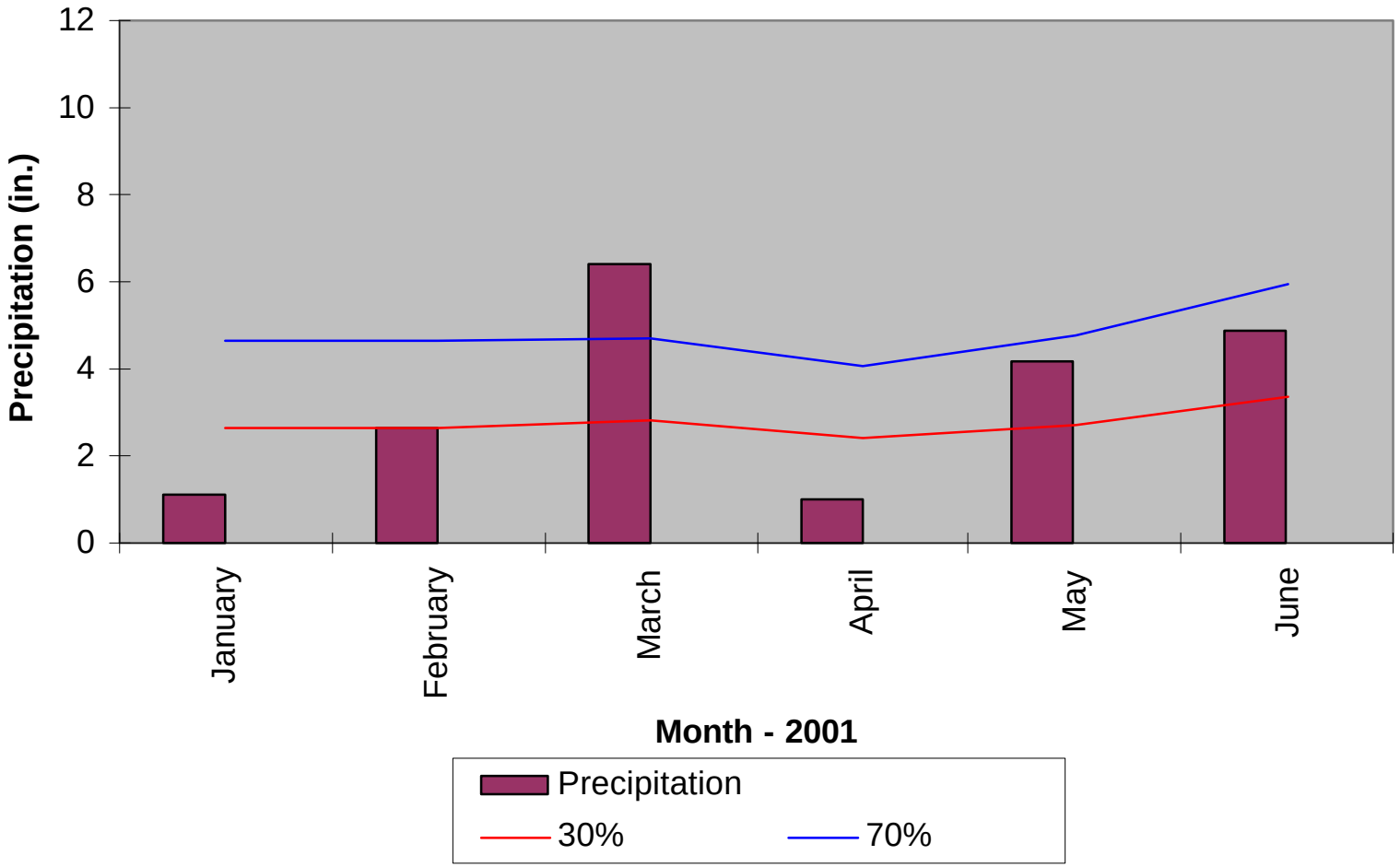
Groundwater gauge and iron rod oxidation data were collected from March 14, 2001 to April 28, 2001. Average depth to groundwater during the 2001 growing season ranged from 14.4 inches on April 28 to 10.9 inches on March 14 (Appendix A –2001 Gauge Hydrographs). Average groundwater depth in the reference plot during the 2001 growing season was 8.4 inches. Average iron rod oxidation depth for plots A - G ranged from 13.4 inches on April 28 to 9.0 inches on March 14. Average iron rod oxidation depth for the reference area during the growing season was 9.4 inches.

During the 2001-early growing season, gauges B, C, E, F, and G met the criteria for wetland hydrology. For those plots achieving wetland hydrology, ground water was within 12 inches of the soil surface for at least 14 consecutive days during the growing season (B –35 days, C – 48 days, E – 35 days, F – 57 days, G – 19 days, and Ref. – 54 days). The gauges that did not indicate wetland hydrology this growing season can be attributed to very little rainfall between the end of March to the middle of May (Rainfall data from Goldsboro 4 SE, NC UCAN:14118, COOP: 313510)

2.3.2 Climatic Data

Figure 3 is a graph of cumulative precipitation on a monthly basis during the months of January through June 2001 to historical precipitation for the area. The two lines represent the 30^{th} and 70^{th} percentiles of monthly precipitation for Goldsboro, NC. These percentiles represent monthly rainfall data collected in Goldsboro between 1903 and 2001. They are designed to illustrate the “normal range” for rainfall in the area. The bars are the monthly rainfall totals for January 2001 through June 2001. The historical data was collected from a National Climatic Data Center rain gauge. The current monthly rainfall data was provided by the State Climate Office of North Carolina at NC State University.

Figure 3: 2001 Seven Springs - 30-70 Graph



2.4 Conclusions

During the 2001 growing season, five out of the seven gauges achieved the criteria for wetland hydrology. Very low precipitation totals in the month of April contributed to two gauges not achieving wetland hydrology. Gauge data trends indicate that virtually the entire site exhibits wetland hydrology.

Table 1: Historical Gauge Data

Gauge	Year					% Success
	1997	1998	1999	2000	2001	
A	X	X	X	X	X	0 %
B	O	O	O	X	O	80 %
C	O	O	O	O	O	100 %
D	X	O	X	X	X	20 %
E	O	O	O	X	O	80 %
F	O	O	O	O	O	100 %
G	O	O	O	X	O	80 %
Reference	O	O	O	X	O	80 %

O – Achieved wetland criteria
X – Did not achieve wetland criteria

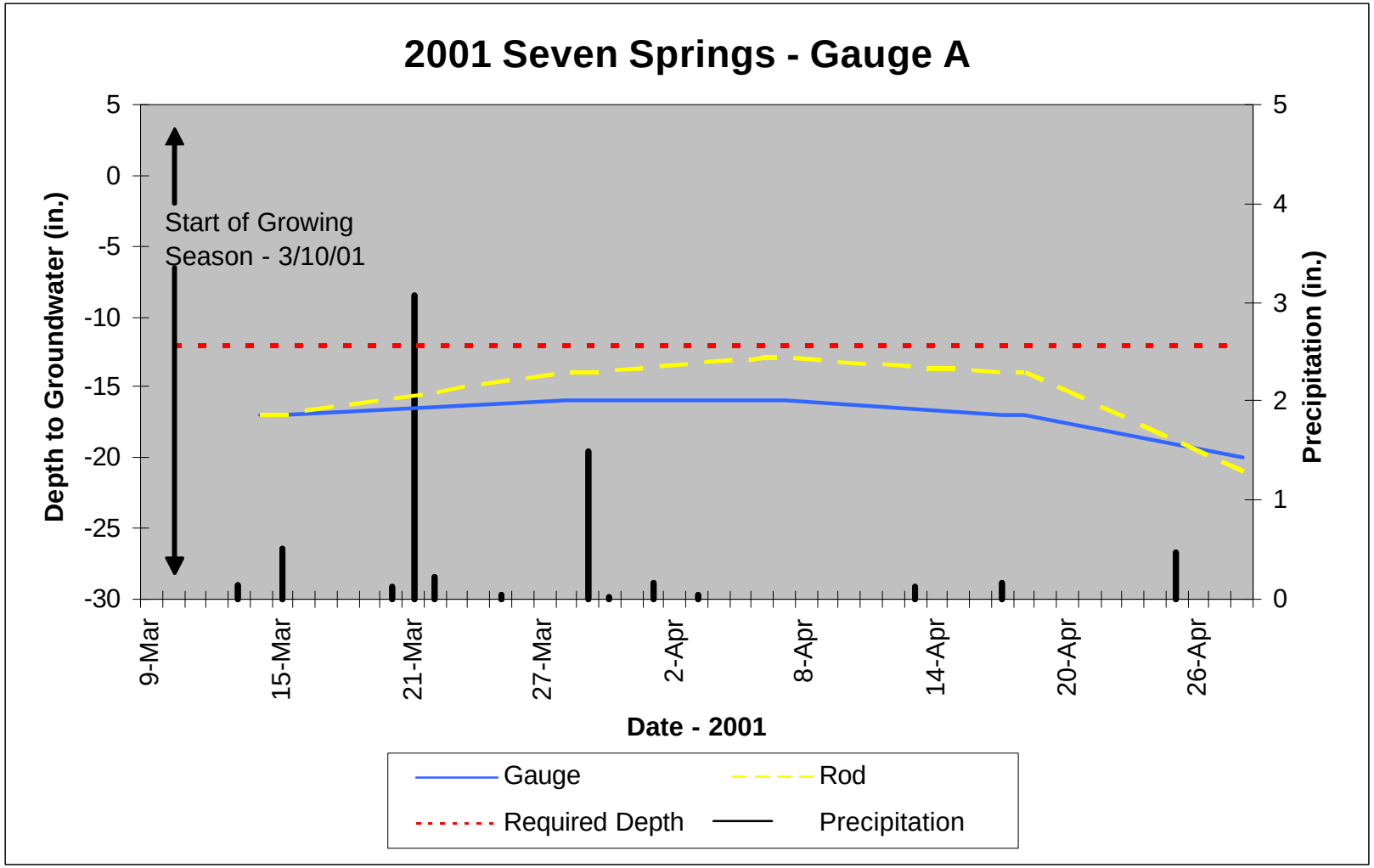
3.0 OVERALL CONCLUSIONS / RECOMMENDATIONS

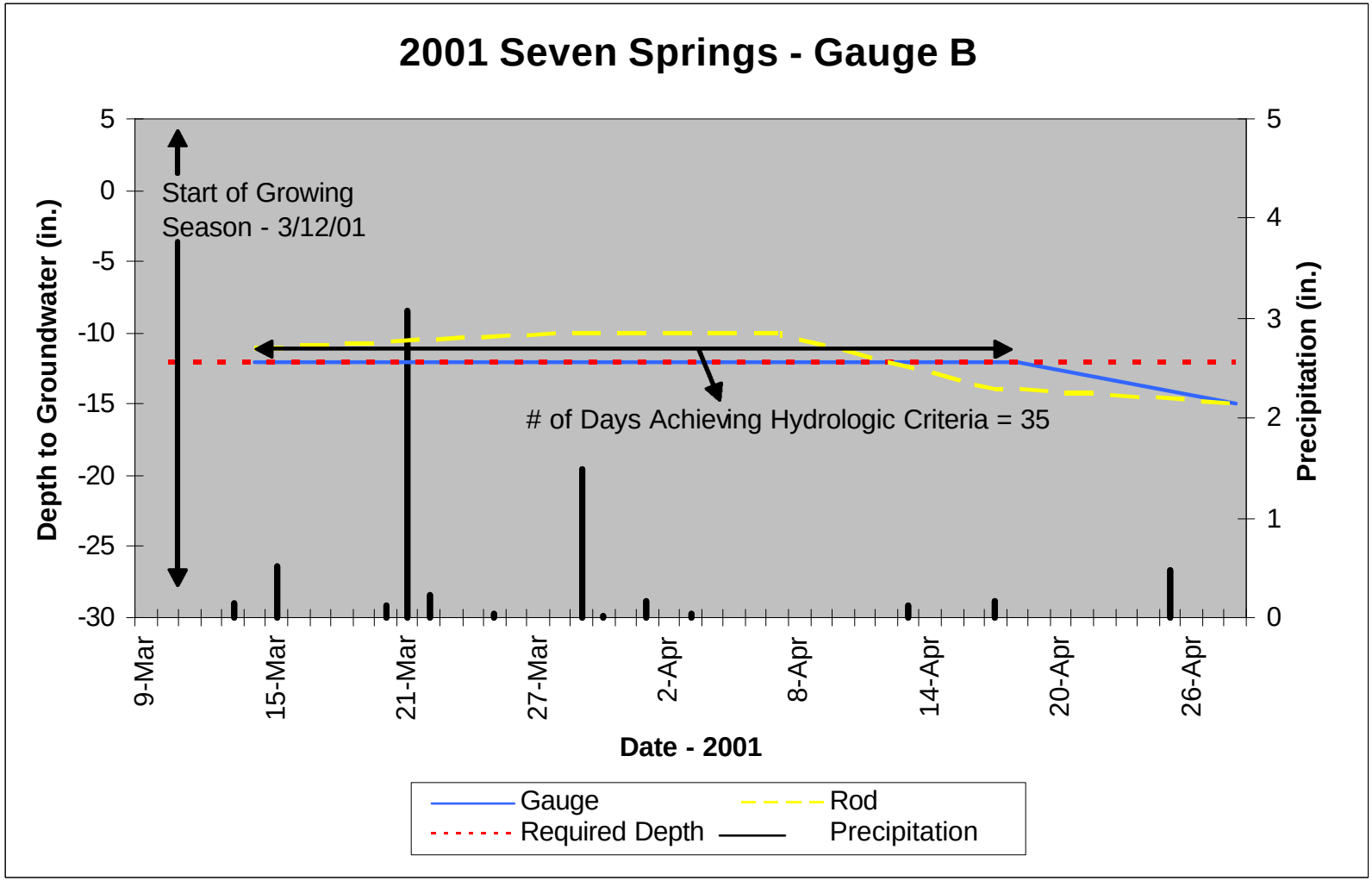
During the 2001 growing season, five out of the seven gauges made the criteria for wetland hydrology. Gauge data trends indicate that virtually the entire site exhibits wetland hydrology. Lower groundwater data in gauges A and D can be explained by the slightly higher landscape position of these gauges and below average rainfall for April. It should be noted that these gauge locations and slightly higher elevations are not representative of the entire restoration project site. The remainder of the hydrograph gauges achieved wetland success criteria every year since 1997 except for 2000. During 2000, precipitation data for the months of February, March and May were below the 30th percentile and was evident in several gauges as well as the reference gauge.

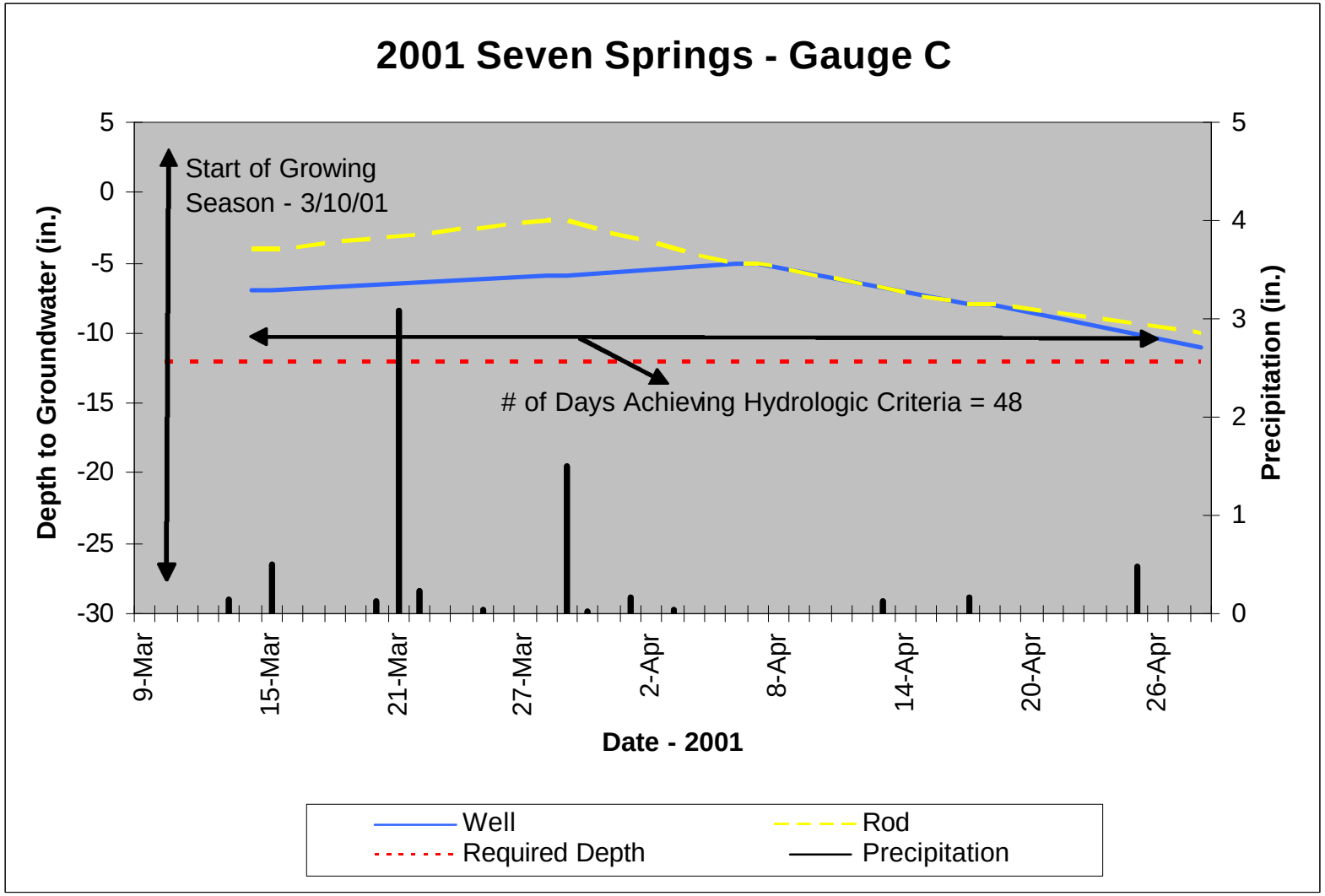
Formerly an agricultural field, this wetland restoration project is functioning as a forested wetland and helping to protect and improve water quality in the Neuse River watershed. From data collected for this site over the last 7 growing seasons, it is evident this site has been restored to a functional wetland. A mature wetland forest is developing, wildlife habitat has been increased on the site, and a diverse plant and animal community has been established. We propose to discontinue monitoring and declare this project successful having met wetland restoration success criteria during the monitoring period.

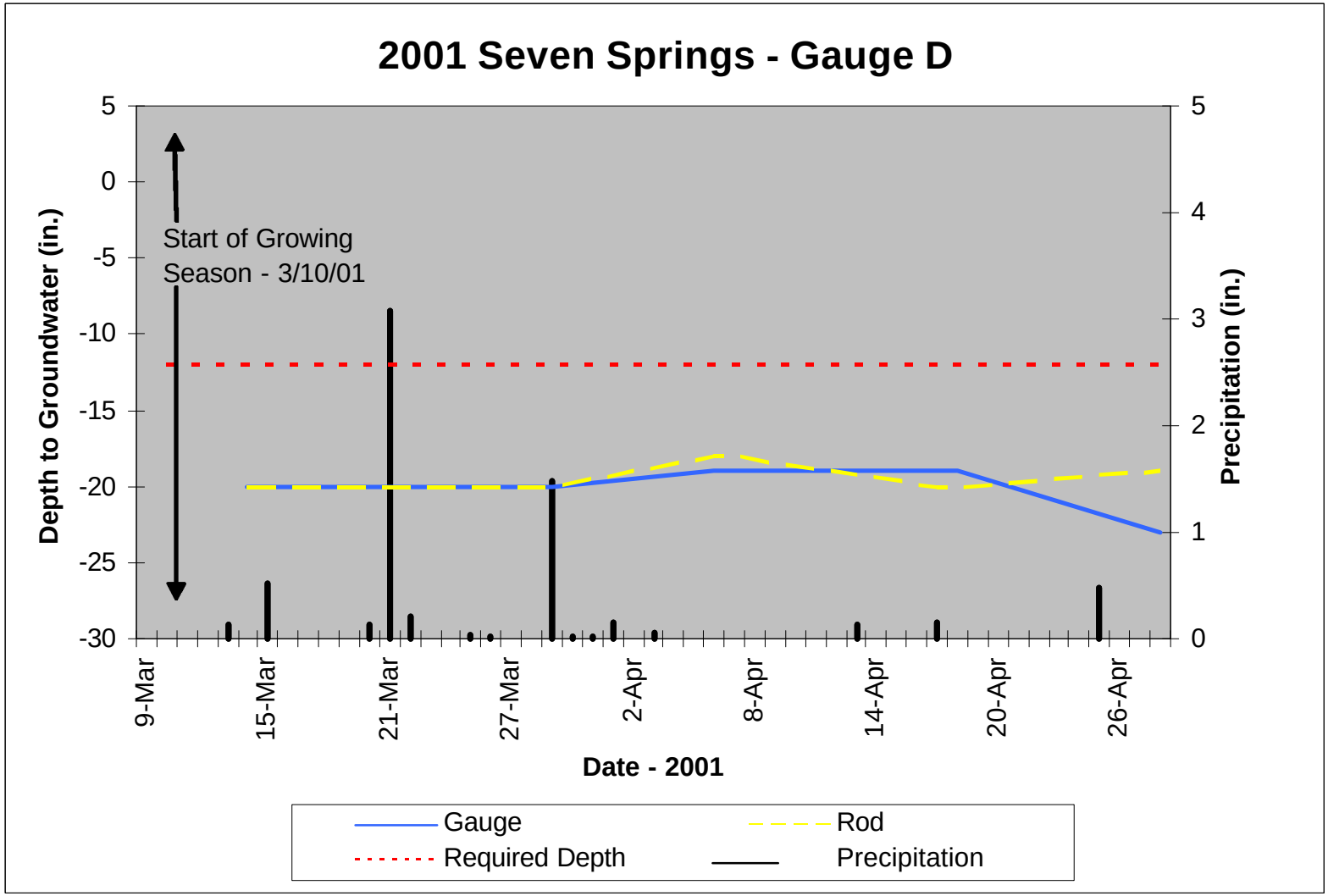
Appendix A

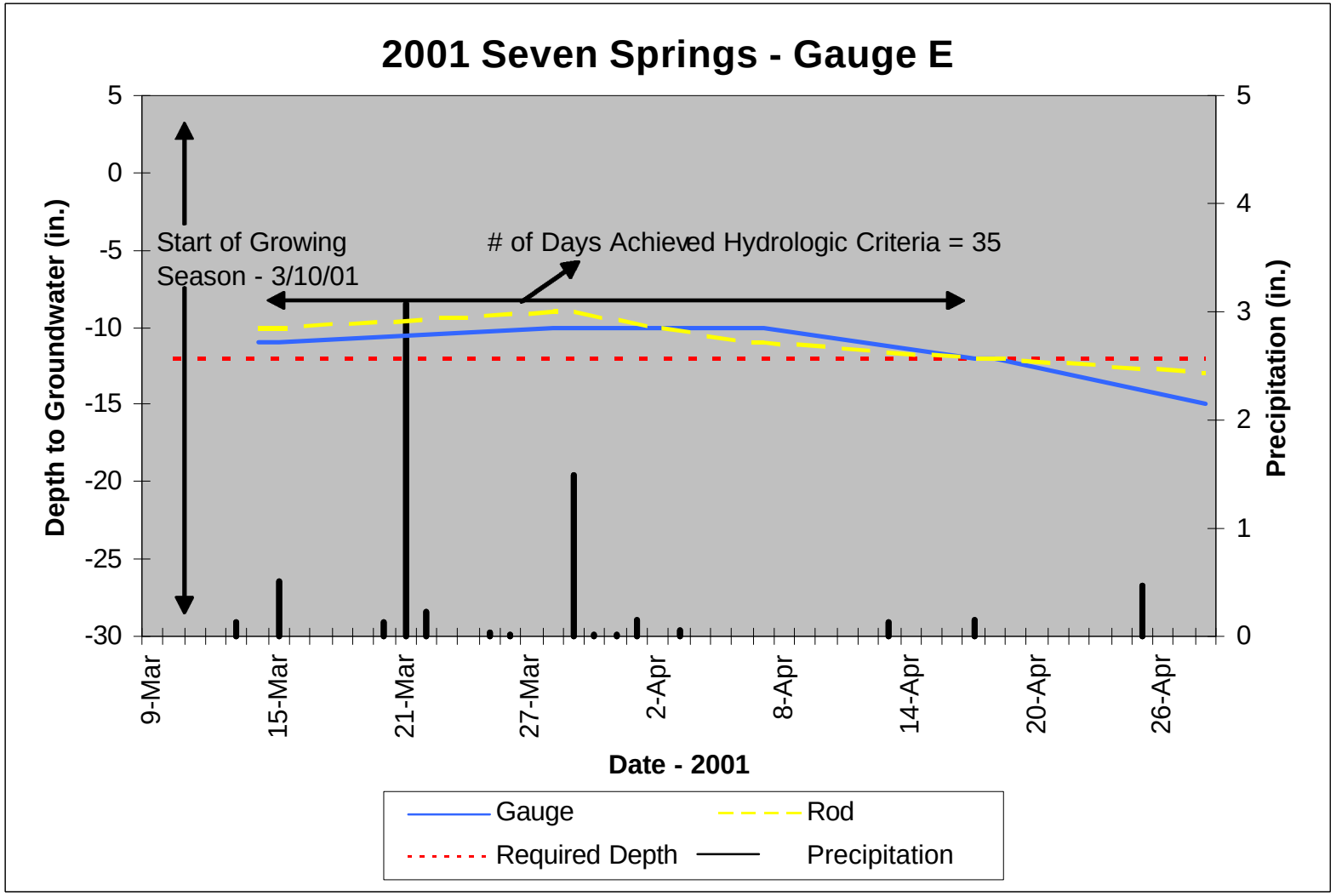
2001 Gauge Hydrographs

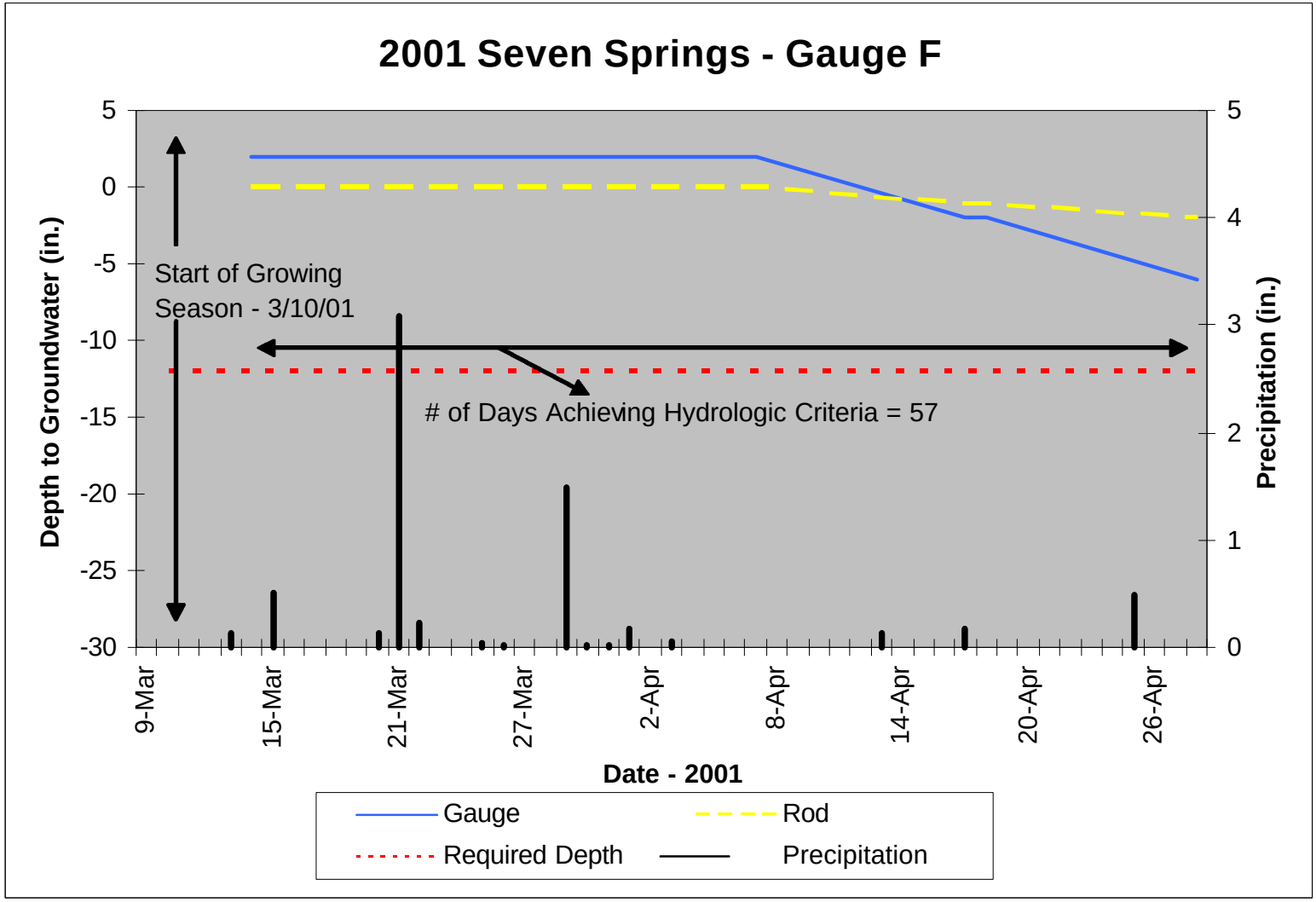

2001 Seven Springs - Gauge A
Depth to Groundwater (in.)
Precipitation (in.)
Start of Growing Season - 3/10/01
5
0
-5
-10
-15
-20
-25
-30
4
3
2
1
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Gauge
Rod
Required Depth
Precipitation

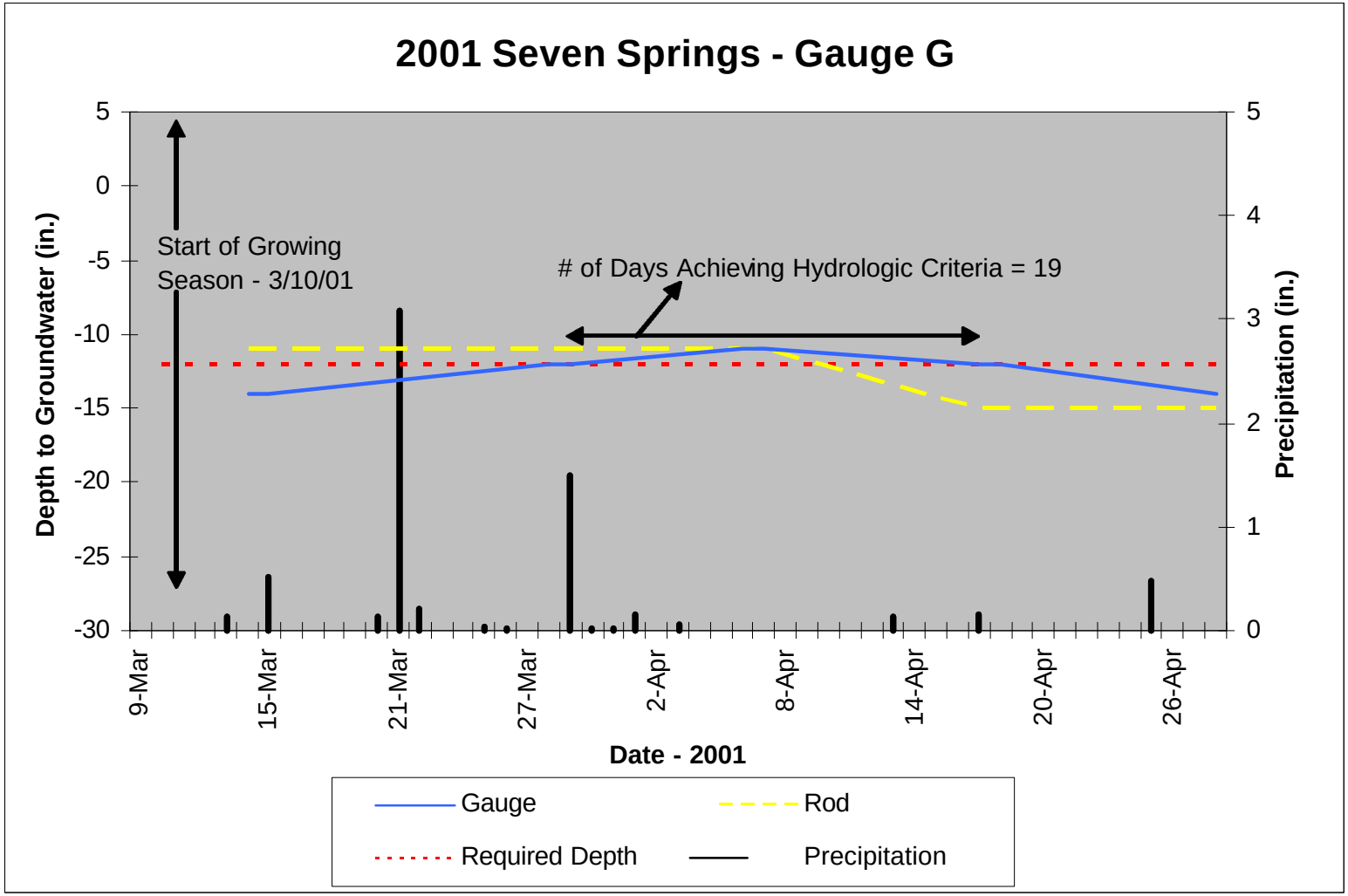

2001 Seven Springs - Gauge B
Depth to Groundwater (in.)
Precipitation (in.)
Start of Growing Season - 3/12/01
# of Days Achieving Hydrologic Criteria = 35
5
0
-5
-10
-15
-20
-25
-30
4
3
2
1
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Gauge
Rod
Required Depth
Precipitation

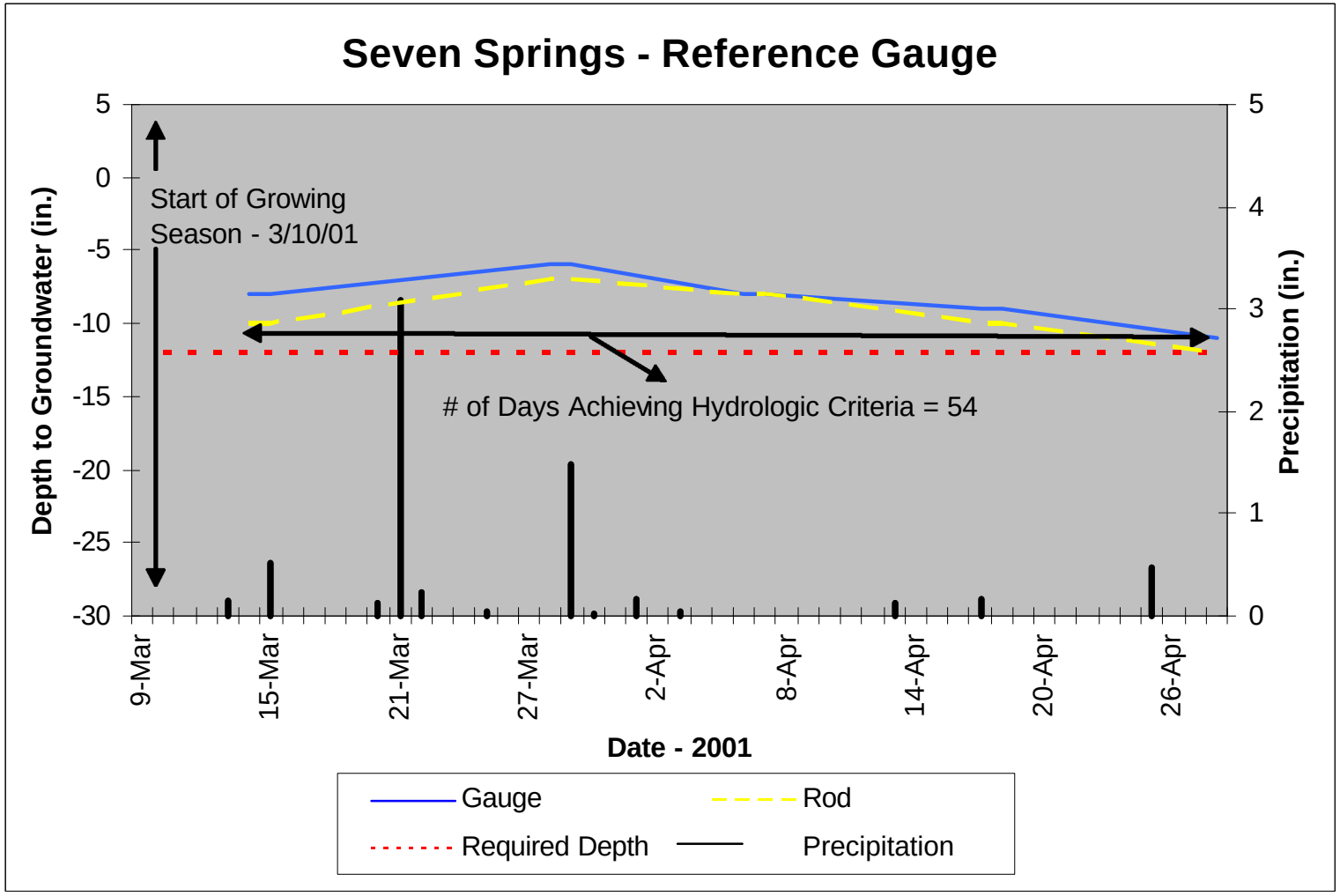

2001 Seven Springs - Gauge C
Start of Growing Season - 3/10/01
# of Days Achieving Hydrologic Criteria = 48
Depth to Groundwater (in.)
Precipitation (in.)
5
0
-5
-10
-15
-20
-25
-30
4
3
2
1
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Well
Rod
Required Depth
Precipitation


2001 Seven Springs - Gauge D
Depth to Groundwater (in.)
Precipitation (in.)
Start of Growing Season - 3/10/01
5
0
-5
-10
-15
-20
-25
-30
5
4
3
2
1
0
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Gauge
Rod
Required Depth
Precipitation


2001 Seven Springs - Gauge E
Depth to Groundwater (in.)
Precipitation (in.)
Start of Growing Season - 3/10/01
# of Days Achieved Hydrologic Criteria = 35
5
0
-5
-10
-15
-20
-25
-30
4
3
2
1
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Gauge
Rod
Required Depth
Precipitation


2001 Seven Springs - Gauge F
Depth to Groundwater (in.)
Precipitation (in.)
5
0
-5
-10
-15
-20
-25
-30
5
4
3
2
1
0
Start of Growing Season - 3/10/01
# of Days Achieving Hydrologic Criteria = 57
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Gauge
Rod
Required Depth
Precipitation


2001 Seven Springs - Gauge G
Depth to Groundwater (in.)
Precipitation (in.)
Start of Growing Season - 3/10/01
# of Days Achieving Hydrologic Criteria = 19
5
0
-5
-10
-15
-20
-25
-30
4
3
2
1
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Gauge
Rod
Required Depth
Precipitation


Seven Springs - Reference Gauge
Depth to Groundwater (in.)
Precipitation (in.)
Start of Growing Season - 3/10/01
# of Days Achieving Hydrologic Criteria = 54
5
0
-5
-10
-15
-20
-25
-30
4
3
2
1
0
9-Mar
15-Mar
21-Mar
27-Mar
2-Apr
8-Apr
14-Apr
20-Apr
26-Apr
Date - 2001
Gauge
Rod
Required Depth
Precipitation

APPENDIX B

SITE PHOTOS

Photo 1 – South side of project area looking Northeast.

Photo 2 – South side of project area looking Northwest.