UT to JUMPING RUN CREEK STREAM & WETLAND RESTORATION

MONITORING REPORT (YEAR 5 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: 2014 Submission Date: November 2014

Prepared by:



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1.0Executive 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 total of five beaver dams were removed by APHIS after the existing beavers were trapped and removed from the area. The primary dam was located along the upstream section (STA ~84+00) of the enhancement reach UT1C just inside of the forested area. Stantec staff partially removed the dam which lowered water levels enough to perform the geomorphic survey. NCEEP was notified of the beaver activity. During 2014 evidence of a bankfull event was observed at the upstream crest gauge (CG1) and downstream crest gauge (CG2) along reach UT1B on May 27, 2014. There was also visual evidence including sediment deposited on vegetation, and arrested vegetation along the bank of reach UT1B. This is the second bankfull event recorded at the site. Reach UT1A has shown visual evidence of water accessing the floodplain from the braided channel throughout Monitoring Year 5.

The Monitoring Year 5 (MY5) 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 260 planted stems per acre (the final success criteria for MY5) while four of the plots have less than 260 planted stems per acre. When volunteers are included in the stem count, all twelve plots overwhelmingly exceed 260 total stems per acre. All five of the random transects monitored had over 260 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 has not encroached or impeded the planted vegetation. Minor areas of *Murdannia keisak* and larger colonies of *Persicaria sagittata* in the stream channel and larger colonies of *Persicaria sagittata* on the stream banks were observed along the downstream portion of UT1B and also the upstream portion of UT1C. These areas do not pose a threat to native vegetation establishment or stream stability.

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 2013, 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 2013. Isolated areas of beaver damage to livestakes exist from STA 52+00 to 82+00 along both banks of the stream. The livestakes were well established, and the root stock area already showing signs of regeneration. Also,

Salix nigra, the prevalent live stake species, has produced volunteers throughout the project area and replanting is not necessary. The enhancement reach UT1C appears to be stable and effectively transporting sediment, with bank pin surveys showing no aggradation or degradation. Overall the stream is visually stable and did an excellent job withstanding the ongoing 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.

Twenty of the 21 groundwater monitoring wells onsite met the success criteria. Well, GW 4A, is waiting to have data extracted. 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 90 days of the growing season. This 90-day period comprises 35% of the growing season. Monthly precipitation totals for 2014 fell below the 70th percentile during the growing season in March, May, June, July, and August. During the month April 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.

2.0Methodology

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 5 stream survey was completed using survey grade GPS on September 22 and 24, 2014. Cross sections were surveyed using a laser level on September 22, 2014. The vegetation monitoring was conducted on September 16 and October 6, 2014.

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 and October of 2014. Twelve 100m^2 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 (100m^2)) 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

Twenty-one 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 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.

4.0Appendices

Appendix A – Project Vicinity Map and Background Tables

Appendix B – Visual Assessment Data

Appendix C – Vegetation Plot Data

Appendix D – Stream Survey Data

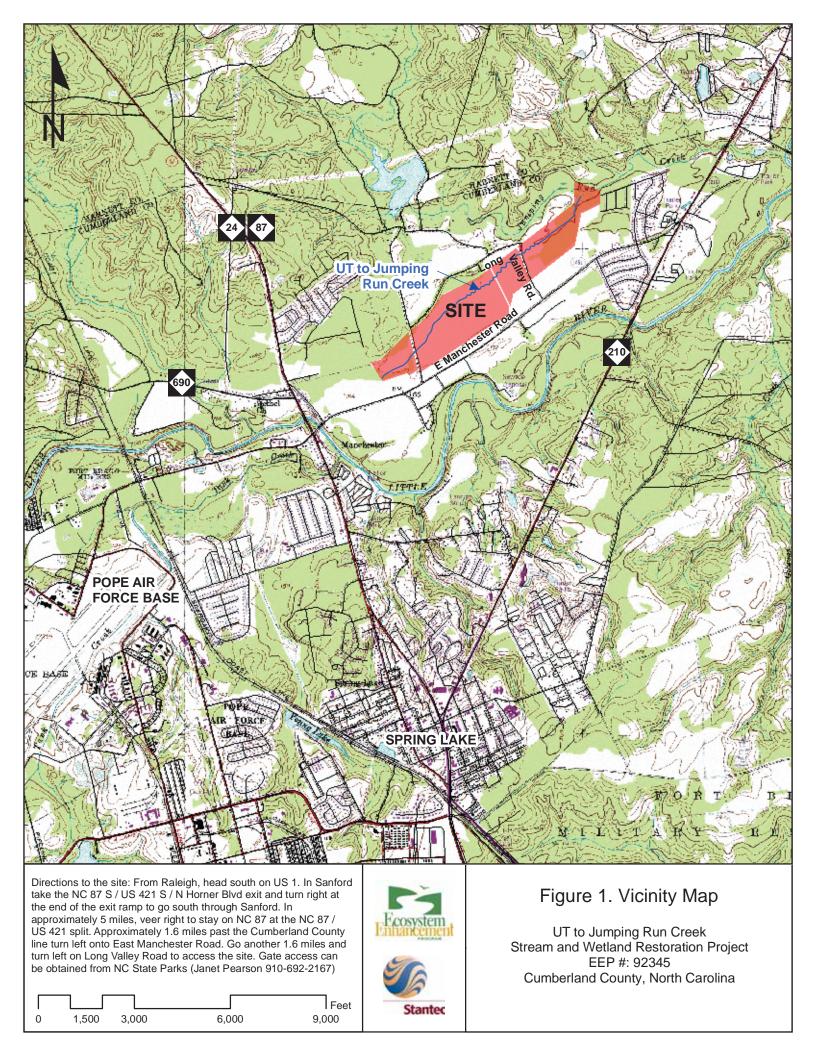
Appendix E – Hydrologic Data

Appendix A. Project Vicinity Map and Background Tables

Figure 1 Table 1a.,b. Vicinity Map and DirectionsProject Restoration Components

Table 2

Project Activity and Reporting History
Project Contacts
Project Attribute Table 3 Table 4



				1	able 1a. Project (Components			
			UT Jump		reek 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
UTIA	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).
UTIB		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 drainange ditches were filled.
UTIC	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		59.8**	~10+00 to 82+39	1:1	59.8		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		11.5	~35+00 to 91+00	1:1	11.5		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

UT Jump	Table 1b. Component Summations UT Jumping Run Creek Restoration Project/EEP Project No. 92345						
				Non-			
Restoration	Stream	Ripa	arian	Ripar	Upland	Buffer	
Level	(lf)	Wetlar	nd (Ac)	(Ac)	(Ac)	(Ac)	BMP
			Non-				
		Riverine	Riverine				
Restoration	7318	59.8		11.5			
Enhancement		2.6					
Enhancement I	1935						
Enhancement II							
Creation							
Preservation					125.9		
HQ Preservation							
Totals (Feet/Acres)	9253	62.4		11.5			
MU Totals	8608	61.1		11.5			

Non-Applicable

Table 2. Project Activity and Re						
UT Jumping Run Creek Restoration Project/EEP Project No. 92345						
Elapsed Time Since Grading Complete:	4 year 6 months					
Elapsed Time Since Planting Complete:	4 year 5 months					
Number of Reporting Years ¹ :	5					
	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				
Supplemental Planting	n/a	Winter 2013/2014				
Year 5 Monitoring	Oct 2014	Nov 2014				

^{1 =} Equals the number of reports or data points produced <u>excluding</u> 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 T	Table			
UT Jumping Run Creek Restoration Project / EEP Project No. 92345						
Project County	Cumberland					
Physiographic Region	Coastal Plai	n				
Ecoregion	Ecoregion Sandhills					
Project River Basin	Cape Fear					
USGS HUC for Project (14 digit)	0303000409	0010				
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					
Restorat	ion Compor	nent Attribu	te Table			
				RW	RW	NRW
	UT1A	UT1B	UT1C	Restoration	Enhancement	
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						N/A
Watershed impervious cover (%)		<5%	1	N/A	N/A	N/A
NCDWQ AU/Index number	N/A	N/A	N/A	N/A	N/A	N/A
NCDWQ classification	С	С	С	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						
Total acreage of easement				225.3		
Total vegetated acreage within the easement				225.3		
Total planted acreage as part of the restoration				153.8	T	
Rosgen classification of pre-existing	F5	F5	F5	N/A	N/A	N/A
Rosgen classification of As-built	DA	С	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.%)		- NT/A	- NT/A	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	D.1	D.1	D.1	D.1	D. I	T. J
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
Т	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

Appendix B. Visual Assessment

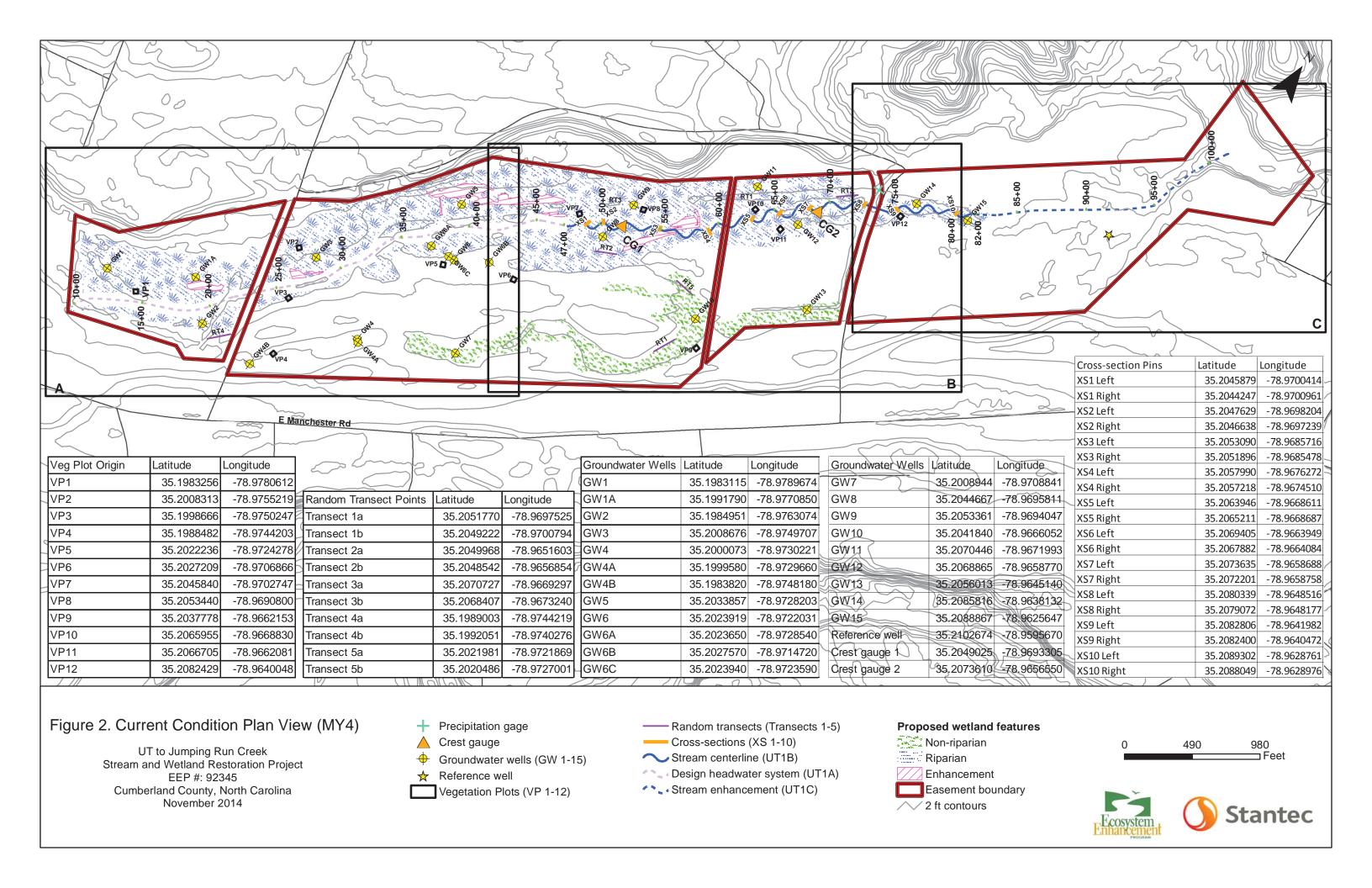
Figure 2 - Current Condition Plan View (4 Sheets)

 Visual Stream Morphology Stability Assessment
 Vegetation Condition Assessment Table 5

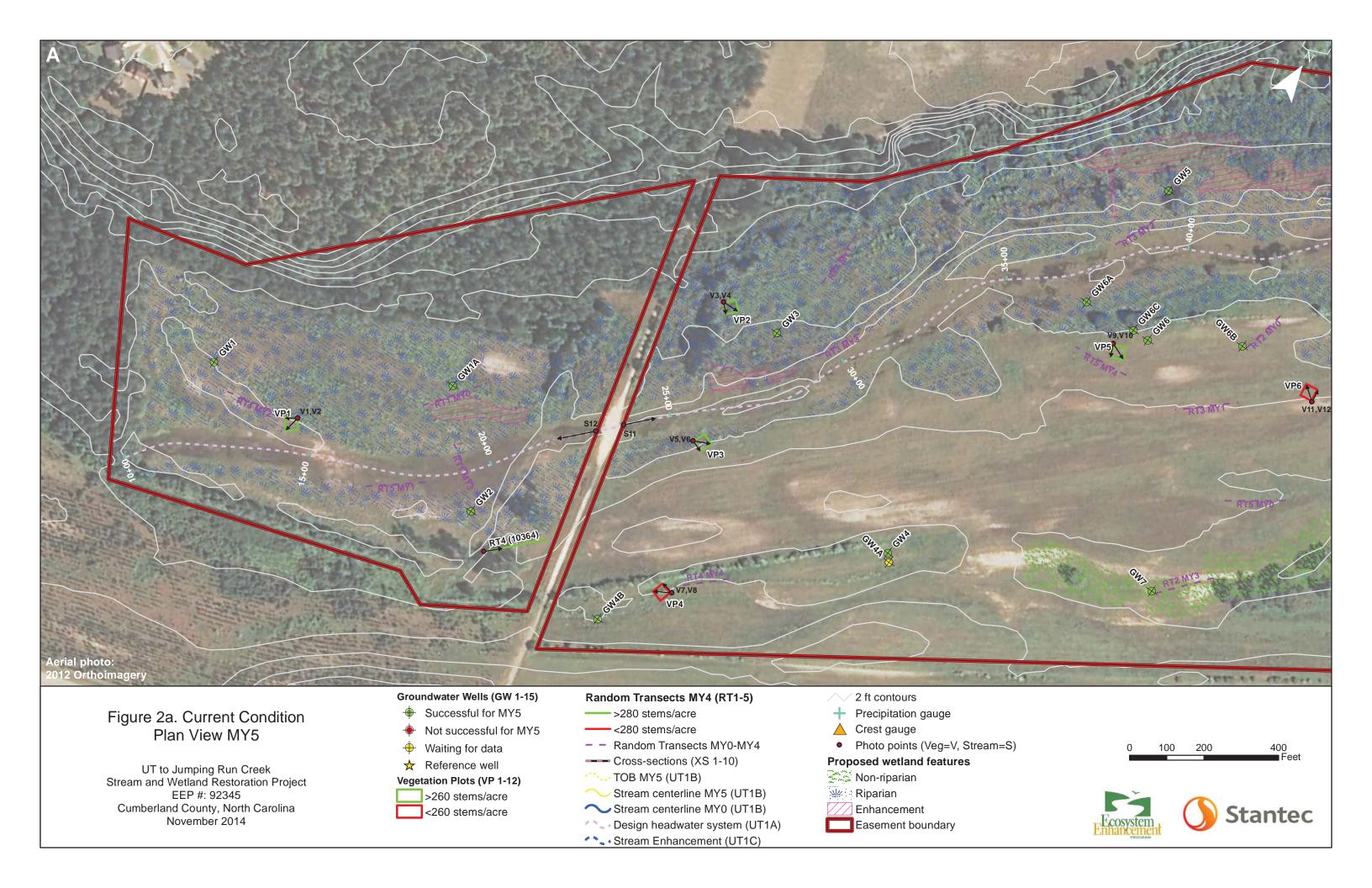
Table 6

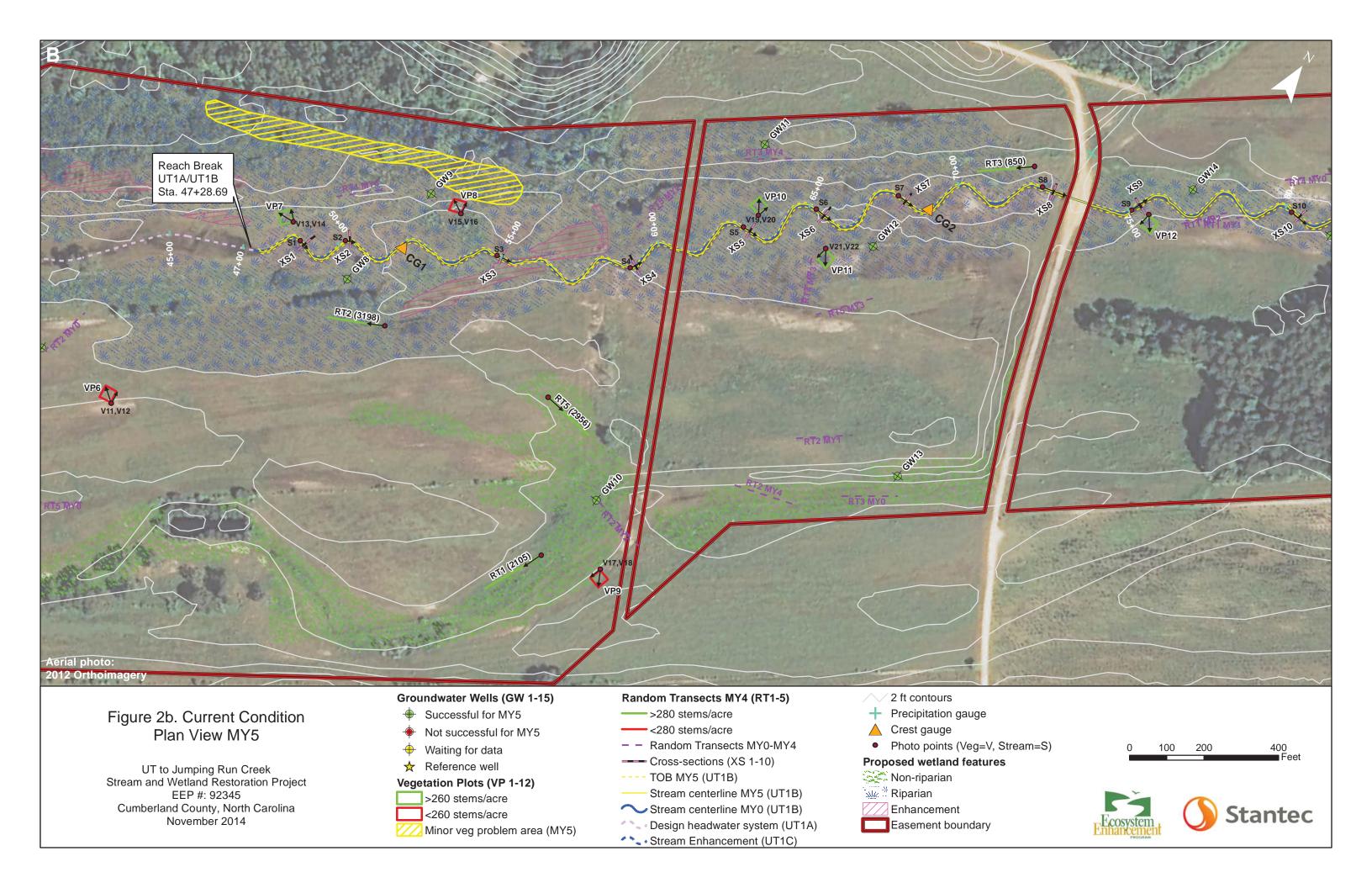
- Headwater Stream Visual Assessment Form Form

- Stream Stations (B1-B13) Photos - Vegetation Plots (B14-B42) Photos



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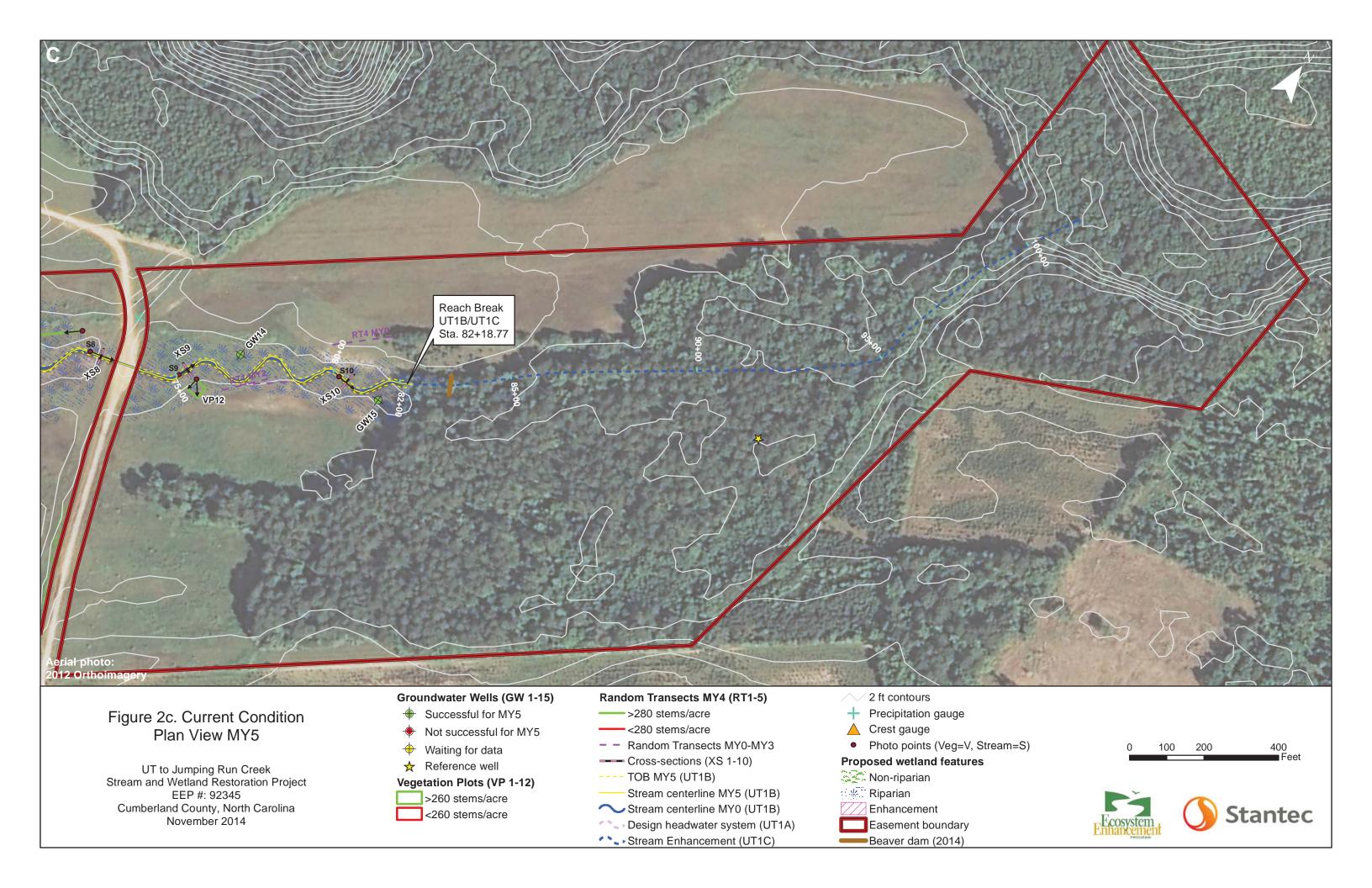


Table 5 <u>Visual Stream Morphology Stability Assessment</u>
Reach ID UT1b

3300

Assessed Length (If)

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	Vertical Stability	Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
	(Riffle and Run units)	2. <u>Degradation</u> - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	Texture/Substrate - Riffle maintains coarser substrate	32	32			100%			
	3. Meander Pool	1. <u>Depth</u> Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	32	32			100%			
	Condition	Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	32	32			100%			
	4 Thelesson Decision	Thalweg centering at upstream of meander bend (Run)	32	32			100%			
	4.Thalweg Position	2. Thalweg centering at downstream of meander (Glide)	32	32			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 <u>NOT</u> 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 ≥ 1.6 Rootwads/logs providing some cover at base-flow.	75	75			100%			

	Table 6. Vegetation Condition As	ssessment				
	UT Jumping Run Creek Restoration Project /	EEP Project	t No. 92345			
Planted acreage	145					
						% of
		Mapping		Number of	Combined	Planted
Vegetation Category	Definitions	Threshold	CCPV Depiction	Polygons	Acreage	Acreage
	Very limited cover of both woody and herbaceous					
1. Bare Areas (previously mowed areas)	material	0.1 acres	None	0	0	0.0%
	Woody stem densities below target levels based					
2. Low Stem Density Areas	on MY3, 4, or 5 stem count criteria	0.1 acres	None	0	0	0.0%
			Total	0	0	0.0%
	Areas with woody stems of a size class that are					
3. Areas of Poor Growth Rates or Vigor	obviously small given the monitoring year	0.25 acres	None	0	0	0.0%
			Total	0	0	0.0%
Easement acreage	225.3		•		-	
						% of
		Mapping		Number of	Combined	Easement
Vegetation Category	Definitions	Threshold	CCPV Depiction	Polygons	Acreage	Acreage
4. Invasive areas of concern	Typha latifolia	1000 SF	Yellow hatching	1	1.22	0.5%
5. Easement encroachment areas		none	None	0	0	0.0%

Headwater Stream Visual Assessment Form

Project 1	Name: UT Jumping Run Creek Date: 7/27/14
Observa	tion Team: A. Baldwin and N. Ronan
Recent \	Weather: $\frac{7/3}{0.01} \cdot \frac{5/6 - 0.4''}{0.01}$ Station: $\sim 37 + 50$
Indicato	$\frac{5}{17} - 4.0^{11}$ rs of Flow (check if present today, and photodocument)
237474440	(
X	Water flowing downstream;
	A natural line impressed on the bank;
1	Shelving;
	Changes in soil characteristics (explain below);
	Destruction of terrestrial vegetation;
	Presence of litter and debris;
	Wracking;
5 9	Vegetation matted down, bent or absent;
	Sediment sorting;
5	Leaf litter disturbed or washed away;
9	Scour;
	Deposition;
	Bed and bank formation;
	Water staining;
	Change in plant community.
Addition	nal notes:
1	video -as also taken the support photo docume tation
	20.20

Stream Station Photos



Photo B1 – (**Photo Station 1**) Cross-section 1 looking downstream at Station 48+81 (09/22/2014 Year 5)



Photo B2 – (**Photo Station 2**) Cross-section 2 looking downstream at Station 50+30 (09/22/2014 Year 5)



Photo B3 – (Photo Station 3) Cross-section 3 looking downstream at Station 54+98 (09/22/2014 Year 5)



Photo B4 – (**Photo Station S4**) Cross-section 4 looking downstream at Station 59+09 (09/22/2014 Year 5)



Photo B5 – (**Photo Station S5**) Cross-section 5 looking downstream at Station 62+87 (09/22/2014 Year 5)



Photo B6 – (**Photo Station S6**) Cross-section 6 looking downstream at Station 65+44 (09/22/2014 Year 5)



Photo B7 – (**Photo Station S7**) Cross-section 7 looking downstream at Station 68+24 (09/22/2014 Year 5)



Photo B8 – (**Photo Station S8**) Cross-section 8 looking downstream at Station 72+84 (09/22/2014 Year 5)



Photo B9 – (Photo Station S9) Cross-section 9 looking downstream at Station 75+30 (09/22/2014 Year 5)



Photo B10 – (**Photo Station S10**) Cross-section 10 looking downstream at Station 80+45 (09/22/2014 Year 5)



Photo B11 – (Photo Station S11) – Stream channel looking downstream at upper road crossing (08/13/2014 Year 5)



Photo B12 – (**Photo Station S12**) Stream channel looking upstream at upper road crossing (08/13/2014 Year 5)



 $\textbf{Photo B13} - \text{Evidence of flow observed in headwater system UT1A (05/27/2014 \; Year \; 5)}$

Vegetation Plot Photos



 $\textbf{Photo B14} - (\textbf{Photo Station V1}) \ Veg \ Plot \ 1 \ looking \ west \ (10/06/2014 \ Year \ 5)$



Photo B15 – (Photo Station V2) Veg Plot 1 looking southwest (10/06/2014 Year 5)



Photo B16 - (Photo Station V3) Veg Plot 2 looking south (10/06/2014 Year 5)



Photo B17 – (Photo Station V4) Veg Plot 2 looking southeast (10/06/2014 Year 5)



Photo B18 – (Photo Station V5) Veg Plot 3 looking southeast (09/16/2014 Year 5)



Photo B19 – (Photo Station V6) Veg Plot 3 looking east (09/16/2014 Year 5)



Photo B20 – (Photo Station V7) Veg Plot 4 looking northwest (10/06/2014 Year 5)



Photo B21 – (**Photo Station V8**) Veg Plot 4 looking west (10/06/2014 Year 5)



Photo B22 – (Photo Station V9) Veg plot 5 looking southwest (09/16/2014 Year 5)



Photo B23 – (Photo Station V10) Veg plot 5 looking south (09/16/2014 Year 5)



 $\textbf{Photo B24} - (\textbf{Photo Station V11}) \ Veg \ plot \ 6 \ looking \ northeast \ (09/16/2014 \ Year \ 5)$



 $\textbf{Photo B25} - (\textbf{Photo Station V12}) \ Veg \ plot \ 6 \ looking \ north \ (09/16/2014 \ Year \ 5)$



 $\textbf{Photo B26} - (\textbf{Photo Station V13}) \ Veg \ plot \ 7 \ looking \ north \ (09/16/2014 \ Year \ 5)$



 $\textbf{Photo B27} - (\textbf{Photo Station V14}) \ Veg \ plot \ 7 \ looking \ northwest \ (09/16/2014 \ Year \ 5)$



 $\textbf{Photo B28} - (\textbf{Photo Station V15}) \ Veg \ plot \ 8 \ looking \ northwest \ (09/16/2014 \ Year \ 5)$



 $\textbf{Photo B29} - (\textbf{Photo Station V16}) \ Veg \ plot \ 8 \ looking \ west \ (09/16/2014 \ Year \ 5)$



 $\textbf{Photo B30} - (\textbf{Photo Station V17}) \ Veg \ plot \ 9 \ looking \ south \ (09/16/2014 \ Year \ 5)$



Photo B31 – (Photo Station V18) Veg Plot 9 looking southeast (09/16/2014 Year 5)



 $\textbf{Photo B32} - (\textbf{Photo Station V19}) \ \text{Veg plot } 10 \ \text{looking northeast} \ (09/16/2014 \ \text{Year 5})$



 $\textbf{Photo B33} - (\textbf{Photo Station V20}) \ \text{Veg plot } 10 \ \text{looking north} \ (09/16/2014 \ \text{Year 5})$



 $\textbf{Photo B34} - (\textbf{Photo Station V21}) \ \text{Veg plot } 11 \ \text{looking southwest} \ (09/16/2014 \ \text{Year 5})$



Photo B35 – (**Photo Station V22**) Veg plot 11 looking south (09/16/2014 Year 5)



Photo B36 – (Photo Station V23) Veg plot 12 looking southwest (09/16/2014 Year 5)



Photo B37 – (**Photo Station V24**) Veg plot 12 looking south (09/16/2014 Year 5)



Photo B38 – (Photo Station RT1) Random transect 1 looking southwest (10/06/2014 Year 5)

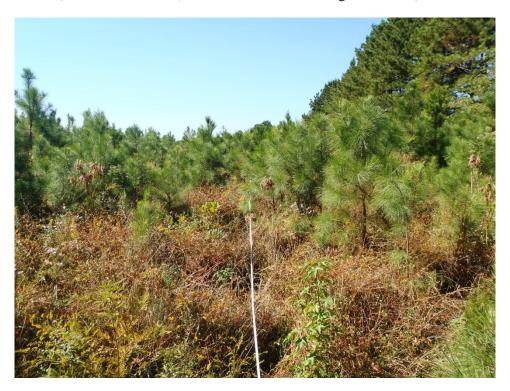


Photo B39 – (Photo Station RT2) Random transect 2 looking west (10/06/2014 Year 5)



Photo B40 – (Photo Station RT3) Random transect 3 looking west (10/06/2014 Year 5)



Photo B41 – (Photo Station RT4) Random transect 4 looking northeast (10/06/2014 Year 5)



Photo B42 – (Photo Station RT5) Random transect 5 looking southeast (10/06/2014 Year 5)

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Appendix C. Vegetation Plot Data

Vegetation Plot Mitigation Success SummaryCVS Vegetation Metadata Table 7

Table 8

Table 9 a

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

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UT to Jumping Run Creek (#92345)

Year 5 (16-Sep-2014 to 06-Oct-2014)

Vegetation Plot Summary Information

Plot #	Riparian Buffer Stems ¹	Stream/ Wetland Stems ²	Live Stakes	Volunteers ³	Total ⁴	Unknown Growth Form
0001	n/a	10	0	237	247	0
0002	n/a	8	0	233	241	0
0003	n/a	10	0	69	79	0
0004	n/a	6	0	38	44	0
0005	n/a	14	0	23	37	0
0006	n/a	6	0	23	29	0
0007	n/a	7	0	15	22	0
0008	n/a	3	0	20	23	0
0009	n/a	5	0	36	41	0
0010	n/a	7	0	25	32	0
0011	n/a	7	0	50	57	0
0012	n/a	10	0	68	79	0

Wetland/Stream Vegetation Totals

(per acre)

	Stream/			Success
	Wetland			Criteria
Plot#	Stems ²	Volunteers ³	Total⁴	Met?
0001	405	9591	9996	Yes
0002	324	9429	9753	Yes
0003	405	2792	3197	Yes
				Yes with
0004	243	1538	1781	Volunteers
0005	567	931	1497	Yes
				Yes with
0006	243	931	1174	Volunteers
0007	283	607	890	Yes
0008	121	809	931	No
0009	202	1457	1659	No
0010	283	1012	1295	Yes
0011	283	2023	2307	Yes
0012	405	2752	3197	Yes
Project Avg	314	2823	3140	Yes

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

	Table 8. CVS Vegetation Plot Metadata
UTto	o Jumping Run Creek Restoration - EEP#92345
Report Prepared By	Alex Baldwin
Date Prepared	11/13/2014 10:58
database name	Stantec_UTJRC2014_cvs-eep-entrytool-v2.3.1.mdb
database location	U:\175613003\UT_Jumping_Run\project\site_data\monitoring\vegetation
computer name	BALDWINA-LT1
file size	46223360
DESCRIPTION OF WORKSHEETS IN	THIS DOCUMENT
	Description of database file, the report worksheets, and a summary of
Metadata	project(s) and project data.
	Each project is listed with its PLANTED stems per acre, for each year. This
Proj, planted	excludes live stakes.
	Each project is listed with its TOTAL stems per acre, for each year. This
Proj, total stems	includes live stakes, all planted stems, and all natural/volunteer stems.
	List of plots surveyed with location and summary data (live stems, dead
Plots	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.
	List of most frequent damage classes with number of occurrences and
Damage	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.
	A matrix of the count of PLANTED living stems of each species for each
Planted Stems by Plot and Spp	plot; dead and missing stems are excluded.
	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
ALL Stems by Plot and spp	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 9a -	CVS S	Stem Count T	otal and	d Plante	d by Plot	and Spe	ecies																	
																					EEP Projec	ct Cod	le 92345. Pro	ject Na	me: UT t	o Jumpin	ng Run C	reek																	
															Cı	ırrent P	lot Data	(MY5 2	014)		-			-		•											Ar	nnual I	Means						
			E9234	5-01-0001	E92	345-01-00	002 E	92345-0	2-0003	E923	15-02-00	004	E92345-0	2-0005	E9234	5-02-00	006	E92345-	02-0007	E9234	5-02-0008	E	92345-02-00	09 E	E92345-0	2-0010	E9234	15-02-001	1 E	E92345-02-0012	MY5 (2014)	М	Y4 (2013)		MY	3 (2012))	MY2	(2011)		MY1 (20	10)	MY	0 (2010)
Scientific Name	Common Name	Species Type	PnoLS F	-all T	PnoL	S P-all T	Pn	oLS P-al	Т	PnoLS	P-all T	ГР	PnoLS P-all	Т	PnoLS I	P-all T	Pr	noLS P-a	II T	PnoLS F	P-all T	Pno	oLS P-all T	Pn	oLS P-all	T	PnoLS P	P-all T	Pno	oLS P-all T	PnoLS P-a	II T	PnoLS	P-all T	Р	noLS P	-all T	F	PnoLS P-	all T	Pno	LS P-all	Т	PnoLS P	-all T
Acer rubrum	red maple	Tree			3		150		31													1				2				2	2	189)		52			10			8		\Box	\Box	
Aronia arbutifolia	Red Chokeberry	Shrub	1	1	1																										1	1 1	. 1	1	2	1	1	1	1	1	1	2 2	2 2	2	2
Baccharis	baccharis	Shrub																																				9			3		\Box	\Box	
Baccharis halimifolia	eastern baccharis	Shrub			2																	5				1						8	3		13								\Box	\Box	
Carpinus caroliniana	American hornbeam	Tree																		1												1											\Box	\Box	
Chamaecyparis thyoides	Atlantic white cedar	Tree	1	1	1	1 1	1																								2	2 2	4	4	4	5	5	5	6	6	6	5 5	5 ز	12	12 1
Diospyros virginiana	common persimmor	Tree	1 1		3		2	1	1 1			5		1																	1	1 12	1	1	13			11	1	1	19	4 4	↓ 4	5	5
Fraxinus pennsylvanica	green ash	Tree						1	1 1				6	6 6									4 4	4							11	11 11	11	11	11	11	11	11	11	11	11	11 11	1 11	11	11 1:
Liquidambar styraciflua	sweetgum	Tree			9		60		7			18		2								4				2			1	4		107			63			30			16			\Box	
Liriodendron tulipifera	tuliptree	Tree	1 1			1 1	1								1	1	1								2	2 2				1 1 1	. 5	5 5	5	5	5	6	6	6	7	7	9	7 7	7	12	12 12
Magnolia virginiana	sweetbay	Tree			3	3 3	3	2	2 2											1											5	5 6	5	5	5	5	5	5	6	6	6	9 9	9	12	12 12
Nyssa	tupelo	Tree																									1	1	1	1 1 1	2	2 2	2	2	2	2	2	2						\Box	
Nyssa biflora	swamp tupelo	Tree	3	3	3 :	1 1	11	1	1 1	1	1	1	4	4 4			1	3	3	3 3	3	3			1	1 1	3	3	3		20	20 31	20	20	24	18	18	18	17	17	17	20 20	20	19	19 19
Persea borbonia	redbay	tree																																								1 1	. 1	1	1
Persea palustris	swamp bay	tree																												1 1 1	. 1	1 1	1	1	1	1	1	1	1	1	1	2 2	2 2	3	3
Pinus palustris	longleaf pine	Tree																															1									1 1	. 1	5	5 !
Pinus taeda	loblolly pine	Tree		22	20		11		22			14		20			22		1	1		5		30		12			7	62		436			413						31			\Box	
Platanus occidentalis	American sycamore	Tree																2	2	2			1 1	4							3	3 6	5		1									\Box	
Quercus	oak	Tree																1	1	1											1	1 1	. 3	3	4	3	3	3	2	2	4	5 5	5 ز	14	14 14
Quercus falcata	southern red oak	Tree	1	1	1	1 1	1			1	1	1			2	2	2														5	5 5	4	4	6	4	4	5	4	4	4	3 3	3 ع	2	2
Quercus lyrata	overcup oak	Tree	4	4	4					1	1	1	1	1 1				1	1	1										1 1 1	8	8 8	8	8	8	9	9	9	7	7	7	7 7	/ 7	4	4
Quercus michauxii	swamp chestnut oak	Tree																									1	1	1		1	1 1											\Box	\Box	
Quercus nigra	water oak	Tree				1 1	1	2	2 2				1	1 1																1 1 1	. 5	5 5	5	5	6	3	3	3	1	1	2	1 1	. 1	1	1
Quercus phellos	willow oak	Tree						2	2 2	3	3	3	2	2 2											3	3 3	1	1	2	4 4 4	15	15 16	15	15	15	16	16	16	15	15	17	14 14	1 14	12	12 1
Quercus stellata	post oak	Tree						1	1 1													ı									1	1 1	. 1	1	1	1	1	1	1	1	1	1 1	. 1	\Box	
Rhus copallinum	flameleaf sumac	shrub							9															3		8						20			359			226		2	280			\Box	
Salix nigra	black willow	Tree																		2		5							41			48			48			35			6			\Box	
Sambucus canadensis	Common Elderberry	Shrub										1																				1						\neg					\Box	\Box	
Smilax	greenbrier																																								12			\Box	
Taxodium distichum	bald cypress	Tree													3	3	3								1	1 1	1	1	1	1 1 1	. 6	6 6	6	6	6	6	6	6	7	7	7	7 7	7 7	7	7
Toxicodendron radicans		Vine																				1																			1		\vdash	-	
Unknown		Shrub or Tree																												1 1 1	. 1	1 1						3			5			1	1
	•	Stem count	t 10	10 24	47 8	3 8	241	10 1	0 79	6	6	44	14 1	4 37	6	6	29	7	7 2	2 3	3 2	23	5 5	41	7	7 32	7	7	57	11 11 79	94	94 931	92	92	1062	91	91	416	87	87 4	74 1	00 100	100	123	123 123
		size (ares)		1		1		1			1		1		- 1	1				1	1		1		1			1		1	12		1	12			12	一十		12	╅	12			12
		size (ACRES)	'	0.02		0.02		0.0	2		0.02	1	0.02	2		0.02		0.0)2	1	0.02		0.02		0.02	2		0.02		0.02	0.3		1	0.30	T		0.30			0.30		0.30			0.30
		Species count	t 5	5 1	10 6	6 6	10	7	7 11	4	4	8	5	5 8	3	3	5	4	4	3 1	1	6	2 2	4	4	4 9	5	5	8	8 8 11		19 27	16		23	15	15	22			24	17 17			17 17
	s	tems per ACRE	404.7	104.7 999	96 323	7 323.7	9753 40	4.7 404	7 3197	242.8	242.8	1781	566.6 566	6 1497	242.8	242.8	1174 2	83.3 28	3.3 890.	3 121.4	121.4 930	8 20	2.3 202.3 1	659 28	83.3 283	.3 1295	283.3	283.3 23	307 44	45.2 445.2 3197		17 3140		310.3	3581	_									414.8 414.8

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

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 (MY5 2014)

				Current	iot Data (iv		
Scientific Name	Common Name	Species Type	Random Transect 1	Random Transect 2	Random Transect 3	Random Transect 4	Random Transect 5
Acer rubrum	Red Maple	Tree	1	2	1	8	
Aronia arbutifolia	Red Chokeberry	Shrub				1	
Baccharis halimifolia	Eastern Baccharis	Shrub	8			9	
Betula nigra	River Birch	Tree				1	
Carpinus caroliniana	Ironwood	Tree		1			
Diospyros virginiana	Persimmon	Tree				2	3
Fraxinus pennsylvanica	Green Ash	Tree	2	1		1	
Liquidambar styraciflua	Sweetgum	Tree		2		120	1
Liriodendron tulipifera	Tulip Poplar	Tree				3	
Magnolia virginiana	Sweetbay	Tree		1		1	
Nyssa biflora	Swamp Tupelo	Tree		1	3	1	1
Nyssa sylvatica	Blackgum	Tree		2			1
Pinus palustris	Longleaf Pine	Tree					1
Pinus taeda	Loblolly Pine	Tree	3	58	12	85	17
Platanus occidentalis	American Sycamore	Tree		2		3	
Quercus sp.	Oak sp.	Tree					1
Quercus falcata	Southern Red Oak	Tree					2
Quercus lyrata	Overcup Oak	Tree		4	1		
Quercus michauxii	Swamp Chestnut Oak	Tree				1	
Quercus nigra	Water Oak	Tree			1	2	1
Quercus pagoda	Cherrybark Oak	Tree	1				
Quercus phellos	Willow Oak	Tree	1	2			1
Rhus copallinum	Winged Sumac	Shrub	36			18	44
Taxodium distichum	Bald Cypress	Tree		3	3		
		Stem Count	52	79	21	256	73
		size (ares)	1	1	1	1	1
		size (ACRES)	0.02	0.02	0.02	0.02	0.02
		Species count	7	12	6	15	11
		Stems per ACRE	2105.3	3198.4	850.2	10364.4	2955.5

Appendix D. Stream Survey Data

Figures 3a-j

Cross-Sections with Annual Overlays
Longitudinal Profiles with Annual Overlays
Baseline – Stream Data Summary Figure 4

Table 10a,b.

Monitoring – Cross-section Morphology Data
Monitoring – Stream Reach Morphology Data Table 11a. Table 11b.

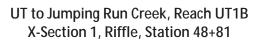
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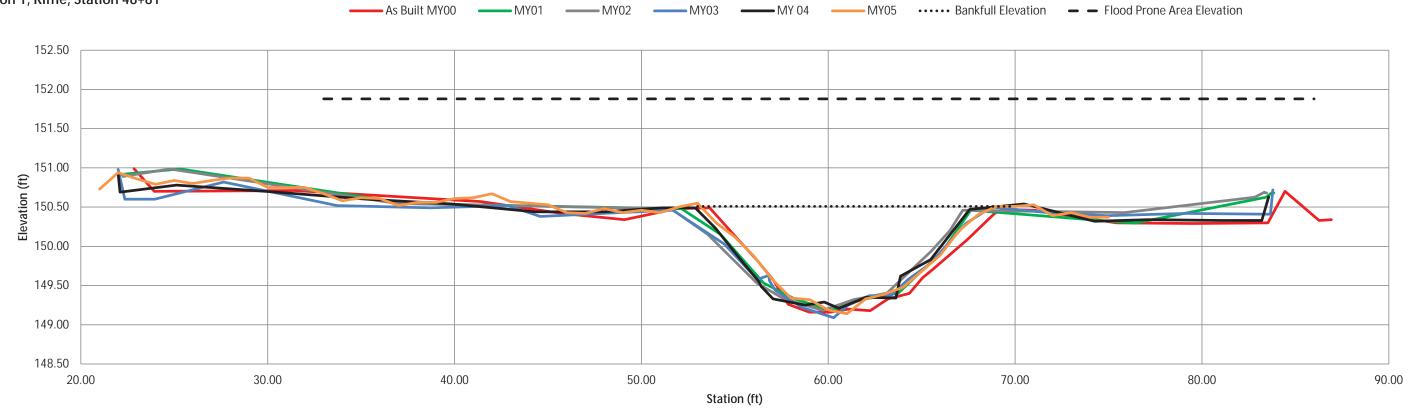
	Cape Fear River
	Jumping Run Creek
	XS-1, Riffle, STA 48+81
Drainage Area(sq. mi.)	1.2
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

M	1Y00	M	Y01	V	Y02	M	Y03	MY	′04	M	Y05
Station	Elevation										
22.84	150.99	22.00	150.91	22.25	150.89	22.00	150.98	22.00	150.93	21.0	150.73
23.93	150.70	25.31	150.99	24.75	150.99	22.36	150.60	22.10	150.69	22.0	150.94
31.43	150.71	37.48	150.55	36.92	150.55	23.96	150.60	25.12	150.78	23.0	150.86
41.41	150.57	52.15	150.48	51.60	150.48	27.65	150.82	29.89	150.70	24.0	150.79
45.73	150.42	54.23	150.15	53.55	150.15	33.72	150.52	35.29	150.60	25.0	150.84
49.10	150.34	56.54	149.53	56.18	149.53	38.73	150.49	39.86	150.54	26.0	150.8
51.90	150.48	58.23	149.33	57.65	149.33	42.83	150.52	44.30	150.44	27.0	150.84
53.65	150.49	60.16	149.18	59.71	149.18	44.59	150.38	48.00	150.44	28.0	150.87
55.09	150.11	61.78	149.32	61.36	149.32	47.90	150.42	51.09	150.49	29.0	150.87
56.24	149.81	63.75	149.40	63.14	149.40	51.68	150.46	52.88	150.49	30.0	150.75
57.05	149.57	66.11	149.94	65.50	149.94	54.43	150.03	53.97	150.23	31.0	150.75
57.45	149.42	67.63	150.46	66.50	150.20	56.21	149.58	55.51	149.77	32.0	150.75
57.86	149.26	76.40	150.30	67.20	150.46	56.82	149.63	56.29	149.55	33.0	150.67
58.99	149.16	83.42	150.63	75.85	150.43	56.85	149.56	56.41	149.49	34.0	150.58
60.10	149.16	83.78	150.69	82.82	150.63	57.15	149.44	57.04	149.33	35.0	150.62
61.10	149.20	83.84	150.68	83.35	150.69	58.61	149.22	58.76	149.25	36.0	150.61
62.24	149.18			83.40	150.68	60.29	149.09	59.78	149.29	37.0	150.52
63.20	149.33			83.46	150.68	61.07	149.25	60.57	149.21	38.0	150.56
64.34	149.40					62.20	149.37	62.03	149.35	39.0	150.56
65.05	149.60					63.35	149.37	63.62	149.34	40.0	150.61
65.61	149.71					64.28	149.58	63.87	149.62	41.0	150.62
67.42	150.08					65.48	149.78	65.48	149.83	42.0	150.67
68.90	150.42					67.36	150.29	67.57	150.47	43.0	150.57
69.34	150.47					68.75	150.50	70.48	150.54	44.0	150.55
71.02	150.46					71.74	150.43	74.25	150.32	45.0	150.53
75.41	150.30					74.94	150.39	77.13	150.34	46.0	150.43



	100	MARKATON COVIDED IN	AREA OR SHILL	A CONTRACTOR OF THE PARTY OF TH	THE PERSON NAMED IN	
SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	150.47	150.46	150.48	150.46	150.47	150.51
Bankfull Cross-Sectional Area	12.9	13.16	12.52	12.74	12.12	12.39
Bankfull Width	15.6	15.35	15.6	16.99	14.61	15.84
Flood Prone Area Elevation	151.78	151.74	151.78	151.83	151.73	151.88
Flood Prone Width	200	200	200	200	200	200
Max Depth at Bankfull	1.31	1.28	1.3	1.37	1.26	1.37
Mean Depth at Bankfull	0.83	0.79	0.8	0.75	0.83	0.78
W/D Ratio	18.73	19.43	19.50	22.65	17.60	20.31
Entrenchment Ratio	12.86	13.03	12.82	11.77	13.69	12.63
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type						



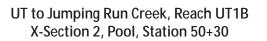


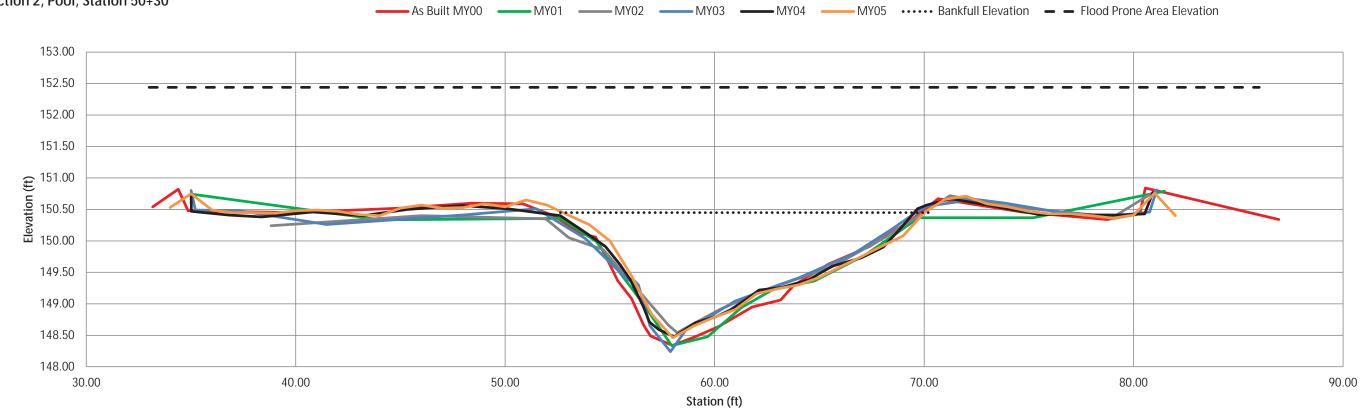
	Cape Fear River
	Jumping Run Creek
	XS-2, Pool, STA 50+30
Drainage Area(sq. mi.)	1.2
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

M	1Y00	M	IY01	M	IY02	M'	Y03	M'	Y04	M'	Y05
Station	Elevation										
33.17	150.54	35.00	150.75	38.82	150.24	35.00	150.80	35.00	150.75	34.0	150.53
34.39	150.82	44.07	150.34	46.01	150.40	35.21	150.49	35.02	150.47	35.0	150.75
34.86	150.48	52.64	150.36	51.94	150.35	37.29	150.48	36.78	150.41	36.0	150.49
39.92	150.45	54.34	149.99	53.04	150.05	41.47	150.26	38.37	150.38	37.0	150.45
45.00	150.52	56.45	149.06	54.69	149.86	47.95	150.41	40.81	150.46	38.0	150.45
48.41	150.60	57.95	148.34	57.80	148.66	51.49	150.51	43.22	150.40	39.0	150.44
50.80	150.59	59.66	148.48	58.22	148.54	53.82	150.04	45.33	150.50	40.0	150.48
50.93	150.58	61.28	148.94	58.48	148.59	55.86	149.38	47.93	150.56	41.0	150.49
52.37	150.39	62.79	149.23	60.25	148.91	56.07	149.40	50.13	150.51	42.0	150.47
53.59	150.12	64.76	149.36	62.18	149.19	56.36	149.30	52.63	150.40	43.0	150.42
54.32	150.06	67.19	149.78	65.61	149.59	56.91	148.65	53.97	150.10	44.0	150.4
55.03	149.60	69.74	150.37	68.21	150.07	57.89	148.24	54.79	149.91	45.0	150.52
55.37	149.37	75.21	150.37	71.23	150.72	58.66	148.60	55.49	149.62	46.0	150.57
56.04	149.08	81.48	150.79	73.91	150.55	59.64	148.77	55.98	149.38	47.0	150.52
56.61	148.66			79.03	150.38	60.96	149.04	56.59	148.96	48.0	150.53
56.93	148.49			81.09	150.80	63.05	149.30	56.89	148.71	49.0	150.59
57.99	148.34					63.99	149.41	57.33	148.59	50.0	150.54
59.16	148.49					66.61	149.79	58.06	148.48	51.0	150.65
60.19	148.64					68.52	150.20	59.08	148.70	52.0	150.57
61.79	148.95					69.55	150.44	60.09	148.80	53.0	150.41
63.15	149.06					70.14	150.55	60.74	148.90	54.0	150.26
63.76	149.29					72.45	150.66	61.45	149.06	55.0	150
65.43	149.63					73.88	150.60	62.12	149.22	56.0	149.46
67.39	149.91					76.37	150.46	63.19	149.26	57.0	148.83
69.34	150.32					78.95	150.39	64.47	149.38	58.0	148.46
70.67	150.67					80.77	150.46	65.63	149.60	59.0	148.65



SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	150.58	150.36	150.35	150.51	150.40	150.45
Bankfull Cross-Sectional Area	21.57	17.26	15.57	18.60	16.78	17.40
Bankfull Width	19.33	17.30	17.56	18.53	16.77	17.25
Flood Prone Area Elevation	152.82	152.38	152.16	152.78	152.32	152.44
Flood Prone Width	200	200	200	200	200	200
Max Depth at Bankfull	2.25	2.02	1.81	2.27	1.92	1.99
Mean Depth at Bankfull	1.12	1.01	0.89	1.00	1.00	1.01
W/D Ratio	17.26	17.13	17.13	18.53	16.77	17.08
Entrenchment Ratio	10.35	11.56	11.56	10.79	11.93	11.59
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type	С	С	С	С	С	С



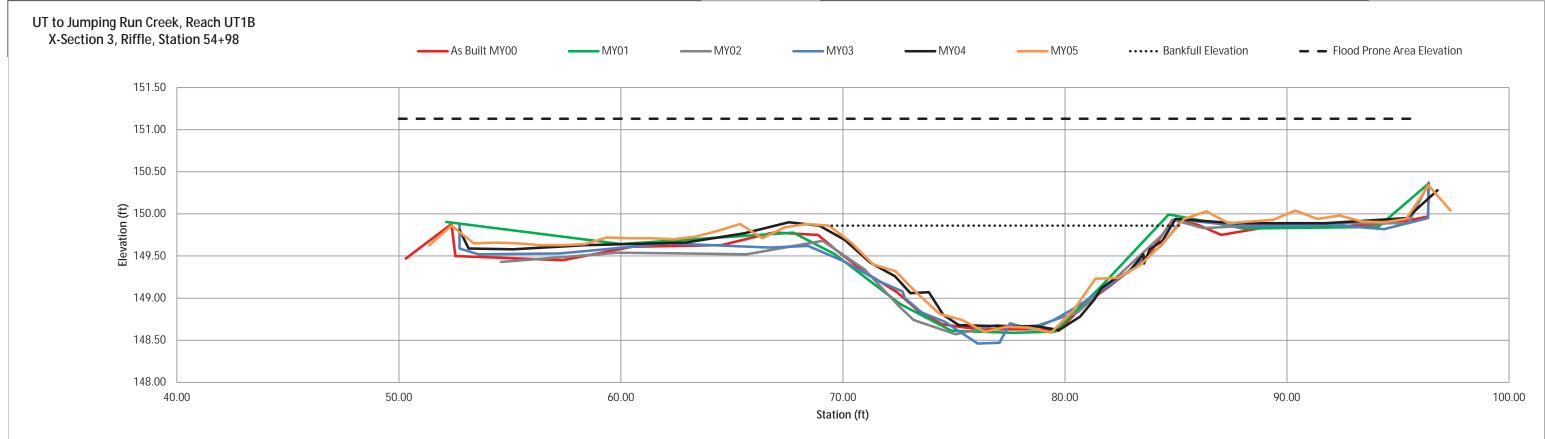


	Cape Fear River
Watershed	Jumping Run Creek
	XS-3, Riffle, STA 54+98
Drainage Area(sq. mi.)	
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

N	IY00	M	IY01	M	IY02	M'	Y03	M\	/04	M'	Y05
Station	Elevation										
50.31	149.47	52.13	149.90	54.60	149.43	52.73	149.87	52.73	149.81	51.37	149.63
52.37	149.88	60.01	149.64	59.86	149.54	52.73	149.59	53.14	149.59	52.37	149.86
52.54	149.50	67.76	149.78	65.67	149.52	53.57	149.52	55.13	149.58	53.37	149.65
57.38	149.45	69.63	149.52	69.09	149.68	57.24	149.53	58.42	149.63	54.37	149.66
60.52	149.61	72.58	148.93	70.98	149.34	62.14	149.65	62.91	149.66	55.37	149.65
64.53	149.63	74.88	148.61	72.54	148.90	66.69	149.60	65.56	149.77	56.37	149.63
66.87	149.78	77.71	148.59	73.18	148.74	68.43	149.62	67.56	149.90	57.37	149.63
68.88	149.75	79.57	148.60	75.08	148.57	70.03	149.44	68.94	149.86	58.37	149.64
69.74	149.56	81.66	149.15	76.91	148.68	71.64	149.20	70.09	149.69	59.37	149.72
70.98	149.31	84.67	149.99	78.47	148.65	72.68	149.08	71.24	149.42	60.37	149.71
72.43	149.07	88.05	149.83	80.57	148.83	72.79	149.00	72.34	149.26	61.37	149.71
73.48	148.83	94.10	149.85	82.33	149.25	73.55	148.83	73.04	149.06	62.37	149.7
74.45	148.69	96.38	150.36	84.38	149.75	74.57	148.72	73.87	149.07	63.37	149.73
75.49	148.65			84.88	149.93	76.07	148.46	74.52	148.80	64.37	149.8
76.56	148.63			86.24	149.83	77.05	148.47	75.22	148.68	65.37	149.88
77.68	148.63			90.28	149.89	77.52	148.70	76.61	148.67	66.37	149.71
78.65	148.63			95.47	149.89	78.54	148.63	77.61	148.66	67.37	149.84
79.71	148.61			96.33	150.34	79.49	148.74	78.67	148.67	68.37	149.88
80.16	148.73					80.35	148.87	79.73	148.62	69.37	149.86
80.81	148.91					81.77	149.11	80.68	148.78	70.37	149.66
82.01	149.14					83.39	149.42	81.31	148.98	71.37	149.4
83.76	149.51					84.35	149.63	81.65	149.12	72.37	149.32
84.84	149.93					85.27	149.93	82.19	149.22	73.37	149.05
85.99	149.87					88.17	149.85	82.87	149.31	74.37	148.81
87.04	149.75					91.99	149.87	83.53	149.52	75.37	148.74
89.46	149.86					94.37	149.82	83.56	149.41	76.37	148.6



SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	149.75	149.78	149.68	149.62	149.86	149.86
Bankfull Cross-Sectional Area	11.71	13.91	10.69	9.88	12.29	12.04
Bankfull Width	15.50	16.16	15.00	15.90	15.86	15.73
Flood Prone Area Elevation	150.89	150.97	150.79	150.78	151.10	151.13
Flood Prone Width	200	200	200	200	200	200
Max Depth at Bankfull	1.14	1.19	1.11	1.16	1.24	1.27
Mean Depth at Bankfull	0.76	0.76	0.71	0.62	0.78	0.77
W/D Ratio	20.90	21.26	21.13	25.65	20.33	20.43
Entrenchment Ratio	12.91	12.38	13.33	12.58	12.61	12.71
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type	((C	C	C	C

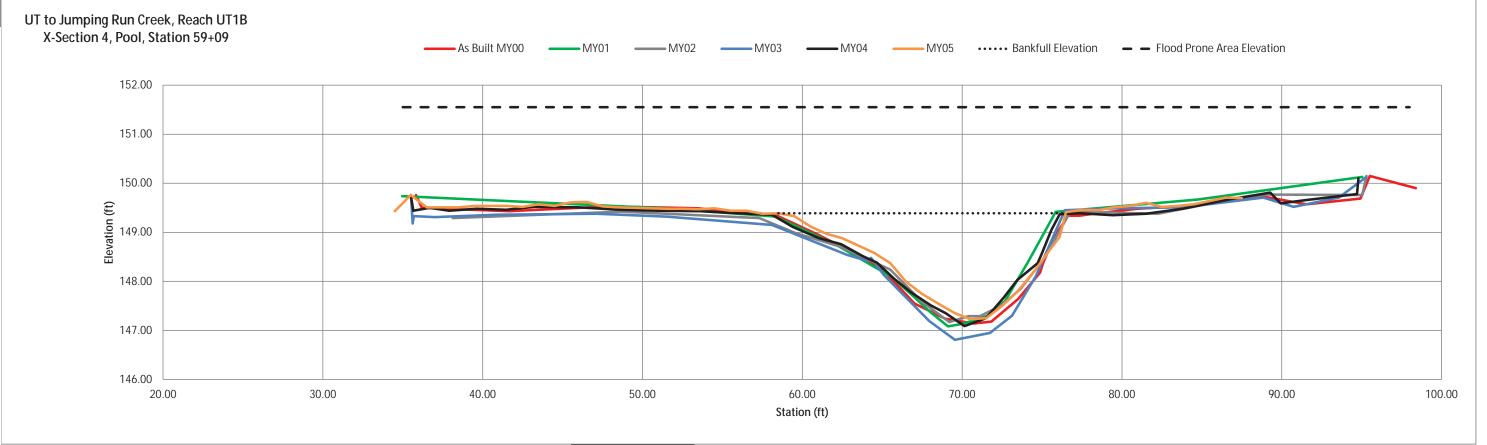


	Cape Fear River
Watershed	Jumping Run Creek
	XS-4, Pool, STA 59+09
Drainage Area(sq. mi.)	
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

M	IY00	M	IY01	M	IY02	M'	Y03	M'	/ 04	M'	Y05
Station	Elevation	Station	Elevation								
35.83	149.76	34.96	149.74	38.12	149.29	35.52	149.72	35.50	149.76	34.5	149.43
36.19	149.50	51.33	149.49	48.68	149.42	35.62	149.18	35.66	149.44	35.5	149.76
41.66	149.43	58.28	149.32	57.30	149.29	35.69	149.33	36.68	149.50	36.5	149.51
47.94	149.53	62.04	148.76	59.53	148.99	37.01	149.31	37.90	149.44	37.5	149.51
53.48	149.49	65.56	148.10	62.35	148.71	40.89	149.36	39.63	149.48	38.5	149.51
58.28	149.36	66.97	147.69	65.50	148.24	47.11	149.38	41.47	149.46	39.5	149.54
60.99	148.95	68.00	147.38	67.46	147.59	51.50	149.32	43.22	149.52	40.5	149.54
63.04	148.61	69.12	147.08	69.20	147.17	58.10	149.15	46.02	149.51	41.5	149.54
65.10	148.21	70.02	147.14	70.40	147.29	62.80	148.54	48.55	149.46	42.5	149.52
67.01	147.55	71.57	147.30	71.12	147.29	64.05	148.42	50.93	149.44	43.5	149.57
68.95	147.24	72.68	147.60	72.46	147.51	64.30	148.48	53.62	149.43	44.5	149.54
70.73	147.14	74.11	148.39	73.66	147.85	65.10	148.13	55.91	149.39	45.5	149.61
71.83	147.18	75.85	149.42	75.13	148.47	66.64	147.62	58.09	149.36	46.5	149.62
73.50	147.64	84.75	149.67	76.79	149.43	67.95	147.19	59.40	149.11	47.5	149.53
74.87	148.18	95.04	150.13	77.13	149.42	69.55	146.81	61.05	148.88	48.5	149.51
75.08	148.39			82.24	149.38	71.74	146.95	62.42	148.76	49.5	149.5
75.70	148.87			86.84	149.67	73.12	147.30	63.80	148.51	50.5	149.49
76.63	149.34			88.87	149.77	74.60	148.10	64.67	148.38	51.5	149.48
77.37	149.34			95.04	149.76	76.43	149.45	65.75	148.05	52.5	149.48
78.21	149.38			95.30	150.15	79.61	149.49	66.82	147.77	53.5	149.47
80.92	149.48					83.81	149.51	68.05	147.51	54.5	149.49
84.67	149.55					88.85	149.71	68.98	147.35	55.5	149.44
88.81	149.73					90.74	149.52	70.15	147.09	56.5	149.44
91.55	149.57					93.56	149.71	71.49	147.25	57.5	149.38
94.93	149.69					95.30	150.13	72.60	147.67	58.5	149.39
95.51	150.15							73.45	148.03	59.5	149.33



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SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	149.34	149.32	149.29	149.15	149.36	149.39
Bankfull Cross-Sectional Area	22.42	20.32	20.78	21.47	20.95	20.46
Bankfull Width	18.22	17.38	19.25	17.92	17.99	19.15
Flood Prone Area Elevation	151.54	151.56	151.41	151.49	151.63	151.55
Flood Prone Width	200	200	200	200	200	200
Max Depth at Bankfull	2.20	2.24	2.12	2.34	2.27	2.16
Mean Depth at Bankfull	1.23	1.17	1.08	1.20	1.16	1.07
W/D Ratio	14.81	14.85	17.82	14.93	15.51	17.90
Entrenchment Ratio	10.98	11.51	10.39	11.16	11.12	10.44
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type	((ſ	C	(C

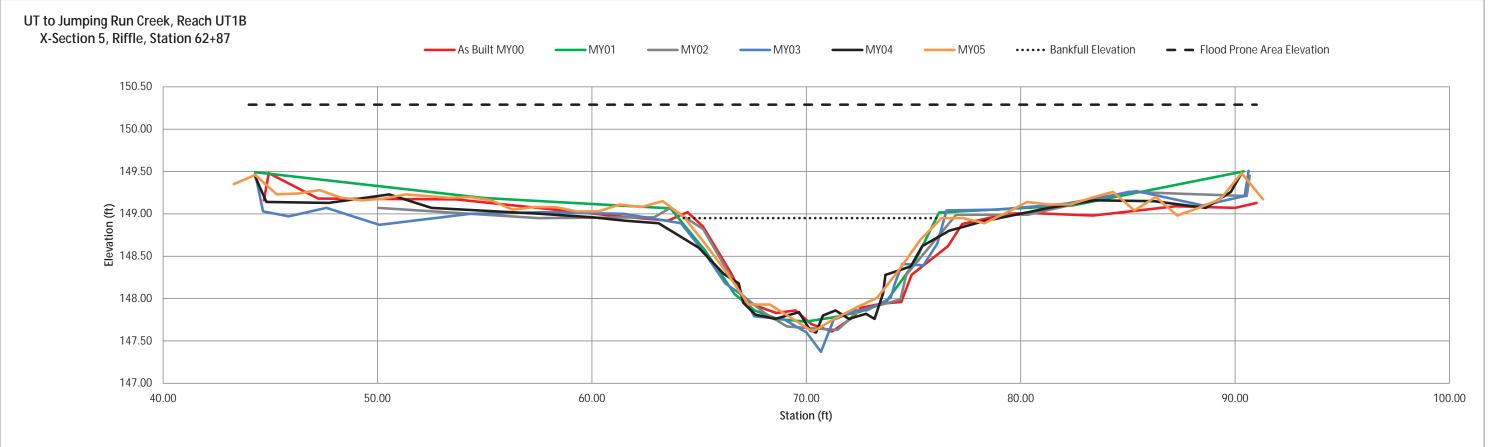


	Cape Fear River
	Jumping Run Creek
	XS-5, Riffle, STA 62+87
Drainage Area(sq. mi.)	
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

M	1Y00	M	IY01	I	Y02	M\	/03	M'	Y04	M'	Y05
Station	Elevation										
44.70	149.16	44.30	149.49	50.03	149.07	44.29	149.48	44.30	149.44	43.3	149.35
44.93	149.48	54.94	149.19	57.50	148.95	44.66	149.03	44.82	149.14	44.3	149.46
47.23	149.18	63.66	149.07	62.90	148.96	45.86	148.97	47.72	149.13	45.3	149.23
53.66	149.17	65.27	148.57	63.66	149.07	47.62	149.07	50.55	149.23	46.3	149.24
58.24	149.05	66.66	148.05	65.19	148.82	50.09	148.87	52.51	149.07	47.3	149.28
61.29	148.97	67.60	147.86	66.95	148.05	54.34	149.00	57.59	149.00	48.3	149.19
63.55	148.92	68.69	147.76	68.05	147.83	57.78	149.02	60.05	148.96	49.3	149.16
64.46	149.02	69.97	147.73	69.11	147.67	61.49	149.00	61.53	148.92	50.3	149.18
65.18	148.85	71.23	147.78	71.46	147.63	64.15	148.89	63.11	148.89	51.3	149.23
66.49	148.30	72.51	147.84	72.41	147.85	65.25	148.54	64.98	148.60	52.3	149.21
67.17	147.96	73.74	147.97	74.39	147.99	66.22	148.18	66.15	148.29	53.3	149.19
68.59	147.83	75.02	148.41	74.66	148.28	67.07	148.03	66.85	148.18	54.3	149.2
69.50	147.86	76.19	149.02	76.99	148.99	67.57	147.79	67.06	147.95	55.3	149.16
70.23	147.70	82.42	149.10	80.33	148.99	68.92	147.76	67.62	147.81	56.3	149.05
71.20	147.61	90.40	149.50	85.02	149.26	70.01	147.60	68.54	147.76	57.3	149.08
72.18	147.78			90.54	149.21	70.68	147.37	69.66	147.84	58.3	149.08
72.54	147.89			90.68	149.45	71.27	147.75	70.19	147.62	59.3	149.03
73.50	147.94					72.31	147.86	70.45	147.60	60.3	149.03
74.43	147.96					72.81	147.86	70.77	147.80	61.3	149.11
74.91	148.28					73.59	147.96	71.36	147.86	62.3	149.08
76.61	148.62					73.94	148.01	71.99	147.76	63.3	149.15
77.27	148.88					74.13	148.18	72.78	147.82	64.3	148.96
79.38	149.00					74.48	148.41	73.18	147.76	65.3	148.64
80.42	149.01					75.46	148.39	73.58	148.06	66.3	148.3
83.37	148.98					76.11	148.65	73.69	148.28	67.3	147.93
87.22	149.09					76.54	149.04	74.87	148.38	68.3	147.93



			Control of the Contro			
SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	149.02	149.07	148.99	148.89	148.89	148.95
Bankfull Cross-Sectional Area	11.69	11.94	11.05	10.25	9.80	9.59
Bankfull Width	15.9	15.64	12.84	12.22	14.83	11.97
Flood Prone Area Elevation	150.38	150.41	150.35	150.41	150.18	150.29
Flood Prone Width	200	200	200	200	200	200
Max Depth at Bankfull	1.41	1.34	1.36	1.52	1.29	1.34
Mean Depth at Bankfull	0.74	0.76	0.86	0.84	0.66	0.80
W/D Ratio	21.49	20.58	14.93	14.55	22.47	14.96
Entrenchment Ratio	12.58	12.79	15.58	16.37	13.49	16.71
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C	C

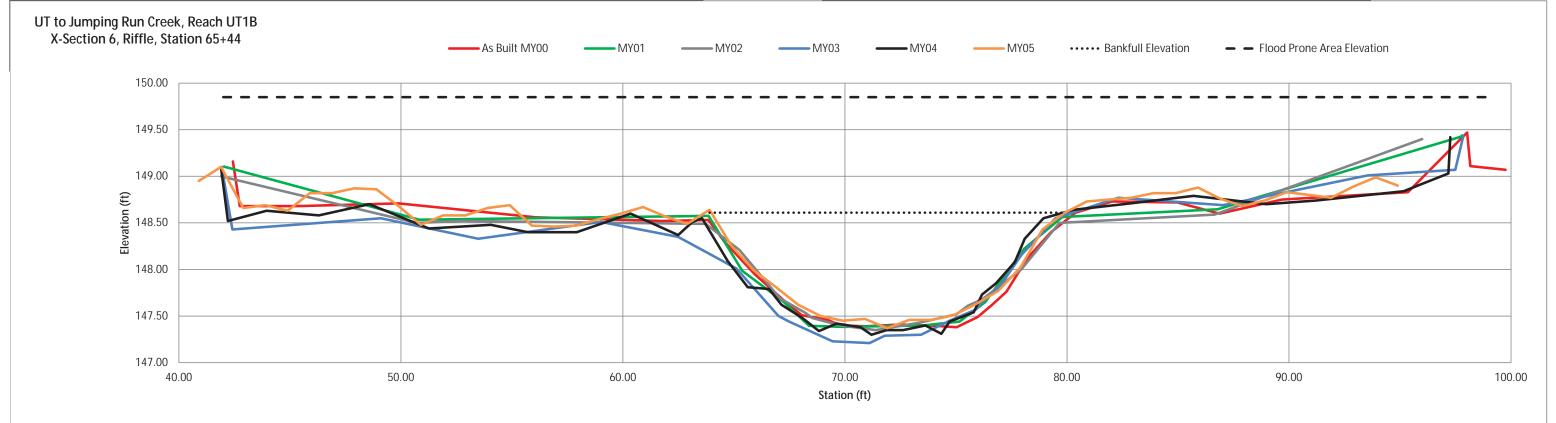


River Basin	Cape Fear River
Watershed	Jumping Run Creek
	XS-6, Riffle, STA 65+44
Drainage Area(sq. mi.)	
	9/22/2014
Field Crew	L. Taylor, A. Baldwin, N. Ronan

N	1Y00	M	Y01	M	Y02	M'	Y03	M'	Y04	M'	Y05
Station	Elevation										
42.43	149.16	42.03	149.10	41.90	149.00	41.93	149.10	41.90	149.09	40.9	148.95
42.74	148.68	50.83	148.53	50.70	148.50	42.41	148.43	42.21	148.52	41.9	149.1
45.36	148.68	63.86	148.58	52.78	148.52	49.10	148.55	43.95	148.63	42.9	148.66
49.90	148.71	65.38	147.99	63.73	148.49	53.48	148.33	46.30	148.58	43.9	148.69
56.07	148.56	67.20	147.66	65.25	148.21	59.01	148.51	48.58	148.70	44.9	148.63
61.78	148.52	68.38	147.40	67.07	147.69	62.48	148.35	51.26	148.44	45.9	148.82
63.85	148.53	69.92	147.38	68.25	147.53	65.11	148.01	54.05	148.48	46.9	148.82
64.56	148.30	71.52	147.39	68.52	147.48	67.01	147.50	55.72	148.40	47.9	148.87
65.93	147.95	73.51	147.40	69.79	147.40	67.49	147.44	57.92	148.40	48.9	148.86
67.33	147.65	75.16	147.44	71.39	147.35	69.44	147.23	60.35	148.60	49.9	148.68
68.06	147.51	76.31	147.65	73.38	147.43	71.11	147.21	62.49	148.37	50.9	148.48
69.22	147.46	78.07	148.22	75.03	147.52	71.79	147.29	63.13	148.51	51.9	148.58
69.80	147.40	79.79	148.56	75.53	147.61	73.43	147.30	63.56	148.55	52.9	148.58
70.94	147.39	86.78	148.65	76.18	147.68	74.72	147.45	64.72	148.09	53.9	148.66
72.49	147.41	97.75	149.43	77.94	148.00	75.89	147.57	65.62	147.81	54.9	148.69
73.80	147.40	97.79	149.44	79.66	148.50	76.18	147.65	66.58	147.79	55.9	148.47
75.03	147.38			86.65	148.59	76.98	147.82	67.14	147.62	56.9	148.46
75.98	147.49			96.00	149.40	77.96	148.16	68.08	147.48	57.9	148.47
76.63	147.62					79.48	148.55	68.83	147.34	58.9	148.54
77.27	147.76					82.31	148.77	69.62	147.42	59.9	148.6
78.21	148.12					87.03	148.69	70.70	147.38	60.9	148.67
79.28	148.40					93.55	149.01	71.19	147.30	61.9	148.57
80.39	148.61					97.49	149.07	71.88	147.35	62.9	148.49
82.03	148.73					97.85	149.43	72.62	147.35	63.9	148.64
84.97	148.72							73.62	147.40	64.9	148.25
86.87	148.60							74.34	147.31	65.9	147.99



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SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	148.61	148.58	148.49	148.51	148.55	148.61
Bankfull Cross-Sectional Area	14.51	13.74	12.05	14.64	13.48	13.40
Bankfull Width	16.39	17.17	15.90	20.32	15.38	15.92
Flood Prone Area Elevation	149.84	149.78	149.63	149.81	149.80	149.85
Flood Prone Width	200.00	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	1.23	1.20	1.14	1.30	1.25	1.24
Mean Depth at Bankfull	0.89	0.80	0.76	0.72	0.88	0.84
W/D Ratio	18.42	21.46	20.92	28.22	17.48	18.95
Entrenchment Ratio	12.20	11.65	12.58	9.84	13.00	12.56
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type	C.	C.	C.	C.	C.	C.

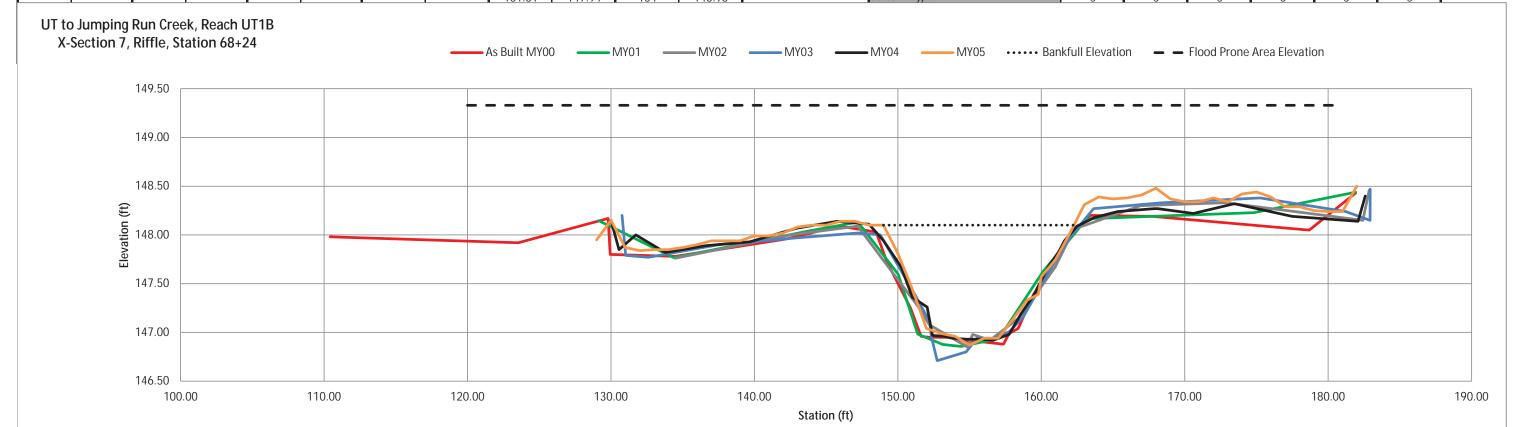


	Cape Fear River
	Jumping Run Creek
	XS-7, Riffle, STA 68+24
Drainage Area(sq. mi.)	1.2
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

IV	1Y00	M	IY01	M	Y02	M'	Y03	M'	Y04	M'	Y05
Station	Elevation										
110.41	147.98	129.14	148.15	134.46	147.76	130.77	148.20	130.00	148.15	129	147.95
123.54	147.92	134.38	147.77	142.52	148.00	131.03	147.79	130.56	147.85	130	148.15
129.80	148.17	143.99	148.05	147.21	148.09	132.60	147.77	131.73	148.00	131	147.87
129.95	147.80	147.23	148.13	147.46	148.04	137.52	147.90	133.78	147.82	132	147.84
134.50	147.78	150.02	147.60	151.44	147.26	142.89	147.97	136.65	147.89	133	147.85
142.25	147.96	151.39	146.98	152.19	147.08	147.22	148.02	139.68	147.93	134	147.85
145.91	148.09	153.14	146.88	154.85	146.85	148.78	148.00	142.95	148.07	135	147.87
148.49	148.03	154.42	146.86	155.21	146.98	151.19	147.39	145.76	148.14	136	147.9
149.22	147.73	157.05	146.94	156.43	146.92	152.21	147.11	147.98	148.11	137	147.94
150.88	147.25	160.12	147.62	158.46	147.15	152.34	146.95	149.01	147.94	138	147.94
151.62	146.96	163.18	148.17	160.97	147.67	152.75	146.71	150.24	147.67	139	147.94
152.18	146.95	174.81	148.23	162.27	148.06	154.77	146.80	151.01	147.36	140	147.99
153.51	146.95	181.92	148.44	166.94	148.30	155.51	146.94	152.04	147.26	141	147.99
154.78	146.91			172.83	148.33	156.73	146.94	152.41	146.97	142	148.02
156.05	146.90			178.19	148.23	157.80	147.01	153.20	146.96	143	148.08
157.36	146.88			182.42	148.15	158.75	147.16	153.83	146.94	144	148.1
157.76	146.99			182.87	148.46	159.55	147.37	154.79	146.93	145	148.1
158.39	147.04					160.04	147.50	155.77	146.93	146	148.14
159.46	147.39					161.80	147.94	156.65	146.92	147	148.14
161.88	147.97					163.65	148.27	157.75	146.98	148	148.1
163.39	148.20					168.43	148.33	158.58	147.19	149	148.1
167.73	148.19					175.26	148.38	159.52	147.39	150	147.81
178.68	148.05					181.22	148.24	159.78	147.47	151	147.45
181.92	148.43					182.92	148.15	160.49	147.67	152	147.04
						182.93	148.47	161.22	147.83	153	146.99
								161.61	147.94	154	146.96



	COMPANY OF THE RESIDENCE OF THE PARTY OF THE					
SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	148.09	148.13	148.06	148.00	148.11	148.10
Bankfull Cross-Sectional Area	11.77	12.18	10.95	10.08	10.97	10.54
Bankfull Width	16.87	15.72	14.91	13.36	14.79	13.28
Flood Prone Area Elevation	149.30	149.40	149.27	149.29	149.30	149.33
Flood Prone Width	200.00	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	1.21	1.27	1.21	1.29	1.19	1.23
Mean Depth at Bankfull	0.70	0.77	0.73	0.75	0.74	0.79
W/D Ratio	24.10	20.42	20.42	17.81	19.99	16.81
Entrenchment Ratio	11.86	12.72	13.41	14.97	13.52	15.06
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type	С	С	С	С	С	С

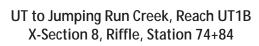


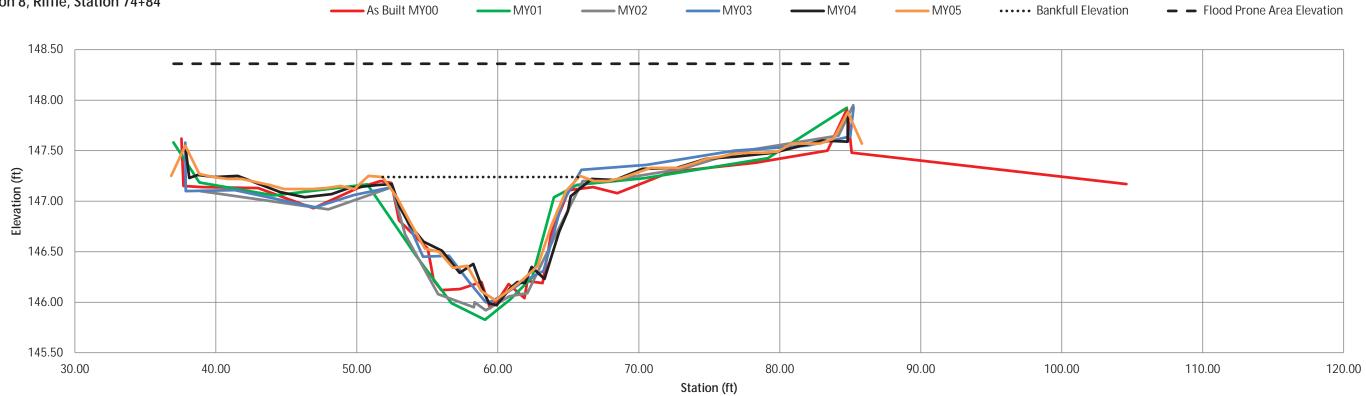
River Basin	Cape Fear River
	Jumping Run Creek
XS ID	XS-8, Riffle, STA 72+84
Drainage Area(sq. mi.)	1.2
Date	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

M	IY00	M	IY01	M	IY02	M	Y03	M)	Y04	M'	Y05
Station	Elevation										
37.56	147.62	36.99	147.58	38.91	147.10	37.83	147.58	37.83	147.55	36.83	147.25
37.71	147.15	38.83	147.19	47.98	146.92	37.87	147.10	38.12	147.23	37.83	147.55
39.04	147.14	44.12	147.06	52.49	147.14	41.35	147.11	38.72	147.26	38.83	147.27
43.00	147.13	50.75	147.17	53.42	146.67	47.05	146.94	39.95	147.24	39.83	147.24
46.92	146.93	54.21	146.46	55.76	146.08	49.77	147.06	41.56	147.25	40.83	147.22
50.07	147.13	56.70	145.99	58.31	145.95	52.51	147.14	43.24	147.16	41.83	147.22
51.69	147.20	59.09	145.83	58.35	146.00	54.70	146.45	44.56	147.09	42.83	147.19
52.45	147.18	60.88	146.03	59.15	145.92	56.54	146.46	46.30	147.04	43.83	147.16
52.99	146.81	62.43	146.25	60.83	146.06	57.97	146.20	48.20	147.07	44.83	147.12
55.04	146.53	63.98	147.04	62.09	146.09	59.14	146.00	49.43	147.13	45.83	147.12
55.45	146.22	65.64	147.16	64.11	146.67	59.57	146.01	51.47	147.16	46.83	147.12
55.99	146.12	70.44	147.23	66.02	147.20	60.59	146.09	52.48	147.17	47.83	147.13
57.33	146.13	79.16	147.43	67.67	147.20	61.86	146.21	53.02	146.95	48.83	147.15
58.84	146.20	84.76	147.93	73.08	147.32	63.24	146.31	53.73	146.77	49.83	147.12
59.45	145.94			77.07	147.49	64.52	146.97	54.73	146.60	50.83	147.25
60.26	146.07			84.17	147.65	65.93	147.31	56.05	146.51	51.83	147.24
60.77	146.18			85.21	147.95	70.56	147.36	57.29	146.29	52.83	147.04
61.89	146.04					76.79	147.50	58.26	146.38	53.83	146.78
62.09	146.21					81.94	147.55	59.03	146.09	54.83	146.53
63.17	146.19					85.00	147.64	59.37	145.99	55.83	146.5
63.79	146.68					85.23	147.93	59.92	145.97	56.83	146.34
65.03	147.11							60.88	146.14	57.83	146.36
66.76	147.14							61.39	146.20	58.83	146.11
68.47	147.08							61.93	146.19	59.83	146.02
72.26	147.29							62.40	146.35	60.83	146.12
78.25	147.38							63.31	146.23	61.83	146.23



	CONTRACTOR OF THE PARTY OF		Sign See Con-City	The state of the s	ALL THE REAL	
SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	147.20	147.17	147.14	147.14	147.17	147.24
Bankfull Cross-Sectional Area	10.81	11.37	11.08	9.16	9.50	9.86
Bankfull Width	15.10	15.24	13.31	12.71	13.72	13.93
Flood Prone Area Elevation	148.46	148.51	148.36	148.28	148.37	148.46
Flood Prone Width	200.00	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	1.26	1.34	1.22	1.14	1.20	1.22
Mean Depth at Bankfull	0.72	0.75	0.83	0.72	0.69	0.71
W/D Ratio	20.97	20.32	16.04	17.65	19.88	19.62
Entrenchment Ratio	13.25	13.12	15.03	15.74	14.58	14.36
Bank Height Ratio	1.000	1.000	1.000	1.0	1.0	1.0
Stream Type		C	C	C	C	C



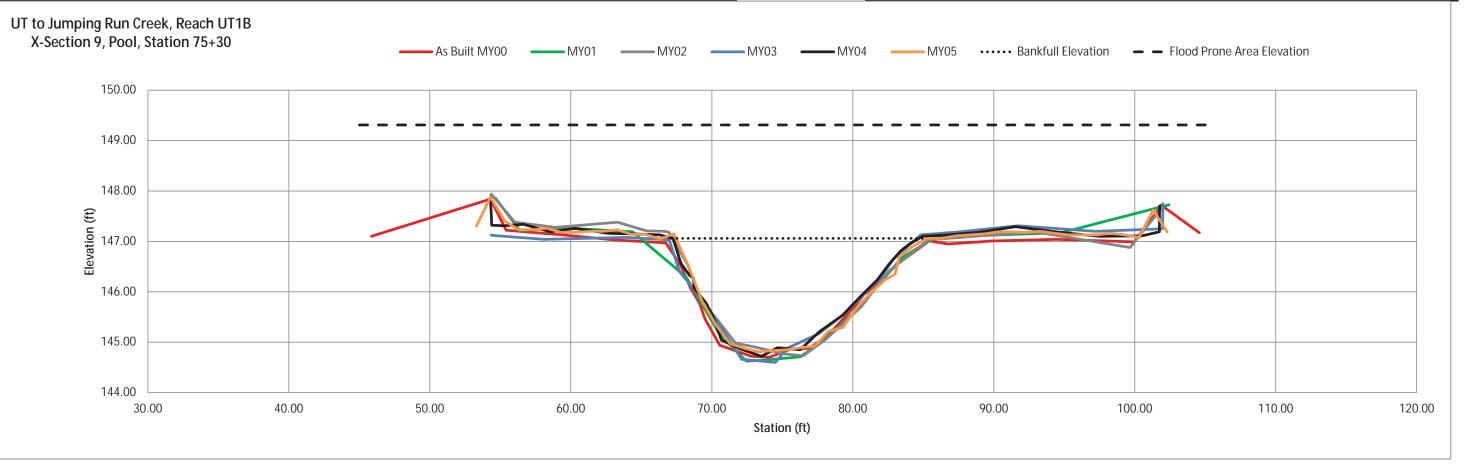


	Cape Fear River
	Jumping Run Creek
	XS-9, Pool, STA 75+30
Drainage Area(sq. mi.)	1.2
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

M	IY00	M	IY01	M	IY02	M'	Y03	M\	Y04	M'	Y05
Station	Elevation										
45.86	147.10	54.66	147.86	54.29	147.85	54.34	147.13	54.30	147.88	53.3	147.3
54.31	147.84	56.39	147.21	54.35	147.94	54.42	147.12	54.39	147.32	54.3	147.88
54.32	147.83	59.30	147.27	56.03	147.38	58.09	147.04	55.29	147.31	55.3	147.41
55.41	147.22	64.36	147.19	58.91	147.28	63.94	147.08	56.64	147.34	56.3	147.23
59.39	147.13	68.17	146.30	63.31	147.38	66.98	147.03	58.55	147.19	57.3	147.23
63.00	147.03	70.50	145.18	65.38	147.21	67.71	146.40	60.34	147.26	58.3	147.26
66.74	146.97	72.44	144.63	66.68	147.20	68.55	146.11	62.58	147.16	59.3	147.18
67.78	146.53	73.73	144.64	66.98	147.18	69.87	145.63	64.42	147.15	60.3	147.18
68.50	146.07	76.28	144.71	68.29	146.53	72.12	144.66	66.30	147.13	61.3	147.2
69.12	145.78	78.01	145.05	69.18	145.88	74.51	144.60	67.25	147.06	62.3	147.2
69.51	145.47	80.48	145.70	71.69	144.98	75.34	144.88	67.82	146.56	63.3	147.23
70.56	144.94	83.46	146.67	72.96	144.91	77.61	145.17	68.40	146.33	64.3	147.14
72.81	144.72	85.82	147.08	75.08	144.77	79.65	145.62	68.71	146.27	65.3	147.14
74.08	144.70	94.80	147.17	76.49	144.73	82.02	146.30	68.73	146.08	66.3	147.05
75.57	144.86	102.44	147.73	78.10	145.06	82.88	146.65	69.61	145.77	67.3	147.15
76.93	144.88			80.59	145.70	84.81	147.13	70.10	145.50	68.3	146.54
78.23	145.13			82.55	146.41	87.59	147.19	70.69	145.04	69.3	145.82
80.13	145.71			85.37	147.03	91.72	147.31	72.00	144.87	70.3	145.34
80.85	145.97			92.90	147.19	97.22	147.20	73.52	144.72	71.3	144.97
80.94	145.97			99.66	146.88	101.97	147.25	74.67	144.89	72.3	144.88
83.22	146.56			102.00	147.69	102.00	147.75	76.27	144.85	73.3	144.81
85.42	147.01							77.63	145.21	74.3	144.83
86.79	146.95							79.25	145.53	75.3	144.85
89.91	147.01							80.53	145.90	76.3	144.89
94.51	147.04							81.75	146.24	77.3	144.92
99.95	146.99							82.57	146.55	78.3	145.22



		100			1000	
SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	146.97	147.08	147.19	147.03	147.06	147.06
Bankfull Cross-Sectional Area	25.96	29.08	29.36	25.48	25.24	26.21
Bankfull Width	18.48	20.67	26.07	17.43	17.45	17.85
Flood Prone Area Elevation	149.24	149.53	149.55	149.46	149.40	149.31
Flood Prone Width	200.00	200.00	200.00	200.00	200.00	200.00
Max Depth at Bankfull	2.27	2.45	2.46	2.43	2.34	2.25
Mean Depth at Bankfull	1.40	1.41	1.13	1.46	1.45	1.47
W/D Ratio	13.20	14.66	23.07	11.94	12.03	12.14
Entrenchment Ratio	10.82	9.68	7.67	11.47	11.46	11.20
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0
Stream Type	C.	C.	C.	C	C.	C.

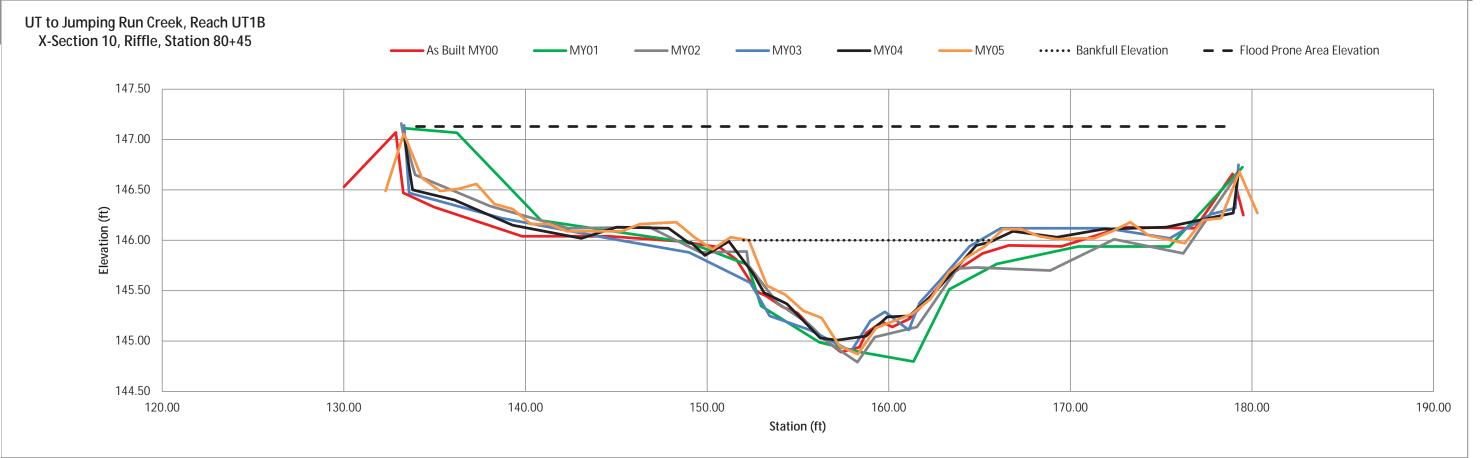


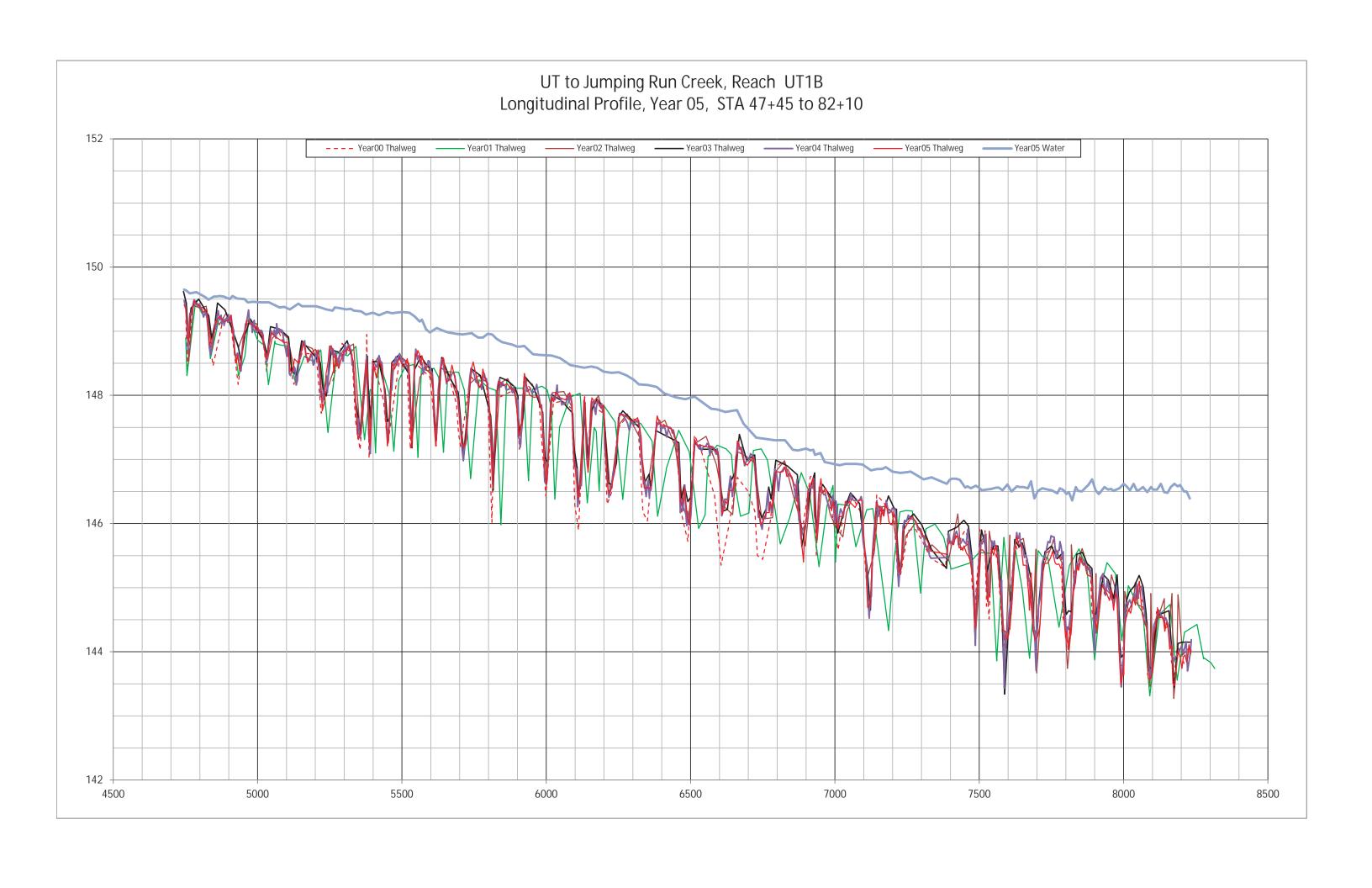
River Basin	Cape Fear River
	Jumping Run Creek
	XS-10, Riffle, STA 80+45
Drainage Area(sq. mi.)	1.2
	9/22/2014
Field Crew	T. Taylor, A. Baldwin, N. Ronan

M	IY00	M	IY01	M	Y02	M	Y03	M'	Y04	M'	Y05
Station	Elevation										
130.01	146.53	133.23	147.11	133.16	147.16	133.32	147.14	133.30	147.06	132.3	146.49
132.86	147.07	136.23	147.07	133.27	147.06	133.59	146.47	133.79	146.50	133.3	147.06
133.28	146.47	140.87	146.20	133.93	146.65	138.70	146.22	136.09	146.40	134.3	146.62
134.96	146.33	148.97	145.98	138.04	146.34	144.59	146.02	139.30	146.15	135.3	146.49
139.81	146.04	152.23	145.76	142.36	146.12	149.02	145.88	143.08	146.02	136.3	146.51
144.59	146.04	152.97	145.35	146.82	146.13	152.37	145.58	145.03	146.13	137.3	146.56
148.52	145.99	156.19	144.99	149.64	145.88	153.45	145.25	147.88	146.12	138.3	146.36
150.69	145.93	158.49	144.89	152.18	145.89	155.66	145.11	149.03	145.97	139.3	146.31
151.61	145.81	161.37	144.80	152.29	145.75	157.93	144.90	149.11	145.98	140.3	146.16
152.74	145.49	163.33	145.51	153.86	145.38	158.99	145.20	149.88	145.85	141.3	146.16
153.24	145.45	165.95	145.77	155.60	145.17	159.79	145.29	151.20	145.99	142.3	146.09
154.14	145.34	170.43	145.94	156.57	145.00	161.10	145.11	152.53	145.67	143.3	146.09
154.97	145.28	175.46	145.94	158.28	144.79	161.70	145.38	153.14	145.48	144.3	146.09
156.22	145.05	179.48	146.73	159.24	145.04	162.81	145.60	154.39	145.37	145.3	146.09
157.37	144.89			161.55	145.14	164.45	145.94	156.23	145.03	146.3	146.16
158.39	144.94			163.77	145.72	166.17	146.12	157.17	145.01	147.3	146.17
158.76	145.08			164.82	145.73	169.86	146.12	158.75	145.05	148.3	146.18
159.62	145.19			168.89	145.70	171.97	146.12	159.91	145.24	149.3	146.03
160.20	145.14			172.41	146.01	175.48	146.02	161.14	145.25	150.3	145.91
161.14	145.22			176.22	145.87	177.74	146.26	162.41	145.46	151.3	146.03
162.05	145.39			179.29	146.68	179.08	146.32	163.36	145.65	152.3	146
163.22	145.64					179.26	146.75	164.82	145.95	153.3	145.55
165.17	145.87							165.53	145.98	154.3	145.46
166.62	145.95							166.84	146.09	155.3	145.3
169.52	145.94							169.26	146.03	156.3	145.23
172.89	146.13							171.79	146.11	157.3	144.95



		THE RESERVE TO SERVE	100	A STATE OF THE STA		
SUMARY DATA	MY00	MY01	MY02	MY03	MY04	MY05
Bankfull Elevation	145.87	145.76	145.73	145.88	145.95	146.00
Bankfull Cross-Sectional Area	7.41	8.10	6.04	7.82	7.98	8.15
Bankfull Width	14.02	13.61	12.45	15.14	14.99	13.35
Flood Prone Area Elevation	146.85	146.72	146.67	146.86	146.89	147.13
Flood Prone Width	103.50	41.41	45.35	50.00	50.00	48.00
Max Depth at Bankfull	0.98	0.96	0.94	0.98	0.94	1.13
Mean Depth at Bankfull	0.53	0.59	0.36	0.52	0.53	0.61
W/D Ratio	26.45	23.07	34.58	29.12	28.28	21.89
Entrenchment Ratio	7.38	3.04	3.64	3.30	3.34	3.60
Bank Height Ratio	1.00	1.00	1.0	1.0	1.0	1.0
Stream Type	C	C	C	C	C	





					D C) l. O			Basel					-	00045	- UT	41- /45	.00 (. (1)						
Dorometer	Caura ²				Run C	Creek St				Resto	oration					o - U1'	1b (45		•	I			D l'		
Parameter	Gauge ²	Reg	ional C	urve		Pre-E	xisting	Condi	tion			Refere	ence Re	each(es	s) Data			Design			IM	onitoring	Baseline		
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD ⁵	n	Min	Mean	Med	Max	SD ⁵	n	Min	Med	Max	Min	Mean	Med	Max	SD⁵	n
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	o				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	o				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))				<u> </u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	31.399	49.709	48.08305	78.4581	11.12	32
Riffle Slope (ft/ft))				<u> </u>	-	-	-	-	-	-	-	-	-	-	-	0.001	0.003	0.005	0.0002	0.4671	0.005	6	1.662	13
Pool Length (ft))				<u>. </u>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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))				-	-	-	-	-	1	-	ı	-	-	-	-	30	40.0	50	32.49	41.47	39.95	55.87	6.35	30.00
Rc:Bankfull width (ft/ft))				-	-	-	-	-	1	1.5	ı	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/f	2						-											0.03				0.05	6		
Max part size (mm) mobilized at bankful	I						-											-				-			
Stream Power (transport capacity) W/m²	2						-											0.026				0.69)		
Additional Reach Parameters																									
Rosgen Classification	1						F5	5					E5.	/C5				C5c				C50	;		
Bankfull Velocity (fps))						-											0.78				-			
Bankfull Discharge (cfs))						9.4	4																	
Valley length (ft))						-							-											
Channel Thalweg length (ft))						650)1						-				3400				347 ⁻	1		
Sinuosity (ft)							1.0	7					1.22	/1.77				1.2				1.2			
Water Surface Slope (Channel) (ft/ft))						0.00	06										0.0016				0.001	24		
BF slope (ft/ft))						-											-				0.001	37		
³ Bankfull Floodplain Area (acres))						-							•				-				-			
⁴ % of Reach with Eroding Banks							-							•											
Channel Stability or Habitat Metric	;						-							•											
Biological or Other	r						-							-											

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. E						-	-					-	_					neter I feet)		outio	ns)							
Parameter		Pre	-Exis	ting C	ondi	tion			Refer	ence	Reac	:h(es)	Data					Desigı	n				,	As-bu	ilt/Ba	seline	9	
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	-	-	-	-	-			-	-	i	-	-										-	-	- 1	-	-		
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 loosley 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-constrution distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable section the stable section surveys and the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

			7	Table	11a.	Mon	itori	ng Da	ıta - D	imen	siona	al Mo	rpho	logy	Sumi	mary	(Dim	ensio	nal F	Param	neter	s – Cr	oss S	Section	ons)										
						Pr	ojec	t Nam	e/Nu	mber	(UT J	ump	ing R	un C	reek)	Se	gmer	nt/Rea	ach:	UT1b	(450	0 feet)												
		Cı	ross Se	ection	1 (Riffle	e)			Cı	ross Se	ction 2	2 (Pool)			Cr	oss Se	ction 3	3 (Riffl	e)			Cr	oss Se	ection 4	4 (Poo	I)			Cr	oss Se	ction	5 (Riffl	e)	
Based on fixed baseline bankfull elevation ¹	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	150.51		150.58	150.36	150.35	150.51	150.40	150.45		149.75	149.78	149.68	149.62	149.86	149.86		149.34	149.32	149.29	149.15	149.36	149.39		149.02	149.07	148.99	148.89	148.89	148.95	
Bankfull Width (ft)	15.60	15.35	15.60	16.99	14.61	15.84		19.33	17.03	17.56	18.53	16.77	17.25		15.50	16.16	15.00	15.90	15.86	15.73		18.22	17.38	19.25	17.90	17.99	19.15		15.90	15.64	12.84	12.22	14.83	11.97	
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+	200+	200+	200+	200+	200+	
Bankfull Mean Depth (ft)	0.83	0.79	0.80	0.75	0.83	0.78		1.12	1.01	0.89	1.00	1.00	1.01		0.76	0.76	0.71	0.62	0.78	0.77		1.23	1.17	1.08	1.20	4	1.07			0.76	0.86	0.84	0.66	0.80	<u>. </u>
Bankfull Max Depth (ft)	_	1.28	1.30	1.37	1.26	1.37		2.25	2.02	1.81	2.27	1.92	1.99		1.14	1.19	1.11		1.24	1.27		2.20	2.24	2.12	2.34	4	2.16		1.41		1.36	1.52	1.29		
Bankfull Cross Sectional Area (ft²)		13.16	12.52	.		12.39		21.57	17.26		18.60	16.78			11.71	13.91	10.69		12.29	_			20.32	20.78	-	_	-		11.69			10.25	1	-	
Bankfull Width/Depth Ratio		19.43	19.50		17.60	_		17.26	16.86		18.53	_	17.08		20.90	21.26	21.13						14.85	17.82	-		17.90		21.49			14.55	1		
Bankfull Entrenchment Ratio				_				10.35							12.91	12.38	_	12.58					11.51	10.39	-	1	10.44			12.79		16.37	13.49	-	
Bankfull Bank Height Ratio	4	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	1.00		
Cross Sectional Area between end pins (ft ²)		17.00	17.25	17.50		17.90		26.30	26.50	26.70			29.90		21.70	22.10	21.85			14.40		32.10	32.50	33.15			35.40		19.00	19.10	18.50			27.60	
d50 (mm))																																		
		Cı	ross Se	ection	6 (Riffle	e)			Cr	oss Se	ction 7	(Riffle	!)			Cı	oss Se	ction 8	3 (Riffl	e)			Cr	oss Se	ction 9	9 (Riffle	e)			Cro	oss Se	ction 1	0 (Riff	le)	
Based on fixed baseline bankfull elevation ¹	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	148.61		148.09	148.13	148.06	148.00	148.11	148.10		147.20	147.17	147.14	147.14	147.17	147.24		146.97	147.08	147.19	147.03	147.06	147.06		145.87	145.76	145.73	145.88	145.95	146.00	
Bankfull Width (ft)	16.39	17.17	15.90	20.32	15.38	15.92		16.87	15.72	14.91	13.36	14.79	13.28		15.10	15.24	13.31	12.71	13.72	13.93		18.48	20.67	26.07	17.43	17.45	17.85		14.02	13.61	12.45	15.14	14.99	13.35	
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+		103.50	41.41	45.35	50+	50+	50+	
Bankfull Mean Depth (ft)	0.89	0.80	0.76	0.72	0.88	0.84		0.70	0.77	0.73	0.75	0.74	0.79		0.72	0.75	0.83	0.72	0.69	0.71		1.40	1.41	1.13	1.46	4	1.47		0.53		0.36	0.52	0.53	0.61	
Bankfull Max Depth (ft)	1.23	1.20	1.14	1.30	1.25	1.24		1.21	1.27	1.21	1.29	1.19	1.23		1.26	1.34	1.22		1.20	_		2.27	2.45	2.46	2.43	_	2.25		0.98	0.96	0.94	0.98	0.94	1.13	,
Bankfull Cross Sectional Area (ft²)	14.51	13.74	4	14.64		13.40		11.77		10.95					10.81	11.37	11.08		9.50				29.08		25.48	4					6.04	7.82	7.98		
Bankfull Width/Depth Ratio	18.42	+	1	28.22	_			24.10		20.42		19.99				20.32	_		_	_				23.07	-	_	-		26.45				28.28	-	
Bankfull Entrenchment Ratio		11.65	+	_	13.00			11.86			14.97				13.25	13.12						10.82	9.68		11.47	_	l —			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	1.00	1.00	
Cross Sectional Area between end pins (ft ²)	24.30	24.50	24.00			36.10		13.10	13.40	13.25			14.40		17.20	17.60	16.85			22.10		40.10	42.10	43.65			49.20		85.50	86.10	85.05			33.90	
d50 (mm)			1																															1 1	

^{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."

									Exh					ng Dat						ary																	
	ī						T .				UT to .	umpi	ng Rui	n Cree			2345 -	UT1b	<u> </u>																		
Parameter			Bas	eline			<u> </u>		MY	′- 1*					MY	-2*					MY-	3**					MY	′- 4***			_			MY-	· <u>5</u>	—	
Dimension and Substrate - Riffle only	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	d Max	x SE	D ⁴	n I	Min N	Mean	Med	Max	SD ⁴	n
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	14.9	17.4	45 1.	.1	8 11	1.97 1	4.73	14.83 1	17.85	1.91	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	3	8 5	50+ 1	181.3	200+ 2	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	6 1.4	5 0.2	28	8 0	0.61	0.85	0.79	1.47	0.26	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	5 2.34	4 0.4	42	8 1	1.13 1	1.38	1.26	2.25	0.36	8
Bankfull Cross Sectional Area (ft²)	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	11.5	55 25.2	24 5.3	38	8 8	3.15 1	2.77	11.29 2	26.21	5.69	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	19.9	4 28.2	28 4.6	63	8 12	2.14 1	8.14	19.29 2	21.89	3.27	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	13.2	25 14.5	58 3.	.6	8 3	3.60 1	12.35	12.67 1	16.71	3.94	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	0 1.00	0 0) ;	8 1	1.00 1	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					7.1 1	14 2	22.3	38.8	36	66.1	13	13	
Riffle Slope (ft/ft)						13			0.0050			13	0.0002	0.4623	0.0048		1.7500				0.0017				0.001 0.003 0.002 0.01 0.00												
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		4 20.9 44.96 45.67									43.6	66.6	13.3	14
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		3.39			5 1.68 2.30 2.30 3				2 0.4				2.23			0.33	
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	3 18	3.8 3	31 7	/2.9 1	06.6	102.7 1	142.5	18.8	32
Channel Beltwidth (ft)	40.15	70 449	60.240	Loc oso	13.679	26	T .	1	I	l																		4	4		-	-	\rightarrow	-			
Radius of Curvature (ft)	32.491					30																							+				\rightarrow				
Rc:Bankfull width (ft/ft)	2.3175			3.0233	-	-										Patte	n data wi	ll not ty	pically be		d unless v			sional o	data or p	profile da	ata indi	cate									
Meander Wavelength (ft)				228.52	23.435	14														signil	icant shift	s from ba	aseline														
Meander Width Ratio	2.8638	4.406	4.4031	5.2466	-	-																															
Additional Reach Parameters																																					
Rosgen Classification				C5						5					С						C5							C5			_			C5			
Channel Thalweg length (ft)				471					34						347						347							471			-			347			
Sinuosity (ft) Water Surface Slope (Channel) (ft/ft)				1.2 0124						.2 0126					0.00						0.001							1.2 00113			+			1.2 0.001			
BF slope (ft/ft)				0124					0.00						0.00				0.00126 0.0014								00134			+			0.001	_			
³ Ri%/Ru%/P%/G%/S%	52	0	48	1 o	0		52	0	48	0	0		52	0	48	0	0		52 0 48 0 0						52	0	48		T 0	<u>. </u>	\blacksquare	52	0	48	0	0	
³ SC%/Sa%/G%/C%/B%/Be%																									32 0 40 0				Ť							Ť	
³ d16 / d35 / d50 / d84 / d95 /	,																								 												
² % of Reach with Eroding Banks				-											_						_																
Channel Stability or Habitat Metric				-						-						•															+						
Biological or Other				-						-			1								-										一						

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 exagerated water surface in lower section. Remnant dam upstream resulted in exagerated elevations upstream.

Appendix E. Hydrology Data

Table 12 - Verification of Bankfull Events

Figure 5

Monthly Rainfall Data
Precipitation and Water Level Plots
Wetland Hydrology Criteria Attainment Figures 6a-p Table 13

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Tab UT to Jumping Run Creek Str	le 12 - Verification of Bankf ream and Wetland Restorati		t No. 92345
Date of Data Collection	Date of Occurrence	Method	Photo
04/04/2014*	Unknown	Crest Gauge 1 and 2 and Debris Piles on Vegetation	E1
05/27/2014	Unknown	Crest Gauge 1 and 2 and Debris Piles on Vegetation	E2
08/13/2014*	Unknown	Crest Gauge 1 and 2	E3

^{*}Inidcates bankfull event was possibly influenced by beaver activity.



 $E1-Crest\ gauge\ 1$ with cork observed above the bankfull line (4/4/2014)

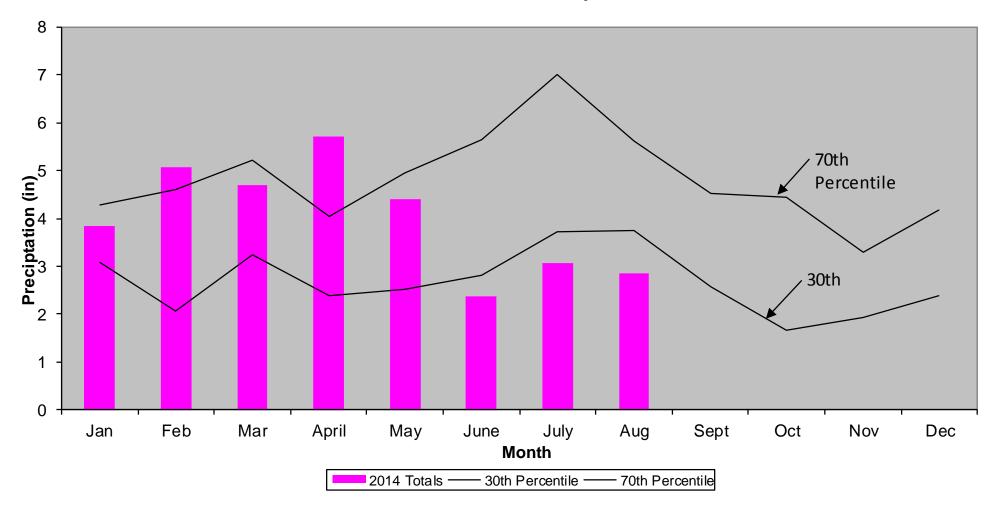


E2-Debris piles immediately downstream of crest gauge 1 (5/27/2014)

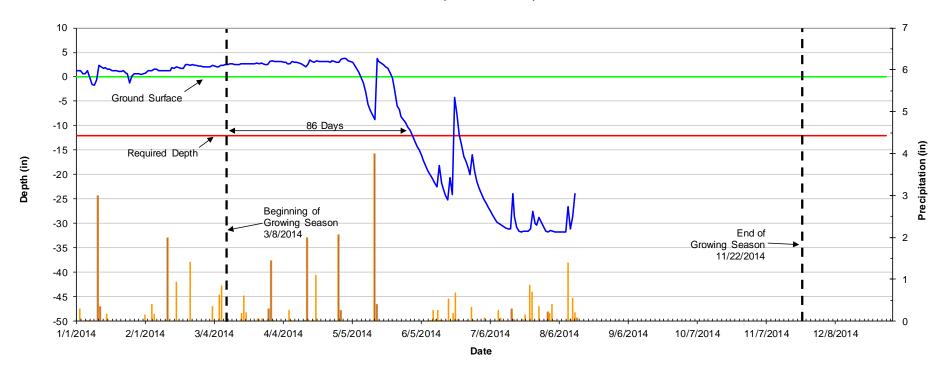


 $E3-Crest\ gauge\ 2$ with cork observed above the bankfull line (8/13/2014)

UT to Jumping Run Creek 2014 30-70 Percentile Graph Cumberland County, North Carolina



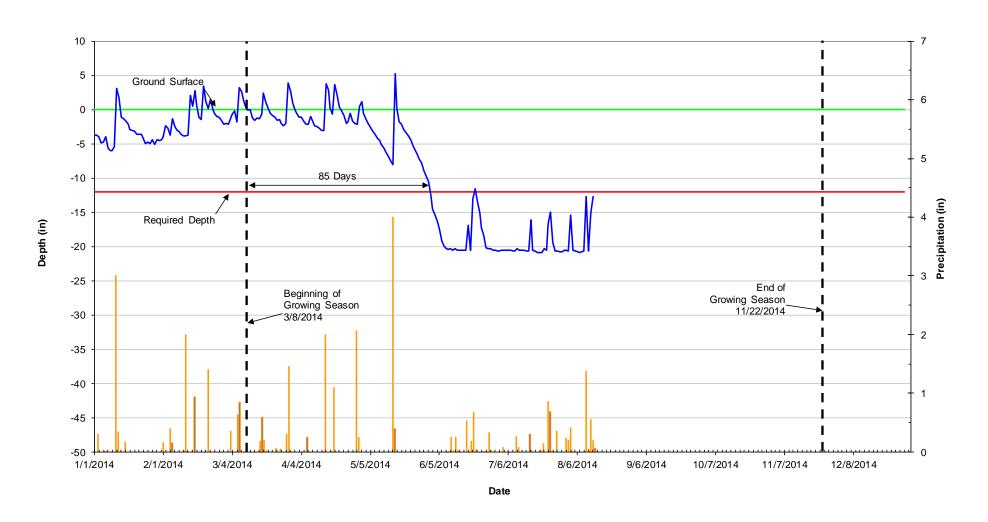
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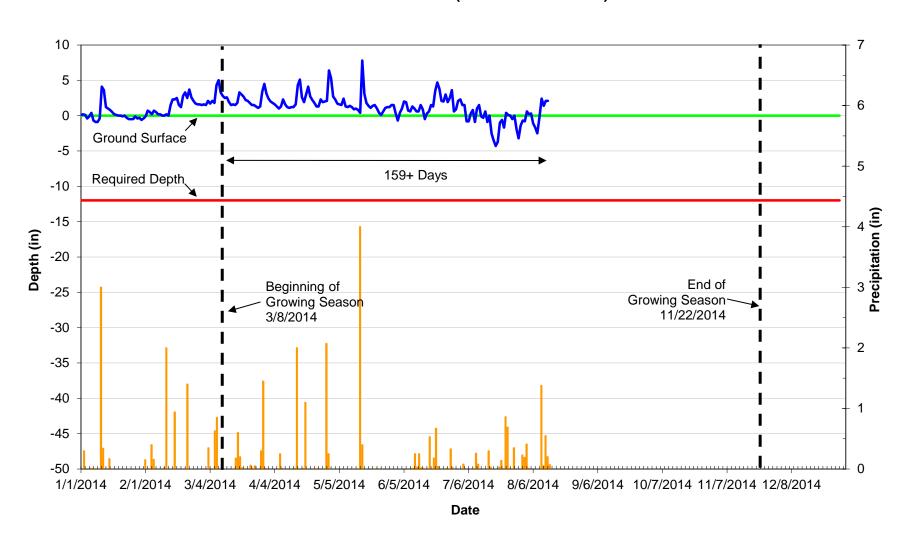
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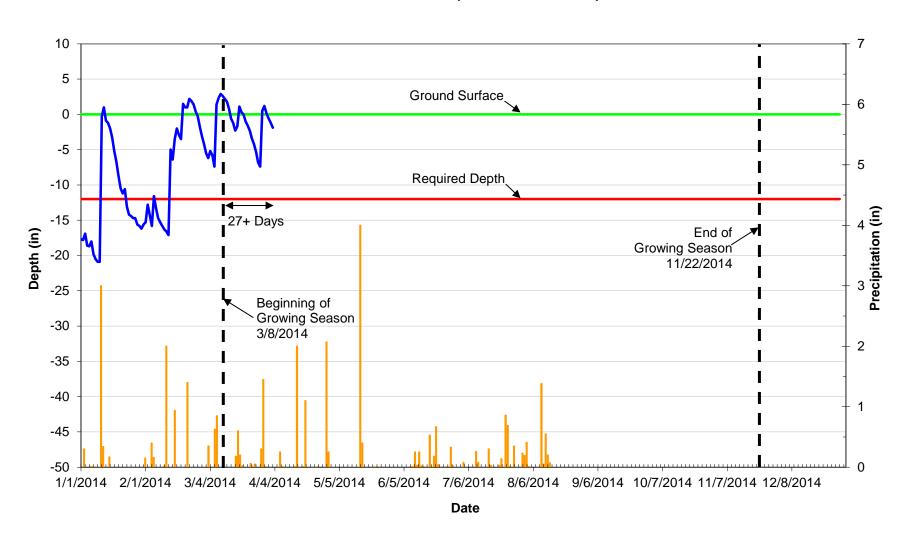
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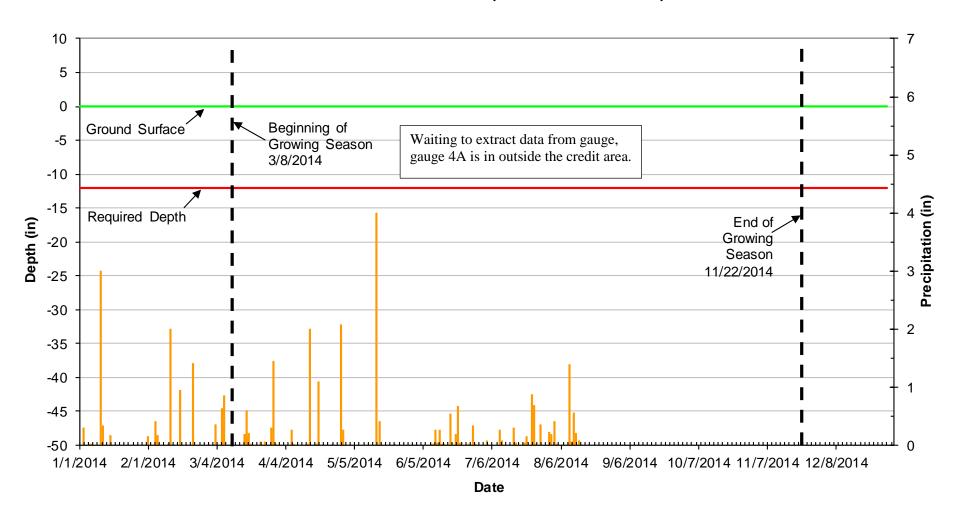
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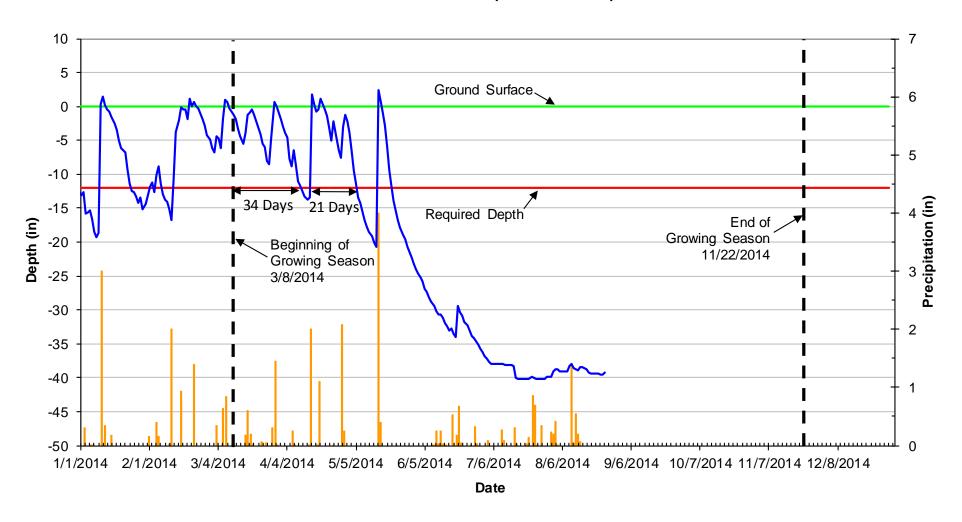
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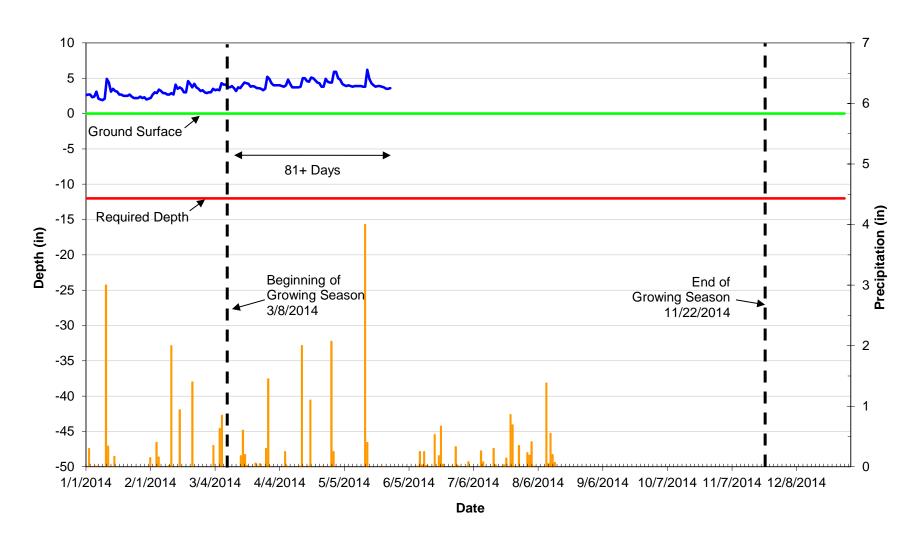
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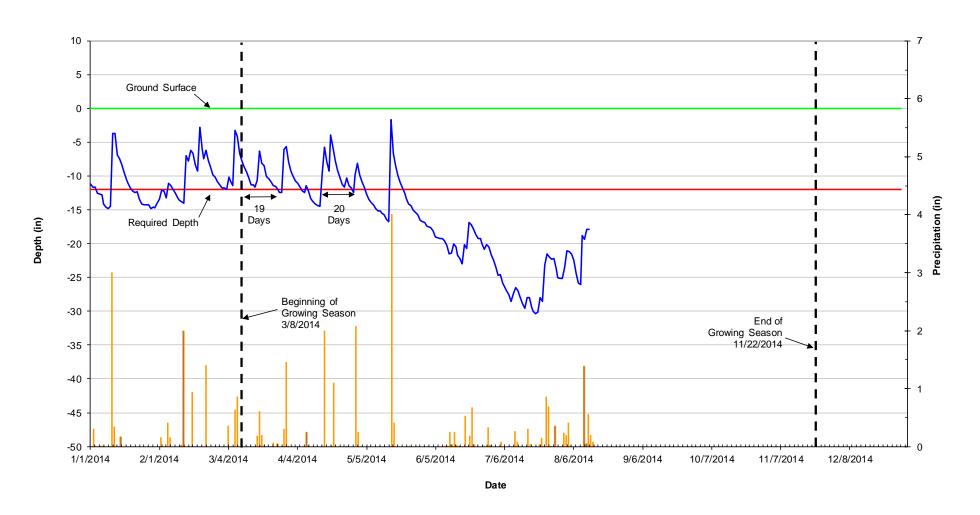
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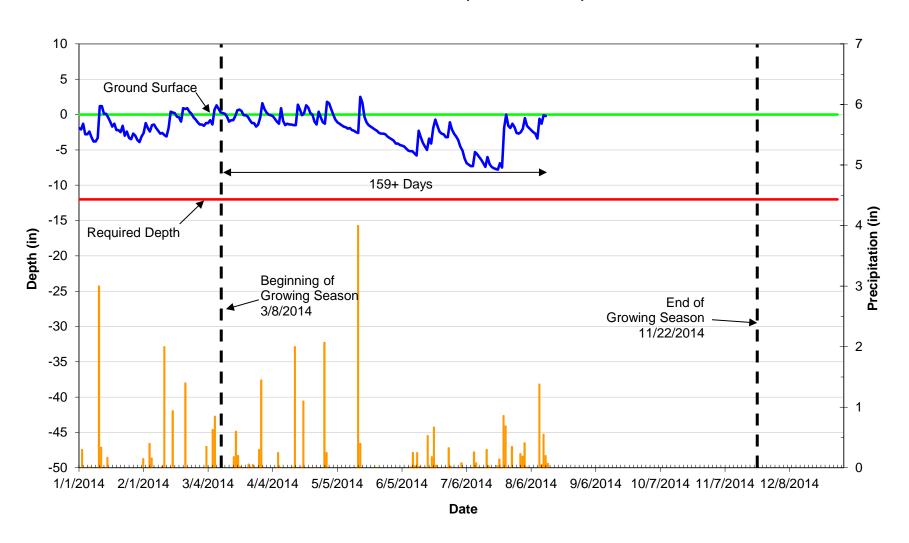
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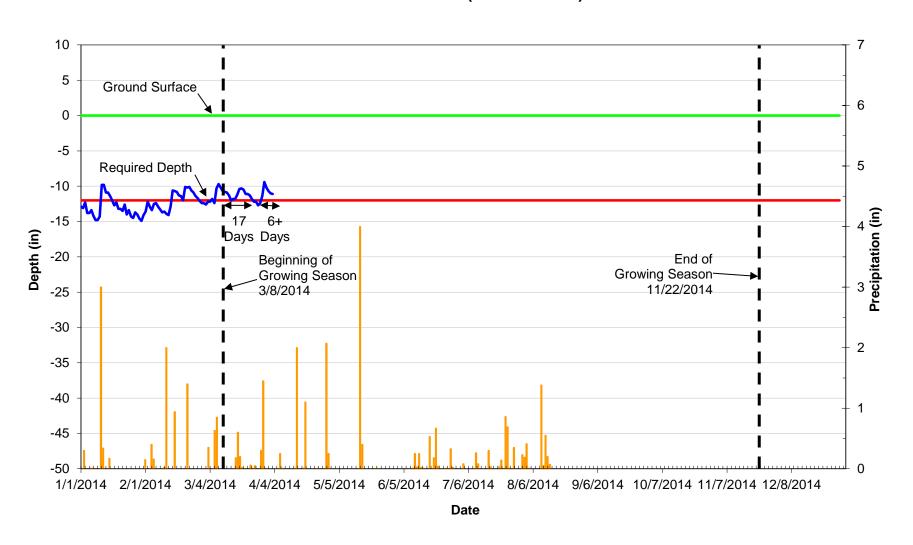
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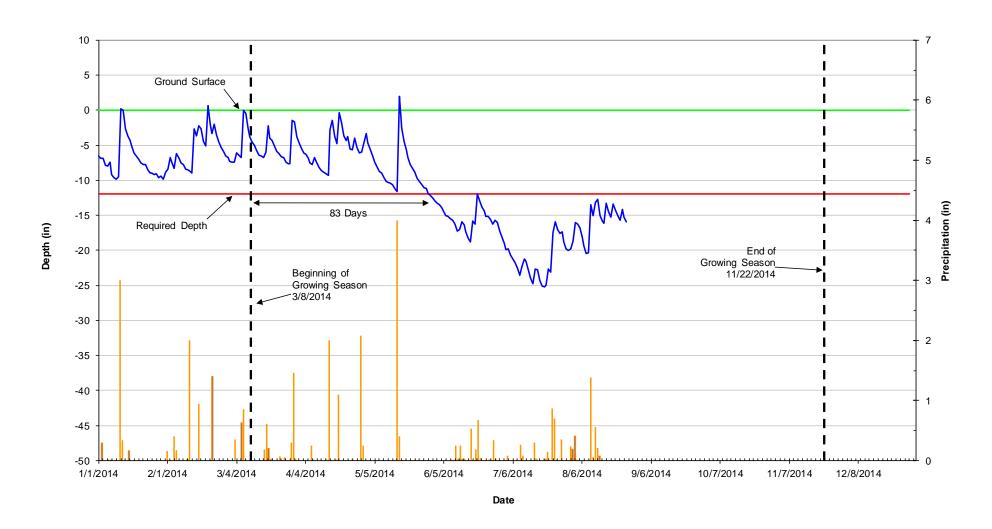
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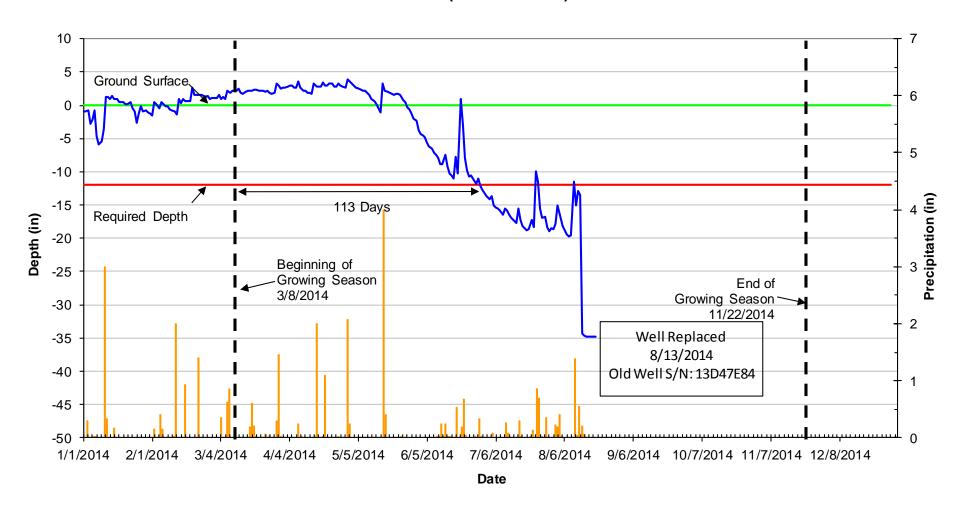
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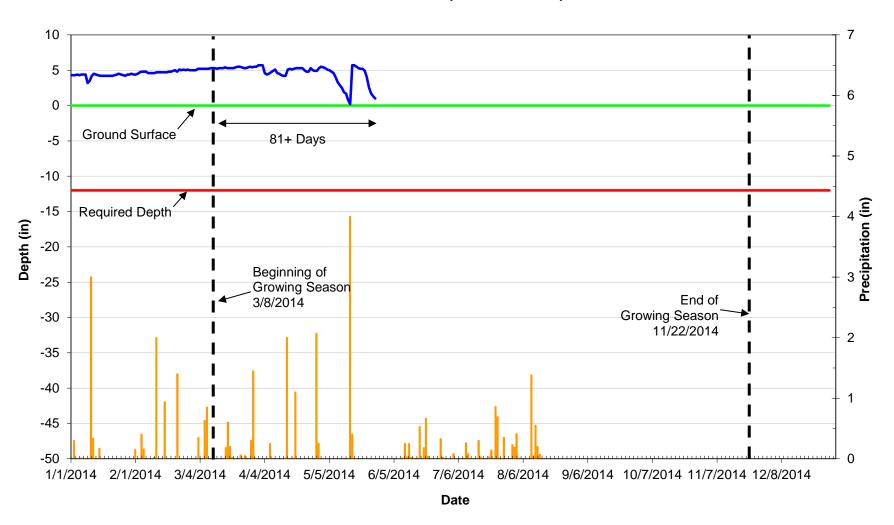
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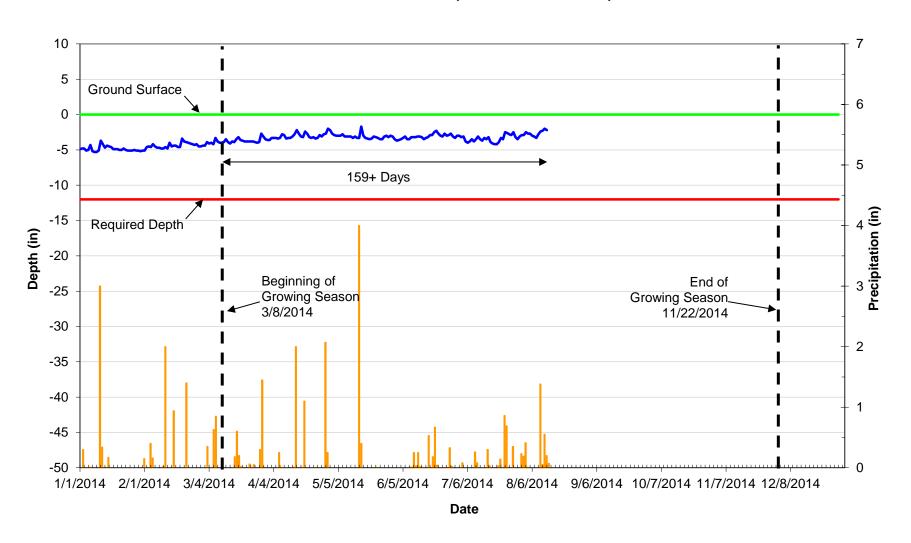
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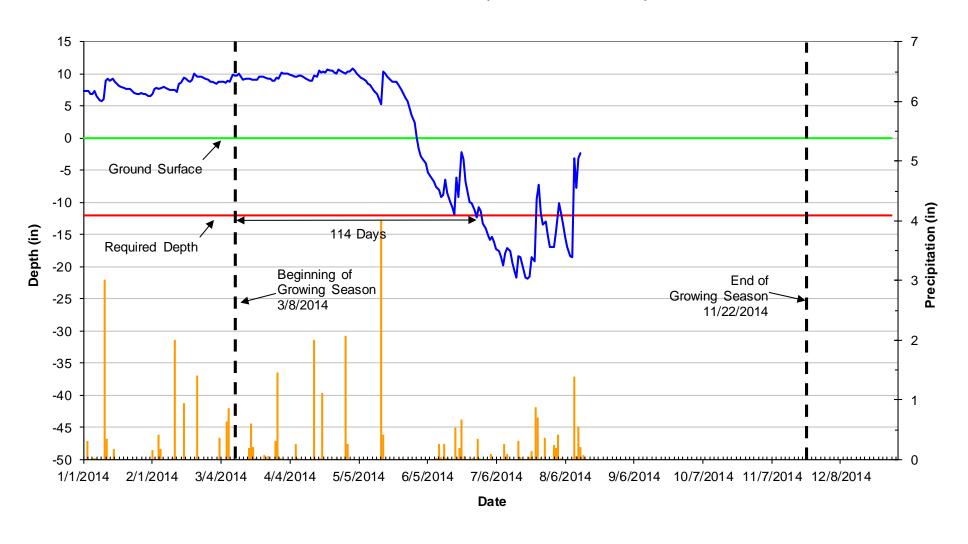
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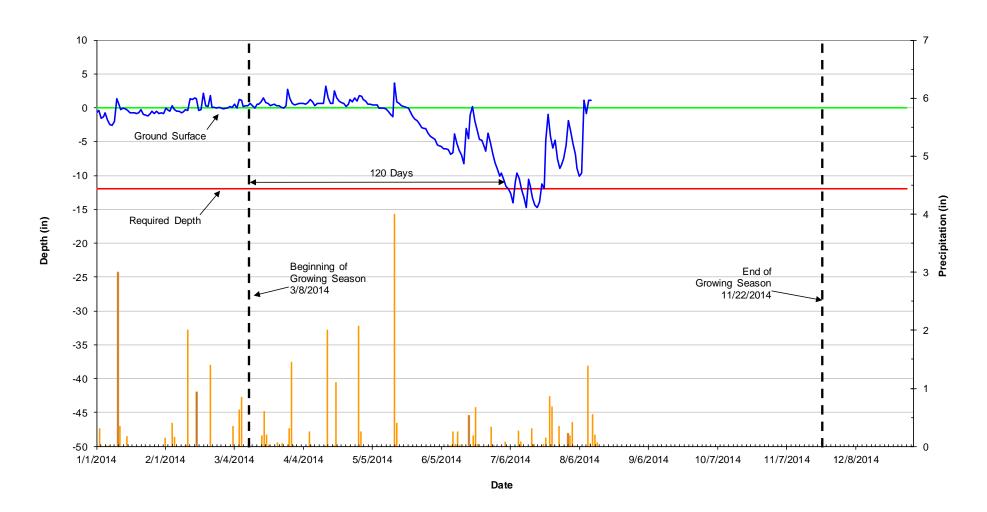
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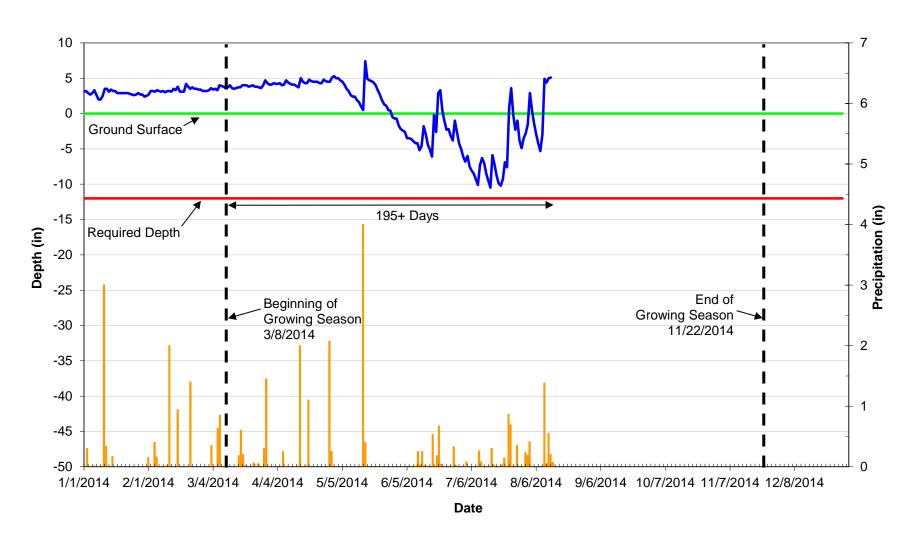
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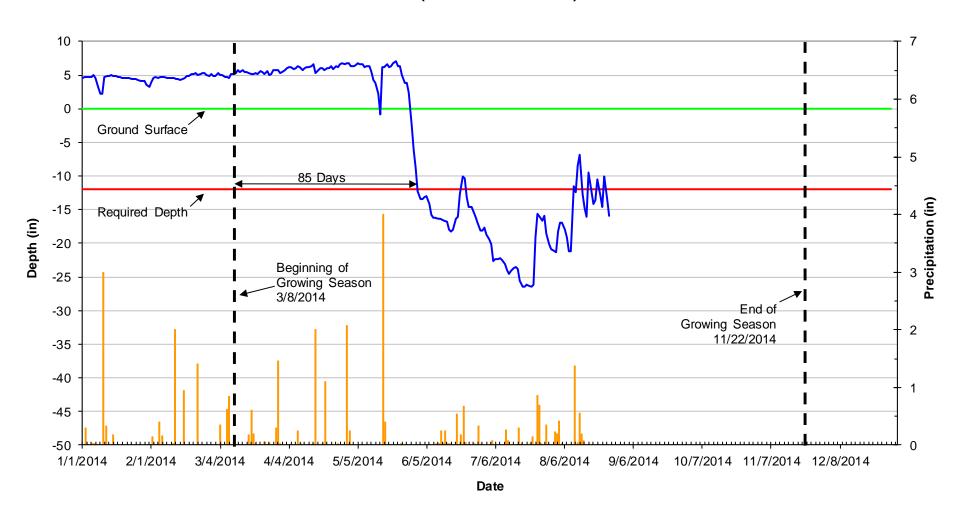
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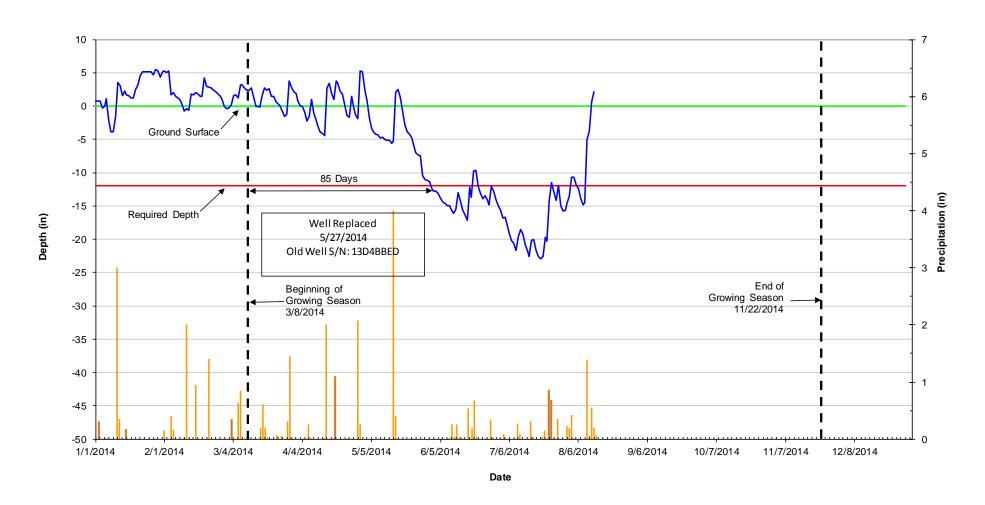
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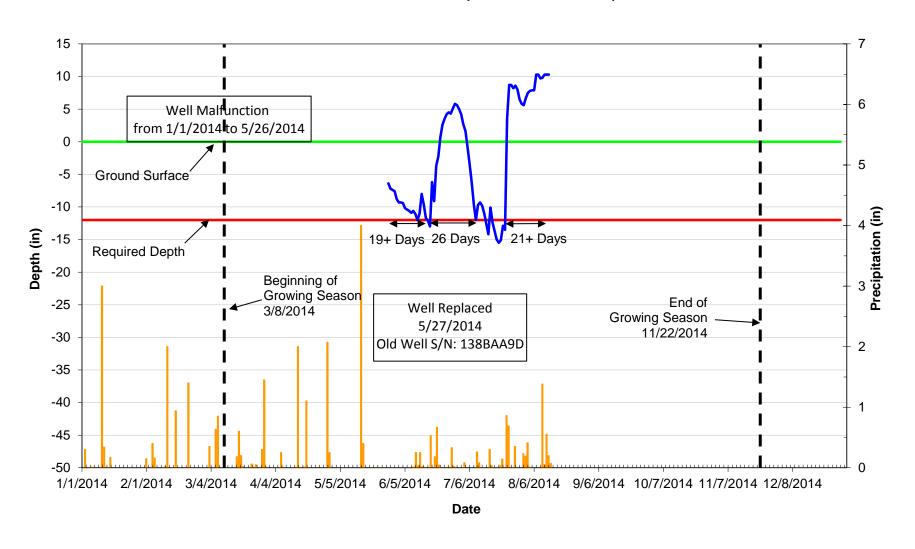
2014 Groundwater Data Well UTJRC-13 (SN: 000009BEBD37)



2014 Groundwater Data Well UTJRC-14 (SN: 11313B9E)



2014 Groundwater Data Well UTJRC-15 (SN: 0000138B8501)



2014 Groundwater Data Well JR-Ref (SN: A287154)

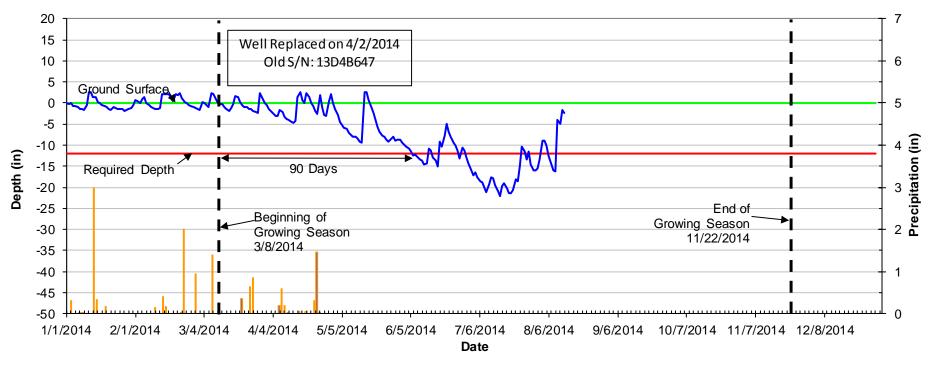


Table 13. Wetland Gauge Attainment Data UT to Jumping Run Creek Restoration Project / EEP Project No. 92345 Summary of Groundwater Results								
Success Criteria Achieved/May Consecutive Days During Growing Seaso								
Wetland Type	Gauge	Year 1 (2010)	Year 2 (2011)	Year 3 (2012)				
		Yes/31 days	Yes/90 days	Yes/42 days	Yes/101 days	Yes/86 days		
Riparian	GW1	(12 percent)	(35 percent)	(16 percent)	(39 percent)	(33 percent)		
		n/a	n/a	n/a	n/a	Yes/63 days		
Riparian	GW1A					(24 percent)		
F		Yes/44 days	Yes/101 days	Yes/37 days	Yes/98 days	Yes/85 days		
Riparian	GW2	(17 percent)	(39 percent)	(14 percent)	(38 percent)	(33 percent)		
		Yes/140 days	Yes/92 days	Yes/124 days	Yes/195 days	Yes/159+ days		
Riparian	GW3	(54 percent)	(36 percent)	(48 percent)	(75 percent)	(61 percent)		
		No	No/0 days	No/0 days	Yes/ 45 days	Yes/27+ days		
Non-Riparian	GW4		J		(17 percent)	(10 percent)		
Tion Tapanan		n/a	n/a	n/a	Yes/45 days	Waiting for		
Non-Riparian	GW4A				(17 percent)	data		
Tion Inpunan		n/a	n/a	n/a	n/a	Yes/34 days		
Non-Riparian	GW4B					(13 percent)		
11011-Riparian		Yes/63 days	Yes/89 days	Yes/119 days	Yes/195 days	Yes/81+ days		
Riparian	GW5	(24 percent)	(35 percent)	(46 percent)	(75 percent)	(31 percent)		
Кірапап		No	No/0 days	No/0 days	Yes/29 days	Yes/20 days		
Riparian	GW6	- 1,0	2		(11 percent)	(8 percent)		
Кірапап		n/a	n/a	n/a	Yes/195 days	Yes/159+ days		
Riparian	GW 6A				(75 percent)	(61 percent)		
Кірапап		n/a	n/a	n/a	No/4 days	Yes/17 days		
Riparian	GW6B				(2 percent)	(6 percent)		
Кірапап		n/a	n/a	n/a	Yes/96 days	Yes/83 days		
Riparian	GW6C				(37 percent)	(32 percent)		
Кірапап		Yes/63 days	Yes/44 days	No/19 days	Yes/195 days	Yes/113 days		
Non-Riparian	GW7	(24 percent)	(17 percent)	(7 percent)	(75 percent)	(44 percent)		
Non-Kipanan		Yes/63 days	Yes/92 days	Yes/136 days	Yes/195 days	Yes/81+ days		
Riparian	GW8	(24 percent)	(36 percent)	(53 percent)	(75 percent)	(31 percent)		
Кірапап		Yes/141 days	Yes/ 112 days	Yes/197 days	Yes/37 days	Yes/159+ days		
Dinarian	GW9	(55 percent)	(43%)	(76 percent)	(14 percent)	(61 percent)		
Riparian		Yes/62 days	Yes/80 days	Yes/78 days	Yes/195 days	Yes/114 days		
Non-Riparian	GW 10	(24 percent)	(31 percent)	(30 percent)	(75 percent)	(44 percent)		
Non-Kipanan		Yes/54 days	Yes/79 days	Yes/80 days	Yes/191 days	Yes/120 days		
Riparian	GW 11	(21 percent)	(31 percent)	(31 percent)	(74 percent)	(46 percent)		
Кірапап		Yes/147days	Yes/ 121 days	Yes/258 days	Yes/195 days	Yes/195+ days		
Dinarian	GW 12	(57 percent)	(47%)	(100 percent)	(75 percent)	(75 percent)		
Riparian		Yes/45 days	Yes/ 47 days	No/12 days	Yes/104 days	Yes/85 days		
Non-Riparian	GW 13	(17 percent)	(18%)	(5 percent)	(40 percent)	(33 percent)		
14011-Kipanan		Yes/44 days	Yes/88 days	Yes/121 days	Yes/195 days	Yes/85 days		
Rinarian	GW 14	(17 percent)	(34%)	(47 percent)	(75 percent)	(33 percent)		
Мранан	Riparian GW 15		Yes/87 days	Yes/136 days	Yes/231 days	Yes/26 days		
Dinarian			(34 percent)	(53 percent)	(89 percent)	(10 percent)		
Riparian		(28 percent) Yes/63 days	Yes/78 days	Yes/40 days	Yes/195 days	Yes/90 days		
no	Reference	(24 percent)	(30 percent)	(15 percent)	(75 percent)	(35 percent)		
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