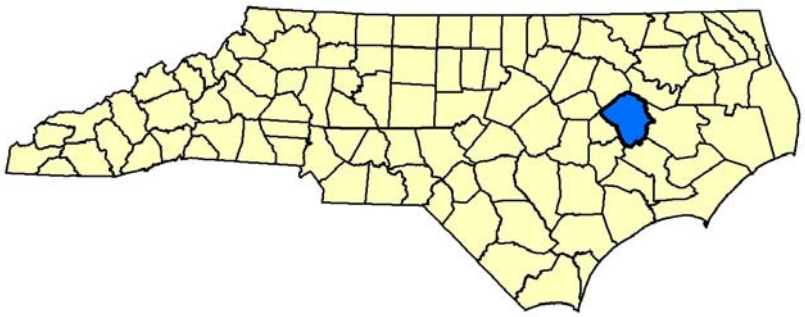
ANNUAL REPORT FOR 2007



Grimesland Sand Pit Phase II Site
Pitt County
Project No. 8.T221801
EEP Project No. 156
TIP No. R-2510WM
Monitoring Year 5 of 5

Ecosystem Enhancement PROGRAM

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February 14, 2008

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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 2007-year represents the fifth 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 2007 demonstrates that the Phase II site met jurisdictional success with nineteen of the twenty groundwater gauges exceeding the 12.5% minimum success criterion, with three gauges meeting 100% during the growing season. Vegetation monitoring yielded 338 trees per acre, which is above the minimum success criteria for the fifth 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 2007-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.)
2007	
March-November	Hydrologic Monitoring (5 yr.)
June	Vegetation Monitoring (5 yr.)

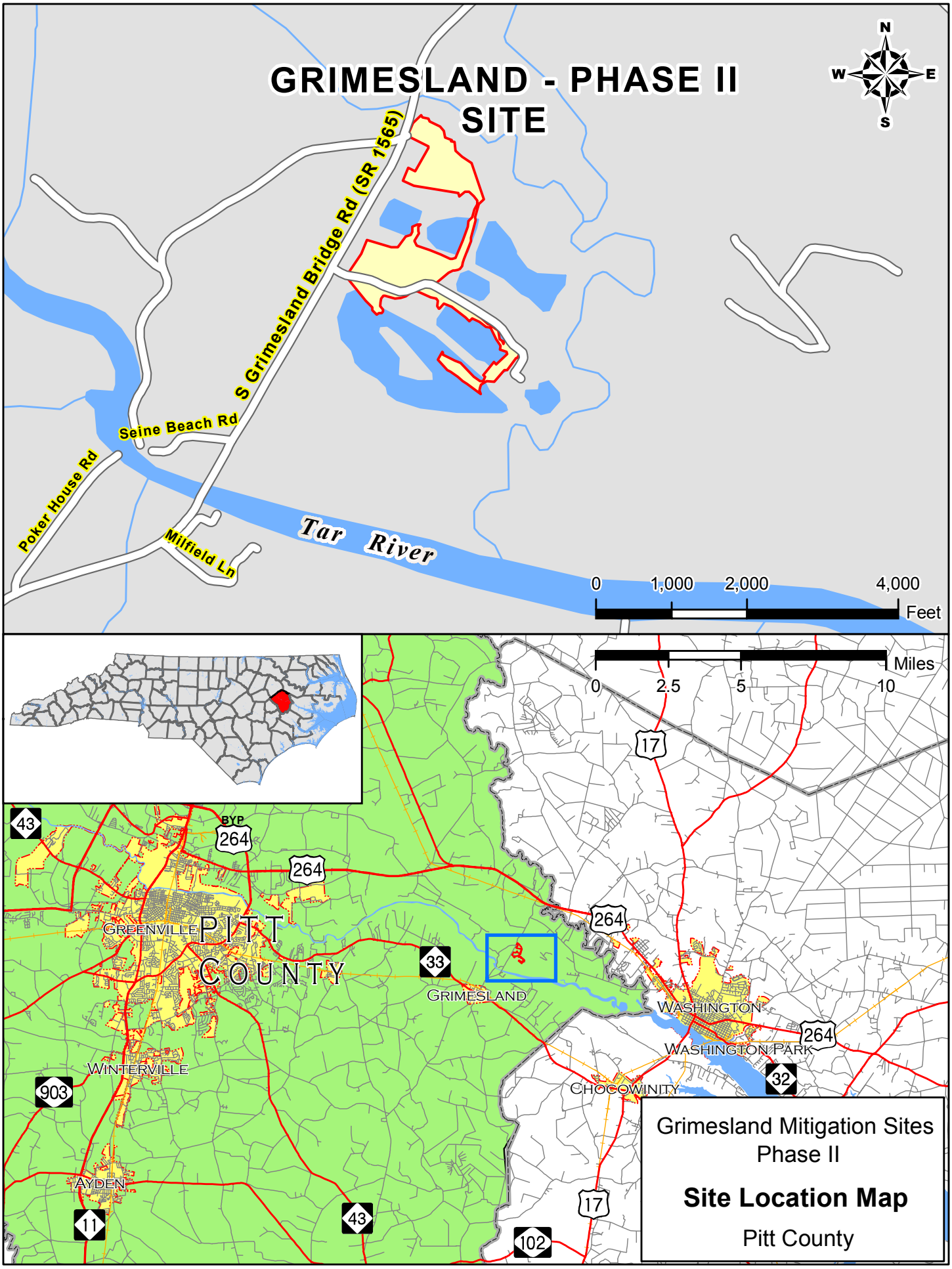

GRIMESLAND - PHASE II SITE
N
W
E
S
S Grimesland Bridge Rd (SR 1565)
Seine Beach Rd
Poker House Rd
Milfield Ln
Tar River
0
1,000
2,000
4,000
Feet
Miles
0
2.5
5
10
17
43
BYP
264
264
264
264
GREENVILLE
PITT
COUNTY
33
GRIMESLAND
WASHINGTON
WASHINGTON PARK
CHOCOWINITY
32
WINTERVILLE
903
AYDEN
11
43
17
102
Grimesland Mitigation Sites
Phase II
Site Location Map
Pitt County

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^{o} 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 2007 data represents the fifth 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 2007; 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.

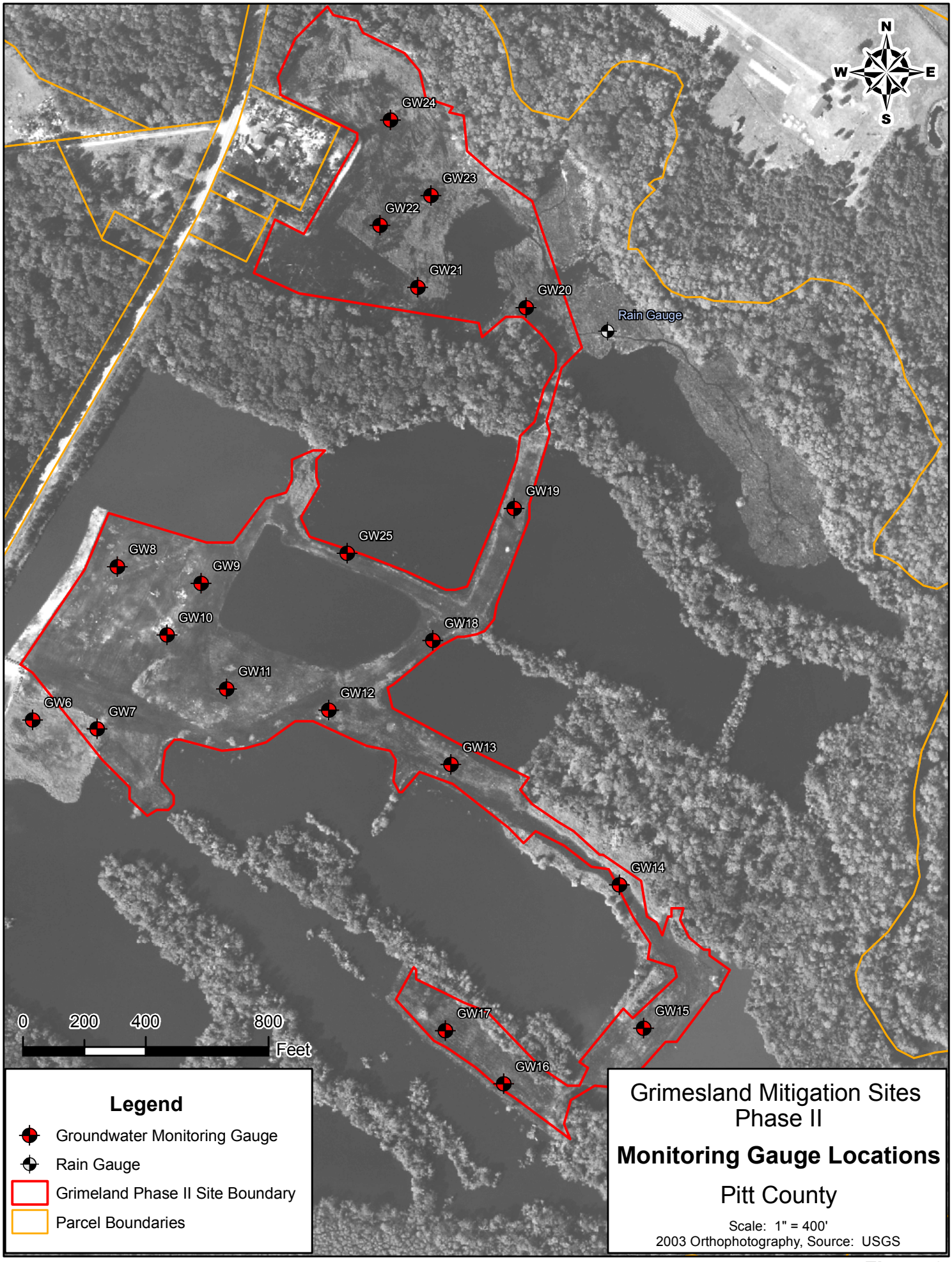

N
W
E
S
GW24
GW23
GW22
GW21
GW20
Rain Gauge
GW19
GW25
GW8
GW9
GW10
GW18
GW11
GW12
GW6
GW7
GW13
GW14
GW17
GW15
GW16
0
200
400
800
Feet
Legend
Groundwater Monitoring Gauge
Rain Gauge
Grimeland Phase II Site Boundary
Parcel Boundaries
Grimesland Mitigation Sites
Phase II
Monitoring Gauge Locations
Pitt County
Scale: 1" = 400'
2003 Orthophotography, Source: USGS

Figure 2

Table 1. 2007 Phase II Hydrologic Monitoring Results

Monitoring Gauge	< 5%	5 – 8%	8 – 12%	> 12.5%	Actual %	Success Dates
GSP-GW6			x		8.9	March 15-April 5
GSP-GW7				x	28.3	March 15-May 23
GSP-GW8				x	42.5	March 15-June 27
GSP-GW9				x	67.6	March 15-August 28
GSP-GW10				x	54.3	March 15-July 26
GSP-GW11				x	31.6	March 15-May 31
GSP-GW12				x	100	March 15-November 16
GSP-GW13				x	99.6	March 15-November 15
GSP-GW14				x	76.9	March 24-July 15 September 1-November 15
GSP-GW15				x	100	March 15-November 16
GSP-GW16				x	96.4	March 24-November 16
GSP-GW17				x	99.6	March 15-November 15
GSP-GW18				x	71.7	March 15-September 7
GSP-GW19				x	64.0	March 15-August 19
GSP-GW20				x	100	March 15-November 16
GSP-GW21				x	80.2	March 15-August 29 September 14-October 23
GSP-GW22				x	78.1	March 24-August 30 September 15-October 17
GSP-GW23				x	83.8	March 15-August 29 September 14-October 23
GSP-GW24				x	65.6	March 24-September 1
GSP-GW25				x	69.6	March 15-September 2

Appendix A contains plots of the groundwater depth at each monitoring gauge location during 2007. 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.

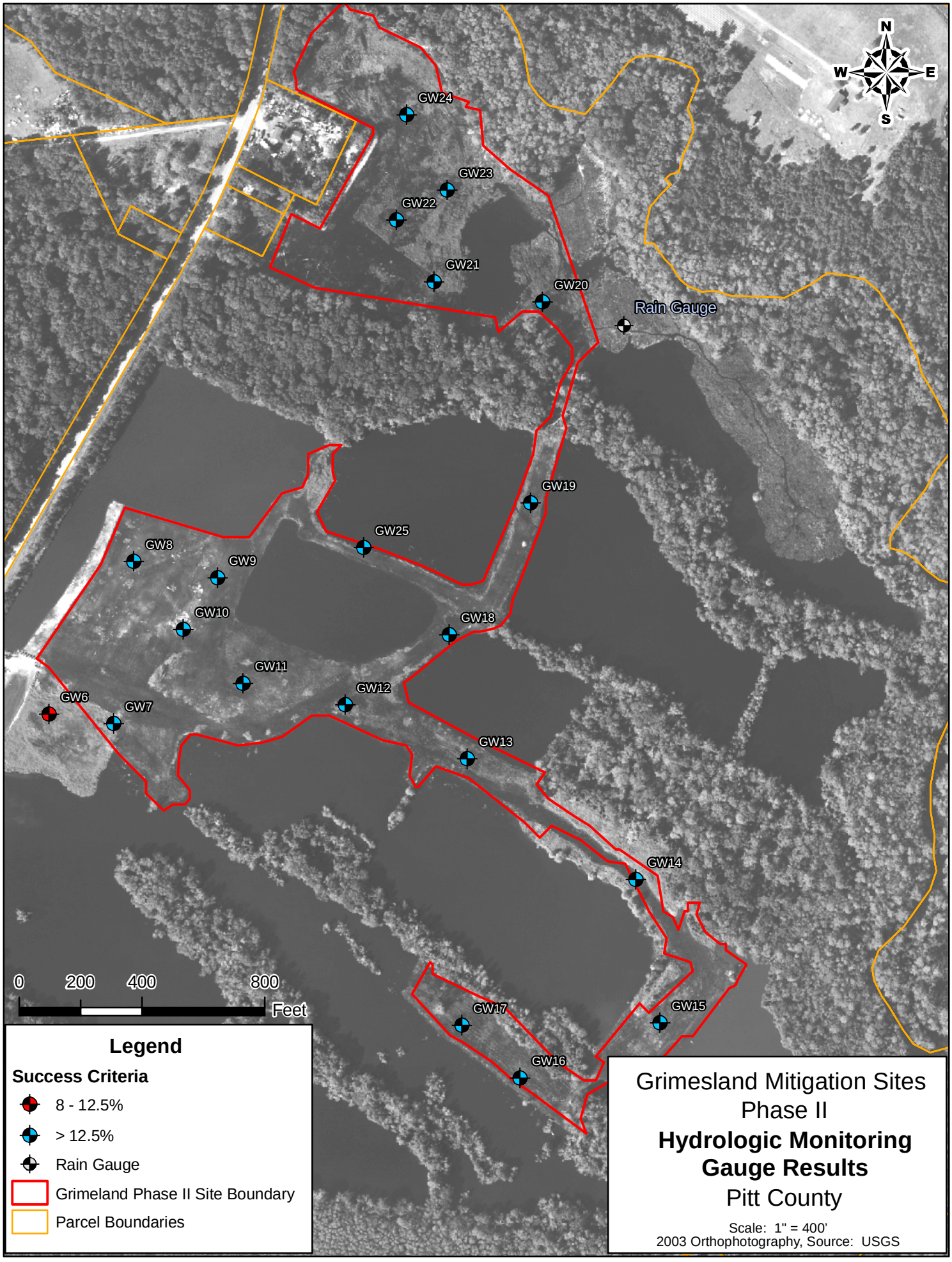

N
W
E
S
GW24
GW23
GW22
GW21
GW20
Rain Gauge
GW19
GW25
GW8
GW9
GW10
GW18
GW11
GW12
GW6
GW7
GW13
GW14
GW17
GW15
GW16
0
200
400
800
Feet
Legend
Success Criteria
8 - 12.5%
> 12.5%
Rain Gauge
Grimeland Phase II Site Boundary
Parcel Boundaries
Grimesland Mitigation Sites
Phase II
Hydrologic Monitoring Gauge Results
Pitt County
Scale: 1" = 400'
2003 Orthophotography, Source: USGS

Figure 3

2.3.2 Climatic Data

Figure 4 is a graph of monthly rainfall for the period of November 2006 through November 15th 2007 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 2007 rainfall versus historical values gives an indication of how 2007 compares to historical climate conditions.

For the 2007 monitoring year, January, May, July, and October experienced average rainfall. The months of February, March, June, August, and September recorded below average rainfall while April recorded above average rainfall.

2.4 CONCLUSIONS

The 2007-year concludes the fifth complete year of hydrology monitoring at the Grimesland Phase II Site. The 2007 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 2007 rainfall versus historical precipitation shows that 2007 experienced average rainfall conditions.

Grimesland II 30-70 Percentile Graph
Washington, NC

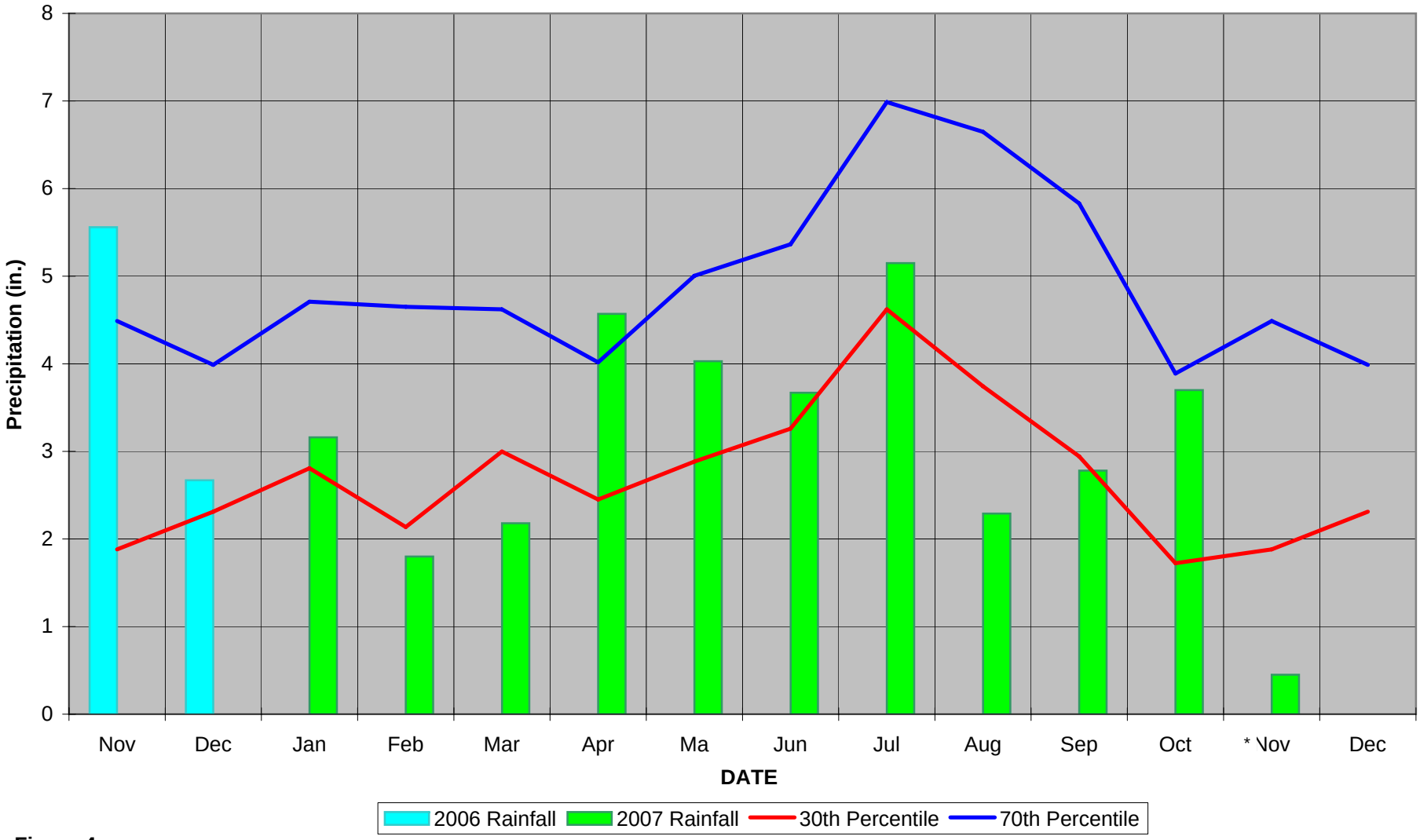


Figure 4

*Data for Nov 2007 is up to Nov 15th.

3.0 VEGETATION (YEAR 5 MONITORING)

3.1 SUCCESS CRITERIA

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

3.2 DESCRIPTION OF SPECIES

Using “Flora of the Carolinas, Virginia, Georgia, and surrounding areas” by: Alan S. Weakley as the taxonomic standard, 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 5)	Total (at planting)	Density (Trees/Acre)
1	2	6		10	2	10	1	31	50	421
2	4	4				1		9	31	197
3	3	1	2	4		1		11	31	241
4	11		6					17	22	525
5	22	5	3			3		33	45	498
6	3	9						12	26	313
7	1	6	3					10	40	170
	AVERAGE TREE DENSITY									**338**

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. Based upon the DOT Stem Counting Protocol, 2007 vegetation monitoring revealed an average tree density of 338 trees per acre in Phase II. This average is above the minimum success criteria after the fifth year of monitoring.

The 2007 monitoring year completes the vegetation monitoring required for the Grimesland Sand Pit Phase II Mitigation Site.

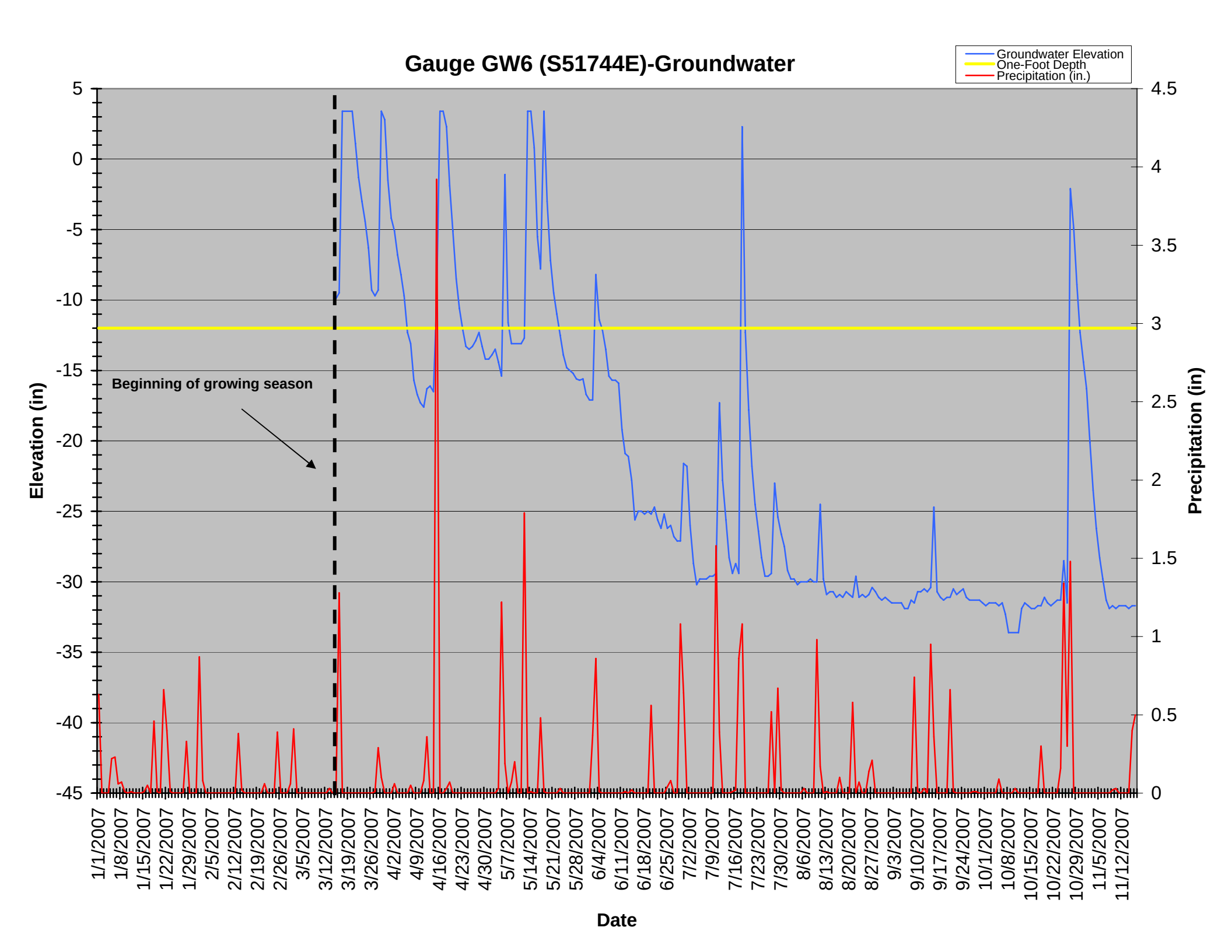
4.0 OVERALL CONCLUSIONS/ RECOMMENDATIONS

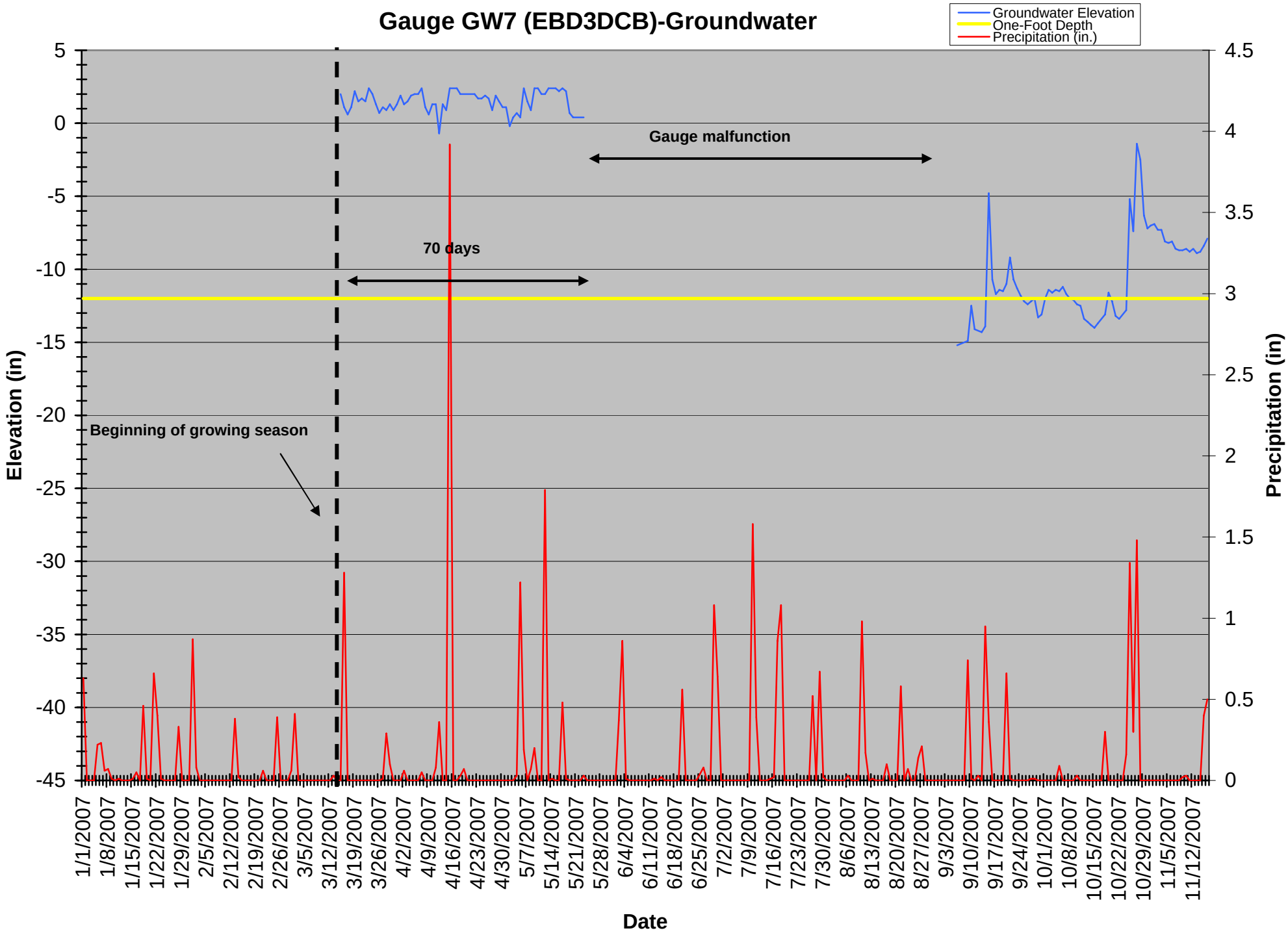
The Grimesland Sand Pit Phase II Mitigation Site was monitored for the fifth year in 2007. Nineteen groundwater-monitoring gauges indicated jurisdictional success for at least 12.5% of the 2006-monitoring year, with three gauges meeting success 100% of the growing season. An analysis of rainfall in nearby 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 five years following planting is 260 trees per acre. Monitoring results showed an average survival rate of 338 trees per acre in the fifth monitoring year. Therefore, the vegetation exceeds the minimum success criteria.

Hydrologic and vegetative monitoring has been completed for the Grimesland Sand Pit Phase II Mitigation Site and met the minimum success criteria. It is recommended that appropriate site close out documentation be prepared in 2008.

APPENDIX A
DEPTH TO GROUNDWATER CHARTS


Gauge GW6 (S51744E)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/1/2007
1/8/2007
1/15/2007
1/22/2007
1/29/2007
2/5/2007
2/12/2007
2/19/2007
2/26/2007
3/5/2007
3/12/2007
3/19/2007
3/26/2007
4/2/2007
4/9/2007
4/16/2007
4/23/2007
4/30/2007
5/7/2007
5/14/2007
5/21/2007
5/28/2007
6/4/2007
6/11/2007
6/18/2007
6/25/2007
7/2/2007
7/9/2007
7/16/2007
7/23/2007
7/30/2007
8/6/2007
8/13/2007
8/20/2007
8/27/2007
9/3/2007
9/10/2007
9/17/2007
9/24/2007
10/1/2007
10/8/2007
10/15/2007
10/22/2007
10/29/2007
11/5/2007
11/12/2007


Gauge GW7 (EBD3DCB)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
Gauge malfunction
70 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/1/2007
1/8/2007
1/15/2007
1/22/2007
1/29/2007
2/5/2007
2/12/2007
2/19/2007
2/26/2007
3/5/2007
3/12/2007
3/19/2007
3/26/2007
4/2/2007
4/9/2007
4/16/2007
4/23/2007
4/30/2007
5/7/2007
5/14/2007
5/21/2007
5/28/2007
6/4/2007
6/11/2007
6/18/2007
6/25/2007
7/2/2007
7/9/2007
7/16/2007
7/23/2007
7/30/2007
8/6/2007
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8/27/2007
9/3/2007
9/10/2007
9/17/2007
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10/1/2007
10/8/2007
10/15/2007
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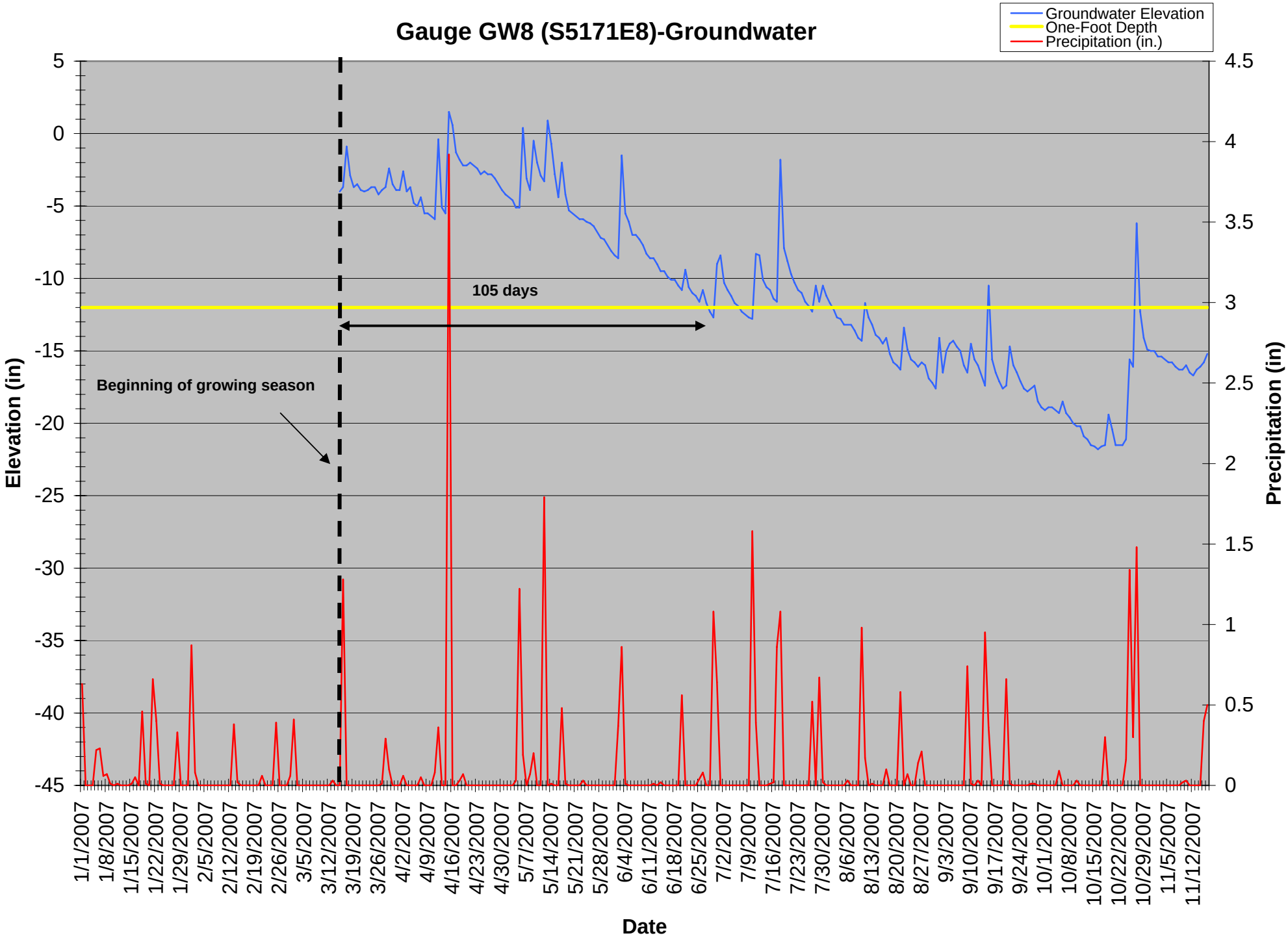
11/5/2007
11/12/2007


Gauge GW8 (S5171E8)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
105 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/1/2007
1/8/2007
1/15/2007
1/22/2007
1/29/2007
2/5/2007
2/12/2007
2/19/2007
2/26/2007
3/5/2007
3/12/2007
3/19/2007
3/26/2007
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6/11/2007
6/18/2007
6/25/2007
7/2/2007
7/9/2007
7/16/2007
7/23/2007
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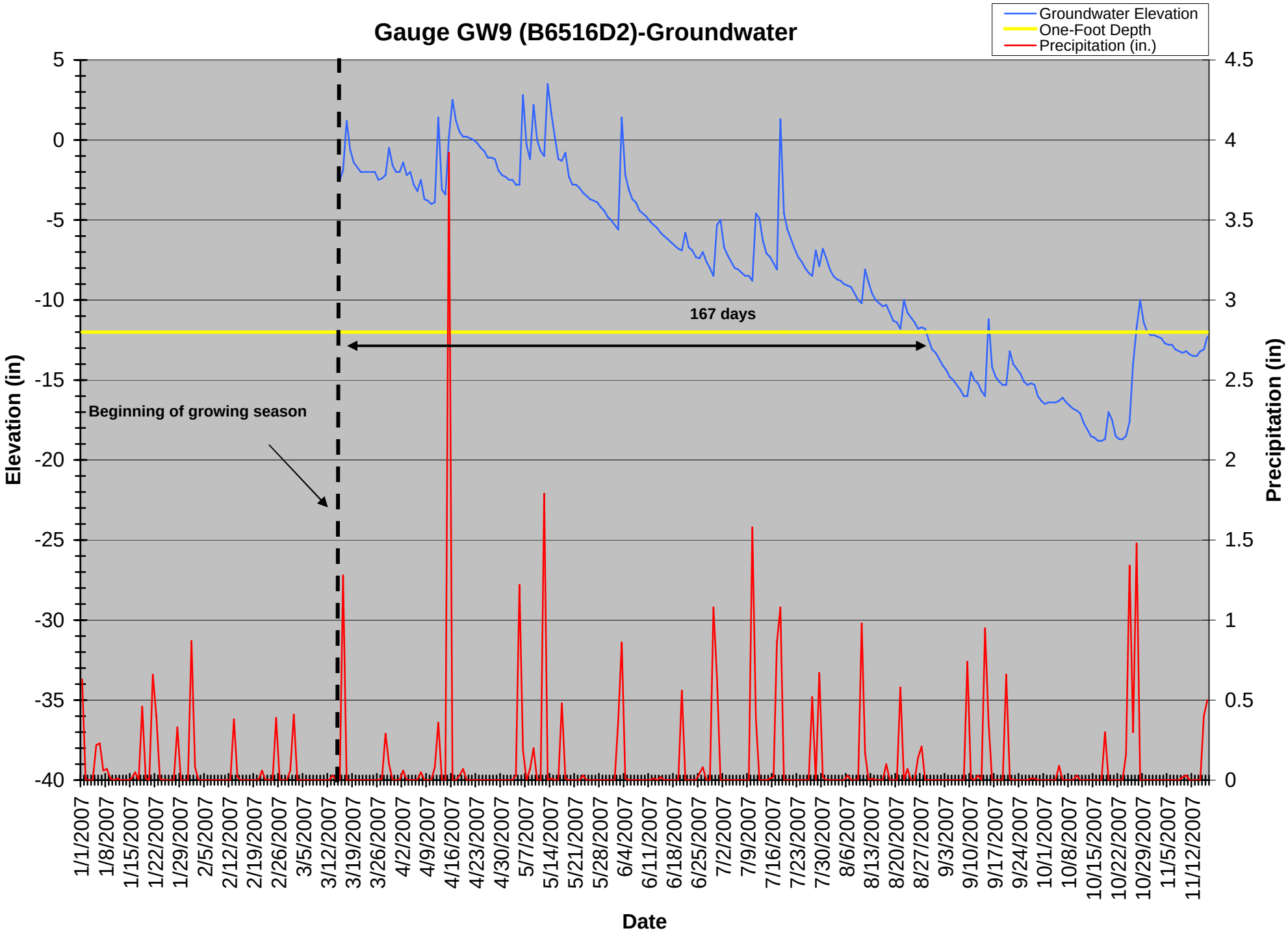
11/12/2007


Gauge GW9 (B6516D2)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
167 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
5
0
-5
-10
-15
-20
-25
-30
-35
-40
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1/1/2007
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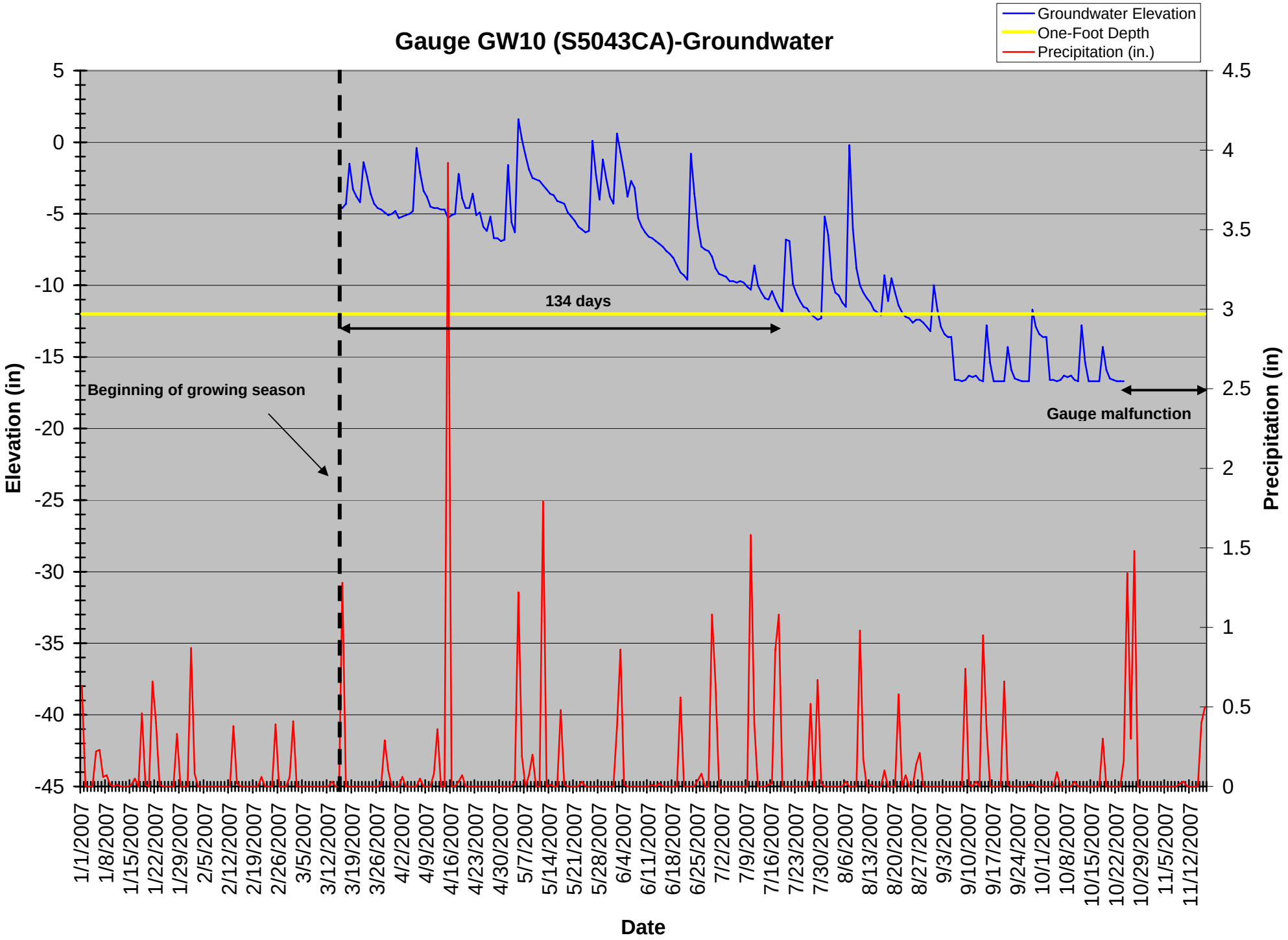
11/5/2007
11/12/2007


Gauge GW10 (S5043CA)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
134 days
Beginning of growing season
Gauge malfunction
Elevation (in)
Precipitation (in)
Date
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
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4
3.5
3
2.5
2
1.5
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0.5
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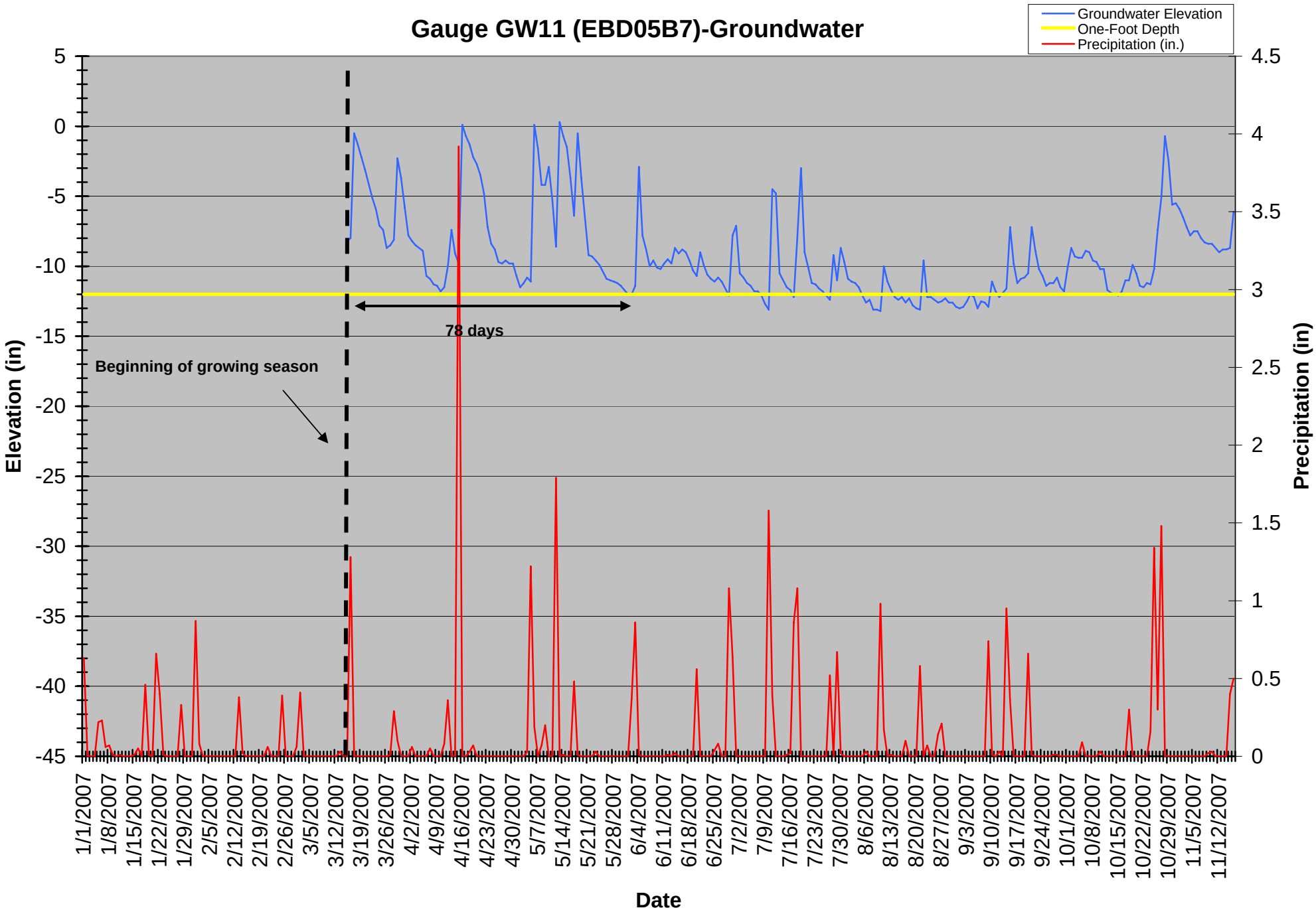
Gauge GW11 (EBD05B7)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
Elevation (in)
Precipitation (in)
Date
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Beginning of growing season
5
0
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-10
-15
-20
-25
-30
-35
-40
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4.5
4
3.5
3
2.5
2
1.5
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2/26/2007
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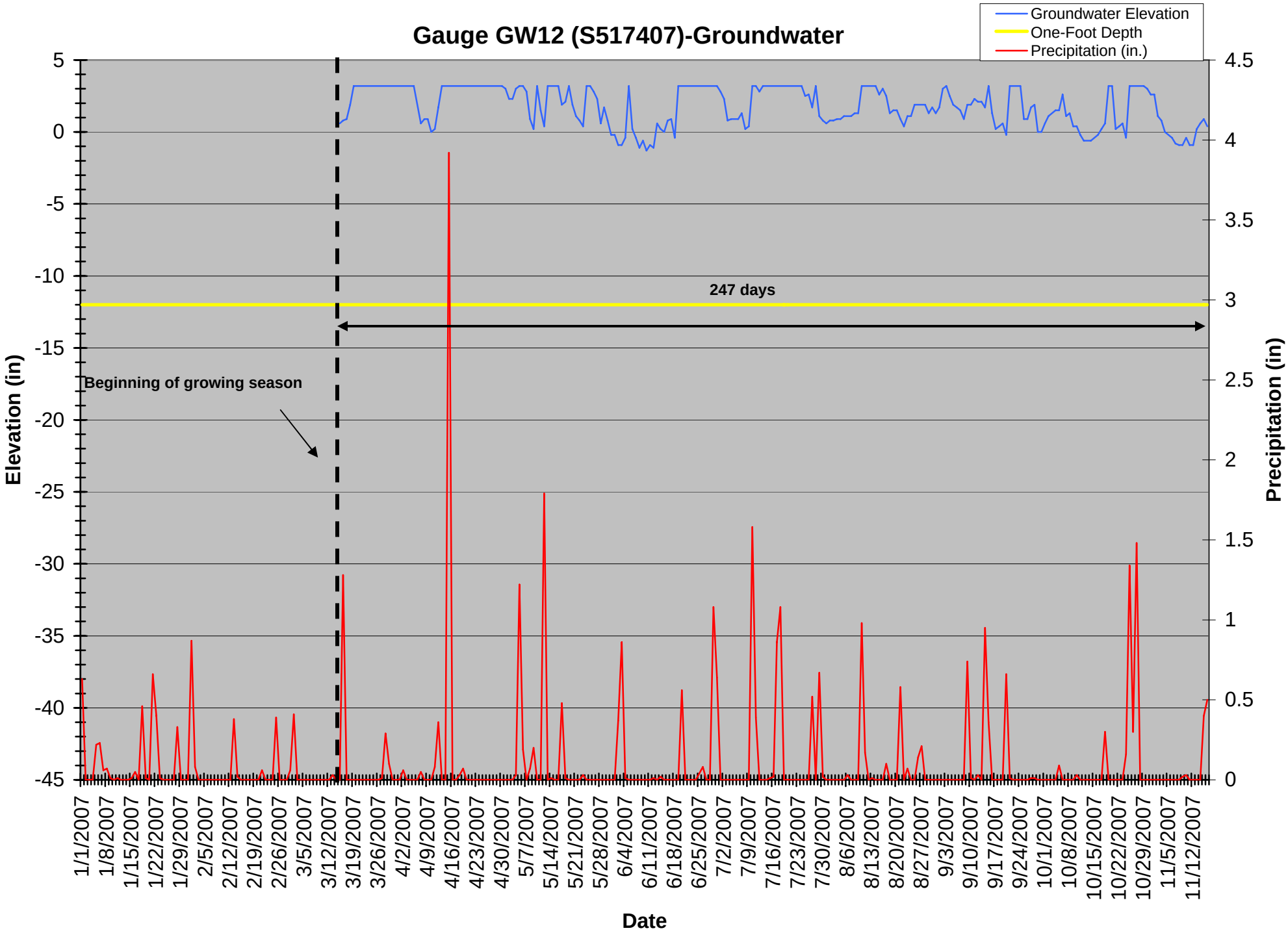
Gauge GW12 (S517407)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
247 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
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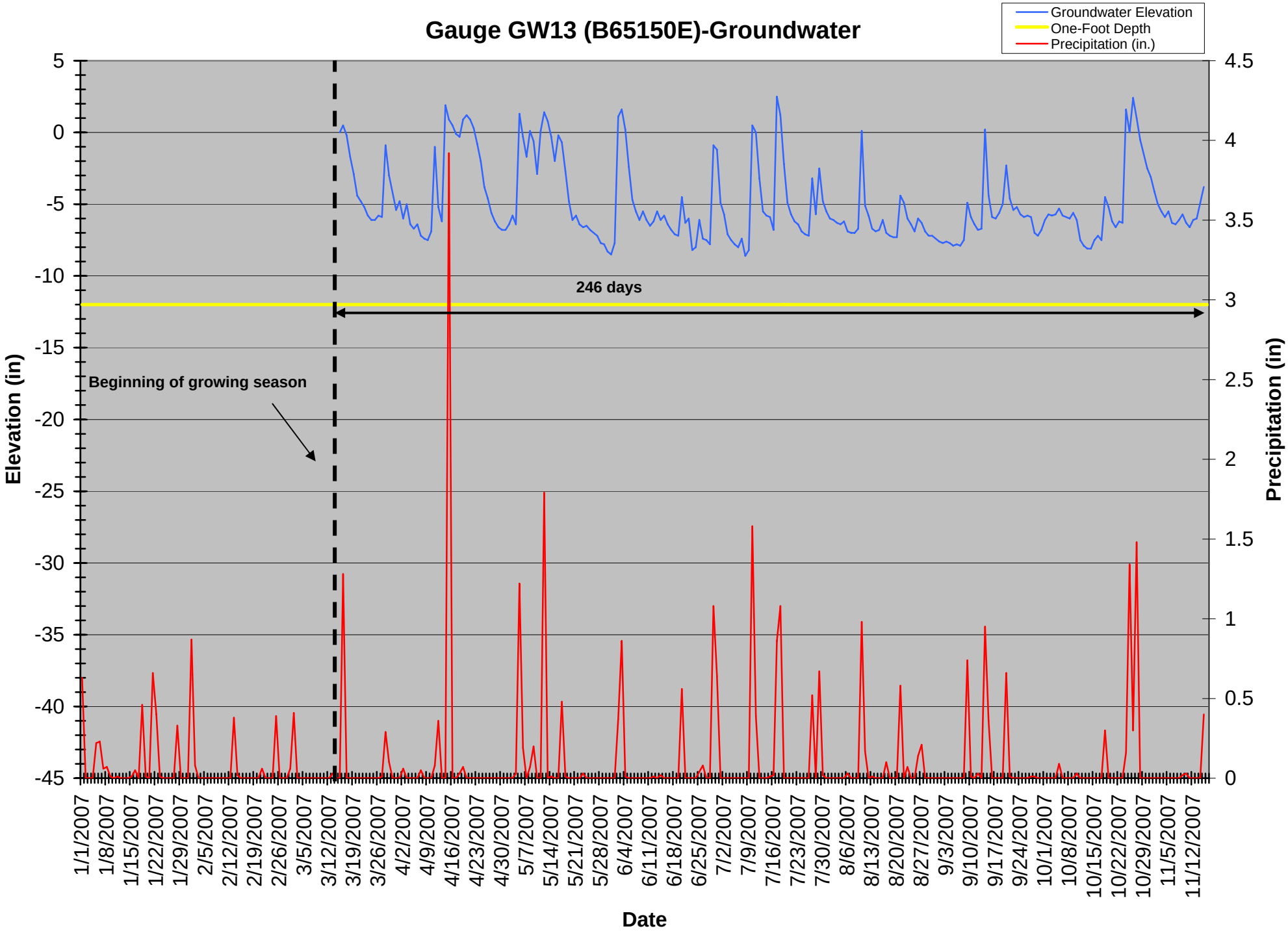
Gauge GW13 (B65150E)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
246 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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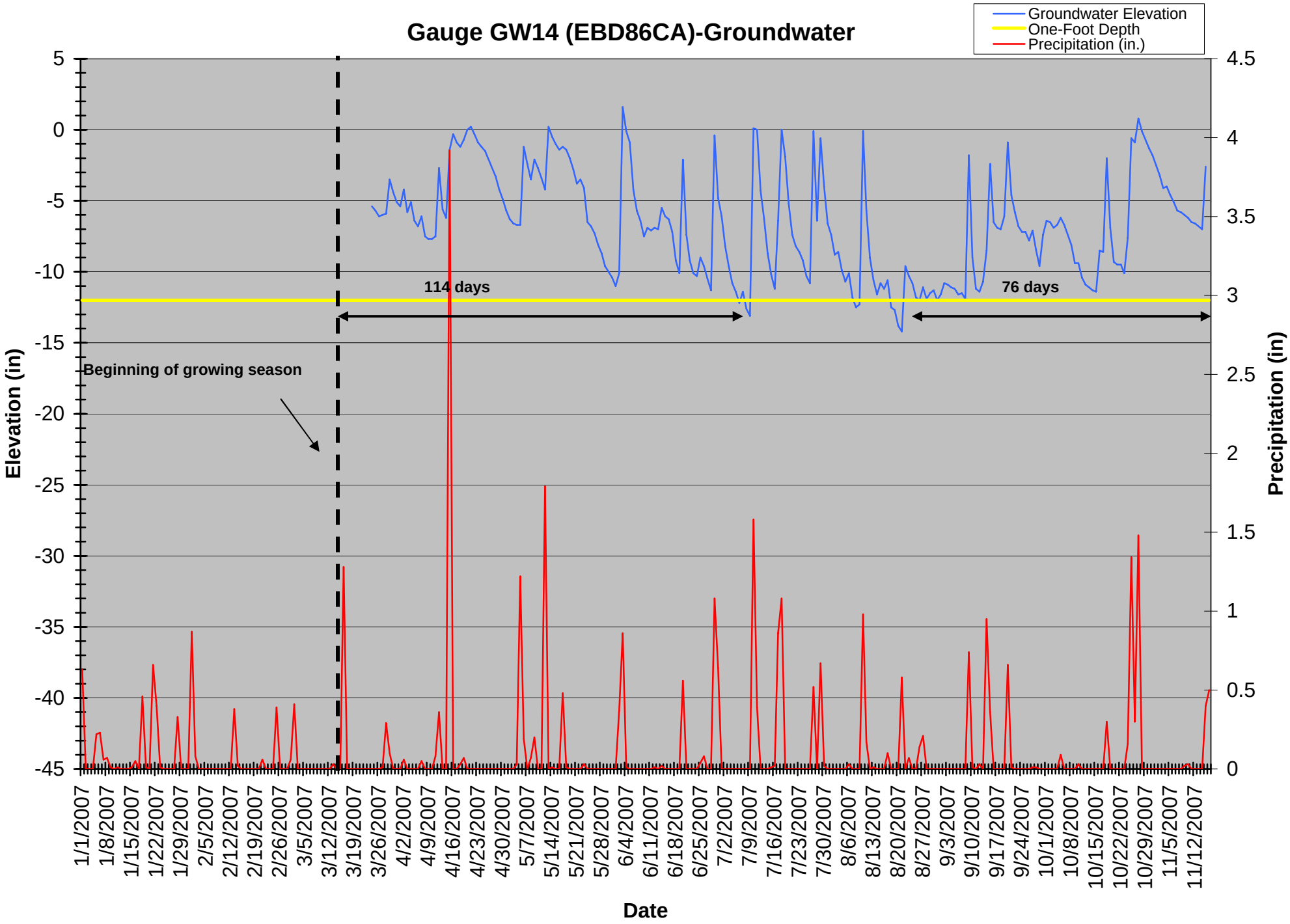
Gauge GW14 (EBD86CA)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
114 days
76 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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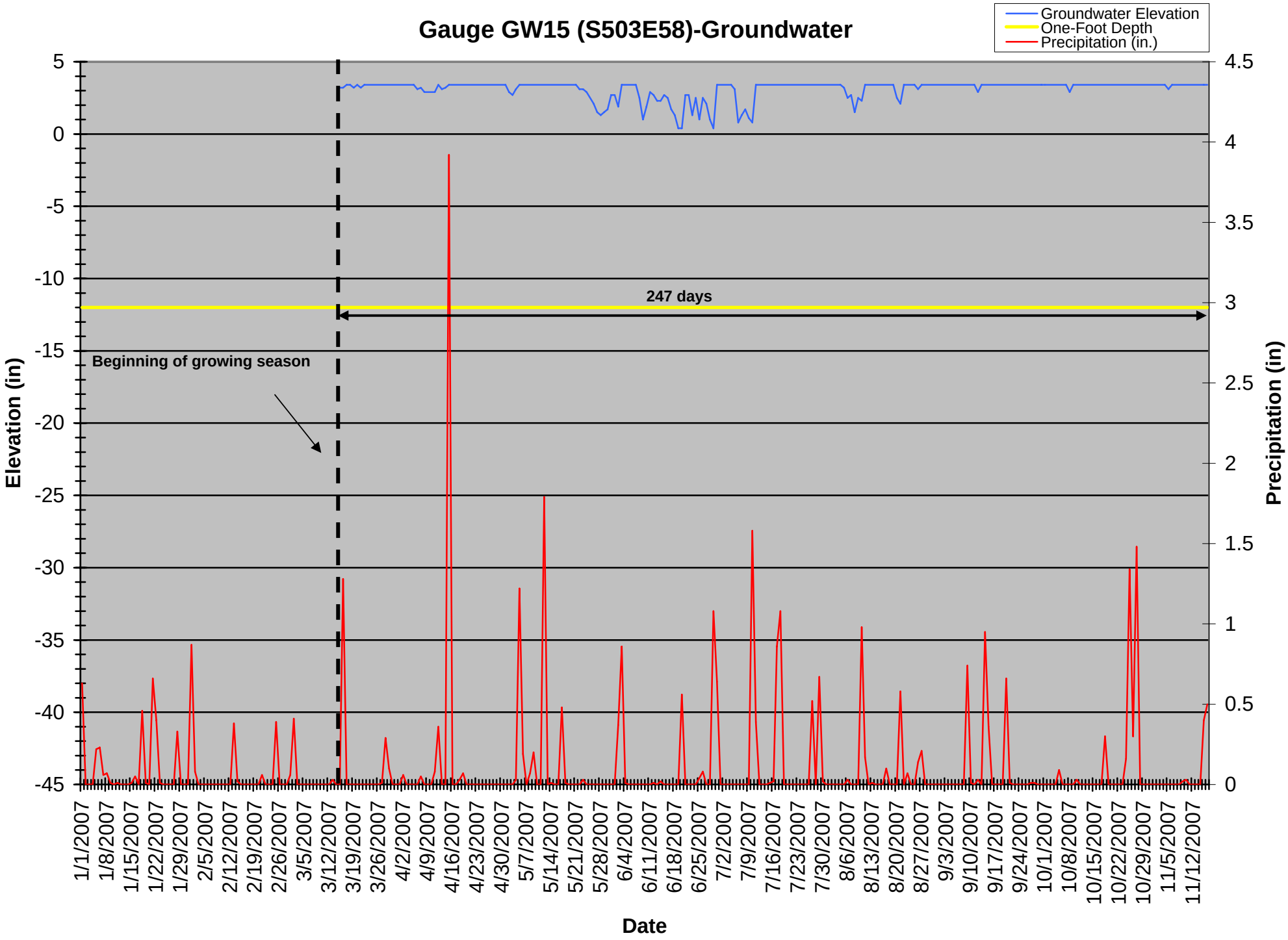
Gauge GW15 (S503E58)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
247 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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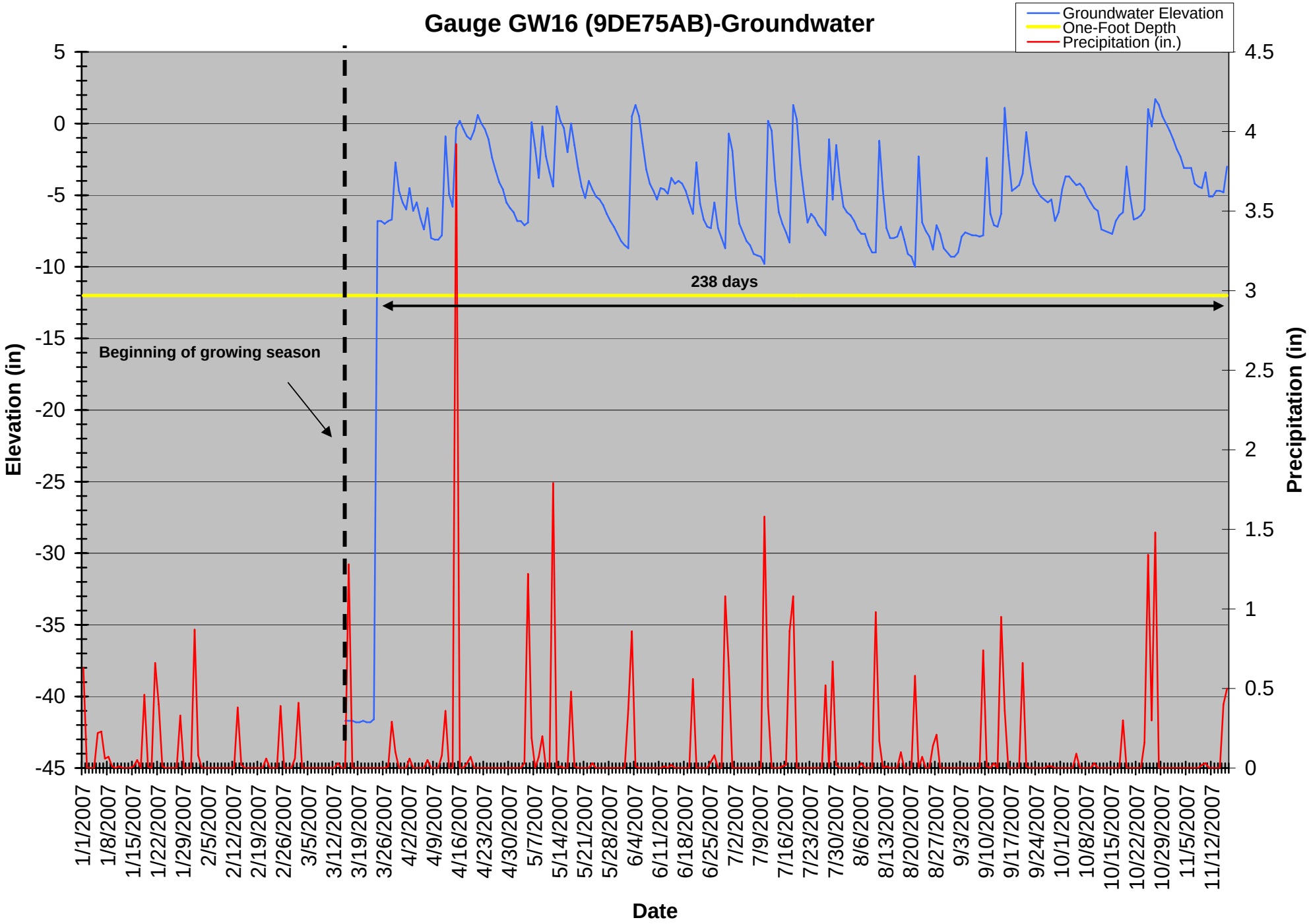
Gauge GW16 (9DE75AB)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
238 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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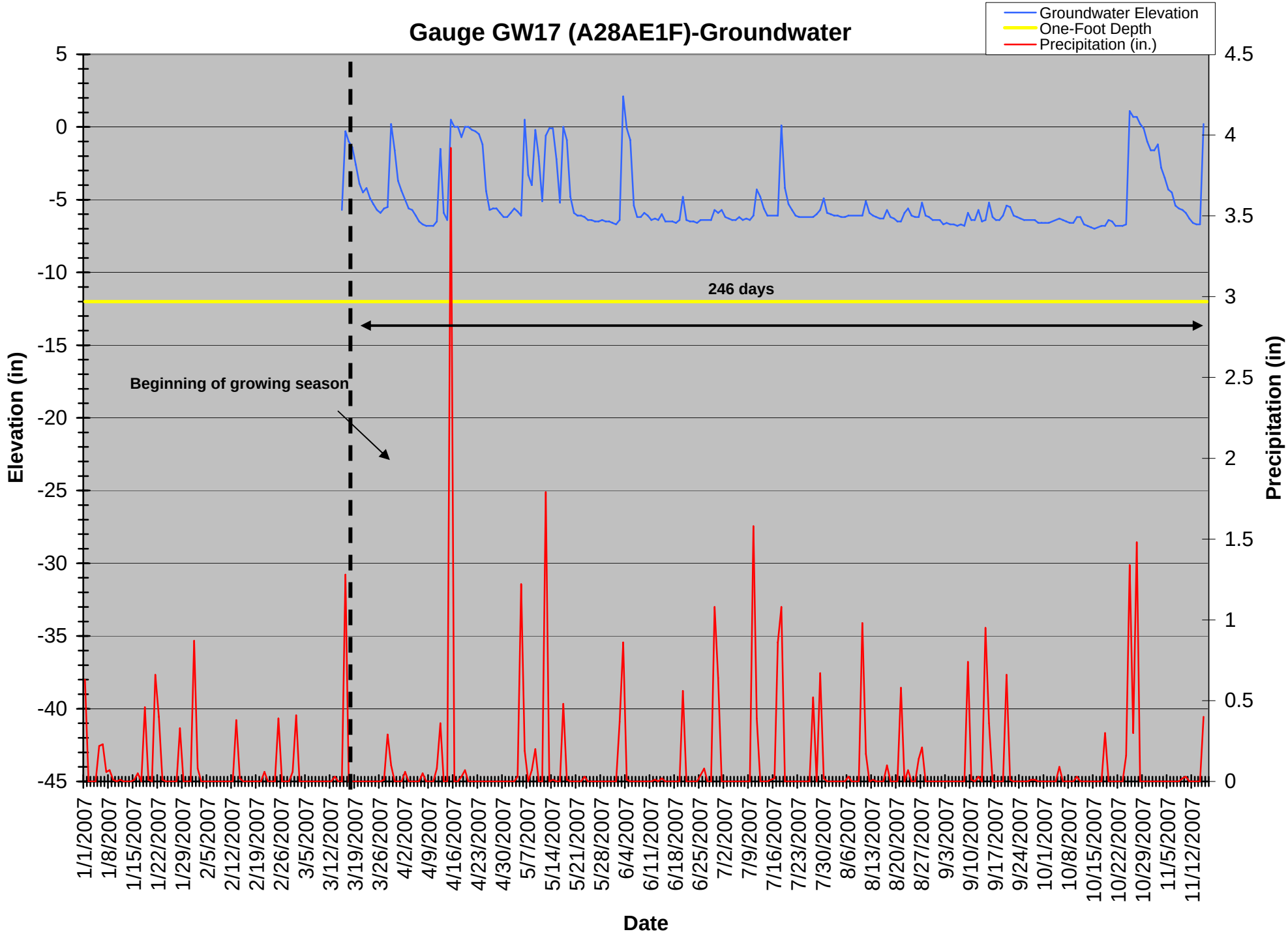
Gauge GW17 (A28AE1F)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
246 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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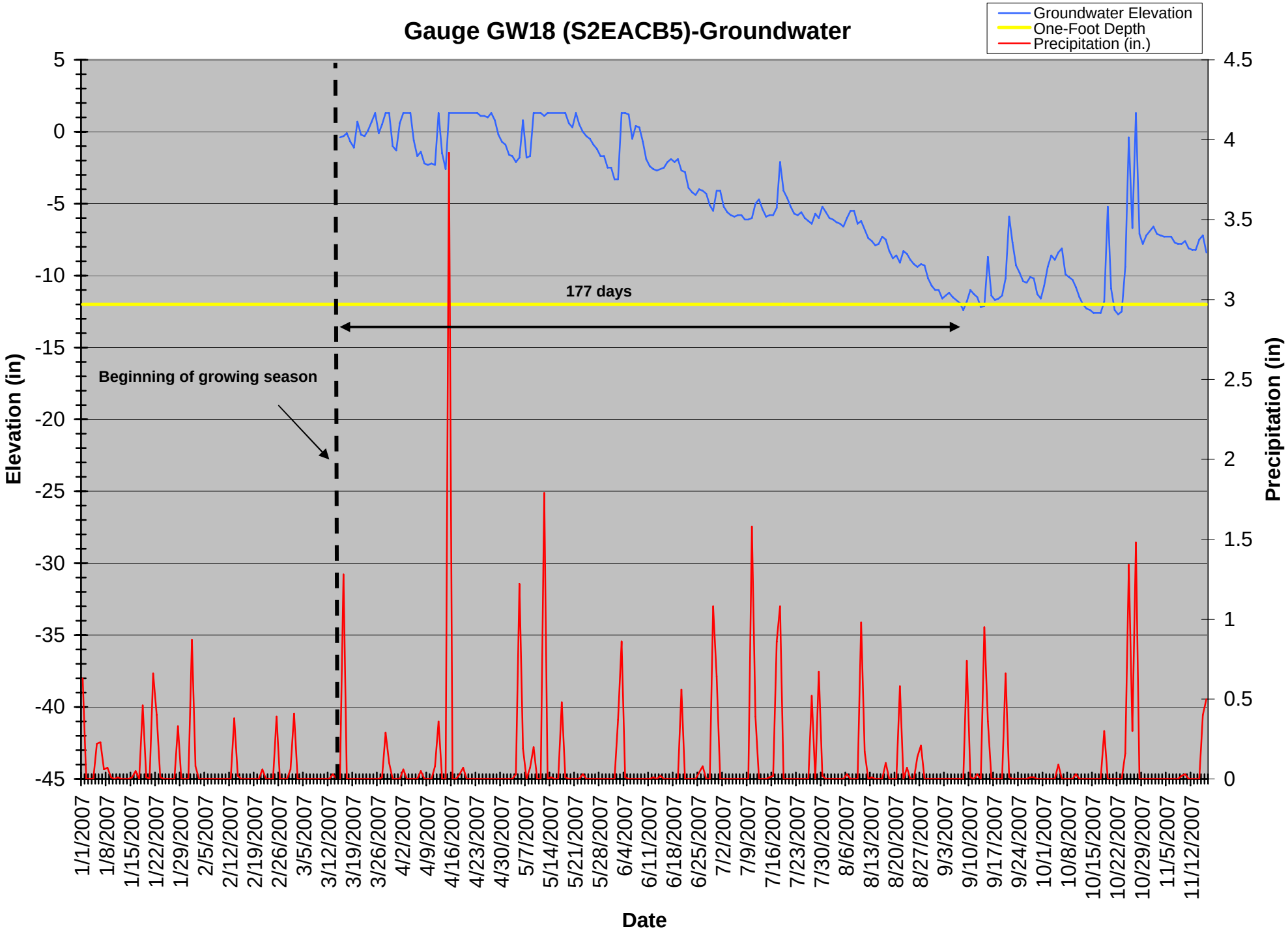
Gauge GW18 (S2EACB5)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
177 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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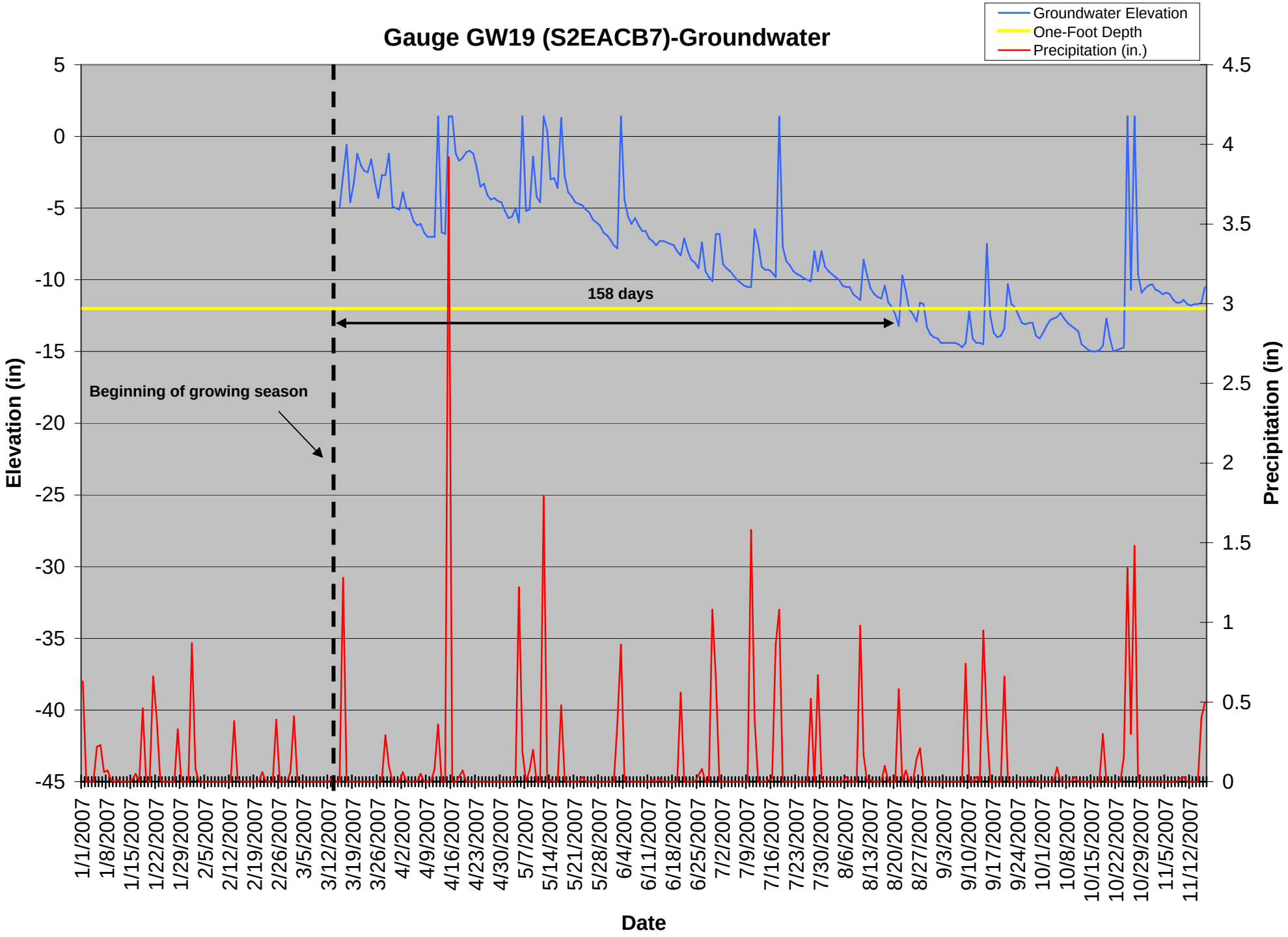
Gauge GW19 (S2EACB7)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
158 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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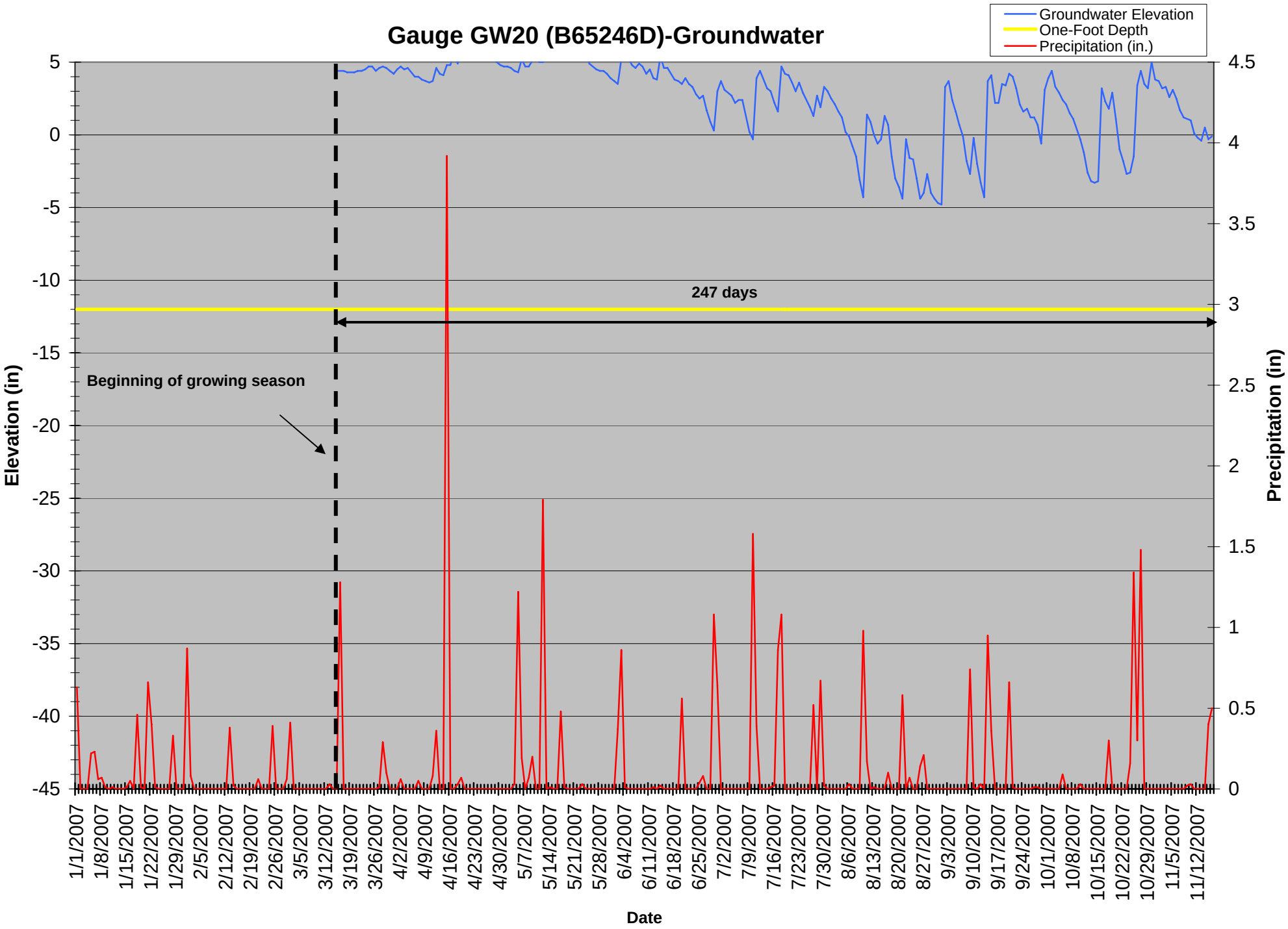
Gauge GW20 (B65246D)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
247 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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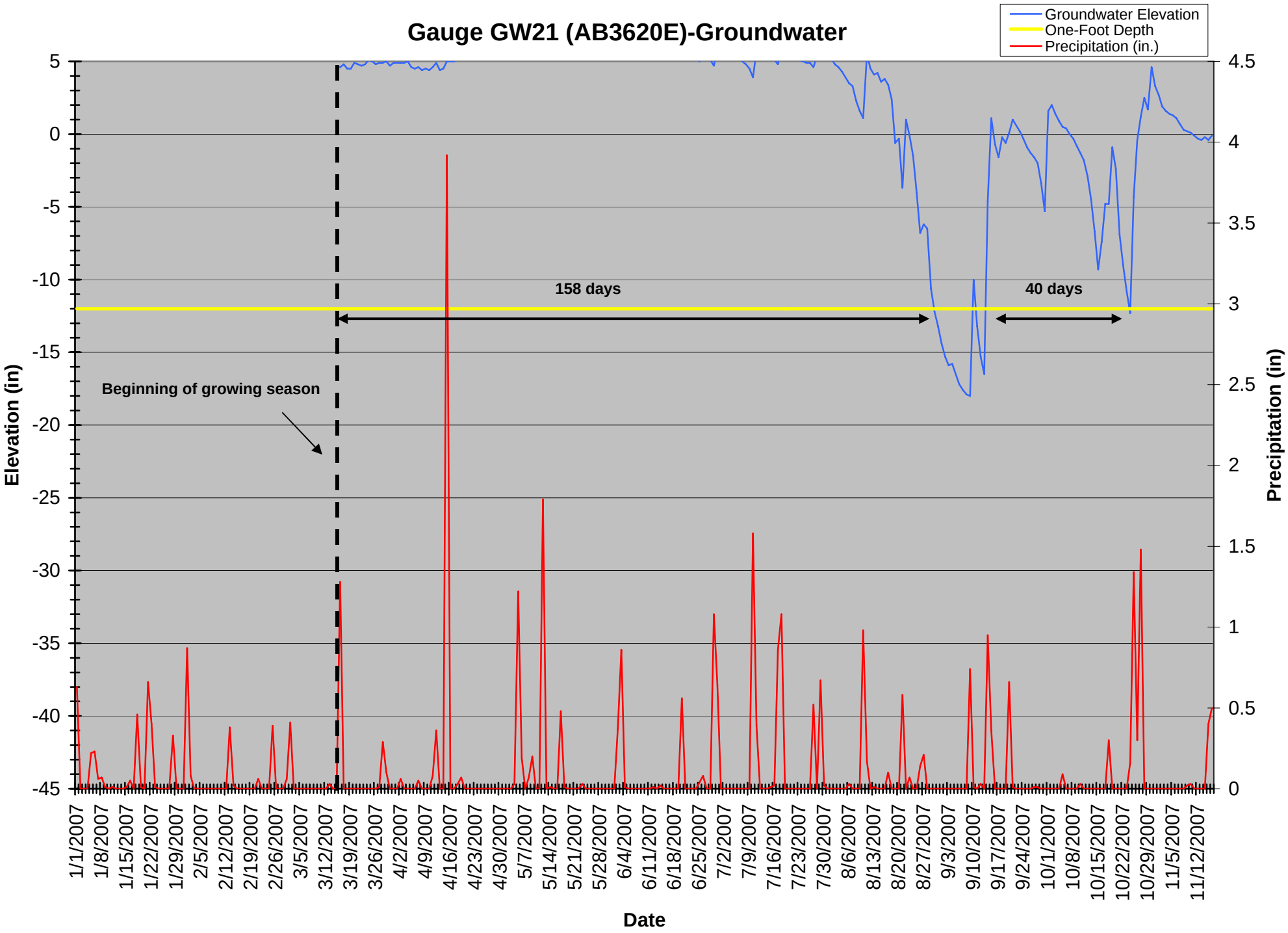
Gauge GW21 (AB3620E)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
158 days
40 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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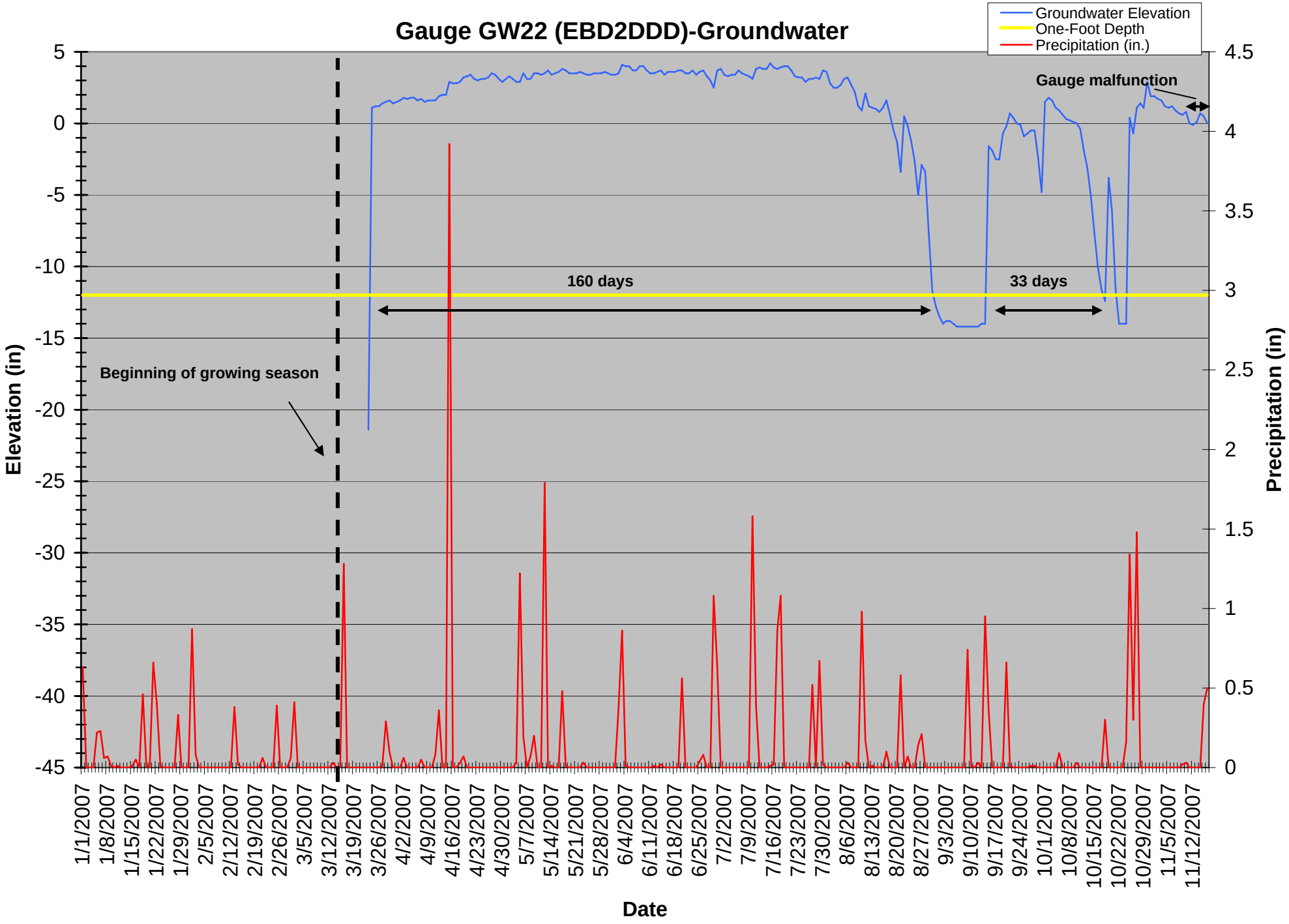
Gauge GW22 (EBD2DDD)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
Gauge malfunction
160 days
33 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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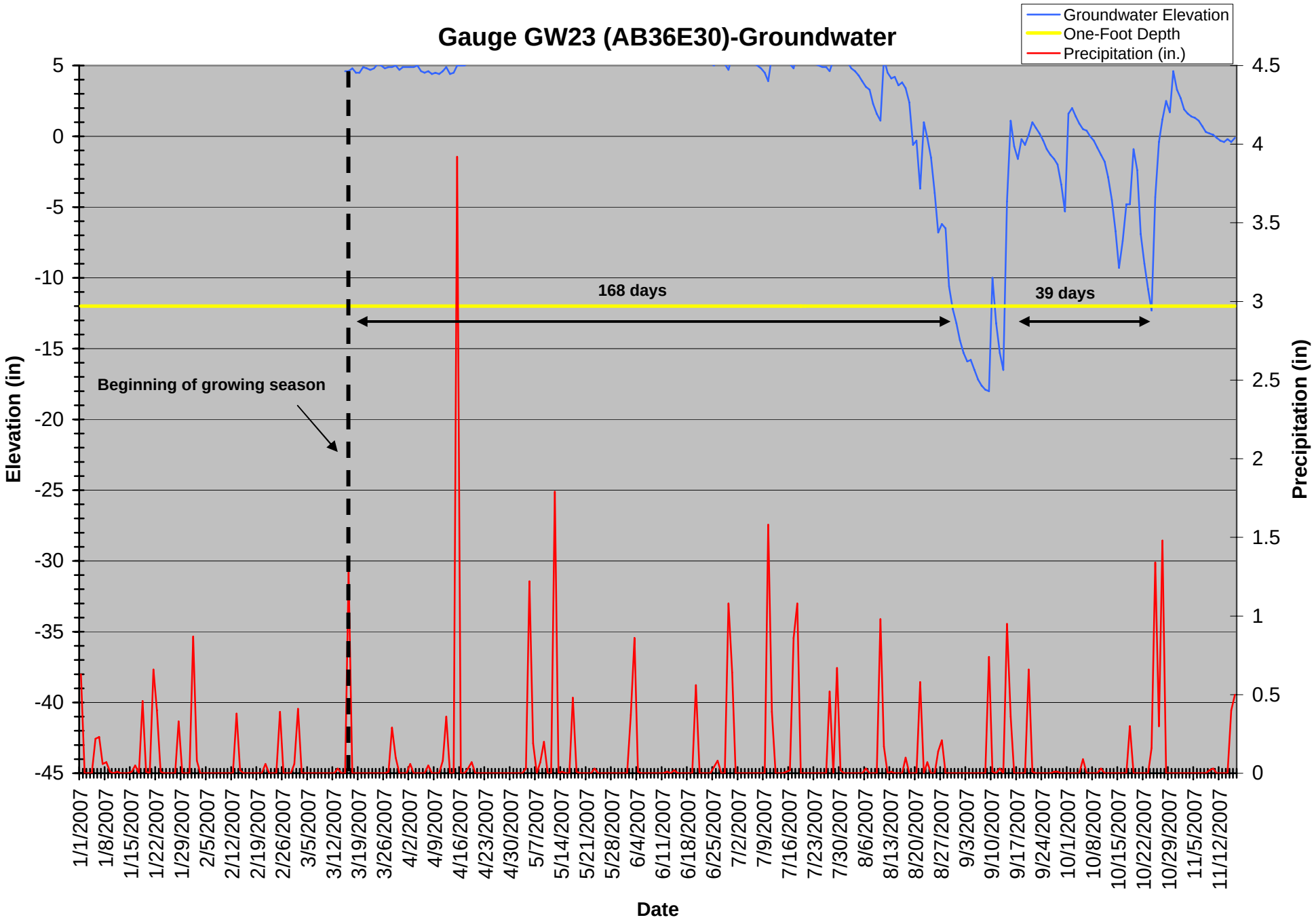
Gauge GW23 (AB36E30)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
168 days
39 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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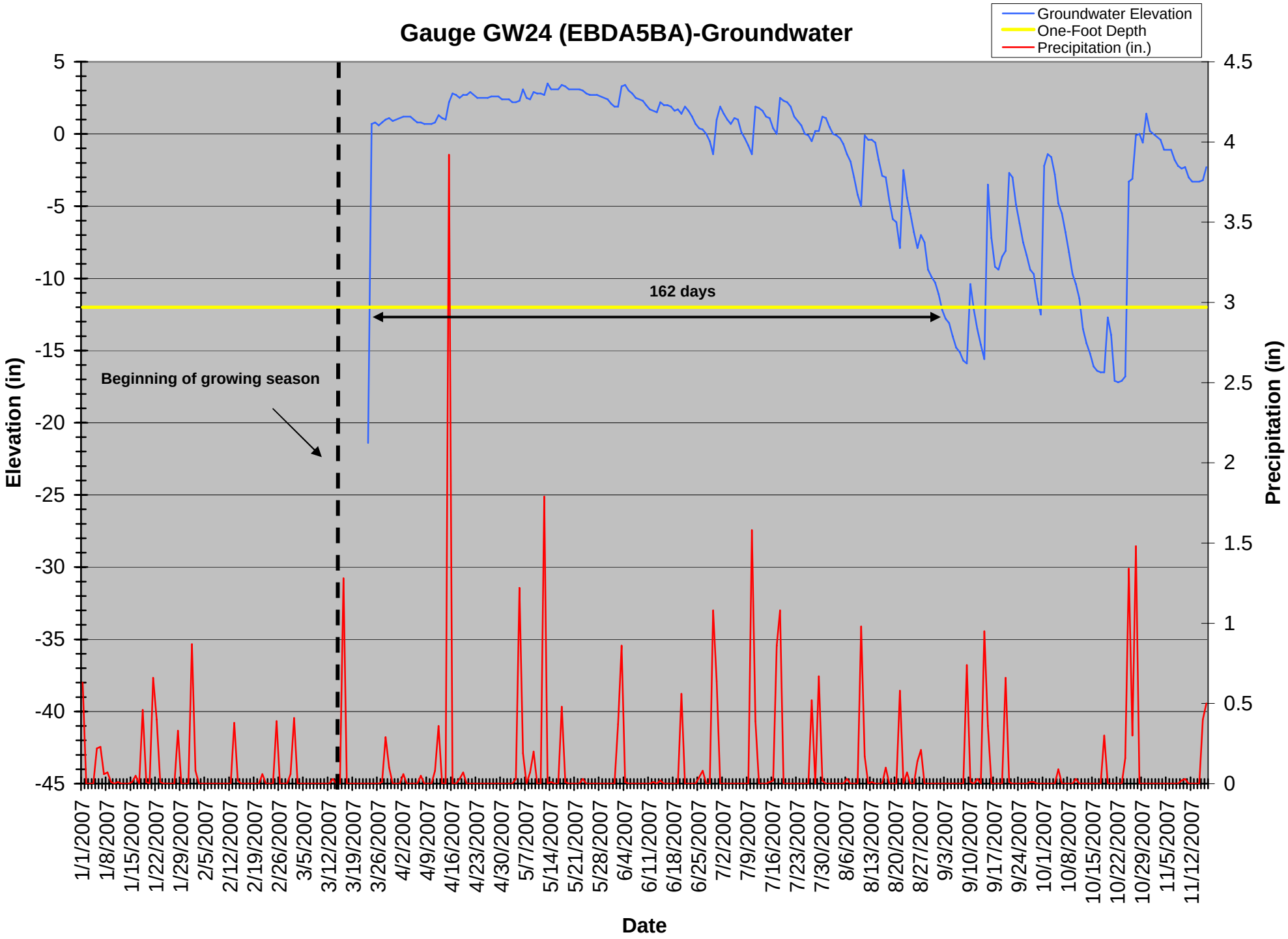
Gauge GW24 (EBDA5BA)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
162 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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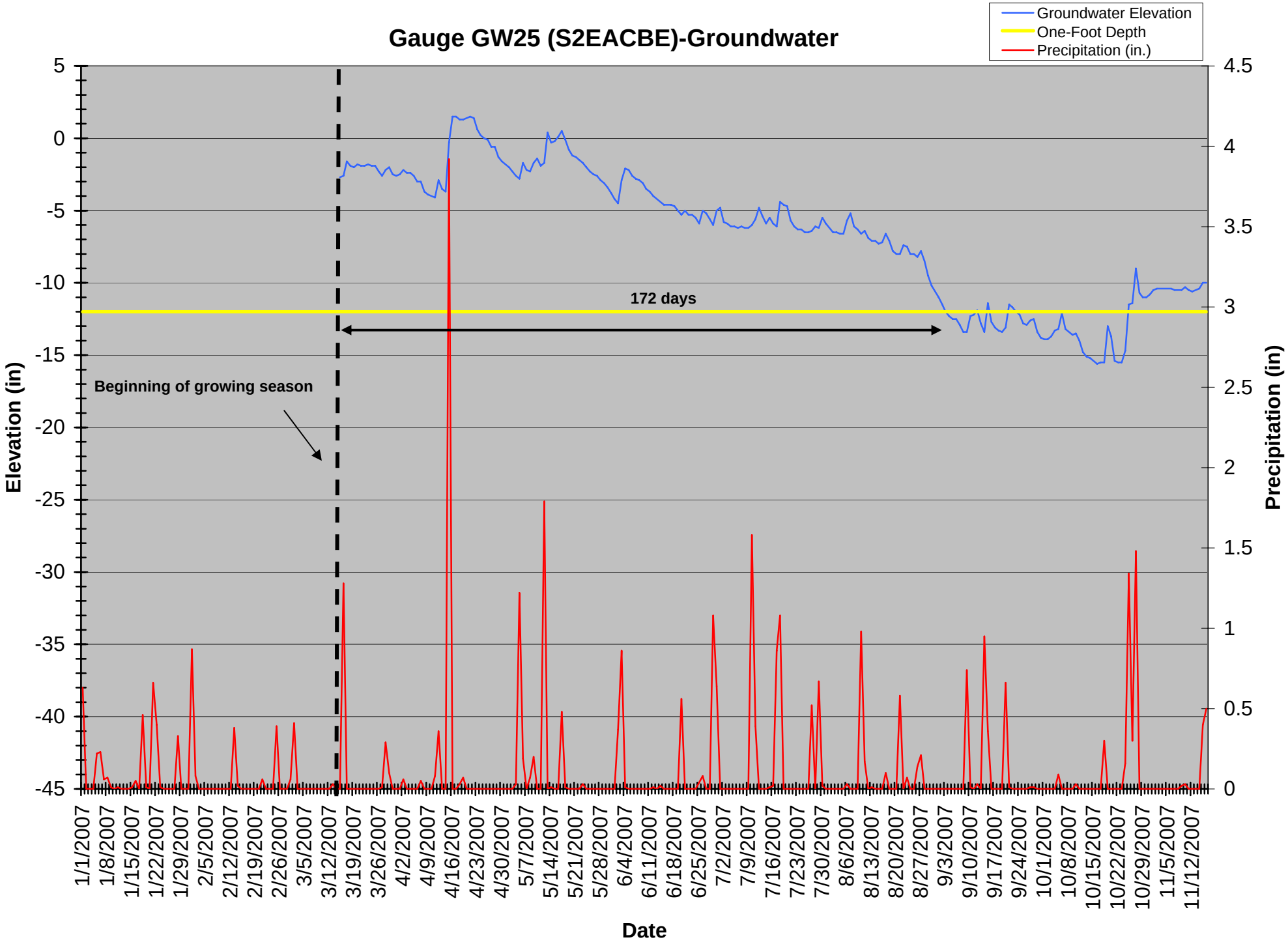
Gauge GW25 (S2EACBE)-Groundwater
Groundwater Elevation
One-Foot Depth
Precipitation (in.)
172 days
Beginning of growing season
Elevation (in)
Precipitation (in)
Date
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11/12/2007

APPENDIX B
SITE PHOTOS AND PHOTO AND PLOT LOCATIONS MAP

Picture 1

Picture 2

Picture 3

Picture 4

Picture 5

GRIMESLAND PHASE II PHOTO AND PLOT LOCATIONS