Briles Stream Restoration Monitoring Report Year 3 of 5 (2011) FINAL

Randolph County, North Carolina

USGS HUC: 03040103

Project ID No. 047

Prepared for:

NCDENR-Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Submitted November 2011

Executive Summary

The Briles Site Stream Restoration site is situated within the USGS hydrologic unit **03040103** and is in a portion of the NCDWQ Priority Sub-basin 03-07-09. The site is located on an 87-acre parcel owned by Mr. and Mrs. Kenneth Briles. It is located southeast of the intersection of Ross Wood Road and Pleasant Grove Road in Trinity, Randolph County, North Carolina. The primary land uses on the property include rangeland (pasture), a chicken egg farm, and forest. The project stream, UT to Jackson Creek, became impaired from poor grazing management and human impacts.

The project goals were to:

- Restore stable channel morphology that is capable of moving the flows and sediment of the associated watershed.
- Restore riparian habitat and functions.
- Improve water quality and reduce land and riparian vegetation loss resulting from lateral erosion and bed degradation.
- Improve aquatic and terrestrial habitat.

The above project goals were achieved through the following project objectives:

- Constructed appropriate C4 and B4c channels with stable channel dimensions.
- Planted a functional Bottomland Hardwood Forest community to create an effective riparian buffer.
- Excluded livestock from the riparian areas.
- Preserved portions of the site that function as a stable riverine environment.

KCI Associates of NC designed the restoration plans and restoration was completed in late 2007 and early 2008. Kimley Horn and Associates, Inc. (KHA) performed stream and riparian monitoring in the fall of 2011 for this Year 3 Monitoring Report. During the monitoring process KHA assessed eight (8) vegetation quads. Five (5) of the eight (8) plots met or exceeded the success criteria of 320 stems/acre (minimum stem count after 3 years). The vegetation averaged 343.75 stems/acre, which exceeds the monitoring success criteria. The herbaceous vegetation continues to out-compete the woody stems in some areas of the project, however not as significantly as the previous monitoring year.

A visual assessment and geomorphic survey were completed for the site, and indicated that the project reaches were performing within established success criteria ranges as shown below. Two small head cuts were observed near stations 10+75 and 15+25. These head cuts have been monitored for the previous two monitoring years, and do not seem to be active or progressing. This can be seen in the longitudinal profile in the appendix. Minor erosion was observed along the banks and bankfull benches from station 18+50 to 19+50, and appeared to be caused by the lack of vegetation growth in these locations. No significant bank erosion was recorded, and the geomorphic measurements are within the range of the design parameters. Bankfull indicators were noted and recorded along the project reach (Appendix E, Photos SP3 and SP4). There is no crest gauge installed on site.

Stream Success Criteria (from approved Mitigation Plan 2008):

- Little or no change from the as-built cross-sections.
- Pools shall maintain design depths with lower water surface slopes, while the riffles should remain shallower with steeper water surface slopes.
- Sediment transport shall remain relatively unchanged with respect to aggradation and deposition of sediments.
- There should be no visual indicators of instability.
- A minimum of two bankfull events must occur in separate years within the five-year monitoring.

Summary information/data related to performance of various project and monitoring elements can be found in the table and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the Baseline Monitoring Reports (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.

Methodology

- Surveys/topographic data collections was performed using total station, survey grade GPS, or equivalent such that each survey point has three-dimensional coordinates, and is georeferenced (NAD83-State Plane Feet – FIPS3200).
- Longitudinal stationing was developed using the as-built survey thalweg as a baseline.
- The particle size distribution protocol used was the Modified-Wolman pebble count.
- CVS level 2 was used as the vegetation plot methodology.

References

Rosgen, David L. 1996. Applied River Morphology, Second Edition., Wildland Hydrology, Pagosa Springs, Colorado.

Lee, Michael T., Peet, Robert K., Roberts, Steven D., Wentworth, Thomas R. 2006. CVS-EEP Protocol for Recording Vegetation, All Levels of Sampling, Version 4.0.,

Environmental Laboratory. 1987. Corps of Engineers Wetlands Delineation Manual. Technical Report Y-87-1. United States Army Engineer Waterways Experiment Station, Vicksburg, Mississippi.
LeGrand, H.E. and S.P. Hall.

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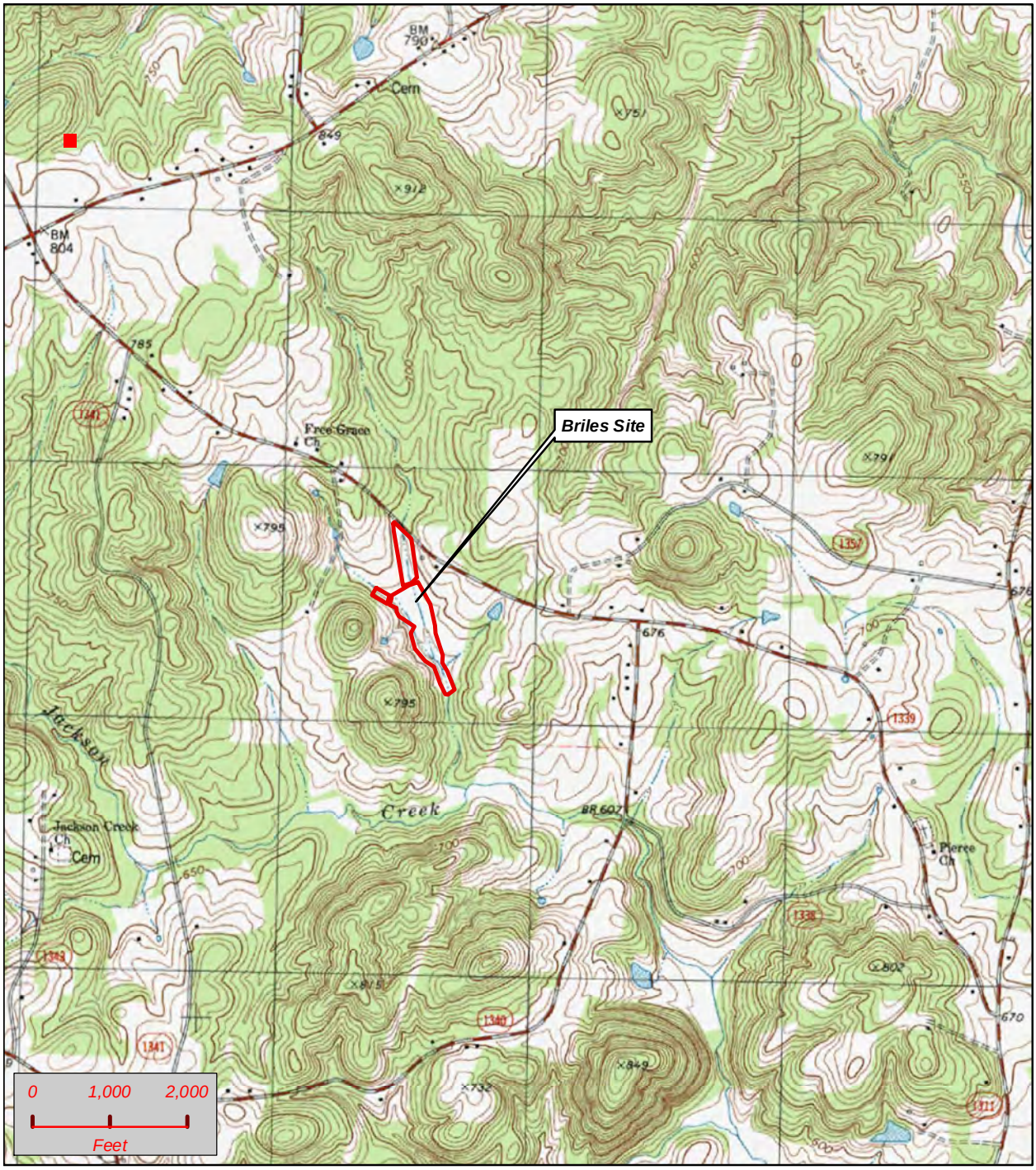
APPENDIX A
PROJECT VICINITY MAP AND BACKGROUND TABLES



Title	Project Setting

Prepared For: Ecosystem Enhancement Program	**Project**	Briles Stream Restoration Monitoring Year 3 – 2011 Randolph County, North Carolina	
	Date	**Project Number**	**Figure**
	11/15/11	047	1

Kimley-Horn and Associates, Inc.

Table 1a. Project Components Briles Stream Restoration Site/047									
Project Component or Reach ID	**Existing Feet/Acres**	**Restoration Level**	**Approach**	**Footage or Acreage**	**Stationing**	**Mitigation Ratio**	**Mitigation Units**	**BMP Elements[1]**	**Comment**
UTJC1	1,358	R	P2	1,425	10+00 - 24+25	1:1	1408		
UTJC2	355	R	P3	362	24+47 - 28+09	1:1	362		
UTJC3	784	E1	P3	817	50+00 - 58+17	1.5:1	509		
UTJC4	508	P	-	508	28+88 - 33+96	5:1	102		

1 = BR = Bioretention Cell; SF = Sand Filter; SW = Stormwater Wetland; WDP = Wet Detention Pond; DDP = Dry Detention Pond;
FS = Filter Strip; Grassed Swale = S; LS = Level Spreader; NI = Natural Infiltration Area, O = Other
CF = Cattle Fencing; WS = Watering System; CH = Livestock Housing

Table 1b. Component Summations Briles Stream Restoration Site/047							
Restoration Level	Stream (lf)	Riparian Wetland (Ac)		Non-Ripar (Ac)	Upland (Ac)	Buffer (Ac)	BMP
		Riverine	Non-Riverine				
Restoration	1787						
Enhancement							
Enhancement I	817						
Enhancement II							
Creation							
Preservation	508						
HQ Preservation							
		0	0				
Totals (Feet/Acres)	**3112**	**0**		**0**	**0**	**0**	**0**
MU Totals	**2381**	**0**		**0**	**0**	**0**	**0**

Non-Applicable

Table 2. Project Activity and Reporting History
Briles Stream Restoration Site/047

Elapsed Time Since Grading Complete: 3 yrs 11 months
Elapsed Time Since Planting Complete: 3 yrs 11 Months
Number of Reporting Years[1]: 3

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Restoration Plan	2003/2004	Dec-05
Final Design – Construction Plans	NA	Sep-06
Construction	NA	Nov-07
Containerized, bare root and B&B plantings for reach/segments 1&2	NA	Nov-07
Mitigation Plan / As-built (Year 0 Monitoring – baseline)	Dec-07	Jan-08
Year 1 Monitoring	Mar-09	Nov-09
Year 2 Monitoring	Oct-10	Jan-11
Year 3 Monitoring	Oct-11	

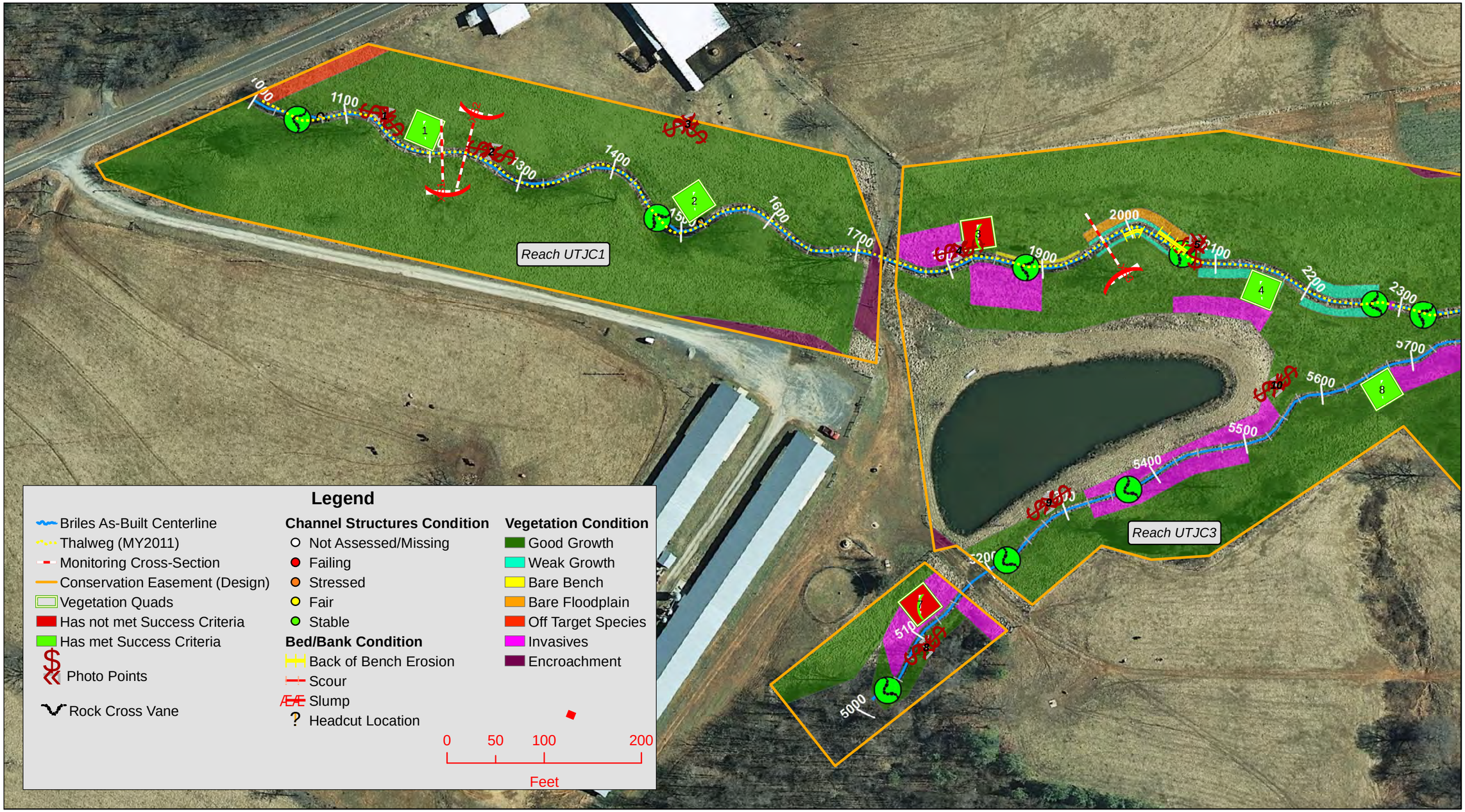
Bolded items are examples of those items that are not standard, but may come up and should be included
Non-bolded items represent events that are standard components over the course of a typical project.
The above are obviously not the extent of potential relevant project activities, but are just provided as example as part of this exhibit.
If planting and morphology are on split monitoring schedules that should be made clear in the table
1 = Equals the number of reports or data points produced excluding the baseline

Table 3. Project Contacts Table Briles Stream Restoration Site/047	
Designer	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd Raleigh, NC 27609
Primary project design POC	Adam Spiller (919) 783-9214
Construction Contractor	L-J, Inc. 220 Stoneridge Dr., Suite 405 Columbia, SC 29210
Construction contractor POC	Richard Goodwin (803) 929-1181
Survey Contractor	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd Raleigh, NC 27609
Survey contractor POC	Adam Spiller (919) 783-9214
Planting Contractor	Habitat Assessment and Restorartion Program, Inc. 9305-D Monroe Rd. Charlotte, NC 28270
Planting contractor POC	Alan Peoples (704) 945-0881
Seed Mix Sources	Evergreen Seed Company (919) 567-1333
Nursery Stock Suppliers	Foggy Mountain Nursery (919) 524-5304
Monitoring Performers	Kimley-Horn and Associates, Inc. 3001 Weston Parkway Cary, NC 27513
Stream Monitoring POC	Daren Pait (919) 677-2000
Vegetation Monitoring POC	Daren Pait (919) 677-2000

Table 4. Project Attribute Table Briles Stream Restoration Site/047		
Project County	Randolph County	
Physiographic Region	Piedmont	
Ecoregion	Carolina Slate Belt	
Project River Basin	Yadkin	
USGS HUC for Project (14 digit)	3040103050030	
NCDWQ Sub-basin for Project	03-07-09	
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?	No	
Restoration Component Attribute Table		
	Reach UTJC1	Reach UTJC2
Drainage area	0.4	0.6
Stream order	1st	2nd
Restored length (feet)	1425	362
Perennial or Intermittent	Perennial	Perennial
Watershed type (Rural, Urban, Developing etc.)	Rural	Rural
Watershed LULC Distribution (e.g.)		
Residential	2%	2%
Ag-Row Crop	12%	12%
Ag-Livestock	13%	13%
Forested	72%	72%
Etc.	<1%	<1%
Watershed impervious cover (%)	<1%	<1%
NCDWQ AU/Index number	13-2-2	13-2-2
NCDWQ classification	C	C
303d listed?	No	No
Upstream of a 303d listed segment?	Yes	Yes
Reasons for 303d listing or stressor	Low dissolved oxygen	Low dissolved oxygen
Total acreage of easement	13.3	13.3
Total vegetated acreage within the easement	4.8	4.8
Total planted acreage as part of the restoration	8.5	8.5
Rosgen classification of pre-existing	G4c/E4/C4/5	G4c/E4/C4/5
Rosgen classification of As-built	C4	B4c
Valley type	VIII	VIII
Valley slope	0.90%	0.90%
Valley side slope range (e.g. 2-3.%)	7-20%	7-20%
Valley toe slope range (e.g. 2-3.%)	2-8%	2-8%
Cowardin classification	N/A	N/A
Trout waters designation	No	No
Species of concern, endangered etc.? (Y/N)	No	No
Dominant soil series and characteristics	Georgeville silt loam	Georgeville silt loam
Series	N/A	N/A
Depth	N/A	N/A
Clay%	N/A	N/A
K	N/A	N/A
T	N/A	N/A

Use N/A for items that may not apply. Use "-" for items that are unavailable and "U" for items that are unknown

APPENDIX B
VISUAL ASSESSMENT DATA



Title	Current Conditions Plan View Upper (2010 Aerial)
Prepared For: Ecosystem Enhancement Program	**Project** Briles Stream Restoration Monitoring Year 3 – 2011 Randolph County, North Carolina

Date	Project Number	Figure
12/5/11	047	2

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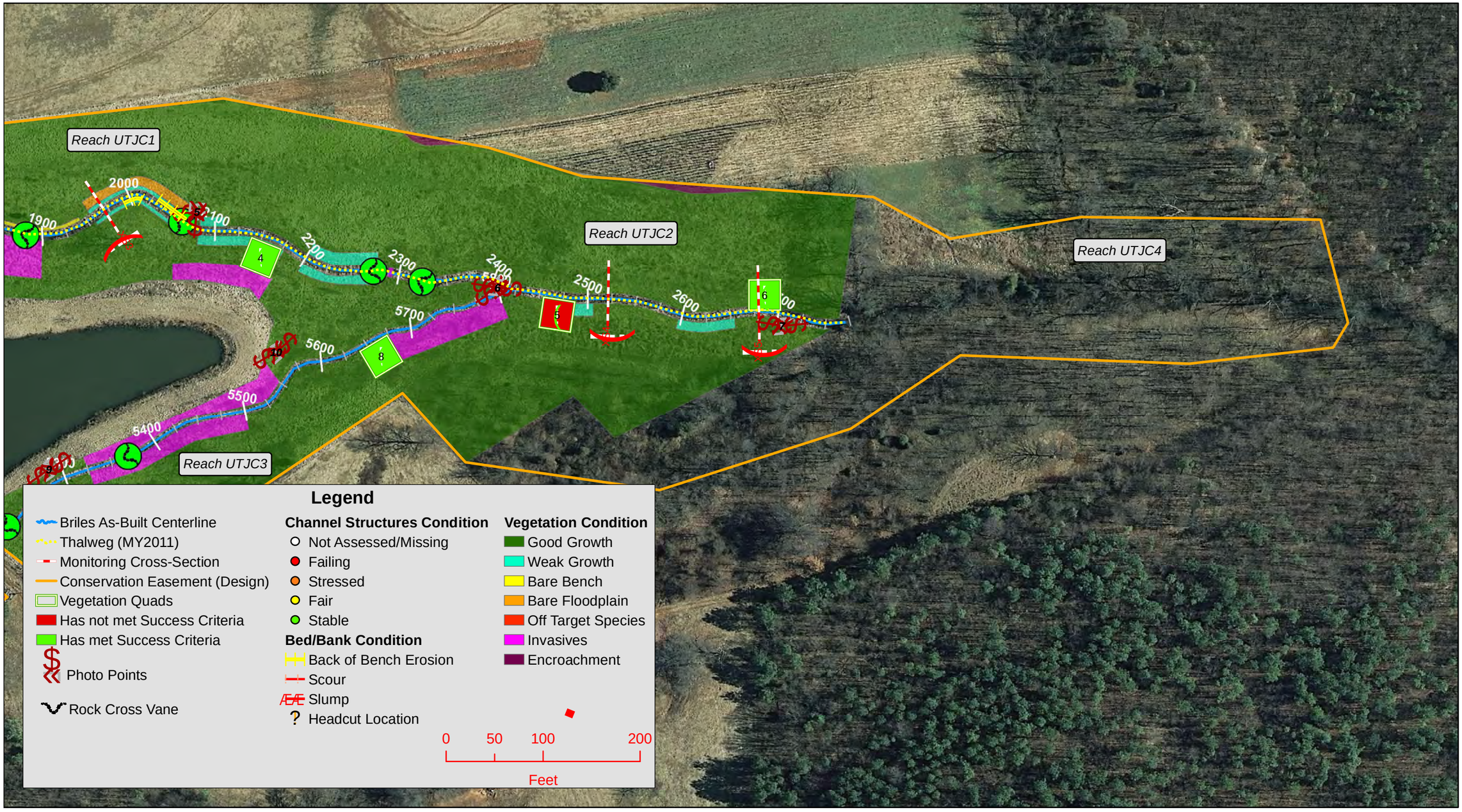


Title	Current Conditions Plan View Lower (2010 Aerial)
Prepared For: Ecosystem Enhancement Program	**Project** Briles Stream Restoration Monitoring Year 3 – 2011 Randolph County, North Carolina

Date	Project Number	Figure
12/5/11	047	3

Kimley-Horn and Associates, Inc.

Table 5.1 **Visual Stream Morphology Stability Assessment**
Reach ID **Reach UTJC1**
Assessed Length **1425**

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			2	3	100%			
	2. Riffle Condition	1. Texture/Substrate - Riffle maintains coarser substrate	12	12			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	12	12			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	12	12			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	12	12			100%			
		2. Thalweg centering at downstream of meander (Glide)	12	12			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			2	60	98%	0	0	98%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	2	60	98%	0	0	98%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	6	6			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	6	6			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	6	6			100%			
	3. Bank Protection	Bank erosion within the structures extent of influence does not exceed 15%. (See guidance for this table in EEP monitoring guidance document)	6	6			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	6	6			100%			

Table 5.2 **Visual Stream Morphology Stability Assessment**
Reach ID **Reach UTJC2**
Assessed Length **362**

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	2	2			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	2	2			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	2	2			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	2	2			100%			
		2. Thalweg centering at downstream of meander (Glide)	2	2			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	--	--			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	--	--			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	--	--			N/A			
	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)	--	--			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	--	--			N/A			

Table 5.3 **Visual Stream Morphology Stability Assessment**
Reach ID **Reach UTJC3**
Assessed Length **817**

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	7	7			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	7	7			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	7	7			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	7	7			100%			
		2. Thalweg centering at downstream of meander (Glide)	7	7			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	4	4			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	4	4			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	4	4			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 maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	4	4			100%			

Table 5.4 **Visual Stream Morphology Stability Assessment**
Reach ID **Reach UTJC4**
Assessed Length **508**

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	--	--			N/A			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	--	--			N/A			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstream riffle)	--	--			N/A			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	--	--			N/A			
		2. Thalweg centering at downstream of meander (Glide)	--	--			N/A			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%	0	0	100%
	2. Undercut	Banks undercut/overhanging to the extent that mass wasting appears likely. Does NOT include undercuts that are modest, appear sustainable and are providing habitat.			0	0	100%	0	0	100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%	0	0	100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	--	--			N/A			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	--	--			N/A			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	--	--			N/A			
	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)	--	--			N/A			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	--	--			N/A			

Table 6 Vegetation Condition Assessment

Planted Acreage[1] **8.8**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	0.1 acres	Pattern and Color	0	0.00	0.0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	0.1 acres	Pattern and Color	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	0.25 acres	Pattern and Color	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%

Easement Acreage[2] **14**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Areas or points (if too small to render as polygons at map scale).	1000 SF	Pattern and Color	7	0.47	3.4%
5. Easement Encroachment Areas[3]	Areas or points (if too small to render as polygons at map scale).	none	Pattern and Color	5	0.11	0.8%

1 = Enter the planted acreage within the easement. This number is calculated as the easement acreage minus any existing mature tree stands that were not subject to supplemental planting of the understory, the channel acreage, crossings or any other elements not directly planted as part of the project effort.

2 = The acreage within the easement boundaries.

3 = Encroachment may occur within or outside of planted areas and will therefore be calculated against the overall easement acreage. In the event a polygon is cataloged into items 1, 2 or 3 in the table and is the result of encroachment, the associated acreage should be tallied in the relevant item (i.e., item 1,2 or 3) as well as a parallel tally in item 5.

4 = Invasives may occur in or out of planted areas, but still within the easement and will therefore be calculated against the overall easement acreage. Invasives of concern/interest are listed below. The list of high concern spcies are those with the potential to directly outcompete native, young, woody stems in the short-term (e.g. monitoring period or shortly thereafter) or affect the community structure for existing, more established tree/shrub stands over timeframes that are slightly longer (e.g. 1-2 decades). The low/moderate concern group are those species that generally do not have this capacity over the timeframes discussed and therefore are not expected to be mapped with regularity, but can be mapped, if in the judgement of the observer their coverage, density or distribution is suppressing the viability, density, or growth of planted woody stems. Decisions as to whether remediation will be needed are based on the integration of risk factors by EEP such as species present, their coverage, distribution relative to native biomass, and the practicality of treatment. For example, even modest amounts of Kudzu or Japanese Knotweed early in the projects history will warrant control, but potentially large coverages of Microstegium in the herb layer will not likley trigger control because of the limited capacities to impact tree/shrub layers within the timeframes discussed and the potential impacts of treating extensive amounts of ground cover. Those species with the "watch list" designator in gray shade are of interest as well, but have yet to be observed across the state with any frequency. Those in *red italics* are of particular interest given their extreme risk/threat level for mapping as points where isolated specimens are found, particularly ealry in a projects monitoring history. However, areas of discreet, dense patches will of course be mapped as polygons. The symbology scheme below was one that was found to be helpful for symbolzing invasives polygons, particulalry for situations where the conditon for an area is somewhere between isolated specimens and dense, discreet patches. In any case, the point or polygon/area feature can be symbolized to describe things like high or low concern and species can be listed as a map inset, in legend items if the number of species are limited or in the narrative section of the executive summary.

Permanent Photo PP1a
Taken: 2007

Permanent Photo PP1a
Taken: 2009

Permanent Photo PP1a
Taken: 2010

Permanent Photo PP1a
Taken: 2011

Permanent Photo PP1b
Taken: 2007

Permanent Photo PP1b
Taken: 2009

Permanent Photo PP1b
Taken: 2010

Permanent Photo PP1b
Taken: 2011

Permanent Photo PP2a
Taken: 2007

Permanent Photo PP2a
Taken: 2009

Permanent Photo PP2a
Taken: 2010

Permanent Photo PP2a
Taken: 2011

Permanent Photo PP2b
Taken: 2007

Permanent Photo PP2b
Taken: 2009

Permanent Photo PP2b
Taken: 2010

Permanent Photo PP2b
Taken: 2011

Permanent Photo PP3a
Taken: 2007

Permanent Photo PP3a
Taken: 2009

Permanent Photo PP3a
Taken: 2010

Permanent Photo PP3a
Taken: 2011

Permanent Photo PP3b
Taken: 2007

Permanent Photo PP3b
Taken: 2009

Permanent Photo PP3b
Taken: 2010

Permanent Photo PP3b
Taken: 2011

Permanent Photo PP4a
Taken: 2007

Permanent Photo PP4a
Taken: 2009

Permanent Photo PP4a
Taken: 2010

Permanent Photo PP4a
Taken: 2011

Permanent Photo PP4b
Taken: 2007

Permanent Photo PP4b
Taken: 2009

Permanent Photo PP4b
Taken: 2010

Permanent Photo PP4b
Taken: 2011

Permanent Photo PP5a
Taken: 2007

Permanent Photo PP5a
Taken: 2009

Permanent Photo PP5a
Taken: 2010

Permanent Photo PP5a
Taken: 2011

Permanent Photo PP5b
Taken: 2007

Permanent Photo PP5b
Taken: 2009

Permanent Photo PP5b
Taken: 2010

Permanent Photo PP5b
Taken: 2011

Permanent Photo PP5c
Taken: 2007

Permanent Photo PP5c
Taken: 2009

Permanent Photo PP5c
Taken: 2010

Permanent Photo PP5c
Taken: 2011

Permanent Photo PP6a
Taken: 2007

Permanent Photo PP6a
Taken: 2009

Permanent Photo PP6a
Taken: 2010

Permanent Photo PP6a
Taken: 2011

Permanent Photo PP6b
Taken: 2007

Permanent Photo PP6b
Taken: 2009

Permanent Photo PP6b
Taken: 2010

Permanent Photo PP6b
Taken: 2011

Permanent Photo PP6c
Taken: 2007

Permanent Photo PP6c
Taken: 2009

Permanent Photo PP6c
Taken: 2010

Permanent Photo PP6c
Taken: 2011

Permanent Photo PP7a
Taken: 2007

Permanent Photo PP7a
Taken: 2009

Permanent Photo PP7a
Taken: 2010

Permanent Photo PP7a
Taken: 2011

Permanent Photo PP7b
Taken: 2007

Permanent Photo PP7b
Taken: 2009

Permanent Photo PP7b
Taken: 2010

Permanent Photo PP7b
Taken: 2011

Permanent Photo PP8a
Taken: 2007

Permanent Photo PP8a
Taken: 2009

Permanent Photo PP8a
Taken: 2010

Permanent Photo PP8a
Taken: 2011

Permanent Photo PP8b
Taken: 2007

Permanent Photo PP8b
Taken: 2009

Permanent Photo PP8b
Taken: 2010

Permanent Photo PP8b
Taken: 2011

Permanent Photo PP9a
Taken: 2007

Permanent Photo PP9a
Taken: 2009

Permanent Photo PP9a
Taken: 2010

Permanent Photo PP9a
Taken: 2011

Permanent Photo PP9b
Taken: 2007

Permanent Photo PP9b
Taken: 2009

Permanent Photo PP9b
Taken: 2010

Permanent Photo PP9b
Taken: 2011

Permanent Photo PP10a
Taken: 2007

Permanent Photo PP10a
Taken: 2009

Permanent Photo PP10a
Taken: 2010

Permanent Photo PP10a
Taken: 2011

Permanent Photo PP10b
Taken: 2007

Permanent Photo PP10b
Taken: 2009

Permanent Photo PP10b
Taken: 2010

Permanent Photo PP10b
Taken: 2011

SP1: Head cut at STA 10+75
Taken: April 2011

SP2: Head cut at STA 15+25
Taken: April 2011

SP3: Bankfull indicator on Reach UTJC1
Taken: April 2011

SP4: Bankfull indicator on Reach UTJC1
Taken: April 2011

VQ1: Vegetation Quad 1
Taken: 2007

VQ1: Vegetation Quad 1
Taken: 2009

VQ1: Vegetation Quad 1
Taken: 2010

VQ1: Vegetation Quad 1
Taken: 2011

VQ2: Vegetation Quad 2
Taken: 2007

VQ2: Vegetation Quad 2
Taken: 2009

VQ2: Vegetation Quad 2
Taken: 2010

VQ2: Vegetation Quad 2
Taken: 2011

VQ3: Vegetation Quad 3
Taken: 2007

VQ3: Vegetation Quad 3
Taken: 2009

VQ3: Vegetation Quad 3
Taken: 2010

VQ3: Vegetation Quad 3
Taken: 2011

VQ4: Vegetation Quad 4
Taken: 2007

VQ4: Vegetation Quad 4
Taken: 2009

VQ4: Vegetation Quad 4
Taken: 2010

VQ4: Vegetation Quad 4
Taken: 2011

VQ5: Vegetation Quad 5
Taken: 2007

VQ5: Vegetation Quad 5
Taken: 2009

VQ5: Vegetation Quad 5
Taken: 2010

VQ5: Vegetation Quad 5
Taken: 2011

VQ6: Vegetation Quad 6
Taken: 2007

VQ6: Vegetation Quad 6
Taken: 2009

VQ6: Vegetation Quad 6
Taken: 2010

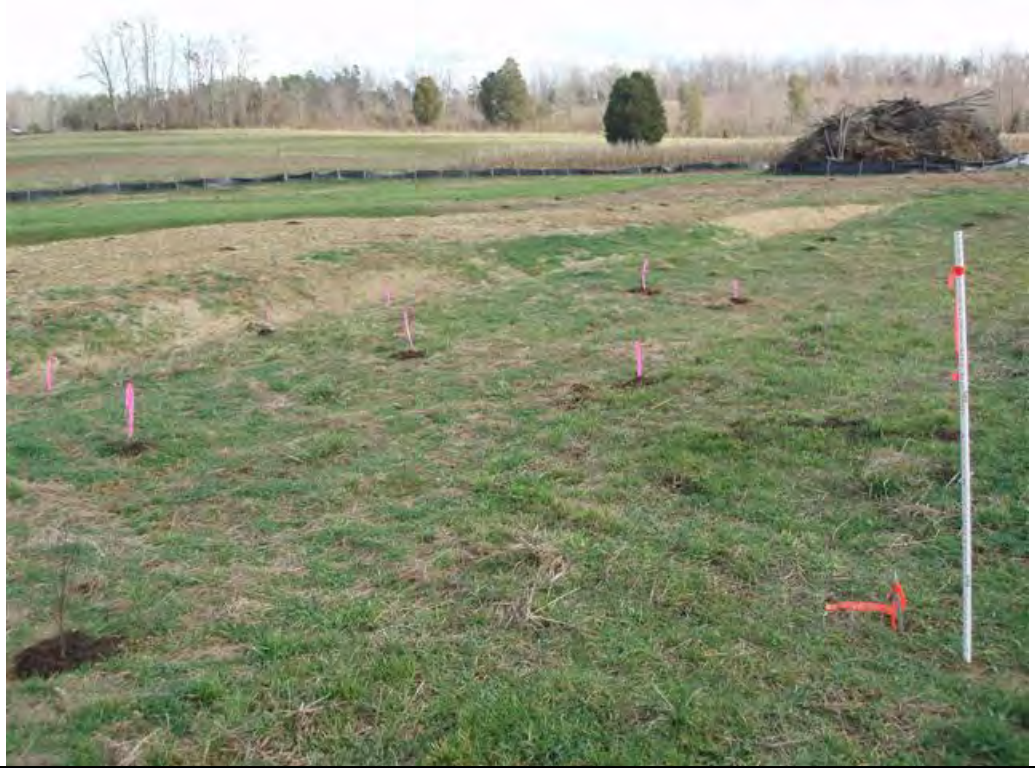
VQ6: Vegetation Quad 6
Taken: 2011

VQ7: Vegetation Quad 7
Taken: 2007

VQ7: Vegetation Quad 7
Taken: 2009

VQ7: Vegetation Quad 7
Taken: 2010

VQ7: Vegetation Quad 7
Taken: 2011



VQ8: Vegetation Quad 8
Taken: 2007

VQ8: Vegetation Quad 8
Taken: 2009

VQ8: Vegetation Quad 8
Taken: 2010

VQ8: Vegetation Quad 8
Taken: 2011

VP1: Weak woody stem growth on Reach UTJC1
Taken: April 2011

VP2: Bare bench on Reach UTJC1 (STA 20+00)
Taken: April 2011

VP3: Bare bench on Reach UTJC1 (STA 20+00)
Taken: April 2011

VP4: Multiflora Rose on Reach UTJC1
Taken: April 2011

VP5: Multiflora Rose on Reach UTJC3
Taken: April 2011

VP6: Multiflora Rose on Reach UTJC3
Taken: April 2011

APPENDIX C
VEGETATION PLOT DATA

Table 7. Vegetation Plot Criteria Attainment
Briles Stream Restoration Site/047

Vegetation Plot ID	MY1		MY2		MY3		MY4		MY5	
	Vegetation Survival Threshold Met?	Tract Mean	Vegetation Survival Threshold Met?	Tract Mean	Vegetation Survival Threshold Met?	Tract Mean	Vegetation Survival Threshold Met?	Tract Mean	Vegetation Survival Threshold Met?	Tract Mean
047-01-0001	Y	75%	Y	63%	Y	63%				
047-01-0002	Y		Y		Y					
047-01-0003	N		N		N					
047-01-0004	Y		Y		Y					
047-01-0005	Y		Y		N					
047-01-0006	Y		N		Y					
047-01-0007	Y		N		N					
047-01-0008	N		Y		Y					

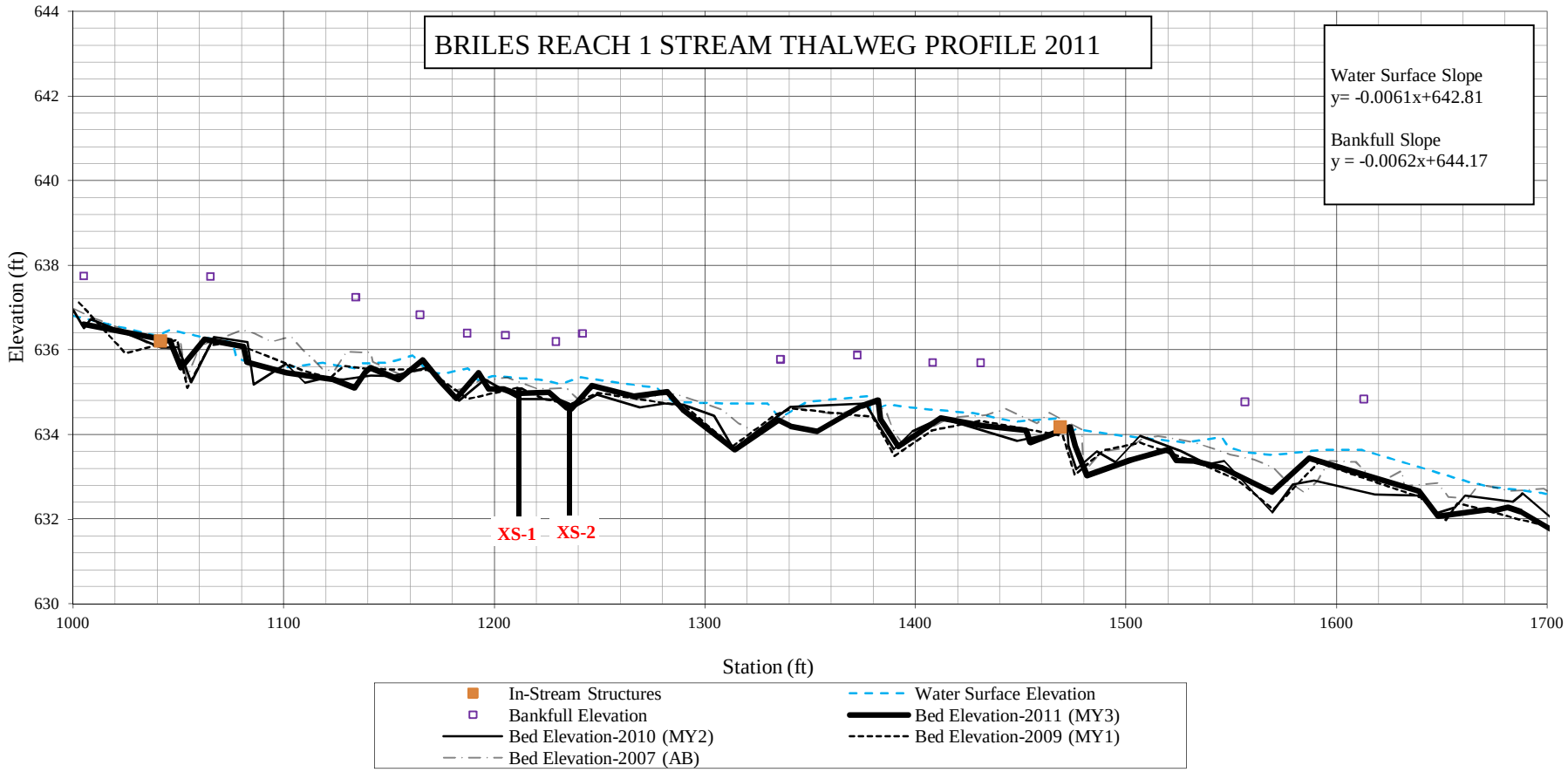
Table 8. CVS Vegetation Plot Metadata Briles Stream Restoration Site/047	
Report Prepared By	Joshua Allen
Date Prepared	11/1/2011 12:56
database name	Briles CVS Database.mdb
database location	K:\RAL_Environmental\011795 Briles Monitoring BRILE\VEGETATION
computer name	DD83306
file size	66236416
DESCRIPTION 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.
PROJECT SUMMARY----------	
Project Code	047
project Name	Briles Stream Restoration Site
Description	stream restoation, enhancement, and preservation
River Basin	Yadkin
length(ft)	3112
stream-to-edge width (ft)	100
area (sq m)	53,823
Required Plots (calculated)	8
Sampled Plots	8

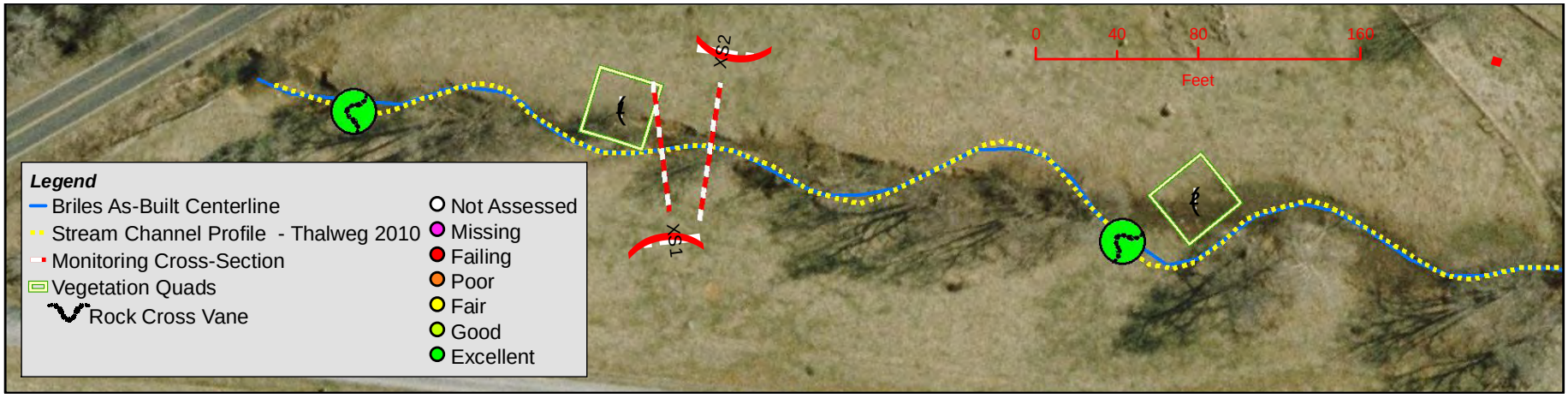
Table 9 Planted and Total Stem Counts (Species by Plot with Annual Means)

			Current Data (MY3 2011)																Annual Means							
	Common Name	Type	Plot 1		Plot 2		Plot 3		Plot 4		Plot 5		Plot 6		Plot 7		Plot 8		Current Mean		MY2 (2010)		MY1 (2009)		MY0 (2007)	
			P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T	P	T
Alnus serrulata	tag alder	Shrub Tree									1	1							1	1						
Betula nigra	river birch	Tree	2	2	2	2	2	2			1	1							7	7	7	7	7	7	15	15
Cornus amomum	silky dogwood	Shrub	3	3	3	3			1	1			1	1					8	8	16	16	35	35	44	44
Fraxinus nigra	black ash	Tree	1	1															1	1	1	1	1	1	1	1
Fraxinus pennsylvanica	green ash	Tree	1	1	1	1	2	2	1	1	3	3	4	4			2	2	12	12	13	13	16	16	26	26
Juglans	walnut	Tree													1	1					1	1				
Liquidambar styraciflua	sweetgum	Tree									1	1							1	1						
Liriodendron tulipifera	tuliptree	Tree	1	1					1	1					1	1			2	2	3	3	3	3	8	8
Platanus occidentalis	American sycamore	Tree							2	2									2	2	2	2	2	2	3	3
Quercus pagoda	cherrybark oak	Tree					1	1	1	1	1	1	2	2					5	5	3	3	8	8	11	11
Quercus phellos	willow oak	Tree																							2	2
Salix nigra	black willow	Tree			1	1											5	5	1	1	7	7	3	3	3	3
Salix sericea	silky willow	Shrub Tree			2	2			3	3									5	5	9	9	12	12	11	11
Sambucus canadensis	Common Elderberry	Shrub Tree			1	1	1	1											2	2	1	1	9	9	11	11
Plot area (acres)			0.02		0.02		0.02		0.02		0.02		0.02		0.02		0.02									
Species count			5	5	6	6	4	4	6	6	4	4	3	3	2	2	2	2	12	12	11	11	10	10	11	11
Stem Count			**8**	**8**	**10**	**10**	**6**	**6**	**9**	**9**	**6**	**6**	**7**	**7**	**2**	**2**	**7**	**7**	**47**	**47**	**63**	**63**	**96**	**96**	**135**	**135**
Stems per Acre			400	400	500	500	300	300	450	450	300	300	350	350	100	100	350	350	343.75	343.75	283	283	486	486	683	683

Type = Tree, Shrub, Livestake
P = Planted
T = Total

APPENDIX D
STREAM SURVEY DATA





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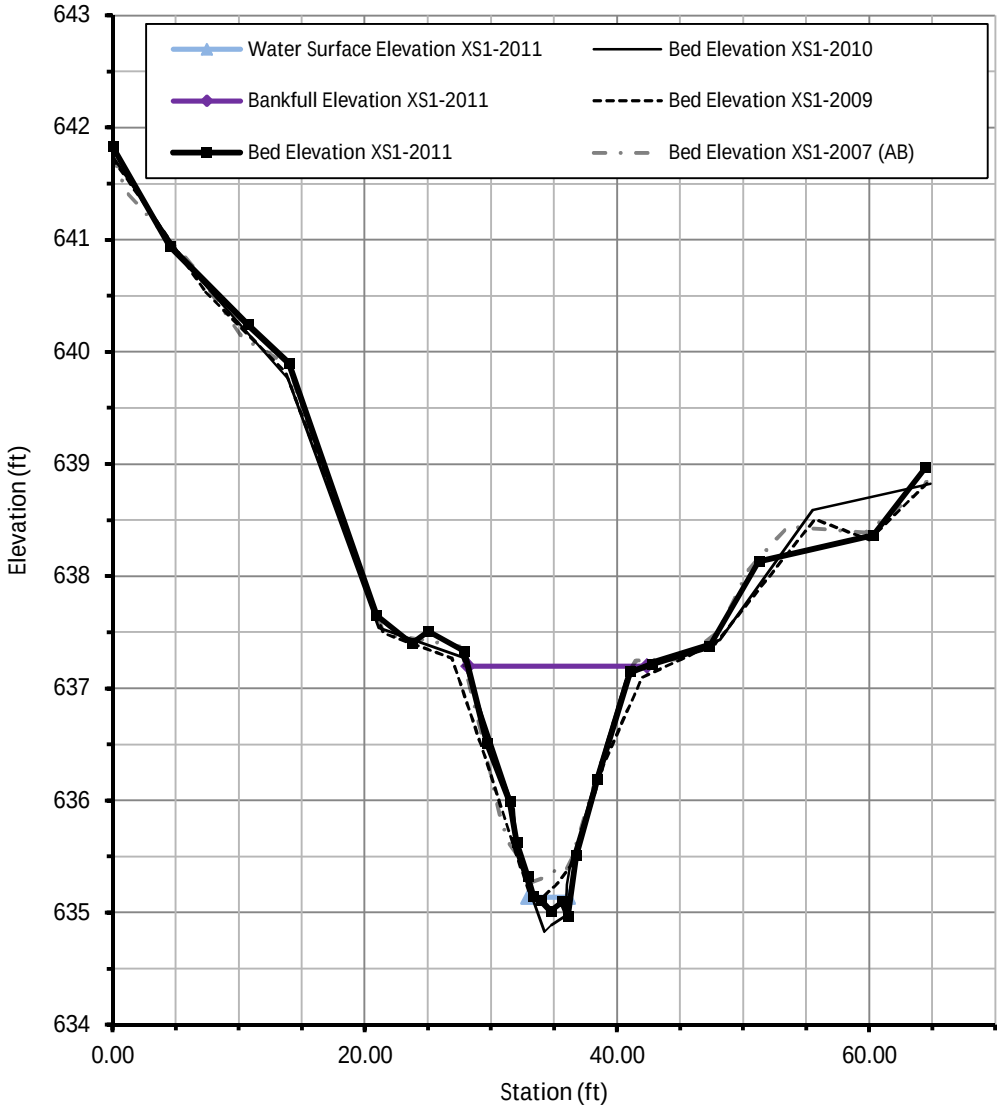
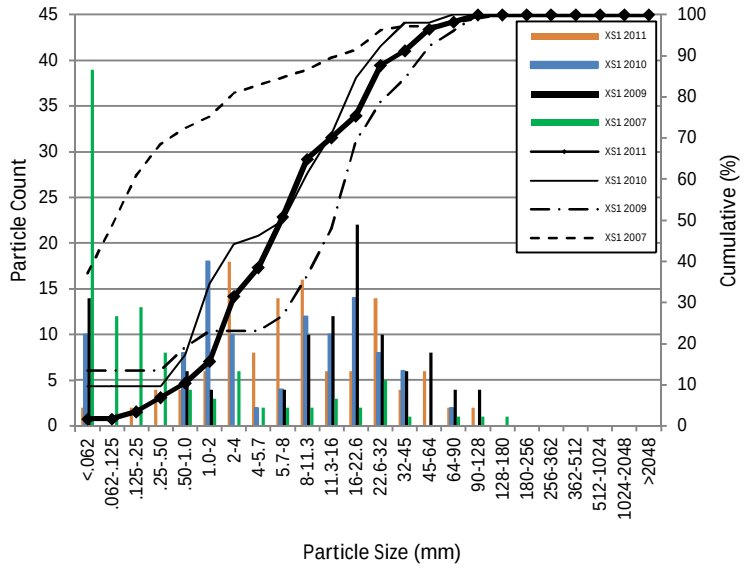
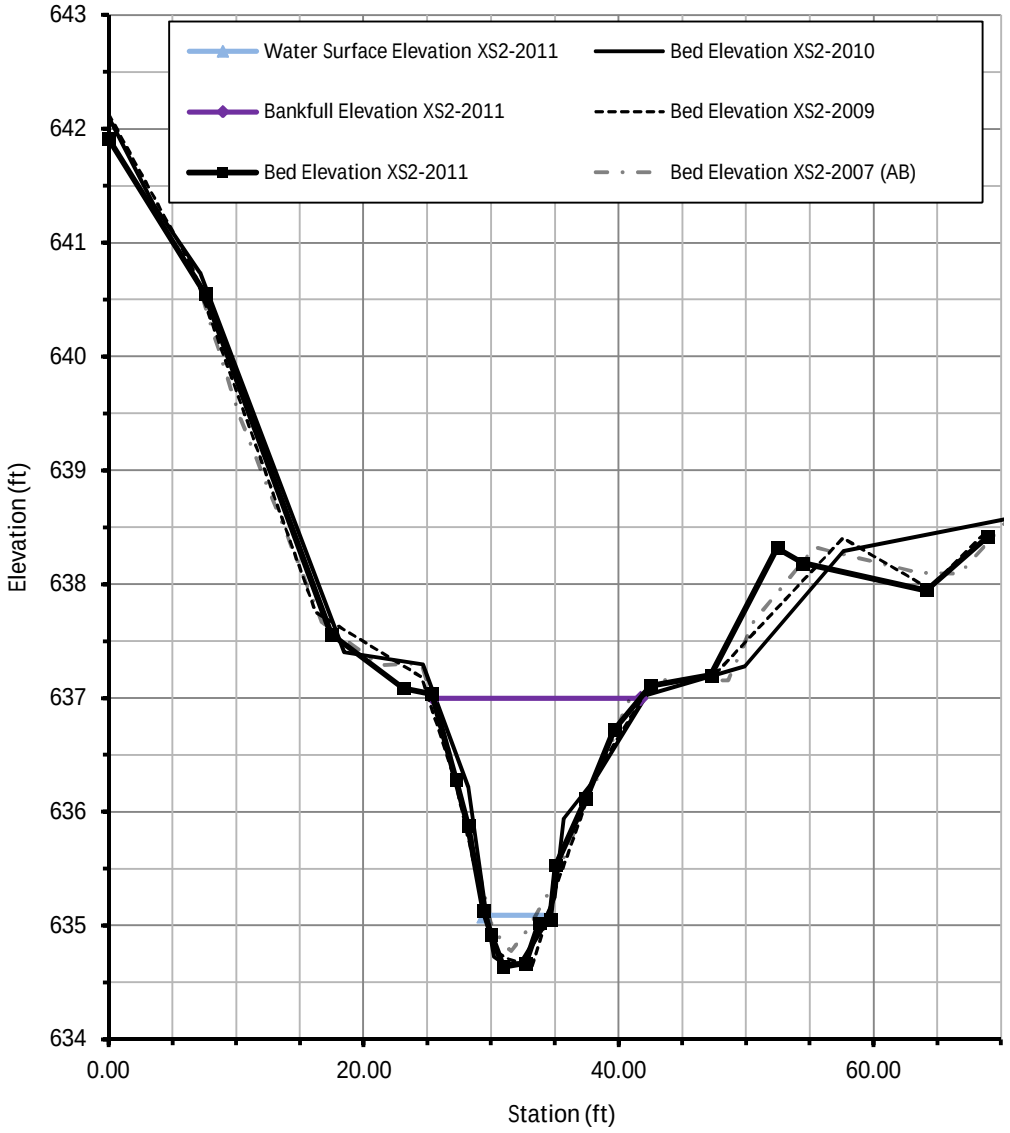
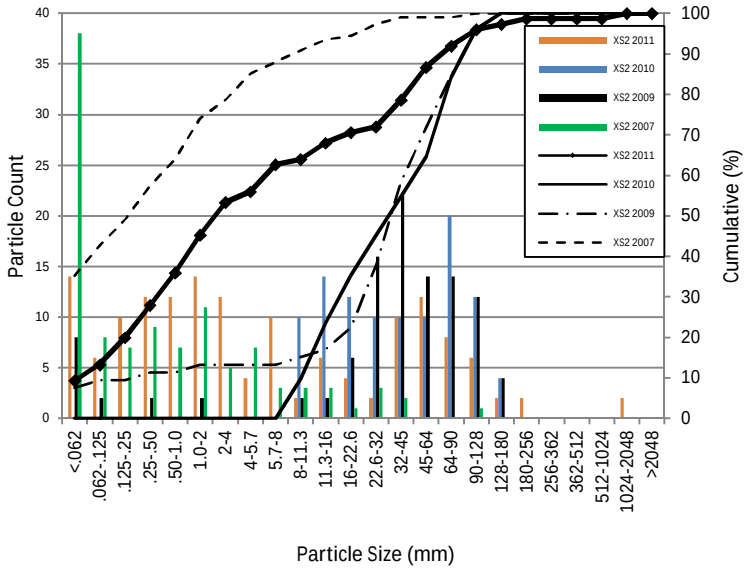




ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS1	2007	AB	RIFFLE	13.4	15.9	1.2
XS1	2009	MY1	RIFFLE	14.6	16.0	1.1
XS1	2010	MY2	RIFFLE	14.5	16.53	1.14
XS1	2011	MY3	RIFFLE	14.3	16.21	1.13

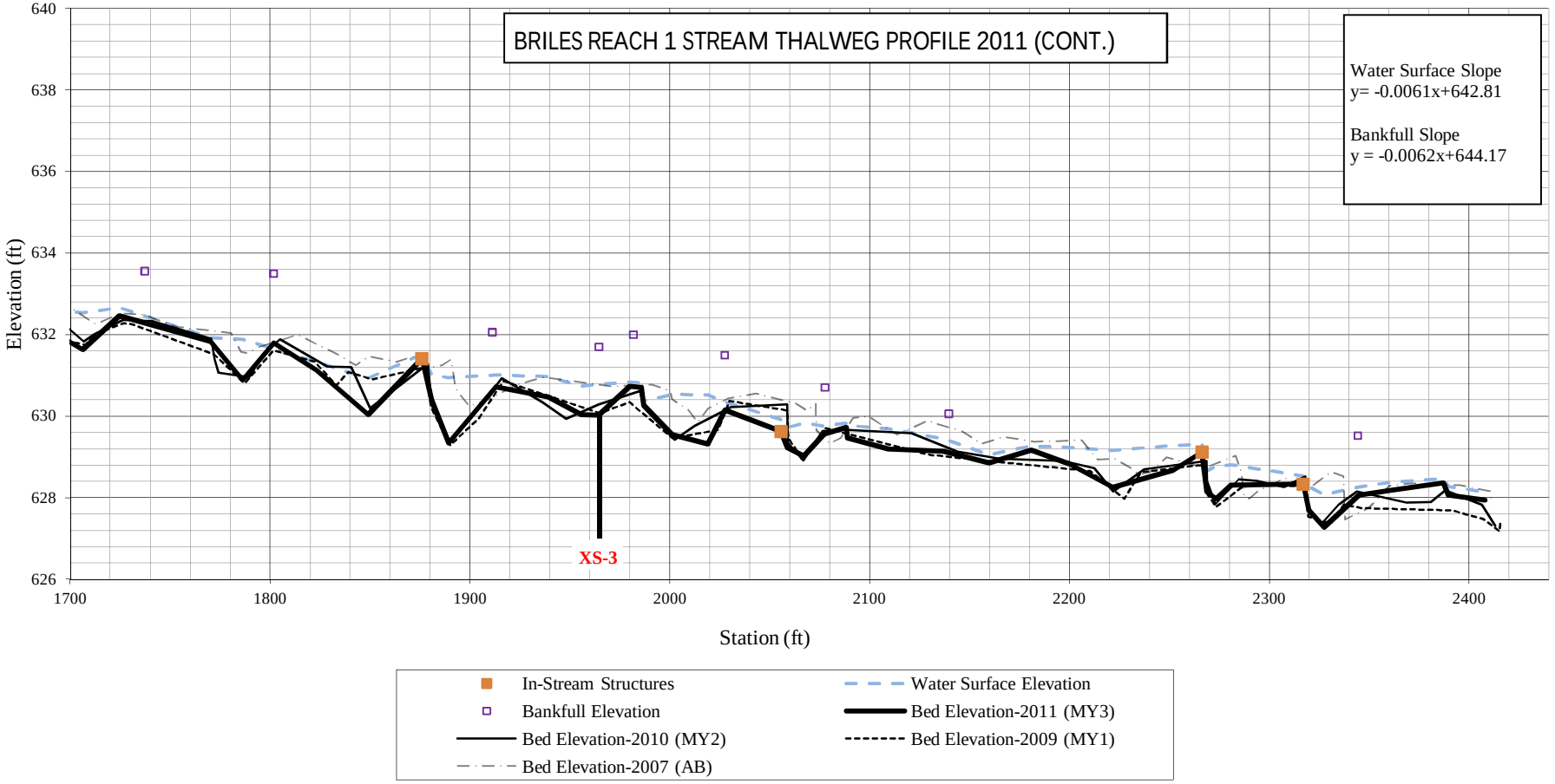
ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS1	2007	AB	0.07	5.02
XS1	2009	MY1	11.73	31.00
XS1	2010	MY2	8	22.3
XS1	2011	MY3	7.84	29.15

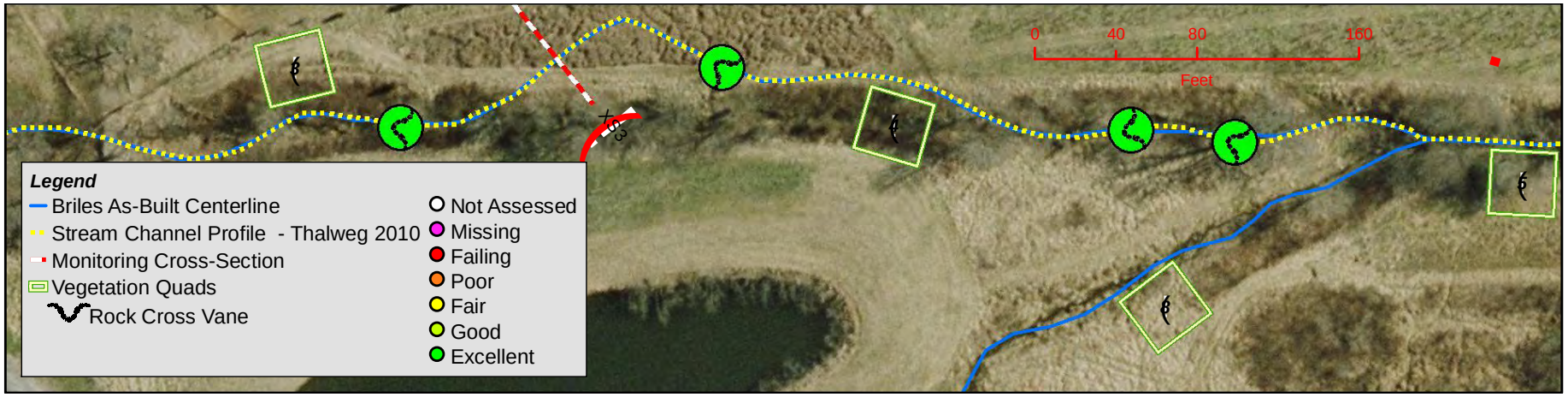


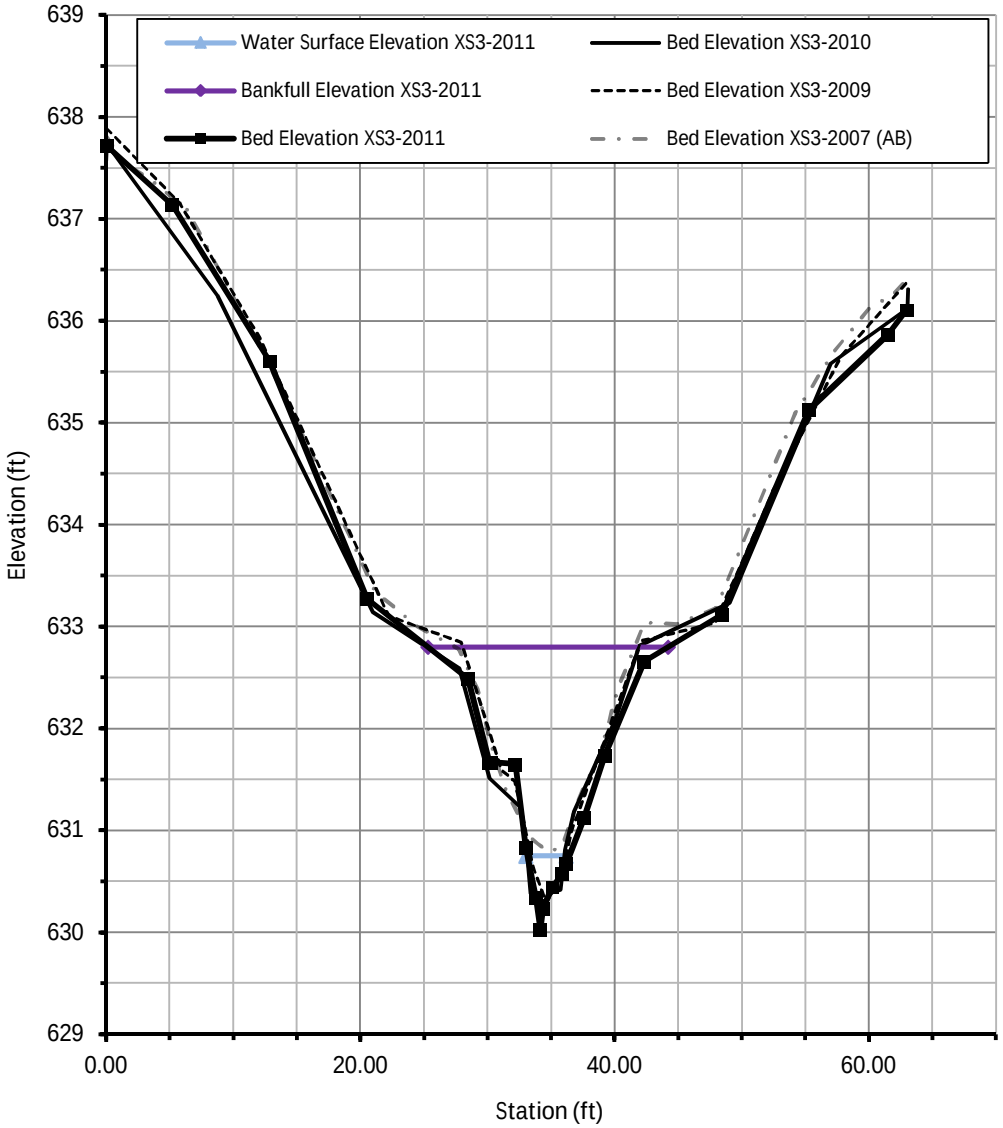


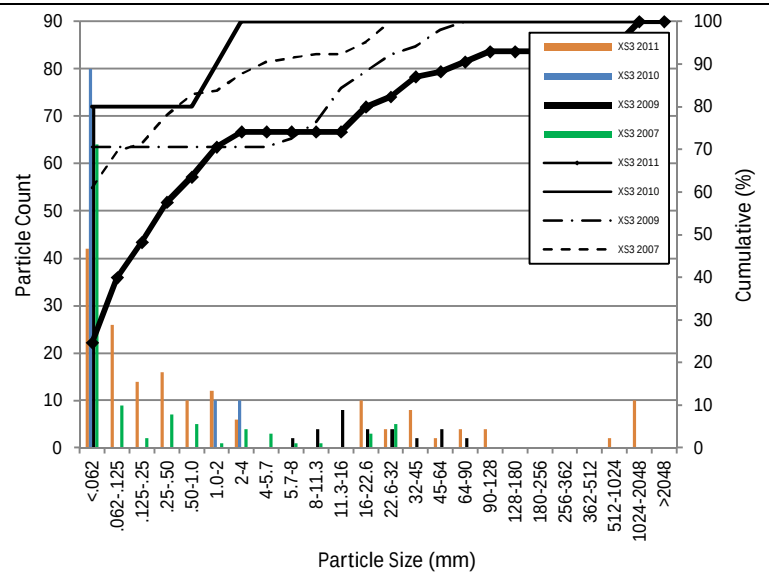
ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS2	2007	AB	POOL	15.9	18.9	1.2
XS2	2009	MY1	POOL	17.6	22.5	1.3
XS2	2010	MY2	POOL	16.59	19.43	1.17
XS2	2011	MY3	POOL	16.25	19.84	1.22

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS2	2007	AB	0.14	3.63
XS2	2009	MY1	28.15	62.7
XS2	2010	MY2	38.5	89.59
XS2	2011	MY3	3.17	57.66


BRILES REACH 1 STREAM THALWEG PROFILE 2011 (CONT.)
Water Surface Slope
y= -0.0061x+642.81
Bankfull Slope
y = -0.0062x+644.17
Elevation (ft)
640
638
636
634
632
630
628
626
1700
1800
1900
2000
2100
2200
2300
2400
XS-3
Station (ft)
In-Stream Structures
Water Surface Elevation
Bankfull Elevation
Bed Elevation-2011 (MY3)
Bed Elevation-2010 (MY2)
Bed Elevation-2009 (MY1)
Bed Elevation-2007 (AB)

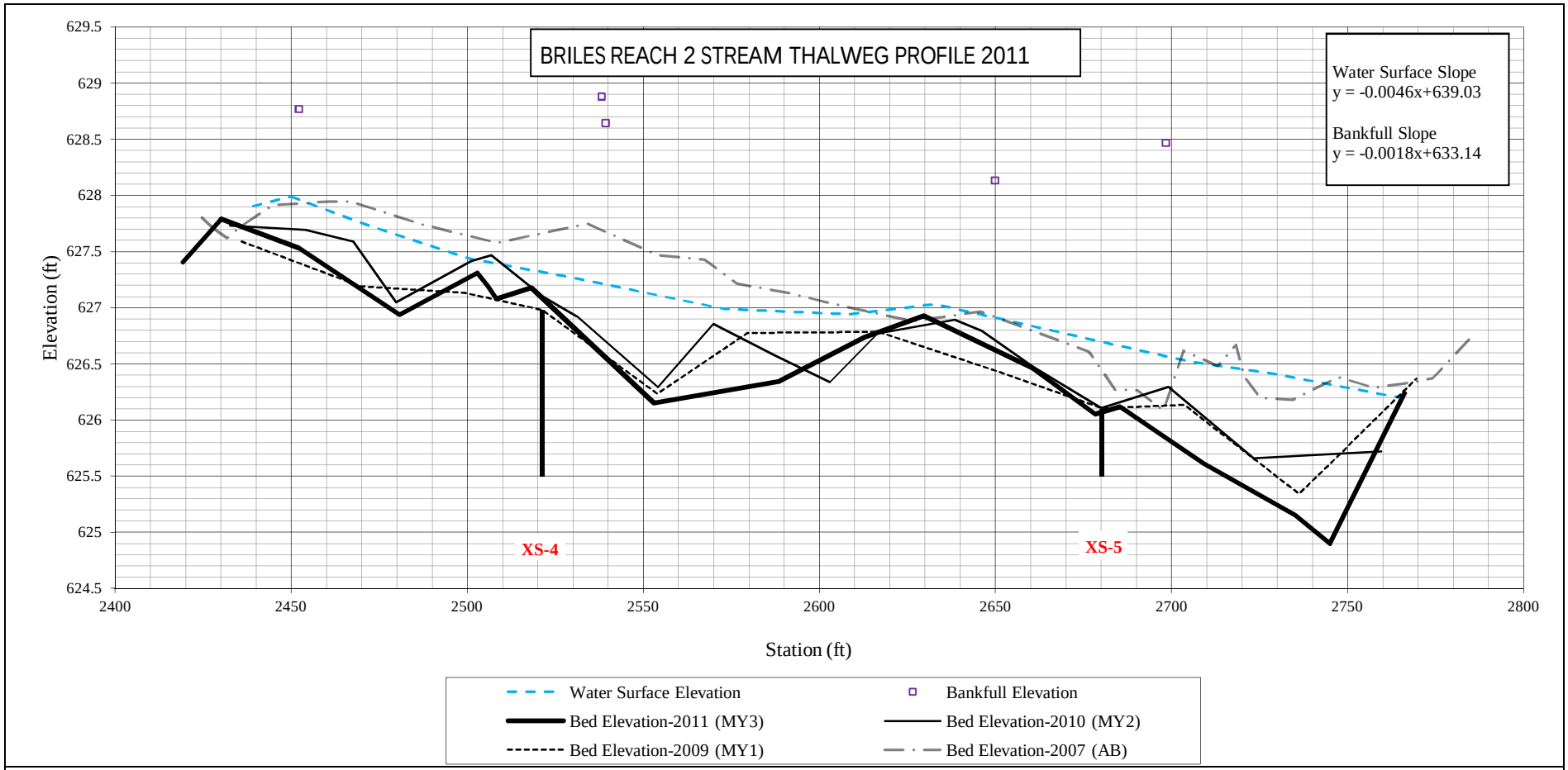

0
40
80
160
Feet
XS-3
Legend
Briles As-Built Centerline
Stream Channel Profile - Thalweg 2010
Monitoring Cross-Section
Vegetation Quads
Rock Cross Vane
Not Assessed
Missing
Failing
Poor
Fair
Good
Excellent





ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS3	2007	AB	POOL	14.2	16.2	1.1
XS3	2009	MY1	POOL	14.1	17.9	1.3
XS3	2010	MY2	POOL	13.56	16.03	1.18
XS3	2011	MY3	POOL	18.91	19.72	1.04

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS3	2007	AB	--	1.05
XS3	2009	MY1	--	11.17
XS3	2010	MY2	0.04	1.4
XS3	2011	MY3	0.3	36.55



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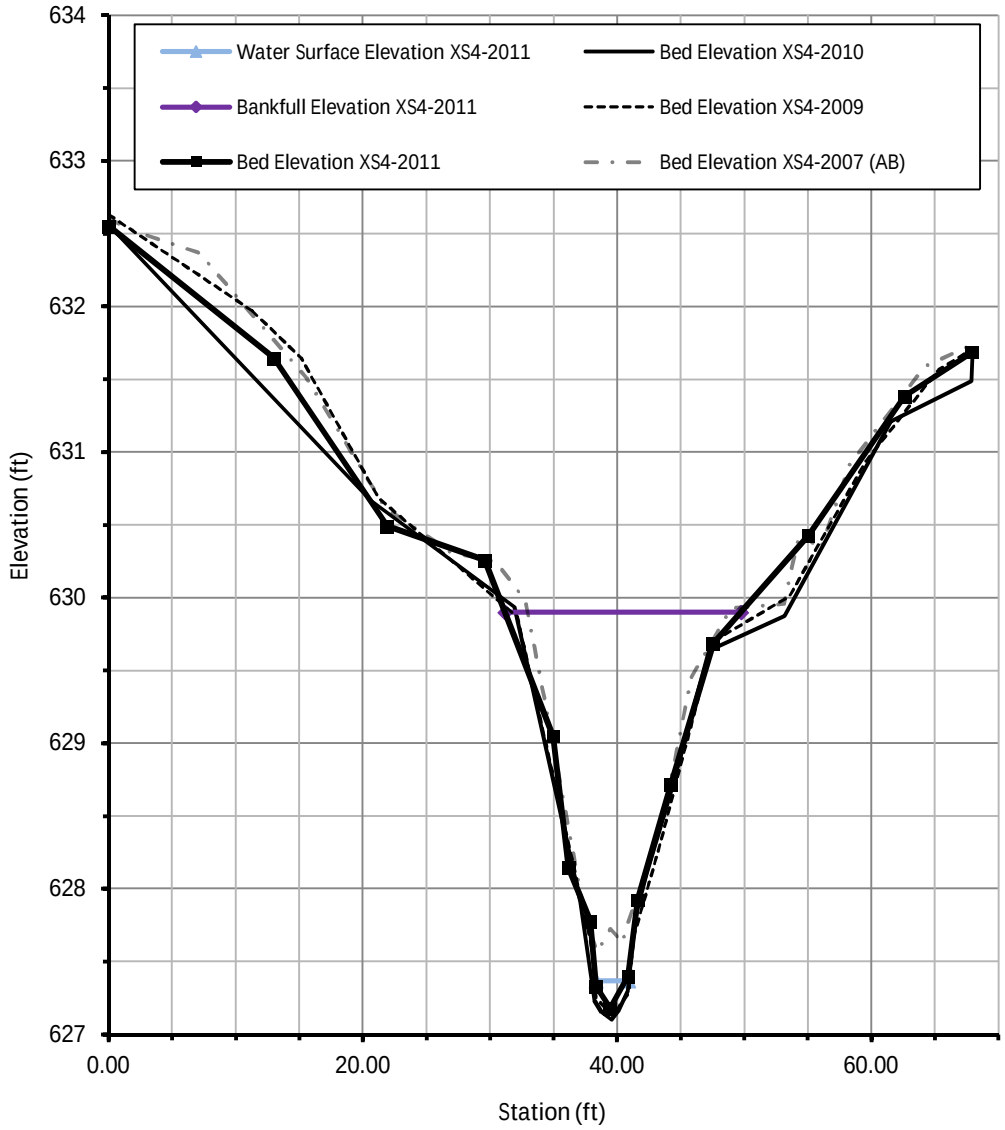
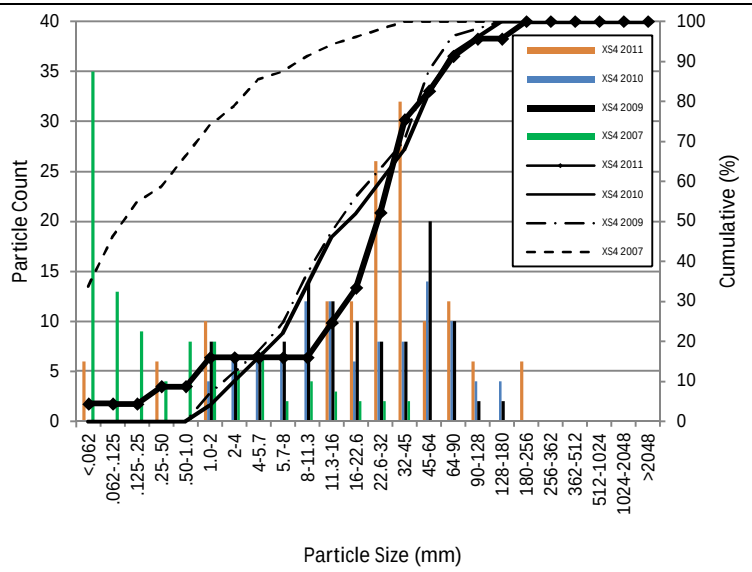
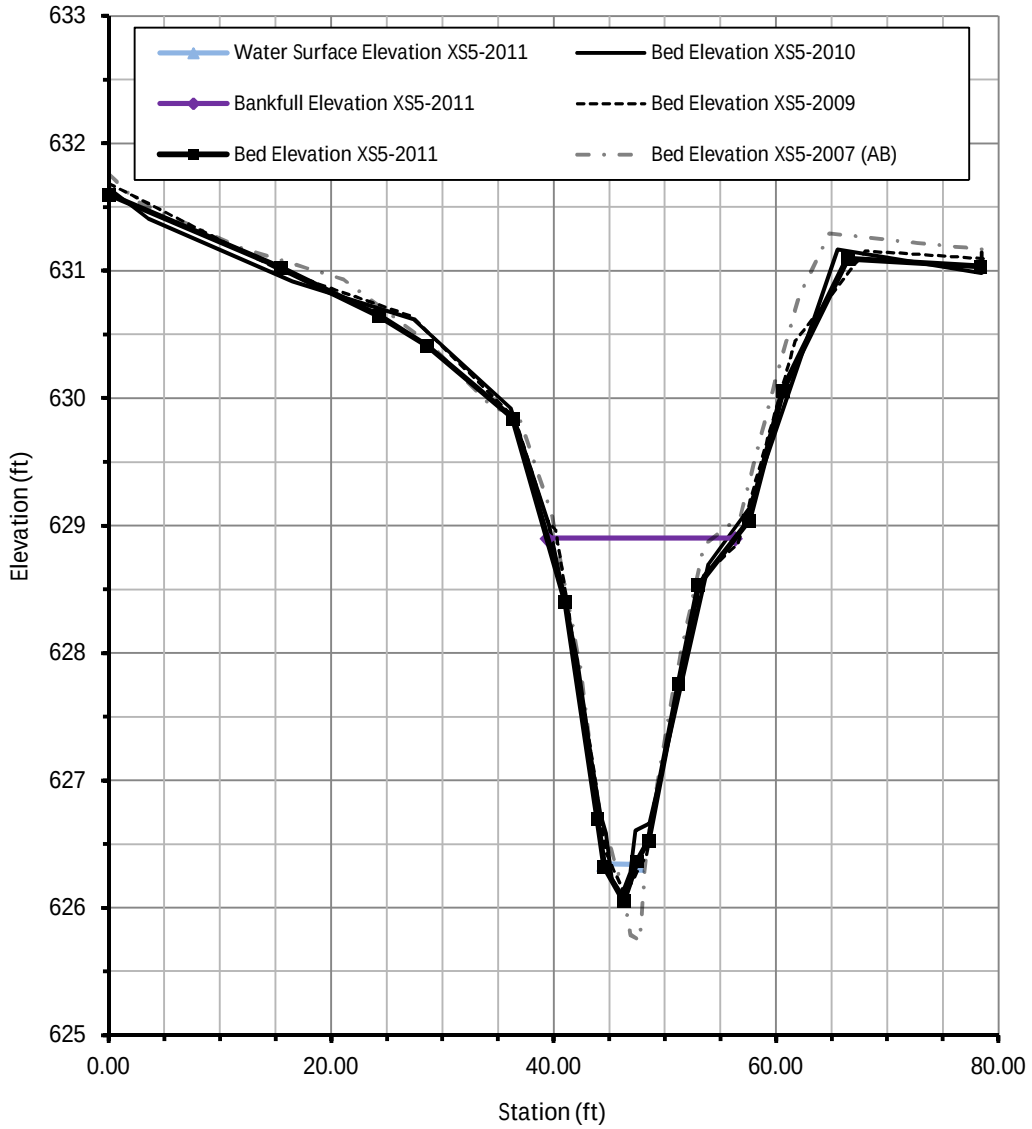
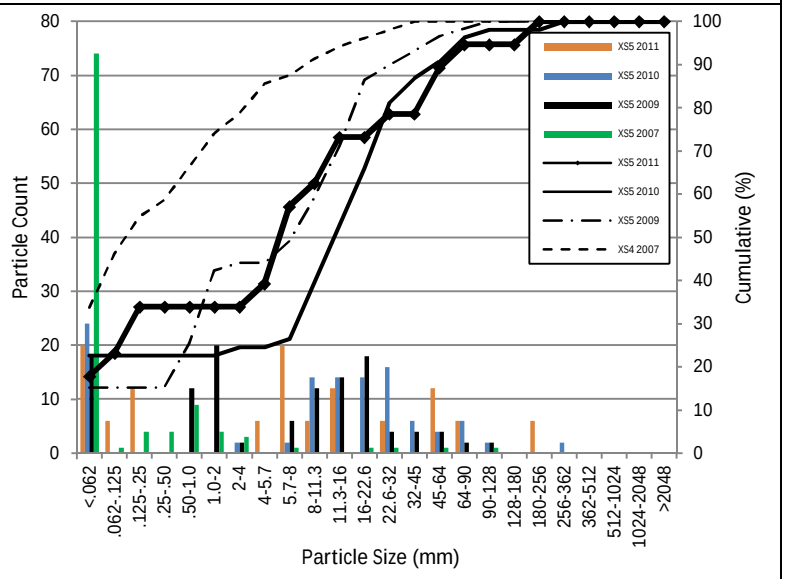




ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS4	2007	AB	RIFFLE	15.8	19.8	1.3
XS4	2009	MY1	RIFFLE	15.0	20.2	1.4
XS4	2010	MY2	RIFFLE	14.5	19.1	1.32
XS4	2011	MY3	RIFFLE	18.6	22.61	1.22

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS4	2007	AB	0.09	3.53
XS4	2009	MY1	12.71	42.24
XS4	2010	MY2	20.4	69.2
XS4	2011	MY3	30.92	68.16





ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS5	2007	AB	RIFFLE	14.0	21.4	1.5
XS5	2009	MY1	RIFFLE	12.7	18.2	1.4
XS5	2010	MY2	RIFFLE	13.6	19.1	1.4
XS5	2011	MY3	RIFFLE	16.9	23.0	1.4

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS5	2007	AB	--	0.37
XS5	2009	MY1	5.89	15.25
XS5	2010	MY2	15	38.6
XS5	2011	MY3	7.08	54.62

Table 10a.1 Baseline Stream Data Summary
Briles Stream Restoration Site/047 - UTJC1 (1,425 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring 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	SD[5]	n
Bankfull Width (ft)		7.617	8.419	8.018	8.5	15.2	11.7	28.8	8.9295	4	9.0	13.1	12.6	18.0	3.7	6	15.4			13.4	13.8		14.2		2
Floodprone Width (ft)					20	42	44	60	16	4	13	114	150	200	79	6	>35			38	43		>48		2
Bankfull Mean Depth (ft)		1.063	1.175	1.119	0.6	1.4	1.4	2.2	0.6532	4	0.9	1.2	1.2	1.5	0.2449	6	1.1			1.1	1.2		1.2		2
[1]Bankfull Max Depth (ft)					1.5	2.0	1.8	2.8	0.556	4	1.3	1.6	1.6	2	0.2872	6	1.5			1.9	2.0		2.0		2
Bankfull Cross Sectional Area (ft^2)		10.92	12.07	11.49	15.1	17.6	18.2	18.8	1.6256	4	10.4	15.3	13.5	22.3	5.0408	6	17.0			15.9	16.1		16.2		2
Width/Depth Ratio					3.8	16.3	8.2	44.9	18.474	4	7.6	11.5	9.7	18	4.4922	6	14.0			11.3	11.9		12.4		2
Entrenchment Ratio					1.8	3.5	3.7	4.7	1.2038	4	1.3	7.5	8.4	14.4	5.361	6	>2.2			2.7	3.1		>3.5		2
[1]Bank Height Ratio					1.0	1.7	1.9	1.8	0.4082	4	1.0	1.0	1.0	1.0	0.0	6	1.0			1.0	1.0		1.0		2
Profile																									
Riffle Length (ft)																				20	46	44	115	40.91	19
Riffle Slope (ft/ft)					0.004	0.008		0.012			0.003	0.04		0.076			0.005	0.009	0.012	0.001	0.01	0.01	0.016	0.006	19
Pool Length (ft)											28			108			15		30	7	12	10	27	8.9069	17
Pool Max depth (ft)																				1	1.23		4.12	1.7387	17
Pool Spacing (ft)											38			181			46		154	50	82	78	157	45.77	17
Pattern																									
Channel Beltwidth (ft)					50						75			135			77			31	51	56	60	12.87	5
Radius of Curvature (ft)					25			57			14.5			26.8			20		50	28	41	42	55	11.03	14
Rc:Bankfull width (ft/ft)					**0.9**			**6.7**			**1**			**1.6**			**1.5**		**3.2**	**2**	**3**	**3**	**4**		
Meander Wavelength (ft)					50			100			70			148			105		170	78	92	91	110	13.15	6
Meander Width Ratio					1.7			5.9			3.6			13			5			2.2	3.7	4.1	4.3		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					0.69888												0.58344			0.71136					
Max part size (mm) mobilized at bankfull					53.6750893												44.47063129			54.67420176					
Stream Power (transport capacity) W/m^2					120.5568												128.0916			143.1612					
Additional Reach Parameters																									
Rosgen Classification					G4c/E4/C5						C4						C4			C4					
Bankfull Velocity (fps)		3.805	4.206	4.005	1.8-3.6												3-3.8								
Bankfull Discharge (cfs)		43.73	48.33	46.03	50-65																				
Valley length (ft)																									
Channel Thalweg length (ft)					1375												1446			1432					
Sinuosity (ft)					1						1.5						1.2			1.1					
Water Surface Slope (Channel) (ft/ft)					0.004-0.012						0.007-0.012						0.005			0.0063					
BF slope (ft/ft)																	**0.005**			**0.0057**					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

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

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

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

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

Table 10a.2 Baseline Stream Data Summary
Briles Stream Restoration Site/047 - UTJC2 (362 feet)

Parameter	Gauge[2]	Regional Curve			Pre-Existing Condition						Reference Reach(es) Data						Design			Monitoring 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	SD[5]	n
Bankfull Width (ft)		9.068	10.02	9.545		22.9				1	9.0	9.5		10.0		2	14.3				15.8				1
Floodprone Width (ft)						37				1	13	17		21		2	19		32		>60				1
Bankfull Mean Depth (ft)		1.21	1.337	1.274		0.8				1	1.1	1.2		1.2		2	1.2				1.3				1
[1]Bankfull Max Depth (ft)						2.2				1	1.3	1.4		1.5		2	2.5				2.3				1
Bankfull Cross Sectional Area (ft^2)		14.38	15.9	15.14		18.8				1	10.4	10.6		10.7		2	17.0				19.8				1
Width/Depth Ratio						27.9				1	8.0	10.0		12.0		2	12.0				12.6				1
Entrenchment Ratio						1.6				1	1.3	1.8		2.3		2	2.3				>3				1
[1]Bank Height Ratio						2				1	1.0	1.0		1.0		2	1.0				1.0				1
Profile																									
Riffle Length (ft)																				17	150		232		2
Riffle Slope (ft/ft)					0.004	0.008		0.012			0.01	0.015		0.02			0.005	0.009	0.012	0.005	0.006		0.006		2
Pool Length (ft)											3			25			15		30	8	11		14		2
Pool Max depth (ft)																				0.5	0.94		1.38		2
Pool Spacing (ft)											30			59			28		86		256				1
Pattern																									
Channel Beltwidth (ft)					50						45						70			28	29		30		2
Radius of Curvature (ft)					25			57			13			42			28		100	44	53	48	66		3
Rc:Bankfull width (ft/ft)					**0.8**			**6.7**			**1.3**			**4.4**			**2**		**7**	**2.8**	**3.4**	**3**	**4.2**		
Meander Wavelength (ft)					50			100			96			136			72		215	45	63		81		2
Meander Width Ratio					1.7			5.9			4.5			5			5			1.7	1.8		1.9		
Transport parameters																									
Reach Shear Stress (competency) lb/f^2					0.39936												0.63648			0.454272					
Max part size (mm) mobilized at bankfull					29.9589873												48.6910315			34.26324512					
Stream Power (transport capacity) W/m^2					120.5568												128.0916			84.38976					
Additional Reach Parameters																									
Rosgen Classification					G4c/E4/C4/5						B4c						B4c			C4					
Bankfull Velocity (fps)		3.867	4.274	4.071	2.1												3-3.8								
Bankfull Discharge (cfs)		58.56	64.72	61.64	50-65																				
Valley length (ft)																									
Channel Thalweg length (ft)					365												362			353					
Sinuosity (ft)					1						1.2						1.1			1.05					
Water Surface Slope (Channel) (ft/ft)					0.004-0.012						0.013						0.06			0.0047					
BF slope (ft/ft)																	**0.06**			**0.0043**					
[3]Bankfull Floodplain Area (acres)																									
[4]% of Reach with Eroding Banks																									
Channel Stability or Habitat Metric																									
Biological or Other																									

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

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

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

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

Table 10b.1 Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Briles Stream Restoration Site/047 - UTJC1 (1,425 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												
[1]SC% / Sa% / G% / C% / B% / Be%	14	27	47	7		5																						
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	0.3	1.2	6.1	10.6	61.9																							
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																												
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																												

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

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

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

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

Footnotes 2,3 - These classes are 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-construction distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

Table 10b.2 Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Briles Stream Restoration Site/047 - UTJC2 (362 feet)

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							As-built/Baseline						
[1]Ri% / Ru% / P% / G% / S%																												
[1]SC% / Sa% / G% / C% / B% / Be%	14	27	47	7		5																						
[1]d16 / d35 / d50 / d84 / d95 / di^{p} / di^{sp} (mm)	0.3	1.2	6.1	10.6	61.9																							
[2]Entrenchment Class <1.5 / 1.5-1.99 / 2.0-4.9 / 5.0-9.9 / >10																												
[3]Incision Class <1.2 / 1.2-1.49 / 1.5-1.99 / >2.0																												

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

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

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

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

Footnotes 2,3 - These classes are 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-construction distribution of these parameters, leaving the reader/consumer with a sample that is weighted heavily on the stable sections of the reach. This means that the distributions for these parameters should include data from both the cross-section surveys and the longitudinal profile and in the case of ER, visual estimates. For example, the typical longitudinal profile permits sampling of the BHR at riffles beyond those subject to cross-sections and therefore can be readily integrated and provide a more complete sample distribution for these parameters, thereby providing the distribution/coverage necessary to provide meaningful comparisons.

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

Briles Stream Restoration Site/047

	Cross Section 1 (Riffle)							Cross Section 2 (Pool)							Cross Section 3 (Riffle)							Cross Section 4 (Riffle)							Cross Section 5 (Pool)						
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	637.2	637.2	637.2	637.2				637	637	637	637				632.8	632.8	632.8	632.8				629.9	629.9	629.9	629.9				628.9	628.9	628.9	628.9			
Bankfull Width (ft)	13.4	16.47	14.2	14.28				15.36	17.04	16.12	16.25				14.2	13.85	16.69	18.91				15.8	19.62	21.34	18.6				14.0	16.12	15.54	16.89			
Floodprone Width (ft)	>48	49.05	50.28	49.04				60.27	57.95	59.51	57.49				38	42.42	43.54	46.14				>60	68.03	67.95	67.89				78.65	78.7	78.45	78.37			
Bankfull Mean Depth (ft)	1.2	1.06	1.14	1.13				1.2	1.22	1.18	1.22				1.1	1.25	1.16	1.04				2.3	1.21	1.12	1.22				1.5	1.4	1.42	1.36			
Bankfull Max Depth (ft)	1.9	2.08	2.37	2.23				2.2	2.36	2.33	2.36				2.0	2.51	2.5	2.77				1.3	2.78	2.8	2.72				3.5	2.8	2.79	2.85			
Bankfull Cross Sectional Area (ft^2)	15.9	17.46	16.16	16.21				18.9	20.86	19.01	19.84				16.2	17.3	19.33	19.72				19.8	23.65	23.9	22.61				21.4	22.61	22.02	22.97			
Bankfull Width/Depth Ratio	11.3	15.54	12.46	12.64				12.49	13.97	13.66	13.32				12.4	11.08	14.39	18.18				12.6	16.21	19.05	15.25				8.83	11.51	10.94	12.42			
Bankfull Entrenchment Ratio	>3.5	2.98	3.54	3.43				3.92	3.4	3.69	3.54				2.7	3.06	2.61	2.44				>3.0	3.47	3.18	3.65				5.71	4.88	5.05	4.64			
Bankfull Bank Height Ratio	1.0	1.0	1.0	1.0				1.1	1.1	1.0	1				1.0	1.0	1.1	1				1.0	1.0	1.0	1				1.0	1.0	1.0	1			
Cross Sectional Area between end pins (ft^2)	67	67	67	67				84	84	84	84				146	146	146	146				86	86	86	86				82	82	82	82			
d50 (mm)	0.14	31	8	7.84				0.27	62.7	38.5	3.17				0.062	11.17	0.04	0.3				0.17	42.24	20.4	30.92				0.062	15.25	14.99	7.08			

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

Exhibit Table 11b.1 Monitoring Data - Stream Reach Data Summary
Briles Stream Restoration Site/047 - UTJC1 (1,425 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
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	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)	13.4	13.8		14.2		2	13.9	15.2		16.5		2	14.2	15.4		16.7		2	14.3	16.6		18.9		2												
Floodprone Width (ft)	38	43		>48		2	42.4	45.7		49.1		2	43.5	46.9		50.3		2	46.1	47.6		49.0		2												
Bankfull Mean Depth (ft)	1.1	1.2		1.2		2	1.06	1.16		1.25		2	1.14	1.15		1.16		2	1.0	1.1		1.1		2												
[1]Bankfull Max Depth (ft)	1.9	2.0		2.0		2	2.08	2.3		2.51		2	2.37	2.44		2.5		2	2.2	2.5		2.8		2												
Bankfull Cross Sectional Area (ft^2)	15.9	16.1		16.2		2	17.3	17.4		17.5		2	16.2	17.7		19.3		2	16.2	18.0		19.7		2												
Width/Depth Ratio	11.3	11.9		12.4		2	11.1	13.3		15.5		2	12.5	13.4		14.4		2	12.6	15.4		18.2		2												
Entrenchment Ratio	2.7	3.1		>3.5		2	2.98	3.02		3.06		2	2.61	3.08		3.54		2	2.4	2.9		3.4		2												
[1]Bank Height Ratio	1.0	1.0		1.0		2	1.0	1.0		1.0		2	1.0	1.1		1.1		2	1.0	1.0		1.0		2												
Profile																																				
Riffle Length (ft)	20	46	44	115	40.9095	19													19.1	38.4		78.9														
Riffle Slope (ft/ft)	0.0014	0.0095	0.0102	0.0163	0.0061	19													0.00535	0.01012		0.03324														
Pool Length (ft)	7	12	10	27	8.906926	17													14.0	42.8		86.1														
Pool Max depth (ft)																			0.1	0.8		1.6														
Pool Spacing (ft)	50	82	78	157	45.7703	17													14.0	76.5		178.7														
Pattern																																				
Channel Beltwidth (ft)	31	51	56	60	12.8712	5																														
Radius of Curvature (ft)	28	41	42	55	11.0303	14																														
Rc:Bankfull width (ft/ft)	**2**	**3**	**3**	**4**																																
Meander Wavelength (ft)	78	92	91	110	13.1498	6																														
Meander Width Ratio	2.2	3.7	4.1	4.3																																

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Additional Reach Parameters																																				
Rosgen Classification	C4						C4						C4						C4																	
Channel Thalweg length (ft)	1432						1432						1432						1432																	
Sinuosity (ft)	1.1						1.1						1.1						1.1																	
Water Surface Slope (Channel) (ft/ft)	0.0063																																			
BF slope (ft/ft)	**0.0057**																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

Exhibit Table 11b.2 Monitoring Data - Stream Reach Data Summary
Briles Stream Restoration Site/047 - UTJC2 (362 feet)

Parameter	Baseline						MY-1						MY-2						MY- 3						MY- 4						MY- 5					
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	Max	SD[4]	n	Min	Mean	Med	Max	SD[4]	n
Bankfull Width (ft)		15.8				1		19.6				1		21.3				1		18.6				1												
Floodprone Width (ft)		>60				1		68				1		68				1		67.9				1												
Bankfull Mean Depth (ft)		1.3				1		1.21				1		1.12				1		1.2				1												
[1]Bankfull Max Depth (ft)		2.3				1		2.78				1		2.8				1		2.7				1												
Bankfull Cross Sectional Area (ft[2])		19.8				1		23.7				1		23.9				1		22.6				1												
Width/Depth Ratio		12.6				1		16.2				1		19.1				1		15.3				1												
Entrenchment Ratio		>3				1		3.47				1		3.18				1		3.7				1												
[1]Bank Height Ratio		1.0				1		1.0				1		1.0				1		1.0				1												
Profile																																				
Riffle Length (ft)	17	150		232		2													16.0	31.9		56.4														
Riffle Slope (ft/ft)	0.01	0.01		0.01		2													0.0109	0.0123		0.0147														
Pool Length (ft)	8	11		14		2													50.5	81.3		112.1														
Pool Max depth (ft)																			0.6	0.9		1.4														
Pool Spacing (ft)		256				1													126.9	131.9		136.9														
Pattern																																				
Channel Beltwidth (ft)	28	29		30		2																														
Radius of Curvature (ft)	44	53	48	66		3																														
Rc:Bankfull width (ft/ft)	**2.8**	**3.4**	**3**	**4.2**																																
Meander Wavelength (ft)	45	63		81		2																														
Meander Width Ratio	1.7	1.8		1.9																																

Pattern data will not typically be collected unless visual data, dimensional data or profile data indicate significant shifts from baseline

Additional Reach Parameters																																				
Rosgen Classification	C4						C4						C4						C4																	
Channel Thalweg length (ft)	353						353						353						353																	
Sinuosity (ft)	1.05						1.05						1.05						1.05																	
Water Surface Slope (Channel) (ft/ft)	0.0047																																			
BF slope (ft/ft)	**0.0043**																																			
[3]Ri% / Ru% / P% / G% / S%																																				
[3]SC% / Sa% / G% / C% / B% / Be%																																				
[3]d16 / d35 / d50 / d84 / d95 /																																				
[2]% of Reach with Eroding Banks																																				
Channel Stability or Habitat Metric																																				
Biological or Other																																				

Shaded cells indicate that these will typically not be filled in.
1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile.
2 = Proportion of reach exhibiting banks that are eroding based on the visual survey from visual assessment table
3 = Riffle, Run, Pool, Glide, Step; Silt/Clay, Sand, Gravel, Cobble, Boulder, Bedrock; dip = max pave, disp = max subpave
4. = Of value/needed only if the n exceeds 3

APPENDIX E
HYDROLOGIC DATA

Table 12. Verification of Bankfull Events Briles Stream Restoration Site/047			
Date of Data Collection	Date of Occurrence	Method	Photo # (if available)
7/6/2010	N/A	Rack lines observed along channel bank	
4/19/2011	N/A	Rack lines observed along channel bank	SP3/SP4