

UT to JUMPING RUN CREEK STREAM & WETLAND
RESTORATION
MONITORING REPORT (YEAR 4 OF 5)
Cumberland County, North Carolina
EEP Project Number 92345
Monitoring Contract Number D09085S



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



Status of Plan: FINAL
Construction Completed: 2010
Data Collected: 2013
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1.0 Executive Summary / Project Abstract

The overall goal of the UT to Jumping Run Creek Restoration Project was to restore a Coastal Plain headwater stream and wetlands, a Coastal Plain Small Stream Swamp, and nonriparian wetlands. The objectives of the project were to restore wetland hydrology to small stream swamp wetlands, restore stream stability and improve aquatic habitats, restore historic flow paths and flooding processes, improve floodplain functionality, establish native vegetation within the permanent conservation easement, and investigate the ecological benefits of installing larger containerized trees in select smaller designated areas.

A beaver dam was removed by APHIS prior to a site visit on June 26, 2013. The dam was located along the upstream section (STA ~84+00) of the enhancement reach UT1C just inside of the forested area. The beaver dam had reestablished at the time of the stream survey on October 24, 2013. Stantec staff partially removed the dam which lowered water levels enough to perform the geomorphic survey. NCEEP was notified of the beaver activity. During 2013 a bankfull event was recorded at the upstream crest gauge (CG1) along reach UT1B on June 26, 2013. This is the first bankfull event recorded at the site. There likely was a bankfull event at the lower crest gauge (CG2), but the event was not recorded because of backwater caused by the beaver impoundment. Reach UT1A has shown visual evidence of water accessing the floodplain from the braided channel throughout Monitoring Year 4.

The Monitoring Year 4 (MY4) stem counts within each of the vegetative monitoring plots are included in Tables 7 and 9 in Appendix C. Both planted and total stem counts are included in Table 9. Eight of the plots have over 280 planted stems per acre (the interim success criteria for MY4) while four of the plots have less than 280 planted stems per acre. When volunteers are included in the stem count, all twelve plots exceed 280 total stems per acre. All five of the random transects monitored had over 280 total stems per acre. A few areas of cattails (*Typha latifolia*) were noted last year, especially in the depressions left by the old channel on the left bank. This area has grown in extent and is marked on the map as a minor vegetation problem area. This area will continue to be monitored to ensure there is no further encroachment on the planted vegetation. Minor areas of *Murdannia keisak* were observed in the stream channel along the downstream portion of UT1B and also the upstream portion of UT1C. Currently, these areas do not pose a threat to native vegetation establishment or stream stability, but they will continue to be monitored during future field visits to document any changes.

The upstream braided reach (UT1A) is stable and appears to be functioning as designed. There are signs that water is flowing through the multiple braids and collecting in the shallow pool areas. Additionally, fish and amphibians were observed in all three reaches of the stream restoration. The single thread restoration reach (UT1B) was observed to be in generally stable condition. Over the approximately 3600 linear feet of channel restoration, the channel's profile and cross-section has only adjusted minimally from baseline conditions. Two small areas of aggradation reported in 2012, at Station 52+50 and Station 55+50, have begun to scour slightly and are transporting sediment. The *Typha latifolia* was still present in these areas, but has not migrated upstream or downstream relative to what was observed in 2012. Random isolated areas of beaver damage to livestakes exist from STA 65+00 to 82+00 along both banks of the stream. The livestakes were well established, and the root stock should allow regeneration without the need for replanting. These areas will be carefully monitored during future field visits to document any

changes. Controlling beaver activity will be essential in allowing these plants to regenerate. The enhancement reach UT1C appears to be stable, with bank pin surveys showing no aggradation or degradation. The above average rainfall recorded from April – July, coupled with the beaver activity, exposed the stream and surrounding floodplain to higher flow conditions that the site had not dealt with before. Overall the stream is visually stable and did an excellent job withstanding the above normal rainfall events and beaver activity. It should be noted that even after the beaver dam was partially removed the water surface survey was still influenced by the backwater (as seen in the longitudinal profile) and limited the number of geomorphic measurements.

Seventeen of the 19 groundwater monitoring wells onsite met the success criteria. Two wells, GW 4A and GW 6B, did not meet the success criteria. The water table measured within 12 inches of the ground surface at GW 6B during the growing season, but the longest duration lasted 4 days. Well GW 4A had to be replaced, and data needs to be downloaded from the malfunctioning well. However, based on data from nearby well GW 4 it is likely that well GW 4A will meet the success criteria. The reference well located in the wetland adjacent to the restoration site met the success criteria, and measured a water table within 12 inches of the ground surface for 195 days of the growing season. This 195-day period comprises 75% of the growing season. Monthly precipitation totals for 2013 fell below the 30th percentile during the growing season in March, August, September, October, and November. During the months of April, May, June, and July the precipitation measured above the 70th percentile.

Summary information, data, and statistics related to the 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

Channel stability, vegetation survival, and viability of wetland function were monitored on the project site. Post-restoration monitoring will be conducted for a minimum of five years or until the success criteria are met following the completion of construction to document project success. The Monitoring Year 4 stream survey was completed using survey grade GPS on October 21, 2013. The vegetation monitoring was conducted on September 16, 2013.

2.1 MORPHOLOGIC PARAMETERS AND CHANNEL STABILITY

2.1.1 Dimension

Reaches UT1A and UT1C involved restoration techniques to restore historic flow patterns and flooding functions. Monitoring efforts for reaches UT1A and UT1C focus on visual documentation of stability. Dimensional characteristics obtained from cross-sectional surveying of 10 permanent cross-sections on UT1B were compared to baseline conditions. All monitored cross-sections should fall within the quantitative parameters defined for channels of the design stream type. Natural variability is expected, however the system should not experience trends toward excessive increasing bank erosion, channel degradation, or channel aggradation.

2.1.2 Pattern and Profile

The entire longitudinal profile of reach UT1B was surveyed (3,661 lf). Stationing from the as-built survey was used. The longitudinal profiles should show that the bedform features are remaining stable. The pools should remain deep with flat water surface slopes, and the riffles should remain steeper and shallower than the pools.

2.1.3 Substrate

Since the streams throughout the project site are dominated by sand-size particles, pebble count procedures would not show a significant change in bed material size or distribution over the monitoring period; therefore, as per NCEEP guidance, bed material analyses will not be undertaken for this project.

2.2 VEGETATION

The Carolina Vegetation Survey (CVS) Level 2 methodology was utilized to sample vegetation in September of 2013. Twelve 100m² plots have been established throughout the project site. In each plot, four plot corners have been permanently located with conduit or rebar. Additionally, five random transect plots (2m x 50m (100m²)) were monitored for surviving species count. The location of the transect plots were selected at random, but stratified to be spread across the different planting zones. These plots are aimed at providing a more thorough account of the vegetation condition across the site outside the permanent vegetation plots.

As per the as-built and baseline monitoring report, the vegetative success criteria are based on the US Army Corps of Engineers Stream Mitigation Guidelines (USACE, 2003). The final vegetative success

criteria will be the survival of 260 5-year old planted trees per acre at the end of the year 5 monitoring period. Interim measures of vegetation planting success will be the survival of at least 320 planted trees per acre at the end of the 3-year monitoring period and 280 planted trees per acre at the end of the 4-year monitoring period. As planted versus volunteer stems cannot be differentiated for the random transect plots, the stem counts for the random transects include both planted and volunteer woody stems.

2.3 HYDROLOGY

2.3.1 Streams

Two crest gauges are used to monitor bankfull events along reach UT1B. One crest gauge has been installed onsite following construction and is located just downstream from cross-section 2. The second crest gauge was installed during the winter of 2012, and is located downstream of the first crest gauge between cross-sections 7 and 8. Each visit to the site includes documentation of the highest stage for the monitoring interval and a reset of the device. Other indications of bankfull flow including the presence of wrack lines, sediment, or flooding are recorded and documented photographically. Refer to Figure 2 in Appendix B for the location of the crest gauges. The headwater stream reach (Reach UT1A) is visually assessed during each monitoring visit to evaluate indicators that the braided channel is exhibiting flow. A visual assessment form was created for this purpose by NCEEP and is included in Appendix B.

2.3.2 Wetlands

Fifteen groundwater monitoring gauges have been installed across the project area to document the hydrologic conditions of the site. Refer to Figure 2 in Appendix B for the location of the groundwater monitoring gauges. Eleven gauges have been installed in the riparian areas and four have been installed in the non-riparian areas of the site. Groundwater gauges will be downloaded on at least a bi-monthly basis during the growing season. A reference well is located in the existing wetlands onsite in the northeast corner of the property and is depicted on Figure 2 in Appendix B. The success criteria for the hydrologic monitoring in the wetlands is for the site to be saturated within 12 inches of the soil surface consecutively for at least 6% of the growing season in the riparian wetlands, and 9% of the growing season in the non-riparian wetlands.

Six additional automated groundwater monitoring gauges were installed by NCEEP, to investigate the hydrology of the non-riparian and riparian wetlands associated with Reach UT1A (Design headwater system). Initially, two wells were installed during the summer of 2012, one of the wells (GW6A) was placed northwest of groundwater well 6 and the other well (GW6B) was placed northeast of groundwater well 6. These additional wells were installed to investigate the lack of hydrologic success exhibited in groundwater well 6. An additional two wells were installed during the initial assessment in March 2013, one well (GW6C) was placed immediately west of groundwater well 6 to further investigate the lack of hydrologic success in groundwater well 6. The second well (GW4A) was placed just southeast of groundwater well 4 to investigate the lack of hydrologic success exhibited in groundwater well 4. In November 2013, NCEEP installed two more wells, one well (GW4B) was placed in the non-riparian area southwest of groundwater well 4 to further investigate the lack of hydrological success exhibited in groundwater well 4. The second well (GW1A) was installed northwest of groundwater well 2 to ensure the riparian wetlands along the upper section of reach UT1A are meeting hydrological success. The additional wells are located within the riparian and non-riparian areas of the site shown on Figure 2 in Appendix B.

3.0References

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>)

NCEEP. 2010. Procedural Guidance and Content Requirements for EEP Monitoring Reports. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, NC. Version 1.3, January 15, 2010.

NCEEP. 2008. Mitigation Plan Document – Format Data Requirements, and Content Guidelines. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, NC. Version 2.0, March 27, 2008.

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

Schafale, M.P. and A.S. Weakley, 1990. Classification of the Natural Communities of North Carolina, Third Approximation. North Carolina Natural Heritage Program, Division of Parks and Recreation, NCDEHNR, Raleigh, North Carolina.

United States Army Corps of Engineers – Wilmington District, North Carolina Division of Water Quality, United States Environmental Protection Agency – Region IV, Natural Resources Conservation Service, North Carolina Wildlife Resources Commission. 2003. Stream Mitigation Guidelines.

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4.0 Appendices

Appendix A – Project Vicinity Map and Background Tables

Appendix B – Visual Assessment Data

Appendix C – Vegetation Plot Data

Appendix D – Stream Survey Data

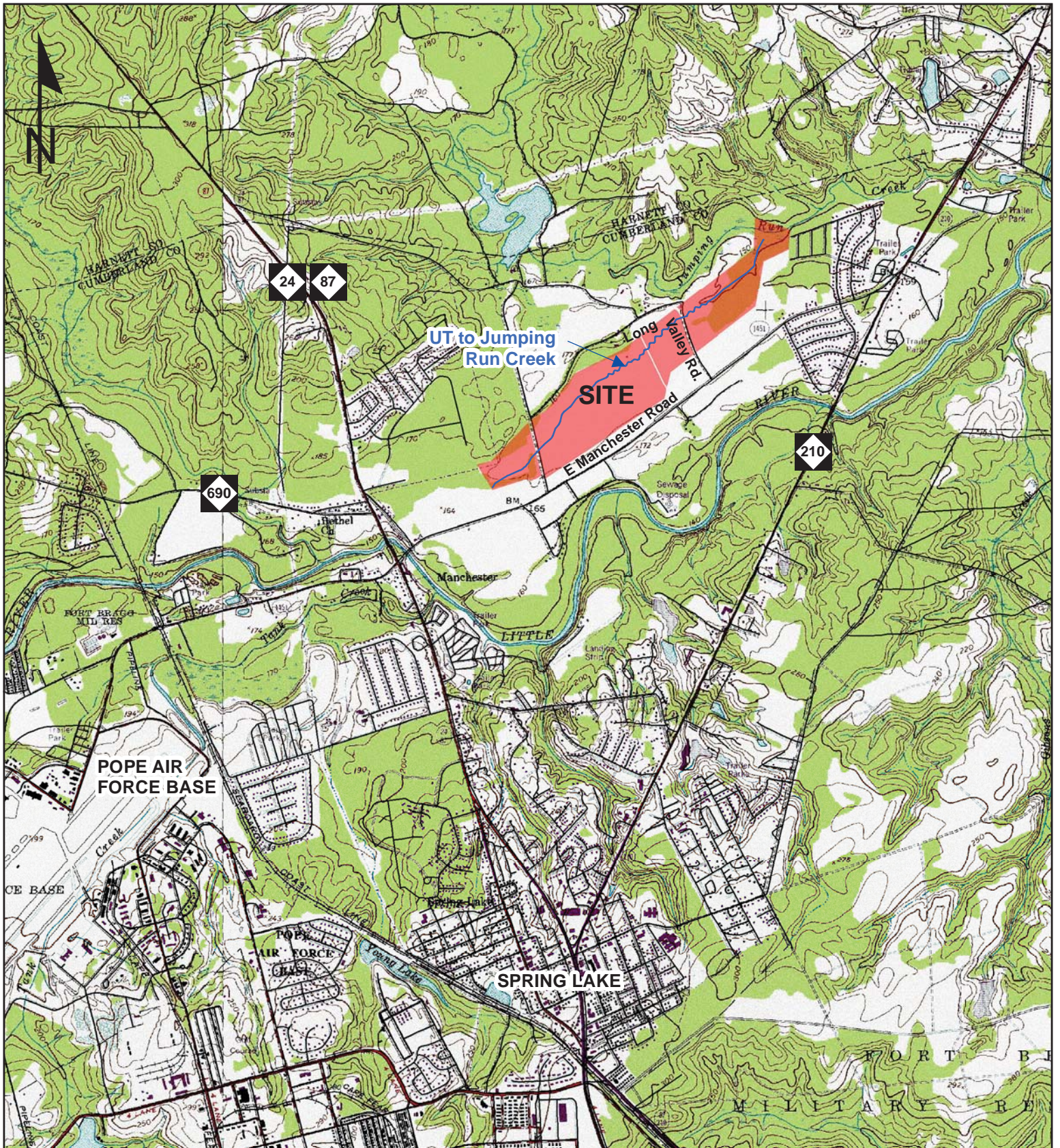
Appendix E – Hydrologic Data

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Appendix A. Project Vicinity Map and Background Tables

Figure 1	– Vicinity Map and Directions
Table 1a.,b.	– Project Restoration Components
Table 2	– Project Activity and Reporting History
Table 3	– Project Contacts
Table 4	– Project Attribute

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Directions to the site: From Raleigh, head south on US 1. In Sanford take the NC 87 S / US 421 S / N Horner Blvd exit and turn right at the end of the exit ramp to go south through Sanford. In approximately 5 miles, veer right to stay on NC 87 at the NC 87 / US 421 split. Approximately 1.6 miles past the Cumberland County line turn left onto East Manchester Road. Go another 0.7 miles and turn left into the entrance of Carvers Creek State Park to access the site. Gate access can be obtained from NC State Parks (Colleen Bowers 910-436-4681)

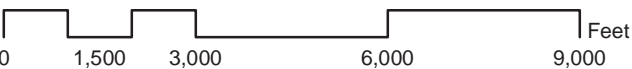


Figure 1. Vicinity Map

UT to Jumping Run Creek
Stream and Wetland Restoration Project
EEP #: 92345
Cumberland County, North Carolina

Table 1a. Project Components									
UT Jumping Run Creek Restoration Project/EEP Project No. 92345									
Project Component or Reach ID	Existing Feet/Acres	Restoration Level	Approach	Footage or Acreage	Stationing	Mitigation Ratio	Mitigation Units	BMP Elements ¹	Comment
UT1A	9,026 lf	R	CP Headwater	3,657*	10+00 to 47+29	1:1	3,657		Restoration consists of filling the channelized portions of stream and restoring valley topography. The system will be allowed to form on its own, either as a single or braided channel headwater stream within the valley (DA stream type).
UT1B		R	PI	3,661	47+29 to 82+19	1:1	3,661		Restoration follows a Rosgen Priority Level I approach. A new meandering channel was constructed across the abandoned floodplain. The old stream channel and drainage ditches were filled.
UT1C	1,935 lf	E	EI	1,935	82+19 to 101+54	1.5:1	1,290		Stream enhancement occurred in the area of existing forest on the eastern side of the project. Flows from the restoration reaches were routed into the existing channel that currently flows through this wooded area, with minimal disturbance to the existing vegetation. The existing channel is relatively stable, and restoring the historic stream flow would enhance the functions of the stream reach.
Riparian Wetland Restoration - field areas along UT1A and UT1B	n/a	R		67.7**	~10+00 to 82+39	1:1	67.7		Restoration of wetland hydrology to drained areas of hydric soil. Drainage ditches were filled, microtopography reintroduced, planting of native wetland vegetation, and overbank flooding regimes restored.
Riparian Wetland Enhancement - along UT1a and UT1B (existing jurisdictional wetland pockets)	2.6 ac	E		2.6***	~16+00 to 60+00	2:1	1.3		Existing jurisdictional wetlands within the farm fields enhanced by raising the local water table, restoring an overbank flooding regime, and planting of native wetland vegetation.
Non-riparian Wetland Restoration	n/a	R		13.2	~24+00 to 91+00	1:1	13.2		Existing drained hydric soil areas within the farm fields restored by raising the local water table and planting of native wetland vegetation.

*Footage is based on valley length for this braided system

**Acreage excludes 7.1 acres within 100 feet of Reach UT1A

***Acreage excludes 0.1 acres within 100 feet of Reach UT1A

1 = BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond;

FS = Filter Strip; Grassed Swale = S; LS = Level Spreader; NI = Natural Infiltration Area, O = Other

CF = Cattle Fencing; WS = Watering System; CH = Livestock Housing

Table 1b. Component Summations							
UT Jumping Run Creek Restoration Project/EEP Project No. 92345							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	7318	67.7		13.2			
Enhancement		2.6					
Enhancement I	1935						
Enhancement II							
Creation							
Preservation					125.9		
HQ Preservation							
Totals (Feet/Acres)	9253	70.3		13.2			
MU Totals	8608	69.0		13.2			

Non-Applicable

Table 2. Project Activity and Reporting History		
UT Jumping Run Creek Restoration Project/EEP Project No. 92345		
Elapsed Time Since Grading Complete:	3 year 6 months	
Elapsed Time Since Planting Complete:	3 year 5 months	
Number of Reporting Years¹:	4	
	Data Collection	Completion or
Activity or Deliverable	Complete	Delivery
Mitigation Plan	Nov 2007	July 2008
Final Design – Construction Plans	n/a	March 2009
Construction	n/a	April 2010
Seeding	n/a	March 2010
Planting	n/a	April 2010
As-built (Year 0 Monitoring – baseline)	May 2010	Dec 2010
Year 1 Monitoring	Sept 2010	Dec 2010
Year 2 Monitoring	Oct 2011	Nov 2011
Supplemental Planting	n/a	Winter 2011/2012
Year 3 Monitoring	Oct 2012	Nov 2012
Year 4 Monitoring	Oct 2013	Nov 2013
Year 5 Monitoring	n/a	n/a

¹ = Equals the number of reports or data points produced excluding the baseline

Table 3. Project Contacts Table	
UT Jumping Run Creek Restoration Project/EEP Project No. 92345	
Designer	Michael Baker Engineering, Inc.
	8000 Regency Pkwy, Ste 200, Cary, NC 27518
Primary project design POC	Kayne Van Stell (919)463-5488
Construction Contractor	Backwater Environmental
	P.O. Box 1654, Pittsboro, NC 27312
Construction contractor POC	Wes Newell (919) 523-4375
Survey Contractor	Turner Land Surveying, PLLC
	3201 Glenridge Drive, Rlaiegh, NC 27604
Survey contractor POC	L Turner (919) 875-1378
Planting Contractor	Carolina Silvics, Inc.
	Indian Trail Rd, Endenton, NC 27932
Planting contractor POC	Mary-Margaret McKinney (252) 482-8491
Seeding Contractor	Unknown
	Unknown
Contractor point of contact	Unknown
Seed Mix Sources	Unknown
	Unknown
Nursery Stock Suppliers	ArborGen, Coastal Plain, Native Roots, Superior Trees, NCDFR
Monitoring Performers	Stantec Consulting Services, Inc.
	801 Jones Franklin Rd, Ste 300, Raleigh, NC 27606
Stream Monitoring POC	Tim Taylor (980)297-7669
Vegetation Monitoring POC	Amber Coleman (919)865-7399
Wetland Monitoring POC	Alex Baldwin (919)865-7583

Table 4. Project Attribute Table						
UT Jumping Run Creek Restoration Project / EEP Project No. 92345						
Project County	Cumberland					
Physiographic Region	Coastal Plain					
Ecoregion	Sandhills					
Project River Basin	Cape Fear					
USGS HUC for Project (14 digit)	03030004090010					
NCDWQ Sub-basin for Project	03-06-14					
Within extent of EEP Watershed Plan?	No					
WRC Hab Class (Warm, Cool, Cold)	Warm					
% of project easement fenced or demarcated	100%					
Beaver activity observed during design phase?	Yes					
Restoration Component Attribute Table						
	UT1A	UT1B	UT1C	RW Restoration	RW Enhancement	NRW Restoration
Drainage area	1.2 sq mi			N/A	N/A	N/A
Stream order	1	1	1	N/A	N/A	N/A
Restored length (feet)	3,657	3,661	1,935	N/A	N/A	N/A
Perennial or Intermittent	I	P	P	N/A	N/A	N/A
Watershed type (Rural, Urban, Developing etc.)	Rural	Rural	Rural	N/A	N/A	N/A
Watershed LULC Distribution (e.g.)						
Residential	25%			N/A	N/A	N/A
Ag-Livestock	45%			N/A	N/A	N/A
Forested	30%			N/A	N/A	N/A
Watershed impervious cover (%)	<5%			N/A	N/A	N/A
NCDWQ AU/Index number	N/A	N/A	N/A	N/A	N/A	N/A
NCDWQ classification	C	C	C	N/A	N/A	N/A
303d listed?	No	No	No	N/A	N/A	N/A
Upstream of a 303d listed segment?	Yes	Yes	Yes	N/A	N/A	N/A
Reasons for 303d listing or stressor	DO, FC, metals, pH			N/A	N/A	N/A
Total acreage of easement	225.3					
Total vegetated acreage within the easement	225.3					
Total planted acreage as part of the restoration	153.8					
Rosgen classification of pre-existing	F5	F5	F5	N/A	N/A	N/A
Rosgen classification of As-built	DA	C	E/C/DA	N/A	N/A	N/A
Valley type	X	X	X	N/A	N/A	N/A
Valley slope	-	0.0011	0.003	N/A	N/A	N/A
Valley side slope range (e.g. 2-3.%)	-	-	-	N/A	N/A	N/A
Valley toe slope range (e.g. 2-3.%)	-	-	-	N/A	N/A	N/A
Cowardin classification	N/A	N/A	N/A	Palustrine	Palustrine	Palustrine
Trout waters designation	N/A	N/A	N/A	N/A	N/A	N/A
Species of concern, endangered etc.? (Y/N)	No	No	No	No	No	No
Dominant soil series and characteristics						
Series	Deloss	Deloss	Deloss	Deloss	Deloss	Tarboro
Depth (to water table)	+1-1.0ft	+1-1.0ft	+1-1.0ft	+1-1.0ft	+1-1.0ft	>6ft
Clay%	3-35%	3-35%	3-35%	3-35%	3-35%	2-12%
K	0.24	0.24	0.24	0.24	0.24	0.1
T	5	5	5	5	5	5

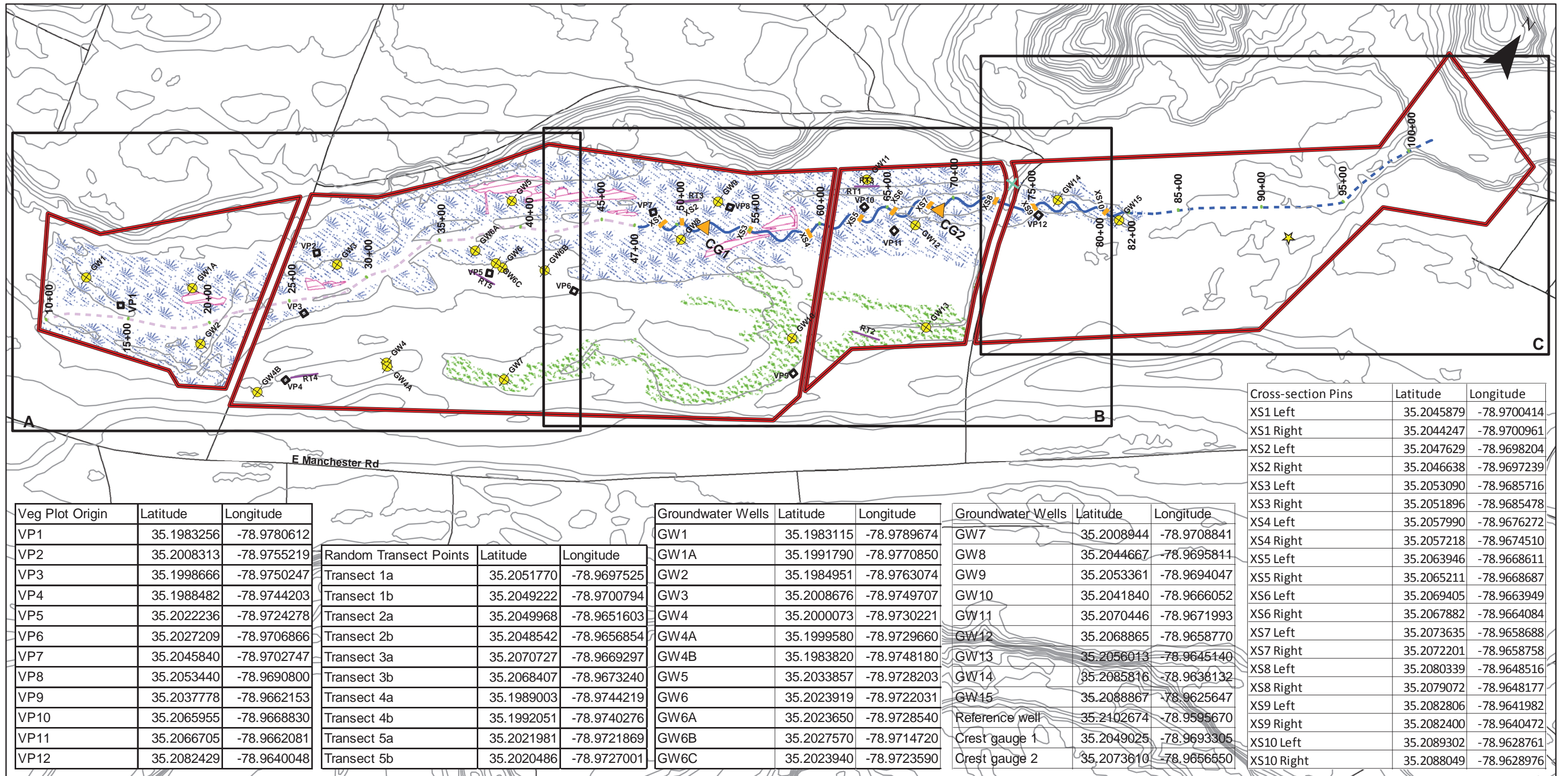
Use N/A for items that may not apply. Use “-” for items that are unavailable and “U” for items that are unknown
RW = Riparian wetland, NRW = Non-riparian wetland

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Appendix B. Visual Assessment

Figure 2	– Current Condition Plan View (4 Sheets)
Table 5	– Visual Stream Morphology Stability Assessment
Table 6	– Vegetation Condition Assessment
Form	– Headwater Stream Visual Assessment Form
Photos	– Stream Stations (B1-B13)
Photos	– Vegetation Plots (B14-B42)

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Cross-section Pins	Latitude	Longitude
XS1 Left	35.2045879	-78.9700414
XS1 Right	35.2044247	-78.9700961
XS2 Left	35.2047629	-78.9698204
XS2 Right	35.2046638	-78.9697239
XS3 Left	35.2053090	-78.9685716
XS3 Right	35.2051896	-78.9685478
XS4 Left	35.2057990	-78.9676272
XS4 Right	35.2057218	-78.9674510
XS5 Left	35.2063946	-78.9668611
XS5 Right	35.2065211	-78.9668687
XS6 Left	35.2069405	-78.9663949
XS6 Right	35.2067882	-78.9664084
XS7 Left	35.2073635	-78.9658688
XS7 Right	35.2072201	-78.9658758
XS8 Left	35.2080339	-78.9648516
XS8 Right	35.2079072	-78.9648177
XS9 Left	35.2082806	-78.9641982
XS9 Right	35.2082400	-78.9640472
XS10 Left	35.2089302	-78.9628761
XS10 Right	35.2088049	-78.9628976

Veg Plot Origin	Latitude	Longitude
VP1	35.1983256	-78.9780612
VP2	35.2008313	-78.9755219
VP3	35.1998666	-78.9750247
VP4	35.1988482	-78.9744203
VP5	35.2022236	-78.9724278
VP6	35.2027209	-78.9706866
VP7	35.2045840	-78.9702747
VP8	35.2053440	-78.9690800
VP9	35.2037778	-78.9662153
VP10	35.2065955	-78.9668830
VP11	35.2066705	-78.9662081
VP12	35.2082429	-78.9640048

Random Transect Points	Latitude	Longitude
Transect 1a	35.2051770	-78.9697525
Transect 1b	35.2049222	-78.9700794
Transect 2a	35.2049968	-78.9651603
Transect 2b	35.2048542	-78.9656854
Transect 3a	35.2070727	-78.9669297
Transect 3b	35.2068407	-78.9673240
Transect 4a	35.1989003	-78.9744219
Transect 4b	35.1992051	-78.9740276
Transect 5a	35.2021981	-78.9721869
Transect 5b	35.2020486	-78.9727001

Groundwater Wells	Latitude	Longitude
GW1	35.1983115	-78.9789674
GW1A	35.1991790	-78.9770850
GW2	35.1984951	-78.9763074
GW3	35.2008676	-78.9749707
GW4	35.2000073	-78.9730221
GW4A	35.1999580	-78.9729660
GW4B	35.1983820	-78.9748180
GW5	35.2033857	-78.9728203
GW6	35.2023919	-78.9722031
GW6A	35.2023650	-78.9728540
GW6B	35.2027570	-78.9714720
GW6C	35.2023940	-78.9723590

Groundwater Wells	Latitude	Longitude
GW7	35.2008944	-78.9708841
GW8	35.2044667	-78.9695811
GW9	35.2053361	-78.9694047
GW10	35.2041840	-78.9666052
GW11	35.2070446	-78.9671993
GW12	35.2068865	-78.9658770
GW13	35.2056013	-78.9645140
GW14	35.2085816	-78.9638132
GW15	35.2088867	-78.9625647
Reference well	35.2102674	-78.9595670
Crest gauge 1	35.2049025	-78.9693305
Crest gauge 2	35.2073610	-78.9656550

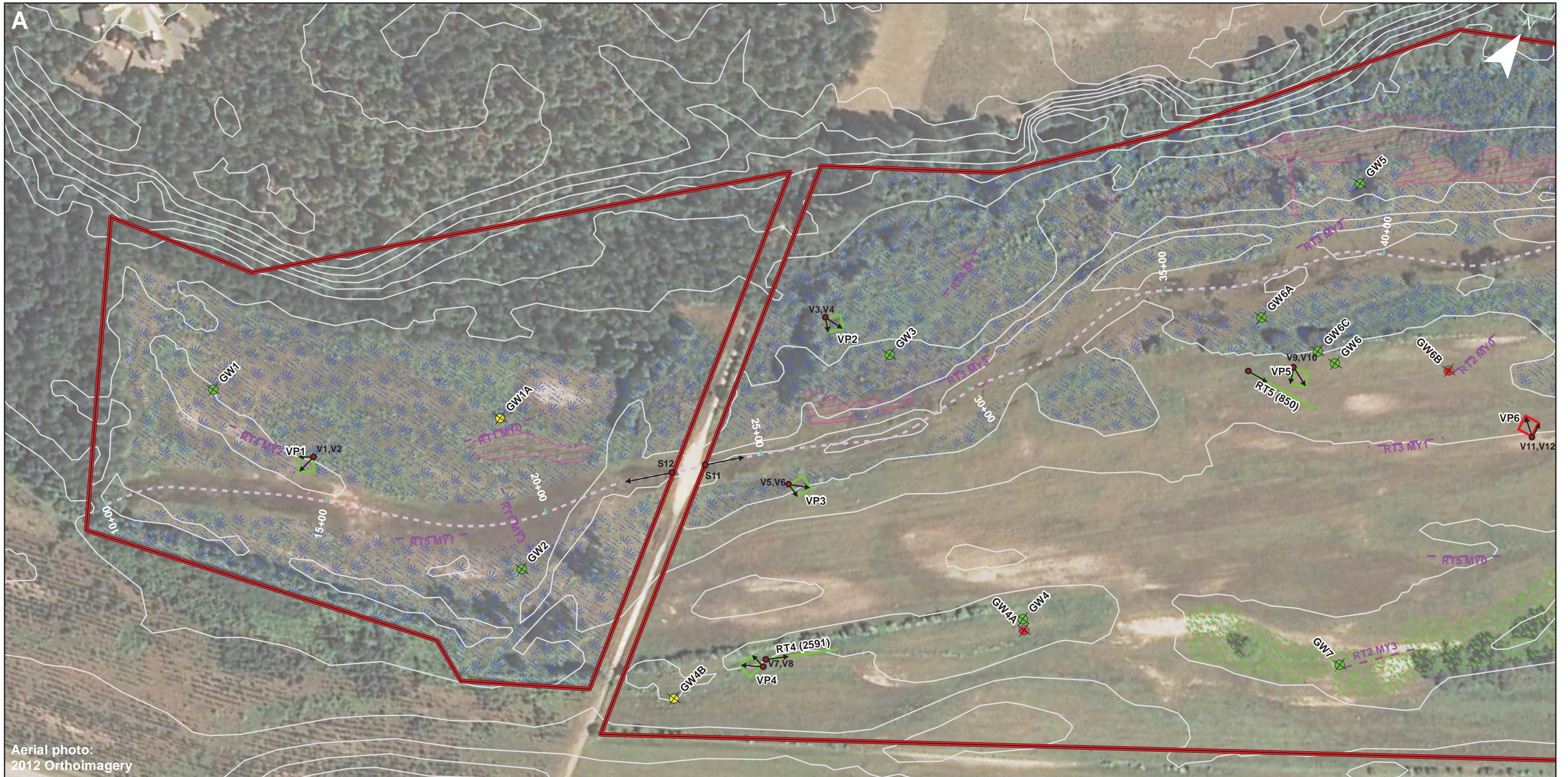
Figure 2. Current Condition Plan View (MY4)

UT to Jumping Run Creek
Stream and Wetland Restoration Project
EEP #: 92345
Cumberland County, North Carolina
November 2013

- Precipitation gage
- Crest gauge
- Random transects (Transects 1-5)
- Non-riparian
- Groundwater wells (GW 1-15)
- Cross-sections (XS 1-10)
- Stream centerline (UT1B)
- Reference well
- Design headwater system (UT1A)
- Stream enhancement (UT1C)
- Vegetation Plots (VP 1-12)
- Enhancement wetland
- Easement boundary
- 2 ft contours

0 500 1,000 Feet





Aerial photo:
2012 Orthoimagery

**Figure 2a. Current Condition
Plan View MY4**

UT to Jumping Run Creek
Stream and Wetland Restoration Project
EEP #: 92345
Cumberland County, North Carolina
November 2013

Groundwater Wells (GW 1-15)

- New Wells
- Successful for MY4
- Not successful for MY4
- Reference well

Vegetation Plots (VP 1-12)

- >280 stems/acre
- <280 stems/acre

Random Transects MY4 (RT1-5)

- >280 stems/acre
- <280 stems/acre
- Random Transects MY0-MY3
- Cross-sections (XS 1-10)
- TOB MY4 (UT1B)
- Stream centerline MY4 (UT1B)
- Stream centerline MY0 (UT1B)
- Design headwater system (UT1A)
- Stream Enhancement (UT1C)

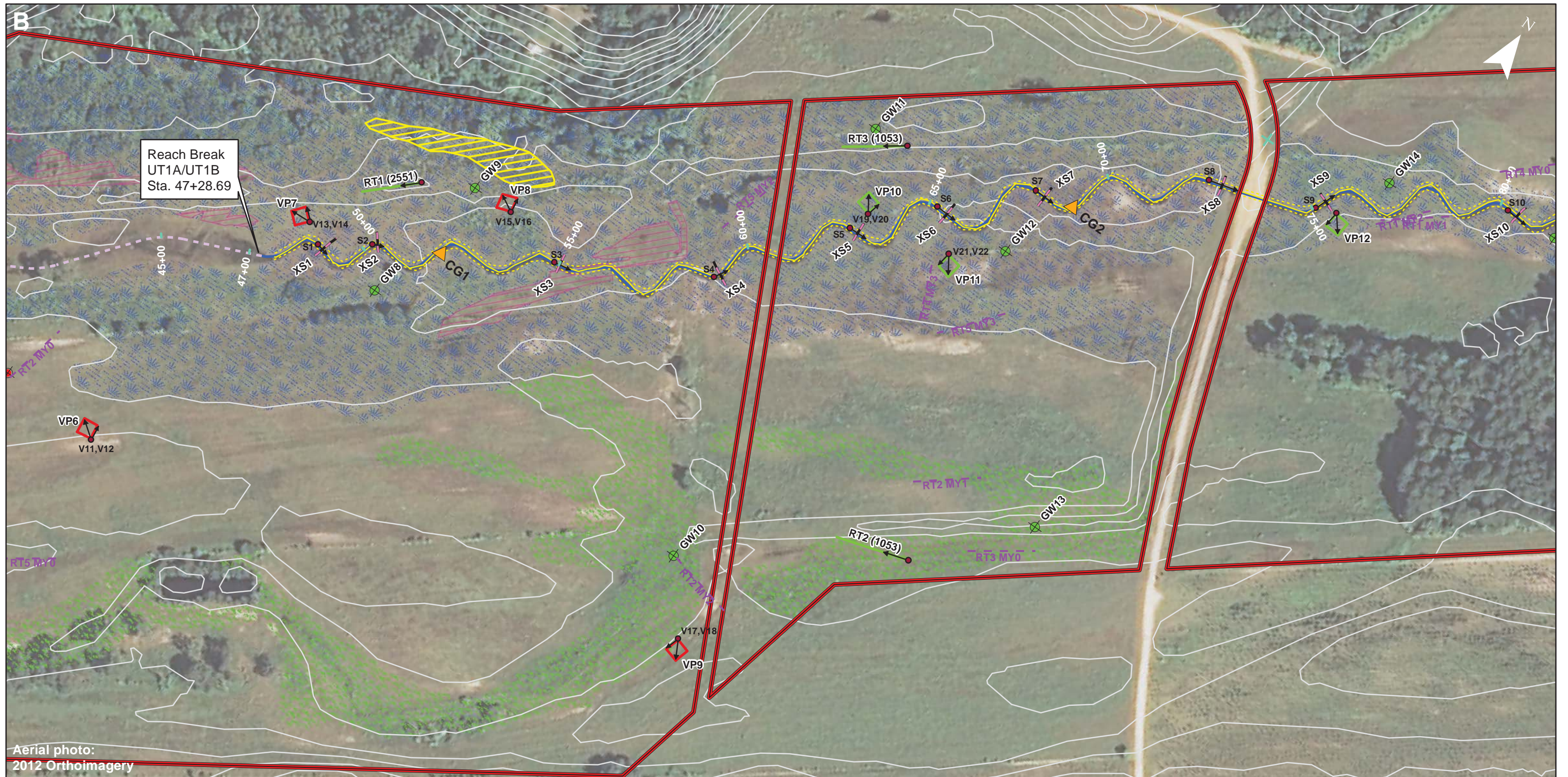
- 2 ft contours

- Precipitation gauge
- Crest gauge
- Photo points (Veg=V, Stream=S)

Designed wetland features

- Non-riparian
- Riparian wetland
- Enhancement wetland
- Easement boundary





Aerial photo:
2012 Orthoimagery

**Figure 2b. Current Condition
Plan View MY4**

UT to Jumping Run Creek
Stream and Wetland Restoration Project
EEP #: 92345
Cumberland County, North Carolina
November 2013

Groundwater Wells (GW 1-15)

- New Wells
- Successful for MY4
- Not successful for MY4
- Reference well

Vegetation Plots (VP 1-12)

- >280 stems/acre
- <280 stems/acre

Random Transects MY4 (RT1-5)

- >280 stems/acre
- <280 stems/acre
- Random Transects MY0-MY3
- Cross-sections (XS 1-10)
- TOB MY4 (UT1B)
- Stream centerline MY4 (UT1B)
- Stream centerline MY0 (UT1B)
- Design headwater system (UT1A)
- Stream Enhancement (UT1C)

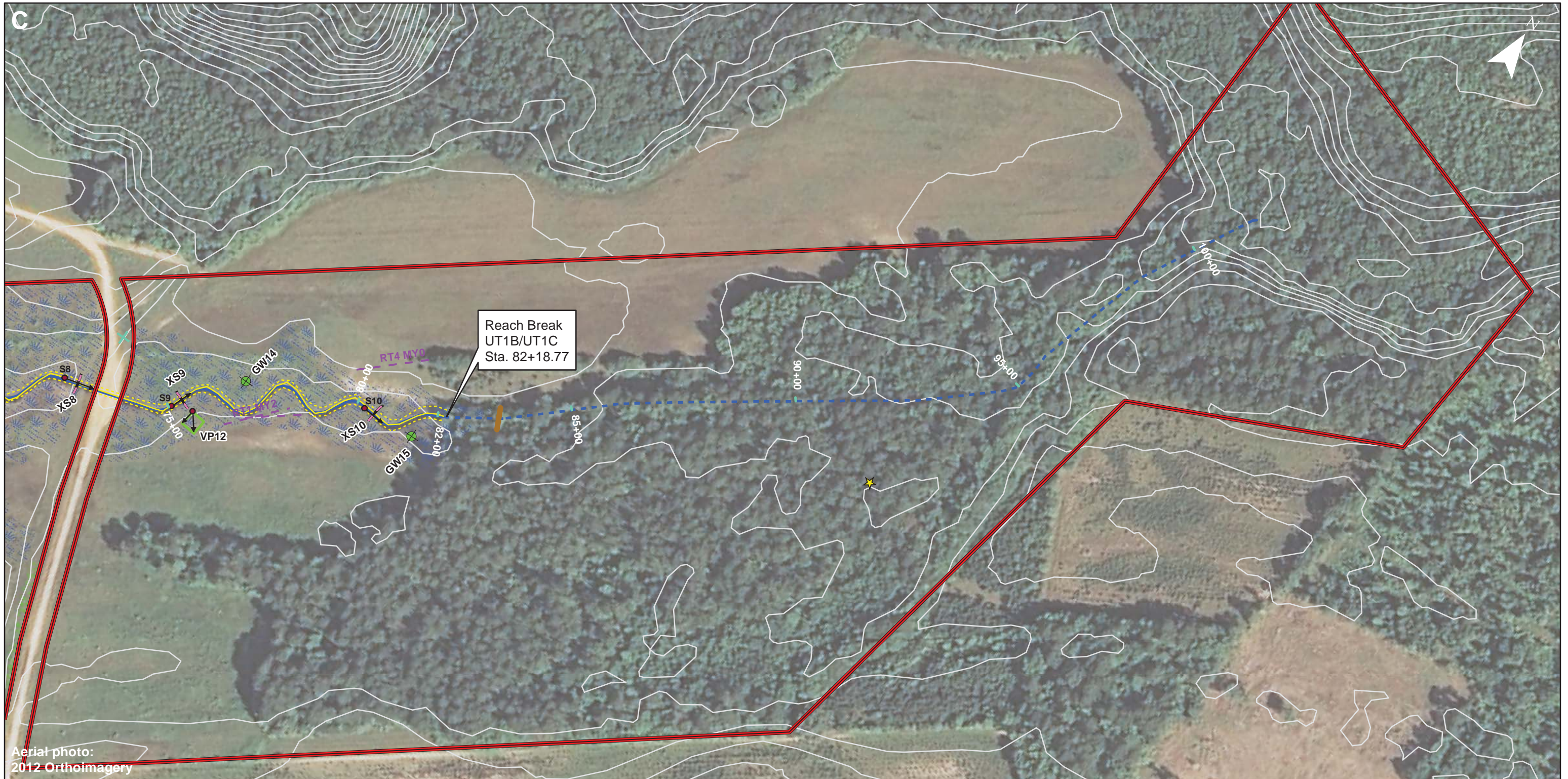
2 ft contours

- Precipitation gauge
- Crest gauge
- Photo points (Veg=V, Stream=S)
- Minor veg problem area (Typha)

Designed wetland features

- Non-riparian
- Riparian wetland
- Enhancement wetland
- Easement boundary





Aerial photo:
2012 Orthoimagery

Figure 2c. Current Condition
Plan View MY4

UT to Jumping Run Creek
Stream and Wetland Restoration Project
EEP #: 92345
Cumberland County, North Carolina
November 2013

Groundwater Wells (GW 1-15)

- New Wells
- Successful for MY4
- Not successful for MY4
- Reference well

Vegetation Plots (VP 1-12)

- > 280 stems/acre
- < 280 stems/acre

Random Transects MY4 (RT1-5)

- >280 stems/acre
- <280 stems/acre
- Random Transects MY0-MY3
- Cross-sections (XS 1-10)
- TOB MY4 (UT1B)
- Stream centerline MY4 (UT1B)
- Stream centerline MY0 (UT1B)
- Design headwater system (UT1A)
- Stream Enhancement (UT1C)

2 ft contours

- Precipitation gauge
- Crest gauge
- Photo points (Veg=V, Stream=S)

Designed wetland features

- Non-riparian
- Riparian wetland
- Enhancement wetland
- Easement boundary
- Beaver dam (2013)



Table 5
 Reach ID
 Assessed Length (lf)

Visual Stream Morphology Stability Assessment
 UT1b
 3300

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	Adjusted % for Stabilizing Woody Vegetation		
1. Bed	1. Vertical Stability (Riffle and Run units)	1. <u>Aggradation</u> - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%					
		2. <u>Degradation</u> - Evidence of downcutting			0	0	100%					
	2. Riffle Condition	1. <u>Texture/Substrate</u> - Riffle maintains coarser substrate	32	32			100%					
		3. Meander Pool Condition	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth \geq 1.6)	32			32				100%	
	2. <u>Length</u> appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)		32	32			100%					
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	32	32			100%					
		2. Thalweg centering at downstream of meander (Glide)	32	32			100%					
Totals							0	0	100%	0	0	100%
2. Bank	1. Scoured/Eroding	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion					0	0	100%	0	0	100%
	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%	0	0	100%		
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%		
Totals					0	0	100%	0	0	100%		
3. Engineered Structures	1. Overall Integrity	Structures physically intact with no dislodged boulders or logs.	75	75			100%					
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	75	75			100%					
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	75	75			100%					
	3. Bank Protection	Bank erosion within the structures extent of influence does <u>not</u> exceed 15%. (See guidance for this table in EEP monitoring guidance document)	75	75			100%					
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio \geq 1.6 Rootwads/logs providing some cover at base-flow.	75	75			100%					

Table 6. Vegetation Condition Assessment

UT Jumping Run Creek Restoration Project / EEP Project No. 92345

Planted acreage							
	145						
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage	
1. Bare Areas (previously mowed areas)	Very limited cover of both woody and herbaceous material	0.1 acres	None	0	0	0.0%	
2. Low Stem Density Areas	Woody stem densities below target levels based on MY3, 4, or 5 stem count criteria	0.1 acres	None	0	0	0.0%	
				Total	0	0	0.0%
3. 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 acres	None	0	0	0.0%	
				Total	0	0	0.0%
Easement acreage							
	225.3						
Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage	
4. Invasive areas of concern	<i>Typha latifolia</i>	1000 SF	Yellow hatching	1	0.79	0.4%	
5. Easement encroachment areas		none	None	0	0	0.0%	

Headwater Stream Visual Assessment Form

Project Name: UTJRC Date: 9/18/2013

Observation Team: Alex Baldwin & Liz Roberson

Recent Weather: No rain in the past week Station: ~ 17+00
Last rain event 9/1/13 ~0.5"

Indicators of Flow (check if present today, and photodocument)

- Water flowing downstream;
- A natural line impressed on the bank;
- Shelving;
- Changes in soil characteristics (explain below);
- Destruction of terrestrial vegetation;
- Presence of litter and debris;
- Wracking;
- Vegetation matted down, bent or absent;
- Sediment sorting;
- Leaf litter disturbed or washed away;
- Scour;
- Deposition;
- Bed and bank formation;
- Water staining;
- Change in plant community.

Additional notes:

Photo: P1010017

Stream Station Photos



Photo B1 – (Photo Station 1) Cross-section 1 looking downstream at Station 48+81
(10/24/2013 Year 4)



Photo B2 – (Photo Station 2) Cross-section 2 looking downstream at Station 50+30
(10/24/2013 Year 4)



Photo B3 – (Photo Station 3) Cross-section 3 looking downstream at Station 54+98
(10/24/2013 Year 4)



Photo B4 – (Photo Station S4) Cross-section 4 looking downstream at Station 59+09
(10/24/2013 Year 4)



Photo B5 – (Photo Station S5) Cross-section 5 looking downstream at Station 62+87
(10/24/2013 Year 4)



Photo B6 – (Photo Station S6) Cross-section 6 looking downstream at Station 65+44
(10/24/2013 Year 4)



Photo B7 – (Photo Station S7) Cross-section 7 looking downstream at Station 68+24
(10/24/2013 Year 4)



Photo B8 – (Photo Station S8) Cross-section 8 looking downstream at Station 72+84
(10/24/2013 Year 4)



Photo B9 – (Photo Station S9) Cross-section 9 looking downstream at Station 75+30
(10/24/2013 Year 4)



Photo B10 – (Photo Station S10) Cross-section 10 looking downstream at Station 80+45
(10/24/2013 Year 4)



Photo B11 – (Photo Station S11) – Stream channel looking downstream at upper road crossing
(10/24/2013 Year 4)



Photo B12 – (Photo Station S12) Stream channel looking upstream at upper road crossing
(10/24/2013 Year 4)



Photo B13 – Evidence of flow observed in headwater system UT1A (10/24/2013 Year 4)

Vegetation Plot Photos



Photo B14 – (Photo Station V1) Veg Plot 1 looking west (9/18/2013 Year 4)



Photo B15 – (Photo Station V2) Veg Plot 1 looking southwest (9/18/2013 Year 4)



Photo B16 - (Photo Station V3) Veg Plot 2 looking south (9/18/2013 Year 4)



Photo B17 - (Photo Station V4) Veg Plot 2 looking southeast (9/18/2013 Year 4)



Photo B18 – (Photo Station V5) Veg Plot 3 looking southeast (9/18/2013 Year 4)



Photo B19 – (Photo Station V6) Veg Plot 3 looking east (9/18/2013 Year 4)



Photo B20 – (Photo Station V7) Veg Plot 4 looking northwest (9/18/2013 Year 4)



Photo B21 – (Photo Station V8) Veg Plot 4 looking west (9/18/2013 Year 4)



Photo B22 – (Photo Station V9) Veg plot 5 looking southwest (9/18/2013 Year 4)



Photo B23 – (Photo Station V10) Veg plot 5 looking south (9/18/2013 Year 4)



Photo B24 – (Photo Station V11) Veg plot 6 looking northeast (9/18/2013 Year 4)



Photo B25 – (Photo Station V12) Veg plot 6 looking north (9/18/2013 Year 4)



Photo B26 – (Photo Station V13) Veg plot 7 looking north (9/18/2013 Year 4)



Photo B27 – (Photo Station V14) Veg plot 7 looking northwest (9/18/2013 Year 4)



Photo B28 – (Photo Station V15) Veg plot 8 looking northwest (9/18/2013 Year 4)



Photo B29 – (Photo Station V16) Veg plot 8 looking west (9/18/2013 Year 4)



Photo B30 – (Photo Station V17) Veg plot 9 looking south (9/18/2013 Year 4)



Photo B31 – (Photo Station V18) Veg Plot 9 looking southeast (9/18/2013 Year 4)



Photo B32 – (Photo Station V19) Veg plot 10 looking northeast (9/18/2013 Year 4)



Photo B33 – (Photo Station V20) Veg plot 10 looking north (9/18/2013 Year 4)



Photo B34 – (Photo Station V21) Veg plot 11 looking southwest (9/18/2013 Year 4)



Photo B35 – (Photo Station V22) Veg plot 11 looking south (9/18/2013 Year 4)



Photo B36 – (Photo Station V23) Veg plot 12 looking southwest (9/18/2013 Year 4)



Photo B37 – (Photo Station V24) Veg plot 12 looking south (9/18/2013 Year 4)



Photo B38 – (Photo Station RT1) Random transect 1 looking southwest (9/18/2013 Year 4)



Photo B39 – (Photo Station RT2) Random transect 2 looking west (9/18/2013 Year 4)



Photo B40 – (Photo Station RT3) Random transect 3 looking southwest (9/18/2013 Year 4)



Photo B41 – (Photo Station RT4) Random transect 4 looking northeast (9/18/2013 Year 4)



Photo B42 – (Photo Station RT5) Random transect 5 looking east (9/18/2013 Year 4)

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Appendix C. Vegetation Plot Data

Table 7	– Vegetation Plot Mitigation Success Summary
Table 8	– CVS Vegetation Metadata
Table 9 a	– CVS Stem Count Total and Planted by Plot and Species
Table 9b	– Stem Count Total and Planted by Plot and Species for Random Transects

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Table 7. UT to Jumping Run Creek (#92345)							
Year 4 (18-Sep-2013)							
Vegetation Plot Summary Information							
Plot #	Riparian Buffer Stems ¹	Stream/Wetland Stems ²	Live Stakes	Invasives	Volunteers ³	Total ⁴	Unknown Growth Form
0001	n/a	10	0	0	204	214	0
0002	n/a	9	0	0	411	420	0
0003	n/a	12	0	0	86	98	0
0004	n/a	7	0	0	28	35	0
0005	n/a	12	0	0	26	38	0
0006	n/a	6	0	0	20	26	0
0007	n/a	4	0	0	15	19	0
0008	n/a	3	0	0	23	26	0
0009	n/a	4	0	0	29	33	0
0010	n/a	8	0	0	22	30	0
0011	n/a	7	0	0	45	52	0
0012	n/a	10	0	0	61	71	0

Wetland/Stream Vegetation Totals					
(per acre)					
Plot #	Stream/Wetland Stems ²	Volunteers ³	Total ⁴	Success Criteria Met?	
0001	405	8256	8660	Yes	
0002	364	16633	16997	Yes	
0003	486	3480	3966	Yes	
0004	283	1133	1416	Yes, barely	
0005	486	1052	1538	Yes	
0006	243	809	1052	No	
0007	162	607	769	No	
0008	121	931	1052	No	
0009	162	1174	1335	No	
0010	324	890	1214	Yes	
0011	283	1821	2104	Yes, barely	
0012	405	2469	2873	Yes	
Project Avg	310	3271	3581	Yes	

Stem Class	Characteristics	Color for Density
¹ Buffer Stems	Native planted hardwood trees. Does NOT include shrubs. No pines. No vines.	Exceeds requirements by 10%
² Stream/Wetland Stems	Native planted woody stems. Includes shrubs, does NOT include live stakes. No vines	Exceeds requirements, but by less than 10%
³ Volunteers	Native woody stems. Not planted. No vines.	Fails to meet requirements, by less than 10%
⁴ Total	Planted + volunteer native woody stems. Includes live stakes. Excl. exotics. Excl. vines.	Fails to meet requirements by more than 10%

Table 8. CVS Vegetation Plot Metadata	
UT to Jumping Run Creek Restoration - EEP#92345	
Report Prepared By	Alex Baldwin
Date Prepared	9/27/2013 11:37
database name	Stantec_UTJRC2012_cvs-EEP-entrytool-v2.3.1.mdb
database location	U:\175613003\UT_Jumping_Run\project\site_data\monitoring\vegetation
computer name	BALDWINA-SP1
file size	38735872
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	92345
project Name	UT to Jumping Run Creek
Description	stream and wetland restoration
River Basin	Cape Fear
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	12

Table 9b. Stem Count Total and Planted by Plot and Species for Random Transects

UT to Jumping Run Creek - EEP Project No. 92345

Current Plot Data (MY4 2013)

Scientific Name	Common Name	Species Type	Random Transect 1	Random Transect 2	Random Transect 3	Random Transect 4	Random Transect 5
<i>Pinus taeda</i>	Loblolly Pine	Tree	5	15	4	51	6
<i>Acer rubrum</i>	Red Maple	Tree	3	1	1		
<i>Liquidambar styraciflua</i>	Sweetgum	Tree		1	1	3	
<i>Quercus nigra</i>	Water Oak	Tree	1	1	1	4	1
<i>Taxodium distichum</i>	Bald Cypress	Tree			2		1
<i>Salix nigra</i>	Black Willow	Tree	1		5		
<i>Quercus phellos</i>	Willow Oak	Tree	3				
<i>Magnolia virginiana</i>	Sweetbay	Shrub Tree			1		
<i>Diospyros virginiana</i>	Persimmon	Tree	1		2		
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree		2			5
<i>Quercus falcata</i>	Southern Red Oak	Tree				1	
<i>Quercus lyrata</i>	Overcup Oak	Tree		3	2		6
<i>Nyssa biflora</i>	Blackgum	Tree	7		6	1	2
<i>Rhus copallinum</i>	Swamp Tupelo	Tree	42				
<i>Pinus palustris</i>	Longleaf Pine	Tree		2		4	
<i>Sambucus canadensis</i>	Elderberry	Shrub		1	1		
		Stem Count	63	26	26	64	21
		size (ares)	1	1	1	1	1
		size (ACRES)	0.02	0.02	0.02	0.02	0.02
		Species count	8	8	11	6	6
		Stems per ACRE	2550.6	1052.6	1052.6	2591.1	850.2

Appendix D. Stream Survey Data

Figures 3a-j	– Cross-Sections with Annual Overlays
Figure 4	– Longitudinal Profiles with Annual Overlays
Table 10a,b.	– Baseline – Stream Data Summary
Table 11a.	– Monitoring – Cross-section Morphology Data
Table 11b.	– Monitoring – Stream Reach Morphology Data

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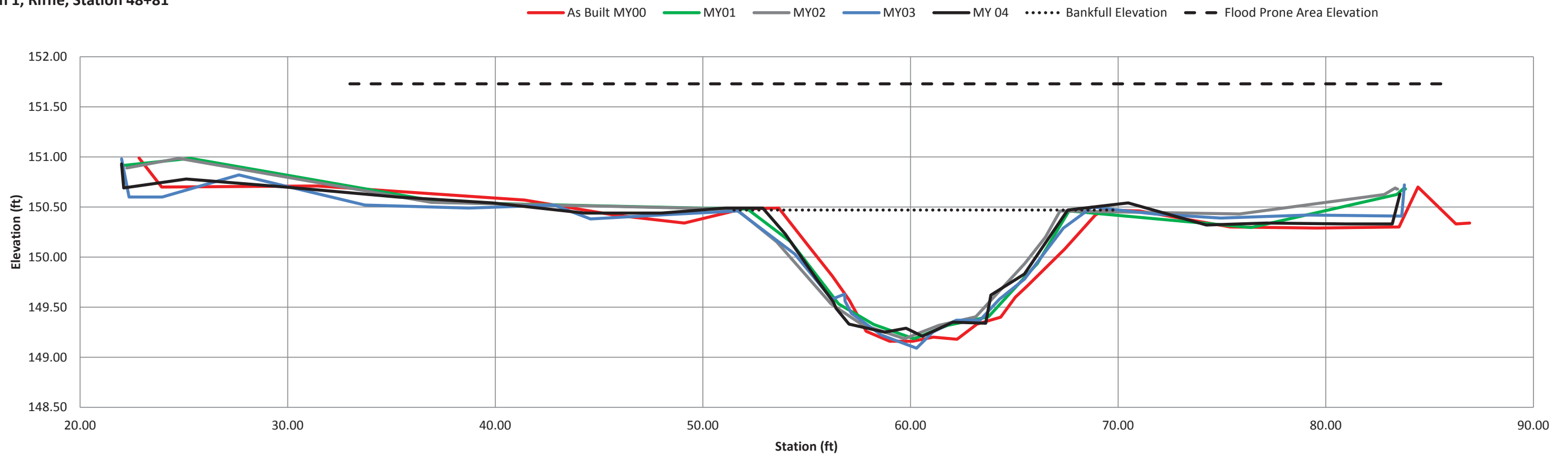
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-1, Riffle, STA 48+81
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin

MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
22.84	150.99	22.00	150.91	22.25	150.89	22.00	150.98	22.00	150.93
23.93	150.70	25.31	150.99	24.75	150.99	22.36	150.60	22.10	150.69
31.43	150.71	37.48	150.55	36.92	150.55	23.96	150.60	25.12	150.78
41.41	150.57	52.15	150.48	51.60	150.48	27.65	150.82	29.89	150.70
45.73	150.42	54.23	150.15	53.55	150.15	33.72	150.52	35.29	150.60
49.10	150.34	56.54	149.53	56.18	149.53	38.73	150.49	39.86	150.54
51.90	150.48	58.23	149.33	57.65	149.33	42.83	150.52	44.30	150.44
53.65	150.49	60.16	149.18	59.71	149.18	44.59	150.38	48.00	150.44
55.09	150.11	61.78	149.32	61.36	149.32	47.90	150.42	51.09	150.49
56.24	149.81	63.75	149.40	63.14	149.40	51.68	150.46	52.88	150.49
57.05	149.57	66.11	149.94	65.50	149.94	54.43	150.03	53.97	150.23
57.45	149.42	67.63	150.46	66.50	150.20	56.21	149.58	55.51	149.77
57.86	149.26	76.40	150.30	67.20	150.46	56.82	149.63	56.29	149.55
58.99	149.16	83.42	150.63	75.85	150.43	56.85	149.56	56.41	149.49
60.10	149.16	83.78	150.69	82.82	150.63	57.15	149.44	57.04	149.33
61.10	149.20	83.84	150.68	83.35	150.69	58.61	149.22	58.76	149.25
62.24	149.18			83.40	150.68	60.29	149.09	59.78	149.29
63.20	149.33			83.46	150.68	61.07	149.25	60.57	149.21
64.34	149.40					62.20	149.37	62.03	149.35
65.05	149.60					63.35	149.37	63.62	149.34
65.61	149.71					64.28	149.58	63.87	149.62
67.42	150.08					65.48	149.78	65.48	149.83
68.90	150.42					67.36	150.29	67.57	150.47
69.34	150.47					68.75	150.50	70.48	150.54
71.02	150.46					71.74	150.43	74.25	150.32
75.41	150.30					74.94	150.39	77.13	150.34



SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	150.47	150.46	150.48	150.46	150.47
Bankfull Cross-Sectional Area	12.9	13.16	12.52	12.74	12.12
Bankfull Width	15.6	15.35	15.6	16.99	14.61
Flood Prone Area Elevation	151.78	151.74	151.78	151.83	151.73
Flood Prone Width	200	200	200	200	200
Max Depth at Bankfull	1.31	1.28	1.3	1.37	1.26
Mean Depth at Bankfull	0.83	0.79	0.8	0.75	0.83
W/D Ratio	18.73	19.43	19.50	22.65	17.60
Entrenchment Ratio	12.86	13.03	12.82	11.77	13.69
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

**UT to Jumping Run Creek, Reach UT1B
X-Section 1, Riffle, Station 48+81**



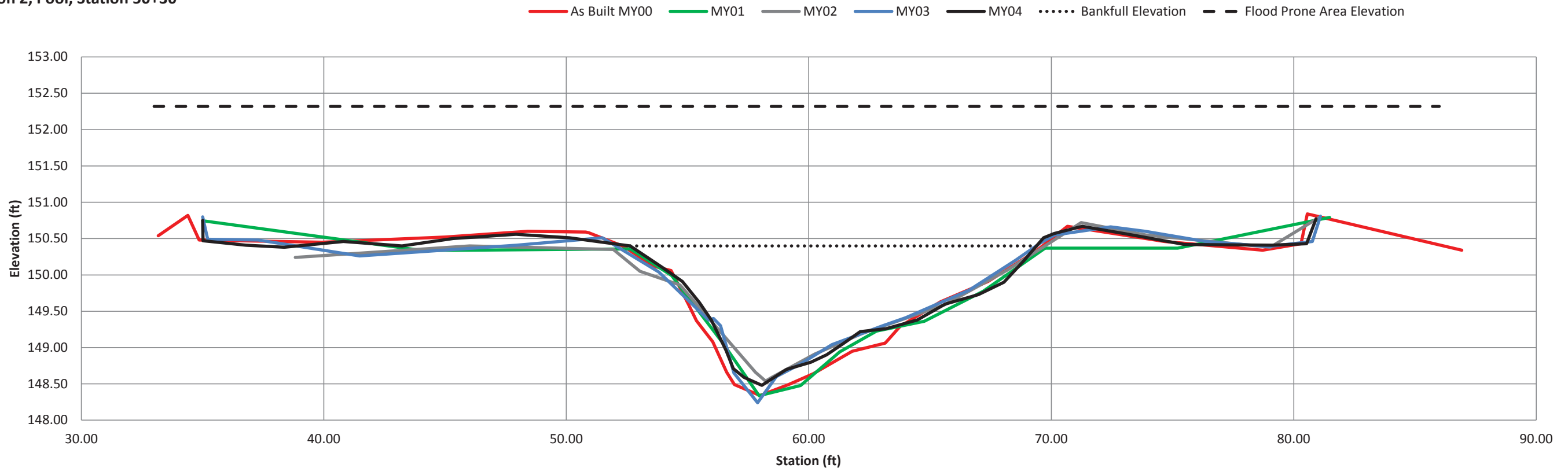
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-2, Pool, STA 50+30
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin

MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
33.17	150.54	35.00	150.75	38.82	150.24	35.00	150.80	35.00	150.75
34.39	150.82	44.07	150.34	46.01	150.40	35.21	150.49	35.02	150.47
34.86	150.48	52.64	150.36	51.94	150.35	37.29	150.48	36.78	150.41
39.92	150.45	54.34	149.99	53.04	150.05	41.47	150.26	38.37	150.38
45.00	150.52	56.45	149.06	54.69	149.86	47.95	150.41	40.81	150.46
48.41	150.60	57.95	148.34	57.80	148.66	51.49	150.51	43.22	150.40
50.80	150.59	59.66	148.48	58.22	148.54	53.82	150.04	45.33	150.50
50.93	150.58	61.28	148.94	58.48	148.59	55.86	149.38	47.93	150.56
52.37	150.39	62.79	149.23	60.25	148.91	56.07	149.40	50.13	150.51
53.59	150.12	64.76	149.36	62.18	149.19	56.36	149.30	52.63	150.40
54.32	150.06	67.19	149.78	65.61	149.59	56.91	148.65	53.97	150.10
55.03	149.60	69.74	150.37	68.21	150.07	57.89	148.24	54.79	149.91
55.37	149.37	75.21	150.37	71.23	150.72	58.66	148.60	55.49	149.62
56.04	149.08	81.48	150.79	73.91	150.55	59.64	148.77	55.98	149.38
56.61	148.66			79.03	150.38	60.96	149.04	56.59	148.96
56.93	148.49			81.09	150.80	63.05	149.30	56.89	148.71
57.99	148.34					63.99	149.41	57.33	148.59
59.16	148.49					66.61	149.79	58.06	148.48
60.19	148.64					68.52	150.20	59.08	148.70
61.79	148.95					69.55	150.44	60.09	148.80
63.15	149.06					70.14	150.55	60.74	148.90
63.76	149.29					72.45	150.66	61.45	149.06
65.43	149.63					73.88	150.60	62.12	149.22
67.39	149.91					76.37	150.46	63.19	149.26
69.34	150.32					78.95	150.39	64.47	149.38
70.67	150.67					80.77	150.46	65.63	149.60



SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	150.58	150.36	150.35	150.51	150.40
Bankfull Cross-Sectional Area	21.57	17.26	15.57	18.60	16.78
Bankfull Width	19.33	17.30	17.56	18.53	16.77
Flood Prone Area Elevation	152.82	152.38	152.16	152.78	152.32
Flood Prone Width	200	200	200	200	200
Max Depth at Bankfull	2.25	2.02	1.81	2.27	1.92
Mean Depth at Bankfull	1.12	1.01	0.89	1.00	1.00
W/D Ratio	17.26	17.13	17.13	18.53	16.77
Entrenchment Ratio	10.35	11.56	11.56	10.79	11.93
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 2, Pool, Station 50+30



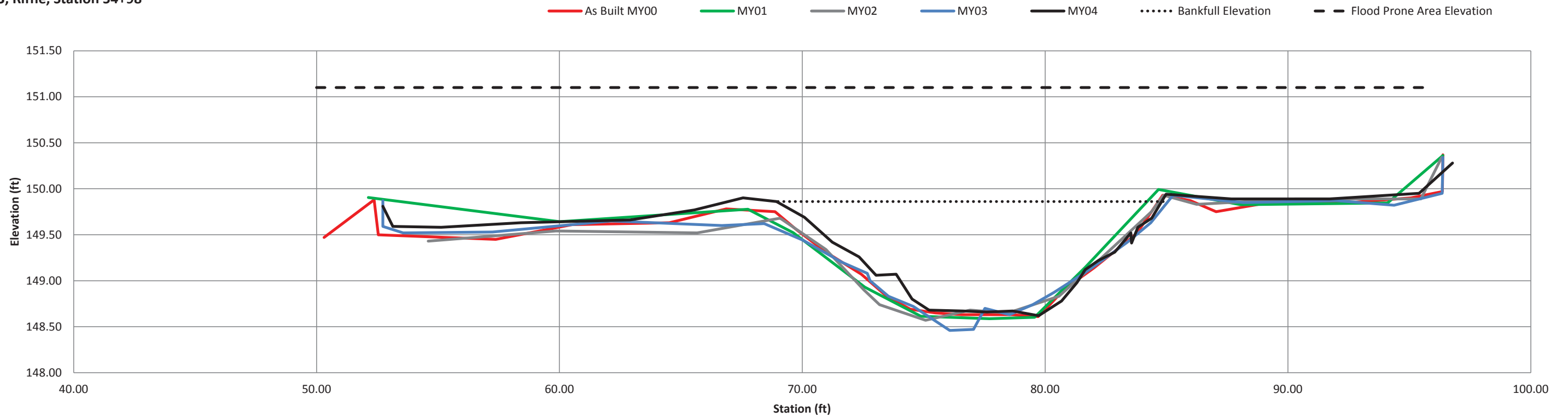
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-3, Riffle, STA 54+98
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin



MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
50.31	149.47	52.13	149.90	54.60	149.43	52.73	149.87	52.73	149.81
52.37	149.88	60.01	149.64	59.86	149.54	52.73	149.59	53.14	149.59
52.54	149.50	67.76	149.78	65.67	149.52	53.57	149.52	55.13	149.58
57.38	149.45	69.63	149.52	69.09	149.68	57.24	149.53	58.42	149.63
60.52	149.61	72.58	148.93	70.98	149.34	62.14	149.65	62.91	149.66
64.53	149.63	74.88	148.61	72.54	148.90	66.69	149.60	65.56	149.77
66.87	149.78	77.71	148.59	73.18	148.74	68.43	149.62	67.56	149.90
68.88	149.75	79.57	148.60	75.08	148.57	70.03	149.44	68.94	149.86
69.74	149.56	81.66	149.15	76.91	148.68	71.64	149.20	70.09	149.69
70.98	149.31	84.67	149.99	78.47	148.65	72.68	149.08	71.24	149.42
72.43	149.07	88.05	149.83	80.57	148.83	72.79	149.00	72.34	149.26
73.48	148.83	94.10	149.85	82.33	149.25	73.55	148.83	73.04	149.06
74.45	148.69	96.38	150.36	84.38	149.75	74.57	148.72	73.87	149.07
75.49	148.65			84.88	149.93	76.07	148.46	74.52	148.80
76.56	148.63			86.24	149.83	77.05	148.47	75.22	148.68
77.68	148.63			90.28	149.89	77.52	148.70	76.61	148.67
78.65	148.63			95.47	149.89	78.54	148.63	77.61	148.66
79.71	148.61			96.33	150.34	79.49	148.74	78.67	148.67
80.16	148.73					80.35	148.87	79.73	148.62
80.81	148.91					81.77	149.11	80.68	148.78
82.01	149.14					83.39	149.42	81.31	148.98
83.76	149.51					84.35	149.63	81.65	149.12
84.84	149.93					85.27	149.93	82.19	149.22
85.99	149.87					88.17	149.85	82.87	149.31
87.04	149.75					91.99	149.87	83.53	149.52
89.46	149.86					94.37	149.82	83.56	149.41

SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	149.75	149.78	149.68	149.62	149.86
Bankfull Cross-Sectional Area	11.71	13.91	10.69	9.88	12.29
Bankfull Width	15.50	16.16	15.00	15.90	15.86
Flood Prone Area Elevation	150.89	150.97	150.79	150.78	151.10
Flood Prone Width	200	200	200	200	200
Max Depth at Bankfull	1.14	1.19	1.11	1.16	1.24
Mean Depth at Bankfull	0.76	0.76	0.71	0.62	0.78
W/D Ratio	20.90	21.26	21.13	25.65	20.33
Entrenchment Ratio	12.91	12.38	13.33	12.58	12.61
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 3, Riffle, Station 54+98



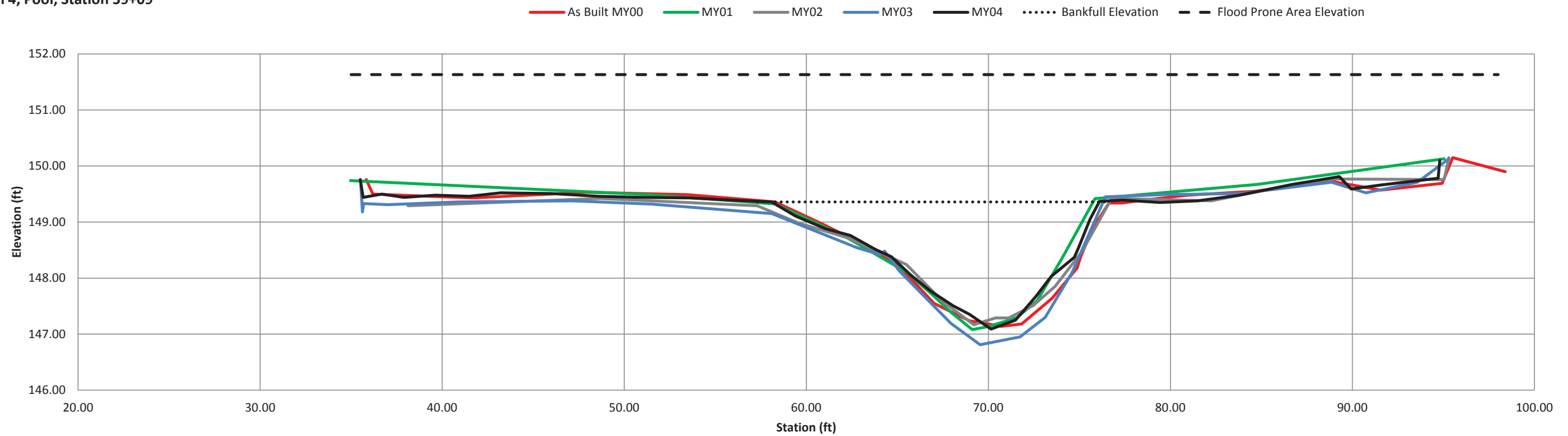
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-4, Pool, STA 59+09
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin



MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
35.83	149.76	34.96	149.74	38.12	149.29	35.52	149.72	35.50	149.76
36.19	149.50	51.33	149.49	48.68	149.42	35.62	149.18	35.66	149.44
41.66	149.43	58.28	149.32	57.30	149.29	35.69	149.33	36.68	149.50
47.94	149.53	62.04	148.76	59.53	148.99	37.01	149.31	37.90	149.44
53.48	149.49	65.56	148.10	62.35	148.71	40.89	149.36	39.63	149.48
58.28	149.36	66.97	147.69	65.50	148.24	47.11	149.38	41.47	149.46
60.99	148.95	68.00	147.38	67.46	147.59	51.50	149.32	43.22	149.52
63.04	148.61	69.12	147.08	69.20	147.17	58.10	149.15	46.02	149.51
65.10	148.21	70.02	147.14	70.40	147.29	62.80	148.54	48.55	149.46
67.01	147.55	71.57	147.30	71.12	147.29	64.05	148.42	50.93	149.44
68.95	147.24	72.68	147.60	72.46	147.51	64.30	148.48	53.62	149.43
70.73	147.14	74.11	148.39	73.66	147.85	65.10	148.13	55.91	149.39
71.83	147.18	75.85	149.42	75.13	148.47	66.64	147.62	58.09	149.36
73.50	147.64	84.75	149.67	76.79	149.43	67.95	147.19	59.40	149.11
74.87	148.18	95.04	150.13	77.13	149.42	69.55	146.81	61.05	148.88
75.08	148.39			82.24	149.38	71.74	146.95	62.42	148.76
75.70	148.87			86.84	149.67	73.12	147.30	63.80	148.51
76.63	149.34			88.87	149.77	74.60	148.10	64.67	148.38
77.37	149.34			95.04	149.76	76.43	149.45	65.75	148.05
78.21	149.38			95.30	150.15	79.61	149.49	66.82	147.77
80.92	149.48					83.81	149.51	68.05	147.51
84.67	149.55					88.85	149.71	68.98	147.35
88.81	149.73					90.74	149.52	70.15	147.09
91.55	149.57					93.56	149.71	71.49	147.25
94.93	149.69					95.30	150.13	72.60	147.67
95.51	150.15							73.45	148.03

SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	149.34	149.32	149.29	149.15	149.36
Bankfull Cross-Sectional Area	22.42	20.32	20.78	21.47	20.95
Bankfull Width	18.22	17.38	19.25	17.92	17.99
Flood Prone Area Elevation	151.54	151.56	151.41	151.49	151.63
Flood Prone Width	200	200	200	200	200
Max Depth at Bankfull	2.20	2.24	2.12	2.34	2.27
Mean Depth at Bankfull	1.23	1.17	1.08	1.20	1.16
W/D Ratio	14.81	14.85	17.82	14.93	15.51
Entrenchment Ratio	10.98	11.51	10.39	11.16	11.12
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 4, Pool, Station 59+09



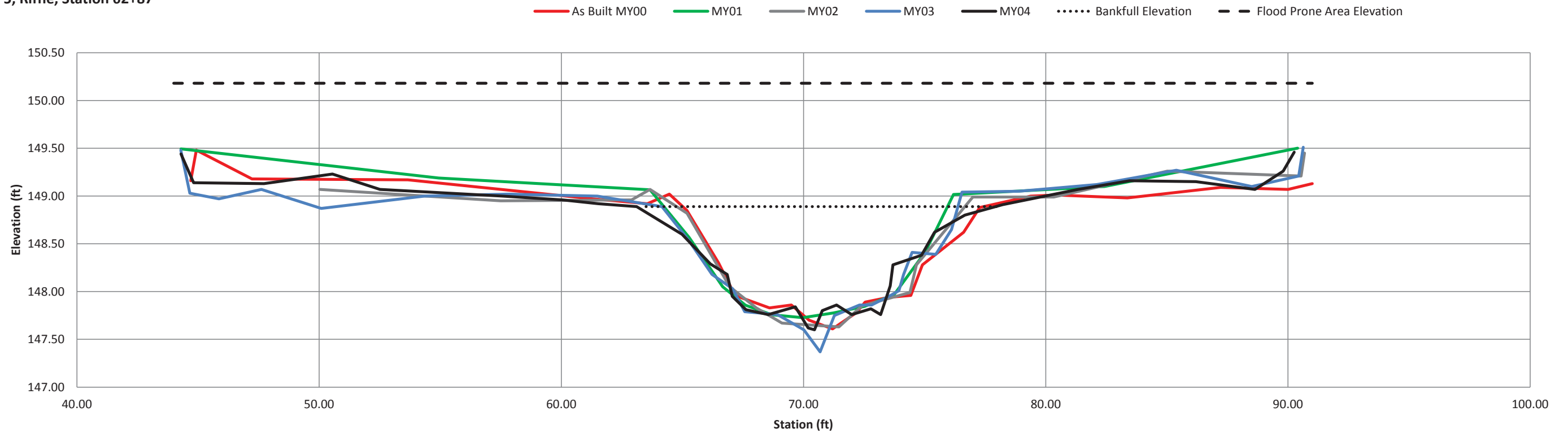
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-5, Riffle, STA 62+87
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin

MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
44.70	149.16	44.30	149.49	50.03	149.07	44.29	149.48	44.30	149.44
44.93	149.48	54.94	149.19	57.50	148.95	44.66	149.03	44.82	149.14
47.23	149.18	63.66	149.07	62.90	148.96	45.86	148.97	47.72	149.13
53.66	149.17	65.27	148.57	63.66	149.07	47.62	149.07	50.55	149.23
58.24	149.05	66.66	148.05	65.19	148.82	50.09	148.87	52.51	149.07
61.29	148.97	67.60	147.86	66.95	148.05	54.34	149.00	57.59	149.00
63.55	148.92	68.69	147.76	68.05	147.83	57.78	149.02	60.05	148.96
64.46	149.02	69.97	147.73	69.11	147.67	61.49	149.00	61.53	148.92
65.18	148.85	71.23	147.78	71.46	147.63	64.15	148.89	63.11	148.89
66.49	148.30	72.51	147.84	72.41	147.85	65.25	148.54	64.98	148.60
67.17	147.96	73.74	147.97	74.39	147.99	66.22	148.18	66.15	148.29
68.59	147.83	75.02	148.41	74.66	148.28	67.07	148.03	66.85	148.18
69.50	147.86	76.19	149.02	76.99	148.99	67.57	147.79	67.06	147.95
70.23	147.70	82.42	149.10	80.33	148.99	68.92	147.76	67.62	147.81
71.20	147.61	90.40	149.50	85.02	149.26	70.01	147.60	68.54	147.76
72.18	147.78			90.54	149.21	70.68	147.37	69.66	147.84
72.54	147.89			90.68	149.45	71.27	147.75	70.19	147.62
73.50	147.94					72.31	147.86	70.45	147.60
74.43	147.96					72.81	147.86	70.77	147.80
74.91	148.28					73.59	147.96	71.36	147.86
76.61	148.62					73.94	148.01	71.99	147.76
77.27	148.88					74.13	148.18	72.78	147.82
79.38	149.00					74.48	148.41	73.18	147.76
80.42	149.01					75.46	148.39	73.58	148.06
83.37	148.98					76.11	148.65	73.69	148.28
87.22	149.09					76.54	149.04	74.87	148.38



SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	149.02	149.07	148.99	148.89	148.89
Bankfull Cross-Sectional Area	11.69	11.94	11.05	10.25	9.80
Bankfull Width	15.9	15.64	12.84	12.22	14.83
Flood Prone Area Elevation	150.38	150.41	150.35	150.41	150.18
Flood Prone Width	200	200	200	200	200
Max Depth at Bankfull	1.41	1.34	1.36	1.52	1.29
Mean Depth at Bankfull	0.74	0.76	0.86	0.84	0.66
W/D Ratio	21.49	20.58	14.93	14.55	22.47
Entrenchment Ratio	12.58	12.79	15.58	16.37	13.49
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 5, Riffle, Station 62+87



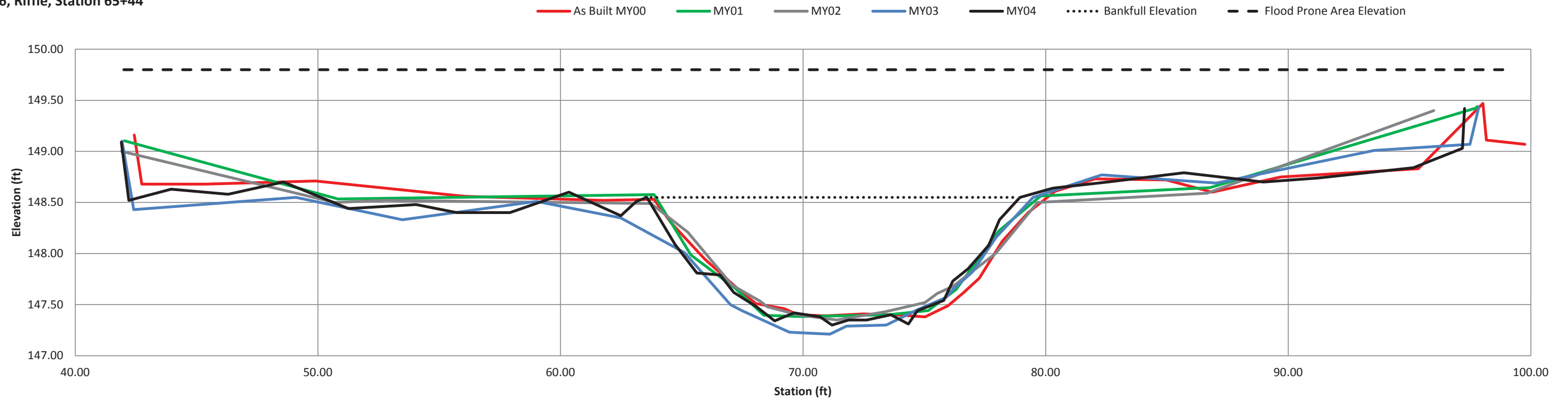
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-6, Riffle, STA 65+44
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin

MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
42.43	149.16	42.03	149.10	41.90	149.00	41.93	149.10	41.90	149.09
42.74	148.68	50.83	148.53	50.70	148.50	42.41	148.43	42.21	148.52
45.36	148.68	63.86	148.58	52.78	148.52	49.10	148.55	43.95	148.63
49.90	148.71	65.38	147.99	63.73	148.49	53.48	148.33	46.30	148.58
56.07	148.56	67.20	147.66	65.25	148.21	59.01	148.51	48.58	148.70
61.78	148.52	68.38	147.40	67.07	147.69	62.48	148.35	51.26	148.44
63.85	148.53	69.92	147.38	68.25	147.53	65.11	148.01	54.05	148.48
64.56	148.30	71.52	147.39	68.52	147.48	67.01	147.50	55.72	148.40
65.93	147.95	73.51	147.40	69.79	147.40	67.49	147.44	57.92	148.40
67.33	147.65	75.16	147.44	71.39	147.35	69.44	147.23	60.35	148.60
68.06	147.51	76.31	147.65	73.38	147.43	71.11	147.21	62.49	148.37
69.22	147.46	78.07	148.22	75.03	147.52	71.79	147.29	63.13	148.51
69.80	147.40	79.79	148.56	75.53	147.61	73.43	147.30	63.56	148.55
70.94	147.39	86.78	148.65	76.18	147.68	74.72	147.45	64.72	148.09
72.49	147.41	97.75	149.43	77.94	148.00	75.89	147.57	65.62	147.81
73.80	147.40	97.79	149.44	79.66	148.50	76.18	147.65	66.58	147.79
75.03	147.38			86.65	148.59	76.98	147.82	67.14	147.62
75.98	147.49			96.00	149.40	77.96	148.16	68.08	147.48
76.63	147.62					79.48	148.55	68.83	147.34
77.27	147.76					82.31	148.77	69.62	147.42
78.21	148.12					87.03	148.69	70.70	147.38
79.28	148.40					93.55	149.01	71.19	147.30
80.39	148.61					97.49	149.07	71.88	147.35
82.03	148.73					97.85	149.43	72.62	147.35
84.97	148.72							73.62	147.40
86.87	148.60							74.34	147.31



SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	148.61	148.58	148.49	148.51	148.55
Bankfull Cross-Sectional Area	14.51	13.74	12.05	14.64	13.48
Bankfull Width	16.39	17.17	15.90	20.32	15.38
Flood Prone Area Elevation	149.84	149.78	149.63	149.81	149.80
Flood Prone Width	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	1.23	1.20	1.14	1.30	1.25
Mean Depth at Bankfull	0.89	0.80	0.76	0.72	0.88
W/D Ratio	18.42	21.46	20.92	28.22	17.48
Entrenchment Ratio	12.20	11.65	12.58	9.84	13.00
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 6, Riffle, Station 65+44



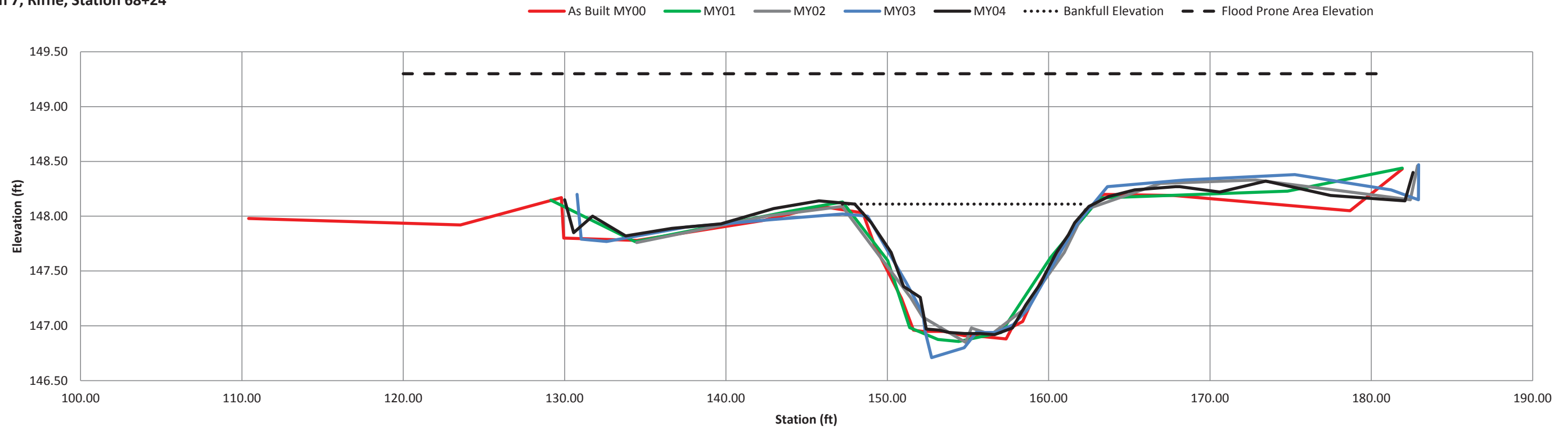
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-7, Riffle, STA 68+24
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	I. Taylor, A. Baldwin

MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
110.41	147.98	129.14	148.15	134.46	147.76	130.77	148.20	130.00	148.15
123.54	147.92	134.38	147.77	142.52	148.00	131.03	147.79	130.56	147.85
129.80	148.17	143.99	148.05	147.21	148.09	132.60	147.77	131.73	148.00
129.95	147.80	147.23	148.13	147.46	148.04	137.52	147.90	133.78	147.82
134.50	147.78	150.02	147.60	151.44	147.26	142.89	147.97	136.65	147.89
142.25	147.96	151.39	146.98	152.19	147.08	147.22	148.02	139.68	147.93
145.91	148.09	153.14	146.88	154.85	146.85	148.78	148.00	142.95	148.07
148.49	148.03	154.42	146.86	155.21	146.98	151.19	147.39	145.76	148.14
149.22	147.73	157.05	146.94	156.43	146.92	152.21	147.11	147.98	148.11
150.88	147.25	160.12	147.62	158.46	147.15	152.34	146.95	149.01	147.94
151.62	146.96	163.18	148.17	160.97	147.67	152.75	146.71	150.24	147.67
152.18	146.95	174.81	148.23	162.27	148.06	154.77	146.80	151.01	147.36
153.51	146.95	181.92	148.44	166.94	148.30	155.51	146.94	152.04	147.26
154.78	146.91			172.83	148.33	156.73	146.94	152.41	146.97
156.05	146.90			178.19	148.23	157.80	147.01	153.20	146.96
157.36	146.88			182.42	148.15	158.75	147.16	153.83	146.94
157.76	146.99			182.87	148.46	159.55	147.37	154.79	146.93
158.39	147.04					160.04	147.50	155.77	146.93
159.46	147.39					161.80	147.94	156.65	146.92
161.88	147.97					163.65	148.27	157.75	146.98
163.39	148.20					168.43	148.33	158.58	147.19
167.73	148.19					175.26	148.38	159.52	147.39
178.68	148.05					181.22	148.24	159.78	147.47
181.92	148.43					182.92	148.15	160.49	147.67
						182.93	148.47	161.22	147.83
								161.61	147.94



SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	148.09	148.13	148.06	148.00	148.11
Bankfull Cross-Sectional Area	11.77	12.18	10.95	10.08	10.97
Bankfull Width	16.87	15.72	14.91	13.36	14.79
Flood Prone Area Elevation	149.30	149.40	149.27	149.29	149.30
Flood Prone Width	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	1.21	1.27	1.21	1.29	1.19
Mean Depth at Bankfull	0.70	0.77	0.73	0.75	0.74
W/D Ratio	24.10	20.42	20.42	17.81	19.99
Entrenchment Ratio	11.86	12.72	13.41	14.97	13.52
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 7, Riffle, Station 68+24



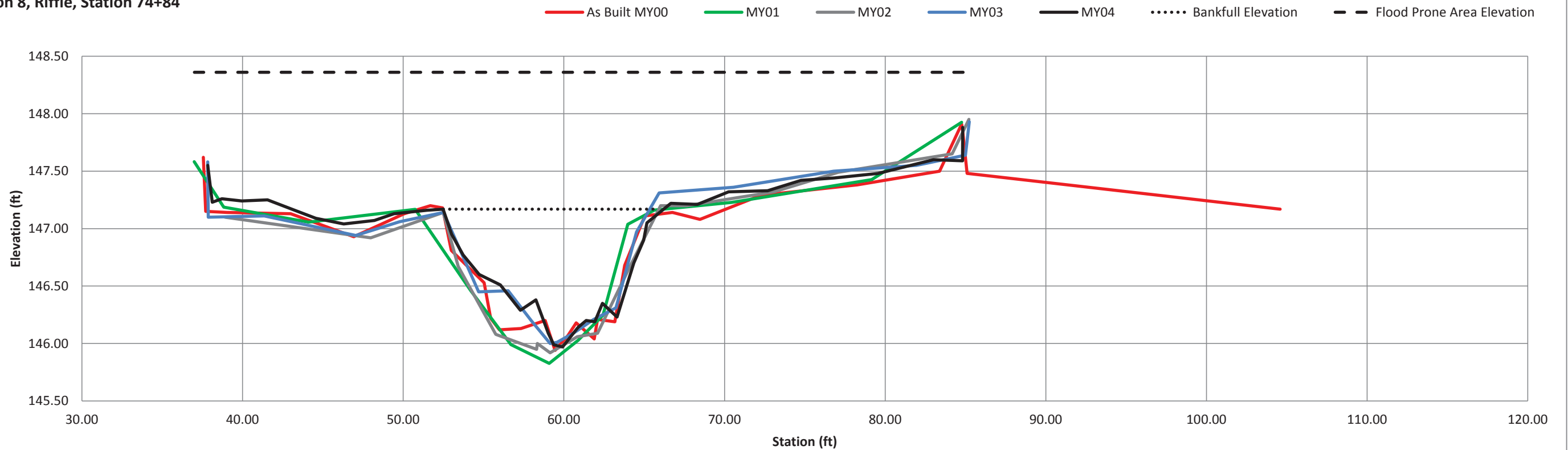
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-8, Riffle, STA 72+84
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin



MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
37.56	147.62	36.99	147.58	38.91	147.10	37.83	147.58	37.83	147.55
37.71	147.15	38.83	147.19	47.98	146.92	37.87	147.10	38.12	147.23
39.04	147.14	44.12	147.06	52.49	147.14	41.35	147.11	38.72	147.26
43.00	147.13	50.75	147.17	53.42	146.67	47.05	146.94	39.95	147.24
46.92	146.93	54.21	146.46	55.76	146.08	49.77	147.06	41.56	147.25
50.07	147.13	56.70	145.99	58.31	145.95	52.51	147.14	43.24	147.16
51.69	147.20	59.09	145.83	58.35	146.00	54.70	146.45	44.56	147.09
52.45	147.18	60.88	146.03	59.15	145.92	56.54	146.46	46.30	147.04
52.99	146.81	62.43	146.25	60.83	146.06	57.97	146.20	48.20	147.07
55.04	146.53	63.98	147.04	62.09	146.09	59.14	146.00	49.43	147.13
55.45	146.22	65.64	147.16	64.11	146.67	59.57	146.01	51.47	147.16
55.99	146.12	70.44	147.23	66.02	147.20	60.59	146.09	52.48	147.17
57.33	146.13	79.16	147.43	67.67	147.20	61.86	146.21	53.02	146.95
58.84	146.20	84.76	147.93	73.08	147.32	63.24	146.31	53.73	146.77
59.45	145.94			77.07	147.49	64.52	146.97	54.73	146.60
60.26	146.07			84.17	147.65	65.93	147.31	56.05	146.51
60.77	146.18			85.21	147.95	70.56	147.36	57.29	146.29
61.89	146.04					76.79	147.50	58.26	146.38
62.09	146.21					81.94	147.55	59.03	146.09
63.17	146.19					85.00	147.64	59.37	145.99
63.79	146.68					85.23	147.93	59.92	145.97
65.03	147.11							60.88	146.14
66.76	147.14							61.39	146.20
68.47	147.08							61.93	146.19
72.26	147.29							62.40	146.35
78.25	147.38							63.31	146.23

SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	147.20	147.17	147.14	147.14	147.17
Bankfull Cross-Sectional Area	10.81	11.37	11.08	9.16	9.50
Bankfull Width	15.10	15.24	13.31	12.71	13.72
Flood Prone Area Elevation	148.46	148.51	148.36	148.28	148.37
Flood Prone Width	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	1.26	1.34	1.22	1.14	1.20
Mean Depth at Bankfull	0.72	0.75	0.83	0.72	0.69
W/D Ratio	20.97	20.32	16.04	17.65	19.88
Entrenchment Ratio	13.25	13.12	15.03	15.74	14.58
Bank Height Ratio	1.000	1.000	1.000	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 8, Riffle, Station 74+84



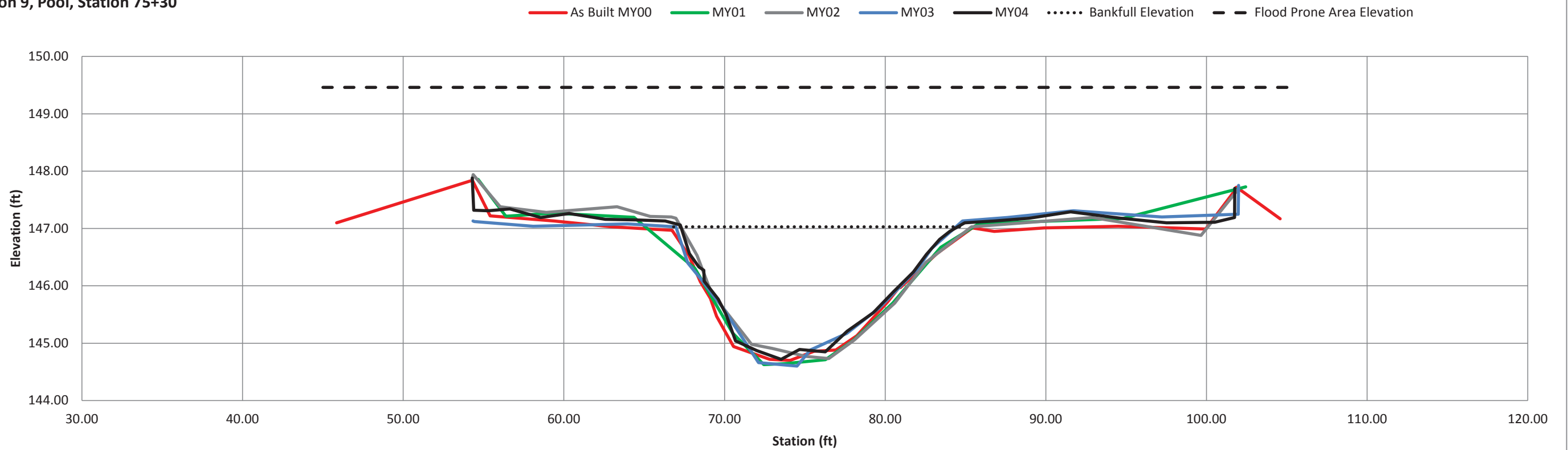
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-9, Pool, STA 75+30
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin

MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
45.86	147.10	54.66	147.86	54.29	147.85	54.34	147.13	54.30	147.88
54.31	147.84	56.39	147.21	54.35	147.94	54.42	147.12	54.39	147.32
54.32	147.83	59.30	147.27	56.03	147.38	58.09	147.04	55.29	147.31
55.41	147.22	64.36	147.19	58.91	147.28	63.94	147.08	56.64	147.34
59.39	147.13	68.17	146.30	63.31	147.38	66.98	147.03	58.55	147.19
63.00	147.03	70.50	145.18	65.38	147.21	67.71	146.40	60.34	147.26
66.74	146.97	72.44	144.63	66.68	147.20	68.55	146.11	62.58	147.16
67.78	146.53	73.73	144.64	66.98	147.18	69.87	145.63	64.42	147.15
68.50	146.07	76.28	144.71	68.29	146.53	72.12	144.66	66.30	147.13
69.12	145.78	78.01	145.05	69.18	145.88	74.51	144.60	67.25	147.06
69.51	145.47	80.48	145.70	71.69	144.98	75.34	144.88	67.82	146.56
70.56	144.94	83.46	146.67	72.96	144.91	77.61	145.17	68.40	146.33
72.81	144.72	85.82	147.08	75.08	144.77	79.65	145.62	68.71	146.27
74.08	144.70	94.80	147.17	76.49	144.73	82.02	146.30	68.73	146.08
75.57	144.86	102.44	147.73	78.10	145.06	82.88	146.65	69.61	145.77
76.93	144.88			80.59	145.70	84.81	147.13	70.10	145.50
78.23	145.13			82.55	146.41	87.59	147.19	70.69	145.04
80.13	145.71			85.37	147.03	91.72	147.31	72.00	144.87
80.85	145.97			92.90	147.19	97.22	147.20	73.52	144.72
80.94	145.97			99.66	146.88	101.97	147.25	74.67	144.89
83.22	146.56			102.00	147.69	102.00	147.75	76.27	144.85
85.42	147.01							77.63	145.21
86.79	146.95							79.25	145.53
89.91	147.01							80.53	145.90
94.51	147.04							81.75	146.24
99.95	146.99							82.57	146.55



SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	146.97	147.08	147.19	147.03	147.06
Bankfull Cross-Sectional Area	25.96	29.08	29.36	25.48	25.24
Bankfull Width	18.48	20.67	26.07	17.43	17.45
Flood Prone Area Elevation	149.24	149.53	149.55	149.46	149.40
Flood Prone Width	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	2.27	2.45	2.46	2.43	2.34
Mean Depth at Bankfull	1.40	1.41	1.13	1.46	1.45
W/D Ratio	13.20	14.66	23.07	11.94	12.03
Entrenchment Ratio	10.82	9.68	7.67	11.47	11.46
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 9, Pool, Station 75+30



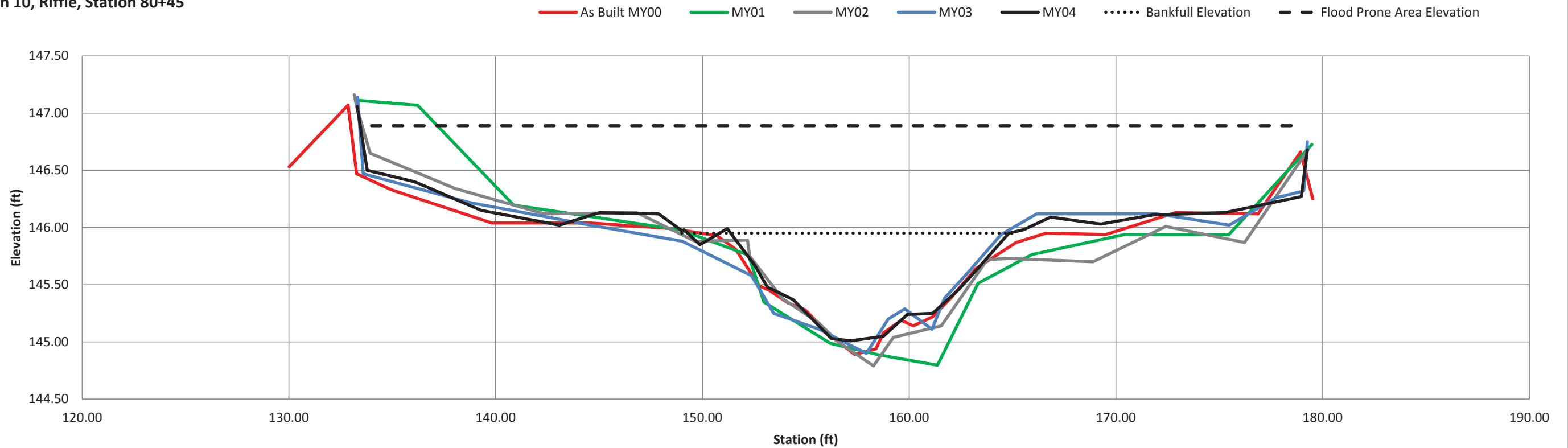
River Basin	Cape Fear River
Watershed	Jumping Run Creek
XS ID	XS-10, Riffle, STA 80+45
Drainage Area(sq. mi.)	1.2
Date	10/24/2013
Field Crew	T. Taylor, A. Baldwin



MY00		MY01		MY02		MY03		MY04	
Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation	Station	Elevation
130.01	146.53	133.23	147.11	133.16	147.16	133.32	147.14	133.30	147.06
132.86	147.07	136.23	147.07	133.27	147.06	133.59	146.47	133.79	146.50
133.28	146.47	140.87	146.20	133.93	146.65	138.70	146.22	136.09	146.40
134.96	146.33	148.97	145.98	138.04	146.34	144.59	146.02	139.30	146.15
139.81	146.04	152.23	145.76	142.36	146.12	149.02	145.88	143.08	146.02
144.59	146.04	152.97	145.35	146.82	146.13	152.37	145.58	145.03	146.13
148.52	145.99	156.19	144.99	149.64	145.88	153.45	145.25	147.88	146.12
150.69	145.93	158.49	144.89	152.18	145.89	155.66	145.11	149.03	145.97
151.61	145.81	161.37	144.80	152.29	145.75	157.93	144.90	149.11	145.98
152.74	145.49	163.33	145.51	153.86	145.38	158.99	145.20	149.88	145.85
153.24	145.45	165.95	145.77	155.60	145.17	159.79	145.29	151.20	145.99
154.14	145.34	170.43	145.94	156.57	145.00	161.10	145.11	152.53	145.67
154.97	145.28	175.46	145.94	158.28	144.79	161.70	145.38	153.14	145.48
156.22	145.05	179.48	146.73	159.24	145.04	162.81	145.60	154.39	145.37
157.37	144.89			161.55	145.14	164.45	145.94	156.23	145.03
158.39	144.94			163.77	145.72	166.17	146.12	157.17	145.01
158.76	145.08			164.82	145.73	169.86	146.12	158.75	145.05
159.62	145.19			168.89	145.70	171.97	146.12	159.91	145.24
160.20	145.14			172.41	146.01	175.48	146.02	161.14	145.25
161.14	145.22			176.22	145.87	177.74	146.26	162.41	145.46
162.05	145.39			179.29	146.68	179.08	146.32	163.36	145.65
163.22	145.64					179.26	146.75	164.82	145.95
165.17	145.87							165.53	145.98
166.62	145.95							166.84	146.09
169.52	145.94							169.26	146.03
172.89	146.13							171.79	146.11

SUMMARY DATA	MY00	MY01	MY02	MY03	MY04
Bankfull Elevation	145.87	145.76	145.73	145.88	145.95
Bankfull Cross-Sectional Area	7.41	8.10	6.04	7.82	7.98
Bankfull Width	14.02	13.61	12.45	15.14	14.99
Flood Prone Area Elevation	146.85	146.72	146.67	146.86	146.89
Flood Prone Width	103.50	41.41	45.35	50.00	50.00
Max Depth at Bankfull	0.98	0.96	0.94	0.98	0.94
Mean Depth at Bankfull	0.53	0.59	0.36	0.52	0.53
W/D Ratio	26.45	23.07	34.58	29.12	28.28
Entrenchment Ratio	7.38	3.04	3.64	3.30	3.34
Bank Height Ratio	1.00	1.00	1.0	1.0	1.0
Stream Type	C	C	C	C	C

UT to Jumping Run Creek, Reach UT1B
X-Section 10, Riffle, Station 80+45



UT to Jumping Run Creek, Reach UT1B
Longitudinal Profile, Year 04, STA 47+45 to 82+10

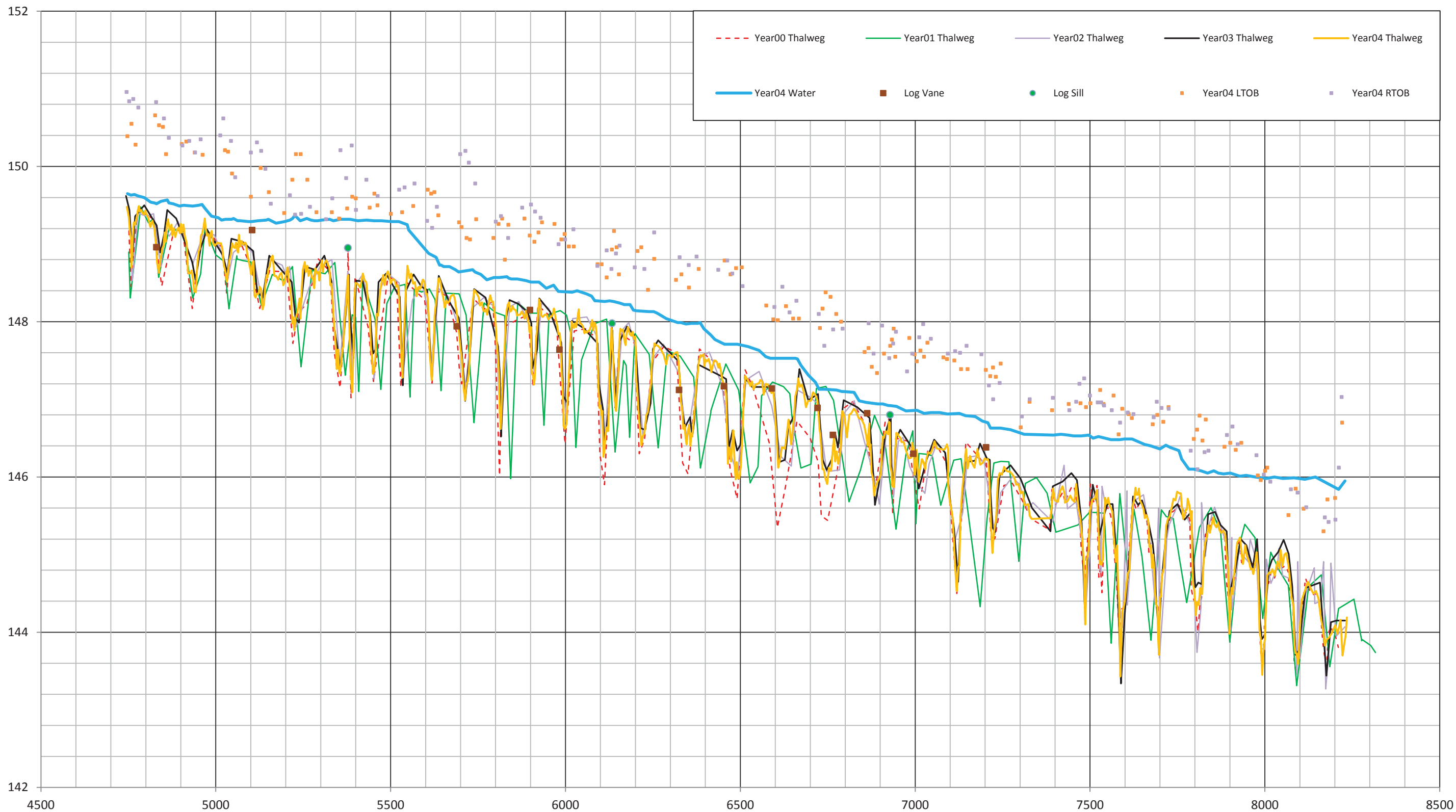


Table 10a. Baseline Stream Data Summary
 UT to Jumping Run Creek Stream and Wetland Restoration Project / EEP No.92345 - UT1b (4500 feet)

Parameter	Gauge ²	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring Baseline					
		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD ⁵	n
Dimension and Substrate - Riffle Only																									
Bankfull Width (ft)					12.10	15.23	13.01	20.55	3.95	5	-	-	-	-	-	-	-	13.4	-	14.02	15.98	15.75	18.48	1.32	8
Floodprone Width (ft)					15.59	18.68	17.51	23.94	3.62	5	-	-	-	-	-	-	-	100+	-	103.50	187.94	200.00	200.00	34.12	8
Bankfull Mean Depth (ft)					0.54	0.77	0.86	0.94	0.19	5	-	-	-	-	-	-	-	0.9	-	0.53	0.82	0.75	1.40	0.26	8
¹ Bankfull Max Depth (ft)					0.87	1.18	1.17	1.45	0.25	5	-	-	-	-	-	-	-	1.1	-	0.98	1.35	1.25	2.27	0.39	8
Bankfull Cross Sectional Area (ft ²)					10.97	11.23	11.13	11.80	0.33	5	7.80	51.85	51.85	95.90	-	2	-	12.0	-	7.41	13.35	11.74	25.96	5.48	8
Width/Depth Ratio					12.47	21.84	15.20	37.78	11.53	5	8.00	11.00	11.00	14.00	-	2	-	15.0	-	13.20	20.53	20.94	26.45	3.97	8
Entrenchment Ratio					1.13	1.25	1.29	1.35	0.09	5	4.00	8.50	8.50	13.00	-	2	8.0	10.0	12.0	7.35	12.85	12.53	21.58	4.00	8
¹ Bank Height Ratio					2.94	4.14	4.29	5.45	0.95	5	1.00	1.15	1.15	1.30	-	2	-	1.0	-	1	1	1	1	0	8
Profile																									
Riffle Length (ft)					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31.399	49.709	48.08305	78.4581	11.12	32
Riffle Slope (ft/ft)					-	-	-	-	-	-	-	-	-	-	-	-	0.001	0.003	0.005	0.0002	0.4671	0.005	6	1.662	13
Pool Length (ft)					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	27.7	59.89	61.4	96	18.34	30
Pool Max depth (ft)					-	-	-	-	-	-	-	-	-	-	-	-	-	1.9	-	0.865	1.4959	1.572	2.395	0.391	30
Pool Spacing (ft)					-	-	-	-	-	-	-	-	-	-	-	-	38	61.5	85	79	106.48	104	143	17.09	29
Pattern																									
Channel Beltwidth (ft)					-	-	-	-	-	-	-	-	-	-	-	-	38	79.0	120	40.15	70.42	69.35	96.96	13.68	26.00
Radius of Curvature (ft)					-	-	-	-	-	-	-	-	-	-	-	-	30	40.0	50	32.49	41.47	39.95	55.87	6.35	30.00
Rc:Bankfull width (ft/ft)					-	-	-	-	-	-	1.5	-	2.25	3	-	-	2	2.8	3.5	2.32	2.59	2.54	3.02	-	-
Meander Wavelength (ft)					-	-	-	-	-	-	-	-	-	-	-	-	70	120	170	152.37	179.88	176.05	228.52	23.44	14.00
Meander Width Ratio					-	-	-	-	-	-	2	-	4.15	6.3	-	-	3.5	5.8	8	2.86	4.41	4.40	5.25	-	-
Transport parameters																									
Reach Shear Stress (competency) lb/ft ²																				0.03				0.056	
Max part size (mm) mobilized at bankfull																				-				-	
Stream Power (transport capacity) W/m ²																				0.026				0.69	
Additional Reach Parameters																									
Rosgen Classification																									
Bankfull Velocity (fps)																									
Bankfull Discharge (cfs)																									
Valley length (ft)																									
Channel Thalweg length (ft)																									
Sinuosity (ft)																									
Water Surface Slope (Channel) (ft/ft)																									
BF slope (ft/ft)																									
³ Bankfull Floodplain Area (acres)																									
⁴ % of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

**Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
UT to Jumping Run Creek Stream and Wetland Restoration / EEP No. 92345 - UT1b (4500 feet)**

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							As-built/Baseline						
¹ Ri% / Ru% / P% / G% / S%	-	0	-	0	0			-	-	-	-	-			-	-	-	-	-			52	-	48	-	-		
¹ SC% / Sa% / G% / C% / B% / Be%	0	33	67	0	0	0		0	100	0	0	0	0															
¹ d16 / d35 / d50 / d84 / d95 / di ^p / di ^{sp} (mm)	0.14	0.26	0.5	4.4	7.3	-	30	0.3	0.4	0.5	0.9	1.2	-	-														
² Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10	-	-	-	-	-			-	-	-	-	-																
³ Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0	-	-	-	-				-	-	-	-																	

Shaded cells indicate that these will typically not be filled in.

1 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave

2 = Entrenchment Class - Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as visual estimates

3 = Assign/bin the reach footage into the classes indicated and provide the percentage of the total reach footage in each class in the table. This will result from the measured cross-sections as well as the longitudinal profile

Footnotes 2,3 - These classes are loosely built around the Rosgen classification and hazard ranking breaks, but were adjusted slightly to make for easier assignment to somewhat coarser bins based on visual estimates in the field such that measurement of every segment for ER would not be necessary.

The intent here is to provide the reader/consumer of design and monitoring information with a good general sense of the extent of hydrologic containment in the pre-existing and the rehabilitated states as well as comparisons to the reference distributions.

ER and BHR have been addressed in prior submissions as a subsample (cross-sections as part of the design survey), however, these subsamples have often focused entirely on facilitating design without providing a thorough pre-construction distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable section of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)

Project Name/Number (UT Jumping Run Creek) Segment/Reach: UT1b (4500 feet)

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Pool)							Cross Section 5 (Riffle)											
Based on fixed baseline bankfull elevation¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+					
Record elevation (datum) used	150.47	150.46	150.48	150.46	150.47			150.58	150.36	150.35	150.51	150.40			149.75	149.78	149.68	149.62	149.86			149.34	149.32	149.29	149.15	149.36			149.02	149.07	148.99	148.89	148.89							
Bankfull Width (ft)	15.60	15.35	15.60	16.99	14.61			19.33	17.03	17.56	18.53	16.77			15.50	16.16	15.00	15.90	15.86			18.22	17.38	19.25	17.90	17.99			15.90	15.64	12.84	12.22	14.83							
Floodprone Width (ft)	200+	200+	200+	200+	200+			200+	200+	200+	200+	200+			200+	200+	200+	200+	200+			200+	200+	200+	200+	200+			200+	200+	200+	200+	200+							
Bankfull Mean Depth (ft)	0.83	0.79	0.80	0.75	0.83			1.12	1.01	0.89	1.00	1.00			0.76	0.76	0.71	0.62	0.78			1.23	1.17	1.08	1.20	1.16			0.74	0.76	0.86	0.84	0.66							
Bankfull Max Depth (ft)	1.31	1.28	1.30	1.37	1.26			2.25	2.02	1.81	2.27	1.92			1.14	1.19	1.11	1.16	1.24			2.20	2.24	2.12	2.34	2.27			1.41	1.34	1.36	1.52	1.29							
Bankfull Cross Sectional Area (ft ²)	12.90	13.16	12.52	12.74	12.12			21.57	17.26	15.57	18.60	16.78			11.71	13.91	10.69	9.88	12.29			22.42	20.32	20.78	21.47	20.95			11.69	11.94	11.05	10.25	9.80							
Bankfull Width/Depth Ratio	18.73	19.43	19.50	22.65	17.60			17.26	16.86	17.13	18.53	16.77			20.90	21.26	21.13	25.65	20.33			14.81	14.85	17.82	14.92	15.51			21.49	20.58	14.93	14.55	22.47							
Bankfull Entrenchment Ratio	12.86	13.03	12.82	11.77	13.69			10.35	11.74	11.56	10.79	11.93			12.91	12.38	13.33	12.58	12.61			10.98	11.51	10.39	11.17	11.11			21.58	12.79	15.58	16.37	13.49							
Bankfull Bank Height Ratio	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00							
Cross Sectional Area between end pins (ft ²)	16.50	17.00	17.25	17.50				26.30	26.50	26.70					21.70	22.10	21.85										32.10	32.50	33.15					19.00	19.10	18.50				
d50 (mm)																																								
	Cross Section 6 (Riffle)							Cross Section 7 (Riffle)							Cross Section 8 (Riffle)							Cross Section 9 (Riffle)							Cross Section 10 (Riffle)											
Based on fixed baseline bankfull elevation¹	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+					
Record elevation (datum) used	148.61	148.58	148.49	148.51	148.55			148.09	148.13	148.06	148.00	148.11			147.20	147.17	147.14	147.14	147.17			146.97	147.08	147.19	147.03	147.06			145.87	145.76	145.73	145.88	145.95							
Bankfull Width (ft)	16.39	17.17	15.90	20.32	15.38			16.87	15.72	14.91	13.36	14.79			15.10	15.24	13.31	12.71	13.72			18.48	20.67	26.07	17.43	17.45			14.02	13.61	12.45	15.14	14.99							
Floodprone Width (ft)	200+	200+	200+	200+	200+			200+	200+	200+	200+	200+			200+	200+	200+	200+	200+			200+	200+	200+	200+	200+			103.50	41.41	45.35	50+	50+							
Bankfull Mean Depth (ft)	0.89	0.80	0.76	0.72	0.88			0.70	0.77	0.73	0.75	0.74			0.72	0.75	0.83	0.72	0.69			1.40	1.41	1.13	1.46	1.45			0.53	0.59	0.36	0.52	0.53							
Bankfull Max Depth (ft)	1.23	1.20	1.14	1.30	1.25			1.21	1.27	1.21	1.29	1.19			1.26	1.34	1.22	1.14	1.20			2.27	2.45	2.46	2.43	2.34			0.98	0.96	0.94	0.98	0.94							
Bankfull Cross Sectional Area (ft ²)	14.51	13.74	12.05	14.64	13.48			11.77	12.18	10.95	10.08	10.97			10.81	11.37	11.08	9.16	9.50			25.96	29.08	29.36	25.48	25.24			7.41	8.10	6.04	7.82	7.98							
Bankfull Width/Depth Ratio	18.42	21.46	20.92	28.22	17.48			24.10	20.42	20.42	17.81	19.99			20.97	20.32	16.04	17.65	19.88			13.20	14.66	23.07	11.94	12.03			26.45	23.07	34.58	29.12	28.28							
Bankfull Entrenchment Ratio	12.20	11.65	12.58	9.84	13.00			11.86	12.72	13.41	14.97	13.52			13.25	13.12	15.03	15.74	14.58			10.82	9.68	7.67	11.47	11.45			7.35	3.04	3.64	3.30	3.34							
Bankfull Bank Height Ratio	1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00			1.00	1.00	1.00	1.00	1.00							
Cross Sectional Area between end pins (ft ²)	24.30	24.50	24.00					13.10	13.40	13.25					17.20	17.60	16.85										40.10	42.10	43.65					85.50	86.10	85.05				
d50 (mm)																																								

¹ = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

**Exhibit Table 11b. Monitoring Data - Stream Reach Data Summary
UT to Jumping Run Creek/EEP No. 92345 - UT1b (3661 feet)**

Parameter	Baseline						MY-1*						MY-2*						MY-3**						MY-4***						MY-5					
	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n	Min	Mean	Med	Max	SD ⁴	n
Dimension and Substrate - Riffle only																																				
Bankfull Width (ft)	14.02	15.983	15.75	18.48	1.3206	8	14.02	15.983	15.75	19	1.32	8	12.45	15.76	14.955	26.07	4.361	8	12.22	15.51	15.52	20.32	2.74	8	13.72	15.20	14.91	17.45	1.1	8						
Floodprone Width (ft)	103.5	187.94	200	200	34.118	8	103.5	187.94	200	200	34.12	8	45.35	177.91	200	200	58.452	8	50+	181.3	200+	200+	53	8	50+	181.3	200+	200+	53	8						
Bankfull Mean Depth (ft)	0.53	0.8213	0.75	1.4	0.2563	8	0.53	0	0.75	1.4	0.26	8	0.36	0.7814	0.815	149.87	0.2277	8	0.52	0.80	0.74	1.46	0.28	8	0.53	0.82	0.76	1.45	0.28	8						
¹ Bankfull Max Depth (ft)	0.98	1.3513	1.245	2.27	0.3918	8	0.98	0.83	1.27	2.28	0.39	8	0.94	1.3757	1.26	149.93	0.4964	8	0.98	1.40	1.30	2.43	0.45	8	0.94	1.34	1.25	2.34	0.42	8						
Bankfull Cross Sectional Area (ft ²)	7.41	13.345	11.74	25.96	5.4803	8	7.41	13.345	11.74	25.96	5.49	8	6.04	13.293	11.565	148.73	7.3972	8	7.82	12.51	10.17	25.48	5.66	8	7.98	12.67	11.55	25.24	5.38	8						
Width/Depth Ratio	13.2	20.533	20.935	26.45	3.9725	8	13.2	20.533	20.935	26.45	3.96	8	14.93	21.352	20.673	149.75	6.4807	8	11.94	20.95	20.23	29.12	6.41	8	12.03	19.76	19.94	28.28	4.63	8						
Entrenchment Ratio	7.35	12.854	12.53	21.58	4.0027	8	7.36	13	12.6	21.58	4.00	8	3.6426	11.533	13.117	149.86	4.3207	8	3.30	12.01	12.18	16.37	4.19	8	3.34	11.96	13.25	14.58	3.6	8						
¹ Bank Height Ratio	1	1	1	1	0	8	1	1	1	1	0.00	8	1	1	1	1	0	8	1.00	1.00	1.00	1.00	0.00	8	1.00	1.00	1.00	1.00	0	8						
Profile																																				
Riffle Length (ft)	31.399	49.709	48.083	78.458	11.125	32	31.399	49.8	48.083	78.458	11.12	32	30	50	48	79	11.26	32	2.54	31.89	30.575	68.68	17.5	26	14.58	48.84	55.65	68.9	17.1	14						
Riffle Slope (ft/ft)	0.0002	0.4671	0.0050	6.0000	1.6624	13	0.0002	0.4671	0.0050	6.0000	1.6624	13	0.0002	0.4623	0.0048	5.5200	1.7500	13	0.0003	0.0017	0.0017	0.0059	0.001	19	0.001	0.003	0.002	0.01	0.002	14						
Pool Length (ft)	27.7	59.89	61.4	96	18.339	30	27.7	59.89	61.4	96	18.34	30	28.1	58.7	60.4	94.3	18.14	30	12.53	32.33	32.915	55.6	11	34	20.9	44.96	45.67	65.7	14.9	15						
Pool Max depth (ft)	0.87	1.50	1.57	2.40	0.39	30	0.87	1.60	1.59	2.60	0.39	30	0.90	1.64	1.58	2.77	0.41	30	1.7	2.148	2.04	3.39	0.37	35	1.68	2.30	2.30	3.42	0.40	35						
Pool Spacing (ft)	79	106.48	104	143	17.089	29	79	106.48	104	143	17.09	29	78.4	105.8	104.7	144.2	17.18	29	77.33	107	103.7	161.69	20	32	75.27	107.4	103.9	143	18.8	31						
Pattern																																				
Channel Beltwidth (ft)	40.15	70.418	69.349	96.958	13.679	26																														
Radius of Curvature (ft)	32.491	41.465	39.95	55.871	6.3477	30																														
Rc:Bankfull width (ft/ft)	2.3175	2.5944	2.5365	3.0233	-	-																														
Meander Wavelength (ft)	152.37	179.88	176.05	228.52	23.435	14																														
Meander Width Ratio	2.8638	4.406	4.4031	5.2466	-	-																														
Additional Reach Parameters																																				
Rosgen Classification	C5						C5						C5						C5						C5											
Channel Thalweg length (ft)	3471						3471						3471						3471						3471											
Sinuosity (ft)	1.2						1.2						1.2						1.2						1.2											
Water Surface Slope (Channel) (ft/ft)	0.00124						0.00126						0.00126						0.00126						0.00113											
BF slope (ft/ft)	0.00137						0.00137						0.00137						0.0014						0.00134											
³ Ri% / Ru% / P% / G% / S%	52	0	48	0	0		52	0	48	0	0		52	0	48	0	0		52	0	48	0	0		52	0	48	0	0							
³ SC% / Sa% / G% / C% / B% / Be%																																				
³ d16 / d35 / d50 / d84 / d95 /																																				
² % of Reach with Eroding Banks	-						-						-						-						-											
Channel Stability or Habitat Metric	-						-						-						-						-											
Biological or Other	-						-						-						-						-											

Shaded cells indicate that these will typically not be filled in.
 1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
 2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
 3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
 4. = Of value/needed only if the n exceeds 3
 *Low flow as a result of dry conditions. Water surface data was insufficient.
 **Recent rainfall resulted in high stream flow causing high water surface data.
 ***Beaver Dam downstream in woods resulted in exaggerated water surface in lower section. Remnant dam upstream resulted in exaggerated elevations upstream.

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Appendix E. Hydrology Data

Table 12	– Verification of Bankfull Events
Figure 5	– Monthly Rainfall Data
Figures 6a-p	– Precipitation and Water Level Plots
Table 13	– Wetland Hydrology Criteria Attainment

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Table 12 - Verification of Bankfull Events			
UT to Jumping Run Creek Stream and Wetland Restoration Project - EEP Project No. 92345			
Date of Data Collection	Date of Occurrence	Method	Photo
9/4/2013	Unknown	Crest Gauge 1 and Sediment on Vegetation	E1 and E2

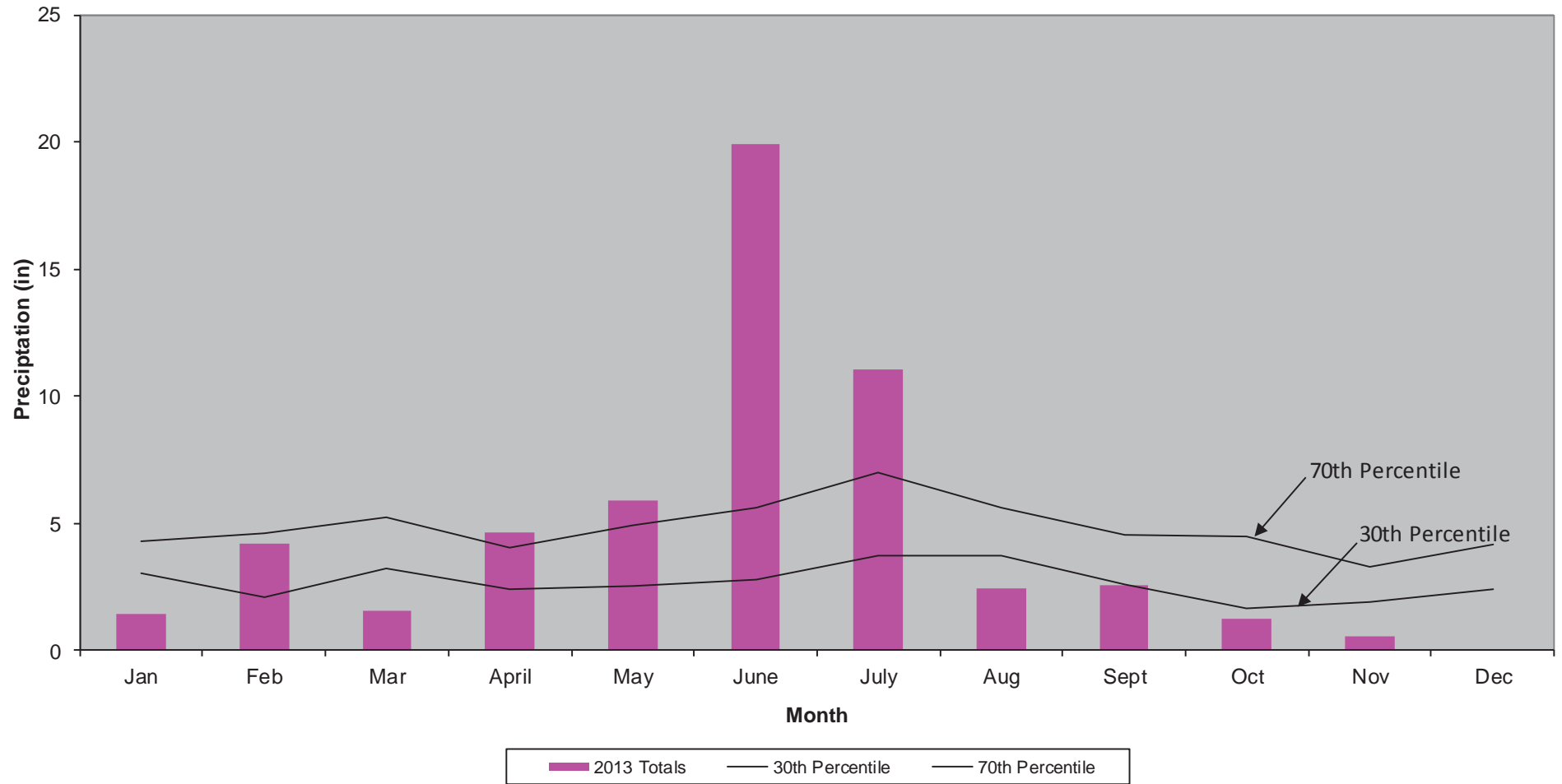


E1 – Crest gauge 1 with cork observed above the bankfull line

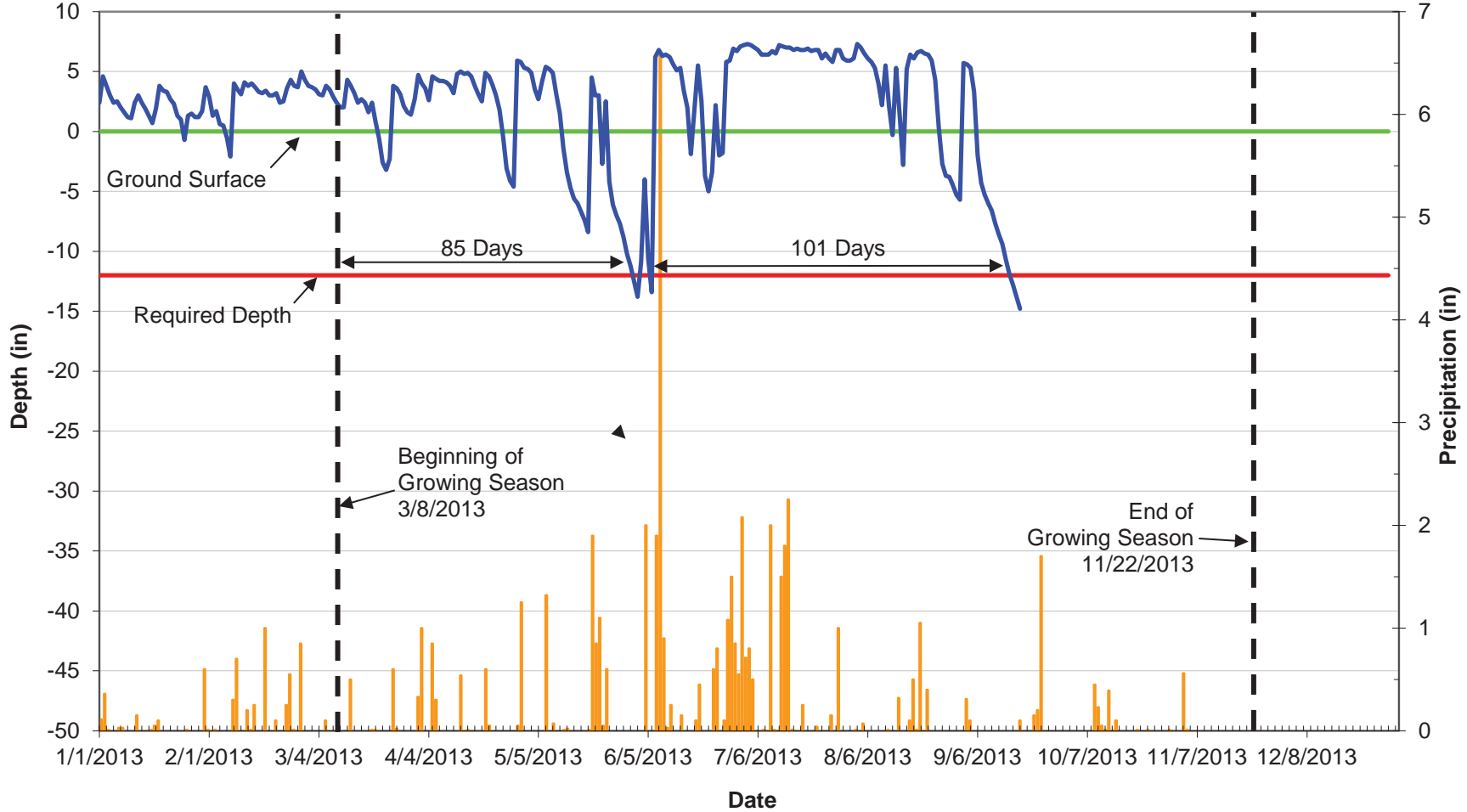


E2 – Water stained vegetation in the vicinity of crest gauge 1

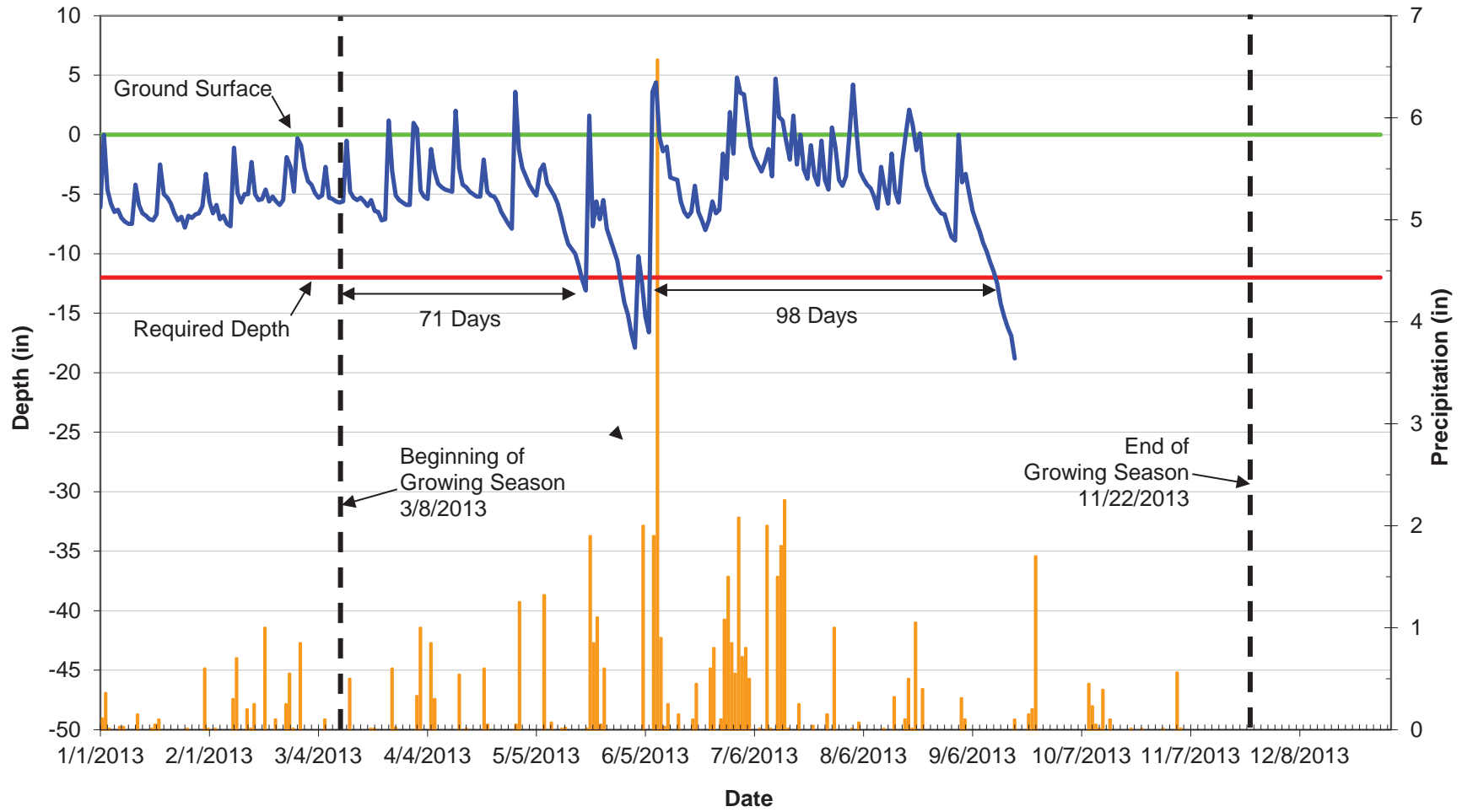
UT to Jumping Run Creek 2013 30-70 Percentile Graph
Cumberland County, North Carolina



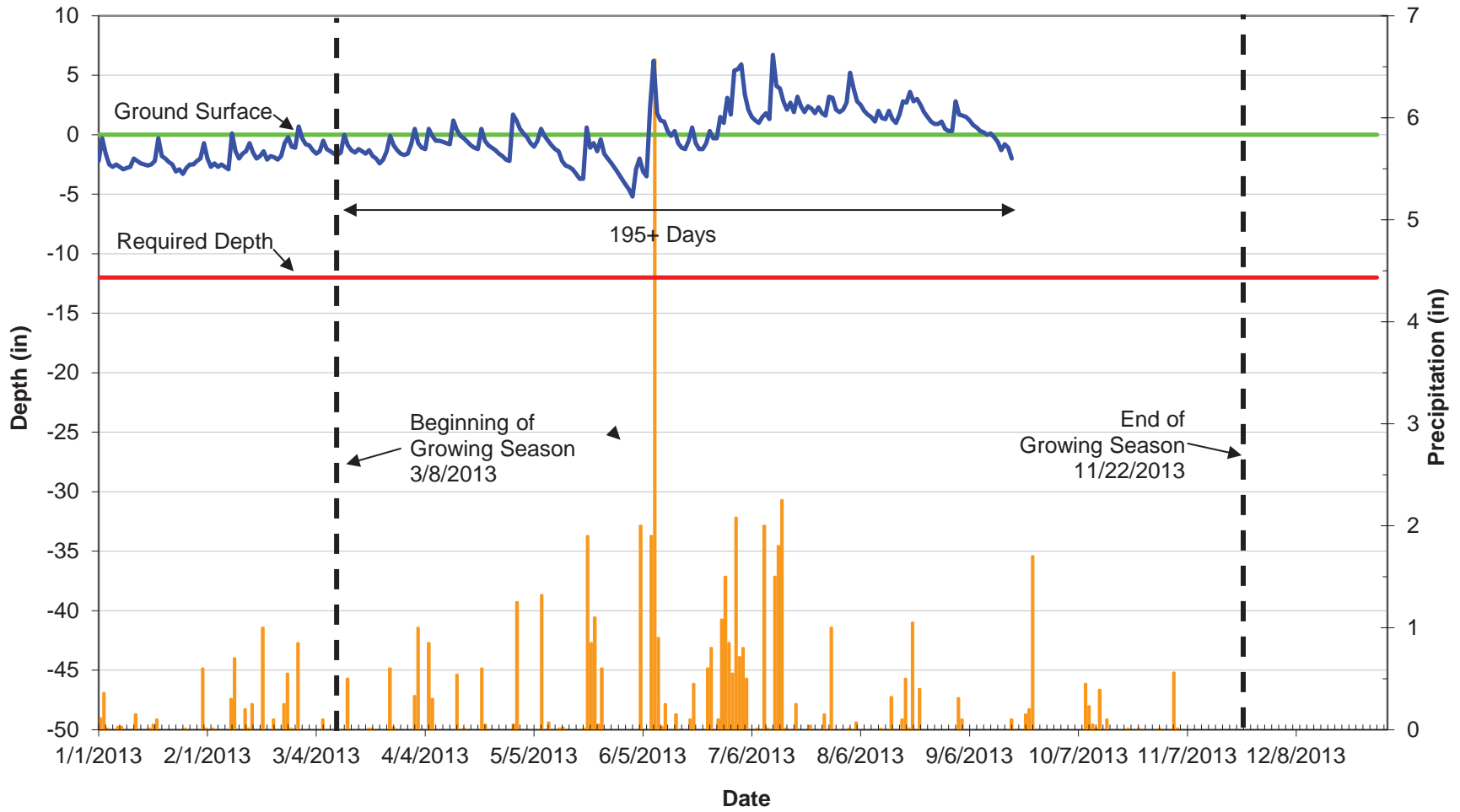
2013 Groundwater Data
Well UTJRC-1 (SN: 13D4CF6A)
Old Well SN: 000009BEBD4E Replaced 9/18/2013



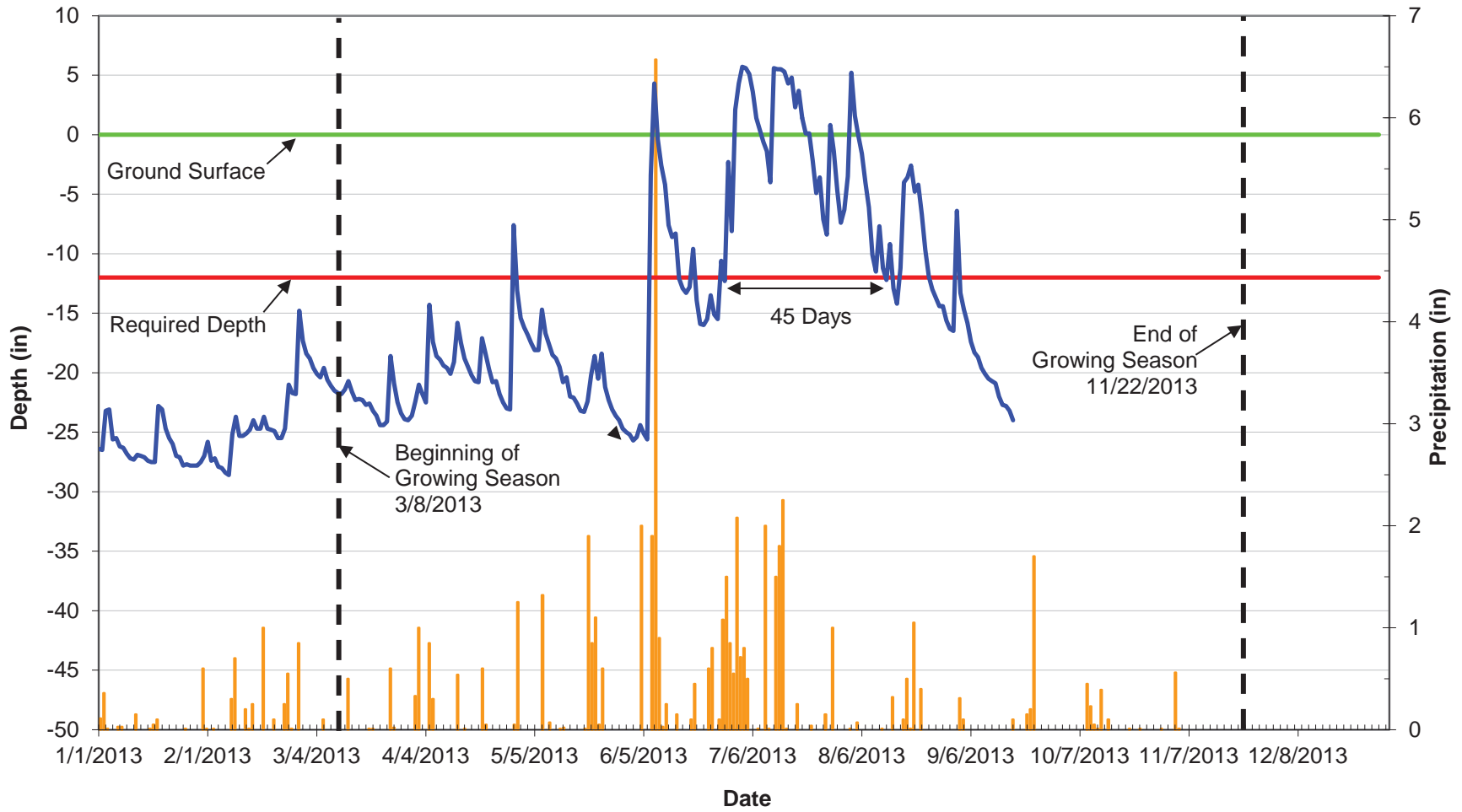
2013 Groundwater Data Well UTJRC-2 (SN: 0000B651828)



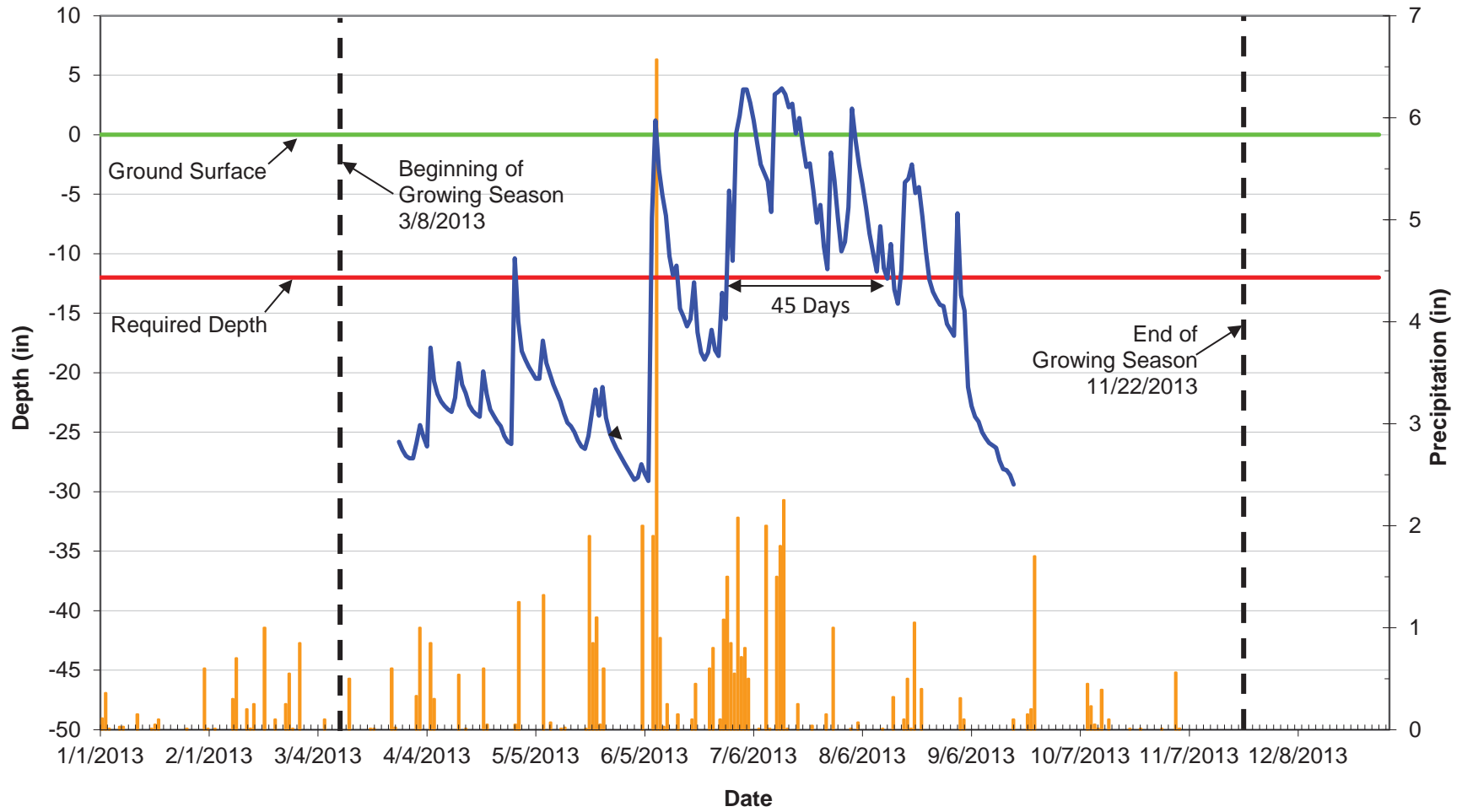
2013 Groundwater Data
Well UTJRC-3 (SN: 000009DE7442)



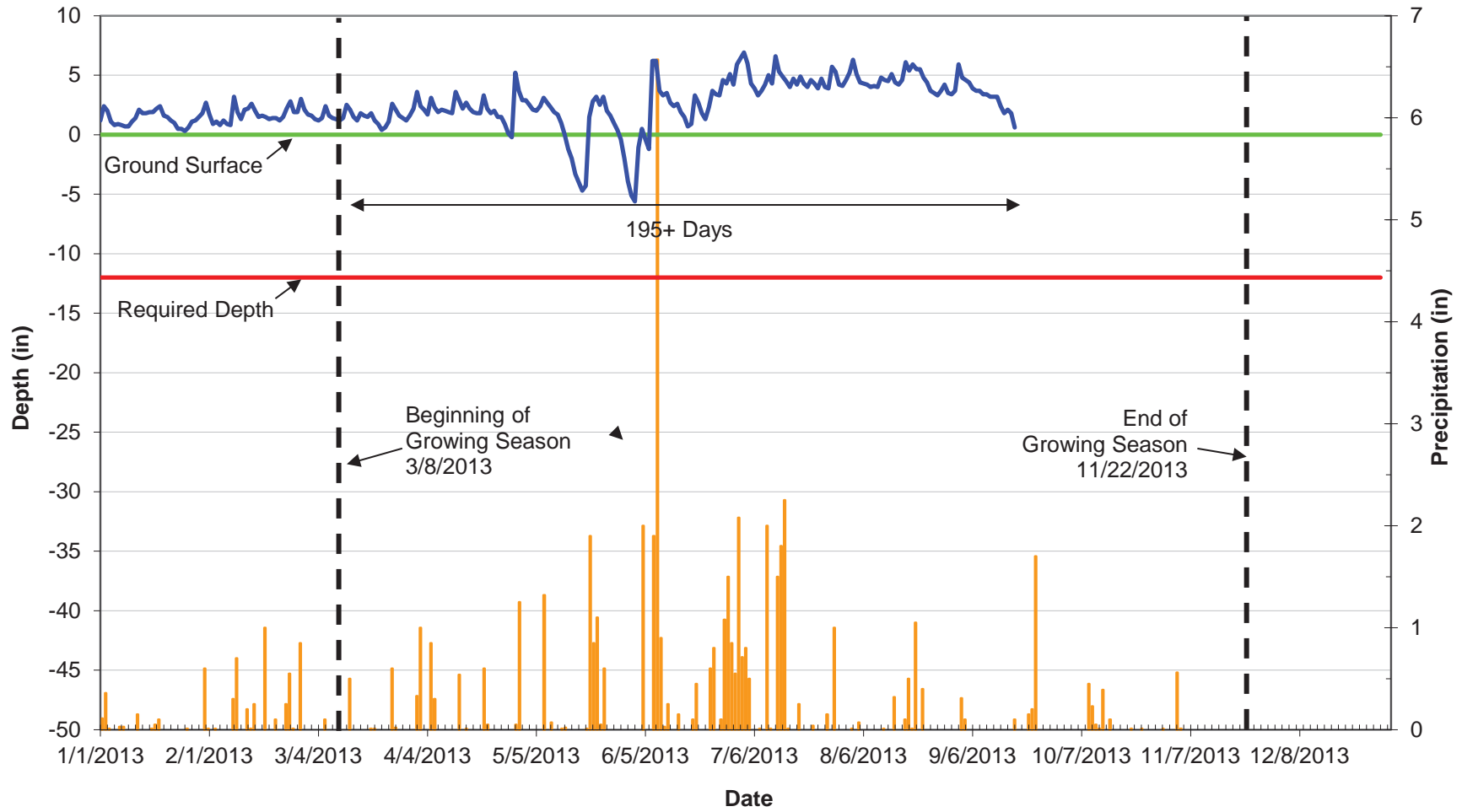
2013 Groundwater Data Well UTJRC-4 (SN: 000011313B9E)



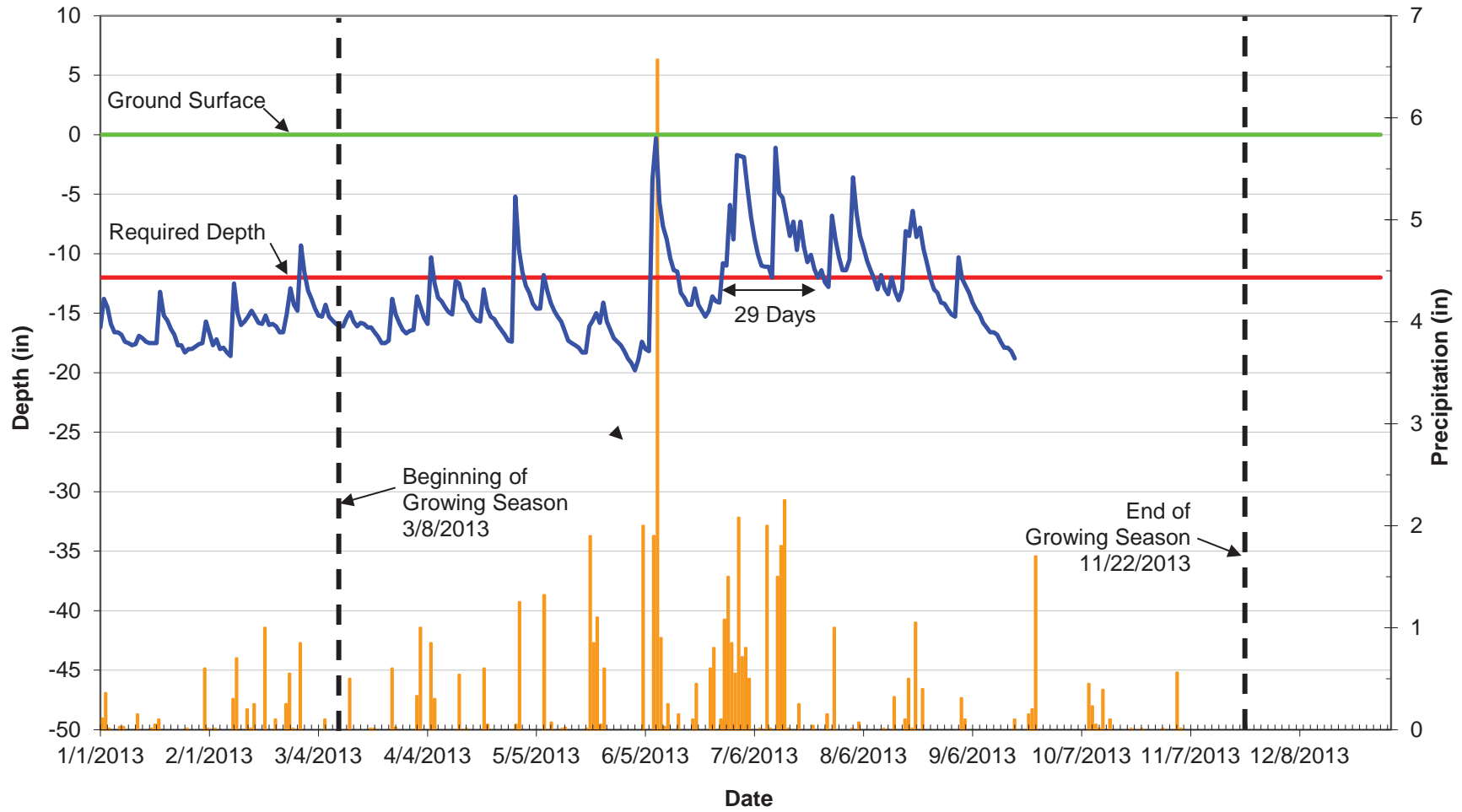
2013 Groundwater Data
Well UTJRC-4A (SN: 00000EBD3CA9)*
*Old Well SN: 000009BEA426 Replaced 9/4/2013



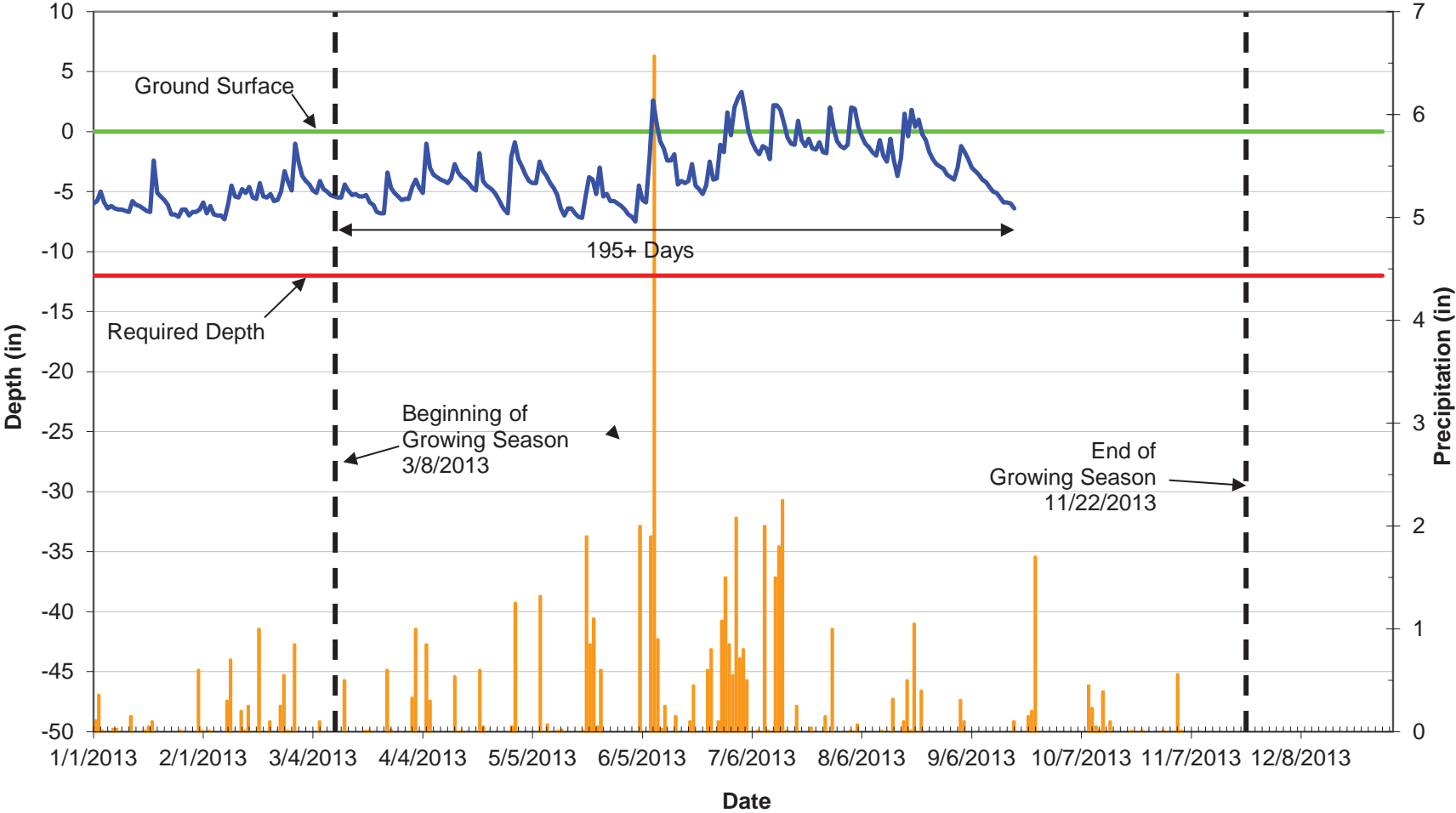
2013 Groundwater Data Well UTJRC-5 (SN: 0000B6522F0)



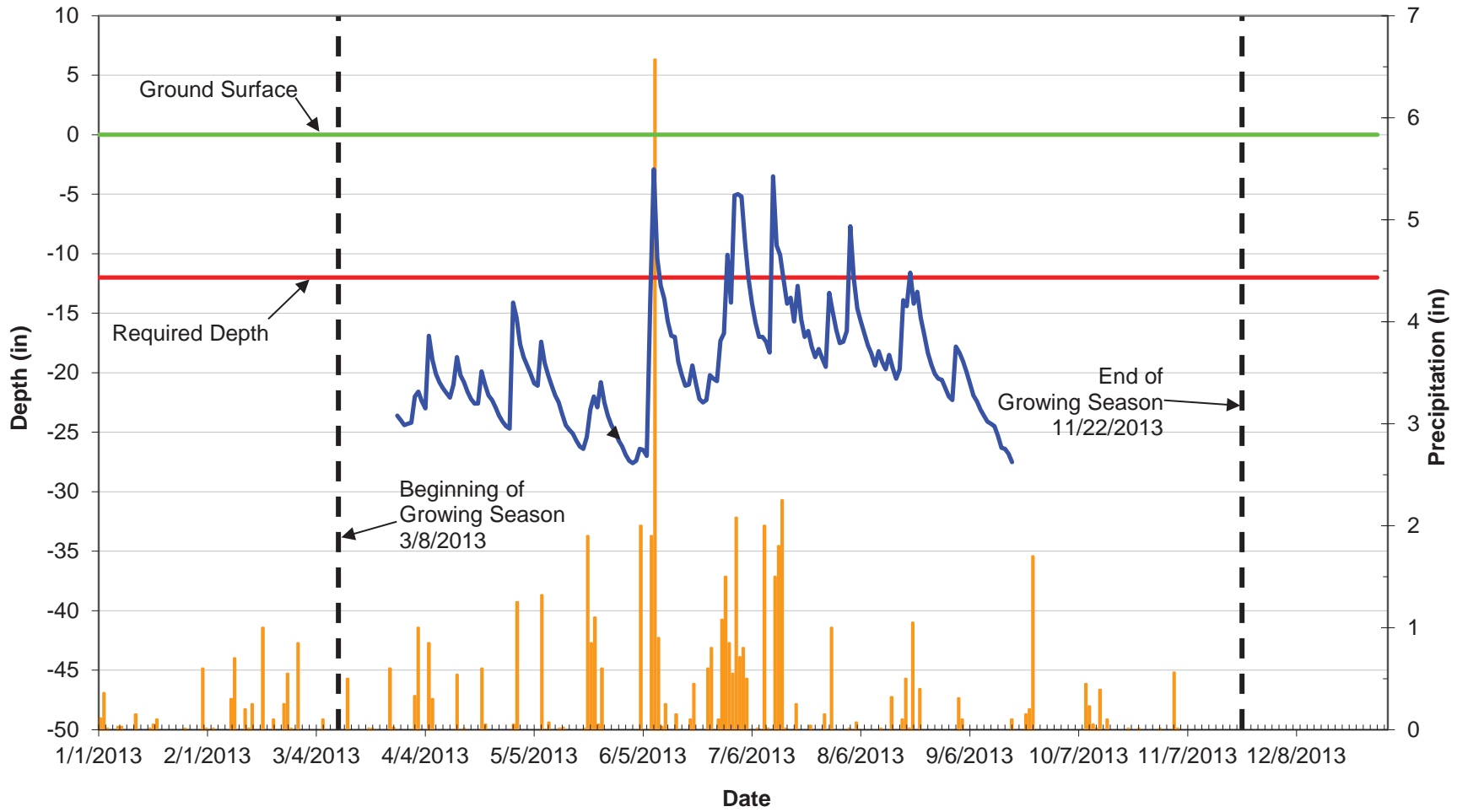
2012 Groundwater Data Well UTJRC-6 (SN: 0000138BBE22)



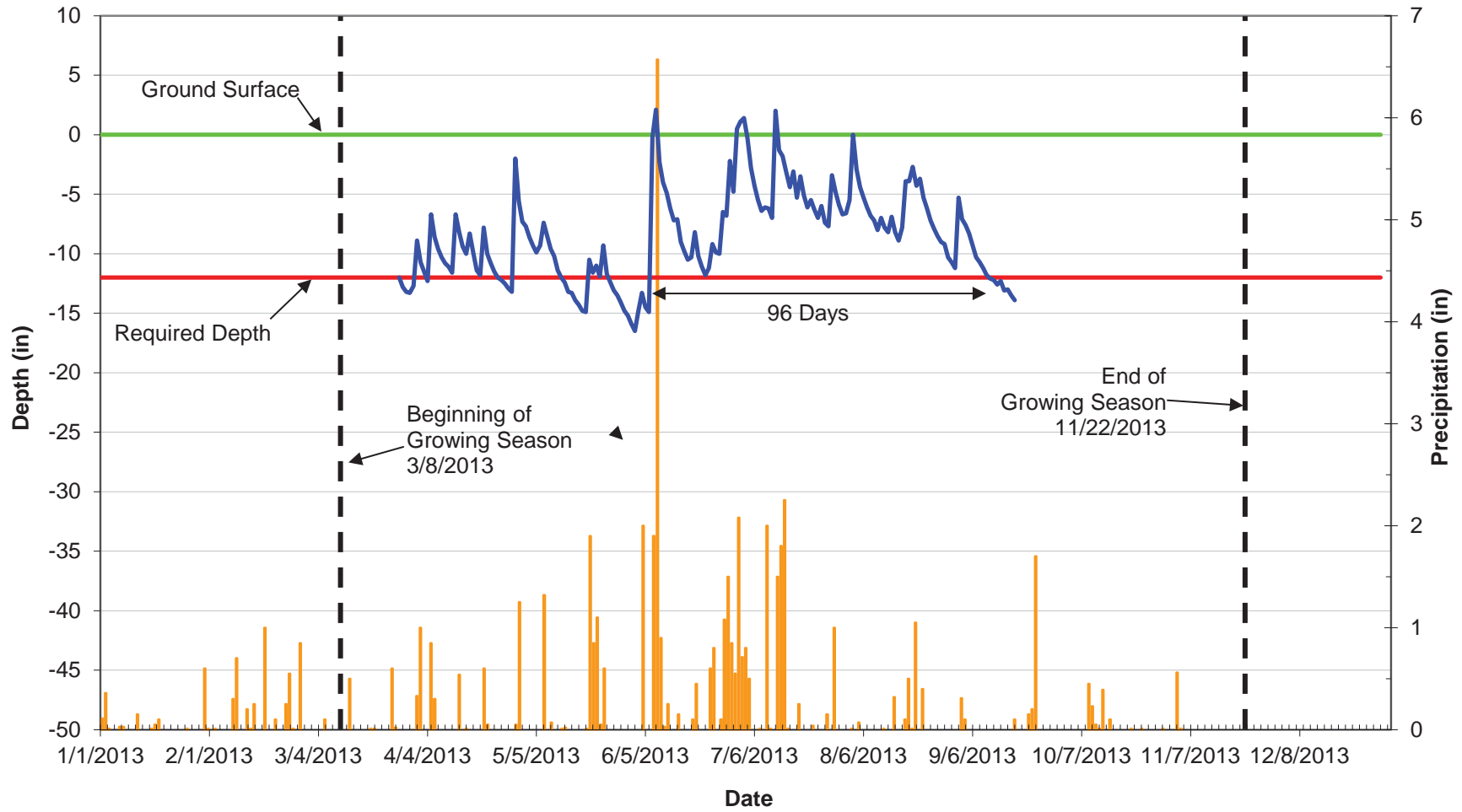
2013 Groundwater Data
Well UTJRC-6A (SN: EBDBABC)



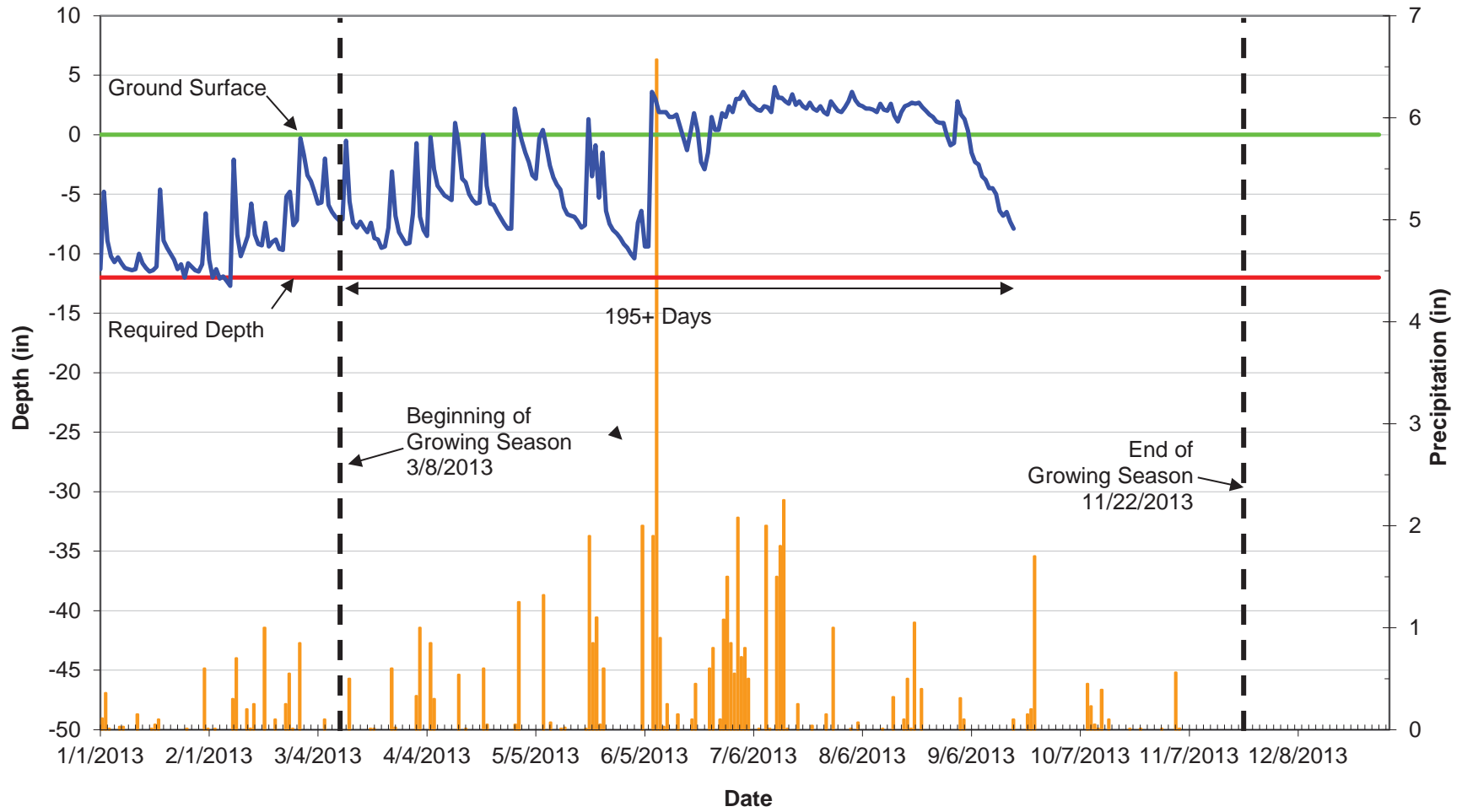
2013 Groundwater Data
Well UTJRC-6B* (SN: EBDC7A3)
*Well Replaced 3/26/13 Old Well SN: EBD2B2A



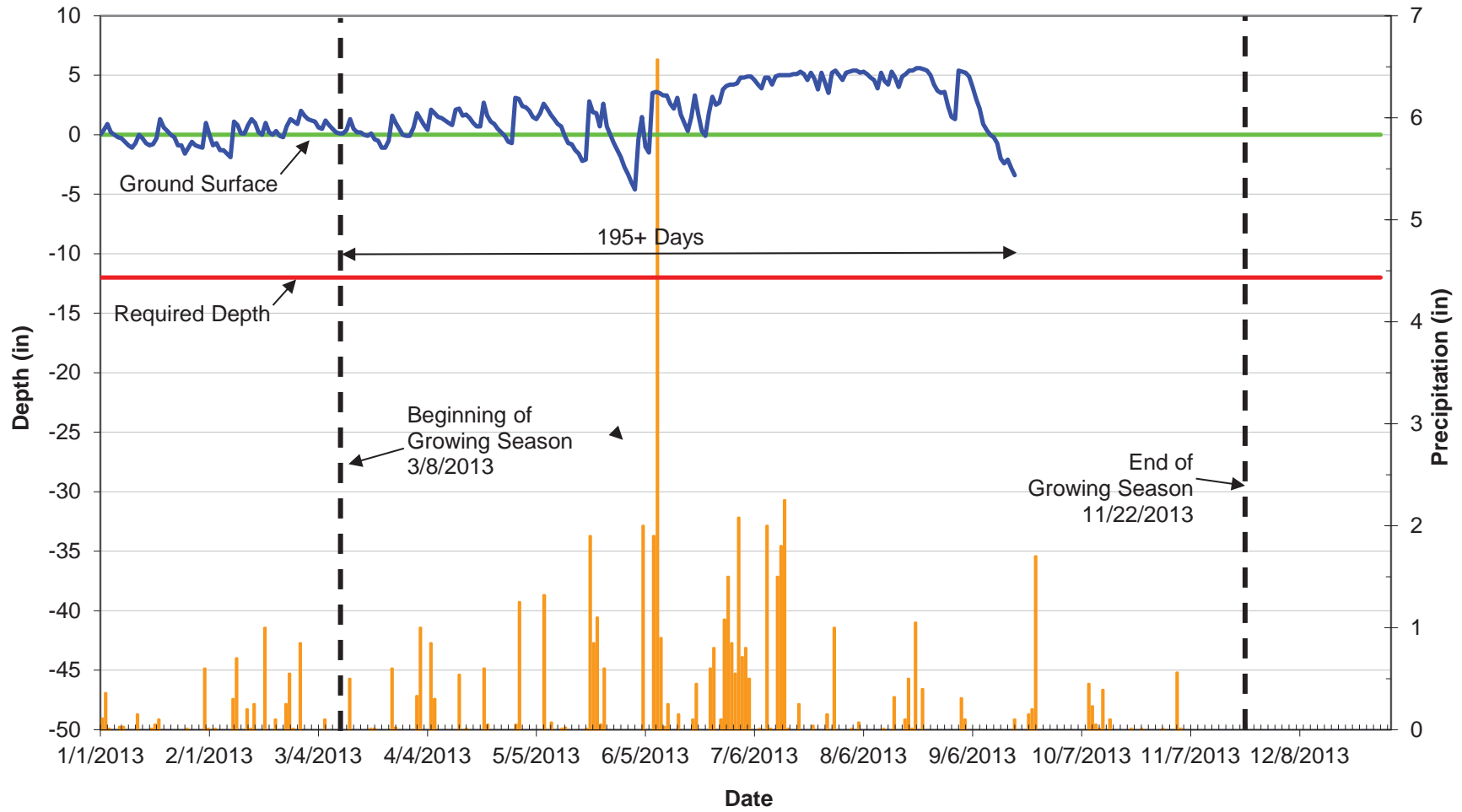
2013 Groundwater Data
Well UTJRC-6C (SN: 13D4A9E0)



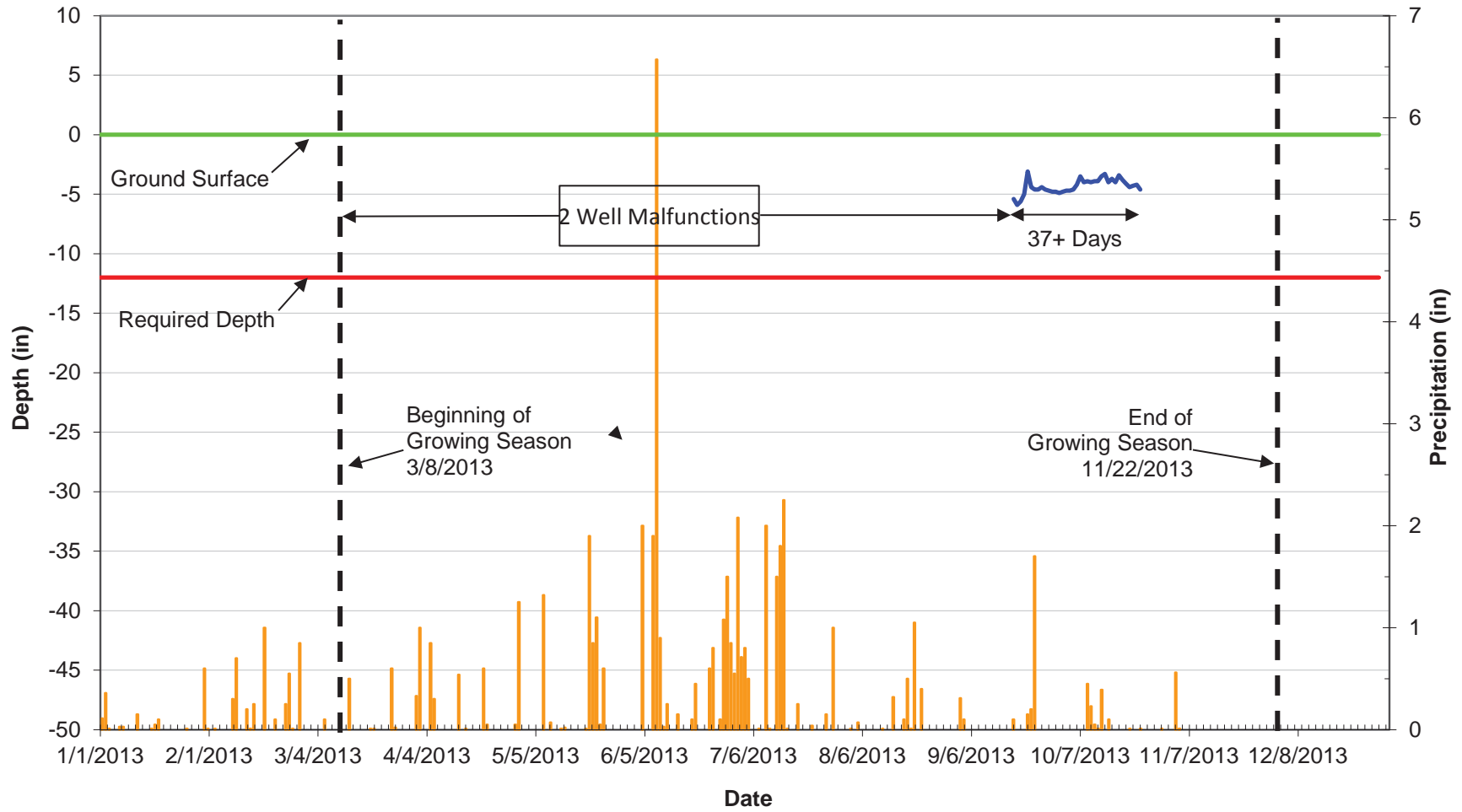
2013 Groundwater Data
Well UTJRC-7 (SN: 000013D47E84)



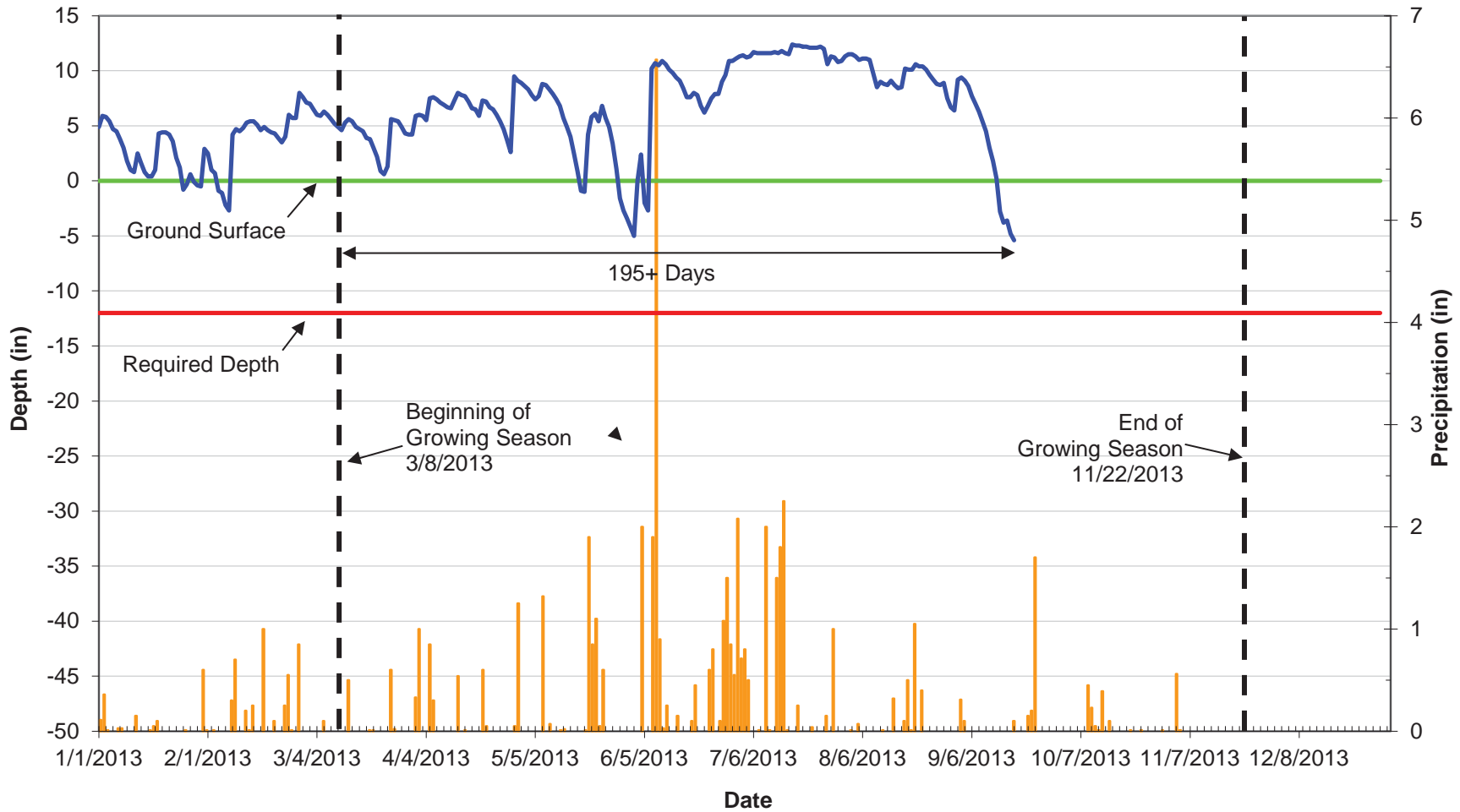
2013 Groundwater Data Well UTJRC-8 (SN: 0000138B8501)



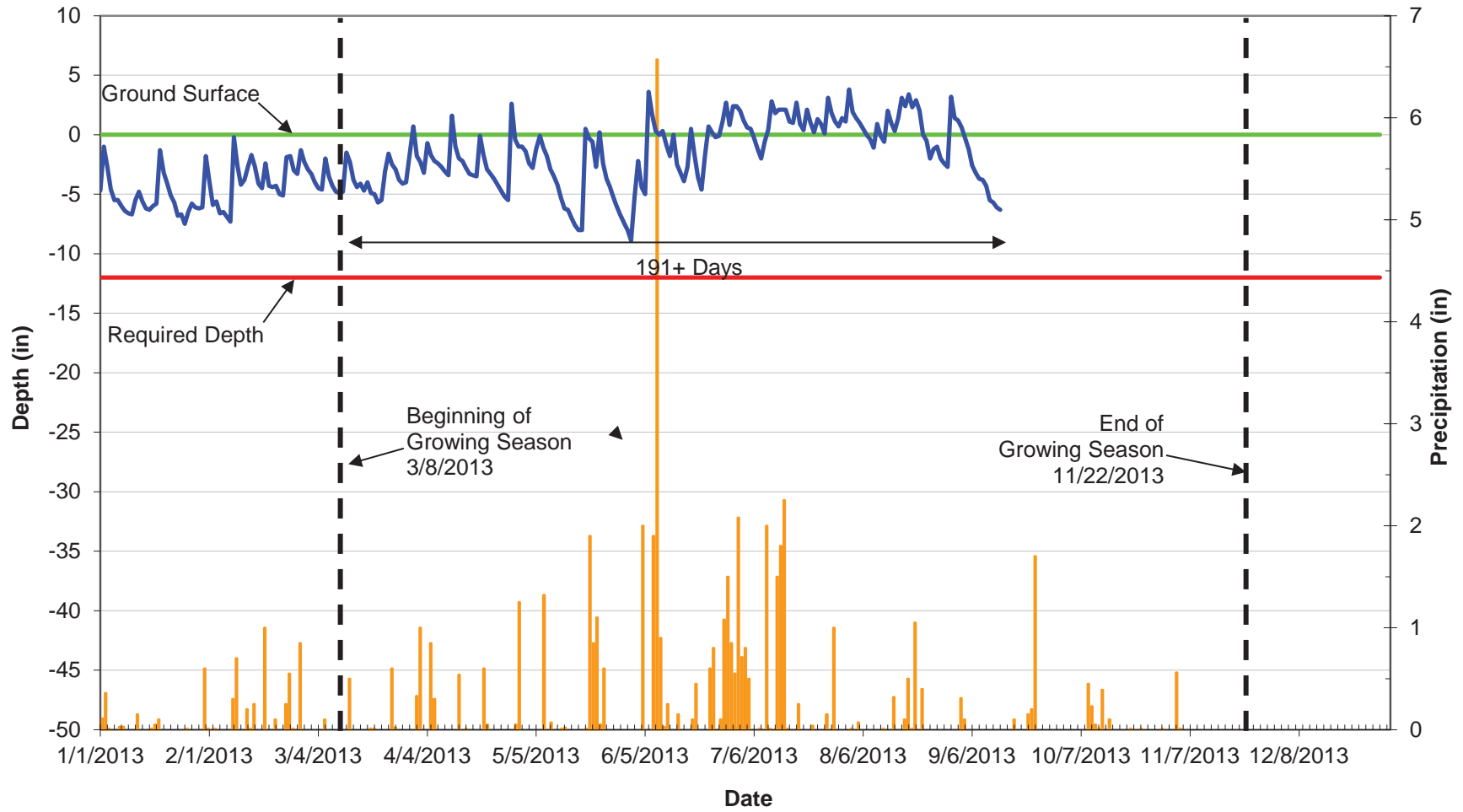
2013 Groundwater Data
Well UTJRC-9* (SN: 000013D4B0AE)
*Well Replaced 9/18/2013 Old Well SN: 00000AB3548B



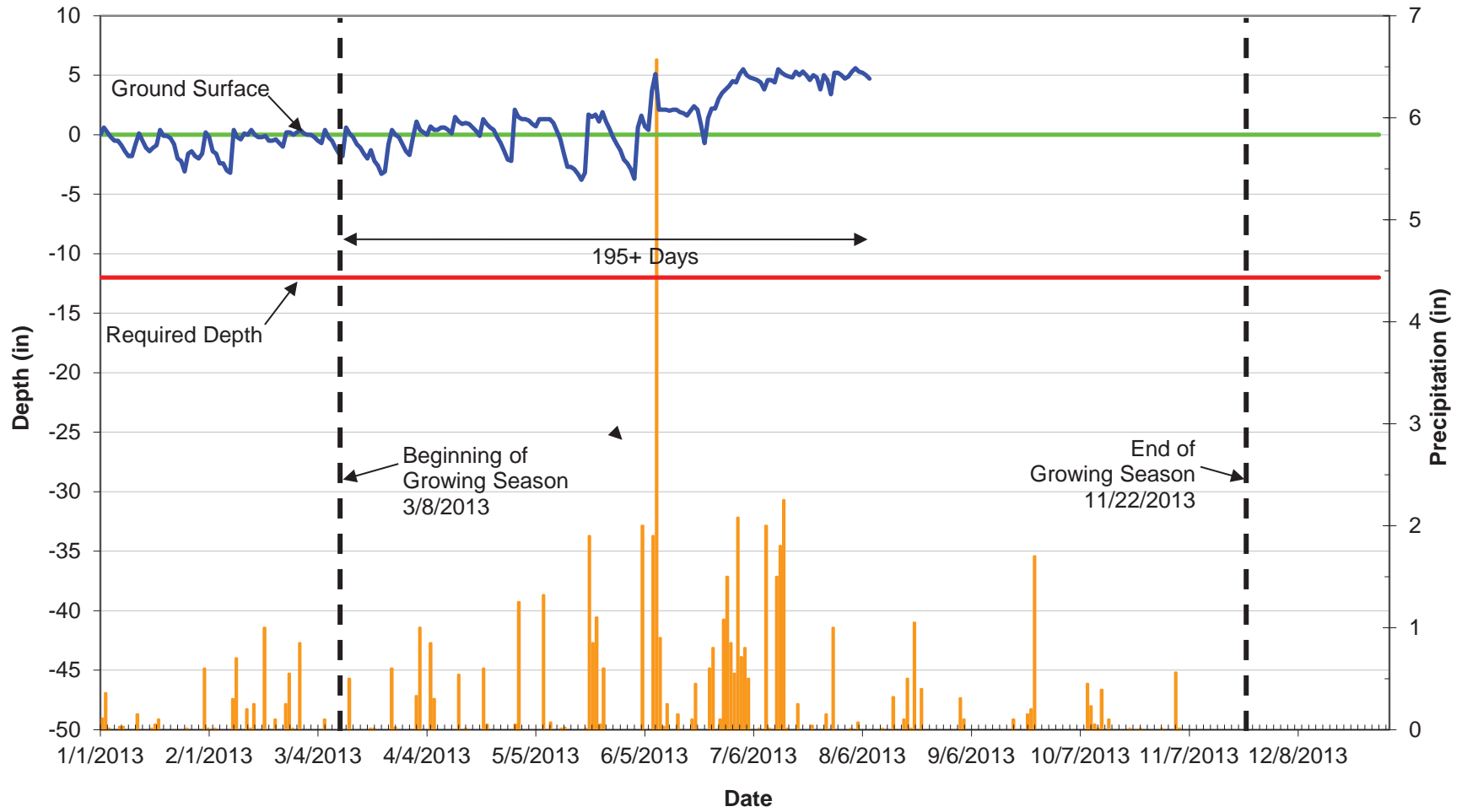
2013 Groundwater Data
Well UTJRC-10* (SN: 000009BEBF4C)
*Well Replaced 8/8/2013 Old Well SN: 000009BEBDBF



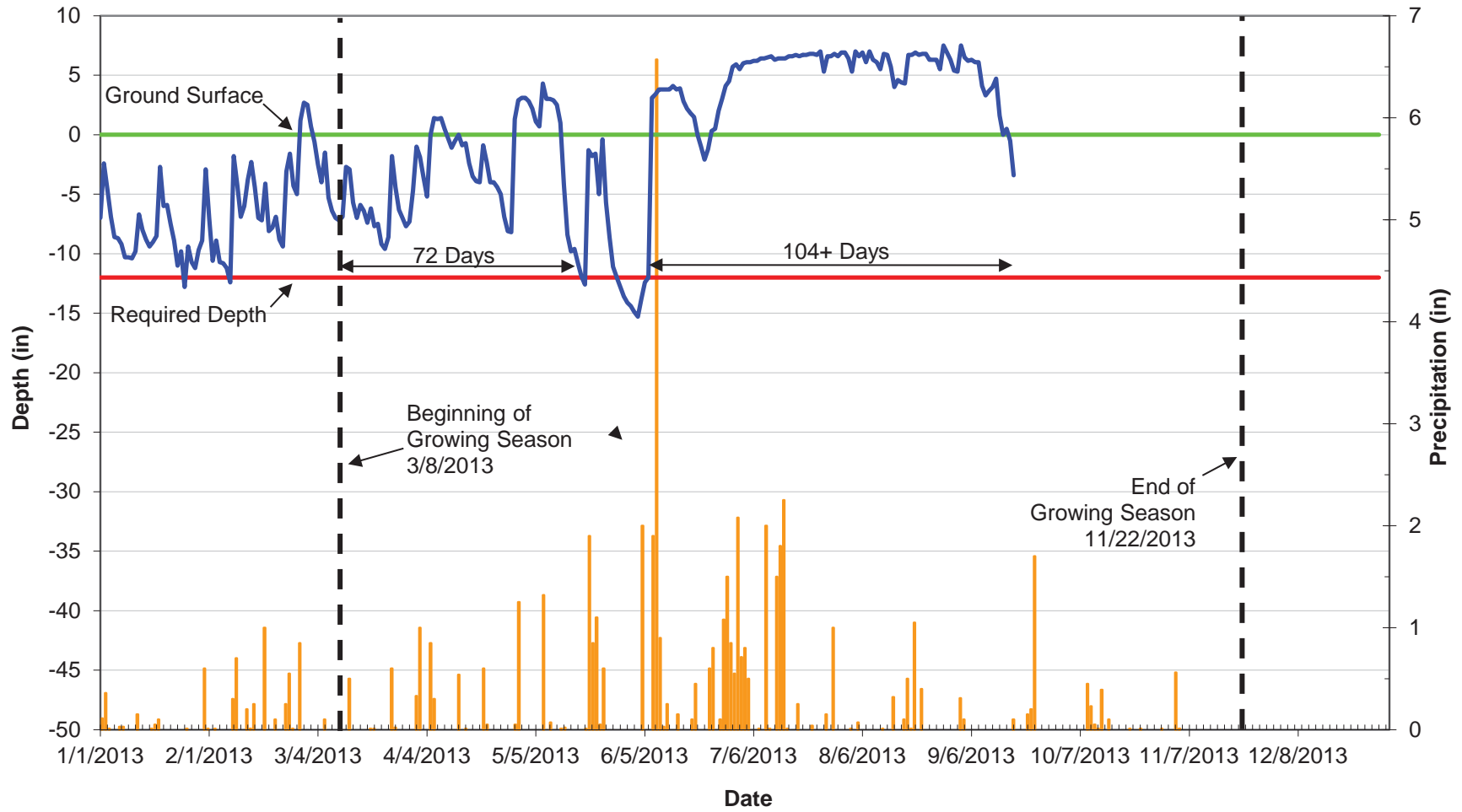
2013 Groundwater Data
Well UTJRC-11 (SN: 000013D49A64)



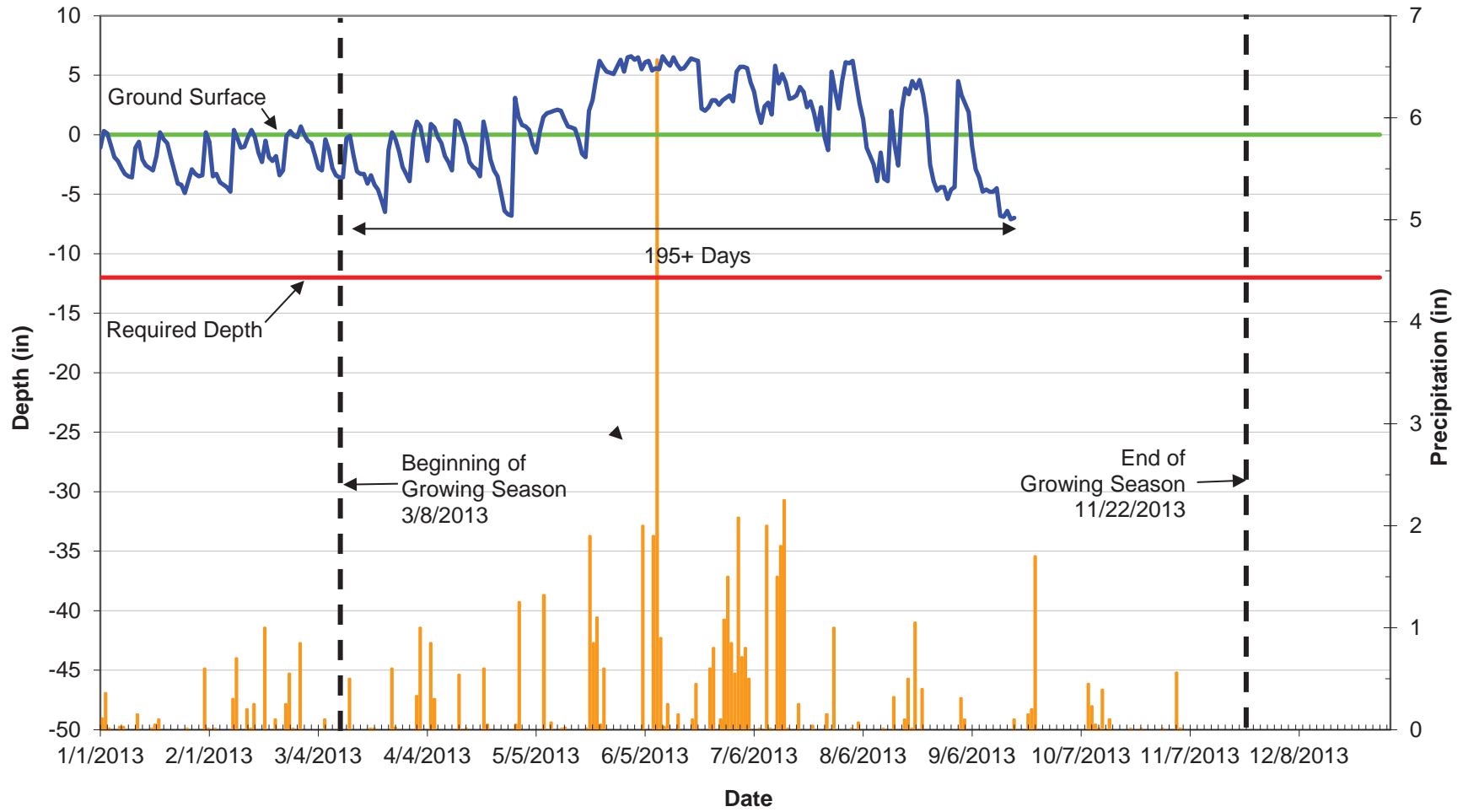
2013 Groundwater Data
Well UTJRC-12* (SN: 00009BEAC50)
*Well Replaced on 6/26/2013 Old Well SN: 00009BEBCFA



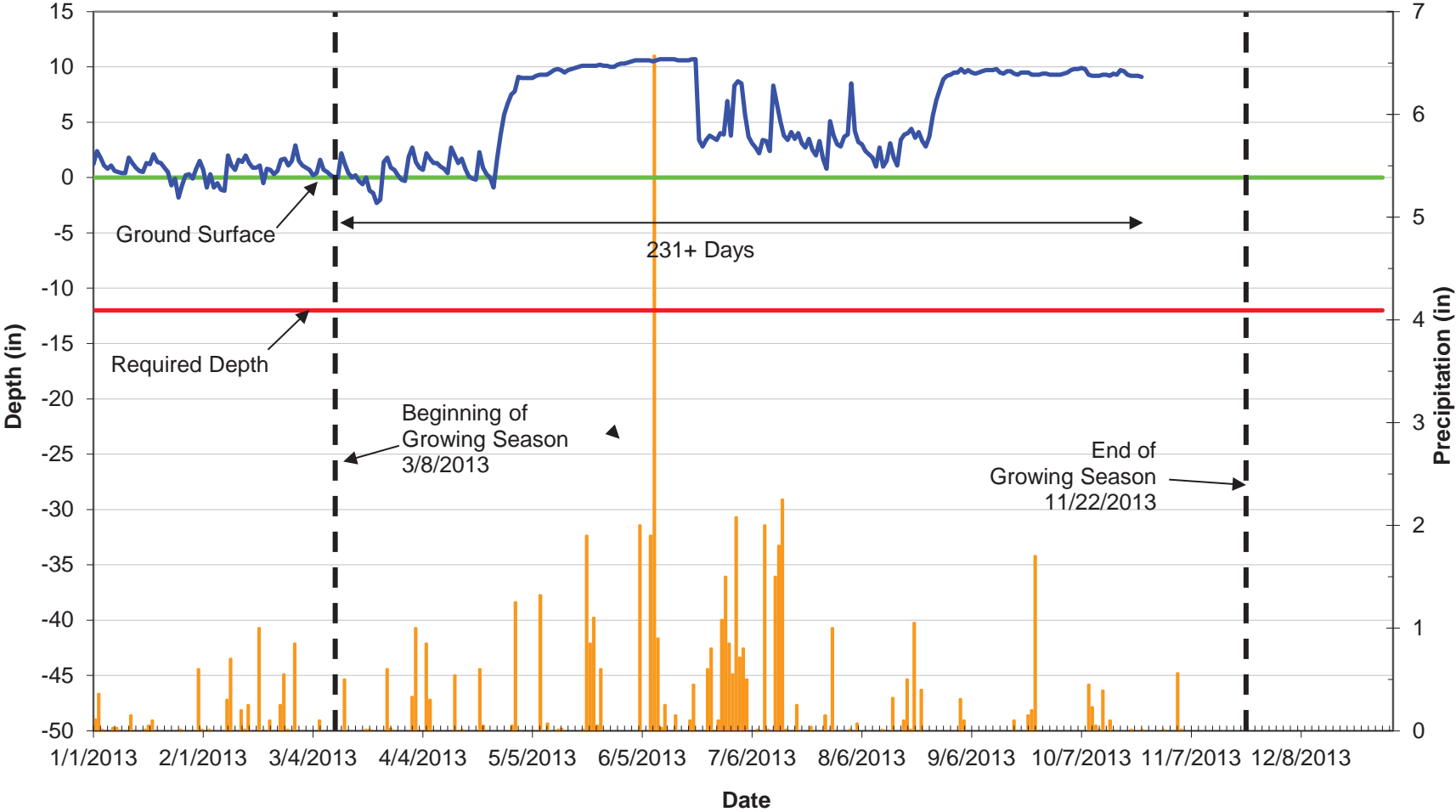
2013 Groundwater Data
Well UTJRC-13* (SN: 000009BEBD37)
*Well Replaced on 6/25/2013 Old Well SN: 00000EBD86CF



2013 Groundwater Data
Well UTJRC-14 (SN: 000013D4BBED)



2013 Groundwater Data
Well UTJRC-15 (SN: 0000138BAA9D)



2013 Groundwater Data
Well JR-Ref (SN: 0000EBD962F)

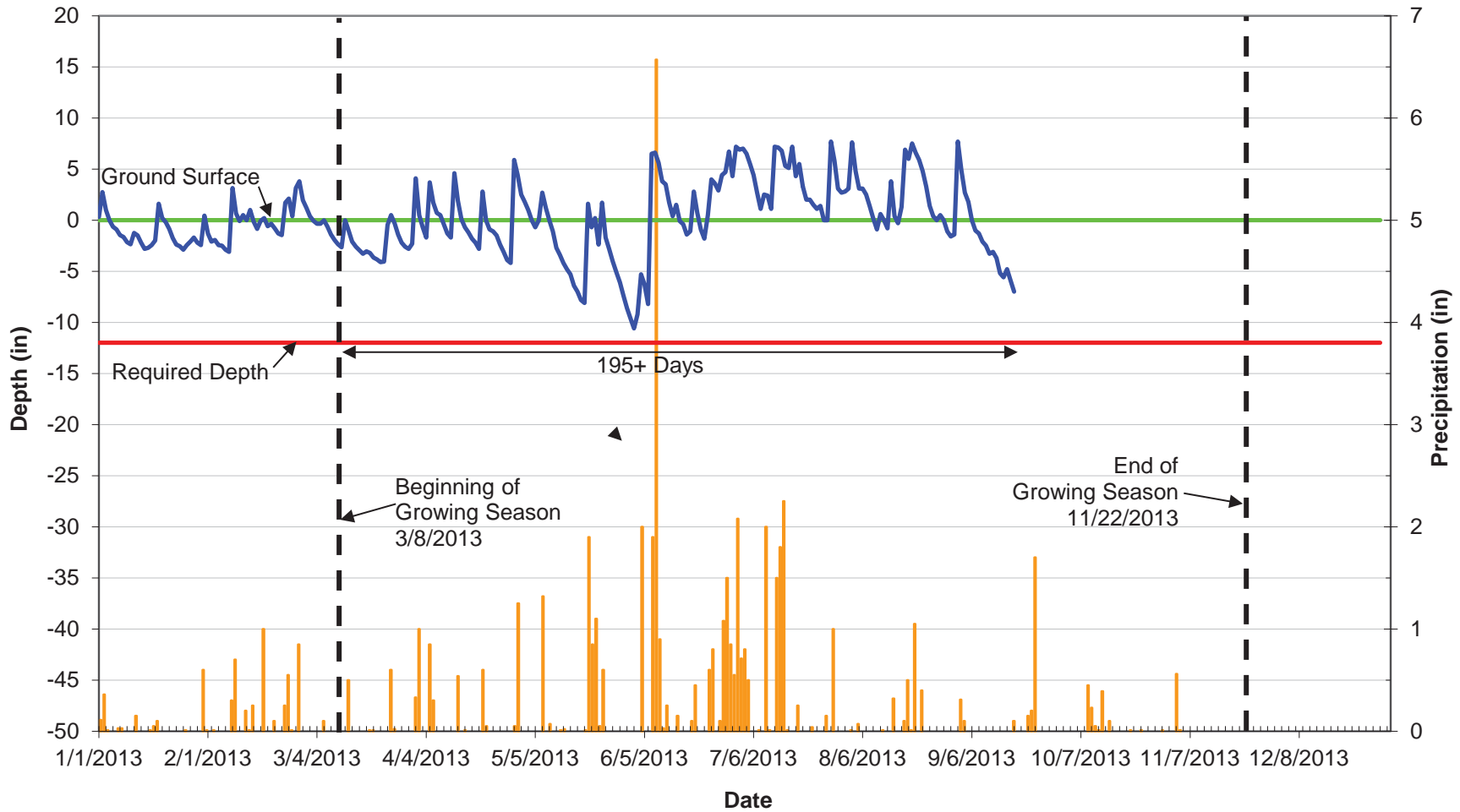


Table 13. Wetland Gauge Attainment Data						
UT to Jumping Run Creek Restoration Project / EEP Project No. 92345 Summary of Groundwater Results						
Wetland Type	Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season				
		Year 1 (2010)	Year 2 (2011)	Year 3 (2012)	Year 4 (2013)	Year 5 (2014)
Riparian	GW 1	Yes/31 days (12 percent)	Yes/90 days (35 percent)	Yes/42 days (16 percent)	Yes/101 days (39 percent)	
Riparian	GW 2	Yes/44 days (17 percent)	Yes/101 days (39 percent)	Yes/37 days (14 percent)	Yes/98 days (38 percent)	
Riparian	GW 3	Yes/140 days (54 percent)	Yes/92 days (36 percent)	Yes/124 days (48 percent)	Yes/195 days (75 percent)	
Non-Riparian	GW 4	No	No/0 days	No/0 days	Yes/ 45 days (17 percent)	
Non-Riparian	GW 4A	n/a	n/a	n/a	Yes/45 days (17 percent)	
Riparian	GW 5	Yes/63 days (24 percent)	Yes/89 days (35 percent)	Yes/119 days (46 percent)	Yes/195 days (75 percent)	
Riparian	GW 6	No	No/0 days	No/0 days	Yes/29 days (11 percent)	
Riparian	GW 6A	n/a	n/a	n/a	Yes/195 days (75 percent)	
Riparian	GW 6B	n/a	n/a	n/a	No/4 days (2 percent)	
Riparian	GW 6C	n/a	n/a	n/a	Yes/96 days (37 percent)	
Non-Riparian	GW 7	Yes/63 days (24 percent)	Yes/44 days (17 percent)	No/19 days (7 percent)	Yes/195 days (75 percent)	
Riparian	GW 8	Yes/63 days (24 percent)	Yes/92 days (36 percent)	Yes/136 days (53 percent)	Yes/195 days (75 percent)	
Riparian	GW 9	Yes/141 days (55 percent)	Yes/ 112 days (43%)	Yes/197 days (76 percent)	Yes/37 days (14 percent)	
Non-Riparian	GW 10	Yes/62 days (24 percent)	Yes/80 days (31 percent)	Yes/78 days (30 percent)	Yes/195 days (75 percent)	
Riparian	GW 11	Yes/54 days (21 percent)	Yes/79 days (31 percent)	Yes/80 days (31 percent)	Yes/191 days (74 percent)	
Riparian	GW 12	Yes/147days (57 percent)	Yes/ 121 days (47%)	Yes/258 days (100 percent)	Yes/195 days (75 percent)	
Non-Riparian	GW 13	Yes/45 days (17 percent)	Yes/ 47 days (18%)	No/12 days (5 percent)	Yes/104 days (40 percent)	
Riparian	GW 14	Yes/44 days (17 percent)	Yes/ 88 days (34%)	Yes/121 days (47 percent)	Yes/195 days (75 percent)	
Riparian	GW 15	Yes/73 days (28 percent)	Yes/87 days (34 percent)	Yes/136 days (53 percent)	Yes/231 days (89 percent)	
na	Reference	Yes/63 days (24 percent)	Yes/78 days (30 percent)	Yes/40 days (15 percent)	Yes/195 days (75 percent)	