YEAR 1 MONITORING REPORT

UT TO THE LUMBER RIVER SITE

Robeson County, North Carolina
Contract No. 002027

Submitted to:

NCDENR-Ecosystem Enhancement Program
2728 Capital Boulevard, Suite 1H 103
Raleigh, North Carolina 27604

Construction Completed: April 2010
Data Collected: October 12-14, 2010
Submitted: December 3, 2010

Prepared by:

Florence & Hutcheson, Inc.
5121 Kingdom Way, Suite 100
Raleigh, North Carolina 27607

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I HEREBY CERTIFY THAT THE DOCUMENTS CONTAINED HEREIN, UT TO THE LUMBER RIVER YEAR 1 MONITORING REPORT WERE PREPARED BY ME OR UNDER MY DIRECT SUPERVISION.

SIGNED SEALED, AND DATED THIS _____ DAY OF _____ 2010.

_____

Chris L. Smith, PE

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1.0 EXECUTIVE SUMMARY

The following report summarizes the vegetation establishment and stream stability for Year 1 monitoring for the UT to the Lumber River Site in Robeson County, North Carolina.

1.1 Goals and Objectives

The primary goals of the UT to the Lumber River stream restoration project focus on:

- Improving water quality
- Providing/enhancing flood attenuation
- Restoring/enhancing aquatic and riparian habitat function and connectivity with adjacent pristine habitats
- Assisting the State of North Carolina initiatives along the Lumber River for conservation, including assisting the EEP with meeting its goals of improving water quality and habitat as documented within the Lumber River/Bear Swamp Watershed Management Plan for the Targeted 03040203030010 14-digit Hydrologic Unit.

These goals will be achieved through the following objectives:

- Restore the UT to a stable, more natural sand bed channel.
- Excavate a floodplain and connect flood flows to existing ponds for attenuation.
- Enhance in stream habitat by creating an undulating bedform.
- Establish a vegetated riparian buffer for nutrient and sedimentation reduction.
- Create three stormwater BMPS on three existing ditches to reduce sedimentation and nutrients from contributing waters.
- Connect the Lumber River with a habitat corridor through the existing agricultural fields through a conservation easement, riparian plantings, and stream restoration.
- Preserve much of the Lumber River and its floodplain through a conservation easement to protect habitat and water quality benefits of a mature floodplain and riverine system.

1.2 Vegetation

After the first growing season, bare root and live stake plantings are meeting and exceeding success criteria goals. Each of the 14 vegetation plots met the success criteria of at least 320 stems per acre.

Several areas along the terrace cut slopes (terrace side slopes) have not obtained acceptable ground cover (grass). It appears that much of the temporary and permanent seed that was broadcast during construction either did not germinate or was washed away during precipitation events. Rill erosion has occurred in several areas due to the absence of ground stabilizing grasses.

F&H is currently contracting Land Mechanics Designs (the contractor who constructed the Site) to remobilize to the Site to establish acceptable growth rates of ground cover. The scope of work

includes regrading areas of severe rill erosion, applying temporary and permanent seeding, straw, and matting bare and regraded areas with non-woven bio netting. Additionally, soil amendments including fertilizer and organic supplements are anticipated to be spread on bare areas to assist the establishment of grass. We are confident that our remediation plan will be produce an acceptable stand of grass that will provide sufficient ground cover to reduce and eliminate rill erosion.

1.3 Stream Stability

The UT to the Lumber River appears to be stable and functioning as designed. There is no evidence of trends towards significant change in channel dimension, profile or pattern. Cross-sectional data indicates that the channel has experienced little change in dimension. Observed changes in dimension at cross section 17 are likely due to significant growth of hydrophytic vegetation in the channel. The profile shows some areas of minor aggradation. This is expected in sand bed channels, where the bed form is in constant flux and pools adjust their depths during most storm events. Some of the adjustment may be a result of soil loss from scattered rill erosion from adjacent terrace side slopes. The areas of rill erosion are due to insufficient grass growth following construction activities as noted in Section 1.2. Sediment deposition in pools is common in sand systems and we fully expect these pools to scour and fill throughout the entire monitoring timeframe. The channel is expected to flush excess sediment out in future high flow events. Table Five, Visual Stream Morphology Stability Assessment, details 48 pools that are "stable, performing as intended". The as-built profile depicted 63 pools. This would give a 76 percent rate of "stable, performing as intended" for Year 1 Monitoring. We would like to caution placing stringent performance standards on sand bed system profiles, especially newly constructed systems in which excess sediments stemming from construction activities may still influence the channel. It is our opinion that the channel is performing as it should and with the establishment of ground cover on adjacent terrace side slopes excess sediment will be transported through the site. However, it is anticipated that pools will experience scour (deeper) after some storm events and will experience aggradation (shallower) after other storm events, which is a common and natural process in sand systems.

The Mitigation Plan As-Built Report dated September 28, 2010 contained an error in the dimension calculations for cross section four that was discovered during the preparation this Report. The error has been corrected and the correct data is presented in Tables 10, 11, and 12.

An overall visual assessment of the channel appears to confirm morphological data, in that there are no substantial areas of concern within the bankfull channel. As stated in Section 1.2, we do have concerns over bare areas along terrace side slopes where rill erosion has occurred, however a remediation plan is in place and will be enacted in short time to establish ground cover.

The site has experienced several bankfull flows throughout the first monitoring year. Crest gauges installed on-site have shown evidence of above bank events on multiple occasions. Additional overbank evidence includes debris lines, and vegetation bent in the downstream direction. Evidence of bankfull events can be found in Appendix E.

1.4 Wetlands

No wetland monitoring areas were established for this project report.

1.5 Note

Summary information/data related to the occurrence of items such as beaver or encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Report (formerly Mitigation Plan) and in the Mitigation Plan (formerly the Restoration Plan) documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 METHODOLOGY

The year one monitoring survey was completed using an optical level, surveying rod and English unit measuring tapes. Each cross section is marked with two rebar monuments at their beginning and ending points. The rebar has been located vertically and horizontally in NAD83-State Plane. Surveying these monuments throughout the Site ensured proper orientation. Measuring tapes were used to layout the profile along the channel. The measuring tape subsequently was used to calculate channel stationing throughout.

The channel is entirely a sand bed system; therefore a pebble count was not conducted due to particle size heterogeneity. It should be noted however, that the channel is dominated by sand, not detritus as was the case in pre-restoration conditions.

Vegetation monitoring was completed using CVS level II methods, for 14, 100 square meter vegetation plots.

3.0 REFERENCES

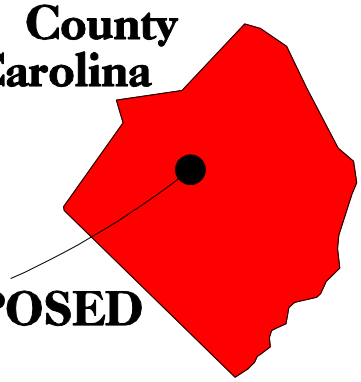
NC State Climate Office website, accessed 11/4/2010
http://nc-climate.ncsu.edu/cronos?station=KLBT&temporal=hourly

APPENDICES

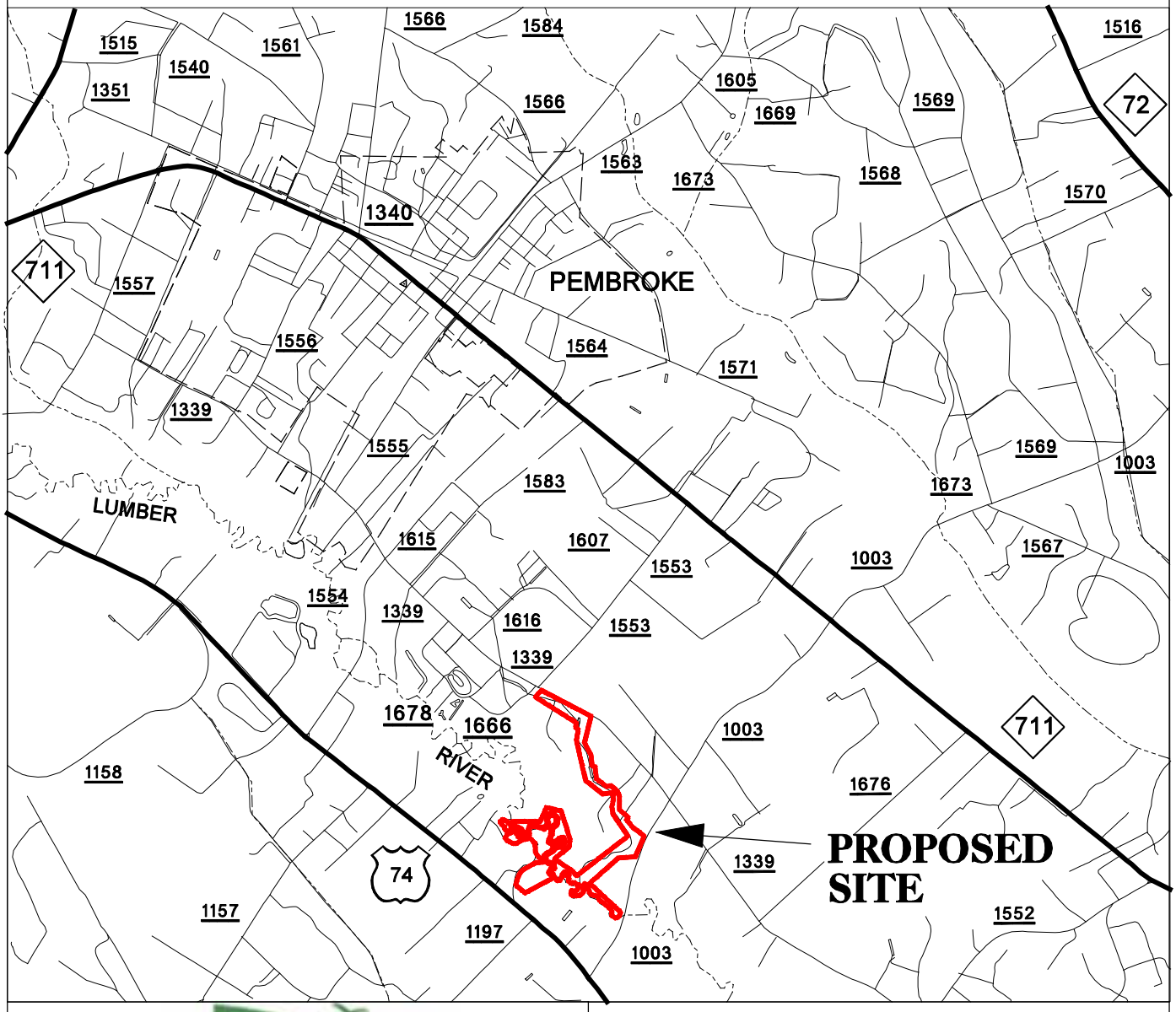
Appendix A. Project Vicinity Map and Background Tables

THE SUBJECT PROJECT SITE IS AN ENVIRONMENTAL RESTORATION SITE OF THE NCDENR ECOSYSTEM ENHANCEMENT PROGRAM (EEP) AND IS ENCOMPASSED BY A RECORDED CONSERVATION EASEMENT, BUT IS BORDERED BY LAND UNDER PRIVATE OWNERSHIP. ACCESSING THE SITE MAY REQUIRE TRAVERSING AREAS NEAR OR ALONG THE EASEMENT BOUNDARY AND THEREFORE ACCESS BY THE GENERAL PUBLIC IS NOT PERMITTED. ACCESS BY AUTHORIZED PERSONNEL OF STATE AND FEDERAL AGENCIES OR THEIR DESIGNEES /CONTRACTORS INVOLED IN THE DEVELOPMENT, OVERSIGHT AND STEWARDSHIP OF THE RESTORATION SITE IS PERMITTED WITHIN THE TERMS AND TIMEFRAMES OF THEIR DEFINED ROLES. ANY INTENDED SITE VISITATION OR ACTIVITY BY ANY PERSON OUTSIDE OF THESE PREVIOUSLY SANCTIONED ROLES AND ACTIVITIES REQUIRES PRIOR COORDINATION WITH EEP.

Robeson County
North Carolina



PROPOSED SITE



Ecosystem Enhancement PROGRAM

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Vicinity Map

UT to the Lumber River
Stream Restoration Plan
Robeson County, North Carolina

0 2000 4000
FEET

Date: 08/26/10

Figure: 1

Project Location and Directions

The UT to the Lumber River Stream Restoration Site (Site) is located approximately two (2) miles southeast of Pembroke in Robeson County, North Carolina (Figure 1). The properties included in this Site span east of State Road (SR) 1003 (Chicken Road) and south from SR 1339 (Deep Branch Road) to US 74 Highway along the Lumber River.

Directions to the Site:

- From Interstate 40 take exit 328A (towards Fayetteville/Benson) onto Interstate 95 South
- From Interstate 95 take exit 17 (towards Pembroke) onto US-711/72. Remain on US 711 at US 711 and US 72 Split.
- Go approximately 7.4 miles west towards Pembroke after exiting I-95.
- Turn left onto SR 1003 (Chicken Road). Go for approximately 1.1 miles to the intersection of Chicken Road and SR 1339 (Deep Branch Road).
- Turn right onto Deep Branch Road. Go for approximately 0.2 miles and turn left onto dirt road that takes you through the Site to the UT.

The subject project is an environmental restoration site of the NCDENR Ecosystem Enhancement Program (EEP) and is encompassed by a recorded conservation easement, but is bordered by land under private ownership. Accessing the site may require traversing areas near or along the easement boundary and therefore access by the general public is not permitted. Access by authorized personnel of state and federal agencies or their designees/contractors involved in the development, oversight and stewardship of the restoration site is permitted within the terms and timeframes of their defined roles. Any intended site visitation or activity by any person outside of these previously sanctioned roles and activities requires prior coordination with EEP.

Table 1. Project Components and Mitigation Credits

Restoration Segment/ Reach ID	Existing LF/AC	Restoration Level	Approach	Restored LF/AC	Station Range	Buffer Acres	Comment
UT Lumber River	5,958	R	PII	4,285	10+00 – 53+57	17.2	Restore pattern, dimension, profile, and riparian buffer.
		E II	Plantings	463	10+00 – 14+63	1.9	Plant a native vegetated riparian buffer through agricultural fields.
		P	Easement	2,177	10+00 – 31+77	12.2	Place a permanent conservation easement over lands in preservation areas.
Lumber River	4,123	P	Easement	4,123	10+00 – 50+87	35.9	Place a permanent conservation easement over lands in preservation areas.

Component Summations		
Restoration Level	**Stream (LF)**	**Buffer (AC)**
Restoration	4,285	17.2
Enhancement 1		
Enhancement II	463	1.9
Preservation	6,300	48.75
Totals	11,022	67.85

Mitigation Unit Summary			
Stream	**Restoration (SMU)**	**Enhancement (SMU)**	**Preservation (SMU)**
UT	4,285	185	435
Lumber River			824
Total (SMU)	**5729**		

The as-built stationing is 22 feet longer than the proposed channel design stationing (53+35 for design and 53+57 for as-built). The contractor stabilized an additional 22 feet of channel past the designed end point during construction to complete the tie in from the design channel to the existing channel. This area was shown in the as-built, but is not considered a major modification in the channel design. Future monitoring may end at station 53+35.

Table 2. Project Activity and Reporting History

Activity or Report	Data Collection Complete	Completion or Delivery
Restoration Plan	September 2009	October 2009
Final Design – Construction Plans	October 2009	November 2009
Construction	January 18, 2010	April 9, 2010
Temporary S&E Mix Applied to Entire Project Area	January 18, 2010	April 9, 2010
Permanent Seed Mix Applied to Entire Project Area	January 18, 2010	April 9, 2010
Containerized and B&B plantings for Entire Project Area	April, 4 2010	April 7, 2010
Mitigation Plan/As-built (Year 0 Monitoring-Baseline)	April 13, 2010	April 22, 2010
Year 1 Monitoring	October 14, 2010	December 3, 2010
Year 2 Monitoring		
Structural maintenance (bench expansion, vane, etc.)		
Year 3 Monitoring		
Supplemental planting of containerized material		
Year 4 Monitoring		

Table 3. Project Contacts Table

Designer Primary project design POC	Florence & Hutcheson, Inc. 5121 Kingdom Way, Suite 100 Raleigh, North Carolina 27607 Kevin Williams (919) 851-6066
Construction Contractor Construction Contractor POC	Land Mechanics Design Lloyd Glover 126 Circle G Lane Willow Springs, NC 27592 (919) 639-6132
Planting Contractor Planting Contractor POC	Bruton Natural Systems Charlie Bruton PO Box 1197 Fremont, NC 27830 (919) 242-6555
Seeding Contractor Seeding Contractor POC	Land Mechanics Design Lloyd Glover 126 Circle G Lane Willow Springs, NC 27592 (919) 639-6132
Seed Mix Sources	Green Resources – Triad Office
Nursery Stock Suppliers	ArborGen - South Carolina SuperTree Nursery Bruton Natural Systems
Monitoring Performers	Florence & Hutcheson, Inc. 5121 Kingdom Way, Suite 100 Raleigh, North Carolina 27607 Ryan Smith (919) 851-6066
Stream Monitoring POC	Florence & Hutcheson, Inc. 5121 Kingdom Way, Suite 100 Raleigh, North Carolina 27607 Ryan Smith (919) 851-6066
Vegetation Monitoring POC	Florence & Hutcheson, Inc. 5121 Kingdom Way, Suite 100 Raleigh, North Carolina 27607 Ryan Smith (919) 851-6066

Table 4. Project Attributes Table

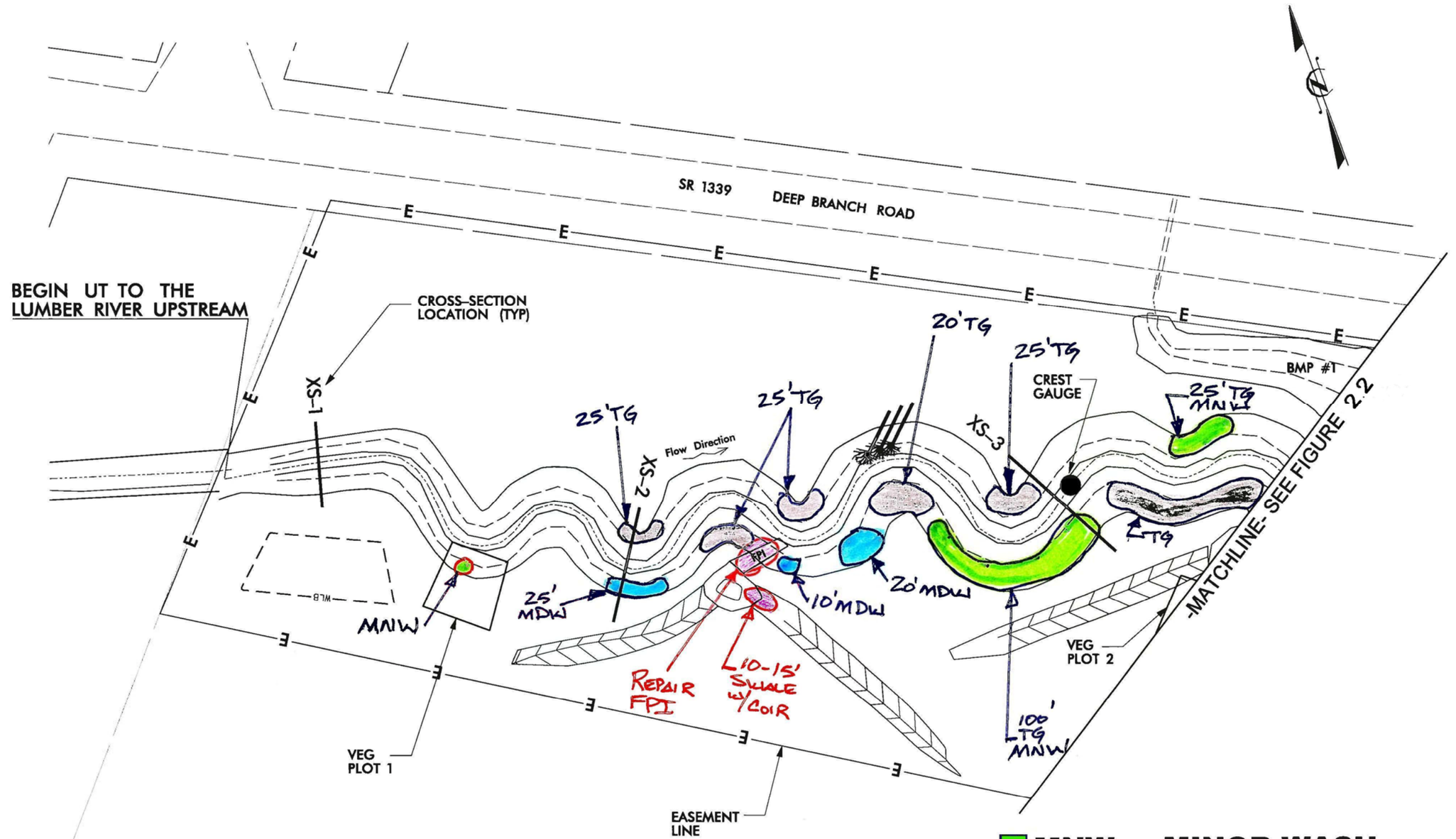
Project County	Robeson County, North Carolina
Physiographic Region	Southeastern Plains
Ecoregion	Southeastern Floodplains and Low Terraces
Project River Basin	Lumber
USGS HUC for Project (14 digit)	03040203030010
NCDWQ Sub-basin for Project	03-07-51
Within extent of EEP Watershed Plan?	Yes – Lumber River/Bear Swamp Watershed Management Plan 2006
WRC Class (Warm, Cool, Cold)	Warm
% of project easement fenced or demarcated	100% demarcated with signs/posts)
Beaver activity observed during design phase?	Yes

Restoration Component Attributes		
	UT Lumber River	**Lumber River**
Drainage Area	0.42 sq mi (At End of Restoration Reach)	432 sq mi
Stream Order (USGS topo)	1st	Multiple Order
Restored Length (feet)	4,285	0.0
Perennial (P) or Intermittent (I)	P	P
Watershed Type	Primarily rural w/ some urban	Primarily Rural
Watershed impervious cover	~5%	~1%
NCDWQ AU/Index number	14-(7)	14-(7)
NCDWQ Classification	WS-IV, B, Sw, HQW	WS-IV, B, Sw, HQW
303d listed?	No	No
Upstream of a 303d listed	No	No
Reasons for 303d listed segment	N/A	N/A
Total acreage of easement	67.85 ac	
Total vegetated acreage of easement	52.5 ac	
Total planted restoration acreage	15.0 ac	
Rosgen Classification of preexisting	G5/F5	E5
Rosgen Classification of As-built	E5	N/A
Valley type	VIII	X
Valley slope	0.23%	0.07%
Cowardin classification	Coastal Plain Small Stream Swamp	Coastal Plain Small Stream Swamp
Trout waters designation	N/A	N/A
Species of concern, endangered etc.	In County: RCW, Michaux's Sumac	In County: RCW, Michaux's Sumac
Dominant Soil Series	Bibb/Rains	Bibb

Appendix B. Visual Assessment Data

Figures 2.1-2.8. Current Condition Plan View

CURRENT CONDITION PLAN VIEW



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Jackson & Hutcheson, Inc.

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UT TO THE LUMBER RIVER
STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

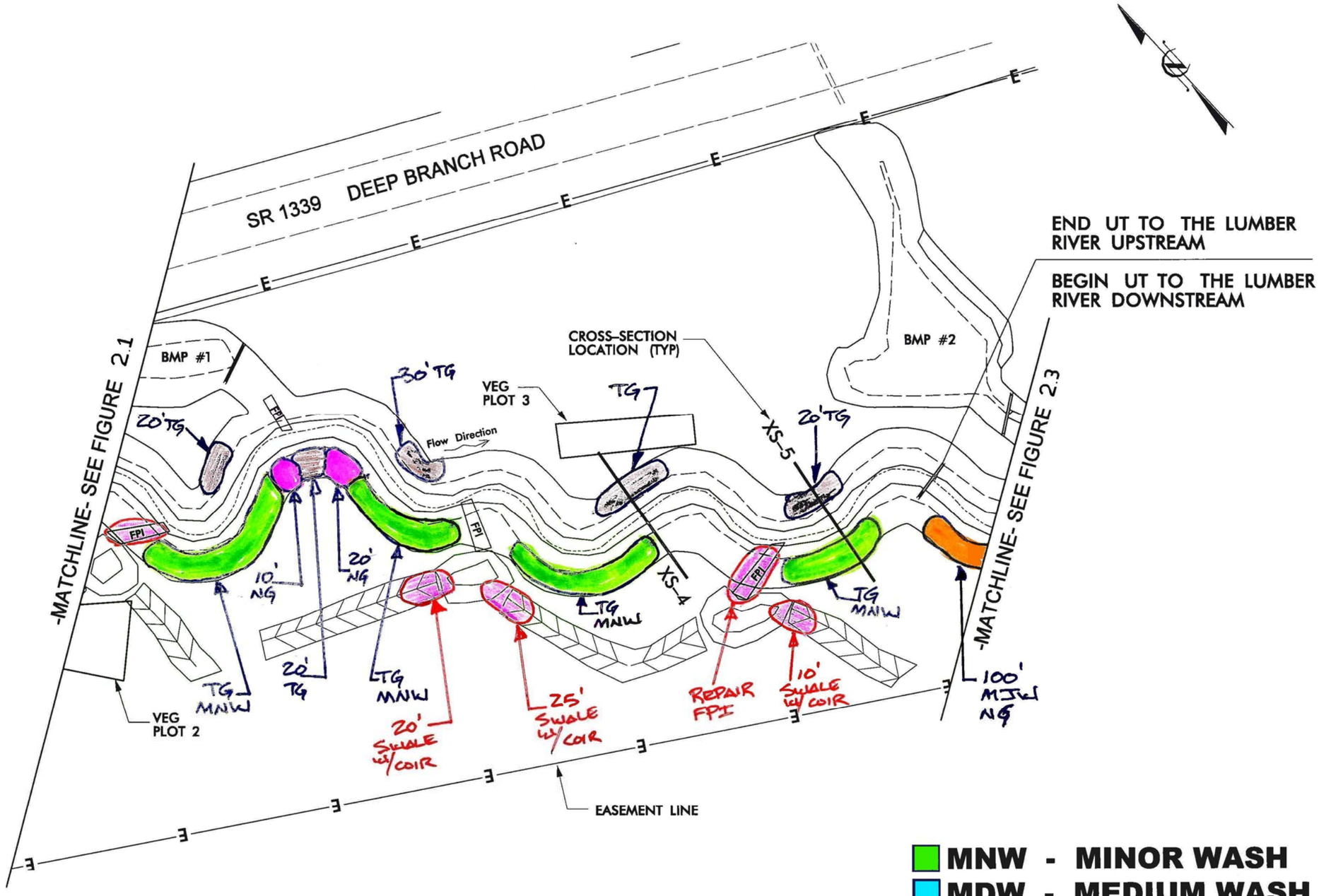
GRAPHIC SCALE
50 25 0 25
PLANS

DATE: 08-26-10

CURRENT CONDITION PLAN VIEW

Figure 2.1

CURRENT CONDITION PLAN VIEW



MNW - MINOR WASH
MDW - MEDIUM WASH
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UT TO THE LUMBER RIVER
STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

GRAPHIC SCALE
50 0 25 25
PLANS

DATE: 08-26-10

CURRENT CONDITION PLAN VIEW

Figure 2.2

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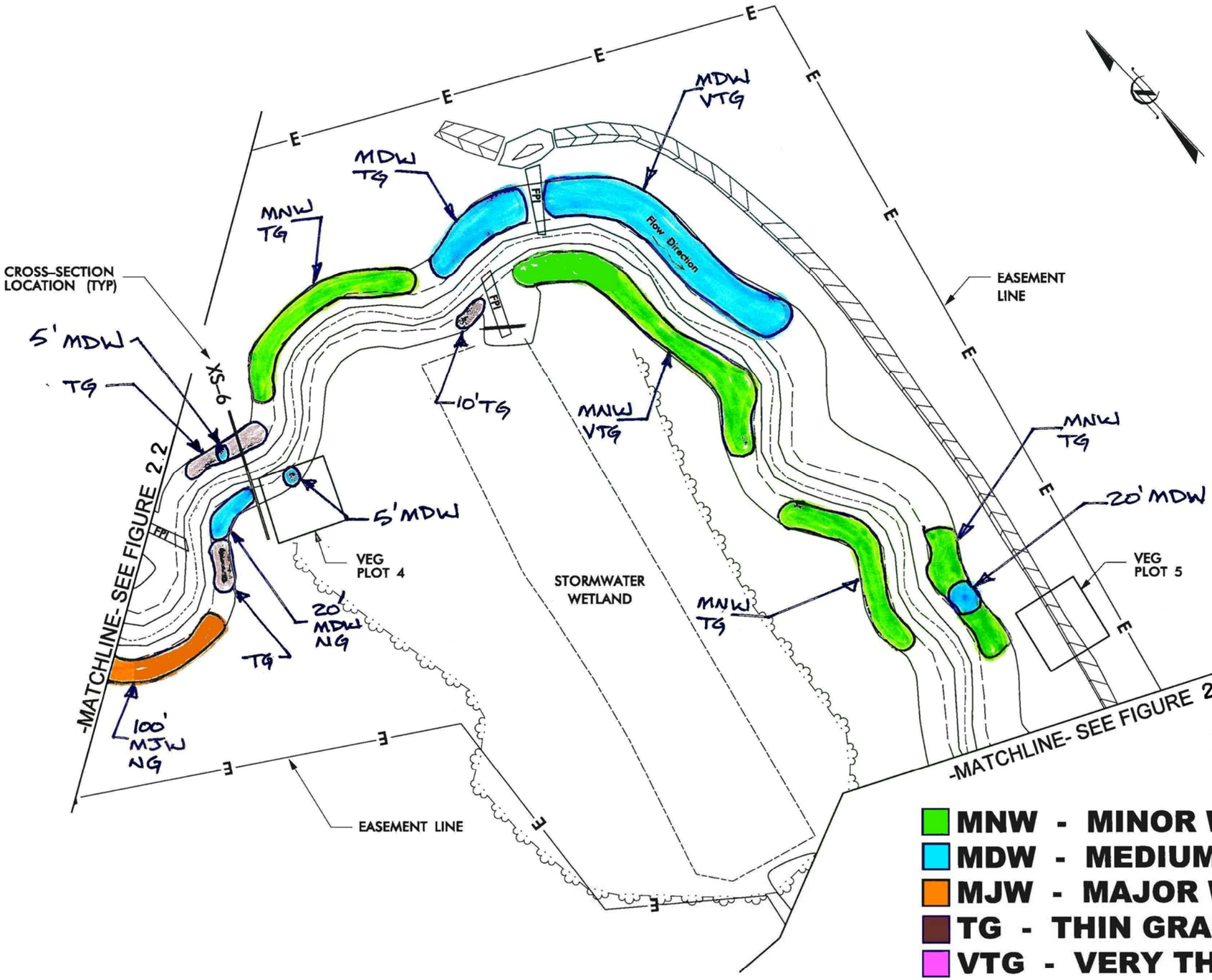
CURRENT CONDITION PLAN VIEW



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UT TO THE LUMBER RIVER
STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

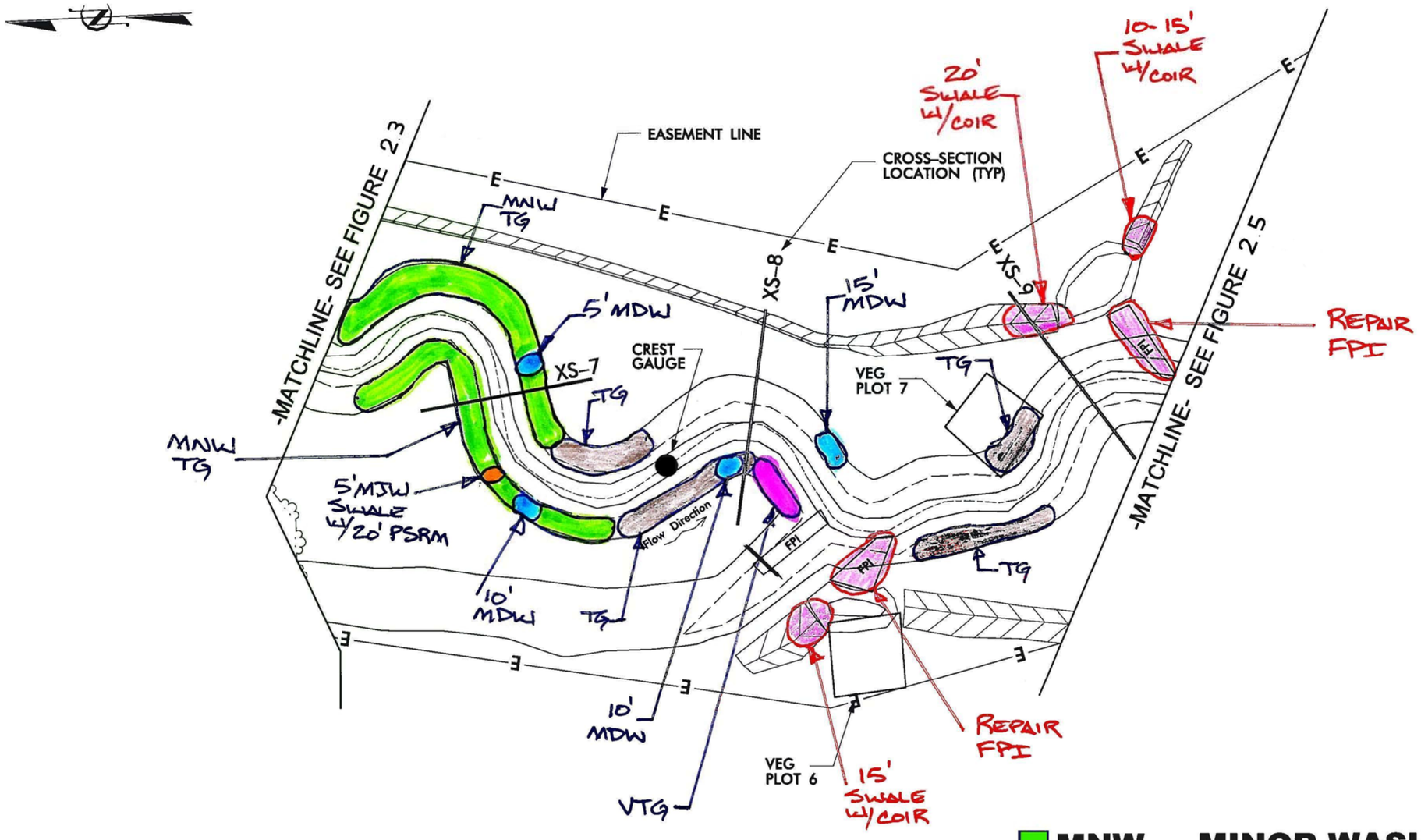
GRAPHIC SCALE
50 25 0 25
PLANS

DATE 08-26-10

CURRENT CONDITION PLAN VIEW

Figure 2.3

CURRENT CONDITION PLAN VIEW



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STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

GRAPHIC SCALE
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DATE 08-26-10

CURRENT CONDITION PLAN VIEW

Figure 2.4

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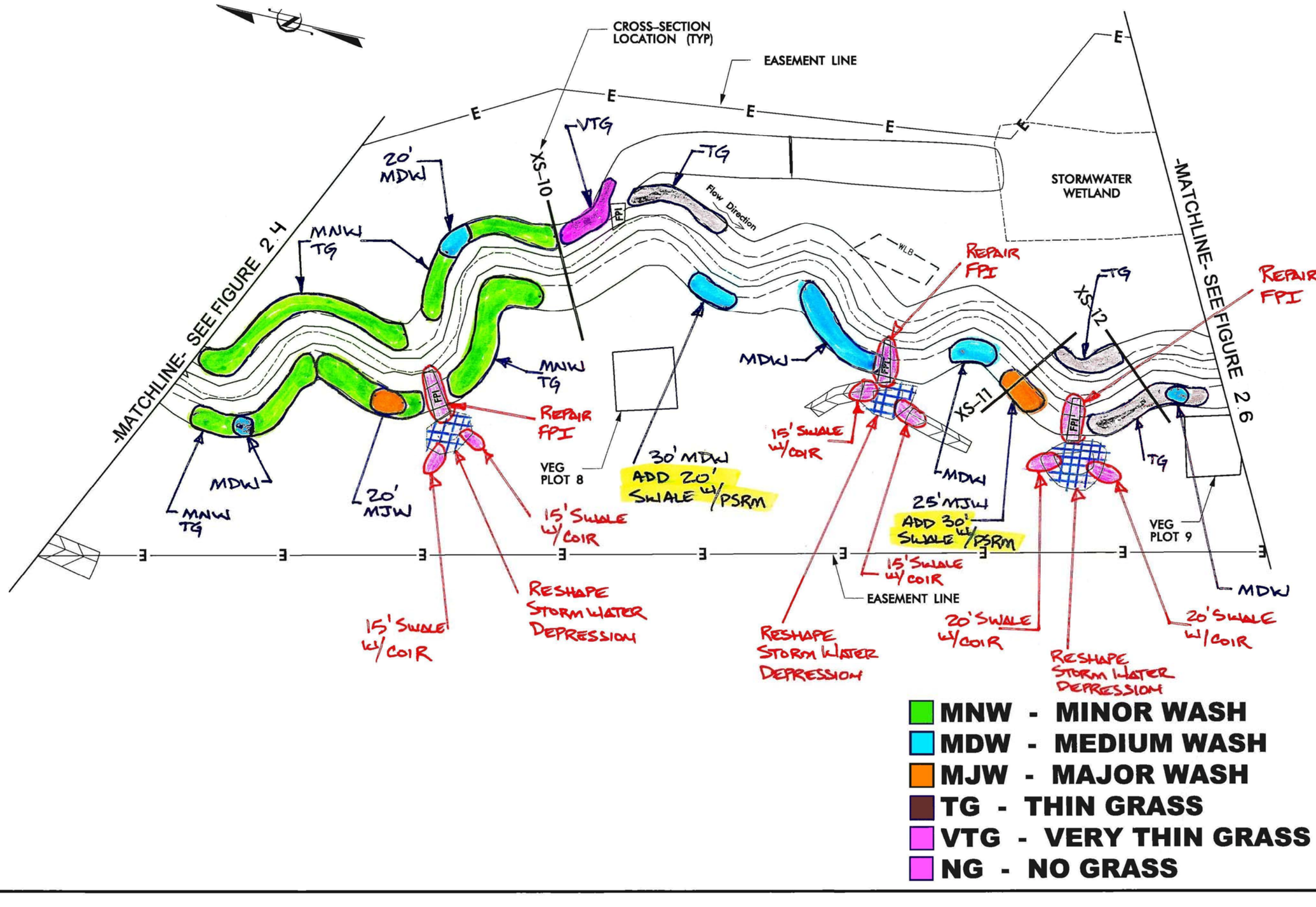
CURRENT CONDITION PLAN VIEW



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UT TO THE LUMBER RIVER
STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

GRAPHIC SCALE
50 25 0 25
PLANS

DATE 08-26-10

CURRENT CONDITION PLAN VIEW

Figure 2.5

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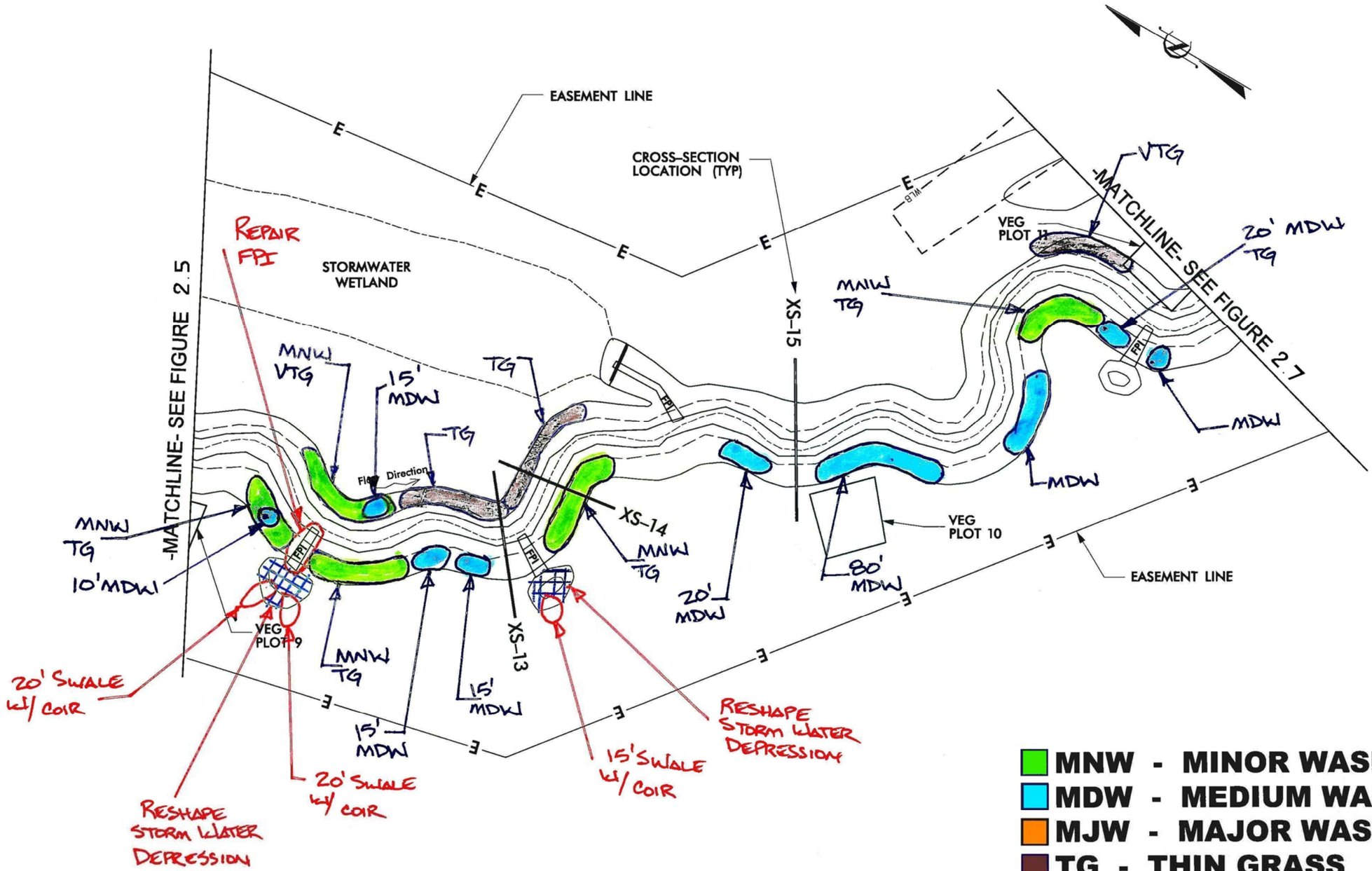
CURRENT CONDITION PLAN VIEW



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UT TO THE LUMBER RIVER
STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

GRAPHIC SCALE
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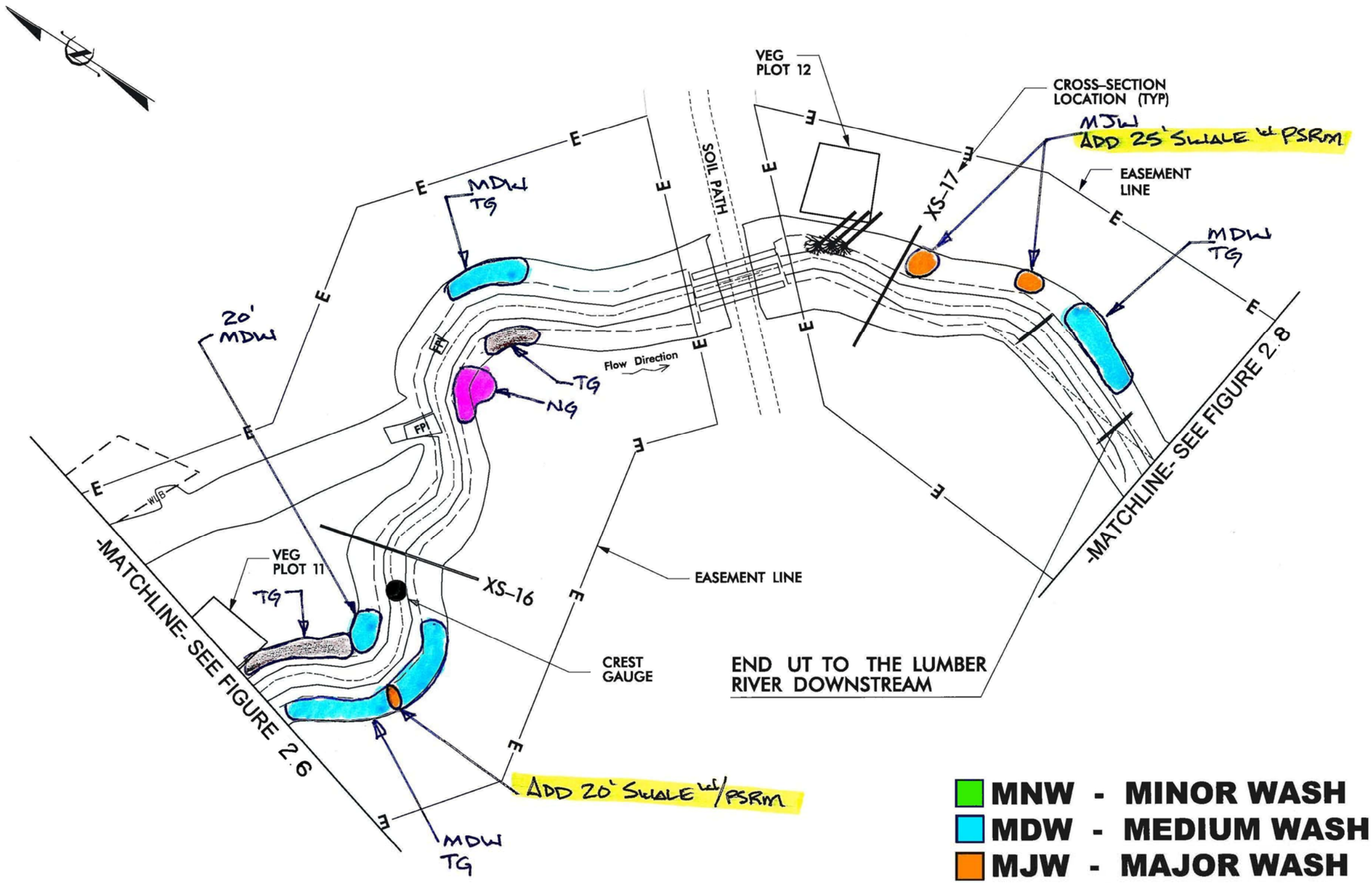
PLANS

DATE: 08-26-10

CURRENT CONDITION PLAN VIEW

Figure 2.6

CURRENT CONDITION PLAN VIEW



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UT TO THE LUMBER RIVER
STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

GRAPHIC SCALE
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PLANS

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CURRENT CONDITION PLAN VIEW

Figure 2.7

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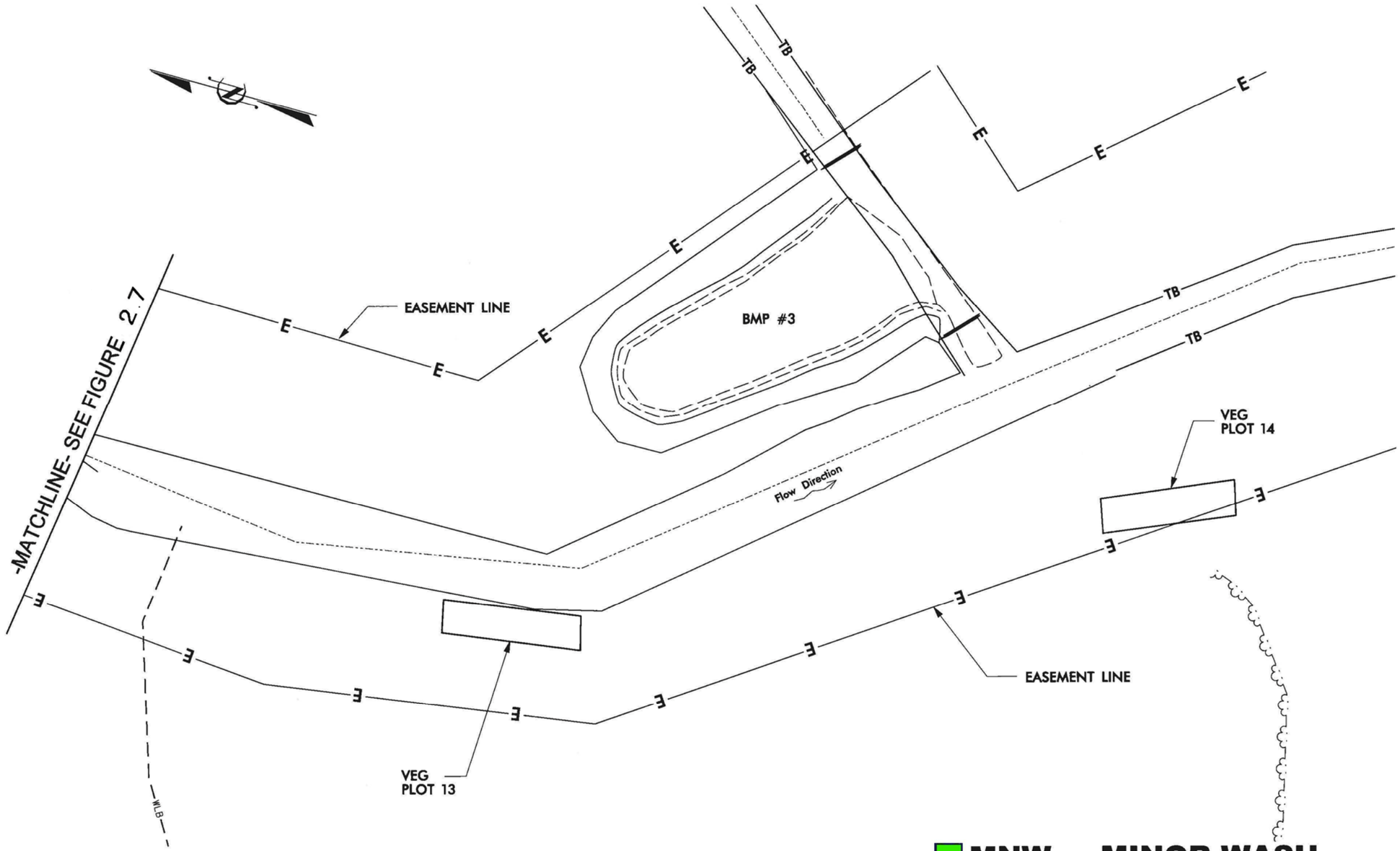
CURRENT CONDITION PLAN VIEW



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UT TO THE LUMBER RIVER
STREAM RESTORATION PROJECT
ROBESON COUNTY, NORTH CAROLINA

GRAPHIC SCALE
50 0 25 50
PLANS

DATE: 08-26-10

CURRENT CONDITION PLAN VIEW

Figure 2.8

Table 5. Visual Stream Morphology Stability Assessment
UT to the Lumber River Site, 002027
UT to the Lumber River: 4,285 feet

Major Channel Category	Channel Sub-Category	Metric	Number Stable, Performing as Intended	Total Number in As-built	Number of Unstable Segments	Amount of Unstable Footage	% Stable, Performing as Intended	Number with Stabilizing Woody Vegetation	Footage with Stabilizing Woody Vegetation	Adjusted % for Stabilizing Woody Vegetation
1. Bed	**1. Vertical Stability** (Riffle and Run units)	1. Aggradation - Bar formation/growth sufficient to significantly deflect flow laterally (not to include point bars)			0	0	100%			
		2. Degradation - Evidence of downcutting			0	0	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	All	N/A			100%			
	3. Meander Pool Condition	1. Depth Sufficient	48	63			76%			
		2. Length appropriate	48	63			76%			
	4. Thalweg Position	1. Thalweg centering at upstream of meander bend (Run)	All	N/A			100%			
		2. Thalweg centering at downstream of meander (Glide)	All	N/A			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	N/A	N/A	N/A
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT included undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	N/A	N/A	N/A
	3. Mass Wasting	Bank slumping, calving, or collaps			0	0	100%	N/A	N/A	N/A
				Totals	0	0	100%	N/A	N/A	N/A
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	3	3			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	3	3			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	4	4			100%			
	4. Habitat	Pool forming structures maintaing ~ Max Pool Depth : Mean Bankfull Depth ratio > 1.6 Rootwads/logs providing some cover at base-flow.	4	4			100%			

Table 6. Vegetation Condition Assessment
UT to the Lumber River Site, 002027
UT to the Lumber River: 4,285 feet

Planted Acreage = 15.0

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited ground cover (grass).	All bare areas contributing sediment were mapped.	See legend on CCPV.	104	0.7	5
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	None	N/A	N/A	N/A	N/A
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	None	N/A	N/A	N/A	N/A

Easement Acreage = 67.85

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreadge	% of Planted Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	None	N/A	N/A	N/A	N/A
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	None	N/A	N/A	N/A	N/A

Figures 3.1-3.20. Vegetation Plot Photos and Problem Areas

3.1 Vegetation Plot 1

3.2 Vegetation Plot 2

3.3 Vegetation Plot 3

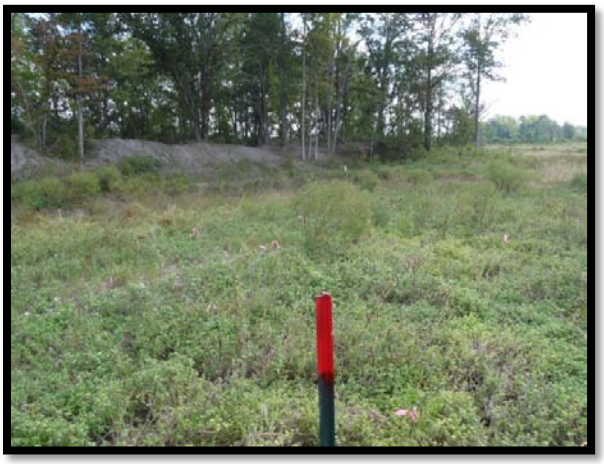
3.4 Vegetation Plot 4

3.5 Vegetation Plot 5

3.6 Vegetation Plot 6

3.7 Vegetation Plot 7

3.8 Vegetation Plot 8



3.9 Vegetation Plot 9

3.10 Vegetation Plot 10

3.11 Vegetation Plot 11

3.12 Vegetation Plot 12

3.13 Vegetation Plot 13

3.14 Vegetation Plot 14

3.15 Area of poor vegetation growth

3.16 Bare area on terrace slope

3.17 Bare area on terrace slope

3.18 Poor vegetation growth on terrace slope

3.19 Wash areas on terrace slope

3.20 Wash areas on terrace slope

Appendix C. Vegetation Plot Data

Table 7. Vegetation Plot Mitigation Success Summary

UT to the Lumber River Site, 002027							
Plot ID	**Community Type**	**Planting Zone ID**	**Reach ID**	**CVS Level**	**Planted Stems**	**Stems Per Acre**	**Survival Threshold Met?**
1	Coastal Plain Small Stream Swamp	CPSSS	Upper	II	19	769	Yes
2	Coastal Plain Small Stream Swamp	CPSSS	Upper	II	18	728	Yes
3	Coastal Plain Small Stream Swamp	CPSSS	Upper	II	14	567	Yes
4	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	21	850	Yes
5	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	17	688	Yes
6	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	16	648	Yes
7	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	20	809	Yes
8	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	20	809	Yes
9	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	18	728	Yes
10	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	14	567	Yes
11	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	15	607	Yes
12	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	18	728	Yes
13	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	24	971	Yes
14	Coastal Plain Small Stream Swamp	CPSSS	Lower	II	21	850	Yes
					Average Stems Per Acre	737	

Table 8. CVS Vegetation Metadata

Report Prepared By	Ryan Smith
Date Prepared	11/2/2010 10:04
database name	CVS_entry.mdb
database location	S:\Lumber_River\Docs\Monitoring
computer name	NC10435
file size	37883904
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
ALL Stems by Plot and spp	A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	94068
project Name	UT to the Lumber River
Description	Stream Restoration, Enhancement and Preservation Site
River Basin	Lumber
length(ft)	4285
stream-to-edge width (ft)	75
area (sq m)	59707
Required Plots (calculated)	14
Sampled Plots	0

Table 9. Planted and Total Stem Counts (Specied by Plot with Annual Means)

Species	Common Name	Type	Current Data (MY1 2010)													
			Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7	
			P	T	P	T	P	T	P	T	P	T	P	T	P	T
Fraxinus pennsylvanica	green ash	Tree	3	3	3	3	1	1	2	2	3	3			2	2
Nyssa biflora	swamp tupelo	Tree	3	3	3	3	1	1	3	3	2	2	1	1	4	4
Quercus laurifolia	laurel oak	Tree	3	3			3	3	2	2	2	2	1	1	1	1
Quercus lyrata	overcup oak	Tree							3	3	1	1			4	4
Quercus michauxii	swamp chestnut oak	Tree	1	1	1	1	1	1	2	2	1	1				
Quercus nigra	water oak	Tree	2	2			5	5	3	3	4	4	5	5	2	2
Quercus phellos	willow oak	Tree	4	4	7	7	1	1	3	3	3	3	5	5	2	2
Taxodium distichum	bald cypress	Tree	3	3	1	1	1	1	1	1					4	4
Ulmus americana	American elm	Tree			3	3	1	1	2	2	1	1	4	4	1	1
		Plot area (acres)	0.0247		0.0247		0.0247		0.0247		0.0247		0.0247		0.0247	
		Species count	7	7	6	6	8	8	9	9	8	8	5	5	8	8
		Stem Count	19	19	18	18	14	14	21	21	17	17	16	16	20	20
		Stems per Acre	769	769	728	728	567	567	850	850	688	688	648	648	809	809

Species	Common Name	Type	Current Data (MY1 2010)													
			Plot 8		Plot 9		Plot 10		Plot 11		Plot 12		Plot 13		Plot 14	
			P	T	P	T	P	T	P	T	P	T	P	T	P	T
Fraxinus pennsylvanica	green ash	Tree	3	3	4	4	2	2	2	2	4	4				
Nyssa biflora	swamp tupelo	Tree	2	2	2	2			3	3	4	4	9	9	6	6
Quercus laurifolia	laurel oak	Tree	4	4			3	3	3	3	3	3				
Quercus lyrata	overcup oak	Tree					1	1	2	2			9	9	11	11
Quercus michauxii	swamp chestnut oak	Tree	6	6	5	5	1	1			2	2				
Quercus nigra	water oak	Tree	4	4	1	1	2	2	1	1	1	1				
Quercus phellos	willow oak	Tree	1	1	4	4	2	2	1	1	3	3				
Taxodium distichum	bald cypress	Tree			1	1	2	2	3	3			6	6	4	4
Ulmus americana	American elm	Tree			1	1	1	1			1	1				
		Plot area (acres)	0.0247		0.0247		0.0247		0.0247		0.0247		0.0247		0.0247	
		Species count	6	6	7	7	8	8	7	7	7	7	3	3	3	3
		Stem Count	20	20	18	18	14	14	15	15	18	18	24	24	21	21
		Stems per Acre	809	809	728	728	567	567	607	607	728	728	971	971	850	850

Species	Common Name	Type	Annual Means			
			MY1 (2010)		BL/AB (2010)	
			P	T	P	T
Fraxinus pennsylvanica	green ash	Tree	2.64	2.64	2.64	N/A
Nyssa biflora	swamp tupelo	Tree	3.31	3.31	3.69	N/A
Quercus laurifolia	laurel oak	Tree	2.50	2.50	2.60	N/A
Quercus lyrata	overcup oak	Tree	4.43	4.43	3.67	N/A
Quercus michauxii	swamp chestnut oak	Tree	2.22	2.22	1.89	N/A
Quercus nigra	water oak	Tree	2.73	2.73	2.82	N/A
Quercus phellos	willow oak	Tree	3.00	3.00	3.17	N/A
Taxodium distichum	bald cypress	Tree	2.60	2.60	2.82	N/A
Ulmus americana	American elm	Tree	1.67	1.67	2.40	N/A
		Plot area (acres)				
		Species count	6.57	6.57	6.86	N/A
		Stem Count	18.21	18.21	19.79	N/A
		Stems per Acre	737	737	801	N/A

Notes:

Plot 2: **The baseline data for plot 2 were entered incorrectly. This was corrected in the baseline CVS data and for the YR 1 report.**

Plot 4: One tree noted as a Taxiodium distichum in the Baseline was actually Nyssa biflora. This was changed in YR 1 data.

Plot 6: One tree noted as a Taxiodium Distichum in the Baseline was actually Quercus larifolia. This was changed in YR 1 data.

Plot 8: Two trees noted as a Quercus lyrata and Nyssa biflora in the Baseline were actually both Quercus michauxii. This was changed in YR 1 data.

Plot 12: One tree noted as a Quercus lyrata in the Baseline was actually Quercus michauxii. This was changed in YR 1 data.

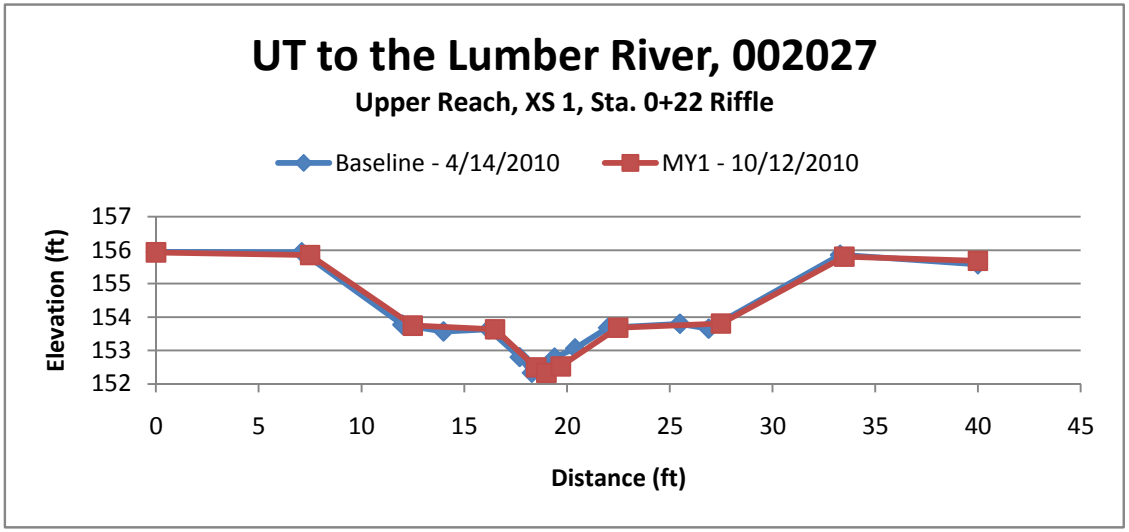
Plot 13: One planted Taxodium distichum was discovered that was not counted in the Baseline. It was added to YR 1 data.

Plot 14: One planted Quercus lyrata was discovered that was not counted in the Baseline. It was added to YR 1 data.

Appendix D. Stream Survey Data

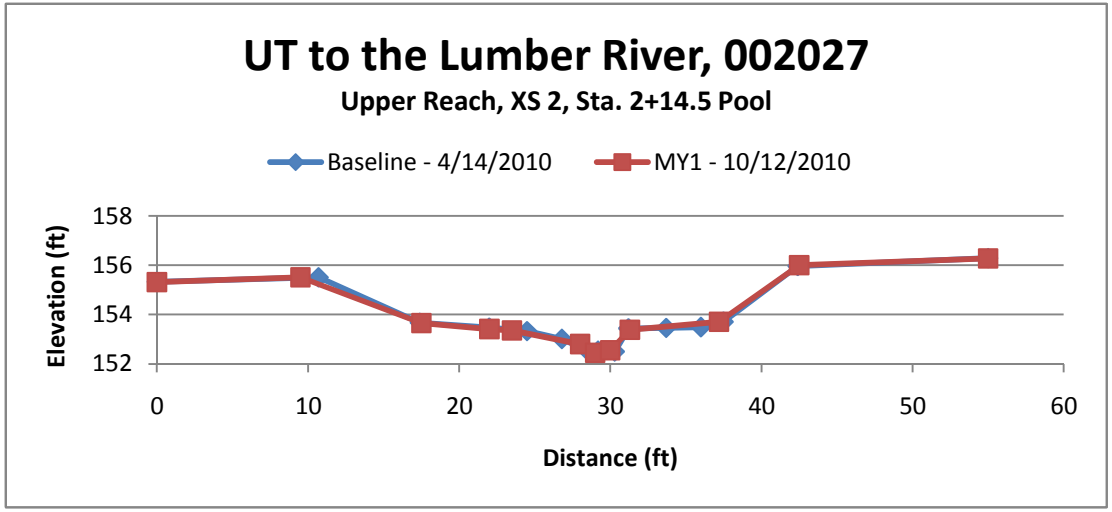
Figures 4.1-4.17. Cross Section Plots and Photos

XSC 1 - Riffle	
STA	**ELEV**
0	155.93
7.5	155.85
12.5	153.74
16.5	153.63
18.5	152.49
19	152.33
19.7	152.52
22.5	153.68
27.5	153.80
33.5	155.80
40	155.68



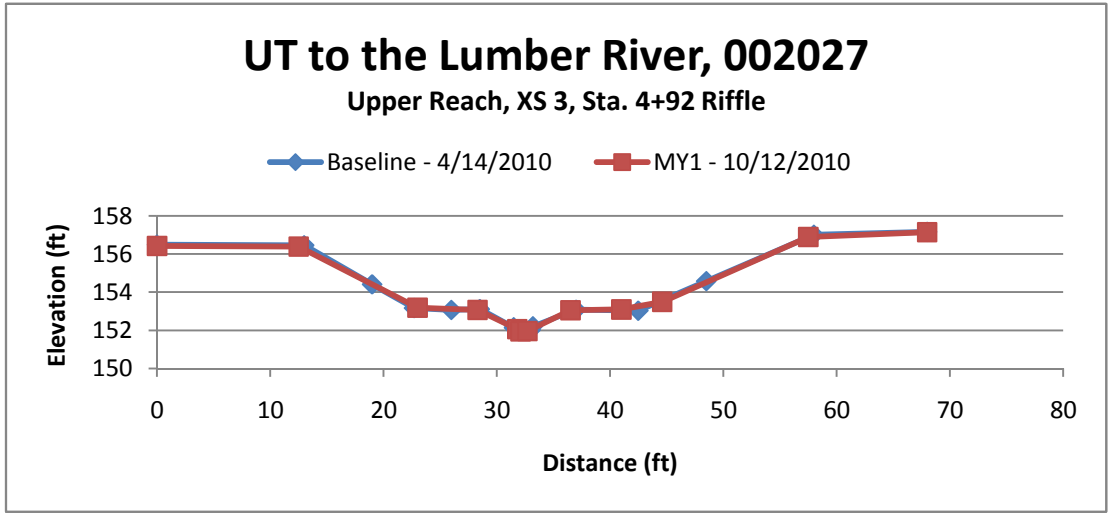
XS 1, Sta. 0+22, Looking Downstream

XSC 2 - Pool	
STA	**ELEV**
0	155.31
9.5	155.51
17.5	153.65
22	153.41
23.5	153.35
28	152.80
29	152.44
30	152.55
31.3	153.38
37.2	153.70
42.5	156.00
55	156.27



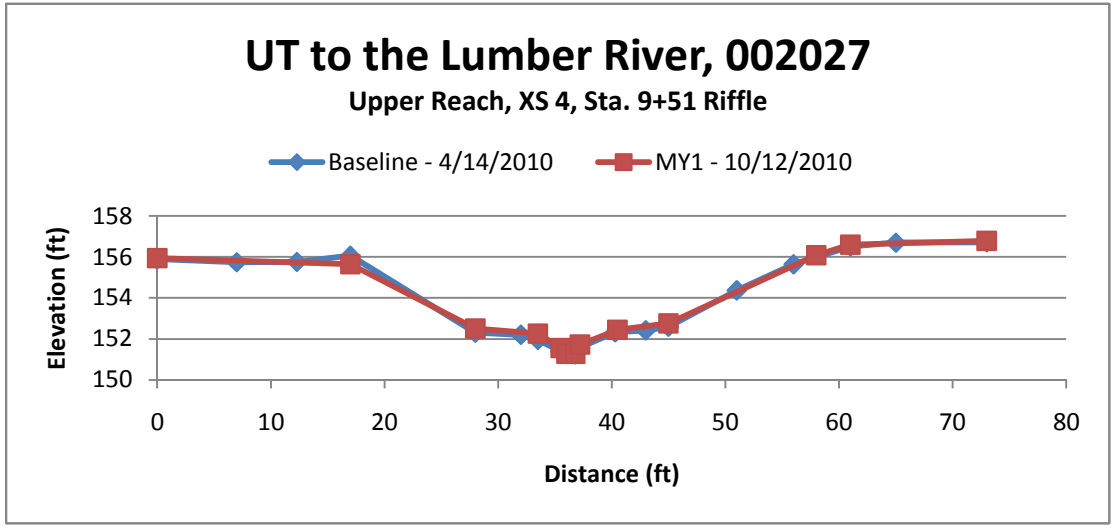
XS 2, Sta. 2+14.5, Looking Downstream

XSC 3 - Riffle	
STA	**ELEV**
0	156.42
12.5	156.39
23	153.18
28.3	153.06
31.8	152.05
32.1	151.94
32.7	151.95
36.5	153.05
41	153.09
44.6	153.49
57.5	156.89
68	157.14



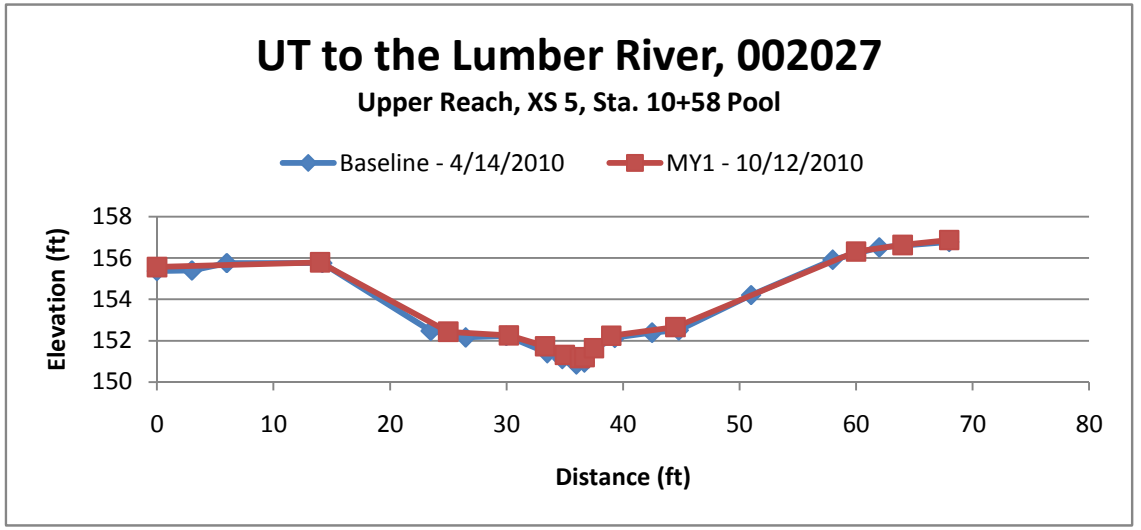
XS 3, Sta. 4+92, Looking Downstream

XSC 4 - Riffle	
STA	**ELEV**
0	155.94
17	155.64
28	152.50
33.5	152.25
35.5	151.55
36	151.28
36.8	151.27
37.2	151.72
40.5	152.44
45	152.75
58	156.08
61	156.59
73	156.78



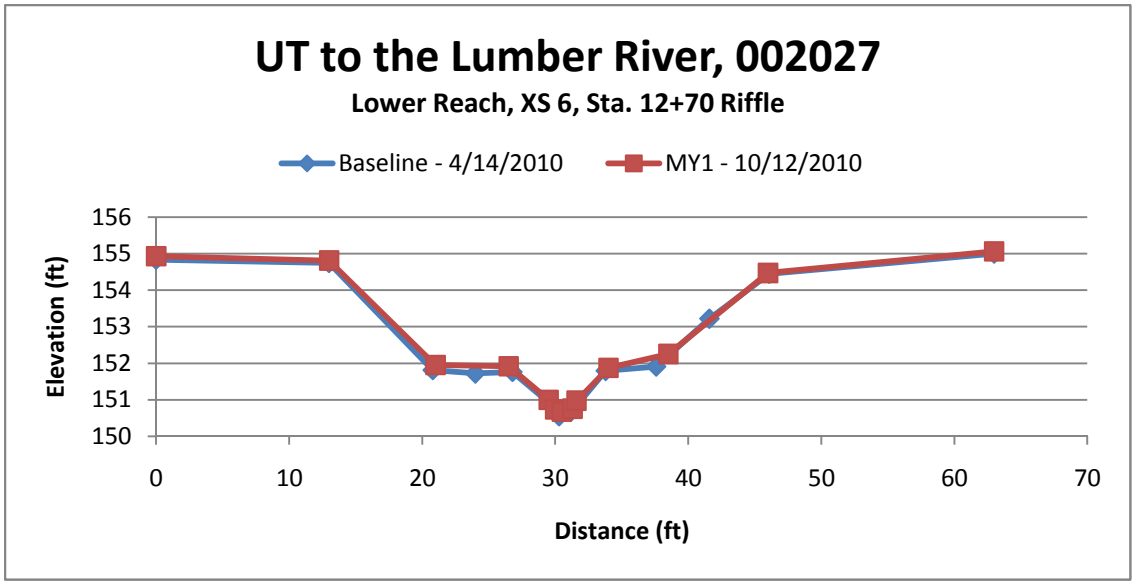
XS 4, Sta. 9+51, Looking Downstream

XSC 5 - Pool	
STA	**ELEV**
0	155.56
14	155.79
25	152.43
30.2	152.25
33.3	151.73
35	151.31
36.3	151.16
36.7	151.20
37.5	151.63
39	152.24
44.5	152.65
60	156.31
64	156.63
68	156.87



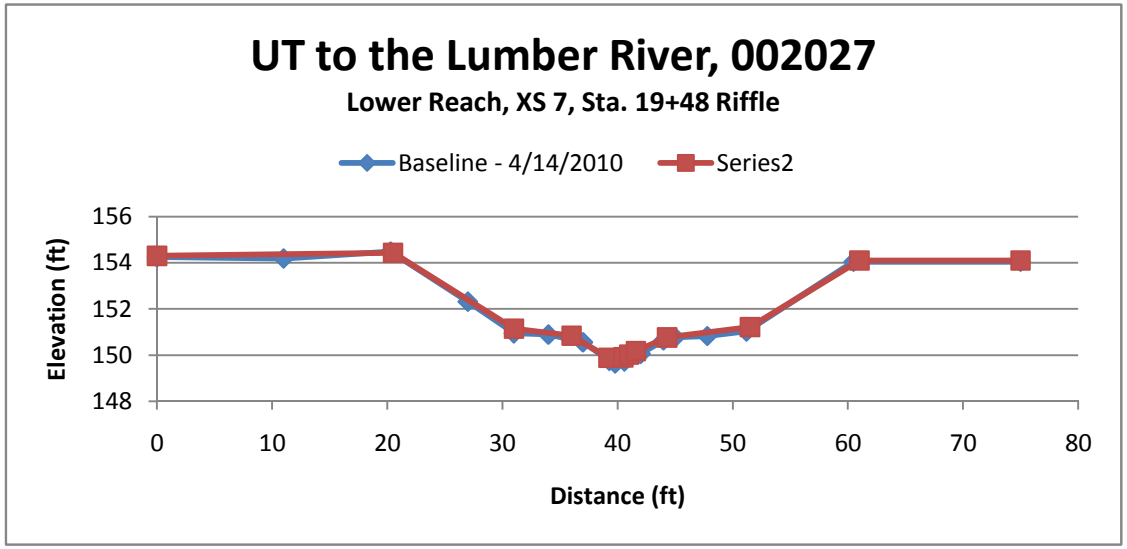
XS 5, Sta. 10+58, Looking Downstream

XSC 6 - Riffle	
STA	**ELEV**
0	154.93
13	154.81
21	151.95
26.5	151.91
29.5	150.99
30	150.73
30.5	150.67
31.3	150.75
31.6	150.97
34	151.87
38.5	152.25
46	154.47
63	155.06



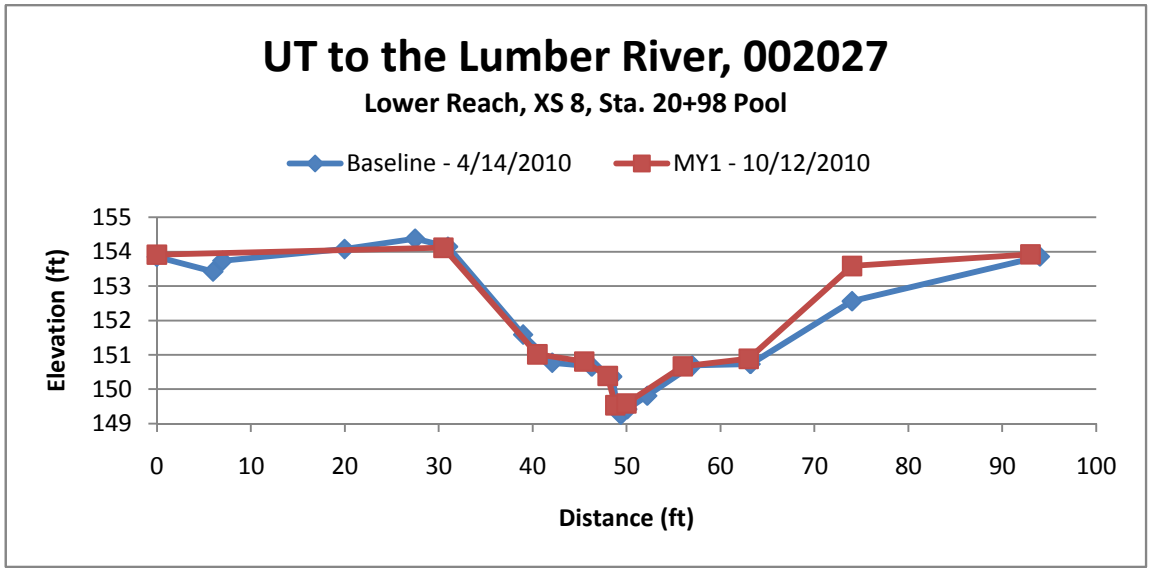
XS 6, Sta. 12+70, Looking Downstream

XSC 7 - Riffle	
STA	**ELEV**
0	154.30
20.5	154.43
31	151.14
36	150.84
39.2	149.88
40.5	149.90
41	150.02
41.6	150.17
44.3	150.76
51.5	151.21
61	154.10
75	154.10



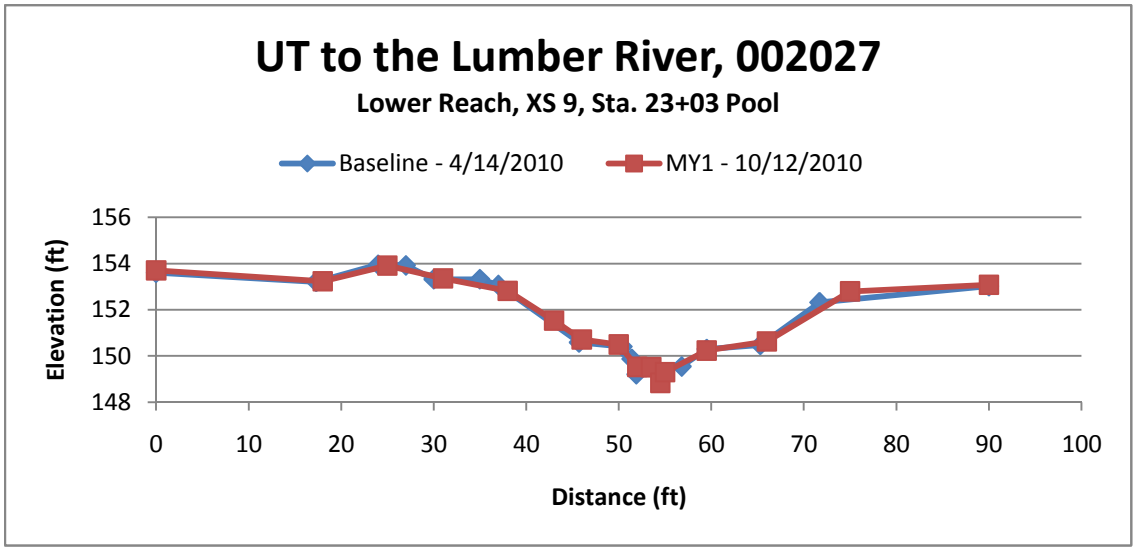
XS 7, Sta. 19+48, Looking Downstream

XSC 8 - Pool	
STA	ELEV
0	153.91
30.5	154.11
40.5	151.01
45.5	150.80
48	150.38
48.8	149.53
50	149.58
56	150.66
63	150.88
74	153.58
93	153.92



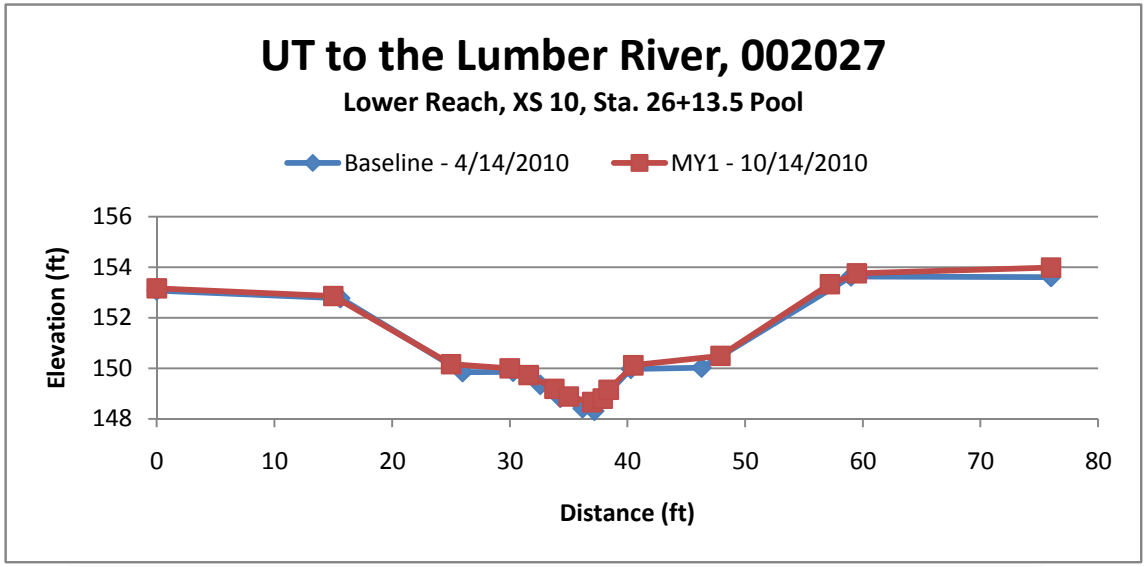
XS 8, Sta. 20+98, Looking Downstream

XSC 9 - Pool	
STA	ELEV
0	153.70
18	153.23
25	153.91
31	153.35
38	152.81
43	151.52
46	150.71
50	150.49
52	149.52
53.5	149.51
54.5	148.83
55	149.29
59.5	150.23
66	150.62
75	152.79
90	153.08



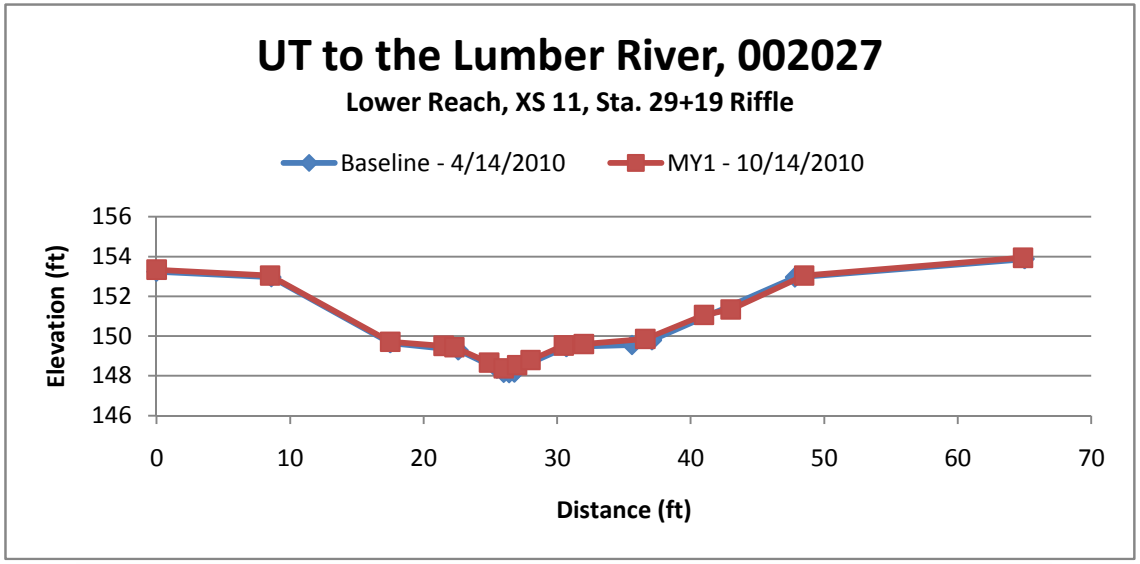
XS 9, Sta. 23+03, Looking Downstream

XSC 10 - Pool	
STA	**ELEV**
0	153.17
15	152.86
25	150.16
30	150.00
31.6	149.73
33.8	149.19
35	148.88
37	148.66
37.9	148.80
38.4	149.15
40.5	150.12
47.9	150.49
57.2	153.33
59.5	153.76
76	153.99



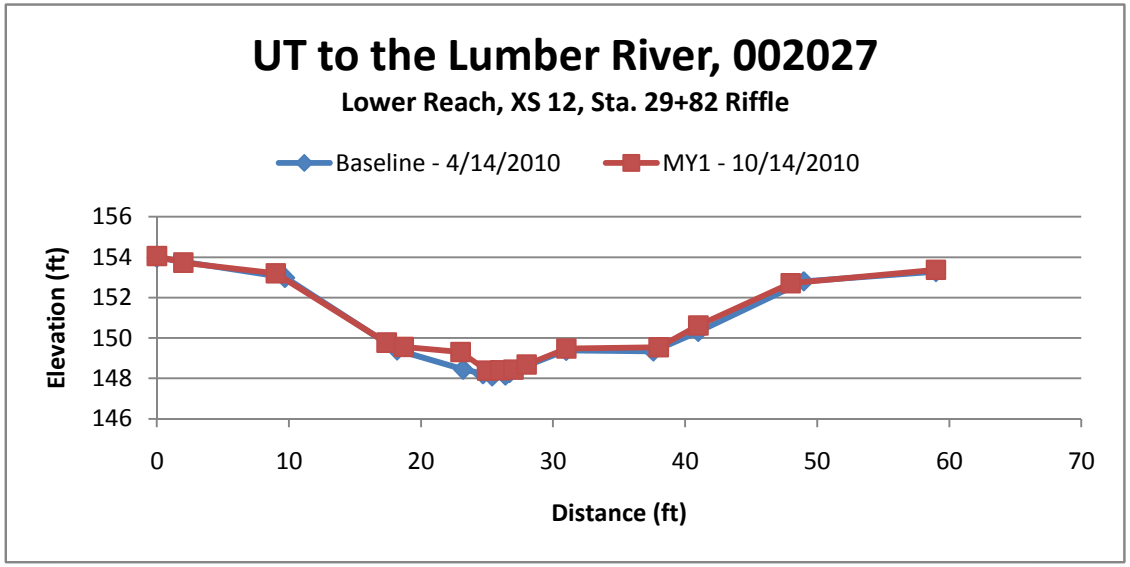
XS 10, Sta. 26+13.5, Looking Downstream

XSC 11 - Riffle	
STA	**ELEV**
0	153.34
8.5	153.04
17.5	149.71
21.5	149.51
22.3	149.44
24.9	148.67
26	148.38
27	148.54
28	148.80
30.5	149.53
32	149.60
36.6	149.86
41	151.06
43	151.34
48.5	153.04
64.9	153.94



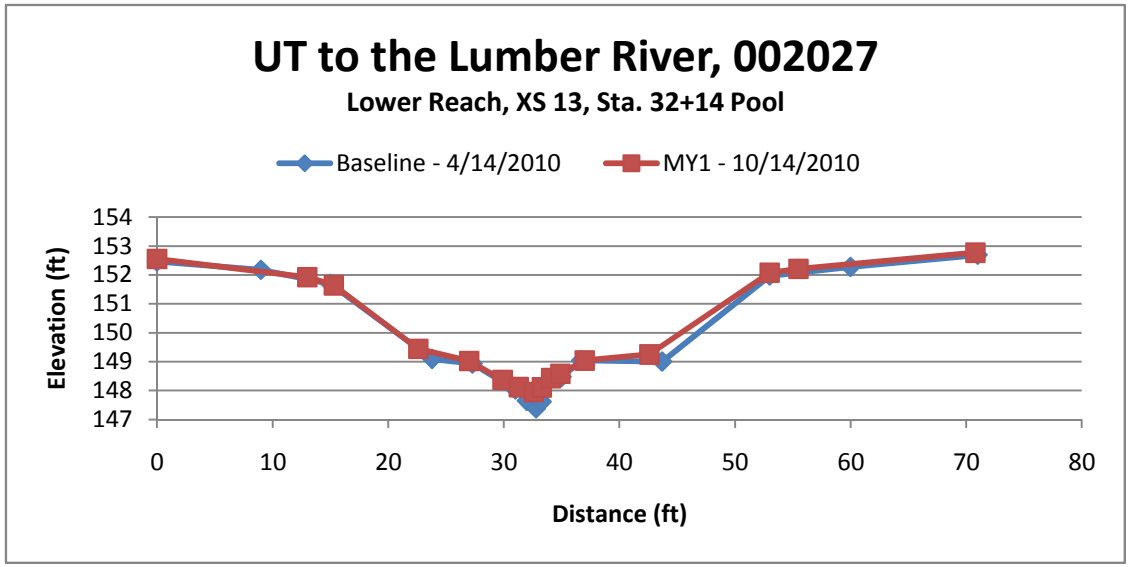
XS 11, Sta. 29+19, Looking Downstream

XSC 12 - Riffle	
STA	**ELEV**
0	154.06
2	153.73
9	153.20
17.4	149.77
18.7	149.56
23	149.30
25	148.39
26	148.40
27	148.43
28	148.69
31	149.48
38	149.54
41	150.62
48	152.71
59	153.38



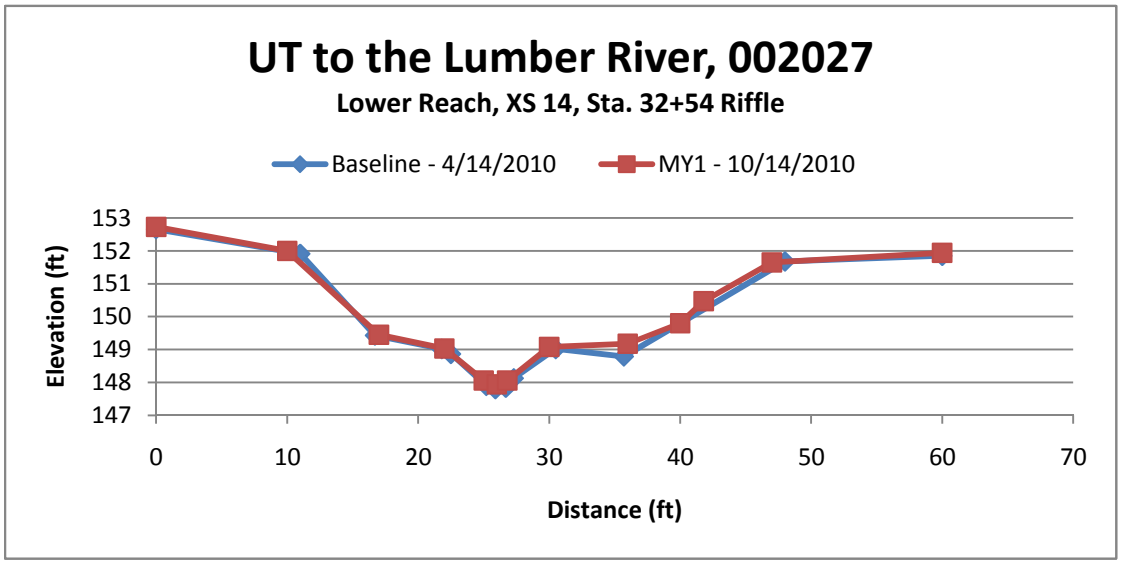
XS 12, Sta. 29+82, Looking Downstream

XSC 13 - Pool	
STA	ELEV
0	152.55
13	151.92
15.3	151.64
22.6	149.44
27	149.02
29.9	148.37
31.3	148.12
32.6	147.95
33.3	148.11
34.1	148.43
34.9	148.58
37	149.04
42.6	149.25
53	152.08
55.5	152.21
70.8	152.77



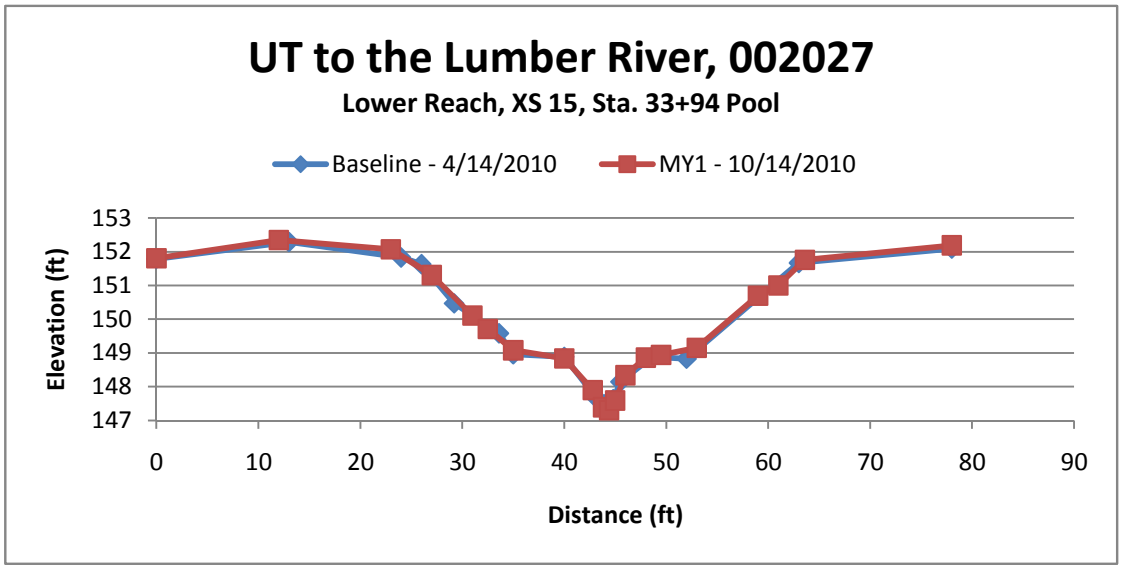
XS 13, Sta. 32+14, Looking Downstream

XSC 14 - Riffle	
STA	**ELEV**
0	152.73
10	152.00
17	149.45
22	149.03
25	148.06
26	147.94
26.8	148.06
30	149.08
36	149.18
40	149.80
41.8	150.47
47	151.65
60	151.94



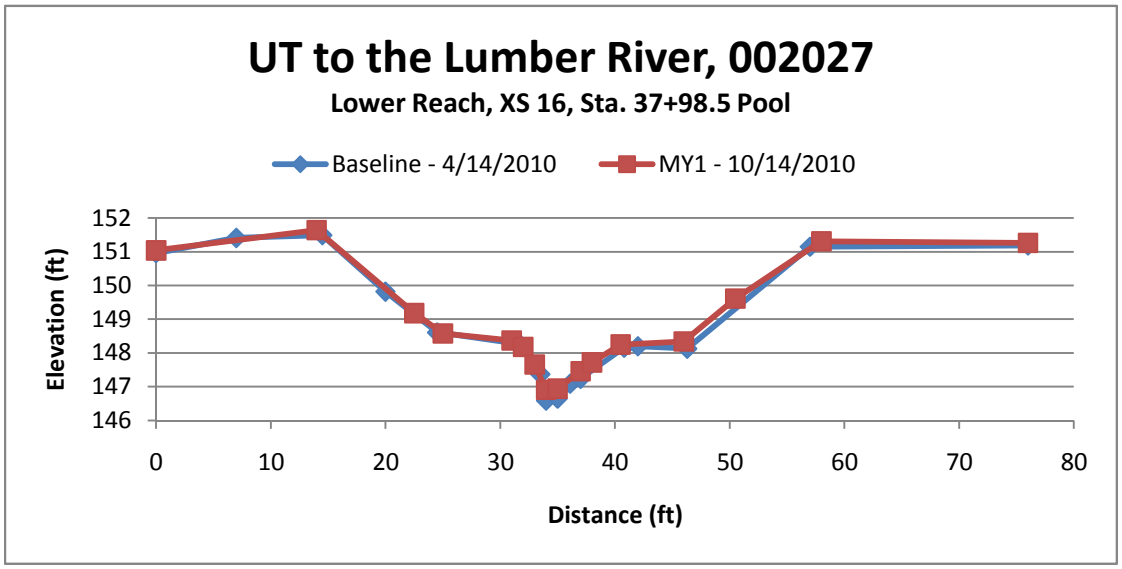
XS 14, Sta. 32+54, Looking Downstream

XSC 15 - Pool	
STA	**ELEV**
0	151.81
12	152.35
23	152.07
27	151.31
31	150.11
32.5	149.71
35	149.08
40	148.84
42.8	147.90
43.8	147.39
44.4	147.30
45	147.59
46	148.34
48	148.86
49.5	148.94
53	149.15
59	150.70
61	151.00
63.6	151.76
78	152.19



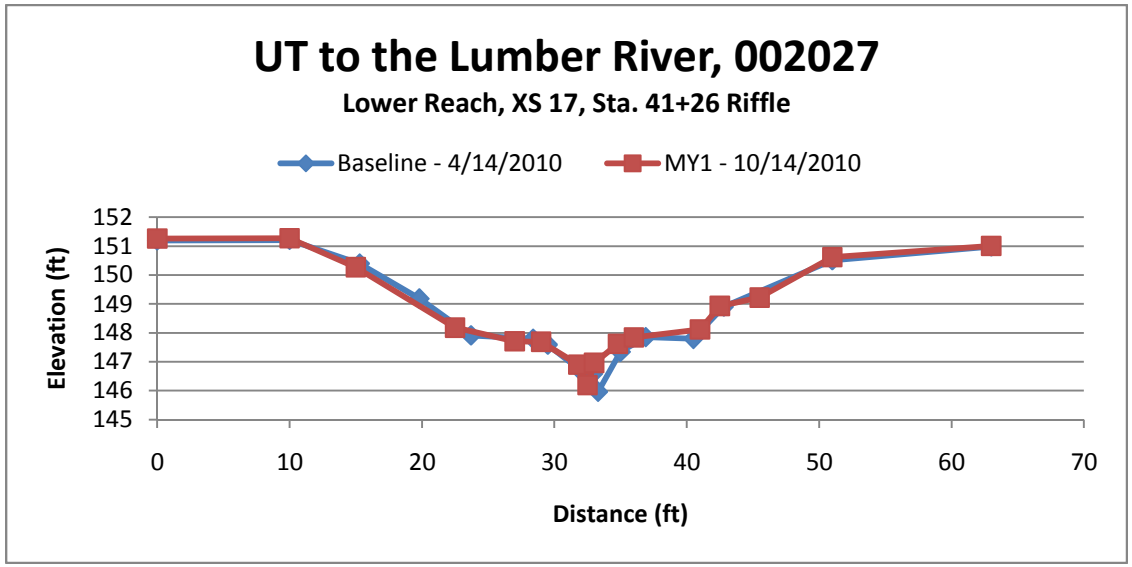
XS 15, Sta. 33+94, Looking Downstream

XSC 16 - Pool	
STA	ELEV
0	151.04
14	151.64
22.5	149.18
25	148.58
31	148.37
32	148.18
33	147.66
34	146.91
35	146.94
37	147.46
38	147.72
40.5	148.25
46	148.34
50.5	149.61
58	151.31
76	151.26



XS 16, Sta. 37+98.5, Looking Downstream

XSC 17 - Riffle	
STA	ELEV
0	151.26
10	151.27
15	150.27
22.5	148.18
27	147.71
29	147.69
31.8	146.90
32.5	146.19
33	146.96
34.8	147.62
36	147.84
41	148.12
42.5	148.93
45.5	149.22
51	150.62
63	151.01



XS 17, Sta. 41+26, Looking Downstream

Figures 5.1-5.3. Longitudinal Profile Plots

Figure 5.1 UT to the Lumber River, 002027, Upper Reach Longitudinal Profile

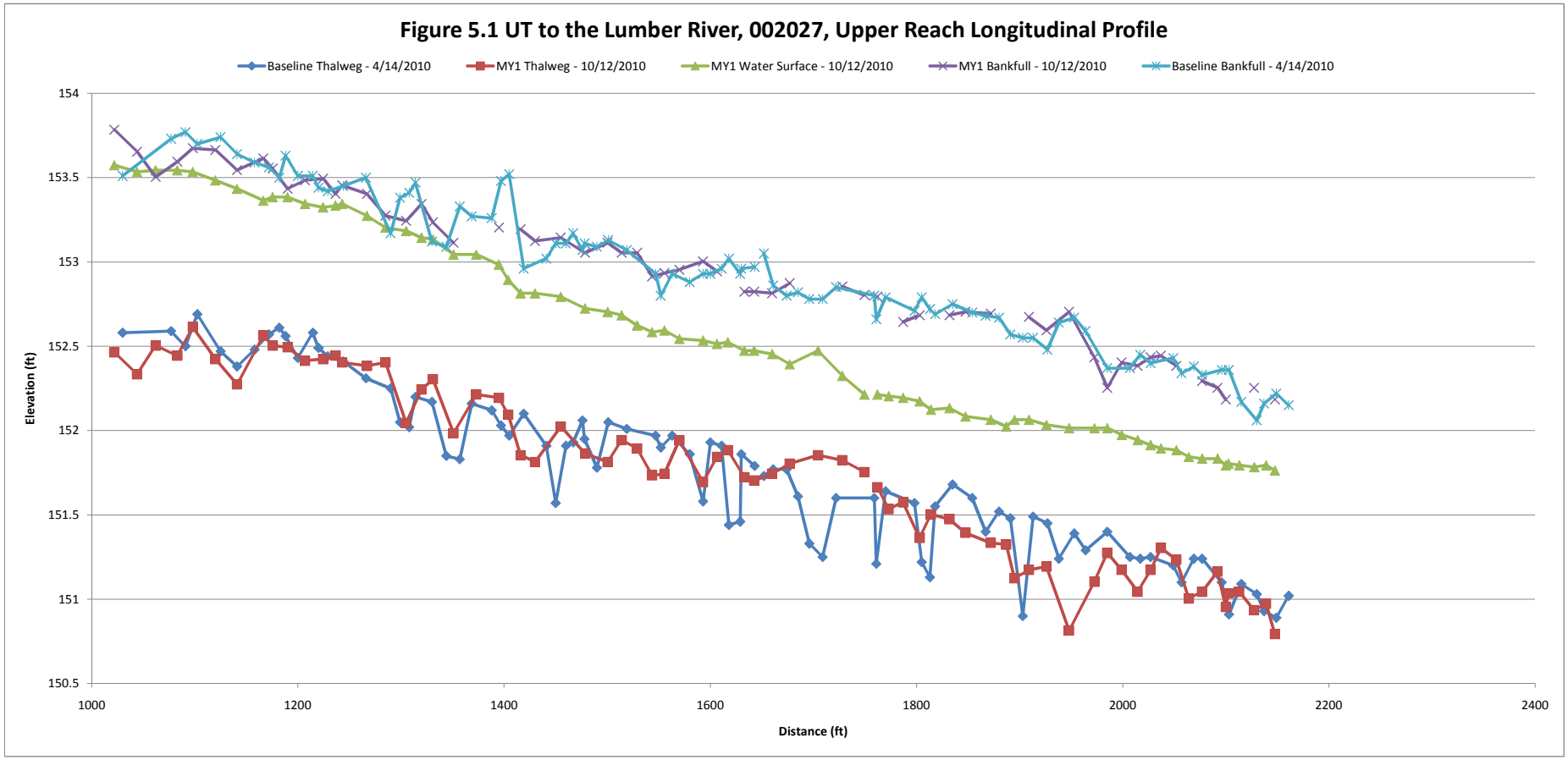


Figure 5.2 UT to the Lumber River, 002027, Lower Reach (1) Longitudinal Profile

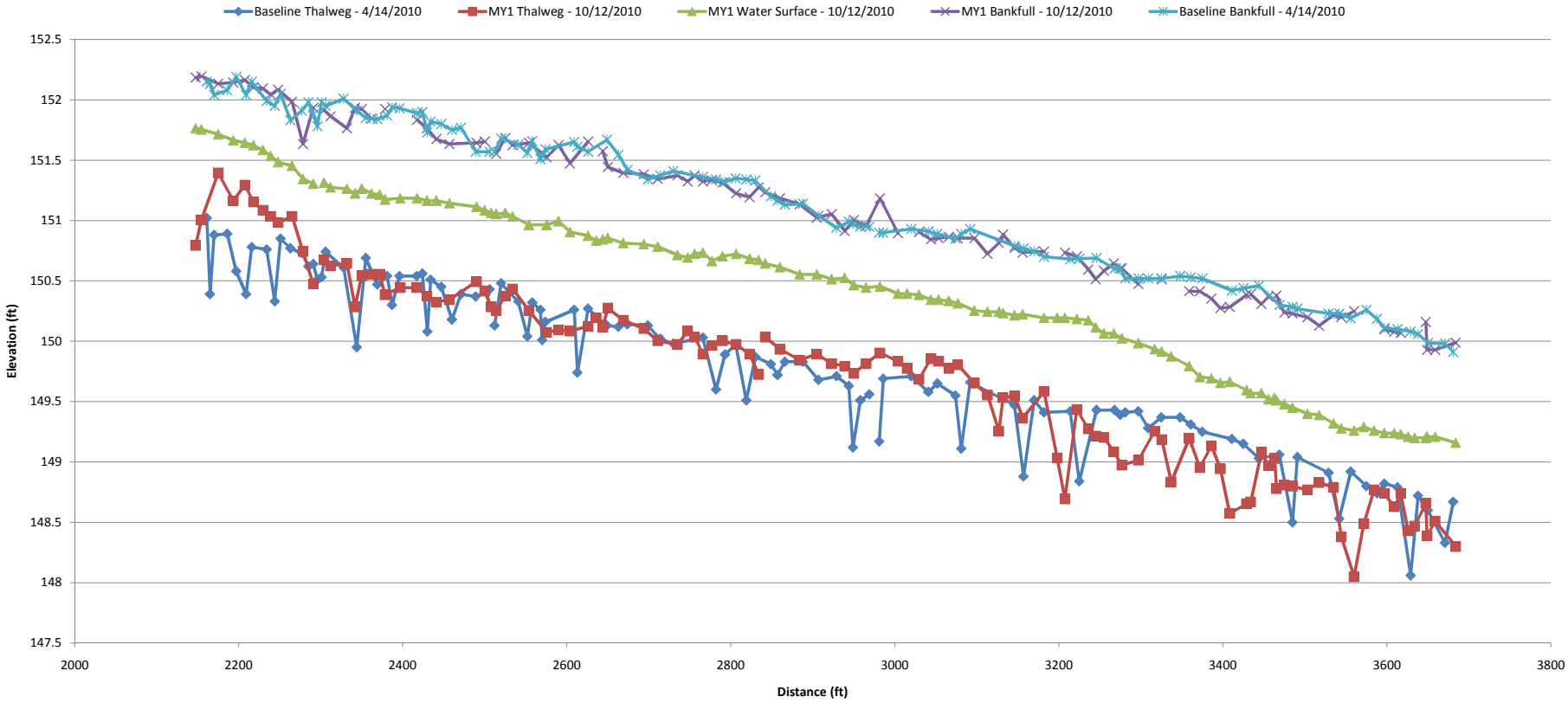


Figure 5.3 UT to the Lumber River, 002027, Lower Reach (2) Longitudinal Profile

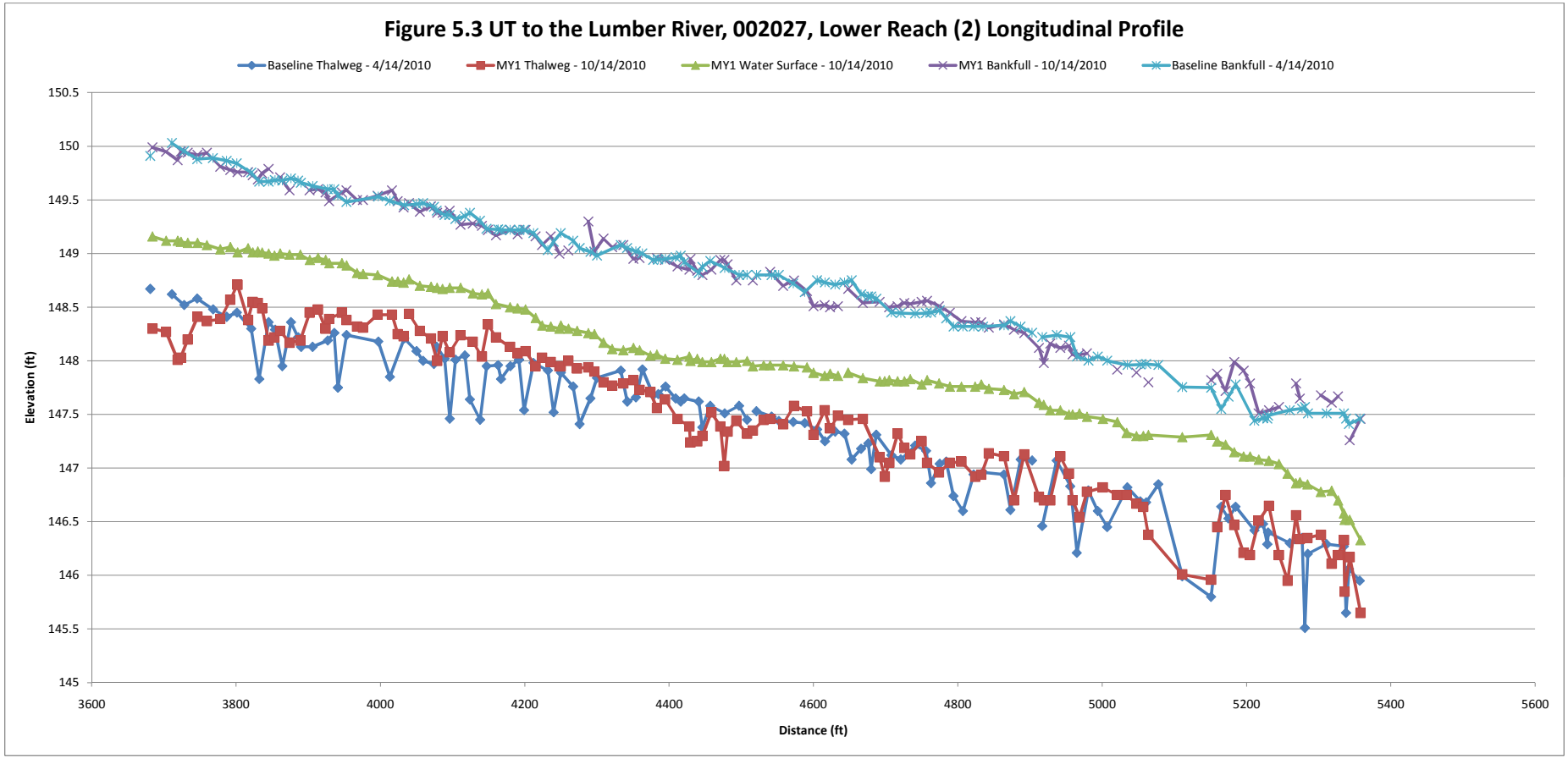


Table 10. Baseline Stream Data Summary
UT to the Lumber River Site, 002027
UT to the Lumber River: 4,285 feet

Parameter	Regional Curve			Pre-Existing Condition	UT Ironhill Branch Reference Reach			UT to Lumber River Reference Reach			Design - Upstream			Design - Downstream			As-built/Baseline - Upstream			As-built/Baseline - Downstream		
Dimensiona and Substrate - Riffle	LL	UL	Eq.	Mean	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	6.41	10.33	8.03	8.70		10.30			9.50			7.80			8.80		5.67	7.31	8.47	6.95	8.07	8.97
Floodprone Width (ft)				13.30		290.00			100.00			25.00			27.00		21.23	23.39	27.54	23.23	25.73	28.30
Bankfull Mean Depth (ft)	0.76	1.45	0.99	0.94		0.95			0.85			0.74			0.83		0.46	0.58	0.64	0.52	0.63	0.73
Bankfull Max Depth (ft)[1]				1.77		1.58			1.42			1.11			1.25		0.96	1.13	1.30	1.00	1.30	1.83
Bankfull Cross Sectional Area (ft^2)	9.08	12.57	8.19	8.16		9.76			8.03			4.90			6.20		3.56	4.19	5.45	4.02	5.10	5.74
Width/Depth Ratio				9.20		10.80			11.20			10.50			10.50		9.00	13.05	16.93	10.68	12.99	15.74
Entrenchment Ratio				1.53		28.21			28.21			3.20			3.10		2.75	3.25	3.74	2.77	3.20	3.44
Bank Height Ratio[1]				2.94		1.00			1.03			1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
d50 (mm)				Detritus		0.30			0.30													
Profile																						
Riffle Length (ft)				NA	11.66	33.00	67.02	17.04	18.60	20.16	0.78	18.20	77.00	0.65	18.70	91.60	5.50	21.67	47.00	5	22.77	87
Riffle Slope (ft/ft)				0.0000		0.0043			0.0013			0.0020			0.0019		0.0000	0.0023	0.0129	0	0.0024	0.0107
Pool Length (ft)				NA	20.74	28.03	42.51	11.69	17.63	21.13	8.50	35.00	42.00	5.90	35.00	39.00	11.00	27.50	48.00	6	23.77	51
Pool Max depth (ft)				2.02	ream Dat	1.78			1.50			1.48			1.67		1.01	1.33	1.65	1.16	1.55	2.1
Pool Spacing (ft)				115.00	37.20	71.50	105.75	26.18	40.12	54.06	15.50	31.00	46.50	21.00	37.20	53.40	23.00	49.96	91.00	16	22.77	87
Pool Cross Sectional Area (ft^2)				NA		12.90			4.69			7.44			9.48		3.92	8.93	5.69	5.94	6.75	7.86
Pattern																						
Channel Beltwidth (ft)				NA	30.00	44.50	59.00	16.00	17.50	19.00	15.50	31.00	46.50	17.50	35.00	52.50	15.50	31.00	46.50	17.50	35.00	52.50
Radius of Curvature (ft)				NA	13.70	17.25	20.80	7.42	8.53	9.63	15.50	19.40	23.30	17.50	21.90	26.30	15.50	19.40	23.30	17.50	21.90	26.30
Rc: Bankfull Width (ft/ft)				NA	1.33	1.68	2.02	0.78	0.90	1.02	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00	2.00	2.50	3.00
Meander Wavelength (ft)				NA	42.00	57.00	72.00	38.00	38.00	38.00	23.30	50.40	77.50	26.30	56.90	87.50	23.30	50.40	77.50	26.30	56.90	87.50
Meander Width Ratio				NA	4.09	5.55	7.00	4.01	4.01	4.01	3.00	6.50	10.00	3.00	6.50	10.00	3.00	6.50	10.00	3.00	6.50	10.00
Substrate, bed and transport parameters																						
Ri%/P%				NA	54.1 / 45.9			51.4 / 48.6									44.1 / 55.9			49.3 / 50.7		
SC%/Sa%/G%/C%/B%/Be%				Detritus	100% Sa			100% Sa														
d16/d35/d50/d84/d95/d^g/di^{sp} (mm)				Detritus	0.30			0.30														
Reach Shear Stress (competency) lb/ft^2				0.148							0.055			0.060			0.073			0.061		
Max part size (mm) mobilized at bankfull				10.62 - 37.22							3.83 - 18.12			4.16 - 19.2			5.1 - 22.2			4.2 - 19.3		
Unit Stream Power (transport capacity) lbs/ft.s				0.100							0.059			0.070			0.075			0.083		
Additional Reach Parameters																						
Drainage Area (SM)				0.42	1.61			0.63														
Impervious cover estimate (%				5.00	5.00			5.00														
Rosgen Classification				G-F/5	E5			E5			E5			E5			E5			E5		
Bankfull Velocity (fps)	0.65	1.11	1.08	0.74							1.02			1.12			1.19			1.37		
Bankfull Discharge (cfs)	5.90	14.06	8.87	6.00													5.00			7.00		
Valley length (ft)				3428.00	200.00			115.40									920.00			2508.00		
Channel Thalweg length (ft				3428.00	264.00			150.00			1162.00			*3123.00			1162.00			*3123.00		
Sinuosity (ft)				1.00	1.32			1.30			1.25			1.25			1.25			1.25		
Water Surface Slope (Channel) (ft/ft)				0.0000 (Backwater Blockage)	0.0020			0.0028			0.0015			0.0014			0.0018			0.00154		
BF slope (ft/ft)				0.0023	0.0020			0.0028			0.0015			0.0014			0.0018			0.00154		
Bankfull Floodplain Area (acres)				0.00							0.67			1.97			0.67			1.97		
Proportion over wide (%				50.00	0.00			0.00														
Entrenchment Class (ER Range				1.53	28.21			10.55														
Incision Class (BHR Range)				2.94	1.00			1.06														
BEHI VL%/L%/M%/H%/VH%/E%				NA	100% VL			100% VL														
Channel Stability or Habitat Metric				NA	NA	NA	NA	NA	NA	NA												
Biological or Other				NA	NA	NA	NA	NA	NA	NA												

It should be noted that As-built conditions were completed at the end of construction. Many storm events had occurred between beginning of construction and end of construction that naturally modified constructed parameters.

*50 foot easement crossing is taken out of the stationing to get 3,123 linear feet of construction.

Table 11. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Section) - Upstream Reach Sections 1 -5; Downstream Reach Sections 6 - 17
UT to the Lumber River Site, 002027
UT to the Lumber River: 4,285 feet

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Riffle)							Cross Section 5 (Pool)						
Dimension and substrate	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+
Based on fixed baseline bankfull elevation[1]																																			
Bankfull Width (ft)	5.67	5.88						8.66	7.75						8.47	9.32						7.79	6.13						8.92	8.74					
Floodprone Width (ft)	21.23	21.21						24.14	23.61						27.54	27.49						21.41	21.43						27.37	25.25					
Bankfull Mean Depth (ft)	0.63	0.69						0.45	0.43						0.64	0.52						0.46	0.46						0.64	0.55					
Bankfull Max Depth (ft)	1.3	1.3						0.94	0.91						1.12	1.12						0.96	0.98						1.29	1.08					
Bankfull Cross Sectional Area (ft^2)	3.56	4.08						3.92	3.32						5.45	4.89						3.56	2.84						5.69	4.85					
Bankfull Width/Depth Ratio	9	8.52						19.24	18.02						13.23	17.92						16.93	13.33						13.94	15.89					
Bankfull Entrenchment Ratio	3.74	3.61						2.79	3.05						3.25	2.95						2.75	3.5						3.07	2.89					
Bankfull Bank Height Ratio	1	1						1	1						1	1						1	1						1	1					

	Cross Section 6 (Riffle)							Cross Section 7 (Riffle)							Cross Section 8 (Pool)							Cross Section 9 (Pool)							Cross Section 10 (Pool)						
Dimension and substrate	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+
Based on fixed baseline bankfull elevation[1]																																			
Bankfull Width (ft)	6.95	7.37						7.73	8.03						11.85	9.67						8.91	8.96						9.78	10.24					
Floodprone Width (ft)	23.23	23.4						24.09	23.51						34.06	28.72						25.68	27.62						30.76	30.05					
Bankfull Mean Depth (ft)	0.63	0.63						0.52	0.5						0.56	0.55						0.69	0.6						0.8	0.73					
Bankfull Max Depth (ft)	1.22	1.2						1	0.88						1.43	1.13						1.1	1.4						1.55	1.34					
Bankfull Cross Sectional Area (ft^2)	4.4	4.66						4.02	4.02						6.63	5.36						6.1	5.35						7.86	7.46					
Bankfull Width/Depth Ratio	11.03	11.7						14.87	16.06						21.16	17.58						12.91	14.93						12.22	14.03					
Bankfull Entrenchment Ratio	3.34	3.18						3.12	2.93						2.88	2.97						2.88	3.08						3.15	2.93					
Bankfull Bank Height Ratio	1	1						1	1						1	1						1	1						1	1					

	Cross Section 11 (Riffle)							Cross Section 12 (Riffle)							Cross Section 13 (Pool)							Cross Section 14 (Riffle)							Cross Section 15 (Pool)						
Dimension and substrate	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+
Based on fixed baseline bankfull elevation[1]																																			
Bankfull Width (ft)	8.97	8.93						7.8	7.32						10.56	9.91						8.7	7.84						8.6	7.92					
Floodprone Width (ft)	24.87	24.47						26.85	23.54						30.02	25.24						27.03	25.7						27.48	27.66					
Bankfull Mean Depth (ft)	0.57	0.57						0.73	0.57						0.63	0.55						0.64	0.61						0.69	0.71					
Bankfull Max Depth (ft)	1.23	1.13						1.27	0.91						1.61	1.07						1.22	1.09						1.4	1.54					
Bankfull Cross Sectional Area (ft^2)	5.15	5.05						5.7	4.15						6.68	5.45						5.59	4.78						5.94	5.6					
Bankfull Width/Depth Ratio	15.74	15.67						10.68	12.84						16.76	18.02						13.59	12.85						12.46	11.15					
Bankfull Entrenchment Ratio	2.77	2.74						3.44	3.22						2.84	2.55						3.11	3.28						3.19	3.49					
Bankfull Bank Height Ratio	1	1						1	1						1	1						1	1						1	1					

	Cross Section 16 (Pool)							Cross Section 17 (Riffle)						
Dimension and substrate	Base	MY1	MY2	MY3	MY4	MY5	MY+	Base	MY1	MY2	MY3	MY4	MY5	MY+
Based on fixed baseline bankfull elevation[1]														
Bankfull Width (ft)	9	8.87						8.28	6.18					
Floodprone Width (ft)	32.36	29.35						28.3	26.31					
Bankfull Mean Depth (ft)	0.81	0.68						0.69	0.52					
Bankfull Max Depth (ft)	1.62	1.34						1.83	1.5					
Bankfull Cross Sectional Area (ft^2)	7.27	6.06						5.74	3.2					
Bankfull Width/Depth Ratio	11.11	13.04						12	11.88					
Bankfull Entrenchment Ratio	3.6	3.31						3.42	4.26					
Bankfull Bank Height Ratio	1	1						1	1					

1 = Widths and depths for each resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development.

Table 12. Monitoring Data - Stream Reach Data Summary

UT to the Lumber River Site, 002027

Reach 1 (Upper), UT to the Lumber River: 1,162 feet

Parameter	Baseline			MY-1			MY-2			MY-3			MY-4			MY-5		
Dimension and substrate - Riffle only	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	5.67	7.31	8.47	5.88	7.11	9.32												
Floodprone Width (ft)	21.23	23.39	27.54	21.21	23.38	27.49												
Bankfull Mean Depth (ft)	0.46	0.58	0.64	0.46	0.56	0.69												
Bankfull Max Depth (ft)	0.96	1.13	1.30	0.98	1.13	1.30												
Bankfull Cross Sectional Area (ft^2)	3.56	4.19	5.45	2.84	3.94	4.89												
Bankfull Width/Depth Ratio	9.00	13.05	16.93	8.52	13.26	17.92												
Bankfull Entrenchment Ratio	2.75	3.25	3.74	2.95	3.35	3.61												
Bankfull Bank Height Ratio	1.00	1.00	1.00	1	1	1												
Profile																		
Riffle Length (ft)	5.50	21.67	47.00	14.99	51.77	121.03												
Riffle Slope (ft/ft)	0.000	0.002	0.013	0.0012	0.0031	0.0050												
Pool Length (ft)	11.00	27.50	48.00	11.78	43.97	68.55												
Pool Max Depth (ft)	1.01	1.33	1.65	1.13	1.33	1.91												
Pool Spacing (ft)	23.00	49.96	91.00	20.35	54.62	131.74												
Pattern																		
Channel Beltwidth (ft)	15.5	31	46.5															
Radius of Curvature (ft)	15.5	19.4	23.3															
Rc:Bankfull Width (ft/ft)	2	2.5	3															
Meander Wavelength (ft)	23.3	50.4	77.5															
Meander Width Ratio	3	6.5	10															
Additional Reach Parameters																		
Rosgen Classification	E5			E5														
Channel Thalweg length (ft)	1162			1113														
Sinuosity (ft)	1.25			1.21														
Water Surface Slope (Channel) (ft/ft)	0.0018			0.00163														
BF slope (ft/ft)	0.0018			0.00143														
[3]Ri% / P%	44.1 / 55.9			44.8 / 55.2														
[3]SC% / Sa% / G% / C% / B% / Be%																		
[3]d16 / d35 / d50 / d84 / d95																		
[2]% of Reach with Eroding Banks																		
Channel Stability or Habitat Metric																		
Biological or Other																		

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

1 = The distributions for these paramenters can include information from both thte 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

Table 12. Monitoring Data - Stream Reach Data Summary

UT to the Lumber River Site, 002027

Reach 2 (Lower), UT to the Lumber River: 3,123 feet

Parameter	Baseline			MY-1			MY-2			MY-3			MY-4			MY-5		
Dimension and substrate - Riffle only	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
Bankfull Width (ft)	6.95	8.07	8.97	6.18	7.61	8.93												
Floodprone Width (ft)	23.23	25.73	28.30	23.40	24.49	26.31												
Bankfull Mean Depth (ft)	0.52	0.63	0.73	0.50	0.57	0.63												
Bankfull Max Depth (ft)	1.00	1.30	1.83	0.88	1.12	1.50												
Bankfull Cross Sectional Area (ft^2)	4.02	5.10	5.74	3.20	4.31	5.05												
Bankfull Width/Depth Ratio	10.68	12.99	15.74	11.70	13.50	16.06												
Bankfull Entrenchment Ratio	2.77	3.20	3.44	2.74	3.27	4.26												
Bankfull Bank Height Ratio	1	1	1	1	1	1												
Profile																		
Riffle Length (ft)	5.00	22.77	87.00	10.3	25.29	81.89												
Riffle Slope (ft/ft)	0.000	0.002	0.011	0.0000	0.0029	0.0081												
Pool Length (ft)	6.00	23.77	51.00	6.02	35.47	109.59												
Pool Max Depth (ft)	1.16	1.55	2.10	1.41	1.70	2.19												
Pool Spacing (ft)	16.00	22.77	87.00	16.61	47.70	104.41												
Pattern																		
Channel Beltwidth (ft)	17.5	35	52.5															
Radius of Curvature (ft)	17.5	21.9	26.3															
Rc:Bankfull Width (ft/ft)	2	2.5	3															
Meander Wavelength (ft)	26.3	56.9	87.5															
Meander Width Ratio	3	6.5	10															
Additional Reach Parameters																		
Rosgen Classification	E5			E5														
Channel Thalweg length (ft)	*3123			*3166														
Sinuosity (ft)	1.25			1.26														
Water Surface Slope (Channel) (ft/ft)	0.00154			0.00169														
BF slope (ft/ft)	0.00154			0.00149														
[3]Ri% / P%	49.3 / 50.7			48.7 / 51.3														
[3]SC% / Sa% / G% / C% / B% / Be%																		
[3]d16 / d35 / d50 / d84 / d95																		
[2]% of Reach with Eroding Banks																		
Channel Stability or Habitat Metric																		
Biological or Other																		

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

*50 foot easement crossing is taken out of the stationing to get channel thalweg length.

1 = The distributions for these paramenters can include information from both thte 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

Appendix E. Hydrologic Data

Table 13. Verification of Bankfull Events

Date	Crest Gauge Info		Gauge Reading (ft)	Gauge Elevation (ft)	Crest Elevation (ft)	Bankfull Elevation (ft)	Height above Bankfull (ft)	Photo
	Site	Sta.						
7/13/2010	XS 16	48+13	3.25	146.9	150.15	148.36	1.79	6.1
11/15/2010	XS 8	30+90	2.5	149.52	152.02	150.79	1.23	6.2

Figures 6.1 & 6.2 Crest Gauge Photos