OVERHILLS STREAM AND WETLAND RESTORATION MONITORING REPORT (YEAR 6)

Harnett County, North Carolina
EEP Project No. 199
Monitoring Contract #004448

Prepared for:
North Carolina Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, NC 27699-1652

Status of Plan: FINAL
Submission Date: November 2012

Monitoring Firm:

Stantec Consulting Services Inc
801 Jones Franklin Road, Suite 300
Raleigh, NC 27608

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1.0 Executive Summary

The North Carolina Ecosystem Enhancement Program (EEP) restored 4,270 linear feet of Jumping Run Creek and 59.7 acres of adjacent riparian wetlands located on the Fort Bragg Overhills tract, north of Spring Lake, in Harnett County, North Carolina. Construction of the project began on July 12, 2004 and the restoration was completed on May 30, 2006. The restoration project is located on the north side of Nursery Road (SR 1120) and has a total drainage area of 15.9 square miles. The site had been significantly altered from its natural state. Prior to 1955, the stream was straightened and moved to the west to provide more room for agricultural practices. Previous to restoration activities, the stream was deeply incised with only the largest rain events resulting in overbank flow. The associated wetlands had been drained and cultivated in various row crops for many years. Priority 1 stream restoration was carried out on the project resulting in a restored C type channel which was expected to naturally evolve in some areas to an E5 channel type. The entire restoration area including streambanks and riparian wetlands were planted with vegetation to stabilize the channel and provide shading, food, and habitat. Berms were installed across the site perpendicular to the valley to promote wetland hydrology and create microtopography beneficial for wildlife habitat.

Project goals and objectives for the Overhills stream and wetland restoration project include:

- Restoration of stream dimension, pattern and profile
- Restoration of riverine wetland hydrology and vegetation
- Improvement of current water quality
- Protection of future water quality

Major repair work on the lower reach took place over the winter of 2011. The repair was designed by Wildlands Engineering, Inc. and built by River Works. Construction was completed by mid-February 2011 and planting was completed in early March 2011. According to the construction plans, 1,025 linear feet of stream was relocated to the east of the existing failing stream channel. Seven of the floodplain berms onsite were notched to provide better flow across the wetlands. Some existing vegetation was salvaged and replanted within the limits of disturbance. The remaining area (11.7 acres) was seeded and planted with bareroot seedlings.

Vegetation Plot 6 was moved in 2011 since it was a 5x20m streambank plot on the older failing section of stream. A new 10x10m plot, "6R", was installed on the floodplain of the newly repaired reach in 2011. Due to the plot's location within the repair area it is the only plot that will continue to be monitored throughout the remainder of the monitoring period. Plot 6R is exceeding the success criteria of 260 stems per acre and more details can be found on Table 7 in Appendix C. Problem areas are referred to as VPA 1 through 22 on the Current Condition Plan View (CCPV) located in Appendix A. Some of the problem areas only existed in the section of the project associated with the upper reach of the stream; therefore not all vegetation problem areas will appear on the CCPV. In VPA 1, 4, 12, 14, and 22 persistent flooding has occurred and has caused the majority of the planted woody vegetation to die in those areas. Standing water continues to be present in these areas. As previously noted, even though these areas are not supporting the planted woody vegetation, they do and will continue to provide excellent habitat diversity for the site. Other wet areas are present onsite, but woody vegetation is present and viable in these areas

and is not a cause for concern at this moment. Some minor beaver foraging was observed in VPA 22. The beaver are attempting to dam a section of the berm that has been removed.

Lespedeza is still present in some drier areas onsite; however, a large portion of it has been removed during the repair construction work. It appears that *Lespedeza* may be reestablishing along the right bank and lower left bank in the newly repaired floodplain but lacked sufficient size to include on the CCPV. A few areas of *Typha* have also been observed onsite and are growing in size from previous assessments. Areas of *Typha* were observed near the wetter areas and are shown on the map as VPA 10, 15 and 20. VPA-15 and VPA-20 (*Typha*) have expanded. As previously noted, the remainder of the floodplain is exhibiting excellent vegetation growth, particularly in the cypress trees.

The lower end of the repair reach is exhibiting weak herbaceous vegetation growth on both the banks and floodplain (VPA-21). However, numerous viable bare root trees were found on the floodplain. Possible causes for the stunted herbaceous growth may include topsoil replacement or compaction during construction. This may be assisting in maintaining low populations of *Lespedeeza*.

The lower four cross sections that were located in the failing section of stream (Cross sections 6, 7, 8 and 9) were moved to the repaired reach, and are now called R1, R2, R3 and R4. Overall the new stream is functioning as intended and some profile adjustments were observed towards the bottom of the reach between STA 37+50 and STA 42+50. Minor aggradation has occurred in the riffles which is most likely a result of vegetation (*Typha*) that was observed in the channel during the initial assessment in April 2012. Also, observed between these stations and throughout the profile was a deepening of the pools. The 2011 monitoring report noted that the pools were not deep enough, so the deepening of the pools in 2012 indicates the channel is adjusting towards the design. This minor area of aggradation should continue to be monitored, but is not likely to expand in size or become a significant problem. Bank instability was observed at stations 38+50 and 39+50, and is primarily the result of concentrated flow over the banks due to beaver impoundments. These problem areas should continue to be monitored and investigated in order to maintain the integrity of the stream and prevent these areas from expanding.

The floodplain immediately adjacent to the stream is drier than in past monitoring years, as shown in well JR-7 which did not meet the hydrology success criteria. However, areas of the floodplain further away from the channel continue to be inundated with water, especially between wells JR-2 and JR-3. The beavers have blocked the nearby breach in the berm (near well JR-2) and have reinforced the berm with sediment. The deepest water in this impounded area was over three feet deep. This beaver activity is directly corresponding to the excessive overland flow observed near STN 39+50, and overwhelming the constructed wetland outlet leading to bank erosion. Headcuts are occurring in areas where the inundated water reenters the stream channel from the side. These areas are located along the stream's left bank at Stations 34+00, 38+00 to 39+00, and 39+75. The CCPV shows beaver dam conditions as of 10/9/12. Continued beaver management will be beneficial to the stability of the site.

The reference well met the hydrology success criteria, with two periods of consecutive days of saturation within 12 inches of the ground surface during the growing season. The longest period, 92 days, comprises approximately 39% of the growing season. Additionally, eight of the nine groundwater monitoring wells currently monitored met the hydrology success criteria, with 6 of the wells being within 12 inches of the ground surface for more than 80% of the growing season. The remaining two wells met the success criteria for more than 45% of the growing season, further indication of the inundation present throughout the floodplain. The only well (JR-7) that did not meet the hydrology success criteria, experienced several

periods of saturation within 12 inches of the ground surface with the longest being 17 consecutive days. This well is the closest well to the stream channel and its hydroperiod may relate to the natural hydrological drainage associated with the stream. Monthly precipitation averages for 2012 fell between the 30th and 70th percentiles during the entire growing season.

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

2.0 Methodology

2.1 VEGETATION ASSESSMENT

The Carolina Vegetation Survey (CVS) Level 2 methodology was utilized to sample vegetation in September 2012. One 100m^2 plot has been established along the right bank of the repair section of the Lower Reach. In the plot, two plot corners have been permanently located with conduit or rebar. Vegetation Plot 6 was moved in 2011 since it was a 5x20m streambank plot on the older failing section of stream. A new 10x10m plot, "6R", was installed on the floodplain of the repaired reach. As per the mitigation plan, the vegetative success criteria are based on the US Army Corps of Engineers Stream Mitigation Guidelines (USACE, 2003). In the repair area, the vegetative success criteria will be the survival of 260 5-year old trees per acre for Monitoring Years 5 and 6, and the final Monitoring Year 7. Currently plot 6R is meeting success criteria with 445 stems per acre.

2.2 STREAM ASSESSMENT

The Upper Reach, classified as a Rosgen C5 stream, flows from the beginning of the project at Station 0+00 to Station 30+77. The Lower Reach, a Priority 2 reach with constructed riffles, flows from 30+77 to the end of the project at Station 42+70. This reach break is approximately 200 feet upstream of the old reach break, to correspond with the upstream end of the 2011 repair. Pattern and profile, as well as dimension were monitored only on the Lower Reach. The Upper Reach is no longer being monitored after 2011, the fifth year of monitoring.

A longitudinal profile survey of the entire length of the Lower Reach repair section of the project was completed in October 2012. Additional data collected included riffle length, riffle slope, pool length and pool spacing. During the longitudinal survey, additional pattern data was collected including channel beltwidth, radius of curvature, meander wavelength and meander width ratio. Stability was also visually assessed.

The lower four cross sections that were located in the failing section of stream (Cross sections 6, 7, 8 and 9) were moved to the repaired reach, and are now called R1, R2, R3 and R4. Data collected included, at a minimum, cross-sectional area, bankfull width, bankfull mean depth, bankfull max depth, floodprone width, width to depth ratio, and entrenchment ratio. Stream type was determined in riffle cross-sections only. Success was measured based on whether the channel features stayed within the natural variability of the dimensionless ratios of the reference reaches.

2.3 WETLAND ASSESSMENT

This site is considered to meet the success criteria for wetland hydrology if the groundwater saturation is within 12 inches of the ground surface consecutively for 12.5% of the growing season. Fifteen groundwater monitoring wells were initially installed on the project site. Following Monitoring Year 5 (2011), the Upper Reach area is no longer being monitored. Only the nine groundwater monitoring wells associated with the Lower Reach and the berm cuts are currently monitored on the project site. Of the

nine wells, eight met the success criteria during the 2012 growing season. Well JR-7 was the only well to not meet the hydrology success criteria (Appendix E). The growing season in this area is from March 18th to November 8th for a total of 234 days (NRCS 2002).

A reference well was installed within the reference site on October 2, 2007. Data has been collected since its installation. More specific details regarding the physical and biological characteristics of the reference site can be found in the Overhills Stream and Wetland Restoration Plan.

3.0 References

Harrelson, C.C., C.L. Rawlins and J.P. Potyondy. 1994. Stream Channel Reference Sites: An Illustrated Guide to Field Technique. United States Department of Agriculture, Fort Collins, CO.

Lee, Michael T., R. K. Peet, S. D. Roberts, and T. R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (http://cvs.bio.unc.edu/methods.htm)

NC CRONOS. 2012. NC CRONOS Database – Dunn 4 Nw (312500). North Carolina State University State, Climate Office of North Carolina. http://www.nc-climate.ncsu.edu/cronos

NCEEP. 2009. Revised Table of Contents for 2009 Monitoring Report Submissions. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, NC. Version 1.2.1 June 1, 2009.

NRCS. 2002. WETS Table for Pope Air Force Base, NC6891 . Natural Resource Conservation Service, National Water and Climate Center.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, CO.

Weakley, Alan S. 2010. Flora of the Carolinas, Virginia, Georgia, and surrounding areas. University of North Carolina Herbarium. Chapel Hill, NC.

Project Condition and Monitoring Data Appendices

APPENDIX A. GENERAL FIGURES AND PLAN VIEWS

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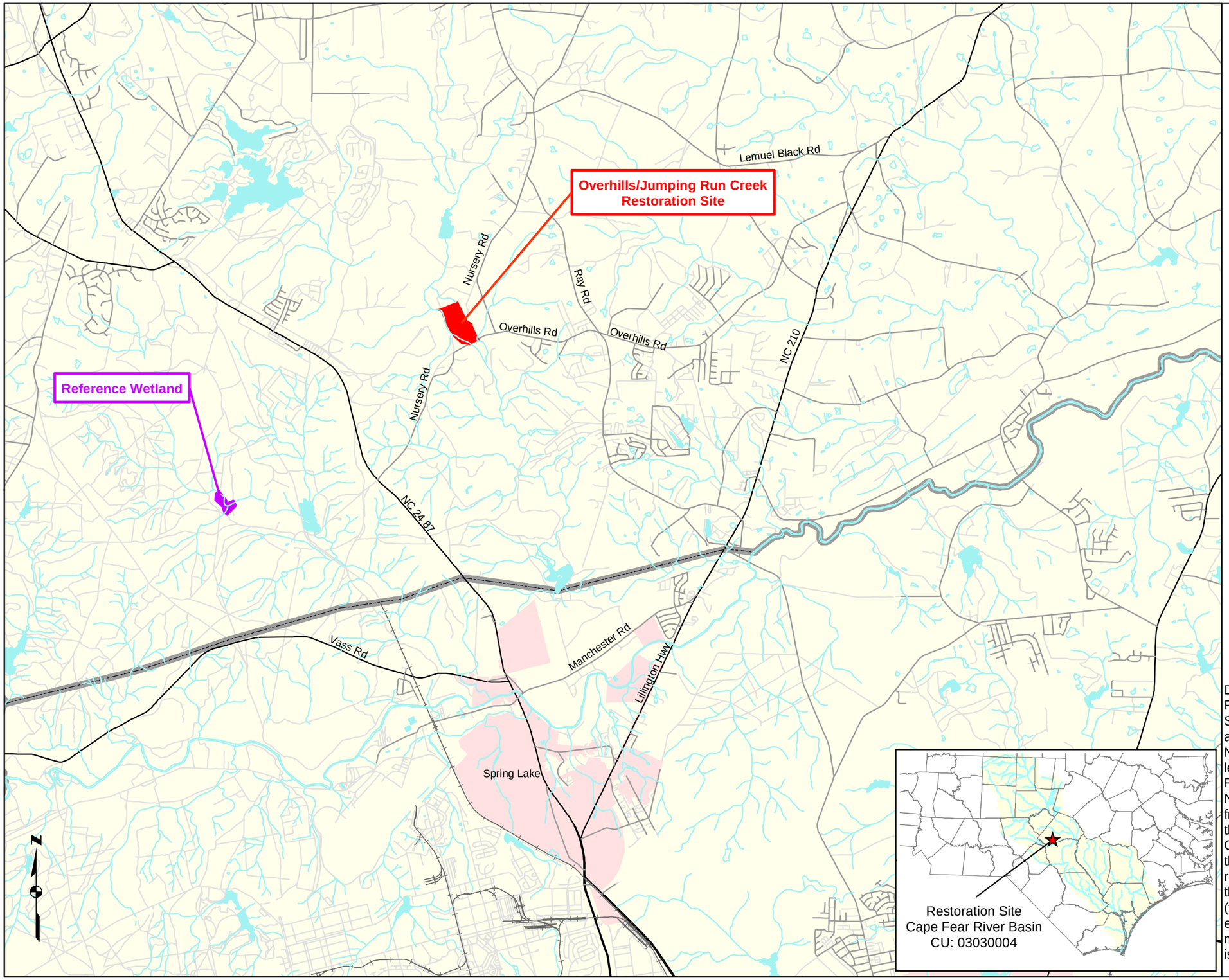

Figure 1 - Vicinity Map

Overhills/Jumping Run Creek Stream and Wetland Restoration Project
EEP #: 0199
Harnett County, North Carolina

Monitoring Report
November 2012

0 0.5 1 2 3Miles

- 1:24000 Hydrography
- Railroads
- NCDOT Secondary Roads
- NCDOT Primary Roads
- Overhills/Jumping Run Creek
  35.258N, 79.000W
- Reference Wetland
  35.227N, 79.050W

Ecosystem Enhancement Program

Stantec

Directions to Overhills/Jumping Run Creek Restoration Site: From Raleigh, take US401 South following signs through Fuquay-Varina and into downtown Lillington. Turn right onto NC 27 and follow for about 9 miles, then turn left onto Nursery Rd. After 6.5 miles, Nursery Rd will come to a T, turn right to stay on Nursery Rd. The restoration site is half a mile from the T on the right hand side. To get to the reference site from the restoration site: Continue travelling east on Nursery Rd for 2 miles, then turn left onto NC24/NC87 for 3 miles. Turn right onto Vass Rd/NC 690. Continue for 3.5 miles, then turn right at sign that states "NO POVs" (this is part of Fort Bragg, need permission to enter). Follow the dirt road straight, at least 1.7 miles (do not turn or veer). The reference well is in the woods, about 100 feet from the end of the road.

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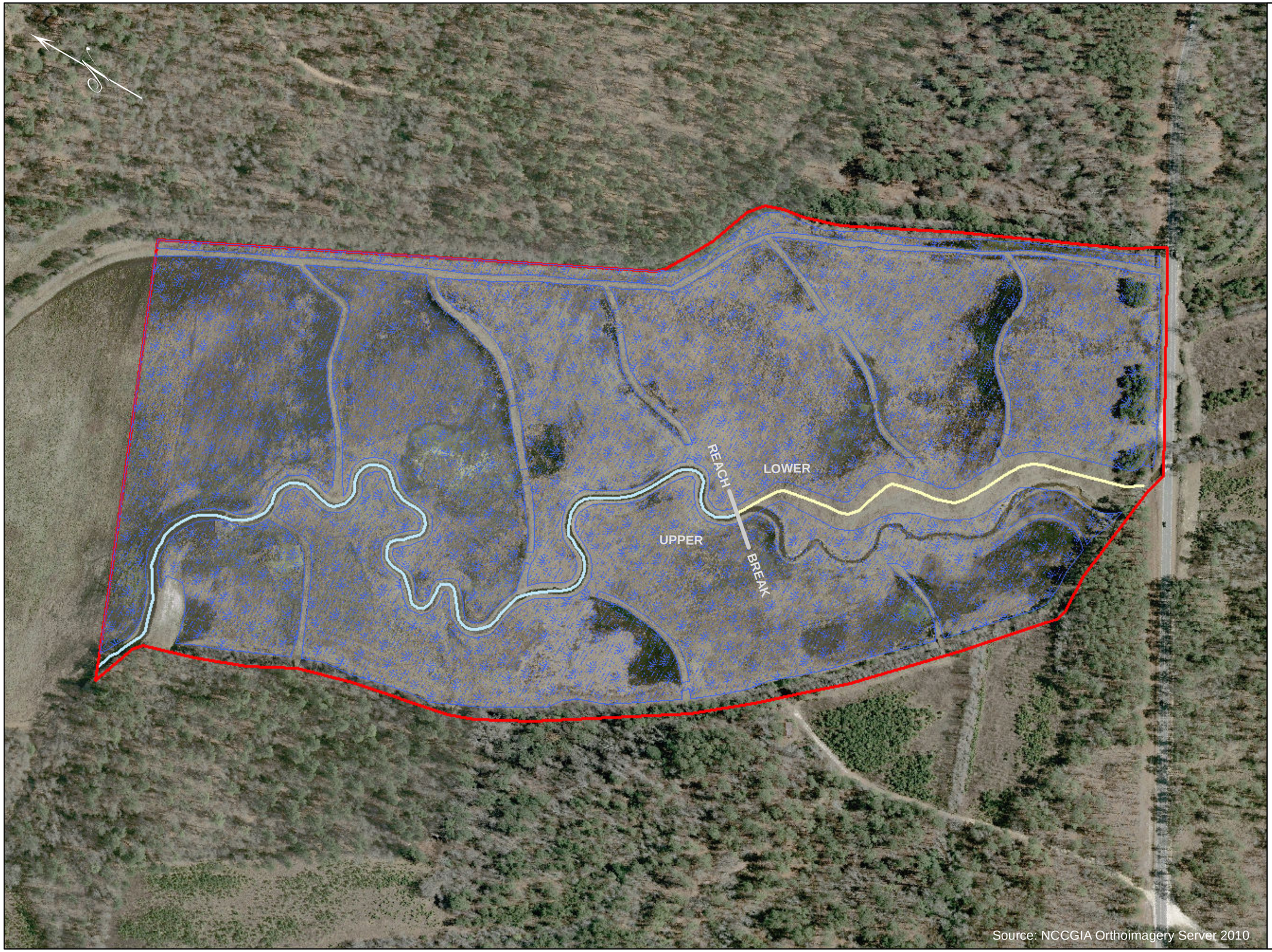

Figure 2 - Asset Map

Overhills Stream and Wetland Restoration Site
EEP Project #: 0199
Harnett County, North Carolina

Monitoring Year 6
November 2012

Wetland Restoration (59.7 ac)
Project Boundary
Priority I Stream Restoration (3077 lf)
Priority II Stream Restoration (1193 lf)

0 125 250 500
Feet

Ecosystem Enhancement PROGRAM

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CURRENT STATUS PLAN VIEW

OVERHILLS STREAM AND WETLAND RESTORATION
HARNETT COUNTY, NORTH CAROLINA

EEP PROJECT NUMBER 199
MONITORING YEAR 6

THIS MAP DEPICTS MY6 CONDITIONS AS OF 10/2012

LEGEND

- REPAIR THALWEG (2011)
- BANKFULL
- BEAVER DAMS
- ANNUAL PHOTO POINTS
- ×JR MONITORING WELLS/ RAIN GAUGE
- DESIGN LOG CROSS VEIN
- DESIGN ROOT WAD
- DESIGN TOE PROTECTION
- CONSTRUCTED RIFFLE
- BERM REMOVAL AREA
- MAJOR VEG. PROBLEM AREA
- MINOR VEG. PROBLEM AREA
- VEG PLOT PINS
- CURRENT VEG. PLOT
- VEG. PLOTS (Prior 2012)
- 2011 REPAIR PLANTING AREA 11.7 acres
- CROSS SECTIONS
- MINOR BANK EROSION
- MAJOR BANK EROSION
- MINOR AGGRADATION

MONITORING WELL LOCATIONS		
NAME	LAT	LONG
JR1	35.25633325	-78.99619887
JR2	35.25704509	-78.99613104
JR3	35.25664382	-78.99728101
JR4	35.25619691	-78.99852738
JR5	35.25784127	-78.99692474
JR6	35.25862538	-78.99752997
JR7	35.25818234	-78.99853736
JR8	35.25781716	-78.99941543
JR9	35.25748554	-79.00022606
JR10	35.26158413	-78.99927614
JR11	35.26140403	-78.99991026
JR12	35.26115267	-79.00070518
JR13	35.26069372	-79.00165278
JR14	35.26164227	-79.00115399
JR15	35.2615367	-79.00177709
RG1	35.26235615	-79.00249699

MONITORING PLOT LOCATIONS		
NAME	LAT	LONG
VP1	35.26080136	-79.00066535
VP2	35.2614819	-78.9998302
VP3	35.25970237	-79.00001297
VP4	35.25794685	-78.99968083
VP5	35.25696862	-78.9973555
VP6R	35.25660386	-78.99796926
VP7	35.26053462	-79.00144889
VP8	35.25882237	-78.99983412
VP9	35.25930164	-78.99884514
VP10	35.25858954	-78.99773114

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Fax. 919.851.7024
www.stantec.com

PROJECT NO.	SHEET NO.
SCO#070695701	
1/8/2013	

Scale 1" = 100'

DATA SOURCE: HARNETT COUNTY 2008 AERIALS

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APPENDIX B. GENERAL PROJECT TABLES

Table 1. Project Restoration Components Overhills/Jumping Run Creek Restoration Project - EEP Project No. 199						
	Existing Feet/Acres	**Type**	**Approach**	**Footage or Acreage**	**Stationing**	**Comment**
Upper Reach	3064	R	P1	3077	0+00 to 30+77	Includes log structures and root wads
Lower Reach		R	P2	1193	30+77 to 42+70	Includes log structures and root wads; step-down to existing channel. Begins at 2011 repair.
Riparian Wetlands	NA	R	-	59.7		Floodplain of restored stream. Area was determined subracting the berm and stream area from the total easement area

R = Restoration

P1 = Priority 1, P2 = Priority 2

Reach break location and total length changed due to repair of lower reach on new location.

Table 2. Project Activity and Reporting History Overhills/Jumping Run Creek Restoration Project - EEP Project No. 199		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	NA	March 2003
Final Design - 90%	NA	Dec 2003
Construction	NA	June 2006
Temporary S&E mix applied to entire project area	NA	2004
Permanent seed mix applied to entire project area	NA	Nov 2004
Bare root, containers, and live stakes for majority of site	NA	Dec 2004
Water released into new channel	NA	Oct 2005
Permanent seed mix applied to entire project area	NA	Nov 2005
Bare root, containers, and live stakes for remainder of site	NA	Dec 2005
Mitigation Plan / As-built (Year 0 Monitoring - baseline)	July 2007	Nov 2007
Year 1 Monitoring	Nov 2007	Nov 2007
Year 2 Monitoring	Nov 2008	Nov 2008
Year 3 Monitoring	Nov 2009	Nov 2009
Year 4 Monitoring	Nov 2010	Nov 2010
Repair of Lower Reach	March 2011	March 2011
Mitigation Plan Addendum	May 2011	May 2011
Year 5 Monitoring	Nov 2011	Nov 2011
Year 6 Monitoring (Repair)	Oct 2012	Nov 2012
Year 7 Monitoring (Repair)		

NA = Not Applicable

Table 3A. Contacts Overhills/Jumping Run Creek Restoration Project - EEP Project No. 199	
Designer	BLUE: Land Water Infrastructure 1271 Old US Highway #1 South Southern Pines, NC 28387 Phone: 910-692-6461
Construction Contractor	Vaughn Contracting, Inc P.O. Box 796 Wadesboro, NC 28170 Phone: 704-694-6450
Surveying Subcontractor	Barbara H. Mulkey Engineers, Inc 7516 E. Independence Blvd, Suite 100 Charlotte, NC 28227 Phone: 704-537-7300
Site Preparation Subcontractor	Herndon, Inc P.O. Box 36 Lugoff, SC 29078 Phone: 803-513-8002
Erosion Control Subcontractor	Carolina Environmental Contractors, Inc P.O. Box 1905 Monut Airy, NC 27030 Phone: 336-320-3849
Vegetation Planting Contractor & Nursery Stock Supplier for livestakes and potted plants	North State Environmental, Inc 2889 Lowery Street Winston-Salem, NC 27101 Phone: 339-725-2010
Nursery Stock Supplier for bare roots	International Paper
Seed Mix Sources	Unknown
Monitoring Performers	Stantec Consulting Services, Inc 801 Jones Franklin Rd, Ste 300 Raleigh, NC 27606
Stream Monitoring POC Vegetation Monitoring POC Wetland Monitoring POC	Tim Taylor, PE 704-329-0900 Amber Coleman 919-851-6866 Alex Baldwin 919-851-6866

Table 3B. Contacts - 2011 Repair Overhills/Jumping Run Creek Restoration Project - EEP Project No. 199	
Designer Primary Project Design POC	Wildlands Engineering, Inc. 5605 Chapel Hill Road, Suite 122 Raleigh, NC 27607 Daniel Taylor 919-851-9986, ext 105
Construction Contractor Construction Contractor POC	River Works, Inc. 8000 Regency Parkway, Suite 200 Cary, NC 27518 Will Pedersen 919-459-9001
Surveying Contractor Survey Contractor POC	Turner Land Surveying, PLLC P.O. Box 41023 Raleigh, NC 27629 David Turner, PLS, 919-875-1378
Planting Contractor Planting Contractor POC	Winstead's Reforestation 536 Jackson Road Nashville, NC 27856 David Winstead 252-462-0305
Bare Root Trees	Mellow Marsh Farm, Inc. 1312 Woody Store Road, Siler City, NC 27344 Sharon Day 919-742-1200 ArborGen (SuperTree Seedlings) 5594 Highway 38 South, Blenheim, SC 29616 800-222-1290 Superior Trees, Inc. PO Drawer 9400, Lee, FL 32059 850-971-5159
Brush Material/Live Stakes	Foggy Mountain Nursery LLC 2251 Ed Little Road, Creston, NC 28615 Glen Sullivan 336-384-5323
Seed Mix Sources	Green Resources PO Box 429, Colfax, NC 27235 Rodney Montgomery 336-855-6363

Table 4. Project Background Table Overhills/Jumping Run Creek Restoration Project - EEP Project No. 199	
Project County	Harnett County
Drainage Area	15.9 square miles
Drainage impervious cover estimate (%)	5%
Stream Order	3rd
Physiographic Region	Sandhills
Ecoregion	Sandhills
Rosgen Classification of As-built	C5
Cowardin Classification	Palustrine
Dominant soil types	Roanoke
	Bibb
	Wehadkee
	Augusta
Reference site ID	Gum Swamp
USGS HUC for Project	03030004
USGS HUC for Reference	03030004
NCDWQ Subbasin for Project	03-16-14
NCDWQ Subbasin for Reference	03-16-13
NCDWQ Classification for Project	C
NCDWQ Classification for Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	No
Percent of project easement fenced	0%

APPENDIX C. VEGETATION ASSESSMENT DATA

Table 5 - Vegetation Plot Mitigation Success Summary			
Overhills/Jumping Run Creek Restoration Project / EEP Project No. 199			
	Vegetation Plot ID	**Vegetation Density Met (260 stems/acre)**	**Tract Mean**
MY5 2011	VP1	Y (283)	78% (324 stems/acre)
	VP2	Y(283)	
	VP3	N (202)	
	VP4	Y (324)	
	VP5	N (121)	
	VP7	Y (364)	
	VP8	Y (567)	
	VP9	Y (324)	
	VP10	Y (445)	
MY6 2012	VP6R*	Y (445)	n/a

*Relocated due to lower reach repair

VEGETATION MONITORING PLOT PHOTOS

Photo Station 21 Vegetation Plot 6R looking northwest (9/25/12)

Photo Station 22 Vegetation Plot 6R looking north (9/25/12)

Table 6. Vegetation Metadata

Report Prepared By	Alex Baldwin
Date Prepared	11/13/2012 13:33
database name	Stantec_Overhills2012_cvs-eep-entrytool-v2.3.1.mdb
database location	U:\171300316\project\1-Overhills\site_data\cvs
computer name	BALDWINA-SP1
file size	58716160
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	199
project Name	Jumping Run Creek
Description	Informally referred to as "Overhills Stream and Wetland Restoration" to distinguish it from other Jumping Run Creeks.
River Basin	Cape Fear
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	1

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Table 7 - CVS Stem Count Total and Planted by Plot and Species
Overhills/Jumping Run Creeek Restoration Project / EEP Project No. 199

			Current Plot Data (MY6 2012)			Annual Means																			
			E199-01-0006R			MY6 (2012)			MY5 (2011)			MY4 (2010)			MY3 (2009)			MY2 (2008)			MY1 (2007)			MY0 (2007)		
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	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree									52			32			14			10						
Cephalanthus occidentalis	common buttonbush	Shrub								4	6	1	10	10	1	11	11	1	11	11	1	11	11	1	11	11
Cornus amomum	silky dogwood	Shrub							1	6	8	1	12	12	1	12	12	1	12	12	1	12	12	1	13	13
Cyrilla racemiflora	swamp titi	Shrub							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Diospyros virginiana	common persimmon	Tree							4	4	4	4	4	4	3	3	3									
Fraxinus pennsylvanica	green ash	Tree	1	1	1	1	1	1	9	9	9	8	8	8	7	7	7	7	7	7	7	7	7	7	7	7
Ilex decidua	possumhaw	shrub																		1						
Liquidambar styraciflua	sweetgum	Tree									15			14			9			5						
Liriodendron tulipifera	tuliptree	Tree									1															
Magnolia grandiflora	southern magnolia	Tree										2	2	2	2	2	2	2	2	2	2	2	2	3	3	3
Morella cerifera	wax myrtle	shrub	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Nyssa	tupelo	Tree												1												
Nyssa biflora	swamp tupelo	Tree	3	3	3	3	3	3	18	18	28	21	21	28	19	19	20	24	24	24	23	23	23	21	21	21
Pinus taeda	loblolly pine	Tree									31			42			67			35						
Quercus nigra	water oak	Tree							1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Quercus phellos	willow oak	Tree	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4	3	3	3	4	4	4	4	4	4
Salix nigra	black willow	Tree								2	5		5	5		4	4		6	7		6	6		6	6
Sambucus	elderberry	Shrub	1	1	1	1	1	1	2	2	2															
Sambucus canadensis	Common Elderberry	Shrub							1	1	1	2	6	6	2	6	7	1	8	8	1	8	8	1	12	12
Sambucus nigra	European black elderbe	Shrub																1	1	1	1	1	1	1	1	1
Taxodium distichum	bald cypress	Tree	4	4	4	4	4	4	31	31	31	29	29	29	29	29	29	27	27	27	27	27	27	27	27	27
Toxicodendron radicans	eastern poison ivy	Vine									120															
Unknown		Shrub or Tree																2	2	2	3	3	3	3	3	3
		Stem count	11	11	11	11	11	11	71	82	318	76	105	201	72	101	193	73	107	159	74	108	108	73	112	112
		size (ares)	1			1			10			10			10			10			10			10		
		size (ACRES)	0.02			0.02			0.25			0.25			0.25			0.25			0.25			0.25		
		Species count	6	6	6	6	6	6	11	13	18	12	13	17	12	13	16	13	14	18	13	14	14	13	14	14
		Stems per ACRE	445.2	445.2	445.1542062	445.2	445.2	445.2	287.3	331.8	1287	307.6	424.9	813.4	291.4	408.7	781	295.4	433	643.5	299.5	437.1	437.1	295.4	453.2	453.2

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APPENDIX D. STREAM ASSESSMENT DATA

Photo Station 7 –Cross Section R1 – looking downstream (11/30/2012)

Photo Station 8 – Cross Section R2 – looking downstream (11/30/2012)

Photo Station 9 – Cross Section R3 – looking downstream (9/25/12)

Photo Station 10 – Cross Section R4 – looking downstream (9/25/12)

Exhibit Table 8 - Visual Morphological Stability Assessment - Lower Reach Overhills/Jumping Run Creek - EEP Project No. 199						
Feature Category	**Metric (per As-built and reference baselines)**	**(# Stable) Number Performing as Intended**	**Total Number per As-built**	**Total Number/Feet in Unstable State**	**% Perform in Stable Condition**	**Feature Perform. Mean or Total**
A. Riffles	1. Present?	8	8		100%	
	2. Armor stable (eg no displacement?)	8	8		100%	
	3. Facet grade appears stable?	8	8		100%	
	4. Minimal evidence of embedding/fining?	4	8		50%	
	5. Length appropiate?	6	8		75%	85%
B. Pools	1. Present? (e.g. not subject to severe aggrad. or migrat.?)	8	8		100%	
	2. Sufficiently deep (Max Pool D:Mean Bkf > 1.6?)	4	8		50%	
	3. Length appropriate?	8	8		100%	83%
C. Thalweg	1. Upstream of meander bend (run/inflection) centering?	6	6		100%	
	2. Downstream of meander (glide/inflection) centering?	6	6		100%	100%
D. Meanders	1. Outer bend in state of limited/controlled erosion?	6	6		100%	
	2. Of those eroding, # w/concomitant point bar formation?	0	0		100%	
	3. Apparent Rc within spec?	6	6		100%	
	4. Sufficient floodplain access and relief?	6	6		100%	100%
E. Bed General	1. General channel bed aggradation areas (bar formation)		1200	0	100%	
	2. Channel bed degradation - areas of increasing down-cutting or head-cutting?		1200	0	100%	100%
F. Bank	1. Actively eroding, wasting, or slumping bank?		1200	100	92%	92%
G. Vanes	1. Free of back or arm scour?	0	1		0%	
	2. Height appropriate?	0	1		0%	
	3. Angle and geometry appear appropriate?	0	1		0%	
	4. Free of piping or other structural failures?	0	1		0%	0%
H. Wads/Boulders	1. Free of scour?	5	5		100%	
	2. Footing stable?	5	5		100%	100%

Table 9 - Verification of Bankfull Events Overhills/Jumping Run Creek Restoration Project - EEP Project No. 199			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo**
2012	No occurrence observed in 2012	n/a	n/a

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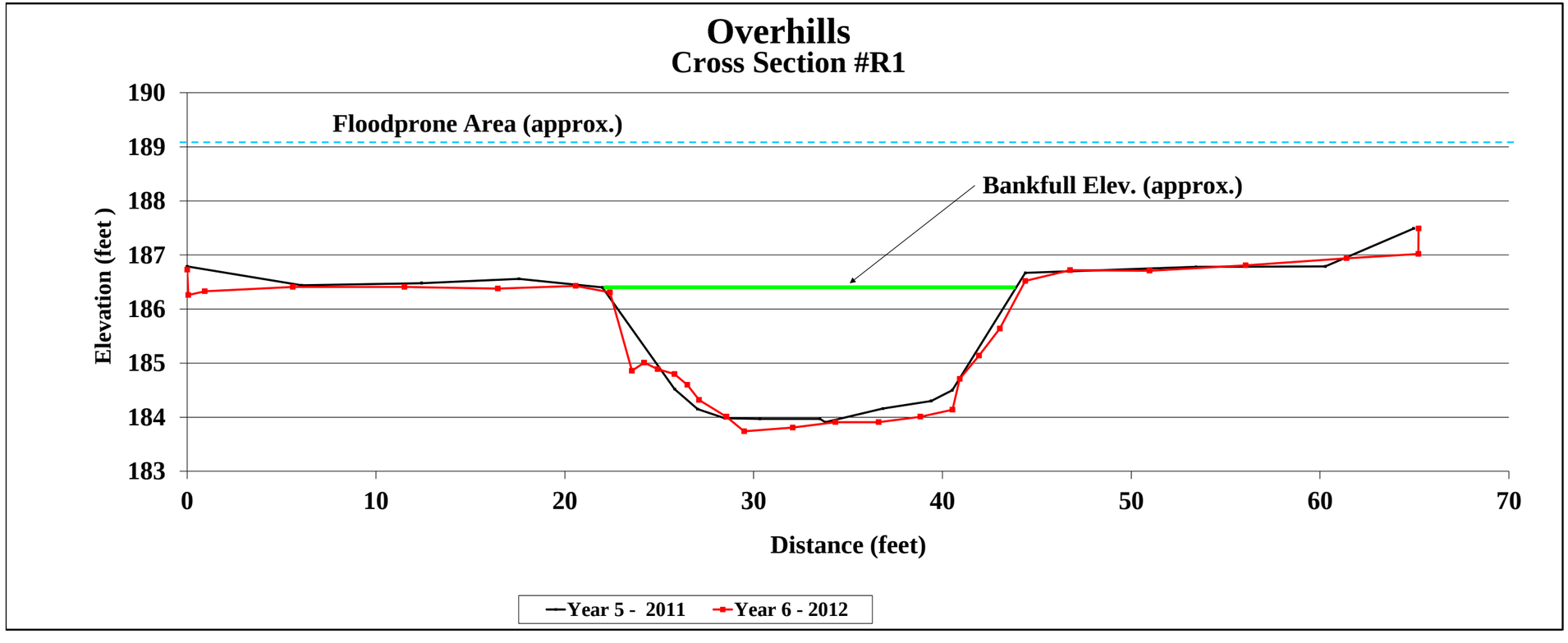
Project Name Overhills
Cross Section Cross Section R1 (Repair)
Feature Riffle
Date Baseline - 03/11, Year 5 - 09/11, Year 6 - 10/12
Crew Baseline - Turner Land Surveying, Year 5 - Jean/Mazzochi/Baldwin, Year 6 - Taylor/Gilman/Baldwin

Baseline Survey			Year 5 - 2011 2011 Survey			Year 6- 2012 2012 Survey		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
			0	186.79		0	186.73	PIN
			6.06	186.44		0.06	186.26	XS01R
			12.41	186.48		0.93	186.33	XS01R
			17.57	186.56		5.59	186.41	XS01R
			21.99	186.4		11.51	186.41	XS01R
			25.82	184.52		16.45	186.38	XS01R
			27.04	184.15		20.58	186.43	bkf
			28.48	183.98		22.39	186.31	XS01R
			30.33	183.97		23.55	184.86	XS01R
			33.51	183.97		24.2	185.01	XS01R
			33.79	183.91		24.92	184.89	XS01R
			36.85	184.16		25.81	184.8	XS01R
DATA NOT AVAIALBLE			39.4	184.3		26.49	184.6	XS01R
			40.52	184.5		27.11	184.32	XS01R
			44.39	186.67		28.56	184.01	XS01R
			53.42	186.78		29.5	183.74	XS01R
			60.28	186.79		32.07	183.81	XS01R
			64.96	187.49		34.33	183.91	XS01R
						36.62	183.91	XS01R
						38.83	184.01	XS01R
						40.53	184.14	XS01R
						40.92	184.71	REW
						41.94	185.14	XS01R
						43.04	185.64	XS01R
						44.39	186.52	XS01R
						46.76	186.72	XS01R
						50.97	186.71	XS01R
						56.06	186.81	XS01R
						61.4	186.9	XS01R
						65.21	187.02	XS01R
						65.22	187.49	XS01R

Photo of Cross-Section R1 - Looking Downstream @ STA 32+82

	Asbuilt - 2011	Year 5 - 2011	Year 6- 2012			
BKF Area		44.50	44.43			
BKF Width		26.62	24.25			
BKF Mean Depth		1.67	1.83			
BKF Max Depth		2.65	2.69			
W/D		15.94	13.25			

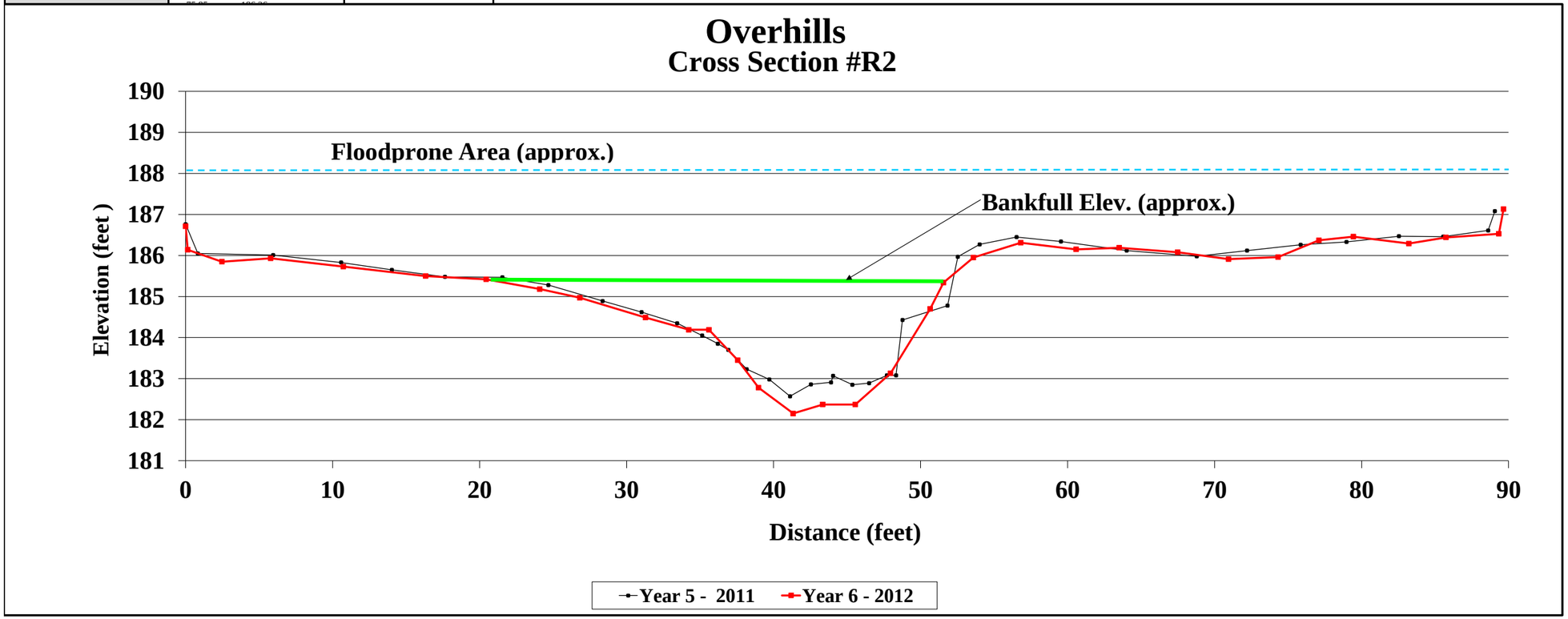


Project Name Overhills
Cross Section Cross Section R2 (Repair)
Feature Pool
Date Baseline - 03/11, Year 5 - 09/11, Year 6 - 10/12
Crew Baseline - Turner Land Surveying, Year 5 - Jean/Mazzochi/Baldwin, Year 6 - Taylor/Gilman/Baldwin

Baseline Survey			Year 5 - 2011 2011 Survey			Year 6 - 2012 2012 Survey		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
			0	186.76		0	186.71	PIN
			0.83	186.05		0.14	186.14	XS02P
			5.95	186.01		2.47	185.85	XS02P
			10.58	185.83		5.78	185.93	XS02P
			14.03	185.65		10.73	185.73	XS02P
			17.64	185.48		16.33	185.5	XS02P
			21.55	185.47		20.45	185.42	bkf
			24.68	185.28		24.09	185.18	XS02P
			28.37	184.89		26.82	184.97	XS02P
			31.02	184.62		31.29	184.49	XS02P
			33.44	184.35		34.23	184.19	XS02P
			35.14	184.05		35.6	184.19	lew
DATA NOT AVAIALBLE			36.2	183.85		37.56	183.45	XS02P
			36.92	183.7		38.98	182.78	XS02P
			38.17	183.23		41.33	182.15	XS02P
			39.71	182.98		43.34	182.37	XS02P
			41.12	182.57		45.56	182.37	XS02P
			42.54	182.86		47.95	183.13	XS02P
			43.91	182.91		50.65	184.7	XS02P
			44.05	183.07		51.56	185.34	XS02P
			45.36	182.85		53.59	185.95	XS02P
			46.5	182.89		56.81	186.31	XS02P
			47.71	183.08		60.58	186.15	XS02P
			48.33	183.08		63.51	186.19	XS02P
			48.77	184.43		67.49	186.08	XS02P
			51.83	184.78		70.95	185.91	XS02P
			52.53	185.97		74.32	185.96	XS02P
			54.02	186.27		77.1	186.37	XS02P
			56.5	186.5		79.4	186.5	XS02P
			59.55	186.34		83.22	186.29	XS02P
			64.02	186.12		85.74	186.44	XS02P
			68.79	185.98		89.34	186.53	XS02P
			72.21	186.12		89.66	187.13	XS02P

Photo of Cross-Section R2 - Looking Downstream @ STA 34+09

	Baseline	0	0			
BKF Area		43.02	46.62			
BKF Width		30.69	31.38			
BKF Mean Depth		1.40	1.49			
BKF Max Depth		2.90	3.27			
W/D		21.92	21.06			



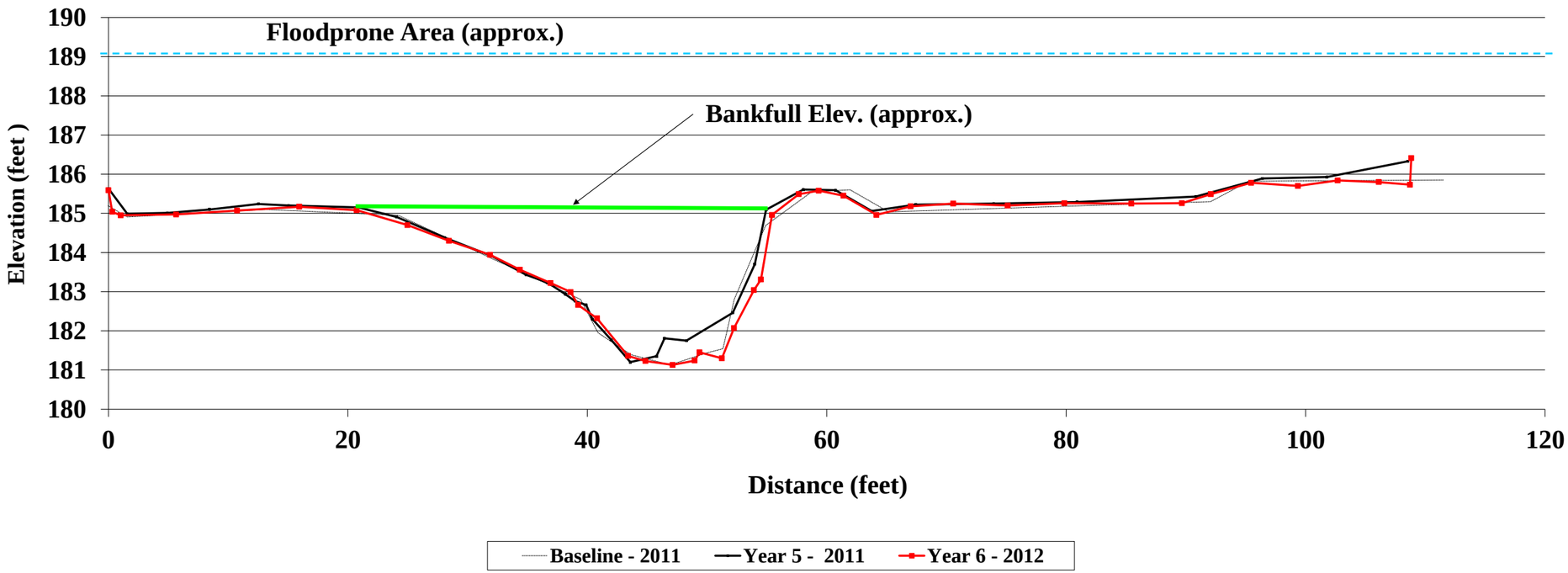
Project Name Overhills
Cross Section Cross Section R3 (Repair)
Feature Pool
Date Baseline - 03/11, Year 5 - 09/11, Year 6 - 10/12
Crew Baseline - Turner Land Surveying, Year 5 - Jean/Mazzochi/Baldwin, Year 6 - Taylor/Gilman/Baldwin

Baseline - 2011 Survey			Year 5 - 2011 2011 Survey			Year 6 - 2012 2012 Survey		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
-20.82	185.5		0	185.63		0	185.59	PIN
-3.34	185.78		1.57	184.99		0.31	185.04	XS03P
1.57	184.91		4.91	185.01		1.02	184.95	XS03P
13.15	185.1		8.44	185.1		5.65	184.97	XS03P
24.19	184.95		12.52	185.24		10.74	185.07	XS03P
27.95	184.42		15.04	185.2		15.94	185.17	XS03P
39.44	182.8		20.87	185.15		20.73	185.08	bkf
40.89	181.95		24.07	184.91		24.97	184.7	XS03P
43.65	181.39		28.07	184.38		28.44	184.3	XS03P
46.93	181.13		32.01	183.91		31.88	183.94	XS03P
50.02	181.44		34.88	183.43		34.36	183.56	XS03P
51.33	181.54		36.68	183.23		36.93	183.22	XS03P
52.26	182.8		38.18	182.93		38.6	182.99	XS03P
54.89	184.69		38.97	182.76		39.23	182.66	XS03P
58.71	185.54		39.9	182.66		40.81	182.32	lew
61.93	185.6		40.41	182.3		43.4	181.36	XS03P
65.16	185.04		42	181.77		44.86	181.23	XS03P
92.05	185.3		43.58	181.2		47.12	181.13	XS03P
95.24	185.82		45.78	181.35		48.96	181.24	XS03P
111.51	185.85		46.44	181.81		49.37	181.45	XS03P
			48.27	181.75		51.24	181.3	XS03P
			52.15	182.46		52.3	182.1	XS03P
			53.98	183.7		53.9	183.0	XS03P
			54.93	185.09		54.5	183.3	XS03P
			58.03	185.61		55.4	185.0	XS03P
			60.73	185.59		57.7	185.5	XS03P
			63.74	185.06		59.3	185.6	XS03P
			67.41	185.22		61.4	185.5	XS03P
			73.9	185.3		64.2	185.0	XS03P
			80.90	185.29		67.01	185.18	XS03P
			90.83	185.43		70.57	185.25	XS03P
			96.39	185.89		75.12	185.2	XS03P

Photo of Cross-Section R3 - Looking Downstream @ STA 37+28

	0	0	0			
BKF Area	63.05	66.57	70.23			
BKF Width	31.87	34.41	35.05			
BKF Mean Depth	1.98	1.93	2			
BKF Max Depth	3.85	3.95	3.94			
W/D	16.10	17.83	17.52			

Overhills
Cross Section #R3



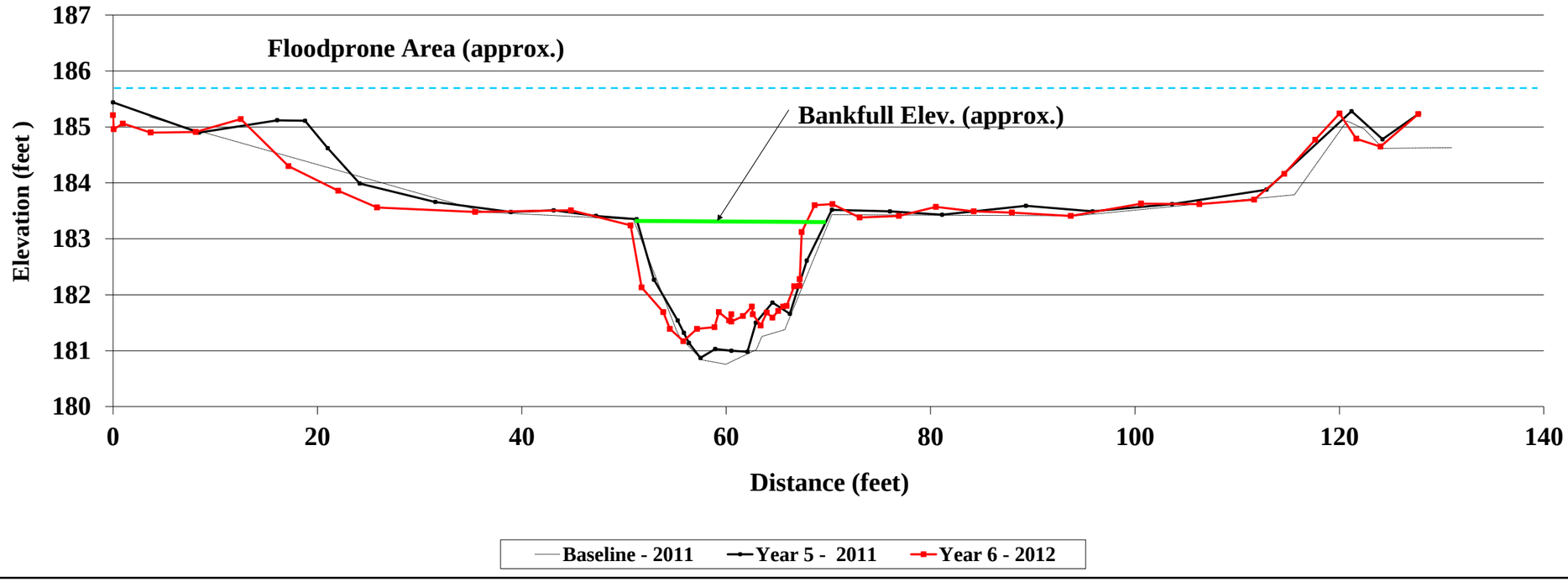
Project Name Overhills
Cross Section Cross Section R4 (Repair)
Feature Riffle
Date Baseline - 03/11, Year 5 - 09/11, Year 6 - 10/12
Crew Baseline - Turner Land Surveying, Year 5 - Jean/Mazzochi/Baldwin, Year 6 - Taylor/Gilman/Baldwin

Baseline - 2011 Survey			Year 5 - 2011 2011 Survey			Year 6 - 2012 2012 Survey		
Station	Elevation	Notes	Station	Elevation	Notes	Station	Elevation	Notes
3.62	185.175		0	185.44		0	185.21	XS04R
36.43	183.476		8.42	184.9		0.07	184.96	XS04R
50.92	183.346		16.06	185.12		0.96	185.06	XS04R
55.14	181.366		18.79	185.11		3.68	184.9	XS04R
55.44	181.251		21.01	184.62		8.09	184.91	XS04R
57.6	180.836		24.14	183.99		12.51	185.14	XS04R
59.97	180.758		31.53	183.66		17.18	184.3	XS04R
62.96	181.021		38.93	183.48		22.04	183.86	XS04R
63.49	181.254		43.12	183.51		25.84	183.56	XS04R
65.72	181.375		47.26	183.41		35.44	183.48	XS04R
70.34	183.43		51.23	183.35		44.81	183.51	bkf
94.25	183.412		52.93	182.27		50.64	183.24	XS04R
115.6	183.787		55.26	181.54		51.72	182.13	XS04R
120.75	185.107		55.86	181.32		53.85	181.69	XS04R
122.4	184.965		56.35	181.14		54.49	181.39	XS04R
124.27	184.619		57.48	180.87		55.81	181.17	XS04R
130.96	184.63		58.92	181.03		57.15	181.39	XS04R
			60.5	181		58.86	181.42	XS04R
			62.08	180.98		59.28	181.69	XS04R
			62.9	181.5		60.29	181.54	XS04R
			64.53	181.86		60.5	181.65	XS04R
			66.23	181.66		60.51	181.52	XS04R
			67.88	182.61		61.64	181.62	XS04R
			70.34	183.52		62.52	181.79	XS04R
			76.02	183.49		62.61	181.65	XS04R
			81.12	183.43		63.38	181.45	XS04R
			89.33	183.59		63.97	181.68	XS04R
			95.85	183.49		64.52	181.59	XS04R
			103.6	183.6		65.1	181.7	XS04R
			112.87	183.88		65.57	181.79	XS04R
			121.19	185.28		65.91	181.8	XS04R
			124.22	184.78		66.65	182.15	REW

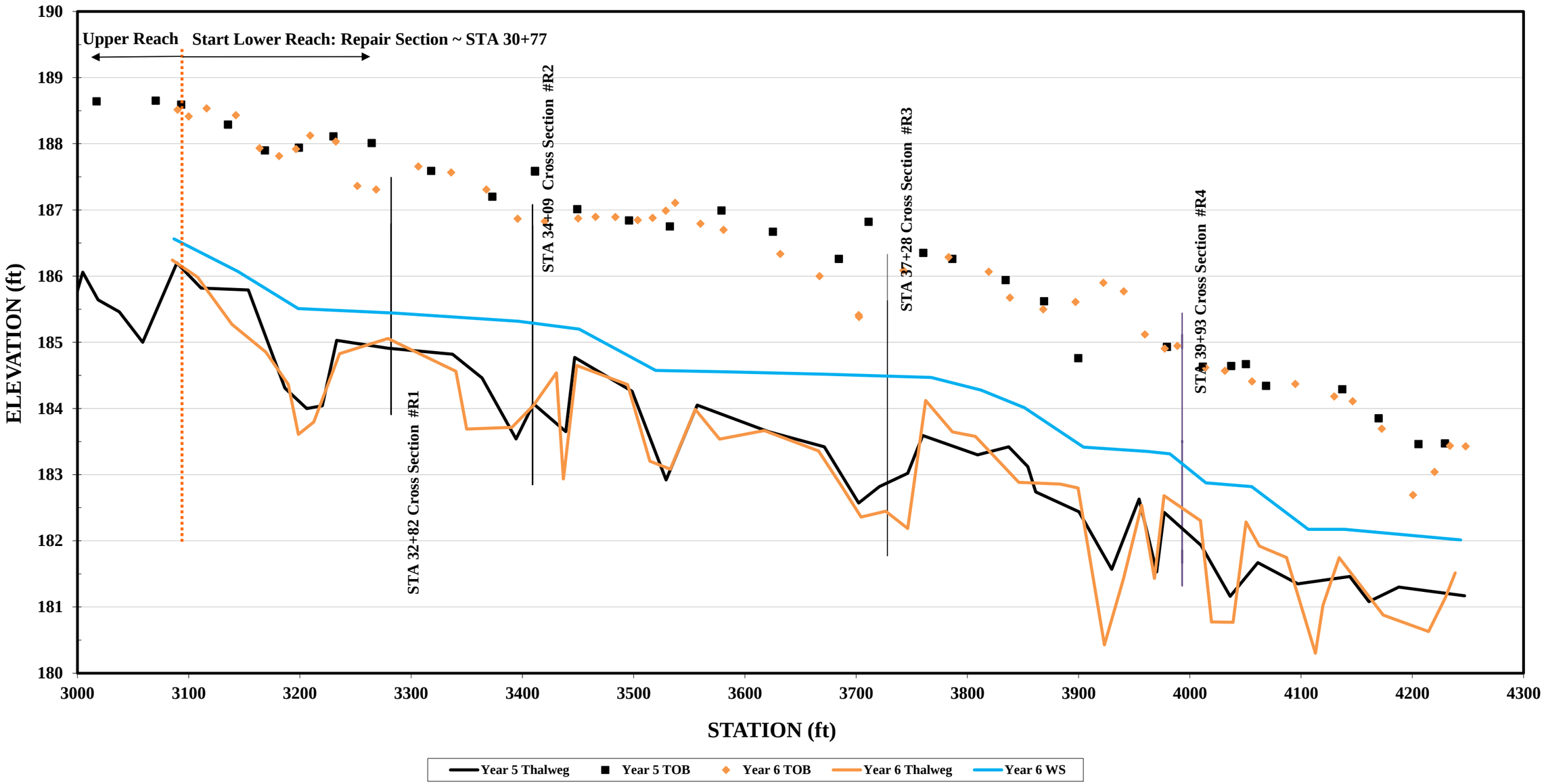
Photo of Cross-Section R4 - Looking Downstream @ STA 39+93

	0	0	0			
BKF Area	33.29	29.90	29.08			
BKF Width	19.24	18.65	19.28			
BKF Mean Depth	1.73	1.60	1.51			
BKF Max Depth	2.59	2.48	2.32			
W/D	11.12	11.66	12.77			

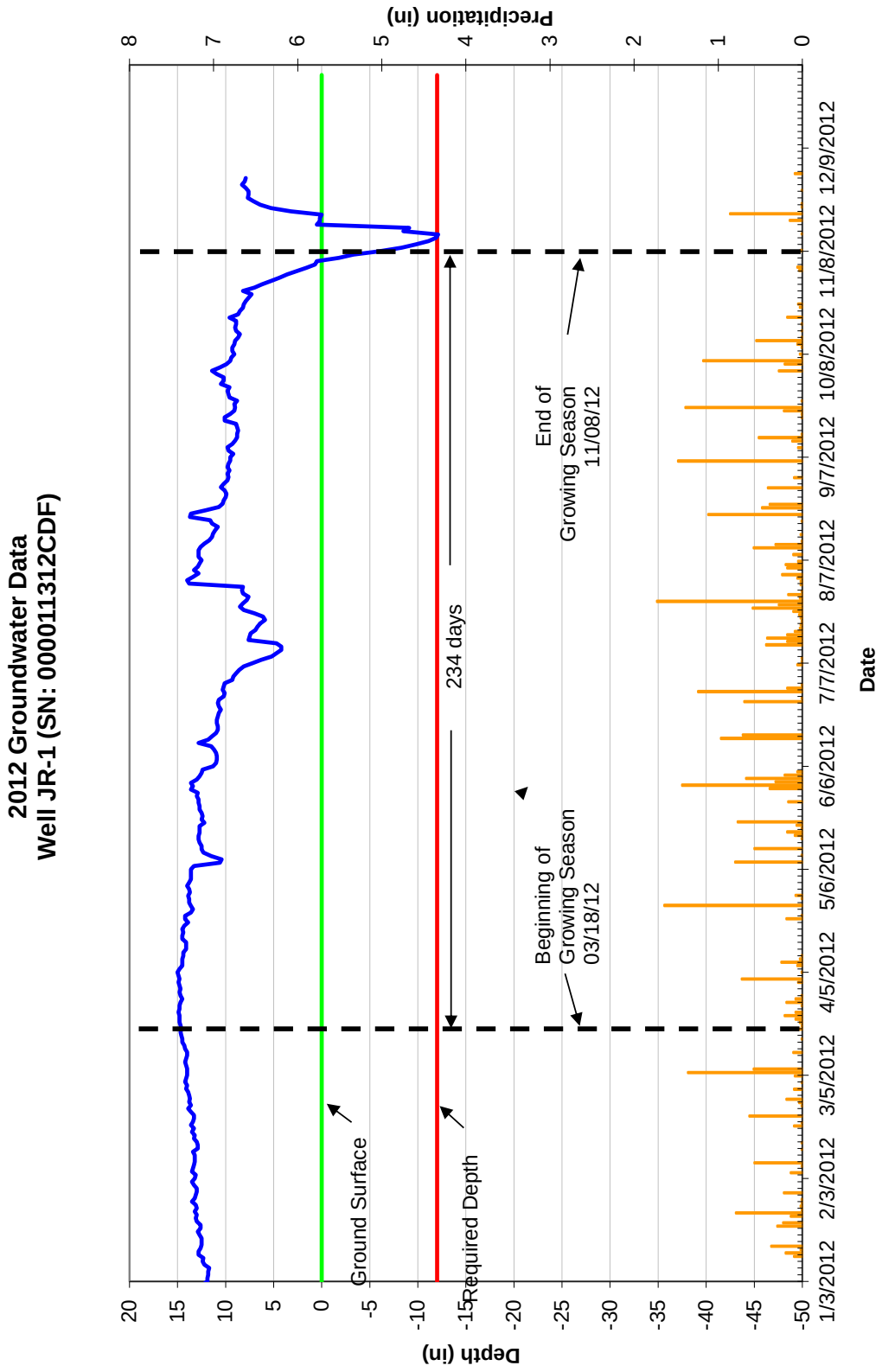
Overhills
Cross Section #R4

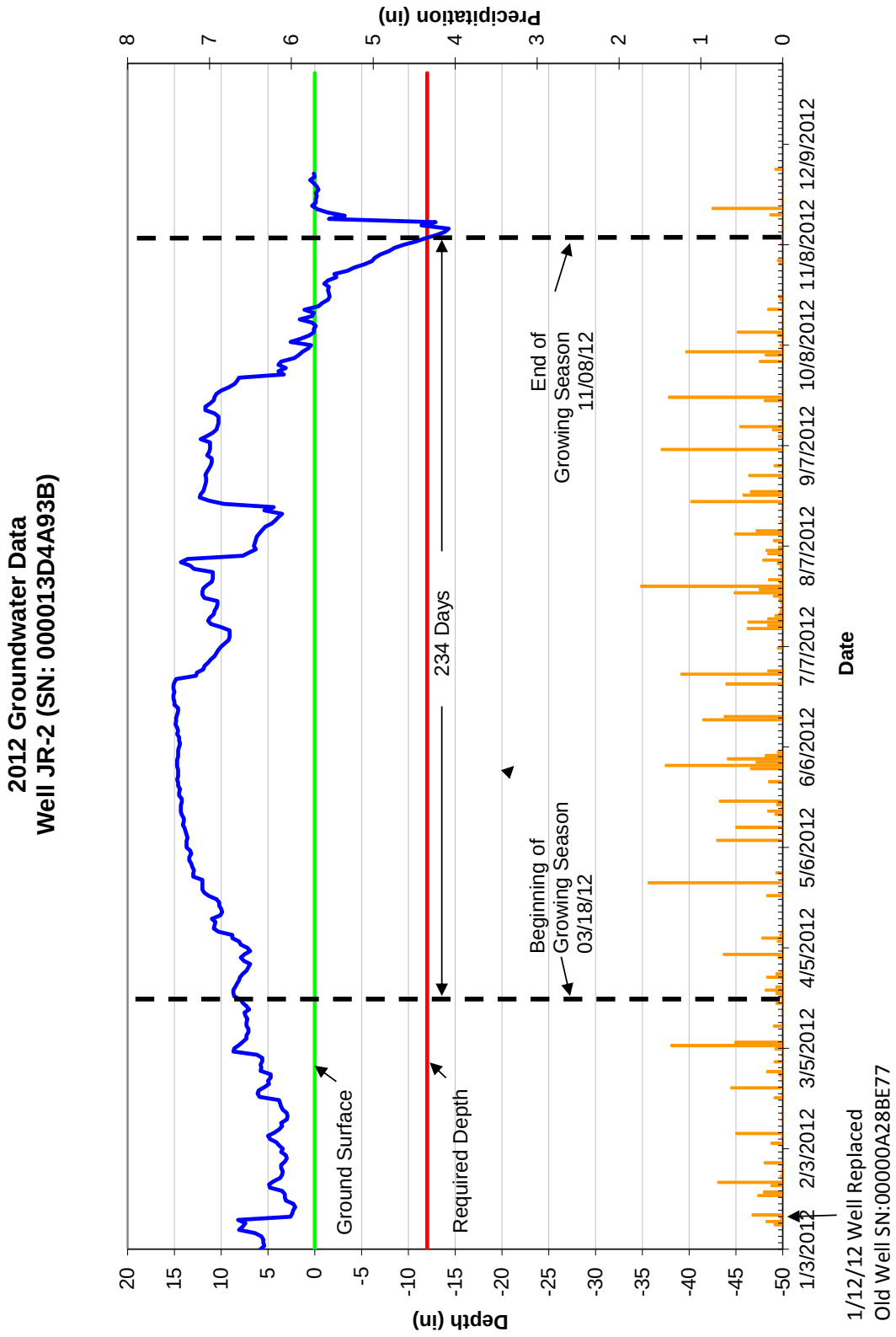


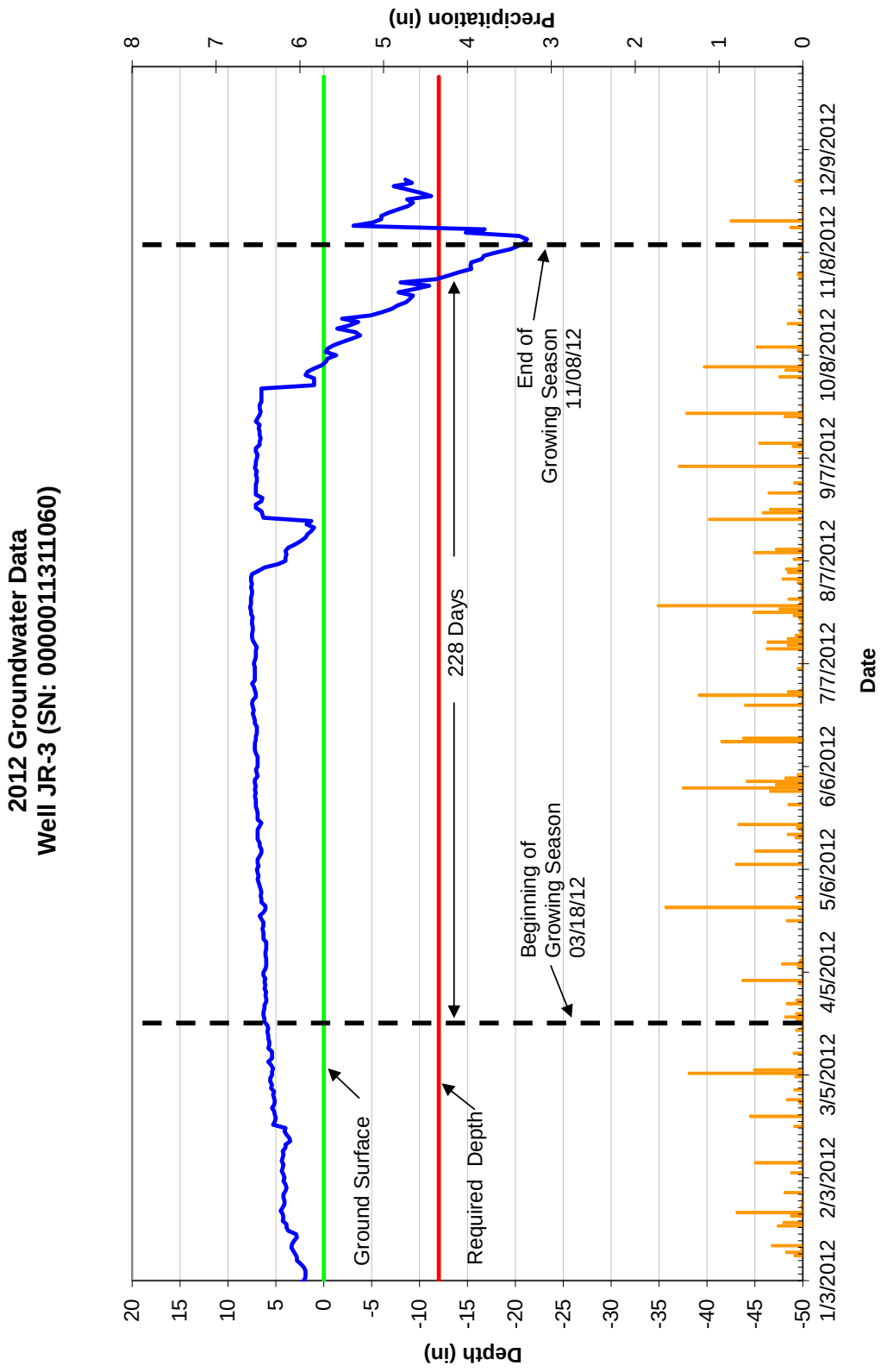
Overhills Profile - Lower Repair Reach
STA 30+00 - STA 40+00
2012 MONITORING Year 05, Year 06

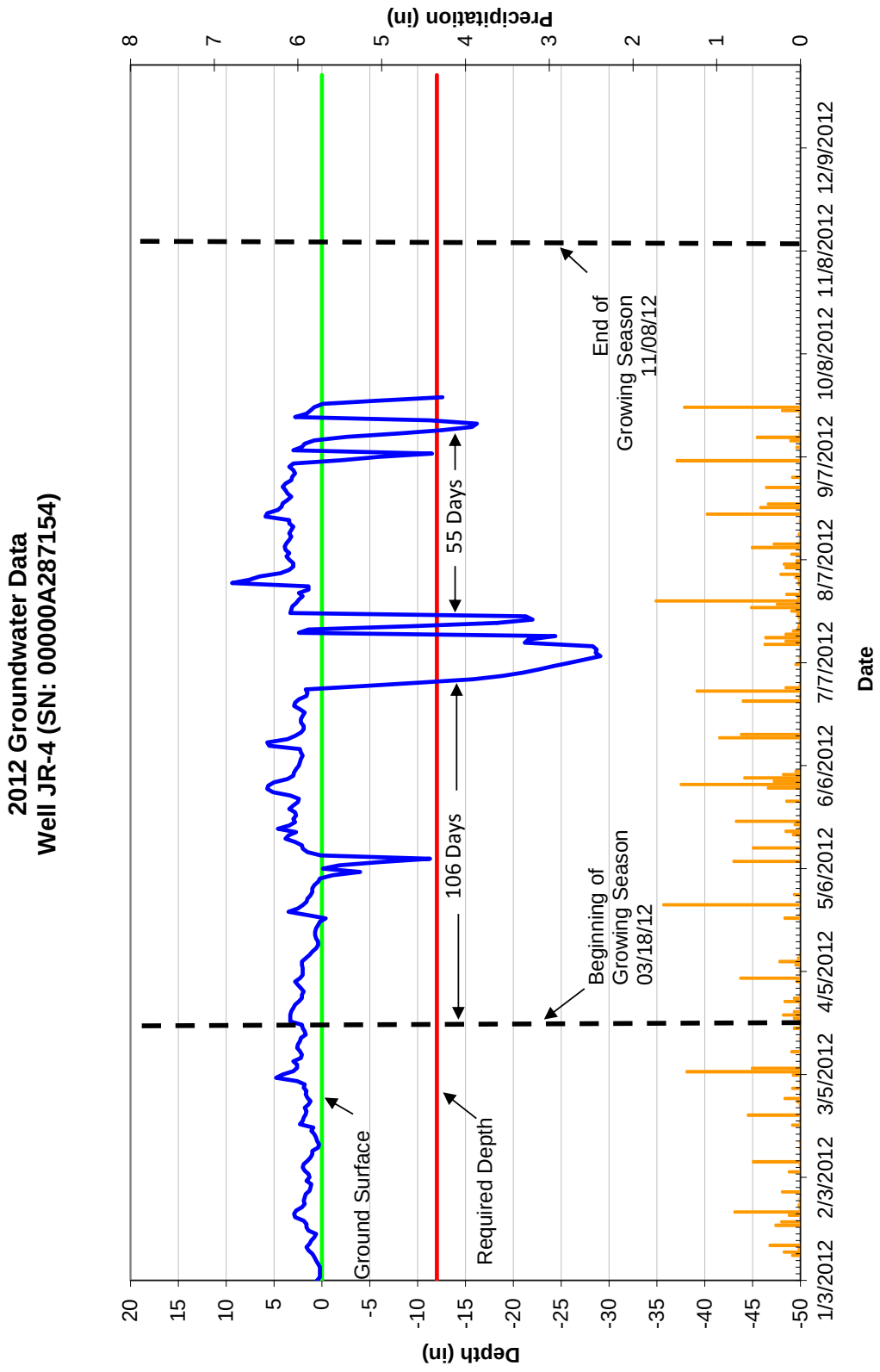


APPENDIX E. WETLAND ASSESSMENT


2012 Groundwater Data
Well JR-1 (SN: 000011312CDF)
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
234 days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012


2012 Groundwater Data
Well JR-2 (SN: 000013D4A93B)
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
234 Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
1/12/12 Well Replaced
Old Well SN:00000A28BE77
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012


2012 Groundwater Data
Well JR-3 (SN: 0000011311060)
Depth (in)
Precipitation (in)
Date
Ground Surface
Required Depth
228 Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
8
7
6
5
4
3
2
1
0
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012


2012 Groundwater Data
Well JR-4 (SN: 00000A287154)
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
106 Days
55 Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
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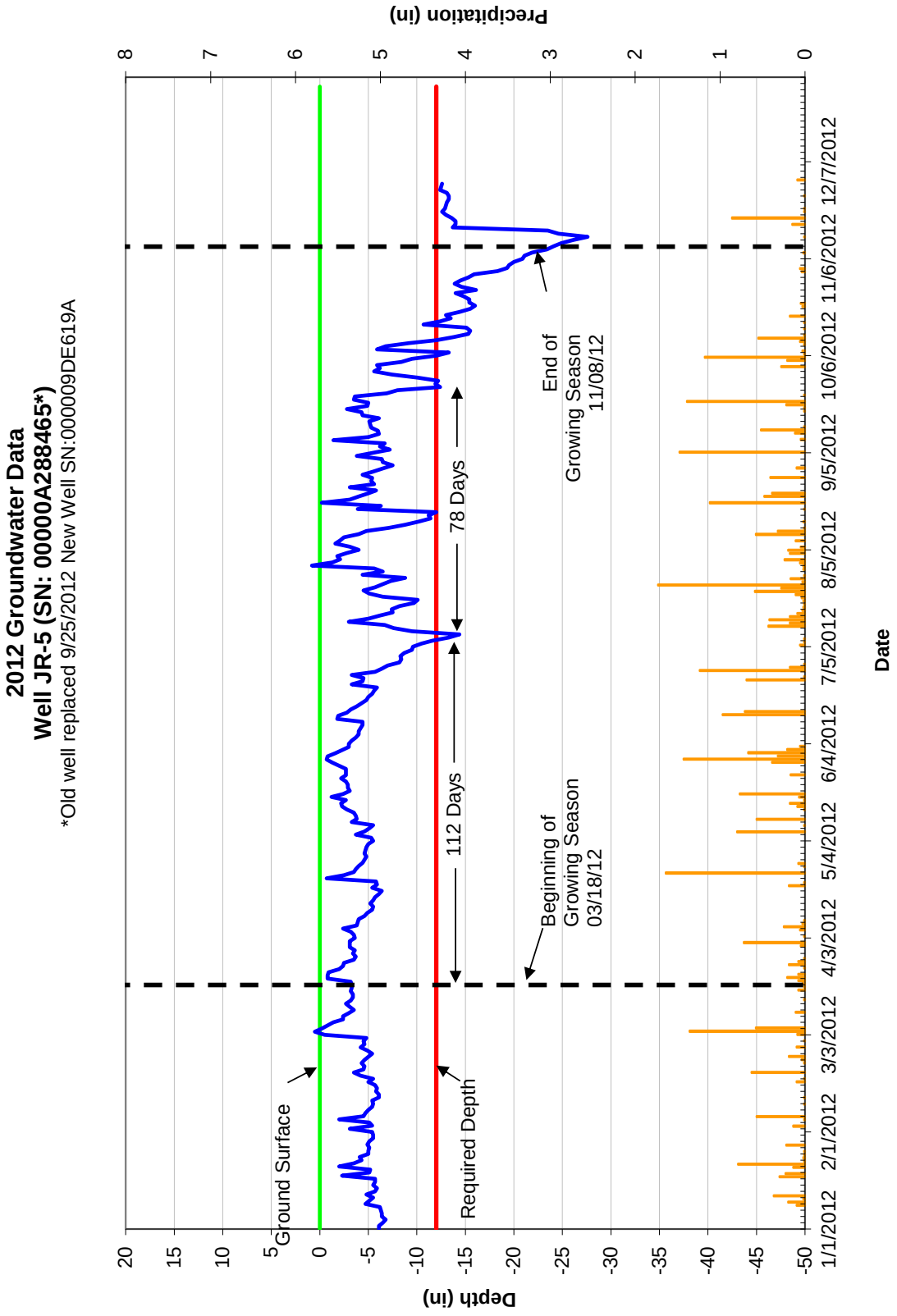
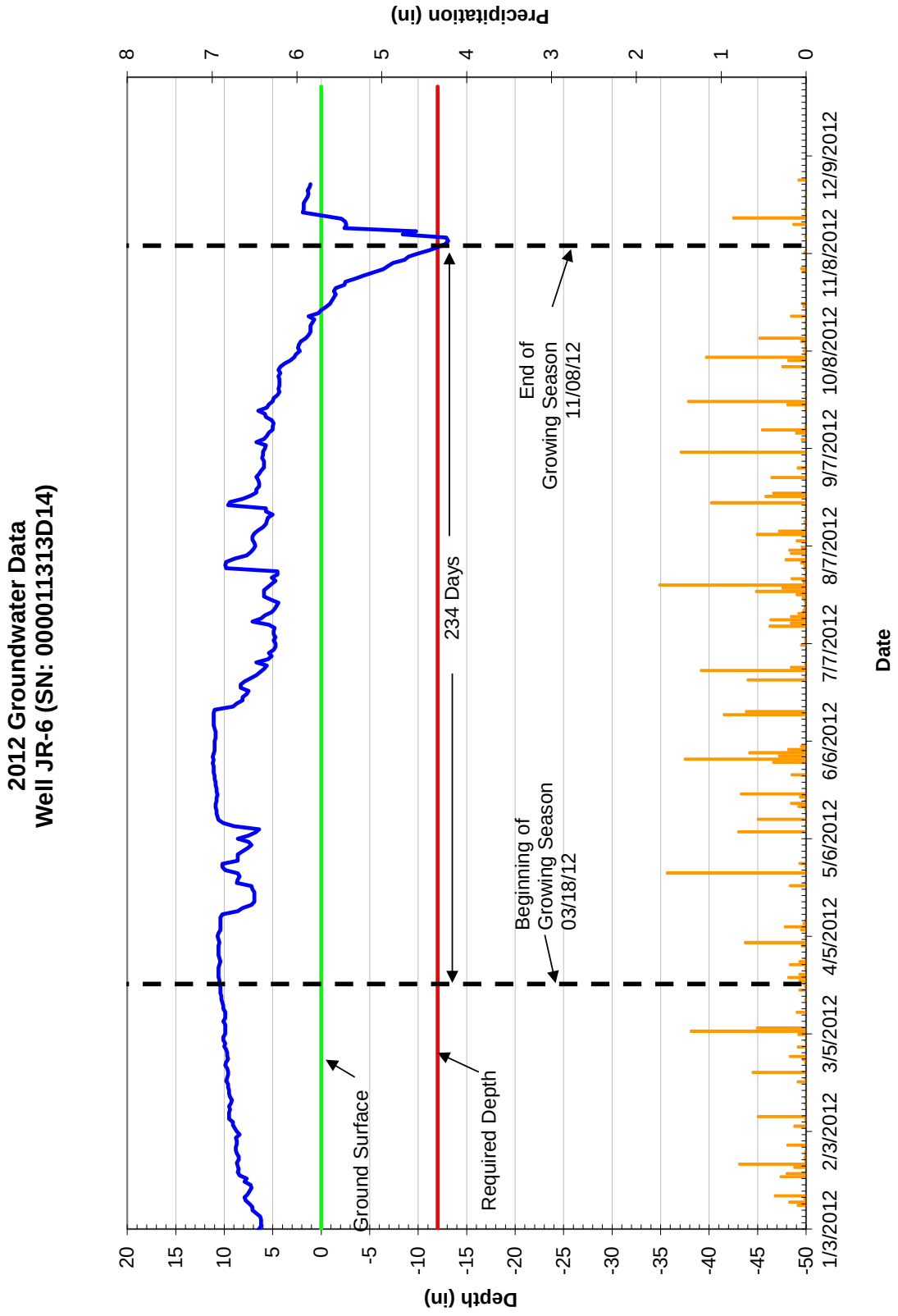
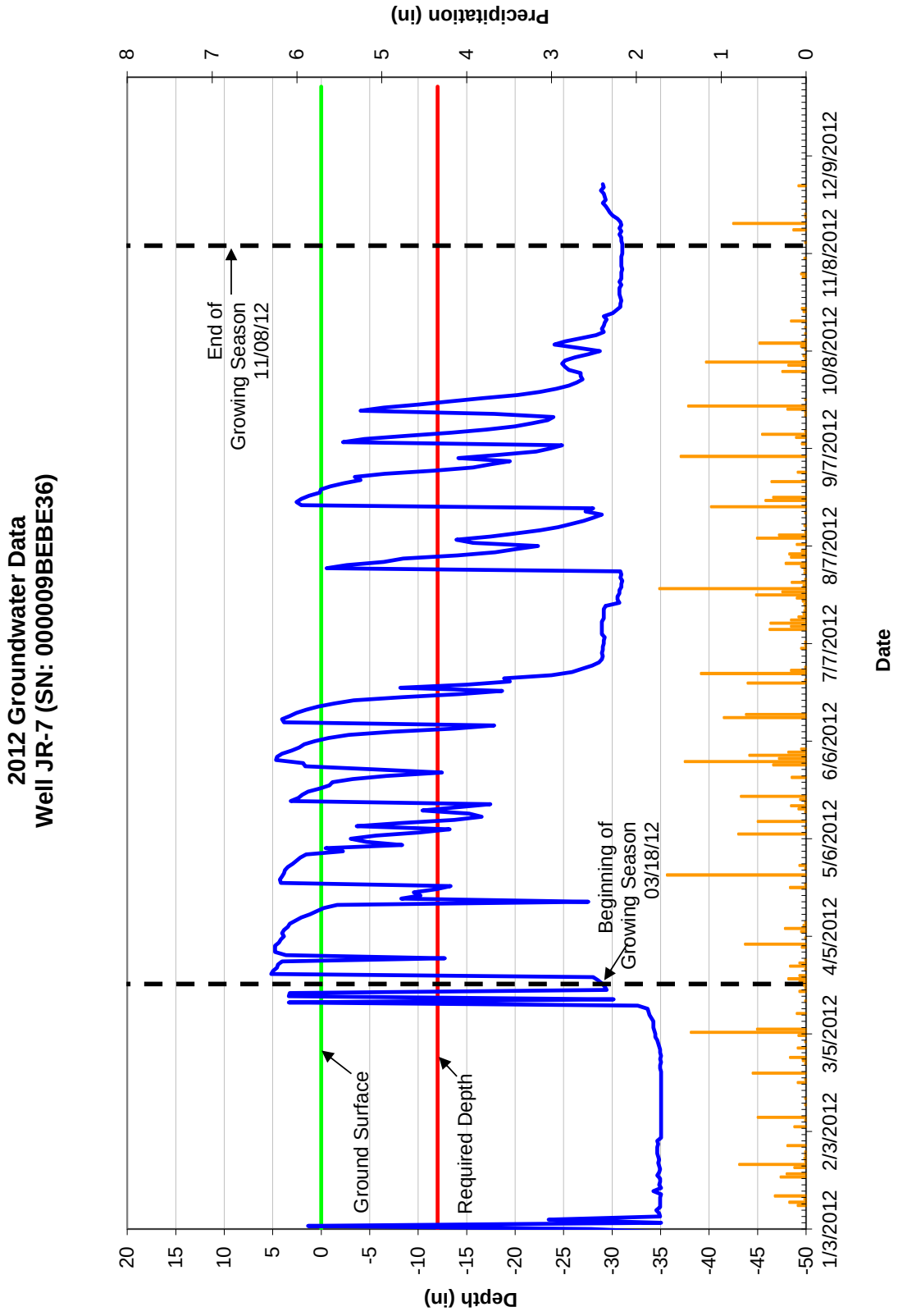
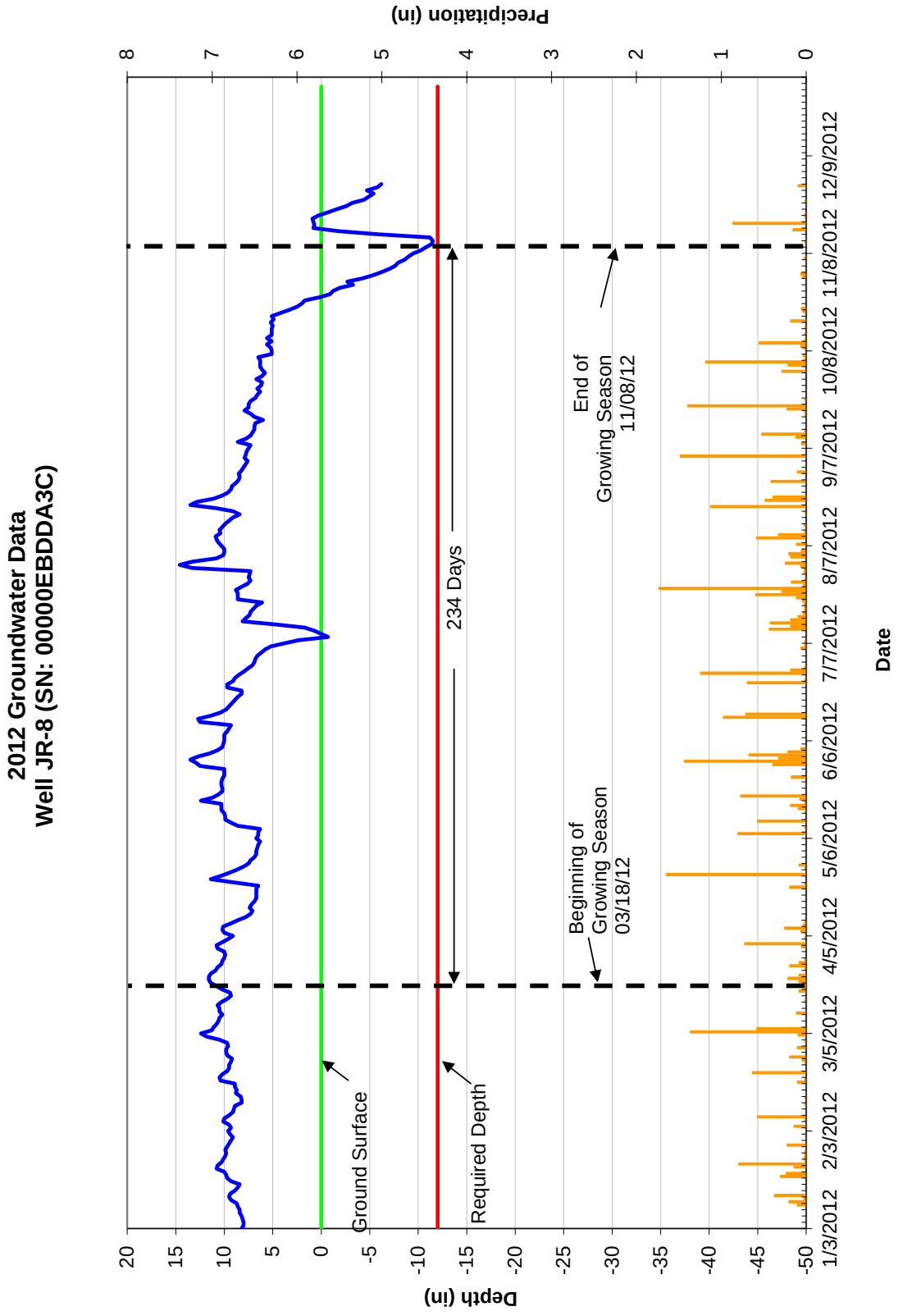
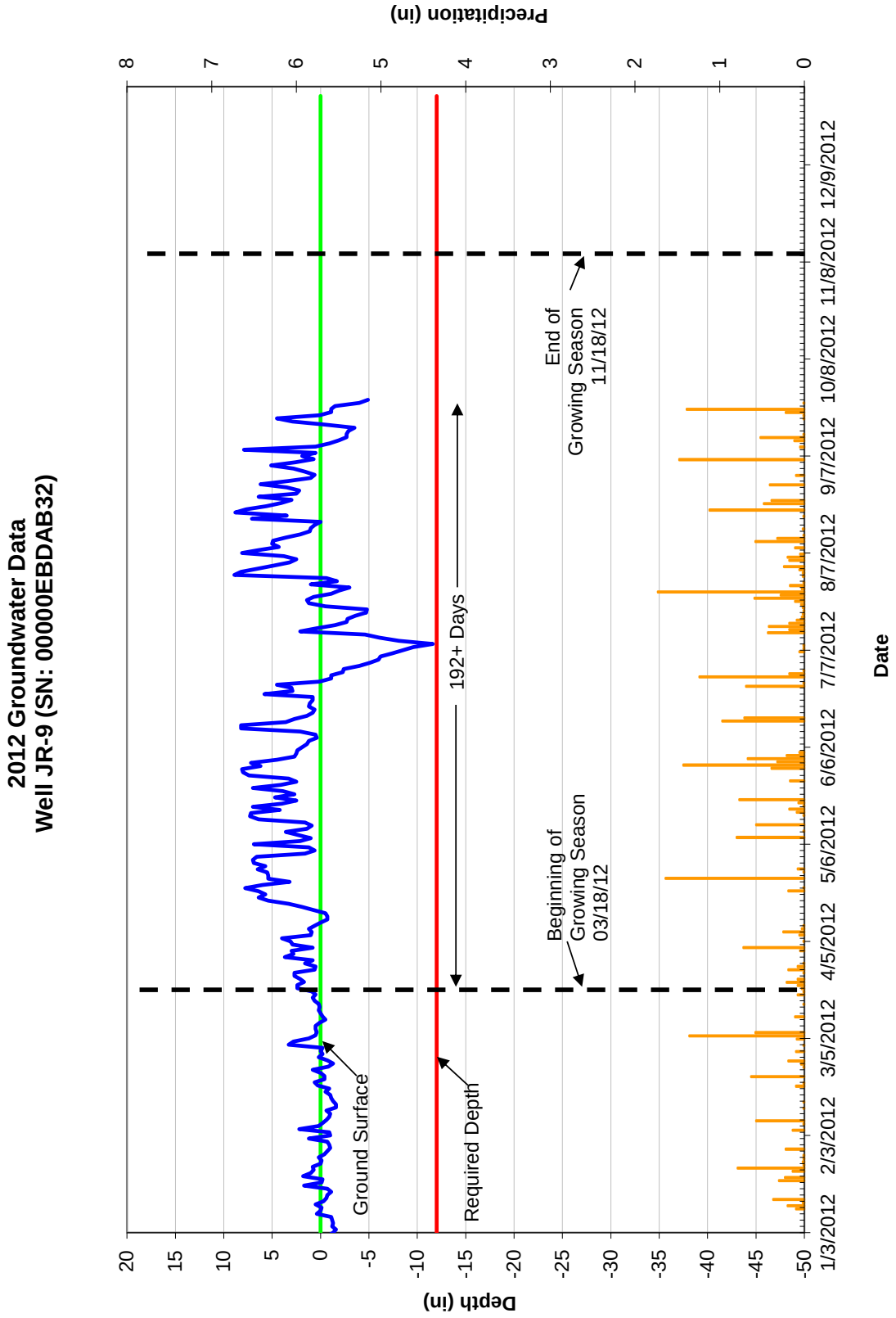
11/8/2012
12/9/2012

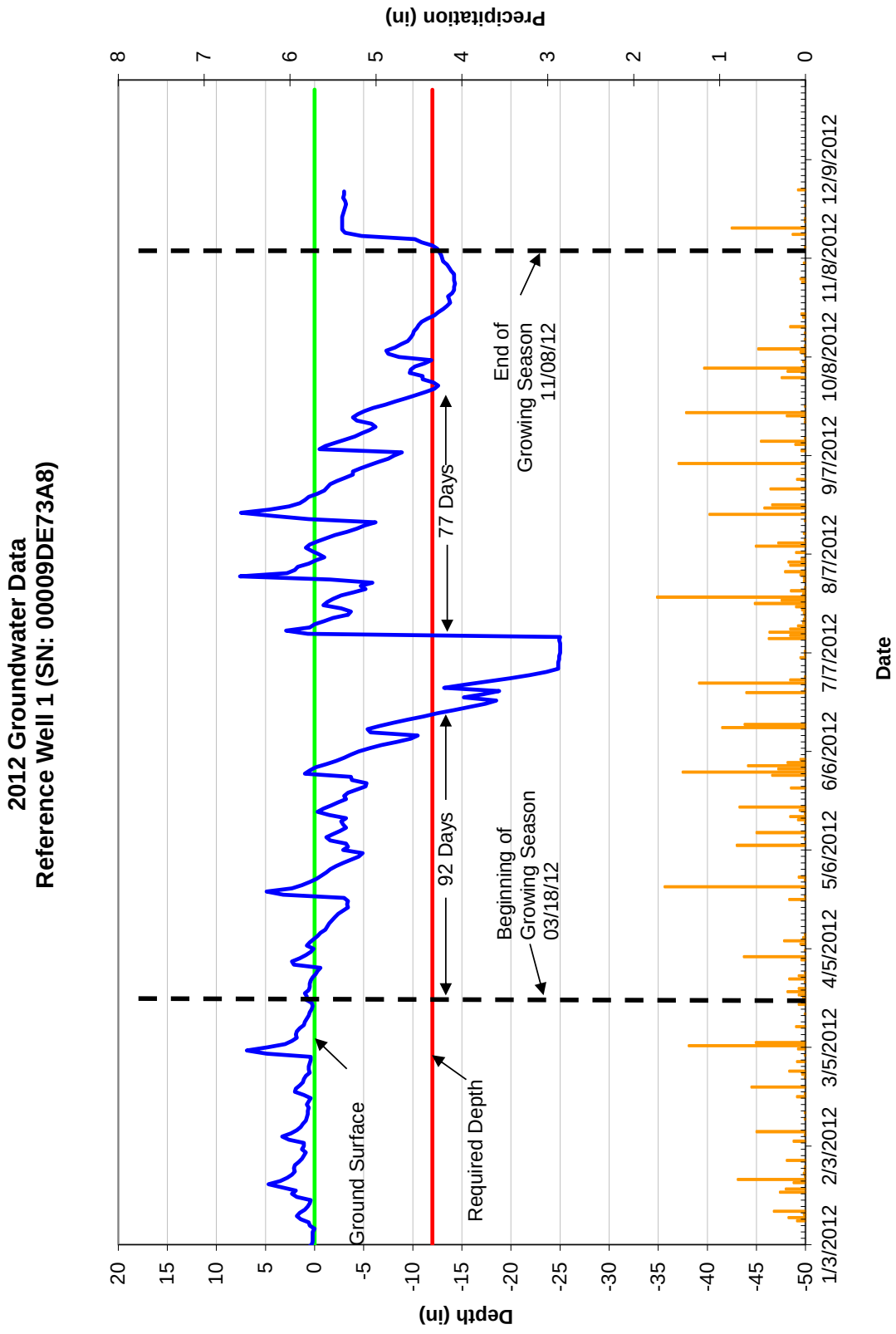

2012 Groundwater Data
Well JR-5 (SN: 00000A288465*)
*Old well replaced 9/25/2012 New Well SN:000009DE619A
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
112 Days
78 Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
1/1/2012
2/1/2012
3/3/2012
4/3/2012
5/4/2012
6/4/2012
7/5/2012
8/5/2012
9/5/2012
10/6/2012
11/6/2012
12/7/2012


2012 Groundwater Data
Well JR-6 (SN: 000011313D14)
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
234 Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012


2012 Groundwater Data
Well JR-7 (SN: 000009BEBE36)
Precipitation (in)
Depth (in)
Date
End of Growing Season 11/08/12
Beginning of Growing Season 03/18/12
Ground Surface
Required Depth
8
7
6
5
4
3
2
1
0
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012


2012 Groundwater Data
Well JR-8 (SN: 00000EBDDA3C)
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
234 Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012


2012 Groundwater Data
Well JR-9 (SN: 00000EBDAB32)
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
192+ Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/18/12
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012


2012 Groundwater Data
Reference Well 1 (SN: 00009DE73A8)
Precipitation (in)
Depth (in)
Date
Ground Surface
Required Depth
92 Days
77 Days
Beginning of Growing Season 03/18/12
End of Growing Season 11/08/12
1/3/2012
2/3/2012
3/5/2012
4/5/2012
5/6/2012
6/6/2012
7/7/2012
8/7/2012
9/7/2012
10/8/2012
11/8/2012
12/9/2012

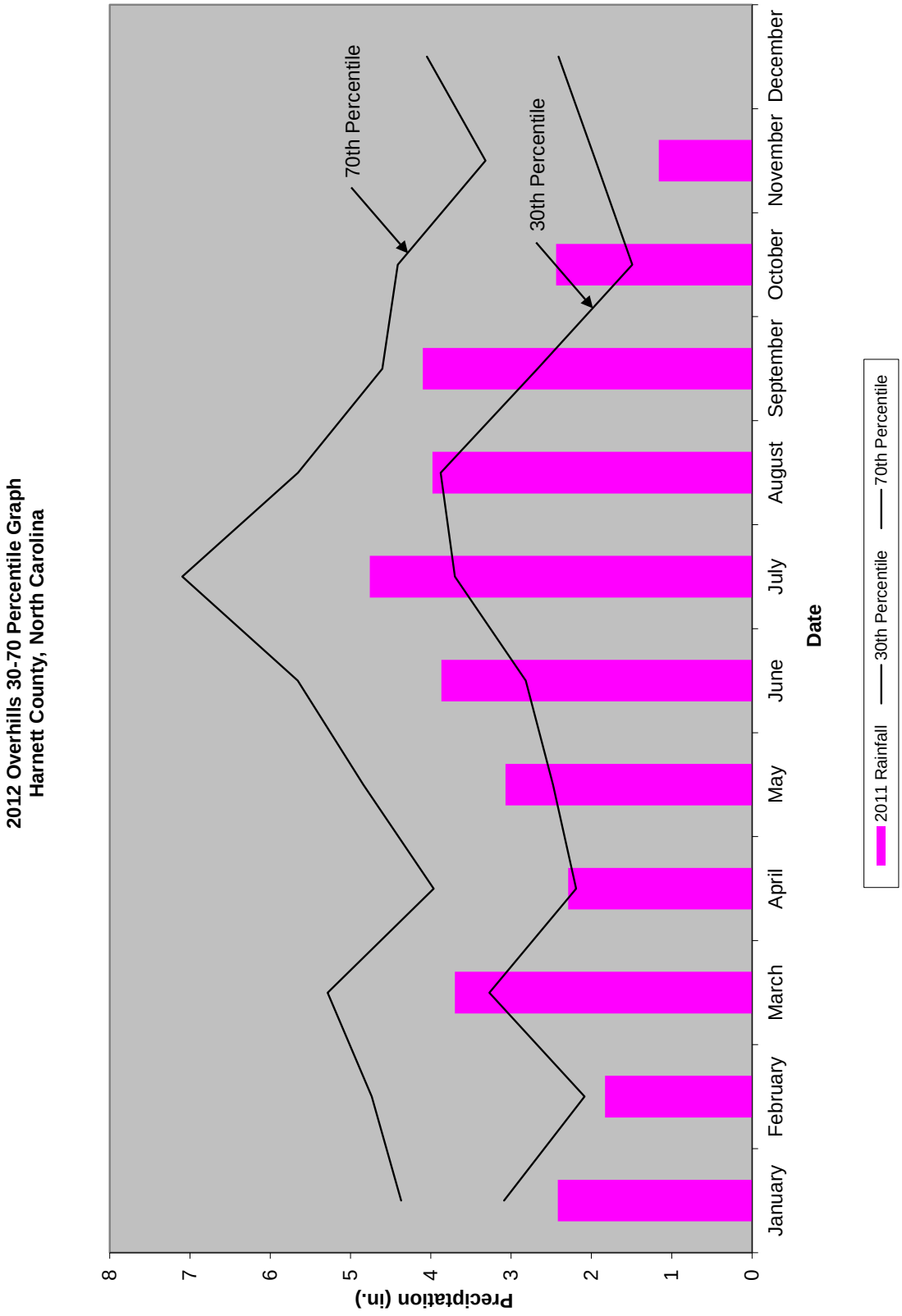

2012 Overhills 30-70 Percentile Graph
Harnett County, North Carolina
Precipitation (in.)
0
1
2
3
4
5
6
7
8
January
February
March
April
May
June
July
August
September
October
November
December
Date
70th Percentile
30th Percentile
2011 Rainfall
30th Percentile
70th Percentile

Table 10 - Summary of Groundwater Results for Years 1 - 6 Overhills/Jumping Run Creek Restoration Project / EEP Project No. 199						
	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)					
Guage	Year 1 (2007)	Year 2 (2008)	Year 3 (2009)	Year 4 (2010)	Year 5 (2011)	Year 6 (2012)
GW1	Yes/57 days (24 percent)	Yes/77 days (33 percent)	Yes/121 days (52 percent)	Yes/100 days (43 percent)	Yes/85 days (36 percent)	Yes/234 days (100 percent)
GW2	Yes/67 days (29 percent)	Yes/78 days (33 percent)	Yes/234 days (100 percent)	Yes/115 days (49 percent)	Yes/132 days (56 percent)	Yes/234 days (100 percent)
GW3	Yes/63 days (27 percent)	Yes/78 days (33 percent)	Yes/234 days (100 percent)	Yes/105 days (45 percent)	Yes/125 days (53 percent)	Yes/228 days (97 percent)
GW4	Yes/61 days (26 percent)	Yes/70 days (30 percent)	Yes/234 days (100 percent)	Yes/41 days (18 percent)	Yes/65 days (28 percent)	Yes/106 days (45 percent)
GW5	No	Yes/63 days (27 percent)	Yes/234 days (100 percent)	Yes/92 days (39 percent)	Yes/58 days (25 percent)	Yes/112 days (48 percent)
GW6	Yes/52 days (22 percent)	Yes/75 days (32 percent)	Yes/234 days (100 percent)	Yes/68 days (29 percent)	Yes/132 days (56 percent)	Yes/234 days (100 percent)
GW7	Yes/56 days (24 percent)	Yes/61 days (26 percent)	Yes/57 days (24 percent)	Yes/32 days (14 percent)	Yes/45 days (19 percent)	No/17 days (7 percent)
GW8	Yes/65 days (28 percent)	Yes/121 days (52 percent)	Yes/234 days (100 percent)	Yes/43 days (18 percent)	Yes/81 days (35 percent)	Yes/234 days (100 percent)
GW9	Yes/56 days (24 percent)	Yes/76 days (32 percent)	Yes/234 days (100 percent)	Yes/41 days (18 percent)	Yes/69 days (29 percent)	Yes/192 days (82 percent)
GW10*	No	Yes/39 days (17 percent)	Yes/63 days (27 percent)	Yes/123 days (53 percent)	Yes/158 days (68 percent)	
GW11*	No	Yes/39 days (17 percent)	Yes/70 days (30 percent)	Yes/123 days (53 percent)	Yes/48 days (21 percent)	
GW12*	No	Yes/33 days (14 percent)	Yes/88 days (38 percent)	Yes/127 days (54 percent)	Yes/160 days (68 percent)	
GW13*	No	Yes/54 days (23 percent)	Yes/130 days (56 percent)	Yes/88 days (38 percent)	Yes/170 days (73 percent)	
GW14*	No	Yes/56 days (24 percent)	Yes/109 days (47 percent)	Yes/127 days (54 percent)	Yes/170 days (73 percent)	
GW15*	Yes/45 days (19 percent)	Yes/71 days (30 percent)	Yes/130 days (56 percent)	Yes/234 days (100 percent)	Yes/234 days (100 percent)	
Reference	N/A	Yes/88 days (38 percent)	Yes/109 days (47 percent)	Yes/103 days (44 percent)	Yes/48 days (21 percent)	Yes/92 days (39 percent)

* Note: GW10 - GW15 are not within repair area and are therefore not being moniotred beyond MY5.