

**Juniper Bay Wetland Mitigation Site  
Robeson County, North Carolina**

**2009 Annual Monitoring Report  
Year 4 of 5**



NCEEP Project Number 201

Submitted To:  
NCDENR/Ecosystem Enhancement Program  
1652 Mail Service Center  
Raleigh, NC 27699-1652

Date: December 2009



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2.0. Table of Contents ..... 2

3.0. Executive Summary..... 3

4.0. Methodology ..... 4

5.0. References ..... 4

6.0. Project Condition and Monitoring Data Appendices ..... 5

Appendix A. General Figures and Plan Views

Figure 1. Vicinity Map

Figure 2. Consolidated Current Condition Plan View

Appendix B. General Project Tables

Table 1. Project Restoration Component

Table 2. Project Activity and Reporting History

Table 3. Project Contacts Table

Table 4. Project Attributes Table

Appendix C. Vegetation Assessment Data

Table 5. Vegetation Plot Mitigation Success Summary Table

Table 6. Vegetation Metadata Table

Table 7. Stem Count Total and Planted by Plot and Species

Appendix D. Wetland Assessment Data

Figure 3. Juniper Bay 30-70 Percentile Graph for Rainfall in 2009

Gauge Hydrologic Data Graphs

Table 8. Wetland Hydrology Criteria Attainment

### **3.0. Executive Summary**

The Juniper Bay Mitigation Site (JBMS) is a Carolina bay located in Robeson County, North Carolina comprising 728.5 acres. The site is monitored for two primary wetland parameters: hydrology and vegetation. In order to demonstrate successful mitigation, hydrologic and vegetation monitoring will be conducted for a minimum of five years. Vegetative data will be correlated with the appropriate hydrologic data from the groundwater monitoring gauges to determine if success criteria are being met. The site was constructed by the North Carolina Department of Transportation (NCDOT) and is managed by the North Carolina Ecosystem Enhancement Program (EEP) with the following goals and objectives.

- Provide compensatory wetland mitigation credits for Transportation Improvement Projects (TIP) in the Lumber River Basin (Hydrologic Unit 03040203).
- Restore the hydrologic functions to a Carolina Bay previously used for agricultural production with a drainage ditch network. The mitigation component in which jurisdictional hydrology is to be enhanced or restored comprises 567.7 acres.
- Restore natural wetland functions, processes, structure, and species composition to the site.
- Establish wetland forest vegetation within the site. The two community types planned for establishment are Peatland Atlantic White Cedar Forest/Bay Forest and Pond Pine Woodland/Bay Forest.

#### **Vegetation Conditions**

The 2009 monitoring event for the JBMS represents the fourth year of monitoring. The minimum survival rates for vegetative success are as follows: 320 stems/acre of target species at the end of Year 3, 290 stems/acre at the end of Year 4, and 260 stems/acre at the end of Year 5. Therefore, any plots with stem counts less than 290 stems/acre will not have met the vegetative success criterion for Year 4 monitoring. In 2009, 12 of the 20 plots (60.0%) did not meet the Year 4 success criterion. Two of the 9 (22.2%) plots in the Peatland Atlantic White Cedar Forest/Bay Forest community met the vegetative success criterion. Six of the 11 (54.5%) plots in the Pond Pine Woodland/Bay Forest community met the vegetative success criterion. The baseline stem counts conducted during the 2006 monitoring event indicate nine of the unsuccessful plots could not have met the success criteria for Year 4 with 100 percent survival rates due to existing low stem counts. The lack of damaged or dead stems found in these plots indicates the initial planting rates in these plots were likely too low to meet the success criteria. However, the anomalies in specific plots not meeting the vegetation success rate do not accurately reflect the overall vegetation success for the entire site. An overall examination of the plots within the entire site demonstrates an average of 316 stems/acre, which is above the Year 4 vegetation success criterion of 290 stems/acre. Furthermore, based upon the stem deaths within the plots during the 2009 monitoring year, it appears the mortality rate for the surviving stems within the plots has stabilized. Therefore, meeting the Year 5 vegetation success rate for the entire site is expected, pending no unforeseen problems contributing to stem mortality.

## Hydrology Conditions

Forty-three automated groundwater monitoring gauges are installed across the site. The hydrologic success criterion requires the soil to be ponded, flooded, or saturated within 12 inches of the surface for a least 12.5% of the growing season during years with normal precipitation. The growing season extends from March 25<sup>th</sup> to November 4<sup>th</sup> in Robeson County (225 days). Therefore, in order to demonstrate hydrologic success, a gauge must have saturated conditions for a minimum of 28 consecutive days during the growing season. During the 2009 monitoring period, 35 of the 43 monitoring gauges met the hydrologic success criterion, an 81.4 % success rate. However, based on the JBMS Mitigation Plan, there are 13 perimeter gauges that are located adjacent to the perimeter ditch in the Pond Pine Woodland/Bay Forest community. The perimeter ditch remains open in order to avoid hydrologic trespass issues. The location of these 13 gauges represents portions of the site which are not expected to meet the wetland criterion due to the zone of influence exerted by the ditch. Seven of the 13 perimeter gauges met the jurisdictional hydrology criterion during the Year 4 monitoring, a 53.8% success rate. Multiple beaver dams within the perimeter ditch have raised the water levels along the perimeter, potentially resulting in higher than expected groundwater levels for the perimeter gauges. Of the remaining 30 interior gauges, 28 met the hydrologic success criterion, a 93.3% success rate.

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

### 4.0. Methodology Section

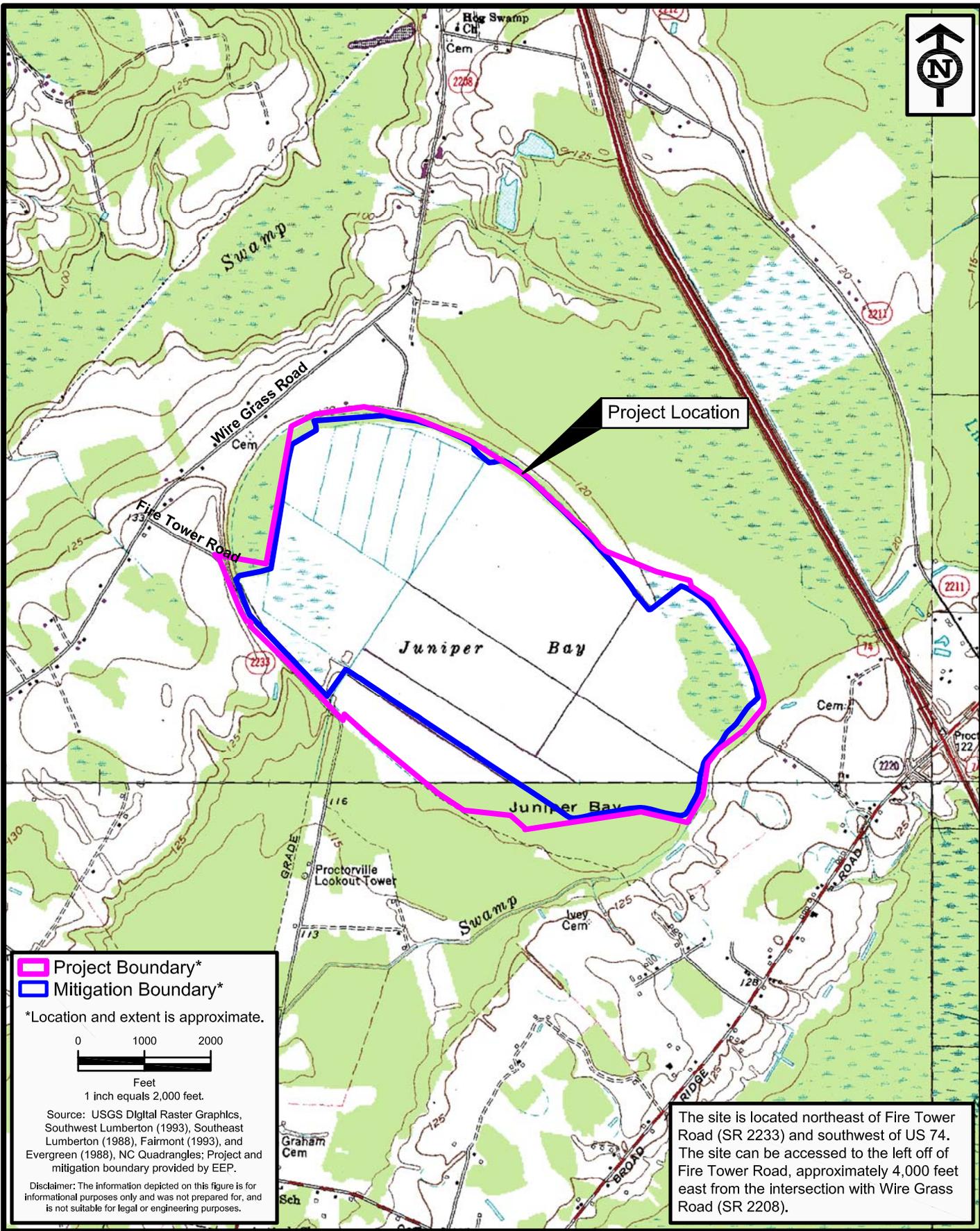
The fourth year of monitoring for JBMS occurred in 2009. Using the CVS-EEP Protocol for Recording Vegetation, Version 4.0 (Lee et al. 2006), 20 (10 meter X 10 meter) plots were designated across the site based on proximity to groundwater gauges and representative conditions for the site as a whole. Stem counts by species were conducted for each plot, including vigor and damage estimates. The stem counts were limited to planted woody stems. Natural recruits were not included in the stem counts. The taxonomic standard for vegetation that was applied was the Manual of the Vascular Flora of the Carolinas (Radford et al. 1968). Photographs of the vegetation plots from the same viewpoints annually were taken to provide a visual record of plot growth. No deviations regarding sampling procedures occurred.

### 5.0. References

- Lee, Michael T., Peet, Robert K., Roberts, Steven D., Wentworth, Thomas R. 2006. CVS-EEP Protocol for Recording Vegetation Version 4.0. Retrieved September 1 2009, from: <http://cvs.bio.unc.edu/methods.htm>.
- Radford, Albert E., H.E. Ahles, and C.R. Bell. 1968. Manual of the Vascular Flora of the Carolinas. The University of North Carolina Press, Chapel Hill, NC. 1183 pp.

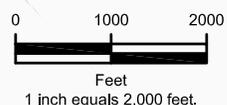
## **6.0. Project Condition and Monitoring Data Appendices**

**Appendix A**  
**General Figures and Plan Views**



- Project Boundary\*
- Mitigation Boundary\*

\*Location and extent is approximate.



Source: USGS Digital Raster Graphics, Southwest Lumberton (1993), Southeast Lumberton (1988), Fairmont (1993), and Evergreen (1988), NC Quadrangles; Project and mitigation boundary provided by EEP.

Disclaimer: The information depicted on this figure is for informational purposes only and was not prepared for, and is not suitable for legal or engineering purposes.

The site is located northeast of Fire Tower Road (SR 2233) and southwest of US 74. The site can be accessed to the left off of Fire Tower Road, approximately 4,000 feet east from the intersection with Wire Grass Road (SR 2208).



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Vicinity Map  
**Juniper Bay**  
 Robeson County, North Carolina  
 Monitoring Report Year 4

|            |            |
|------------|------------|
| Project:   | ER07008.00 |
| Date:      | Dec 2009   |
| Drwn/Chkd: | KT/GT      |
| Figure:    | 1          |

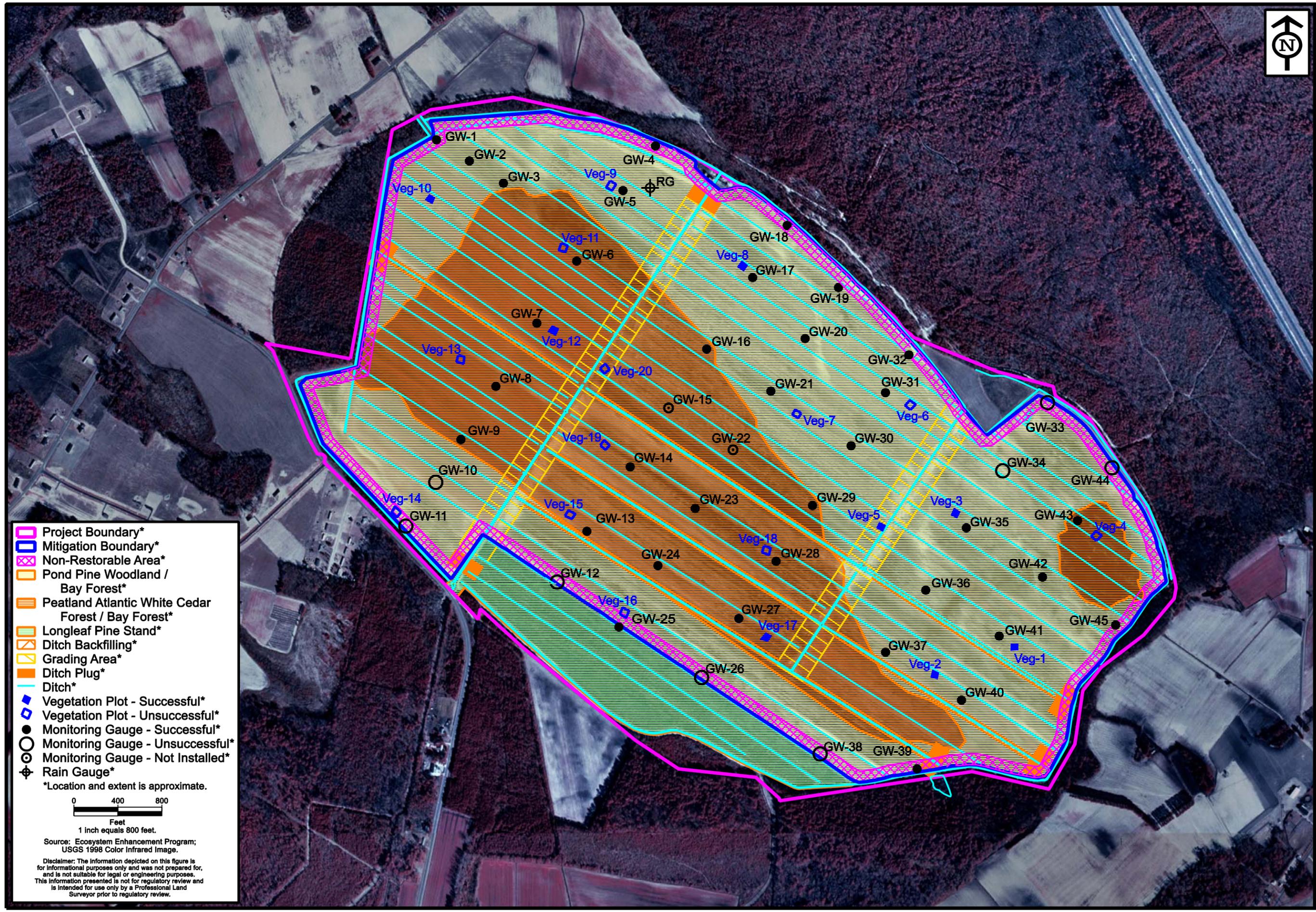


Project: ER07008.00  
 Date: Dec 2009  
 Drwn/Chkd: KT/GT  
 Figure: 2

Consolidated Current Condition Plan View  
**Juniper Bay - EEP Project # 201**  
 Robeson County, North Carolina  
 Monitoring Report Year 4



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- Project Boundary\*
- Mitigation Boundary\*
- Non-Restorable Area\*
- Pond Pine Woodland / Bay Forest\*
- Peatland Atlantic White Cedar Forest / Bay Forest\*
- Longleaf Pine Stand\*
- Ditch Backfilling\*
- Grading Area\*
- Ditch Plug\*
- Ditch\*
- Vegetation Plot - Successful\*
- Vegetation Plot - Unsuccessful\*
- Monitoring Gauge - Successful\*
- Monitoring Gauge - Unsuccessful\*
- Monitoring Gauge - Not Installed\*
- Rain Gauge\*

\*Location and extent is approximate.

0 400 800  
 Feet  
 1 inch equals 800 feet.

Source: Ecosystem Enhancement Program;  
 USGS 1998 Color Infrared Image.

Disclaimer: The information depicted on this figure is for informational purposes only and was not prepared for, and is not suitable for legal or engineering purposes. This information presented is not for regulatory review and is intended for use only by a Professional Land Surveyor prior to regulatory review.

**Appendix B**  
**General Project Tables**

Table 1 lists the estimated wetland acreage by community type to be restored or enhanced.

| <b>Table 1. Project Restoration Components<br/>Juniper Bay Wetland Mitigation Site-EEP # 201</b> |                        |                |
|--|------------------------|----------------|
| <b>Community Type</b>  | <b>Mitigation Type</b> | <b>Acreage</b> |
| Peatland Atlantic White Cedar Forest   | Restoration            | 264.8          |
| Peatland Atlantic White Cedar Forest   | Enhancement            | 11.8           |
| Pond Pine Woodland   | Restoration            | 291.1          |
|  | <b>Total</b>           | <b>567.7</b>   |
|  |                        |                |
| <b>Non-restorable areas</b>  | <b>Total</b>           | <b>160.8</b>   |
| <b>Juniper Bay Mitigation Site</b>   | <b>Total</b>           | <b>728.5</b>   |

Table 2 provides the timeline for data collection and actual completion for construction and monitoring milestones of the JBMS. The dates for several activities were unavailable.

| <b>Table 2. Project Activity and Reporting History<br/>Juniper Bay Wetland Mitigation Site-EEP # 201</b> |                                 |                                     |
|--|---------------------------------|-------------------------------------|
| <b>Activity or Report</b>  | <b>Data Collection Complete</b> | <b>Actual Completion</b>            |
| Restoration Plan   | N/A                             | N/A                                 |
| Final Design-90%   | N/A                             | N/A                                 |
| Construction   | N/A                             | Phase I Feb 2004; Phase II Jan 2006 |
| Temporary S&E mix applied to entire site   | N/A                             | N/A                                 |
| Permanent Seed mix applied   | N/A                             | N/A                                 |
| Mitigation Plan/ As-built (Year 0 Monitoring- baseline)  | N/A                             | Feb 2006                            |
| Year 1 Monitoring  | Nov 2006                        | Dec 2006                            |
| Year 2 Monitoring  | Nov 2007                        | Dec 2007                            |
| Year 3 Monitoring  | Sept 2008                       | Oct 2008                            |
| Year 4 Monitoring  | Sept 2009                       | Nov 2009                            |
| Year 5 Monitoring  | N/A                             | N/A                                 |

The point of contact for various phases and monitoring of the JBMS are provided in Table 3.

| <b>Table 3. Project Contacts Table<br/>Juniper Bay Wetland Mitigation Site-EEP # 201</b> |  |
|--|--|
| <b>Designer</b><br>Primary project design POC  | N.C. Department of Transportation-Natural Environment Unit<br>Arcadis  |
| <b>Construction Contractor</b><br>Construction contractor POC                            | NCDOT Division 6<br>Robeson County Maintenance<br>Eugene McKeithan, Highway Maintenance Engineer                   |
| <b>Planting Contractor</b><br>Planting contractor POC                                    | Professional Consolidated, LLC<br>Henry Rozo   |
| <b>Seeding Contractor</b><br>Seeding contractor POC                                      | NCDOT Division 6 Roadside Environmental Unit<br>James Barnes, Division Roadside Environmental Engineer             |
| <b>Nursery Stock Suppliers</b>   | NC Forestry Service (hardwoods); Coastal Plain Conservation Nursery (bays); Hillis Nursery (bays)                  |
| <b>Monitoring Performers</b><br>Wetland and Vegetation POC                               | Environmental Services, Inc.<br>524 S. New Hope Road<br>Raleigh, North Carolina 27610<br>Todd Milam (919) 212-1760 |

Relevant project background information for the JBMS is provided in Table 4. The North Carolina Division of Water Quality (NCDWQ) classification for Project and Reference was unavailable at the time of report submission.

| <b>Table 4. Project Attributes Table<br/>Juniper Bay Wetland Mitigation Site-EEP # 201</b> |  |
|--|--|
| Project County   | Robeson County   |
| Drainage Area  | 904 Acres; 756 acres within the site perimeter                       |
| Drainage impervious cover estimate (%)   | 1%   |
| Physiographic Region   | Coastal Plain  |
| Ecoregion  | 651 Atlantic Southern Loam Plain                                     |
| Cowardin Classification  | PFOB4/6  |
| Dominant soil types  | Ponzer muck, Leon sand, Rutledge loamy sand, Pantego fine sandy loam |
| Reference site ID  | Tatum Millpond Bay, Bladen County, NC                                |
| USGS HUC for Project and Reference   | 03040203   |
| NCDWQ Sub-basin for Project and Reference  | 03-07-54   |
| NCDWQ classification for Project and Reference   | N/A  |
| Any portion of the project 303d listed?  | No   |
| Any upstream portion 303d listed?  | No   |
| % of project easement fenced   | Gate at access road  |

**Appendix C**  
**Vegetation Assessment Data**

Table 5 provides a summary of the vegetation success for the 20 vegetation plots within the JBMS.

| <b>Table 5. Vegetation Plot Mitigation Success Summary Table<br/>Juniper Bay Wetland Mitigation Site-EEP# 201</b> |                               |                            |
|---|-------------------------------|----------------------------|
| <b>Peatland Atlantic White Cedar Forest/ Bay Forest</b>   |                               |                            |
| <b>Vegetation Plot</b>  | <b>Vegetative Success Met</b> | <b>Community Type Mean</b> |
| Veg-4   | N                             | 22.2%                      |
| Veg-11  | N                             |                            |
| Veg-12  | Y                             |                            |
| Veg-13  | N                             |                            |
| Veg-15  | N                             |                            |
| Veg-17  | Y                             |                            |
| Veg-18  | N                             |                            |
| Veg-19  | N                             |                            |
| Veg-20  | N                             |                            |
| <b>Pond Pine Woodland/Bay Forest</b>  |                               |                            |
| <b>Vegetation Plot</b>  | <b>Vegetative Success Met</b> | <b>Community Type Mean</b> |
| Veg-1   | Y                             | 54.5%                      |
| Veg-2   | Y                             |                            |
| Veg-3   | Y                             |                            |
| Veg-5   | Y                             |                            |
| Veg-6   | N                             |                            |
| Veg-7   | N                             |                            |
| Veg-8   | Y                             |                            |
| Veg-9   | N                             |                            |
| Veg-10  | Y                             |                            |
| Veg-14  | N                             |                            |
| Veg-16  | N                             |                            |

**Vegetation Monitoring Plot Photos**

**PLOT 1**



**2006** Photo Taken 9/19/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 10/21/08



**2009** Photo Taken 9/22/09

PLOT 2



**2006** Photo Taken 9/19/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/21/2008



**2009** Photo Taken 9/23/2009

PLOT 3



**2006** Photo Taken 9/19/06



**2007** Photo Taken 9/10/07



**2008** Photo Taken 9/22/2008



**2009** Photo Taken 9/23/2009

PLOT 4



**2006** Photo Taken 9/21/06



**2007** Photo Taken 9/10/07



**2008** Photo Taken 9/22/08



**2009** Photo Taken 9/27/09

PLOT 5



**2006** Photo Taken 9/19/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/22/09

PLOT 6



**2006** Photo Taken 9/19/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/23/09

PLOT 7



**2006** Photo Taken 9/19/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/22/08



**2009** Photo Taken 9/22/09

PLOT 8



**2006** Photo Taken 9/19/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/27/09

PLOT 9



**2006** Photo Taken 9/18/06



**2007** Photo Taken 9/12/07



**2008** Photo Taken 9/22/2008



**2009** Photo Taken 9/23/2009

PLOT 10



**2006** Photo Taken 9/18/06



**2007** Photo Taken 9/12/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/27/09

PLOT 11



**2006** Photo Taken 9/18/06



**2007** Photo Taken 9/12/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/27/09

PLOT 12



**2006** Photo Taken 9/18/06



**2007** Photo Taken 9/12/07



**2008** Photo Taken 9/22/08



**2009** Photo Taken 9/23/09

PLOT 13



**2006** Photo Taken 9/18/06



**2007** Photo Taken 9/12/07



**2008** Photo Taken 9/22/08



**2009** Photo Taken 9/27/09

PLOT 14



**2006** Photo Taken 9/18/06



**2007** Photo Taken 9/12/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/22/09

PLOT 15



**2006** Photo Taken 9/20/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/22/08



**2009** Photo Taken 9/22/09

PLOT 16



**2006** Photo Taken 9/20/06



**2007** Photo Taken 9/10/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/22/09

PLOT 17



**2006** Photo Taken 9/20/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/21/08



**2009** Photo Taken 9/23/09

PLOT 18



**2006** Photo Taken 9/20/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/22/08



**2009** Photo Taken 9/27/09

PLOT 19



**2006** Photo Taken 9/20/06



**2007** Photo Taken 9/11/07



**2008** Photo Taken 9/22/08



**2009** Photo Taken 9/22/09

PLOT 20



**2006** Photo Taken 9/21/06



**2007** Photo Taken 9/11/07

**\*No 2008 Photo for Plot 20-**  
No stem survival after Year 2



**2009** Photo Taken 9/27/09

**Table 6. Vegetation Metadata Table**

|  |   |
|--|---|
| <b>Report Prepared By</b>                              | M. Todd Milam   |
| <b>Date Prepared</b>                                   | 10/5/2009 10:01   |
| <b>database name</b>                                   | cvs-eep-entrytool-v2.2.7.mdb  |
| <b>database location</b>                               | P:\Projects\2007\ER07-008\2009 Monitoring\Veg Plot Data   |
| <b>computer name</b>                                   | ES01043   |
| <b>file size</b>                                       | 53137408  |
| <b>DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----</b> |   |
| <b>Metadata</b>  | Description of database file, the report worksheets, and a summary of project(s) and project data.  |
| <b>Proj, planted</b>                                   | Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.   |
| <b>Proj, total stems</b>                               | Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems. |
| <b>Plots</b>   | List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).  |
| <b>Vigor</b>   | Frequency distribution of vigor classes for stems for all plots.  |
| <b>Vigor by Spp</b>                                    | Frequency distribution of vigor classes listed by species.  |
| <b>Damage</b>  | List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.  |
| <b>Damage by Spp</b>                                   | Damage values tallied by type for each species.   |
| <b>Damage by Plot</b>                                  | Damage values tallied by type for each plot.  |
| <b>Planted Stems by Plot and Spp</b>                   | A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.                                   |
| <b>PROJECT SUMMARY-----</b>                            |   |
| <b>Project Code</b>                                    | 201   |
| <b>project Name</b>                                    | Juniper Bay   |
| <b>Description</b>                                     | A Carolina Bay mitigation site  |
| <b>River Basin</b>                                     | Cape Fear   |
| <b>length(ft)</b>                                      | N/A   |
| <b>stream-to-edge width (ft)</b>                       | N/A   |
| <b>area (sq m)</b>                                     | 2948134.9   |
| <b>Required Plots (calculated)</b>                     | N/A   |
| <b>Sampled Plots</b>                                   | 20  |

**Table 7. Stem Count Total and Planted by Plot and Species**

| Scientific Name   | Common Name          | Species Type | 00201-01-0001 |       |       | 00201-01-0002 |       |       | 00201-01-0003 |       |       | 00201-01-0004 |       |       |   |       |       |
|---|----------------------|--------------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|---|-------|-------|
|   |                      |              | P-LS          | P-all | T     |   |       |       |
| <i>Acer rubrum</i>  | red maple            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Baccharis halmifolia</i>   | baccharis            | Shrub Tree   |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Chamaecyparis thyoides</i>   | Atlantic white cedar | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Liquidambar styraciflua</i>  | sweetgum             | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Magnolia virginiana</i>  | sweetbay             | Shrub Tree   |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Morella cerifera</i>   | sweetgale            | Shrub        |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Nyssa aquatica</i>   | water tupelo         | Tree         |               |       |       |               |       |       |               |       |       |               | 1     | 1     |   |       |       |
| <i>Persea palustris</i>   | swamp bay            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Pinus serotina</i>   | pond pine            | Tree         |               |       |       |               |       |       |               |       |       |               | 2     | 2     |   |       |       |
| <i>Pinus taeda</i>  | loblolly pine        | Tree         |               | 6     | 6     |               | 5     | 5     |               |       |       |               |       |       |   |       |       |
| <i>Quercus lyrata</i>   | overcup oak          | Tree         |               | 2     | 2     |               |       |       |               | 12    | 12    |               |       |       |   |       |       |
| <i>Salix nigra</i>  | black willow         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Taxodium ascendens</i>   | pond cypress         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Taxodium distichum</i>   | bald cypress         | Tree         |               | 1     | 1     |               | 4     | 4     |               | 4     | 4     |               | 1     | 1     |   |       |       |
| <b>Stem count size (ares)</b><br><b>size (ACRES)</b><br><b>Species count</b><br><b>Stems per ACRE</b> |                      |              | 0             | 9     | 9     | 0             | 9     | 9     | 0             | 16    | 16    | 0             | 4     | 4     |   |       |       |
|   |                      |              | 1             |       |       | 1             |       |       | 1             |       |       | 1             |       |       |   |       |       |
|   |                      |              | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       |   |       |       |
|   |                      |              | 0             | 3     | 3     | 0             | 2     | 2     | 0             | 2     | 2     | 0             | 2     | 2     | 0 | 3     | 3     |
|   |                      |              | 0             | 364.2 | 364.2 | 0             | 364.2 | 364.2 | 0             | 647.5 | 647.5 | 0             | 647.5 | 647.5 | 0 | 161.9 | 161.9 |

Table 7. Continues.

**Table 7. Stem Count Total and Planted by Plot and Species continued.**

| Scientific Name   | Common Name          | Species Type | 00201-01-0005 |       |       | 00201-01-0006 |       |       | 00201-01-0007 |       |       | 00201-01-0008 |       |       |   |       |       |
|---|----------------------|--------------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|---|-------|-------|
|   |                      |              | P-LS          | P-all | T     |   |       |       |
| <i>Acer rubrum</i>  | red maple            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Baccharis halmifolia</i>   | baccharis            | Shrub Tree   |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Chamaecyparis thyoides</i>   | Atlantic white cedar | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Liquidambar styraciflua</i>  | sweetgum             | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Magnolia virginiana</i>  | sweetbay             | Shrub Tree   |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Morella cerifera</i>   | sweetgale            | Shrub        |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Nyssa aquatica</i>   | water tupelo         | Tree         |               |       |       |               |       |       | 1             | 1     |       |               |       |       |   |       |       |
| <i>Persea palustris</i>   | swamp bay            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Pinus serotina</i>   | pond pine            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Pinus taeda</i>  | loblolly pine        | Tree         |               |       |       |               | 2     | 2     |               | 5     | 5     |               | 2     | 2     |   |       |       |
| <i>Quercus lyrata</i>   | overcup oak          | Tree         |               |       |       |               | 1     | 1     |               |       |       |               | 2     | 2     |   |       |       |
| <i>Salix nigra</i>  | black willow         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Taxodium ascendens</i>   | pond cypress         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |   |       |       |
| <i>Taxodium distichum</i>   | bald cypress         | Tree         |               | 20    | 20    |               | 4     | 4     |               | 1     | 1     |               | 5     | 5     |   |       |       |
| <b>Stem count size (ares)</b><br><b>size (ACRES)</b><br><b>Species count</b><br><b>Stems per ACRE</b> |                      |              | 0             | 20    | 20    | 0             | 7     | 7     | 0             | 7     | 7     | 0             | 9     | 9     |   |       |       |
|   |                      |              | 1             |       |       | 1             |       |       | 1             |       |       | 1             |       |       |   |       |       |
|   |                      |              | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       |   |       |       |
|   |                      |              | 0             | 1     | 1     | 0             | 3     | 3     | 0             | 3     | 3     | 0             | 3     | 3     | 0 | 3     | 3     |
|   |                      |              | 0             | 809.4 | 809.4 | 0             | 283.3 | 283.3 | 0             | 283.3 | 283.3 | 0             | 283.3 | 283.3 | 0 | 364.2 | 364.2 |

Table 7. Continues.

**Table 7. Stem Count Total and Planted by Plot and Species continued.**

| Scientific Name                | Common Name          | Species Type | 00201-01-0009 |       |       | 00201-01-0010 |       |       | 00201-01-0011 |       |       | 00201-01-0012 |       |       |
|--------------------------------|----------------------|--------------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|
|                                |                      |              | P-LS          | P-all | T     |
| <i>Acer rubrum</i>             | red maple            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Baccharis halmifolia</i>    | baccharis            | Shrub Tree   |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Chamaecyparis thyoides</i>  | Atlantic white cedar | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Liquidambar styraciflua</i> | sweetgum             | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Magnolia virginiana</i>     | sweetbay             | Shrub Tree   |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Morella cerifera</i>        | sweetgale            | Shrub        |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Nyssa aquatica</i>          | water tupelo         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Persea palustris</i>        | swamp bay            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Pinus serotina</i>          | pond pine            | Tree         |               |       |       |               |       |       | 4             | 4     |       |               |       |       |
| <i>Pinus taeda</i>             | loblolly pine        | Tree         |               | 3     | 3     |               | 10    | 10    |               |       |       | 4             | 4     |       |
| <i>Quercus lyrata</i>          | overcup oak          | Tree         |               | 1     | 1     |               |       |       |               |       |       |               |       |       |
| <i>Salix nigra</i>             | black willow         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Taxodium ascendens</i>      | pond cypress         | Tree         |               |       |       |               |       |       |               |       |       |               | 1     | 1     |
| <i>Taxodium distichum</i>      | bald cypress         | Tree         |               |       |       |               |       |       | 2             | 2     |       | 3             | 3     |       |
|                                |                      |              | 0             | 4     | 4     | 0             | 10    | 10    | 0             | 6     | 6     | 0             | 8     | 8     |
|                                |                      |              | 1             |       |       | 1             |       |       | 1             |       |       | 1             |       |       |
|                                |                      |              | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       |
|                                |                      |              | 0             | 2     | 2     | 0             | 1     | 1     | 0             | 2     | 2     | 0             | 3     | 3     |
|                                |                      |              | 0             | 161.9 | 161.9 | 0             | 404.7 | 404.7 | 0             | 242.8 | 242.8 | 0             | 323.7 | 323.7 |

Table 7. Continues.

**Table 7. Stem Count Total and Planted by Plot and Species continued.**

| Scientific Name   | Common Name          | Species Type | 00201-01-0013 |       |       | 00201-01-0014 |       |       | 00201-02-0015 |       |       | 00201-02-0016 |       |       |
|---|----------------------|--------------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|
|   |                      |              | P-LS          | P-all | T     |
| <i>Acer rubrum</i>  | red maple            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Baccharis halmifolia</i>   | baccharis            | Shrub Tree   |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Chamaecyparis thyoides</i>   | Atlantic white cedar | Tree         |               |       |       |               |       |       |               |       |       |               | 2     | 2     |
| <i>Liquidambar styraciflua</i>  | sweetgum             | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Magnolia virginiana</i>  | sweetbay             | Shrub Tree   |               |       |       |               | 2     | 2     |               | 3     | 3     |               |       |       |
| <i>Morella cerifera</i>   | sweetgale            | Shrub        |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Nyssa aquatica</i>   | water tupelo         | Tree         |               |       |       |               |       |       |               |       |       |               | 1     | 1     |
| <i>Persea palustris</i>   | swamp bay            | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Pinus serotina</i>   | pond pine            | Tree         |               |       |       |               |       |       |               |       |       |               | 1     | 1     |
| <i>Pinus taeda</i>  | loblolly pine        | Tree         |               | 7     | 7     |               | 5     | 5     |               |       |       |               |       |       |
| <i>Quercus lyrata</i>   | overcup oak          | Tree         |               |       |       |               |       |       |               |       |       |               | 3     | 3     |
| <i>Salix nigra</i>  | black willow         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Taxodium ascendens</i>   | pond cypress         | Tree         |               |       |       |               |       |       |               |       |       |               |       |       |
| <i>Taxodium distichum</i>   | bald cypress         | Tree         |               |       |       |               |       |       |               | 2     | 2     |               |       |       |
| <b>Stem count size (ares)</b><br><b>size (ACRES)</b><br><b>Species count</b><br><b>Stems per ACRE</b> |                      |              | 0             | 7     | 7     | 0             | 7     | 7     | 0             | 5     | 5     | 0             | 7     | 7     |
|   |                      |              | 1             |       |       | 1             |       |       | 1             |       |       | 1             |       |       |
|   |                      |              | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       |
|   |                      |              | 0             | 1     | 1     | 0             | 2     | 2     | 0             | 2     | 2     | 0             | 4     | 4     |
|   |                      |              | 0             | 283.3 | 283.3 | 0             | 283.3 | 283.3 | 0             | 202.3 | 202.3 | 0             | 283.3 | 283.3 |

Table 7. Continues.

**Table 7. Stem Count Total and Planted by Plot and Species continued.**

| Scientific Name   | Common Name          | Species Type | 00201-02-0017 |       |       | 00201-02-0018 |       |       | 00201-02-0019 |       |       |
|---|----------------------|--------------|---------------|-------|-------|---------------|-------|-------|---------------|-------|-------|
|   |                      |              | P-LS          | P-all | T     | P-LS          | P-all | T     | P-LS          | P-all | T     |
| <i>Acer rubrum</i>  | red maple            | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Baccharis halmifolia</i>   | baccharis            | Shrub Tree   |               |       |       |               |       |       |               |       |       |
| <i>Chamaecyparis thyoides</i>   | Atlantic white cedar | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Liquidambar styraciflua</i>  | sweetgum             | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Magnolia virginiana</i>  | sweetbay             | Shrub Tree   |               |       |       |               | 3     | 3     |               |       |       |
| <i>Morella cerifera</i>   | sweetgale            | Shrub        |               |       |       |               |       |       |               |       |       |
| <i>Nyssa aquatica</i>   | water tupelo         | Tree         |               |       |       |               | 3     | 3     |               |       |       |
| <i>Persea palustris</i>   | swamp bay            | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Pinus serotina</i>   | pond pine            | Tree         |               | 7     | 7     |               |       |       |               |       |       |
| <i>Pinus taeda</i>  | loblolly pine        | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Quercus lyrata</i>   | overcup oak          | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Salix nigra</i>  | black willow         | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Taxodium ascendens</i>   | pond cypress         | Tree         |               |       |       |               |       |       |               |       |       |
| <i>Taxodium distichum</i>   | bald cypress         | Tree         |               | 4     | 4     |               |       |       |               | 4     | 4     |
| <b>Stem count size (ares) size (ACRES) Species count Stems per ACRE</b> |                      |              | 0             | 7     | 0     | 11            | 11    | 0     | 6             | 6     | 0     |
|   |                      |              | 1             |       |       | 1             |       |       | 1             |       |       |
|   |                      |              | 0.02          |       |       | 0.02          |       |       | 0.02          |       |       |
|   |                      |              | 0             | 2     | 2     | 0             | 2     | 2     | 0             | 1     | 1     |
|   |                      |              | 0             | 445.2 | 445.2 | 0             | 242.8 | 242.8 | 0             | 161.9 | 161.9 |

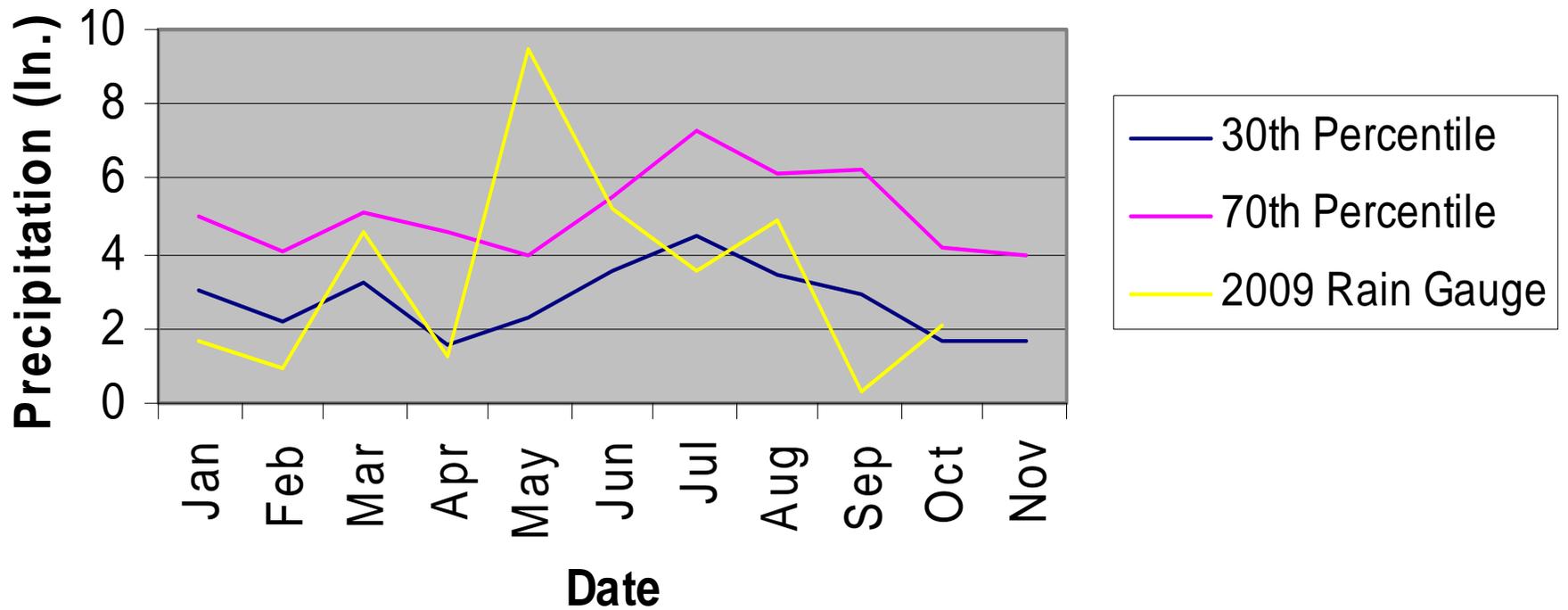
Table 7. Continues.

**Table 7. Stem Count Total and Planted by Plot and Species concluded.**

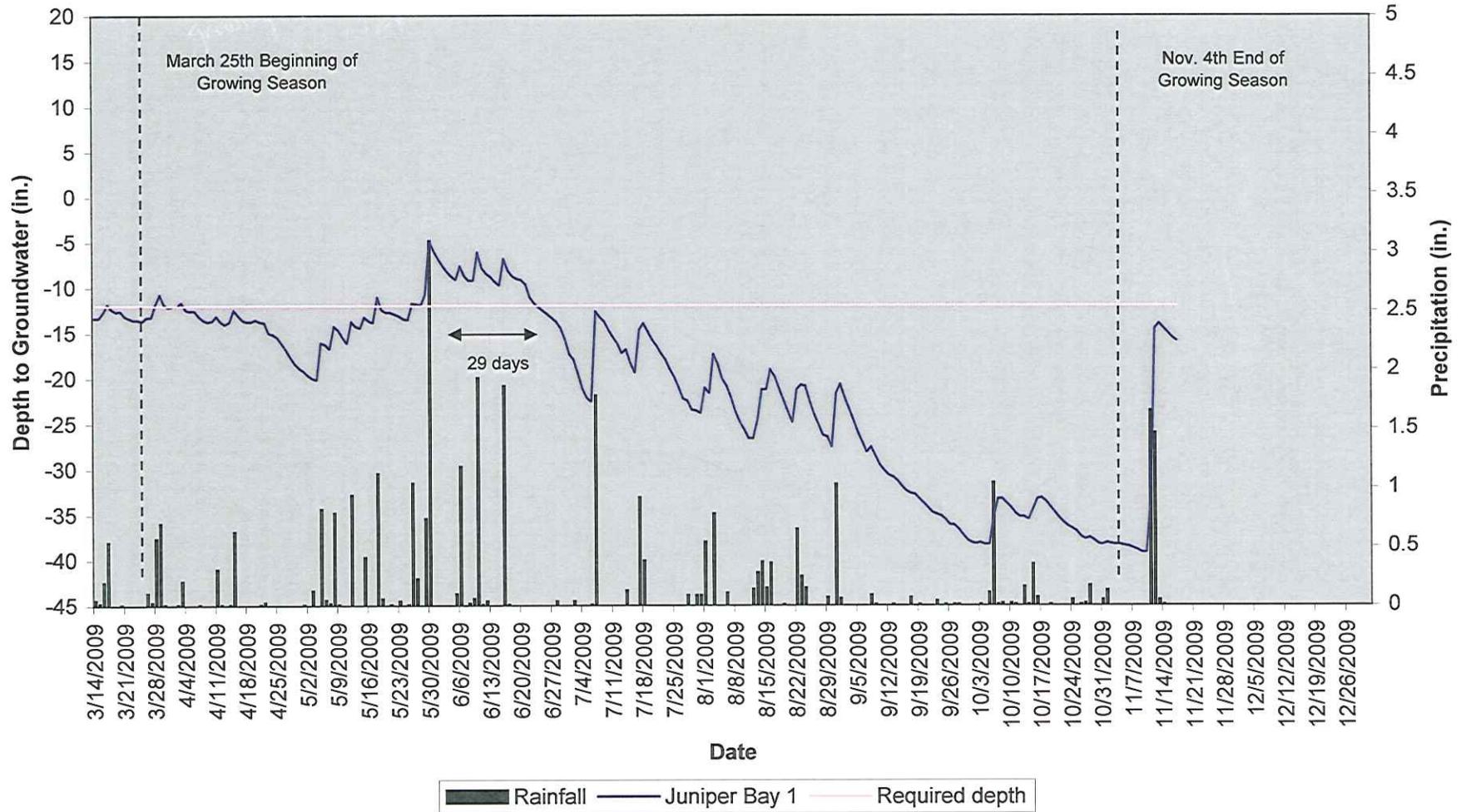
| Scientific Name   | Common Name          | Species Type | MY3 (2009) |       |       | MY2 (2008) |       |       | MY1 (2007) |       |       | MY0 (2006) |       |       |   |   |    |
|---|----------------------|--------------|------------|-------|-------|------------|-------|-------|------------|-------|-------|------------|-------|-------|---|---|----|
|   |                      |              | P-LS       | P-all | T     |   |   |    |
| <i>Acer rubrum</i>  | red maple            | Tree         |            |       |       |            |       |       |            |       |       |            |       | 8     |   |   |    |
| <i>Baccharis halmifolia</i>   | baccharis            | Shrub Tree   |            |       |       |            |       |       |            |       |       |            |       | 1     |   |   |    |
| <i>Chamaecyparis thyoides</i>   | Atlantic white cedar | Tree         |            | 2     | 2     |            | 2     | 2     |            | 2     | 2     |            | 2     | 2     |   |   |    |
| <i>Liquidambar styraciflua</i>  | sweetgum             | Tree         |            |       |       |            |       |       |            |       |       |            |       | 2     |   |   |    |
| <i>Magnolia virginiana</i>  | sweetbay             | Shrub Tree   |            | 8     | 8     |            | 8     | 8     |            | 8     | 8     |            | 8     | 8     |   |   |    |
| <i>Morella cerifera</i>   | sweetgale            | Shrub        |            |       |       |            |       |       |            |       |       |            |       | 1     |   |   |    |
| <i>Nyssa aquatica</i>   | water tupelo         | Tree         |            | 6     | 6     |            | 6     | 6     |            | 7     | 7     |            | 14    | 15    |   |   |    |
| <i>Persea palustris</i>   | swamp bay            | Tree         |            |       |       |            |       |       |            |       |       |            | 7     | 7     |   |   |    |
| <i>Pinus serotina</i>   | pond pine            | Tree         |            | 14    | 14    |            | 15    | 15    |            | 16    | 16    |            | 20    | 20    |   |   |    |
| <i>Pinus taeda</i>  | loblolly pine        | Tree         |            | 49    | 49    |            | 49    | 49    |            | 51    | 51    |            | 52    | 52    |   |   |    |
| <i>Quercus lyrata</i>   | overcup oak          | Tree         |            | 21    | 21    |            | 21    | 21    |            | 22    | 22    |            | 28    | 28    |   |   |    |
| <i>Salix nigra</i>  | black willow         | Tree         |            |       |       |            |       |       |            |       |       |            |       | 18    |   |   |    |
| <i>Taxodium ascendens</i>   | pond cypress         | Tree         |            | 1     | 1     |            |       |       |            |       |       |            |       |       |   |   |    |
| <i>Taxodium distichum</i>   | bald cypress         | Tree         |            | 55    | 55    |            | 54    | 54    |            | 55    | 55    |            | 58    | 58    |   |   |    |
| <b>Stem count size (ares) size (ACRES) Species count Stems per ACRE</b> |                      |              | 0          | 7     | 0     | 156        | 156   | 0     | 155        | 155   | 0     | 161        | 161   | 0     |   |   |    |
|   |                      |              | 20         |       |       | 20         |       |       | 20         |       |       | 20         |       |       |   |   |    |
|   |                      |              | 0.49       |       |       | 0.49       |       |       | 0.49       |       |       | 0.49       |       |       |   |   |    |
|   |                      |              | 0          | 8     | 8     | 0          | 7     | 7     | 0          | 7     | 7     | 0          | 7     | 7     | 0 | 8 | 13 |
|   |                      |              | 0          | 315.7 | 315.7 | 0          | 313.6 | 313.6 | 0          | 325.8 | 325.8 | 0          | 382.4 | 445.2 |   |   |    |

**Appendix D**  
**Wetland Assessment Data**

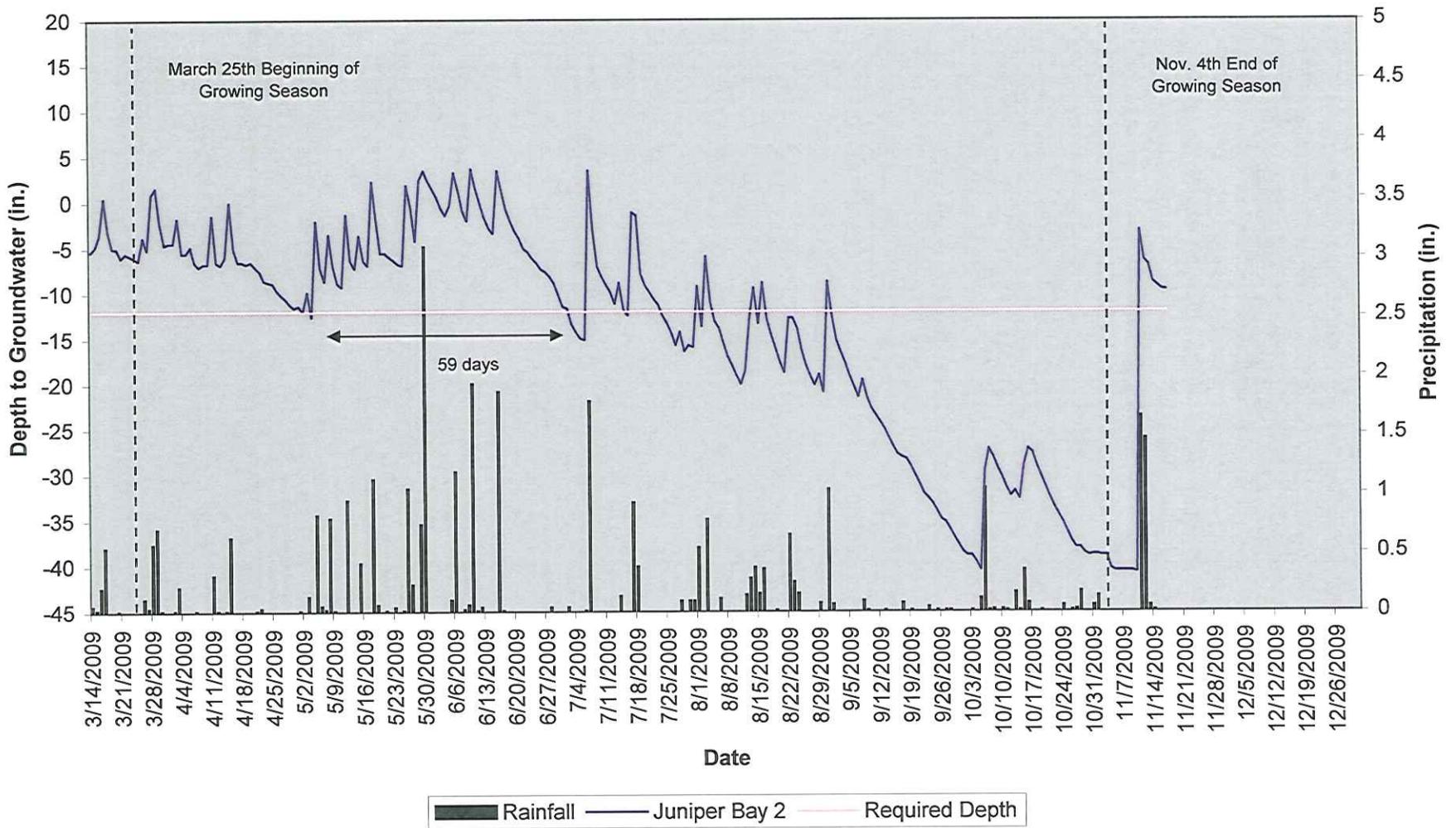
**Figure 3. Juniper Bay 30-70 Percentile Graph for Rainfall in 2009**



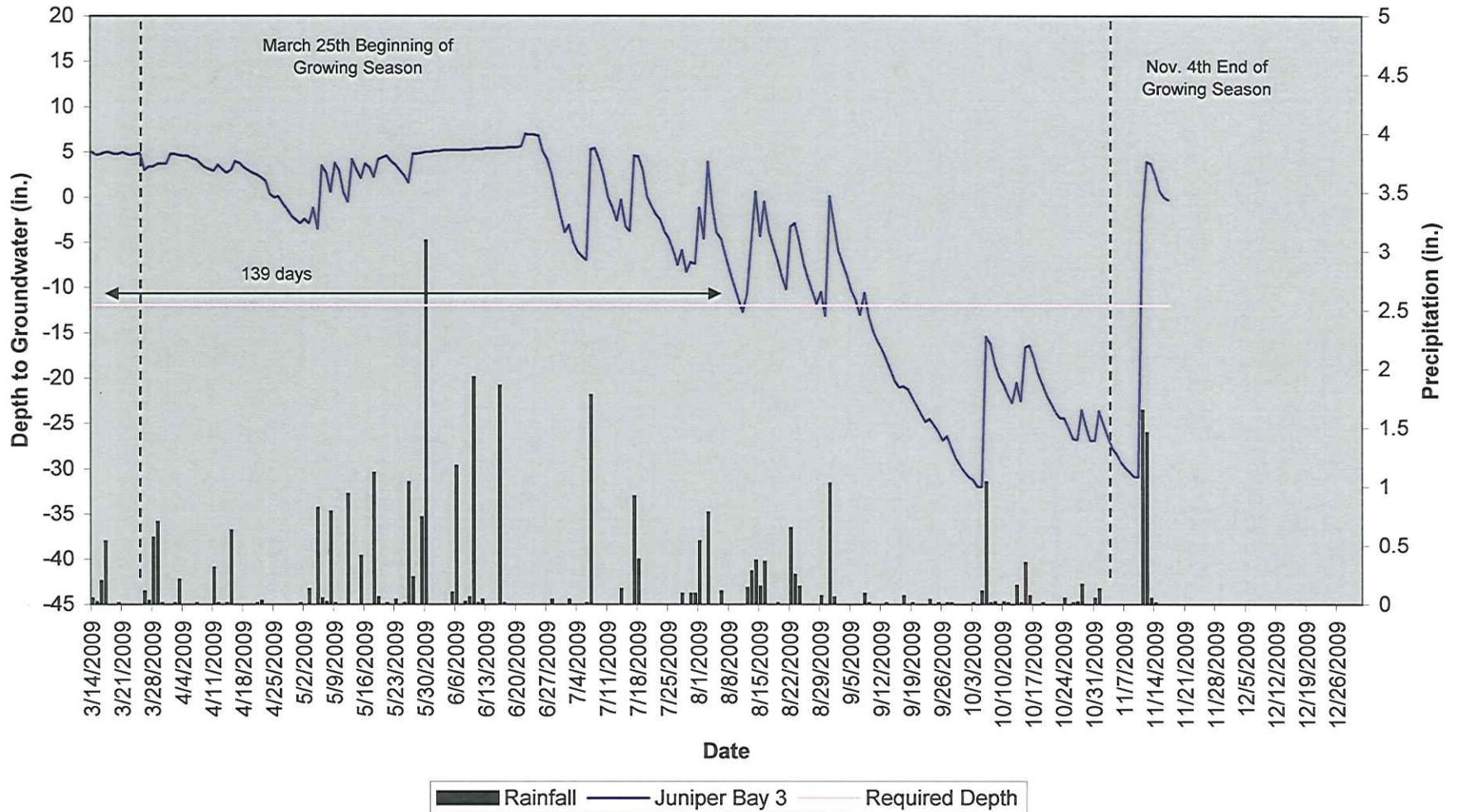
**Juniper Bay  
1  
40" Groundwater**



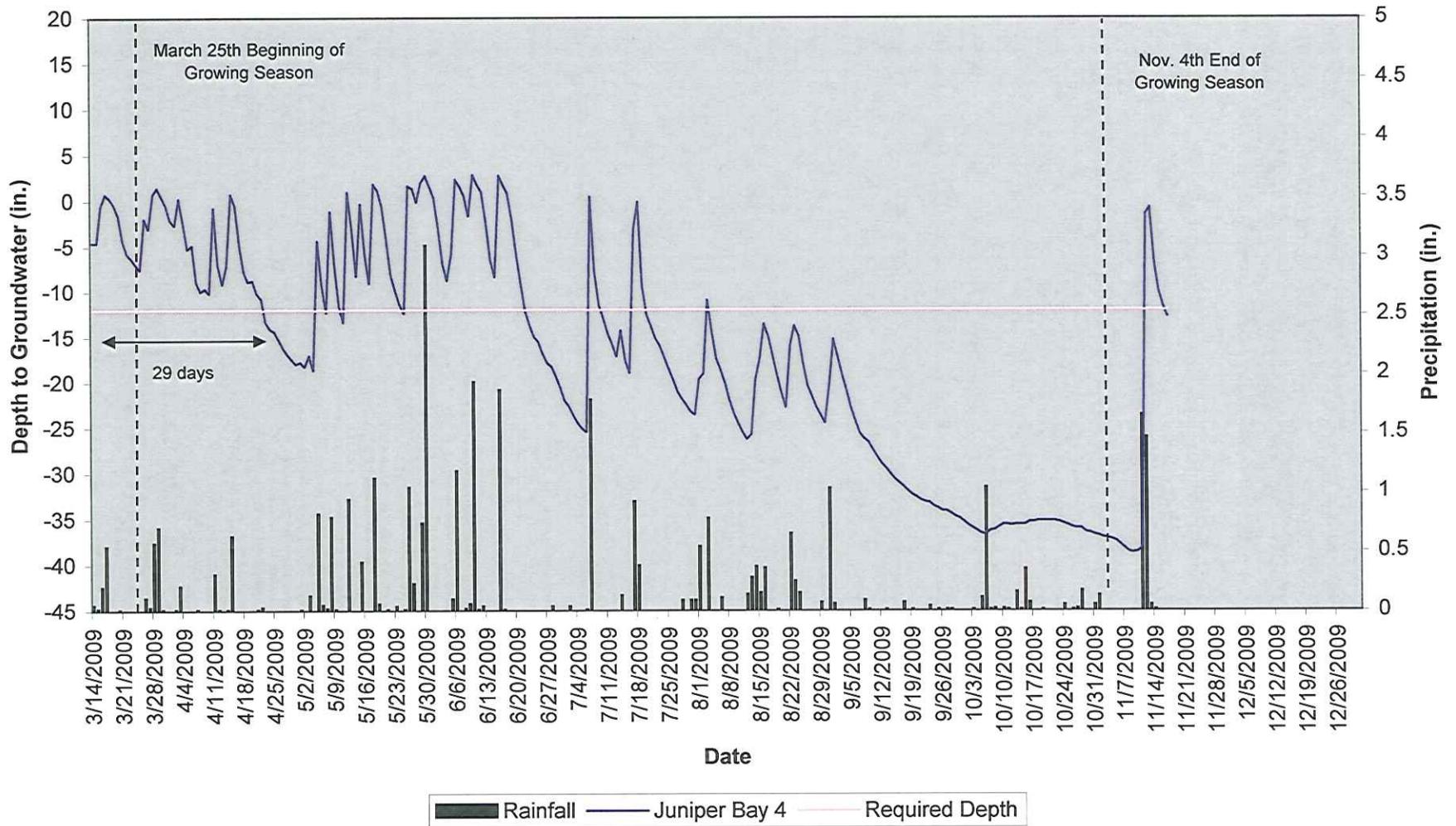
**Juiper Bay  
2  
40" Groundwater**



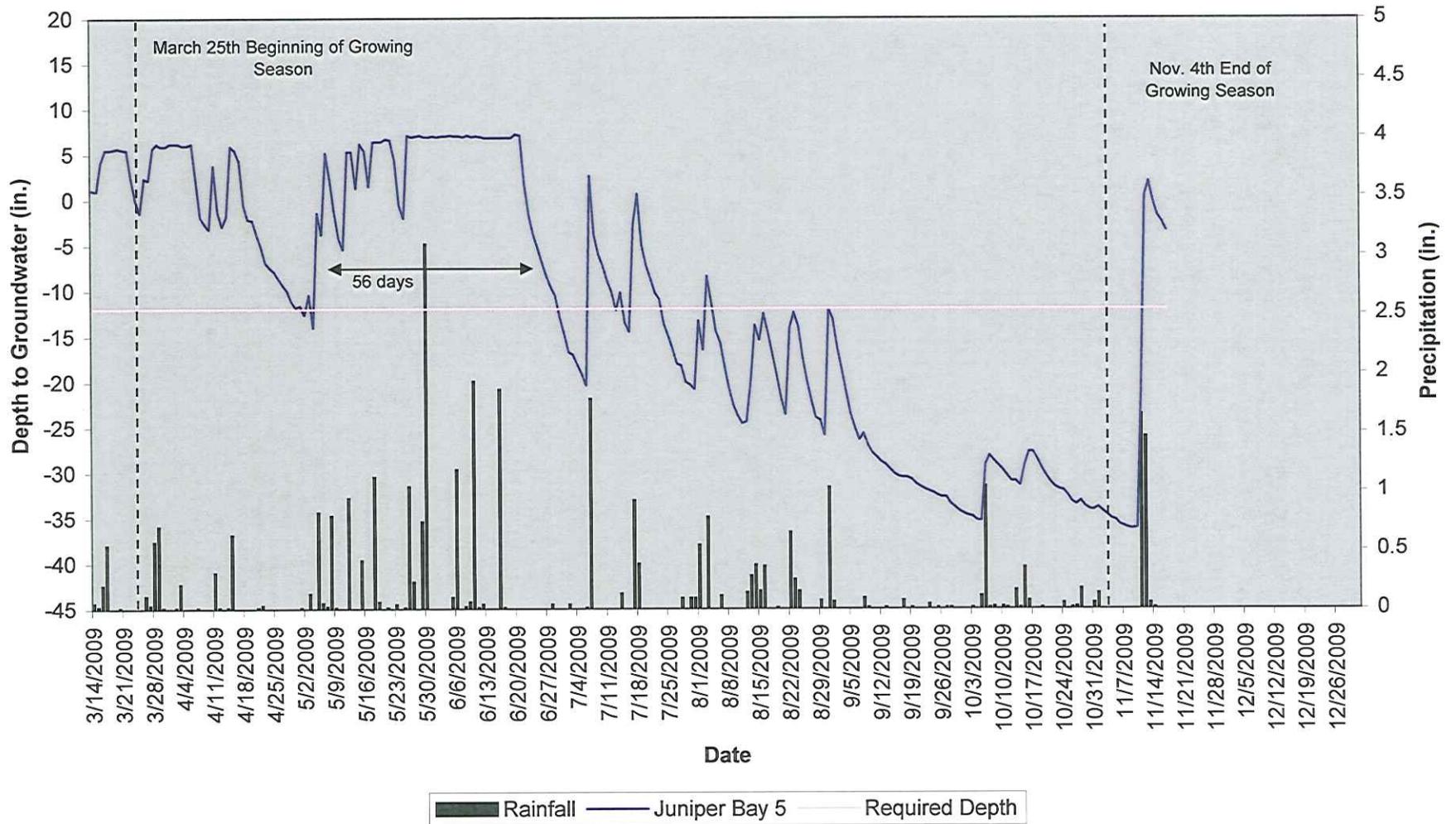
### Juniper Bay 3 40" Groundwater



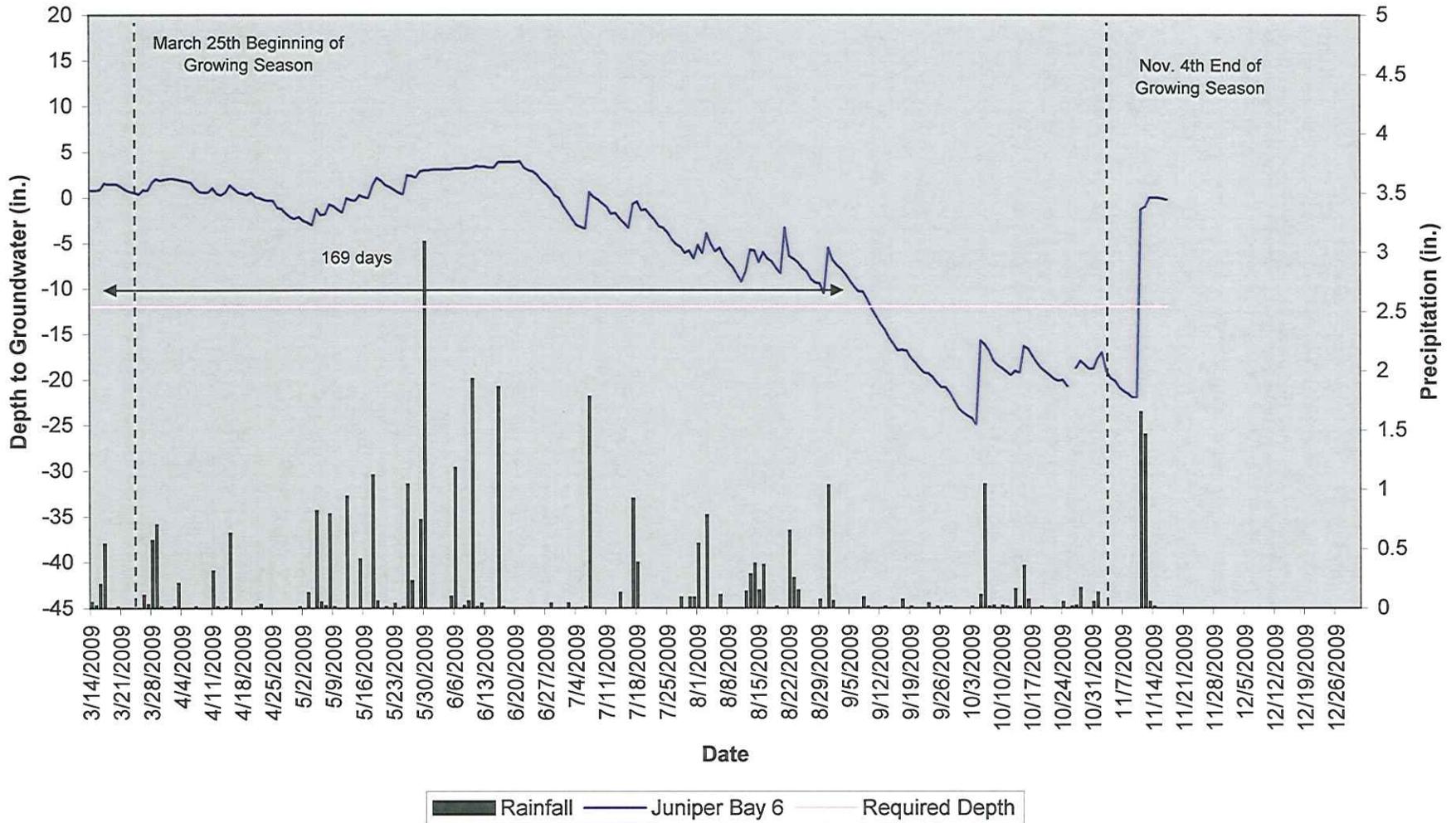
**Juniper Bay  
4  
40" Groundwater**



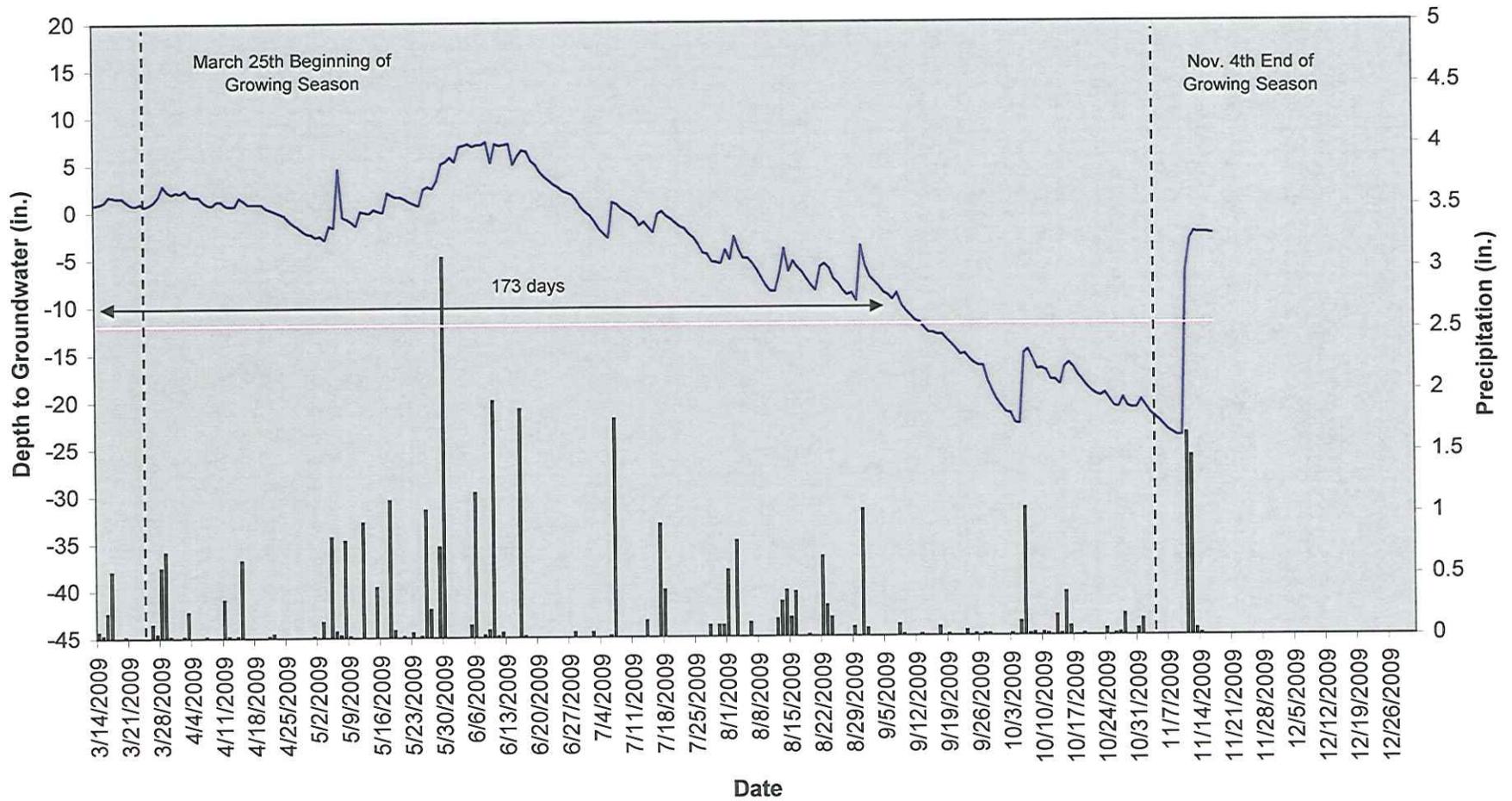
# Juniper Bay 5 40" Groundwater



**Juniper Bay  
6  
40" Groundwater**

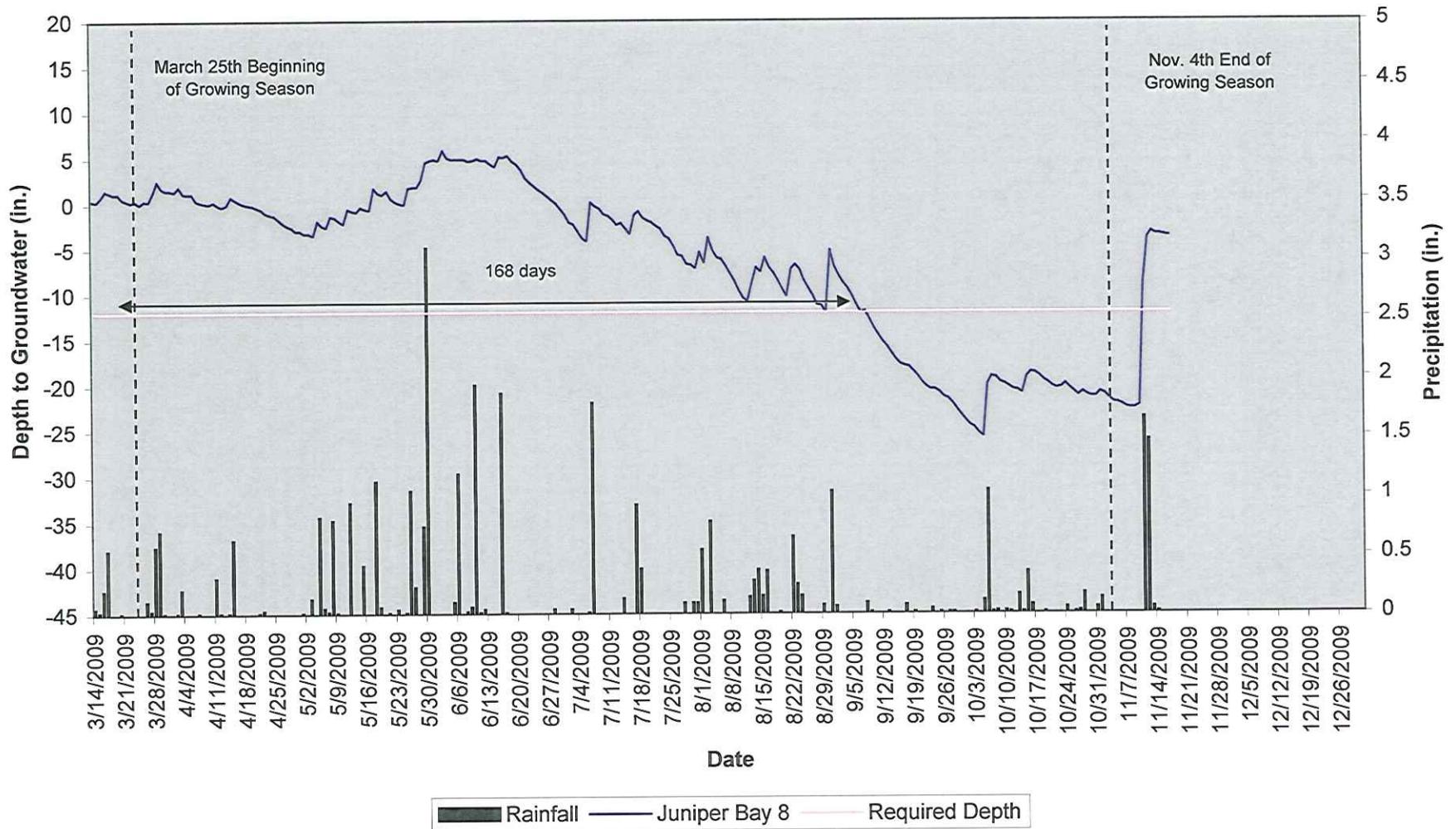


**Juniper Bay  
7  
40" Groundwater**

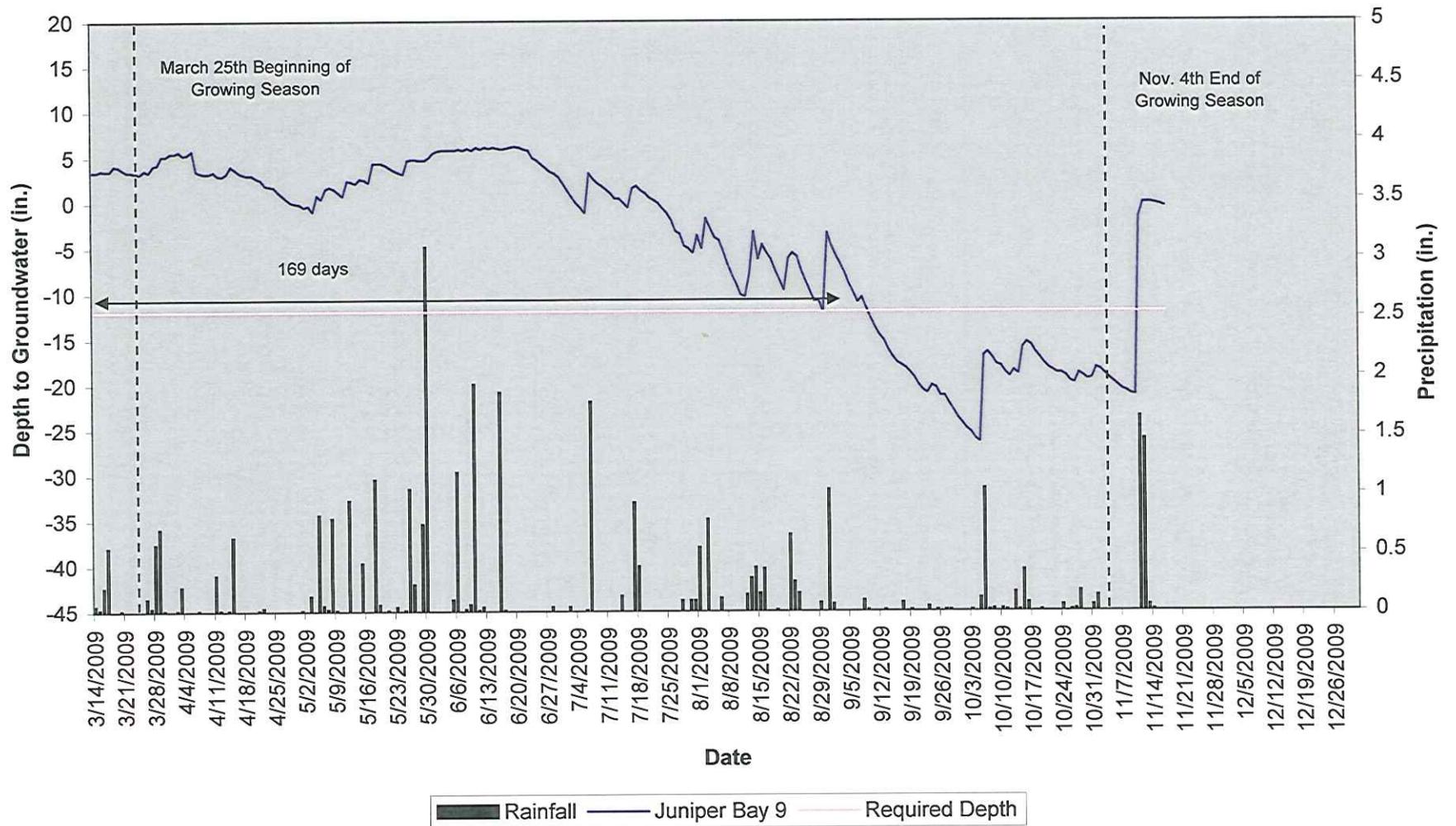


Rainfall
  Juniper Bay 7
  Required Depth

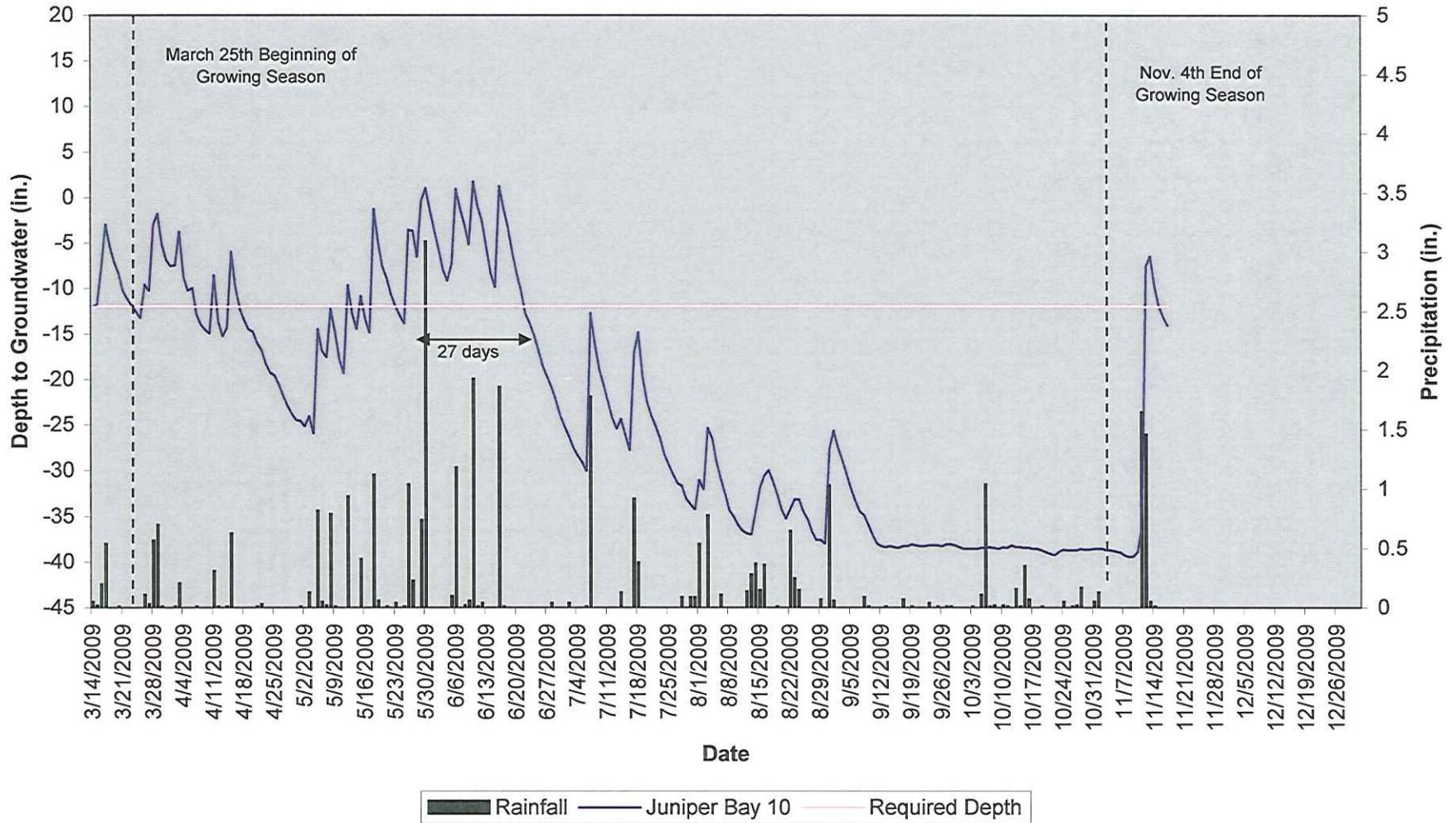
**Juniper Bay  
8  
40" Groundwater**



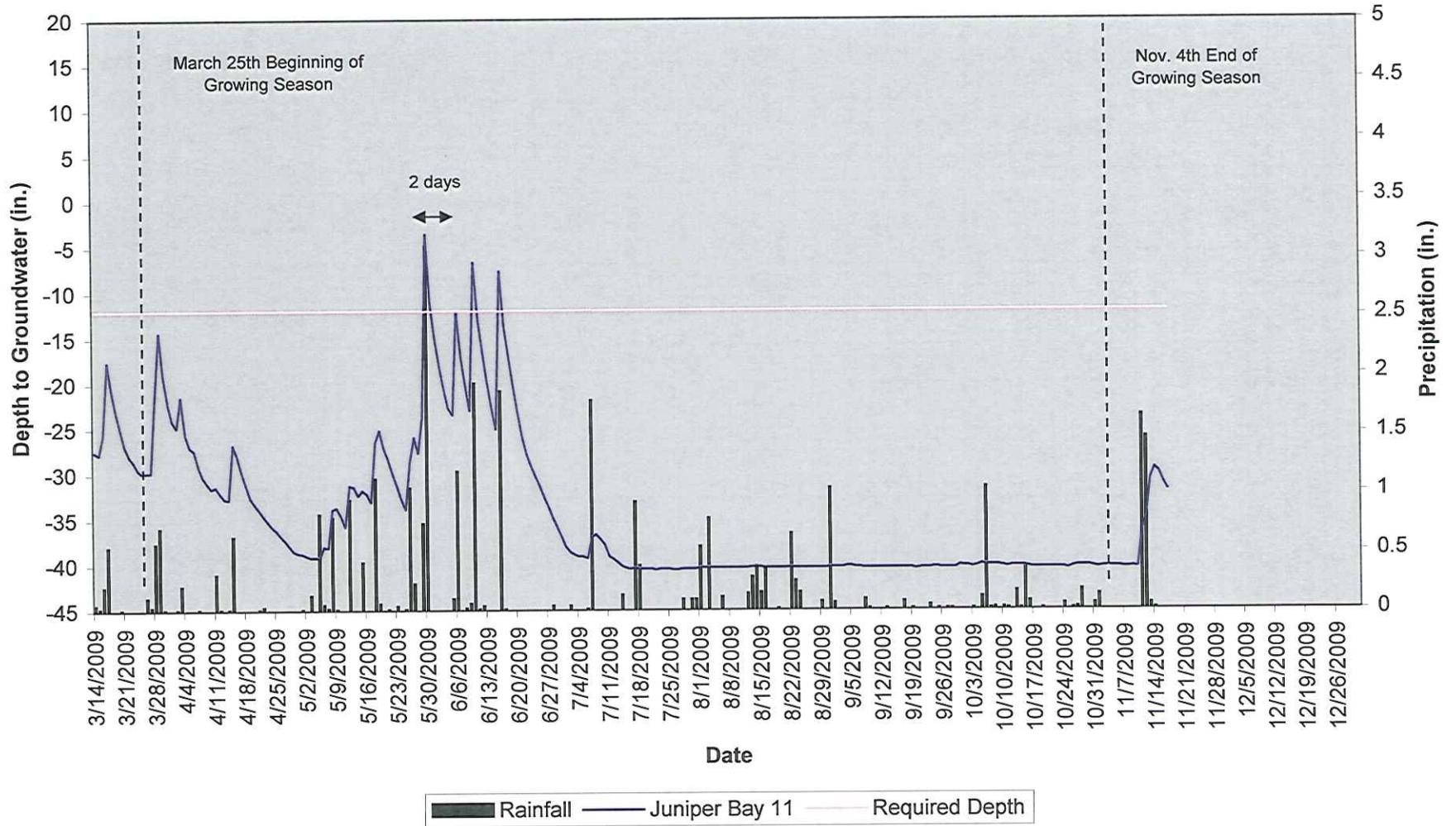
**Juniper Bay  
9  
40" Groundwater**



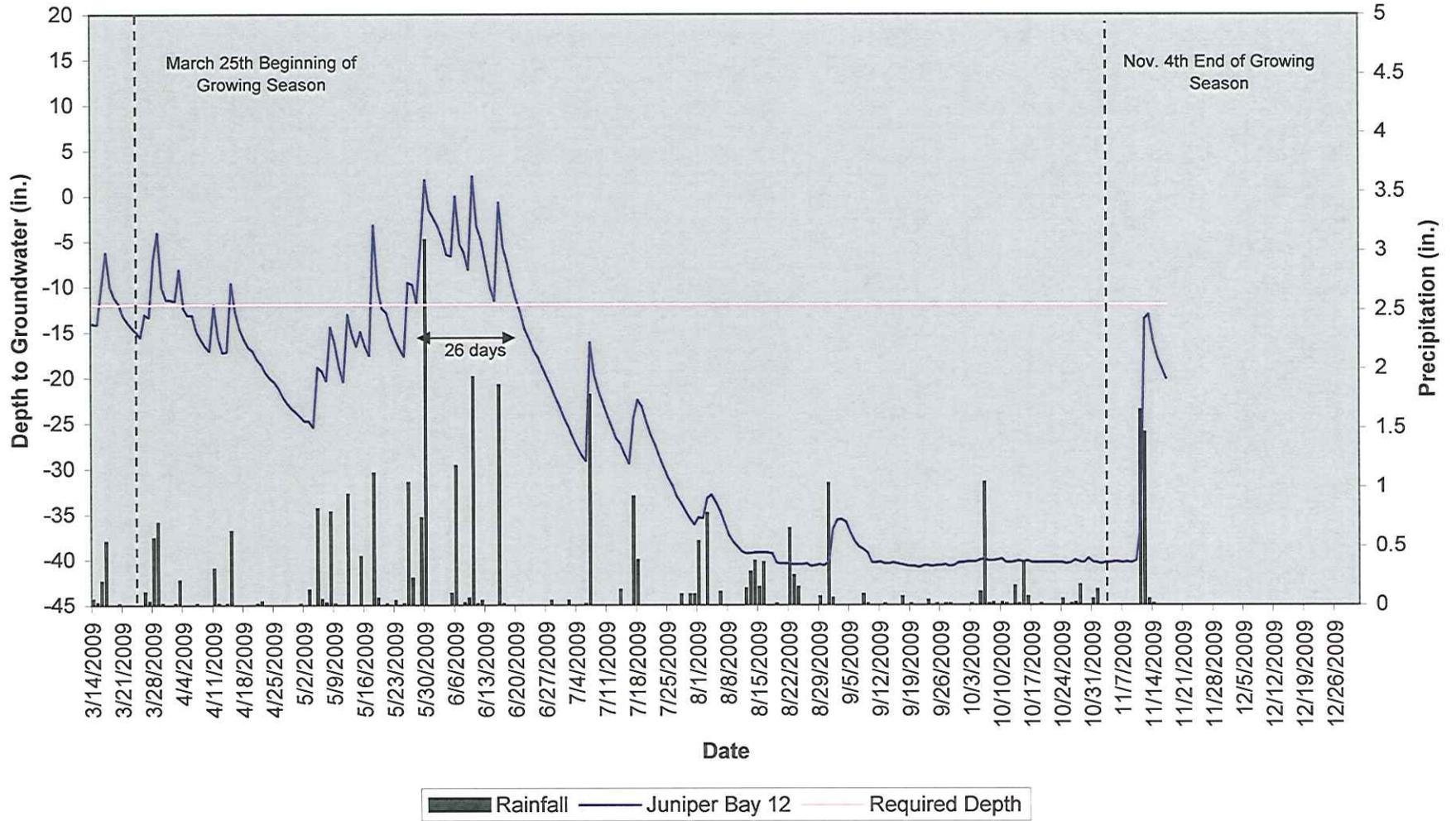
**Juniper Bay  
10  
40" Groundwater**



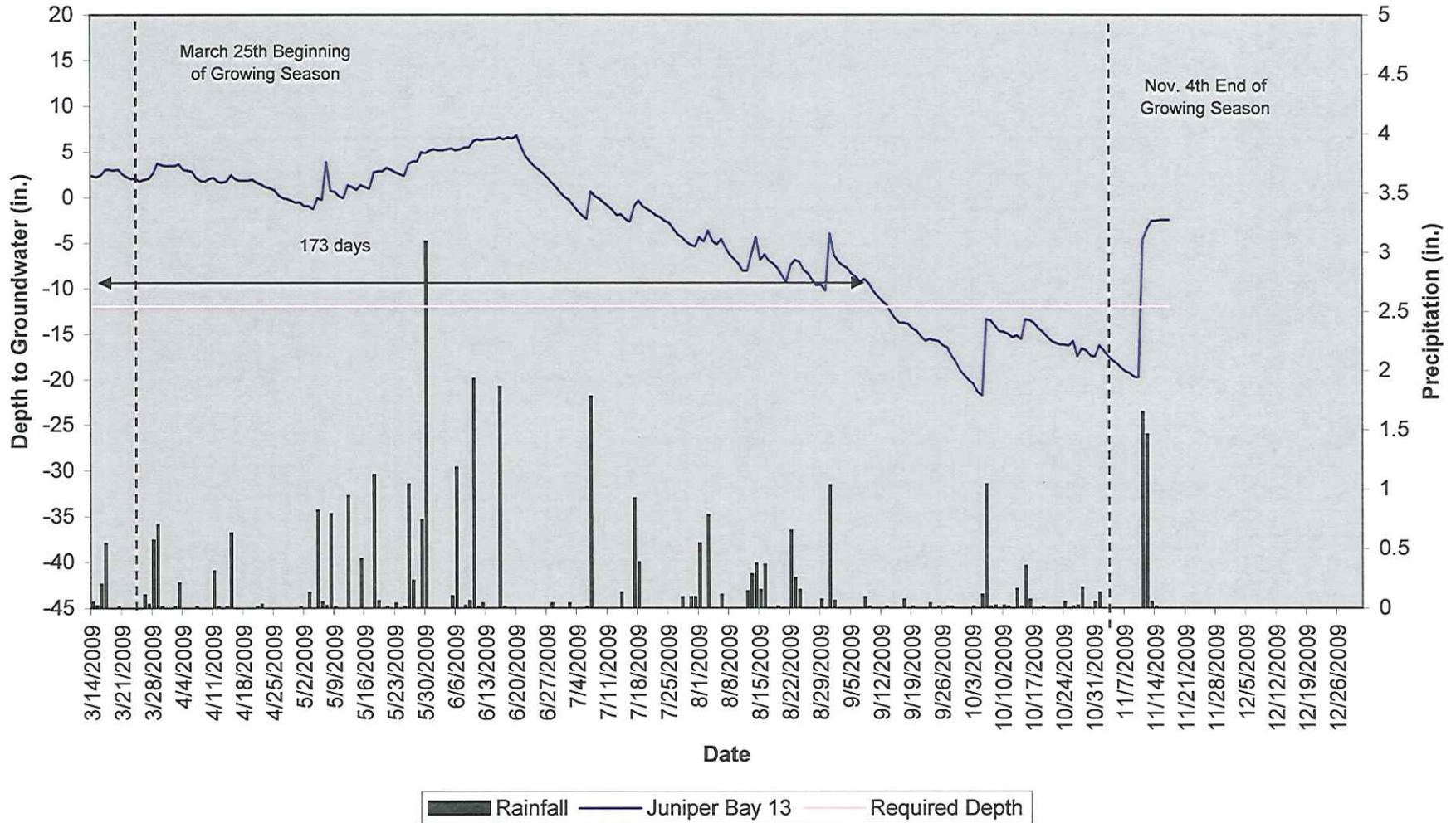
**Juniper Bay  
11  
40" Groundwater**



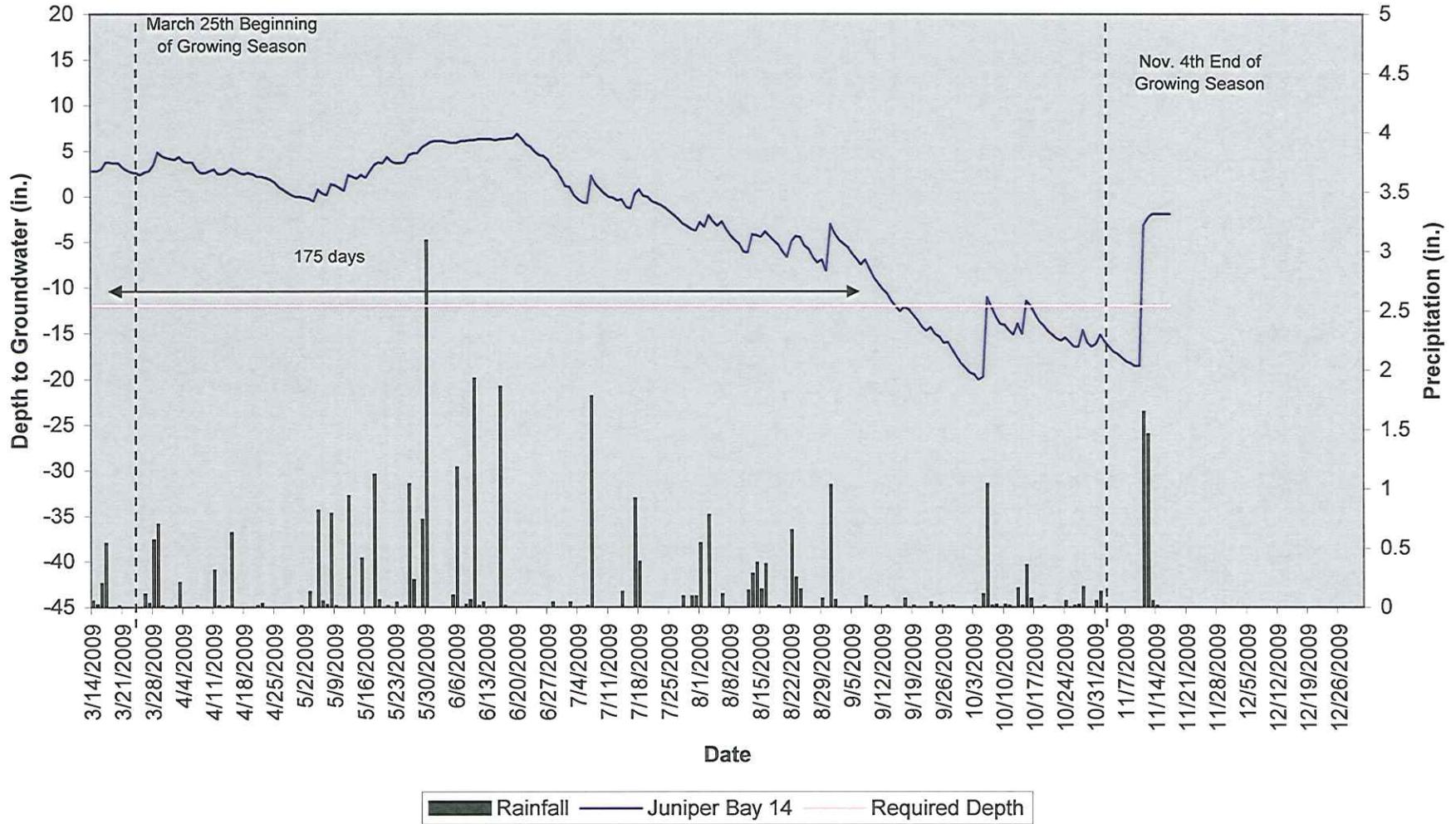
**Juniper Bay  
12  
40" Groundwater**



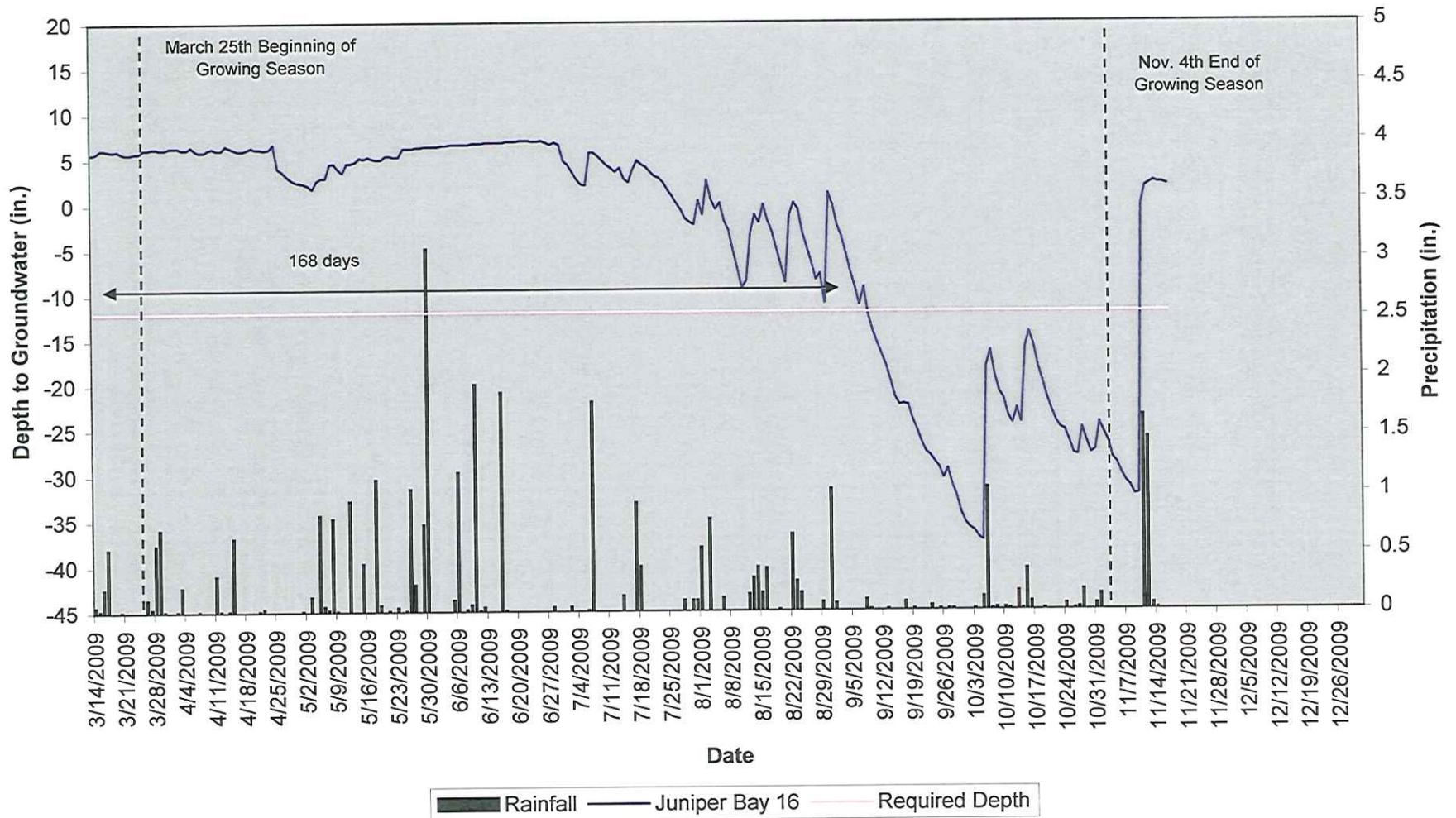
**Juniper Bay  
13  
40" Groundwater**



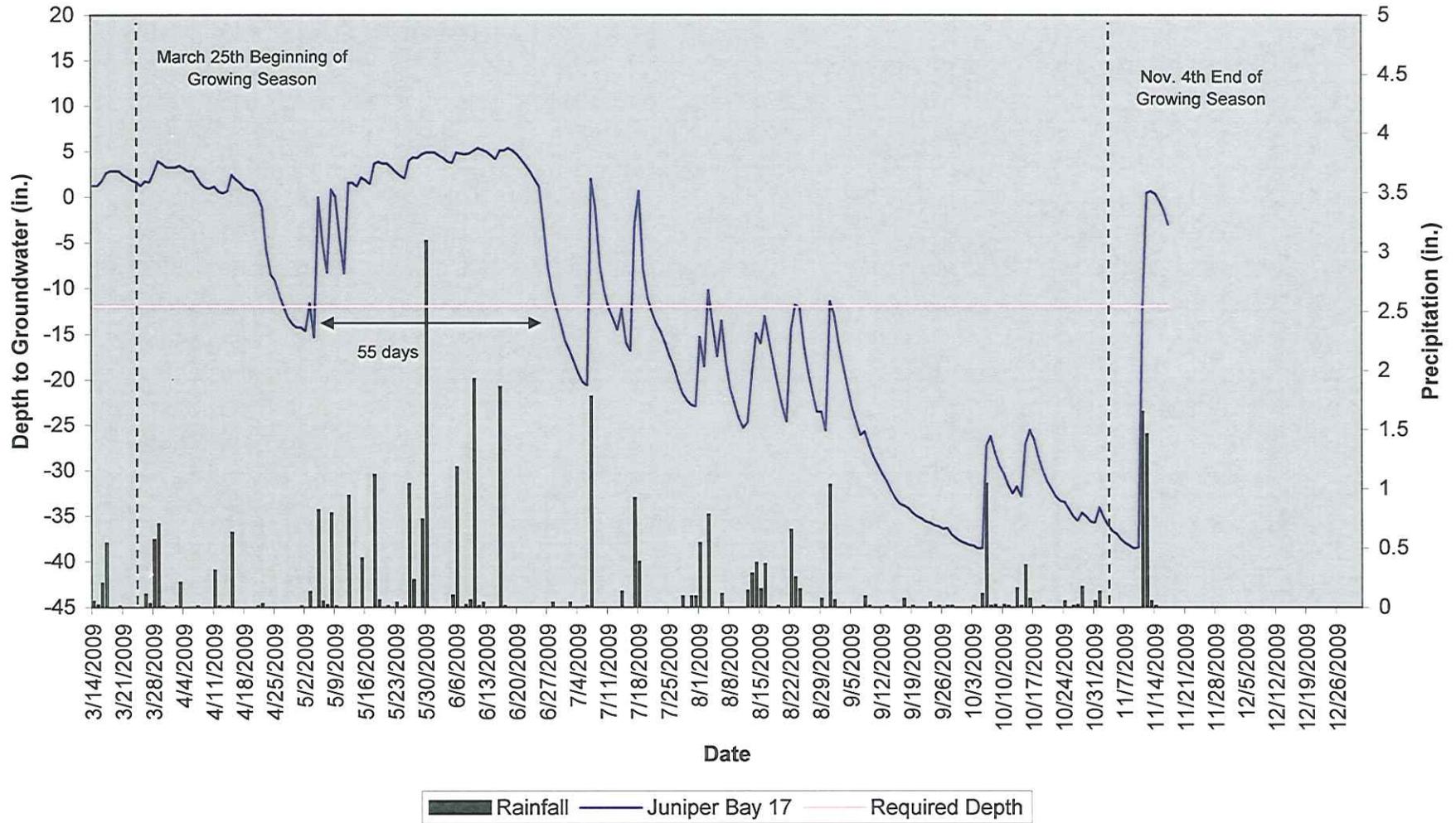
## Juniper Bay 14 40" Groundwater



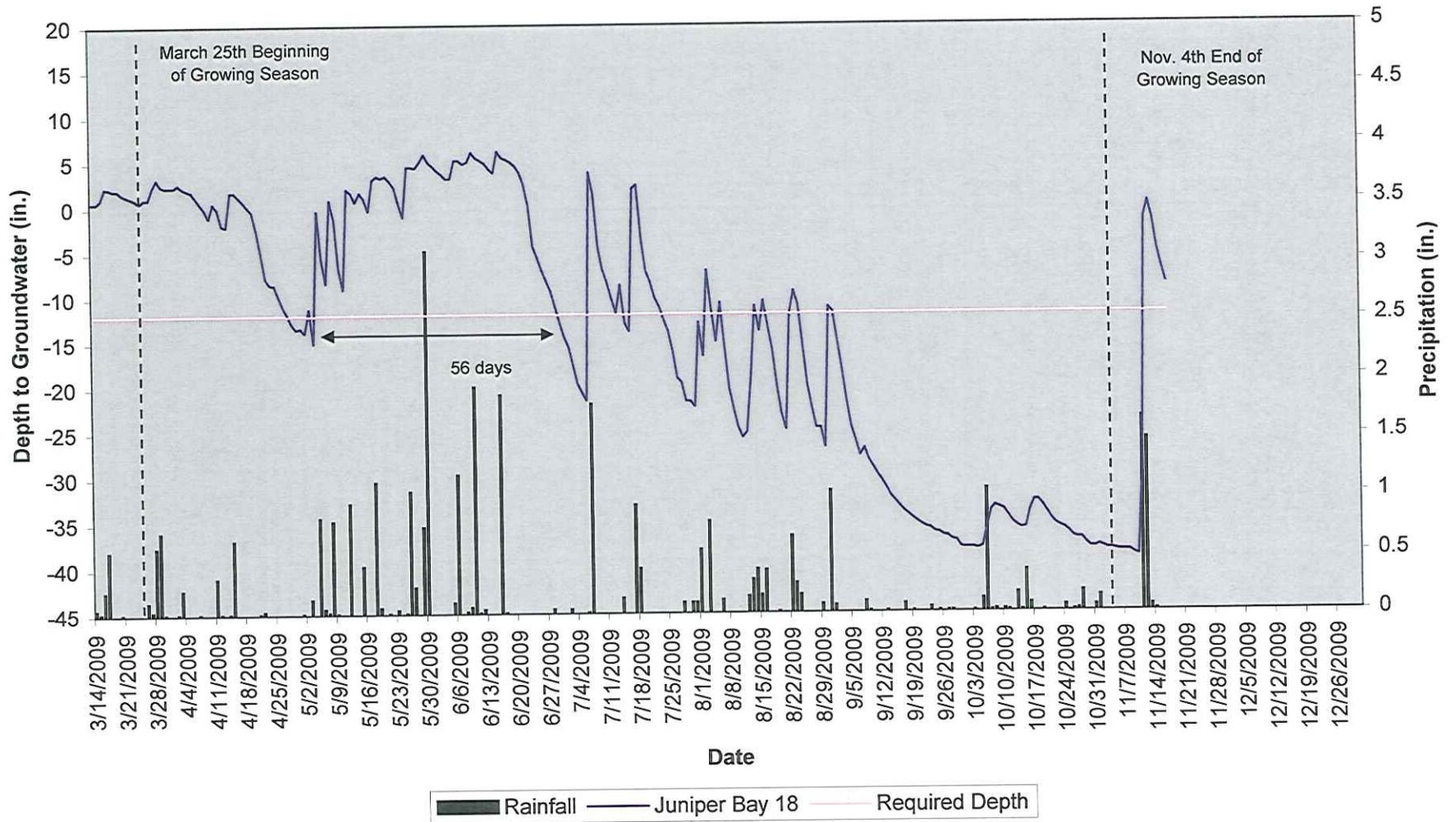
## Juniper Bay 16 40" Groundwater



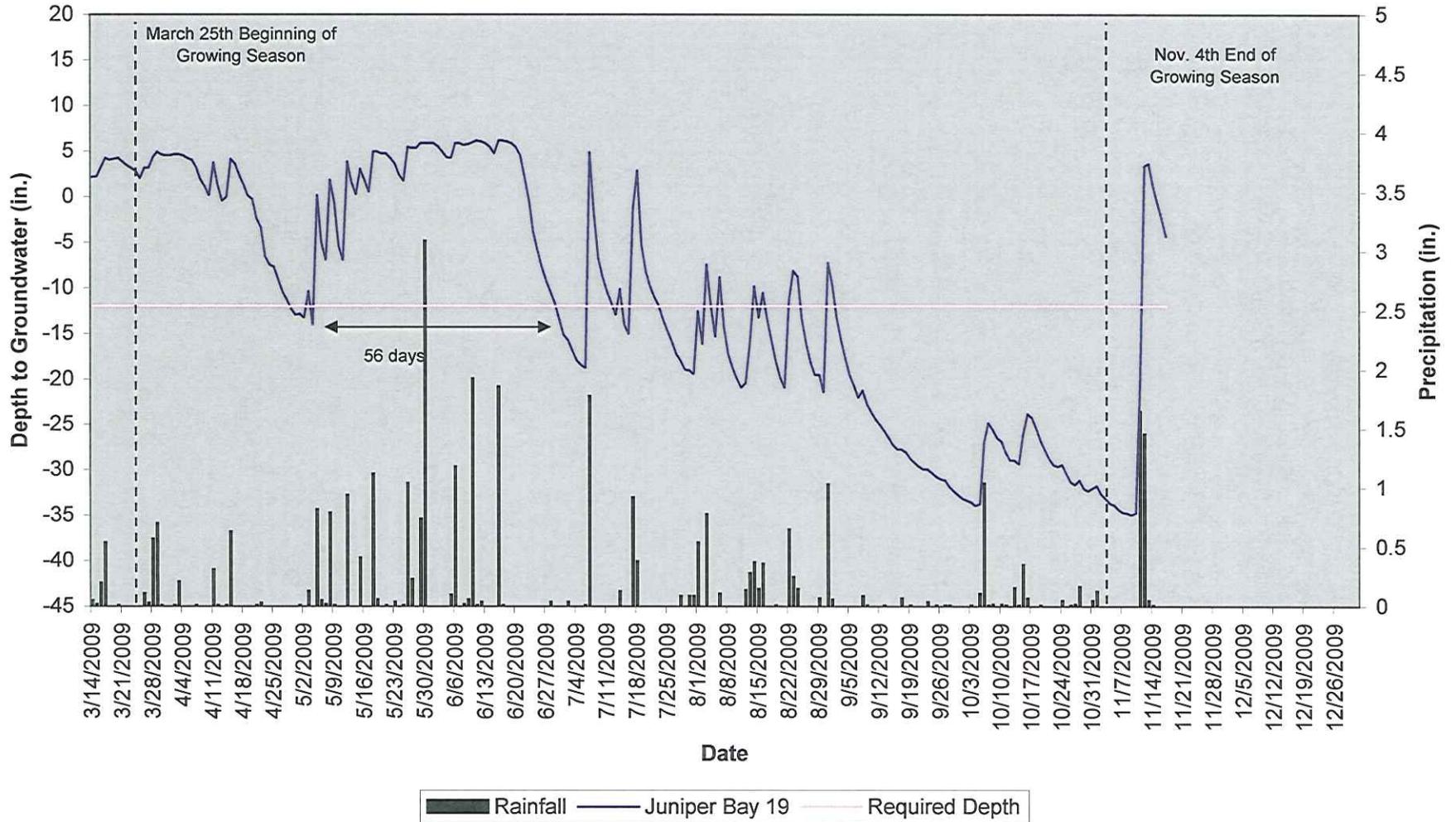
**Juniper Bay  
17  
40" Groundwater**



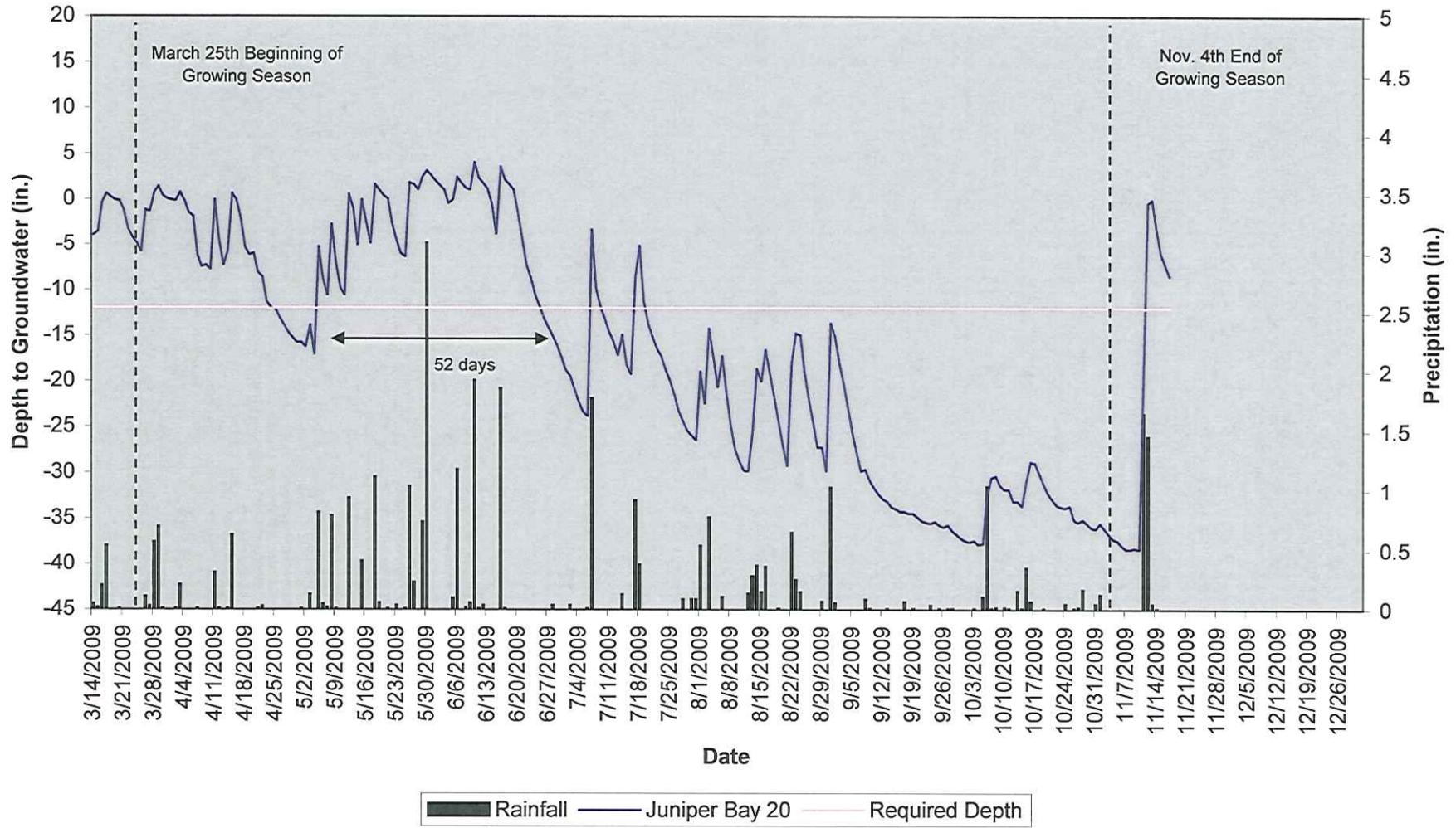
Juniper Bay  
18  
40" Groundwater



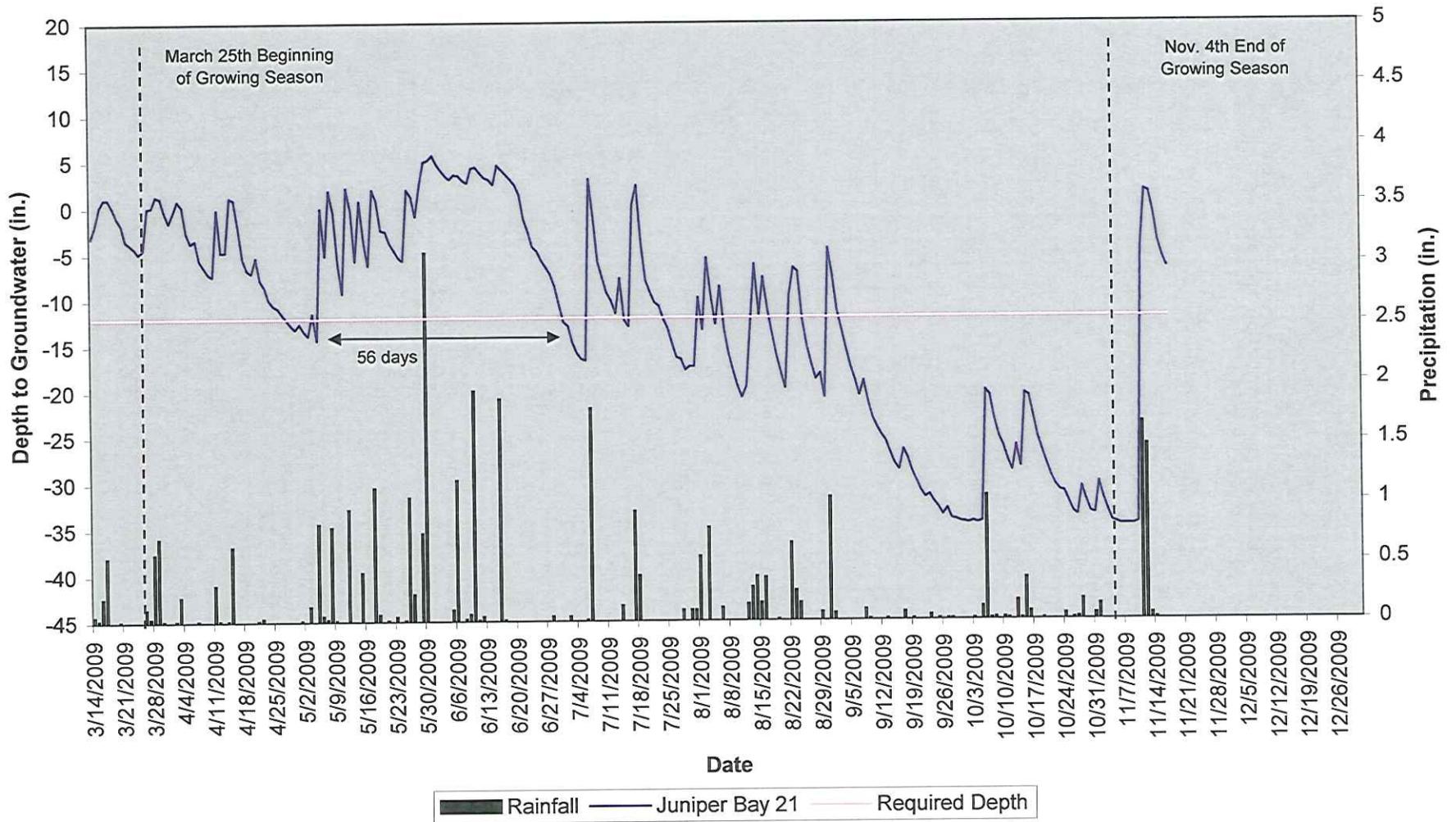
## Juniper Bay 19 40" Groundwater



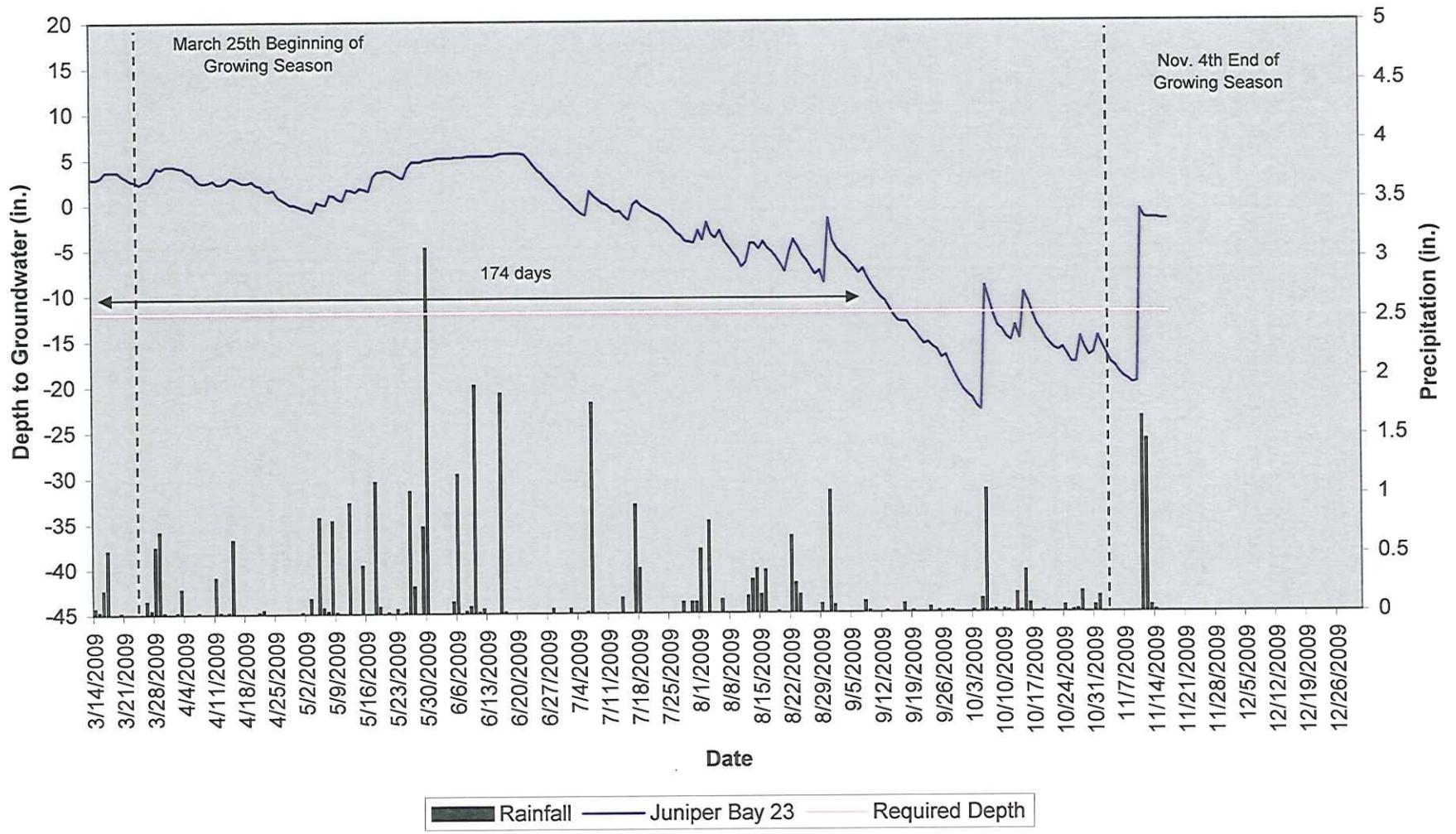
**Juniper Bay  
20  
40" Groundwater**



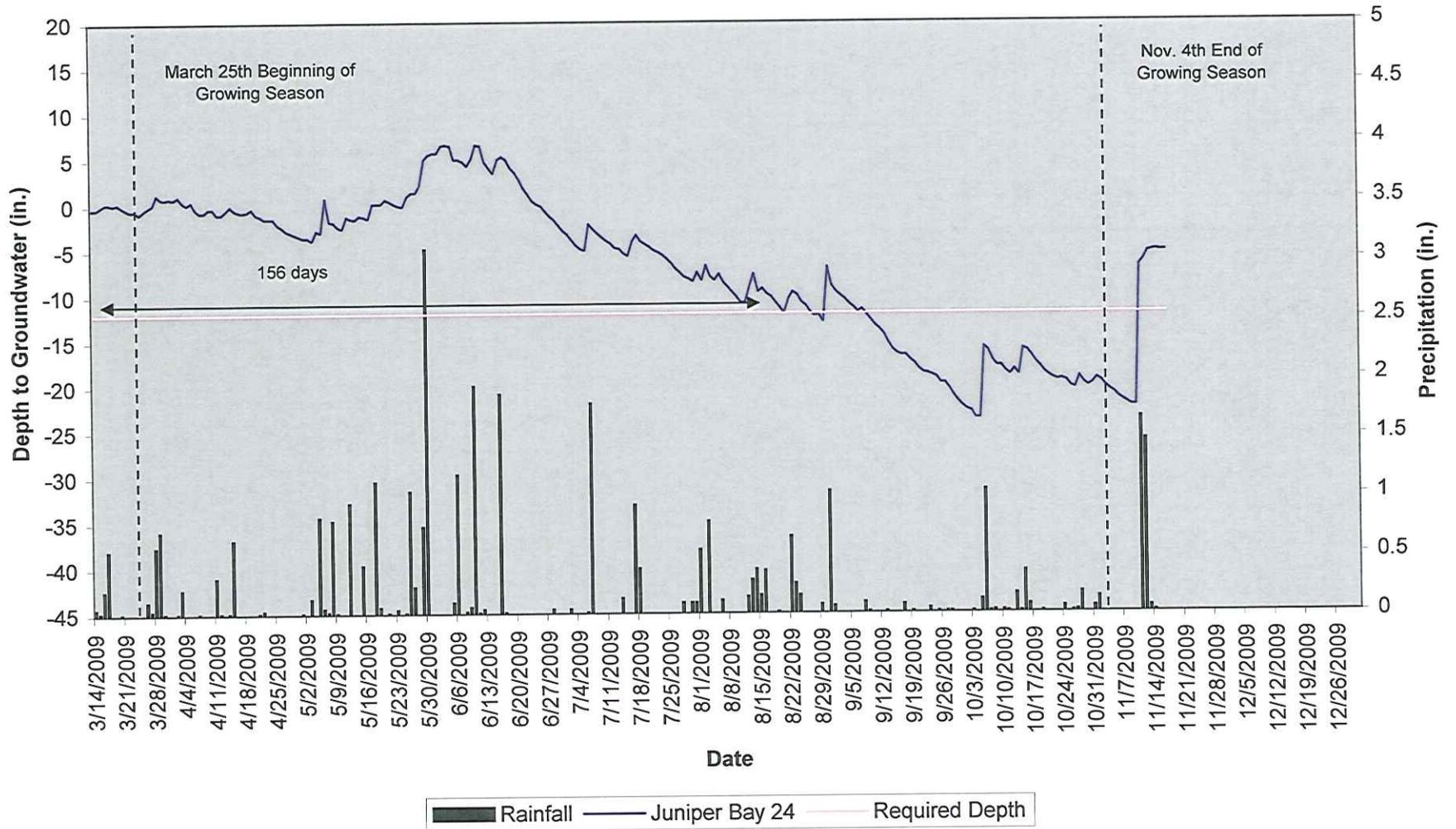
# Juniper Bay 21 40" Groundwater



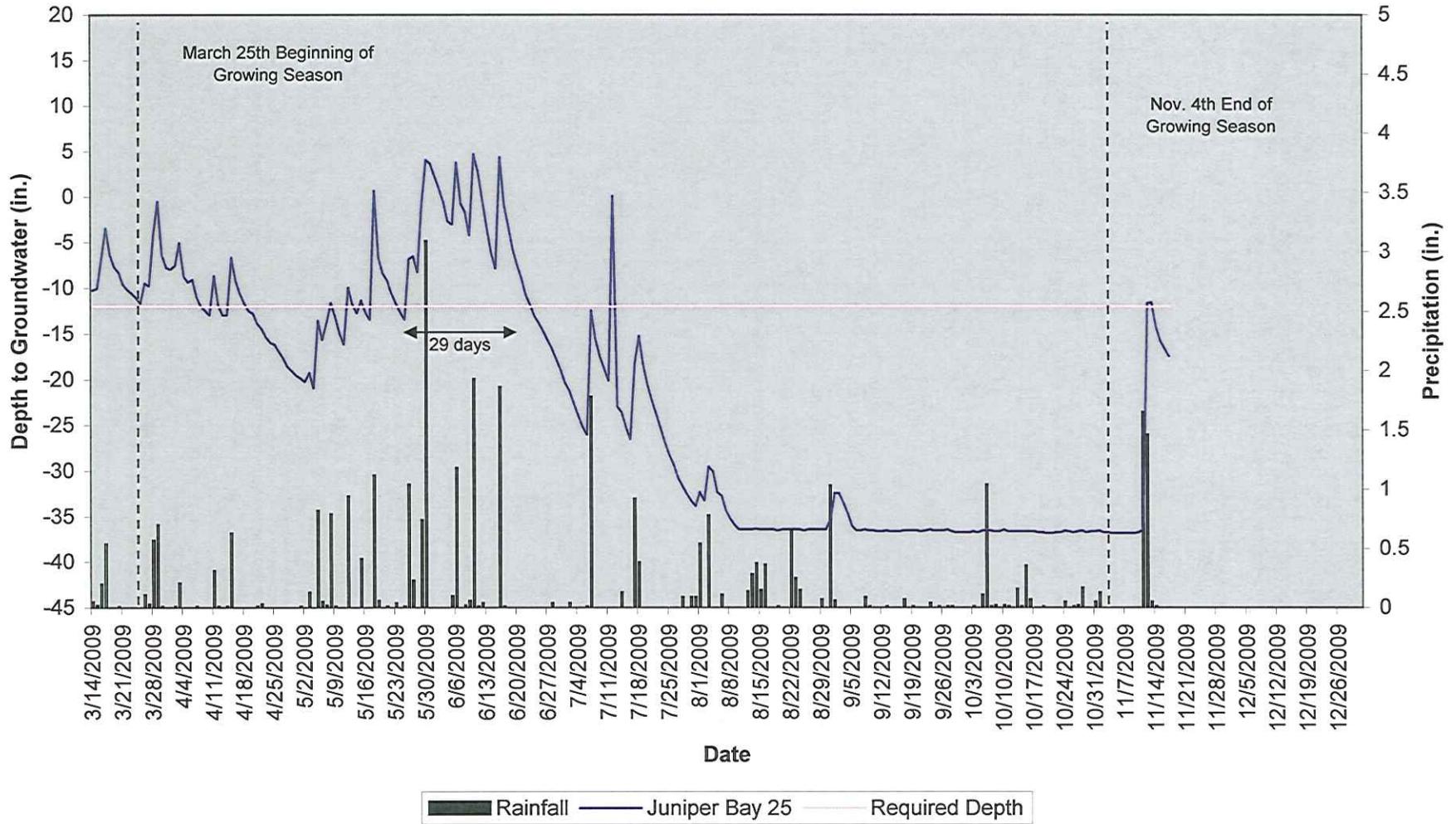
**Juniper Bay  
23  
40" Groundwater**



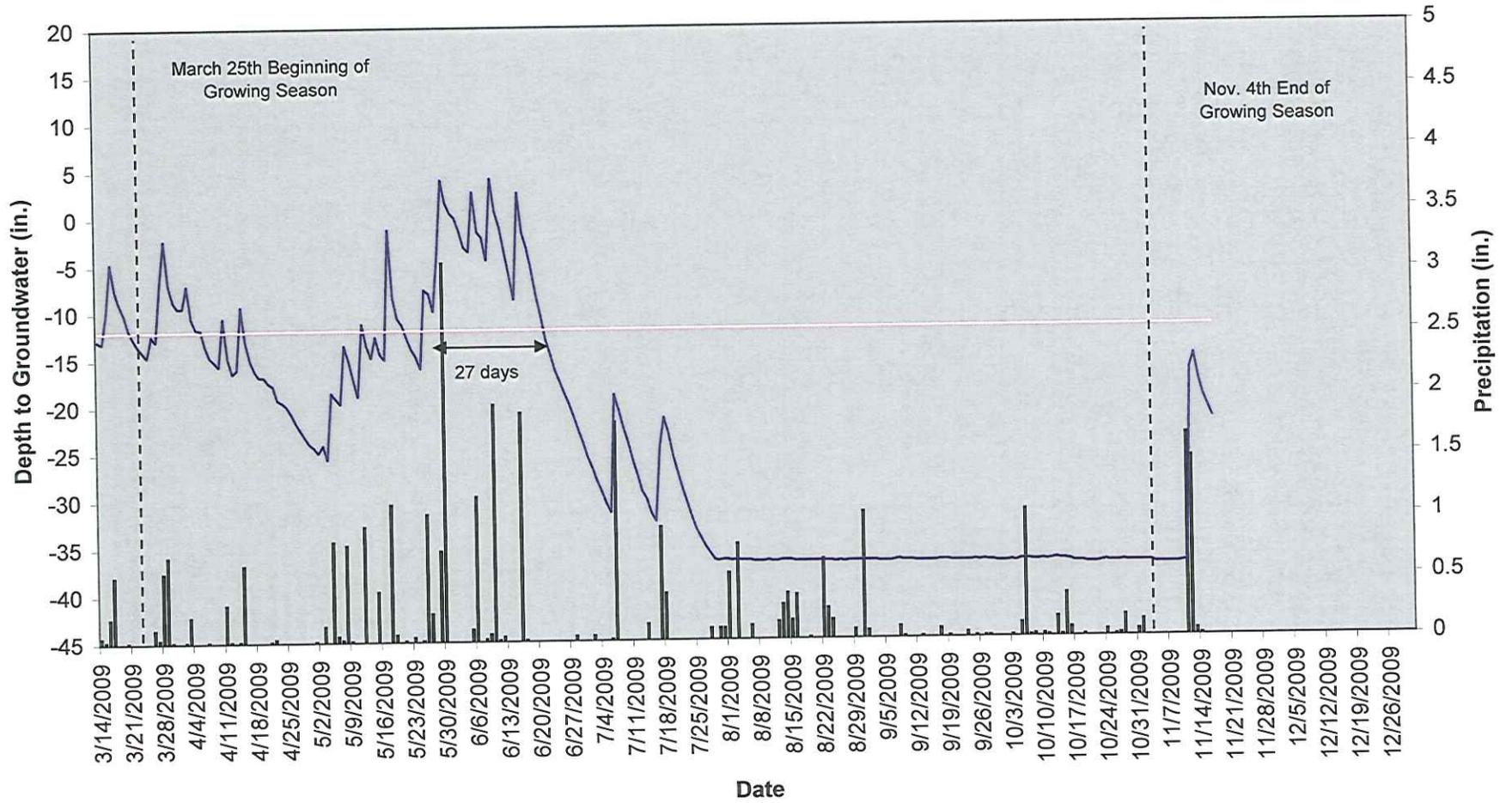
**Juniper Bay  
24  
40" Groundwater**



**Juniper Bay  
25  
40" Groundwater**

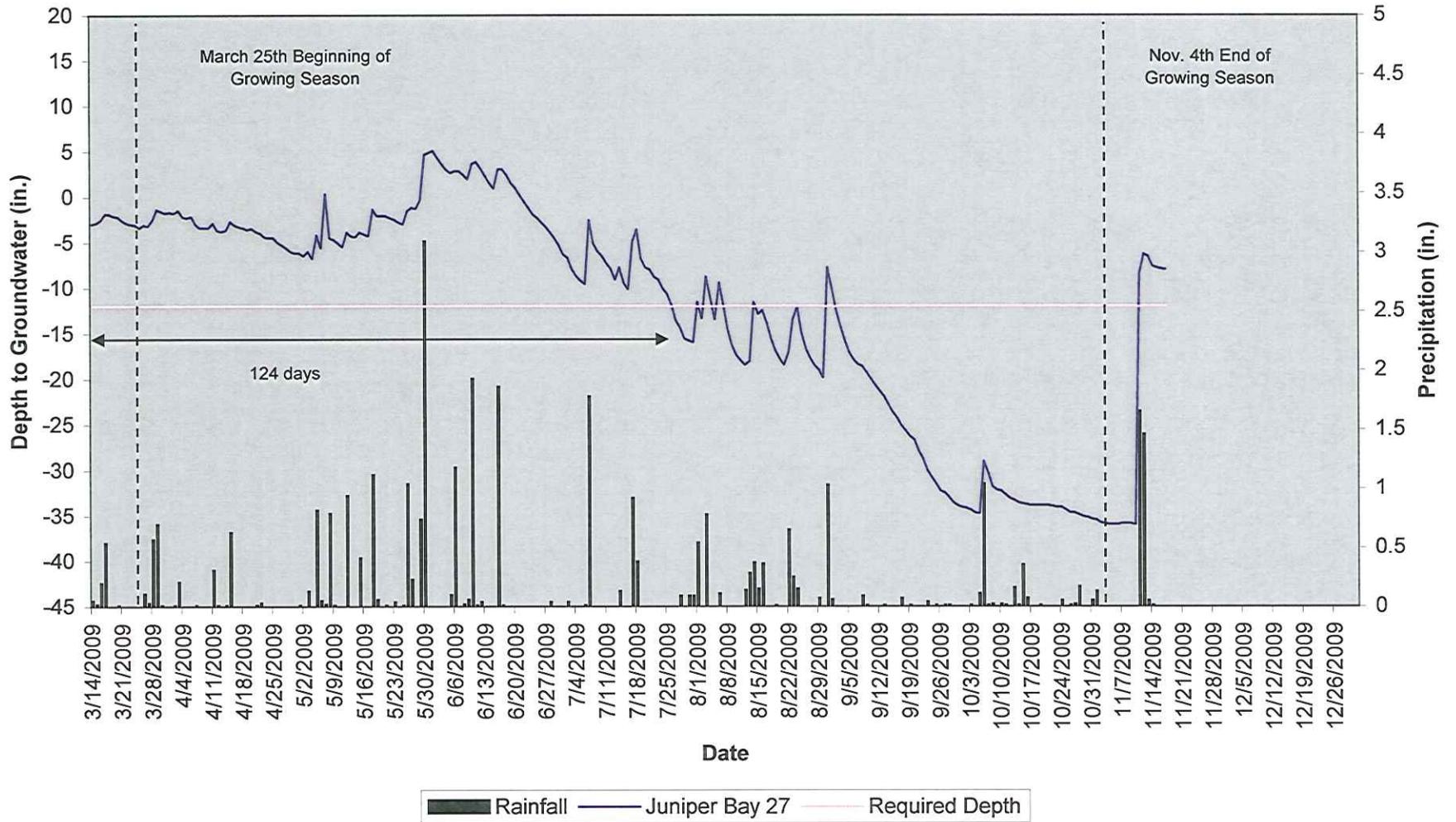


**Juniper Bay  
26  
40" Groundwater**

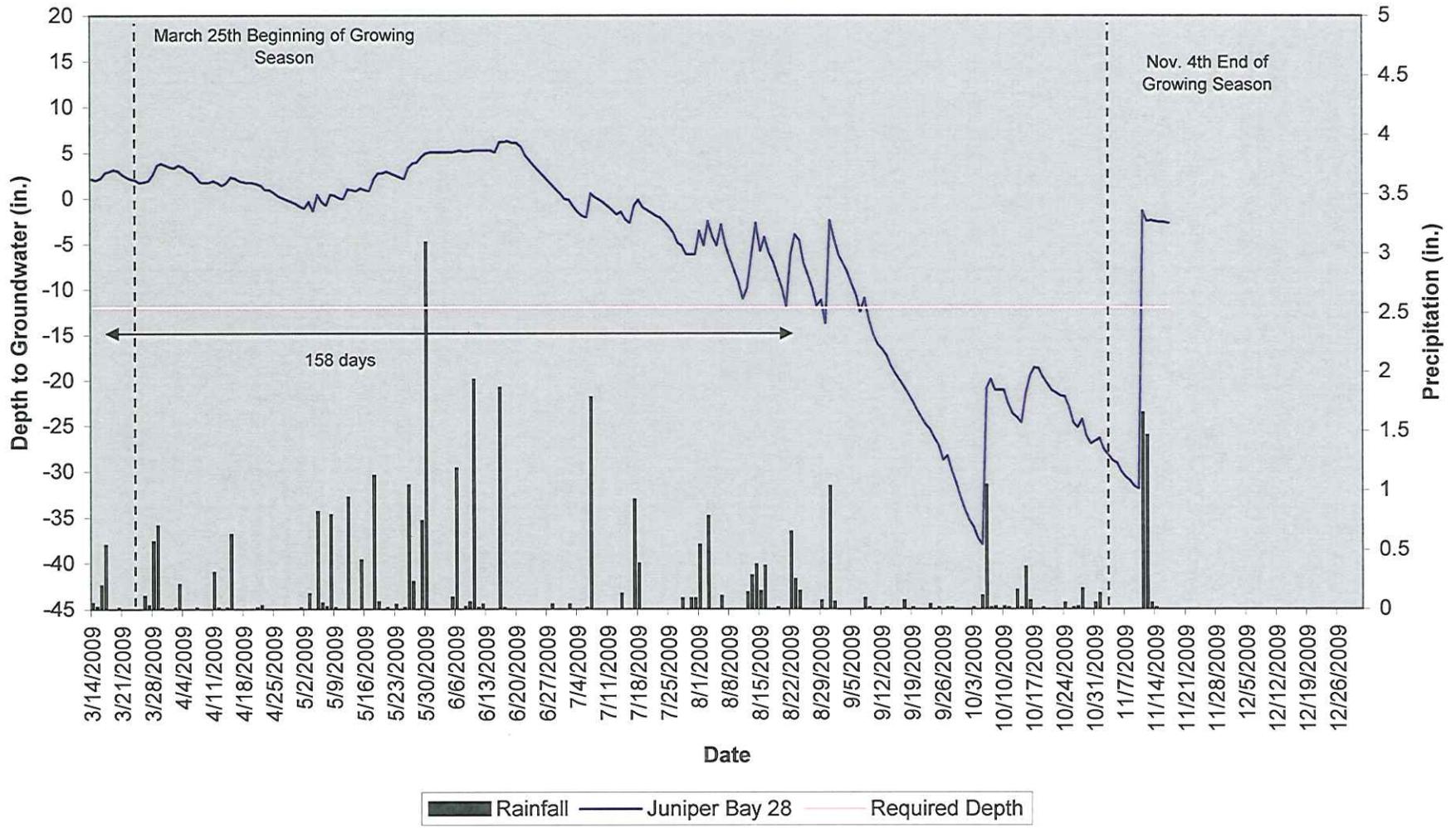


Rainfall
  Juniper Bay 26
  Required Depth

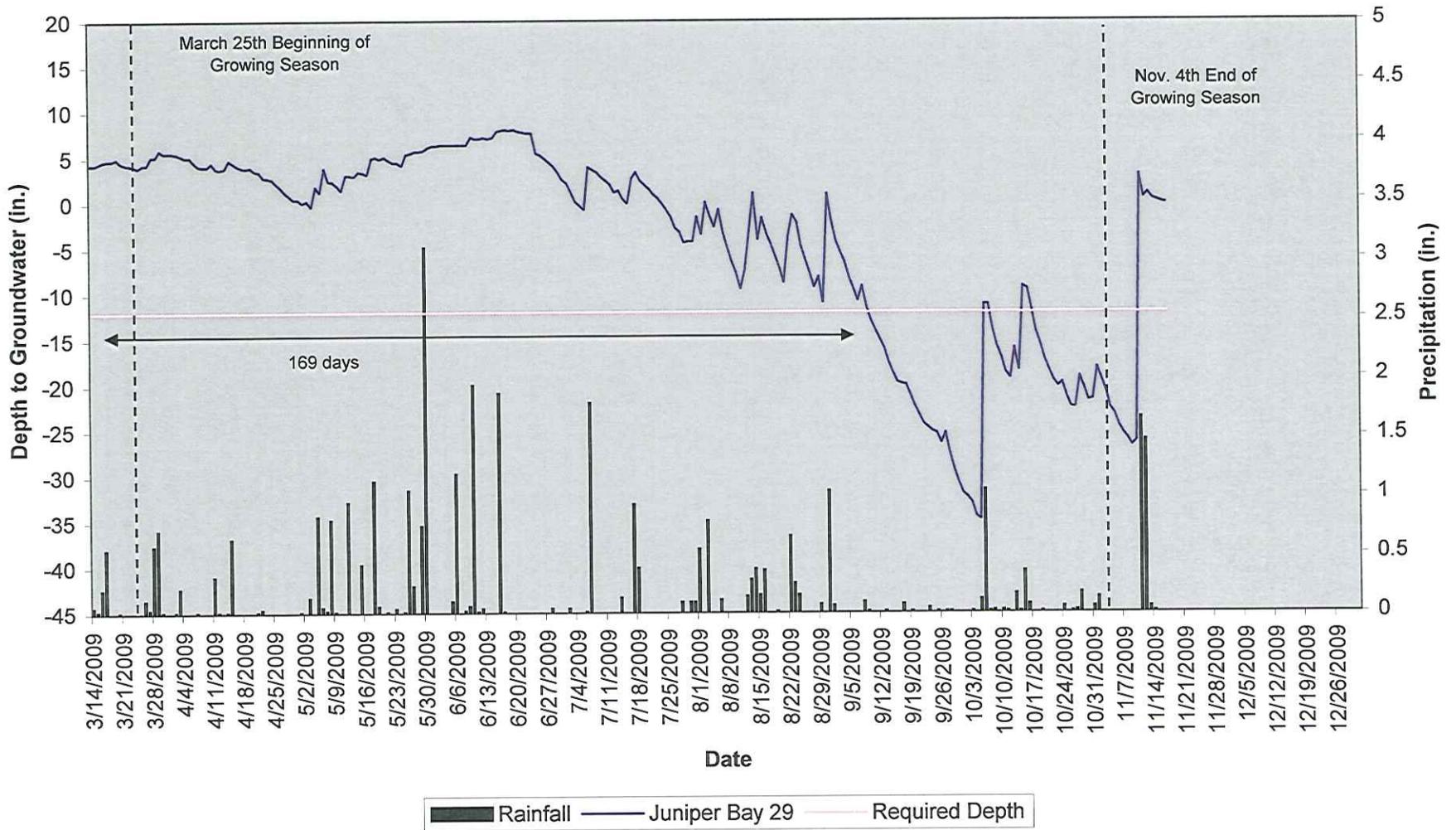
**Juniper Bay  
27  
40" Groundwater**



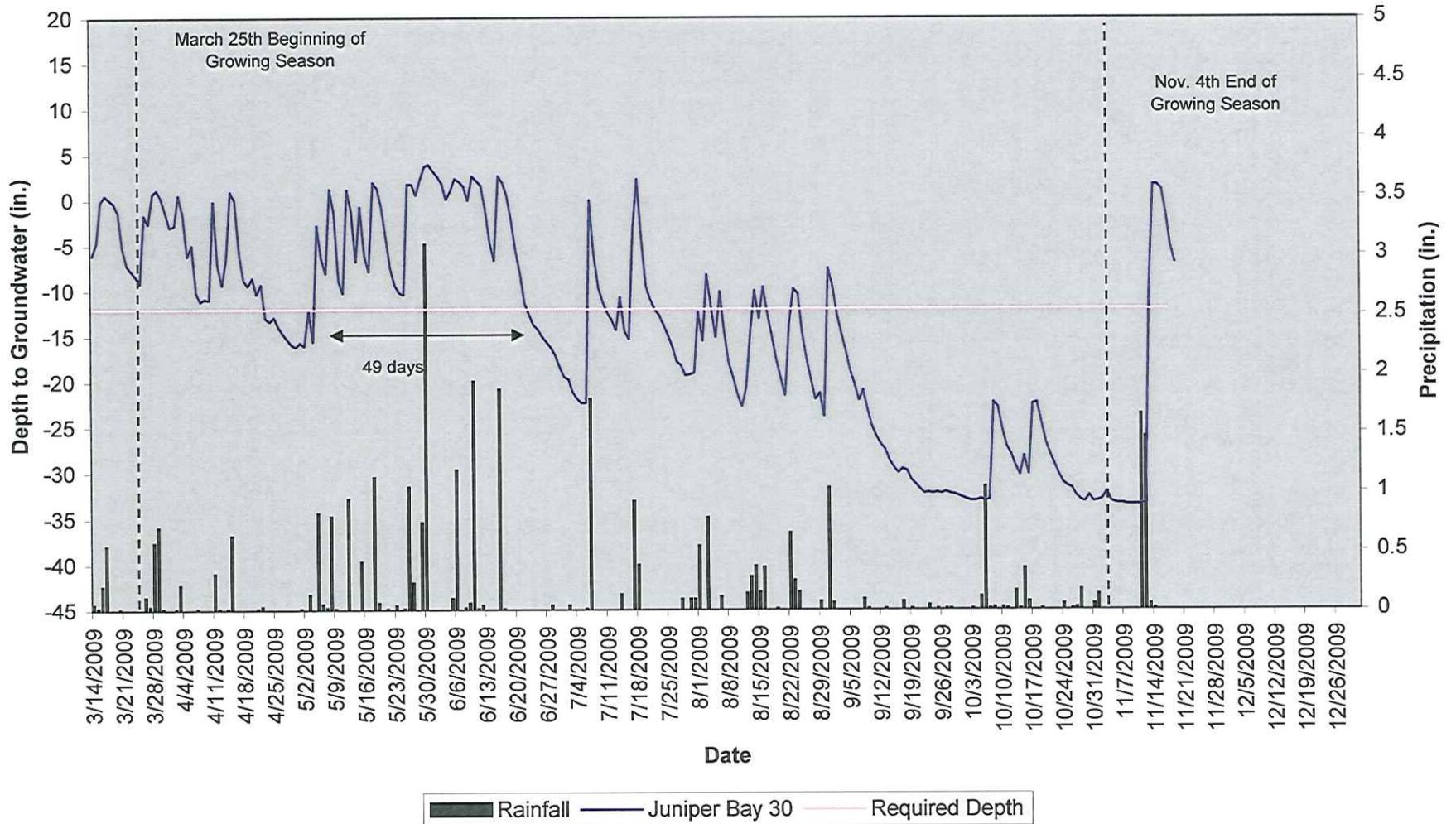
**Juniper Bay  
28  
40" Groundwater**



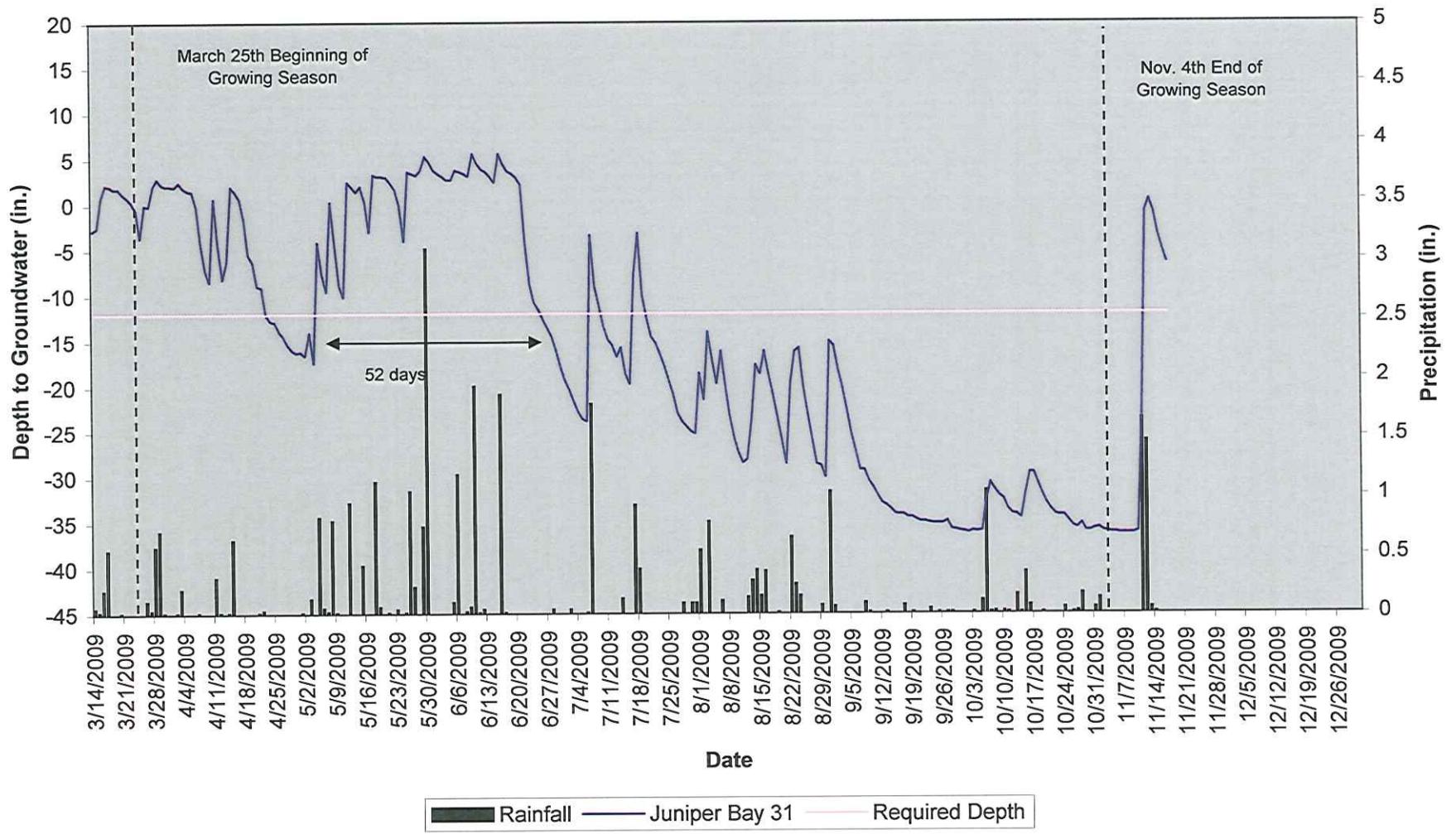
**Juniper Bay  
29  
40" Groundwater**



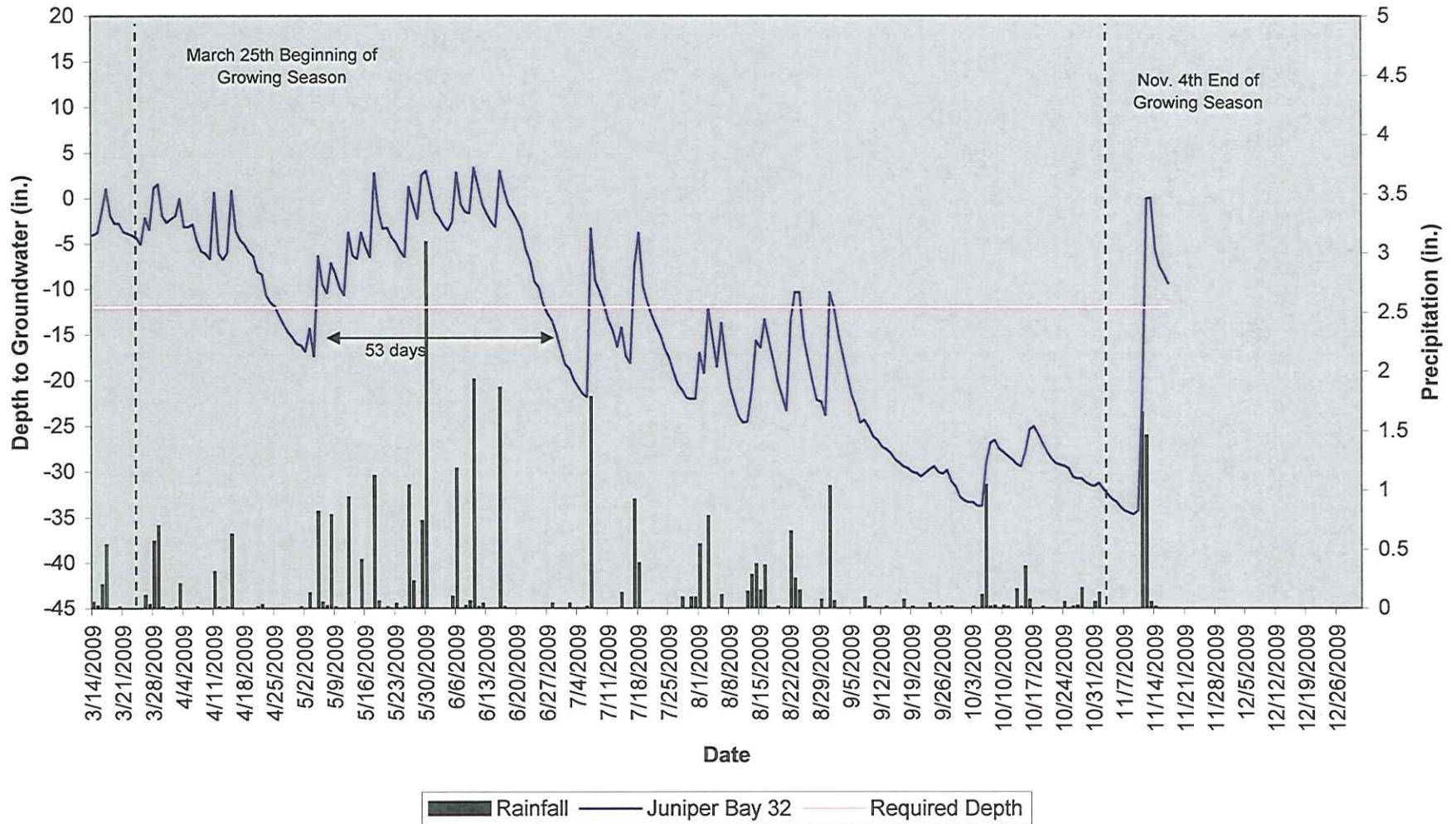
**Juniper Bay  
30  
40" Groundwater**



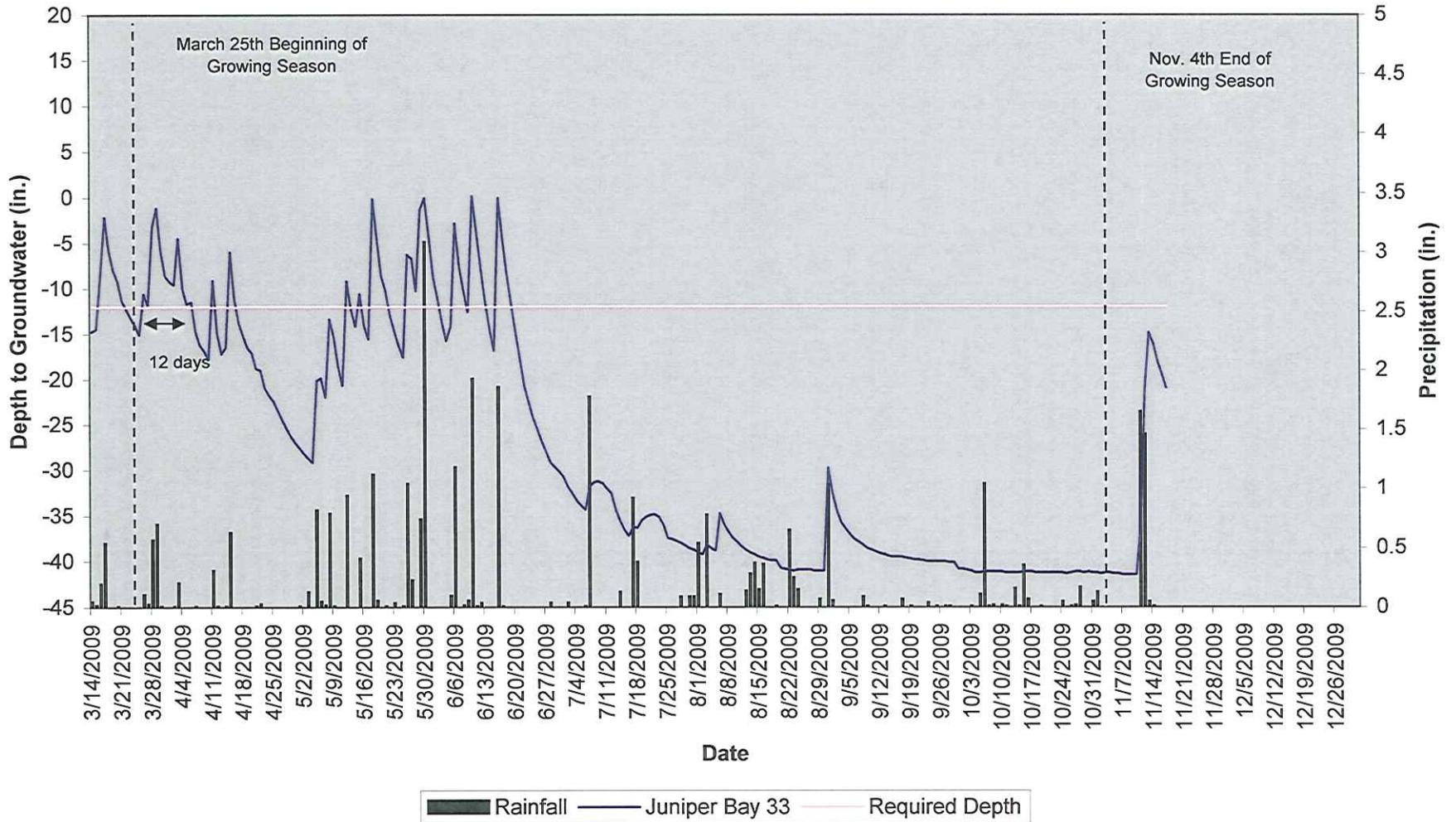
Juniper Bay  
31  
40" Groundwater



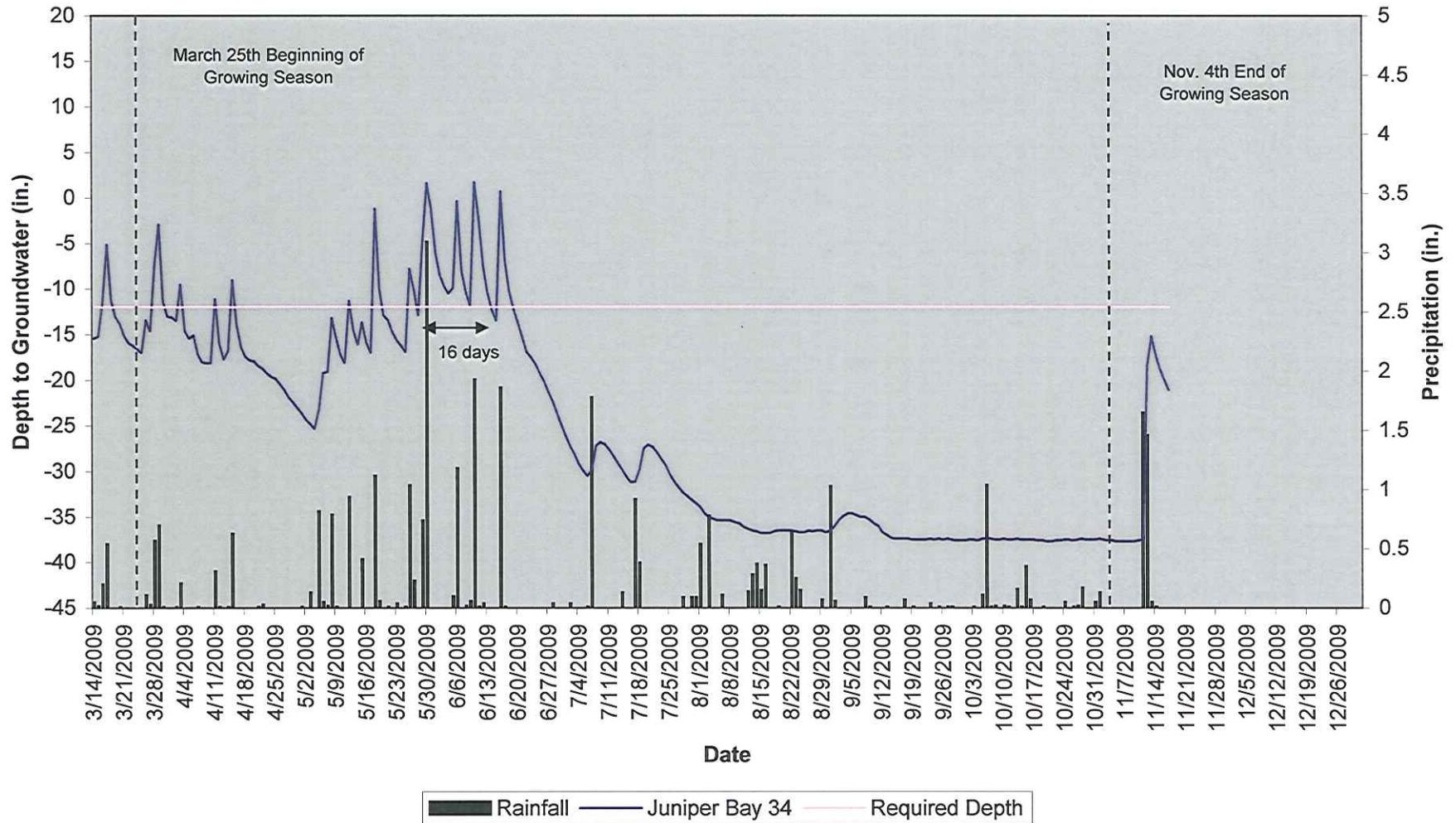
**Juniper Bay  
32  
40" Groundwater**



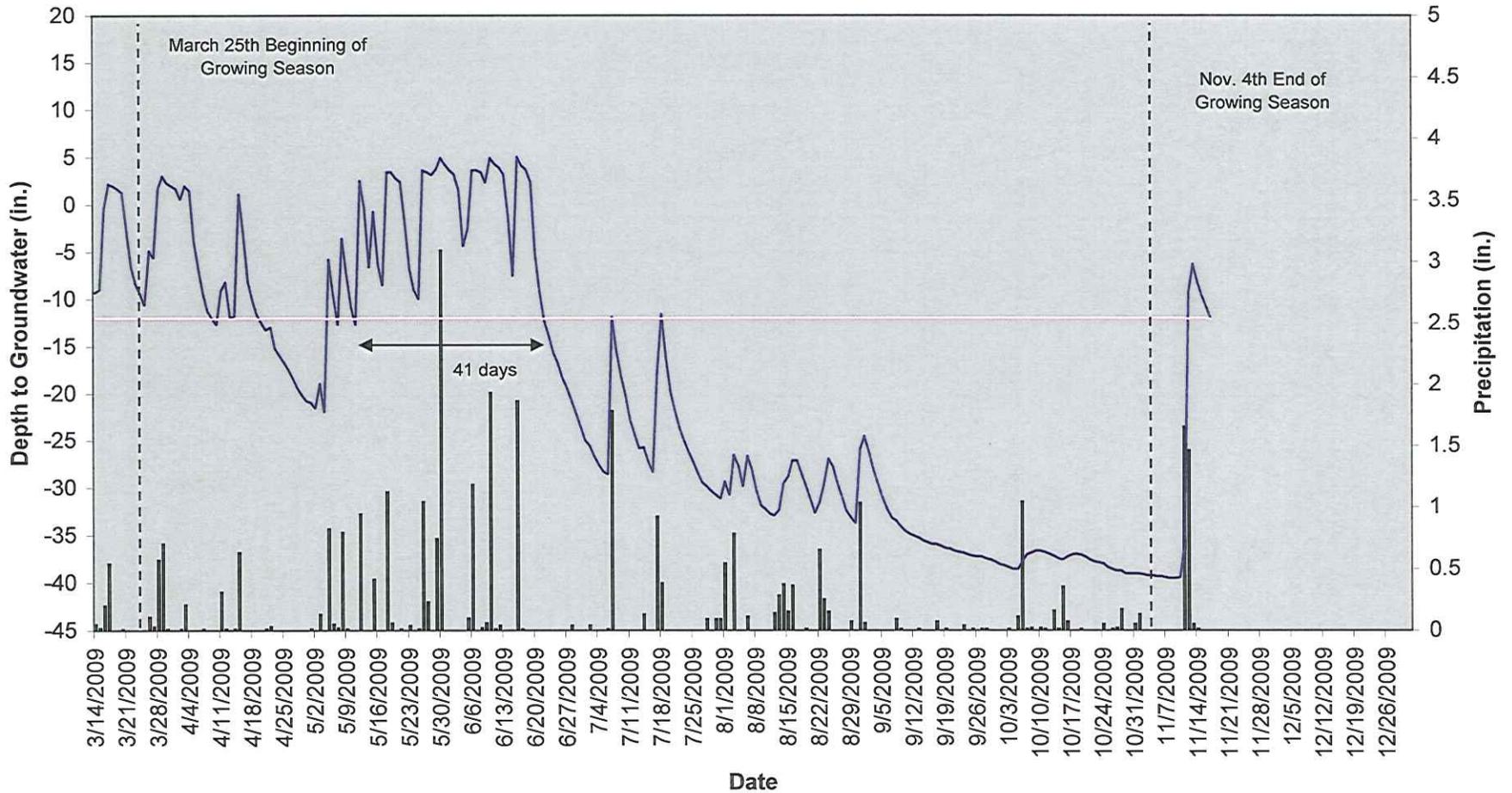
Juniper Bay  
33  
40" Groundwater



**Juniper Bay  
34  
40" Groundwater**

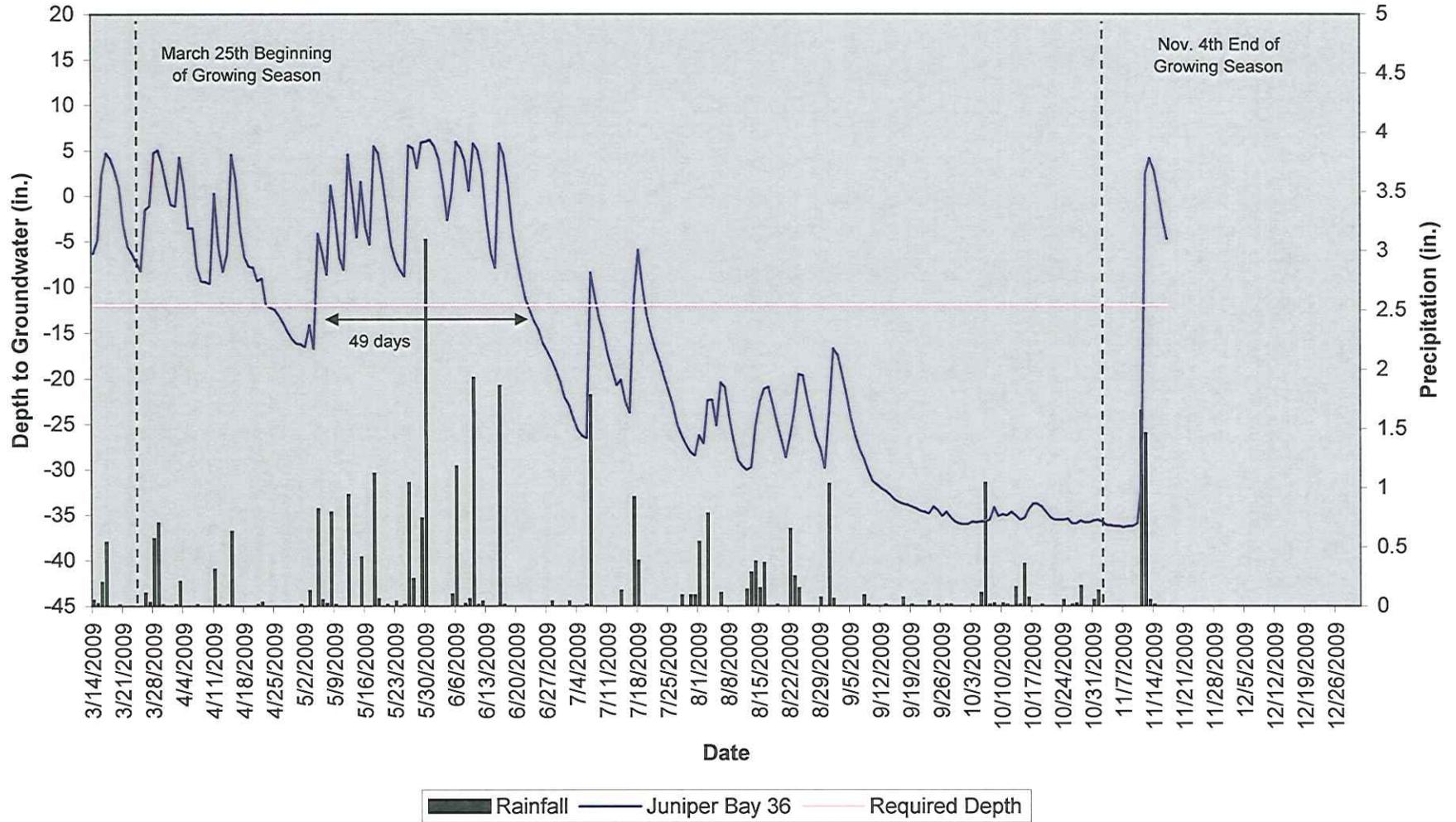


**Juniper Bay  
35  
40" Groundwater**

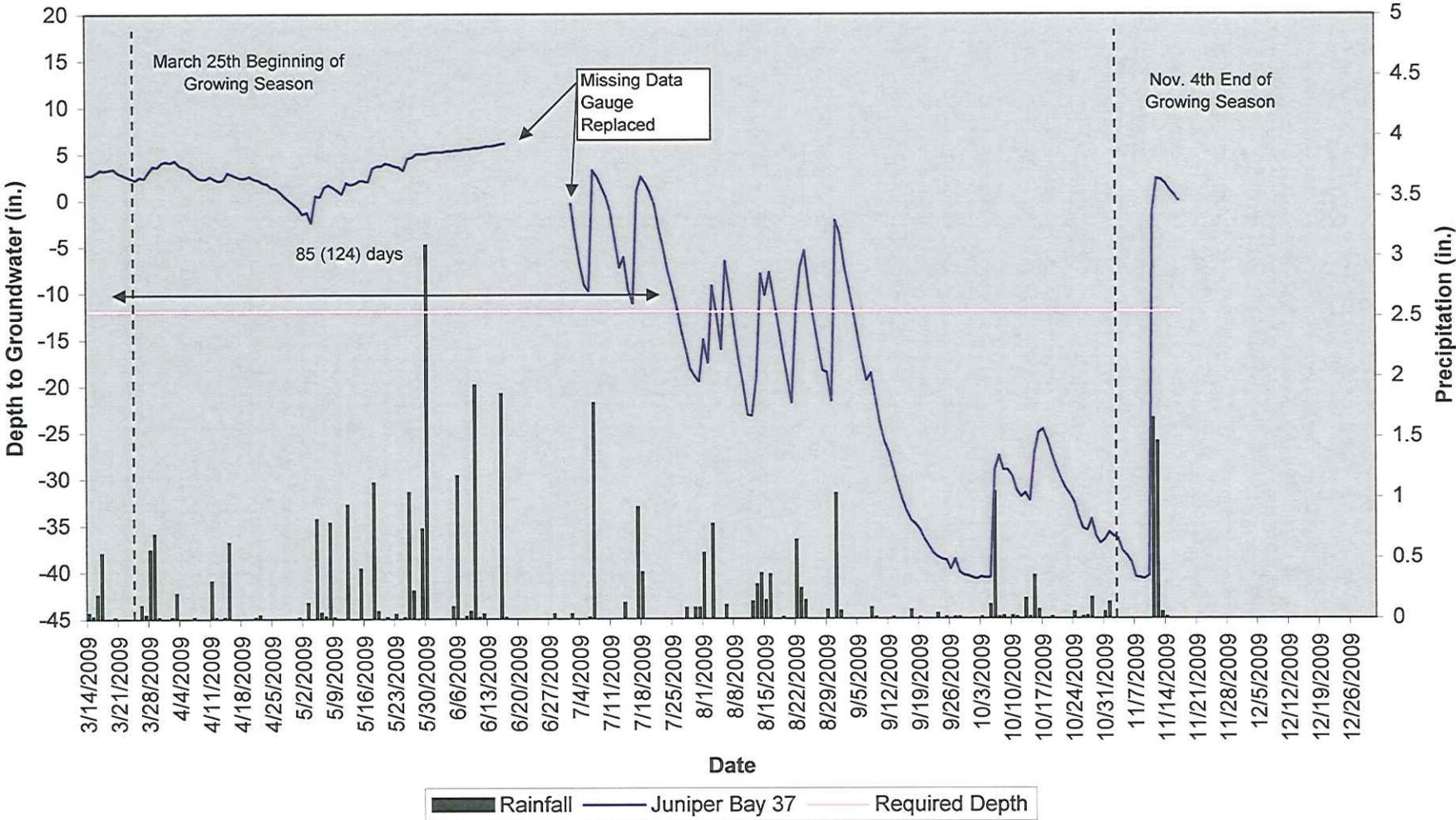


Rainfall
  Juniper Bay 35
  Required Depth

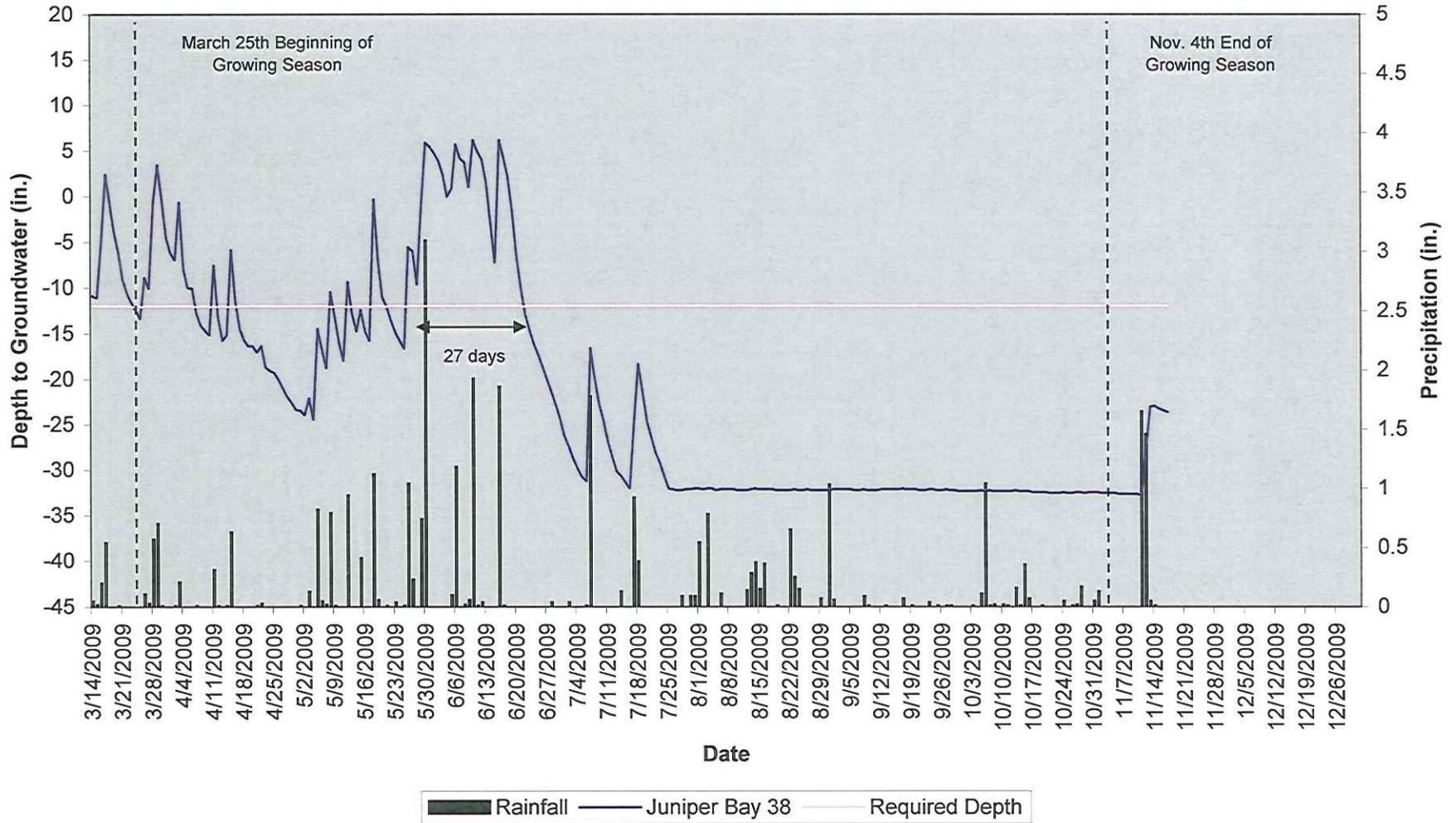
**Juniper Bay  
36  
40" Groundwater**



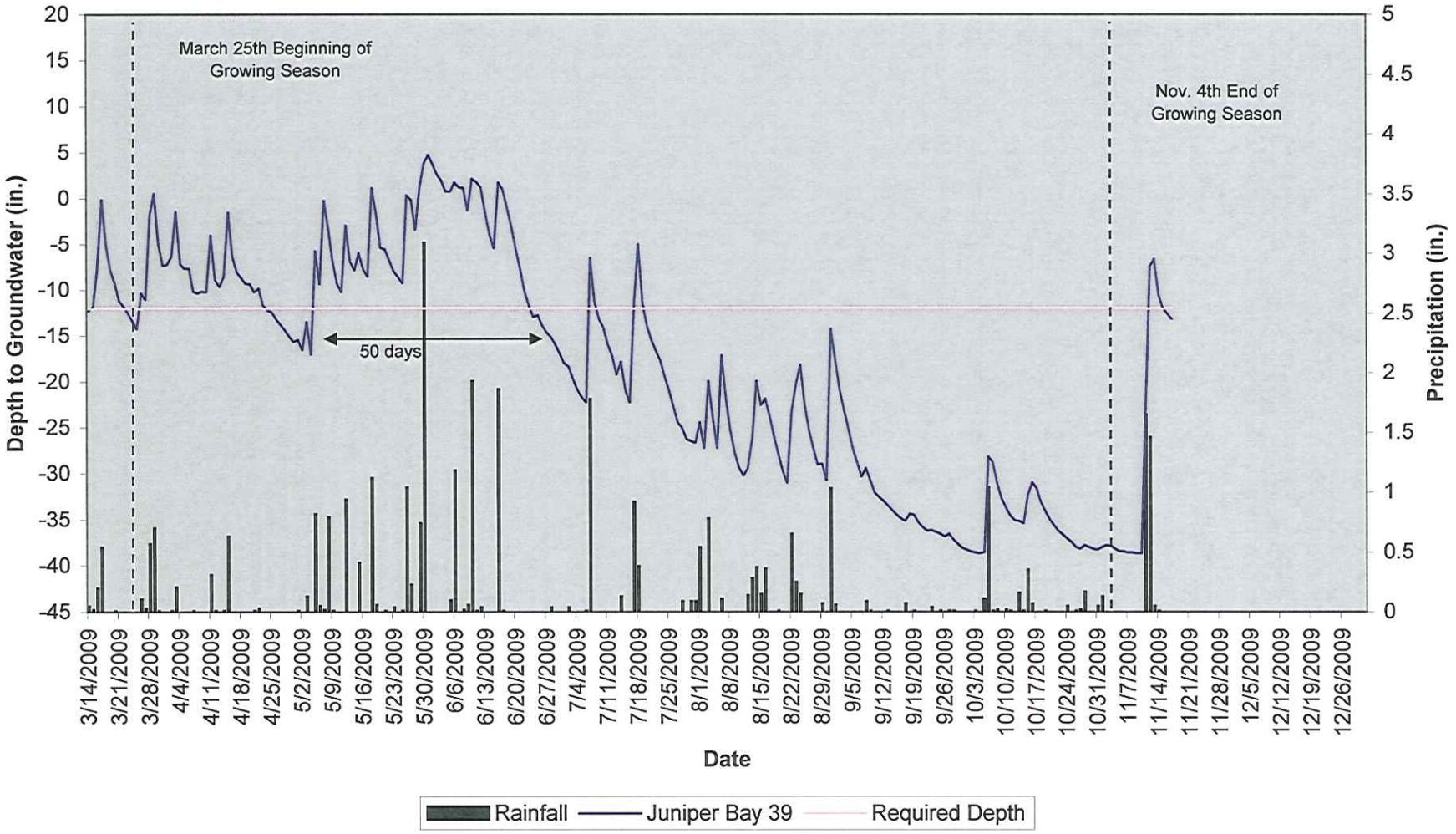
**Juniper Bay  
37  
40" Groundwater**



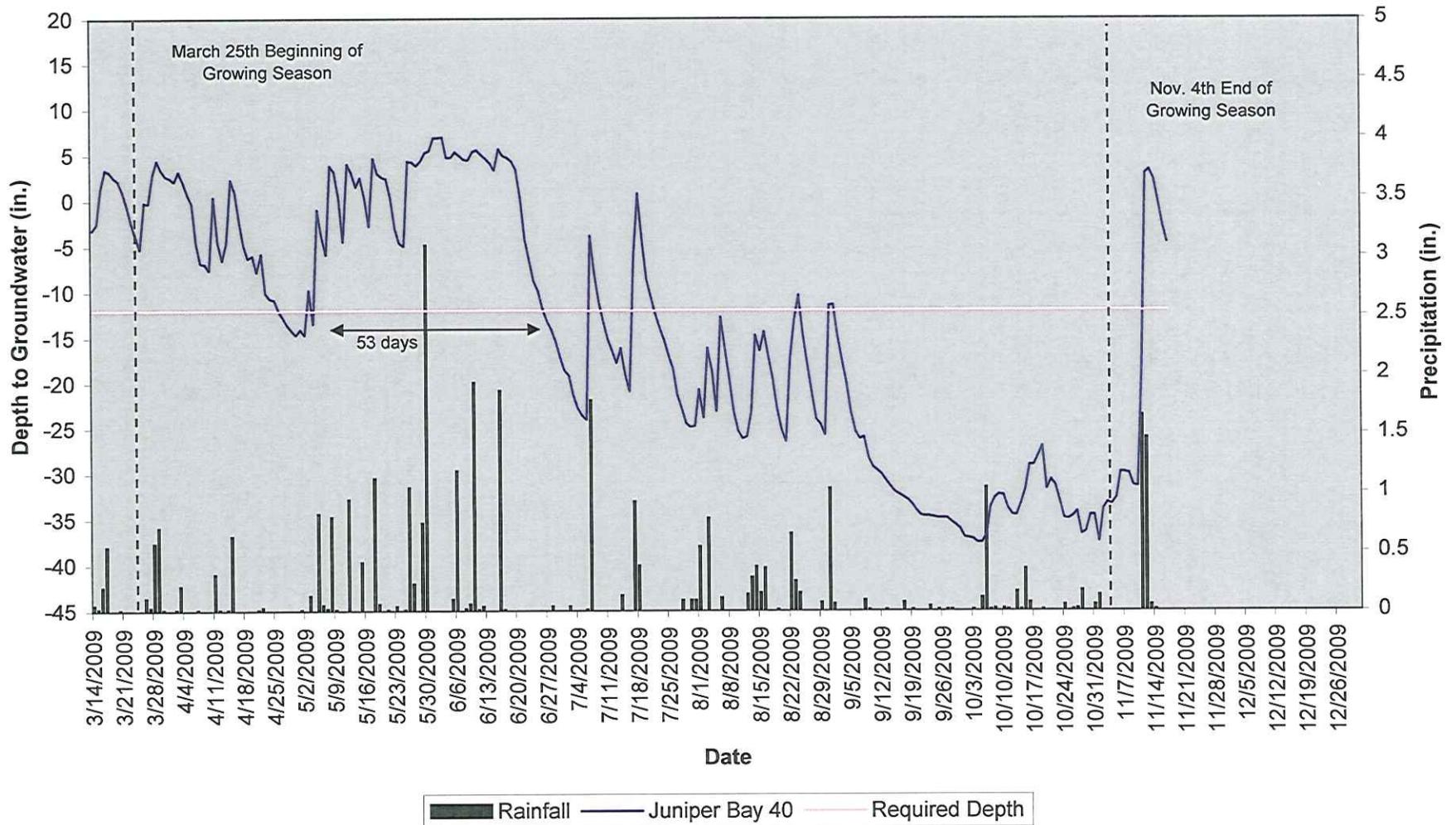
**Juniper Bay  
38  
40" Groundwater**



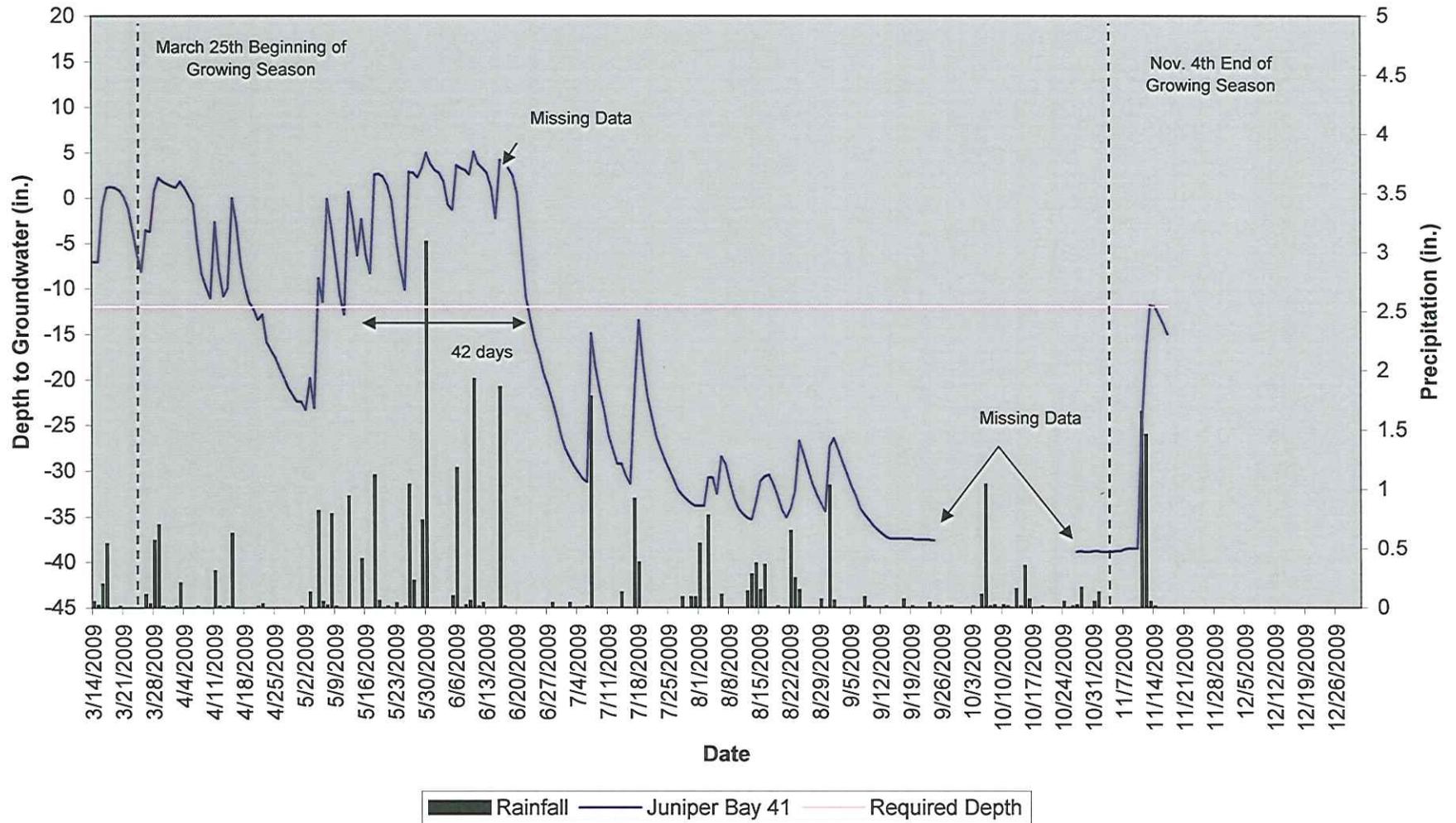
**Juniper Bay  
39  
40" Groundwater**



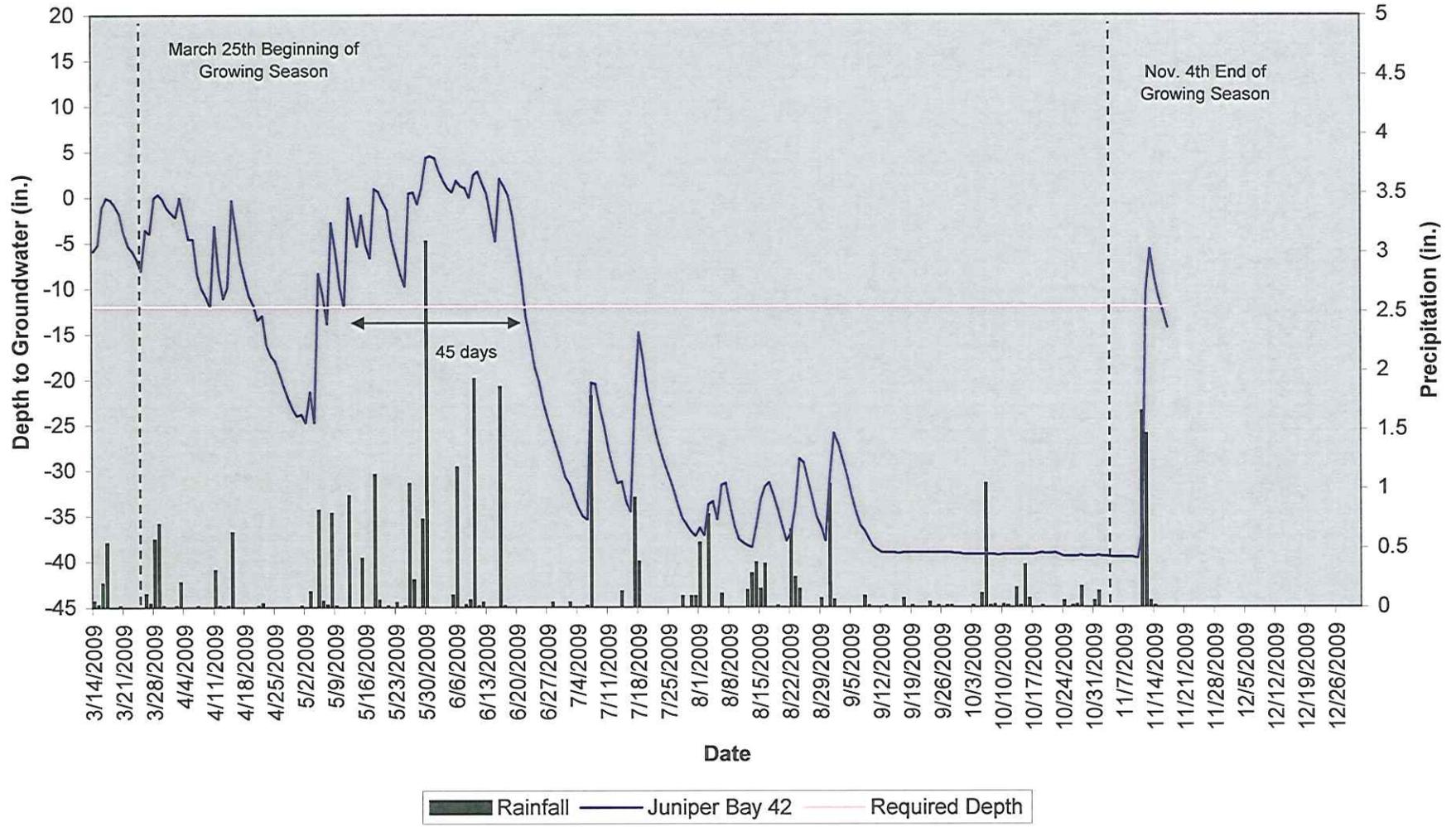
**Juniper Bay  
40  
40" Groundwater**



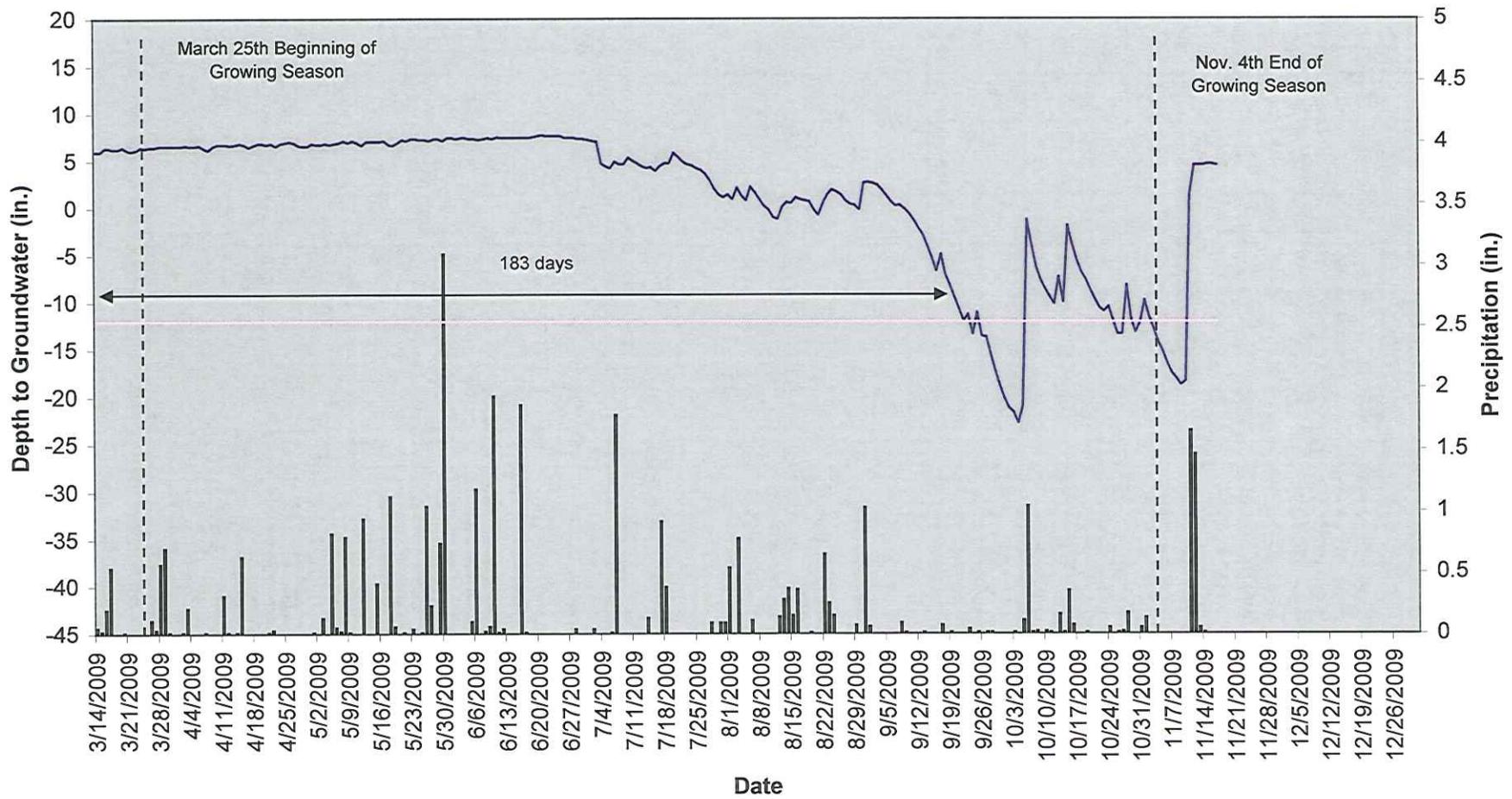
**Juniper Bay  
41  
40" Groundwater**



**Juniper Bay  
42  
40" Groundwater**

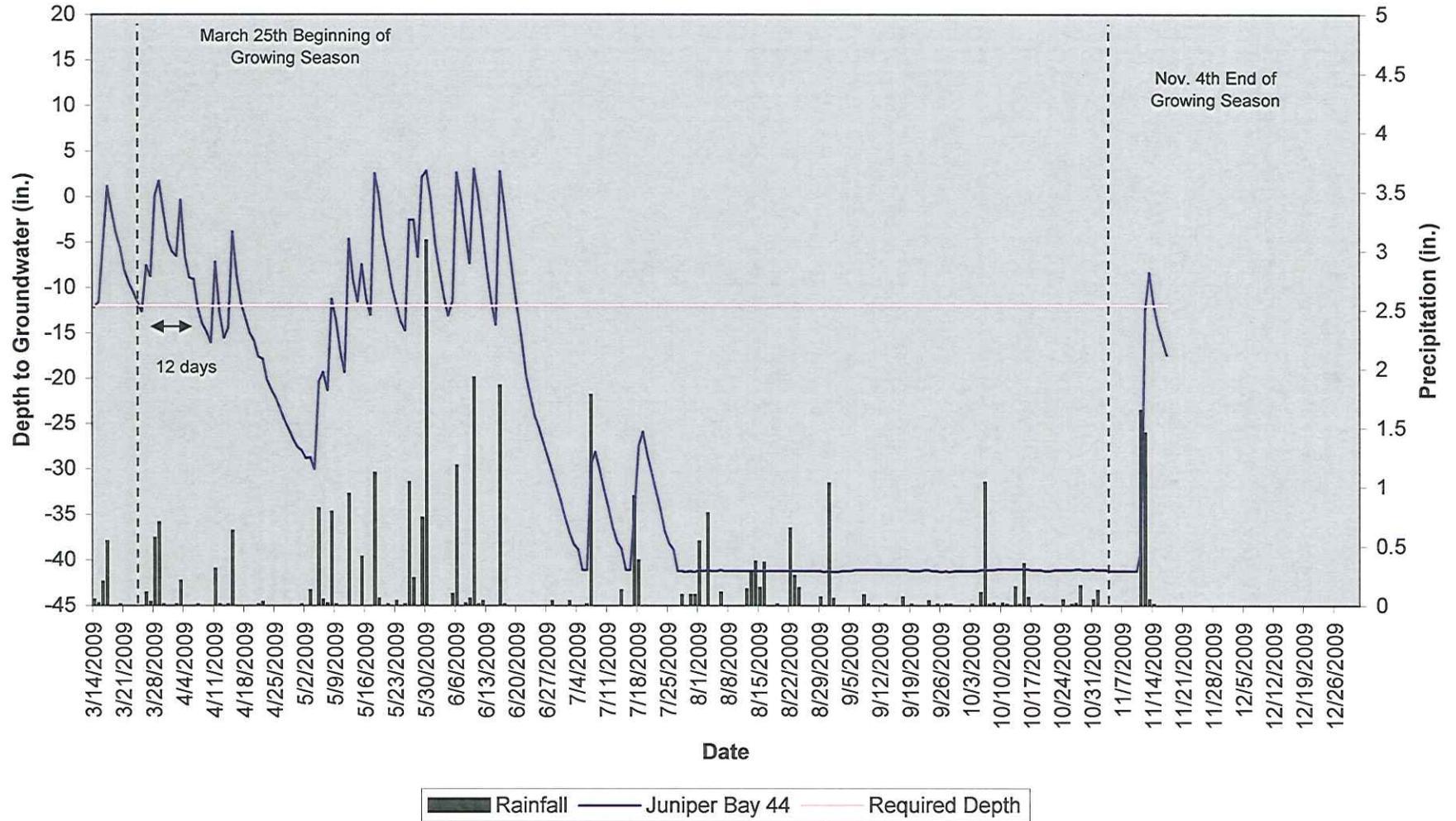


**Juniper Bay  
43  
40" Groundwater**

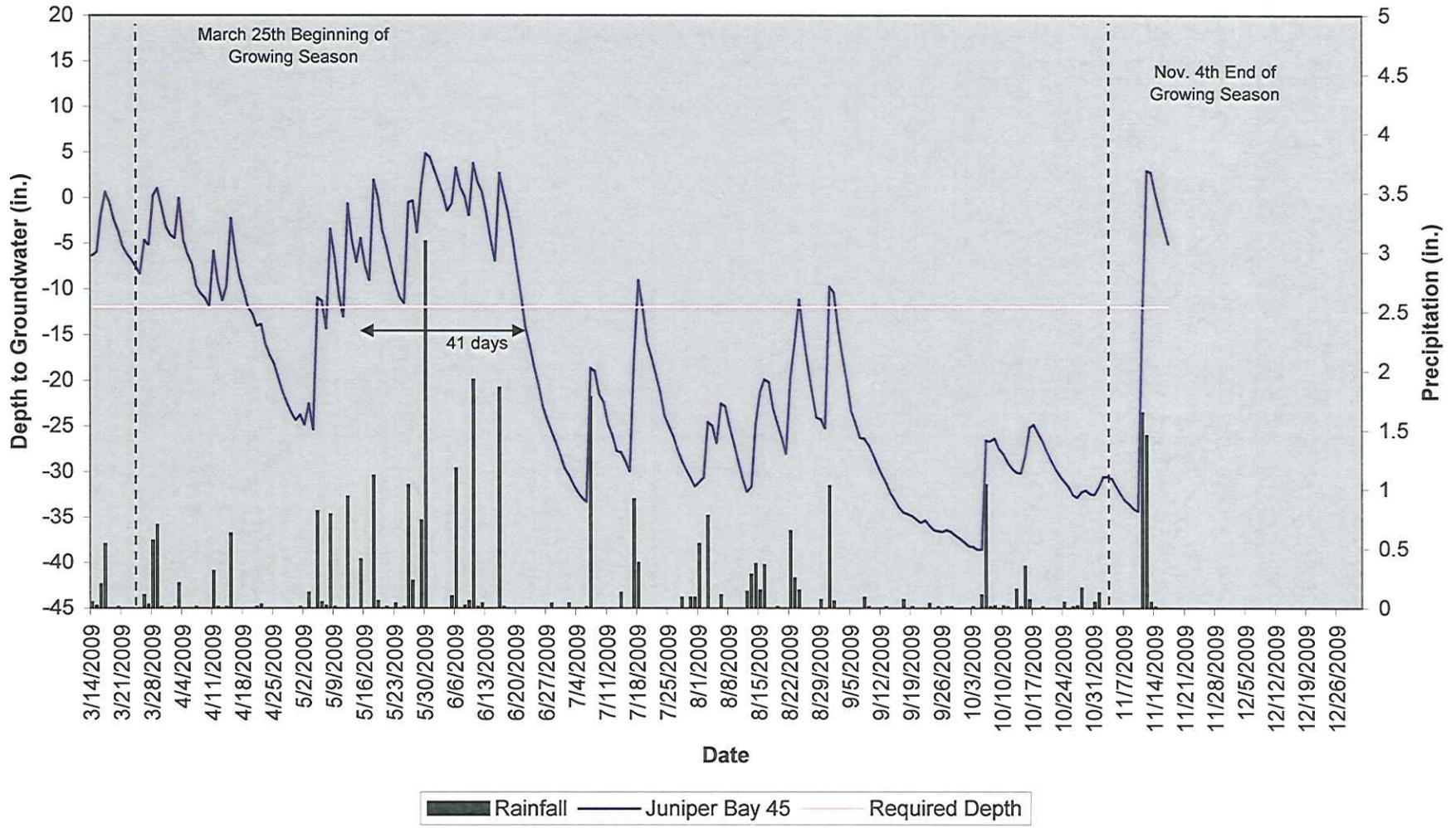


Rainfall
  Juniper Bay 43
  Required Depth

**Juniper Bay  
44  
40" Groundwater**



**Juniper Bay  
45  
40" Groundwater**



**Table 8. Wetland Hydrology Criteria Attainment  
Summary of Groundwater Gauge Results for Year 1 through Year 4**

|                    |                             | Year 1 (2006)    |                           |                    | Year 2 (2007)    |                       |                    | Year 3 (2008)    |                       |                    | Year 4 (2009)    |                       |                    |
|--------------------|-----------------------------|------------------|---------------------------|--------------------|------------------|-----------------------|--------------------|------------------|-----------------------|--------------------|------------------|-----------------------|--------------------|
| Gauge              | Community Type <sup>a</sup> | Growing Season % | Days <12 <sup>b</sup>     | Hydrologic Success | Growing Season % | Days <12 <sup>b</sup> | Hydrologic Success | Growing Season % | Days <12 <sup>b</sup> | Hydrologic Success | Growing Season % | Days <12 <sup>b</sup> | Hydrologic Success |
| GW-1 <sup>d</sup>  | PPW/BF                      | <5%              | 2                         | No                 | >12.5%           | 80 <sup>b</sup>       | Yes                | 5-12.5%          | 19                    | No                 | >12.5%           | 29                    | Yes                |
| GW-2               | PPW/BF                      | >12.5%           | 71                        | Yes                | >12.5%           | 97                    | Yes                | >12.5%           | 71                    | Yes                | >12.5%           | 59                    | Yes                |
| GW-3               | PPW/BF                      | >12.5%           | 116                       | Yes                | >12.5%           | 117                   | Yes                | >12.5%           | 72(79) <sup>c</sup>   | Yes                | >12.5%           | 139                   | Yes                |
| GW-4 <sup>d</sup>  | PPW/BF                      | 5-12.5%          | 18                        | No                 | 5-12.5%          | 20                    | No                 | >12.5%           | 39                    | Yes                | >12.5%           | 29                    | Yes                |
| GW-5               | PPW/BF                      | >12.5%           | 112 <sup>b</sup>          | Yes                | >12.5%           | 97                    | Yes                | >12.5%           | 72                    | Yes                | >12.5%           | 56                    | Yes                |
| GW-6               | PAWCF/BF                    | >12.5%           | 225                       | Yes                | >12.5%           | 117                   | Yes                | >12.5%           | 84                    | Yes                | >12.5%           | 169                   | Yes                |
| GW-7               | PAWCF/BF                    | >12.5%           | 225                       | Yes                | >12.5%           | 119                   | Yes                | >12.5%           | 87                    | Yes                | >12.5%           | 173                   | Yes                |
| GW-8               | PAWCF/BF                    | >12.5%           | 225                       | Yes                | >12.5%           | 118                   | Yes                | >12.5%           | 82                    | Yes                | >12.5%           | 168                   | Yes                |
| GW-9               | PAWCF/BF                    | >12.5%           | 225                       | Yes                | >12.5%           | 117                   | Yes                | >12.5%           | 82                    | Yes                | >12.5%           | 169                   | Yes                |
| GW-10              | PPW/BF                      | <5%              | 10                        | No                 | >12.5%           | 58                    | Yes                | 5-12.5%          | 19                    | No                 | 5-12.5%          | 27                    | No                 |
| GW-11 <sup>d</sup> | PPW/BF                      | <5%              | 1                         | No                 | <5%              | 1                     | No                 | <5%              | 4                     | No                 | <5%              | 2                     | No                 |
| GW-12 <sup>d</sup> | PPW/BF                      | <5%              | 1                         | No                 | >12.5%           | 68                    | Yes                | >12.5%           | 16(30) <sup>c</sup>   | Yes                | 5-12.5%          | 26                    | No                 |
| GW-13              | PAWCF/BF                    | >12.5%           | 196                       | Yes                | >12.5%           | 133                   | Yes                | >12.5%           | 118                   | Yes                | >12.5%           | 173                   | Yes                |
| GW-14              | PAWCF/BF                    | >12.5%           | 156<br>(225) <sup>c</sup> | Yes                | >12.5%           | 130                   | Yes                | >12.5%           | 115                   | Yes                | >12.5%           | 175                   | Yes                |
| GW-15              | PAWCF/BF                    | N/A              | Not Installed             | N/A                | N/A              | Not Installed         | N/A                | N/A              | Not Installed         | N/A                | N/A              | Not Installed         | N/A                |
| GW-16              | PAWCF/BF                    | >12.5%           | 225                       | Yes                | >12.5%           | 121                   | Yes                | >12.5%           | 82                    | Yes                | >12.5%           | 168                   | Yes                |
| GW-17              | PPW/BF                      | >12.5%           | 83                        | Yes                | >12.5%           | 62                    | Yes                | >12.5%           | 72                    | Yes                | >12.5%           | 55                    | Yes                |
| GW-18 <sup>d</sup> | PPW/BF                      | >12.5%           | 64                        | Yes                | >12.5%           | 48                    | Yes                | >12.5%           | 62                    | Yes                | >12.5%           | 56                    | Yes                |
| GW-19              | PPW/BF                      | >12.5%           | 81                        | Yes                | >12.5%           | 43                    | Yes                | >12.5%           | 64                    | Yes                | >12.5%           | 56                    | Yes                |
| GW-20              | PPW/BF                      | >12.5%           | 79                        | Yes                | >12.5%           | 68 <sup>b</sup>       | Yes                | >12.5%           | 62                    | Yes                | >12.5%           | 52                    | Yes                |
| GW-21              | PPW/BF                      | >12.5%           | 83                        | Yes                | >12.5%           | 116                   | Yes                | >12.5%           | 73                    | Yes                | >12.5%           | 56                    | Yes                |
| GW-22              | PAWCF/BF                    | N/A              | Not Installed             | N/A                | N/A              | Not Installed         | N/A                | N/A              | Not Installed         | N/A                | N/A              | Not Installed         | N/A                |

Table 8. Wetland Hydrology Criteria Attainment Continues.

**Table 8. Wetland Hydrology Criteria Attainment Concluded.  
Summary of Groundwater Gauge Results for Year 1 through Year 4**

|                    |                             | Year 1 (2006)    |           |                    | Year 2 (2007)    |                          |                    | Year 3 (2008)    |           |                    | Year 4 (2009)    |                          |                    |
|--------------------|-----------------------------|------------------|-----------|--------------------|------------------|--------------------------|--------------------|------------------|-----------|--------------------|------------------|--------------------------|--------------------|
| Gauge              | Community Type <sup>a</sup> | Growing Season % | Days <12" | Hydrologic Success | Growing Season % | Days <12"                | Hydrologic Success | Growing Season % | Days <12" | Hydrologic Success | Growing Season % | Days <12"                | Hydrologic Success |
| GW-23              | PAWCF/BF                    | >12.5%           | 225       | Yes                | >12.5%           | 208                      | Yes                | >12.5%           | 115       | Yes                | >12.5%           | 174                      | Yes                |
| GW-24              | PAWCF/BF                    | >12.5%           | 105       | Yes                | >12.5%           | 130                      | Yes                | >12.5%           | 114       | Yes                | >12.5%           | 156                      | Yes                |
| GW-25 <sup>d</sup> | PPW/BF                      | <5%              | 4         | No                 | >12.5%           | 88                       | Yes                | >12.5%           | 63        | Yes                | >12.5%           | 29                       | Yes                |
| GW-26 <sup>d</sup> | PPW/BF                      | <5%              | 10        | No                 | >12.5%           | 80                       | Yes                | >12.5%           | 64        | Yes                | 5-12.5%          | 27                       | No                 |
| GW-27              | PAWCF/BF                    | >12.5%           | 88        | Yes                | >12.5%           | 113                      | Yes                | >12.5%           | 84        | Yes                | >12.5%           | 124                      | Yes                |
| GW-28              | PAWCF/BF                    | >12.5%           | 119       | Yes                | >12.5%           | 122                      | Yes                | >12.5%           | 100       | Yes                | >12.5%           | 158                      | Yes                |
| GW-29              | PAWCF/BF                    | >12.5%           | 225       | Yes                | >12.5%           | 118                      | Yes                | >12.5%           | 82        | Yes                | >12.5%           | 169                      | Yes                |
| GW-30              | PPW/BF                      | >12.5%           | 77        | Yes                | >12.5%           | 111                      | Yes                | >12.5%           | 62        | Yes                | >12.5%           | 49                       | Yes                |
| GW-31              | PPW/BF                      | >12.5%           | 49        | Yes                | >12.5%           | 57                       | Yes                | >12.5%           | 62        | Yes                | >12.5%           | 52                       | Yes                |
| GW-32 <sup>d</sup> | PPW/BF                      | >12.5%           | 50        | Yes                | 5-12.5%          | 19                       | No                 | >12.5%           | 40        | Yes                | >12.5%           | 53                       | Yes                |
| GW-33 <sup>d</sup> | PPW/BF                      | <5%              | 10        | No                 | 5-12.5%          | 12                       | No                 | 5-12.5%          | 17        | No                 | 5-12.5%          | 12                       | No                 |
| GW-34              | PPW/BF                      | <5%              | 9         | No                 | >12.5%           | 58                       | Yes                | <5%              | 9         | No                 | 5-12.5%          | 16                       | No                 |
| GW-35              | PPW/BF                      | >12.5%           | 36        | Yes                | >12.5%           | 38                       | Yes                | >12.5%           | 32        | Yes                | >12.5%           | 41                       | Yes                |
| GW-36              | PPW/BF                      | 5-12.5%          | 22        | No                 | >12.5%           | 62                       | Yes                | >12.5%           | 61        | Yes                | >12.5%           | 49                       | Yes                |
| GW-37              | PPW/BF                      | >12.5%           | 88        | Yes                | >12.5%           | 117                      | Yes                | >12.5%           | 78        | Yes                | >12.5%           | 85<br>(124) <sup>c</sup> | Yes                |
| GW-38 <sup>d</sup> | PPW/BF                      | >12.5%           | 35        | Yes                | >12.5%           | 89                       | Yes                | >12.5%           | 62        | Yes                | 5-12.5%          | 27                       | No                 |
| GW-39 <sup>d</sup> | PPW/BF                      | 5-12.5%          | 22        | No                 | >12.5%           | 109                      | Yes                | >12.5%           | 72        | Yes                | >12.5%           | 50                       | Yes                |
| GW-40              | PPW/BF                      | >12.5%           | 35        | Yes                | >12.5%           | 103                      | Yes                | >12.5%           | 74        | Yes                | >12.5%           | 53                       | Yes                |
| GW-41              | PPW/BF                      | >12.5%           | 44        | Yes                | 5-12.5%          | 19                       | No                 | >12.5%           | 32        | Yes                | >12.5%           | 42 <sup>b</sup>          | Yes                |
| GW-42              | PPW/BF                      | 5-12.5%          | 20        | No                 | >12.5%           | 66                       | Yes                | >12.5%           | 31        | Yes                | >12.5%           | 45                       | Yes                |
| GW-43              | PAWCF/BF                    | >12.5%           | 116       | Yes                | >12.5%           | 60<br>(129) <sup>c</sup> | Yes                | >12.5%           | 118       | Yes                | >12.5%           | 183                      | Yes                |
| GW-44 <sup>d</sup> | PPW/BF                      | <5%              | 10        | No                 | 5-12.5%          | 17                       | No                 | 5-12.5%          | 18        | No                 | 5-12.5%          | 12                       | No                 |
| GW-45 <sup>d</sup> | PPW/BF                      | 5-12.5%          | 20        | No                 | >12.5%           | 62                       | Yes                | >12.5%           | 32        | Yes                | >12.5%           | 41                       | Yes                |

<sup>a</sup> Community Types: PPW/BF-Pine Pond Woodland/Bay Forest, PAWCF/BF- Peatland Atlantic White Cedar Forest/Bay Forest.

<sup>b</sup> Missing data: data does not affect longest hydroperiod.

<sup>c</sup> Missing data: status shown in parenthesis was extrapolated from comparable gauges.

<sup>d</sup> Gauges originally not expected to meet the jurisdictional hydrologic success criterion due to proximity to perimeter ditch