

WHITE OAK CREEK MITIGATION SITE

2006 Annual Monitoring Report (Year 5)

Johnson County
EEP Project No. 417
Design Firm: Rummel, Klepper & Kahl, LLP

NCDOT Format

Prepared for:



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WHITE OAK CREEK MITIGATION SITE 2006 Annual Monitoring Report (Year 5)

SUMMARY

The White Oak Creek Mitigation Site (Site) was constructed for “up-front” wetland restoration by the North Carolina Department of Transportation (NCDOT) to be used for compensatory mitigation requirements involving roadway impact to wetlands in the Neuse River Basin. Through an agreement with the Ecosystem Enhancement Program (EEP) to the North Carolina Department of Transportation (NCDOT), EEP has accepted the transfer of all off-site mitigation projects. Therefore, EEP will be responsible for fulfilling the remaining requirements and future remediation for the Site. The NCDOT monitoring report format has been retained for clarity and continuity.

The following report summarizes the monitoring activities that have occurred in the past year at the Site. Site construction was begun in February 2002 and completed in March 2002. The Site was planted in late March 2002. In December 2002, the Site was replanted; therefore vegetation monitoring was restarted beginning in March 2003. The 2006 monitoring report represents the fourth year of vegetation monitoring and the fifth year of hydrological monitoring. The Site must demonstrate both hydrologic and vegetation success for a minimum of five years or until the Site is deemed successful.

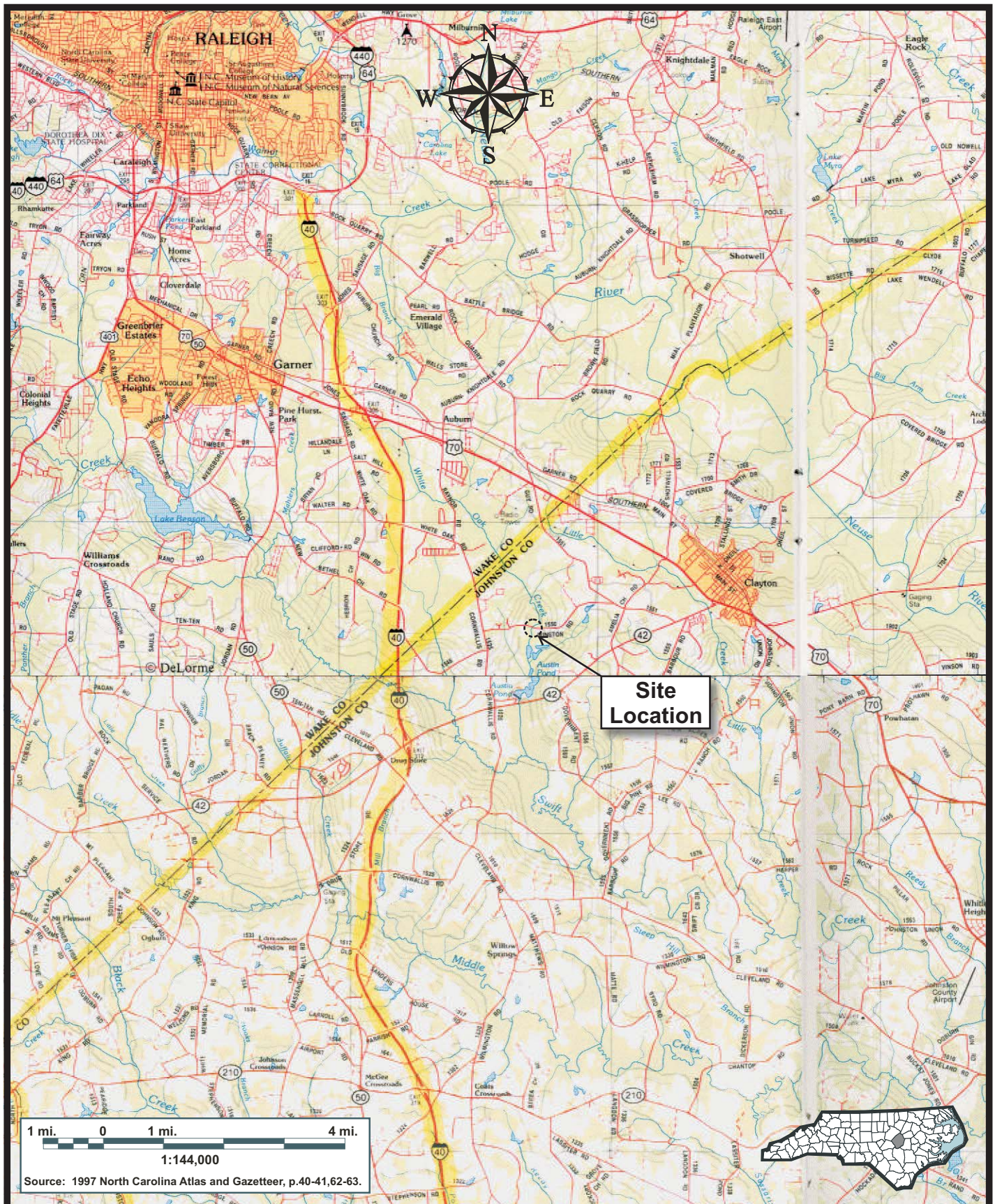
The 2006 year represents the fifth year of hydrologic monitoring of the Site. Overall, 23 of the 36 monitoring gauges met the success criteria (groundwater within 12 inches of the surface for at least 12.5 percent of the growing season). Nine monitoring gauges indicated groundwater within 12 inches of the surface for 5 to 12.5 percent of the growing season. The remaining four monitoring gauges indicated groundwater within 12 inches of the surface for 1 to 5 percent of the growing season.

The 2006 vegetation monitoring results revealed an average density of 305 trees per acre of planted species. This average is above the minimum success criteria of 290 trees per acre after the fourth growing season. Overall, 49 percent of the stems planted in the eight plots have survived.

1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

The Site is located adjacent to the west bank of White Oak Creek, immediately south of Winston Road (SR 1550) and north of Austin Pond, approximately 2.5 miles west of Clayton (Figure 1). White Oak Creek flows south for approximately 2 miles to the confluence with Swift Creek. The Site is located in hydrologic unit 03020201110040 (USGS). The Site is bordered on the north and west by residential development. The Site’s eastern boundary is White Oak Creek, which is buffered by mature swamp and bottomland hardwood forest communities.



Site Location

1 mi. 0 1 mi. 4 mi.
 1:144,000
 Source: 1997 North Carolina Atlas and Gazetteer, p.40-41,62-63.



SITE LOCATION
White Oak Creek Mitigation Site
 Johnston County, North Carolina
 EEP Project # 417

| | |
|----------|-----------|
| Dwn. by: | MAF |
| Ckd by: | JWG |
| Date: | DEC 2006 |
| Project: | 06-282.01 |

FIGURE
1

The Site comprises approximately 50.7 acres of previously open pasture land that was used for grazing horses. The Site was restored to promote natural plant communities and provide water quality benefits to the area. Construction at the Site was begun in January 2002 and completed in March 2002. Planting of the Site was completed in March 2002. Poor vegetation establishment required a second planting in December of 2002. Monitoring of the Site was restarted in 2003.

1.2 PURPOSE

In order to demonstrate successful wetland mitigation, hydrological and vegetative monitoring must be conducted for a minimum of five consecutive years. Success criteria are based on federal guidelines for wetland mitigation. These guidelines stipulate criteria for both hydrological conditions and vegetation survival. The following report details the results of hydrological and vegetative monitoring at the Site during the 2006 growing season.

Included in this report are analyses of both hydrologic and vegetative monitoring results, as well as local climate conditions throughout the growing season, and site photographs.

1.3 PROJECT HISTORY

| | |
|---------------------|--|
| January-March 2002 | Site Construction |
| March 2002 | Site Planted |
| August 2002 | Vegetation Monitoring (1year) |
| March-November 2002 | Hydrologic Monitoring (1 year) |
| December 2002 | Site Replanted |
| June 2003 | Vegetation Monitoring (Restart 1 year) |
| March-November 2003 | Hydrologic Monitoring (2 year) |
| June 2004 | Vegetation Monitoring (2 year) |
| March-November 2004 | Hydrologic Monitoring (3 year) |
| October 2005 | Vegetation Monitoring (3 year) |
| March-November 2005 | Hydrologic Monitoring (4 year) |
| October 2006 | Vegetation Monitoring (4 year) |
| March-November 2006 | Hydrologic Monitoring (5 year) |

2.0 HYDROLOGY

2.1 SUCCESS CRITERIA

In accordance with federal guidelines for wetland mitigation, the success criteria for hydrology state that the restoration areas must be inundated or saturated (within 12 inches of the surface) by surface water or groundwater for at least 12.5 percent of the growing season (consecutive days) during a normal precipitation year. Areas that have between 5 and 12.5 percent of the growing season may be considered hydric under certain conditions. Areas inundated for less than 5 percent of the growing season are always classified as non-wetlands.

The growing season in Johnson County begins March 21 and ends November 4. These dates correspond to a 50 percent probability that temperatures will not drop to 28 degrees Fahrenheit or lower after March 21 and before November 4 (Natural Resources Conservation Service, Soil Survey of Johnston County). The growing season is 228 days.

2.2 HYDROLOGIC DESCRIPTION

In March 2002, 38 Remote Data Systems (RDS) continuous logging groundwater gauges were installed. Thirty-six of these gauges were installed within the Site and two were installed as reference gauges on an adjacent property. The on-site gauge locations are shown on Figure 2, Appendix A). The monitoring gauges record daily readings of depth to groundwater. This year's data represents the fifth growing season that the gauges have been monitored. The reference gauges are non-functioning and are not currently being monitored. The Site was designed to receive hydrologic inputs from rainfall, groundwater, and surface water from overbanking events.

2.3 RESULTS OF HYDROLOGIC MONITORING

2.3.1 Site Data

The maximum number of consecutive days that groundwater was within 12 inches of the surface was calculated for each monitoring gauge and converted into a percentage of the 228-day growing season (March 21-November 4). The results are presented in Table 1.

Appendix B contains the hydrographs for each monitoring gauge for the current monitoring year. The corresponding rain data collected from the on-site rain gauge is also provided on each hydrograph.

Figure 2 provides a graphical representation of the hydrologic results. Gauges highlighted in green indicate wetland hydrology for more than 12.5 percent of the growing season. Gauges highlighted in yellow are those that had wetland hydrology between 5 and 12.5 percent of the growing season. Gauges highlighted in red are those that had wetland hydrology less than 5 percent of the growing season.

Table 1. White Oak Hydrologic Monitoring Results

| Monitoring Gauge* | <5% | 5-12.5% | >12.5% | Actual % | Success Date |
|-------------------|-----|---------|--------|----------|-----------------------|
| GW-1 | ✓ | | | 4 | |
| GW-2 | | ✓ | | 9 | |
| GW-3 | | | ✓ | 94 | April 3 – November 4 |
| GW-4 | | | ✓ | 100 | March 21 – November 4 |
| GW-5 | | | ✓ | 94 | April 3 – November 4 |
| GW-6 | | ✓ | | 11 | |
| GW-7 | ✓ | | | 3 | |
| GW-8 | | | ✓ | 15 | April 23 – May 28 |
| GW-9 | | | ✓ | 60 | March 21 – August 8 |
| GW-10 | | ✓ | | 9 | |
| GW-11 | | | ✓ | 62 | March 21 – August 11 |
| GW-12 | | ✓ | | 6 | |
| GW-13 | | | ✓ | 31 | March 21 – May 31 |
| GW-14 | | ✓ | | 10 | |
| GW-15 | ✓ | | | 1 | |
| GW-16 | | | ✓ | 100 | March 21 – November 4 |
| GW-17 | | | ✓ | 62 | March 21 – August 10 |
| GW-18 | | | ✓ | 33 | March 21 – June 6 |
| GW-19 | | ✓ | | 8 | |
| GW-20 | | | ✓ | 13 | March 21 – April 20 |
| GW-21 | | | ✓ | 13 | March 21 – April 19 |

| | | | | | |
|-------|---|---|---|-----|-----------------------|
| GW-22 | | ✓ | | 10 | |
| GW-23 | | ✓ | | 11 | |
| GW-24 | | | ✓ | 30 | March 21 – May 28 |
| GW-25 | | | ✓ | 35 | March 21 – June 8 |
| GW-26 | | | ✓ | 19 | March 21 – May 4 |
| GW-27 | | | ✓ | 50 | March 21 – July 14 |
| GW-28 | | | ✓ | 33 | March 21 – June 6 |
| GW-29 | | | ✓ | 14 | March 21 – April 21 |
| GW-30 | ✓ | | | 1 | |
| GW-31 | | | ✓ | 100 | March 21 – November 4 |
| GW-32 | | | ✓ | 100 | March 21 – November 4 |
| GW-33 | | ✓ | | 9 | |
| GW-34 | | | ✓ | 52 | March 21 – July 16 |
| GW-35 | | | ✓ | 50 | March 21 – July 12 |
| GW-36 | | | ✓ | 62 | March 21 – August 19 |

*Monitoring gauges 1, 7, 8, 10, 13, 20, 23, 26, and 28 were reinstalled with a new bentonite seal prior to the 2006 growing season.

2.3.2 Climatic Data

Figure 3 (Appendix A) provides an evaluation of the local climate in comparison with historical data in order to determine whether 2006 was a year with “average” rainfall. The bars are the monthly rainfall totals for the 2006 hydrologic year collected from the on-site rain gauge. Also represented on the figure are the 30th and 70th percentiles of monthly precipitation for the Clayton weather station. The historical data and monthly data were collected by the Southeast Regional Climate Data.

Months with below average rainfall include: January, February, March, July, August, and September. The months of April and October experienced average rainfall. May and June

received above average rainfall. A normal yearly rainfall in the area is approximately 45.7 inches.

2.4 CONCLUSION

The current year represents the fifth year of hydrologic monitoring. In general, water levels showed a typical pattern of flooding during the spring, followed by a late summer and fall draw down period, punctuated by peaks associated with precipitation events. The 2006 year represents the fifth year of hydrologic monitoring of the Site. Overall, 23 of the 36 monitoring gauges met the success criteria (groundwater within 12 inches of the surface for at least 12.5 percent of the growing season). Nine monitoring gauges indicated groundwater within 12 inches of the surface for 5 to 12.5 percent of the growing season. The remaining four monitoring gauges indicated groundwater within 12 inches of the surface for 1 to 5 percent of the growing season. Gauges 1 and 10 indicated saturation for a much shorter period compared to the 2005 growing season. Gauges 1 and 10 are two of the gauges that were reinstalled prior to the 2006 growing season due to deteriorated bentonite seals. During the 2006 growing season the new bentonite seals stopped surface water from entering the gauge. The monitoring results for 2006 for gauges 1 and 10 are a more accurate indicator of the hydrologic conditions in the areas adjacent to the gauges compared to the 2005 monitoring results.

3.0 VEGETATION

3.1 SUCCESS CRITERIA

The success criteria state that at least 320 stems per acre must survive after the completion of the third growing season. The required survival criterion will decrease by 10 percent per year after the third year of vegetation monitoring (i.e., for an expected 290 stems per acre for year 4 and 260 stems per acre for year 5. Photograph locations are shown in Figure 4 (Appendix A). Site photographs are provided in Appendix C.

3.2 DESCRIPTION OF SPECIES

The following tree species were planted in the Wetland Areas:

Zone 1: Wetland Restoration Area (10.03 Acres)

Quercus lyrata, Overcup Oak
Quercus michauxii, Swamp Chestnut Oak
Quercus phellos, Willow Oak
Quercus nigra, Water Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Fraxinus pennsylvanica, Green Ash
Cornus amomum, Silky Dogwood
Sambucus canadensis, Elderberry
Cephalanthus occidentalis, Buttonbush

Zone 2: Wetland Enhancement Area (1.58 Acres)

Quercus lyrata, Overcup Oak
Quercus michauxii, Swamp Chestnut Oak
Quercus phellos, Willow Oak
Quercus nigra, Water Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Fraxinus pennsylvanica, Green Ash
Cornus amomum, Silky Dogwood
Sambucus canadensis, Elderberry
Cephalanthus occidentalis, Buttonbush

Zone 3: Wetland Creation Area (6.59 Acres)

Quercus lyrata, Overcup Oak
Quercus michauxii, Swamp Chestnut Oak
Quercus phellos, Willow Oak
Quercus nigra, Water Oak
Nyssa sylvatica var. *biflora*, Swamp Blackgum
Fraxinus pennsylvanica, Green Ash

3.3 RESULTS OF VEGETATION MONITORING

RESULTS OF VEGETATION MONITORING

The following table lists the densities of planted tree species recorded in each established 0.06-acre (50-foot by 50-foot) plot. (Figure 4, Appendix A).

TABLE 2: Vegetation Monitoring Statistics

| Plot Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | Total |
|--|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| Buttonbush <i>Cephalanthus occidentalis</i> | | 2 | 2 | | | | | 3 | 7 |
| Elderberry <i>Sambucus canadensis</i> | | | 3 | 3 | | | 3 | 1 | 10 |
| Green Ash <i>Fraxinus pennsylvanica</i> | 2 | 10 | 3 | 4 | 6 | 6 | 3 | 4 | 38 |
| Overcup Oak <i>Quercus lyrata</i> | 1 | 3 | 1 | 1 | | 2 | 1 | 6 | 15 |
| Silky Dogwood <i>Cornus amomum</i> | 5 | 11 | 8 | 10 | 4 | | 4 | 2 | 44 |
| Swamp Blackgum <i>Nyssa sylvatica</i> var. <i>biflora</i> | 5 | | | | | 1 | | | 6 |
| Swamp Chestnut Oak <i>Quercus michauxii</i> | 2 | 1 | | 2 | 1 | | 4 | 1 | 11 |
| Water Oak <i>Quercus nigra</i> | 1 | | | | | | 2 | | 3 |
| Willow Oak <i>Quercus phellos</i> | 3 | 1 | | | | | 1 | 1 | 6 |
| Total (2006, Year 4) | 19 | 28 | 17 | 20 | 11 | 9 | 18 | 18 | 140 |
| Total (2005, Year 3) | 21 | 22 | 18 | 15 | 12 | 10 | 21 | 17 | 115 |
| Total (2003, Year 1) | 30 | 28 | 40 | 17 | 31 | 21 | 39 | 22 | 198 |
| Total (2002, at Planting) | 40 | 38 | 45 | 24 | 37 | 31 | 40 | 32 | 247 |
| Density (Trees/Acre) | 331 | 488 | 296 | 348 | 192 | 157 | 314 | 314 | |
| Average Density (Trees/Acre) | | | | | | | | | 305 |

Stem counts were made of additional, volunteer woody species within the study plots. These are listed in Table 3.

TABLE 3: Volunteer Woody Stem Counts in the Study Plots.

| Plot Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | TOTAL |
|--|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|------------|
| Black Willow <i>Salix nigra</i> | 1 | 2 | 8 | | 1 | 20 | | 1 | 33 |
| Bradford Pear <i>Pyrus calleryana</i> | | | | 1 | 1 | | | | 2 |
| Groundsel Bush <i>Baccharis halimifolia</i> | 14 | | 2 | | 1 | 1 | 1 | 4 | 23 |
| Loblolly Pine <i>Pinus taeda</i> | 26 | 3 | 4 | | 6 | 1 | 52 | 7 | 99 |
| Persimmon <i>Diospyros virginiana</i> | | | | 10 | | | | | 10 |
| Red Maple <i>Acer rubrum</i> | | 45 | 20 | 3 | 2 | 42 | | 38 | 150 |
| Sweetgum <i>Liquidambar styraciflua</i> | 3 | 5 | 10 | 2 | | | 1 | 3 | 24 |
| Tulip Poplar <i>Liriodendron tulipifera</i> | | 2 | | 1 | | | | | 3 |
| Wax Myrtle <i>Morella cerifera</i> | 1 | 5 | 5 | | | | | 2 | 13 |
| American Elm <i>Ulmus americana</i> | | 1 | | | | | | 1 | 2 |
| Winged Elm <i>Ulmus alata</i> | | | | 2 | | | | | 2 |
| TOTAL | 45 | 63 | 49 | 19 | 11 | 64 | 54 | 56 | 361 |
| Density (Trees/Acre) | 784 | 1098 | 854 | 331 | 192 | 1115 | 941 | 976 | |
| Average Density (Trees/Acre) | | | | | | | | | 786 |

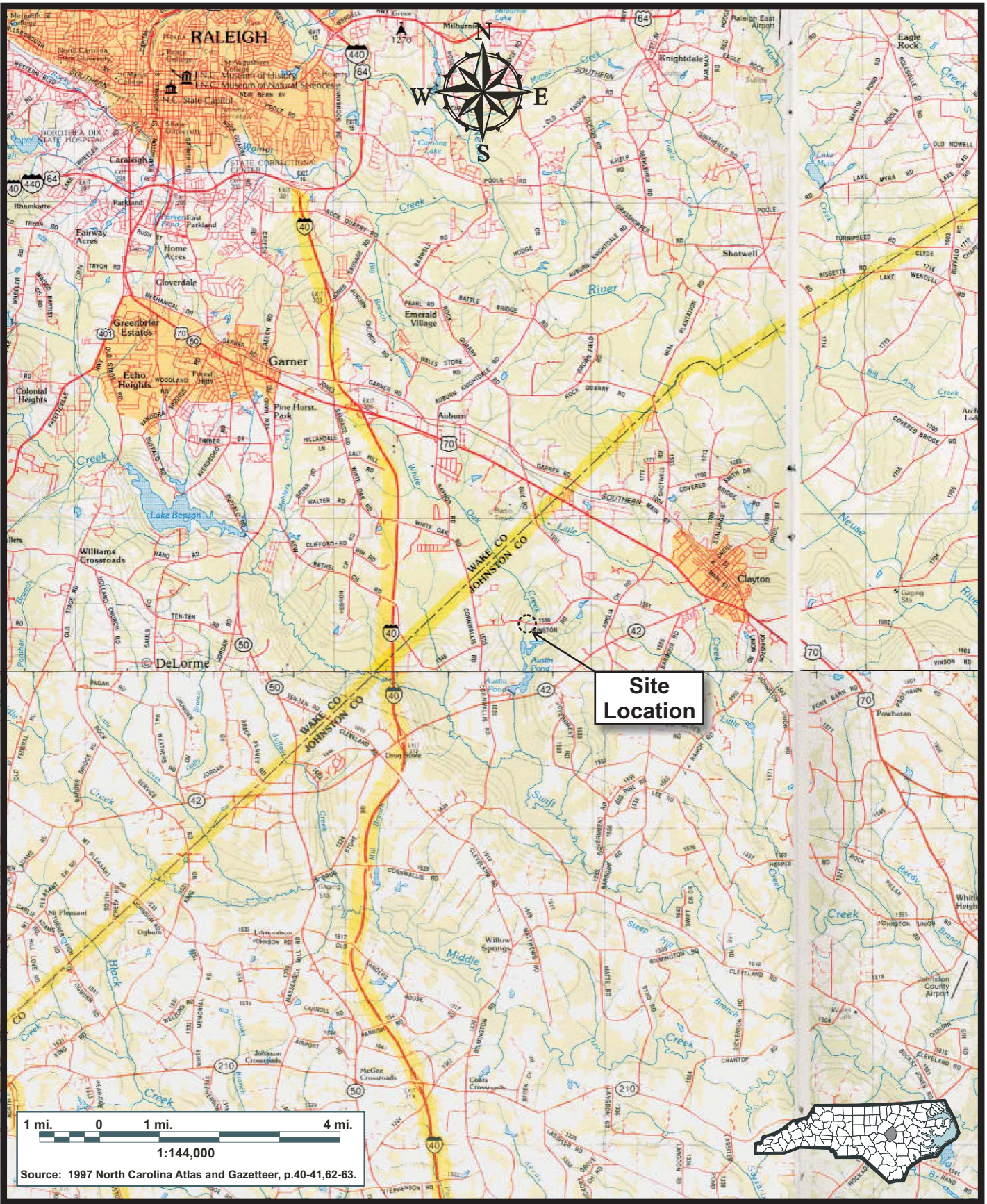
An inventory of herbaceous species on the site was also taken. Dominant herbaceous species over the site as a whole include: blackberry (*Rubus argutus*), climbing hempweed (*Mikania scandens*), common cattail (*Typha latifolia*), dog fennel (*Eupatorium capillifolium*), false nettle (*Boehmeria cylindrica*), goldenrod (*Solidago* sp.), jewelweed (*Impatiens capensis*), meadow beauty (*Rhexia mariana*), seedbox (*Ludwigia alternifolia*), soft rush (*Juncus effusus*), tearthumb (*Polygonum sagittatum*), woolgrass (*Scirpus cyperinus*), Virginia buttonweed (*Diodia virginiana*), Virginia creeper (*Parthenocissus quinquefolia*), sneezeweed (*Helenium autumnale*), boneset (*Eupatorium perfoliatum*), monkey-flower (*Mimulus ringens*), beggar ticks (*Bidens frondosa*), broomsedge (*Andropogon virginicus*), fescue (*Festuca* sp.), greenbrier (*Smilax rotundifolia*), ragweed (*Ambrosia artemisiifolia*), ragwort (*Senecio* sp.), sericea lespedeza (*Lespedeza cuneata*), and trumpet creeper (*Campsis radicans*).

3.4 CONCLUSION

Of the 50.7 acres on this site, approximately 18.2 acres involved tree planting. Supplemental tree planting was completed in December 2002. An upland buffer area that consisted of 12.04 acres was also planted. Eight vegetation monitoring plots, 50 by 50 feet (0.06 acre) in size, were established throughout the planting areas. The 2006 vegetation monitoring results revealed an average density of 305 trees per acre of planted species. This average is above the minimum success criteria of 290 trees per acre after the fourth growing season. Overall, 49 percent of the stems planted in the eight plots survive.

Nuisance trees such as red maple and loblolly pine occur in significant amounts in some areas of the Site, as seen in Plots 1, 3, and 7. The increase in stem counts of these species over 2005, for example in Plot 1, is likely due to site characteristics and proximity to seed sources. These occurrences do not appear to have a direct effect on the survivability of planted species on the plots. However, several areas on the site are nearly devoid of vegetation with Plots 5 and 6 below minimum planted tree density.

APPENDIX A
FIGURES



Site Location

1 mi. 0 1 mi. 4 mi.
 1:144,000
 Source: 1997 North Carolina Atlas and Gazetteer, p.40-41,62-63.



SITE LOCATION
White Oak Creek Mitigation Site
 Johnston County, North Carolina
 EEP Project # 417

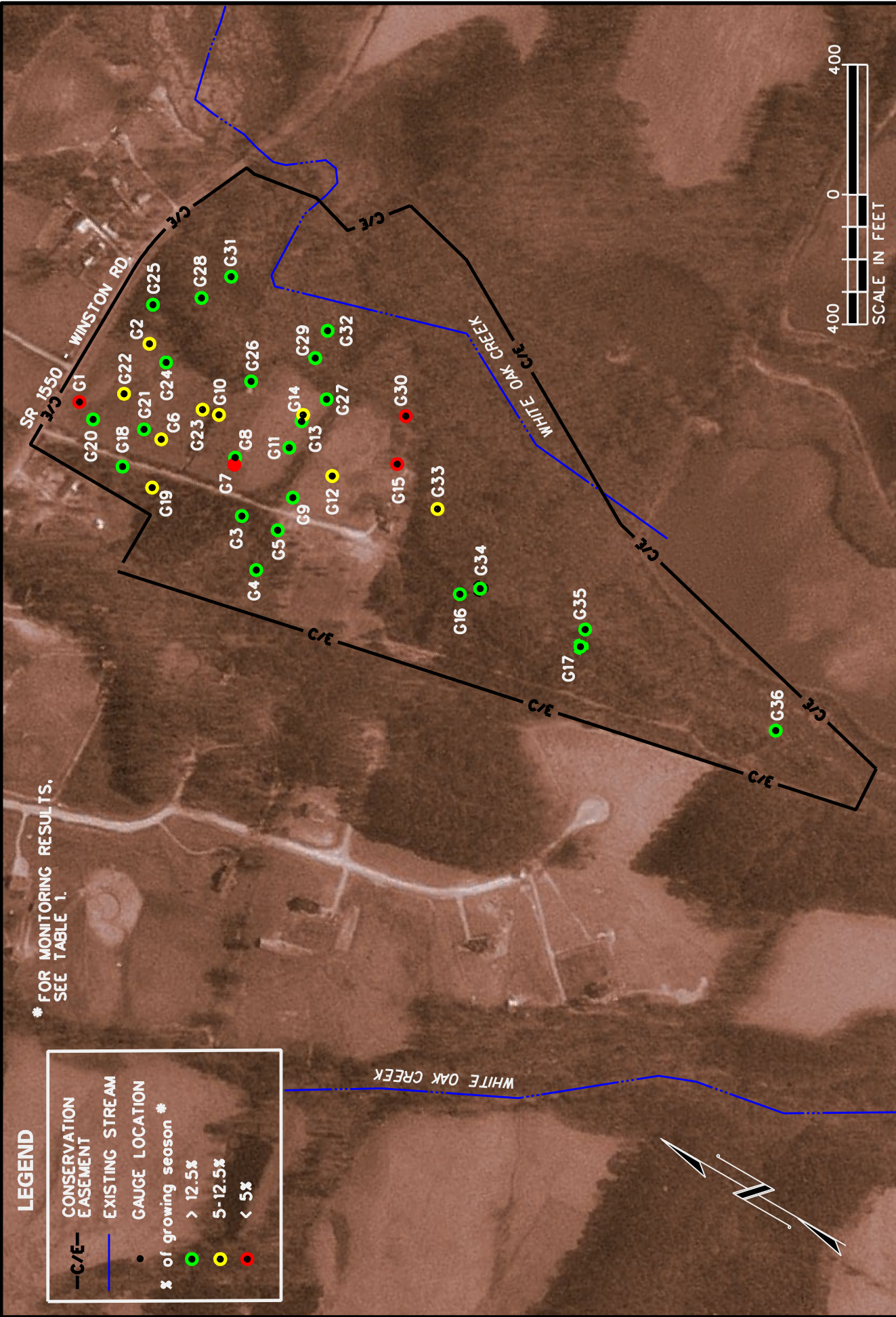
| | |
|----------|-----------|
| Dwn. by: | MAF |
| Ckd by: | JWG |
| Date: | DEC 2006 |
| Project: | 06-282.01 |

FIGURE
1

LEGEND

- C/E - CONSERVATION EASEMENT
- EXISTING STREAM
- GAUGE LOCATION *
- * of growing season > 12.5%
- * 5-12.5%
- * < 5%

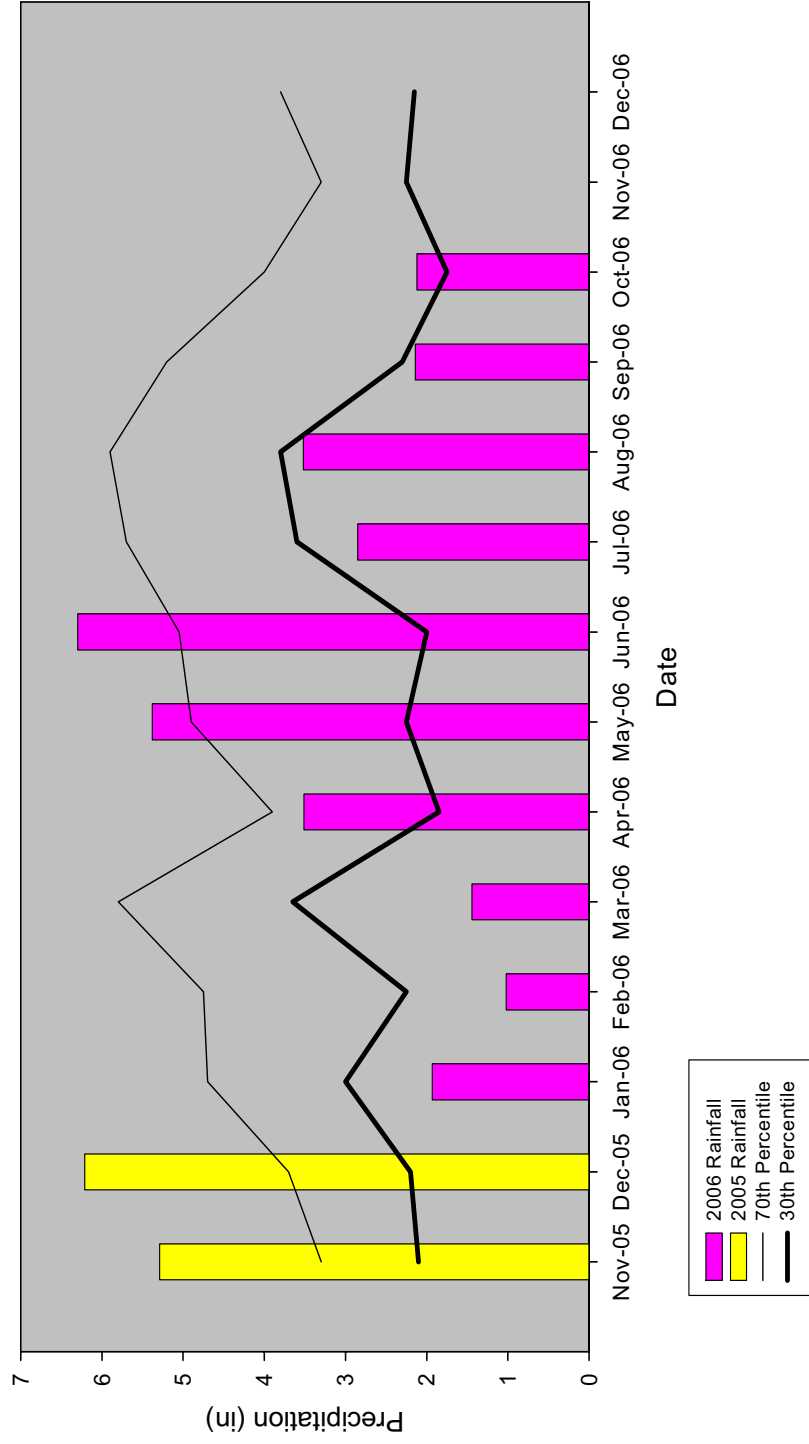
* FOR MONITORING RESULTS, SEE TABLE 1.



MONITORING GAUGE LOCATIONS AND RESULTS
White Oak Creek Mitigation Site
 JOHNSTON COUNTY, NORTH CAROLINA

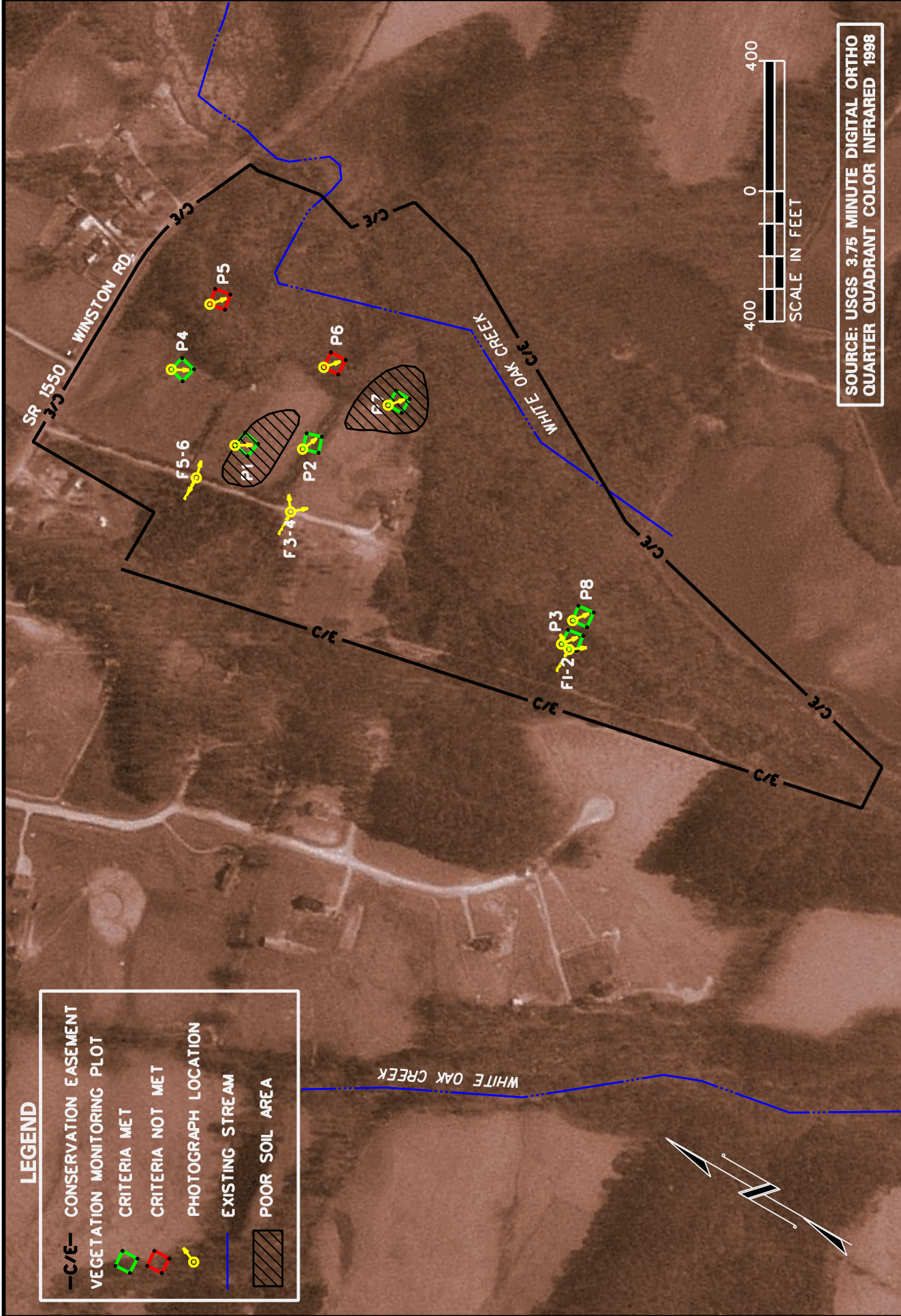
| | | | |
|------------------|---------------------------------|--------|-----------|
| Client: | EcoScience Corporation | | |
| Project: | White Oak Creek Mitigation Site | | |
| Drawn By: | GWN | Date: | DEC 2006 |
| Checked By: | JWG | Scale: | 1" = 400' |
| ESC Project No.: | 06-282.01 | | |
| FIGURE | 2 | | |

**Fig 3. White Oak Creek 30-70 Percentile Graph 2006
Clayton, NC**



LEGEND

- C/E- CONSERVATION EASEMENT
- VEGETATION MONITORING PLOT
- CRITERIA MET
- CRITERIA NOT MET
- PHOTOGRAPH LOCATION
- EXISTING STREAM
- POOR SOIL AREA



SOURCE: USGS 3.75 MINUTE DIGITAL ORTHO QUARTER QUADRANT COLOR INFRARED 1998



Project: **VEGETATION MONITORING PLOTS AND PHOTOGRAPH LOCATIONS**
 White Oak Creek Mitigation Site

EEP Project No. 417

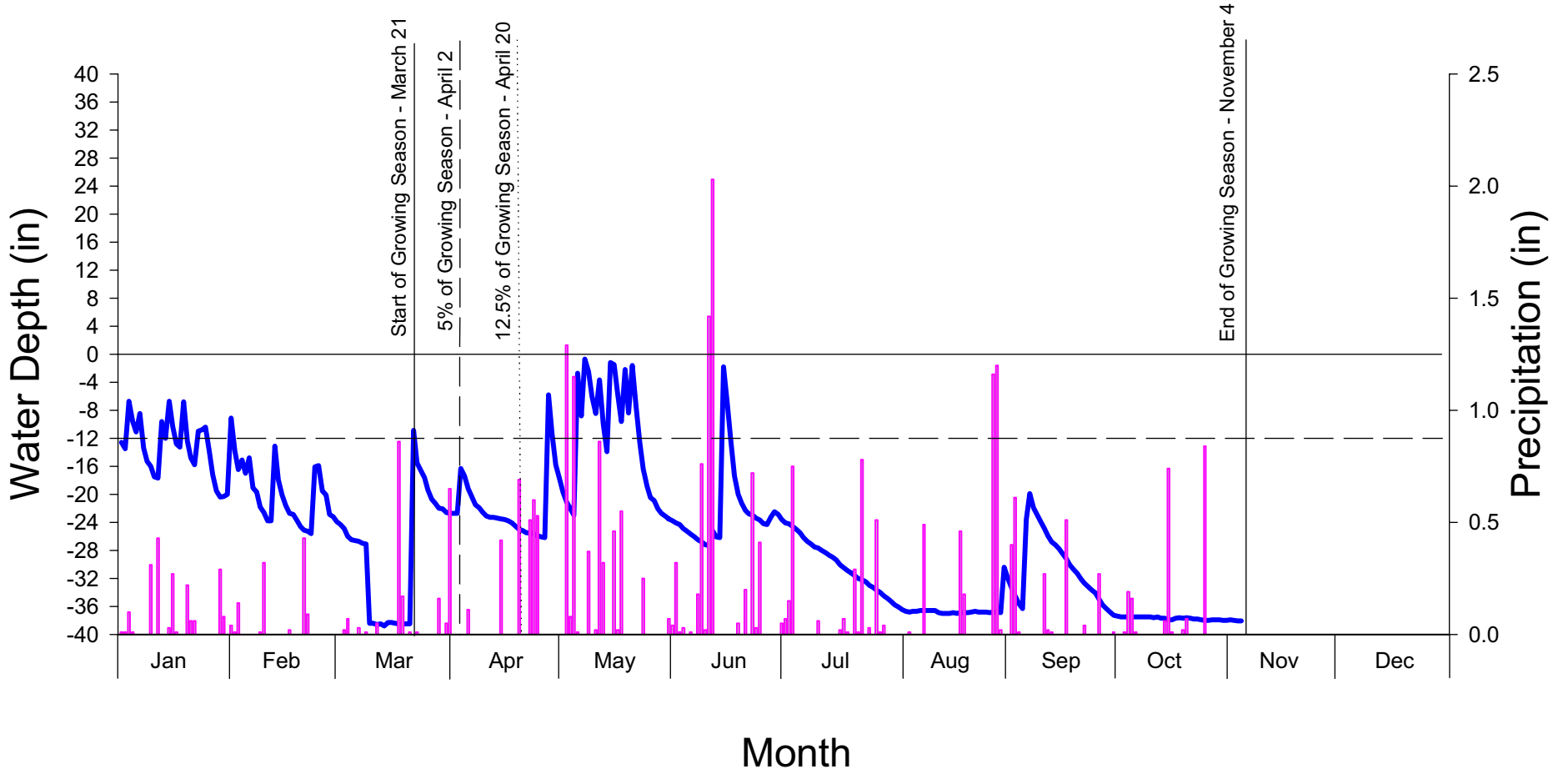
JOHNSTON COUNTY, NORTH CAROLINA

| | | | |
|------------------|-----|-----------|-----------|
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| Checked By: | JWG | Scale: | 1" = 400' |
| ESC Project No.: | | 06.282.01 | |

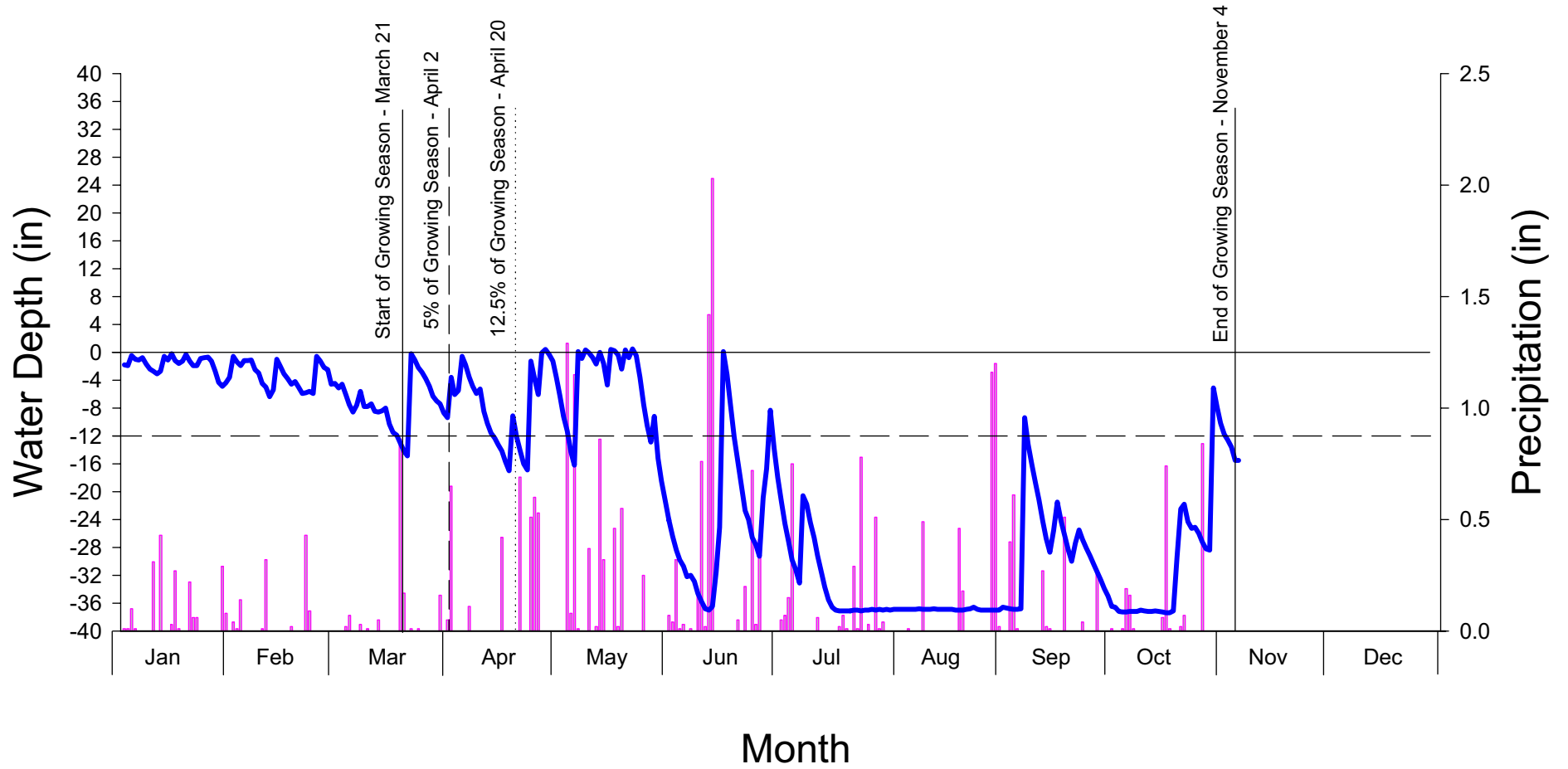
FIGURE **4**

APPENDIX B
GROUNDWATER GAUGE HYDROGRAPHS

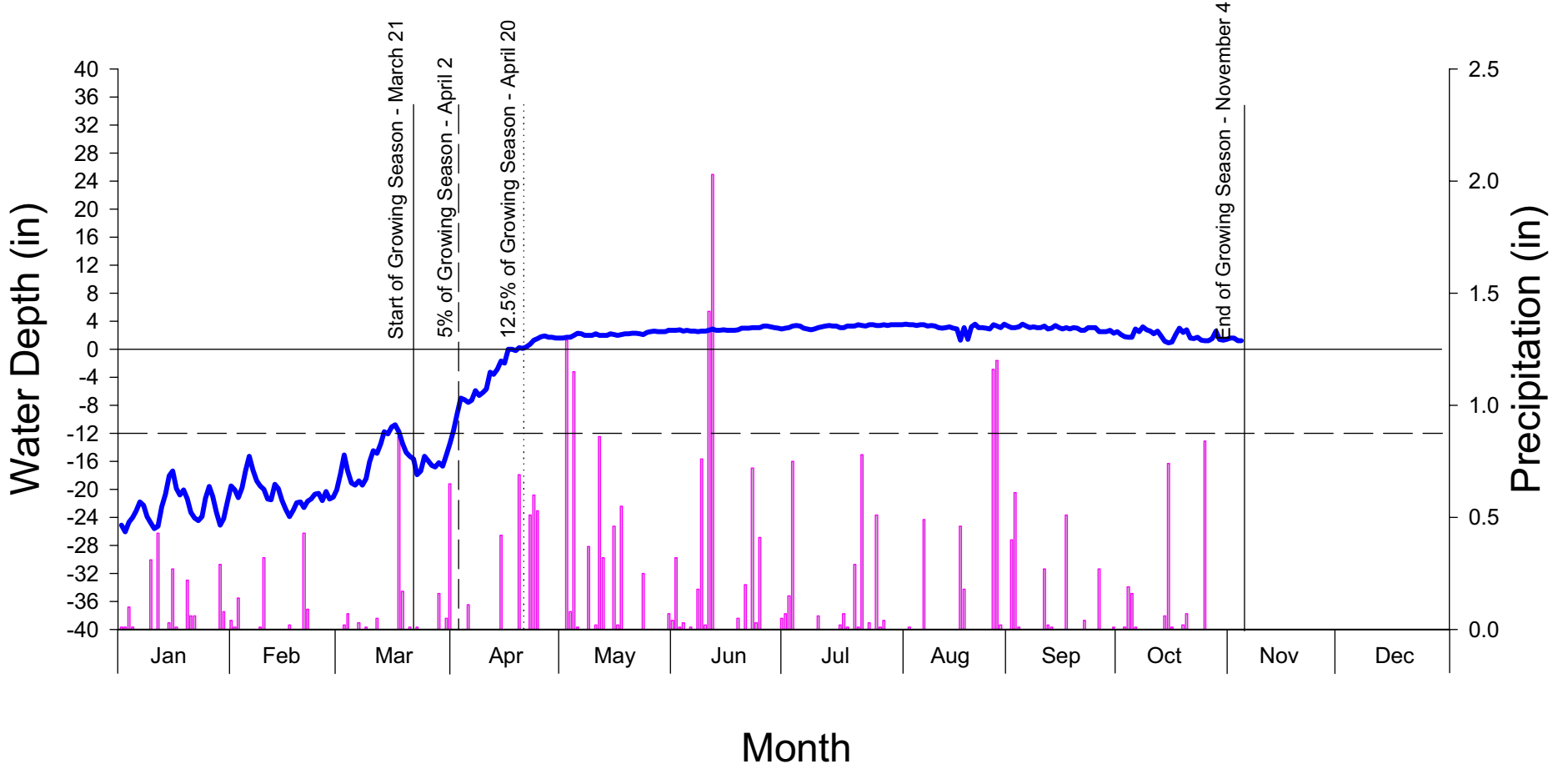
White Oak Creek 2006 Monitoring Gauge 1 - 9DE4246



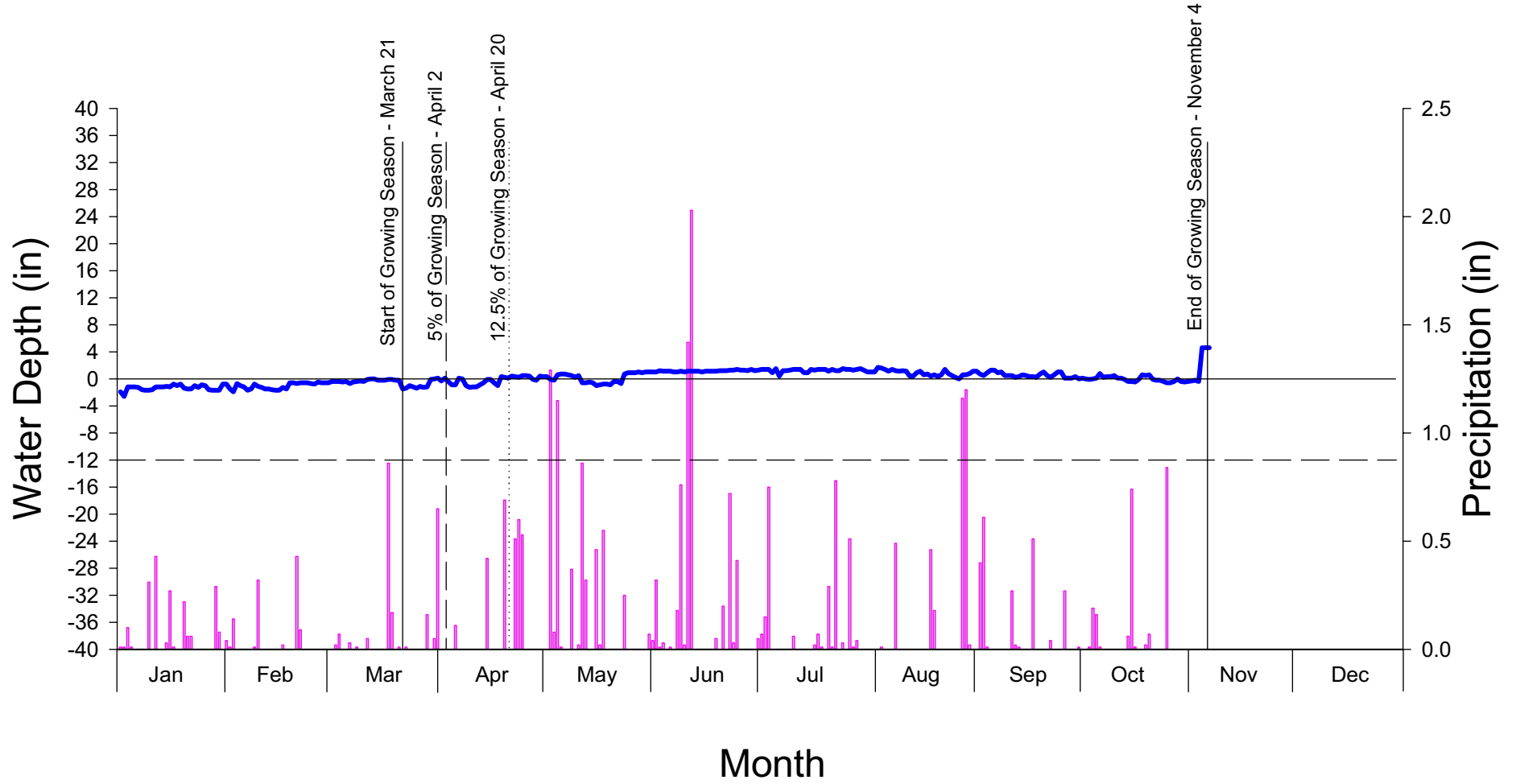
White Oak Creek 2006 Monitoring Gauge 2 - 9BEB CFA



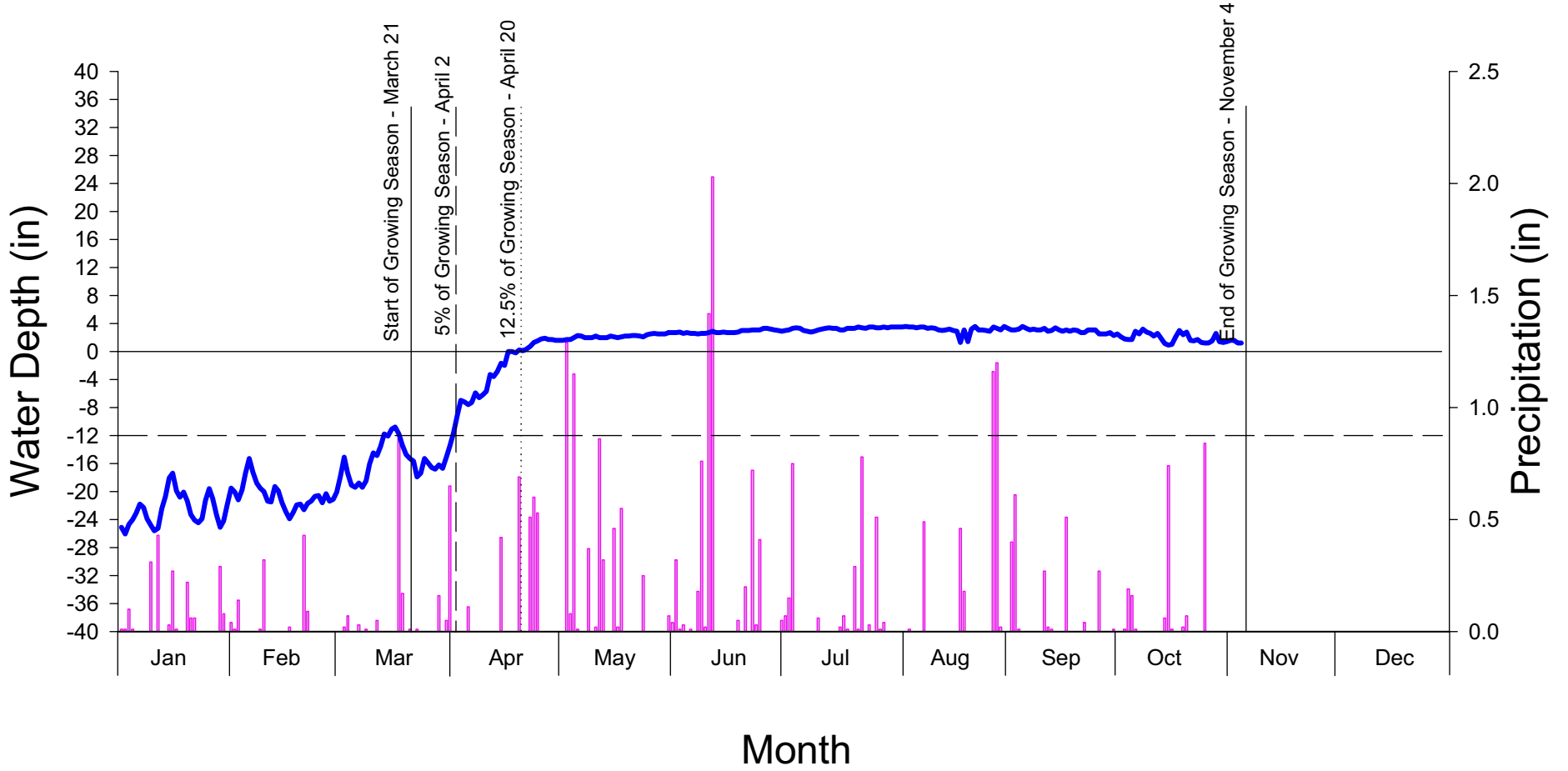
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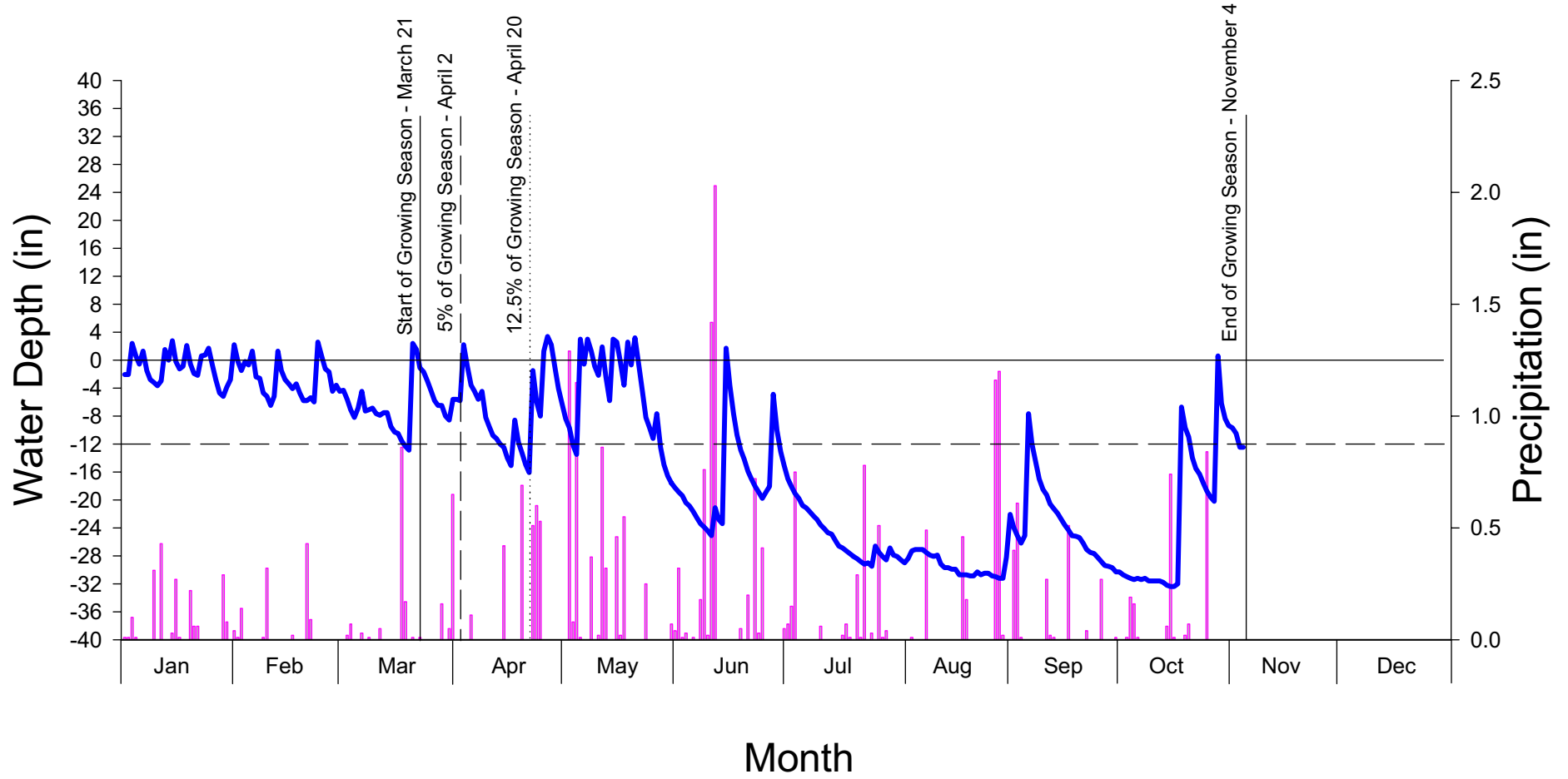
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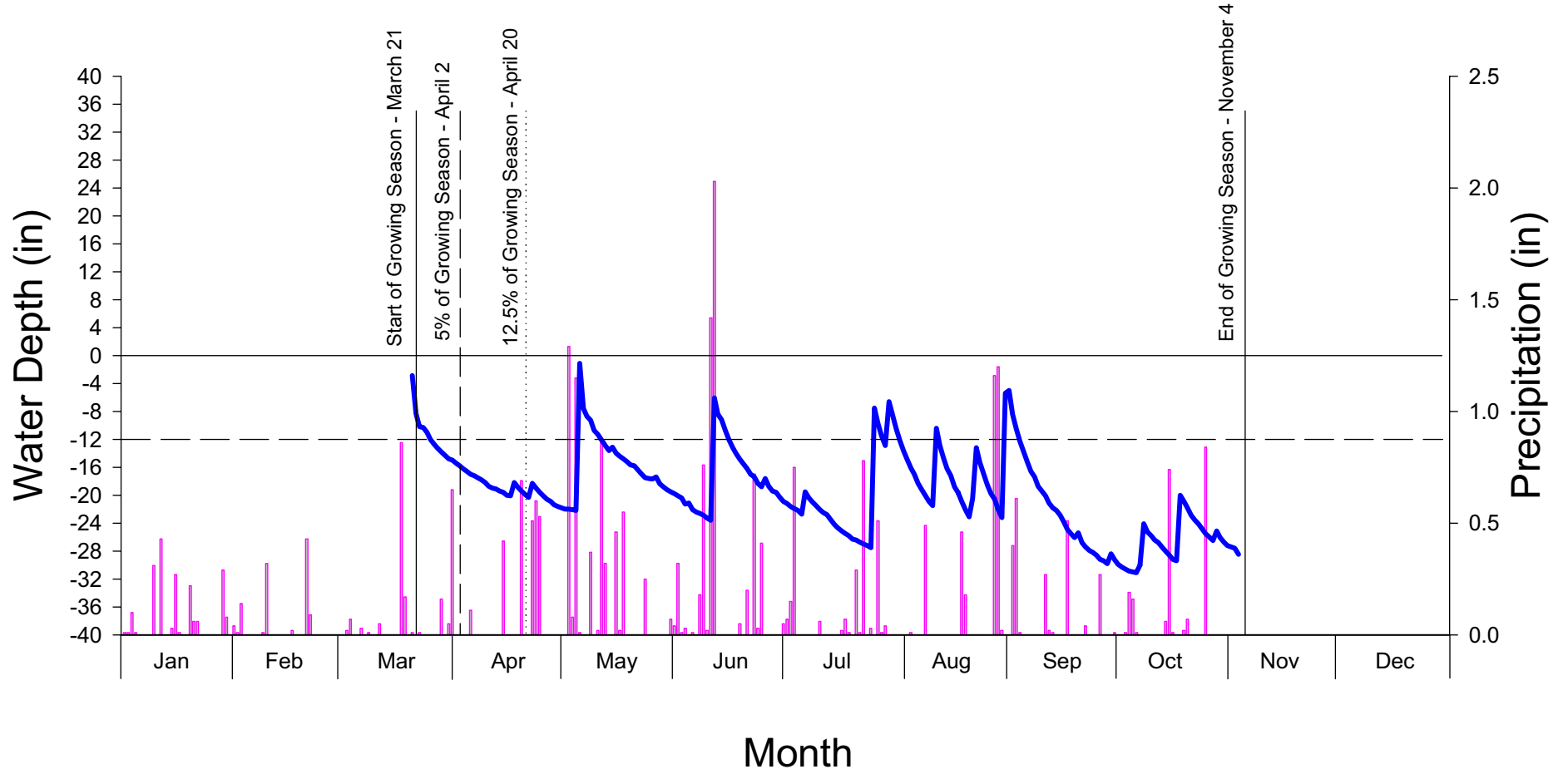
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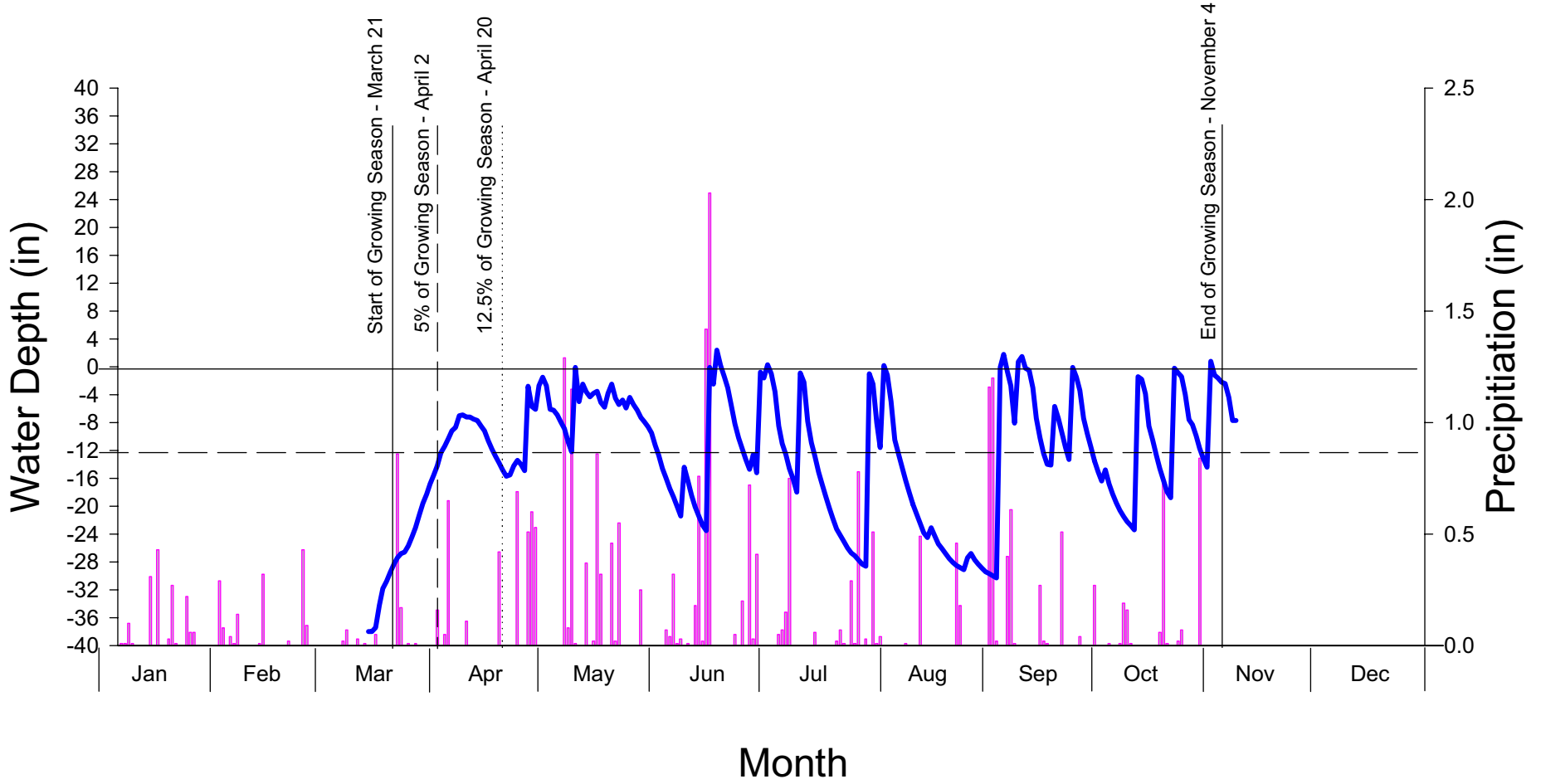
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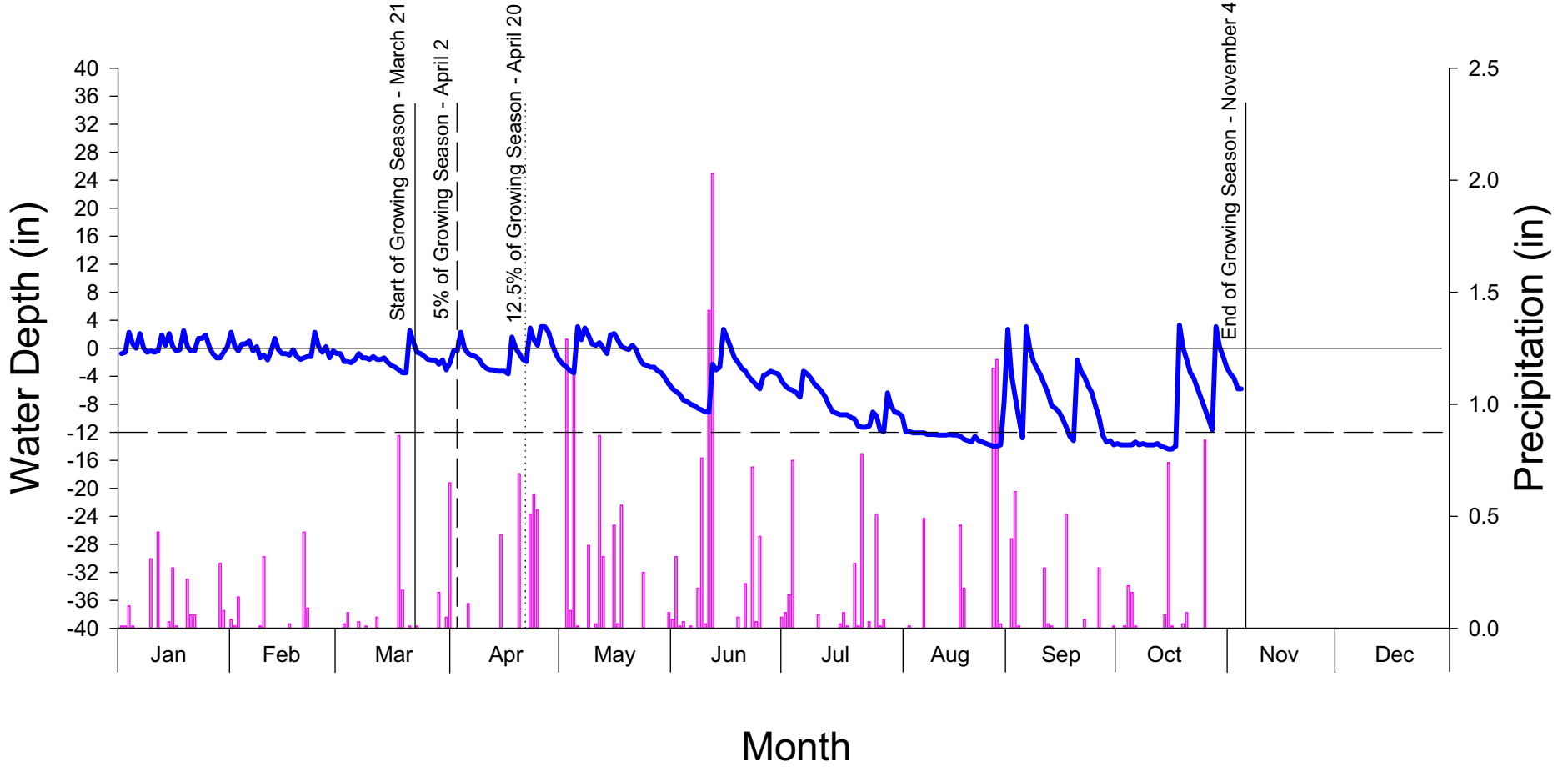
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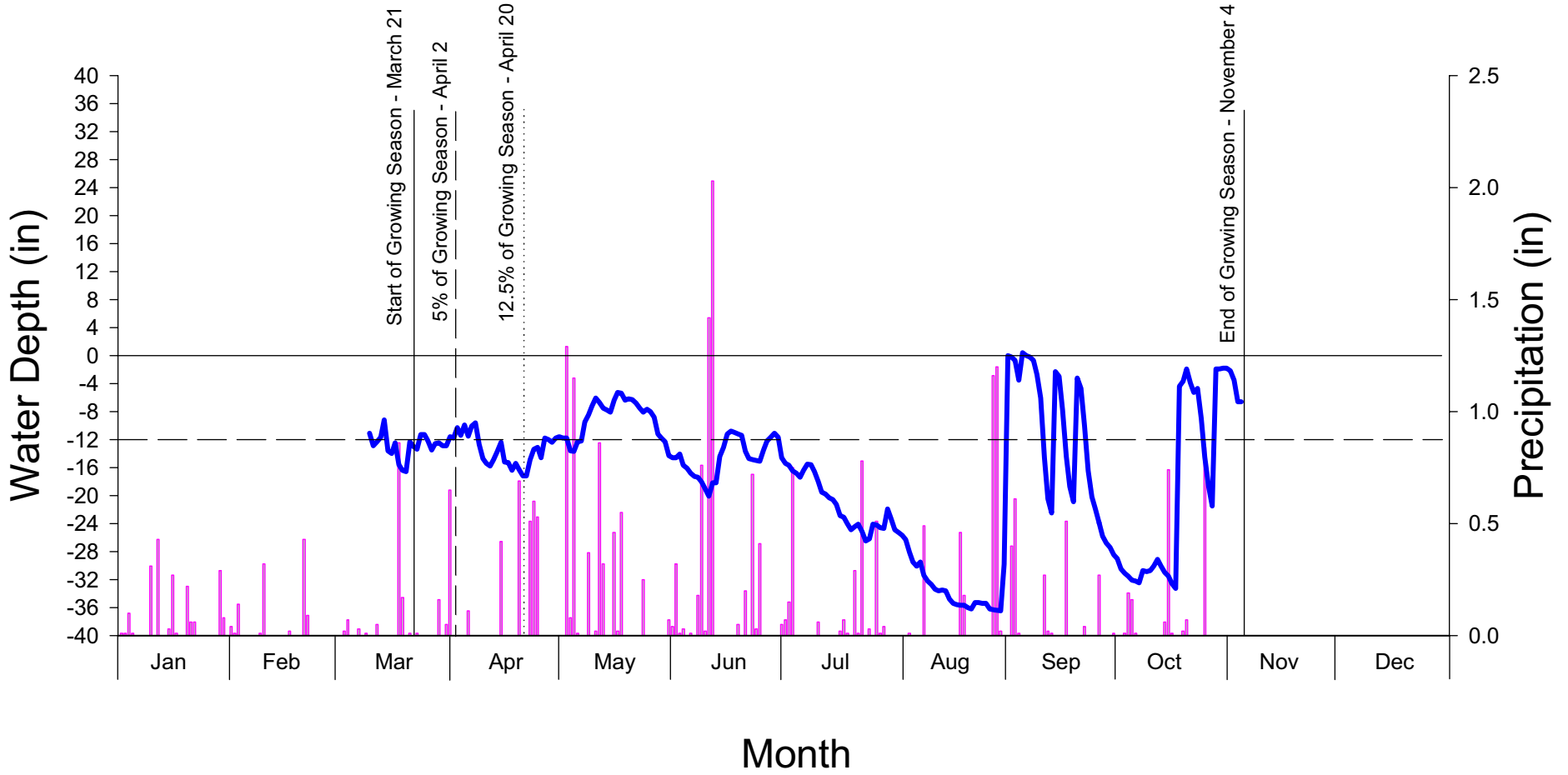
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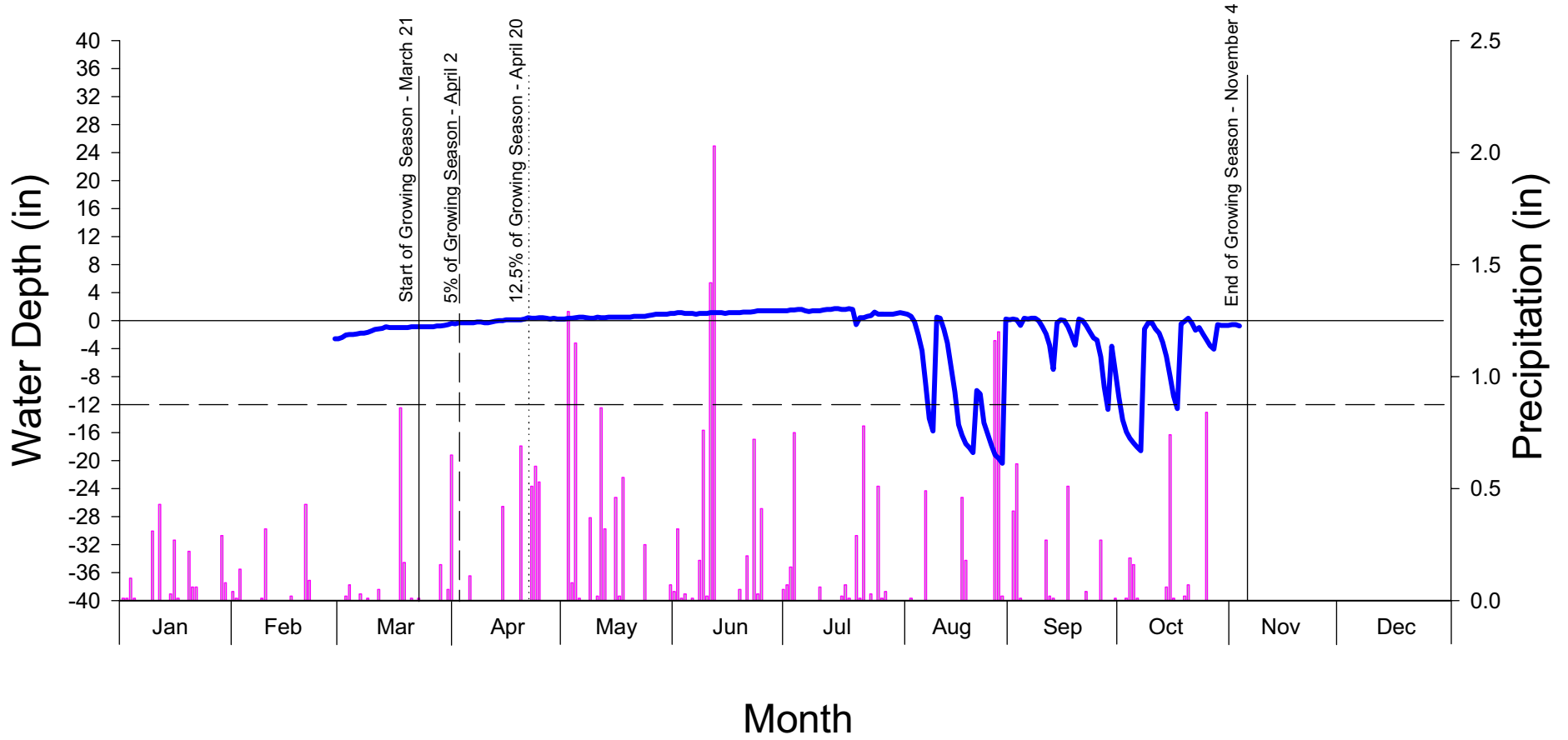
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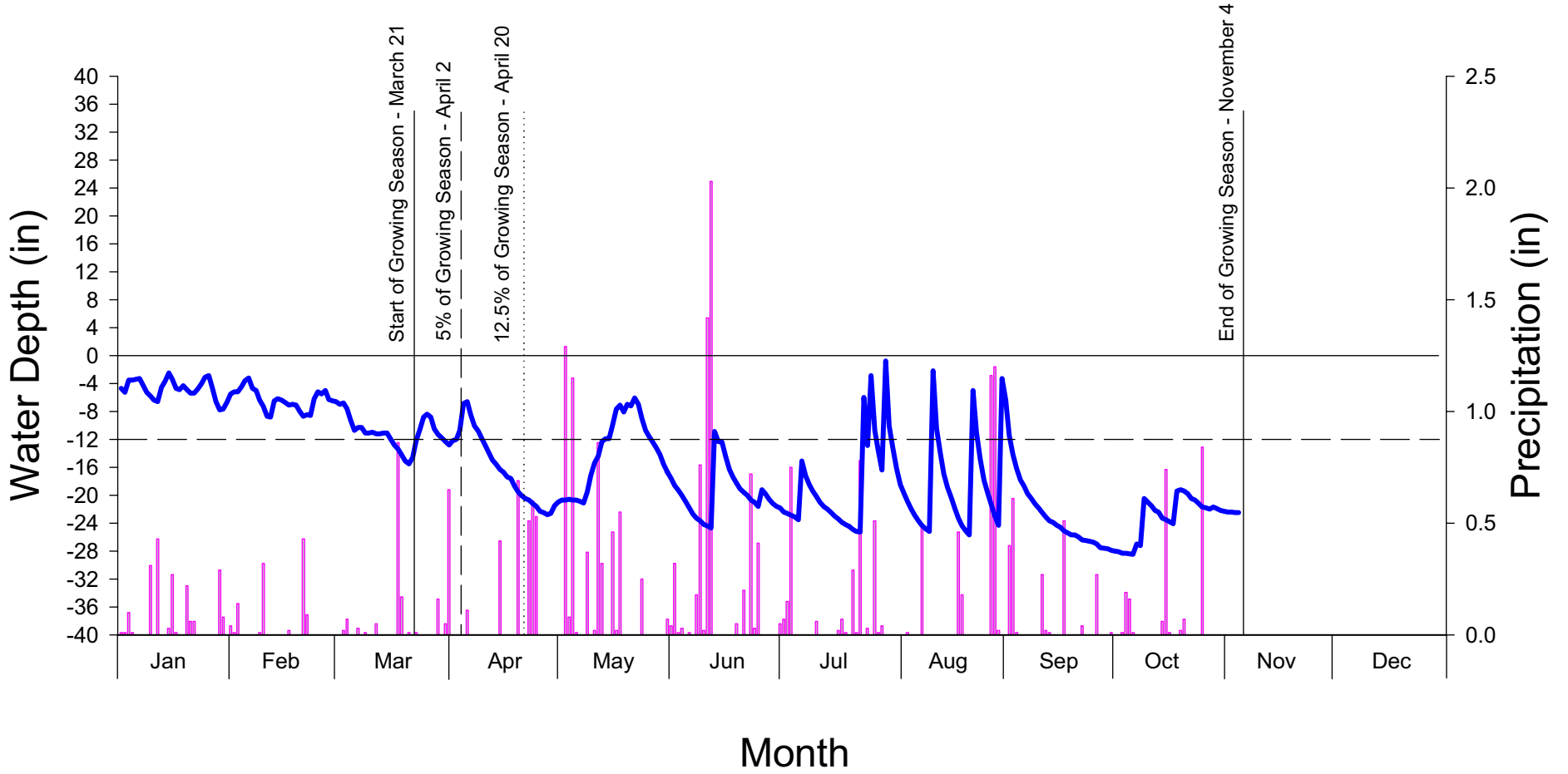
White Oak Creek 2006 Monitoring Gauge 10 - 9DE5CAE



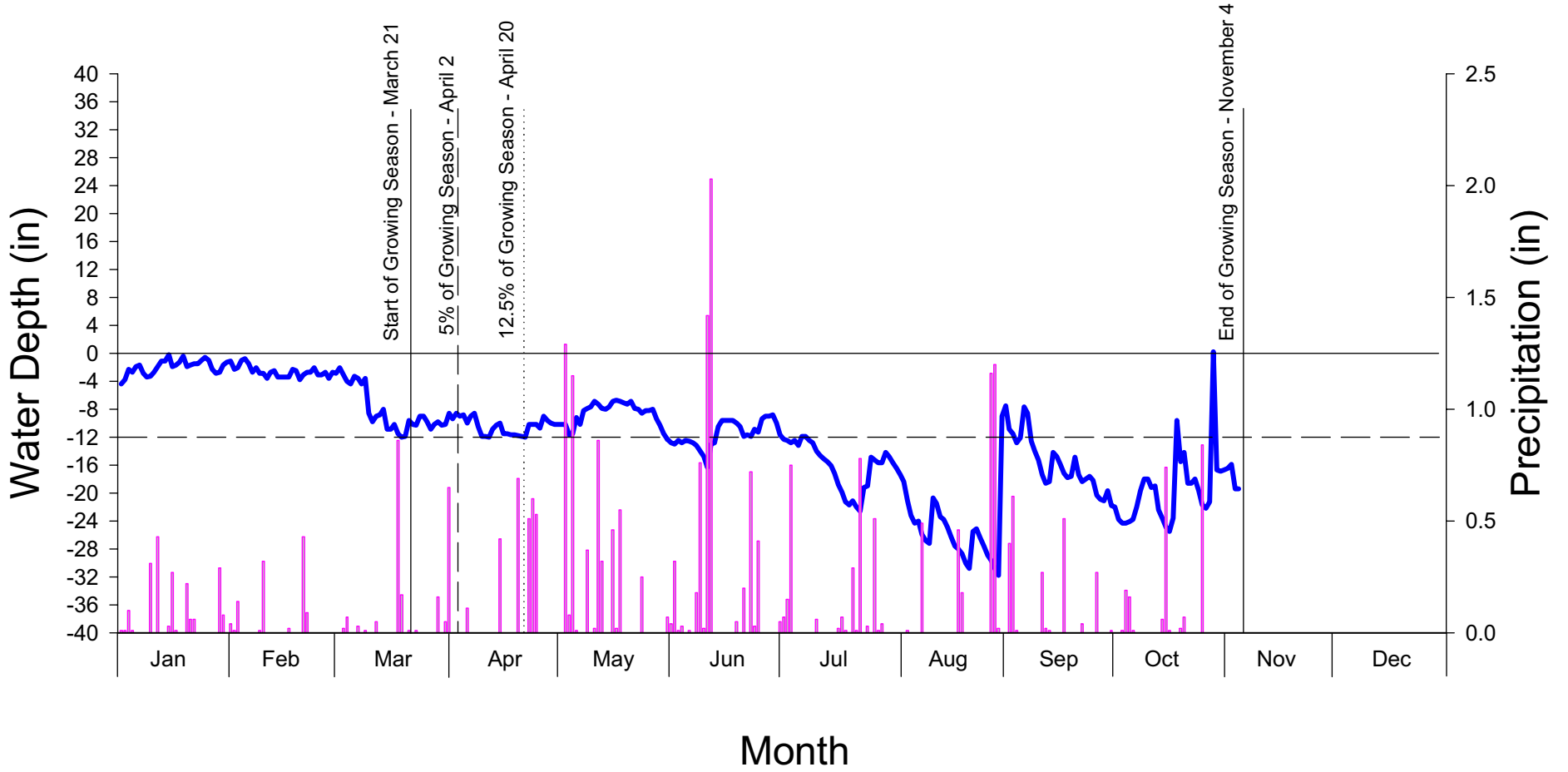
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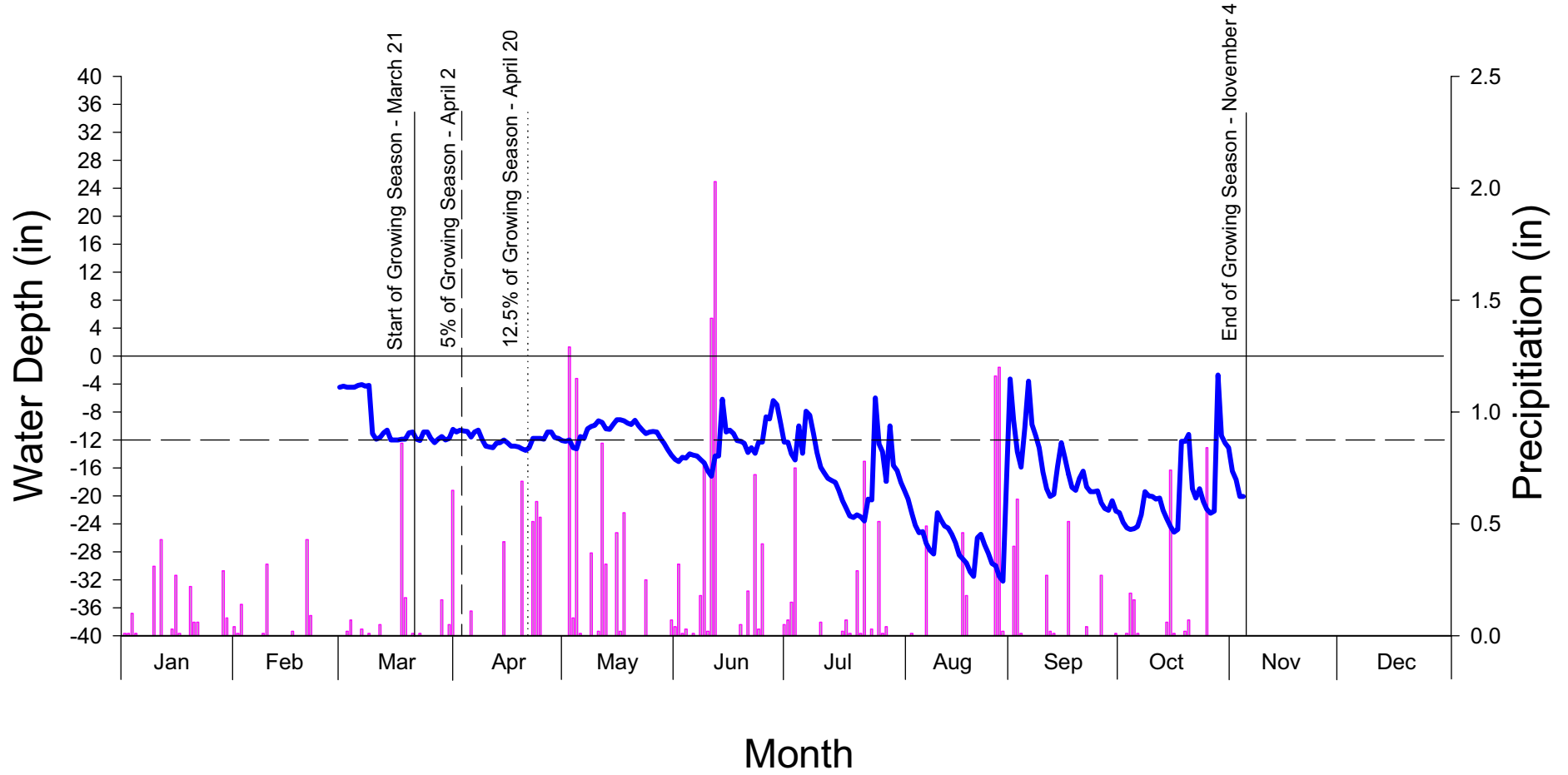
White Oak Creek 2006 Monitoring Gauge 12 - B65222F



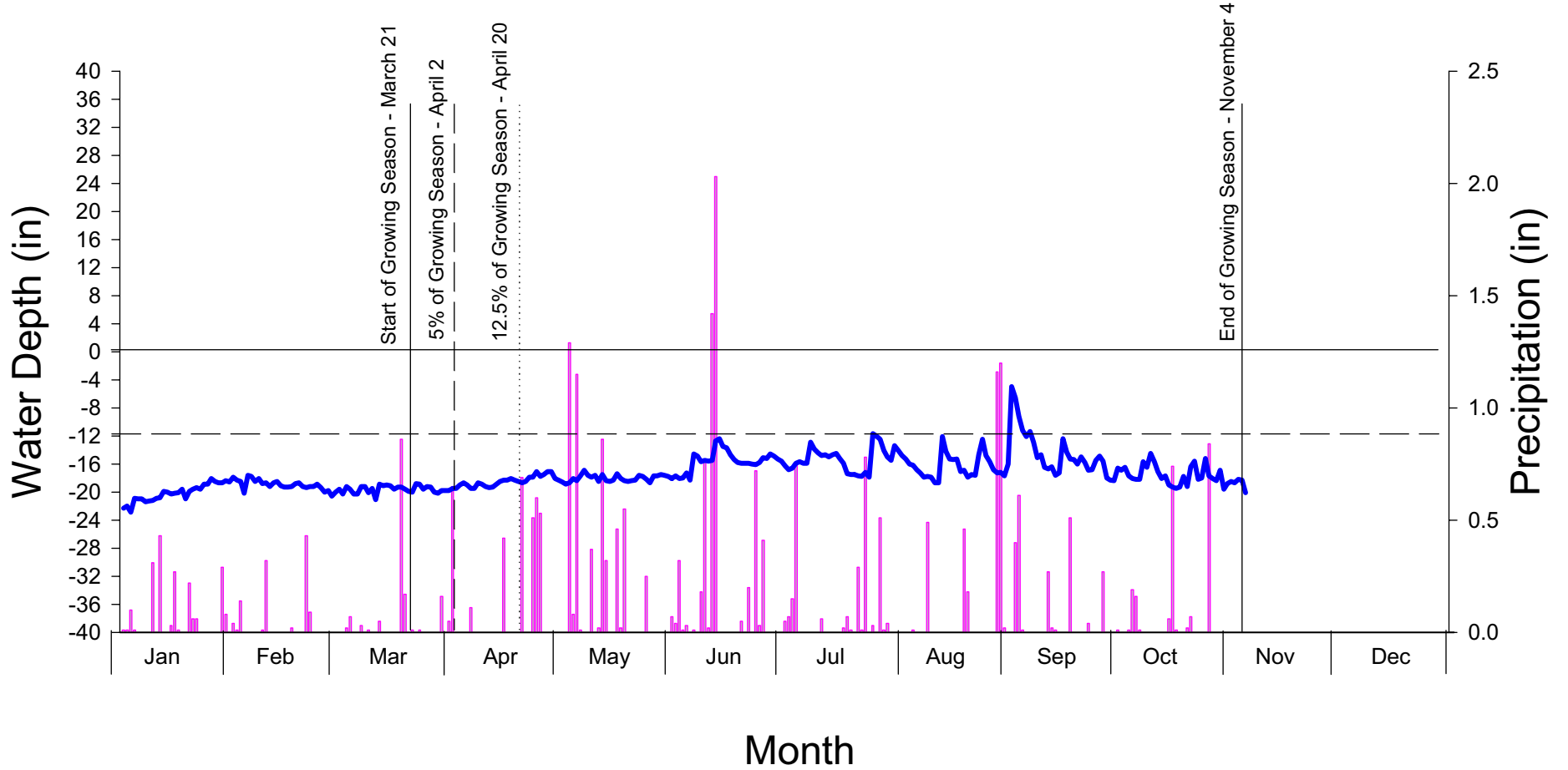
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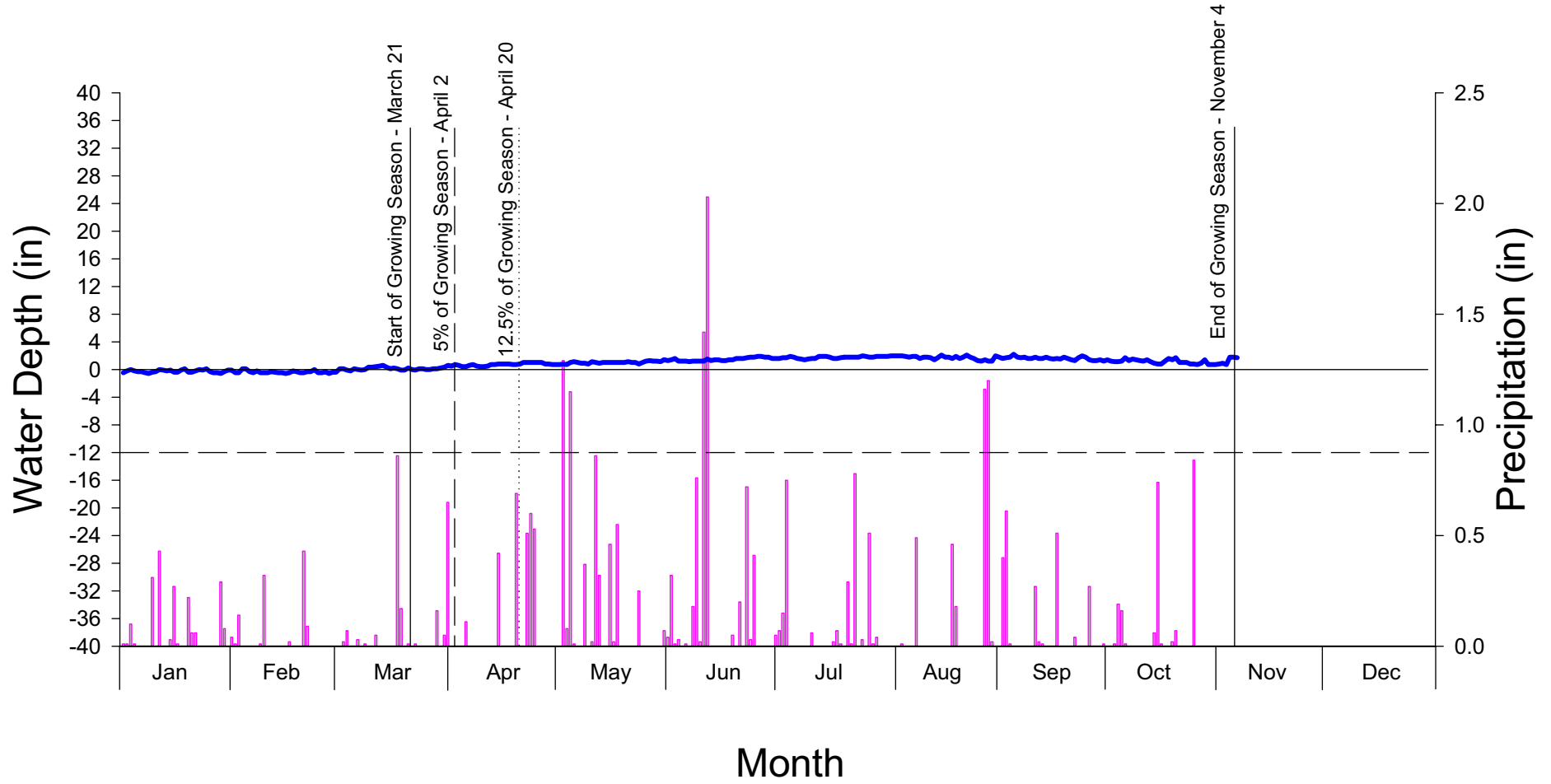
White Oak Creek 2006 Monitoring Gauge 14 - 9D7ECE7



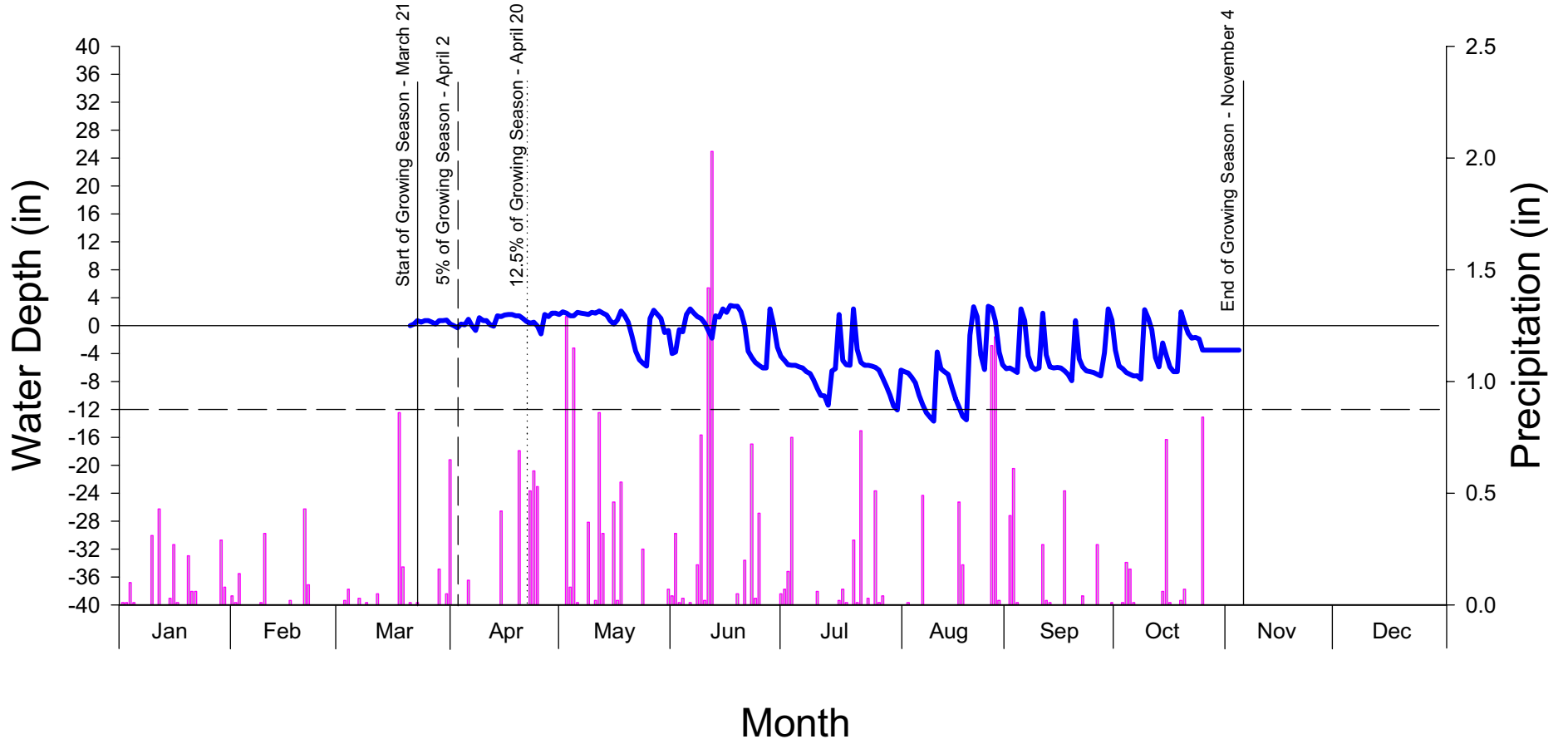
White Oak Creek 2006 Monitoring Gauge 15 - 9DE497E



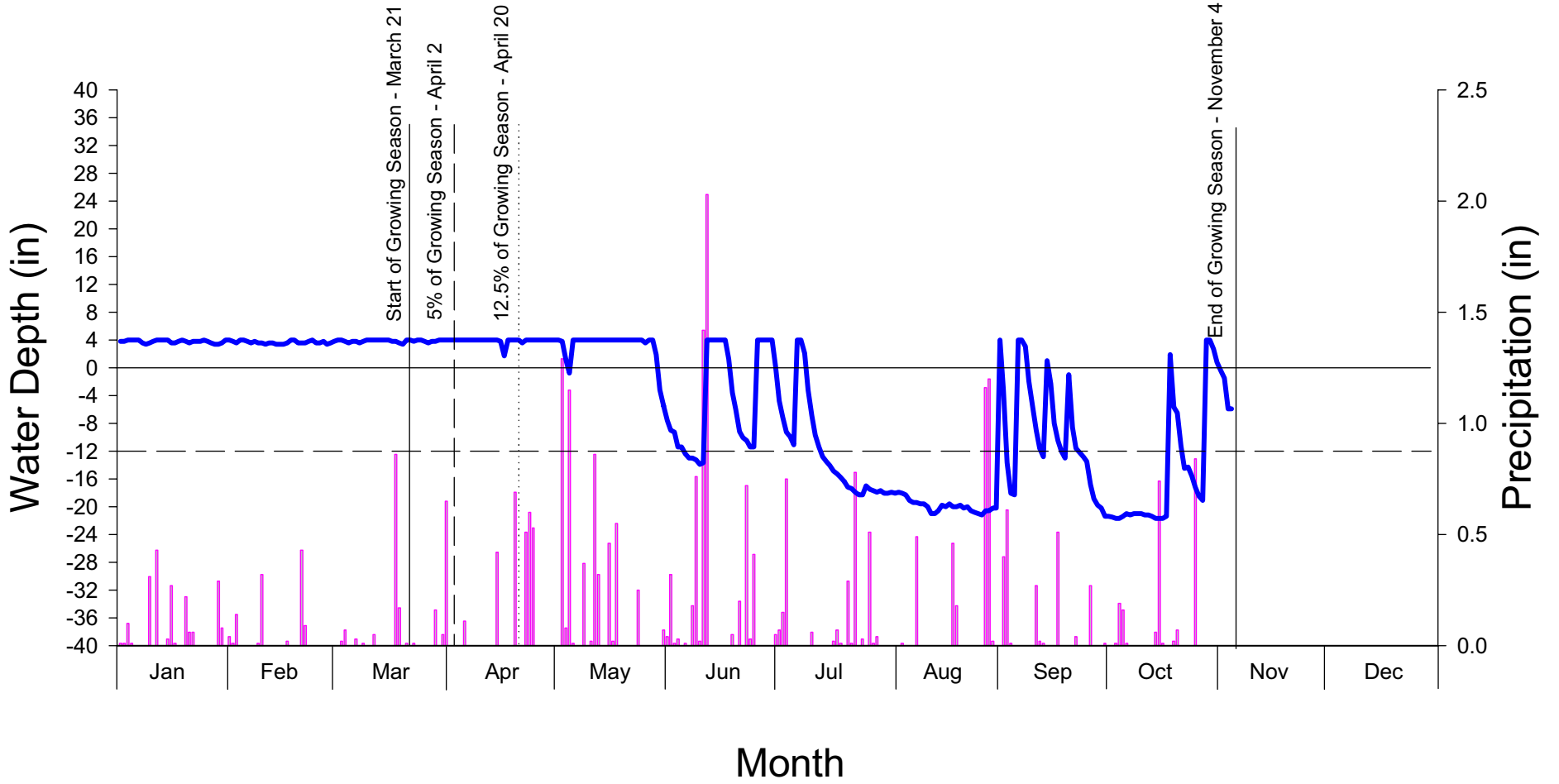
White Oak Creek 2006 Monitoring Gauge 16 - B6513D9



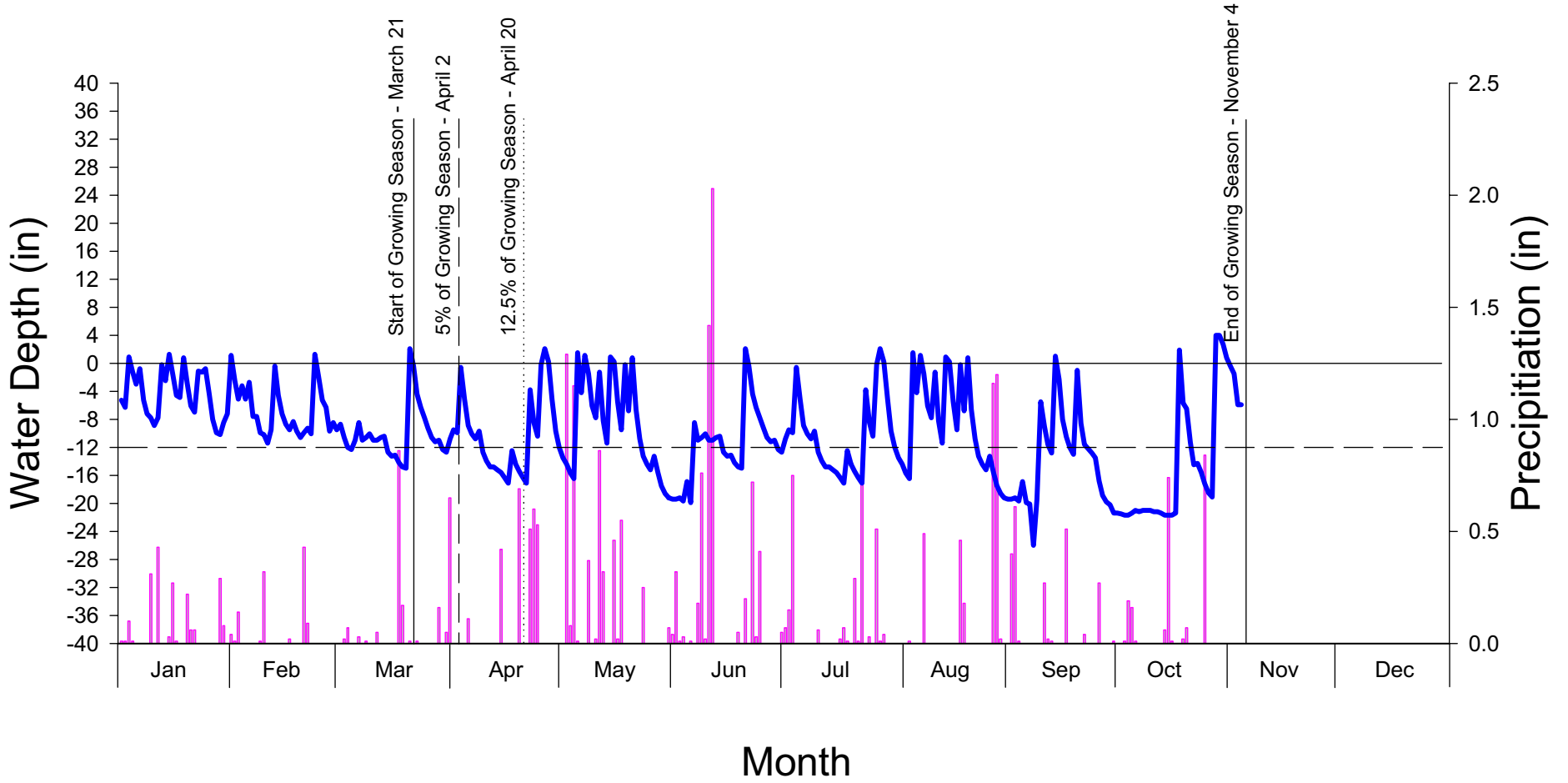
White Oak Creek 2006 Monitoring Gauge 17 - A28765B



White Oak Creek 2006 Monitoring Gauge 18 - 04489A2



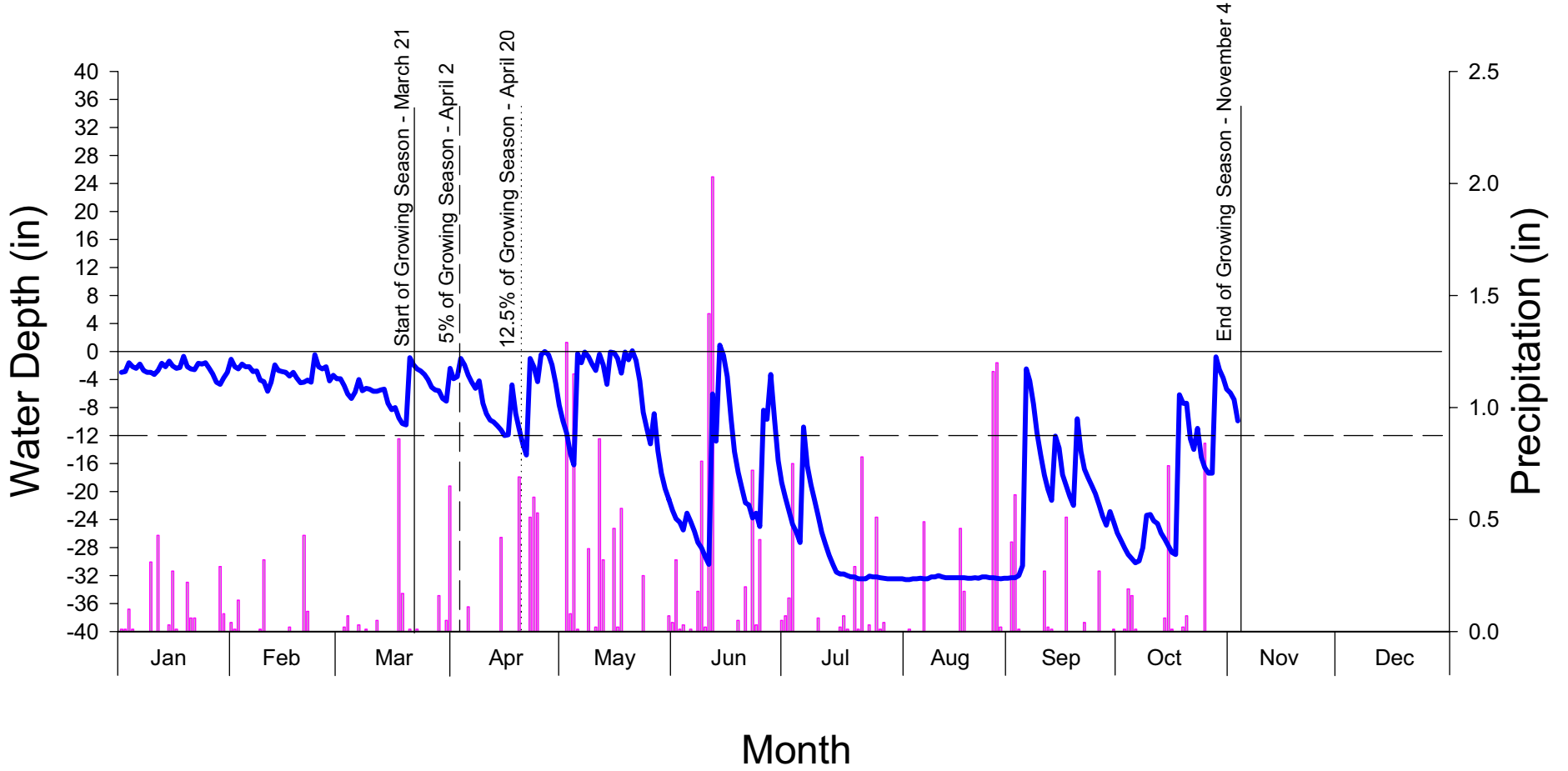
White Oak Creek 2006 Monitoring Gauge 19 - 04CFF90



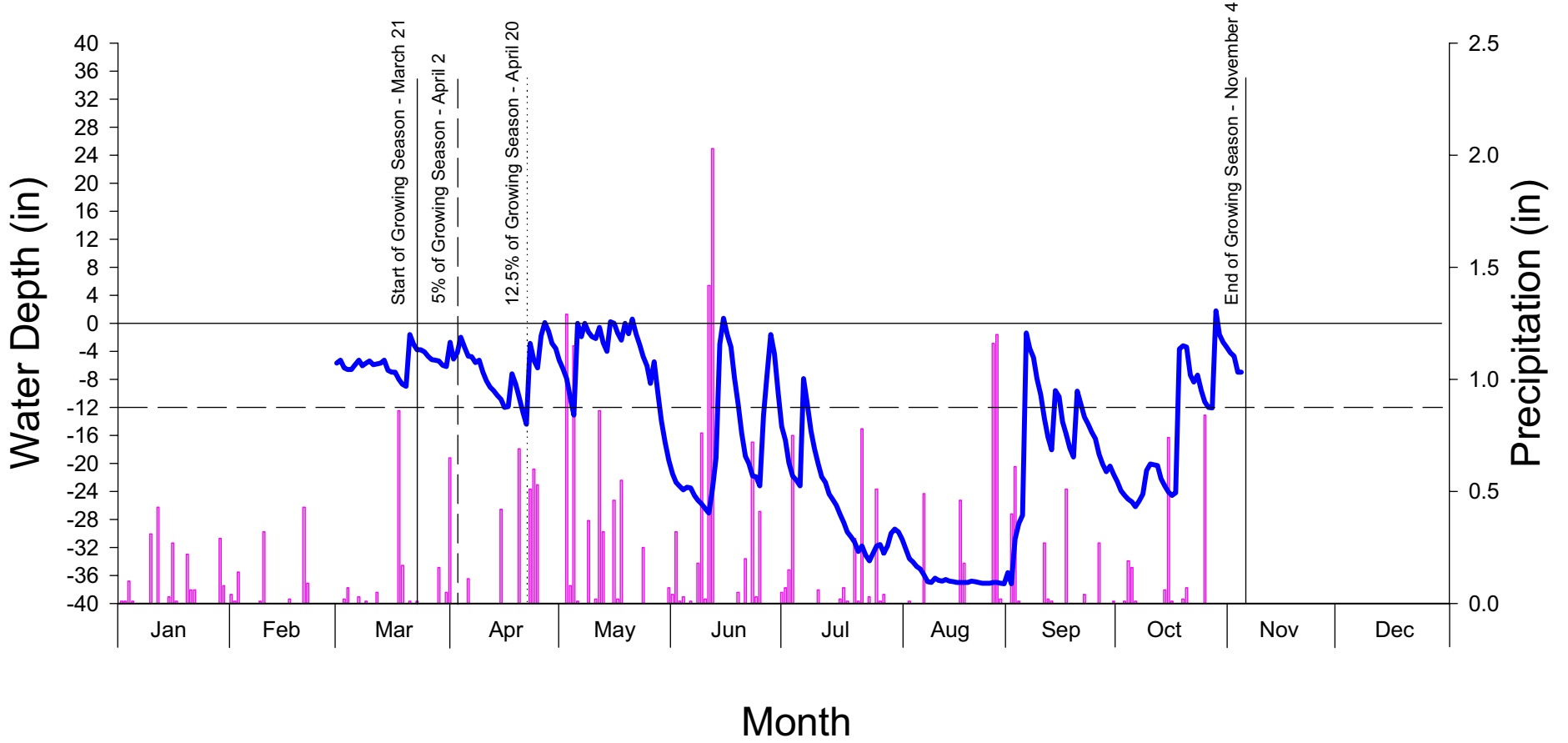
White Oak Creek

2006

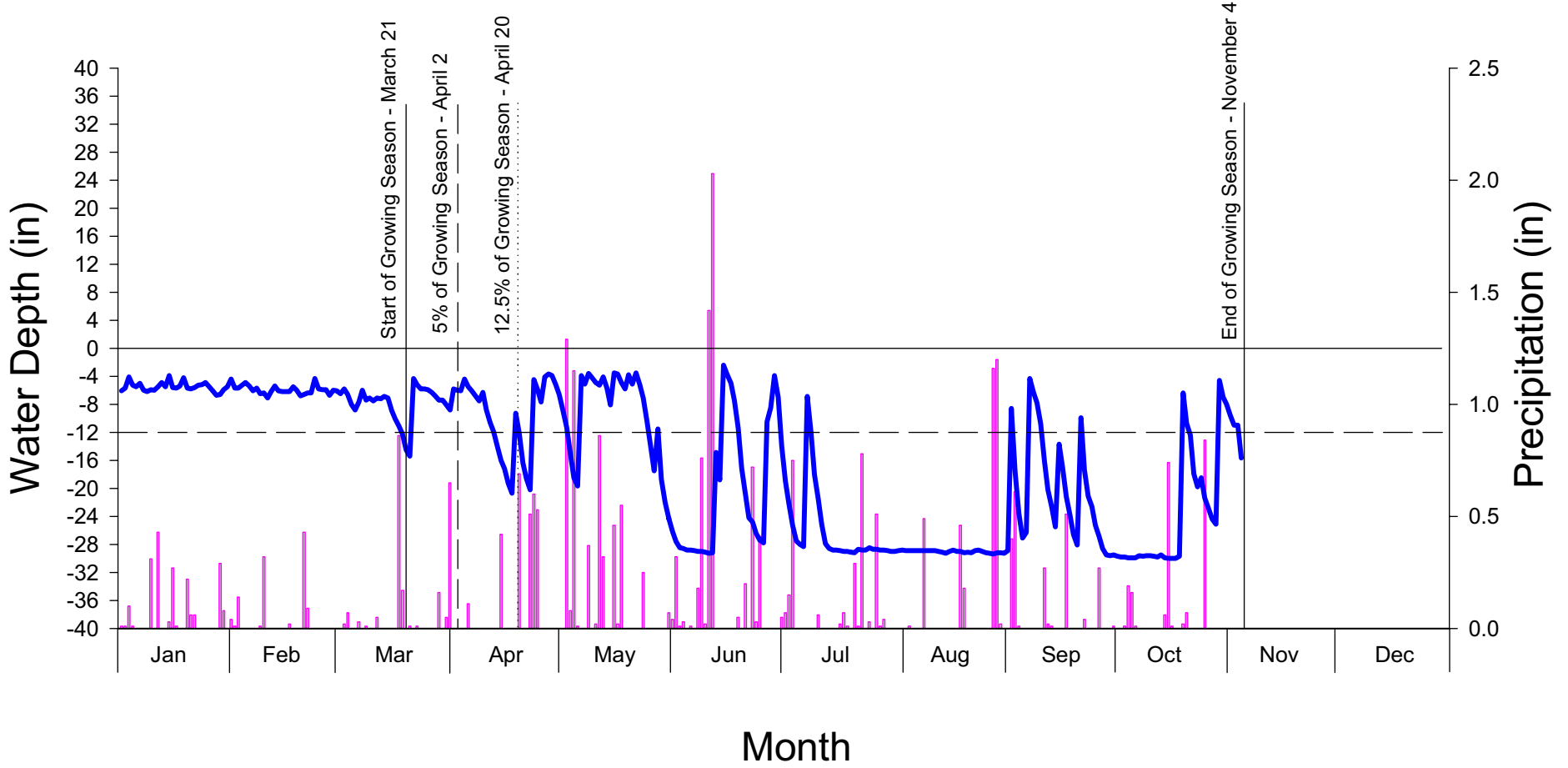
Monitoring Gauge 20 - 9DE4B47



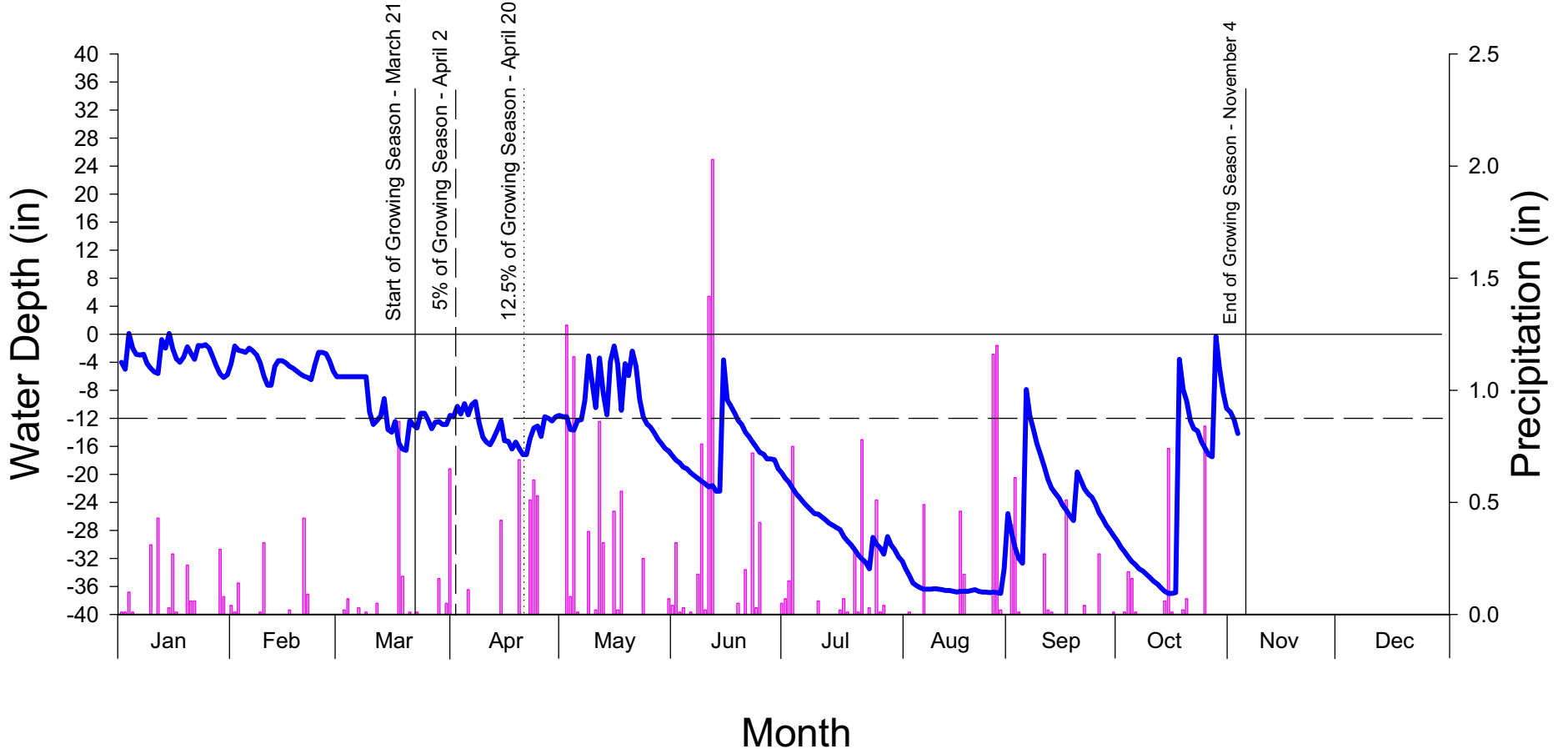
White Oak Creek 2006 Monitoring Gauge 21 - A28A703



White Oak Creek 2006 Monitoring Gauge 22 - 9DE4889



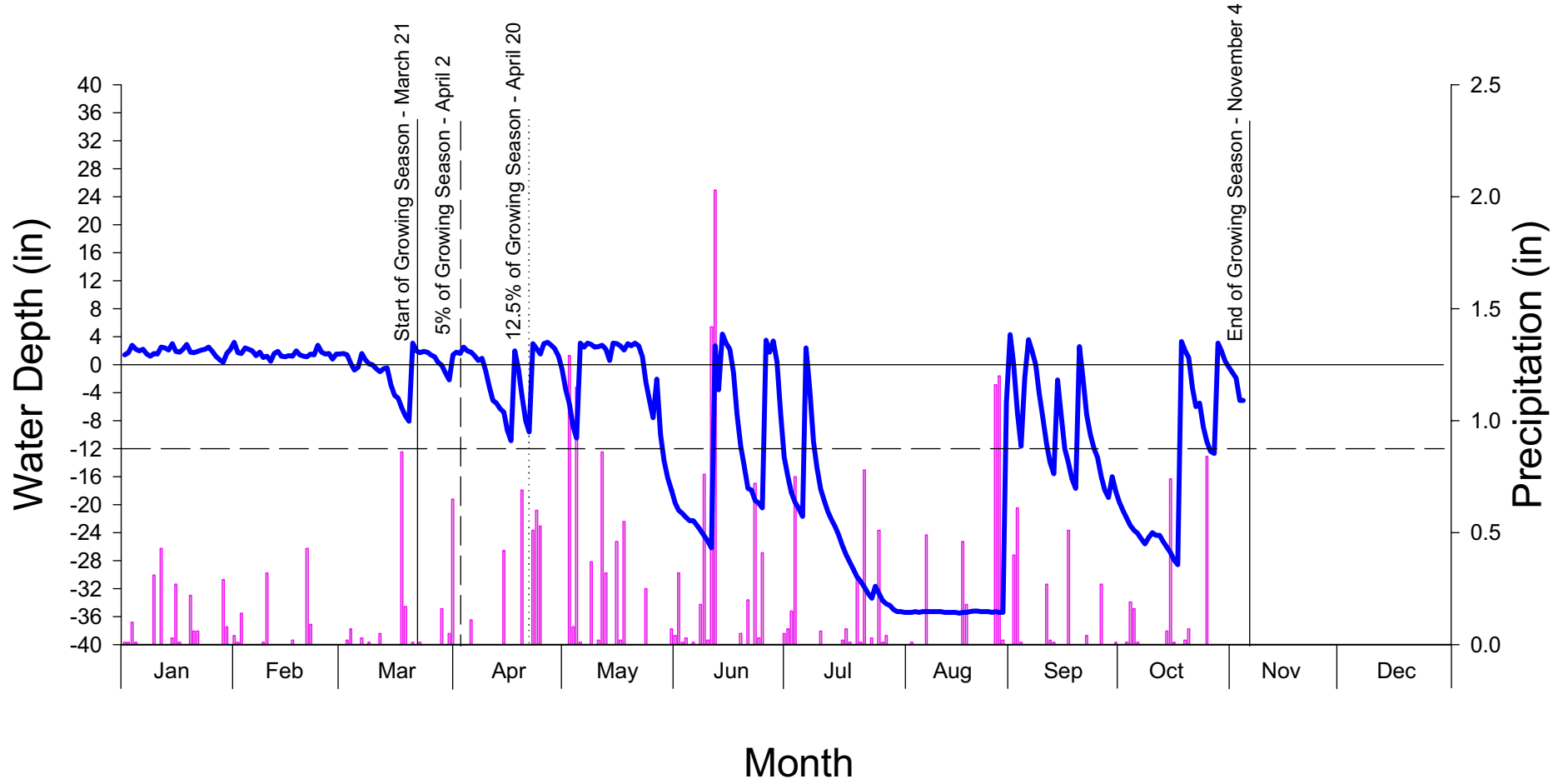
White Oak Creek 2006 Monitoring Gauge 23 - 8E546A7



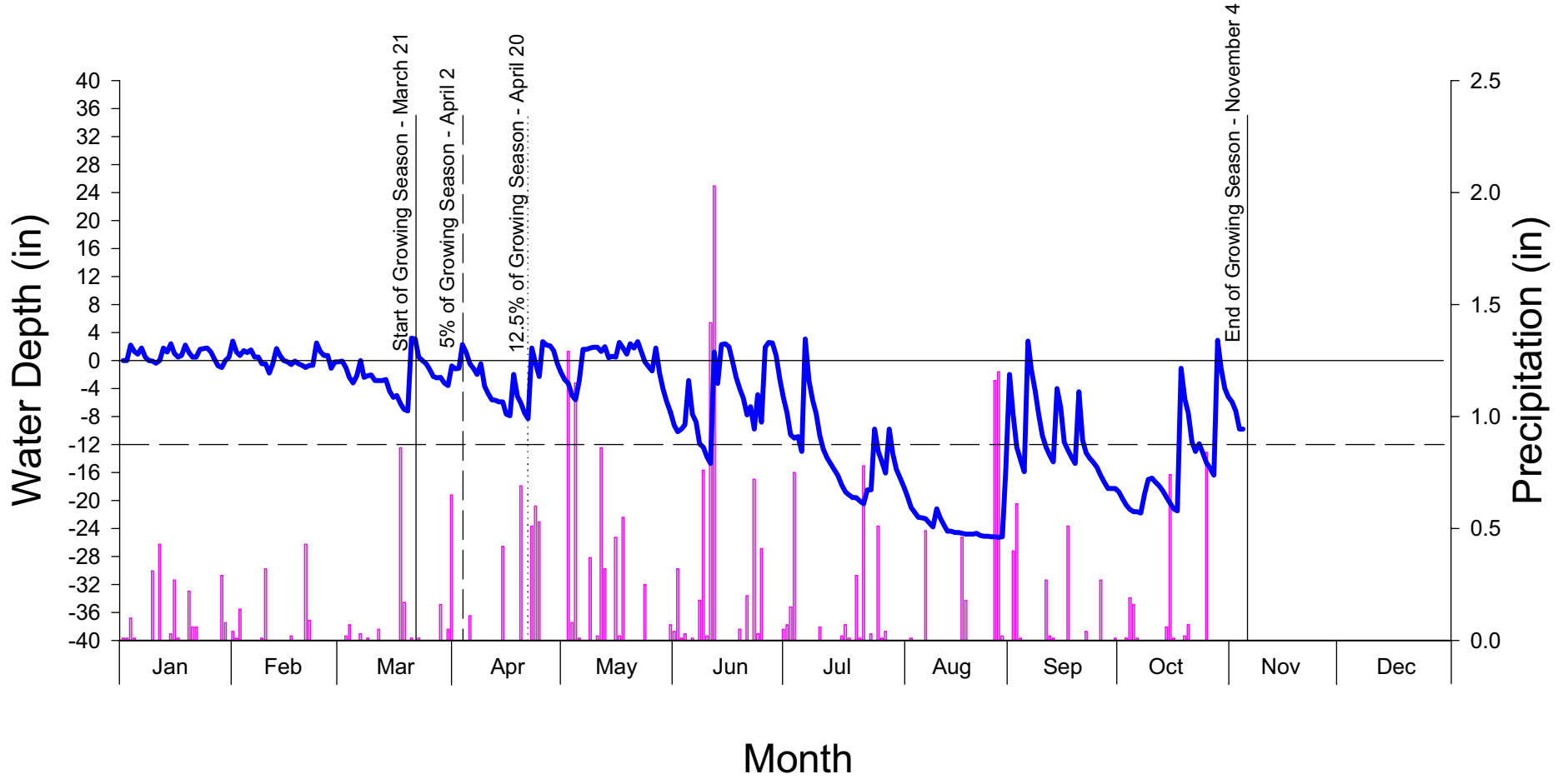
White Oak Creek

2006

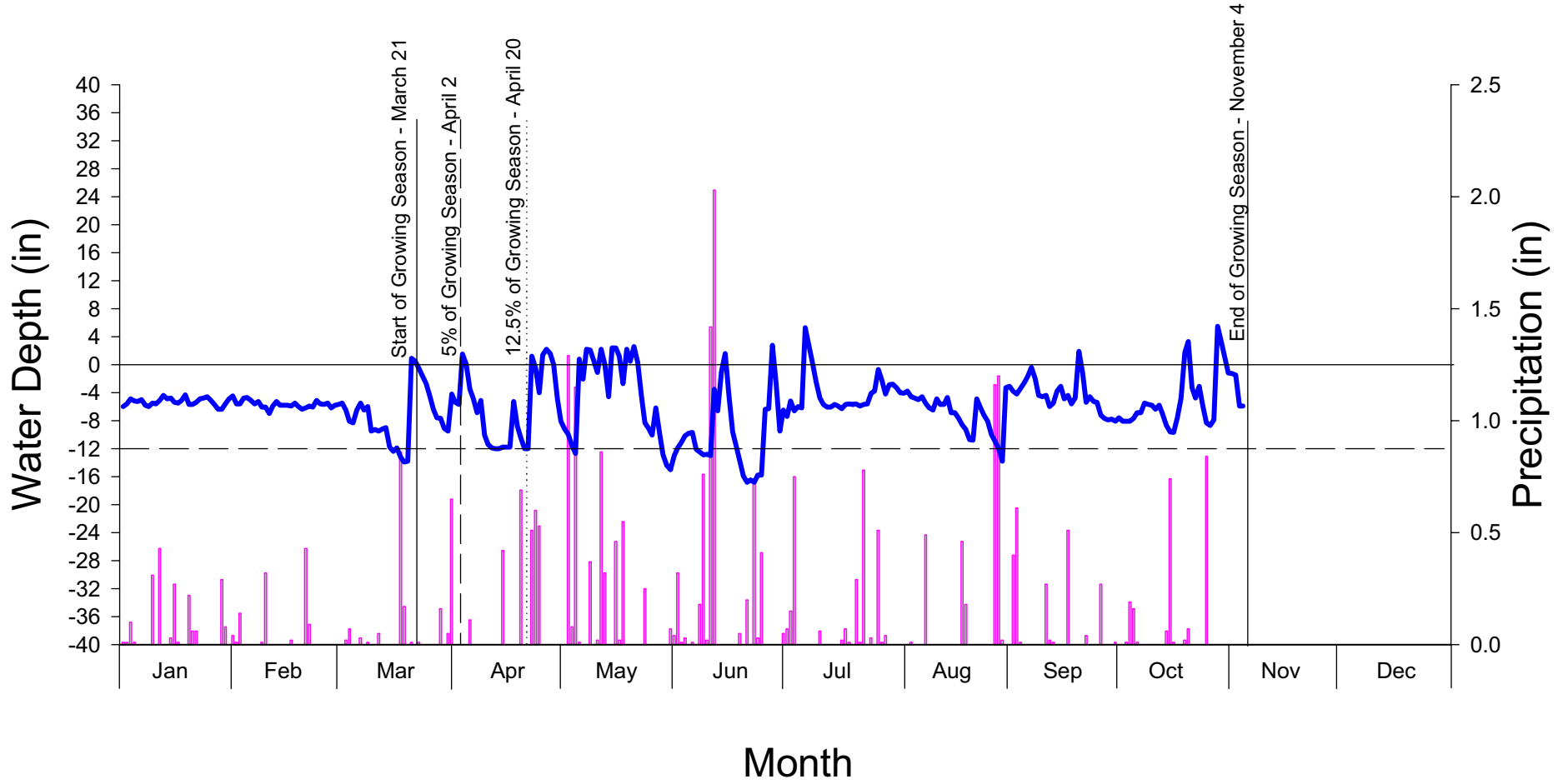
Monitoring Gauge 24 - 9DE55A7



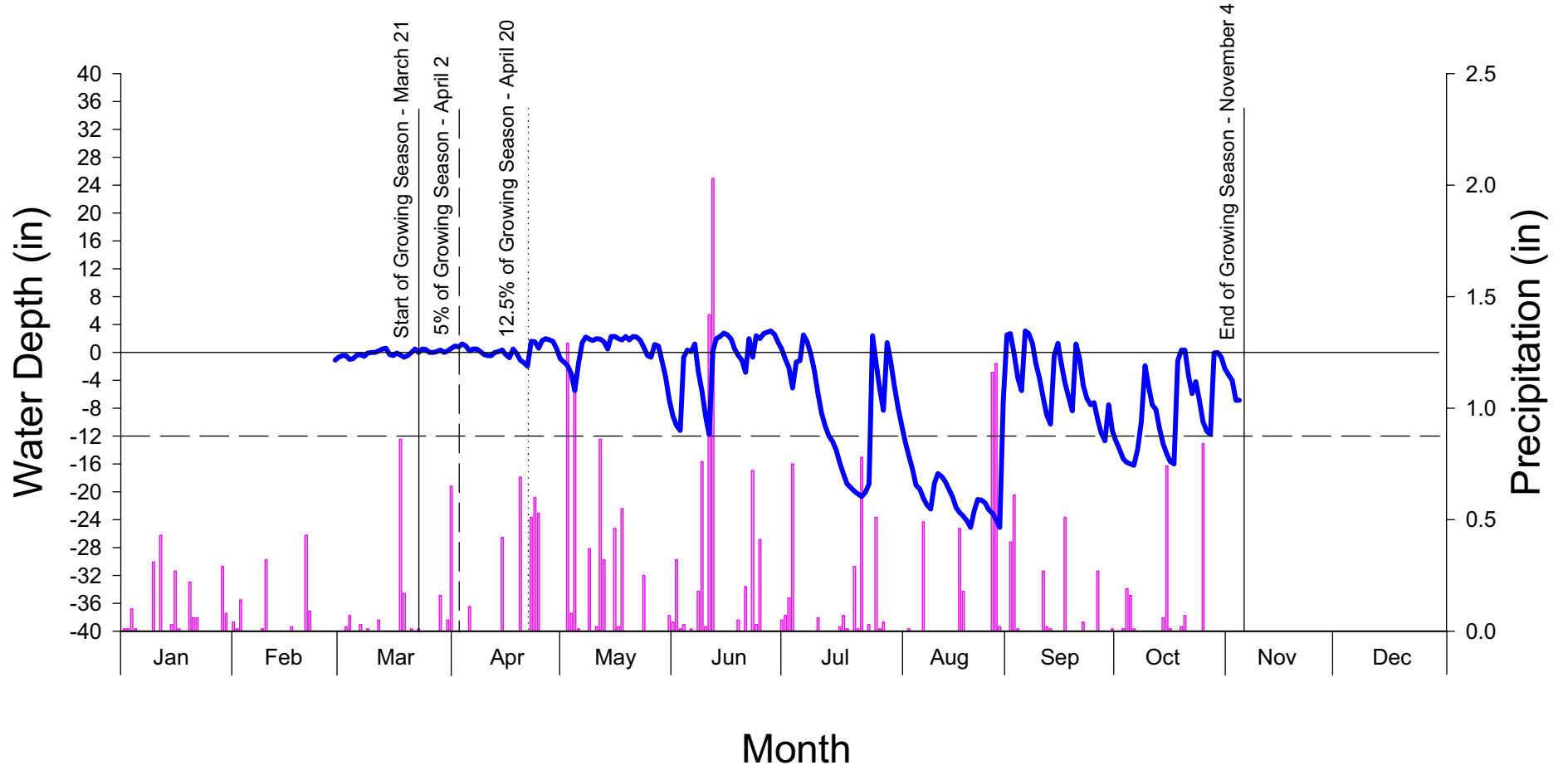
White Oak Creek 2006 Monitoring Gauge 25 - B652202



White Oak Creek 2006 Monitoring Gauge 26 - B651934



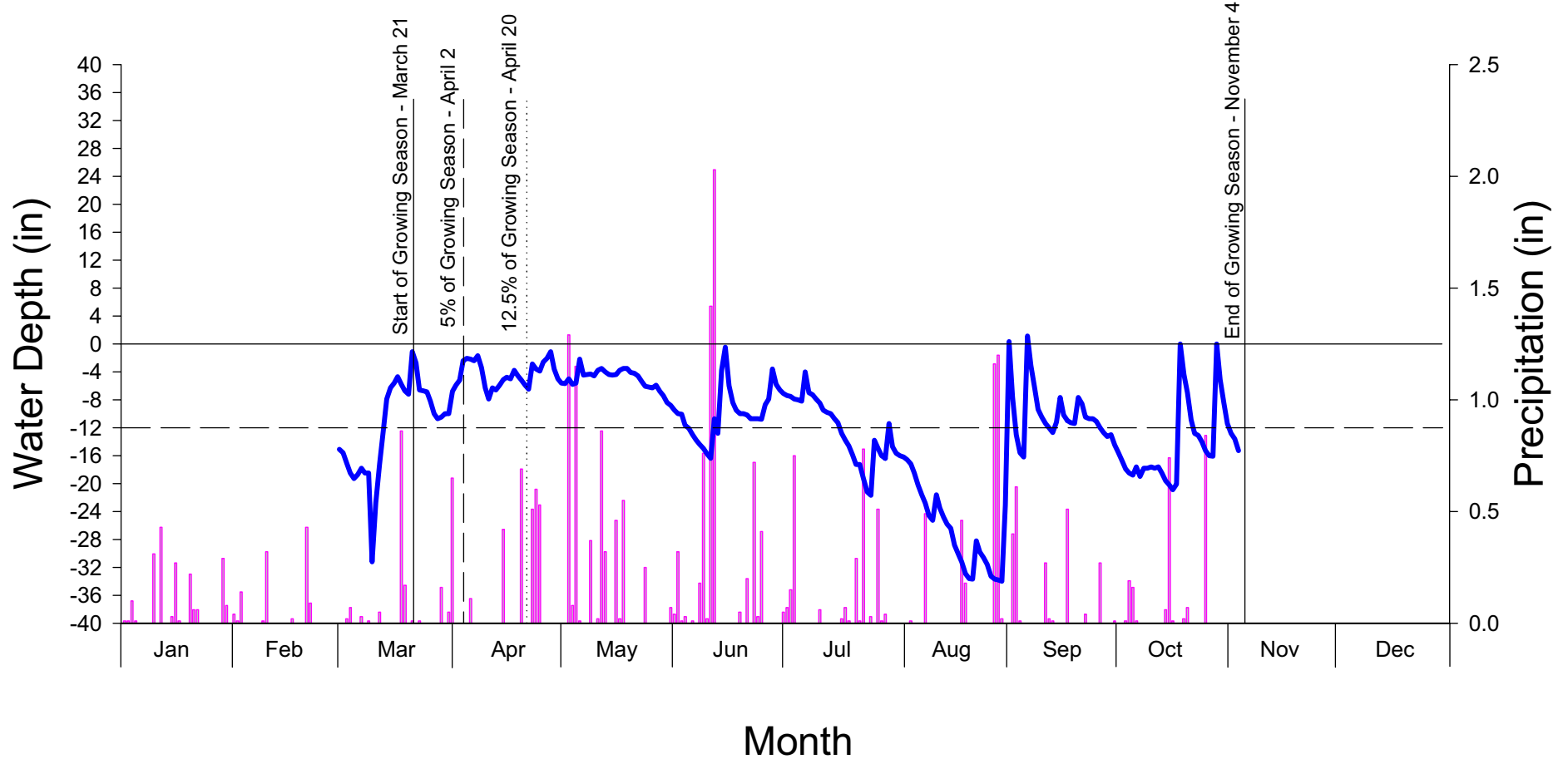
White Oak Creek 2006 Monitoring Gauge 27 - AB3548B



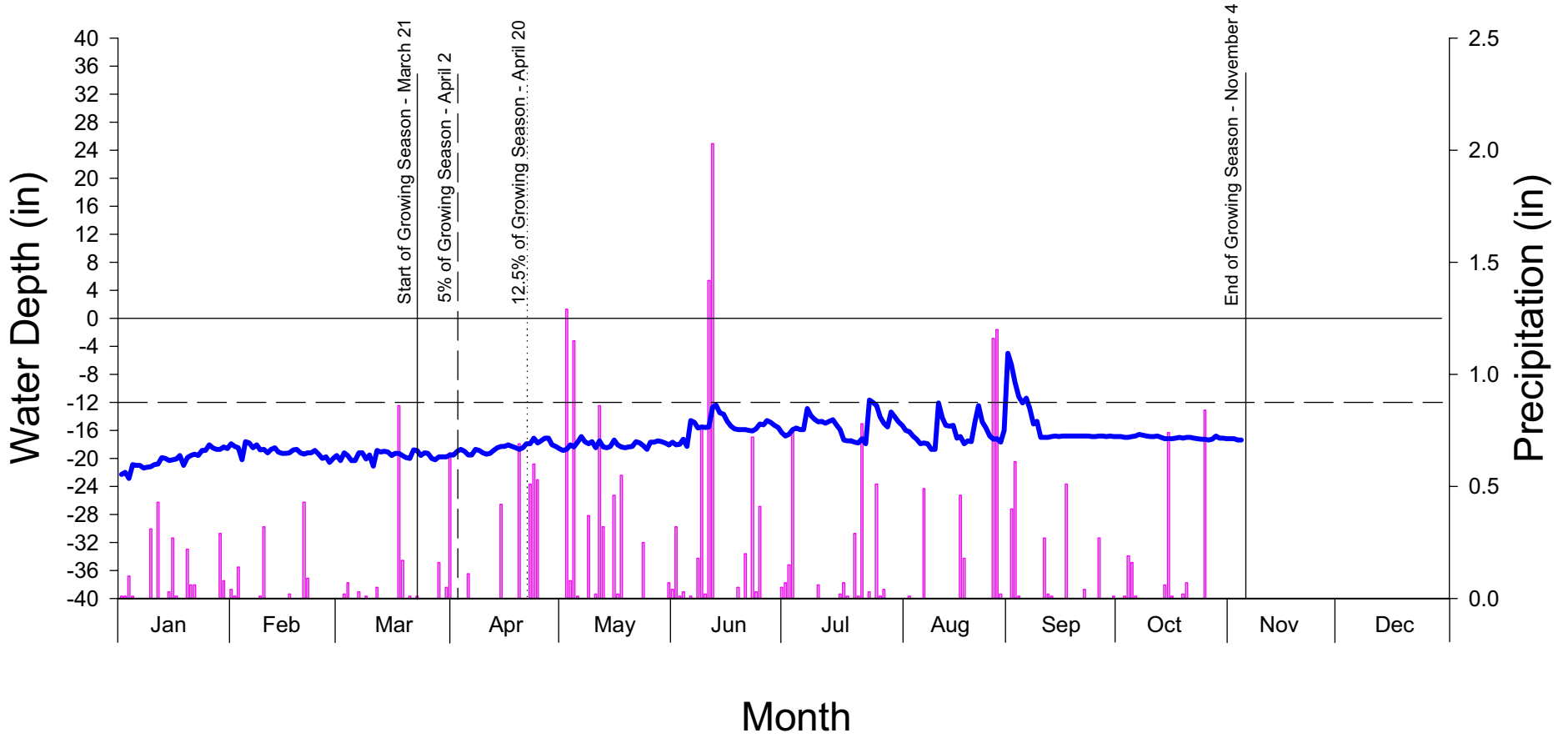
White Oak Creek

2006

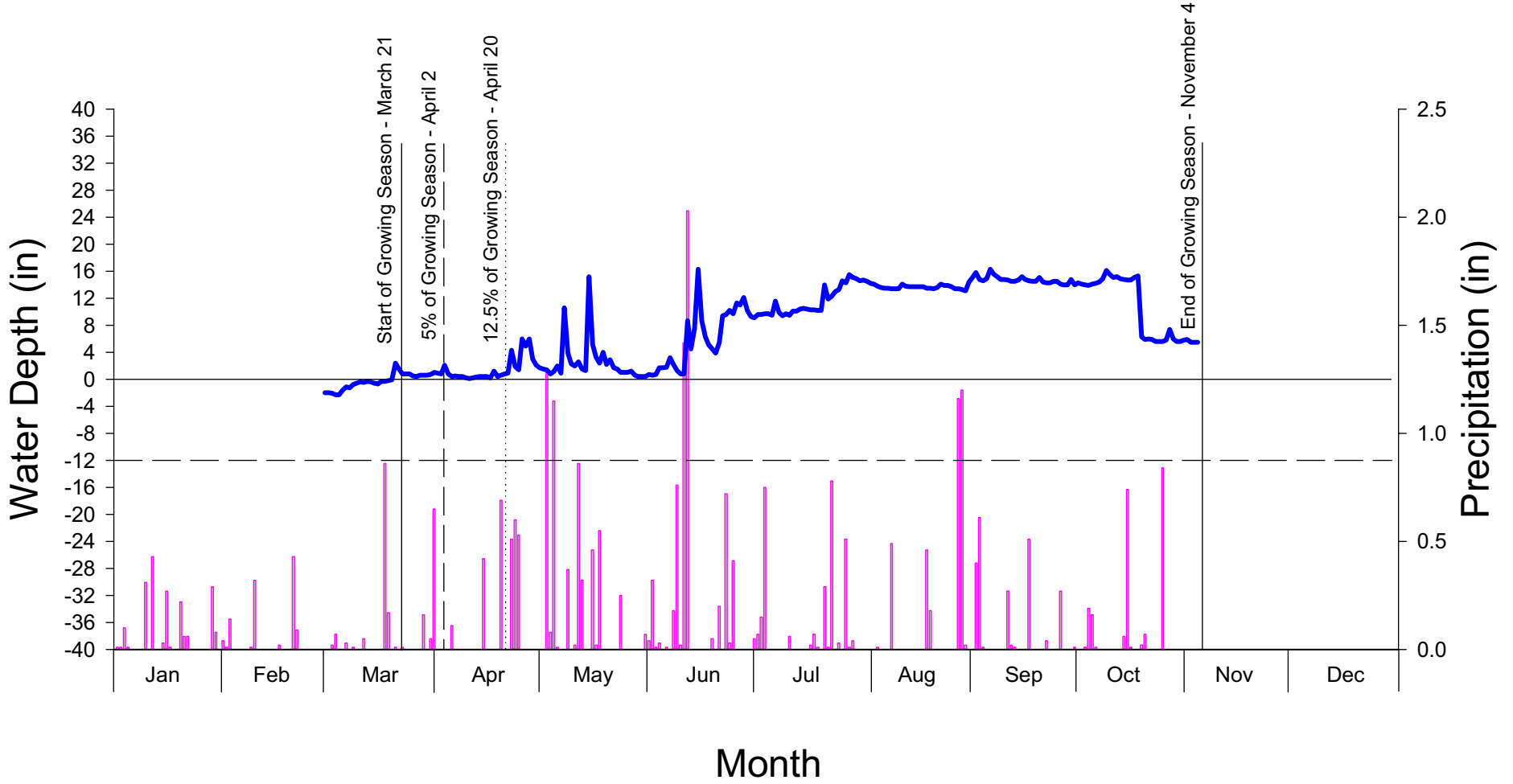
Monitoring Gauge 28 - 8E52E9F



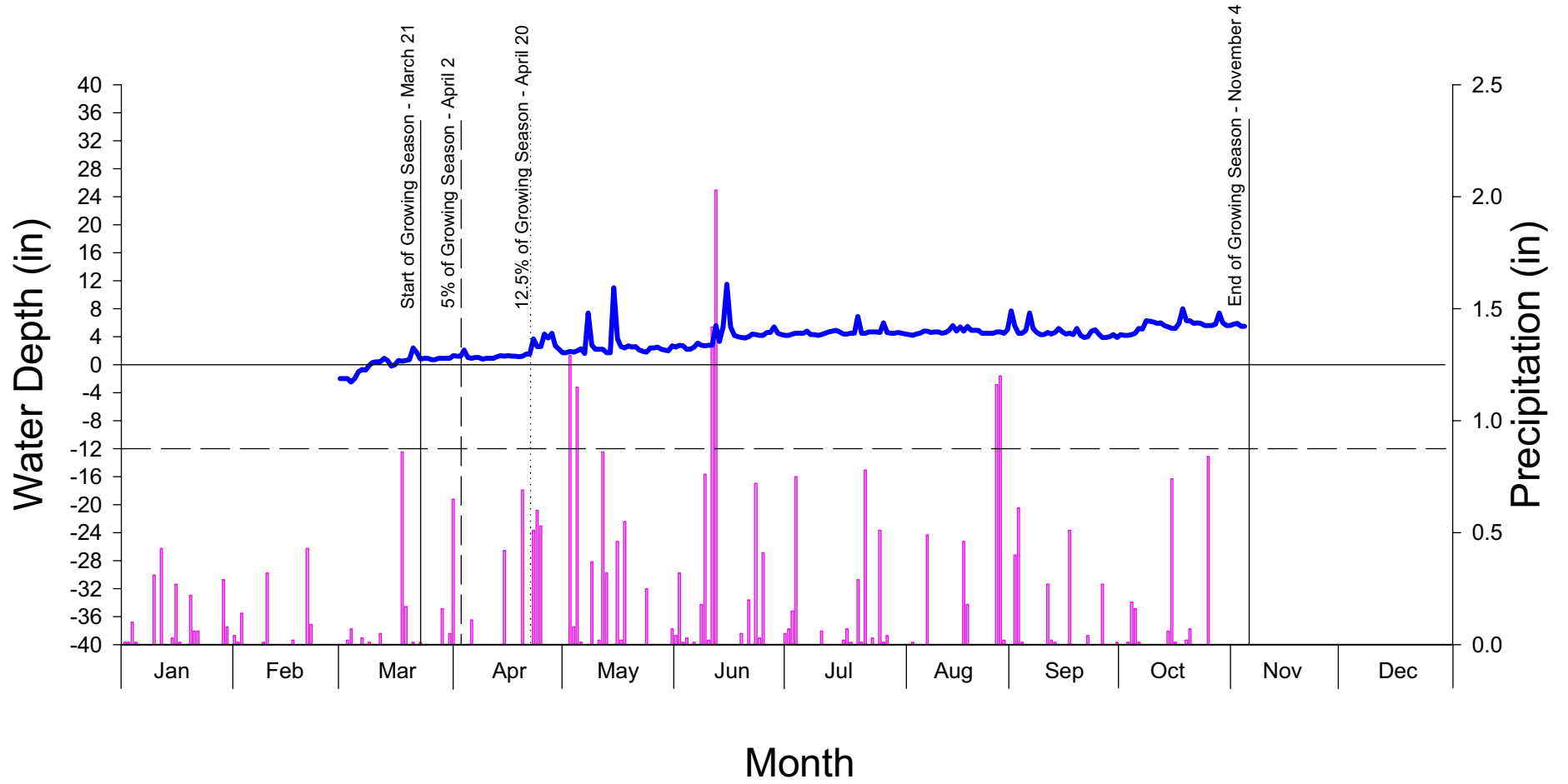
White Oak Creek 2006 Monitoring Gauge 30 - 8E556CA



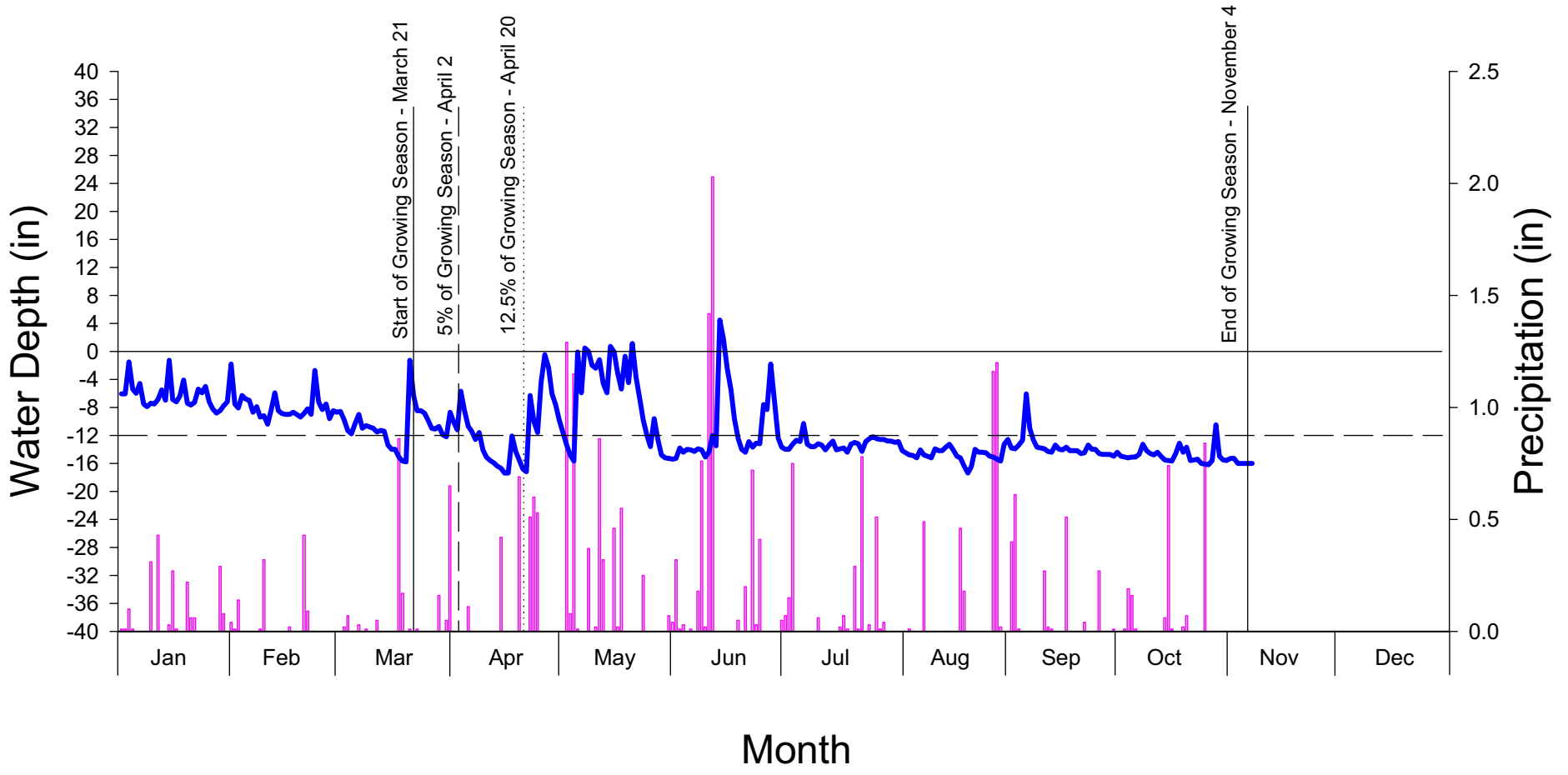
White Oak Creek 2006 Monitoring Gauge 31- 8E576F0



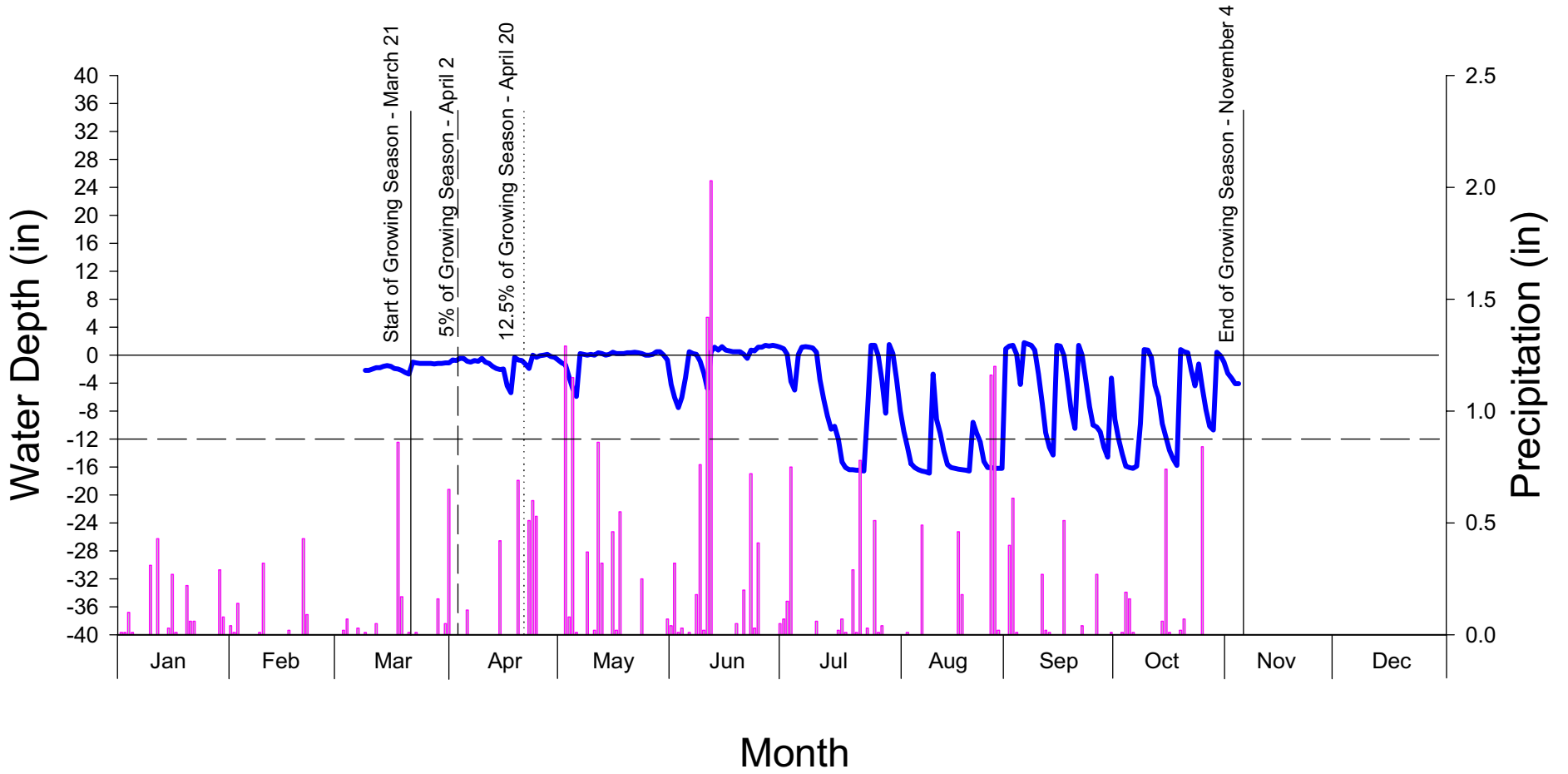
White Oak Creek 2006 Monitoring Gauge 32 - AB36B47



White Oak Creek 2006 Monitoring Gauge 33 - 9BEBE36



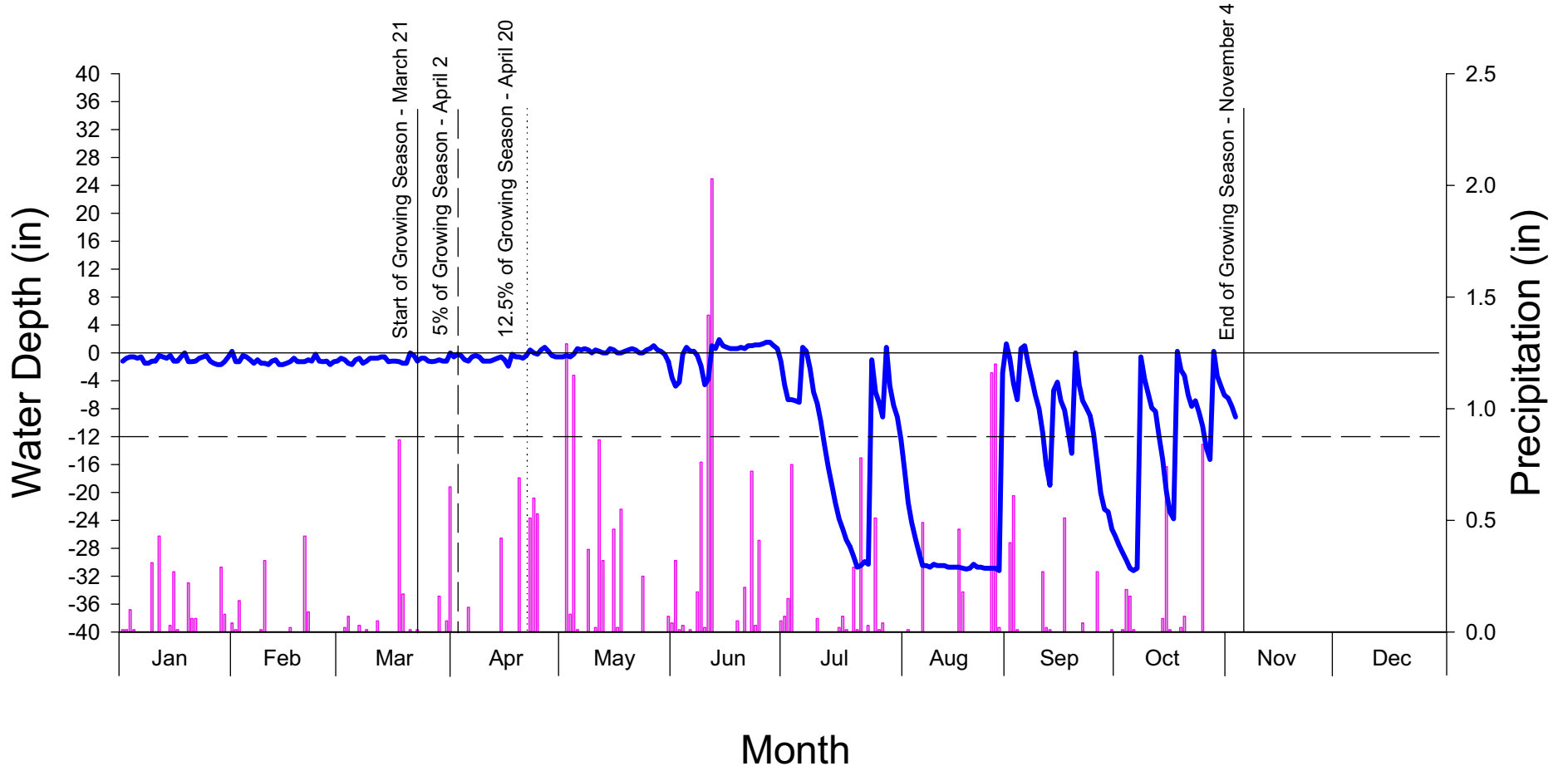
White Oak Creek 2006 Monitoring Gauge 34 - A285DB5



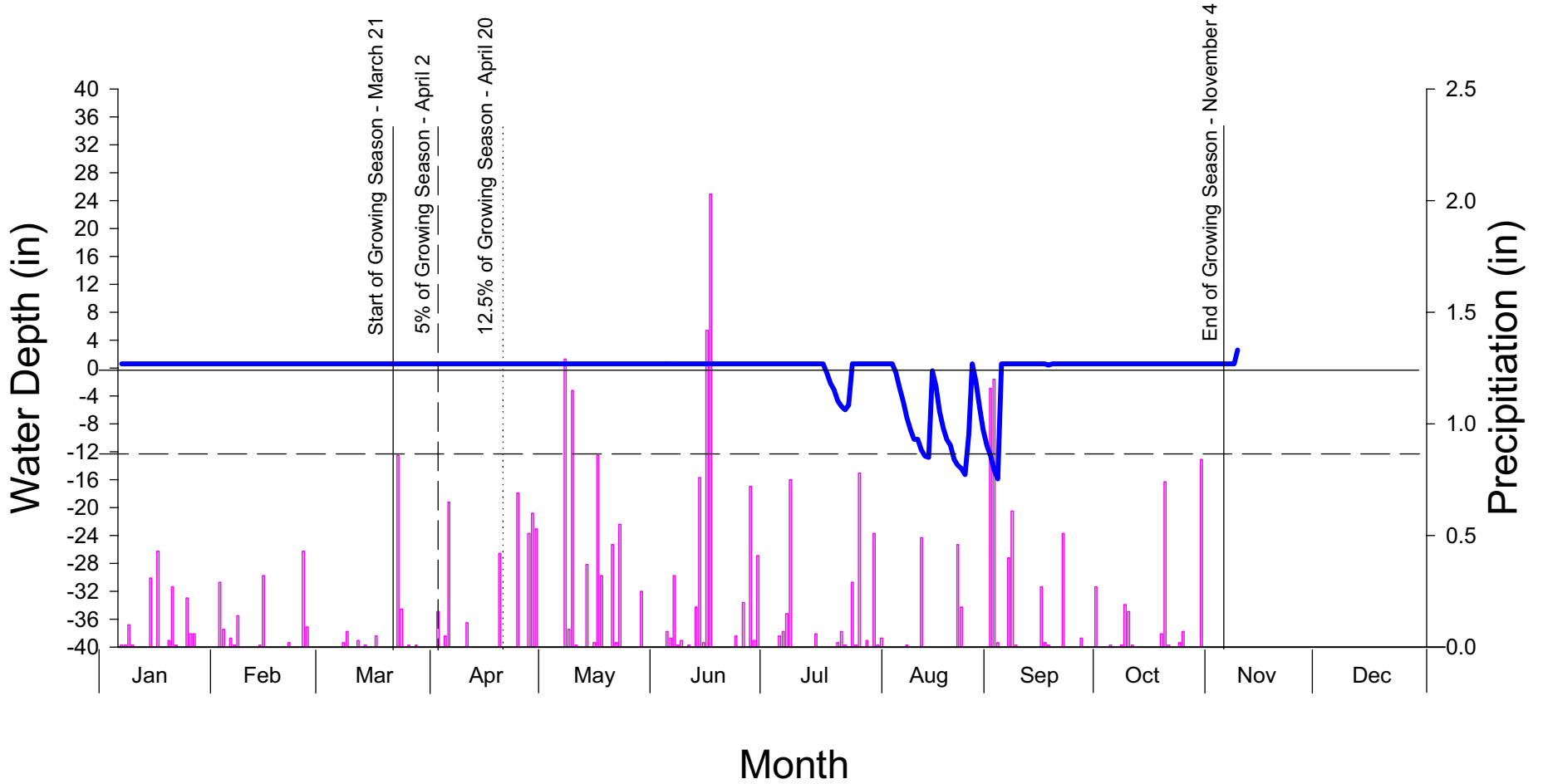
White Oak Creek

2006

Monitoring Gauge 35 - 04CFEA0



White Oak Creek 2006 Monitoring Gauge 36 - 031FA53



APPENDIX C

SITE PHOTOS

**White Oak Creek
Fixed Photo Stations
August 16, 2006 – Year 4 of 5**



Photo Plot 1



Photo Plot 2



Photo Plot 3



Photo Plot 4



Photo Plot 5



Photo Plot 6

**White Oak Creek
Vegetation Plot Photos
August 16, 2006 – Year 4 of 5**



Vegetation Plot 1 looking southeast



Vegetation Plot 2 looking southeast



Vegetation Plot 3 looking south



Vegetation Plot 4 looking southeast



Vegetation Plot 5 looking southeast



Vegetation Plot 6 looking southeast



Vegetation Plot 7 looking south

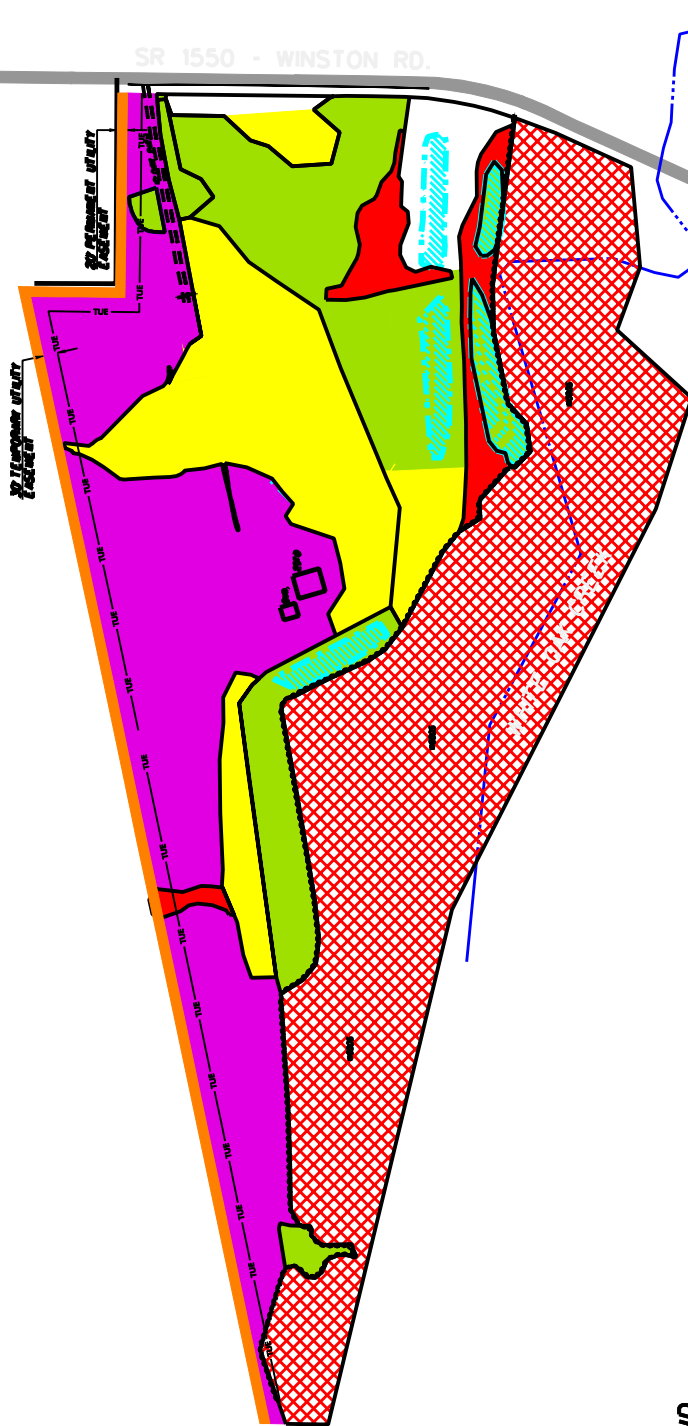


Vegetation Plot 8 looking south







APPENDIX D

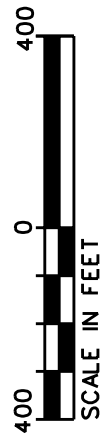
RESTORATION AREA

WHITE OAK CREEK



LEGEND

-  WETLAND CREATION (6.59 AC.)
-  WETLAND ENHANCEMENT (1.58 AC.)
-  RESTORATION (1003 AC.)
-  WETLAND PRESERVATION (1908 AC.)
-  UPLAND BUFFER RESTORATION (1204 AC.)
-  UTILITY EASEMENT EXCLUDING E2 & R1 OVERLAP (1.37 AC.)
- TOTAL EASEMENT - 1.40 AC.**
- TOTAL AREA (5069 AC.)**



RESTORATION PLAN
White Oak Creek Mitigation Site
EEP Project No. 417
 JOHNSTON COUNTY, NORTH CAROLINA

| | | | |
|------------------|-----|-----------|-----------|
| Drawn By: | GWN | Date: | DEC 2006 |
| Created By: | JWG | Scale: | 1" = 400' |
| ESC Project No.: | | 06.282.01 | |

APPENDIX
D