

ANNUAL REPORT FOR 2006



Grimesland Sand Pit Phase II Site

Pitt County

Project No. 8.T221801

EEP Project No. 156

TIP No. R-2510WM

Monitoring Year 4 of 5



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SUMMARY

The following report summarizes the monitoring activities that have occurred in the past year for Phase II of the Grimesland Sand Pit Mitigation Site. This site was constructed to serve as a wetland mitigation site for roadway project impacts in the Lower Tar River portion of the Tar-Pamlico River Basin in North Carolina. The site consists of three phases. Phase II construction was completed in 2003 and planting occurred in February of 2003.

The site is monitored for hydrology using twenty groundwater-monitoring gauges and one rain gauge. The site is monitored for vegetation using seven vegetation plots, which are representative of the 48.8 acres planted in trees on the Grimesland Sand Pit Site Phase II.

The 2006-year represents the fourth year of hydrology and vegetation monitoring following construction. The site must demonstrate hydrologic and vegetation success for a minimum of five years or until the project is deemed successful.

Results for both hydrologic and vegetation monitoring indicate that the site is meeting success. The hydrologic data for 2006 demonstrates that the Phase II site met jurisdictional success with nineteen of the twenty groundwater gauges exceeding the 12.5% minimum success criterion, with fourteen gauges meeting 100% during the growing season. Vegetation monitoring yielded 361 trees per acre, which is above the minimum success criteria for the fourth year of monitoring.

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The 550-acre Grimesland Sand Pit Mitigation Site (herein after referred to as “the site”) is located in Pitt County near the community of Grimesland. The site is currently owned and mined by NCDOT. The site is bounded on the north and the east by Grindle Creek, on the west by croplands and pine plantation, and on the south by the floodplain of the Tar River and the Tar River itself (Figure 1). The site serves as a regional wetland mitigation site for NCDOT roadway projects that would impact similar sites located in the Lower Tar River Sub-Basin. The site includes the creation of 58 acres of forested riverine wetlands (cypress-gum swamp and coastal plain bottomland hardwoods), the creation of 2 acres of emergent wetlands on submerged benches, the preservation of 348 acres of riverine wetland ecosystem, the preservation of 29.59 acres of riparian buffer and the enhancement of aquatic habitat within 80 acres of flooded abandoned borrow pits.

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 satisfied. 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 2006-growing season at the Grimesland Sand Pit Site Phase II.

1.3 PROJECT HISTORY

Date	Task Accomplished
2003 (Construction-Phase II)	
February	Phase II Planted
March-November	Hydrologic Monitoring (1 yr.)
June	Vegetation Monitoring (1 yr.)
2004	
March-November	Hydrologic Monitoring (2 yr.)
June	Vegetation Monitoring (2 yr.)
2005	
March-November	Hydrologic Monitoring (3 yr.)
June	Vegetation Monitoring (3 yr.)
2006	
March-November	Hydrologic Monitoring (4 yr.)
June	Vegetation Monitoring (4 yr.)

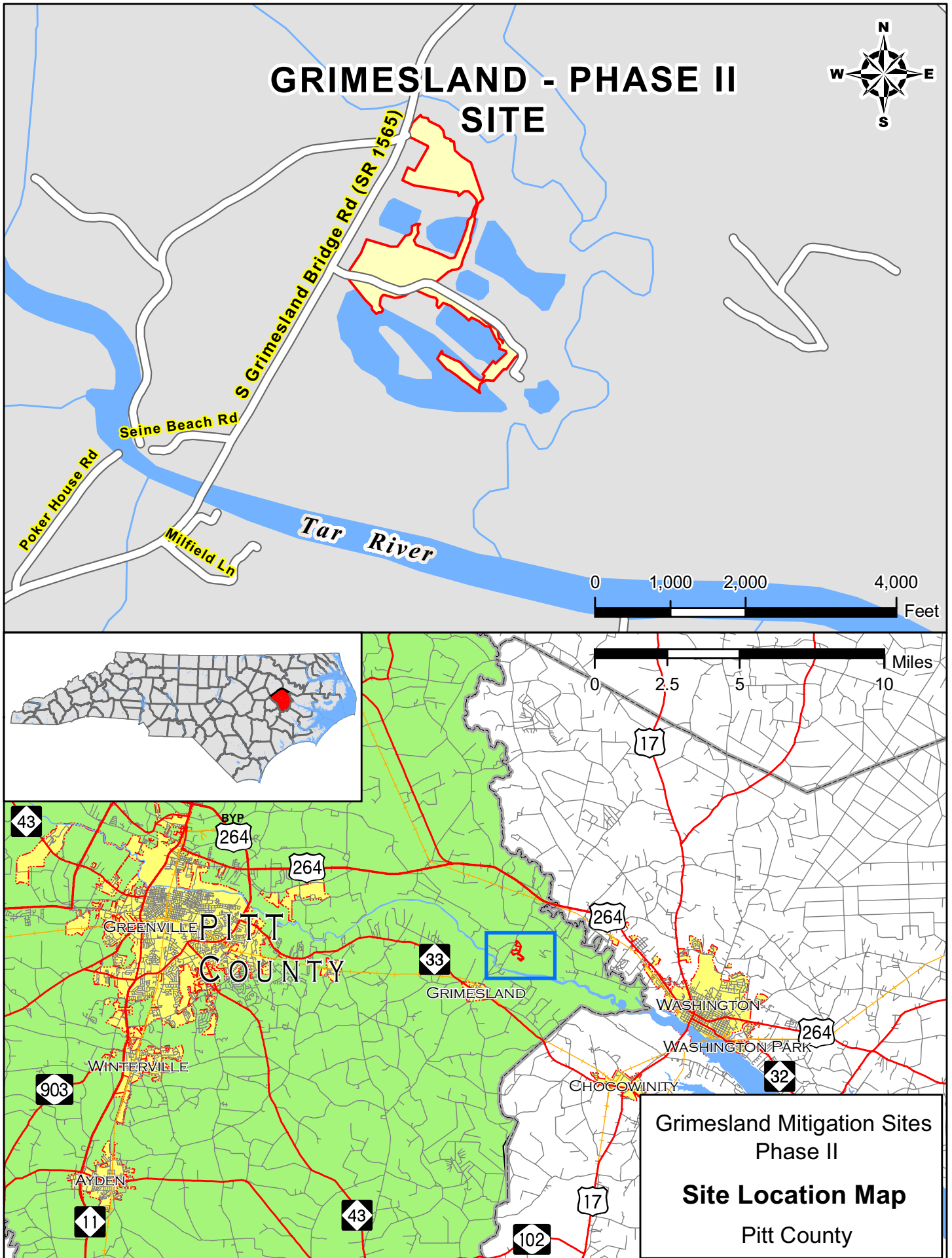


Figure 1

2.0 HYDROLOGY

2.1 SUCCESS CRITERIA

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology state that the area must be inundated or saturated (within 12" of the surface) by surface or groundwater for consecutive days lasting at least 12.5% of the growing season. Areas inundated less than 5% of the growing season are always classified as nonwetlands. Areas inundated between 5% - 12.5% of the growing season can be classified as wetlands depending upon other factors, such as the presence of hydrophytic vegetation and hydric soils.

The growing season in Pitt County begins March 15 and ends November 16. These dates correspond to a 50% probability that temperatures will remain above 28° F or higher after March 15 and before November 16. The growing season is 247 days; therefore, the optimum duration for wetland hydrology is 31 days. Also, local climate must represent average conditions for the area.

2.2 HYDROLOGIC DESCRIPTION

Twenty groundwater gauges were installed in the Phase II area in April 2003 (Figure 2). The automatic monitoring gauges record daily readings of the groundwater depth. The 2006 data represents the fourth full growing season during which the water table was monitored in the Phase II area. A rain gauge installed onsite records daily rainfall totals; these rain events are incorporated into the monitoring results to examine how the site's groundwater level responds to rainfall.

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 groundwater-monitoring gauge. This number was converted into a percentage of the 247-day growing season (March 15 – November 16).

Table 1 shows the hydrologic results for 2006; Figure 3 is an aerial photograph with the gauges shown as a blue dot indicating the gauge showed success for more than 12.5% of the growing season; a red dot, between 8 and 12.5%; a green dot, between 5 and 8%, and a black dot, less than 5%. Nineteen of the twenty groundwater gauges met the 12.5% success criterion.

¹ Soil Conservation Service, Soil Survey of Pitt County, North Carolina, p.71.

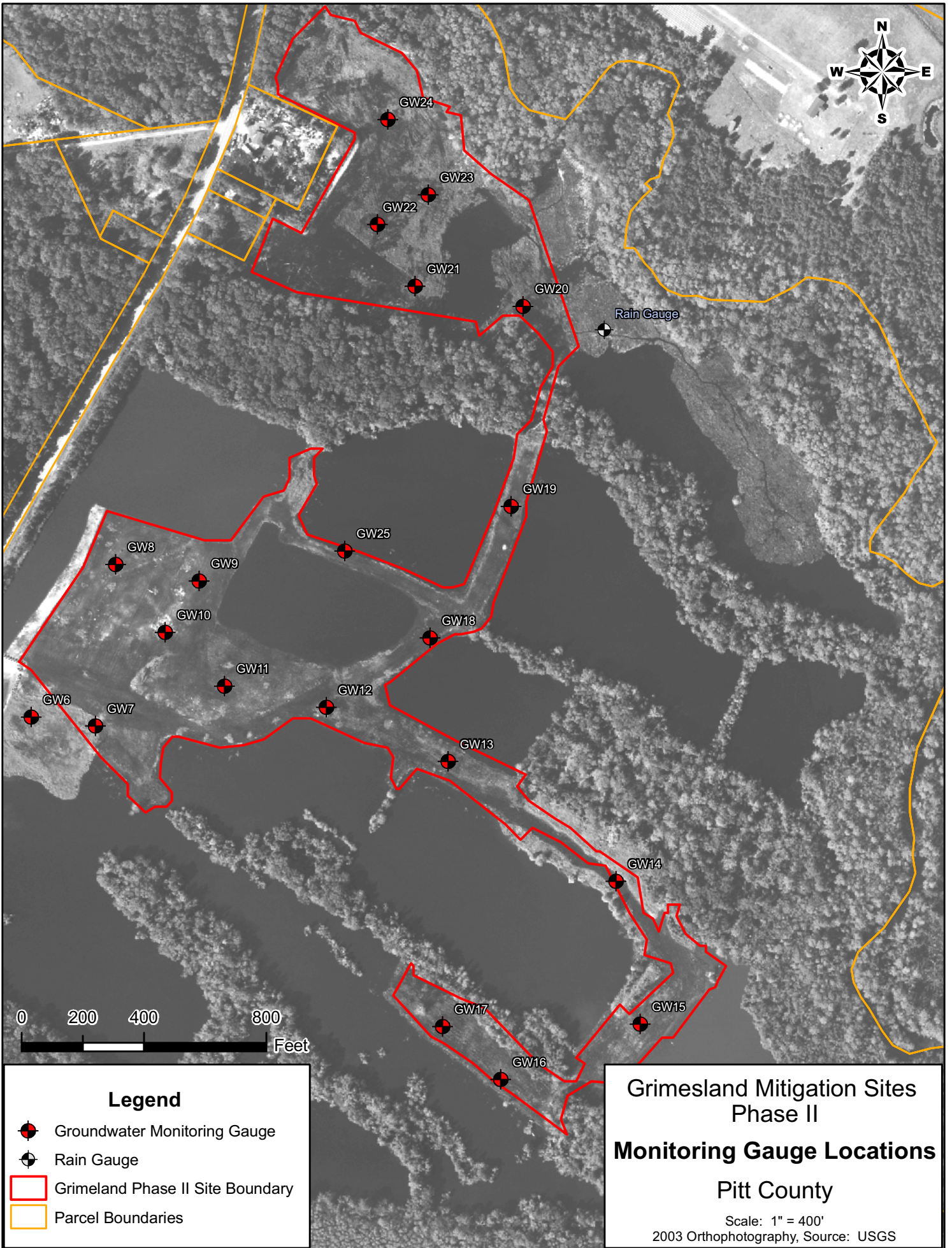


Figure 2

Table 1. 2006 Phase II Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 8%	8 – 12%	> 12.5%	Actual %	Success Dates
GSP-GW6				x	27.9	May 8-July 15
GSP-GW7				x	100	March 15-November 16
GSP-GW8				x	100	March 15-November 16
GSP-GW9				x	100	March 15-November 16
GSP-GW10				x	100	March 15-November 16
GSP-GW11		x			6.5	July 16-July 31
GSP-GW12				x	100	March 15-November 16
GSP-GW13				x	100	March 15-November 16
GSP-GW14				x	86.2	March 15-September 13
GSP-GW15				x	100	March 15-November 16
GSP-GW16				x	100	March 15-November 16
GSP-GW17				x	100	March 15-November 16
GSP-GW18				x	100	March 15-November 16
GSP-GW19				x	100	March 15-November 16
GSP-GW20				x	100	March 15-November 16
GSP-GW21				x	100	March 15-November 16
GSP-GW22				x	97.2	March 15-September 13
GSP-GW23				x	58.7	March 15-June 8 September 19-November 16
GSP-GW24				x	100	March 15-November 16
GSP-GW25				x	100	March 15-November 16

Appendix A contains plots of the groundwater depth at each monitoring gauge location during 2006. In addition to documenting the water table level relative to the ground surface, these monitoring gauge graphs are designed to show the reaction of the groundwater level to specific rainfall events. The maximum number of consecutive days that the gauge indicates successful hydrology is noted on each graph. Precipitation events recorded by the onsite rain gauge are also included on each graph. Plots of the data recorded at each of the two surface water gauges are included in Appendix A.

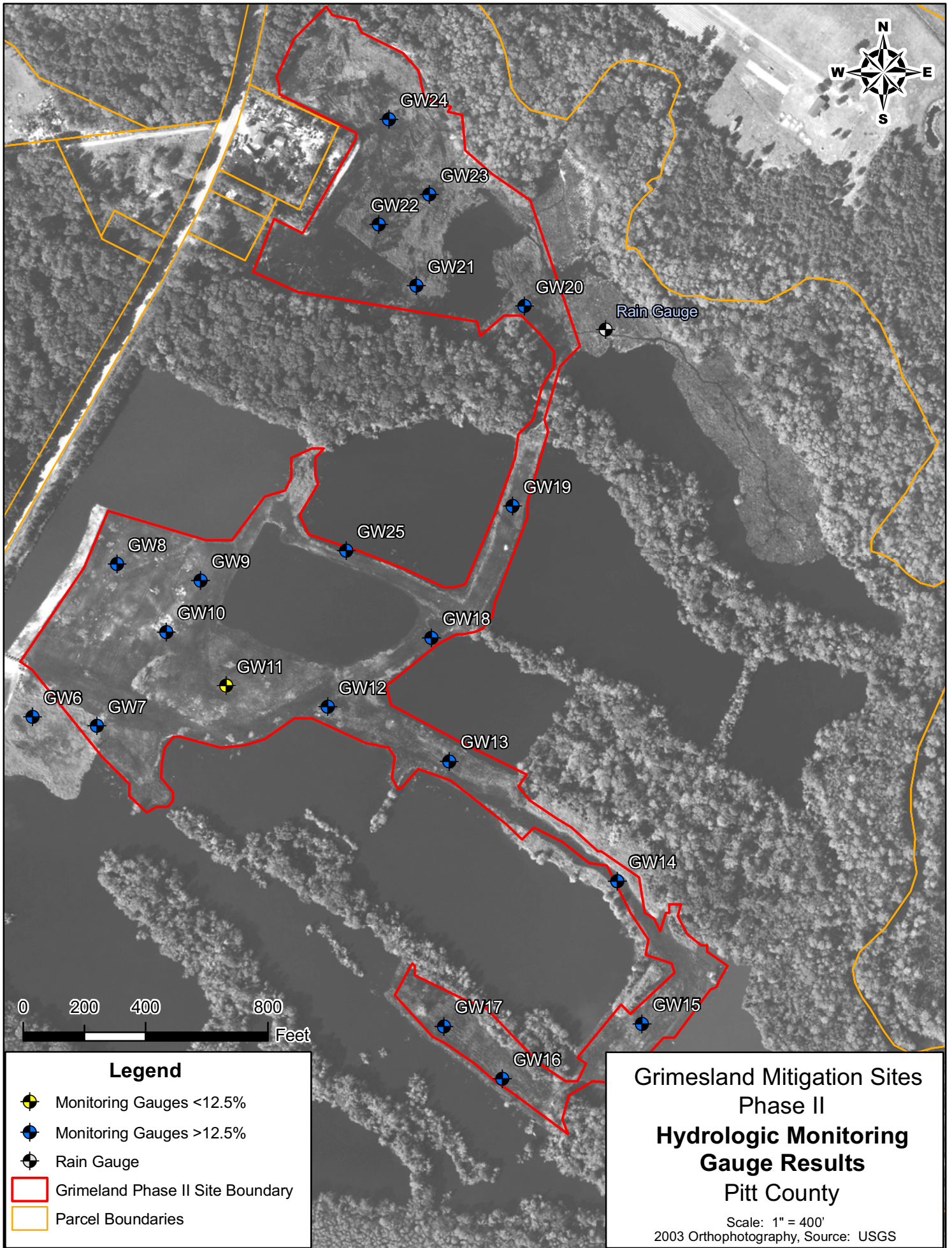


Figure 3

2.3.2 Climatic Data

Figure 4 is a graph of monthly rainfall for the period of November 2005 through September 2006 compared to historical precipitation data (collected between 1973 and 2004) for Washington, North Carolina. The onsite rain gauge provided the rainfall data and the NC State Climate Office provided the historical rainfall data. The comparison of 2006 rainfall versus historical values gives an indication of how 2006 compares to historical climate conditions.

For the 2006 monitoring year, January and September experienced average rainfall. The months of February, March, April, May, and July recorded below average rainfall while June, August, and November recorded above average rainfall.

2.4 CONCLUSIONS

The 2006-year concludes the fourth complete year of hydrology monitoring at the Grimesland Phase II Site. The 2006 data shows that the Phase II site met jurisdictional success with nineteen gauges exceeding the 12.5% minimum success criterion and one gauge in the 8 to 12.5% range. A comparison of 2006 rainfall versus historical precipitation shows that 2006 experienced average rainfall conditions. It is recommended that EEP continue monitoring at the Grimesland Phase II Mitigation Site for the 2007 monitoring year.

**Grimesland II 30-70 Percentile Graph
Washington, NC**

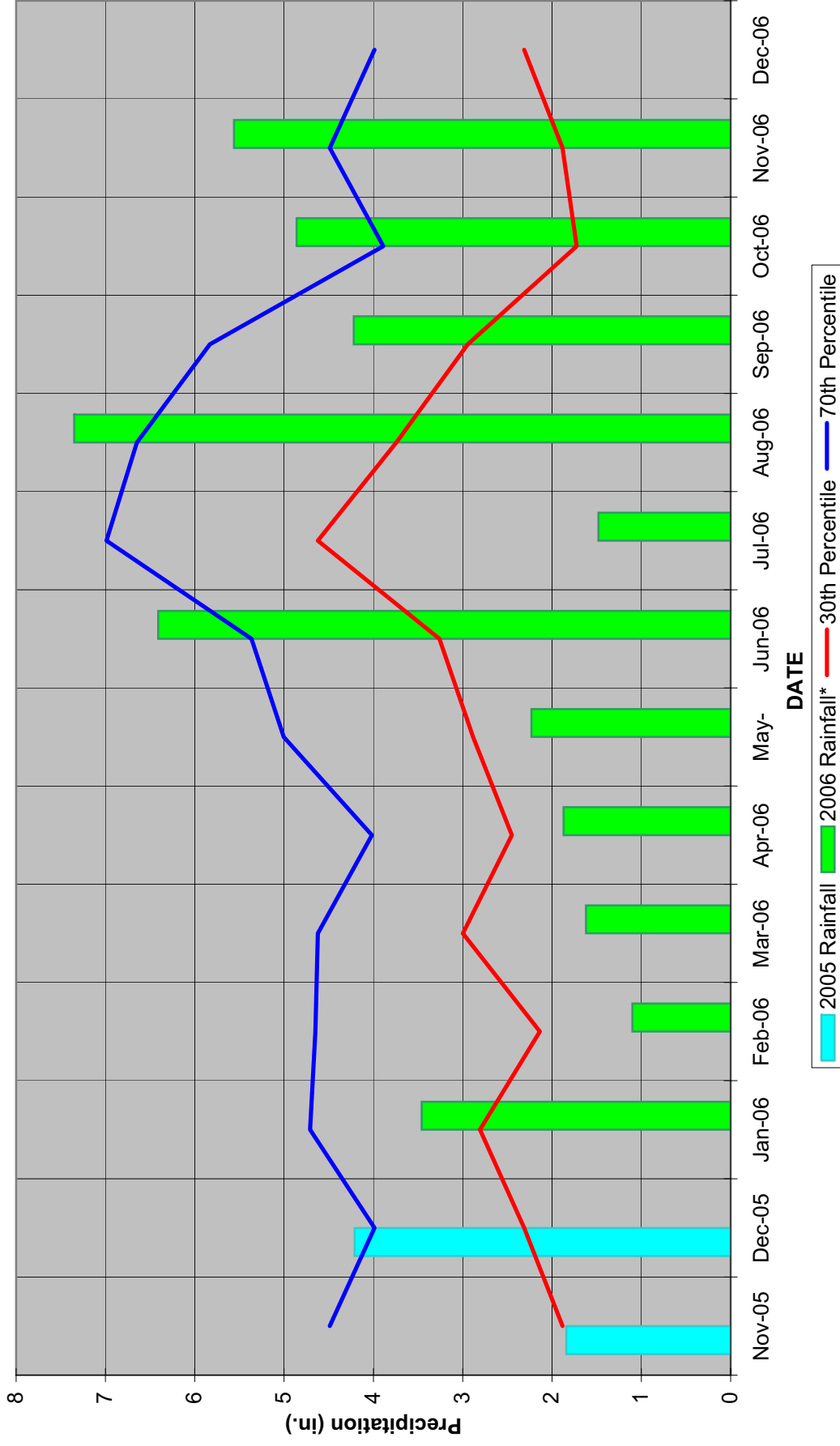


Figure 4 *Due to onsite rain gauge malfunction, rain fall data from KPGV - Pitt / Greenville Airport for the months of June, July, and August 2006.

3.0 VEGETATION (YEAR 4 MONITORING)

3.1 SUCCESS CRITERIA

The success criteria state that there must be a minimum density of 280 trees per acre after four years of initial planting and a minimum count of 260 trees per acre must be achieved after five years of initial planting.

3.2 DESCRIPTION OF SPECIES

The following species were planted in the Wetland Restoration Area:

Phase II:

Nyssa sylvatica var. *biflora*, Swamp Blackgum

Fraxinus pennsylvanica, Green Ash

Quercus phellos, Willow Oak

Quercus nigra, Water Oak

Taxodium distichum, Baldcypress

Quercus lyrata, Overcup Oak

Platanus occidentalis, Sycamore

3.3 RESULTS OF VEGETATION MONITORING

Table 2. Vegetation Monitoring Statistics

Plot #	Baldcypress	Green Ash	Swamp Blackgum	Water Oak	Willow Oak	Overcup Oak	Sycamore	Total (Year 3)	Total (at planting)	Density (Trees/Acre)
1	7	5		10	2	14	1	39	50	530
2	3	5				2		10	31	219
3	3		2	3		2		10	31	219
4	11		6					17	22	525
5	24	5	3			3		35	45	529
6	3	9						12	26	314
7	1	6	4					11	40	187
AVERAGE TREE DENSITY										361

Site Notes: Other species noted: black willow, *Juncus* sp., woolgrass, cattail, *Cyperus* sp., *Scirpus* sp., smartweed, volunteer sycamore, volunteer swamp blackgum, and various grasses.

3.4 CONCLUSIONS

Phase II consisted of approximately 48.8 acres of tree planting. There were seven vegetation-monitoring plots established throughout the Phase II planting areas. The 2006 vegetation monitoring of the site revealed an average tree density of 361 trees per acre in Phase II. This average is above the minimum success criteria after the fourth year of monitoring.

Vegetation monitoring will continue at the Grimesland Phase II Mitigation Site for the 2007 monitoring year.

4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

The Grimesland Sand Pit Phase II Mitigation Site was monitored for the fourth year in 2006. Nineteen groundwater-monitoring gauges indicated jurisdictional success for at least 12.5% of the 2006-monitoring year, with fourteen gauges meeting success 100% of the growing season. An analysis of rainfall in nearby Washington, NC shows that the region experienced average rainfall for the year. Therefore, the site met jurisdictional success criteria under average climatic conditions.

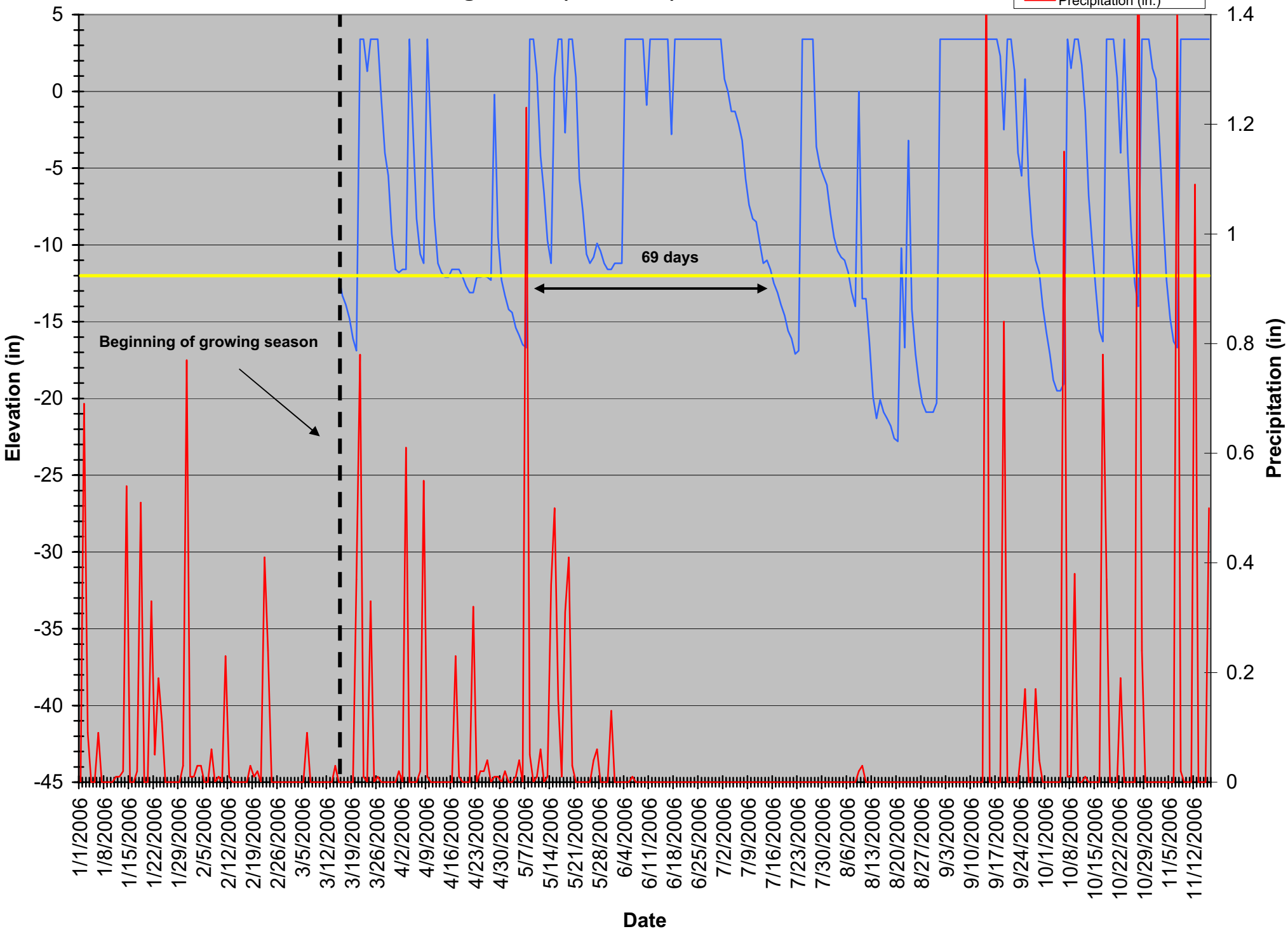
Approximately 48.8 acres of the site were planted; seven vegetation plots within this area are used for vegetation monitoring. The established success criteria state that the minimum survival rate in the first four years following planting is 280 trees per acre. Monitoring results showed an average survival rate of 361 trees per acre in the fourth monitoring year. Therefore, the vegetation exceeds the minimum success criteria.

It is recommended to continue hydrologic and vegetative for monitoring year 5 during 2007.

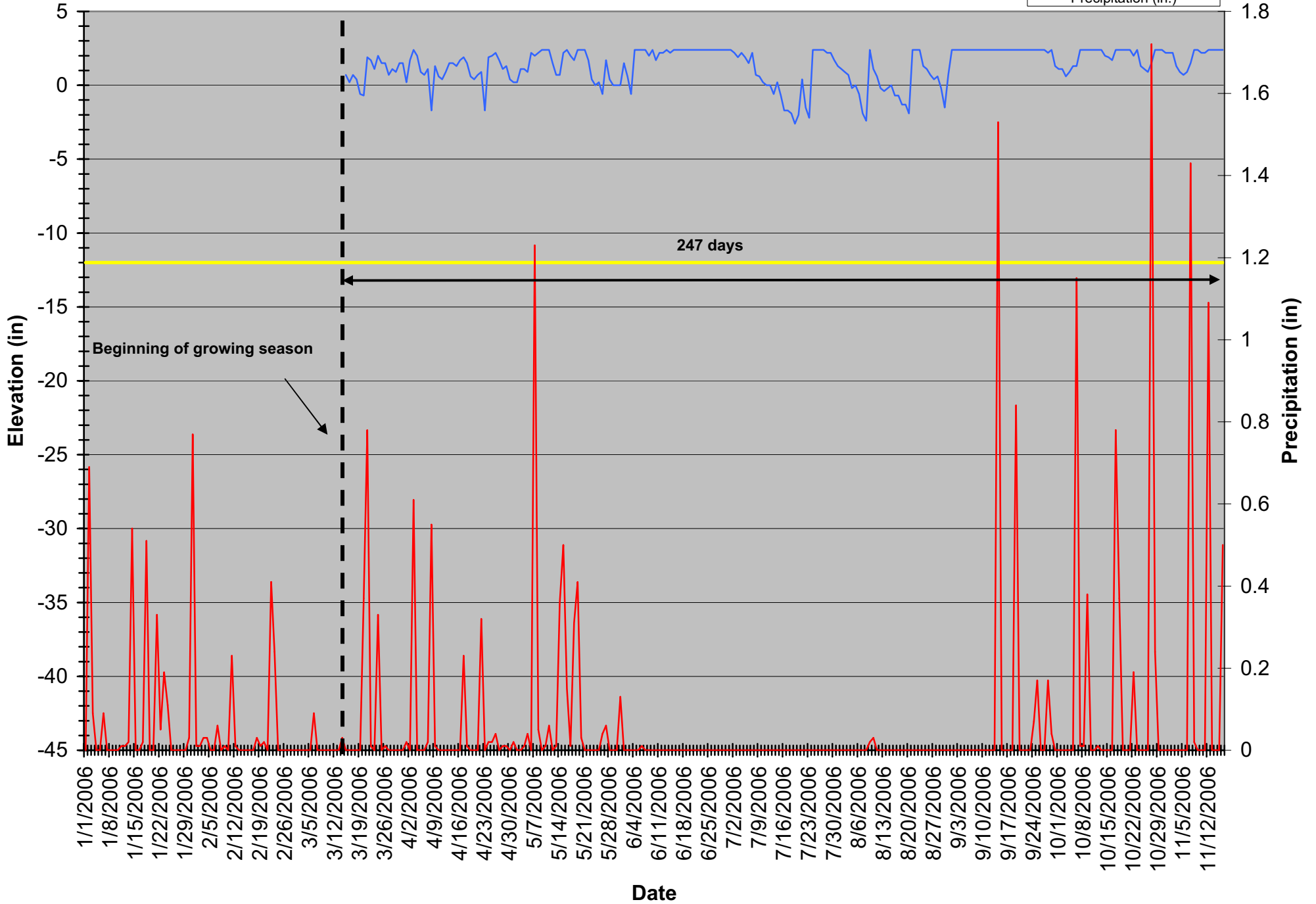
APPENDIX A
DEPTH TO GROUNDWATER CHARTS

Gauge GW6 (S51744E)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)

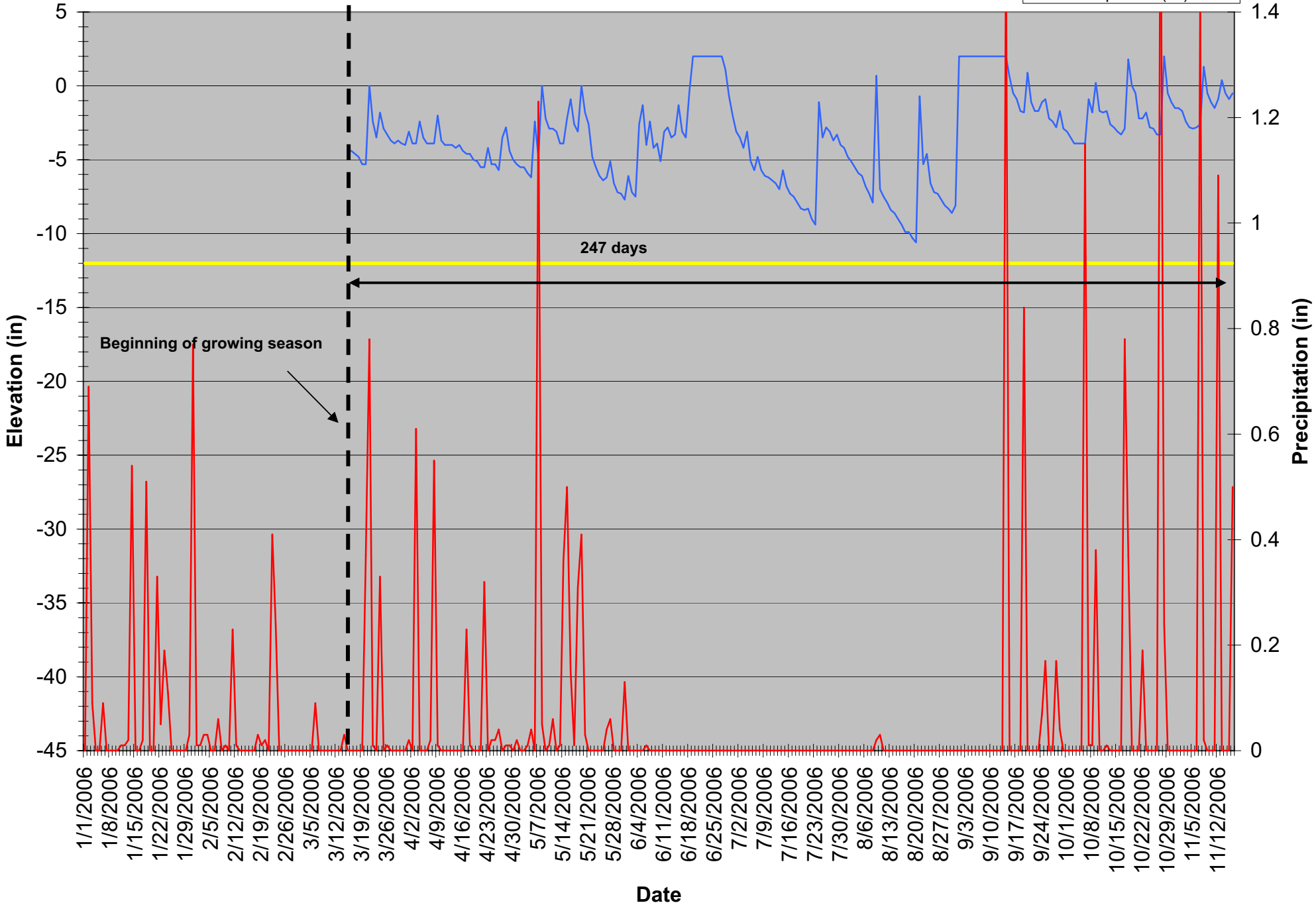


Gauge GW7 (S5176AF)-Groundwater



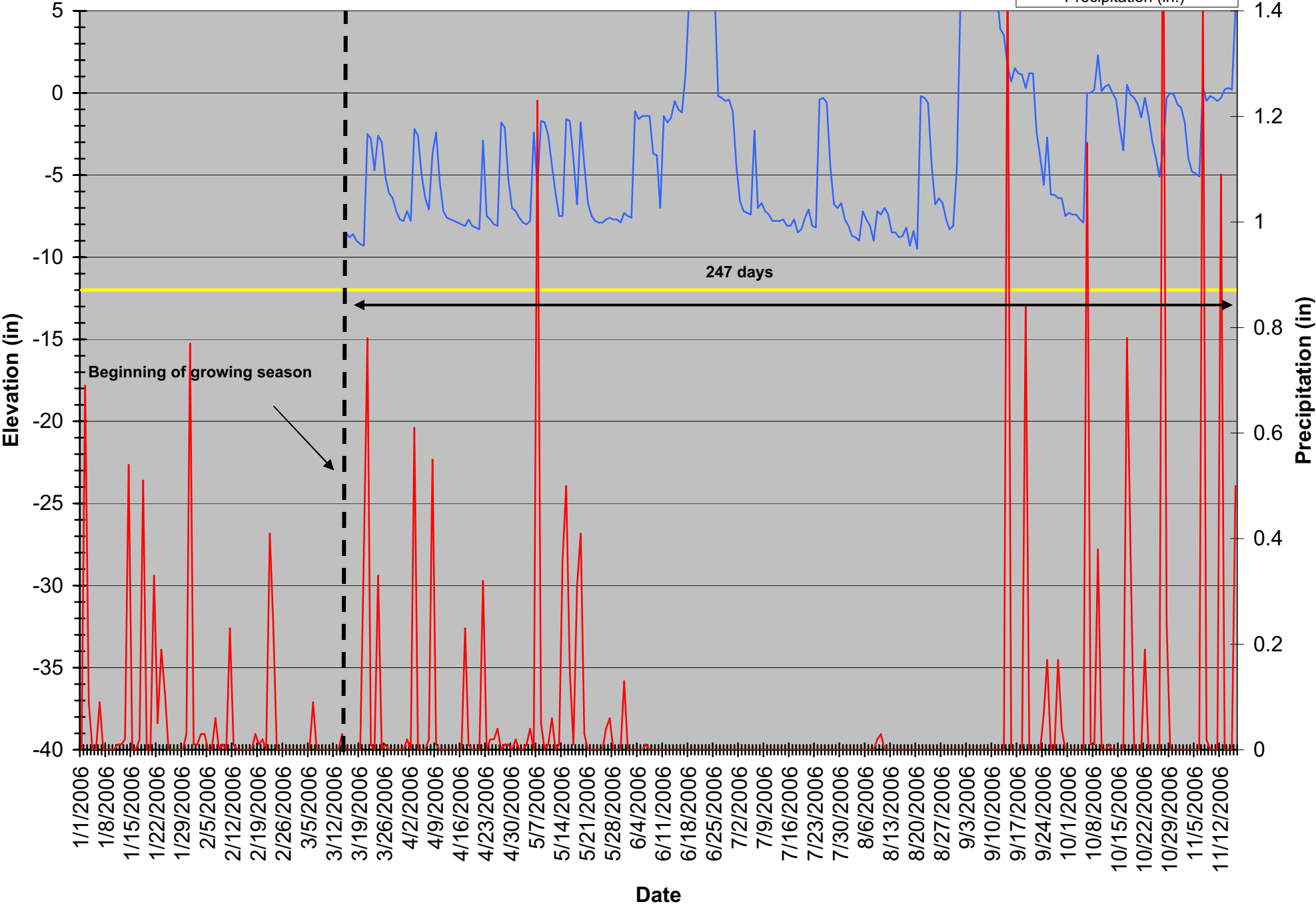
Gauge GW8 (S5171E8)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



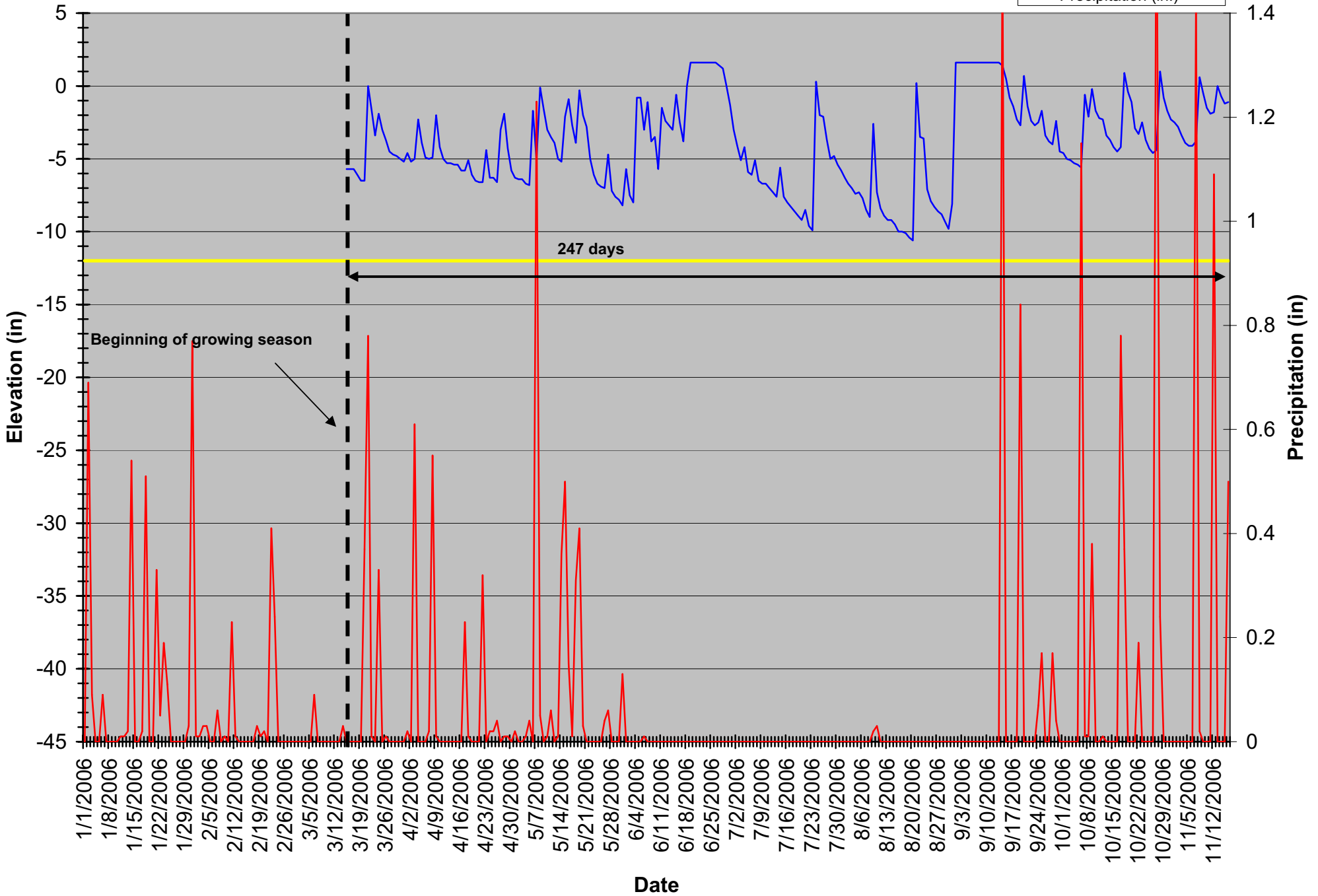
Gauge GW9 (A28AE1F)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



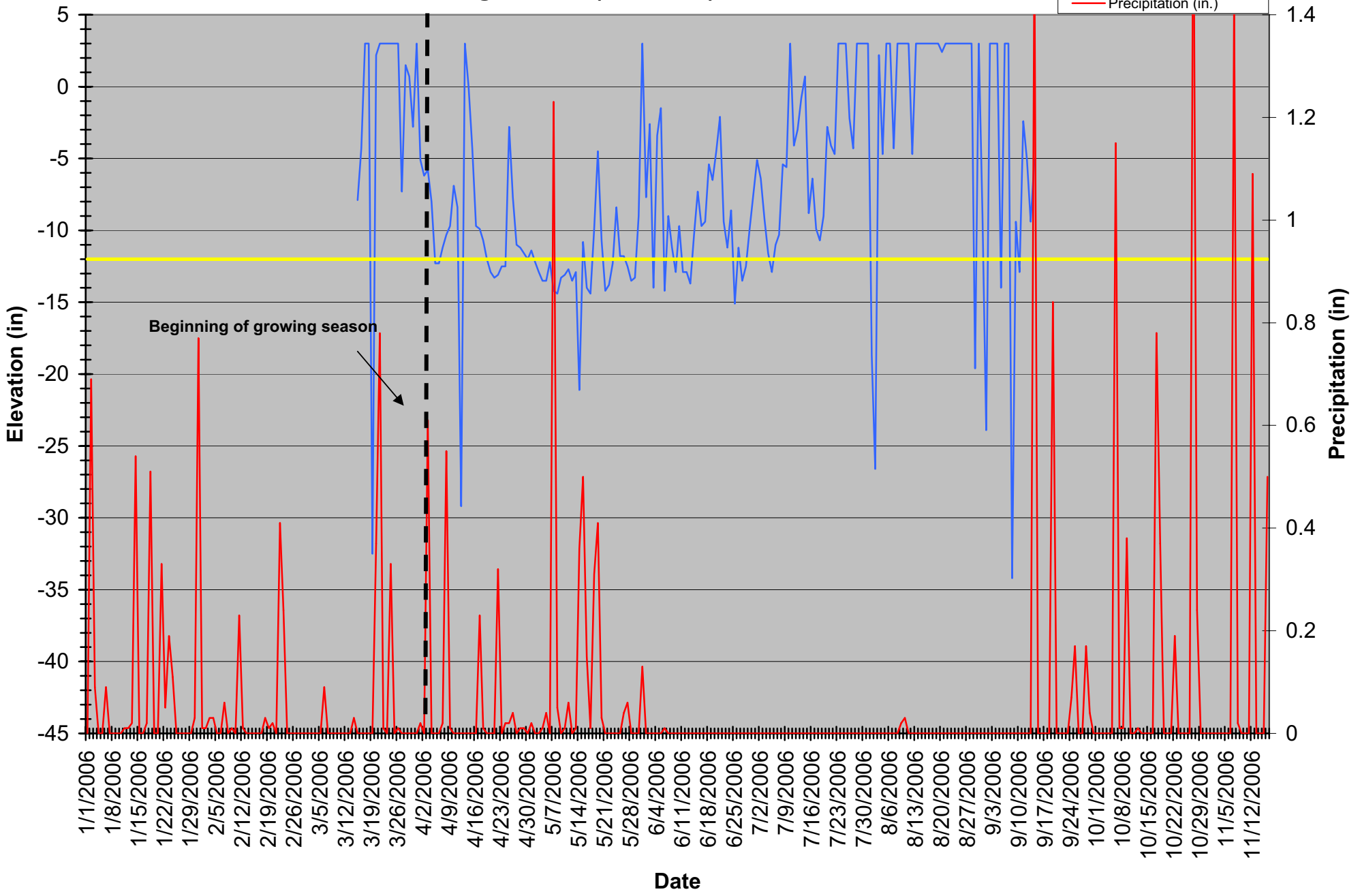
Gauge GW10 (S5043CA)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



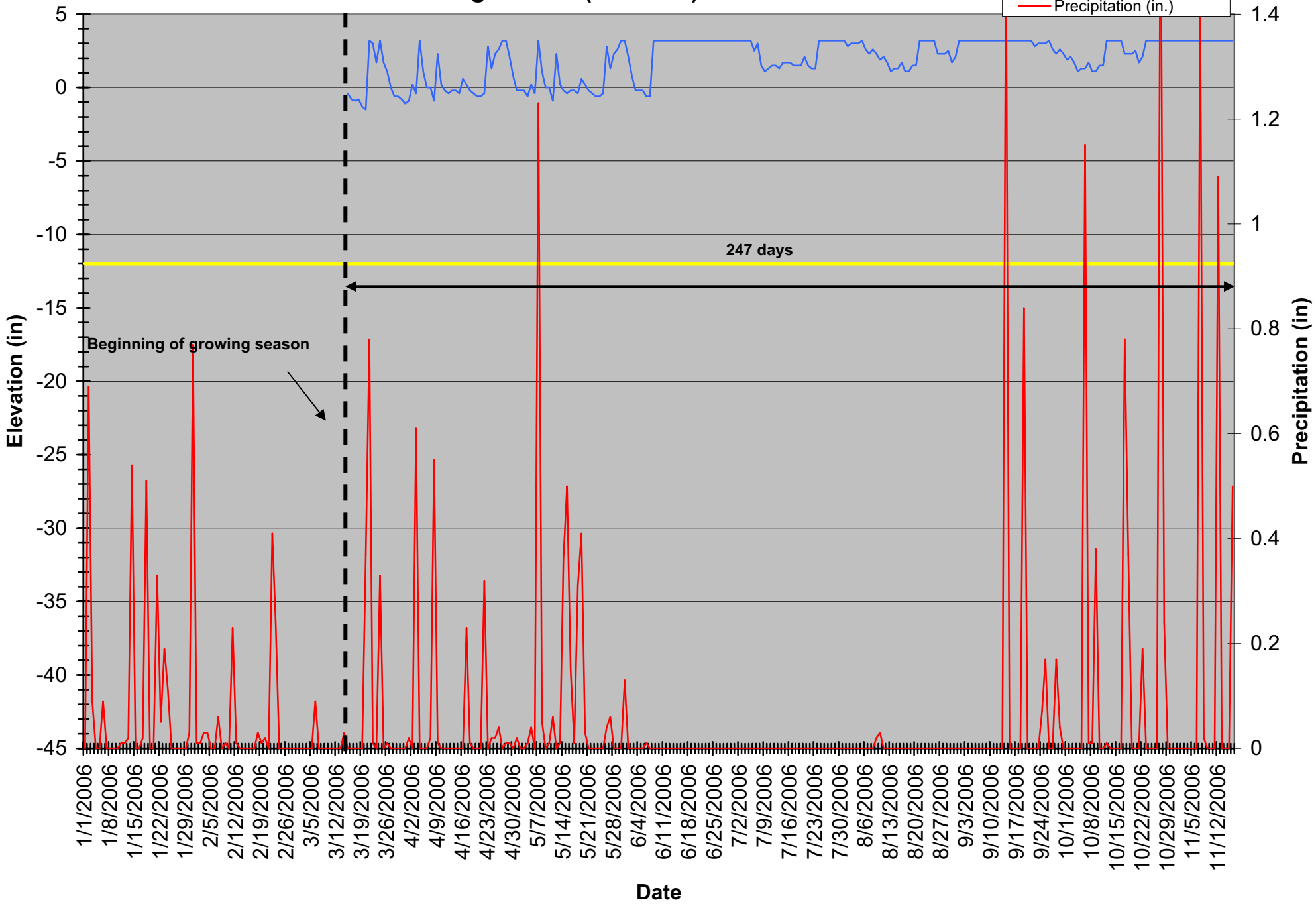
Gauge GW11 (S51B986)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



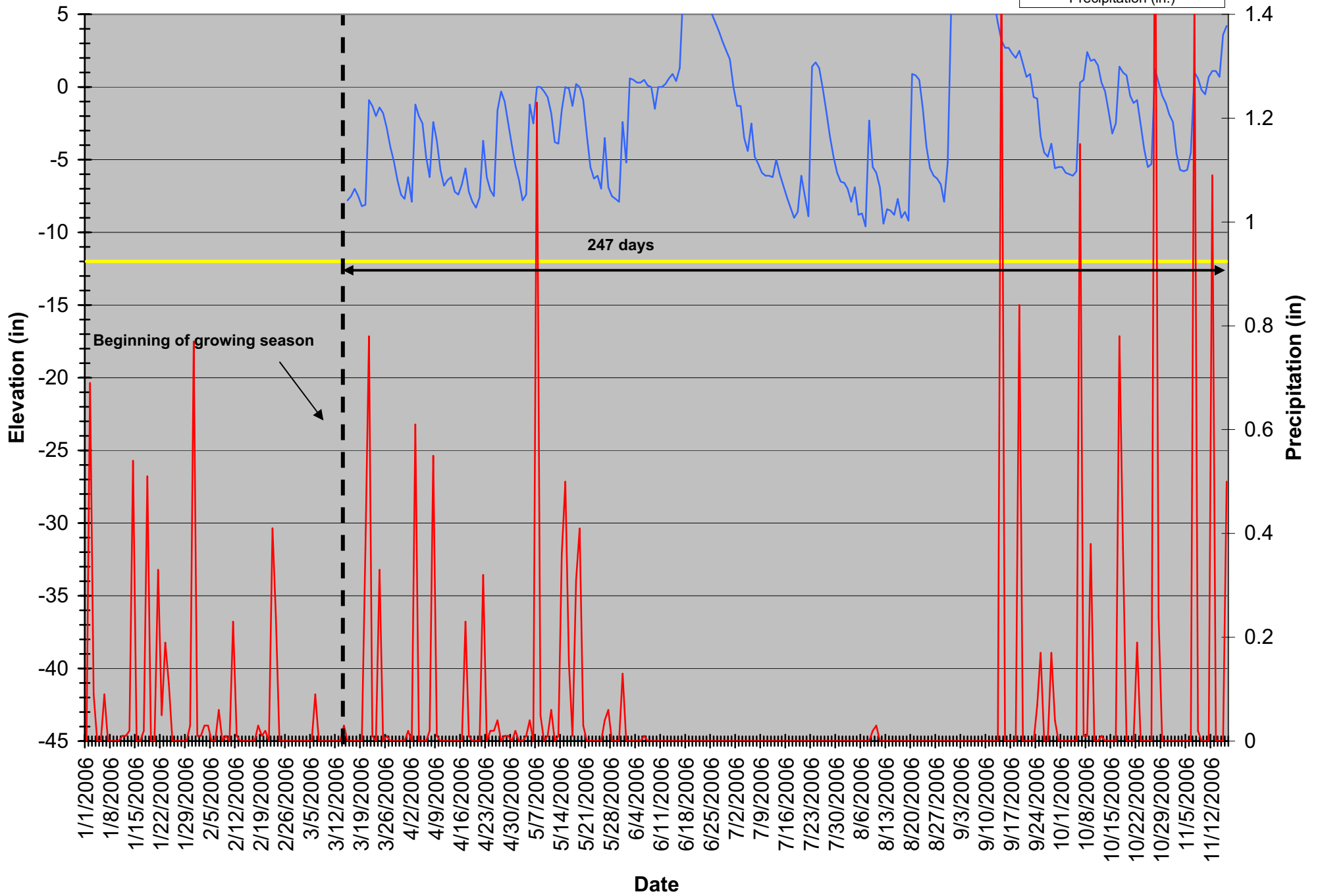
Gauge GW12 (S517407)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



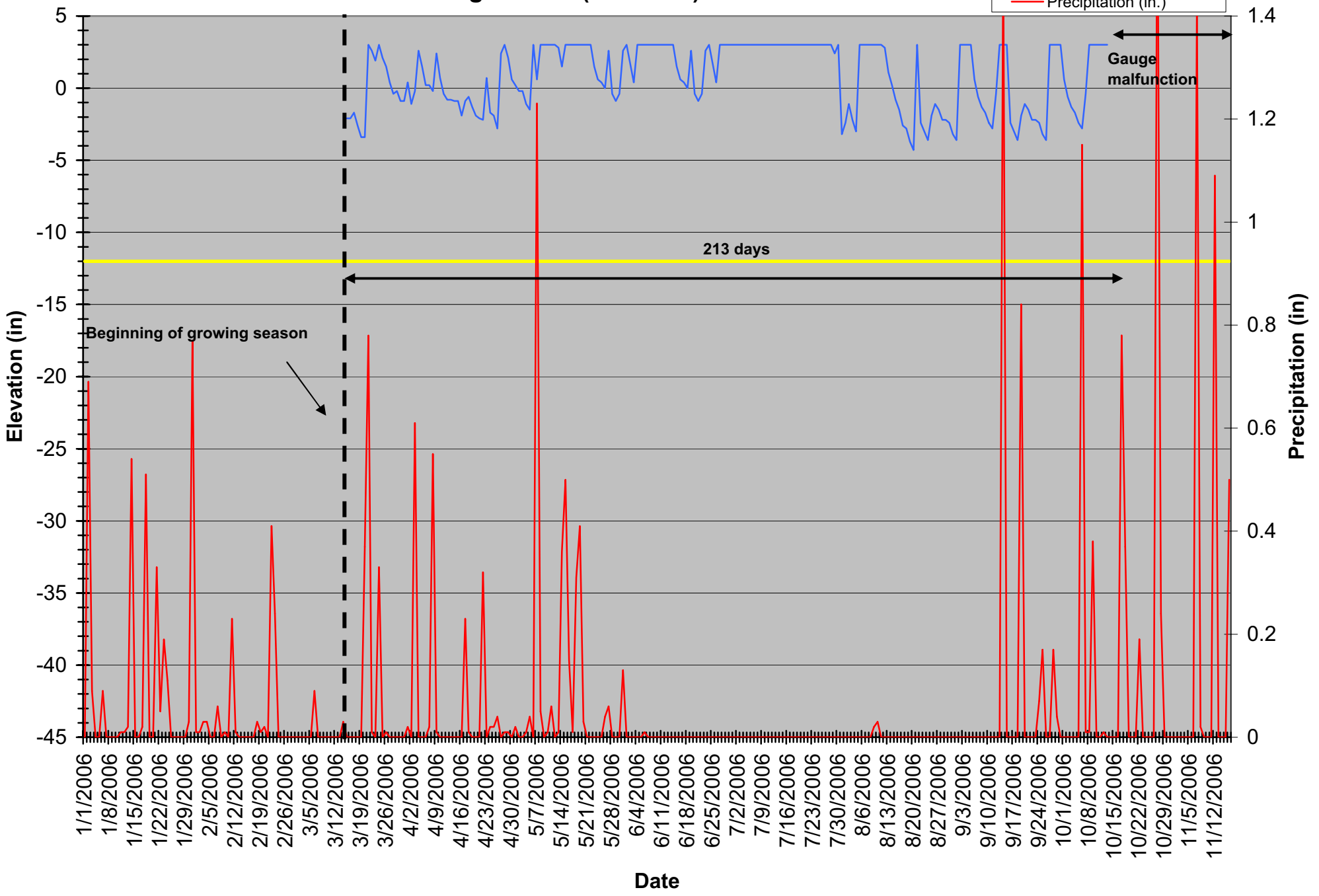
Gauge GW13 (B65150E)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



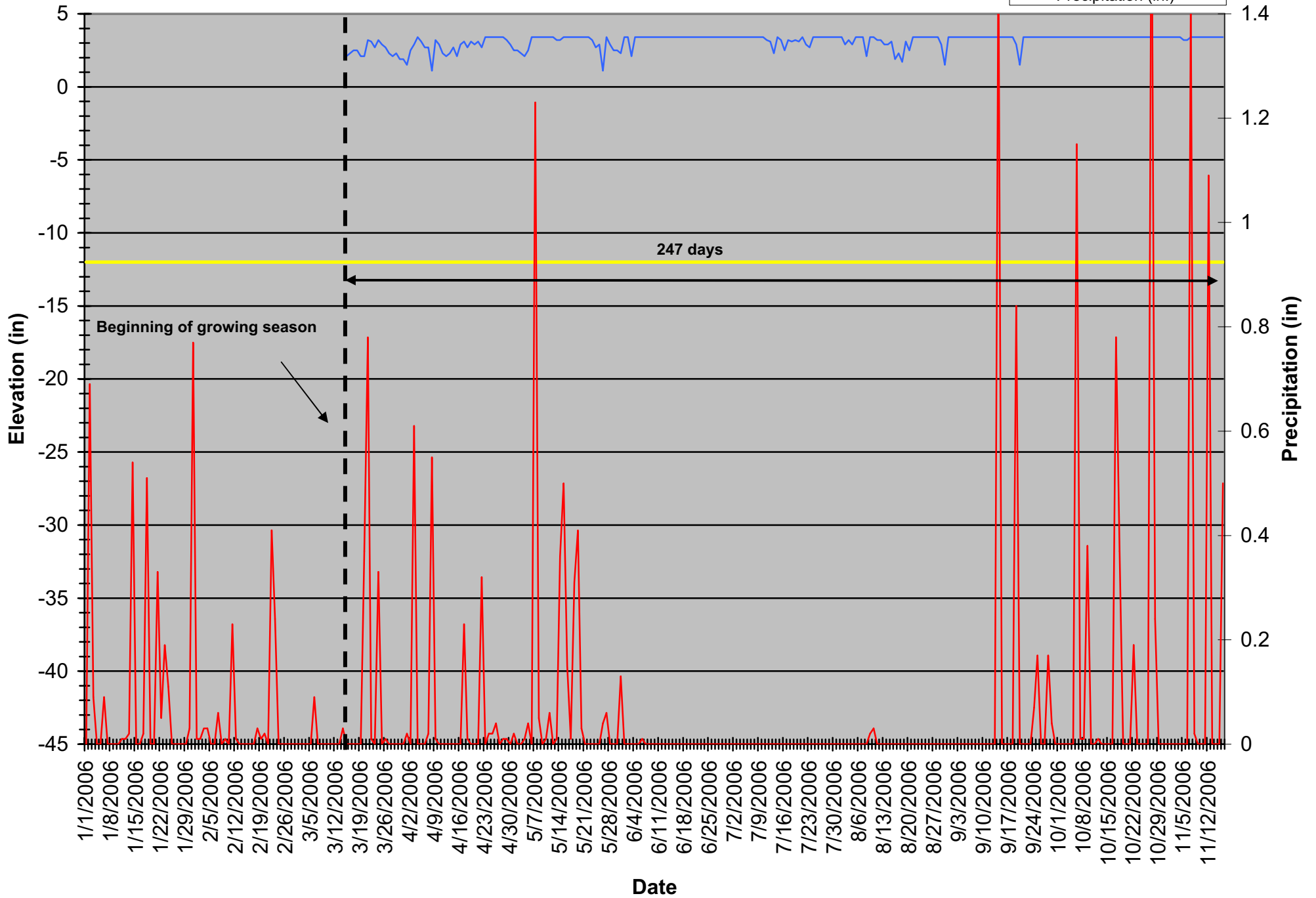
Gauge GW14 (S50448D)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



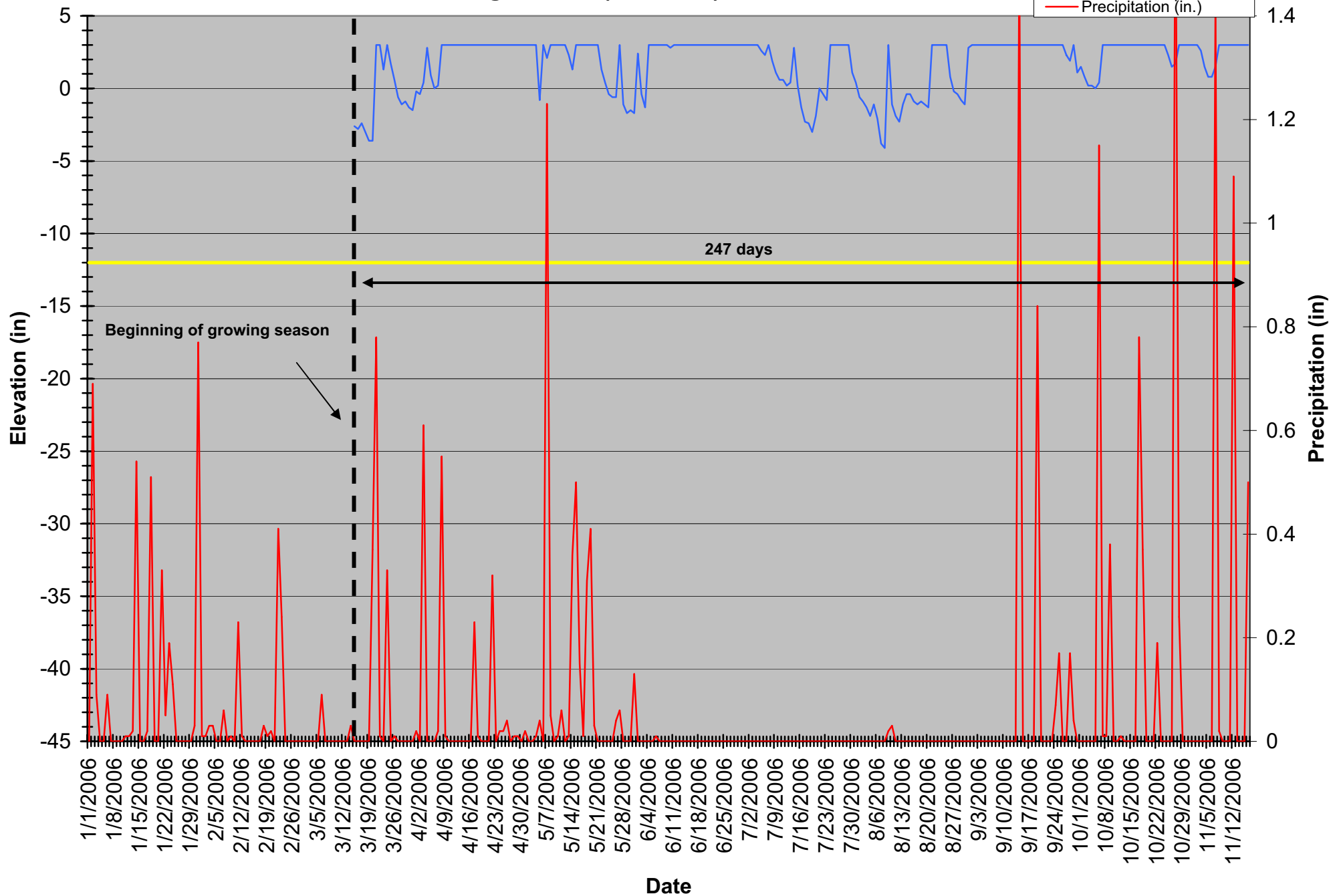
Gauge GW15 (S503E58)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



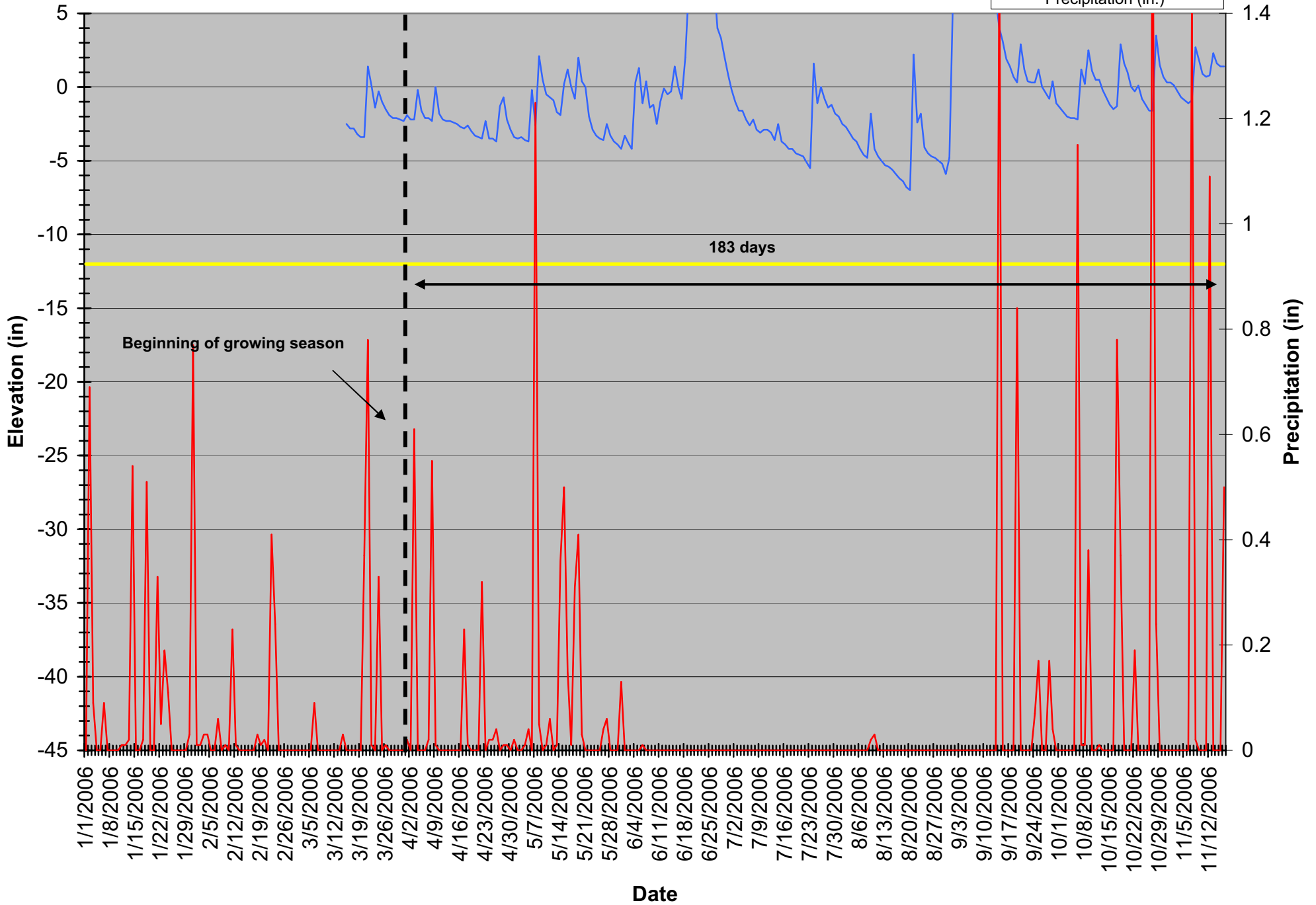
Gauge GW16 (S50457E)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



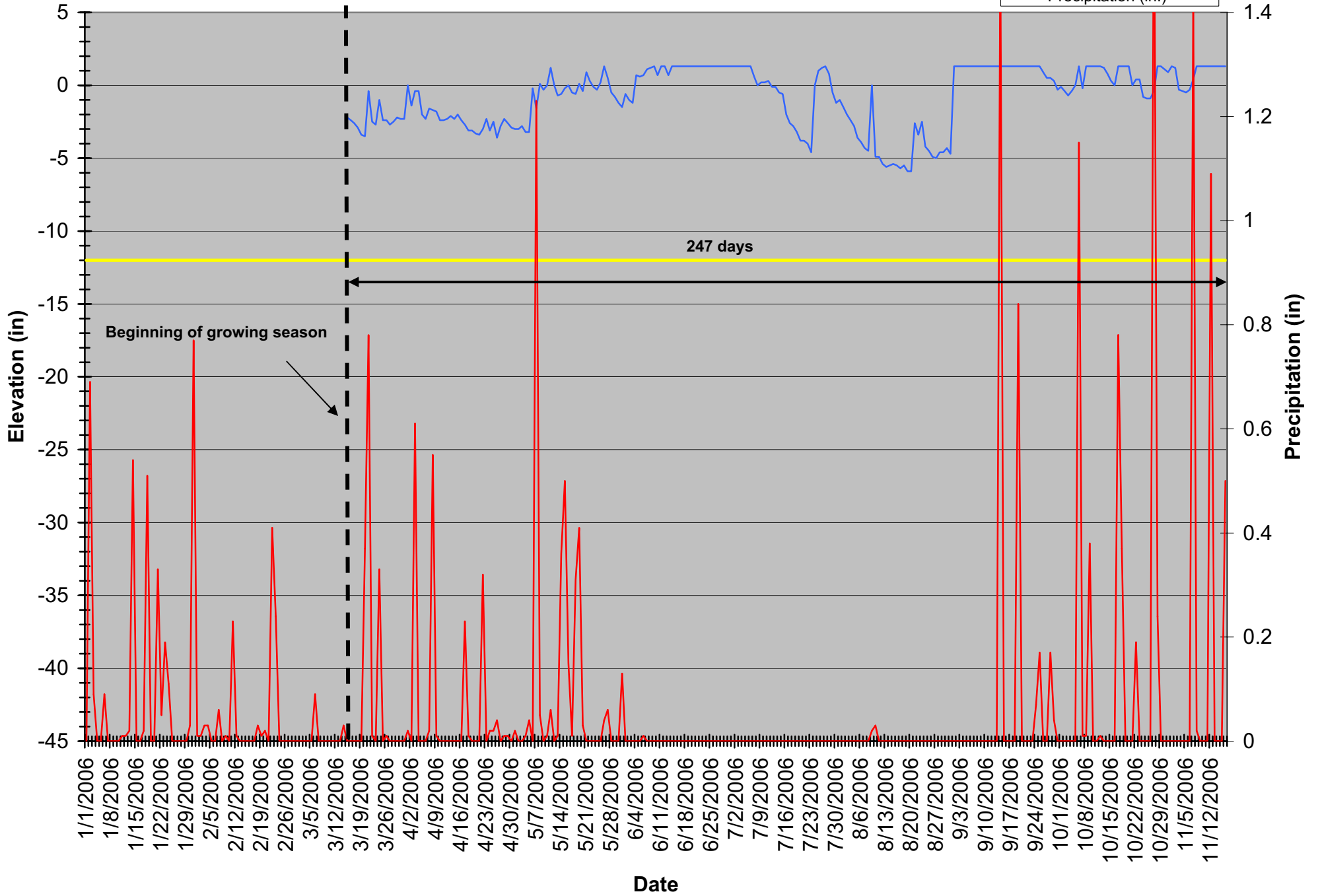
Gauge GW17 (S504321)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



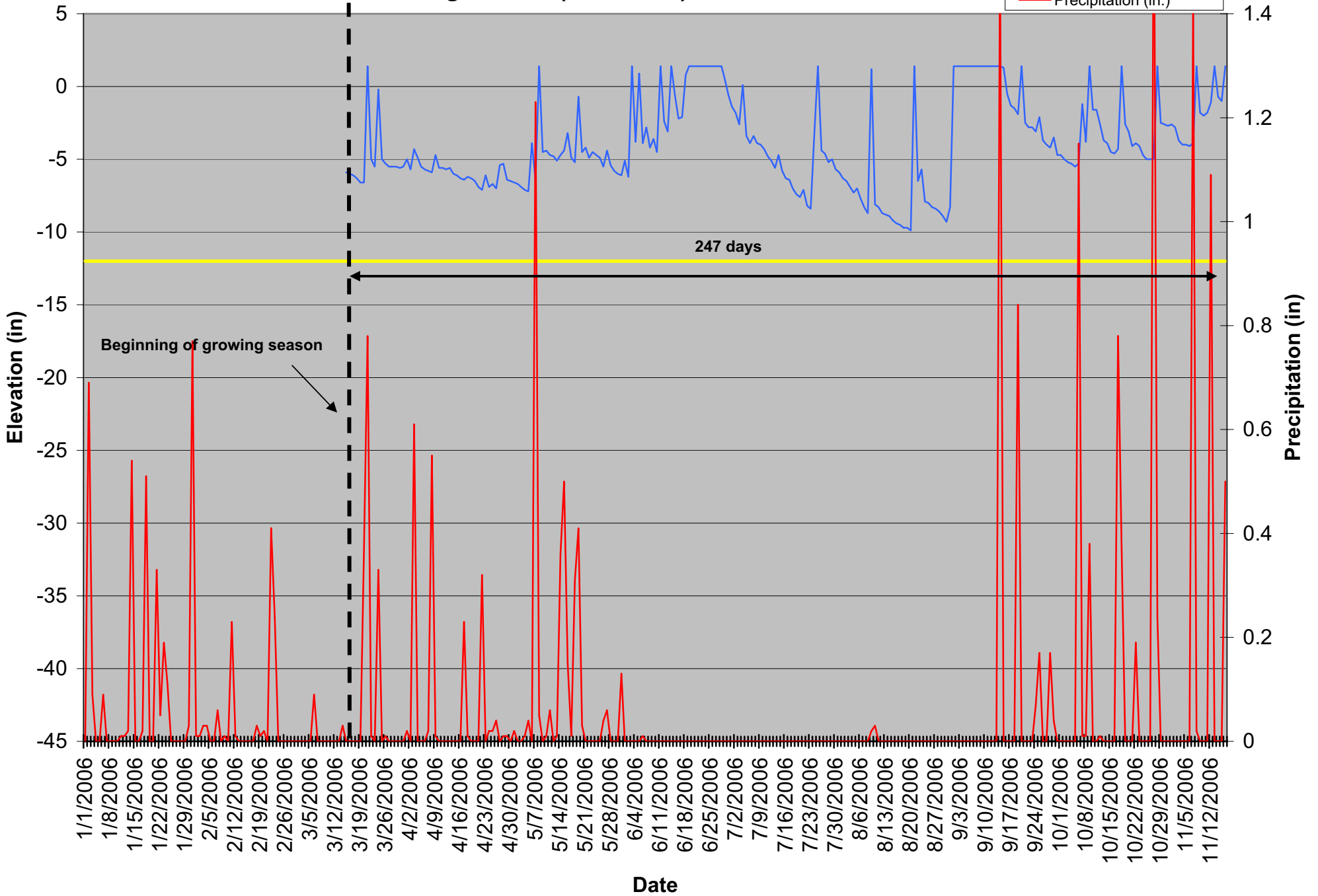
Gauge GW18 (S2EACB5)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



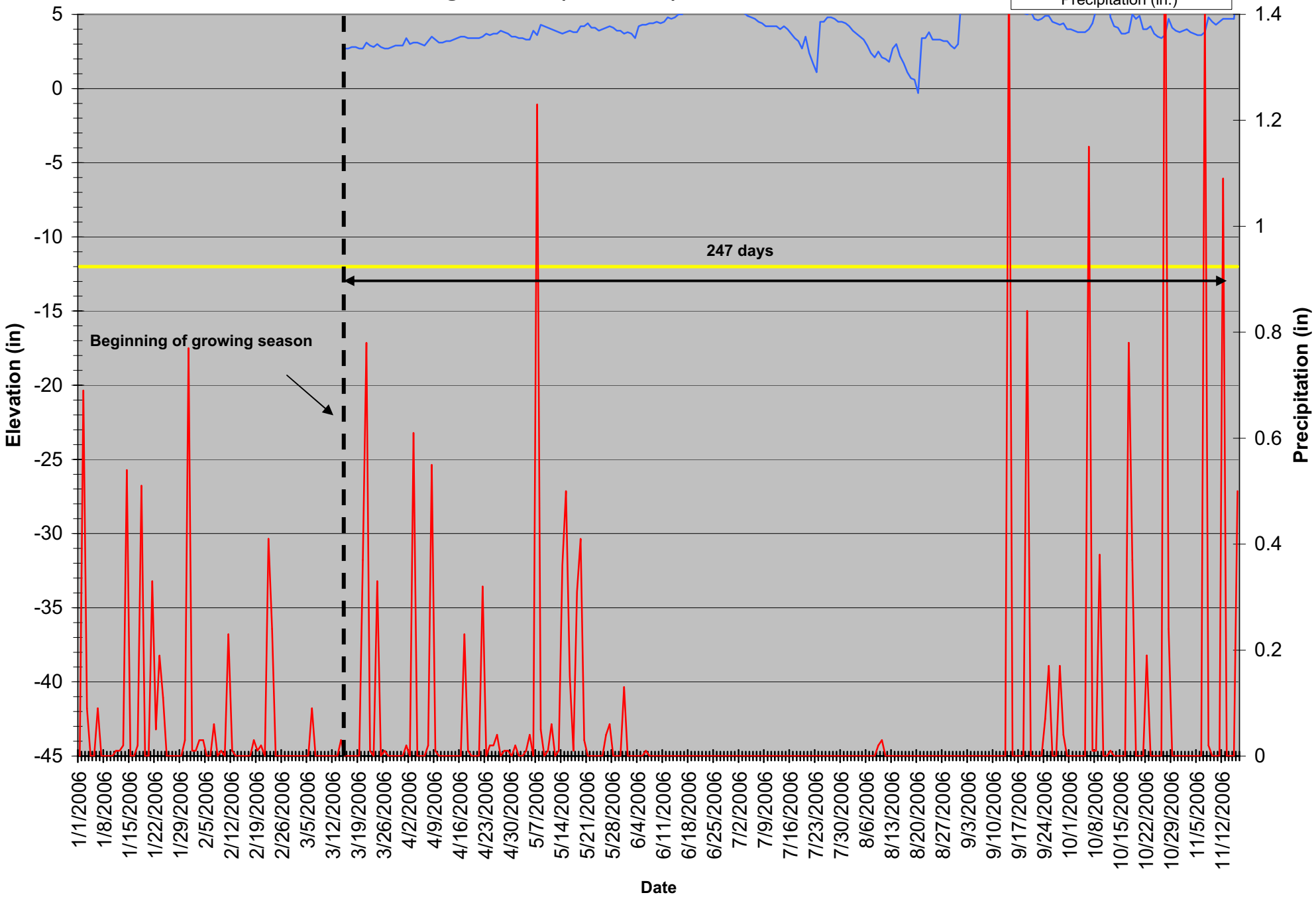
Gauge GW19 (S2EACB7)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



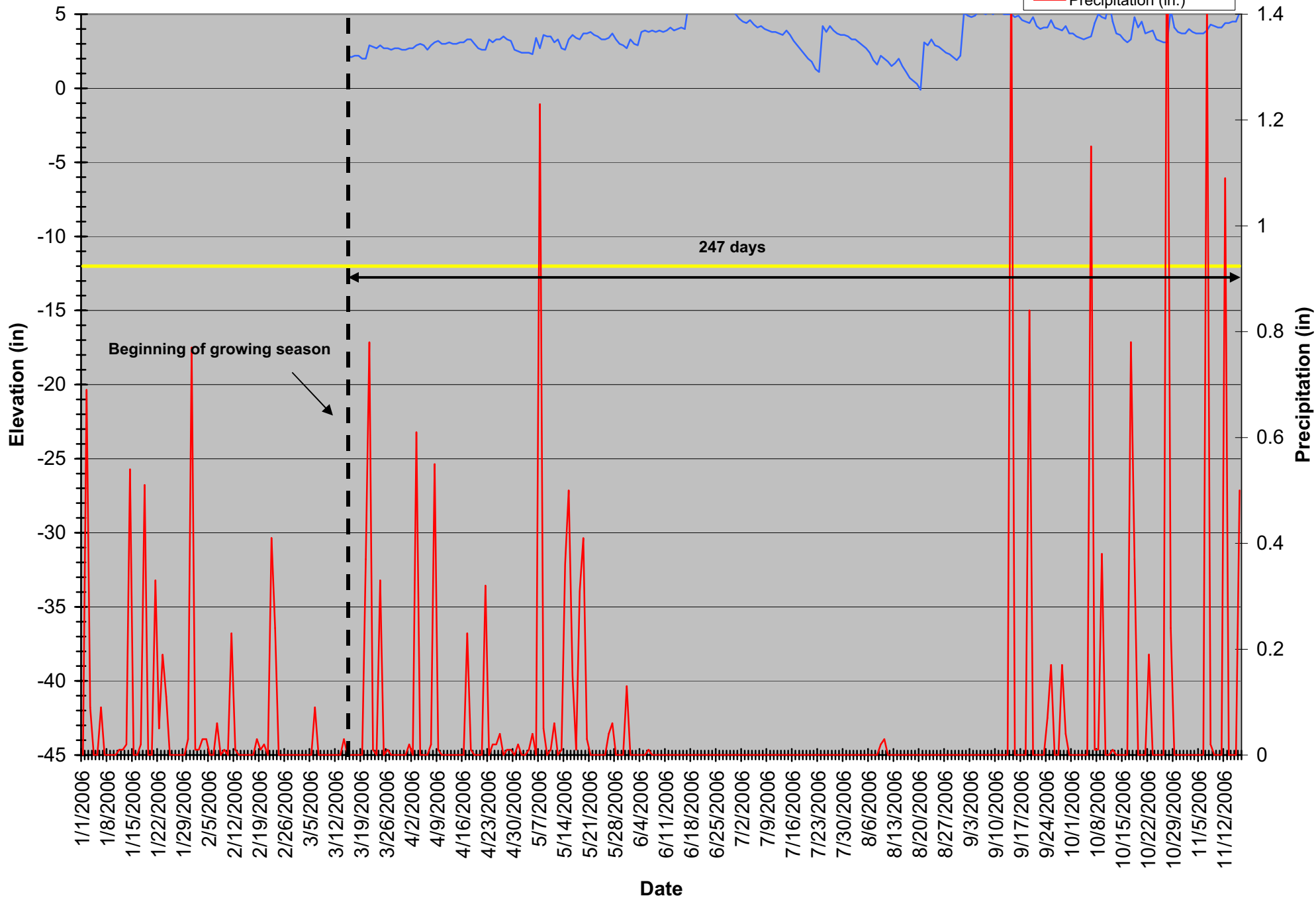
Gauge GW20 (B65246D)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)

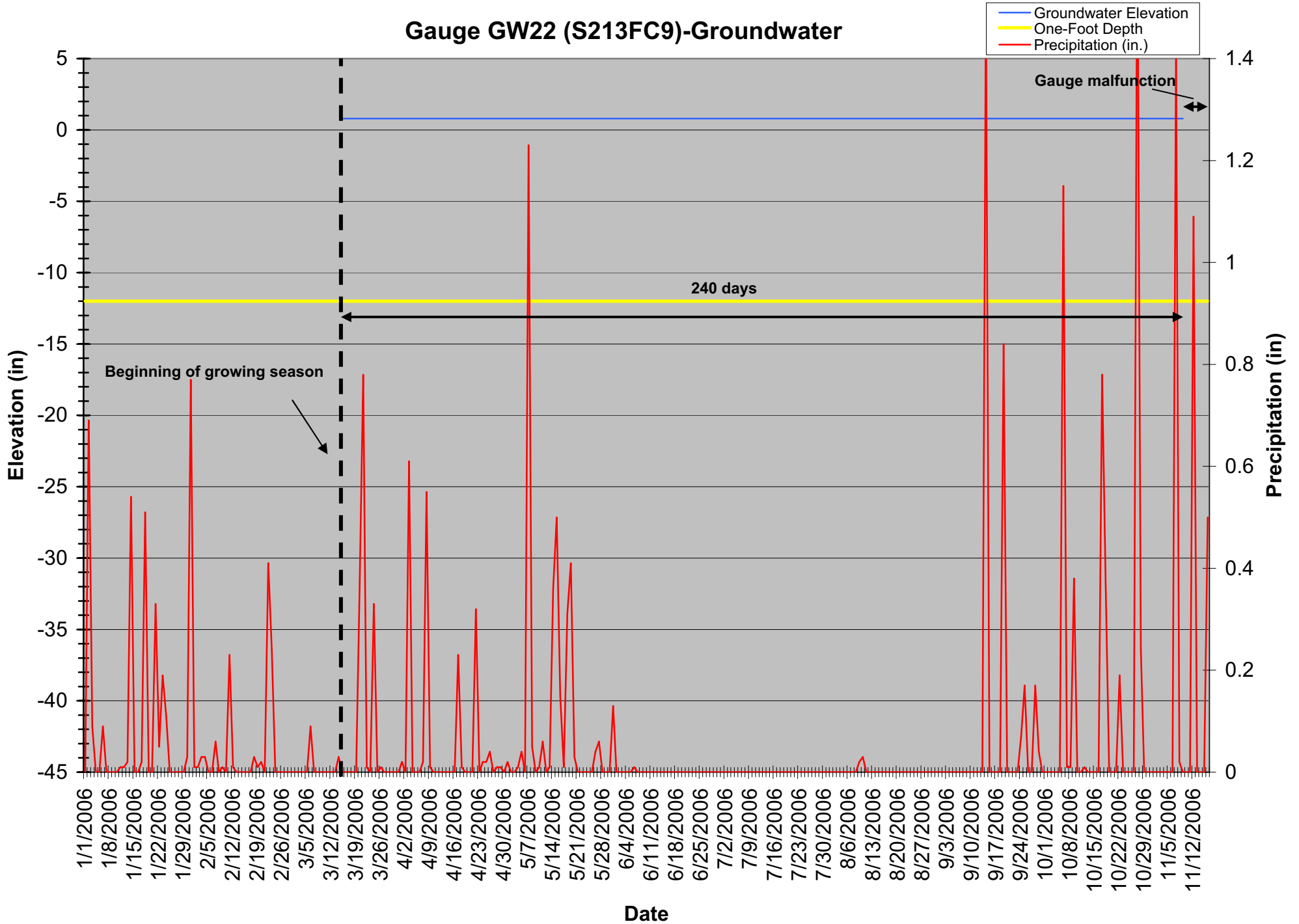


Gauge GW21 (S503FC8)-Groundwater

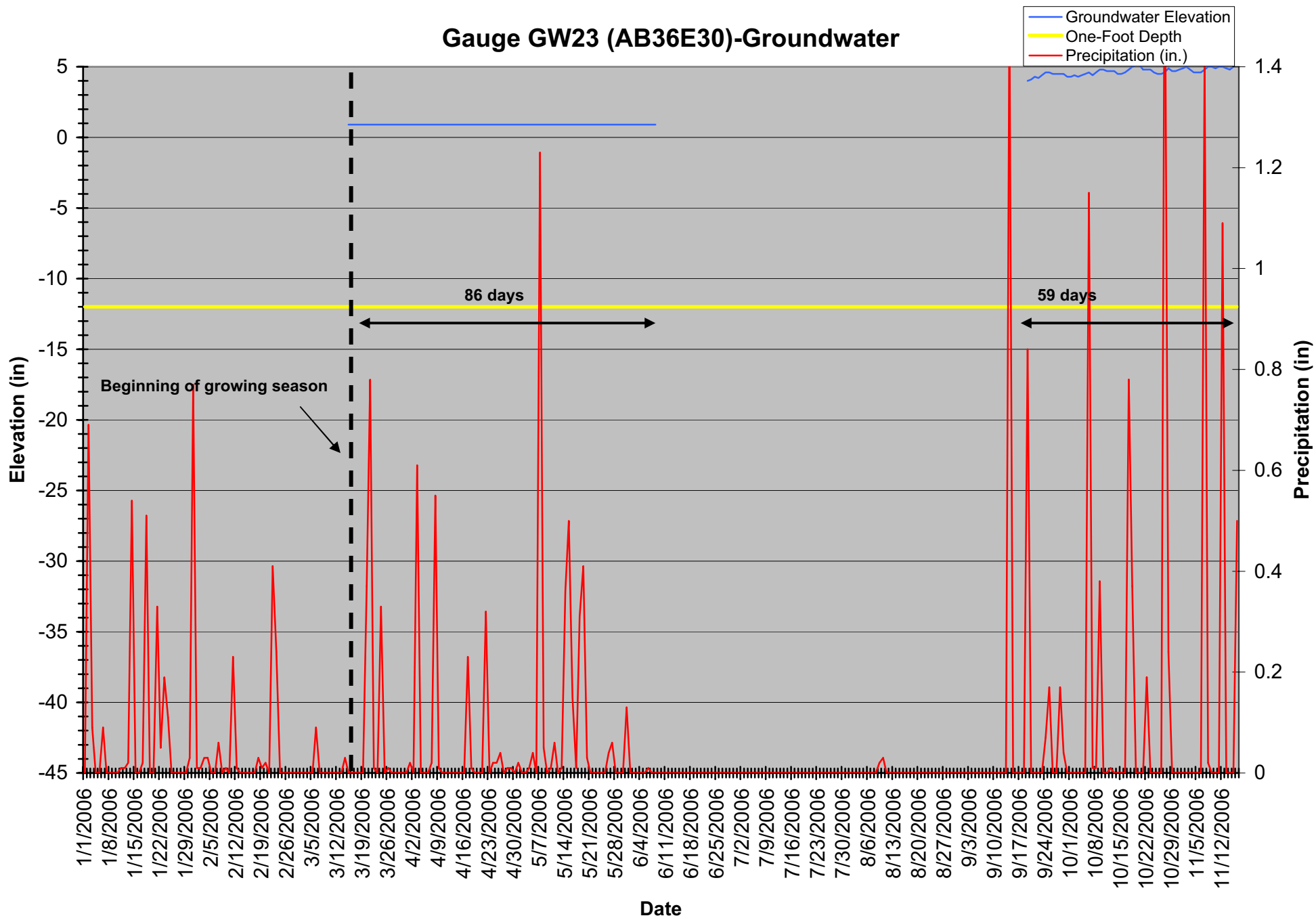
- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



Gauge GW22 (S213FC9)-Groundwater

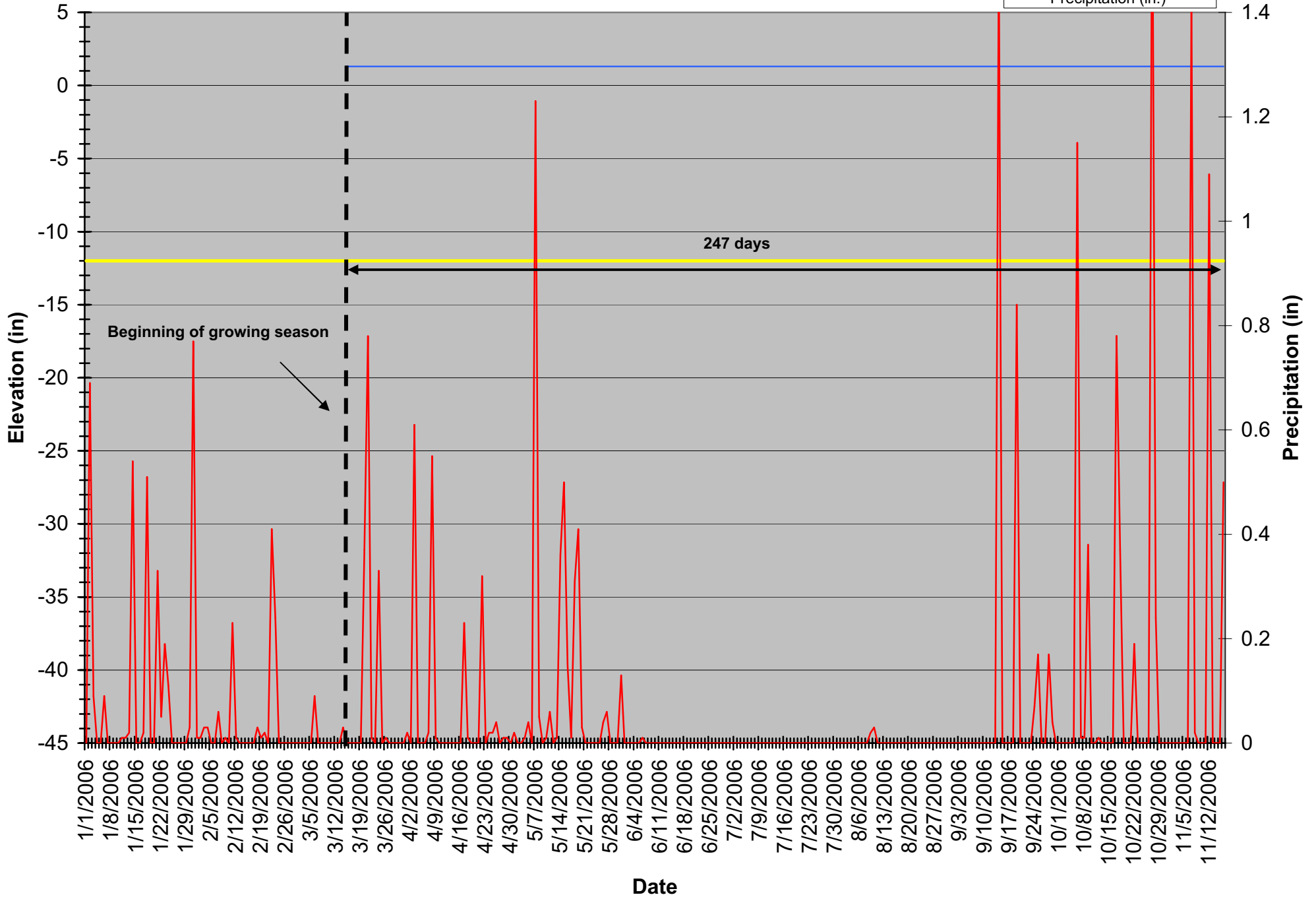


Gauge GW23 (AB36E30)-Groundwater



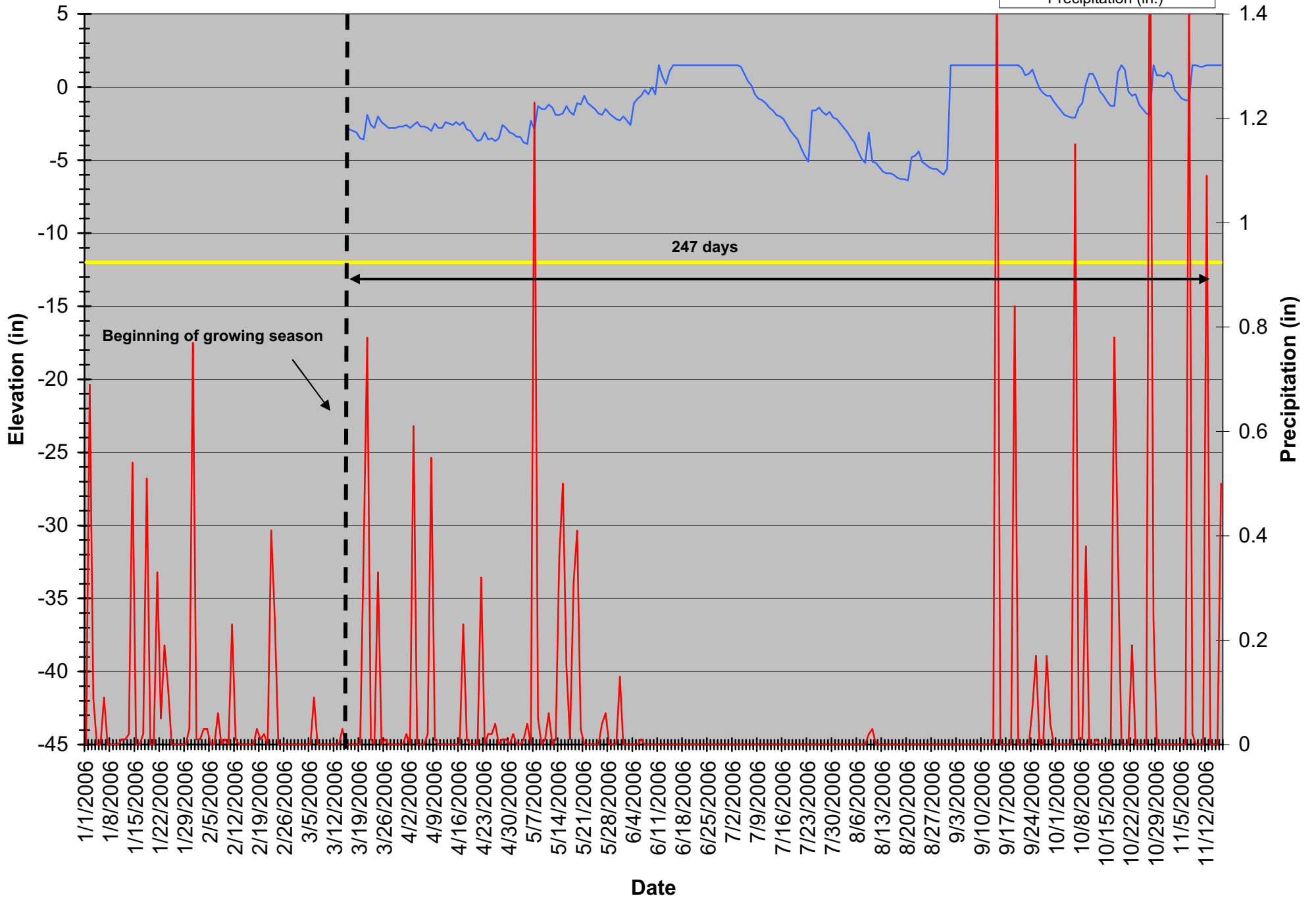
Gauge GW24 (S1EC72B)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



Gauge GW25 (S2EACBE)-Groundwater

- Groundwater Elevation
- One-Foot Depth
- Precipitation (in.)



APPENDIX B
SITE PHOTOS AND PHOTO AND PLOT LOCATIONS
MAP

Grimesland Pit – Phase II



Photo 1



Photo 2



Photo 3

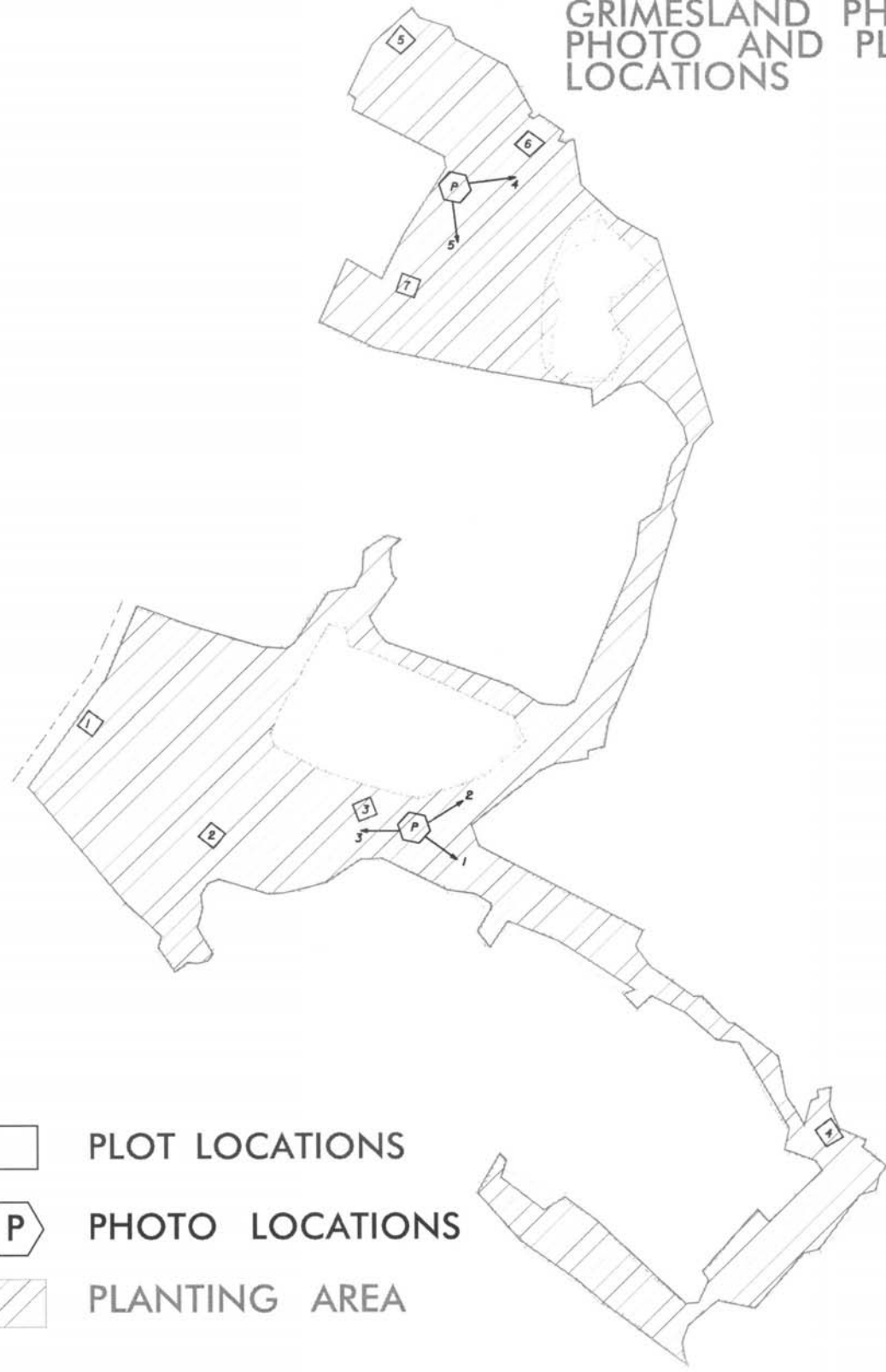


Photo 4



Photo 5

GRIMESLAND PHASE II PHOTO AND PLOT LOCATIONS



-  PLOT LOCATIONS
-  PHOTO LOCATIONS
-  PLANTING AREA