MONITORING YEAR 4 ANNUAL REPORT
Final

DEVIL'S RACETRACK MITIGATION SITE
Johnston County, NC
NCDEQ Contract 003989
DMS Project Number 95021
USACE Action ID Number 2012-00810
NCDWR Project Number 12-0747

Data Collection Period: March - November 2017
Draft Submission Date: December 19, 2017
Final Submission Date: February 12, 2018

PREPARED FOR:

NC Department of Environmental Quality
Division of Mitigation Services
1652 Mail Service Center
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February 12, 2018

Jeff Schaffer
N.C. Division of Mitigation Services
1652 Mail Service Center
Raleigh, NC 27699-1652

RE: Monitoring Year 4 Report for Devil's Racetrack Mitigation Site (95021)
Neuse River Basin – CU# 03020201
Johnston County, North Carolina
Contract No. 003989

Dear Mr. Schaffer,

We have reviewed the comments on the Monitoring Year 4 Report for the above referenced project dated January 11, 2018 and have revised the report based on these comments. The revised documents are submitted with this letter. Below are responses to each of your comments. For your convenience, the comments are reprinted with our response in italics.

1) The digital data and drawings received on December 21, 2017 have been reviewed and determined to meet DMS requirements.

2) Add the USACE Action ID number (2012-00810) and NCDWR Project number (12-0747) to the cover page.

The USACE Action ID number and NCDWR Project Number were added to the cover page.

3) Executive Summary. First paragraph states that the project proposes to provide 18,216 SMUs. DMS calculated SMUs at 18,215.10 in excel and 18,215 from WEI's electronic submittal of Table 1. Please change to 18,215 SMUs.

The SMUs have been changed to 18,215 in the Executive Summary.

4) Table of Contents: Fix page numbers for Sections 1 through 3.

Page numbers for Sections 1 through 3 have been fixed.

5) Section 1, page 1-1, last paragraph state that the project provides 18,216 SMUs. DMS calculated SMUs at 18,215.10 in excel and 18,215 from WEI's electronic submittal of Table 1. Please change to 18,215 SMUs.

The SMUs have been changed to 18,215 in Section 1.

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6) Section 1.2.6
   a) First paragraph, page 1-4: In the first sentence, you state that all but one gauge (GW32) are within the wetland restoration zones. Based on the CCPV and conversations in the field, GW8 is also outside the wetland restoration zones. This also conflicts with the sentence referenced in comment 6.b. below. Please correct.

      This sentence was updated to state that two gauges (GW8, and GW32) are outside of wetland restoration zones.

   b) Top of Page 1-5 the report states that two of the 13 gauges that failed to meet success criteria are outside of the wetland boundaries. DMS assumes these are GW8 and GW32, but please state which gauges you are referring to, and explain why they are being monitored.

      At the top of page 1-5 GW8 and GW32 were added to the text to clarify that these are the two wells that were placed outside of the wetland boundaries. At the beginning of section 1.2.6 an explanation is given as to why these two wells were placed outside of wetland boundaries and that they will be removed in subsequent monitoring years.

   c) 12 of the 21 gauges that failed to meet the wetland hydrologic success criteria of 8.5% for MY 4 also failed to meet success criteria in MY 3 after meeting in MY 2. In many cases there was a drastic drop in hydrology from MY 2 to MY 3. Specifically gauges 2, 3, 5, 8, 13, 14, 20, 23, 24, 30, 32, and 38. Please explain in detail within the report narrative what has happened over the last two years to cause this trend over the last 2 years. DMS is becoming more concerned over these assets and considers these to be at risk of not being delivered.

      Wildlands believes abnormal rainfall over the past two years has caused groundwater levels to drop below the 12 inch threshold earlier in the growing season than normal. Rainfall has been abnormally low and sporadic in the spring of the last two monitoring years, causing groundwater levels to drop faster than previous years. Wildlands understands that majority of the wetlands are at risk and would like to see what the groundwater data looks like in a year of normal rainfall.

7) Appendix 1, Table 1 shows 18,216 SMUs. DMS calculated SMUs at 18,215.10 in excel and 18,215 from WEI's electronic submittal of Table 1. Please change to 18,215 SMUs.

   Table 1 was updated to show 18,215 SMUs.

8) Appendix 4, Tables 11a-11f: DMS realizes that there are various methods used to calculate Bank Height Ratio from year to year. One of these is to hold the bankfull depth static (denominator) while allowing the Low Top of Bank max depth (numerator) to vary. Another method that has been proposed and is being evaluated is to hold the As-Built cross-sectional are static with each year's new cross-section and allow that to determine the max bankfull depth for each year. However, if there are large changes in the W/D ratio either method can make for somewhat distorted BHR values depending upon the direction and magnitude of the changes in W/D ratio. Please update the calculations to reflect changes observed in the overlays and explain in detail as a footnote with the

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tables that describes the method by which Wildlands is calculating Bank Height Ratio and Entrenchment Ratio. In addition, please provide context to any observed changes in these calculated ratios in the report narrative. Wildlands must be prepared to defend the method used for credit release and justify through context whether or not any changes observed in a cross section represent an issue.

A footnote was added to Tables 11a-11f in Appendix 4 describing the method used to calculate Bank Height Ratio, and Entrenchment Ratio.

9) Appendix 5, Table14

a) Groundwater gauge 34 has failed to meet hydrologic success (8.5%) during the first four years of monitoring. During the MY 3 site visit in December 2016, Wildlands and DMS staff checked this gauge specifically to see why it continued to fail. DMS and Wildlands agreed during the 2016 site visit that the soils around gauge 34 appeared to contain hydric indicators that point towards the soils becoming hydric and that groundwater within the gauge was within 12 inches of the ground surface. Given this, Wildlands stated that they would replace the transducer in this gauge and collect data during the Year 4 monitoring period and reassess success in this wetland area. Clarify whether Wildlands replaced the transducer as discussed and if so, provide an explanation for the continued failure of this gauge. As discussed in MY 3, DMS considers these wetland assets to be at risk of not being delivered.

The transducer on groundwater well 34 was replaced at the beginning of 2017. Wildlands believes abnormally low rainfall, and the open ditch along the KOA campground to the north of well 34 are contributing to the continue failure of groundwater well 34. Wildlands understands this wetland area is at risk and will re-evaluate it during MY5.

b) Based on the data in the MY4 report, DMS believes that the vast majority of wetland assets (in excess of 50% of the site) are at risk and unless Wildlands can provide a convincing argument to the contrary, DMS will recommend further withholding of wetland assets from credit release.

10) Based upon the change in credit calculations directed by the IRT and the loss wetland credits in the vicinity of gauge 10, the total credits determined by DMS are 165 SMUs and 3.6 WMUs below the currently adjusted contract amount of 18,380 SMUs and 62.1 WMUs. Therefore, the contract value would need to be reduced $236,835.00 from $8,182,485.00 based on the shortfall of stream and wetland credits. To reconcile the overpayment, please adjust the Task 10 payment downward to a revised amount of $231,498.00. The remaining future milestone invoice amounts will be revised.

Invoices will be adjusted to account for loss of credits.

If you have any questions, please contact me by phone (919) 851-9986, or by email (jlorch@wildlandseng.com).

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Sincerely,

Jason Lorch, *Monitoring Coordinator*

PREPARED BY:

Wildlands Engineering, Inc.
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EXECUTIVE SUMMARY

Wildlands Engineering (Wildlands) completed a full-delivery project for the North Carolina Division of Mitigation Services (DMS) to restore and enhance a total of 18,748 linear feet (LF) of stream and restore 59.70 acres (ac) of wetlands in Johnston County, North Carolina. The project streams consist of five unnamed tributaries (UTs) to the Neuse River. The largest of these streams, Devil's Racetrack Creek (East and West), drains directly to the Neuse River. The other four streams are small headwater tributaries to Devil's Racetrack Creek (Southwest Branch, Middle Branch, Southeast Branch, and North Branch). The project proposes to provide 18,215 stream mitigation units (SMU's) and 58.50 wetland mitigation units (WMU's). At the downstream limits of the project, the drainage area is 831 acres (1.30 square miles).

The Devil's Racetrack Mitigation Site, hereafter referred to as the Site, is located in eastern Johnston County along Devil's Racetrack Road just east of its intersection with U.S. Highway 701 and approximately one mile east of Interstate 95 (Figure 1). The Site is located in the western portion of the Inner Coastal Plain Physiographic Province (USGS, 1998). The Site is located within the North Carolina Division of Water Resources (NCDWR) subbasin 03-04-02 of the Neuse River Basin (United States Geological Survey (USGS) Hydrologic Unit 03020201140010).

Prior to construction activities, the streams had been relocated and channelized and the surrounding wetland complex had been drained for agricultural purposes. The primary objectives of the project were to promote wetland hydrology; restore a Coastal Plain Small Stream Swamp wetland community; restore a Coastal Plain stream system to promote hydrologic connectivity with the floodplains and wetlands; stabilize stream banks; promote instream habitat and aeration; restore riparian buffers; and further improve water quality through removing existing agricultural practices. Figure 2 and Table 1 present the restoration and enhancement design for the Site.

The following project goals were established to address the effects listed above from watershed and project site stressors:

- Restore a large wetland complex to a naturally occurring community to improve riparian habitat and water quality;
- Restore a network of badly degraded stream channels, including multiple headwater streams, to create aquatic habitat and further improve water quality to receiving waters; and
- Restore riparian buffers along stream corridors for additional habitat and water quality benefits.

Stream and wetland restoration and enhancement construction efforts were completed in February 2014. Baseline as-built monitoring activities (MY0) were completed between January and February 2014. A conservation easement is in place on 96.065 acres of the stream and wetland riparian corridors to protect them in perpetuity.

Monitoring Year 4 (MY4) assessment and site visits were completed between the months of March and November 2017 to assess the conditions of the project. Overall, the Site has met the required vegetation, hydrology, and stream success criteria for MY4. The overall MY4 average planted stem density for the Site is 581 stems per acre, which is greater than the year five interim density requirement of 260 stems per acre. All restored and enhanced streams are stable and functioning as designed. Southeast Branch, Southwest Branch, and Middle Branch all had pressure transducers installed to monitor stream flow. All three stream gages met the hydrologic criteria for MY4. Of the 38 groundwater monitoring wells on the Site, 17 met the success criteria (water table with 12 inches of the ground surface for 8.5% of the growing

season consecutively), eight had a hydroperiod greater than 5% but did not meet the success criteria, and 13 had a hydroperiod below 5% however two of these are located outside of the wetland boundary. Timing and intensity of rainfall is believed to be the cause for lower hydrology performance than in previous monitoring years as explained in the report.

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APPENDICES

Section 1: PROJECT OVERVIEW

The Devil's Racetrack Mitigation Site, hereafter referred to as the Site, is located in eastern Johnston County within the Neuse River Basin (USGS Hydrologic Unit 03020201) near the town of Four Oaks, North Carolina. The Site is located along Devil's Racetrack Road just east of its intersection with U.S. Highway 701 and approximately one mile east of Interstate 95. The Site is located in the western portion of the Inner Coastal Plain Physiographic Province (USGS, 1998). The project watershed consists primarily of agricultural lands and forest. The only significant development in the watershed is a campground adjacent to Devil's Racetrack Creek on the western portion of the project site, a middle school in the upper portion of the watershed, a low-density subdivision with single family homes, and a small section of I-95. The drainage area for the project site is 831 acres (1.30 square miles) at the lower end of Devil's Racetrack Creek (East).

The project stream reaches include Devil's Racetrack Creek (East and West), Southwest Branch, Middle Branch, Southeast Branch, and North Branch, (stream restoration and/or enhancement level I/II approach). Mitigation work within the Site included restoration and enhancement of 18,748 linear feet (LF) of perennial and intermittent stream channel and restoration of 59.7 acres (ac) of riparian wetlands. The stream and wetland areas were also planted with native vegetation to improve habitat and protect water quality. The final mitigation plan was submitted and accepted by the DMS in January of 2013. Construction activities were completed by Land Mechanic Designs, Inc. (East Side) and Fluvial Solutions (West Side) in February 2014. Planting and seeding activities were completed by Bruton Natural Systems, Inc. in February 2014. Baseline monitoring (MY0) was conducted between December 2013 and February 2014. Annual monitoring will be conducted for seven years with the close-out anticipated to commence in 2021 given the success criteria are met. Appendix 1 provides more detailed project activity, history, contact information, and watershed/site background information for this project.

A conservation easement has been recorded and is in place along the stream and wetland riparian corridors to protect them in perpetuity; 96.065 ac (Deed Book 4221, Page 419-433) within two tracts owned by Nell Howell Revocable Trust. The project provides 18,215 stream mitigation units (SMU's) and 58.50 wetland mitigation units (WMU's). Directions and a map of the Site are provided in Figure 1 and project components are illustrated in Figures 2a and 2b.

1.1 Project Goals and Objectives

Prior to construction activities, the streams had been relocated and channelized and the surrounding wetland complex had been drained for agricultural purposes. Stream valleys and other low areas were filled to raise wet areas and even out the fields. At the same time the streams were straightened and riparian vegetation was also removed. The project area west of Devil's Racetrack Road was used for row crop agriculture and the eastern portion was used for timber production.

The channelization of streams on the Site resulted in severely over-enlarged channels that were extremely deep in many locations. The alterations of the Site to promote farming practices resulted in complete elimination of the ecological function of this small stream/wetland complex. Specifically, functional losses at the Site include degraded aquatic habitat, altered hydrology (related to loss of floodplain connection and lowered water table), and reduction of quality and amount of riparian wetland habitats and related water quality benefits. Ongoing bank erosion was also occurring at some locations due to high, overly steep banks and lack of bank vegetation. Table 4 in Appendix 1 and Tables 10a through 10f in Appendix 4 present the pre-restoration conditions in detail.

The Site was designed to meet the over-arching goals as described in the mitigation plan (Wildlands, 2013). The project is intended to provide numerous ecological benefits within the Neuse River Basin. While many of these benefits are limited to the Devil's Racetrack Creek Site project area, others, such as pollutant removal and improved aquatic and terrestrial habitat, have more far-reaching effects. The following project specific goals established in the mitigation plan include:

- Restore a large wetland complex to a naturally occurring community to improve riparian habitat and water quality;
- Restore a network of badly degraded stream channels, including multiple headwaters streams, to create aquatic habitat and further improve water quality to receiving waters; and
- Restore riparian buffers along stream corridors for additional habitat and water quality benefits.

Secondary project goals established in the mitigation plan were to restore fish passage from the Neuse River to Devil's Racetrack Creek. This is a secondary goal because success will not be measured during monitoring.

The primary project goals were addressed through the following project objectives:

- Promote wetland hydrology by raising channelized stream beds and filling drainage ditches;
- Plant wetland areas with native tree species to restore a Coastal Plain Small Stream Swamp – Blackwater Subtype community;
- Reconstruct stream channels to have the appropriate slope, planform, and cross-sectional geometry for the region of the Coastal Plain in which the project is located;
- Size reconstructed stream channels to flood floodplains and wetlands frequently;
- Stabilize stream banks using bioengineering, natural channel design techniques, and grading to reduce bank angles and bank height;
- Install in-stream structures and woody debris to promote aeration of water, create habitat, and influence the creation of bed forms commonly found in sand bed channels;
- Restore riparian buffer areas with native tree species to stabilize channels, filter flood flows and runoff, and supplement wetland plantings; and
- Remove project area from agricultural production further improving water quality.

The design streams and wetlands were restored to the appropriate type based on the surrounding landscape, climate, and natural vegetation communities but also with strong consideration to existing watershed conditions and trajectory. The mitigation project was developed to restore a large stream/wetland complex directly adjacent to the Neuse River to a naturally occurring community to create riparian and wetland habitat and improve water quality. Other key factors addressed in the design were to create stable habitats, improve riparian buffers, and restore the natural migration patterns for anadromous and other fish for spawning.

1.2 Monitoring Year 4 Data Assessment

Annual monitoring and quarterly site visits were conducted during MY4 to assess the condition of the project. The stream and wetland mitigation success criteria for the Site follow the approved success criteria presented in the Devil's Racetrack Mitigation Plan (Wildlands, 2013).

1.2.1 Vegetative Assessment

A total of 51 vegetation plots were established during the baseline monitoring within the project easement areas. All of the plots were installed using a standard 10 meter by 10 meter plot. The final

vegetative success criteria will be the survival of 210 planted stems per acre in the riparian corridor along restored and enhanced reaches and within the wetland restoration areas at the end of the seven year monitoring period (MY7). The interim measure of vegetative success for the Site will be the survival of at least 260 stems per acre at the end of the fifth year of monitoring (MY5). Planted vegetation must average 10 feet in height in each plot at the end of the seventh year of monitoring.

The MY4 vegetative survey was completed in August 2017. The 2017 vegetation monitoring resulted in an average planted stem density of 581 stems per acre, which is greater than the interim requirement of 260 stems per acre required at MY4, but approximately 17% less than the baseline density recorded at MY0, in January 2014. When including volunteer stems, the average stems per acre is 926. This is well above the MY5 interim requirement of 260 stems per acre. There was an average of 14 planted stems per plot which is a slight decrease from 15 stems per plot in MY3. All 51 of the vegetation plots individually met success criteria for MY4 and are on track to meet the success criteria required for MY7 (Table 9, Appendix 3). Refer to Appendix 2 for vegetation plot photographs and the vegetation condition assessment table and Appendix 3 for vegetation data tables.

1.2.2 Vegetation Areas of Concern

Along the lower section of Devil's Racetrack (East), there are a few bare areas totaling 4.8 acres (approximately 5.0% of the planted acreage). In these bare areas, the planted trees appear healthy and volunteer trees have sprouted, but the herbaceous ground cover is still deficient and not well established. This area was graded down several feet during construction which removed the nutrient rich top soil, leaving a more acidic subsoil. Wildlands incorporated liquid and pelletized lime into the soil during construction with the expectation that the pH would increase over the first year or two and would provide better herbaceous growing conditions. As of MY4, this area still has low pH soils, but continues to improve as the herbaceous ground cover density develops. In May hugel beds (small trenches filled with organic material and covered with straw or mulch to hold moisture) were installed at varying locations within the 4.8 acre problem area to help promote vegetation growth. A mixture of mulch, lime, fertilizer, and temporary and permanent grasses was applied in November to add organic matter to the surface of the excavated areas to promote herbaceous ground cover.

Throughout the site pine trees have begun to grow with the planted trees. On the west side of the project the pine trees are mixed in with the planted trees and herbaceous cover and are not affecting planted vegetation. On the east side of the project pine trees are growing at a high density and could potentially affect planted vegetation if not maintained during MY5. Wildlands thinned the pine trees in this area during MY4, and plans to cut them on both sides of the Site during MY5.

This winter supplemental tree planting will be performed in these areas as needed. Tree species that can tolerate lower pH levels will be planted. During MY5 Wildlands will continue to monitor these areas and will reapply seed and soil amendments as necessary. Refer to Appendix 2 for the vegetation condition assessment table, the Integrated Current Condition Plan View (CCPV), and reference photographs.

1.2.3 Stream Assessment

Morphological surveys for MY4 were conducted in May 2017. All streams within the Site are stable and met success criteria for MY4. In general, cross sections for all streams showed little to no change in bankfull area, maximum depth ratio, or width-to-depth ratio. Cross section surveys show that the bank height ratios remain at or very near 1.0. Entrenchment ratios vary slightly from year to year due to minor changes in bankfull widths. Small adjustments in width occur due to vegetation, sediment deposition, and many other factors. These minor changes do not indicate channel instability. Surveyed riffle cross sections fell within the parameters defined for channels of the appropriate Rosgen stream type.

Longitudinal profile surveys are not required on the project unless visual inspection indicates reach wide vertical stability concerns. Refer to Appendix 2 for the visual stability assessment table, the CCPV map, and reference photographs. Refer to Appendix 4 for the morphological data and plots.

1.2.4 Stream Areas of Concern

No stream areas of concern were identified during MY4.

1.2.5 Hydrology Assessment

At the end of the seven-year monitoring period, two or more bankfull events must have occurred in separate years within the restoration reaches. Multiple bankfull events were recorded on all the streams with crest gages and pressure transducers during the MY4 data collection. All streams on the Site had multiple bankfull events during MY1, MY2, and MY3. Therefore, the Site has met the required stream hydrology success criteria.

Pressure transducers were also installed on Southwest Branch, Southeast Branch, and Middle Branch to measure stream flow. These pressure transducers were installed to show that the streams have adequate flow throughout the year and are not ephemeral ditches. Per discussion with the Interagency Review Team (IRT), on these three streams, consistent flow must be documented for at least 30 consecutive days under normal circumstances. Stream flow must be documented to occur intermittently in all months other than July through September. Southwest Branch and Middle Branch showed constant flow throughout MY4. Southeast Branch showed consistent flow for 70 consecutive days, from January to mid-April. From mid-April to July Southeast Branch showed intermittent flow. All three intermittent streams have met the flow success criteria for MY4. Refer to Appendix 5 for hydrologic data.

1.2.6 Wetland Assessment

Thirty-four groundwater monitoring gages were established during the baseline monitoring and four additional gages were added during MY2, all but two (GW8, and GW32) are within the wetland restoration zones. Groundwater gages 8, and 32 were placed outside of wetland boundaries to capture the extent of the wetlands. These gages will be removed in subsequent monitoring years. All the gages were installed at appropriate locations so that the data collected will provide an indication of groundwater levels throughout the Site. To provide data for the determination of the growing season, three soil temperature probes (2 on the west side and 1 on the east side) have been installed at a depth of twelve inches. A barotroll logger (to measure barometric pressure used in the calculations of groundwater levels with well transducer data) and a rain gage were also installed on the Site. All monitoring gages were downloaded and maintained on an as needed basis. The success criteria for wetland hydrology is to have a free groundwater surface within 12 inches of the ground surface for 8.5 percent of the growing season, which is measured in consecutive days under typical precipitation conditions. During MY1 NRCS WETS Data was used to determine the growing season for the Site. After discussions with the United States Army Corps of Engineers (USACE), it was agreed to use on-site soil temperature data to determine the beginning of the growing season and use NRCS WETS data to determine the end of the growing season. During MY4 the beginning of the growing season was extended by 20 days based on soil temperatures staying above 41 degrees Fahrenheit at 12 inches below the ground surface.

The USACE also requested pre-construction groundwater well data be overlaid on hydrographs with the current monitoring year groundwater well data. USACE requested this data to see how groundwater levels are recharging after rain events on the Site. Wildlands overlaid the pre-construction groundwater well data with the closest monitoring groundwater well data and rain data. It is evident from these

overlays that the Site drained more rapidly and to greater depths prior to restoration. Refer to Appendix 5 for pre and post construction groundwater gage comparison plots.

Of the 38 groundwater monitoring wells on the Site, 17 met the success criteria (water table with 12 inches of the ground surface for 8.5% of the growing season consecutively), eight had a hydroperiod greater than 5% but did not meet the success criteria, and 13 had a hydroperiod below 5% however two of these are located outside of the wetland boundaries (GW8, and GW32). Of the 17 wells that met the success criteria, hydroperiods ranged from 8.8% to 30.0%, with one outlier at 39.2%. Eight wells had a hydroperiod range of 5.0% to 6.2% which is greater than USACE defined minimum wetland hydroperiod but lower than the listed success criteria. Of the 11 wells within the wetland boundaries that showed hydroperiods below 5.0% the majority of these are around the wetland perimeter where elevations start to rise.

Overall rainfall year to date is average with a few months exceeding the USDA listed 70th percentile monthly rainfall limit. However, the beginning of 2017 was significantly drier than normal. During MY4, three of the first four months of the year had rainfall below the USDA listed 30th percentile. January had a total of 2.96 inches of rain, February had 0.84 inches, and April had 1.78 inches for the month before a large rain event that occurred on April 24th. These rainfall totals are well below normal when compared the 30th percentile (Appendix 5). The 30th percentile for January is 3.17, which is 10 percent higher than the actual amount of rainfall received in 2017. For February, the 30th percentile is 2.54 inches of rain, which is three times the amount of rain that fell during February 2017. Assuming an even rainfall distribution across the month of April, the 30th percentile for the period from April 1 to April 20 is 1.34 inches. Due to these drier than normal months, groundwater levels dropped from at or near the ground surface to below the 12 inch threshold in February and did not rebound until later in the growing season when evapotranspiration rates are too high to sustain high water tables. In previous years, water levels did not drop to this level until May.

Rainfall patterns from the end of April through the summer were atypical with periodic large events followed by extended periods of no rain. April had above normal rainfall with 7.90 inches, however 5.88 inches fell during one storm event on April 24th and 25th. This large event occurred near the end of April after several months of below normal rainfall. When conditions are dry and large rainfall events occur, runoff tends to be high relative to infiltration (Winter 1998).

Groundwater wells 22 and 25 are good examples of how rainfall affected groundwater levels during 2017. Both wells met wetland success criteria during the previous three years of monitoring. During MY4 both wells had groundwater within a few inches of the surface during January, however in February groundwater levels fell near the 12 inch threshold for wetland success criteria. With below normal rainfall in January, February, and most of April, groundwater levels stayed below 12 inches, except for a normal rainfall period from mid-March to the beginning of April. The reference well displayed a similar groundwater pattern as wells 22 and 25 and performed worse than 29 of the 38 groundwater wells on the Site. This reference wetland has been monitored since 2001 and has met wetland criteria for every year Wildlands has data (2006-2010, 2015-2016) except for 2017. Along with below normal rainfall, 2017 had above average ambient temperatures in January and February, which increased evaporation further exacerbating the problem.

Groundwater well 10 has not meet the success criteria during the first four monitoring years. After multiple field observations Wildlands adjusted the wetland boundaries around groundwater well 10 based on hydrology, soils, topography, and vegetation during MY4. Hydric soils were not forming in this area and it was obvious this area was not maintaining hydrology. Wetland mitigation credits were updated in Table 1 and Figures 2a-b and 3.0-3.2 show the revised wetland boundaries. Refer to Appendix 2 for the groundwater gage locations and Appendix 5 for groundwater hydrology data and plots.

1.2.7 Maintenance Plan

Pine trees will be removed from the site as described in section 1.2.2 above. Also, supplemental planting will be performed this winter to the bare areas on the east side as needed. Section 1.2.2 describes this in more detail.

1.3 Monitoring Year 4 Summary

The average stem density for the Site is on track to meeting the MY7 success criteria; all individual vegetation plots meet the MY4 success criteria as noted in the CCPV. All streams within the Site are stable and functioning as designed. There have been at least two documented bankfull events recorded in separate years for each stream on the Site. Of the 38 groundwater monitoring wells on the Site, 17 met the success criteria (water table with 12 inches of the ground surface for 8.5% of the growing season consecutively), eight had a hydroperiod greater than 5% but did not meet the success criteria, and 13 had a hydroperiod below 5% however two of these are located outside of the wetland boundary. Timing and intensity of rainfall is believed to be the cause for lower hydrology performance than in previous monitoring years as explained in the report.

Summary information and data related to the success 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 Plan documents available on DMS's website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

Section 2: METHODOLOGY

Geomorphic data was collected following the standards outlined in The Stream Channel Reference Site: An Illustrated Guide to Field Techniques (Harrelson et al., 1994) and in the Stream Restoration: A Natural Channel Design Handbook (Doll et al., 2003). All the Integrated Current Condition Mapping was recorded using a Trimble handheld GPS with sub-meter accuracy and processed using Pathfinder and ArcGIS. Crest gages and pressure transducers were installed in surveyed riffle cross sections and monitored quarterly. Hydrology attainment installation and monitoring methods are in accordance with the USACE (2003) standards. Vegetation monitoring protocols followed the Carolina Vegetation Survey-DMS Level 2 Protocol (Lee et al., 2008).

Section 3: REFERENCES

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APPENDIX 1. General Tables and Figures

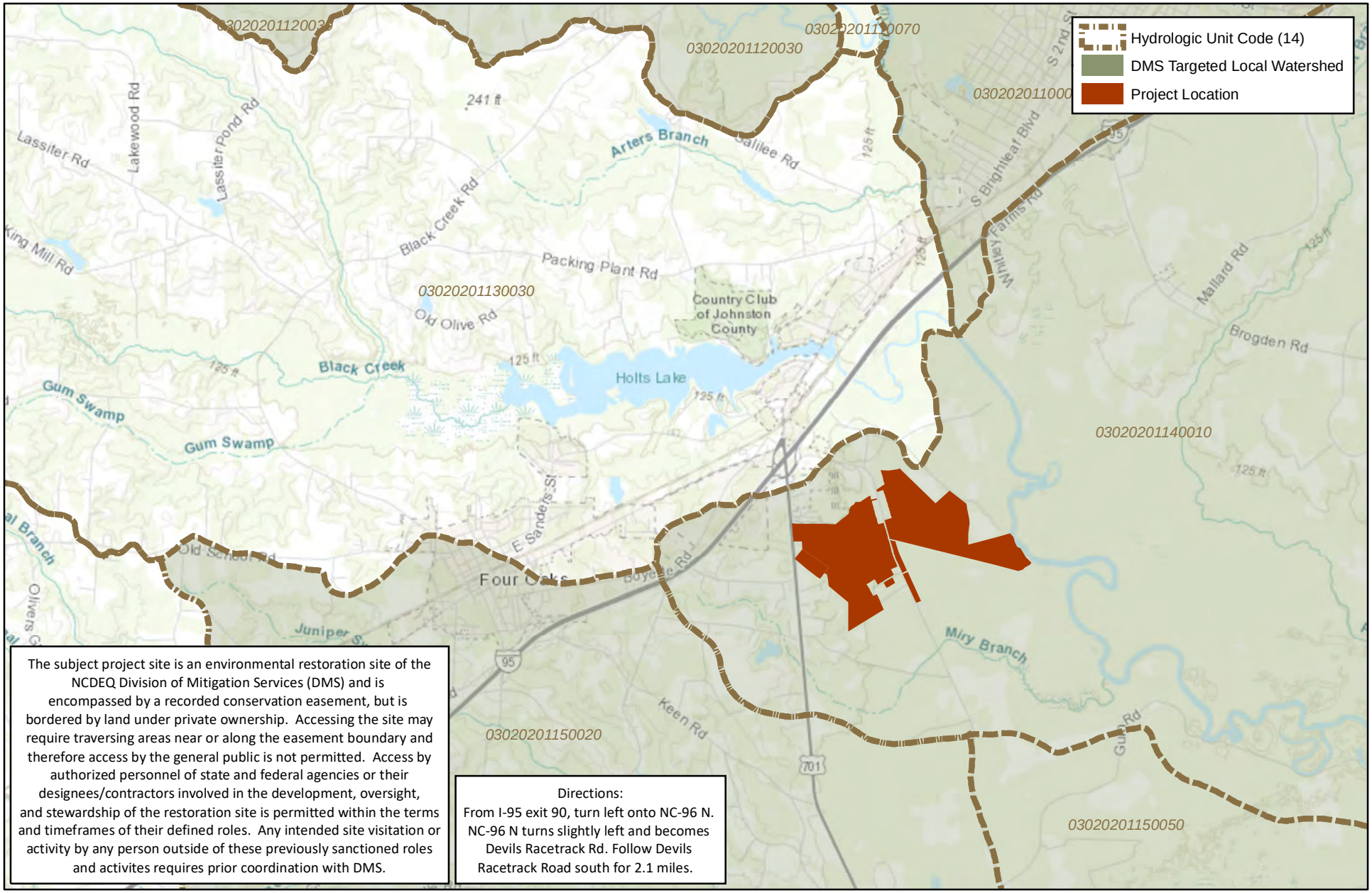

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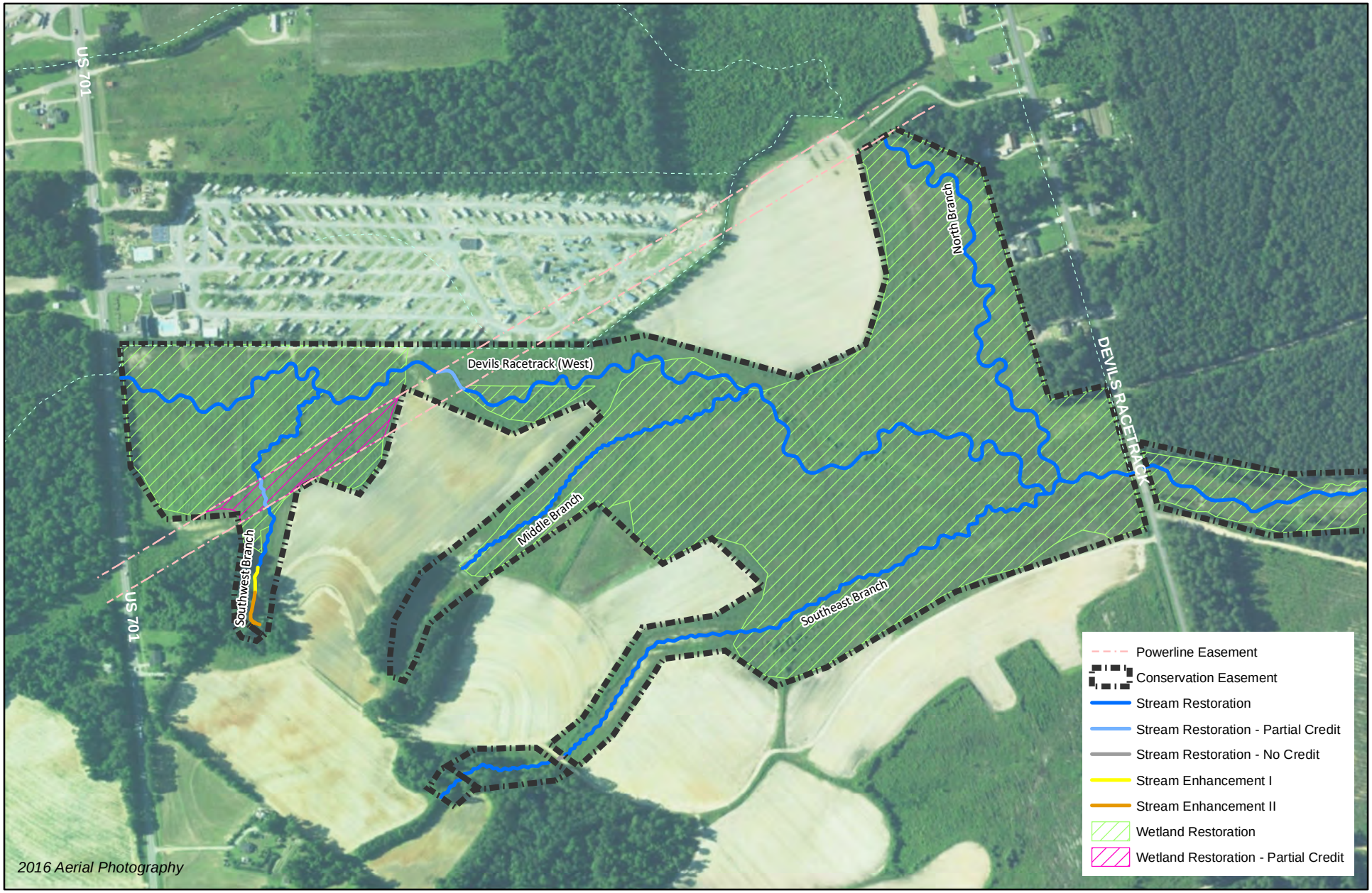
Figure 1. Project Vicinity Map
Devil's Racetrack Mitigation Site
DMS Project No. 95021
Monitoring Year 4 - 2017
Johnston County, NC

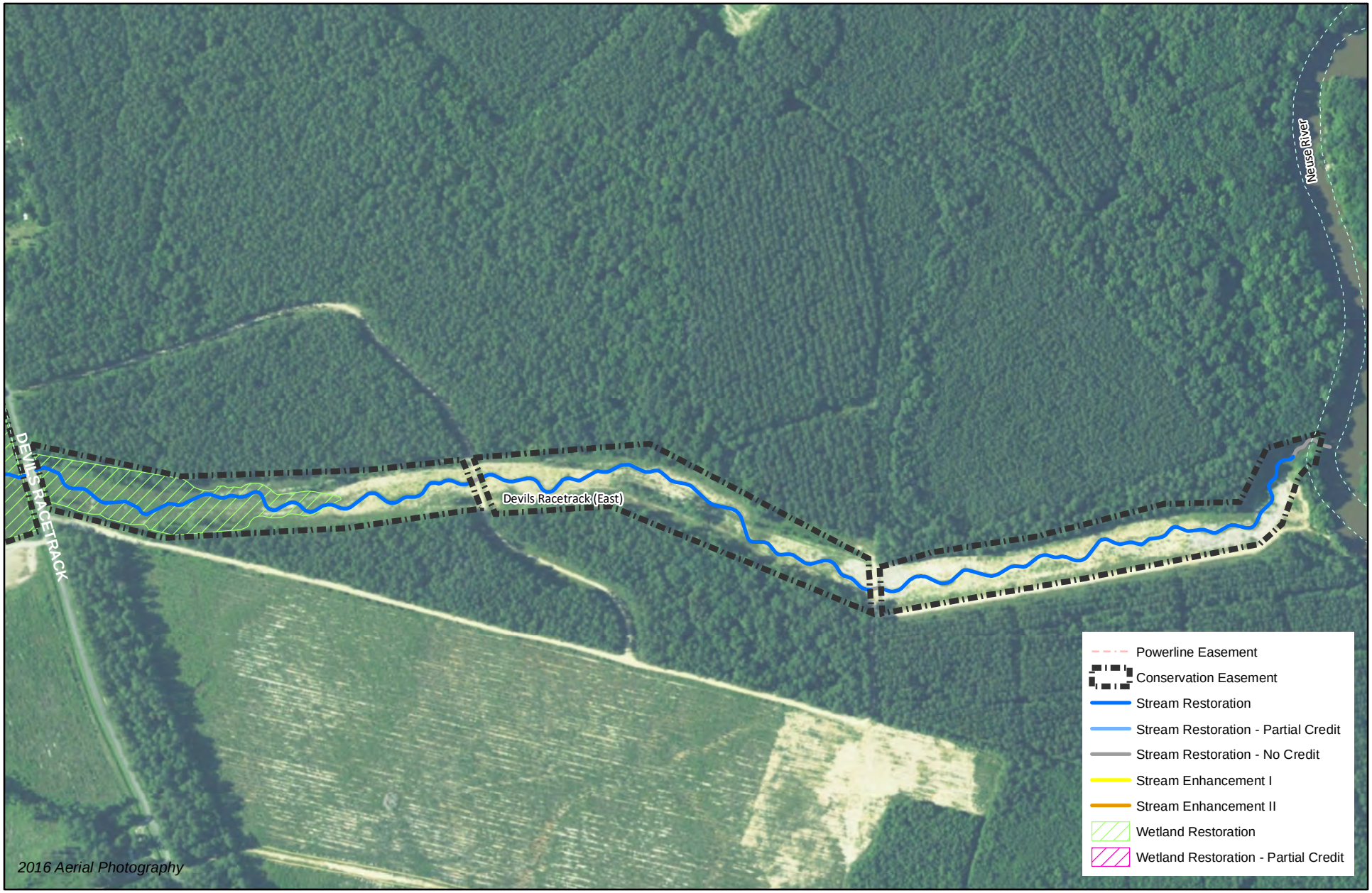


WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 2a. Project Component/Asset Map
Devil's Racetrack Mitigation Site
DMS Project No. 95021
Monitoring Year 4 - 2017
Johnston County, NC



WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 2b. Project Component/Asset Map
Devil's Racetrack Mitigation Site
DMS Project No. 95021
Monitoring Year 4 - 2017
Johnston County, NC

Table 1. Project Components and Mitigation Credits
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Mitigation Credits

	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorous Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	18,215	0	58.50	0	N/A	N/A	N/A	N/A	N/A

Project Components

Reach ID	As-Built Stationing/ Location	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage/ Acreage	Mitigation Ratio	Credits (SMU/ WMU)
Streams							
Devil's Racetrack Creek (West) (DOT ROW)	0+00-0+20	20 LF	P1	Restoration (No Credit)	20	N/A	N/A
Devil's Racetrack Creek (West)	0+20-16+26 & 17+50-52+05	4,755 LF	P1	Restoration	5,061	1:1	5,061
Devil's Racetrack Creek (West) (Power Line Easement)	16+26-17+50	196 LF	P1	Restoration (Partial Credit)	124	4:1[1]	31
Devil's Racetrack Creek (West) (DOT ROW)	52+05-52+11	5 LF	P1	Restoration (No Credit)	6	N/A	N/A
Devil's Racetrack (East) (DOT ROW)	52+59-52+65	5 LF	P1	Restoration (No Credit)	6	N/A	N/A
Devil's Racetrack (East)	52+65-70+73 & 71+03-88+00 & 88+31-106+85	4,778 LF	P1/2	Restoration	5,363	1:1	5,363
Devil's Racetrack (East) (Easement Break)	70+73-71+03	30 LF	P1/2	Restoration (No Credit)	30	N/A	N/A
Devil's Racetrack (East) (Easement Break)	88+00 to 88+31	31 LF	P1/2	Restoration (No Credit)	31	N/A	N/A
Devil's Racetrack (East)	106+85-107+97	0 LF	P1/2	Restoration (No Credit)	112	N/A	N/A
Southwest Branch	500+00-501+31 600+00-600+23	154 LF	EII	Enhancement	154	2.5:1	61.6
Southwest Branch	501+31-502+06	75 LF	EI	Enhancement	75	1.5:1	50
Southwest Branch	502+06-504+85 505+99-511+32	740 LF	P1/2	Restoration	812	1:1	812
Southwest Branch (Power Line Easement)	504+85-505+99	111 LF	P1/2	Restoration (Partial Credit)	114	4:1[1]	28.5
Middle Branch	200+00-204+10	410 LF		Headwater Wetland	410	1:1	410
Middle Branch	204+10-219+06	1,326 LF	P1/2	Restoration	1,496	1:1	1,496
Southeast Branch	300+00-305+03 305+35-328+92	2,946 LF	P1	Restoration	2,860	1:1	2,860
Southeast Branch (Easement Break)	305+03-305+35	30 LF	P1	Restoration (Partial Credit)	32	N/A	N/A
North Branch	403+76-424+18	---	P1	Restoration	2,042	1:1	2,042
Wetlands							
Riparian Wetlands (West)	N/A	0.0 ac	N/A	Restoration	54.65	1:1	54.65
Riparian Wetlands (West) (Power Line Easement)	N/A	0.0 ac	N/A	Restoration (Partial Credit)	1.60	4:1	0.40
Riparian Wetlands (East)	N/A	0.0 ac	N/A	Restoration	3.45	1:1	3.45

Component Summation

Restoration Level	Stream (LF)	Riparian Wetland (acres)		Non-Riparian Wetland (acres)	Buffer(square feet)	Upland (acres)
		Riverine	Non-Riverine			
Restoration	18,519	59.70	-	-	-	-
Enhancement		-	-	-	-	-
Enhancement I	75					
Enhancement II	154					
Creation		-	-	-		
Preservation	-	-	-	-		-
High Quality Preservation	-	-	-	-		-

N/A: not applicable
1. Ratio of 4:1 based on an expected 75% reduction in credits for stream restoration with shrub buffer zone in power line easements.
* Stream credit calculations were originally calculated along the as-built thalweg and updated to be calculated along stream centerlines for Monitoring Year 4 after discusions with NC IRT.
** Riparian Wetlands (West) credit calculations were updated for Monitoring Year 4 based on the performance of groundwater well 10.

Table 2. Project Activity and Reporting History
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Activity or Report		Date Collection Complete	Completion or Scheduled Delivery
Mitigation Plan		September 2011-March 2012	January 2013
Final Design - Construction Plans		September 2011-March 2012	August 2013
Construction		December 2013-February 2014	February 2014
Temporary S&E mix applied to entire project area[1]		February 2014	February 2014
Permanent seed mix applied to reach/segments		February 2014	February 2014
Bare root and live stake plantings for reach/segments		February 2014	February 2014
Baseline Monitoring Document (Year 0)	Stream Survey	February 2014	May 2014
	Vegetation Survey	February 2014	
Year 1 Monitoring	Stream Survey	July 2014	December 2014
	Vegetation Survey	September 2014	
Minor Stream Repairs			May 2014
Year 2 Monitoring	Stream Survey	April 2015	December 2015
	Vegetation Survey	June 2015	
Minor Stream Repairs & Soil Amendments			April 2015
Year 3 Monitoring	Stream Survey	April 2016	December 2016
	Vegetation Survey	June 2016	
Soil Amendments			June 2016
Beaver Dam Removal			September 2016
Year 4 Monitoring	Stream Survey	May 2017	December 2017
	Vegetation Survey	August 2017	
Pine Tree Removal			February 2017
Hugel Beds Installed			May 2017
Soil Amendments			November 2017
Year 5 Monitoring	Stream Survey	2018	December 2018
	Vegetation Survey	2018	
Year 6 Monitoring	Stream Survey	2019	December 2019
	Vegetation Survey	2019	
Year 7 Monitoring	Stream Survey	2020	December 2020
	Vegetation Survey	2020	

[1]Seed and mulch is added as each section of construction is completed.

Table 3. Project Contact Table
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Designer	**Wildlands Engineering, Inc.**
Jeff Keaton, PE	312 West Millbrook Road, Suite 225 Raleigh, NC 27609 919.851.9986
Construction Contractor (East Side)	**Land Mechanic Designs, Inc.** 126 Circle G Lane Willow Spring, NC 27592
Construction Contractor (West Side)	**Fluvial Solutions** P.O. Box 28749 Raleigh, NC 27611
Planting Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seeding Contractor	**Bruton Natural Systems, Inc** P.O. Box 1197 Fremont, NC 27830
Seed Mix Sources	**Green Resource, LLC**
Nursery Stock Suppliers	
Bare Roots	**Dykes and Son Nursery and NC Forest Service (Claridge Nursery)**
Live Stakes	**Bruton Natural Systems, Inc**
Monitoring Performers	**Wildlands Engineering, Inc.**
Stream, Vegetation, and Wetland Monitoring, POC	Jason Lorch 919.851.9986, ext. 107

Table 4. Project Information and Attributes
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Project Information	
Project Name	Devil's Racetrack Mitigation Site
County	Johnston County
Project Area (acres)	96.065 ac
Project Coordinates (latitude and longitude)	35° 27'01.58" N, 78° 23' 18.08" W
Project Watershed Summary Information	
Physiographic Province	Upper Coastal Plain
River Basin	Neuse
USGS Hydrologic Unit 8-digit	03020201
USGS Hydrologic Unit 14-digit	03020201140010
DWR Sub-basin	03-04-02
Project Drainage Area (acres)	831 ac
Project Drainage Area Percentage of Impervious Area	<1%
CGIA Land Use Classification	62% forest/wetland, 34% farm land, 4% developed

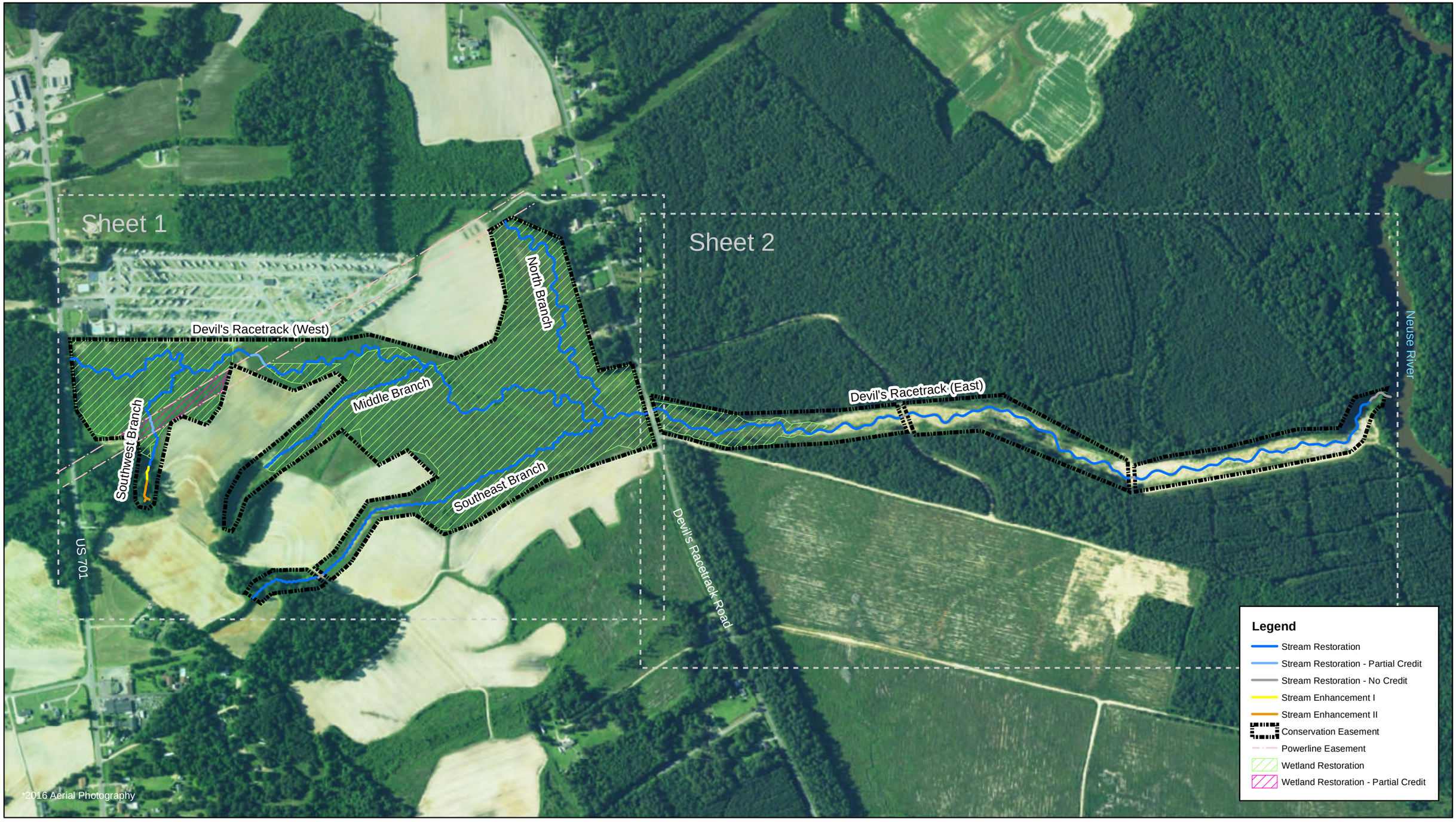
Reach Summary Information

Parameters	Southwest Branch	Middle Branch	Southeast Branch	North Branch	Devil's Racetrack Creek (west)	Devil's Racetrack Creek (east)
Length of reach (linear feet) - Post-Restoration	1,155	1,906	2,892	2,042	5,211	5,542
Drainage area (acres)	20.6	10.8	69.9	49.9	493.5	831.4
NCDWR stream identification score	34.5 - 37	30	29 - 30.75	32	38	37.5
NCDWR Water Quality Classification	C/NSW					
Morphological Desription (stream type)	P	P	P/I	P	P	P
Evolutionary trend (Simon's Model) - Pre- Restoration	---	---	---	---	---	---
Underlying mapped soils	Altavista fine sandy loam, Bibb sandy loam, Cecil loam, Goldsboro sandy loam, Leaf silt loam, Lynchburg sandy loam, Nason silt loam, Norfolk loamy sand, and Rains sandy loam.					
Drainage class	---	---	---	---	---	---
Soil Hydric status	---	---	---	---	---	---
Slope	---	---	---	---	---	---
FEMA classification	None					
Native vegetation community	Coastal Plain bottomland riparian forest					
Percent composition exotic invasive vegetation -Post-Restoration	0%					

Regulatory Considerations

Regulation	Applicable?	Resolved?	Supporting Documentation
Waters of the United States - Section 404	X	X	USACE Nationwide Permit No.27 and DWQ 401 Water Quality Certification No. 3885.
Waters of the United States - Section 401	X	X	
Division of Land Quality (Dam Safety)	N/A	N/A	N/A
Endangered Species Act	X	X	Devils Racetrack Mitigation Plan; Wildlands determined "no effect" on Johnston County listed endangered species.
Historic Preservation Act	X	X	No historic resources were found to be impacted (letter from SHPO dated 7/20/2011).
Coastal Zone Management Act (CZMA)/Coastal Area Management Act (CAMA)	N/A	N/A	N/A
FEMA Floodplain Compliance	N/A	N/A	The project streams do not have an associated regulatory flooplaing; however the downstream end of Devil's Racetrack Creek is located within the floodwasy and flood fringe of the Neuse River (FEMA Zone AE, FIRM panel 1680).
Essential Fisheries Habitat	N/A	N/A	N/A

APPENDIX 2. Visual Assessment Data



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0 500 1,000 Feet

N

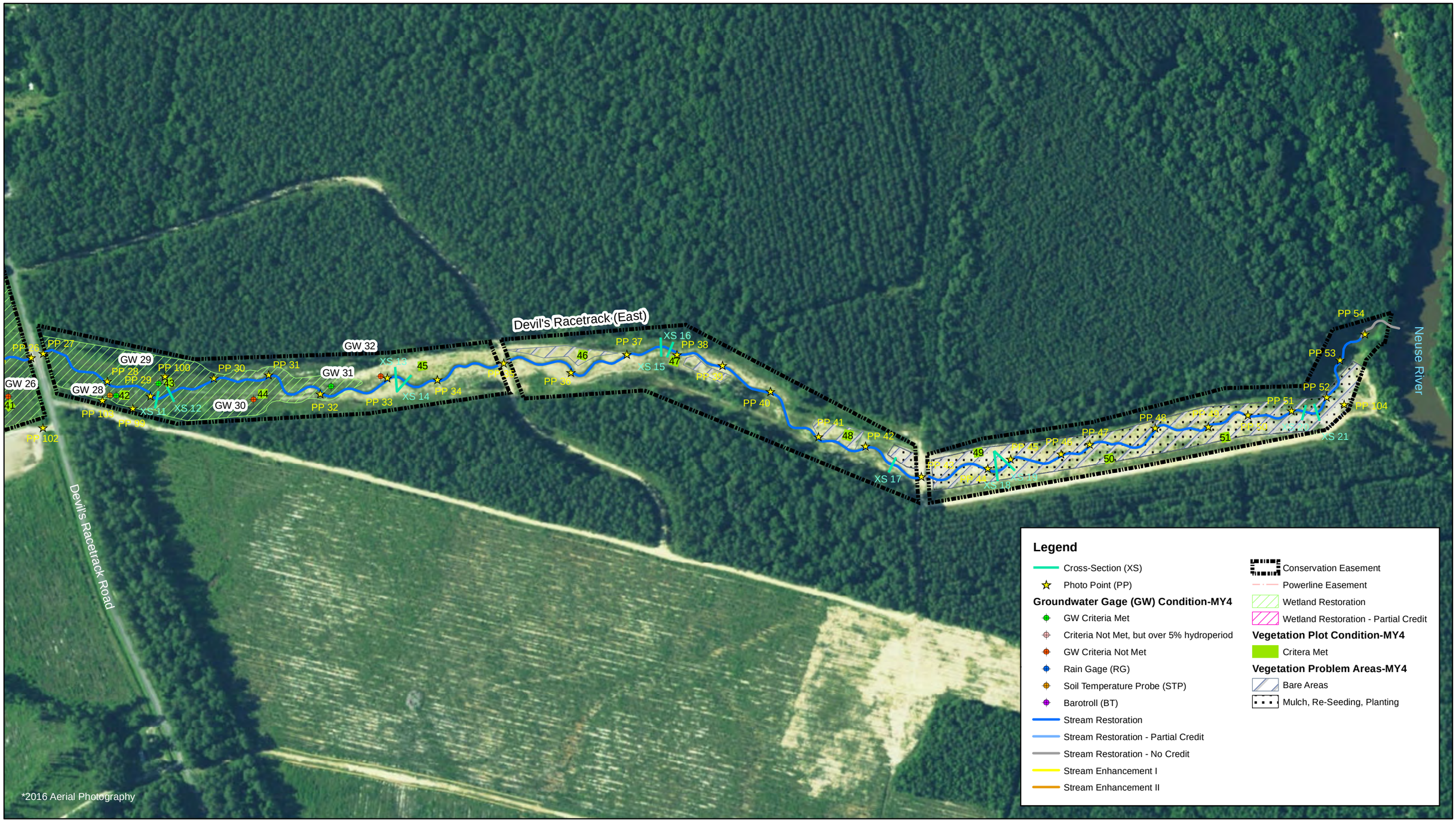
Figure 3.0 Integrated Current Condition Plan View (Key)
Devil's Racetrack Mitigation Site
DMS Project No. 95021
Monitoring Year 4 - 2017
Johnston County, NC

WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.1 Integrated Current Condition Plan View
(Sheet 1 of 2)
Devil's Racetrack Mitigation Site
DMS Project No. 95021
Monitoring Year 4 - 2017
Johnston County, NC



WILDLANDS ENGINEERING

0 250 500 Feet

N

Figure 3.2 Integrated Current Condition Plan View
(Sheet 2 of 2)
Devil's Racetrack Mitigation Site
DMS Project No. 95021
Monitoring Year 4 - 2017

Johnston County, NC

Table 5a. Visual Stream Morphology Stability Assessment Table

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Devil's Racetrack (West) (5,211 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	74	74			100%			
	3. Meander Pool Condition	Depth Sufficient	74	74			100%			
		Length Appropriate	74	74			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	74	74			100%			
		Thalweg centering at downstream of meander bend (Glide)	74	74			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	6	6			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5b. Visual Stream Morphology Stability Assessment Table

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Devil's Racetrack (East) (5,542 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	85	85			100%			
	3. Meander Pool Condition	Depth Sufficient	85	85			100%			
		Length Appropriate	85	85			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	85	85			100%			
		Thalweg centering at downstream of meander bend (Glide)	85	85			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	17	17			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	17	17			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	17	17			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	17	17			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	17	17			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5c. Visual Stream Morphology Stability Assessment Table

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Southeast Branch (2,892 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	121	121			100%			
	3. Meander Pool Condition	Depth Sufficient	120	120			100%			
		Length Appropriate	120	120			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	120	120			100%			
		Thalweg centering at downstream of meander bend (Glide)	120	120			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	67	67			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	67	67			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	67	67			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	67	67			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	67	67			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5d. Visual Stream Morphology Stability Assessment Table

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Middle Branch (1,906 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	79	79			100%			
	3. Meander Pool Condition	Depth Sufficient	78	78			100%			
		Length Appropriate	78	78			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	78	78			100%			
		Thalweg centering at downstream of meander bend (Glide)	78	78			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	52	52			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	52	52			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	52	52			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	52	52			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	52	52			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5e. Visual Stream Morphology Stability Assessment Table

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Southwest Branch (1,155 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	1. Vertical Stability (Riffle and Run units)	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	48	48			100%			
	3. Meander Pool Condition	Depth Sufficient	47	47			100%			
		Length Appropriate	47	47			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	47	47			100%			
		Thalweg centering at downstream of meander bend (Glide)	47	47			100%			
2. Bank	1. Scoured/Eroded	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs	28	28			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	28	28			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	28	28			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	28	28			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	28	28			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 5f. Visual Stream Morphology Stability Assessment Table

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

North Branch (2,042 LF)

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-Built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjust % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability (Riffle and Run units)**	Aggradation			0	0	100%			
		Degradation			0	0	100%			
	2. Riffle Condition	Texture/Substrate	35	35			100%			
	3. Meander Pool Condition	Depth Sufficient	34	34			100%			
		Length Appropriate	34	34			100%			
	4. Thalweg Position	Thalweg centering at upstream of meander bend (Run)	34	34			100%			
		Thalweg centering at downstream of meander bend (Glide)	34	34			100%			
2. Bank	**1. Scoured/Eroded**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	n/a	n/a	n/a
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat			0	0	100%	n/a	n/a	n/a
	3. Mass Wasting	Bank slumping, caving, or collapse			0	0	100%	n/a	n/a	n/a
				Totals	0	0	100%	n/a	n/a	n/a
3. Engineered Structures[1]	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	10	10			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%	10	10			100%			
	4. Habitat	Pool forming structures maintaining ~Max Pool Depth : Bankfull Depth ≥ 1.6 Rootwads/logs providing some cover at baseflow	10	10			100%			

[1]Excludes constructed riffles since they are evaluated in section 1.

Table 6. Vegetation Condition Assessment Table
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Planted Acreage **96**

Vegetation Category	Definitions	Mapping Threshold (Ac)	Number of Polygons	Combined Acreage	% of Planted Acreage
Bare Areas	Very limited cover of both woody and herbaceous material.	0.1	5	4.8	5.0%
Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1	0	0.0	0.0%
		Total	**5**	**4.8**	**5.0%**
Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 Ac	0	0	0%
		Cumulative Total	**5**	**4.8**	**5.0%**

Easement Acreage **96**

Vegetation Category	Definitions	Mapping Threshold (SF)	Number of Polygons	Combined Acreage	% of Planted Acreage
Invasive Areas of Concern	Areas of points (if too small to render as polygons at map scale).	1,000	0	0	0.0%
Easement Encroachment Areas	Areas of points (if too small to render as polygons at map scale).	none	0	0	0%

STREAM PHOTOGRAPHS
Devil's Racetrack West
Monitoring Year 4

	
PHOTO POINT 1 – looking upstream *(05/2/2017)*	**PHOTO POINT 1** – looking downstream *(05/2/2017)*
	
PHOTO POINT 2 – looking upstream *(05/2/2017)*	**PHOTO POINT 2** – looking downstream *(05/2/2017)*

	
PHOTO POINT 3 – looking upstream *(05/2/2017)*	**PHOTO POINT 3** – looking downstream *(05/2/2017)*
	
PHOTO POINT 4 – looking upstream *(05/2/2017)*	**PHOTO POINT 4** – looking downstream *(05/2/2017)*
	
PHOTO POINT 5 – looking upstream *(05/2/2017)*	**PHOTO POINT 5** – looking downstream *(05/2/2017)*

	
PHOTO POINT 6 – looking upstream *(05/2/2017)*	**PHOTO POINT 6** – looking downstream *(05/2/2017)*
	
PHOTO POINT 7 – looking upstream *(05/2/2017)*	**PHOTO POINT 7** – looking downstream *(05/2/2017)*
	
PHOTO POINT 8 – looking upstream *(05/2/2017)*	**PHOTO POINT 8** – looking downstream *(05/2/2017)*

	
PHOTO POINT 9 – looking upstream *(05/2/2017)*	**PHOTO POINT 9** – looking downstream *(05/2/2017)*
	
PHOTO POINT 10 – looking upstream *(05/2/2017)*	**PHOTO POINT 10** – looking downstream *(05/2/2017)*
	
PHOTO POINT 11 – looking upstream *(05/2/2017)*	**PHOTO POINT 11** – looking downstream *(05/2/2017)*

	
PHOTO POINT 12 – looking upstream *(05/2/2017)*	**PHOTO POINT 12** – looking downstream *(05/2/2017)*
	
PHOTO POINT 13 – looking upstream *(05/2/2017)*	**PHOTO POINT 13** – looking downstream *(05/2/2017)*
	
PHOTO POINT 14 – looking upstream *(05/2/2017)*	**PHOTO POINT 14** – looking downstream *(05/2/2017)*

	
PHOTO POINT 15 – looking upstream *(05/2/2017)*	**PHOTO POINT 15** – looking downstream *(05/2/2017)*
	
PHOTO POINT 16 – looking upstream *(05/2/2017)*	**PHOTO POINT 16** – looking downstream *(05/2/2017)*
	
PHOTO POINT 17 – looking upstream *(05/2/2017)*	**PHOTO POINT 17** – looking downstream *(05/2/2017)*

	
PHOTO POINT 18 – looking upstream *(05/2/2017)*	**PHOTO POINT 18** – looking downstream *(05/2/2017)*
	
PHOTO POINT 19 – looking upstream *(05/2/2017)*	**PHOTO POINT 19** – looking downstream *(05/2/2017)*
	
PHOTO POINT 20 – looking upstream *(05/2/2017)*	**PHOTO POINT 20** – looking downstream *(05/2/2017)*

	
PHOTO POINT 21 – looking upstream *(05/2/2017)*	**PHOTO POINT 21** – looking downstream *(05/2/2017)*
	
PHOTO POINT 22 – looking upstream *(05/2/2017)*	**PHOTO POINT 22** – looking downstream *(05/2/2017)*
	
PHOTO POINT 23 – looking upstream *(05/2/2017)*	**PHOTO POINT 23** – looking downstream *(05/2/2017)*

PHOTO POINT 24 – looking upstream *(05/2/2017)*

PHOTO POINT 24 – looking downstream *(05/2/2017)*

PHOTO POINT 25 – looking upstream *(05/2/2017)*

PHOTO POINT 25 – looking downstream *(05/2/2017)*

PHOTO POINT 26 *(05/2/2017)*

STREAM PHOTOGRAPHS
Devil's Racetrack East
Monitoring Year 4

PHOTO POINT 27 *(05/2/2017)*

PHOTO POINT 28 – looking upstream *(05/2/2017)*

PHOTO POINT 28 – looking downstream *(05/2/2017)*

	
PHOTO POINT 29 – looking upstream *(05/2/2017)*	**PHOTO POINT 29** – looking downstream *(05/2/2017)*
	
PHOTO POINT 30 – looking upstream *(05/2/2017)*	**PHOTO POINT 30** – looking downstream *(05/2/2017)*
	
PHOTO POINT 31 – looking upstream *(05/2/2017)*	**PHOTO POINT 31** – looking downstream *(05/2/2017)*

	
PHOTO POINT 32 – looking upstream *(05/2/2017)*	**PHOTO POINT 32** – looking downstream *(05/2/2017)*
	
PHOTO POINT 33 – looking upstream *(05/2/2017)*	**PHOTO POINT 33** – looking downstream *(05/2/2017)*
	
PHOTO POINT 34 – looking upstream *(05/2/2017)*	**PHOTO POINT 34** – looking downstream *(05/2/2017)*

	
PHOTO POINT 35 – looking upstream *(05/2/2017)*	**PHOTO POINT 35** – looking downstream *(05/2/2017)*
	
PHOTO POINT 36 – looking upstream *(05/2/2017)*	**PHOTO POINT 36** – looking downstream *(05/2/2017)*
	
PHOTO POINT 37 – looking upstream *(05/2/2017)*	**PHOTO POINT 37** – looking downstream *(05/2/2017)*

	
PHOTO POINT 38 – looking upstream *(05/2/2017)*	**PHOTO POINT 38** – looking downstream *(05/2/2017)*
	
PHOTO POINT 39 – looking upstream *(05/2/2017)*	**PHOTO POINT 39** – looking downstream *(05/2/2017)*
	
PHOTO POINT 40 – looking upstream *(05/2/2017)*	**PHOTO POINT 40** – looking downstream *(05/2/2017)*

	
PHOTO POINT 41 – looking upstream *(05/2/2017)*	**PHOTO POINT 41** – looking downstream *(05/2/2017)*
	
PHOTO POINT 42 – looking upstream *(05/2/2017)*	**PHOTO POINT 42** – looking downstream *(05/2/2017)*
	
PHOTO POINT 43 – looking upstream *(05/2/2017)*	**PHOTO POINT 43** – looking downstream *(05/2/2017)*

	
PHOTO POINT 44 – looking upstream *(05/2/2017)*	**PHOTO POINT 44** – looking downstream *(05/2/2017)*
	
PHOTO POINT 45 – looking upstream *(05/2/2017)*	**PHOTO POINT 45** – looking downstream *(05/2/2017)*
	
PHOTO POINT 46 – looking upstream *(05/2/2017)*	**PHOTO POINT 46** – looking downstream *(05/2/2017)*

	
PHOTO POINT 47 – looking upstream *(05/2/2017)*	**PHOTO POINT 47** – looking downstream *(05/2/2017)*
	
PHOTO POINT 48 – looking upstream *(05/2/2017)*	**PHOTO POINT 48** – looking downstream *(05/2/2017)*
	
PHOTO POINT 49 – looking upstream *(05/2/2017)*	**PHOTO POINT 49** – looking downstream *(05/2/2017)*

	
PHOTO POINT 50 – looking upstream *(05/2/2017)*	**PHOTO POINT 50** – looking downstream *(05/2/2017)*
	
PHOTO POINT 51 – looking upstream *(05/2/2017)*	**PHOTO POINT 51** – looking downstream *(05/2/2017)*
	
PHOTO POINT 52 – looking upstream *(05/2/2017)*	**PHOTO POINT 52** – looking downstream *(05/2/2017)*

	
PHOTO POINT 53 – looking upstream *(08/1/2017)*	**PHOTO POINT 53** – looking downstream *(08/1/2017)*
	
PHOTO POINT 54 – looking upstream *(08/1/2017)*	**PHOTO POINT 54 –** looking downstream *(08/1/2017)*

STREAM PHOTOGRAPHS
Southwest Branch
Monitoring Year 4

	
PHOTO POINT 55 – looking upstream *(05/2/2017)*	**PHOTO POINT 55** – looking downstream *(05/2/2017)*
	
PHOTO POINT 56 – looking upstream *(05/2/2017)*	**PHOTO POINT 56** – looking downstream *(05/2/2017)*

	
PHOTO POINT 57 – looking upstream *(11/16/2017)*	**PHOTO POINT 57** – looking downstream *(11/16/2017)*
	
PHOTO POINT 58 – looking upstream *(05/2/2017)*	**PHOTO POINT 58** – looking downstream *(05/2/2017)*
	
PHOTO POINT 59 – looking upstream *(05/2/2017)*	**PHOTO POINT 59** – looking downstream *(05/2/2017)*

	
PHOTO POINT 60 – looking upstream *(05/2/2017)*	**PHOTO POINT 60** – looking downstream *(05/2/2017)*

STREAM PHOTOGRAPHS
Middle Branch
Monitoring Year 4

	
PHOTO POINT 61 – looking upstream *(05/2/2017)*	**PHOTO POINT 61** – looking downstream *(05/2/2017)*
	
PHOTO POINT 62 – looking upstream *(05/2/2017)*	**PHOTO POINT 62** – looking downstream *(05/2/2017)*

	
PHOTO POINT 63 – looking upstream *(05/2/2017)*	**PHOTO POINT 63** – looking downstream *(05/2/2017)*
	
PHOTO POINT 64 – looking upstream *(05/2/2017)*	**PHOTO POINT 64** – looking downstream *(05/2/2017)*
	
PHOTO POINT 65 – looking upstream *(05/2/2017)*	**PHOTO POINT 65** – looking downstream *(05/2/2017)*

	
PHOTO POINT 66 – looking upstream *(05/2/2017)*	**PHOTO POINT 66** – looking downstream *(05/2/2017)*
	
PHOTO POINT 67 – looking upstream *(05/2/2017)*	**PHOTO POINT 67** – looking downstream *(05/2/2017)*
	
PHOTO POINT 68 – looking upstream *(05/2/2017)*	**PHOTO POINT 68** – looking downstream *(05/2/2017)*

	
PHOTO POINT 69 – looking upstream *(05/2/2017)*	**PHOTO POINT 69** – looking downstream *(05/2/2017)*

STREAM PHOTOGRAPHS
Southeast Branch
Monitoring Year 4

	
PHOTO POINT 70 – looking upstream *(05/2/2017)*	**PHOTO POINT 70** – looking downstream *(05/2/2017)*
	
PHOTO POINT 71 – looking upstream *(05/2/2017)*	**PHOTO POINT 71** – looking downstream *(05/2/2017)*

	
PHOTO POINT 72 – looking upstream *(05/2/2017)*	**PHOTO POINT 72** – looking downstream *(05/2/2017)*
	
PHOTO POINT 73 – looking upstream *(05/2/2017)*	**PHOTO POINT 73** – looking downstream *(05/2/2017)*
	
PHOTO POINT 74 – looking upstream *(05/2/2017)*	**PHOTO POINT 74** – looking downstream *(05/2/2017)*

	
PHOTO POINT 75 – looking upstream *(05/2/2017)*	**PHOTO POINT 75** – looking downstream *(05/2/2017)*
	
PHOTO POINT 76 – looking upstream *(05/2/2017)*	**PHOTO POINT 76** – looking downstream *(05/2/2017)*
	
PHOTO POINT 77 – looking upstream *(05/2/2017)*	**PHOTO POINT 77** – looking downstream *(05/2/2017)*

	
PHOTO POINT 78 – looking upstream *(05/2/2017)*	**PHOTO POINT 78** – looking downstream *(05/2/2017)*
	
PHOTO POINT 79 – looking upstream *(05/2/2017)*	**PHOTO POINT 79** – looking downstream *(05/2/2017)*
	
PHOTO POINT 80 – looking upstream *(05/2/2017)*	**PHOTO POINT 80** – looking downstream *(05/2/2017)*

PHOTO POINT 81 – looking upstream *(05/2/2017)*

PHOTO POINT 81 – looking downstream *(05/2/2017)*

PHOTO POINT 82 – looking upstream *(05/2/2017)*

PHOTO POINT 82 – looking downstream *(05/2/2017)*

PHOTO POINT 83 – looking upstream *(05/2/2017)*

PHOTO POINT 83 – looking downstream *(05/2/2017)*

STREAM PHOTOGRAPHS
North Branch
Monitoring Year 4

	
PHOTO POINT 84 – looking upstream *(05/2/2017)*	**PHOTO POINT 84** – looking downstream *(05/2/2017)*
	
PHOTO POINT 85 – looking upstream *(05/2/2017)*	**PHOTO POINT 85** – looking downstream *(05/2/2017)*

PHOTO POINT 86 – looking upstream *(05/2/2017)*

PHOTO POINT 86 – looking downstream *(05/2/2017)*

PHOTO POINT 87 – looking upstream *(05/2/2017)*

PHOTO POINT 87 – looking downstream *(05/2/2017)*

PHOTO POINT 88 – looking upstream *(11/16/2017)*

PHOTO POINT 88 – looking downstream *(11/16/2017)*

PHOTO POINT 89 – looking upstream *(05/2/2017)*

PHOTO POINT 89 – looking downstream *(05/2/2017)*

PHOTO POINT 90 – looking upstream *(05/2/2017)*

PHOTO POINT 90 – looking downstream *(05/2/2017)*

PHOTO POINT 91 – looking upstream *(05/2/2017)*

PHOTO POINT 91 – looking downstream *(05/2/2017)*

	
PHOTO POINT 92 – looking upstream *(05/2/2017)*	**PHOTO POINT 92** – looking downstream *(05/2/2017)*
	
PHOTO POINT 93 – looking upstream *(05/2/2017)*	**PHOTO POINT 93** – looking downstream *(05/2/2017)*
	
PHOTO POINT 94 – looking upstream *(05/2/2017)*	**PHOTO POINT 94** – looking downstream *(05/2/2017)*

VEGETATION PHOTOGRAPHS
Devil's Racetrack
Monitoring Year 4

	
VEG PLOT 1 *(08/01/2017)*	**VEG PLOT 2** *(08/01/2017)*
	
VEG PLOT 3 *(08/01/2017)*	**VEG PLOT 4** *(08/01/2017)*

VEG PLOT 5 *(08/01/2017)*

VEG PLOT 6 *(08/01/2017)*

VEG PLOT 7 *(08/01/2017)*

VEG PLOT 8 *(08/01/2017)*

VEG PLOT 9 *(08/01/2017)*

VEG PLOT 10 *(08/01/2017)*

VEG PLOT 11 *(08/01/2017)*

VEG PLOT 12 *(08/01/2017)*

VEG PLOT 13 *(08/01/2017)*

VEG PLOT 14 *(08/01/2017)*

VEG PLOT 15 *(08/01/2017)*

VEG PLOT 16 *(08/01/2017)*

VEG PLOT 17 *(08/01/2017)*

VEG PLOT 18 *(08/01/2017)*

VEG PLOT 19 *(08/01/2017)*

VEG PLOT 20 *(08/01/2017)*

VEG PLOT 21 *(08/01/2017)*

VEG PLOT 22 *(08/01/2017)*

VEG PLOT 23 *(08/01/2017)*

VEG PLOT 24 *(08/01/2017)*

VEG PLOT 25 *(08/01/2017)*

VEG PLOT 26 *(08/01/2017)*

VEG PLOT 27 *(08/01/2017)*

VEG PLOT 28 *(08/01/2017)*

VEG PLOT 29 *(08/01/2017)*

VEG PLOT 30 *(08/01/2017)*

VEG PLOT 31 *(08/01/2017)*

VEG PLOT 32 *(08/01/2017)*

VEG PLOT 33 *(08/01/2017)*

VEG PLOT 34 *(08/01/2017)*

VEG PLOT 35 *(08/01/2017)*

VEG PLOT 36 *(08/01/2017)*

VEG PLOT 37 *(08/01/2017)*

VEG PLOT 38 *(08/01/2017)*

VEG PLOT 39 *(08/01/2017)*

VEG PLOT 40 *(08/01/2017)*

VEG PLOT 41 *(08/01/2017)*

VEG PLOT 42 *(08/01/2017)*

VEG PLOT 43 *(08/01/2017)*

VEG PLOT 44 *(08/01/2017)*

VEG PLOT 45 *(08/01/2017)*

VEG PLOT 46 *(08/01/2017)*

VEG PLOT 47 *(08/01/2017)*

VEG PLOT 48 *(08/01/2017)*

VEG PLOT 49 *(08/01/2017)*

VEG PLOT 50 *(08/01/2017)*

VEG PLOT 51 *(08/01/2017)*

APPENDIX 3. Vegetation Plot Data

Table 7. Vegetation Plot Criteria Attainment
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Plot	Success Criteria Met (Y/N)	Tract Mean
1	Y	
2	Y	
3	Y	
4	Y	
5	Y	
6	Y	
7	Y	
8	Y	
9	Y	
10	Y	
11	Y	
12	Y	
13	Y	
14	Y	
15	Y	
16	Y	
17	Y	
18	Y	
19	Y	
20	Y	
21	Y	
22	Y	
23	Y	
24	Y	
25	Y	
26	Y	100%
27	Y	
28	Y	
29	Y	
30	Y	
31	Y	
32	Y	
33	Y	
34	Y	
35	Y	
36	Y	
37	Y	
38	Y	
39	Y	
40	Y	
41	Y	
42	Y	
43	Y	
44	Y	
45	Y	
46	Y	
47	Y	
48	Y	
49	Y	
50	Y	
51	Y	

Table 8. CVS Vegetation Table - Metadata

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Database name	Devils Racetrack MY3 cvs-eep-entrytool-v2.3.1.mdb
Database location	F:\Projects\005-02129 Devil's Racetrack\Monitoring\Monitoring Year 4\Vegetation Assessment
Computer name	CAROLYN
File size	55967744
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	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.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	95021
project Name	Devils Racetrack Mitigation Site
Description	Stream and Wetland Mitigation
River Basin	Neuse
Sampled Plots	51

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0001			95021-01-0002			95021-01-0003			95021-01-0004			95021-01-0005		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	1	1	1	1	1	1	3	3	3	2	2	2	2	2	2
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	3	3	3	4	4	4	3	3	3	1	1	1	2	2	2
Liquidambar styraciflua	sweetgum	Tree			4			20			8			17			10
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree				1	1	1	1	1	1						
Nyssa sylvatica	blackgum	Tree	3	3	3	1	1	1	3	3	3						
Pinus	pine	Tree			2									13			9
Platanus occidentalis	American sycamore	Tree	2	2	2	2	2	2	2	2	2	3	3	3			
Quercus michauxii	swamp chestnut oak	Tree	3	3	3							1	1	1	3	3	3
Quercus pagoda	cherrybark oak	Tree										1	1	1	1	1	1
Quercus phellos	willow oak	Tree	3	3	3	4	4	4	1	1	1						
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree															
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	2	2	2	3	3	3	3	3	3	3	3	3	4	4	4
		Stem count	17	17	23	16	16	36	16	16	24	11	11	41	12	12	31
		size (ares)		1			1			1			1			1	
		size (ACRES)		0.02			0.02			0.02			0.02			0.02	
		Species count	7	7	9	7	7	8	7	7	8	6	6	8	5	5	7
		Stems per ACRE	688	688	930.8	647.5	647.5	1457	647.5	647.5	971.2	445.2	445.2	1659	485.6	485.6	1255

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0006			95021-01-0007			95021-01-0008			95021-01-0009			95021-01-0010		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	5	5	5	5	5	5	2	2	2	2	2	2	1	1	1
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	2	2	2	1	1	1	4	4	4	1	1	1	3	3	3
Liquidambar styraciflua	sweetgum	Tree			4						1			1			
Liriodendron tulipifera	tuliptree	Tree				5	5	5									
Nyssa biflora	swamp tupelo	Tree										1	1	1			
Nyssa sylvatica	blackgum	Tree															
Pinus	pine	Tree						2			8						
Platanus occidentalis	American sycamore	Tree	2	2	2	1	1	1	1	1	1	5	5	6	5	5	5
Quercus michauxii	swamp chestnut oak	Tree	1	1	1				1	1	1						
Quercus pagoda	cherrybark oak	Tree							1	1	1						
Quercus phellos	willow oak	Tree			6							2	2	2			2
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree															
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	5	5	5				4	4	4	4	4	4	3	3	3
		Stem count	15	15	25	12	12	14	13	13	22	15	15	17	12	12	14
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	7	4	4	5	6	6	8	6	6	7	4	4	5
		Stems per ACRE	607	607	1012	485.6	485.6	566.6	526.1	526.1	890.3	607	607	688	485.6	485.6	566.6

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0011			95021-01-0012			95021-01-0013			95021-01-0014			95021-01-0015		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree			3									1			1
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	2	2	2	1	1	1	2	2	2						
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	5	5	5	4	4	4				2	2	2	1	1	1
Liquidambar styraciflua	sweetgum	Tree						7			3			11			4
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree							1	1	1						
Nyssa sylvatica	blackgum	Tree															
Pinus	pine	Tree			5			7			5						
Platanus occidentalis	American sycamore	Tree	2	2	2	5	5	5	3	3	3	3	3	3	4	4	4
Quercus michauxii	swamp chestnut oak	Tree							1	1	1				2	2	2
Quercus pagoda	cherrybark oak	Tree													1	1	1
Quercus phellos	willow oak	Tree				4	4	4	4	4	4						
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree															5
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	2	2	2	2	2	2	5	5	5	10	10	10	7	7	7
		Stem count	11	11	19	16	16	30	16	16	24	15	15	27	15	15	25
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	4	4	6	5	5	7	6	6	8	3	3	5	5	5	8
		Stems per ACRE	445.2	445.2	768.9	647.5	647.5	1214	647.5	647.5	971.2	607	607	1093	607	607	1012

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0016			95021-01-0017			95021-01-0018			95021-01-0019			95021-01-0020		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	6	6	6	2	2	2									
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	3	3	3	2	2	2	1	1	1	2	2	2			
Liquidambar styraciflua	sweetgum	Tree			3			2			4			6			5
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree	3	3	3				2	2	2	2	2	2	2	2	2
Nyssa sylvatica	blackgum	Tree															
Pinus	pine	Tree															
Platanus occidentalis	American sycamore	Tree	1	1	1	1	1	1							4	4	4
Quercus michauxii	swamp chestnut oak	Tree										6	6	6	1	1	1
Quercus pagoda	cherrybark oak	Tree															
Quercus phellos	willow oak	Tree	1	1	1				4	4	4				1	1	1
Quercus rubra	northern red oak	Tree				1	1	1									
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree															
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree				10	10	10	5	5	5	4	4	4	7	7	7
		Stem count	14	14	17	16	16	18	12	12	16	14	14	20	15	15	20
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	5	5	6	5	5	6	4	4	5	4	4	5	5	5	6
		Stems per ACRE	566.6	566.6	688	647.5	647.5	728.4	485.6	485.6	647.5	566.6	566.6	809.4	607	607	809.4

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0021			95021-01-0022			95021-01-0023			95021-01-0024			95021-01-0025		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree									1						
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	3	3	3				2	2	2				2	2	2
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	5	5	5	3	3	3				6	6	6	3	3	3
Liquidambar styraciflua	sweetgum	Tree												3			1
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree															
Nyssa sylvatica	blackgum	Tree															
Pinus	pine	Tree						4									
Platanus occidentalis	American sycamore	Tree				1	1	1	7	7	7	4	4	4	4	4	4
Quercus michauxii	swamp chestnut oak	Tree										2	2	2			
Quercus pagoda	cherrybark oak	Tree				2	2	2									
Quercus phellos	willow oak	Tree				3	3	3	2	2	2	1	1	1			
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree															1
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	5	5	5	7	7	7	3	3	3	4	4	4	6	6	6
		Stem count	13	13	13	16	16	20	14	14	15	17	17	20	15	15	17
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	3	3	3	5	5	6	4	4	5	5	5	6	4	4	6
		Stems per ACRE	526.1	526.1	526.1	647.5	647.5	809.4	566.6	566.6	607	688	688	809.4	607	607	688

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0026			95021-01-0027			95021-01-0028			95021-01-0029			95021-01-0030		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	2	2	2				2	2	2	1	1	1	1	1	1
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	4	4	4	1	1	1	1	1	1				1	1	1
Liquidambar styraciflua	sweetgum	Tree									3						
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree	1	1	1				2	2	2	2	2	2			
Nyssa sylvatica	blackgum	Tree															
Pinus	pine	Tree															
Platanus occidentalis	American sycamore	Tree	1	1	1	1	1	1	3	3	3	1	1	1			
Quercus michauxii	swamp chestnut oak	Tree				4	4	4				1	1	1	8	8	8
Quercus pagoda	cherrybark oak	Tree															
Quercus phellos	willow oak	Tree				1	1	1	4	4	4	1	1	1	4	4	4
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree									8			1			
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	3	3	3	9	9	9	1	1	1	6	6	6	3	3	3
		Stem count	11	11	11	16	16	16	13	13	24	12	12	13	17	17	17
		size (ares)		1			1			1			1			1	
		size (ACRES)		0.02			0.02			0.02			0.02			0.02	
		Species count	5	5	5	5	5	5	6	6	8	6	6	7	5	5	5
		Stems per ACRE	445.2	445.2	445.2	647.5	647.5	647.5	526.1	526.1	971.2	485.6	485.6	526.1	688	688	688

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0031			95021-01-0032			95021-01-0033			95021-01-0034			95021-01-0035		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree									2						
Alnus serrulata	hazel alder	Shrub									3						
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	4	4	4				3	3	3	3	3	3	4	4	4
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	1	1	1	5	5	6	2	2	2	2	2	2	2	2	2
Liquidambar styraciflua	sweetgum	Tree						1			6			2			
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree	2	2	2	3	3	3	2	2	2	4	4	4	4	4	4
Nyssa sylvatica	blackgum	Tree															
Pinus	pine	Tree												15			2
Platanus occidentalis	American sycamore	Tree	4	4	4	2	2	2	4	4	4	1	1	1	7	7	7
Quercus michauxii	swamp chestnut oak	Tree	2	2	2	2	2	2	1	1	1	4	4	4			
Quercus pagoda	cherrybark oak	Tree															
Quercus phellos	willow oak	Tree	1	1	1				2	2	2						
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree			5			4									
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	2	2	2	7	7	7	4	4	4	2	2	2	2	2	2
		Stem count	16	16	21	19	19	25	18	18	29	16	16	33	19	19	21
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	7	7	8	5	5	7	7	7	10	6	6	8	5	5	6
		Stems per ACRE	647.5	647.5	849.8	768.9	768.9	1012	728.4	728.4	1174	647.5	647.5	1335	768.9	768.9	849.8

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0036			95021-01-0037			95021-01-0038			95021-01-0039			95021-01-0040		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	4	4	4	2	2	2	2	2	2	2	2	2	1	1	1
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	1	1	1	2	2	2	2	2	2	2	2	2	1	1	1
Liquidambar styraciflua	sweetgum	Tree															2
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree	1	1	1	2	2	2									
Nyssa sylvatica	blackgum	Tree															
Pinus	pine	Tree			9									9			7
Platanus occidentalis	American sycamore	Tree	2	2	2	2	2	2				6	6	6	5	5	5
Quercus michauxii	swamp chestnut oak	Tree	1	1	1										1	1	1
Quercus pagoda	cherrybark oak	Tree			1												
Quercus phellos	willow oak	Tree	5	5	5	1	1	1				1	1	1	4	4	4
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub															
Salix nigra	black willow	Tree															14
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	3	3	3	3	3	3	5	5	5	4	4	4	5	5	5
		Stem count	17	17	27	12	12	12	9	9	9	15	15	24	17	17	40
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	7	7	9	6	6	6	3	3	3	5	5	6	6	6	9
		Stems per ACRE	688	688	1093	485.6	485.6	485.6	364.2	364.2	364.2	607	607	971.2	688	688	1619

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)														
			95021-01-0041			95021-01-0042			95021-01-0043			95021-01-0044			95021-01-0045		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree															
Alnus serrulata	hazel alder	Shrub															
Baccharis	baccharis	Shrub															
Betula nigra	river birch	Tree	1	1	1	1	1	1	2	2	2	1	1	1	2	2	2
Cephalanthus occidentalis	common buttonbush	Shrub															
Fraxinus pennsylvanica	green ash	Tree	2	2	2				4	4	4	4	4	4	1	1	1
Liquidambar styraciflua	sweetgum	Tree									1						6
Liriodendron tulipifera	tuliptree	Tree															
Nyssa biflora	swamp tupelo	Tree	1	1	1	6	6	6	2	2	2	8	8	8			
Nyssa sylvatica	blackgum	Tree															1
Pinus	pine	Tree						19			20			20			76
Platanus occidentalis	American sycamore	Tree	3	3	3	1	1	1							2	2	2
Quercus michauxii	swamp chestnut oak	Tree										1	1	1			
Quercus pagoda	cherrybark oak	Tree															
Quercus phellos	willow oak	Tree	2	2	2	3	3	3				1	1	1	2	2	2
Quercus rubra	northern red oak	Tree															
Rhus copallinum	flameleaf sumac	Shrub						1									1
Salix nigra	black willow	Tree															
Salix sericea	silky willow	Shrub															
Taxodium distichum	bald cypress	Tree	6	6	6	1	1	1	4	4	4				6	6	6
		Stem count	15	15	15	12	12	32	12	12	33	15	15	35	13	13	97
		size (ares)	1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02		
		Species count	6	6	6	5	5	7	4	4	6	5	5	6	5	5	9
		Stems per ACRE	607	607	607	485.6	485.6	1295	485.6	485.6	1335	607	607	1416	526.1	526.1	3925

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Current Plot Data (MY4 2017)																	
			95021-01-0046			95021-01-0047			95021-01-0048			95021-01-0049			95021-01-0050			95021-01-0051		
Scientific Name	**Common Name**	**Species Type**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**	**PnoLS**	**P-all**	**T**
Acer rubrum	red maple	Tree																		
Alnus serrulata	hazel alder	Shrub																		
Baccharis	baccharis	Shrub																		
Betula nigra	river birch	Tree	4	4	4							4	4	4	5	5	5	3	3	3
Cephalanthus occidentalis	common buttonbush	Shrub																		
Fraxinus pennsylvanica	green ash	Tree				3	3	3	6	6	6	4	4	4	3	3	3	2	2	2
Liquidambar styraciflua	sweetgum	Tree																		
Liriodendron tulipifera	tuliptree	Tree	1	1	1				2	2	2				3	3	3	2	2	2
Nyssa biflora	swamp tupelo	Tree			1															
Nyssa sylvatica	blackgum	Tree			1															
Pinus	pine	Tree																		
Platanus occidentalis	American sycamore	Tree	2	2	2										3	3	3	5	5	5
Quercus michauxii	swamp chestnut oak	Tree	3	3	3	2	2	2	1	1	1	1	1	1	1	1	1	3	3	3
Quercus pagoda	cherrybark oak	Tree							4	4	4				1	1	1	1	1	1
Quercus phellos	willow oak	Tree	2	2	2	3	3	3	1	1	1	1	1	1	1	1	1	1	1	1
Quercus rubra	northern red oak	Tree															2			1
Rhus copallinum	flameleaf sumac	Shrub																		
Salix nigra	black willow	Tree																		
Salix sericea	silky willow	Shrub																		
Taxodium distichum	bald cypress	Tree	1	1	1							1	1	1						
		Stem count	13	13	15	8	8	8	14	14	14	11	11	11	17	17	19	17	17	18
		size (ares)	1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	6	6	8	3	3	3	5	5	5	5	5	5	7	7	8	7	7	8
		Stems per ACRE	526.1	526.1	607	323.7	323.7	323.7	566.6	566.6	566.6	445.2	445.2	445.2	688	688	768.9	688	688	728.4

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

Table 9. Planted and Total Stem Counts

Devil's Racetrack Mitigation Site (DMS Project Code 95021)

Monitoring Year 4 - 2017

			Annual Means														
			MY4 (2017)			MY3 (2016)			MY2 (2015)			MY1 (2014)			MY0 (2014)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			8			3			2						
Alnus serrulata	hazel alder	Shrub			3			4									
Baccharis	baccharis	Shrub						32									
Betula nigra	river birch	Tree	98	98	98	102	102	102	104	104	104	106	106	106	106	106	106
Cephalanthus occidentalis	common buttonbush	Shrub									2						
Fraxinus pennsylvanica	green ash	Tree	117	117	118	119	119	119	123	123	125	124	124	124	126	126	126
Liquidambar styraciflua	sweetgum	Tree			135			184			86						
Liriodendron tulipifera	tuliptree	Tree	13	13	13	13	13	13	14	14	14	25	25	25	20	20	20
Nyssa biflora	swamp tupelo	Tree	53	53	54	54	54	54	59	59	59	64	64	64	60	60	60
Nyssa sylvatica	blackgum	Tree	7	7	9	8	8	8	8	8	8	9	9	9	10	10	10
Pinus	pine	Tree			232												
Platanus occidentalis	American sycamore	Tree	117	117	118	123	123	126	128	128	128	124	124	124	124	124	124
Quercus michauxii	swamp chestnut oak	Tree	57	57	57	60	60	60	77	77	77	91	91	91	108	108	108
Quercus pagoda	cherrybark oak	Tree	12	12	13	12	12	12	12	12	12	14	14	14			
Quercus phellos	willow oak	Tree	71	71	79	77	77	79	97	97	97	104	104	104	125	125	125
Quercus rubra	northern red oak	Tree	1	1	4	1	1	7	1	1	3						
Rhus copallinum	flameleaf sumac	Shrub			2												
Salix nigra	black willow	Tree			38			13									
Salix sericea	silky willow	Shrub									3						
Taxodium distichum	bald cypress	Tree	186	186	186	189	189	189	190	190	190	189	189	189	206	206	206
		Stem count	732	732	1167	758	758	1005	813	813	910	850	850	850	885	885	885
		size (ares)	51			51			51			51			51		
		size (ACRES)	1.26			1.26			1.26			1.26			1.26		
		Species count	11	11	17	11	11	16	11	11	15	10	10	10	9	9	9
		Stems per ACRE	580.8	580.8	926	601.5	601.5	797.5	645.1	645.1	722.1	674.5	674.5	674.5	702.2	702.2	702.2

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

Volunteer species included in total

PnoLS: Number of Planted stems excluding live stakes

P-all: Number of planted stems including live stakes,

T: Total Stems

APPENDIX 4. Morphological Summary Data and Plots

Table 10a. Baseline Stream Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Devils Racetrack- West

		Pre-Restoration Condition		Reference Reach Data										Design				As-Built/Baseline			
Parameter	**Gage**	**Devil's Racetrack - West**		**Scout West 1**		**Scout East 2**		**Scout West 2**		**Johanna Creek**		**Jarman Oak**		**Devil's Racetrack - West (Reach 1)**		**Devil's Racetrack - West (Reach 2)**		**Devil's Racetrack - West (Reach 1)**		**Devil's Racetrack - West (Reach 2)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Shallow																					
Bankfull Width (ft)		4.8	8.0	2.6	6.3	4.7	6.1	5.6	7.6	9.7		9.3		9.0		11.5		4.7	9.6	7.7	
Floodprone Width (ft)		7.8	18.0	>20		>50		>50		>75		>150		100	300	100	300	>200		>200	
Bankfull Mean Depth		0.8	1.2	0.3	0.5	1.1	1.3	0.7	1.0	0.8		1.2		0.6		0.8		0.4	0.9	0.5	
Bankfull Max Depth		1.3	1.6	0.5	0.7	1.7	1.8	1.2	1.3	1.1		2.3		0.9	1.1	1.1	1.5	1.1	1.4	0.7	
Bankfull Cross Sectional Area (ft^2)	N/A	5.7	6.3	1.3	2.0	6.0	6.9	5.3	5.4	7.2	7.8	11.6		5.8		9.5		2.1	8.5	4.0	
Width/Depth Ratio		4.0	10.5	5.4	19.4	3.6	5.4	5.7	11.0	10.1	19.7	7.4		14.0	14.5	14.0		10.6	14.8	14.5	
Entrenchment Ratio		1.6	2.2	>2.2		>2.2		>2.2		8.0	9.6	16.1	26.9	11.1	33.3	8.7	26.1	>20.9	>42.5	>26.1	
Bank Height Ratio		1.9	4.5	1.1	1.3	1.0		1.1	1.2	1.0		1.0		1.0	1.1	1.0	1.1	1.0		1.0	
D50 (mm)		0.464																N/A		N/A	
Profile																					
Shallow Length (ft)				---		---		---		---		---		---		---		3.7	86.8	7.4	54.2
Shallow Slope (ft/ft)		---		0.026	0.047	N/A		0.033	0.051	N/A		0.0129		0.0036	0.0277	0.0023	0.0072	0.0013	0.0593	0.0008	0.0195
Pool Length (ft)	N/A			---		---		---		---		---		---		---		5.5	63.1	18.7	72.9
Pool Max Depth (ft)		1.2		0.6		N/A		1.7	1.9	1.5		3.1		0.9	2.1	1.1	2.5	1.1	2.9	1.4	1.9
Pool Spacing (ft)		---		27	67	N/A		21	27	16	59	32	55	14	63	18	81	9	132	38	104
Pool Volume (ft^3)																					
Pattern																					
Channel Beltwidth (ft)		---		8.7	14.3	7.2	16.2	9.1	9.8	14.0	20.0	21.0	36.0	12.0	72.0	15.0	92.0	13.0	53.0	16.0	73.0
Radius of Curvature (ft)		---		3.1	9.0	5.5	16.0	5.4	6.8	15.0	27.0	13.7	18.6	14.0	43.0	17.0	55.0	12.0	40.0	17.0	35.0
Rc:Bankfull Width (ft/ft)	N/A	---		0.6	1.6	1.0	3.0	0.8	1.0	1.5	2.8	1.5	2.0	1.5	4.8	1.5	4.8	2.6	4.2	2.2	4.5
Meander Length (ft)		---		39.8	84.8	36.5	63.2	32.5	36.9	50.0		N/A		27	153	35	196	52	133	70	137
Meander Width Ratio		---		1.6	2.6	1.3	3.0	1.4	1.5	1.4	2.1	2.3	2.9	1.3	8.0	1.3	8.0	2.8	5.5	2.1	9.5
Substrate, Bed and Transport Parameters																					
Ri%/Ru%/P%/G%/S%																					
SC%/Sa%/G%/C%/B%/Be%																					
d16/d35/d50/d84/d95/d100	N/A	0.168/0.33/0.464/1.23/2.0/9.6		---		---		---		---		---						N/A		N/A	
Reach Shear Stress (Competency) lb/ft^2		0.18	0.23											---		---		N/A		N/A	
Max part size (mm) mobilized at bankfull																					
Stream Power (Capacity) W/m^2																					
Additional Reach Parameters																					
Drainage Area (SM)		0.77		0.06		0.67		0.34		0.90		1.27		0.60		0.70		0.60		0.70	
Watershed Impervious Cover Estimate (%)		<1%		---		---		---		---		---		<1%		<1%		<1%		<1%	
Rosgen Classification		Gc5		E/C5b		E5		E5		E5/C5		E6		E/C5		E/C5		E/C5		C	
Bankfull Velocity (fps)		1.5	1.8	1.3	2.0	2.5	2.9	1.2	1.2	1.8	1.9	0.95		1.7		1.2		1.2	4.8	3.3	
Bankfull Discharge (cfs)		9.2	10.6	2.6		17.5		6.4		14.0		11.0		10.0		13.0		10.0		13.0	
Q-NFF regression		---																			
Q-USGS extrapolation	N/A	---																			
Q-Mannings		---																			
Valley Length (ft)		---		---		---		---		---		---		---		---					
Channel Thalweg Length (ft)		4,976		---		---		---		---		---		4,245		966		4,239		962	
Sinuosity		1.0		1.1		1.2		1.2		1.2		1.4		1.2	1.6	1.2	1.6	1.2		1.4	
Water Surface Slope $(ft/ft)^2$		---		---		---		---		---		---		---		---		0.0054		0.0015	
Bankfull Slope (ft/ft)		0.0041		0.0260		0.0170		0.0040		0.0022		0.0040		0.0025	0.0087	0.0016	0.0022	0.0053	0.0054	0.0017	0.0023

(---): Data was not provided
N/A: Not Applicable

Table 10b. Baseline Stream Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Devils Racetrack- East

		Pre-Restoration Condition		Reference Reach Data										Design						As-Built/Baseline					
Parameter	**Gage**	**Devil's Racetrack - East**		**Scout West 1**		**Scout East 2**		**Scout West 2**		**Johanna Creek**		**Jarman Oak**		**Devil's Racetrack - East (Reach 1)**		**Devil's Racetrack - East (Reach 2)**		**Devil's Racetrack - East (Reach 3)**		**Devil's Racetrack - East (Reach 1)**		**Devil's Racetrack - East (Reach 2)**		**Devil's Racetrack - East (Reach 3)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Shallow																									
Bankfull Width (ft)		8.1	10.4	2.6	6.3	4.7	6.1	5.6	7.6	9.7		9.3		13.0		8.0		8.0		12.2	13.7	8.2		---	
Floodprone Width (ft)		14.2	18.6	>20		>50		>50		>75		>150		100	500	100	500	100	500	>300		>300		---	
Bankfull Mean Depth		1.0	1.8	0.3	0.5	1.1	1.3	0.7	1.0	0.8		1.2		1.0		0.6		---		0.8	1.1	0.7		---	
Bankfull Max Depth		2.1	2.8	0.5	0.7	1.7	1.8	1.2	1.3	1.1		2.3		1.4	1.8	0.8	1.0	0.9		1.3	1.7	1.1		---	
Bankfull Cross Sectional Area (ft^2)	N/A	14.2	19.1	1.3	2.0	6.0	6.9	5.3	5.4	7.2	7.8	11.6		12.8		4.8		---		10.3	13.9	5.7		---	
Width/Depth Ratio		5.0	7.8	5.4	19.4	3.6	5.4	5.7	11.0	10.1	19.7	7.4		13.0	13.5	14.0	14.5	---		12.1	14.6	11.9		---	
Entrenchment Ratio		1.6	1.8	>2.2		>2.2		>2.2		8.0	9.6	16.1	26.9	7.7	38.5	12.5	62.6	---		>21.9	>24.5	>36.5		---	
Bank Height Ratio		2.6	4.3	1.1	1.3	1.0		1.1	1.2	1.0		1.0		1.0	1.1	1.0	1.1	---		1.0		1.0		---	
D50 (mm)		0.179																		N/A		N/A		---	
Profile																									
Shallow Length (ft)				---		---		---		---		---		---		---		---		13.0	80.1	20.8	42.4	11.3	25.9
Shallow Slope (ft/ft)		---		0.026	0.047	N/A		0.033	0.051	N/A		0.0129		0.0007	0.0025	0.0377	0.0671	---		0.0004	0.0099	0.0192	0.0318	0.0072	0.0675
Pool Length (ft)	N/A			---		---		---		---		---		---		---		---		16.0	77.3	16.5	66.1	13.0	34.2
Pool Max Depth (ft)		---		0.6		N/A		1.7	1.9	1.5		3.1		1.4	3.2	0.8	2.0	1.2		1.9	3.4	1.7	2.7	1.4	2.5
Pool Spacing (ft)		---		27	67	N/A		21	27	16	59	32	55	21	91	39	64	---		26	131	43	73	25	70
Pool Volume (ft^3)																									
Pattern																									
Channel Beltwidth (ft)		---		8.7	14.3	7.2	16.2	9.1	9.8	14.0	20.0	21.0	36.0	17.0	65.0	10.0	40.0	---		15.0	55.0	21	41	12	32
Radius of Curvature (ft)		---		3.1	9.0	5.5	16.0	5.4	6.8	15.0	27.0	13.7	18.6	20.0	62.0	12.0	36.0	---		18.0	65.0	12	26	10	35
Rc:Bankfull Width (ft/ft)	N/A	---		0.6	1.6	1.0	3.0	0.8	1.0	1.5	2.8	1.5	2.0	1.5	4.8	1.5	4.5	---		1.5	4.7	1.5	3.2	---	
Meander Length (ft)		---		39.8	84.8	36.5	63.2	32.5	36.9	50.0		N/A		39	221	64	136	---		62	203	101	140	52	112
Meander Width Ratio		---		1.6	2.6	1.3	3.0	1.4	1.5	1.4	2.1	2.3	2.9	1.3	5.0	1.3	5.0	---		1.2	4.0	2.6	5.0	---	
Substrate, Bed and Transport Parameters																									
Ri%/Ru%/P%/G%/S%																									
SC%/Sa%/G%/C%/B%/Be%																									
d16/d35/d50/d84/d95/d100	N/A	-/-/0.179/0.642/1.0/9.6		---		---		---		---		---								N/A		N/A		N/A	
Reach Shear Stress (Competency) lb/ft^2		0.01												---		---		---		N/A		N/A		N/A	
Max part size (mm) mobilized at bankfull																									
Stream Power (Capacity) W/m^2																									
Additional Reach Parameters																									
Drainage Area (SM)		1.30		0.06		0.67		0.34		0.90		1.27		1.14		1.30		---		1.14		1.30		---	
Watershed Impervious Cover Estimate (%)		<1%		---		---		---		---		---		<1%		<1%		<1%		<1%		<1%		<1%	
Rosgen Classification		Gc5		E/C5b		E5		E5		E5/C5		E6		E/C5		E/C5		E/C5		C		C		---	
Bankfull Velocity (fps)		0.3	0.4	1.3	2.0	2.5	2.9	1.2	1.2	1.8	1.9	0.95		1.2		3.5		---		1.2	1.6	3.0		---	
Bankfull Discharge (cfs)		8.5		2.6		17.5		6.4		14.0		11.0		16.0		17.0		---		16.0		17.0		---	
Q-NFF regression		---																							
Q-USGS extrapolation	N/A	---																							
Q-Mannings		---																							
Valley Length (ft)		---		---		---		---		---		---		---		---		---							
Channel Thalweg Length (ft)		4,844		---		---		---		---		---		4,840		313		385		4,833		310		372	
Sinuosity		1.0		1.1		1.2		1.2		1.2		1.4		1.1	1.3	1.1	1.2	---		1.1		1.1		1.1	
Water Surface Slope $(ft/ft)^2$		---		---		---		---		---		---		---		---		---		---		---		---	
Bankfull Slope (ft/ft)		0.0003		0.0260		0.0170		0.0040		0.0022		0.0040		0.0004	0.0008	0.0224	0.0251	---		0.0007	0.0008	0.0153	0.0166	0.0219	0.0231

(---): Data was not provided
N/A: Not Applicable

Table 10c. Baseline Stream Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Southeast Branch

		Pre-Restoration Condition		Reference Reach Data										Design						As-Built/Baseline					
Parameter	**Gage**	**Southeast Branch**		**Scout West 1**		**Scout East 2**		**Scout West 2**		**Johanna Creek**		**Jarman Oak**		**Southeast Branch (Reach 1)**		**Southeast Branch (Reach 2)**		**Southeast Branch (Reach 3)**		**Southeast Branch (Reach 1)**		**Southeast Branch (Reach 2)**		**Southeast Branch (Reach 3)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Shallow																									
Bankfull Width (ft)		2.7	5.7	2.6	6.3	4.7	6.1	5.6	7.6	9.7		9.3		3.0		4.0		5.4		3.0		3.8		5.3	
Floodprone Width (ft)		8.6	11.4	>20		>50		>50		>75		>150		25	35	50	70	100	300	>30		>60		>200	
Bankfull Mean Depth		0.2	0.4	0.3	0.5	1.1	1.3	0.7	1.0	0.8		1.2		0.5		0.6		1.0		0.3		0.4		0.4	
Bankfull Max Depth		0.4	1.4	0.5	0.7	1.7	1.8	1.2	1.3	1.1		2.3		0.4	0.6	0.5	0.7	0.8	1.2	0.5		0.5		0.6	
Bankfull Cross Sectional Area (ft^2)	N/A	1.1	1.4	1.3	2.0	6.0	6.9	5.3	5.4	7.2	7.8	11.6		1.0		1.5		2.5		0.8		1.3		2.1	
Width/Depth Ratio		6.8	24.3	5.4	19.4	3.6	5.4	5.7	11.0	10.1	19.7	7.4		9.0	10.0	10.0	12.0	11.0	12.0	11.4		10.8		13.8	
Entrenchment Ratio		1.5	4.2	>2.2		>2.2		>2.2		8.0	9.6	16.1	26.9	8.3	11.7	12.5	17.5	18.5	55.6	>9.9		>15.8		>37.5	
Bank Height Ratio		2.2	6.0	1.1	1.3	1.0		1.1	1.2	1.0		1.0		1.0	1.1	1.0	1.1	1.0	1.2	1.0		1.0		1.0	
D50 (mm)		0.409																		N/A		N/A		N/A	
Profile																									
Shallow Length (ft)				---		---		---		---		---		---		---		---		2.1	64.4	3.4	144.4	6.0	47.3
Shallow Slope (ft/ft)		---		0.026	0.047	N/A		0.033	0.051	N/A		0.0129		0.0162	0.0681	0.0144	0.0384	0.0035	0.0285	0.0010	0.0803	0.0021	0.0272	0.0005	0.0168
Pool Length (ft)				---		---		---		---		---		---		---		---		2.1	36.7	3.1	33.6	3.2	61.3
Pool Max Depth (ft)	N/A	0.4		0.6		N/A		1.7	1.9	1.5		3.1		0.5	1.1	0.4	1.2	0.5	1.5	0.7	1.5	0.5	1.0	0.5	1.1
Pool Spacing (ft)		---		27	67	N/A		21	27	16	59	32	55	15	24	20	32	9	38	4	76	8	90	14	52
Pool Volume (ft^3)																									
Pattern																									
Channel Beltwidth (ft)		---		8.7	14.3	7.2	16.2	9.1	9.8	14.0	20.0	21.0	36.0	4.0	9.0	5.0	12.0	7.0	43.0	5.3	11.2	6.8	14.3	12.7	32.8
Radius of Curvature (ft)		---		3.1	9.0	5.5	16.0	5.4	6.8	15.0	27.0	13.7	18.6	5.0	14.0	6.0	18.0	8.0	26.0	5.0	23.5	10.0	25.6	10.4	29.5
Rc:Bankfull Width (ft/ft)	N/A	---		0.6	1.6	1.0	3.0	0.8	1.0	1.5	2.8	1.5	2.0	1.5	4.5	1.5	4.5	1.5	4.8	1.7	7.8	2.6	6.7	2.0	5.6
Meander Length (ft)		---		39.8	84.8	36.5	63.2	32.5	36.9	50.0		N/A		24	51	32	68	16	92	22	63	33	70	32	74
Meander Width Ratio		---		1.6	2.6	1.3	3.0	1.4	1.5	1.4	2.1	2.3	2.9	1.3	3.0	1.3	3.0	1.3	8.0	1.8	3.7	1.8	3.8	2.4	6.2
Substrate, Bed and Transport Parameters																									
Ri%/Ru%/P%/G%/S%																									
SC%/Sa%/G%/C%/B%/Be%																									
d16/d35/d50/d84/d95/d100	N/A	0.08/0.28/0.41/0.94/1.6/9.6		---		---		---		---		---										N/A		N/A	
Reach Shear Stress (Competency) lb/ft^2		0.51												---		---		---		N/A		N/A		N/A	
Max part size (mm) mobilized at bankfull																									
Stream Power (Capacity) W/m^2																									
Additional Reach Parameters																									
Drainage Area (SM)		0.19		0.06		0.67		0.34		0.90		1.27		0.03		0.07		0.10		0.03		0.07		0.10	
Watershed Impervious Cover Estimate (%)		<1%		---		---		---		---		---		<1%		<1%		<1%		<1%		<1%		<1%	
Rosgen Classification		G/F5		E/C5b		E5		E5		E5/C5		E6		---		---		E/C5		E/C5		E/C5		E/C5	
Bankfull Velocity (fps)		2.2		1.3	2.0	2.5	2.9	1.2	1.2	1.8	1.9	0.95		1.7		1.4		1.4		1.9		1.5		1.4	
Bankfull Discharge (cfs)		2.4		2.6		17.5		6.4		14.0		11.0		1.5		2.0		3.0		1.5		2.0		3.0	
Q-NFF regression		---																							
Q-USGS extrapolation	N/A	---																							
Q-Mannings		---																							
Valley Length (ft)		---		---		---		---		---		---		---		---		---							
Channel Thalweg Length (ft)		2,976		---		---		---		---		---		1,559		716		617		1,559		713		616	
Sinuosity		1.0		1.1		1.2		1.2		1.2		1.4		1.1	1.2	1.1	1.2	1.2	1.6	1.6		1.1		1.3	
Water Surface Slope ($ft/ft)^2$		---		---		---		---		---		---		---		---		---		0.0221		0.0174		0.0030	
Bankfull Slope (ft/ft)		0.0230		0.0260		0.0170		0.0040		0.0022		0.0040		0.0108	0.0227	0.0096	0.0128	0.0025	0.0089	0.0222		0.0015	0.0119	0.0028	0.0030

(---): Data was not provided
N/A: Not Applicable

Table 10d. Baseline Stream Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Middle Branch

		Pre-Restoration Condition		Reference Reach Data										Design				As-Built/Baseline			
Parameter	**Gage**	**Middle Branch**		**Scout West 1**		**Scout East 2**		**Scout West 2**		**Johanna Creek**		**Jarman Oak**		**Middle Branch (Reach 1)**		**Middle Branch (Reach 2)**		**Middle Branch (Reach 1)**		**Middle Branch (Reach 2)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Shallow																					
Bankfull Width (ft)		1.8	2.3	2.6	6.3	4.7	6.1	5.6	7.6	9.7		9.3		3.0		4.0		2.2		3.4	
Floodprone Width (ft)		4.6	6.8	>20		>50		>50		>75		>150		40	60	100	300	>50		>200	
Bankfull Mean Depth		0.2	0.3	0.3	0.5	1.1	1.3	0.7	1.0	0.8		1.2		0.3		0.3		0.3		0.3	
Bankfull Max Depth		0.3	0.6	0.5	0.7	1.7	1.8	1.2	1.3	1.1		2.3		0.4	0.5	0.5	0.6	0.5		0.5	
Bankfull Cross Sectional Area (ft^2)	N/A	0.4	0.5	1.3	2.0	6.0	6.9	5.3	5.4	7.2	7.8	11.6		0.9		1.5		0.7		1.1	
Width/Depth Ratio		6.9	12.0	5.4	19.4	3.6	5.4	5.7	11.0	10.1	19.7	7.4		10.0	10.5	10.0	12.0	6.7		10.1	
Entrenchment Ratio		2.0	3.8	>2.2		>2.2		>2.2		8.0	9.6	16.1	26.9	33.3	100.0	22.2	66.7	>22.9		>58.8	
Bank Height Ratio		5.3	6.5	1.1	1.3	1.0		1.1	1.2	1.0		1.0		1.0	1.1	1.0	1.1	1.0		1.0	
D50 (mm)		0.083																N/A		N/A	
Profile																					
Shallow Length (ft)				---		---		---		---		---		---		---		2.5	46.6	7.9	16.1
Shallow Slope (ft/ft)		---		0.026	0.047	N/A		0.033	0.051	N/A		0.0129		0.0144	0.0489	0.0002	0.0074	0.0008	0.0492	0.0059	0.0236
Pool Length (ft)	N/A			---		---		---		---		---		---		---		2.9	17.3	11.2	19.8
Pool Max Depth (ft)		---		0.6		N/A		1.7	1.9	1.5		3.1		0.4	1.0	0.5	1.0	0.5	1.2	0.6	0.9
Pool Spacing (ft)		---		27	67	N/A		21	27	16	59	32	55	15	24	5	22	8	56	18	24
Pool Volume (ft^3)																					
Pattern																					
Channel Beltwidth (ft)		---		8.7	14.3	7.2	16.2	9.1	9.8	14.0	20.0	21.0	36.0	4.0	9.0	6.0	36.0	4.1	9.4	6.7	20.9
Radius of Curvature (ft)		---		3.1	9.0	5.5	16.0	5.4	6.8	15.0	27.0	13.7	18.6	5.0	14.0	7.0	22.0	7.0	23.9	9.2	23.5
Rc:Bankfull Width (ft/ft)	N/A	---		0.6	1.6	1.0	3.0	0.8	1.0	1.5	2.8	1.5	2.0	1.7	4.5	1.5	4.8	3.2	10.9	2.7	6.9
Meander Length (ft)		---		39.8	84.8	36.5	63.2	32.5	36.9	50.0		N/A		24	51	14	77	23	44	32	57
Meander Width Ratio		---		1.6	2.6	1.3	3.0	1.4	1.5	1.4	2.1	2.3	2.9	1.3	3.0	1.3	8.0	2.2	4.3	2.0	6.1
Substrate, Bed and Transport Parameters																					
Ri%/Ru%/P%/G%/S%																					
SC%/Sa%/G%/C%/B%/Be%																					
d16/d35/d50/d84/d95/d100	N/A	-/-/0.083/0.498/0.9/9.6		---		---		---		---		---						N/A		N/A	
Reach Shear Stress (Competency) lb/ft^2		0.24	0.27											---		---		N/A		N/A	
Max part size (mm) mobilized at bankfull																					
Stream Power (Capacity) W/m^2																					
Additional Reach Parameters																					
Drainage Area (SM)		0.02		0.06		0.67		0.34		0.90		1.27		0.01		0.01		0.01		0.01	
Watershed Impervious Cover Estimate (%)		<1%		---		---		---		---		---		<1%		<1%		<1%		<1%	
Rosgen Classification		G5		E/C5b		E5		E5		E5/C5		E6		N/A		E/C5		E/C5		E/C5	
Bankfull Velocity (fps)		1.4	1.5	1.3	2.0	2.5	2.9	1.2	1.2	1.8	1.9	0.95		1.3		0.8		1.4		0.9	
Bankfull Discharge (cfs)		0.6	0.7	2.6		17.5		6.4		14.0		11.0		1.0		1.0		1.0		1.0	
Q-NFF regression		---																			
Q-USGS extrapolation	N/A	---																			
Q-Mannings		---																			
Valley Length (ft)		---		---		---		---		---		---		---		---		985			
Channel Thalweg Length (ft)		1,736		---		---		---		---		---		1,060		436		1,058		432	
Sinuosity		1.0		1.1		1.2		1.2		1.2		1.4		1.1	1.2	1.2	1.5	1.1		1.2	
Water Surface Slope $(ft/ft)^2$		---		---		---		---		---		---		---		---		0.0145		0.0064	
Bankfull Slope (ft/ft)		0.0240		0.0260		0.0170		0.0040		0.0022		0.0040		0.0096	0.0163	0.0024	0.0077	0.0148		0.0024	0.0066

(---): Data was not provided
N/A: Not Applicable

Table 10e. Baseline Stream Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Southwest Branch

		Pre-Restoration Condition		Reference Reach Data										Design				As-Built/Baseline			
Parameter	**Gage**	**Southwest Branch**		**Scout West 1**		**Scout East 2**		**Scout West 2**		**Johanna Creek**		**Jarman Oak**		**Southwest Branch (Reaches 1 - 3)**		**Southwest Branch (Reach 4)**		**Southwest Branch (Reaches 1 - 3)**		**Southwest Branch (Reach 4)**	
		Min	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Shallow																					
Bankfull Width (ft)		2.8	3.4	2.6	6.3	4.7	6.1	5.6	7.6	9.7		9.3		3.0		3.3		---		2.4	
Floodprone Width (ft)		4.9	6.2	>20		>50		>50		>75		>150		40	60	100	300	---		>200	
Bankfull Mean Depth		0.2	0.3	0.3	0.5	1.1	1.3	0.7	1.0	0.8		1.2		0.3		0.3		---		0.3	
Bankfull Max Depth		0.3	0.9	0.5	0.7	1.7	1.8	1.2	1.3	1.1		2.3		0.5	0.6	0.4	0.5	---		0.4	
Bankfull Cross Sectional Area (ft^2)	N/A	0.8	0.9	1.3	2.0	6.0	6.9	5.3	5.4	7.2	7.8	11.6		1.0		1.0		---		0.6	
Width/Depth Ratio		10.0	14.0	5.4	19.4	3.6	5.4	5.7	11.0	10.1	19.7	7.4		9.0	10.0	10.0	12.0	---		9.7	
Entrenchment Ratio		1.5	1.9	>2.2		>2.2		>2.2		8.0	9.6	16.1	26.9	13.3	20.0	30.3	90.9	---		82.3	
Bank Height Ratio		10.0	10.7	1.1	1.3	1.0		1.1	1.2	1.0		1.0		1.0	1.1	1.0	1.1	---		1.0	
D50 (mm)		0.105																---		N/A	
Profile																					
Shallow Length (ft)				---		---		---		---		---		---		---		3.8	51.6	8.3	44.1
Shallow Slope (ft/ft)		---		0.026	0.047	N/A		0.033	0.051	N/A		0.0129		0.0257	0.0648	0.0109	0.0308	0.0015	0.0339	0.0032	0.0228
Pool Length (ft)	N/A			---		---		---		---		---		---		---		1.7	19.9	4.3	23.4
Pool Max Depth (ft)		---		0.6		N/A		1.7	1.9	1.5		3.1		0.5	1.1	0.4	1.0	0.3	1.2	0.6	1.4
Pool Spacing (ft)		---		27	67	N/A		21	27	16	59	32	55	15	24	5	23	8	53	12	51
Pool Volume (ft^3)																					
Pattern																					
Channel Beltwidth (ft)		---		8.7	14.3	7.2	16.2	9.1	9.8	14.0	20.0	21.0	36.0	4.0	9.0	4.0	26.0	3.9	10.2	5.2	18.9
Radius of Curvature (ft)		---		3.1	9.0	5.5	16.0	5.4	6.8	15.0	27.0	13.7	18.6	5.0	14.0	5.0	16.0	10.0	19.0	7.4	20.3
Rc:Bankfull Width (ft/ft)	N/A	---		0.6	1.6	1.0	3.0	0.8	1.0	1.5	2.8	1.5	2.0	1.7	4.5	1.5	4.8	---		3.1	8.5
Meander Length (ft)		---		39.8	84.8	36.5	63.2	32.5	36.9	50.0		N/A		24	51	10	56	27	50	28	54
Meander Width Ratio		---		1.6	2.6	1.3	3.0	1.4	1.5	1.4	2.1	2.3	2.9	1.3	3.0	1.3	8.0	---		2.2	7.9
Substrate, Bed and Transport Parameters																					
Ri%/Ru%/P%/G%/S%																					
SC%/Sa%/G%/C%/B%/Be%																					
d16/d35/d50/d84/d95/d100	N/A	-/0.065/0.105/0.336/0.4/9.6		---		---		---		---		---						N/A		N/A	
Reach Shear Stress (Competency) lb/ft^2		0.37	0.42											---		---		N/A		N/A	
Max part size (mm) mobilized at bankfull																					
Stream Power (Capacity) W/m^2																					
Additional Reach Parameters																					
Drainage Area (SM)		0.03		0.06		0.67		0.34		0.90		1.27		0.02		0.02		0.02		0.02	
Watershed Impervious Cover Estimate (%)		<1%		---		---		---		---		---		<1%		<1%		<1%		<1%	
Rosgen Classification		G5		E/C5b		E5		E5		E5/C5		E6		NA		E/C5		N/A		E/C5	
Bankfull Velocity (fps)		1.8	1.9	1.3	2.0	2.5	2.9	1.2	1.2	1.8	1.9	0.95		1.7		1.3		N/A		2.5	
Bankfull Discharge (cfs)		1.6	1.7	2.6		17.5		6.4		14.0		11.0		1.5		1.5		1.5		1.5	
Q-NFF regression		---																			
Q-USGS extrapolation	N/A	---																			
Q-Mannings		---																			
Valley Length (ft)		---		---		---		---		---		---		---		---					
Channel Thalweg Length (ft)		1,080		---		---		---		---		---		650		482		646		479	
Sinuosity		1.0		1.1		1.2		1.2		1.2		1.4		1.1	1.2	1.1	1.5	1.0		1.3	
Water Surface Slope (ft/ft^2)		---		---		---		---		---		---		---		---		0.0191		0.0090	
Bankfull Slope (ft/ft)		0.0320		0.0260		0.0170		0.0040		0.0022		0.0040		0.0171	0.0216	0.0078	0.0096	0.0186	0.0191	0.0085	0.0088

(---): Data was not provided
N/A: Not Applicable

Table 10f. Baseline Stream Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

North Branch

		Pre-Restoration Condition	Reference Reach Data										Design		As-Built/Baseline	
Parameter	**Gage**	**North Branch**	**Scout West 1**		**Scout East 2**		**Scout West 2**		**Johanna Creek**		**Jarman Oak**		**North Branch**		**North Branch**	
		Min	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**	**Min**	**Max**
Dimension and Substrate - Shallow																
Bankfull Width (ft)	N/A	---	2.6	6.3	4.7	6.1	5.6	7.6	9.7		9.3		9.2		8.6	9.3
Floodprone Width (ft)		---	>20		>50		>50		>75		>150		100	300	>200	
Bankfull Mean Depth		---	0.3	0.5	1.1	1.3	0.7	1.0	0.8		1.2		0.6		0.7	0.7
Bankfull Max Depth		---	0.5	0.7	1.7	1.8	1.2	1.3	1.1		2.3		0.9	1.1	1.0	1.2
Bankfull Cross Sectional Area (ft^2)		---	1.3	2.0	6.0	6.9	5.3	5.4	7.2	7.8	11.6		5.9		5.7	6.5
Width/Depth Ratio		---	5.4	19.4	3.6	5.4	5.7	11.0	10.1	19.7	7.4		14.0	14.5	13.1	13.2
Entrenchment Ratio		---	>2.2		>2.2		>2.2		8.0	9.6	16.1	26.9	10.9	32.6	>21.6	>23.2
Bank Height Ratio		---	1.1	1.3	1.0		1.1	1.2	1.0		1.0		1.0	1.1	1.0	
D50 (mm)		---													N/A	
Profile																
Shallow Length (ft)	N/A		---		---		---		---		---		---		5.3	35.8
Shallow Slope (ft/ft)		---	0.026	0.047	N/A		0.033	0.051	N/A		0.0129		0.0010	0.0065	0.0013	0.0163
Pool Length (ft)			---		---		---		---		---		---		8.5	80.8
Pool Max Depth (ft)		---	0.6		N/A		1.7	1.9	1.5		3.1		0.9	2.1	1.0	3.8
Pool Spacing (ft)		---	27	67	N/A		21	27	16	59	32	55	15	64	17	101
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)	N/A	---	8.7	14.3	7.2	16.2	9.1	9.8	14.0	20.0	21.0	36.0	12.0	74.0	16	72
Radius of Curvature (ft)		---	3.1	9.0	5.5	16.0	5.4	6.8	15.0	27.0	13.7	18.6	14.0	44.0	15	40
Rc:Bankfull Width (ft/ft)		---	0.6	1.6	1.0	3.0	0.8	1.0	1.5	2.8	1.5	2.0	1.5	4.8	1.7	4.3
Meander Length (ft)		---	39.8	84.8	36.5	63.2	32.5	36.9	50.0		N/A		28	156	79	129
Meander Width Ratio		---	1.6	2.6	1.3	3.0	1.4	1.5	1.4	2.1	2.3	2.9	1.3	8.0	1.9	7.7
Substrate, Bed and Transport Parameters																
Ri%/Ru%/P%/G%/S%	N/A															
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100		---	---		---		---		---		---				N/A	
Reach Shear Stress (Competency) lb/ft^2		---											---		N/A	
Max part size (mm) mobilized at bankfull																
Stream Power (Capacity) W/m^2																
Additional Reach Parameters																
Drainage Area (SM)	N/A	0.08	0.06		0.67		0.34		0.90		1.27		0.19		0.19	
Watershed Impervious Cover Estimate (%)		<1%	---		---		---		---		---		<1%		<1%	
Rosgen Classification		N/A	E/C5b		E5		E5		E5/C5		E6		E/C5		C5	
Bankfull Velocity (fps)		---	1.3	2.0	2.5	2.9	1.2	1.2	1.8	1.9	0.95		0.9		0.8	0.9
Bankfull Discharge (cfs)		---	2.6		17.5		6.4		14.0		11.0		5.0		5.0	
Q-NFF regression		---														
Q-USGS extrapolation		---														
Q-Mannings		---														
Valley Length (ft)		---	---		---		---		---		---		---			
Channel Thalweg Length (ft)		---	---		---		---		---		---		2,418		2,410	
Sinuosity		---	1.1		1.2		1.2		1.2		1.4		1.2	1.6	1.31	
Water Surface Slope ($ft/ft)^2$		---	---		---		---		---		---		---		0.0016	
Bankfull Slope (ft/ft)		---	0.0260		0.0170		0.0040		0.0022		0.0040		0.0007	0.0020	0.0004	0.0020

(---): Data was not provided
N/A: Not Applicable

Table 11a. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Devil's Racetrack (West)

	Cross Section 1 (Shallow)								Cross Section 2 (Pool)								Cross Section 3 (Shallow)								Cross Section 4 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	135.4	135.4	135.4	135.4	135.4				135.1	135.1	135.1	135.1	135.1				131.0	131.0	131.0	131.0	131.0				130.6	130.6	130.6	130.6	130.6			
Bankfull Width (ft)	9.6	7.6	7.7	7.6	7.8				10.7	10.1	10.2	9.8	9.2				9.5	10.0	10.0	10.0	9.3				11.1	11.4	11.4	11.4	11.2			
Floodprone Width (ft)	>200	>200	>200	>200	>200				N/A	N/A	N/A	N/A	N/A				>200	>200	>200	>200	>200				N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	0.6	0.7	0.8	0.8	0.7				0.7	0.8	0.8	0.8	0.9				0.9	0.8	0.8	0.7	0.8				1.0	0.8	0.9	0.8	0.7			
Bankfull Max Depth (ft)	1.1	1.5	1.5	1.4	1.4				1.7	1.9	2.0	1.9	2.0				1.4	1.4	1.4	1.4	1.4				1.7	1.7	1.7	1.7	1.6			
Bankfull Cross Sectional Area (ft^2)	6.2	5.6	5.8	5.8	5.3				7.8	7.6	8.6	8.1	8.1				8.5	8.1	8.2	7.4	7.1				10.7	9.4	9.9	8.6	8.0			
Bankfull Width/Depth Ratio	14.8	10.4	10.1	10.0	11.5				14.6	13.4	12.2	12.0	10.6				10.6	12.3	12.2	13.5	12.1				11.4	13.9	13.1	15.1	15.6			
Entrenchment Ratio[1]	>20.9	>26.2	>26.1	>26.3	>25.7				N/A	N/A	N/A	N/A	N/A				>21.1	>20.0	>20.1	>20.0	>21.5				N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

	Cross Section 5 (Pool)								Cross Section 6 (Shallow)								Cross Section 7 (Pool)								Cross Section 8 (Shallow)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	125.3	125.3	125.3	125.3	125.3				124.7	124.7	124.7	124.7	124.7				120.8	120.8	120.8	120.8	120.8				119.9	119.9	119.9	119.9	119.9			
Bankfull Width (ft)	8.9	8.6	8.6	8.6	9.3				8.7	8.2	8.6	8.5	8.0				9.5	8.0	8.0	8.7	8.7				4.7	4.8	4.8	4.2	4.2			
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A				>200	>200	>200	>200	>200				N/A	N/A	N/A	N/A	N/A				>200	>200	>200	>200	>200			
Bankfull Mean Depth (ft)	0.8	0.8	0.8	0.7	0.7				0.7	0.7	0.6	0.6	0.5				0.8	0.9	0.9	0.8	0.8				0.4	0.7	1.2	0.8	1.0			
Bankfull Max Depth (ft)	1.5	1.5	1.5	1.5	1.4				1.1	1.2	1.2	1.1	1.0				1.6	1.7	1.7	1.7	1.8				1.3	1.3	1.7	1.2	1.7			
Bankfull Cross Sectional Area (ft^2)	7.5	7.0	6.8	6.2	6.5				6.0	5.3	5.6	5.2	4.3				7.6	7.4	7.3	7.0	7.0				2.1	3.3	5.7	3.3	4.4			
Bankfull Width/Depth Ratio	10.7	10.6	10.9	11.9	13.4				12.6	12.6	13.4	14.0	14.7				11.7	8.7	8.8	10.8	10.8				10.6	6.9	4.0	5.4	4.0			
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A				>23.0	>24.4	>23.2	>23.5	>25.1				N/A	N/A	N/A	N/A	N/A				>42.5	>42.1	>41.9	>47.4	>47.4			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

	Cross Section 9 (Shallow)								Cross Section 10 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	116.4	116.4	116.4	116.4	116.4				116.1	116.1	116.1	116.1	116.1			
Bankfull Width (ft)	7.7	7.5	7.5	7.5	7.5				6.8	5.9	5.9	6.2	6.0			
Floodprone Width (ft)	>200	>200	>200	>200	>200				N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	0.5	0.7	0.7	0.6	0.6				0.6	0.8	0.8	0.7	0.7			
Bankfull Max Depth (ft)	0.7	1.0	1.0	1.1	1.0				0.9	1.0	1.0	1.0	0.9			
Bankfull Cross Sectional Area (ft^2)	4.0	5.4	4.9	4.7	4.6				4.4	4.7	4.6	4.5	4.0			
Bankfull Width/Depth Ratio	14.5	10.4	11.4	12.1	12.4				10.6	7.5	7.6	8.5	9.0			
Entrenchment Ratio[1]	>26.1	>26.7	>26.7	>26.7	>26.7				N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

[1]Entrenchment Ratio is the flood prone width divided by the bankfull width
[2]Bank Height Ratio is the bank height divided by the max depth of the bankfull channel

Table 11b. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Devil's Racetrack (East)

	Cross Section 11 (Pool)								Cross Section 12 (Shallow)								Cross Section 13 (Pool)								Cross Section 14 (Shallow)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	115.4	115.4	115.4	115.4	115.4				115.1	115.1	115.1	115.1	115.1				115.0	115.0	115.0	115.0	115.0				114.6	114.6	114.6	114.6	114.6			
Bankfull Width (ft)	15.0	15.1	15.1	15.1	15.1				12.2	12.5	12.3	12.2	12.2				19.8	20.5	20.8	21.1	21.8				12.7	11.8	12.4	12.2	12.0			
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A				>300	>300	>300	>300	>300				N/A	N/A	N/A	N/A	N/A				>300	>300	>300	>300	>300			
Bankfull Mean Depth (ft)	1.2	1.1	1.1	1.1	1.1				0.8	0.7	0.8	0.7	0.7				1.5	1.2	1.3	1.1	1.1				1.1	0.9	0.9	0.9	0.9			
Bankfull Max Depth (ft)	2.1	2.0	2.0	2.5	2.0				1.3	1.3	1.3	1.2	1.3				2.7	2.5	2.5	2.3	2.5				1.6	1.6	1.6	1.5	1.6			
Bankfull Cross Sectional Area (ft^2)	18.8	16.5	17.3	16.1	15.9				10.3	8.9	9.3	8.0	8.4				30.2	24.6	26.2	23.2	23.2				13.3	10.4	10.9	10.5	10.6			
Bankfull Width/Depth Ratio	12.0	13.8	13.1	14.2	14.3				14.6	17.6	16.1	18.6	17.6				13.0	17.1	16.6	19.2	20.5				12.1	13.4	14.0	14.1	13.7			
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A				>24.5	>23.9	>24.5	>24.5	>24.6				N/A	N/A	N/A	N/A	N/A				>23.7	>25.4	>24.3	>24.6	>24.9			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

	Cross Section 15 (Pool)								Cross Section 16 (Shallow)								Cross Section 17 (Shallow)								Cross Section 18 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	114.2	114.2	114.2	114.2	114.2				114.1	114.1	114.1	114.1	114.1				113.3	113.3	113.3	113.3	113.3				112.6	112.6	112.6	112.6	112.6			
Bankfull Width (ft)	15.6	12.4	12.4	12.4	12.3				13.4	12.6	12.7	12.4	12.4				13.7	12.5	12.7	12.7	13.6				15.5	15.3	15.3	15.3	15.3			
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A				>300	>300	>300	>300	>300				>300	>300	>300	>300	>300				N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	1.1	1.2	1.2	1.1	1.1				1.0	1.0	1.0	0.9	0.9				1.0	1.0	1.0	1.0	1.0				1.6	1.5	1.4	1.2	1.1			
Bankfull Max Depth (ft)	2.1	1.9	1.9	1.8	1.8				1.7	1.8	1.7	1.7	1.7				1.7	1.7	1.7	2.1	2.1				2.8	2.7	2.6	2.1	2.0			
Bankfull Cross Sectional Area (ft^2)	17.3	14.5	14.3	13.5	13.3				13.2	12.0	12.3	11.5	11.3				13.9	12.5	12.7	13.2	13.4				25.0	22.4	21.0	18.8	16.6			
Bankfull Width/Depth Ratio	14.0	10.6	10.7	11.4	11.4				13.6	13.2	13.0	13.4	13.5				13.4	12.5	12.6	12.2	13.8				9.5	10.5	11.2	12.4	14.1			
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A				>22.3	>23.9	>23.6	>24.1	>24.3				>21.9	>24.0	>23.6	>23.7	>22.1				N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

	Cross-Section 19 (Shallow)								Cross Section 20 (Shallow)								Cross Section 21 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	112.7	112.7	112.7	112.7	112.7				109.0	109.0	109.0	109.0	109.0				108.1	108.1	108.1	108.1	108.1			
Bankfull Width (ft)	13.3	14.3	14.2	12.6	14.0				8.2	7.9	7.9	8.3	8.2				8.8	8.9	9.1	7.8	7.8			
Floodprone Width (ft)	>300	>300	>300	>300	>300				>300	>300	>300	>300	>300				N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	0.9	0.8	0.8	0.8	0.7				0.7	0.7	0.8	0.8	0.8				1.2	1.1	1.3	1.2	1.4			
Bankfull Max Depth (ft)	1.6	1.6	1.6	1.6	1.4				1.1	1.1	1.2	1.2	1.2				2.0	1.9	2.1	2.1	2.0			
Bankfull Cross Sectional Area (ft^2)	12.5	11.2	11.9	9.9	9.6				5.7	5.9	6.1	6.3	6.3				10.8	9.7	11.5	9.4	10.6			
Bankfull Width/Depth Ratio	14.1	18.4	17.1	16.1	20.4				11.9	10.6	10.3	10.9	10.6				7.3	8.1	7.2	6.5	5.7			
Entrenchment Ratio[1]	>22.6	>20.9	>21.1	>23.8	>21.5				>36.5	>37.8	>37.8	>36.3	>36.6				N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

[1]Entrenchment Ratio is the flood prone width divided by the bankfull width
[2]Bank Height Ratio is the bank height divided by the max depth of the bankfull channel

Table 11c. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Southeast Branch

	Cross Section 28 (Pool)								Cross Section 29 (Shallow)								Cross Section 30 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	137.7	137.7	137.7	137.7	137.7				137.1	137.1	137.1	137.1	137.1				122.8	122.8	122.8	122.8	122.8			
Bankfull Width (ft)	3.8	3.3	3.3	3.2	3.3				3.0	2.9	2.6	2.8	2.4				3.8	4.1	3.5	3.5	3.0			
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A				>30	>30	>30	>30	>30				N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	0.4	0.5	0.5	0.5	0.4				0.3	0.4	0.3	0.3	0.3				0.3	0.4	0.3	0.3	0.2			
Bankfull Max Depth (ft)	0.8	1.2	1.2	1.1	1.1				0.5	0.7	0.7	0.7	0.7				0.4	0.7	0.5	0.4	0.4			
Bankfull Cross Sectional Area (ft^2)	1.5	1.7	1.6	1.5	1.5				0.8	1.1	0.8	0.9	0.7				1.3	1.7	1.1	0.9	0.7			
Bankfull Width/Depth Ratio	9.3	6.6	7.1	7.2	7.3				11.4	7.7	8.3	8.2	7.9				11.2	9.4	11.7	13.5	12.7			
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A				>9.9	>10.4	>11.4	>10.9	>12.5				N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			
	Cross Section 31 (Shallow)								**Cross Section 32 (Shallow)**								**Cross Section 33 (Pool)**							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	122.7	122.7	122.7	122.7	122.7				116.5	116.5	116.5	116.5	116.5				116.4	116.4	116.4	116.4	116.4			
Bankfull Width (ft)	3.8	3.9	3.8	2.7	2.4				5.3	5.1	3.9	3.5	3.5				6.3	5.8	5.0	3.6	3.7			
Floodprone Width (ft)	>60	>60	>60	>60	>60				>200	>200	>200	>200	>200				N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	0.4	0.5	0.3	0.3	0.3				0.4	0.4	0.3	0.3	0.3				0.4	0.3	0.4	0.3	0.3			
Bankfull Max Depth (ft)	0.5	0.8	0.5	0.6	0.5				0.6	0.5	0.5	0.5	0.4				0.8	0.6	0.6	0.5	0.4			
Bankfull Cross Sectional Area (ft^2)	1.3	2.0	1.3	0.9	0.7				2.1	1.8	1.2	1.0	0.9				2.4	1.7	1.8	1.1	0.9			
Bankfull Width/Depth Ratio	10.8	7.8	11.2	8.3	7.9				13.8	14.6	13.0	12.5	13.7				16.8	19.7	13.7	11.6	14.7			
Entrenchment Ratio[1]	>15.8	>15.4	>15.8	>22.4	>24.9				>37.5	>38.9	>51.3	>57.9	>56.4				N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

[1]Entrenchment Ratio is the flood prone width divided by the bankfull width.

[2]Bank Height Ratio is the bank height divided by the max depth of the bankfull channel.

Table 11d. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Middle Branch

	Cross Section 24 (Shallow)								Cross Section 25 (Pool)								Cross Section 26 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	136.4	136.4	136.4	136.4	136.4				136.4	136.4	136.4	136.4	136.4				124.7	124.7	124.7	124.7	124.7			
Bankfull Width (ft)	2.2	2.3	2.2	1.3	1.2				3.1	3.1	3.2	3.0	2.7				4.1	4.8	5.0	5.2	4.4			
Floodprone Width (ft)	>50	>50	>50	>50	>50				N/A	N/A	N/A	N/A	N/A				N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	0.3	0.3	0.3	0.3	0.3				0.4	0.5	0.3	0.4	0.5				0.3	0.2	0.2	0.3	0.2			
Bankfull Max Depth (ft)	0.5	0.6	0.6	0.4	0.5				0.7	0.9	0.6	0.8	0.8				0.9	0.5	0.5	0.6	0.5			
Bankfull Cross Sectional Area (ft^2)	0.7	0.8	0.7	0.4	0.4				1.2	1.6	1.1	1.2	1.2				1.4	1.0	1.0	1.5	1.0			
Bankfull Width/Depth Ratio	6.7	6.8	6.8	4.0	3.5				8.1	6.0	9.1	7.6	5.8				11.9	21.9	24.3	17.7	19.7			
Entrenchment Ratio[1]	>22.9	>21.5	>23.2	>38.4	>42.9				N/A	N/A	N/A	N/A	N/A				N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

	Cross Section 27 (Shallow)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	124.6	124.6	124.6	124.6	124.6			
Bankfull Width (ft)	3.4	3.2	3.1	3.5	2.9			
Floodprone Width (ft)	>200	>200	>200	>200	>200			
Bankfull Mean Depth (ft)	0.3	0.3	0.3	0.4	0.3			
Bankfull Max Depth (ft)	0.5	0.6	0.6	0.7	0.6			
Bankfull Cross Sectional Area (ft^2)	1.1	1.0	1.0	1.3	0.9			
Bankfull Width/Depth Ratio	10.1	10.7	10.2	9.5	8.7			
Entrenchment Ratio[1]	>58.8	>62.5	>64.3	>57.5	>69.8			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0			

[1]Entrenchment Ratio is the flood prone width divided by the bankfull width.

[2]Bank Height Ratio is the bank height divided by the max depth of the bankfull channel.

Table 11e. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Southwest Branch

	Cross Section 22 (Pool)								Cross Section 23 (Shallow)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	136.4	136.4	136.4	136.4	136.4				136.4	136.4	136.4	136.4	136.4			
Bankfull Width (ft)	4.9	4.8	5.0	4.5	4.2				2.4	2.9	3.0	2.5	1.8			
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A				>200	>200	>200	>200	>200			
Bankfull Mean Depth (ft)	0.4	0.4	0.4	0.3	0.3				0.3	0.3	0.3	0.3	0.2			
Bankfull Max Depth (ft)	0.8	1.0	0.9	0.7	0.6				0.4	0.4	0.5	0.4	0.3			
Bankfull Cross Sectional Area (ft^2)	1.8	1.9	2.1	1.5	1.3				0.6	0.8	0.9	0.7	0.3			
Bankfull Width/Depth Ratio	13.2	11.9	11.7	13.7	13.2				9.7	11.2	10.1	8.9	12.0			
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A				>82.3	>68.6	>67.5	>79.4	>108.7			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

[1]Entrenchment Ratio is the flood prone width divided by the bankfull width.

[2]Bank Height Ratio is the bank height divided by the max depth of the bankfull channel.

Table 11f. Morphology and Hydraulic Summary (Dimensional Parameters - Cross Section)

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

North Branch

	Cross Section 34 (Pool)								Cross Section 35 (Shallow)								Cross Section 36 (Shallow)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	118.6	118.6	118.6	118.6	118.6				118.73	118.7	118.7	118.7	118.7				116.8	116.8	116.8	116.8	116.8			
Bankfull Width (ft)	9.8	10.0	10.2	9.7	9.5				8.6	9.2	9.2	9.2	8.9				9.3	9.0	9.0	9.0	9.0			
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A				>200	>200	>200	>200	>200				>200	>200	>200	>200	>200			
Bankfull Mean Depth (ft)	0.8	0.7	0.7	0.7	0.7				0.7	0.7	0.7	0.6	0.6				0.7	0.8	0.8	0.8	0.7			
Bankfull Max Depth (ft)	1.3	1.4	1.4	1.3	1.4				1.0	1.2	1.2	1.1	1.1				1.2	1.4	1.4	1.4	1.3			
Bankfull Cross Sectional Area (ft^2)	7.5	7.2	7.5	6.7	6.9				5.7	6.0	6.4	5.4	5.1				6.5	7.0	6.9	6.9	6.7			
Bankfull Width/Depth Ratio	12.8	14.0	13.9	14.0	12.9				13.1	14.1	13.2	15.6	15.4				13.2	11.5	11.7	11.8	12.0			
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A				>23.2	>21.7	>21.7	>21.7	>22.5				>21.6	>22.2	>22.2	>22.2	>22.2			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0				1.0	1.0	1.0	1.0	1.0			

	Cross Section 37 (Pool)							
Dimension and Substrate	**Base**	**MY1**	**MY2**	**MY3**	**MY4**	**MY5**	**MY6**	**MY7**
based on fixed bankfull elevation	116.5	116.5	116.5	116.5	116.5			
Bankfull Width (ft)	10.6	11.1	10.7	11.1	11.7			
Floodprone Width (ft)	N/A	N/A	N/A	N/A	N/A			
Bankfull Mean Depth (ft)	0.9	0.8	0.9	0.8	0.8			
Bankfull Max Depth (ft)	1.4	1.4	1.5	1.4	1.4			
Bankfull Cross Sectional Area (ft^2)	9.2	9.2	9.2	8.9	8.9			
Bankfull Width/Depth Ratio	12.3	13.4	12.5	13.8	15.4			
Entrenchment Ratio[1]	N/A	N/A	N/A	N/A	N/A			
Bankfull Bank Height Ratio[2]	1.0	1.0	1.0	1.0	1.0			

[1]Entrenchment Ratio is the flood prone width divided by the bankfull width.

[2]Bank Height Ratio is the bank height divided by the max depth of the bankfull channel.

Table 12a. Monitoring Data - Stream Reach Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Devil's Racetrack (West)

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Shallow																
Bankfull Width (ft)	4.7	9.6	4.8	10.0	4.8	10.0	4.2	10.0	4.2	9.3						
Floodprone Width (ft)	>200	>200	>200	>200	>200	>200	>200	>200	>200	>200						
Bankfull Mean Depth	0.4	0.9	0.7	0.8	0.6	1.2	0.6	0.8	0.5	1.0						
Bankfull Max Depth	0.7	1.4	1.0	1.5	1.0	1.7	1.1	1.4	1.0	1.7						
Bankfull Cross Sectional Area (ft^2)	2.1	8.5	3.3	8.1	4.9	8.2	3.3	7.4	4.3	7.1						
Width/Depth Ratio	10.6	14.8	6.9	12.6	4.0	13.4	4.7	14.0	4.0	14.7						
Entrenchment Ratio	>20.9	>42.5	>20	>42.1	>20.1	>41.9	>20.0	>47.4	>21.5	>47.4						
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0						
D50 (mm)																
Profile																
Shallow Length (ft)																
Shallow Slope (ft/ft)																
Pool Length (ft)																
Pool Max Depth (ft)																
Pool Spacing (ft)																
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)																
Radius of Curvature (ft)																
Rc:Bankfull Width (ft/ft)																
Meander Wave Length (ft)																
Meander Width Ratio																
Additional Reach Parameters																
Rosgen Classification																
Channel Thalweg Length (ft)																
Sinuosity (ft)																
Water Surface Slope (ft/ft)																
Bankfull Slope (ft/ft)																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		0%							

*Baseline, MY1, and MY2 data was updated during MY3 to include only shallow data.

Table 12b. Monitoring Data - Stream Reach Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Devil's Racetrack (East)

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Shallow																
Bankfull Width (ft)	8.2	13.7	7.9	14.3	7.9	14.2	8.3	12.7	8.2	14.0						
Floodprone Width (ft)	>300	>300	>300	>300	>300	>300	>300	>300	>300	>300						
Bankfull Mean Depth	0.7	1.1	0.7	1.0	0.8	1.0	0.7	1.0	0.7	1.0						
Bankfull Max Depth	1.1	1.7	1.1	1.8	1.2	1.7	1.2	2.1	1.2	2.1						
Bankfull Cross Sectional Area (ft^2)	5.7	14.1	5.9	12.5	6.1	12.7	6.3	13.2	6.3	13.4						
Width/Depth Ratio	11.9	14.6	10.6	18.4	10.3	17.1	10.9	18.6	10.6	20.4						
Entrenchment Ratio	>21.9	>36.5	>20.9	>37.8	>21.1	>37.8	>23.7	>36.3	>21.5	>36.6						
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0						
D50 (mm)																
Profile																
Shallow Length (ft)																
Shallow Slope (ft/ft)																
Pool Length (ft)																
Pool Max Depth (ft)																
Pool Spacing (ft)																
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)																
Radius of Curvature (ft)																
Rc:Bankfull Width (ft/ft)																
Meander Wave Length (ft)																
Meander Width Ratio																
Additional Reach Parameters																
Rosgen Classification																
Channel Thalweg Length (ft)																
Sinuosity (ft)																
Water Surface Slope (ft/ft)																
Bankfull Slope (ft/ft)																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		0%							

*Baseline, MY1, and MY2 data was updated during MY3 to include only shallow data.

Table 12c. Monitoring Data - Stream Reach Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Southeast Branch

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Shallow																
Bankfull Width (ft)	3.0	5.3	2.9	5.1	2.6	3.9	2.7	3.5	2.4	3.5						
Floodprone Width (ft)	>30	>200	>30	>200	>30	>200	>30	>200	>30	>200						
Bankfull Mean Depth	0.3	0.4	0.4	0.5	0.3	0.3	0.3	0.3	0.3	0.3						
Bankfull Max Depth	0.5	0.6	0.5	0.8	0.5	0.7	0.5	0.7	0.4	0.7						
Bankfull Cross Sectional Area (ft^2)	0.8	2.1	1.1	2.0	0.8	1.3	0.9	1.0	0.7	0.9						
Width/Depth Ratio	10.8	13.8	7.7	14.6	8.3	13.0	8.2	12.5	7.9	13.7						
Entrenchment Ratio	>9.9	>37.5	>10.4	>38.9	>11.4	>51.3	>10.9	>57.9	>12.5	>56.4						
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0						
D50 (mm)																
Profile																
Shallow Length (ft)																
Shallow Slope (ft/ft)																
Pool Length (ft)																
Pool Max Depth (ft)																
Pool Spacing (ft)																
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)																
Radius of Curvature (ft)																
Rc:Bankfull Width (ft/ft)																
Meander Wave Length (ft)																
Meander Width Ratio																
Additional Reach Parameters																
Rosgen Classification																
Channel Thalweg Length (ft)																
Sinuosity (ft)																
Water Surface Slope (ft/ft)																
Bankfull Slope (ft/ft)																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			10%		0%		0%		0%							

*Baseline, MY1, and MY2 data was updated during MY3 to include only shallow data.

Table 12d. Monitoring Data - Stream Reach Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Middle Branch

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Shallow																
Bankfull Width (ft)	2.2	3.4	2.3	3.2	2.2	3.1	1.3	3.5	1.2	2.9						
Floodprone Width (ft)	>50	>200	>50	>200	>50	>200	>50	>200	>50	>200						
Bankfull Mean Depth	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.3						
Bankfull Max Depth	0.5	0.5	0.6	0.6	0.6	0.6	0.4	0.7	0.5	0.6						
Bankfull Cross Sectional Area (ft^2)	0.7	1.1	0.8	1.0	0.7	1.0	0.4	1.3	0.4	0.9						
Width/Depth Ratio	6.7	10.1	6.8	10.7	6.8	10.2	4.0	9.5	3.5	8.7						
Entrenchment Ratio	>22.9	>58.8	>21.5	>62.5	>23.2	>64.3	>38.4	>57.5	>42.9	>69.8						
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0						
D50 (mm)																
Profile																
Shallow Length (ft)																
Shallow Slope (ft/ft)																
Pool Length (ft)																
Pool Max Depth (ft)																
Pool Spacing (ft)																
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)																
Radius of Curvature (ft)																
Rc:Bankfull Width (ft/ft)																
Meander Wave Length (ft)																
Meander Width Ratio																
Additional Reach Parameters																
Rosgen Classification																
Channel Thalweg Length (ft)																
Sinuosity (ft)																
Water Surface Slope (ft/ft)																
Bankfull Slope (ft/ft)																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		0%							

*Baseline, MY1, and MY2 data was updated during MY3 to include only shallow data.

Table 12e. Monitoring Data - Stream Reach Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Southwest Branch

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Shallow																
Bankfull Width (ft)	2.4		2.9		3.0		2.5		1.8							
Floodprone Width (ft)	>200		>200		>200		>200		>200							
Bankfull Mean Depth	0.3		0.3		0.3		0.3		0.2							
Bankfull Max Depth	0.4		0.4		0.5		0.4		0.3							
Bankfull Cross Sectional Area (ft^2)	0.6		0.8		0.9		0.7		0.3							
Width/Depth Ratio	9.7		11.2		10.1		8.9		12.0							
Entrenchment Ratio	>82.3		>68.6		>67.5		>79.4		>108.7							
Bank Height Ratio	1.0		1.0		1.0		1.0		1.0							
D50 (mm)																
Profile																
Shallow Length (ft)																
Shallow Slope (ft/ft)																
Pool Length (ft)																
Pool Max Depth (ft)																
Pool Spacing (ft)																
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)																
Radius of Curvature (ft)																
Rc:Bankfull Width (ft/ft)																
Meander Wave Length (ft)																
Meander Width Ratio																
Additional Reach Parameters																
Rosgen Classification																
Channel Thalweg Length (ft)																
Sinuosity (ft)																
Water Surface Slope (ft/ft)																
Bankfull Slope (ft/ft)																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		0%							

*Baseline, MY1, and MY2 data was updated during MY3 to include only shallow data.

Table 12f. Monitoring Data - Stream Reach Data Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

North Branch

Parameter	As-Built/Baseline		MY1		MY2		MY3		MY4		MY5		MY6		MY7	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
Dimension and Substrate - Shallow																
Bankfull Width (ft)	8.6	9.3	9.0	9.2	9.0	9.2	9.0	9.2	8.9	9.0						
Floodprone Width (ft)	>200	>200	>200	>200	>200	>200	>200	>200	>200	>200						
Bankfull Mean Depth	0.7	0.7	0.7	0.8	0.7	0.8	0.6	0.8	0.6	0.7						
Bankfull Max Depth	1.0	1.2	1.2	1.4	1.2	1.4	1.1	1.4	1.1	1.3						
Bankfull Cross Sectional Area (ft^2)	5.7	6.5	6.0	7.0	6.4	6.9	5.4	6.9	5.1	6.7						
Width/Depth Ratio	13.1	13.2	11.5	14.1	11.7	13.2	11.8	15.6	12.0	15.4						
Entrenchment Ratio	>21.6	>23.2	>21.7	>22.2	>21.7	>22.2	>21.7	>22.2	>22.2	>22.5						
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0						
D50 (mm)																
Profile																
Shallow Length (ft)																
Shallow Slope (ft/ft)																
Pool Length (ft)																
Pool Max Depth (ft)																
Pool Spacing (ft)																
Pool Volume (ft^3)																
Pattern																
Channel Beltwidth (ft)																
Radius of Curvature (ft)																
Rc:Bankfull Width (ft/ft)																
Meander Wave Length (ft)																
Meander Width Ratio																
Additional Reach Parameters																
Rosgen Classification																
Channel Thalweg Length (ft)																
Sinuosity (ft)																
Water Surface Slope (ft/ft)																
Bankfull Slope (ft/ft)																
Ri%/Ru%/P%/G%/S%																
SC%/Sa%/G%/C%/B%/Be%																
d16/d35/d50/d84/d95/d100																
% of Reach with Eroding Banks			0%		0%		0%		0%							

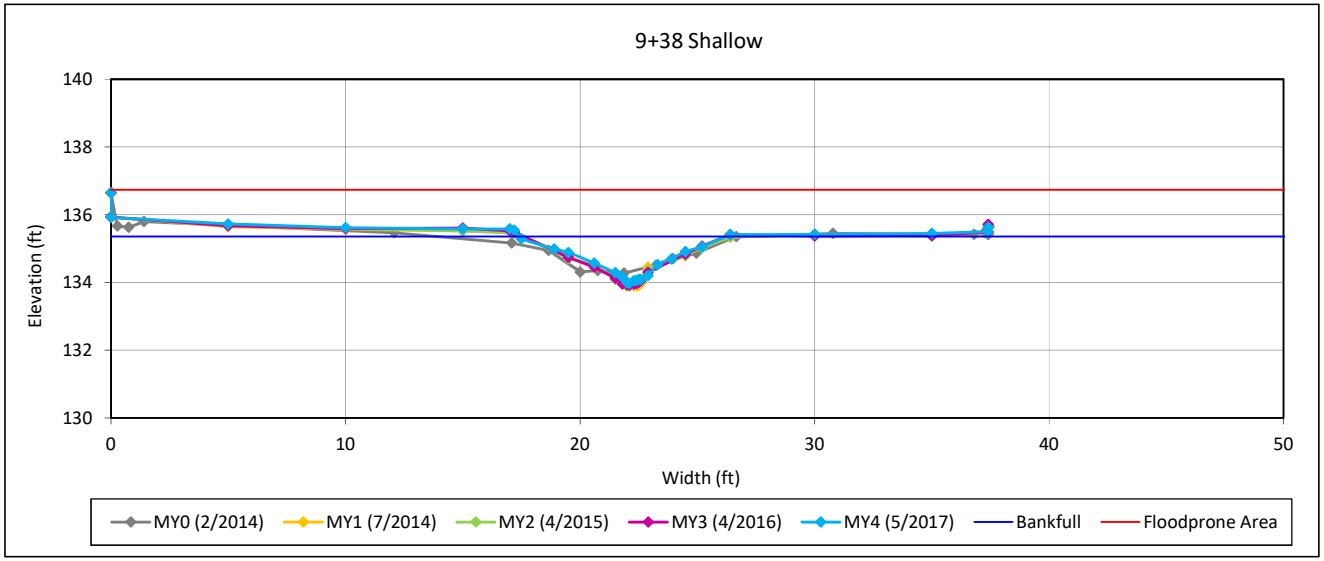
*Baseline, MY1, and MY2 data was updated during MY3 to include only shallow data.

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 1-DRC West



Bankfull Dimensions	
5.3	x-section area (ft.sq.)
7.8	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
8.2	wetted parimeter (ft)
0.6	hyd radi (ft)
11.5	width-depth ratio
200.0	W flood prone area (ft)
25.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

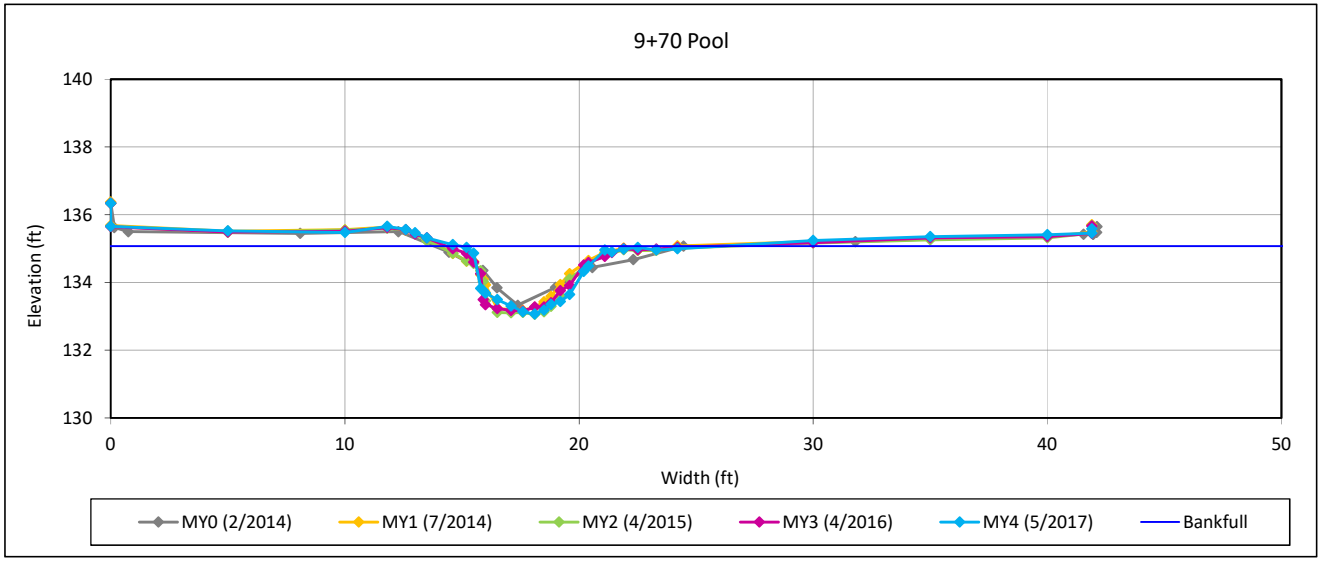
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 2-DRC West



Bankfull Dimensions	
8.1	x-section area (ft.sq.)
9.2	width (ft)
0.9	mean depth (ft)
2.0	max depth (ft)
10.9	wetted parimeter (ft)
0.7	hyd radi (ft)
10.6	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

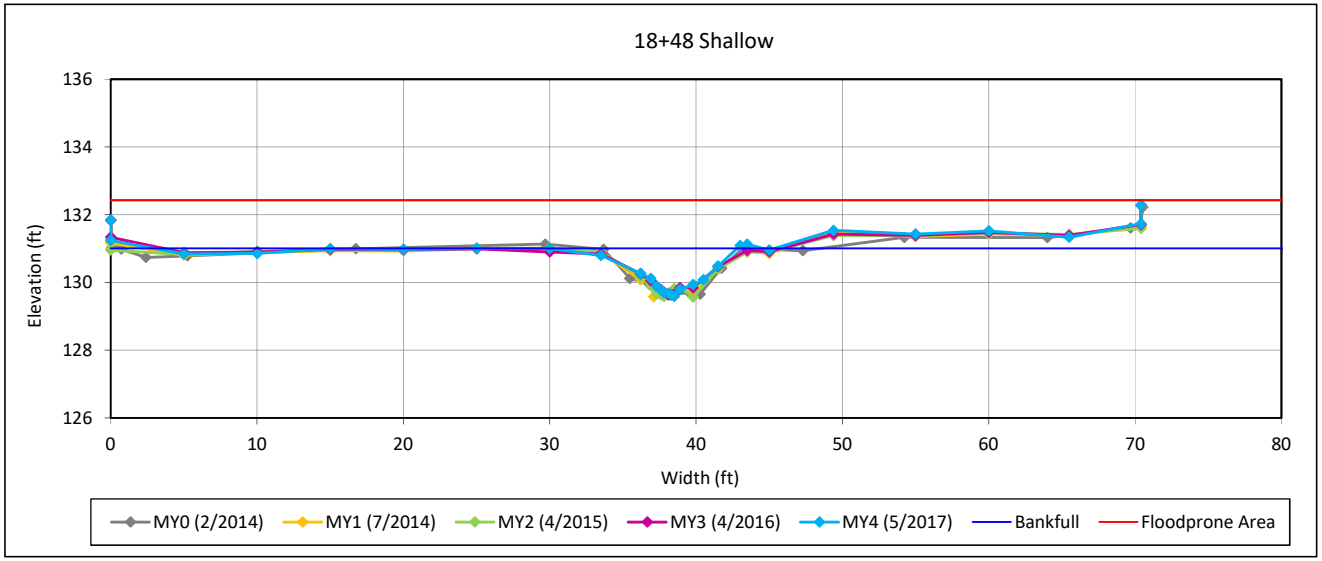
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 3-DRC West



Bankfull Dimensions	
7.1	x-section area (ft.sq.)
9.3	width (ft)
0.8	mean depth (ft)
1.4	max depth (ft)
9.7	wetted parimeter (ft)
0.7	hyd radi (ft)
12.1	width-depth ratio
200.0	W flood prone area (ft)
21.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

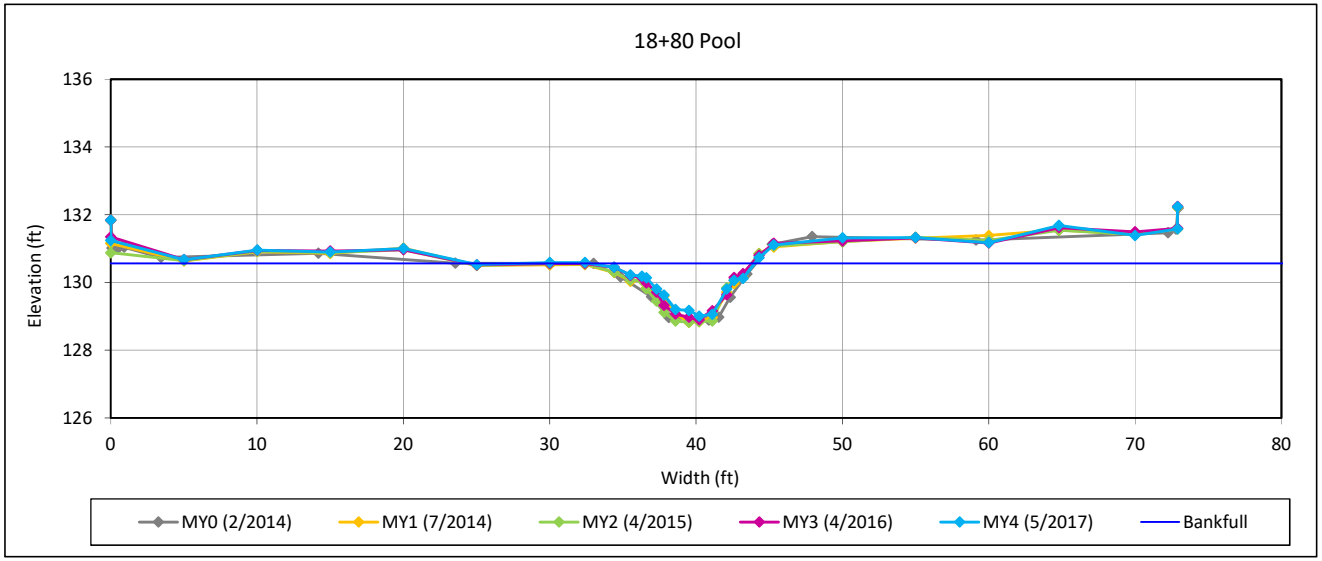
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 4-DRC West



Bankfull Dimensions	
8.0	x-section area (ft.sq.)
11.2	width (ft)
0.7	mean depth (ft)
1.6	max depth (ft)
11.9	wetted parimeter (ft)
0.7	hyd radi (ft)
15.6	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

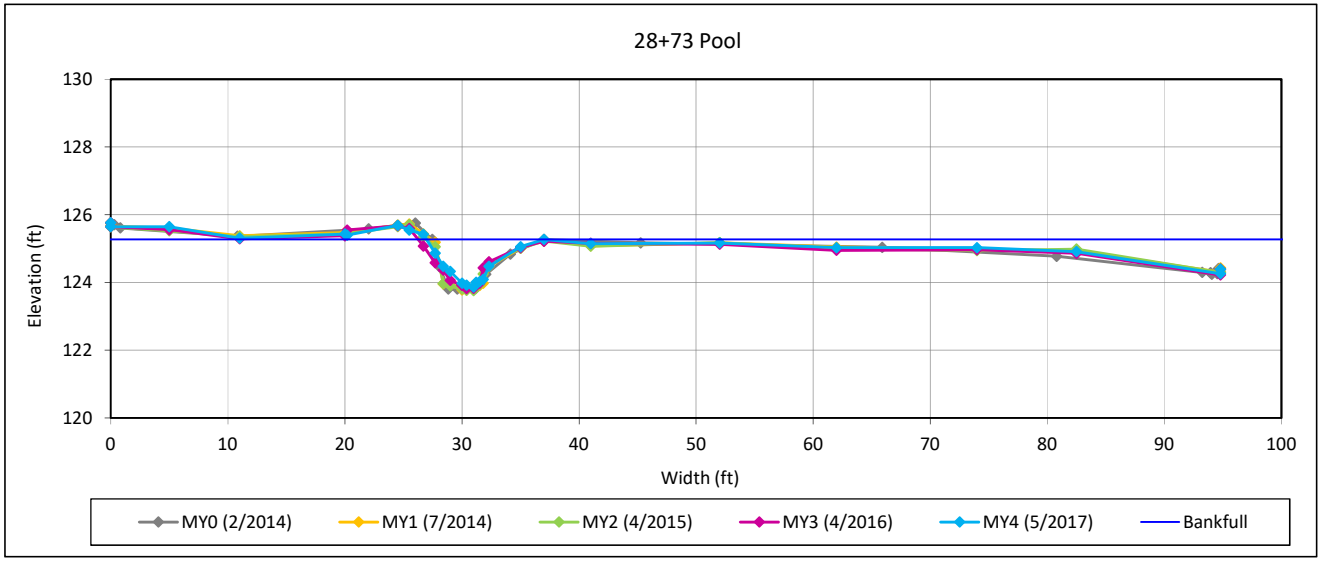
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 5-DRC West



Bankfull Dimensions	
6.5	x-section area (ft.sq.)
9.3	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
9.7	wetted parimeter (ft)
0.7	hyd radi (ft)
13.4	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

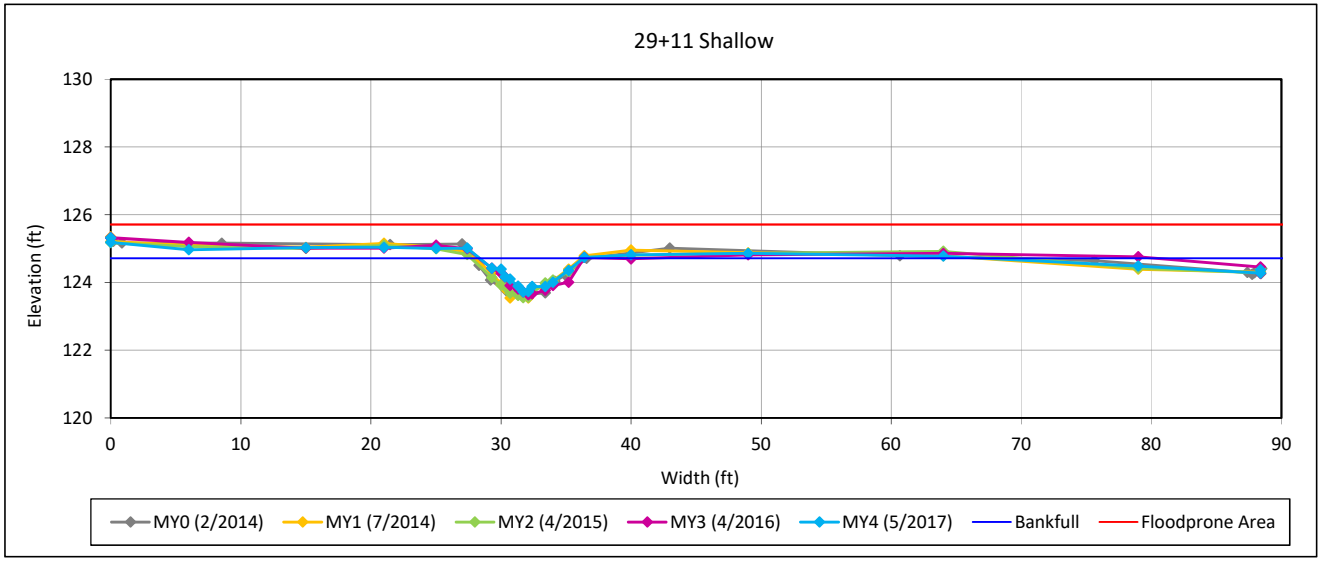
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 6-DRC West



Bankfull Dimensions	
4.3	x-section area (ft.sq.)
8.0	width (ft)
0.5	mean depth (ft)
1.0	max depth (ft)
8.3	wetted parimeter (ft)
0.5	hyd radi (ft)
14.7	width-depth ratio
200.0	W flood prone area (ft)
25.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

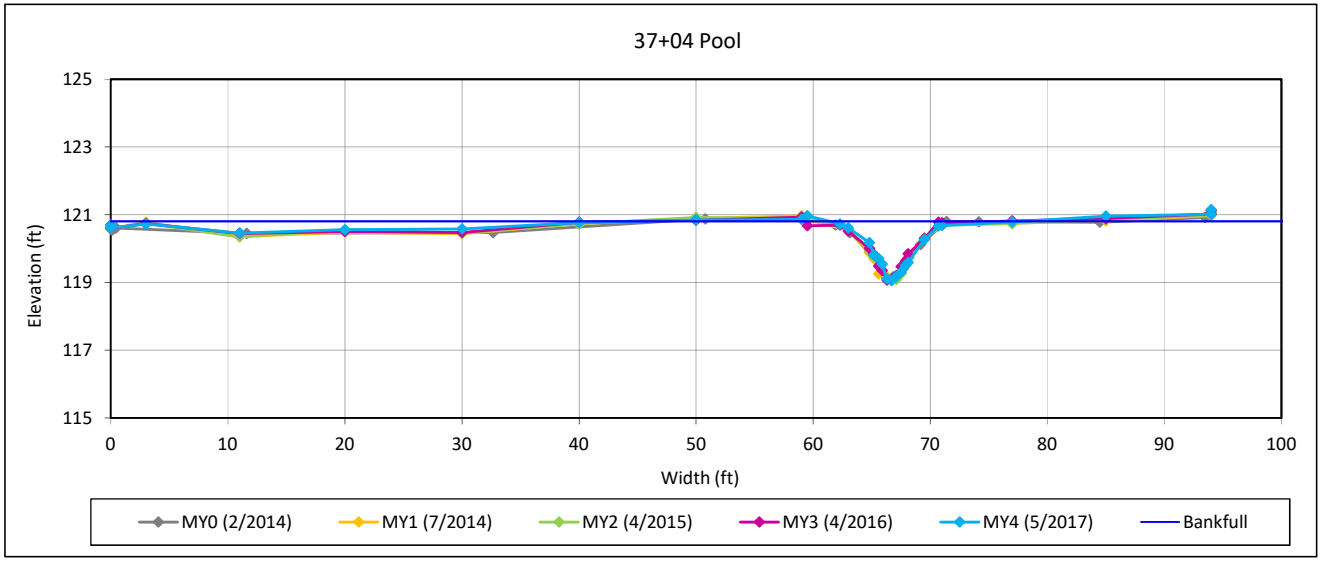
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 7-DRC West



Bankfull Dimensions	
7.0	x-section area (ft.sq.)
8.7	width (ft)
0.8	mean depth (ft)
1.8	max depth (ft)
9.5	wetted parimeter (ft)
0.7	hyd radi (ft)
10.8	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

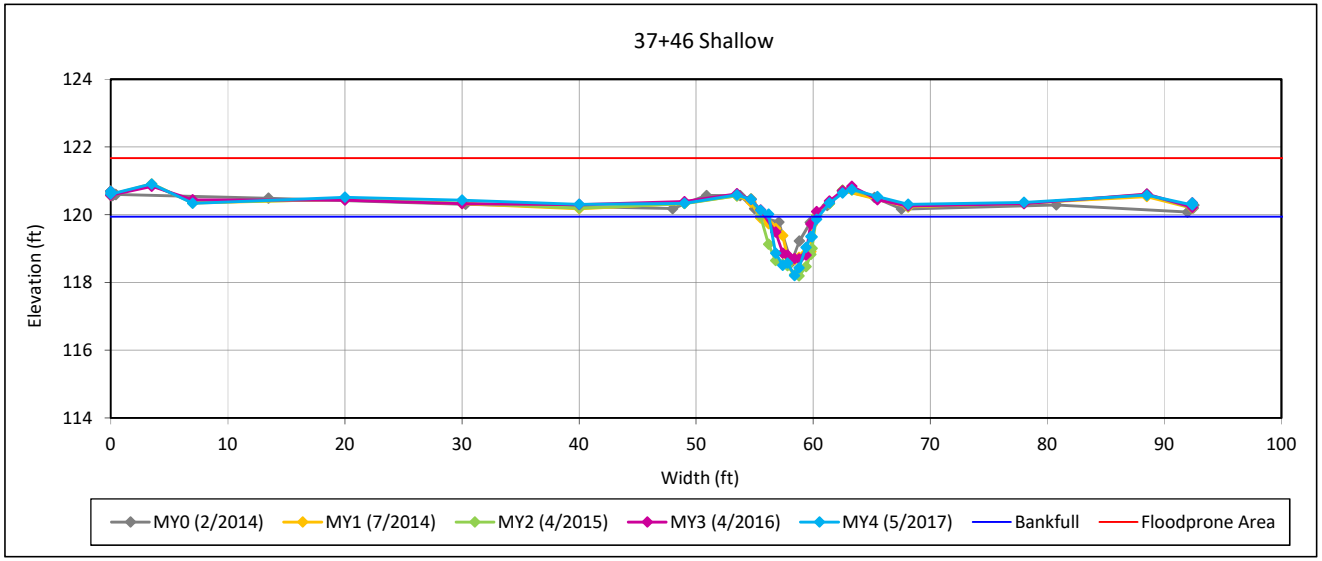
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 8-DRC West



Bankfull Dimensions	
4.4	x-section area (ft.sq.)
4.2	width (ft)
1.0	mean depth (ft)
1.7	max depth (ft)
5.8	wetted parimeter (ft)
0.8	hyd radi (ft)
4.0	width-depth ratio
200.0	W flood prone area (ft)
47.4	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

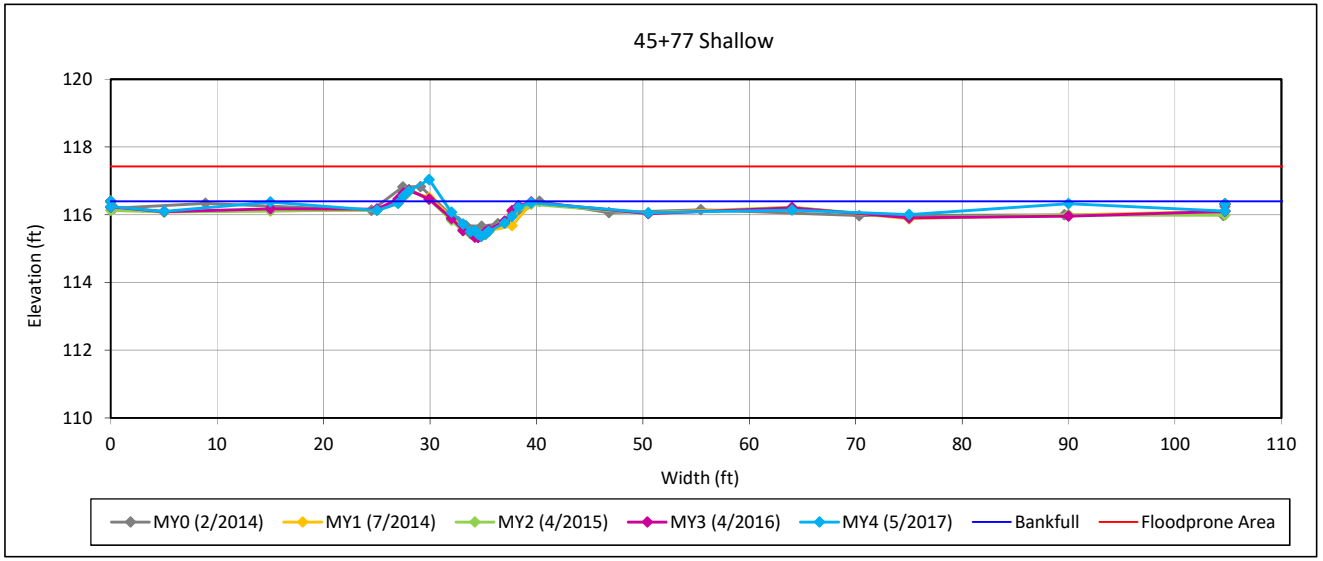
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 9-DRC West



Bankfull Dimensions	
4.6	x-section area (ft.sq.)
7.5	width (ft)
0.6	mean depth (ft)
1.0	max depth (ft)
7.7	wetted parimeter (ft)
0.6	hyd radi (ft)
12.4	width-depth ratio
200.0	W flood prone area (ft)
26.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

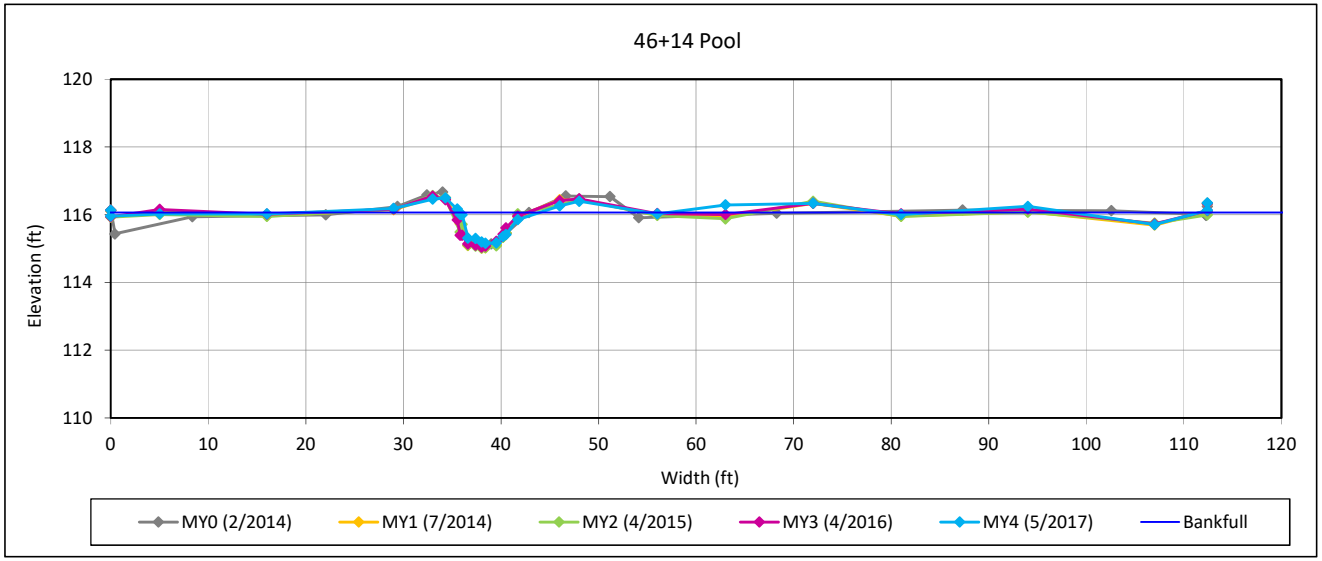
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 10-DRC West



Bankfull Dimensions	
4.0	x-section area (ft.sq.)
6.0	width (ft)
0.7	mean depth (ft)
0.9	max depth (ft)
6.5	wetted parimeter (ft)
0.6	hyd radi (ft)
9.0	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

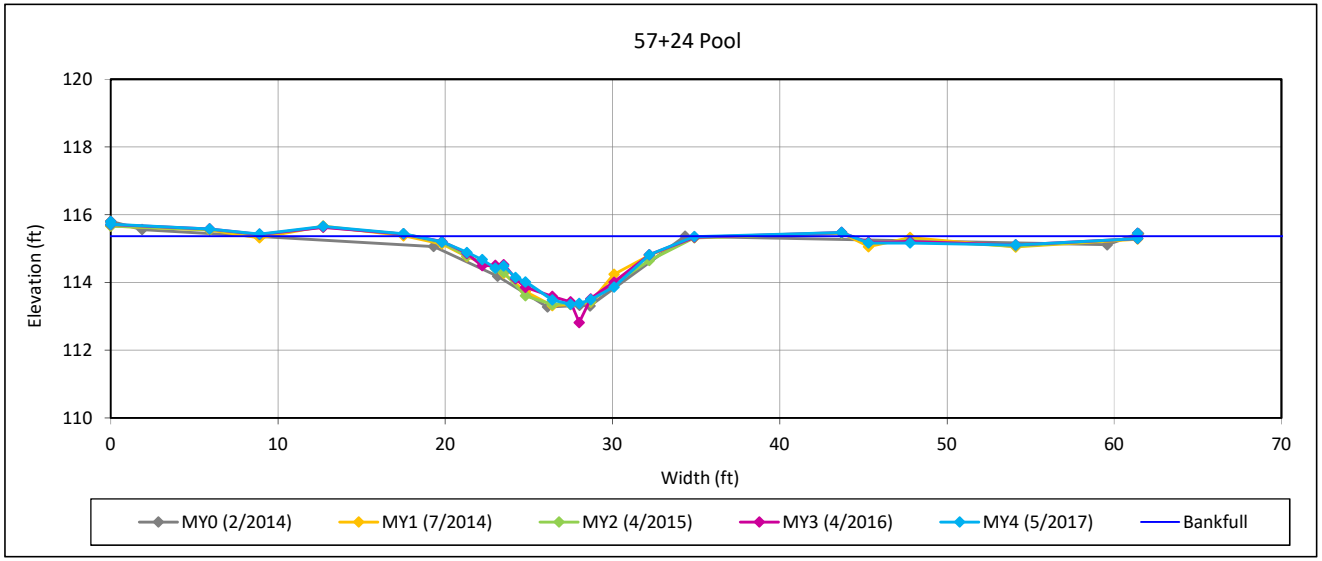
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 11-DRC East



Bankfull Dimensions	
15.9	x-section area (ft.sq.)
15.1	width (ft)
1.1	mean depth (ft)
2.0	max depth (ft)
15.7	wetted parimeter (ft)
1.0	hyd radi (ft)
14.3	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

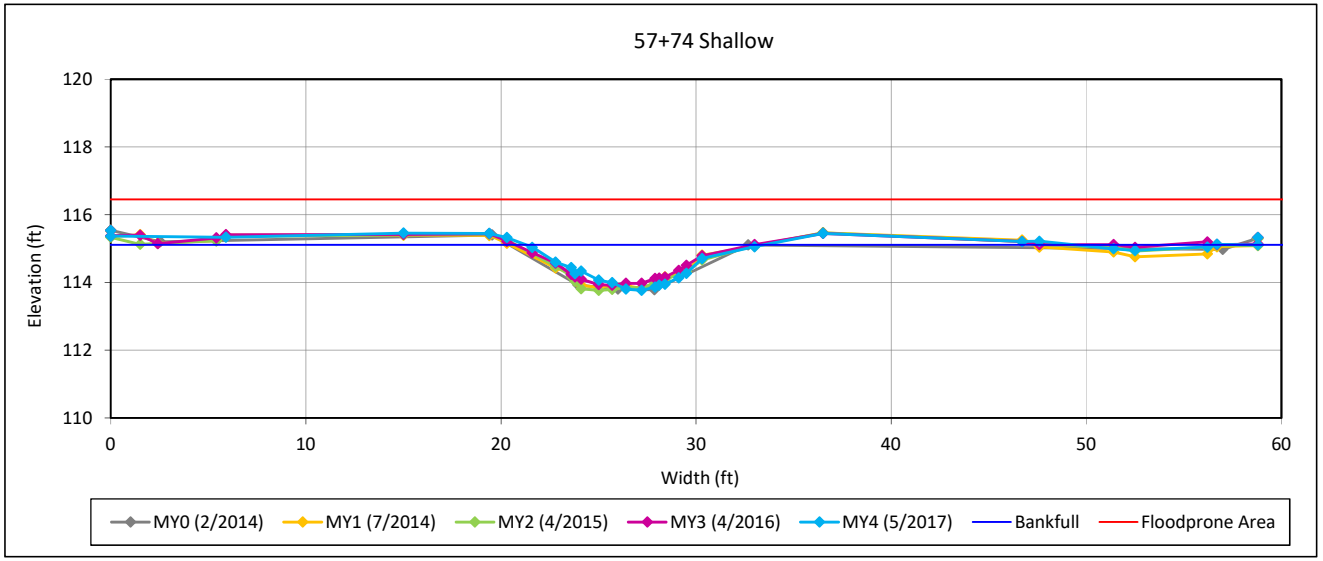
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 12-DRC East



Bankfull Dimensions	
8.4	x-section area (ft.sq.)
12.2	width (ft)
0.7	mean depth (ft)
1.3	max depth (ft)
12.6	wetted parimeter (ft)
0.7	hyd radi (ft)
17.6	width-depth ratio
300.0	W flood prone area (ft)
24.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

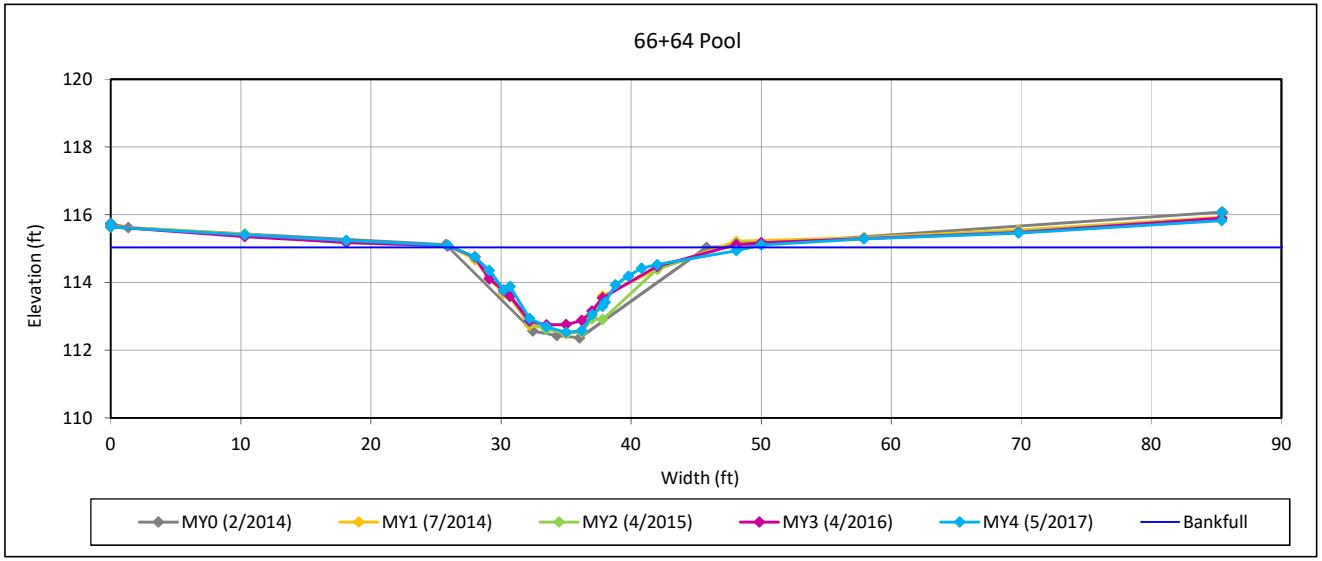
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 13-DRC East



Bankfull Dimensions	
23.2	x-section area (ft.sq.)
21.8	width (ft)
1.1	mean depth (ft)
2.5	max depth (ft)
22.8	wetted parimeter (ft)
1.0	hyd radi (ft)
20.5	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

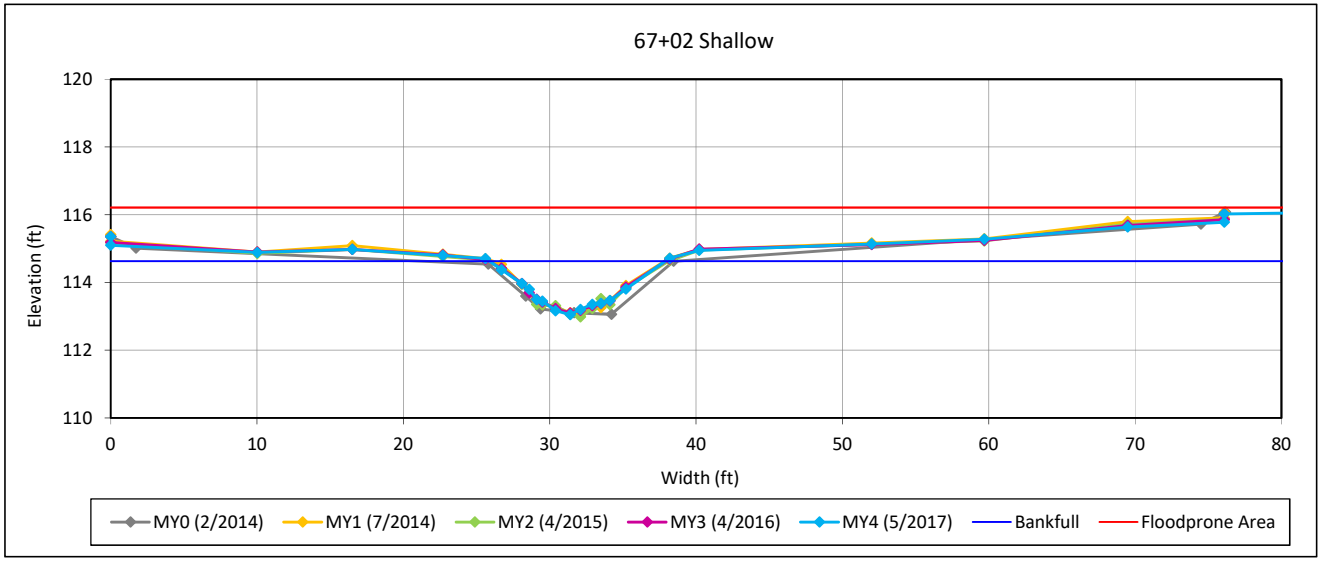
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 14-DRC East



Bankfull Dimensions	
10.6	x-section area (ft.sq.)
12.0	width (ft)
0.9	mean depth (ft)
1.6	max depth (ft)
12.5	wetted parimeter (ft)
0.8	hyd radi (ft)
13.7	width-depth ratio
300.0	W flood prone area (ft)
24.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

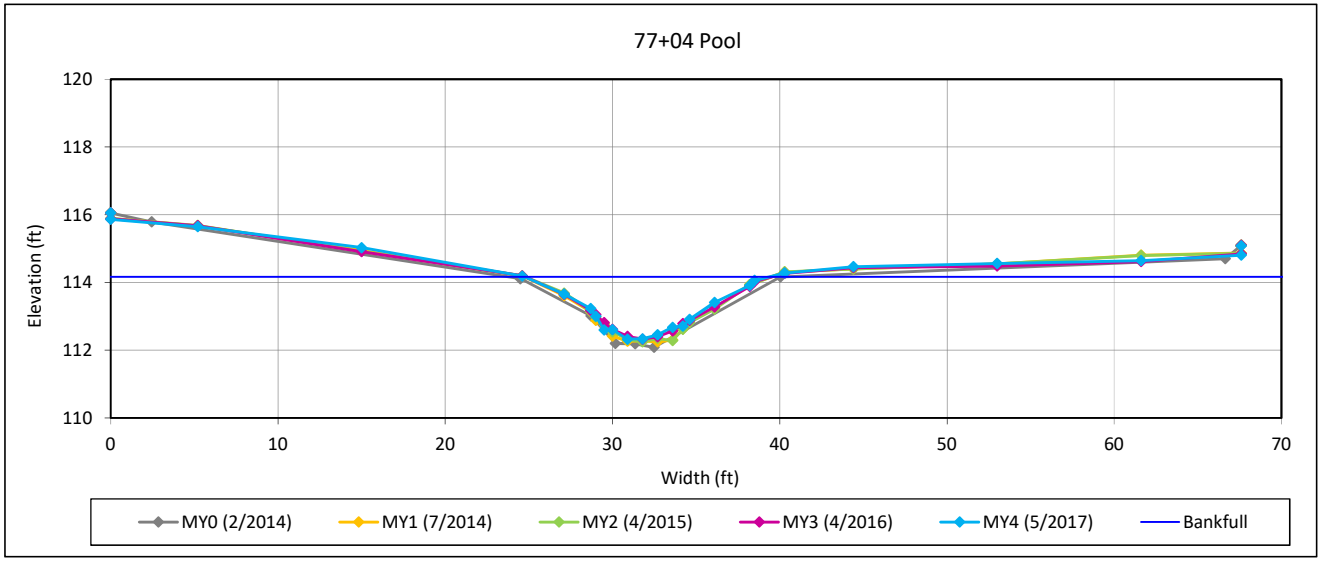
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 15-DRC East



Bankfull Dimensions	
13.3	x-section area (ft.sq.)
12.3	width (ft)
1.1	mean depth (ft)
1.8	max depth (ft)
12.9	wetted parimeter (ft)
1.0	hyd radi (ft)
11.4	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

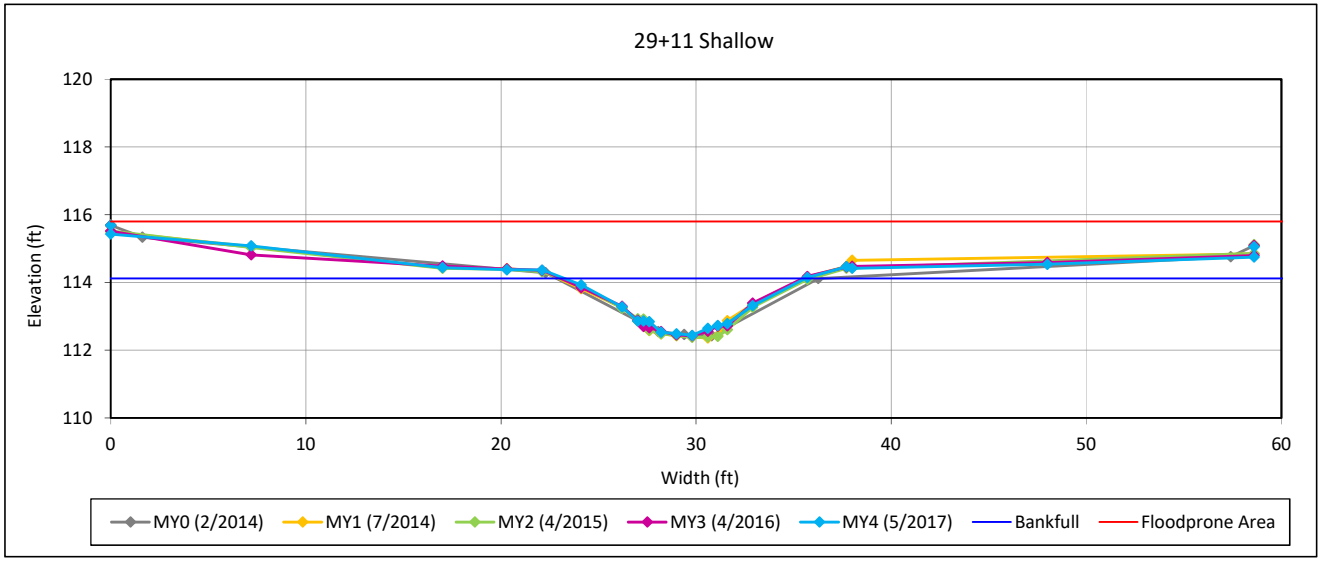
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 16-DRC East



Bankfull Dimensions	
11.3	x-section area (ft.sq.)
12.4	width (ft)
0.9	mean depth (ft)
1.7	max depth (ft)
12.9	wetted parimeter (ft)
0.9	hyd radi (ft)
13.5	width-depth ratio
300.0	W flood prone area (ft)
24.3	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

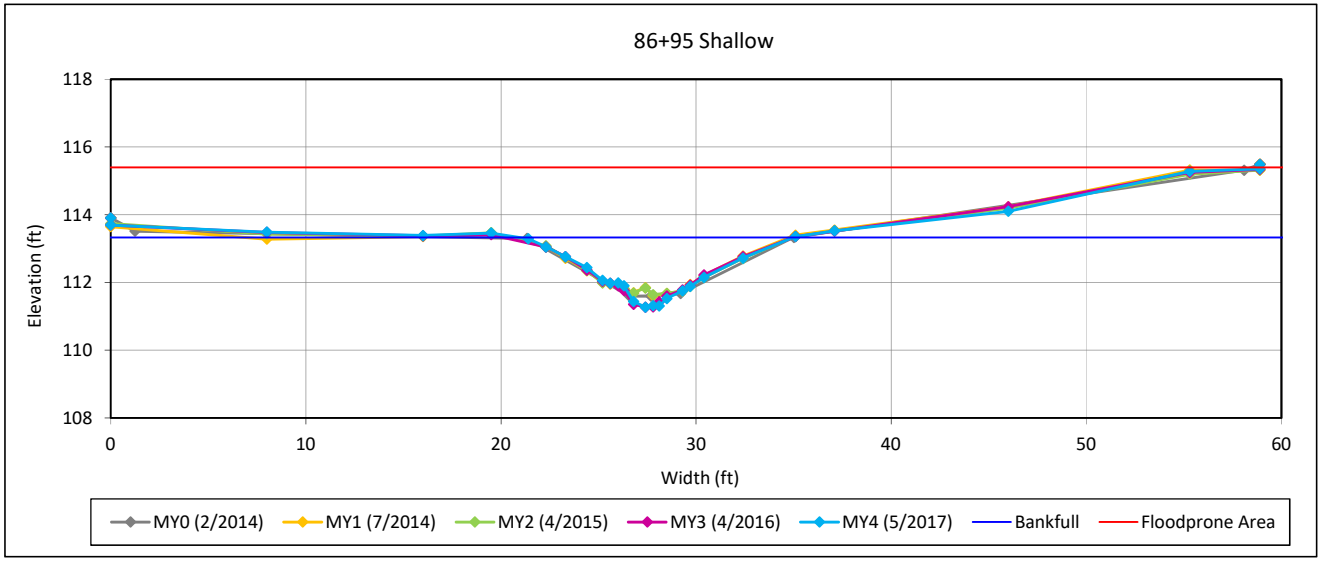
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 17-DRC East



Bankfull Dimensions	
13.4	x-section area (ft.sq.)
13.6	width (ft)
1.0	mean depth (ft)
2.1	max depth (ft)
14.3	wetted parimeter (ft)
0.9	hyd radi (ft)
13.8	width-depth ratio
300.0	W flood prone area (ft)
22.1	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

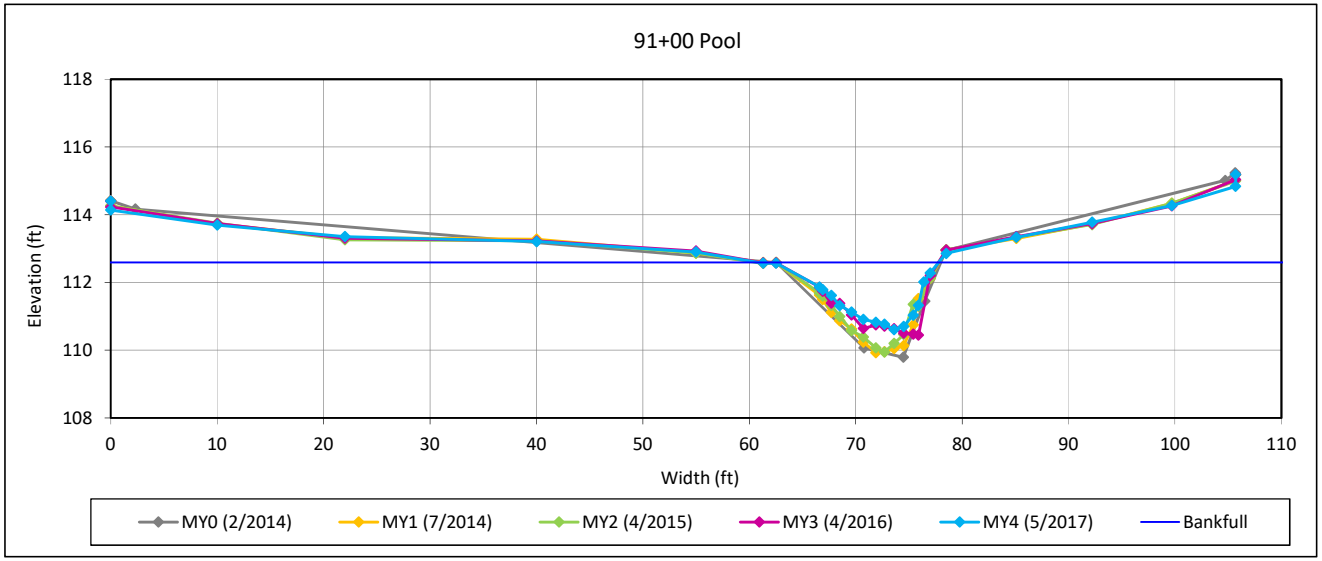
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 18-DRC East



Bankfull Dimensions

16.6	x-section area (ft.sq.)
15.3	width (ft)
1.1	mean depth (ft)
2.0	max depth (ft)
16.1	wetted parimeter (ft)
1.0	hyd radi (ft)
14.1	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

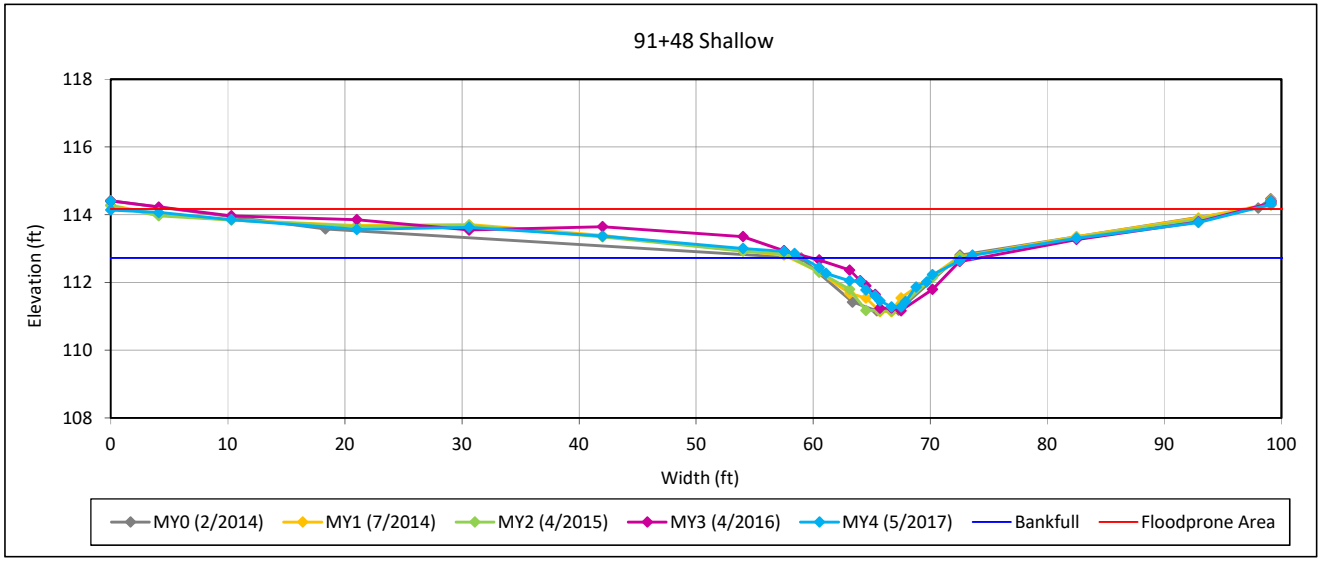
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 19-DRC East



Bankfull Dimensions	
9.6	x-section area (ft.sq.)
14.0	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
14.4	wetted parimeter (ft)
0.7	hyd radi (ft)
20.4	width-depth ratio
300.0	W flood prone area (ft)
21.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

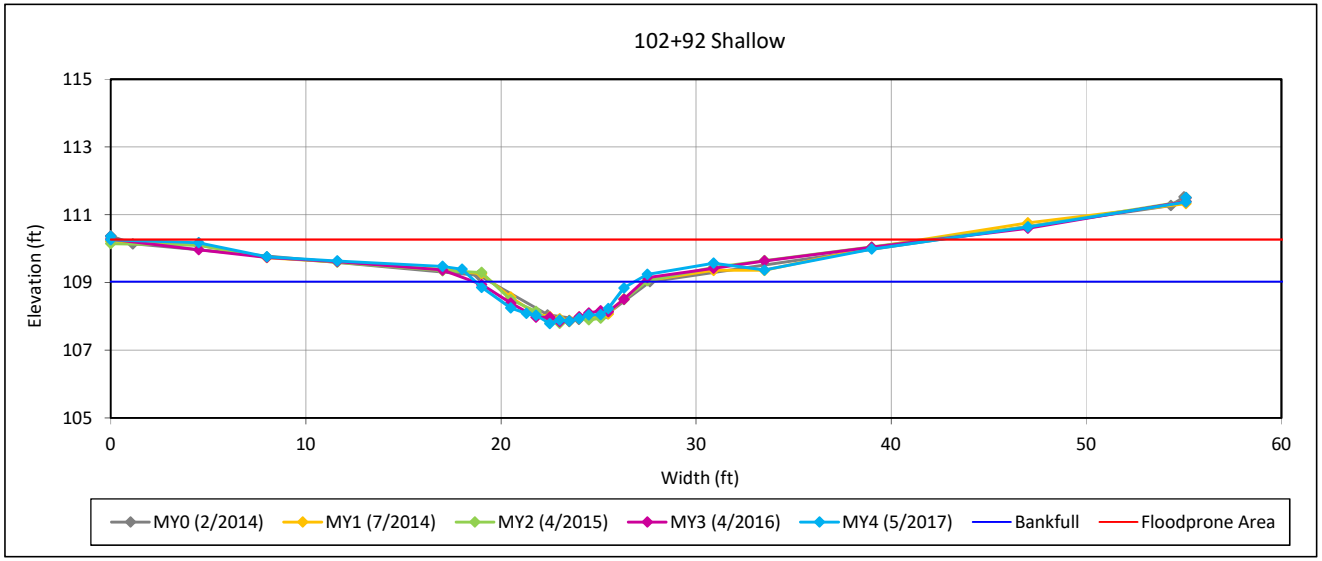
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 20-DRC East



Bankfull Dimensions	
6.3	x-section area (ft.sq.)
8.2	width (ft)
0.8	mean depth (ft)
1.2	max depth (ft)
8.7	wetted parimeter (ft)
0.7	hyd radi (ft)
10.6	width-depth ratio
300.0	W flood prone area (ft)
36.6	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

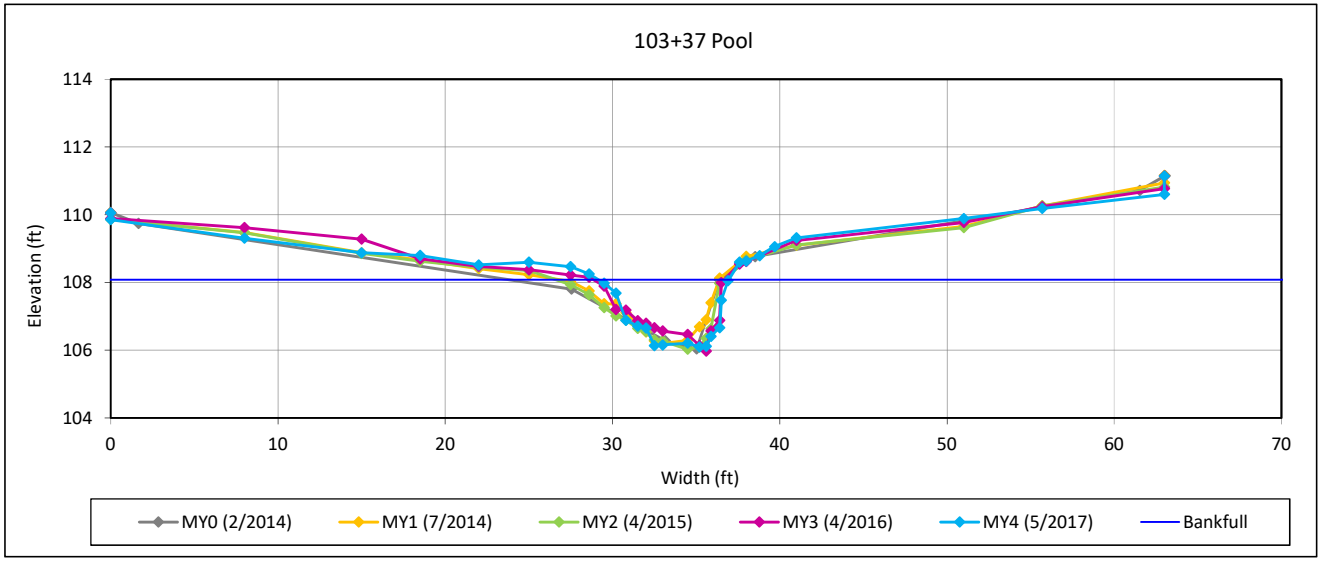
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 21-DRC East



Bankfull Dimensions	
10.6	x-section area (ft.sq.)
7.8	width (ft)
1.4	mean depth (ft)
2.0	max depth (ft)
9.7	wetted parimeter (ft)
1.1	hyd radi (ft)
5.7	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

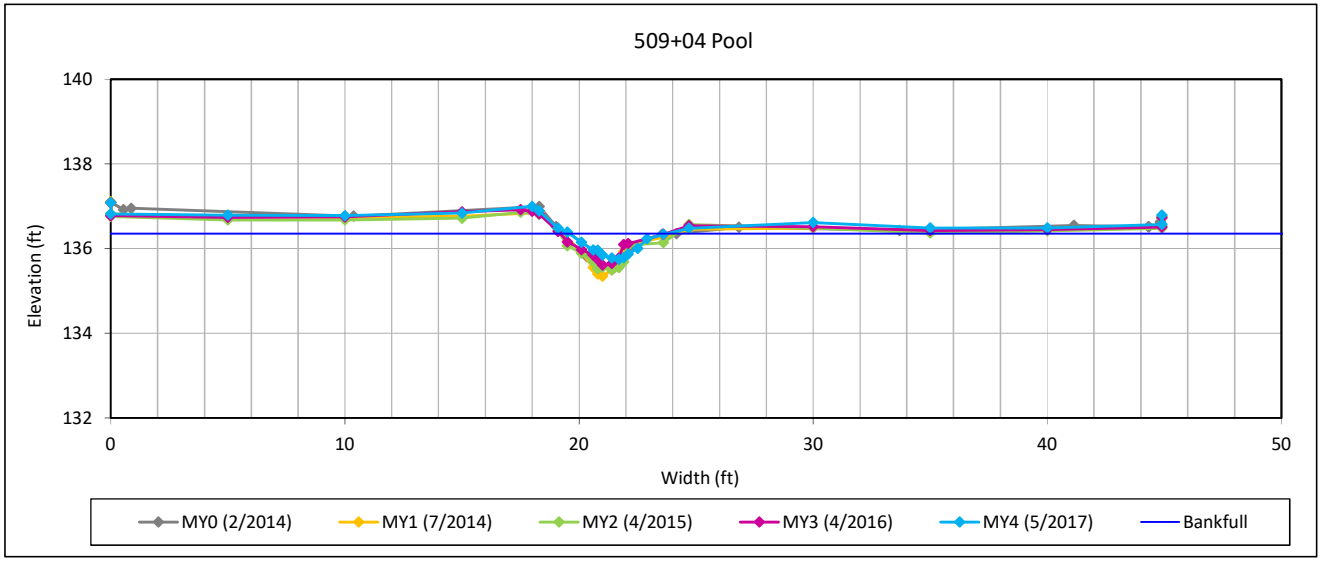
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 22-Southwest Branch



Bankfull Dimensions	
1.3	x-section area (ft.sq.)
4.2	width (ft)
0.3	mean depth (ft)
0.6	max depth (ft)
4.4	wetted parimeter (ft)
0.3	hyd radi (ft)
13.2	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

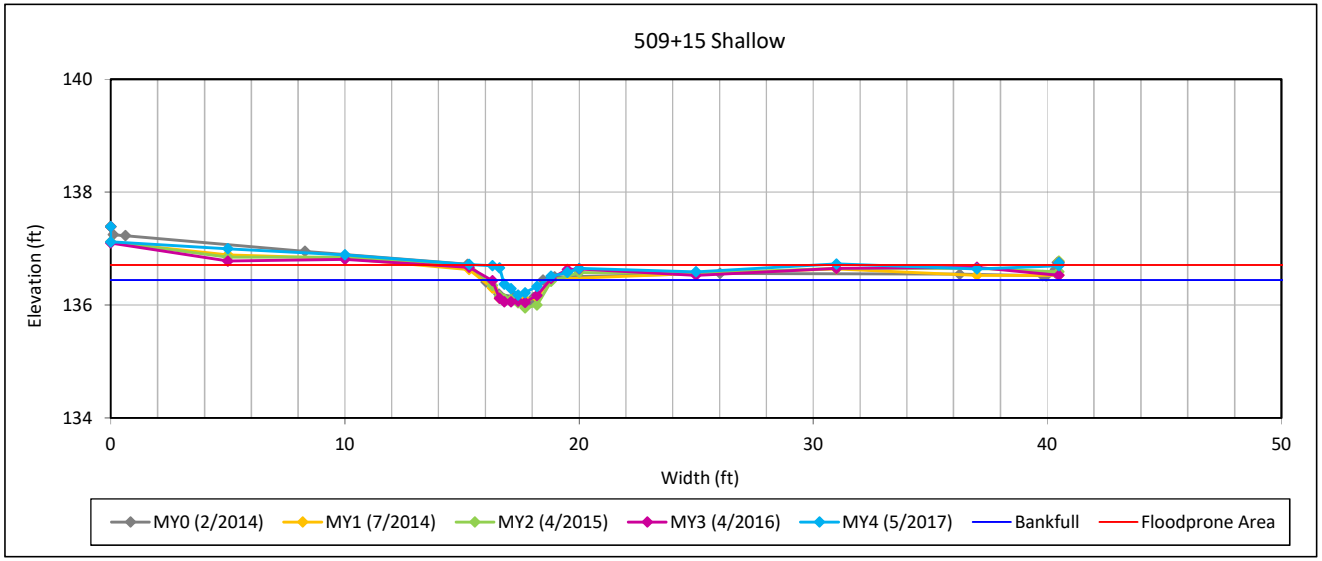
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 23-Southwest Branch



Bankfull Dimensions	
0.3	x-section area (ft.sq.)
1.8	width (ft)
0.2	mean depth (ft)
0.3	max depth (ft)
1.9	wetted parimeter (ft)
0.1	hyd radi (ft)
12.0	width-depth ratio
200.0	W flood prone area (ft)
108.7	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

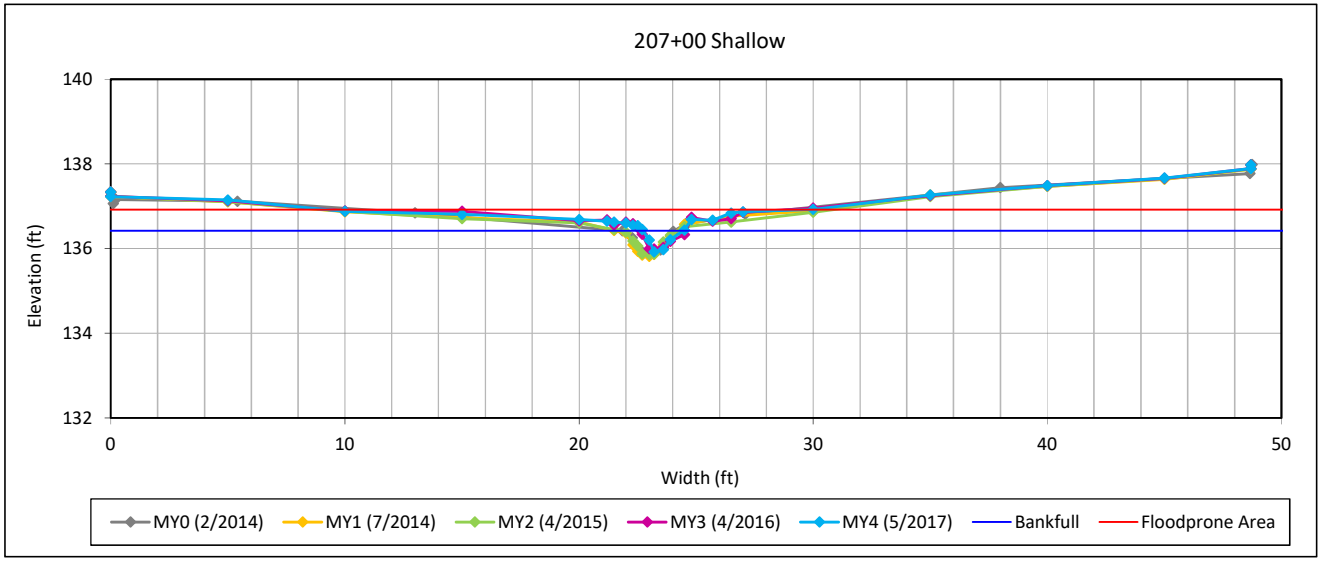
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 24-Middle Branch



Bankfull Dimensions	
0.4	x-section area (ft.sq.)
1.2	width (ft)
0.3	mean depth (ft)
0.5	max depth (ft)
1.5	wetted parimeter (ft)
0.3	hyd radi (ft)
3.5	width-depth ratio
50.0	W flood prone area (ft)
42.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

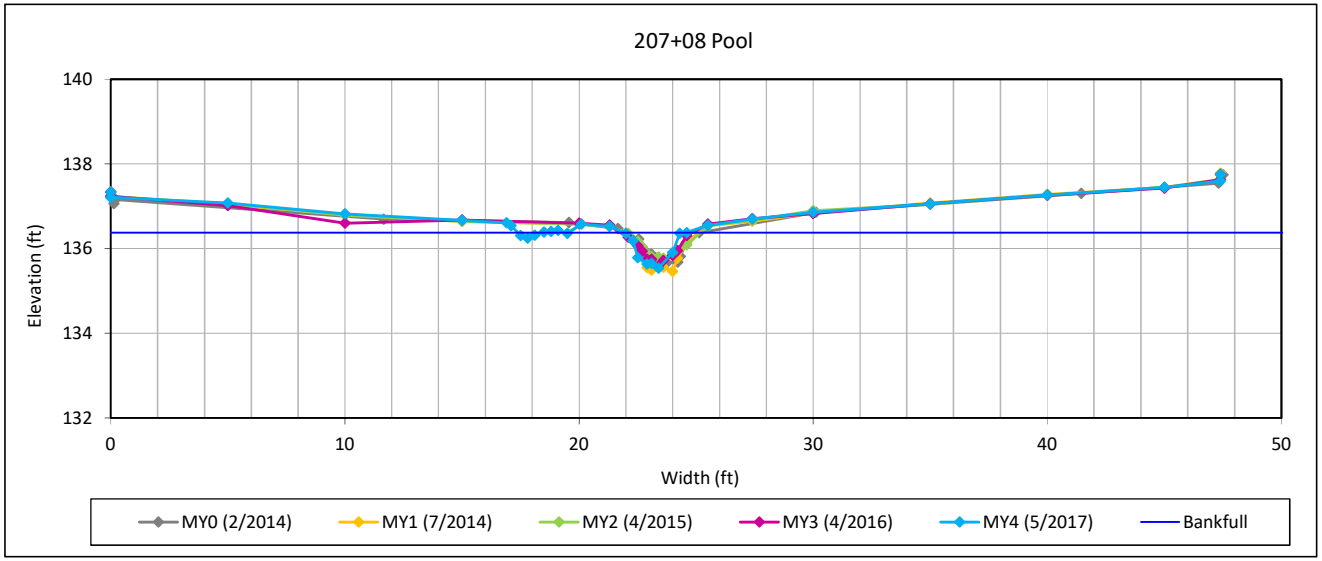
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 25-Middle Branch



Bankfull Dimensions

1.2	x-section area (ft.sq.)
2.7	width (ft)
0.5	mean depth (ft)
0.8	max depth (ft)
3.4	wetted parimeter (ft)
0.4	hyd radi (ft)
5.8	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

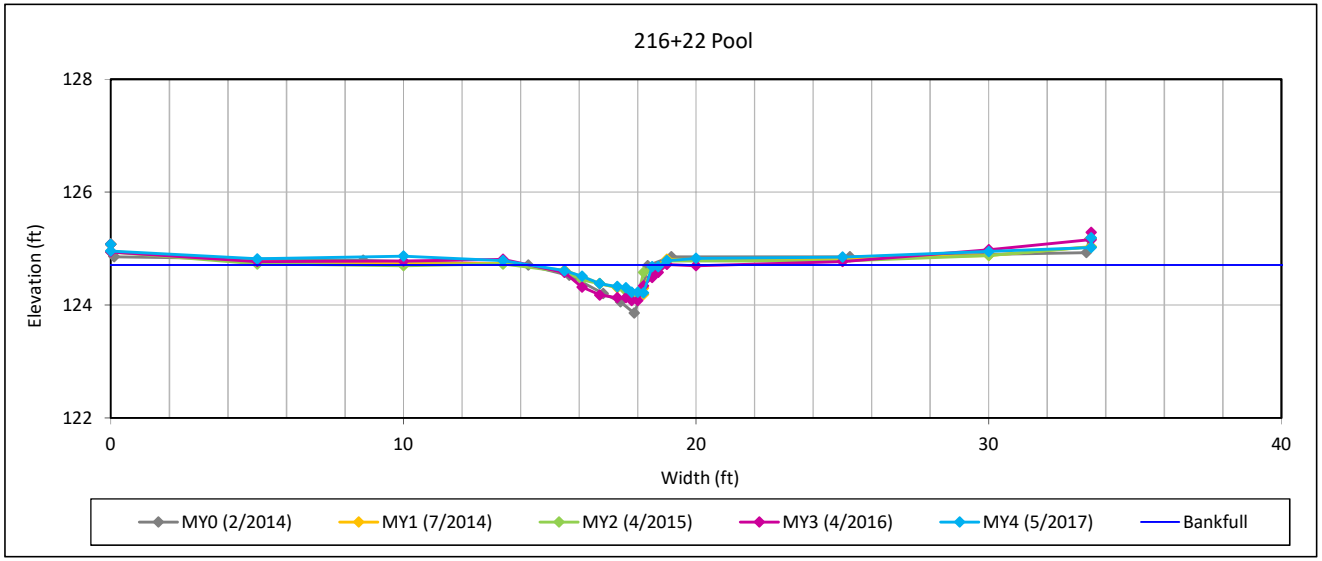
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 26-Middle Branch



Bankfull Dimensions	
1.0	x-section area (ft.sq.)
4.4	width (ft)
0.2	mean depth (ft)
0.5	max depth (ft)
4.7	wetted parimeter (ft)
0.2	hyd radi (ft)
19.7	width-depth ratio

Survey Date: 5/2017
Field Crew: Wildlands Engineering

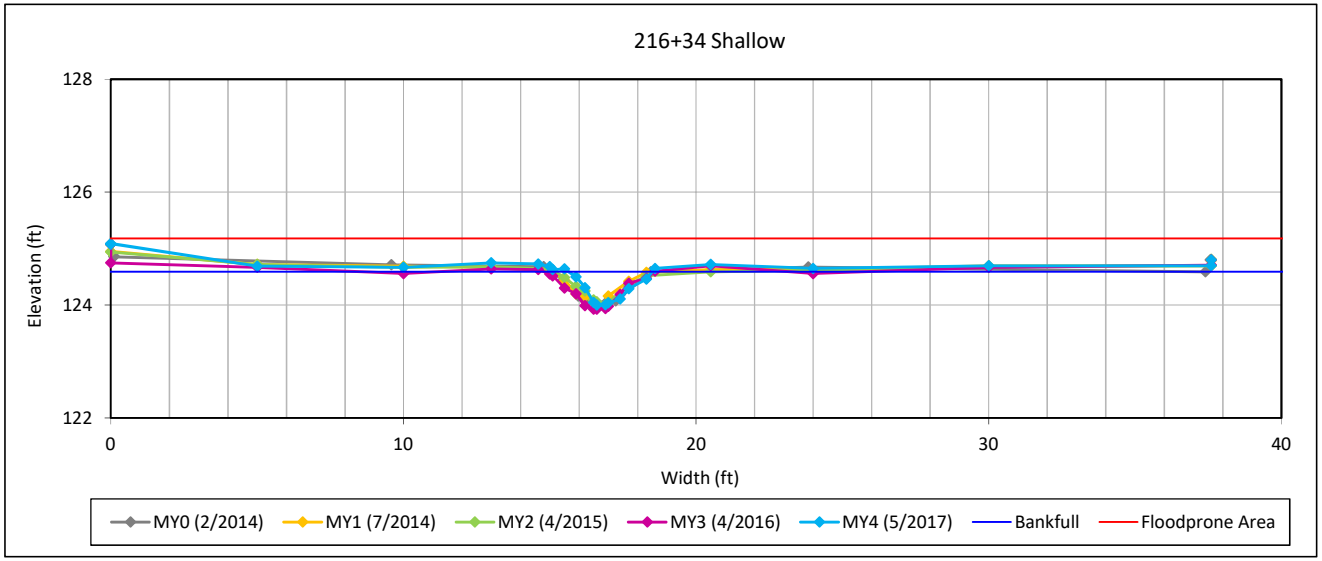
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 27-Middle Branch



Bankfull Dimensions	
0.9	x-section area (ft.sq.)
2.9	width (ft)
0.3	mean depth (ft)
0.6	max depth (ft)
3.2	wetted parimeter (ft)
0.3	hyd radi (ft)
8.7	width-depth ratio
200.0	W flood prone area (ft)
69.8	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

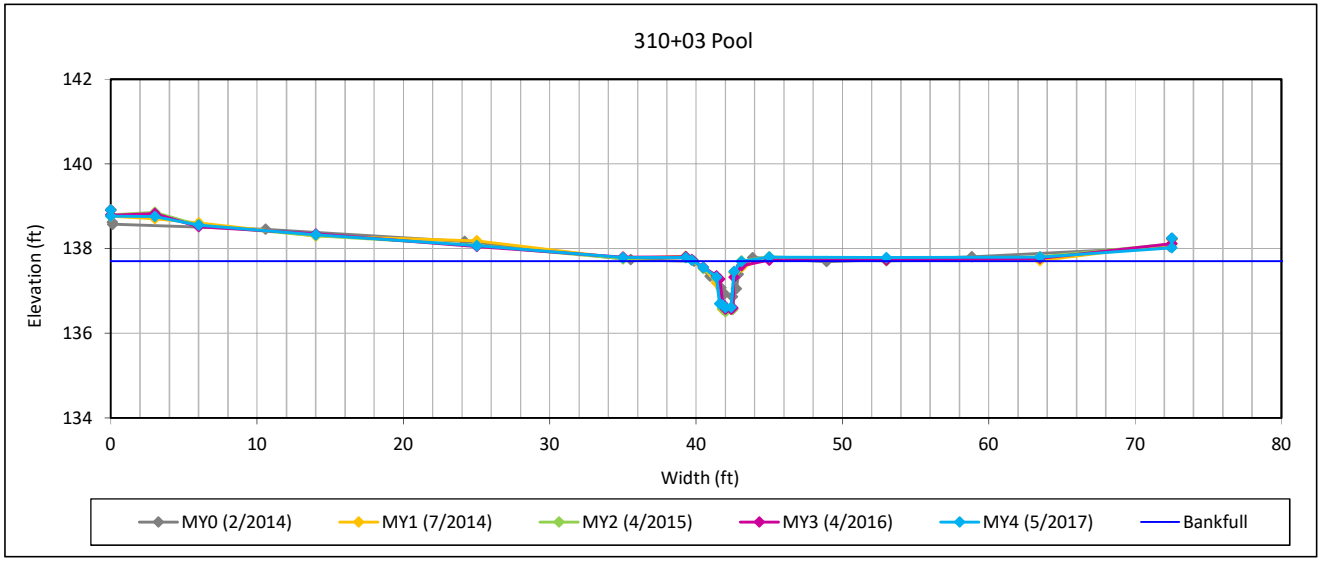
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 28-Southeast Branch



Bankfull Dimensions	
1.5	x-section area (ft.sq.)
3.3	width (ft)
0.4	mean depth (ft)
1.1	max depth (ft)
4.5	wetted parimeter (ft)
0.3	hyd radi (ft)
7.3	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

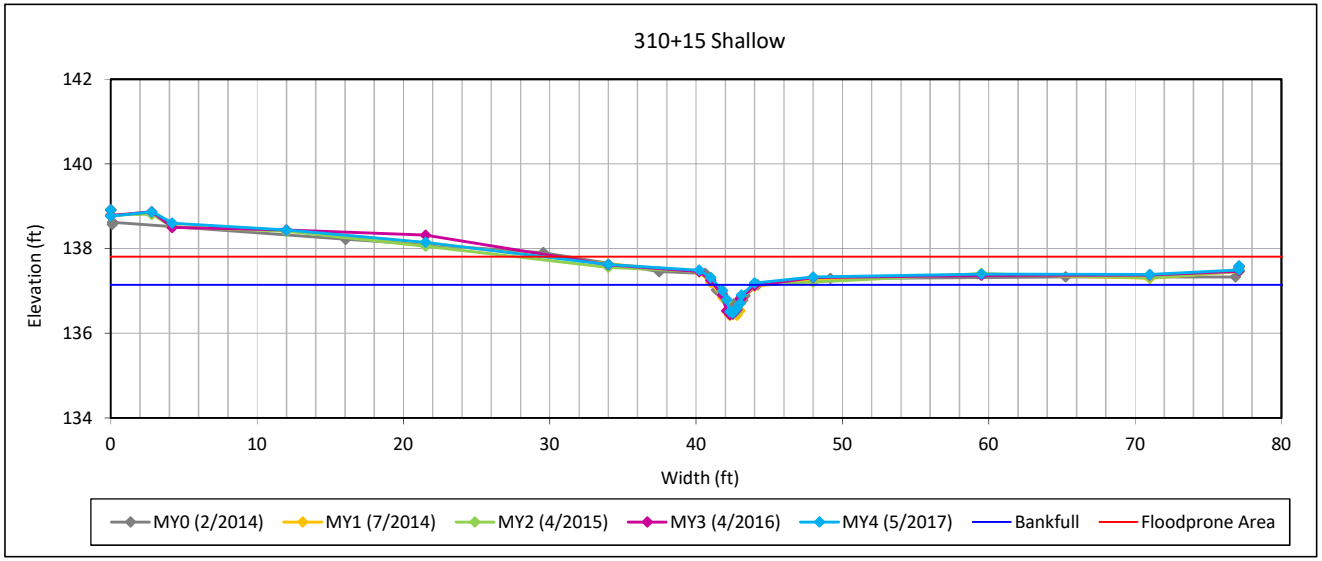
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 29-Southeast Branch



Bankfull Dimensions	
0.7	x-section area (ft.sq.)
2.4	width (ft)
0.3	mean depth (ft)
0.7	max depth (ft)
2.9	wetted parimeter (ft)
0.3	hyd radi (ft)
7.9	width-depth ratio
30.0	W flood prone area (ft)
12.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

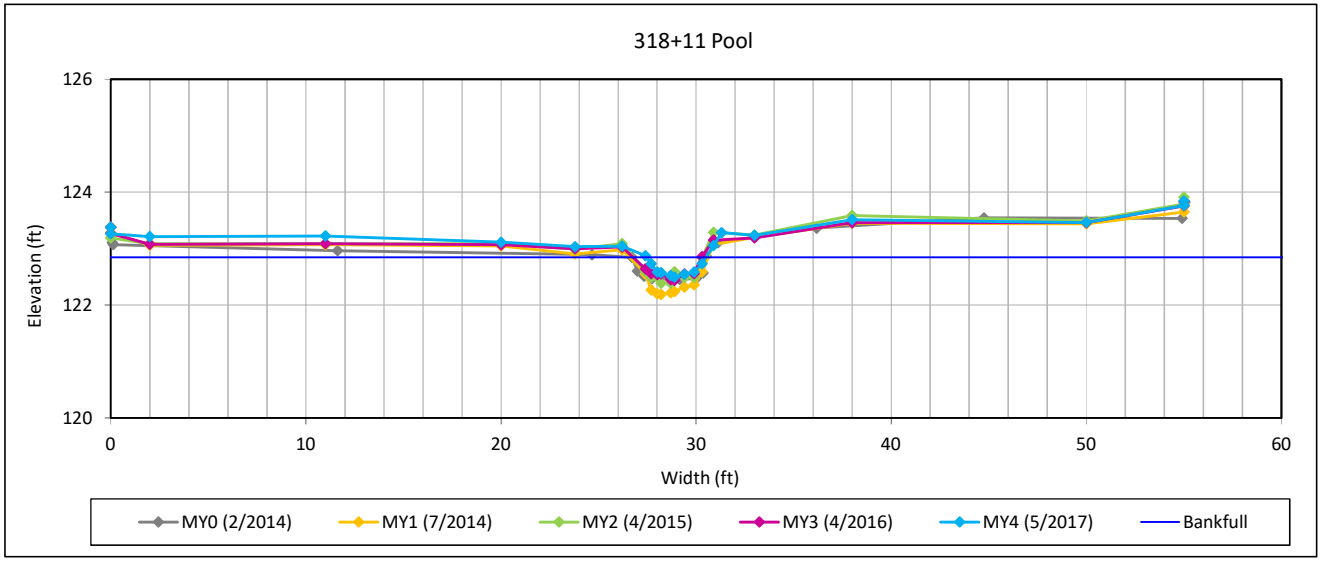
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 30-Southeast Branch



Bankfull Dimensions

0.7	x-section area (ft.sq.)
3.0	width (ft)
0.2	mean depth (ft)
0.4	max depth (ft)
3.2	wetted parimeter (ft)
0.2	hyd radi (ft)
12.7	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

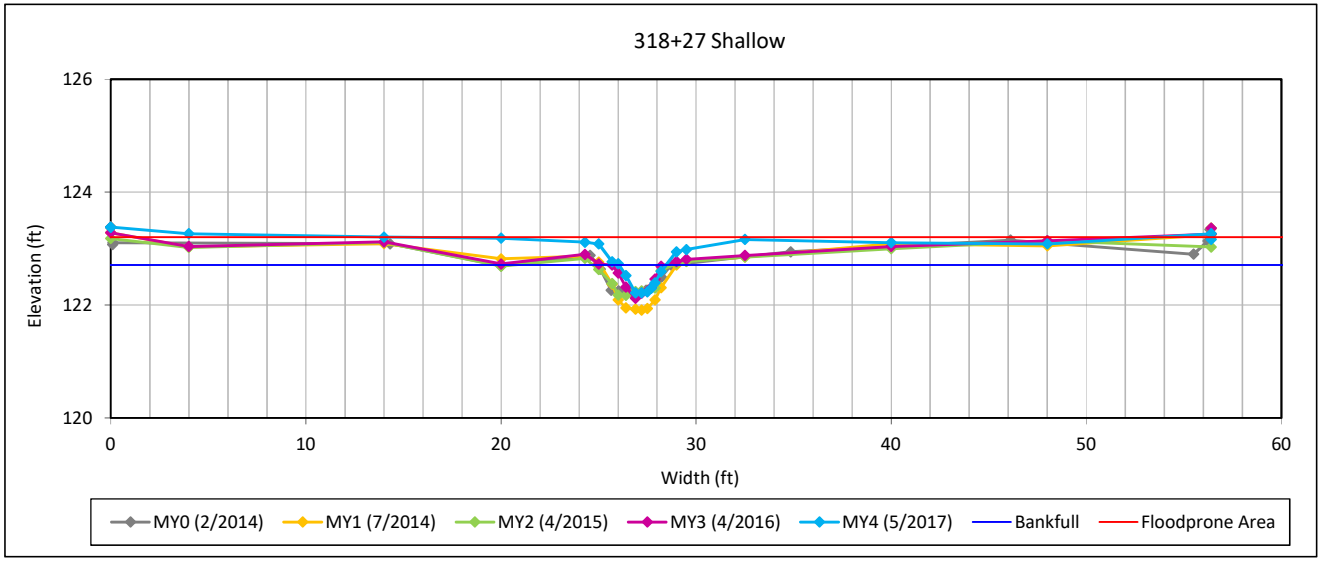
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 31-Southeast Branch



Bankfull Dimensions	
0.7	x-section area (ft.sq.)
2.4	width (ft)
0.3	mean depth (ft)
0.5	max depth (ft)
2.7	wetted parimeter (ft)
0.3	hyd radi (ft)
7.9	width-depth ratio
60.0	W flood prone area (ft)
24.9	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

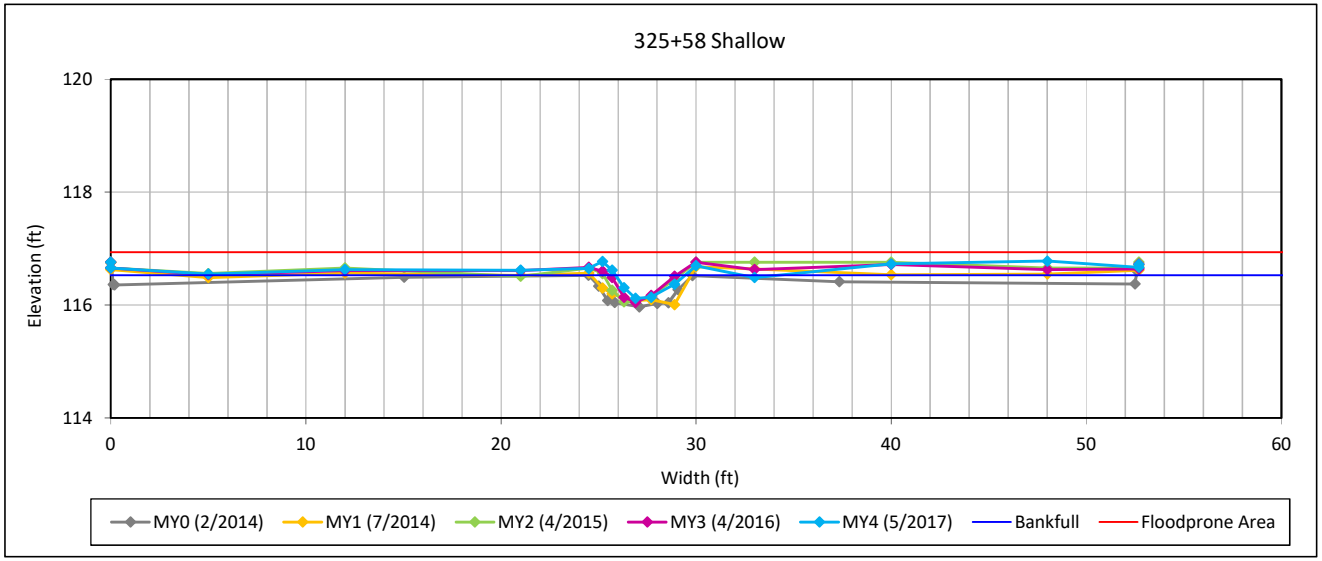
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 32-Southeast Branch



Bankfull Dimensions	
0.9	x-section area (ft.sq.)
3.5	width (ft)
0.3	mean depth (ft)
0.4	max depth (ft)
3.7	wetted parimeter (ft)
0.3	hyd radi (ft)
13.7	width-depth ratio
200.0	W flood prone area (ft)
56.4	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

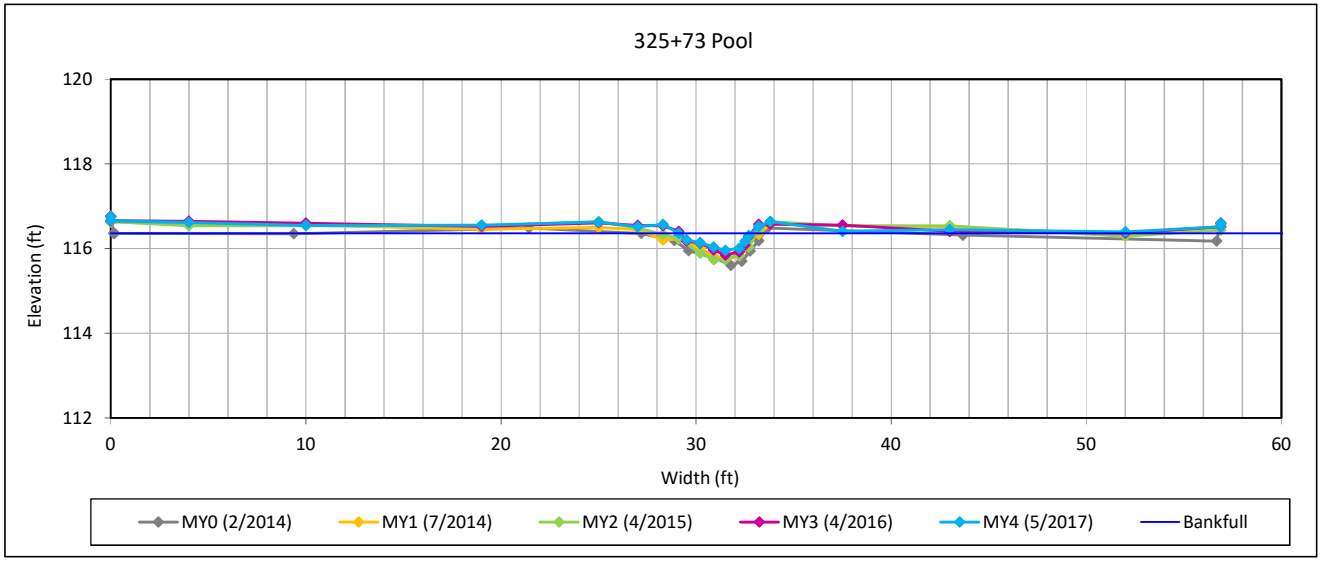
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 33-Southeast Branch



Bankfull Dimensions

0.9	x-section area (ft.sq.)
3.7	width (ft)
0.3	mean depth (ft)
0.4	max depth (ft)
3.9	wetted parimeter (ft)
0.2	hyd radi (ft)
14.7	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

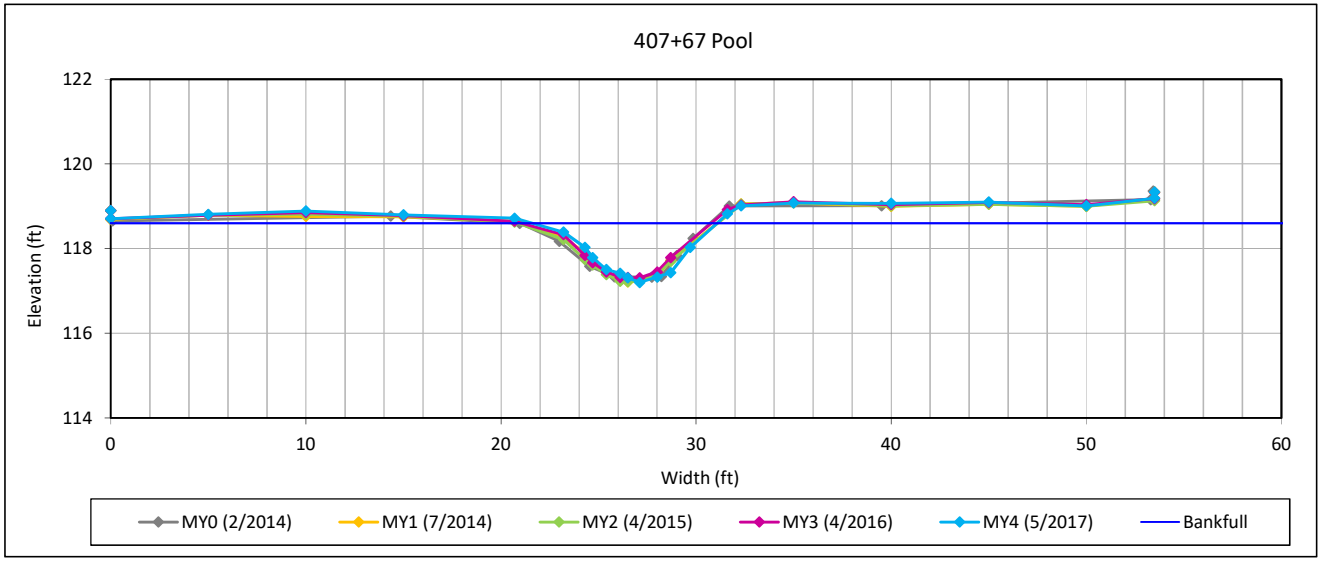
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 34-North Branch



Bankfull Dimensions	
6.9	x-section area (ft.sq.)
9.5	width (ft)
0.7	mean depth (ft)
1.4	max depth (ft)
10.0	wetted parimeter (ft)
0.7	hyd radi (ft)
12.9	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

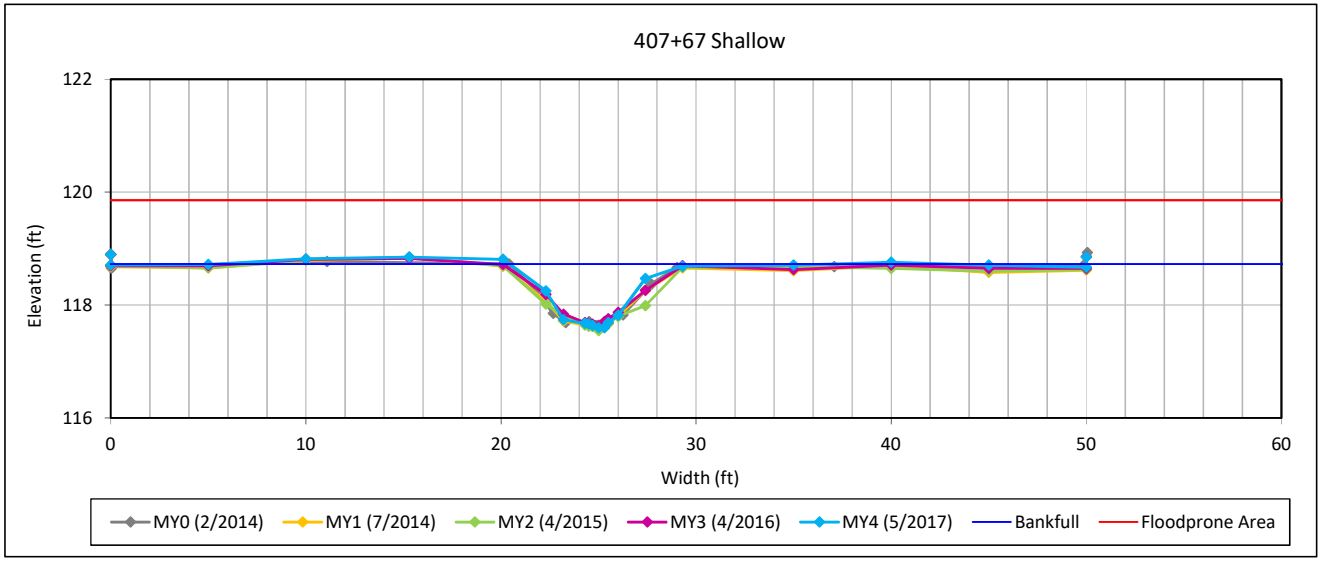
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 35-North Branch



Bankfull Dimensions	
5.1	x-section area (ft.sq.)
8.9	width (ft)
0.6	mean depth (ft)
1.1	max depth (ft)
9.3	wetted parimeter (ft)
0.6	hyd radi (ft)
15.4	width-depth ratio
200.0	W flood prone area (ft)
22.5	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

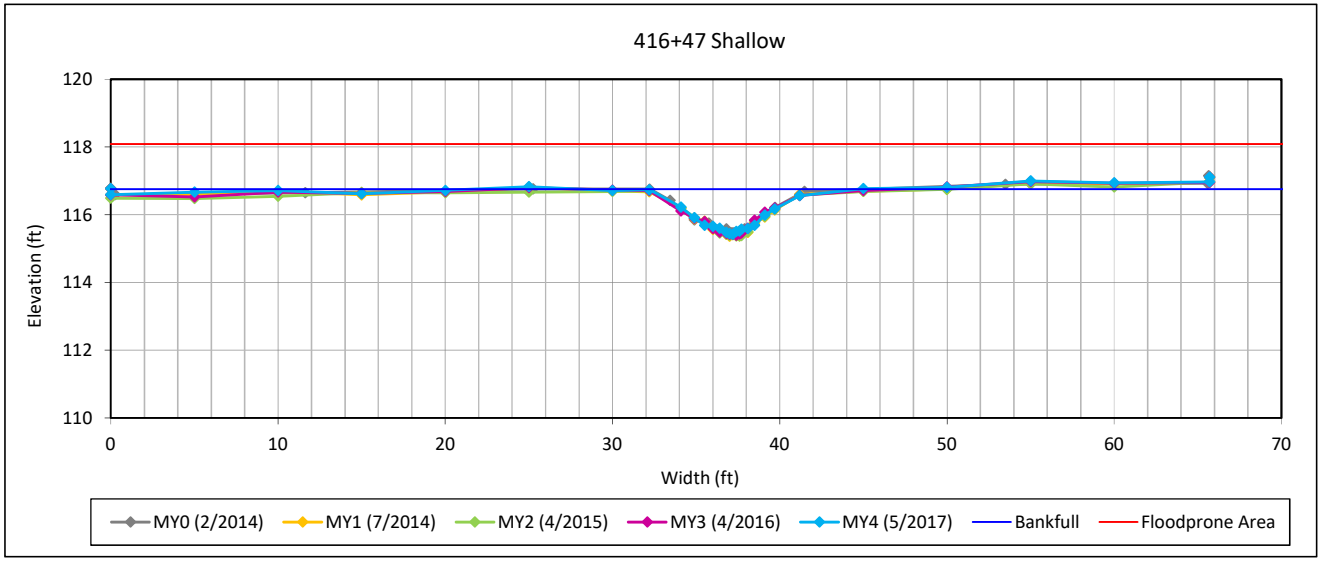
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 36-North Branch



Bankfull Dimensions	
6.7	x-section area (ft.sq.)
9.0	width (ft)
0.7	mean depth (ft)
1.3	max depth (ft)
9.4	wetted parimeter (ft)
0.7	hyd radi (ft)
12.0	width-depth ratio
200.0	W flood prone area (ft)
22.2	entrenchment ratio
1.0	low bank height ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

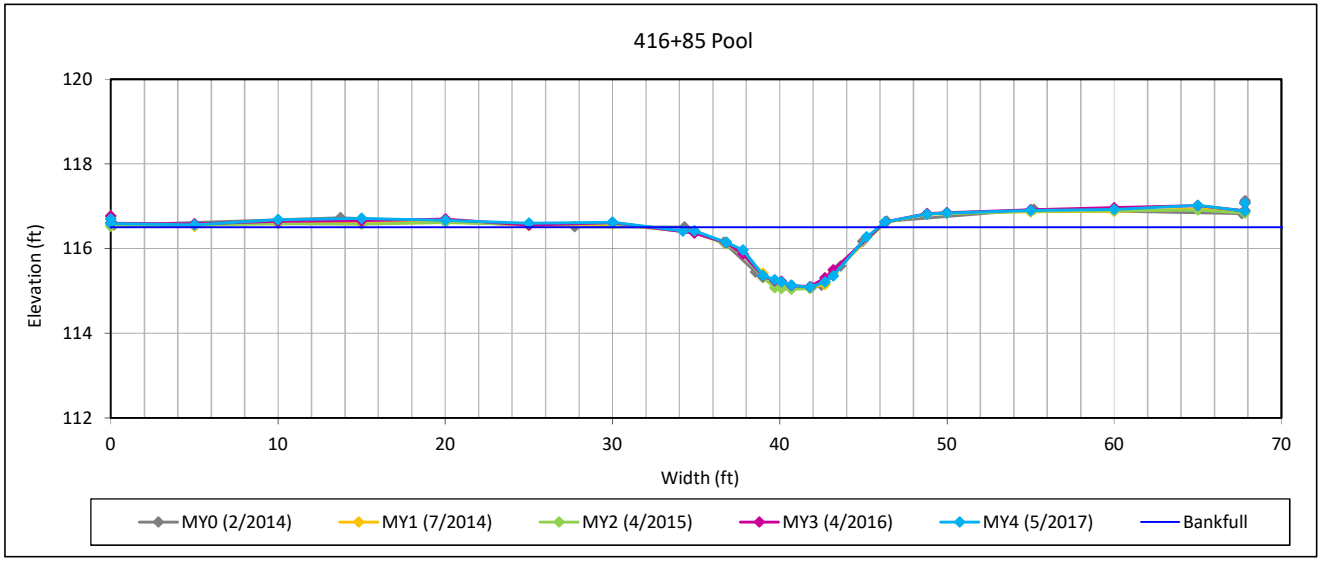
View Downstream

Cross Section Plots

Devil's Racetrack Mitigtion Site (DMS Project No. 95021)

Monitoring Year 4 - 2017

Cross Section 37-North Branch



Bankfull Dimensions

8.9	x-section area (ft.sq.)
11.7	width (ft)
0.8	mean depth (ft)
1.4	max depth (ft)
12.2	wetted parimeter (ft)
0.7	hyd radi (ft)
15.4	width-depth ratio

Survey Date: 5/2017

Field Crew: Wildlands Engineering

View Downstream

APPENDIX 5. Hydrology Summary Data and Plots

Table 13. Verification of Bankfull Events
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

Reach	Date of Data Collection	Date of Occurrence	Method
Devil's Racetrach (West)	4/19/2017	3/14/2017	Crest Gage/ Pressure Transducer
	5/17/2017	4/25/2017	
	7/10/2017	5/24/2017	
	7/10/2017	6/15/2017	
Devil's Racetrach (East)	4/19/2017	3/14/2017	
	5/17/2017	4/25/2017	
	7/10/2017	5/24/2017	
Southwest Branch	5/17/2017	4/25/2017	
	7/10/2017	5/24/2017	
Middle Branch	5/17/2017	4/25/2017	
	7/10/2017	5/24/2017	
Southeast Branch	4/19/2017	3/14/2017	
	5/17/2017	4/25/2017	
North Branch	5/17/2017	4/25/2017	
	7/10/2017	5/24/2017	

Table 14. Wetland Gage Attainment Summary
Devil's Racetrack Mitigation Site (DMS Project No. 95021)
Monitoring Year 4 - 2017

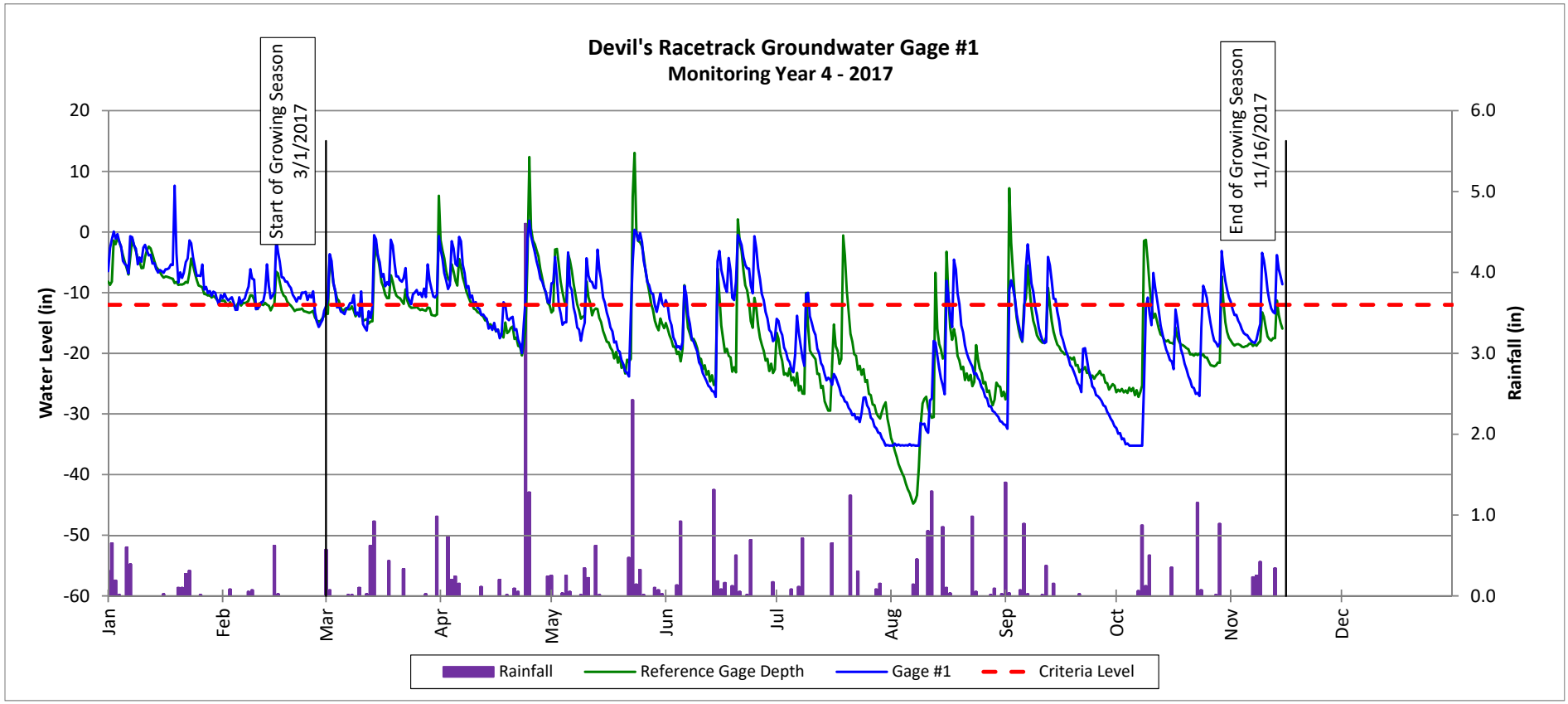
Summary of Groundwater Gage Results for Monitoring Years 1 through 7							
Gage	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)						
	Year 1 (2014)*	Year 2 (2015)	Year 3 (2016)	Year 4 (2017)	Year 5 (2018)	Year 6 (2019)	Year 7 (2020)
1	No/7.5 Days (3.1%)	No/16 Days (6.0%)	Yes/31 Days (11.9%)	Yes/28 Days (10.8%)			
2	No/14.5 Days (6.0%)	Yes/ 58 Days (22.3%)	No/21 Days (8.1%)	No/15 Days (5.8%)			
3	No/2.5 Days (1.0%)	Yes/33 Days (12.8%)	No/9 Days (3.5%)	No/11 Days (4.2%)			
4	No/13.5 Days (5.6%)	Yes/57 Days (21.9%)	Yes/25 Days (9.6%)	Yes/30 Days (11.5%)			
5	No/12.5 Days (5.2%)	Yes/34 Days (13.0%)	No/18 Days (6.9%)	No/12 Days (4.6%)			
6	No/11.0 Days (4.6%)	Yes/53 Days (20.3%)	Yes/23 Days (8.8%)	No/13 Days (5.0%)			
7	Yes/21.5 Days (9.0%)	Yes/66 Days (25.6%)	Yes/25 Days (9.6%)	Yes/23 Days (8.8%)			
8	No/5.0 Days (2.1%)	Yes/31 Days (12.0%)	No/8 Days (3.1%)	No/10 Days (3.8%)			
9	Yes/ 22.0 Days (9.2%)	Yes/80 Days (31.0%)	Yes/ 39.0 Days (15.0%)	Yes/28 Days (10.8%)			
10	No/ 1.5 Days (0.6%)	No/10 Days (3.9%)	No/ 3 Days (1.2%)	No/3 Days (1.2%)			
11	No/9.0 Days (3.8%)	Yes/65 Days (25.2%)	Yes/23 Days (8.8%)	Yes/31 Days (11.9%)			
12	No/7.5 Days (3.1%)	Yes/31 Days (12.0%)	No/13 Days (5.0%)	Yes/30 Days (11.5%)			
13	No/8.0 Days (3.3%)	Yes/34 Days (13.0%)	No/11 Days (4.2%)	No/10 Days (3.8%)			
14	No/ 8.5 Days (3.5%)	Yes/32 Days (12.4%)	No/12 Days (4.6%)	No/12 Days (4.6%)			
15	No/12.5 Days (5.2%)	Yes/33 Days (12.8%)	No/14 Days (5.4%)	Yes/30 Days (11.5%)			
16	No/12.5 Days (5.2%)	Yes/33 Days (12.8%)	Yes/39 Days (15%)	Yes/29 Days (11.2%)			
17	No/15.0 Days (6.3%)	Yes/34 Days (13.2%)	Yes/23 Days (8.8%)	No/16 Days (6.2%)			
18	Yes/69.5 Days (29.0%)	Yes/66 Days (25.6%)	Yes/22 Days (8.5%)	No/14 Days (5.4%)			
19	Yes/31.5 Days (13.1%)	Yes/66 Days (25.6%)	Yes/26 Days (10.0%)	Yes/30 Days (11.5%)			
20	No/19.5 Days (8.1%)	Yes/35 Days (13.4%)	No/12 Days (4.6%)	No/5 Days (1.9%)			
21	Yes/69.5 Days (29.0%)	Yes/79 Days (30.4%)	Yes/38 Days (14.6%)	Yes/31 Days (11.9%)			
22	Yes/ 31.0 Days (12.9%)	Yes/66 Days (25.6%)	Yes/24 Days (9.2%)	No/16 Days (6.2%)			
23	No/8.0 Days (3.3%)	Yes/31 Days (11.8%)	No/6 Days (2.3%)	No/5 Days (1.9%)			
24	No/13.0 Days (5.4%)	Yes/33 Days (12.8%)	No/ 5 Days (1.9%)	No/9 Days (3.5%)			
25	Yes/25.5 Days (10.6%)	Yes/66 Days (25.6%)	Yes/23 Days (8.8%)	No/16 Days (6.2%)			
26	Yes/39.0 Days (16.3%)	Yes/83 Days (32.2%)	Yes/25 Days (9.6%)	No/14 Days (5.4%)			
27	Yes/29.5 Days (12.3%)	Yes/67 Days (26.0%)	Yes/31 Days (11.9%)	Yes/32 Days (12.3%)			
28	No/19.5 Days (8.1%)	Yes/81 Days (31.2%)	Yes/106 Days (40.8%)	Yes/102 Days (39.2%)			
29	Yes/70.0 Days (29.2%)	Yes/81 Days (31.4%)	Yes/56 Days (21.5%)	Yes/78 Days (30.0%)			
30	Yes/52.5 Days (21.9%)	Yes/83 Days (32.0%)	No/11 Days (4.2%)	No/9 Days (3.5%)			
31	No/9.0 Days (3.8%)	Yes/77 Days (29.7%)	Yes/40 Days (15.4%)	Yes/32 Days (12.3%)			
32	No/ 7.0 Days (2.9%)	Yes/78 Days (30.2%)	No/11 Days (4.2%)	No/3 Days (1.2%)			
33	Yes/69.5 Days (29.0%)	Yes/84 Days (32.4%)	Yes/51 Days (19.6%)	Yes/46 Days (17.7%)			
34	No/2.0 Days (0.8%)	No/16 Days (6.0%)	No/10 Days (3.8%)	No/4 Days (1.5%)			
35	Added During MY2	Yes/33 Days (12.8%)	Yes/42 Days (16.2%)	Yes/31 Days (11.9%)			
36	Added During MY2	Yes/34 Days (13.0%)	Yes/40 Days (15.4%)	Yes/31 Days (11.9%)			
37	Added During MY2	Yes/33 Days (12.8%)	Yes/22 Days (8.5%)	No/15 Days (5.8%)			
38	Added During MY2	Yes/33 Days (12.8%)	No/6 Days (2.3%)	No/11 Days (4.2%)			

* NRCS WETS data was used to determine the growing season for monitorg year 1. After discussions with the US Army Corps of Engineers, on-site soil temperature probe data is being used to determine the beginning of the growing season.

Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

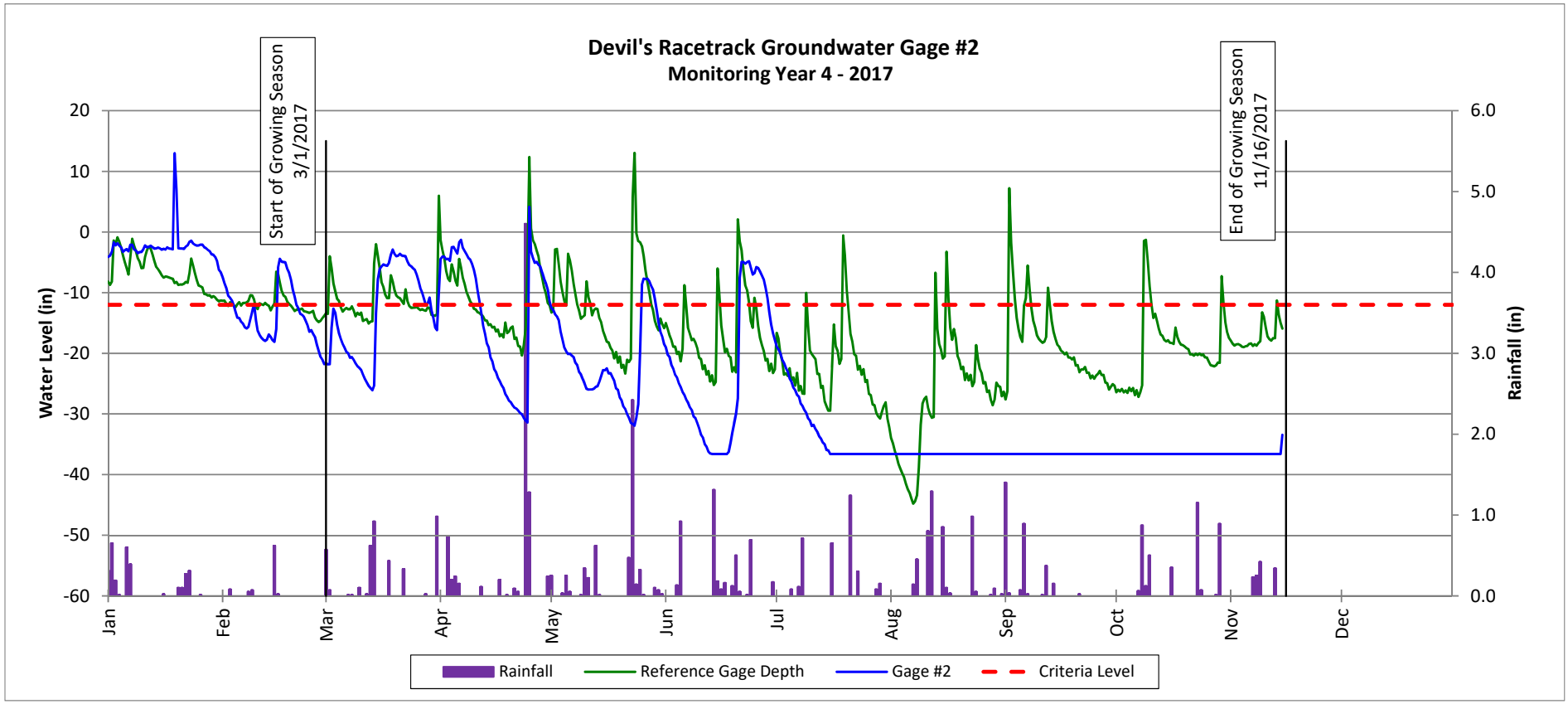
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

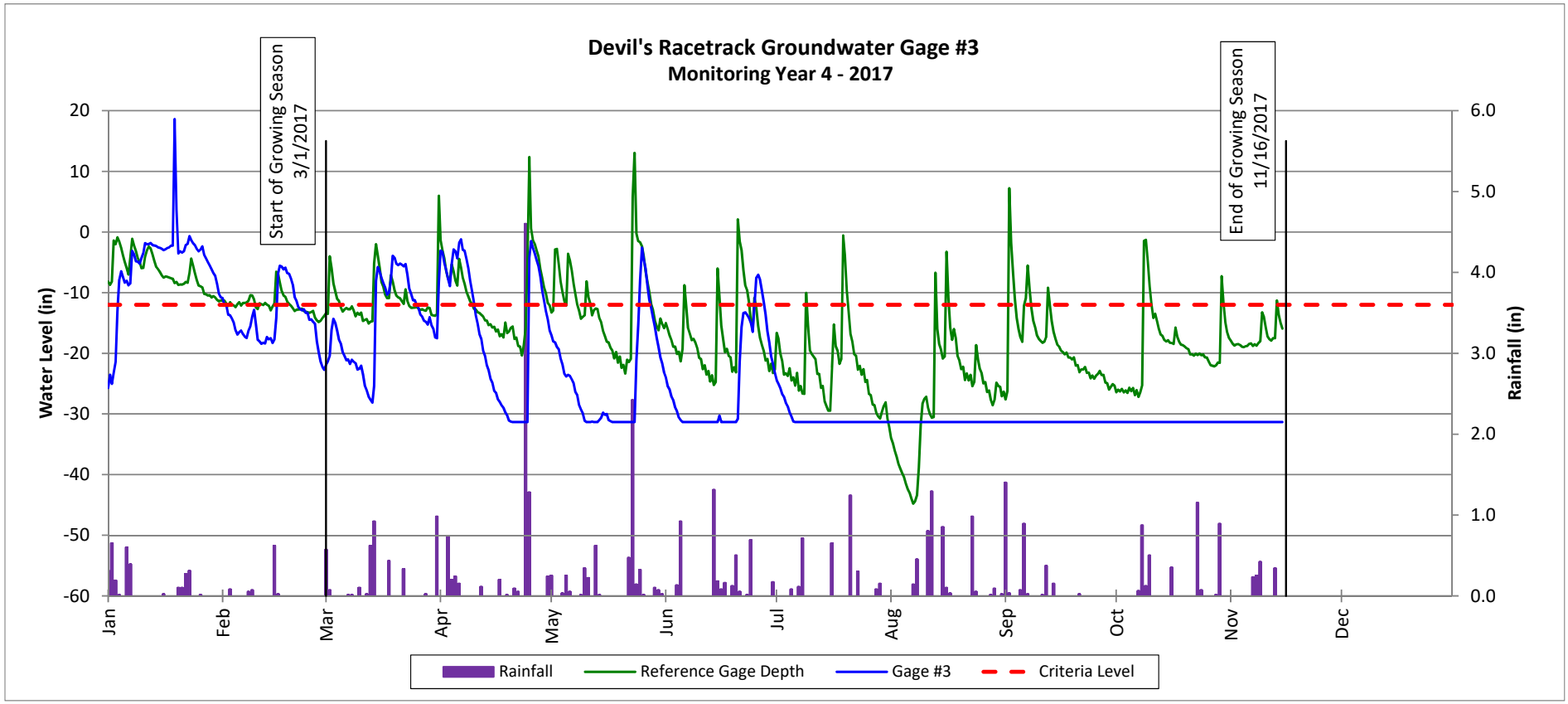
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

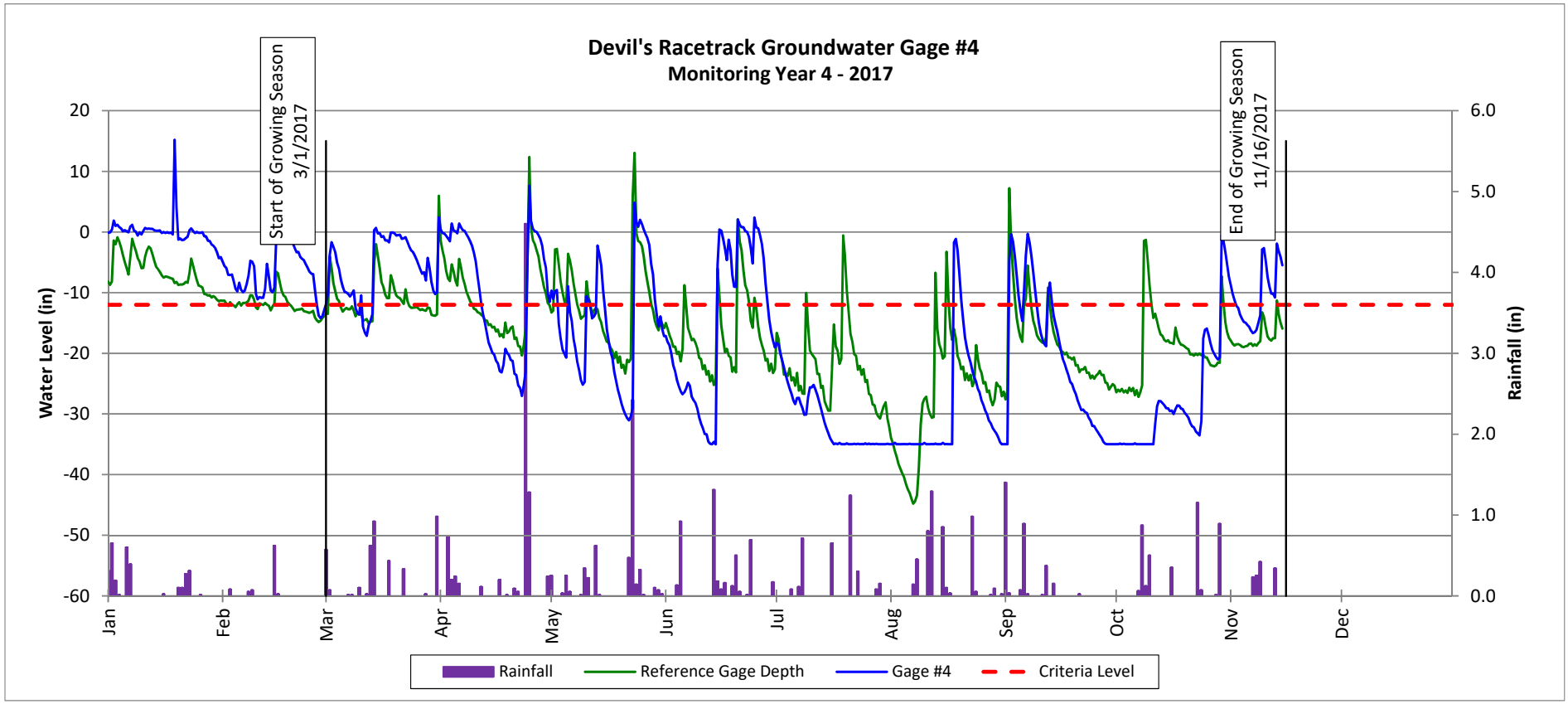
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

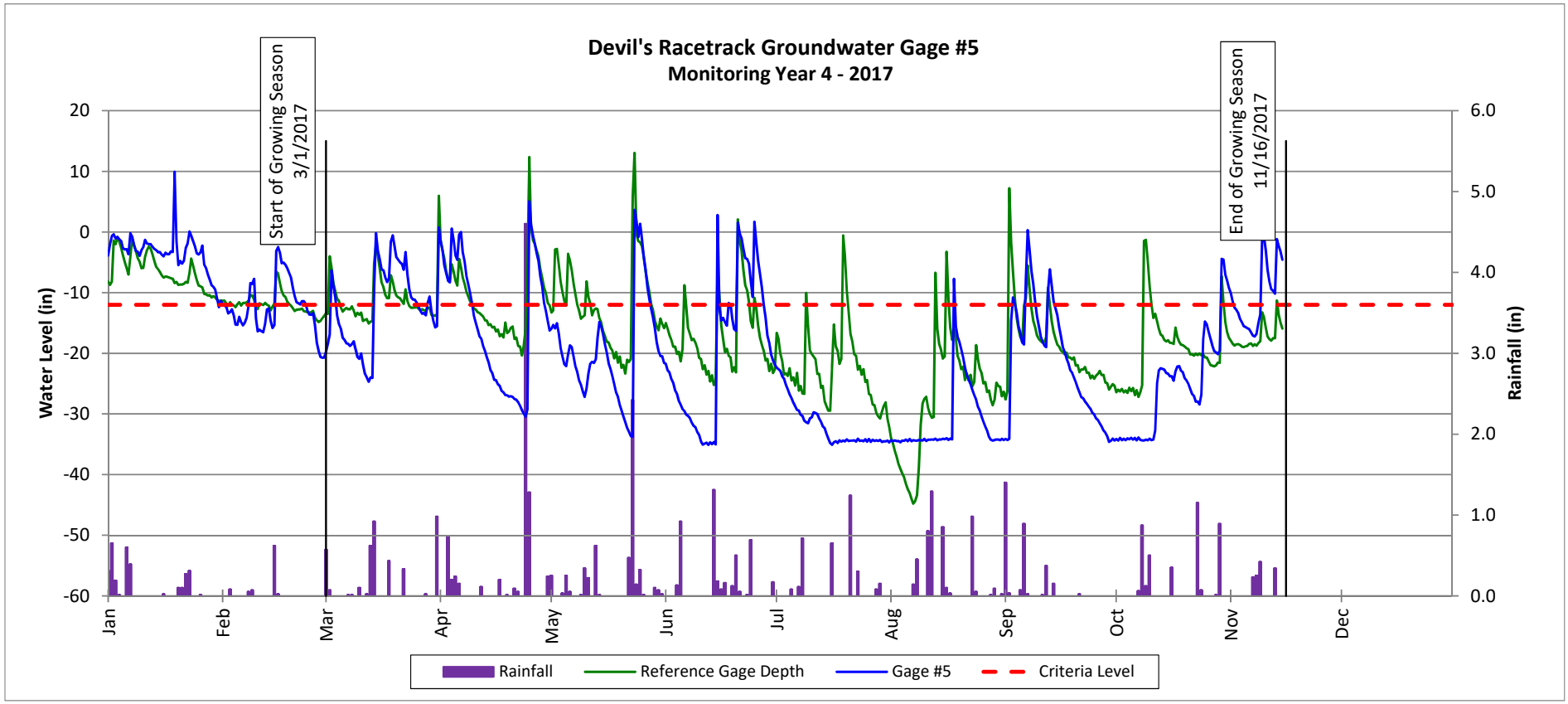
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

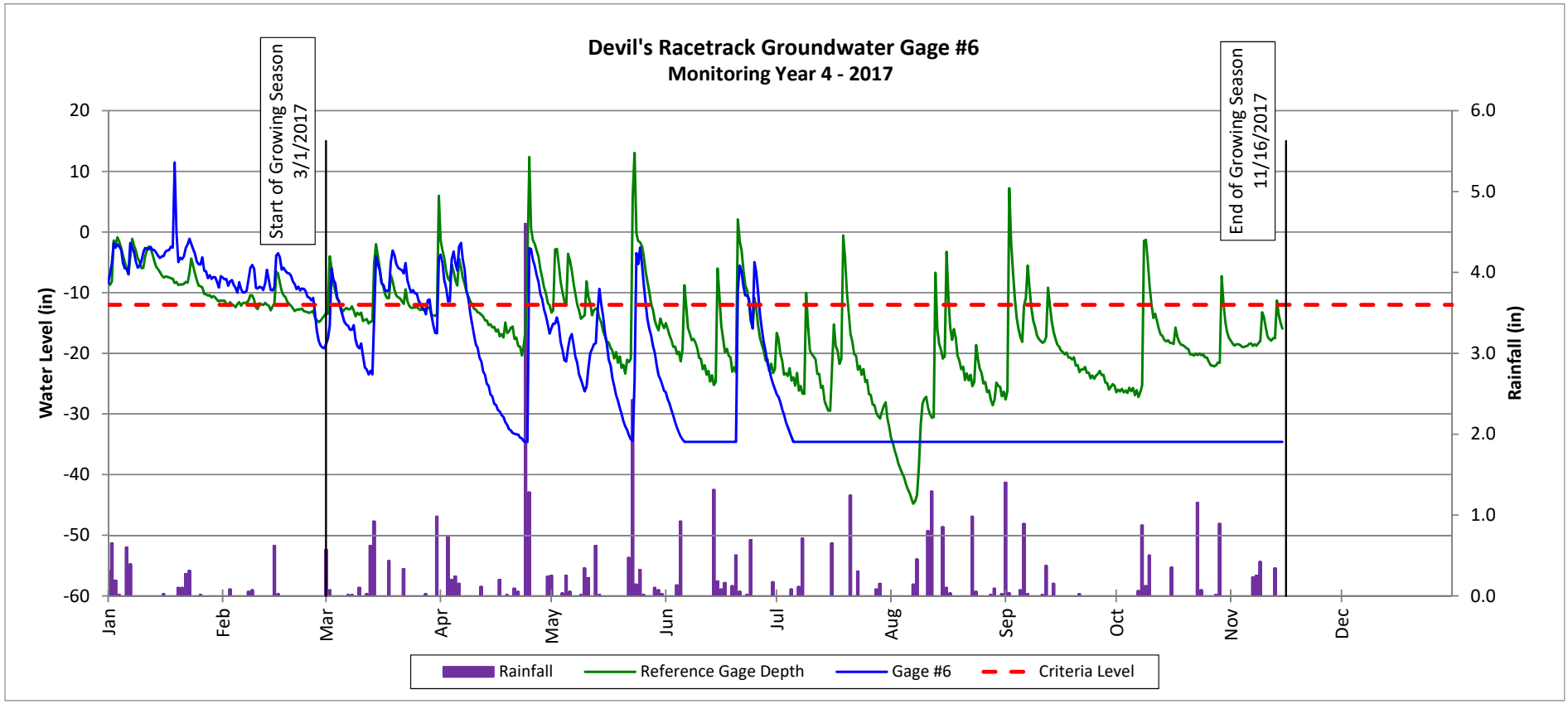
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

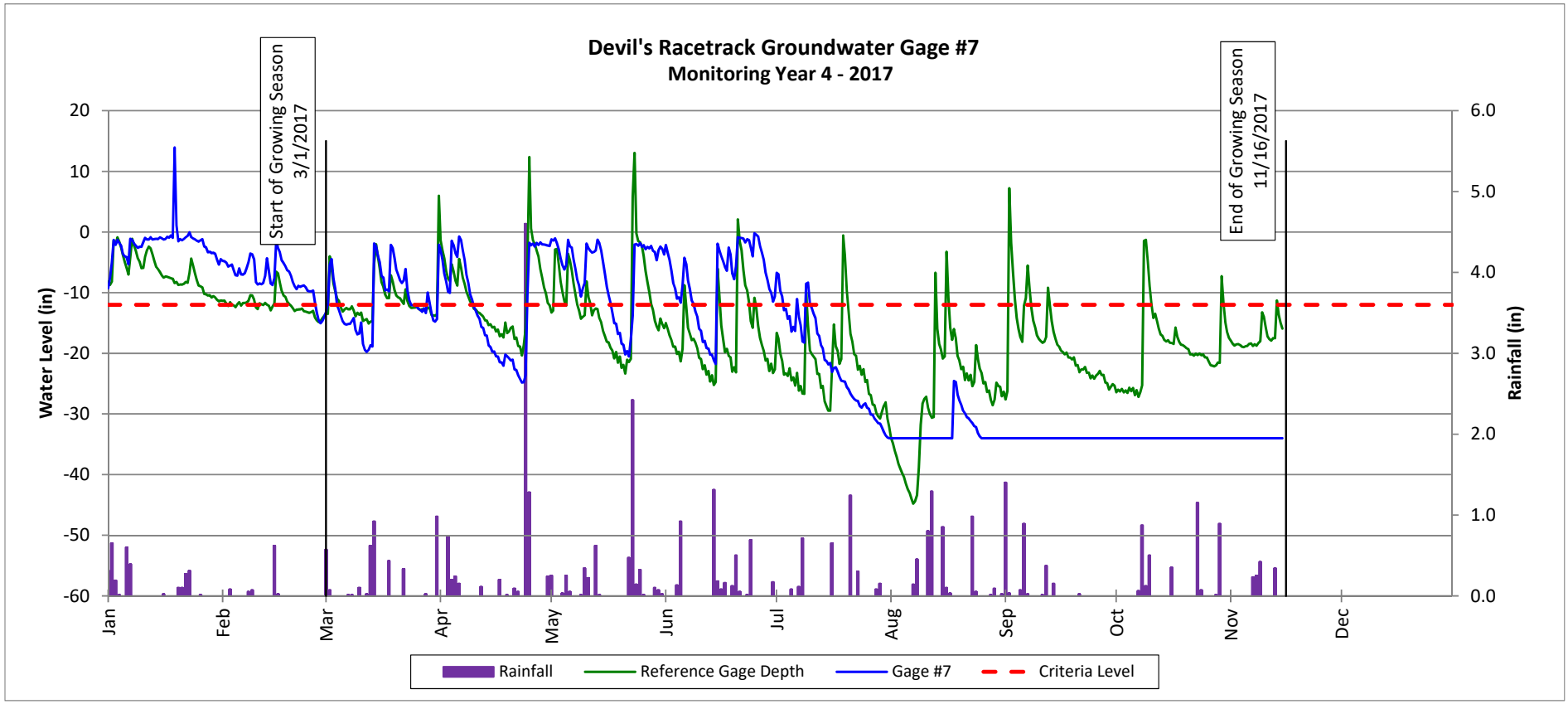
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

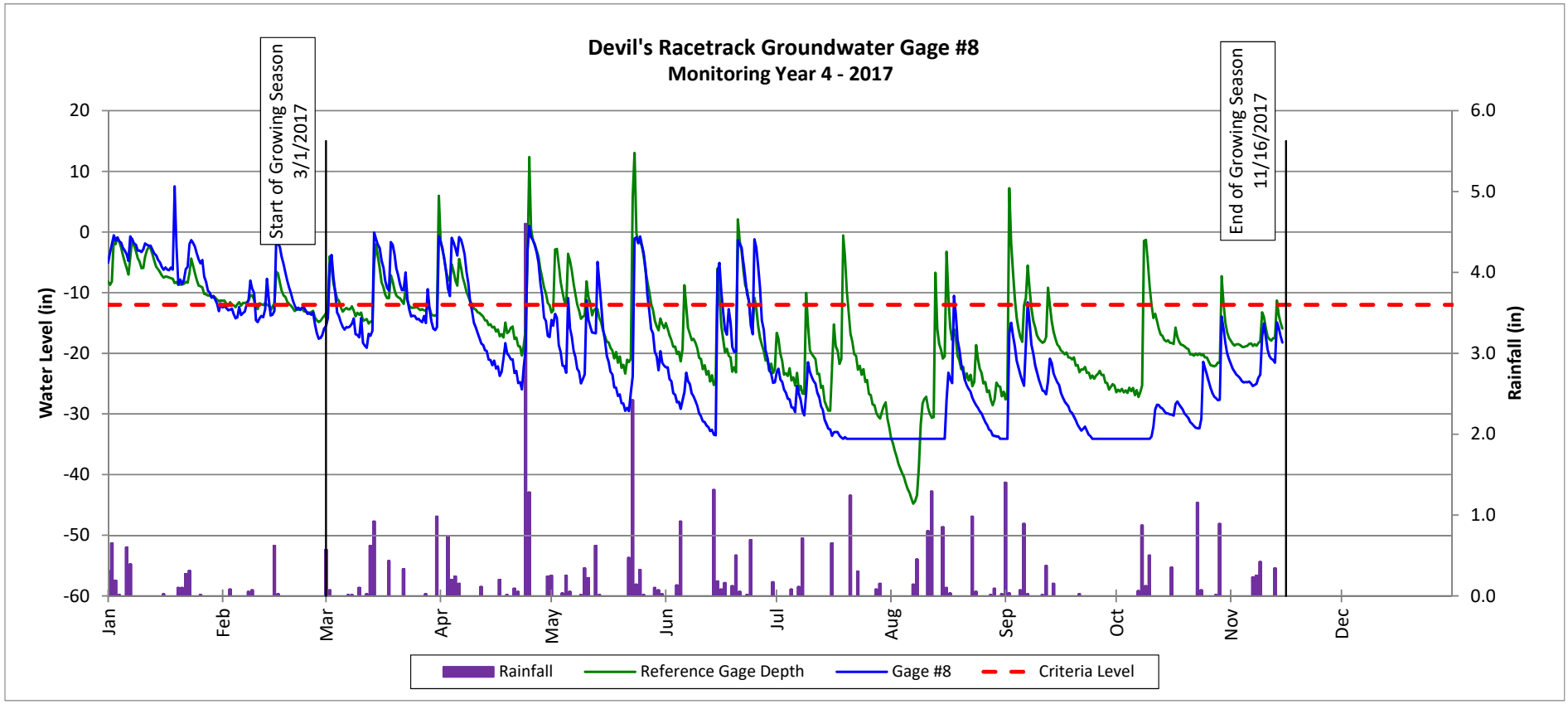
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

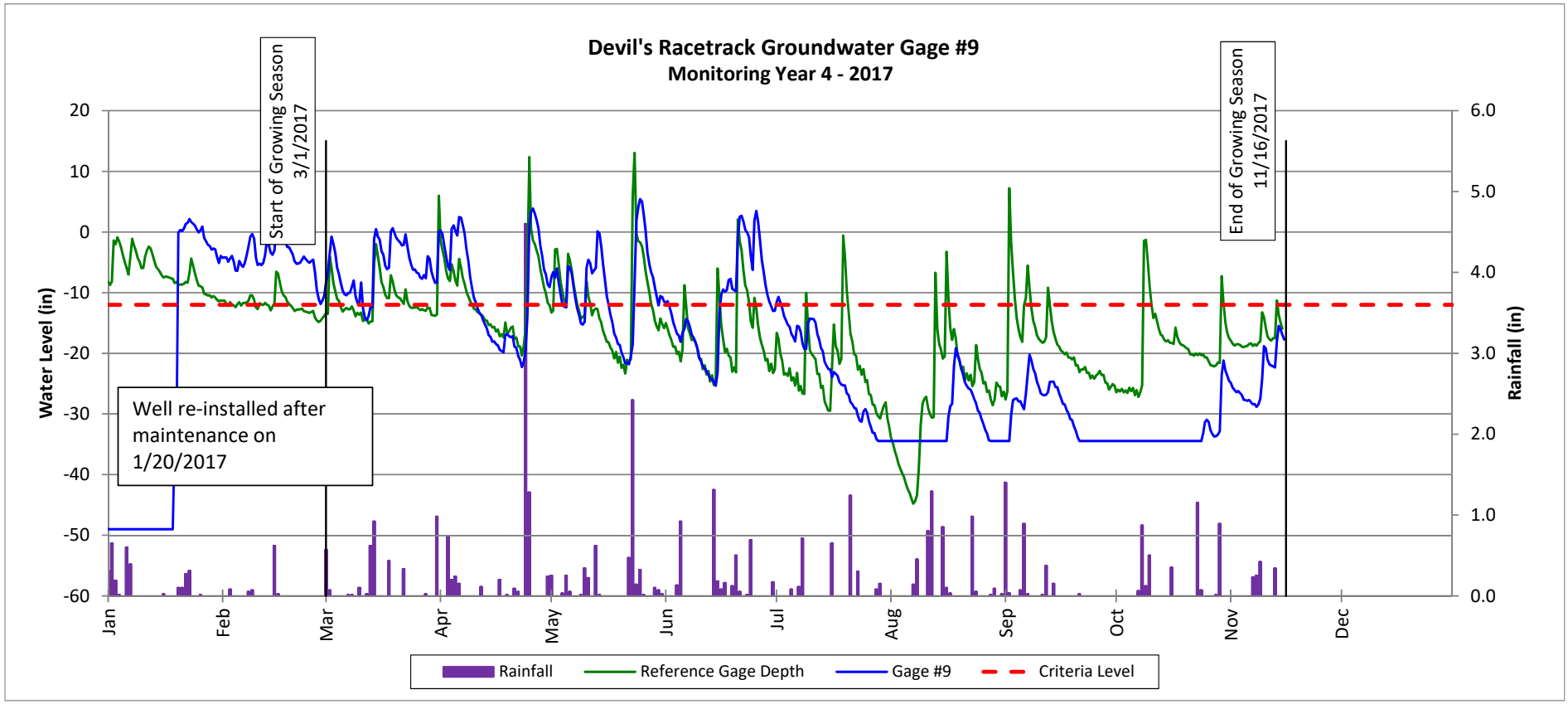
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017



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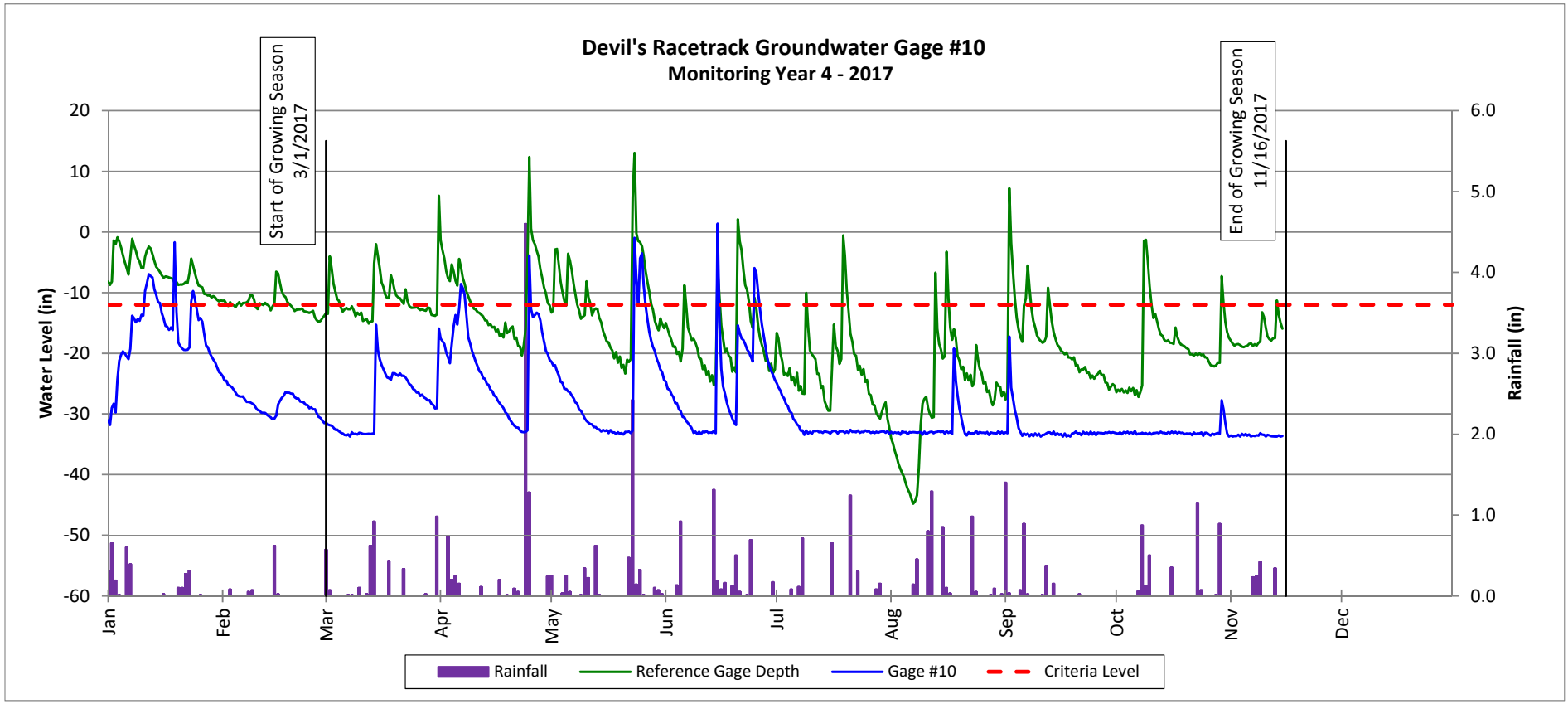
Devil's Racetrack Mitigation Site (DMS Project No. 95021)

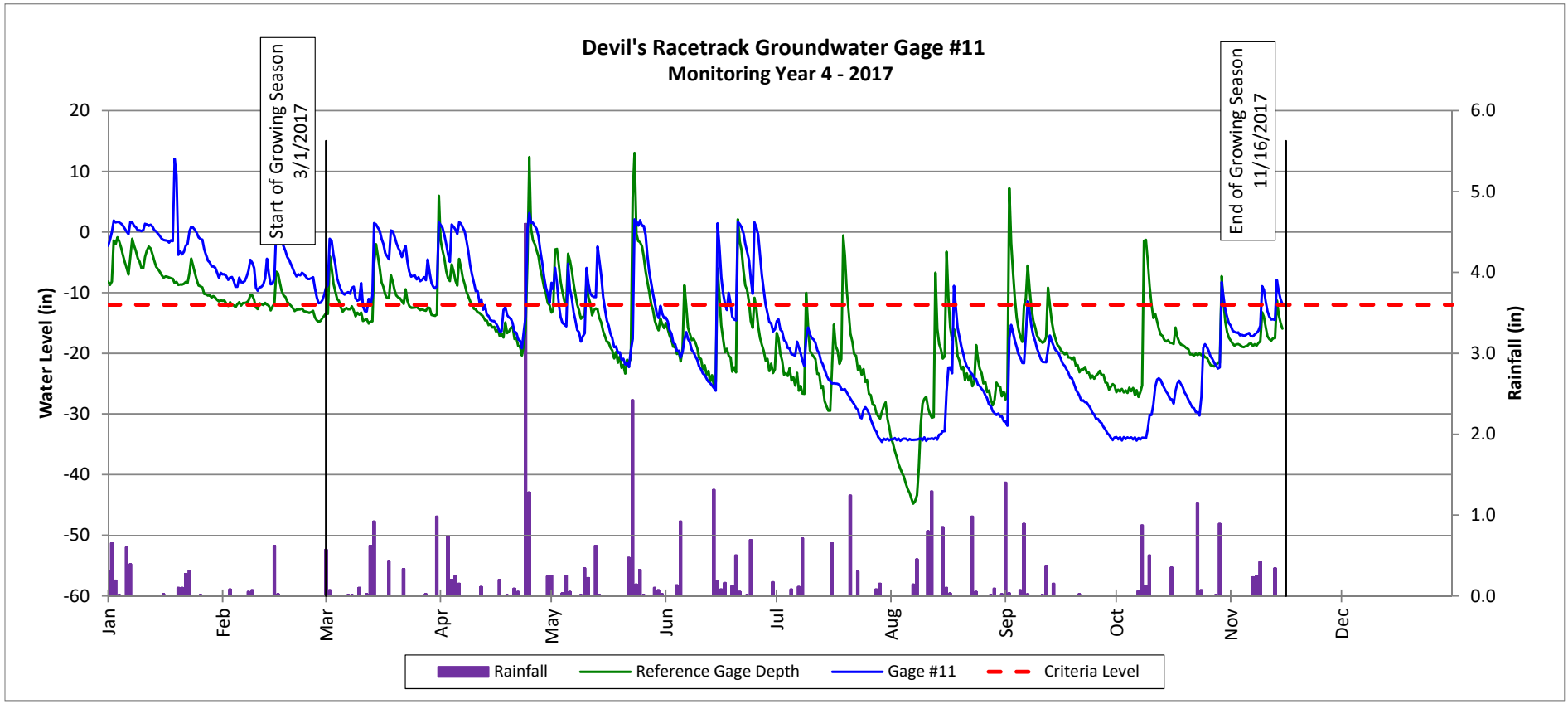
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

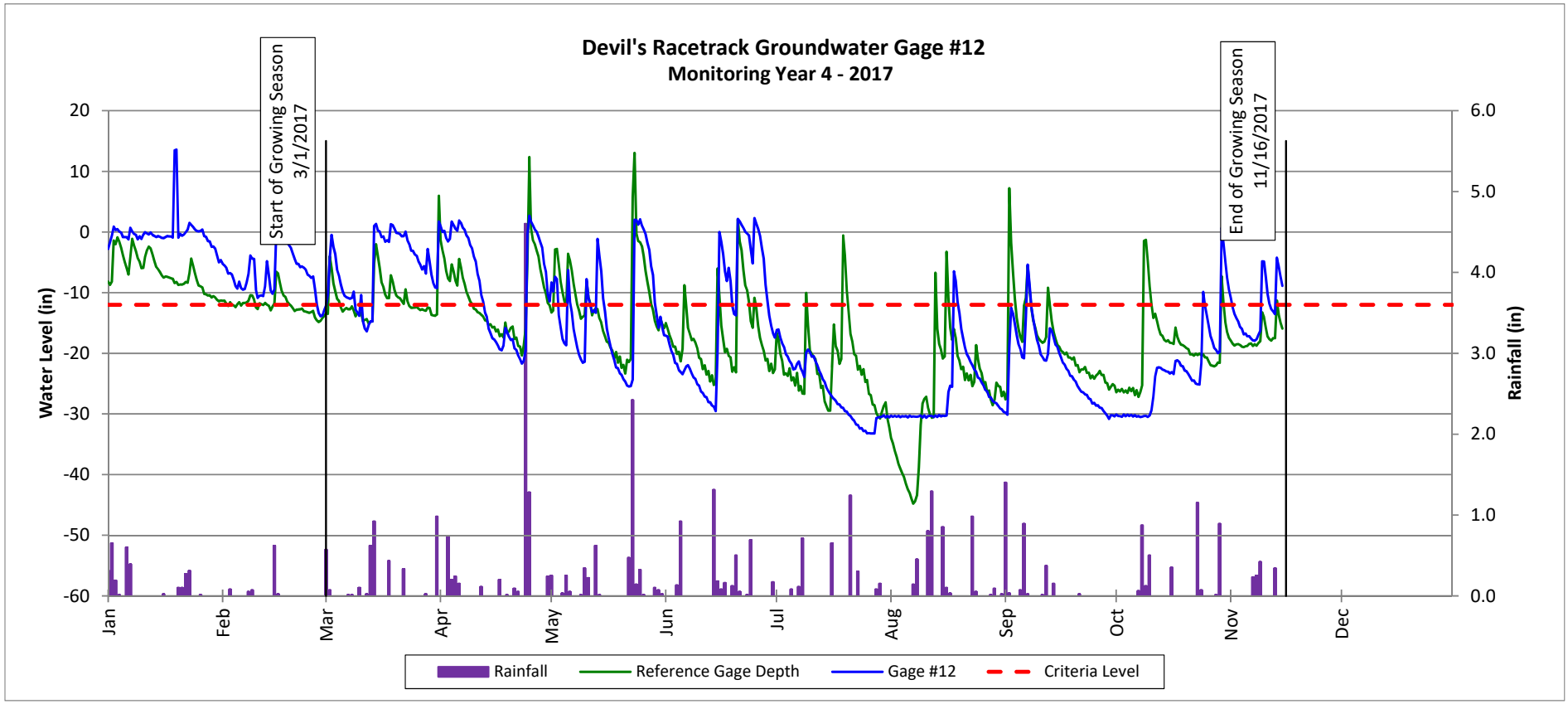
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

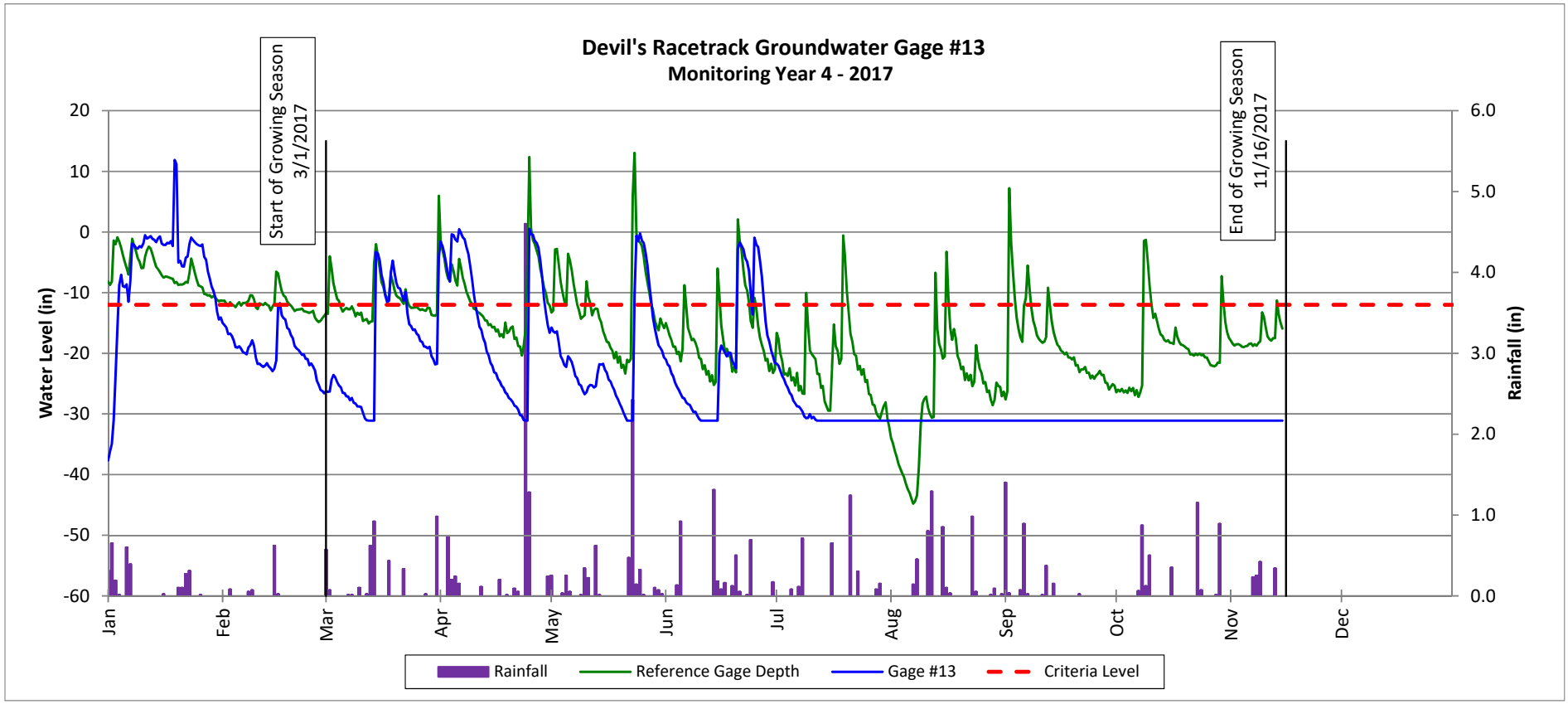
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

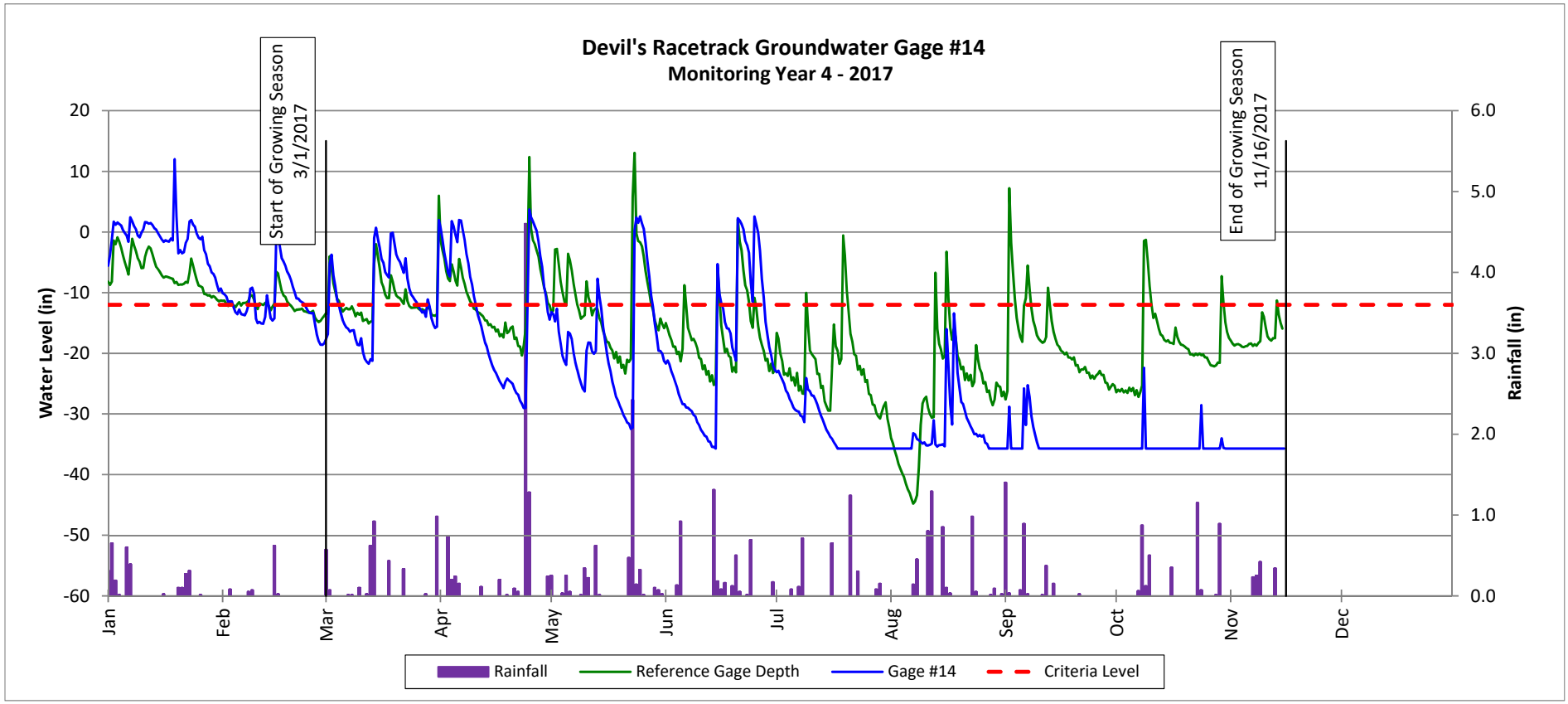
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

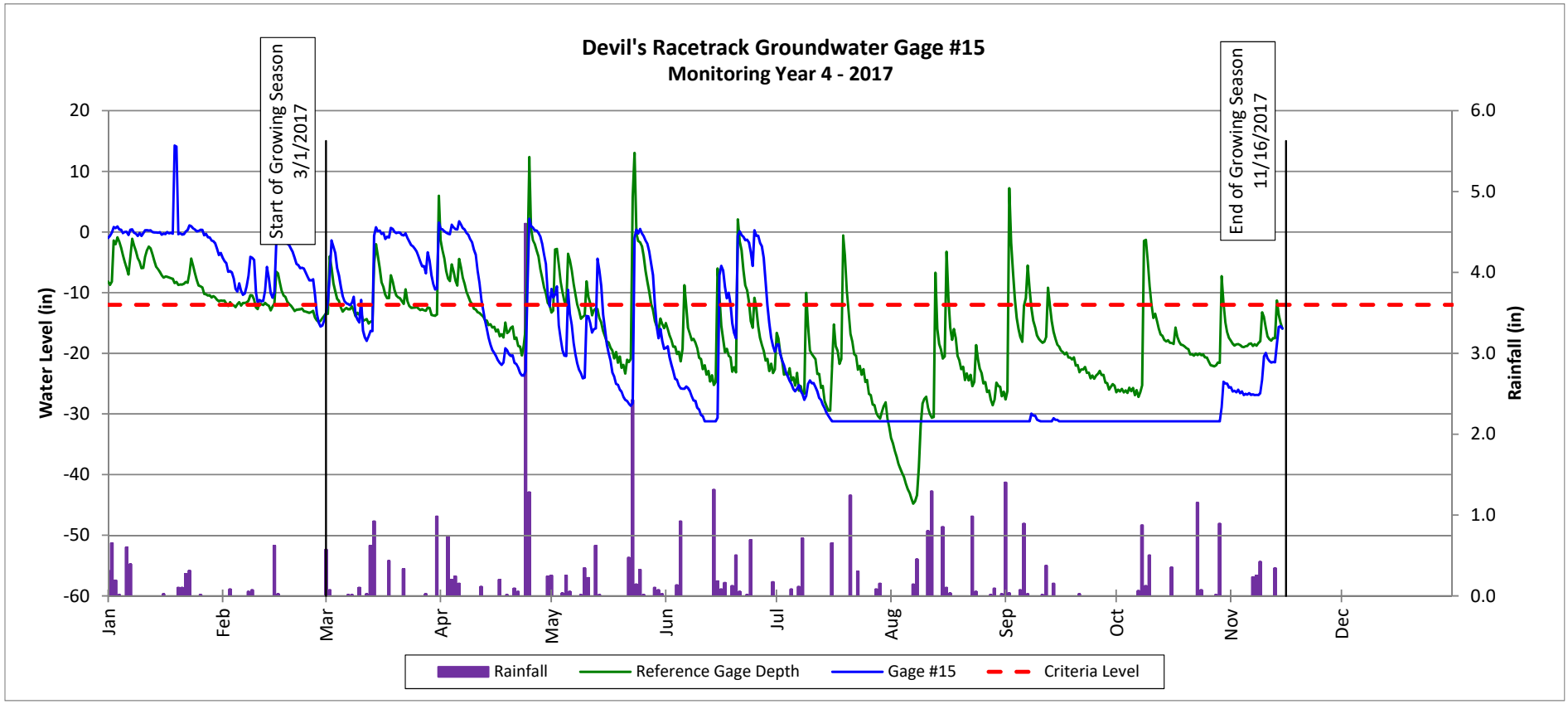
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

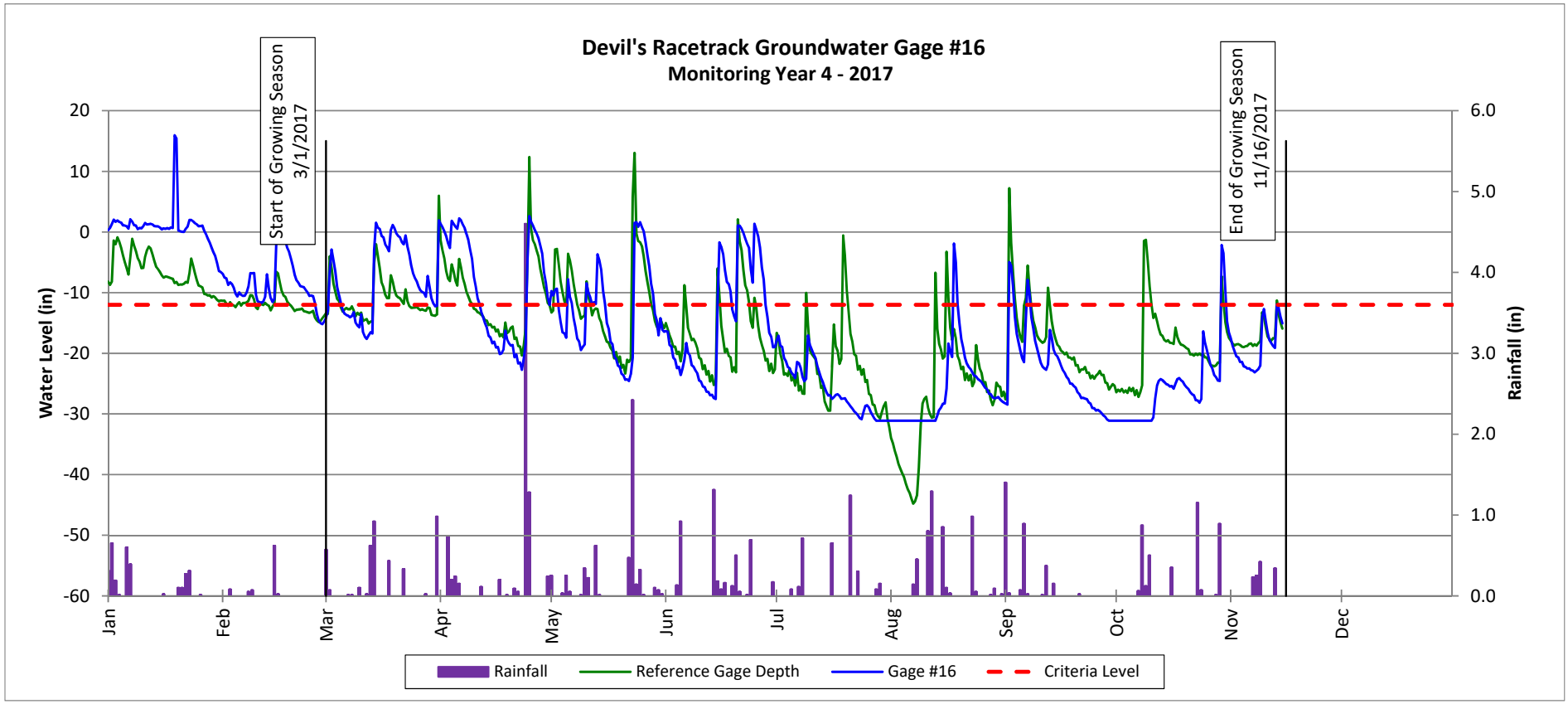
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

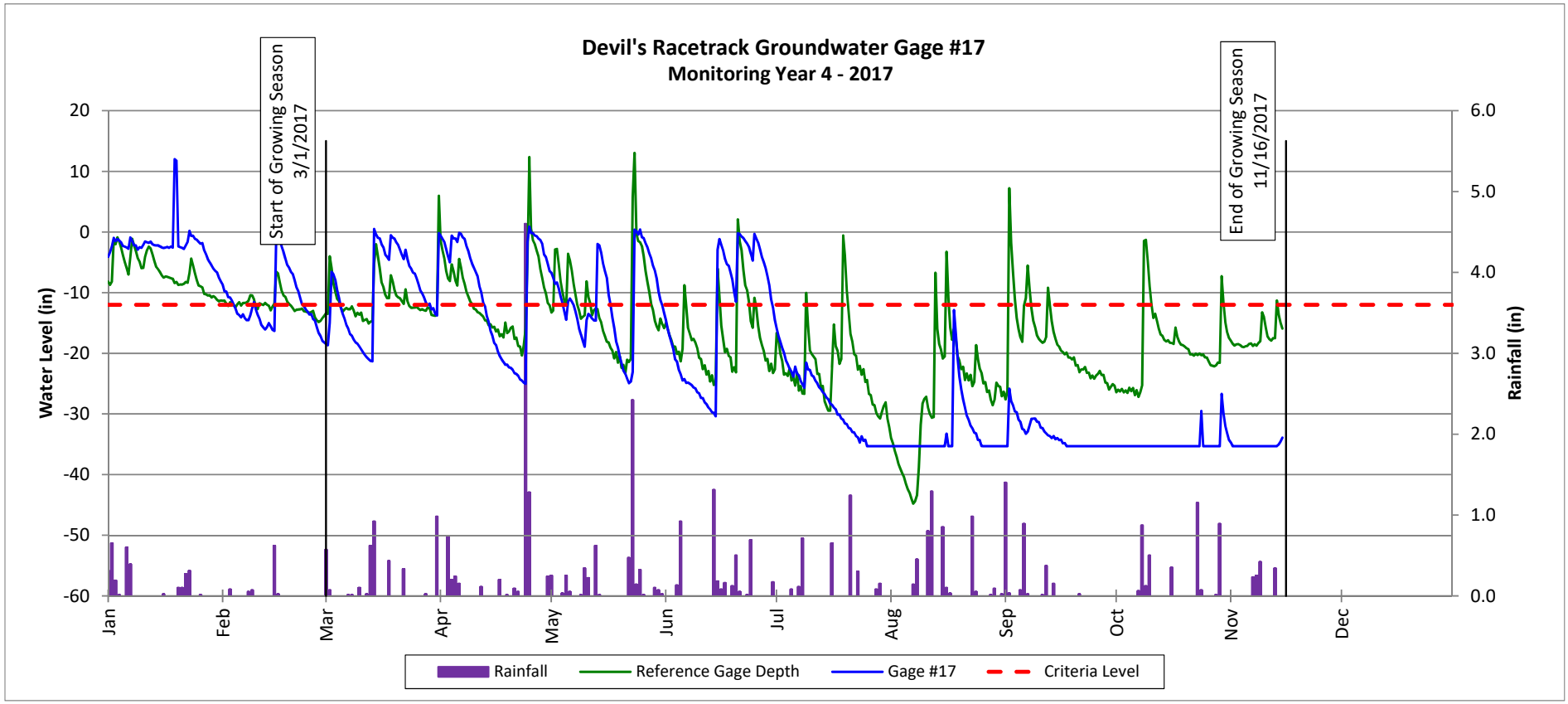
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

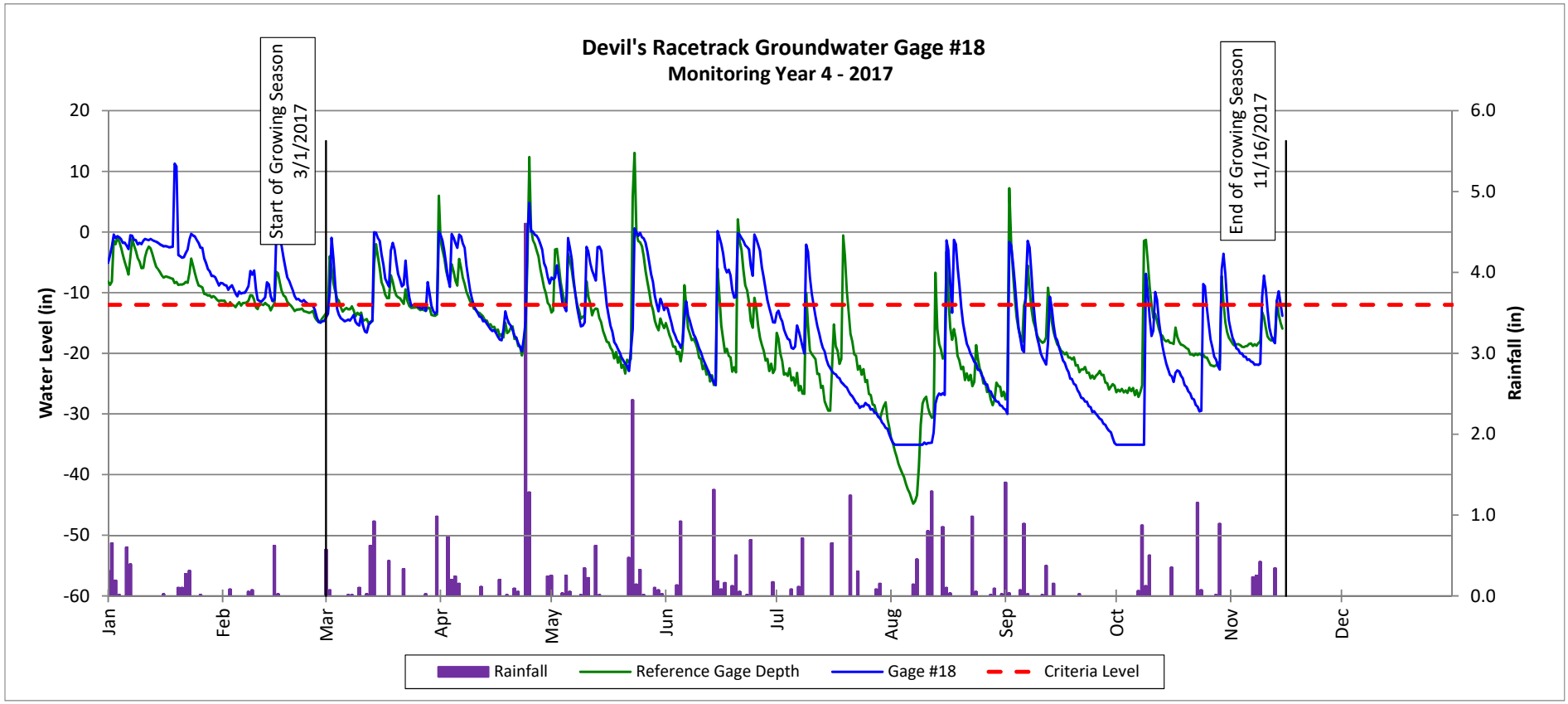
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

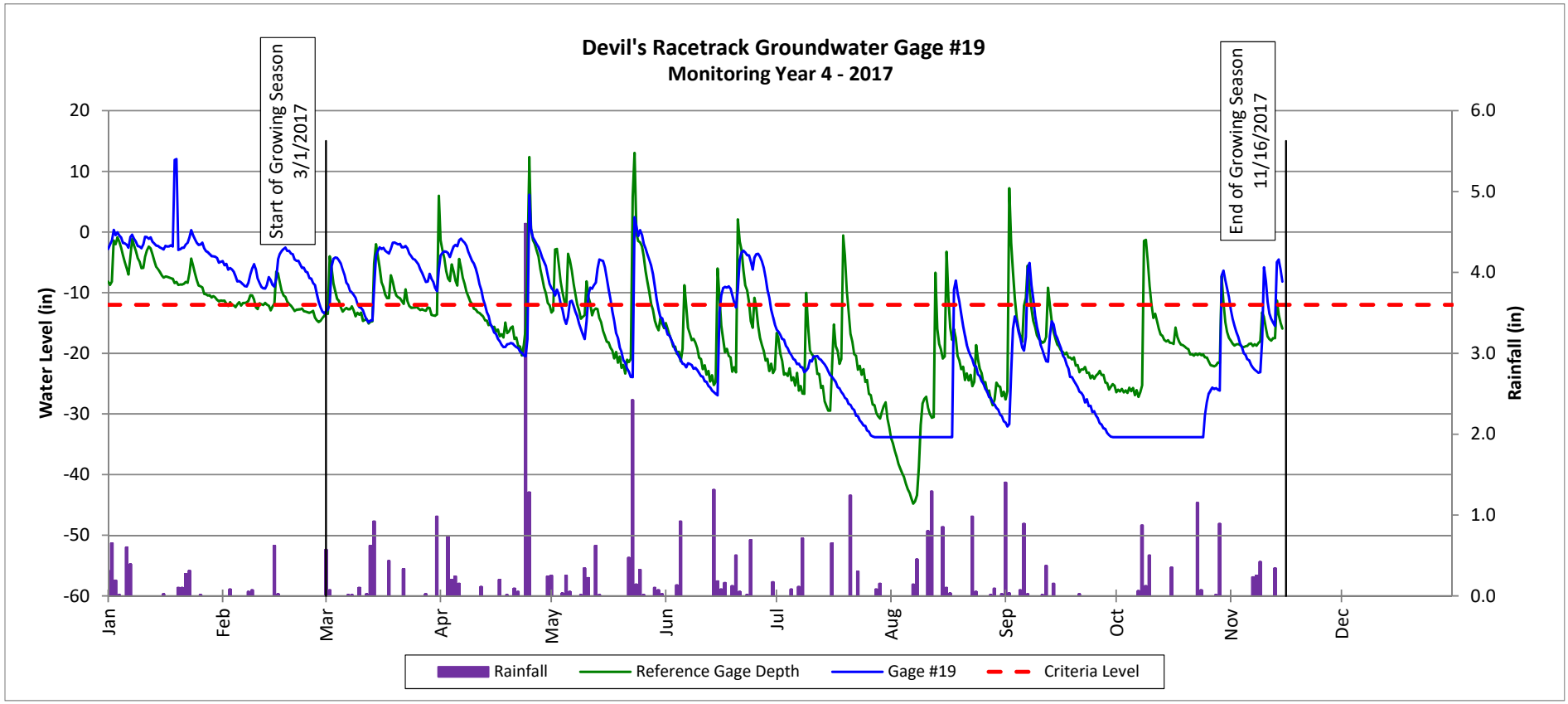
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

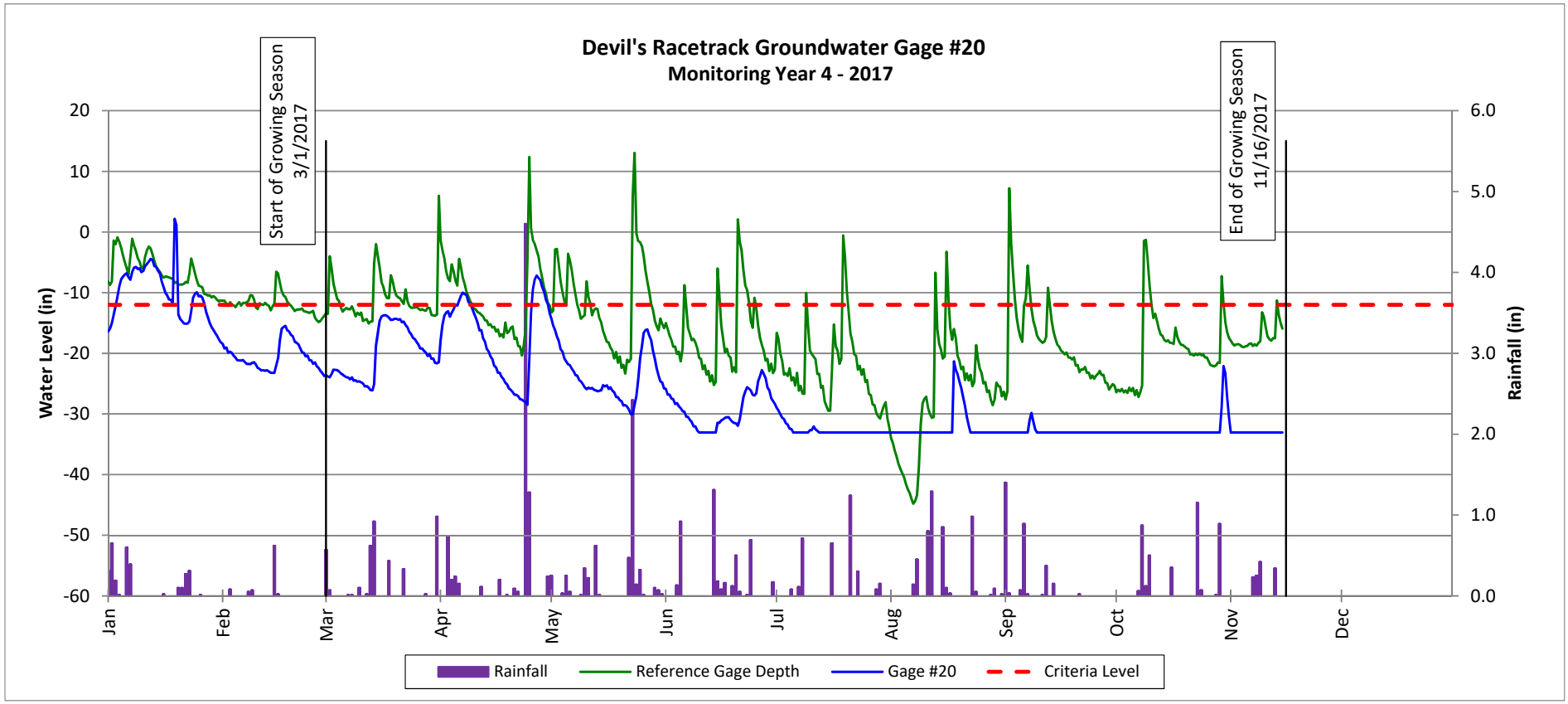
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

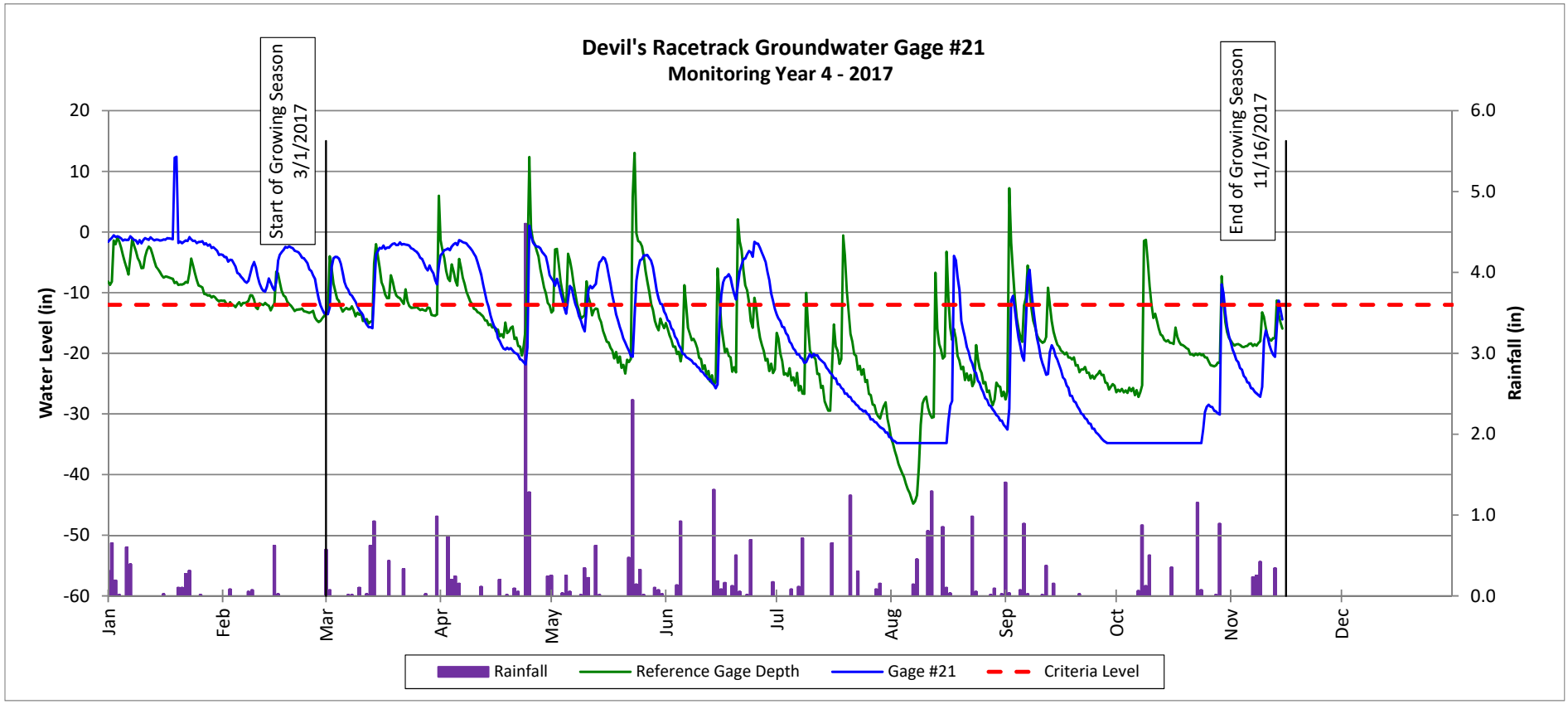
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

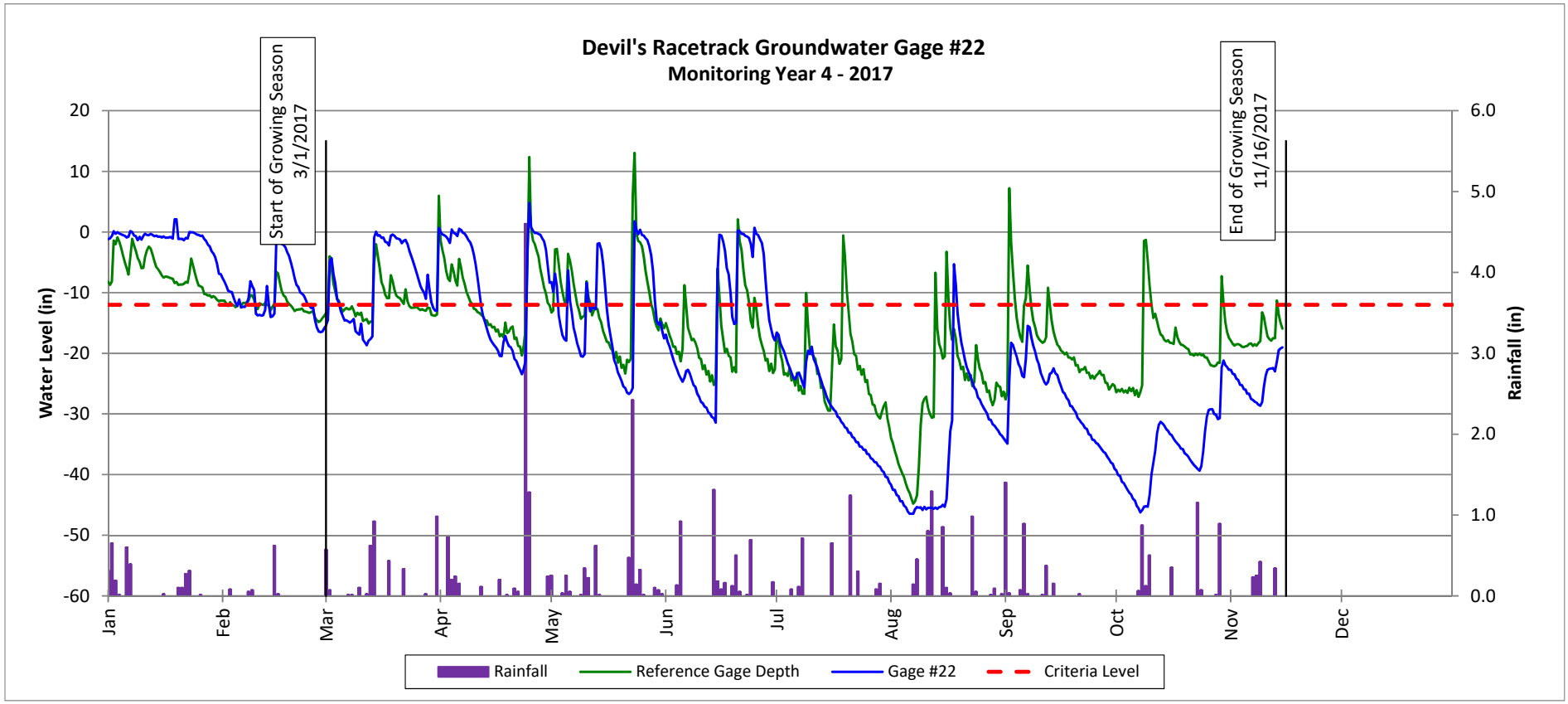
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

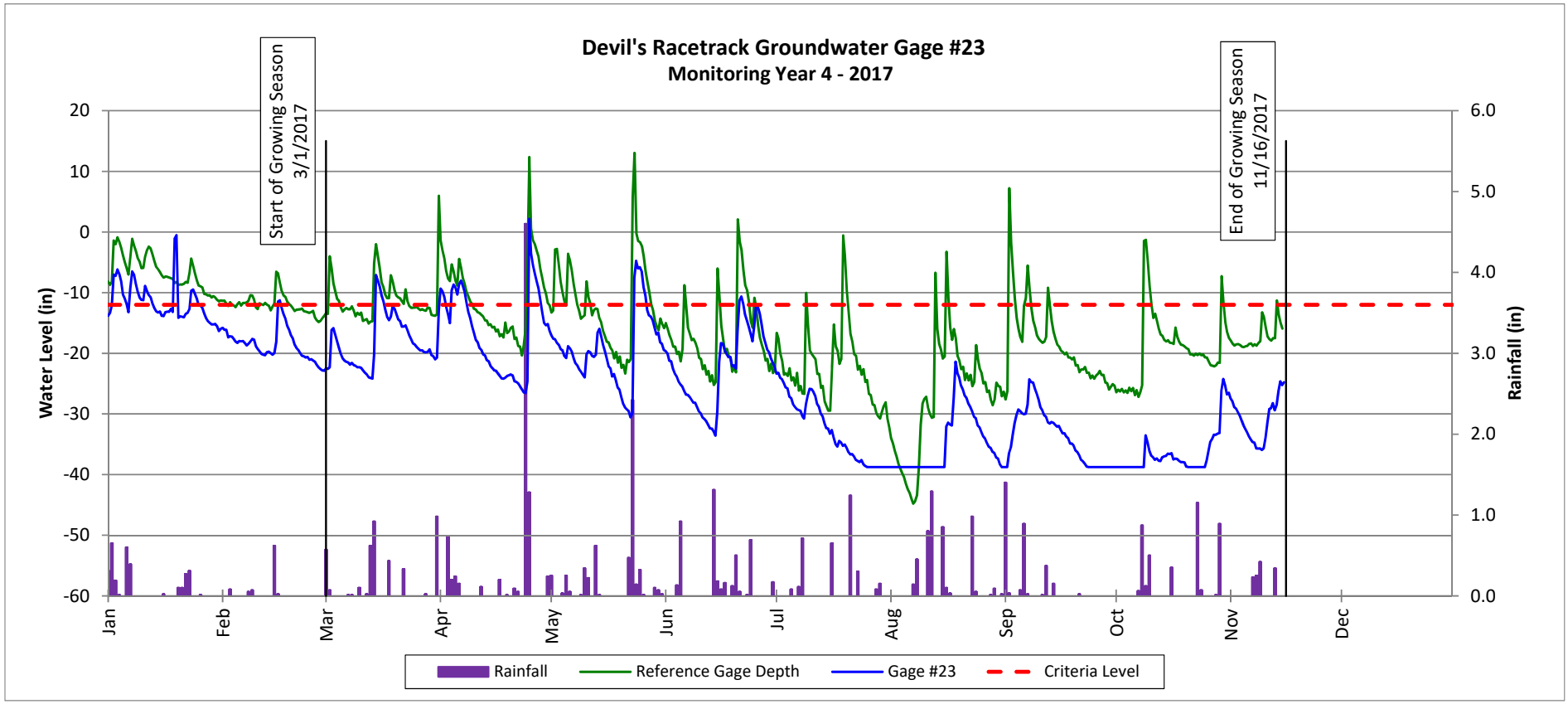
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

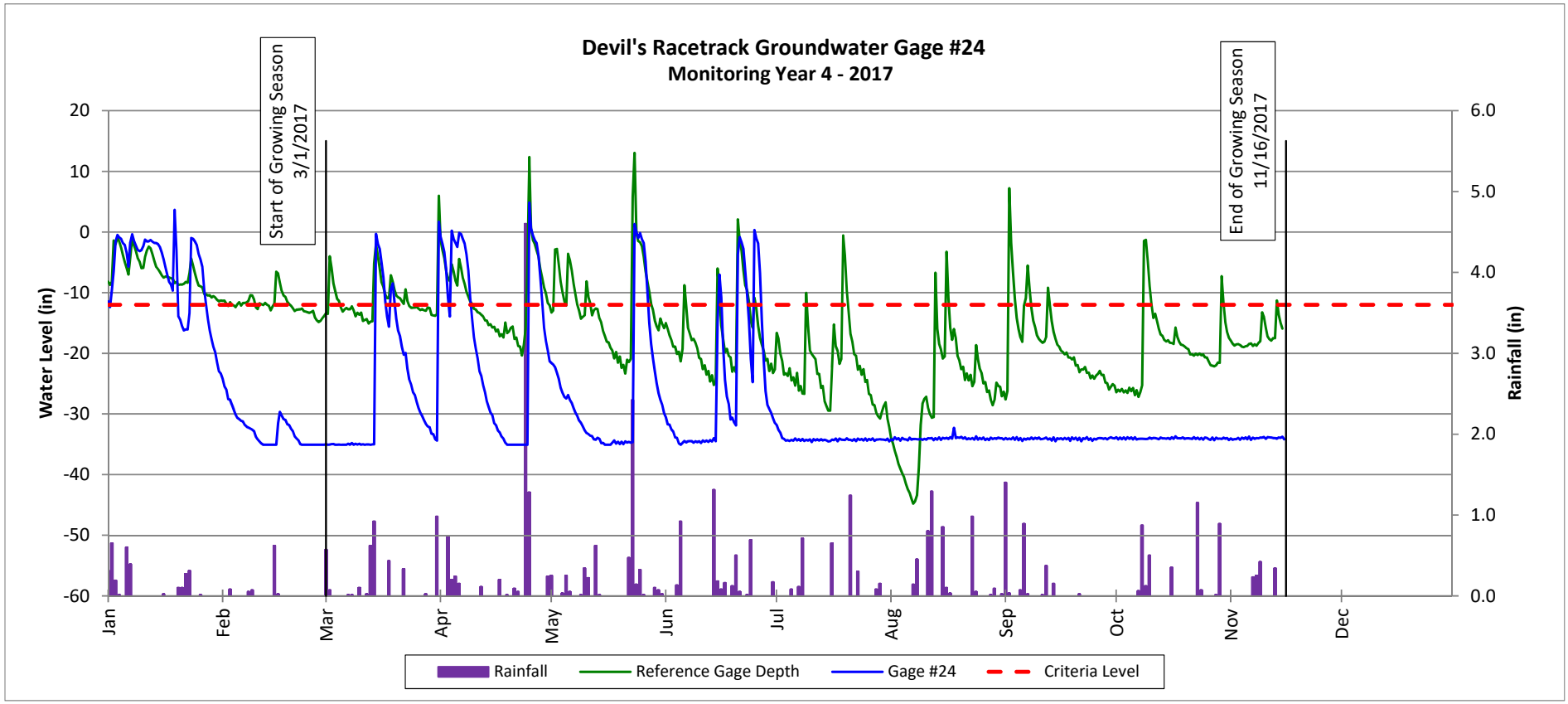
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

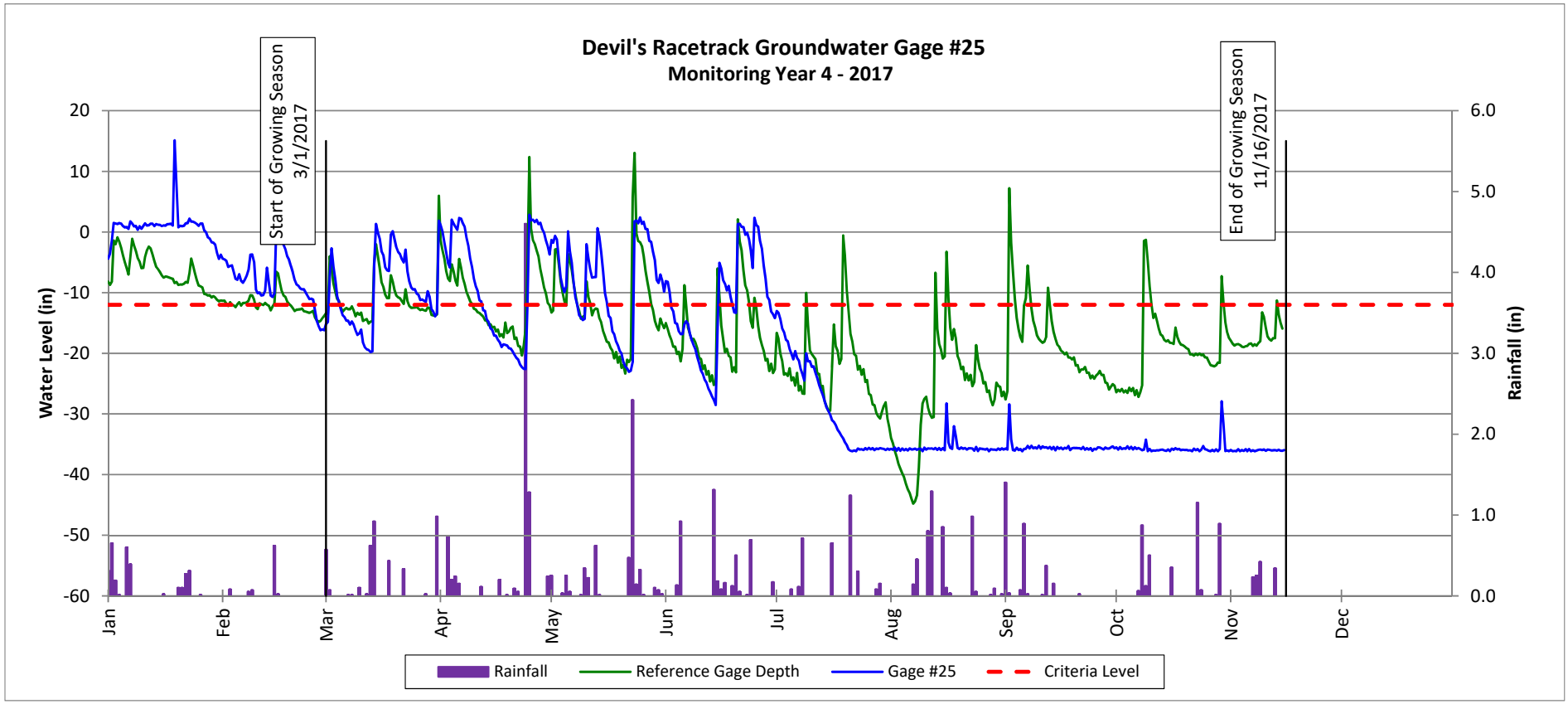
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

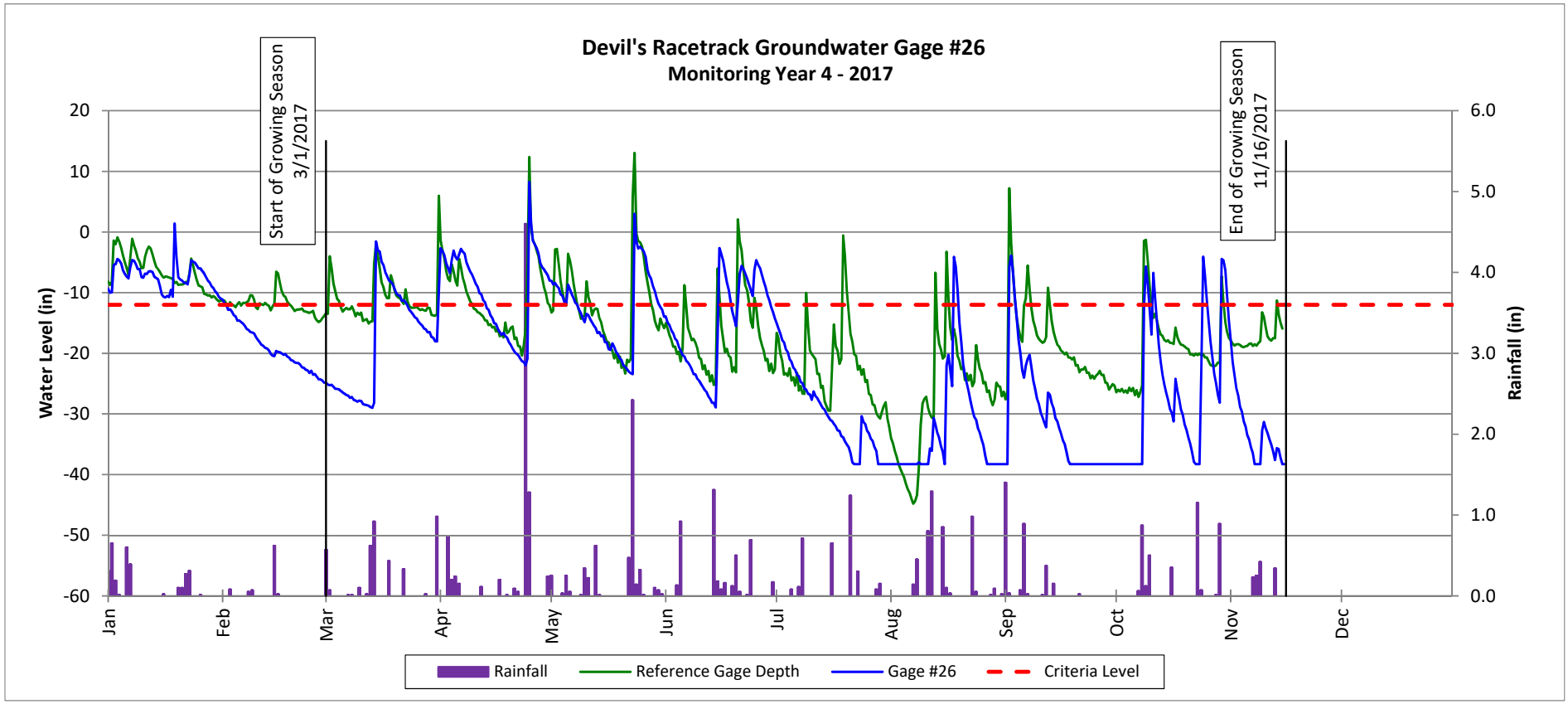
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

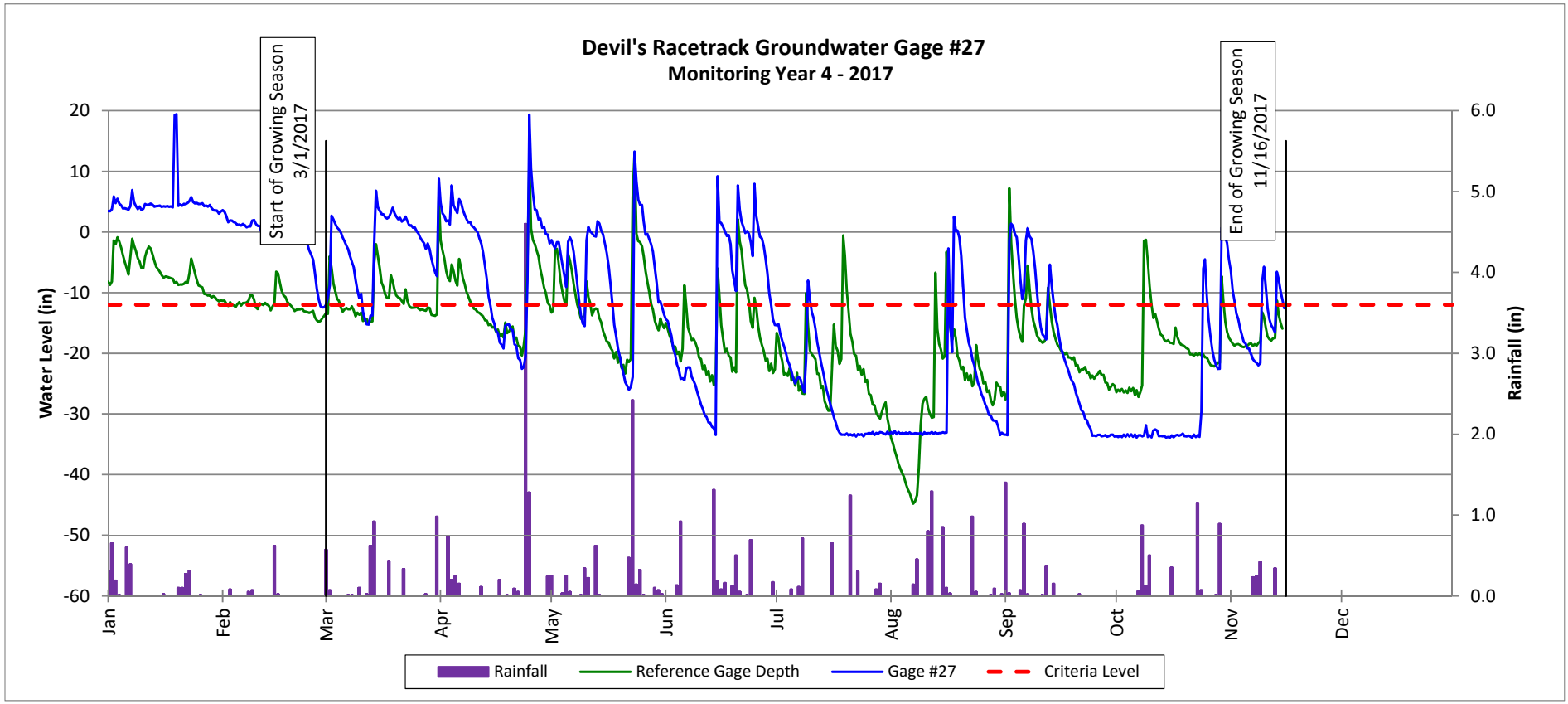
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

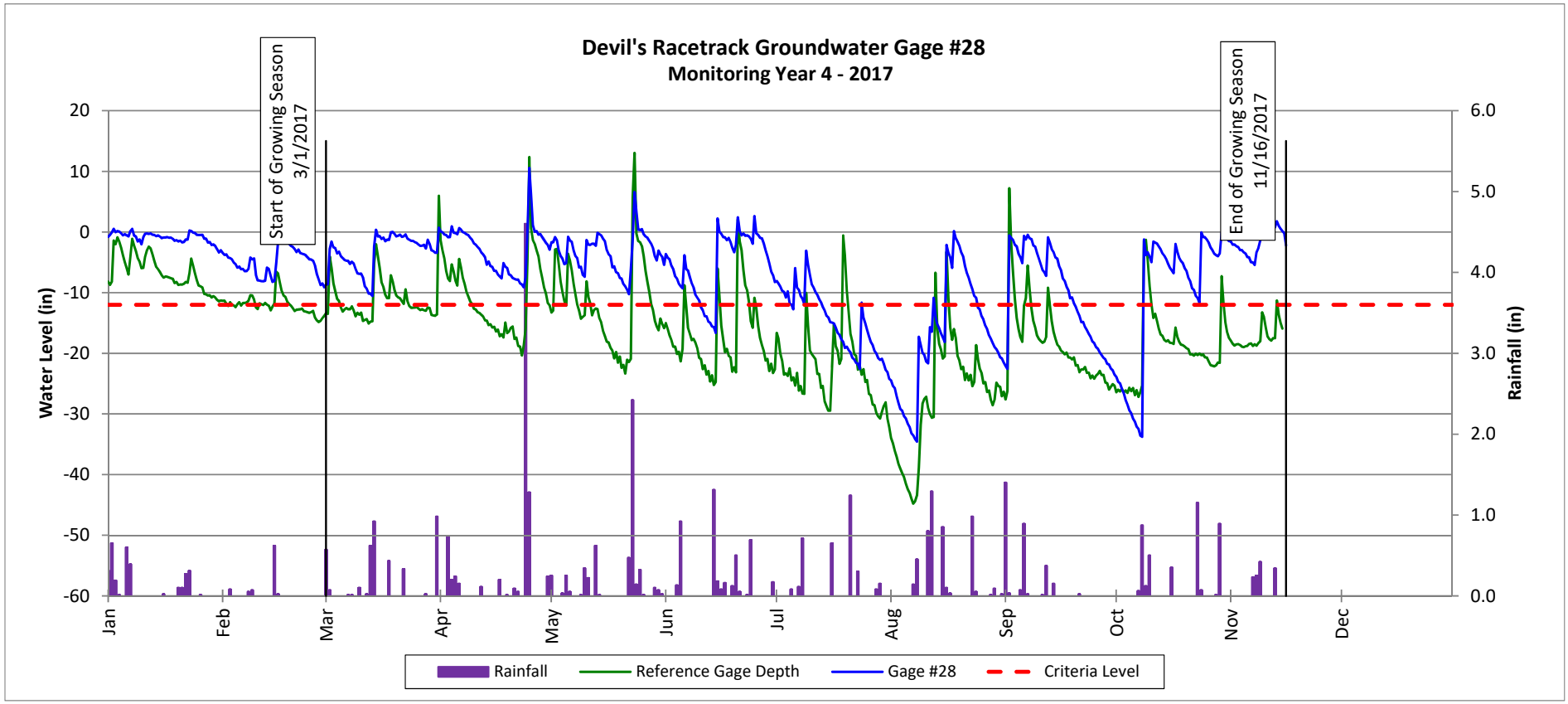
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017



Groundwater Gage Plots

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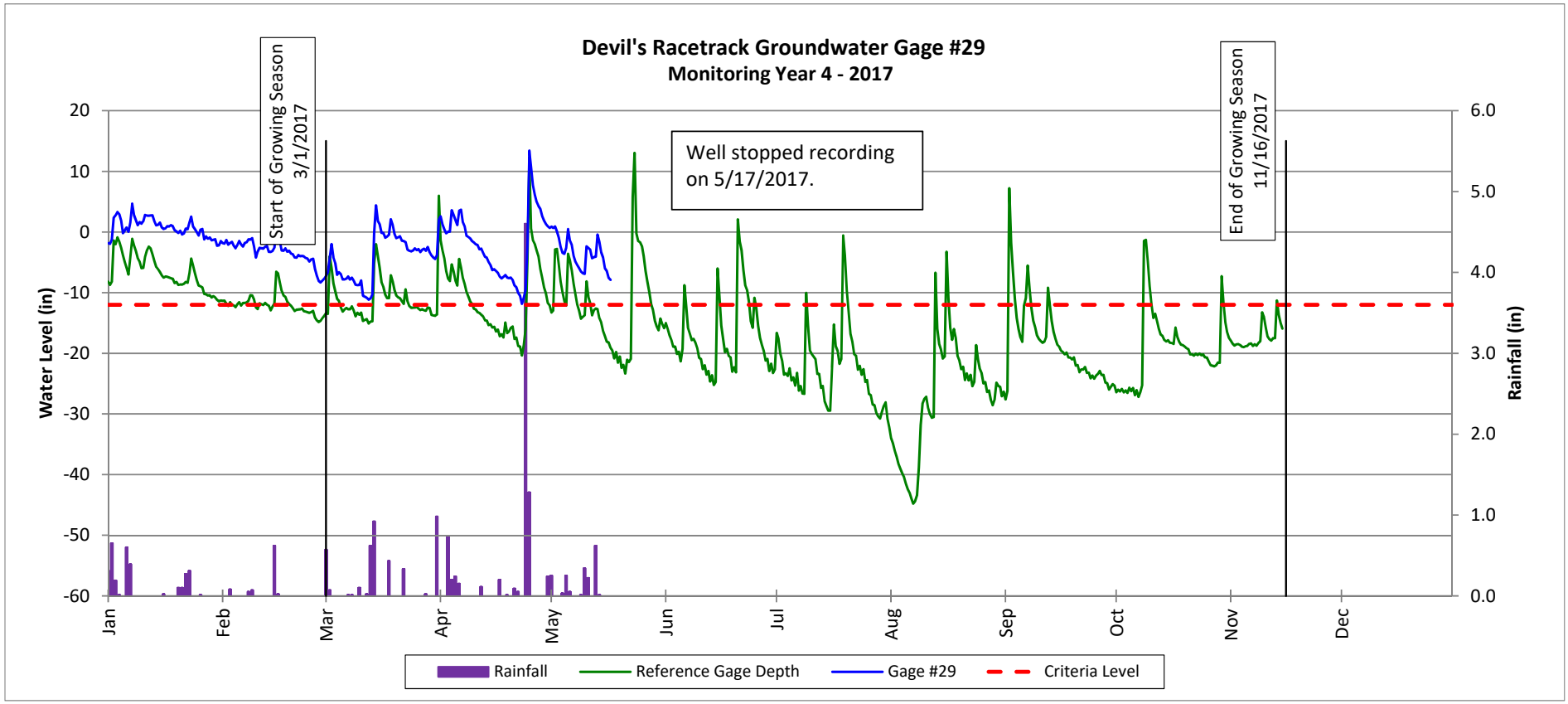
Monitoring Year 4 - 2017



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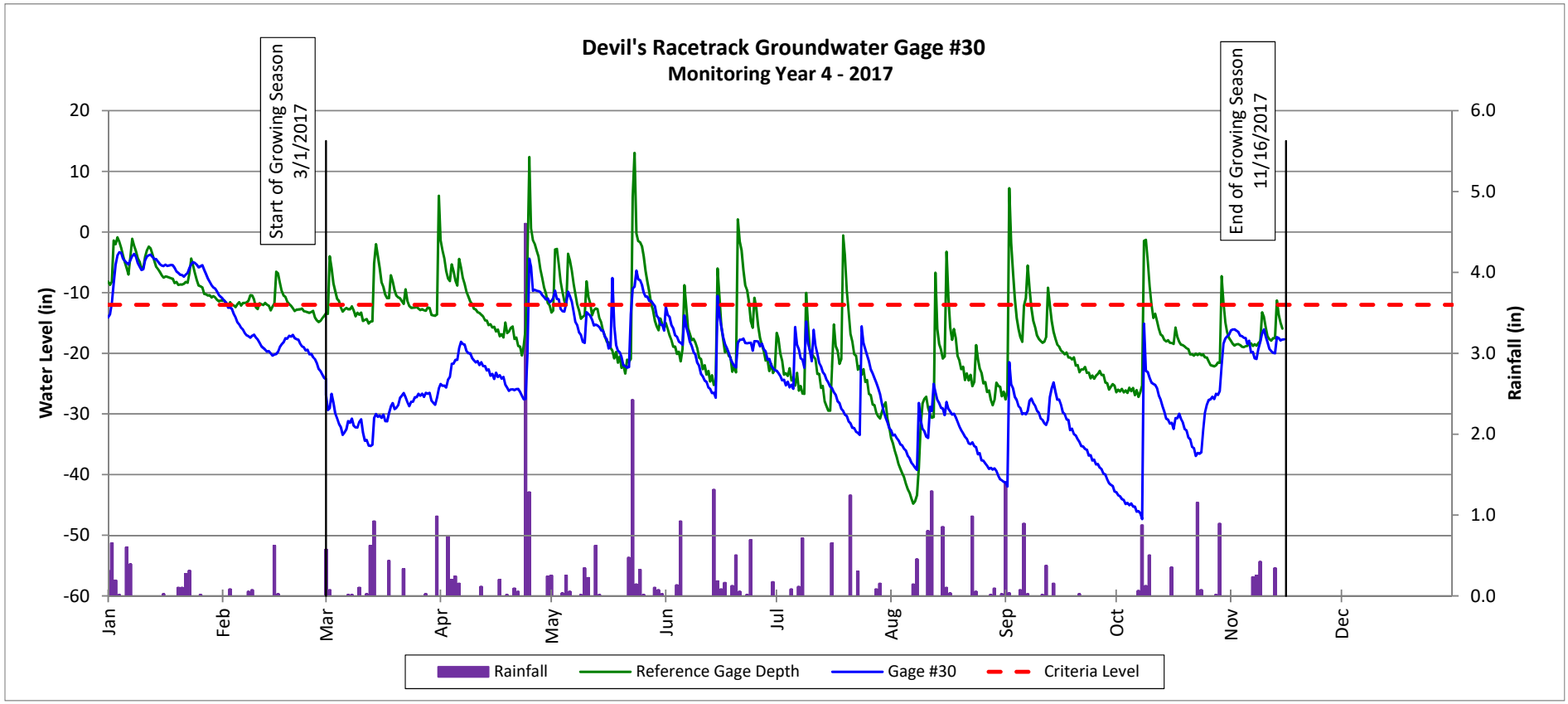
Monitoring Year 4 - 2017



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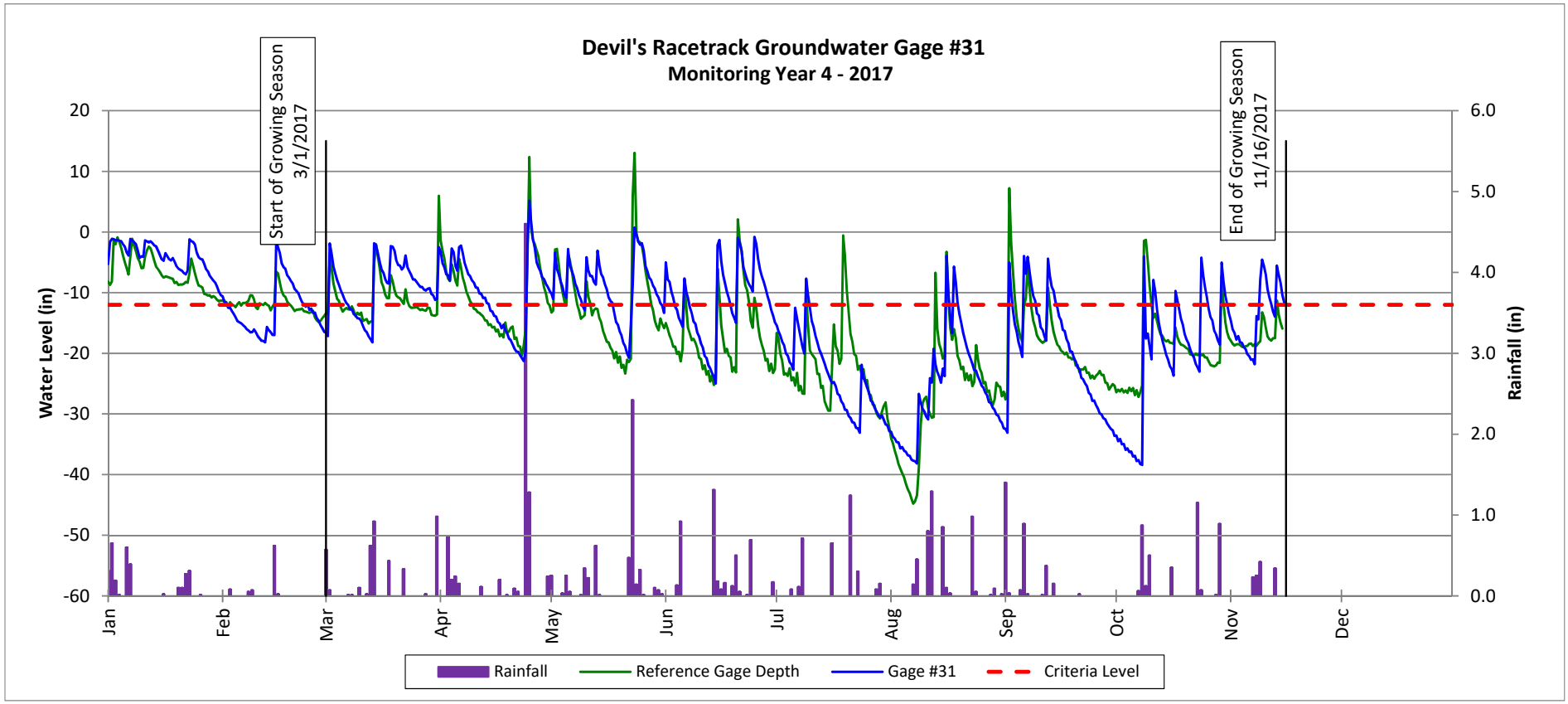
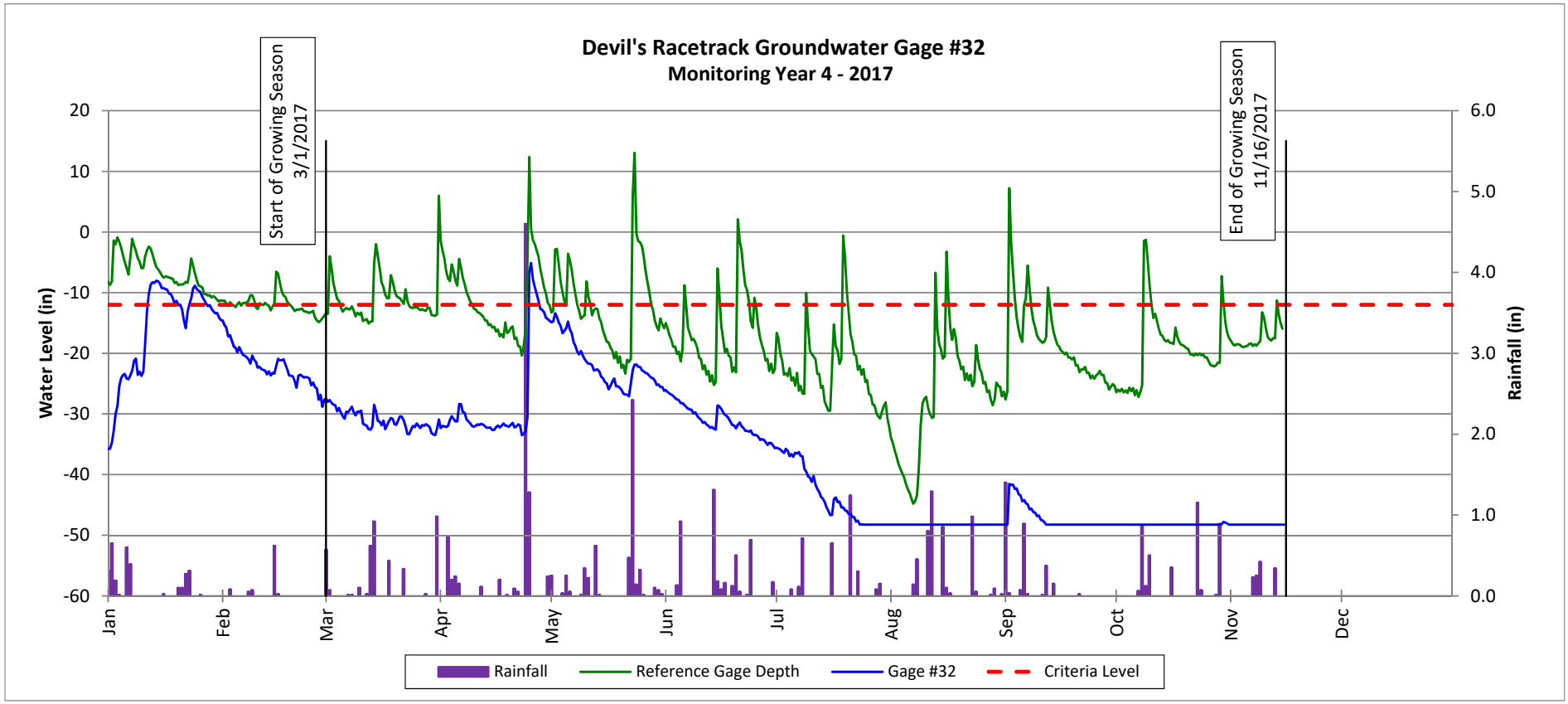
Monitoring Year 4 - 2017



Groundwater Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017



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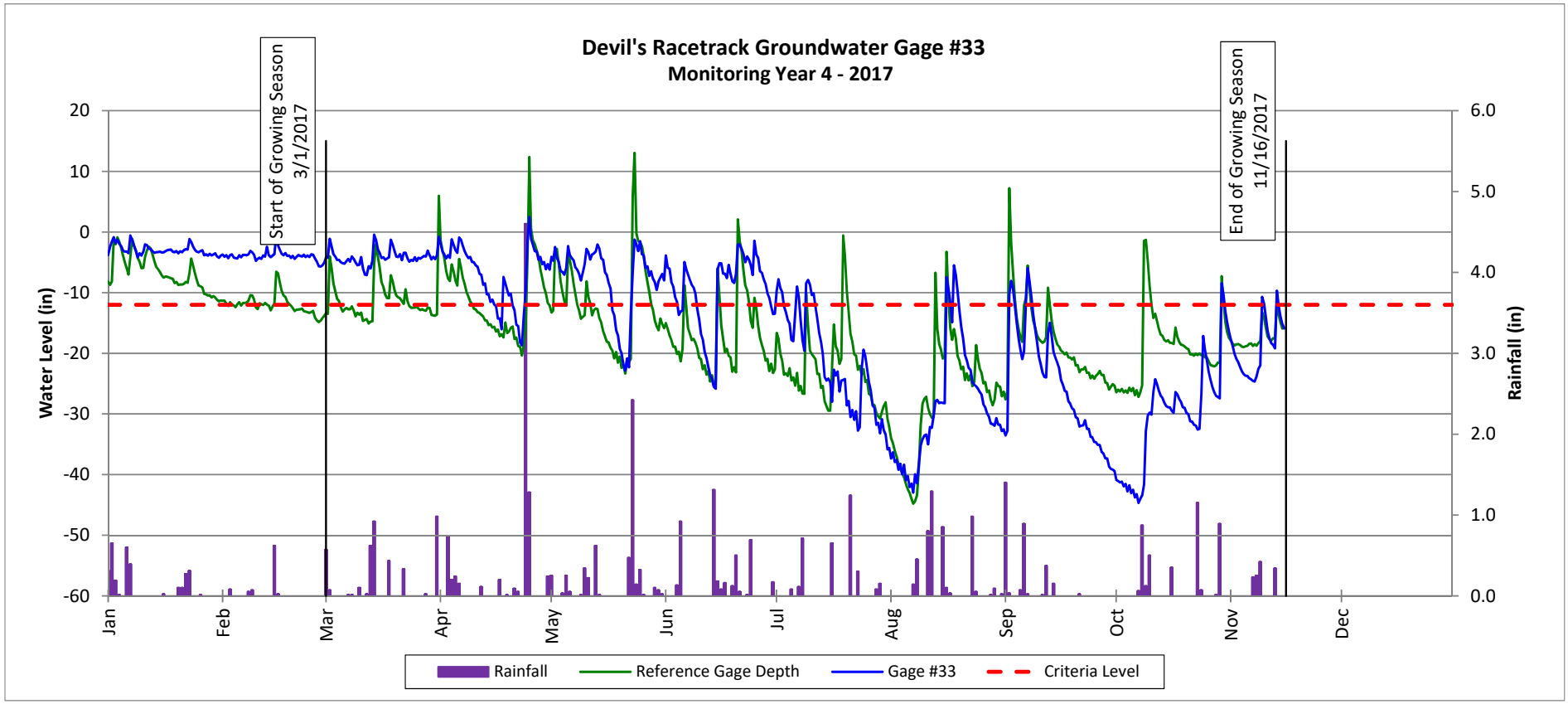
Monitoring Year 4 - 2017



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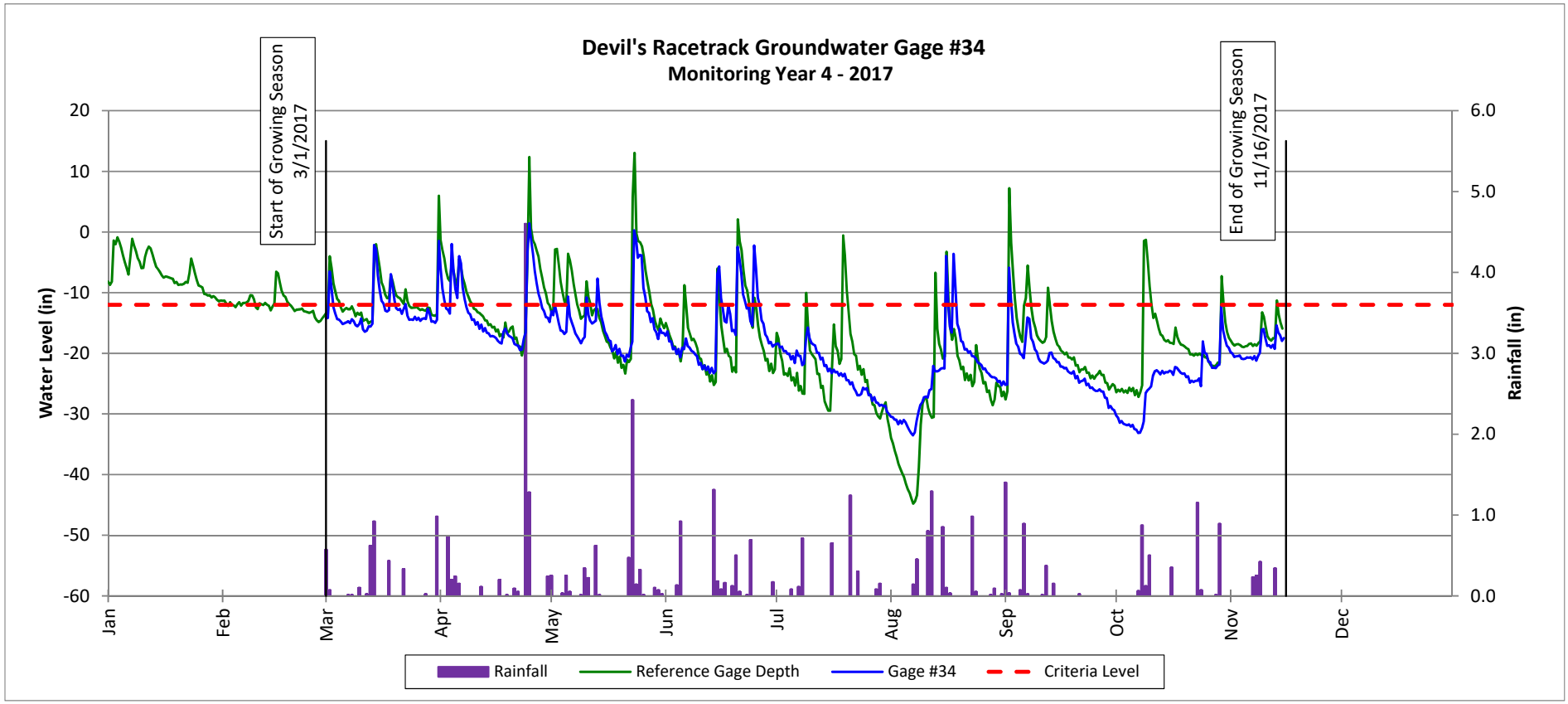
Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017



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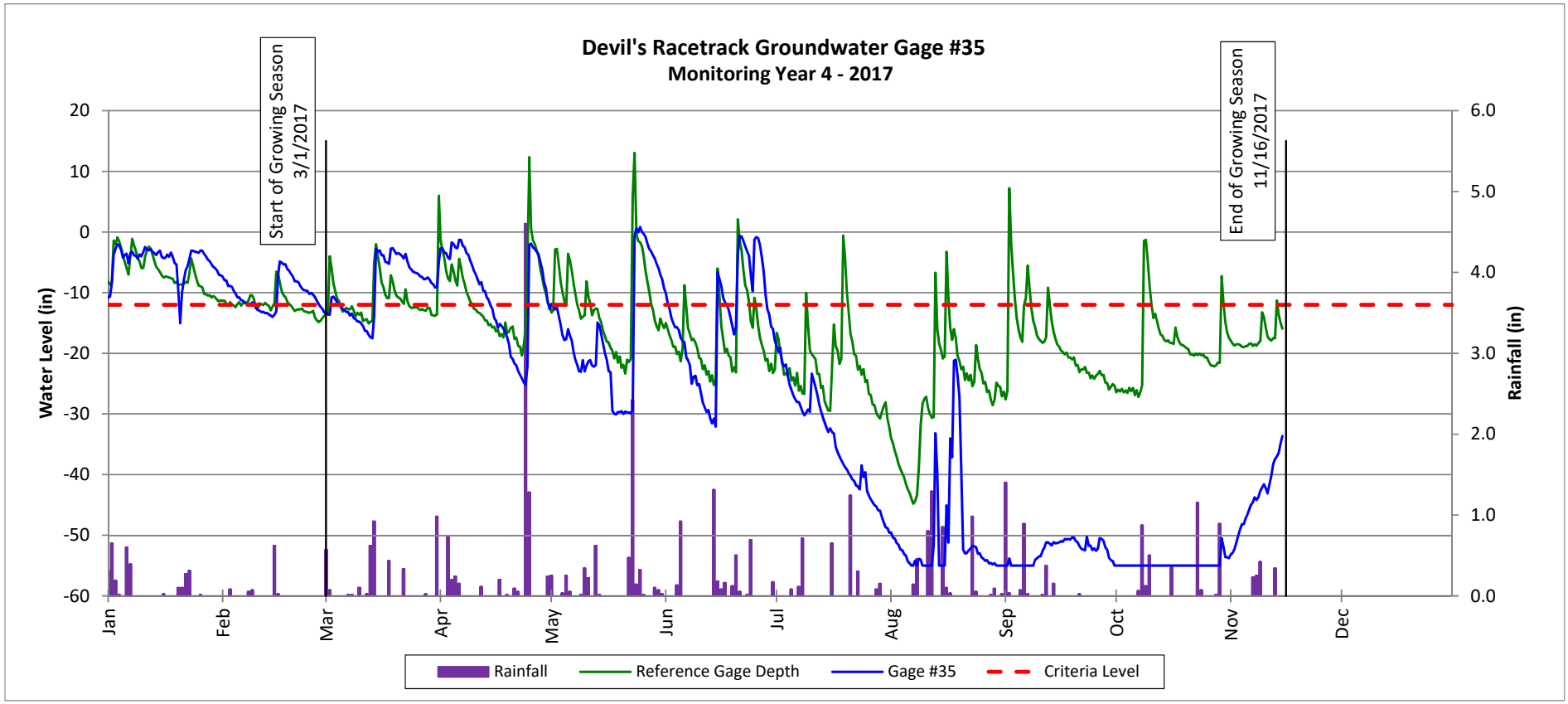
Monitoring Year 4 - 2017



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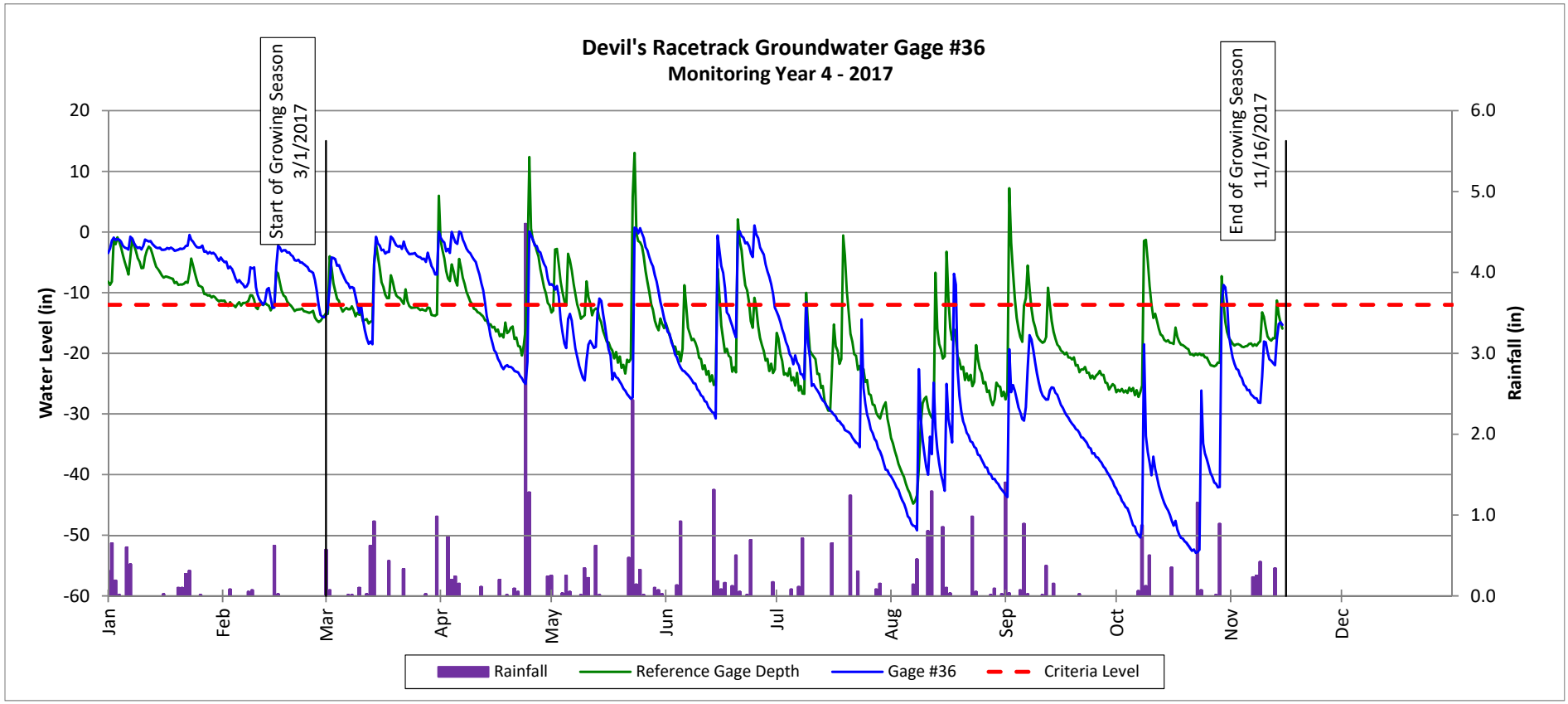
Monitoring Year 4 - 2017



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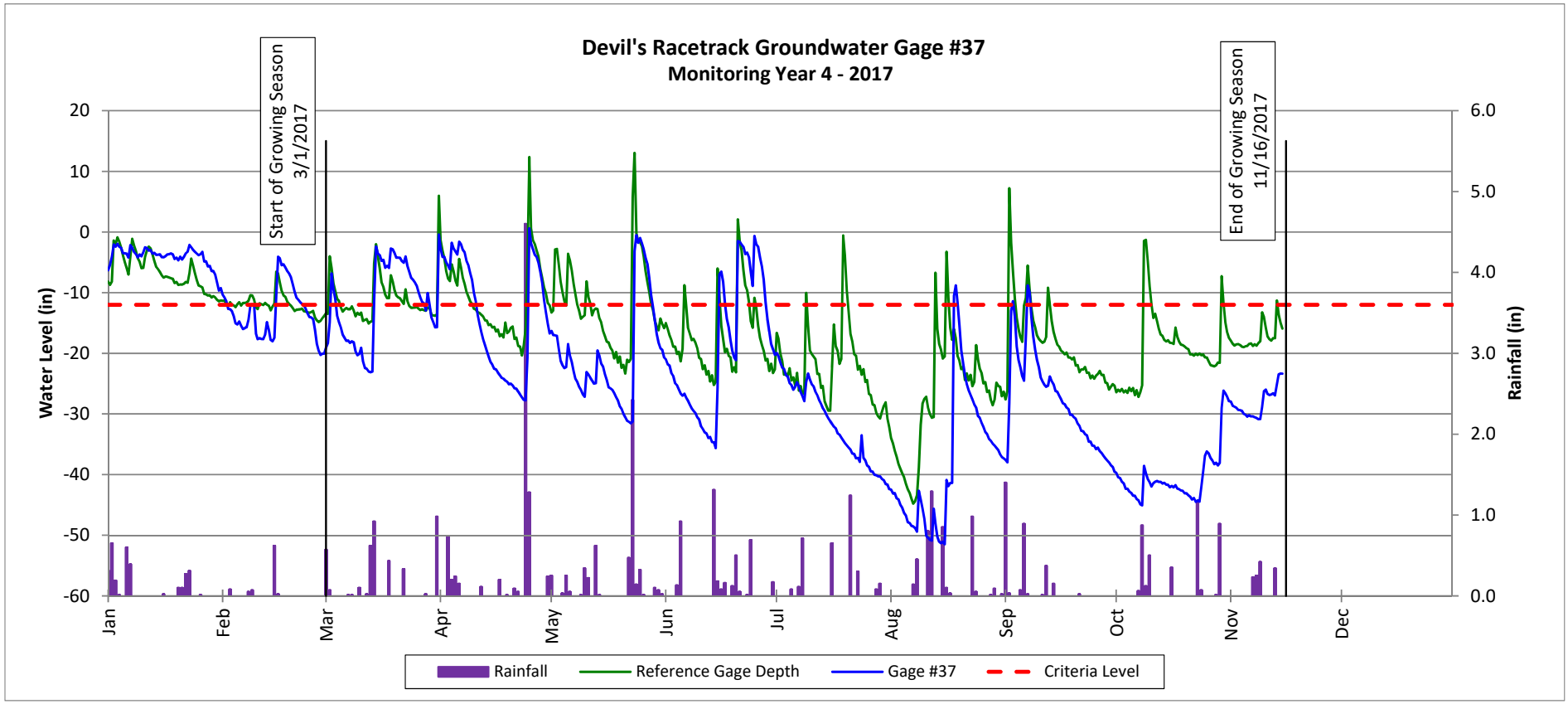
Monitoring Year 4 - 2017



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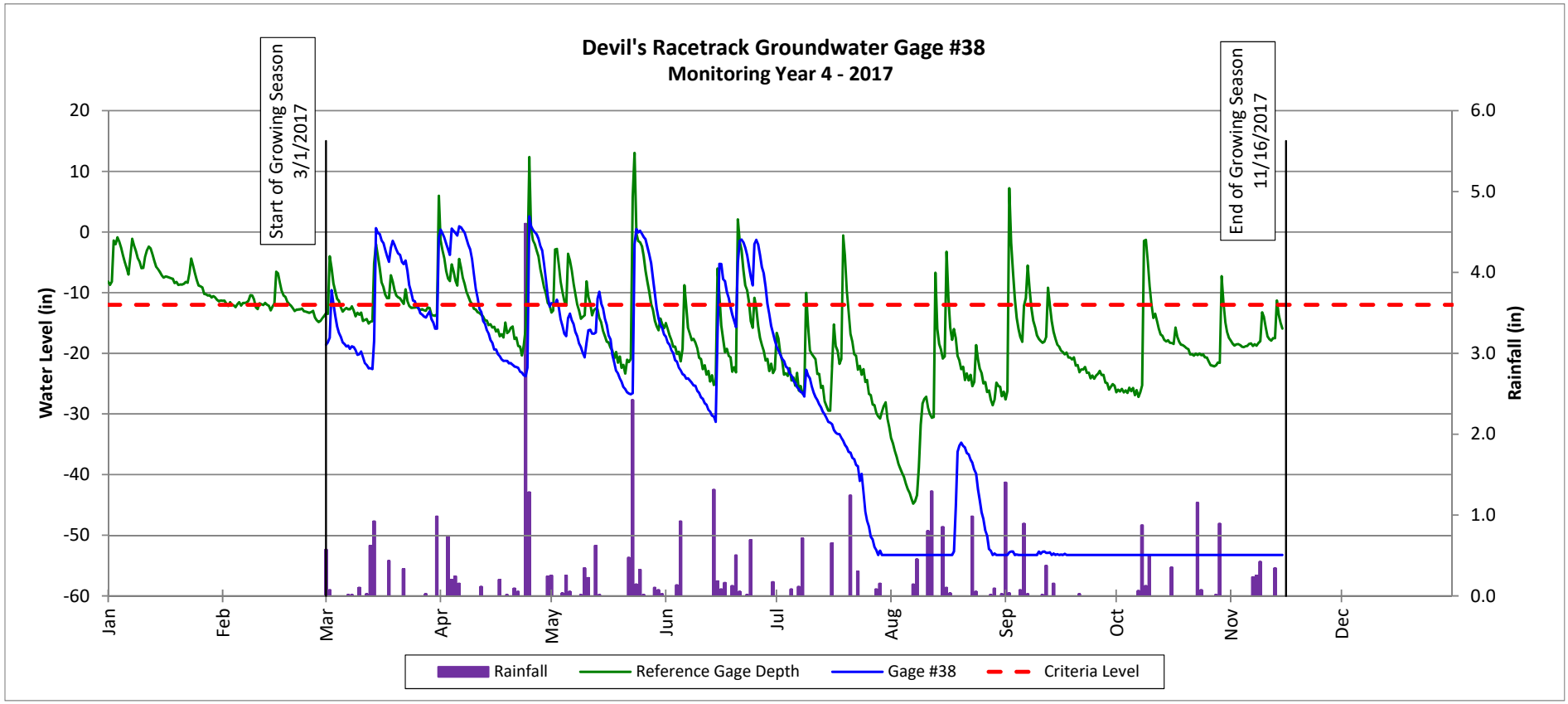
Devil's Racetrack Mitigation Site (DMS Project No. 95021)

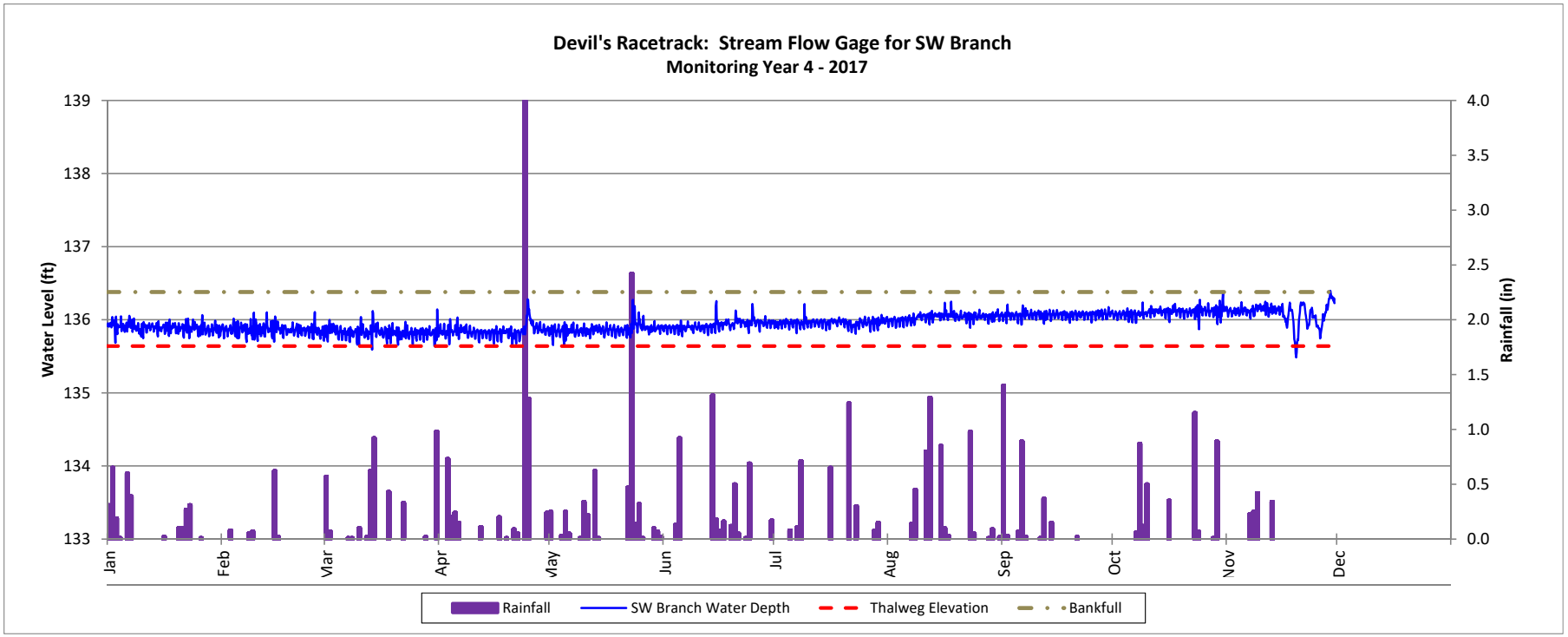
Monitoring Year 4 - 2017



Stream Flow Gage Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017



Stream Flow Gage Plots

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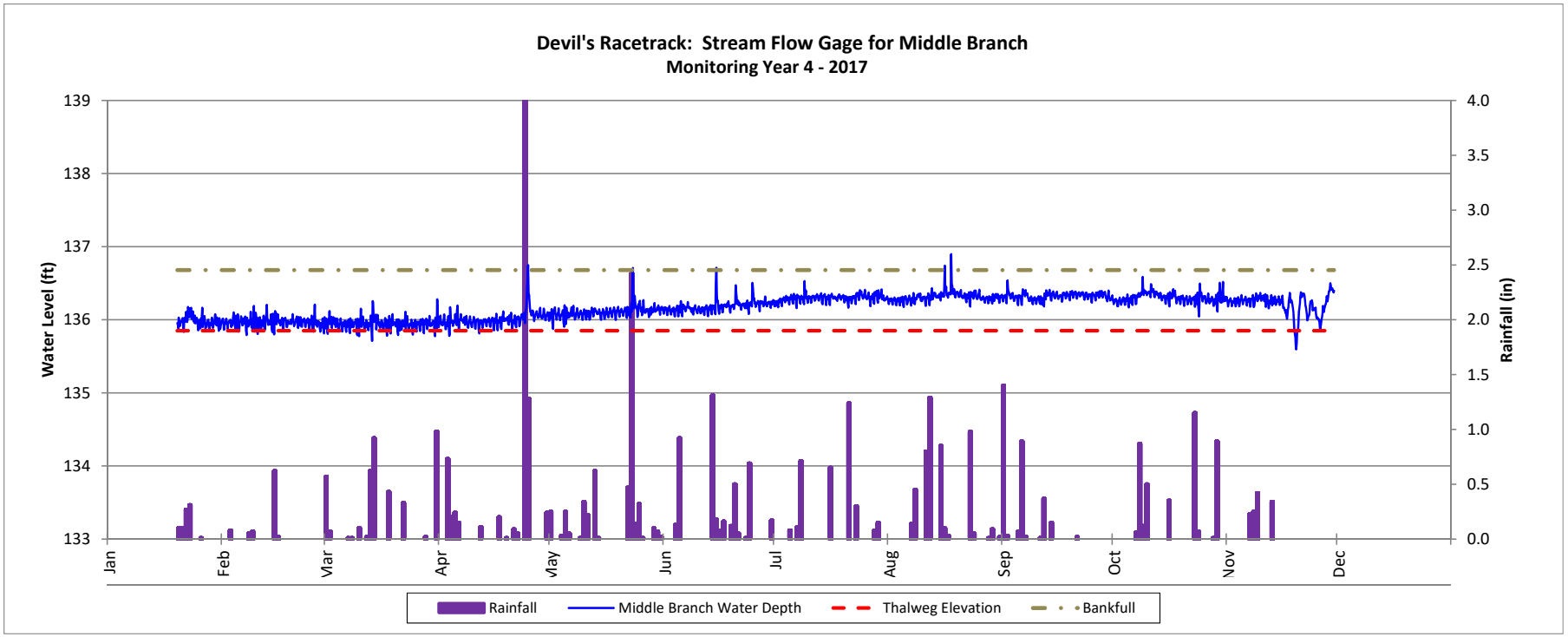
Monitoring Year 4 - 2017



Stream Flow Gage Plots

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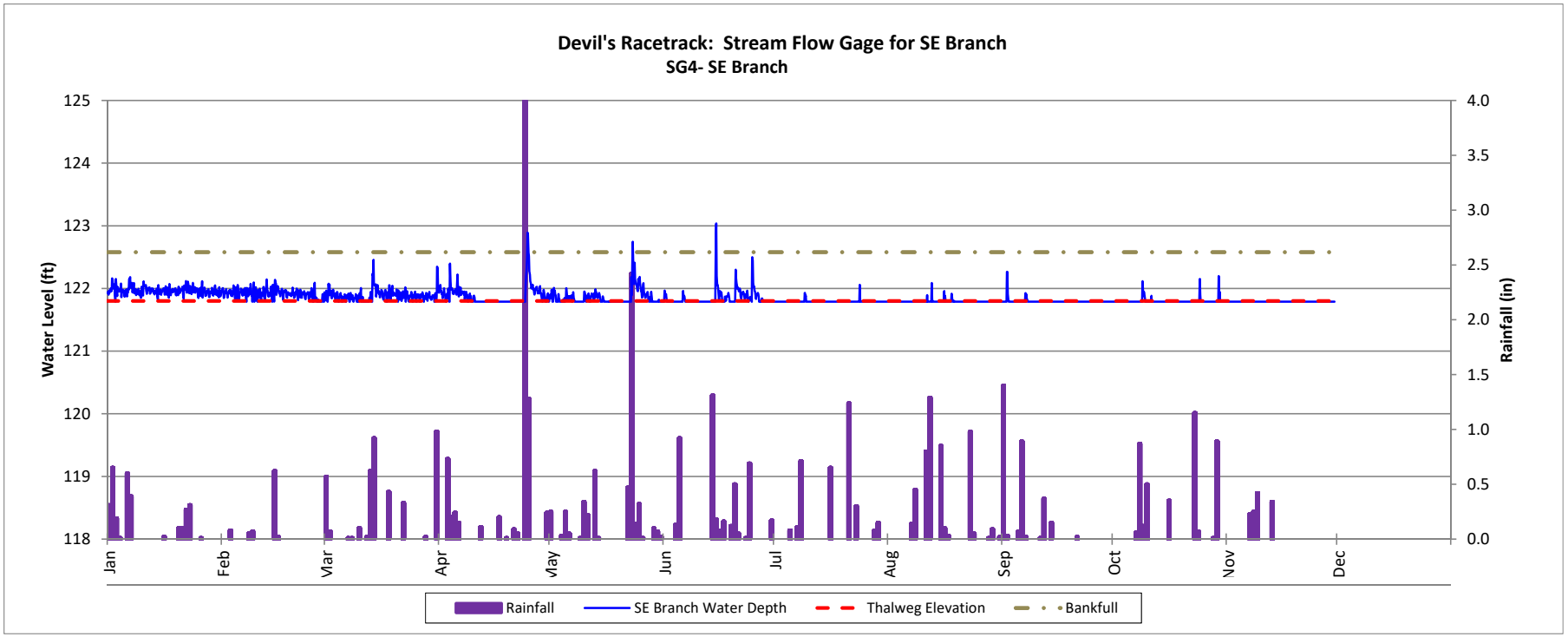
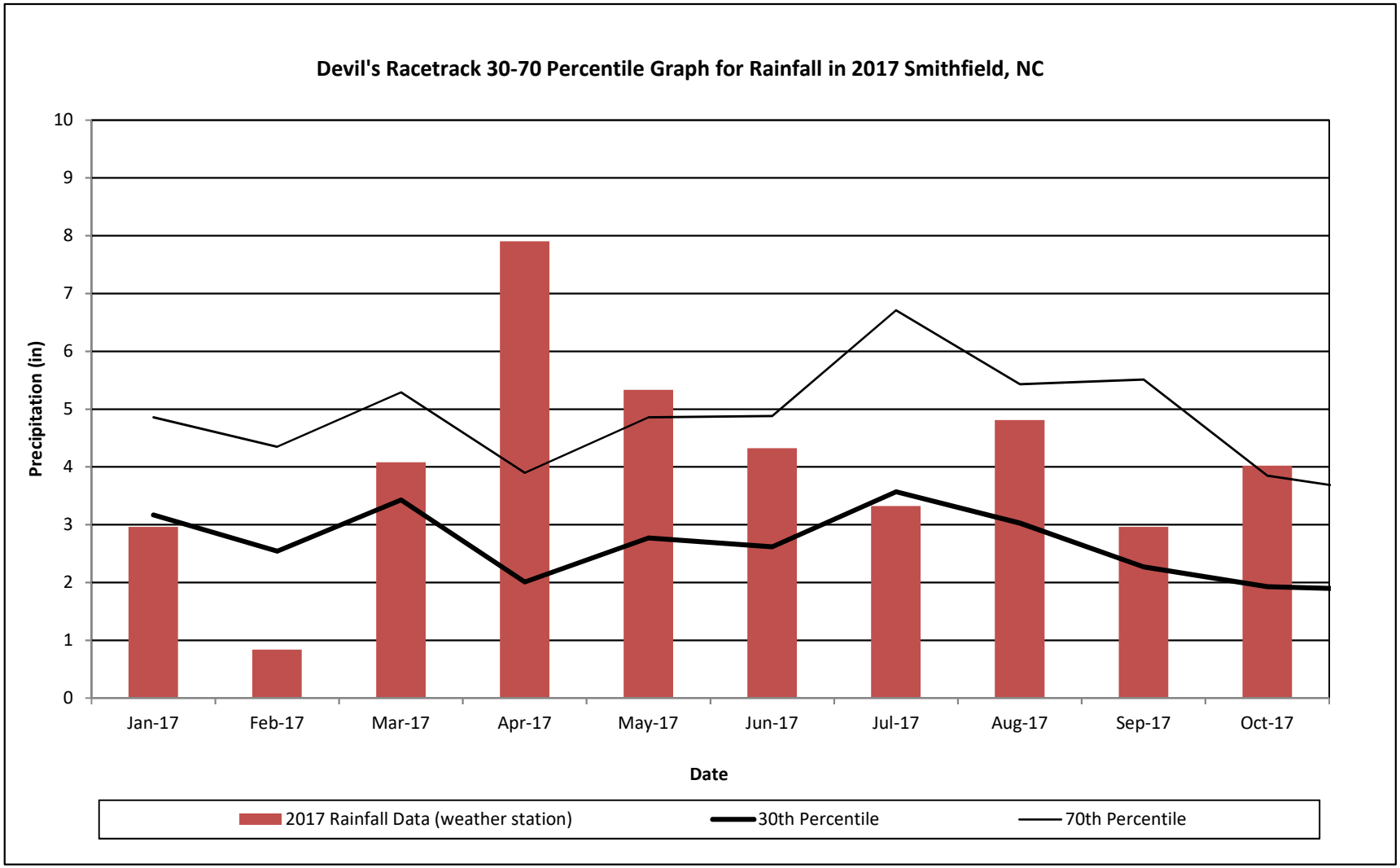
Monitoring Year 4 - 2017



Monthly Rainfall Data

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017



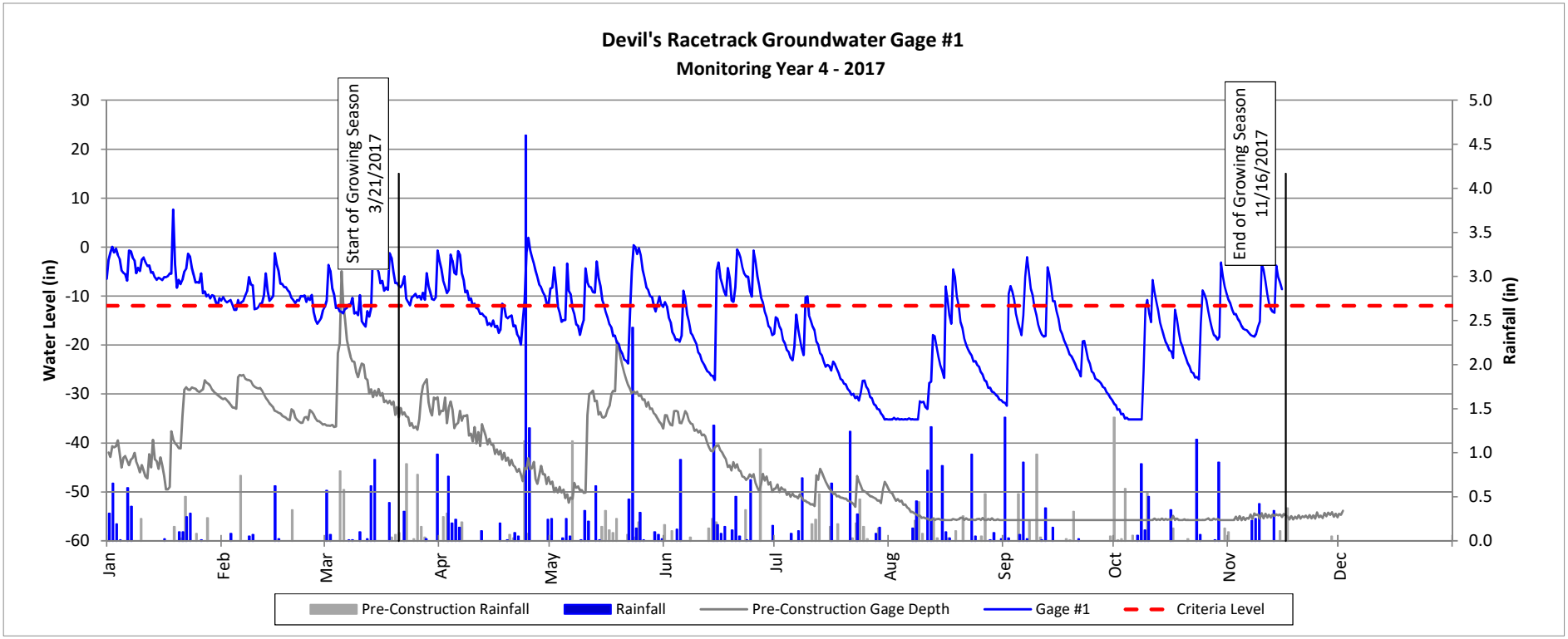
[1] 2017 monthly rainfall collected from USDA weather station 317994 (Smithfield, NC).

[2] 30th and 70th percentile rainfall data collected from weather station 317994, in Smithfield, NC (USDA, 1970 - 2000).

Pre and Post Construction Groundwater Gage Comparison Plots

Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017



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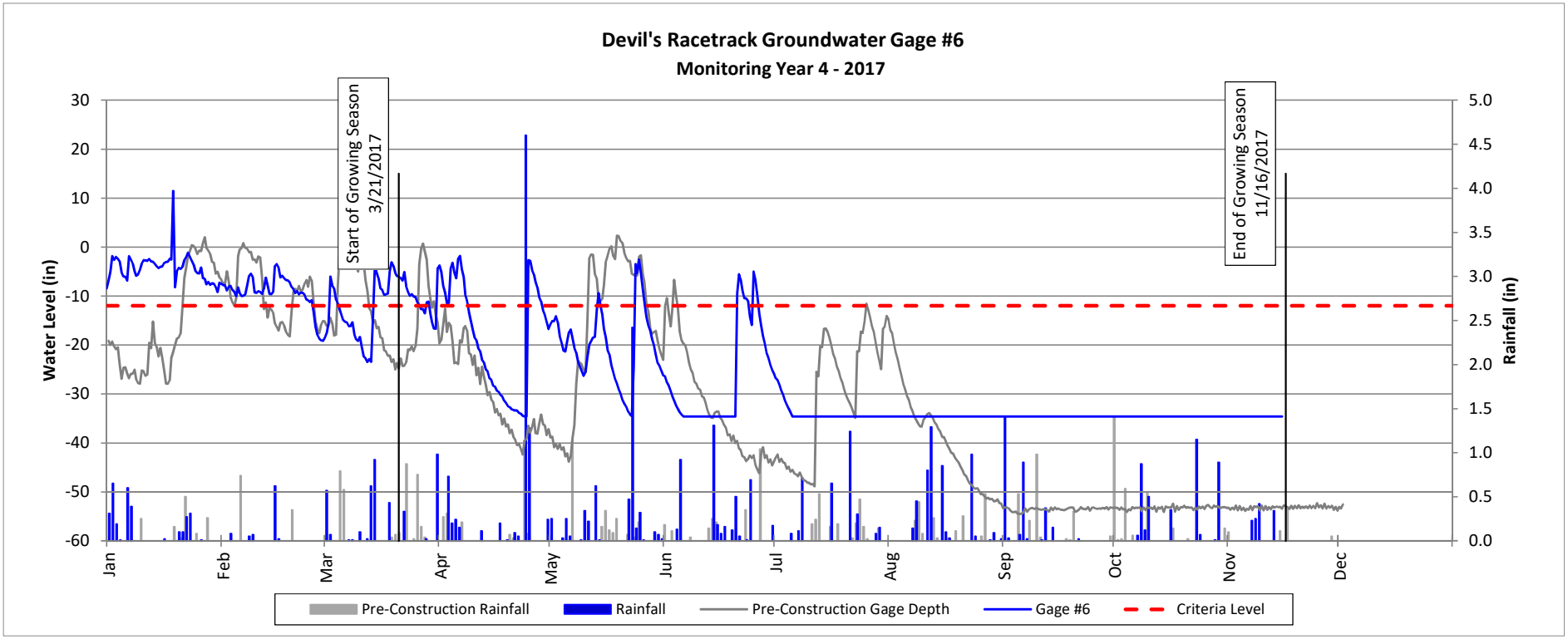

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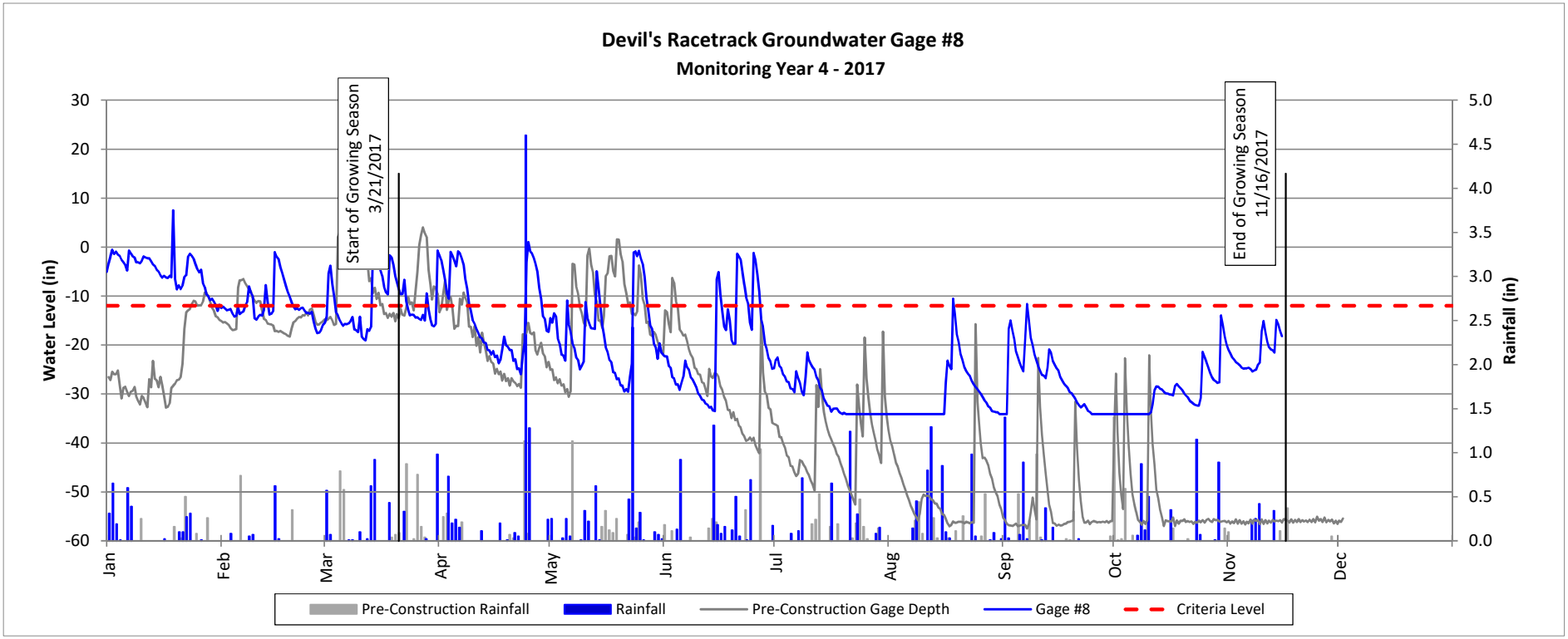

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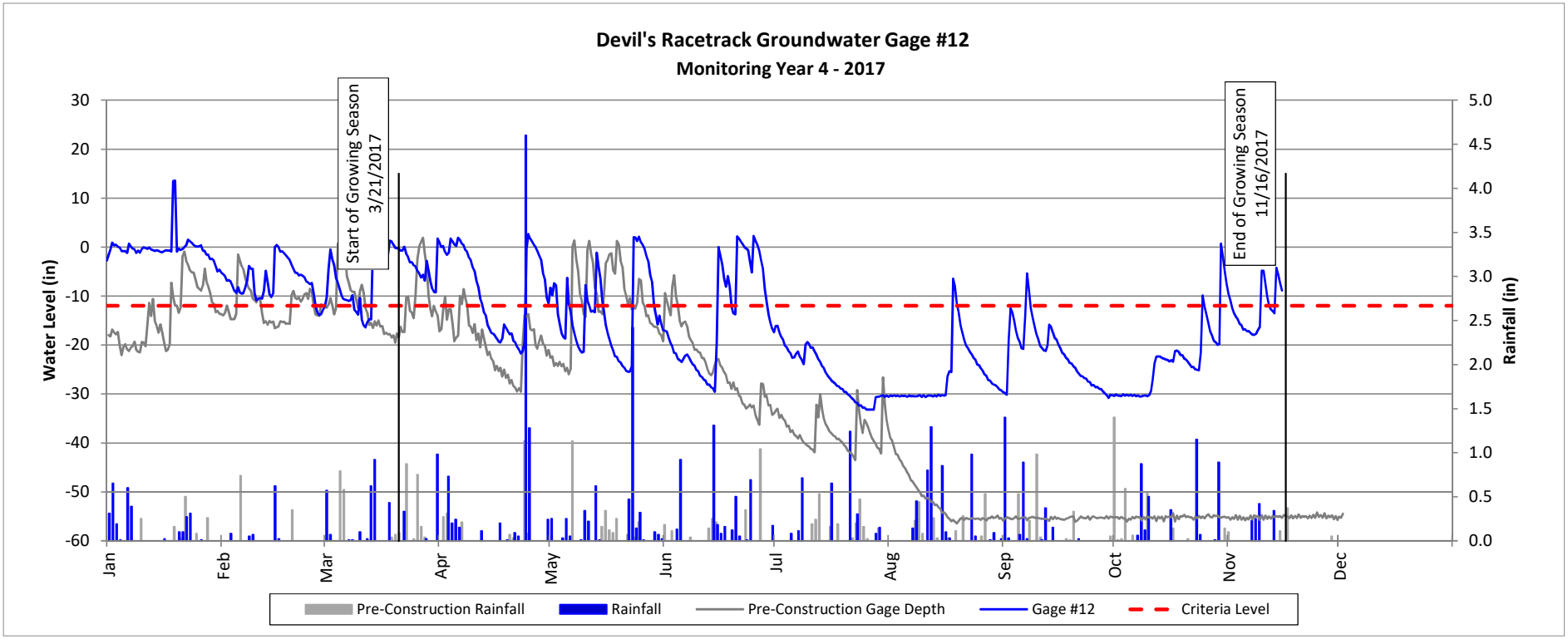

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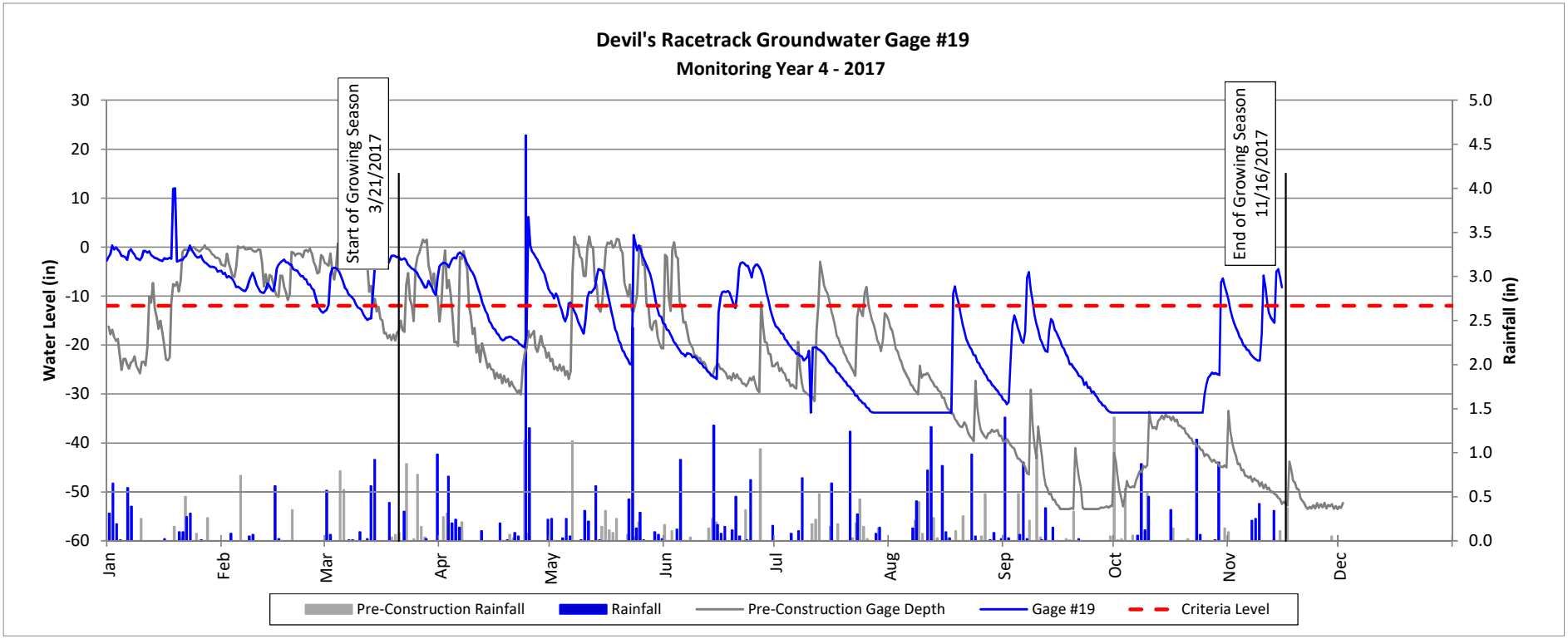

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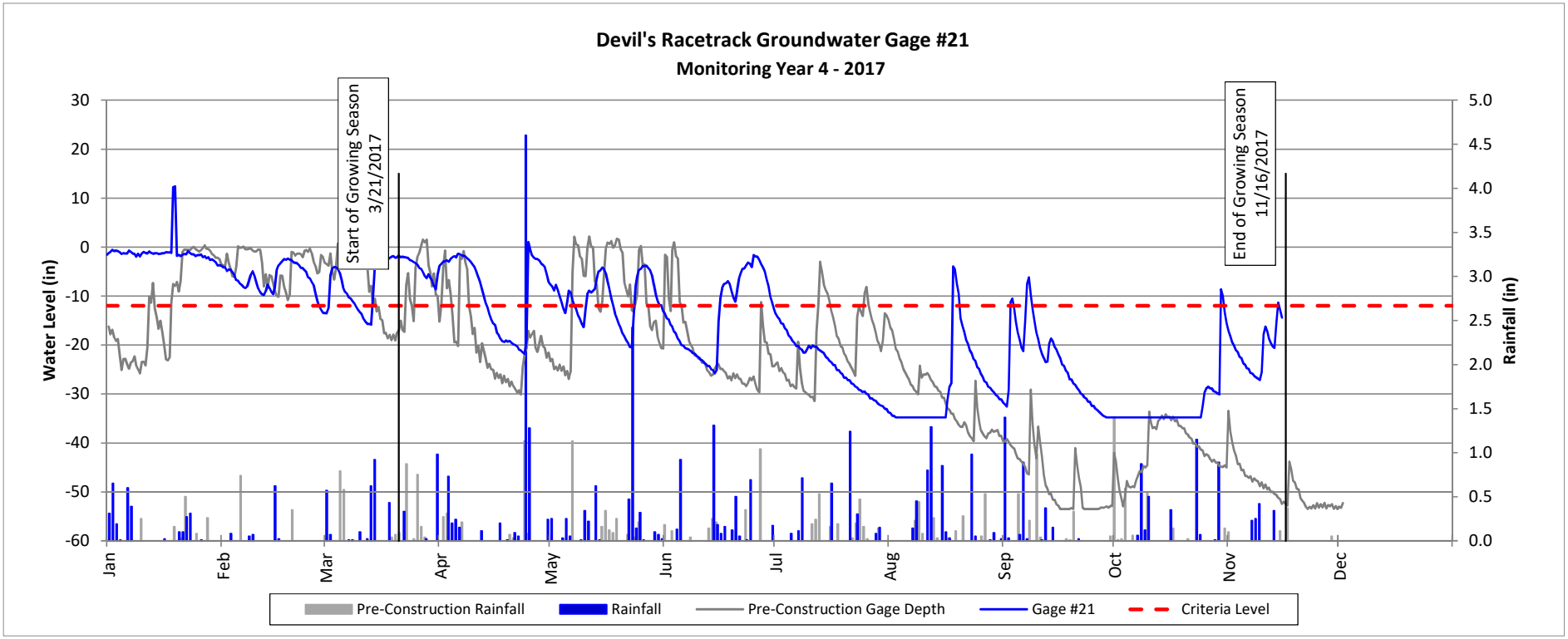

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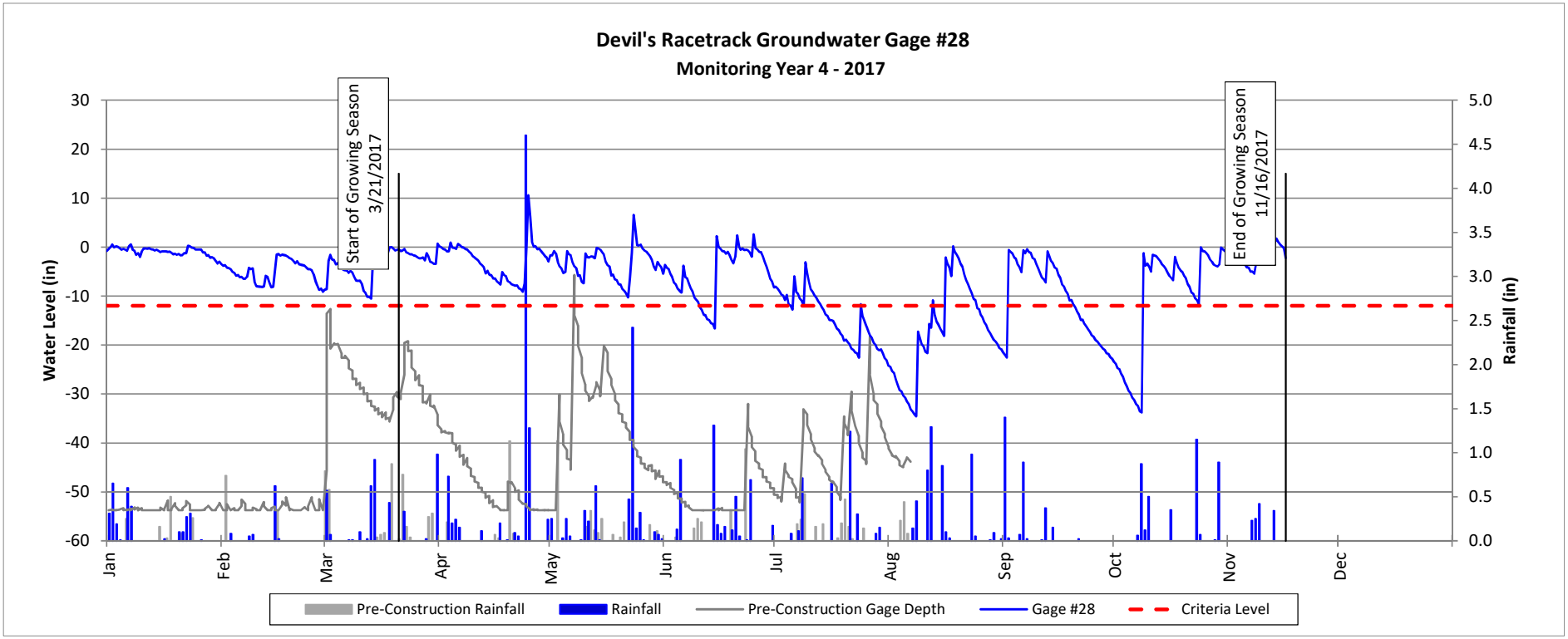

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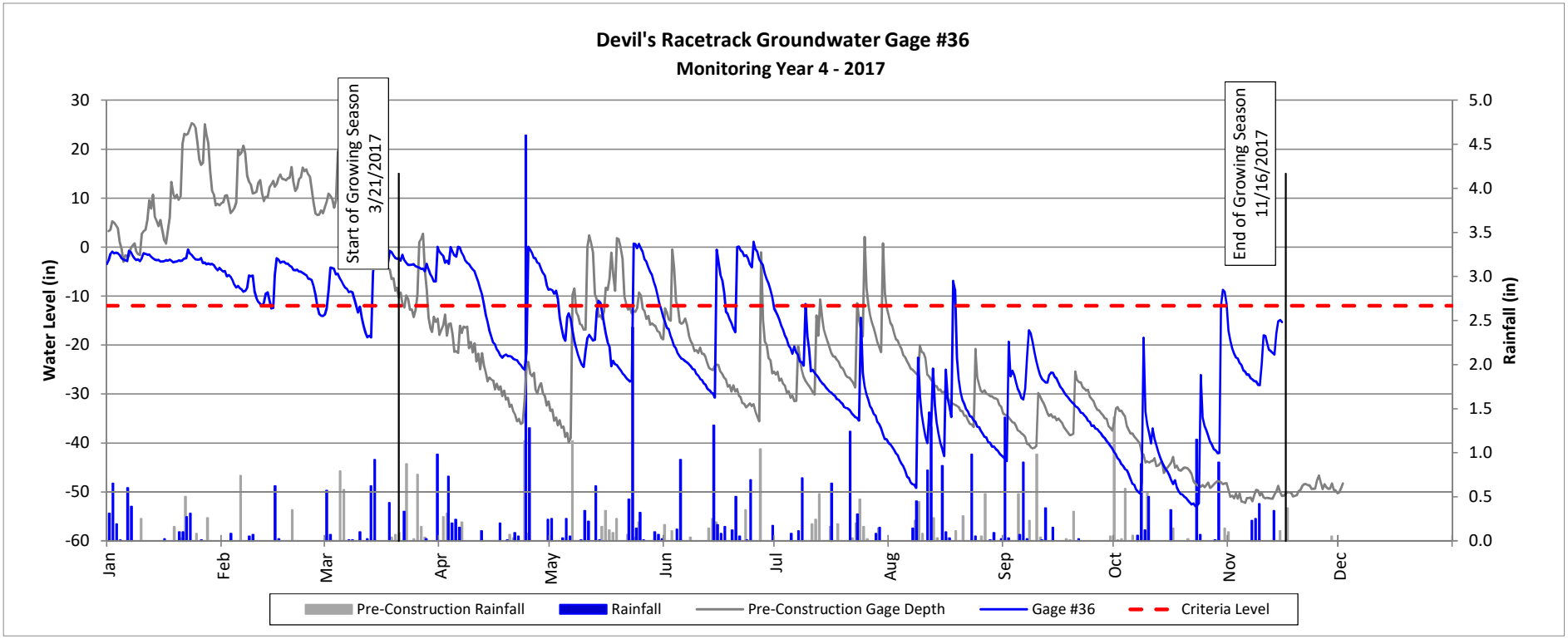

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Devil's Racetrack Mitigation Site (DMS Project No. 95021)

Monitoring Year 4 - 2017