FINAL
YEAR 5 (2018) ANNUAL MONITORING REPORT
MARTIN'S CREEK II MITIGATION PROJECT

Cherokee County, North Carolina
DMS Project No. 92633 (Contract No. 005717)
USACE Action ID No. SAW – 2009-00209/DWR Project No. 10-0952
SCO No. 08-07251-01

Data Collection – March-November 2018

Hiwassee River Basin
Cataloging Unit 06020002170010

SUBMITTED TO/PREPARED FOR:

North Carolina Department of Environmental Quality
Division of Mitigation Services
217 West Jones Street, Suite 3000A
Raleigh, North Carolina 27603

December 2018

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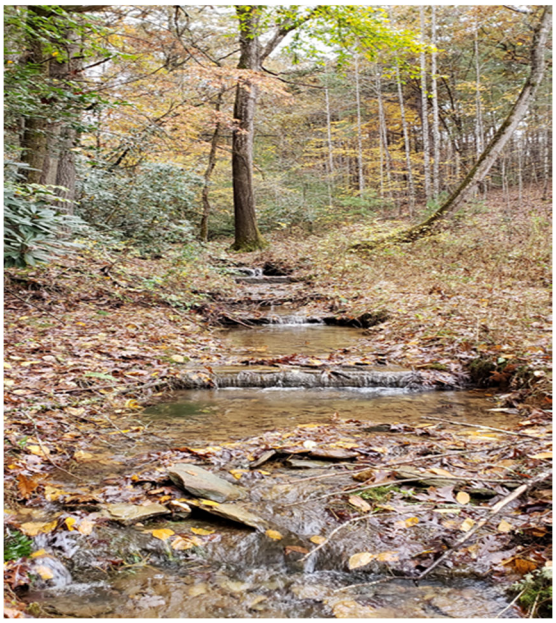

SUBMITTED TO/PREPARED FOR:

North Carolina Department of Environmental Quality
Division of Mitigation Services
217 West Jones Street, Suite 3000A
Raleigh, North Carolina 27603

SUBMITTED BY:

Axiom Environmental, Inc.
218 Snow Avenue
Raleigh, North Carolina 27603

December 2018

Axiom Environmental, Inc.

Axiom Environmental, Inc.

218 Snow Avenue, Raleigh, NC 27603 919-215-1693

December 5, 2018

Mr. Matthew Reid
North Carolina Department of Environmental Quality
Division of Mitigation Services
5 Ravenscroft Drive, Suite 102
Asheville, NC 28801

RE: Martin's Creek II Monitoring (DMS Project # 92633, Contract # 005717)
Final MY5 (2018) Annual Monitoring Report **12-004.16**

Dear Matthew:

Axiom Environmental, Inc. (AXE) is pleased to provide you with three hard copies and a CD of digital files for the Final Martin's Creek II Annual Monitoring Report. We received your comments via email on December 3, 2018 and have addressed them as follows:

- 2.2 Vegetation: Please add sentence at the end of the invasive species discussion: DMS will continue invasive species treatment in 2019.
  This sentence was added to the invasive species discussion.

- 2.2 Vegetation: Please add sentence to section discussing wetland delineation services: DMS is not seeking additional wetland credit for the site.
  This sentence was added to the wetland delineation discussion.

- Table 2: Please add two additional lines under Year 5 Monitoring for Vegetation Monitoring and Stream Monitoring with corresponding dates.
  These additional rows were added to Table 2.

- Cross Sections and Table 11: Please double check XS15. According to Table 11a, this section did not hold the Abkf constant in the dimension calculations. Please update graph and table as necessary.
  The data for cross section 15 were revised to assure that the bankfull area remained fixed from last year's data. The graph and table were updated to reflect the change.

- As Axiom has done in the past, please include a response to the comment letter and how/where the comments were addressed. Please insert this letter directly behind the cover page in the final deliverables.
  This letter has been inserted directly behind the cover page in the final deliverable.

Please let me know if you have any questions or comments regarding any component of this submittal. Thank you for the opportunity to continue to assist the Division of Mitigation Services with this important project.

Sincerely,
AXIOM ENVIRONMENTAL, INC.

Kenan Jernigan
Project Scientist

Attachments: 3 hardcopies Final Martin's Creek II MY5 (2018) Annual Monitoring Report
1 CD containing digital support files

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Appendices

1.0 PROJECT SUMMARY

The North Carolina Department of Environmental Quality - Division of Mitigation Services (DMS) has established the Martin's Creek II Mitigation Project (Site) located in Cherokee County, just south of the town of Murphy. The Site includes a 93.87-acre easement encompassed within 14-digit Cataloging Unit 06020002170010 of the Hiwassee River Basin (Figure 1, Appendix B and Table 4, Appendix A). Land use at the Site, prior to mitigation activities, was composed of livestock pasture, open land, a residence, and forested areas. Martin's Creek and its tributaries were impaired by historical and current land management practices, which included timber harvesting, pasture, channelization, and livestock grazing. Completed project activities, reporting history, completion dates, project contacts, and project attributes are summarized in Tables 1-4 (Appendix A).

The Site is located along Martin's Creek and several unnamed tributaries, which have been assigned Stream Index Number 1-49 and Best Usage Classification of C. Site streams are listed on the NCDWQ draft 2014 and final 2012 Section 303(d) list of impaired streams due to a fair bioclassification for reduced ecological/biological integrity and fish communities, and elevated levels of fecal coliform bacteria. The Site is located within a Targeted Local Watershed that has been identified for stream and buffer restoration opportunities (NCDMS 2008).

The Site lies within the focus area of the *Peachtree-Martins Creek Local Watershed Plan* (LWP) and roughly corresponds to Restoration site #1 & Preservation site #1 of the LWP project atlas (NCDMS 2007). Goals of the LWP include implementation of wetland and stream restoration projects that reduce sources of sediment and nutrients by restoring riparian buffers, stabilizing stream banks, and restoring natural channel geomorphology, particularly in headwater streams.

The project goals will directly address stressors identified in the Peachtree-Martins Creek LWP, namely lack of riparian vegetation, channel modification, excess sediment inputs, excess nutrient inputs, and bacterial contamination as follows.

- Restore geomorphically stable stream channels within the Site;
- Restore or enhance wetlands;
- Exclude livestock from accessing project streams, wetlands, and riparian zones;
- Improve and restore hydrologic connections and achieve uplift of ecosystem functions;
- Improve water quality within the Site by reducing bank erosion, improving nutrient and sediment removal, and stabilizing stream banks;
- Restore and preserve headwater tributaries to the Peachtree-Martins Creek Watershed and the Hiwassee River; and
- Improve aquatic and terrestrial habitat by improving substrate and in-stream cover, adding woody debris, reducing water temperatures, and restoring riparian habitat.

The Site mitigation plan was completed in March 2010 with the final design and construction plans completed in November 2010 (Table 2, Appendix A). Project construction was completed between October 2012 and July 2013. The implemented mitigation is as follows (Figure 2, Appendix B and Table 1, Appendix A).

- 8817 Stream Mitigation Units
    - Restoring approximately 3486 linear feet of stream channel through construction of stable channel at the historic floodplain elevation.
    - Enhancing (level I) approximately 832 linear feet of stream channel through cessation of current land use practices, installing grade control structures, repairing bank erosion, restoring proper channel dimension, and planting with native forest vegetation.
    - Enhancing (level II) approximately 1903 linear feet of stream channel through cessation of current land use practices, removing invasive species, and planting with native forest vegetation.
    - Preserving 21,327 linear feet of stream channel.
- 5.97 Riparian Wetland Mitigation Units
    - Restoring approximately 5.20 acres of riparian wetland by removing spoil castings, restoring stream inverts to historic elevations rehydrating stream-side wetlands, removing drain tile, eliminating land use practices, and planting with native forest vegetation.
    - Enhancing approximately 1.61 acres of riparian wetland by fencing livestock and supplemental planting.
- Planting a native woody riparian buffer (at least 30 feet in width) adjacent to restored/enhanced streams and wetlands within the Site.
- Protecting the Site in perpetuity with a conservation easement.

Stream Success Criteria

Stream restoration success criteria for the Site are based on the *Stream Mitigation Guidelines* issued in April 2003 by the USACE and NCDWQ. Success criteria for stream restoration will include 1) documentation of two bankfull events, 2) little change in the channel cross-section from as-built conditions, 3) stable longitudinal profile, 4) substrate consistency, and 5) photographic evidence of stability.

Bankfull Events

Two bankfull flow events in separate years must be documented within the 5-year monitoring period. Otherwise, the stream monitoring will continue until two bankfull events have been documented in separate years.

Cross-sections

Riffle cross-sections on restoration and enhancement reaches should be stable and should show little change in bankfull area, maximum depth ratio, and width-to-depth ratio. Riffle cross-sections should generally fall within the parameters defined for channels of the appropriate Rosgen stream type. If any changes do occur, these changes will be evaluated to assess whether the stream channel is showing signs of instability. Indicators of instability include a vertically incising thalweg or eroding channel banks. Changes in the channel that indicate a movement toward stability or enhanced habitat include a decrease in the width-to-depth ratio in meandering channels or an increase in pool depth.

Longitudinal Profile

Longitudinal profile data for the stream reach should show that bedform features are remaining stable. The riffles should be steeper and shallower than the pools, while the pools should be deep with flat water surface slopes. The relative percentage of riffles and pools should not change significantly from the design parameters.

Bed Material Analysis

Substrate materials in restoration reaches should indicate a progression towards or the maintenance of coarser materials in the riffle features and smaller particles in the pool features.

Photo Reference Sites
Photographs will be used to evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation, and effectiveness of erosion control measures subjectively. Lateral photos should not indicate excessive erosion or continuing degradation of the banks. A series of photos over time should indicate successive maturation of riparian vegetation.

Vegetation Success Criteria
Success criteria have been established to verify that the vegetation component supports community elements necessary for forest development. Success criteria for this project includes an average density of 320 planted stems per acre must be surviving in the first three monitoring years. Subsequently, 290 planted stems per acre must be surviving in year 4, and 260 planted stems per acre in year 5.

Wetland Success Criteria
Hydrologic success will be based on conditions of on-site reference wetlands. Success will be determined by the following criteria.

Years One Through Three
Hydrologic success criteria will be met if the Site demonstrates groundwater table levels within 12 inches of the soil surface for a minimum of 13% of the growing season (this criterion reflects a deviation of 50% from the duration of saturation expected for this type of wetland system (~25%). Success for monitoring years one through three will be determined based on this 50% tolerance of deviation from the duration of wetland hydrology at the reference sites.

Years Four and Five
Success for monitoring years four and five will be determined based on a 20% tolerance of deviation from the duration of wetland hydrology at the reference sites. Therefore, it is expected that in years four and five the site will achieve a minimum of 20% saturation.

Based on reference conditions and the criterion stated above, it is expected that reference soil saturation for years one through five will continue to exceed the regulatory 12.5% minimum requirement of the growing season for Cherokee County. In order to attain conditions suitable for the formation of wetland vegetation and hydric soils, the Site should be saturated within 12 inches of the surface or inundated for consecutive period equal to 24 days. However, to meet hydrologic success criteria and mimic the reference wetland hydrology, the site should demonstrate wetland hydrology for a minimum of 25 days in years one through three. In years four and five, this will increase to a minimum of 38 days. Overbank flooding from the adjacent channel will also be noted during monitoring.

Reference areas will be monitored for a minimum of five years.

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 tables and figures within this report's 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 the Division of Mitigation Services (DMS) website. All raw data supporting the tables and figures in the appendices are available from DMS upon request.

2.0 METHODOLOGY

Monitoring of the Site's restoration efforts will be performed until agreed upon success criteria are fulfilled. Monitoring is proposed for the stream channel, riparian vegetation, and hydrology for a period of five years

(Figures 2 & 2A-2C, Appendix A). Monitoring reports of collected data will be submitted no later than December of each monitoring year.

2.1 Streams

Post-restoration monitoring will be conducted for five years following the completion of construction to evaluate the effectiveness of the restoration practices. Measurements were taken using a Topcon GTS 303 total station and Recon data collector. The raw total station file was processed using Carlson Survey Software into a Computer Aided Design (CAD) file. Coordinates were exported as a text/ASCII file to Microsoft Excel for processing and presentation of data, and are not georeferenced. Pebble counts were completed using the modified Wolman method (Rosgen 1993). Monitored stream parameters include stream dimension (cross-sections), pattern (longitudinal survey), profile (profile survey), and photographic documentation. Stream data can be found in Appendix D.

On March 8, 2017, two time-lapse cameras were installed on MC UT1R2. These cameras were installed to document 30 consecutive days of continuous flow. The 2018 photos from the downstream camera show obvious, continuous stream flow from January 24 to March 22, or 58 days, when the camera battery failed. The battery was replaced on April 5 and continuous flow was documented until June 11, or 67 days, when herbaceous vegetation obstructed the view of the camera. The upstream camera battery died on January 17, 2018 and was not replaced until April 5. However, obvious, continuous flow was visible from April 5 until May 15, or 41 days, when a photo appears to show water in the pool and a dry riffle. Another period of flow was documented from September 8 until November 11, or 61 days. It is expected that the stream will continue to flow through the remainder of 2018. A selection of Year 5 (2018) time-lapse photos is in Appendix E, and all photos can be made available upon request.

Bankfull Events

The occurrence of bankfull events within the monitoring period will be documented by the use of a crest gauge and photographs. One crest gauge was installed to record the highest watermark between site visits; the gauge will be checked each Site visit to determine if a bankfull event has occurred (Figure 2A, Appendix B). Photographs will be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits.

Three bankfull events were documented during monitoring year 5 (2018) for a total of 16 bankfull events during the five year monitoring period.

Cross-sections

A total of 19 permanent cross-sections, 12 riffle and 7 pool, were established and will be used to evaluate stream dimension; locations are depicted on Figures 2, 2A, and 2B (Appendix B) Because riffle cross-sections are critical in determining bankfull design parameters, the number of riffle cross-sections established will generally outnumber pool cross-sections. Each cross-section will be marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be used for cross-sections and consistently used to facilitate easy comparison of year-to-year data. The annual cross-section survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross-sections will be classified using the Rosgen Stream Classification System.

No areas of concern or indicators of instability were observed during year 5 (2018) monitoring; therefore, stream dimension measurements are currently meeting success criteria.

Longitudinal Profile

After Site construction, approximately 4493 linear feet of longitudinal profile was completed to document baseline conditions. Longitudinal profile will be resurveyed annually for the duration of the five-year

monitoring period. Measurements include thalweg, water surface, bankfull, and top of low bank. Each of these measurements will be taken at the head of each channel unit (e.g., riffle, pool) and at the maximum pool depth. The survey will be tied to a permanent benchmark.

No areas of concern or indicators of bedform instability were observed during year 5 (2018) monitoring; therefore, stream longitudinal profile measurements are currently meeting success criteria.

Bed Material Analysis

Pebble counts will be conducted annually on one permanent riffle cross-section (100-counts) at the time cross-section and longitudinal surveys are performed during the five year monitoring period. These samples will reveal changes in sediment gradation over time as the stream adjusts to upstream sediment loads.

Year 5 (2018) pebble counts indicate the maintenance of coarser materials in the measured riffle feature; therefore, bed material is currently meeting success criteria.

Photo Reference Sites

A total of 26 photographs will be used to visually document restoration success for at least five years following construction. Photographs will be taken from a height of approximately five to six feet. Photo locations will be recorded using sub-meter GPS to ensure that the same locations (and view directions) on the Site are monitored in each monitoring period.

Year 5 (2018) photo reference sites show no channel aggradation or degradation, or bank erosion

2.2 Vegetation

After planting was completed, an initial evaluation was performed to verify planting methods were successful and to determine initial species composition and density. Fifteen sample vegetation plots (10-meter by 10-meter) were installed and measured within the Site as per guidelines established in *CVS-DMS Protocol for Recording Vegetation, Version 4.2* (Lee et al. 2008). Vegetation plots are permanently monumented with 6-foot metal t-posts at each corner. In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be documented by photograph. Vegetation plot data can be found in Appendix C.

Year 5 (2018) stem count measurements indicate an average of 297 planted stems per acre (excluding livestakes) across the Site; therefore, the Site is currently meeting vegetation success criteria. Eleven of the fifteen individual vegetation plots met success criteria based on planted stems alone; plots 7 and 11 were each one stem shy of meeting success criteria. When including naturally recruited stems of ironwood (*Carpinus caroliniana*) and tulip poplar (*Liriodendron tulipifera*) Plot 11 was well-above success criteria.

A population of Chinese privet (*Ligustrum sinense*) was observed on the left bank of UT1-R3 during previous monitoring years. This area has been treated several times throughout the monitoring period, and though it responded well, several resprouts were observed in this area late in year 5 (2018). Two additional Chinese privet populations have been observed during previous monitoring years along the lower reaches of the Right Prong Tributaries, particularly in the vicinity of Photo Points 21 and 23. These still appear vigorous during year 5 (2018). Several smaller Chinese privet populations as well as Japanese honeysuckle (*Lonicera japonica*) populations were observed throughout the site during year 5 (2018) monitoring. These areas are depicted on Figures 2A-C, Appendix B. Furthermore, small populations of multiflora rose (*Rosa multiflora*) were observed scattered throughout the Site, with most occurrences in the preservation and enhancement reaches in areas shaded by canopy. NCDMS will continue invasive species treatment in 2019.

2.3 Wetland Hydrology

Thirteen RDS Ecotone WM groundwater monitoring gauges were installed within Site wetland restoration areas to monitor groundwater hydrology (Figure 2A, Appendix A). Hydrological sampling will continue for five years with gauges recording daily and downloaded at a minimum of quarterly throughout the growing season (April 14-October 21). In addition, an on-site rain gauge will document rainfall data for comparison of groundwater conditions with extended drought conditions. Finally, groundwater gauges located within riverine wetlands adjacent to restored stream reaches will supplement crest gauge measurements to confirm overbank flooding events.

Year 5 (2018) rain data comes partially from a Weather Underground Station in Andrews, North Carolina. The onsite rain gauge continued to be infested with ants throughout the growing season, despite best efforts to eradicate them the data was not reliable due to inability of the magnetic reed switch to be activated by the tipping bucket.

Wetland success criteria increases in Years 4-5 (2017-2018) to a minimum of 20 percent saturation or inundation during the growing season. Eleven of the thirteen groundwater gauges met or exceeded wetland success criteria for the Year 5 (2018) monitoring year; however, the remainder of the gauges were saturated/inundated for 15.2-16.8 percent of the growing season. Year 5 (2018) data indicates that the majority of the Site wetland area is successful.

On May 3, 2018, a wetland delineation was performed by Axiom as part of the wetland confirmation services in the monitoring contract with NCDMS. This delineation was performed in accordance with the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Eastern Mountains and Piedmont Region (USACE, 2012) and has not been approved in the field by a USACE representative. The results of the delineation show a net increase in wetlands across the site from the wetlands originally proposed as mitigation assets (Table 1, Appendix A). NCDMS is not seeking additional wetland credit for the site. Appendix F contains a figure depicting the 2018 wetland delineation as well as the accompanying wetland data forms.

3.0 REFERENCES

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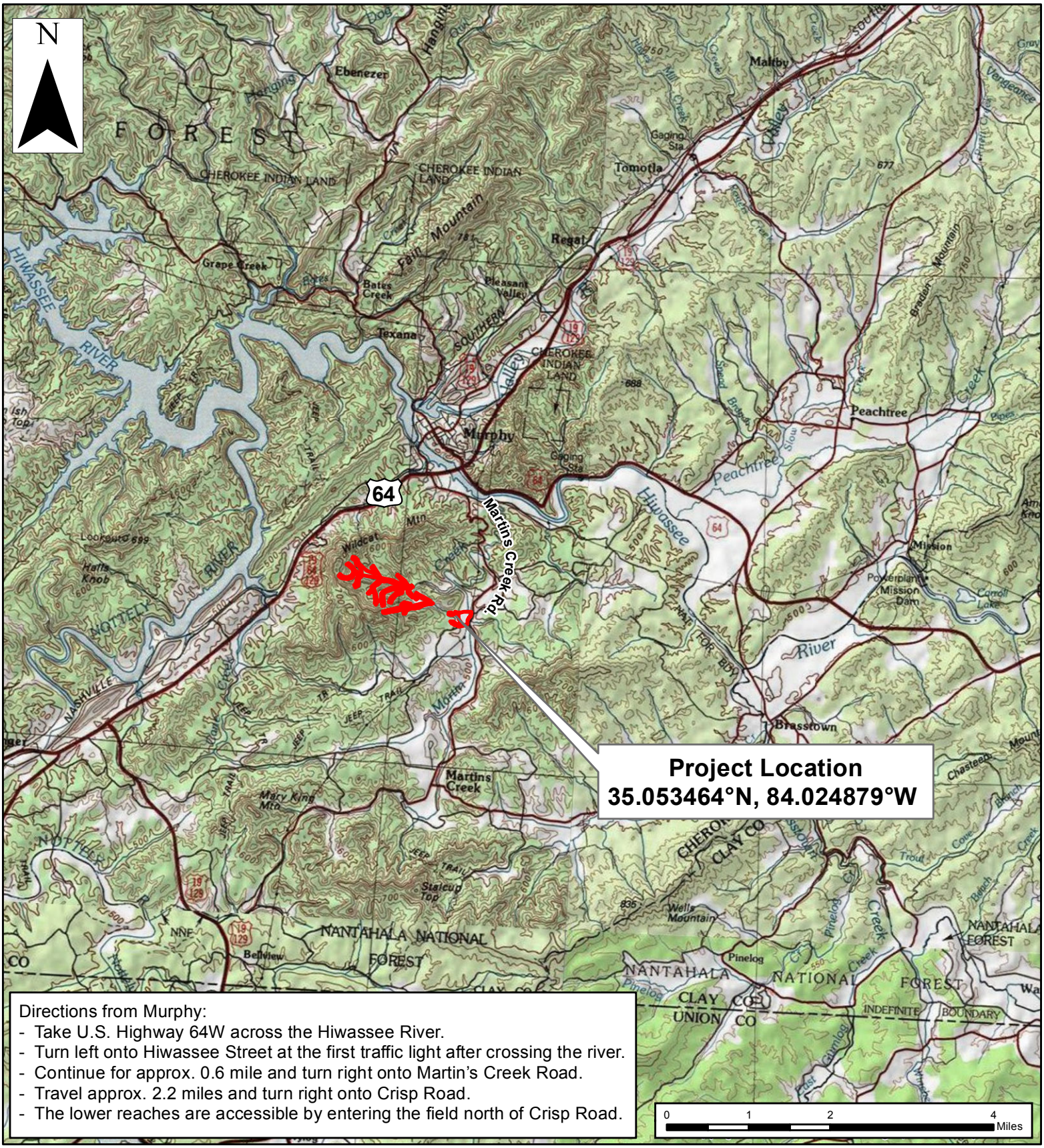
Weakley, Alan S. 2012. Flora of the Southern and Mid-Atlantic States. Available online at: http://www.herbarium.unc.edu/WeakleysFlora.pdf [September 28, 2012]. University of North Carolina Herbarium, North Carolina Botanical Garden, University of North Carolina, Chapel Hill, North Carolina.

APPENDIX A

PROJECT BACKGROUND DATA AND MAPS



Prepared by:	Prepared for:			
Axiom Environmental, Inc.	**North Carolina Department of Environmental Quality** **Division of Mitigation Services**	VICINITY MAP MARTINS CREEK II DMS PROJECT NUMBER 92633 Cherokee County, North Carolina	Dwn. by. KRJ Date: Nov 2015 Project: 12.004.16	FIGURE 1

Table 1. Project Components and Mitigation Credits
Martin's Creek II Mitigation Site

Mitigation Credit Summations							
Stream			**Riparian Wetland**				**Nonriparian Wetland**
8817			**5.97**				**---**
Projects Components							
Station Range		**Existing Linear Footage/Acreage**	**Priority Approach**	**Restoration/ Restoration Equivalent**	**Restoration Linear Footage/Acreage**	**Mitigation Ratio**	**Mitigation Credits**	**Comment**
Right Prong Martin's Creek and UTs		17,234	---	Preservation	17,234-203= 17,031	5:1	3406.2	Three short reaches in upstream portion of RP UT1 do not have adequate buffer to claim credit and therefore have been removed from the total linear footage and calculated mitigation credits.
Right Prong Martin 's Creek and UTs		971	---	Enhance II	971	2.5:1	388.4	Enhancement Level II - invasive species controls and localized erosion stabilization.
Martin's Creek UTs		4296	---	Preservation	4296	5:1	859.2	
Martin's Creek*		857	---	Enhance II	857	5:1*	171.4	Enhancement Level II - invasive species controls and localized erosion stabilization.
UT-2 to Martin's Creek		75	---	Enhance II	75	2.5:1	30.0	
UT 1 (Reach 3) to Martin's Creek Station 00+00 to 03+37		337	---	Enhance I	337	1.5:1	224.7	Level I stream enhancement - grade control structures, repair bank erosion, and restore proper dimension.
UT 1-3 (Reach 1) to Martin's Creek Station 00+00 to 04+95		495	---	Enhance I	495	1.5:1	330.0	Level I stream enhancement - grade control structures, repair bank erosion, and restore proper dimension.
UT 1 (Reach 2) to Martin's Creek Station 00+00 to 10+52		1052	I	Restoration	1052	1:1	1052	Construction of a new channel on the existing floodplain.
UT 1 (Reach 4) to Martin's Creek	05+46 to 05+91	332	II	Restoration	51	1:1	51.0	Construction of a new channel in a low slope valley.
	05+91 to 06+35**				37	2:1**	18.5	
	06+35 to 15+75				941	1:1	941.0	
	15+75 to 16+75**				100	2:1**	50.0	
UT 1-3 (Reach 2) to Martin's Creek	05+54 to 05+90	1068	II	Restoration	35	1:1	35.0	Construction of a new channel in a low slope valley.
	05+90 to 06+10***				20	2:1***	10.0	
	06+10 to 18+59				1250	1:1	1250.0	
Wetland Restoration		---	---	Restoration	5.14	1:1	5.14	Restoration of riparian wetlands through stream restoration activities, filling abandoned channels and drain tiles, removing spoil castings, and planting.
					0.06	2:1^	0.03	
Wetland Enhancement		1.61	---	Enhancement	1.604	2:1	0.802	Enhancement of existing riparian wetlands by fencing livestock and planting.
					0.006	4:1[+]	0.002	

Component Summation

Restoration Level	**Stream (linear footage)**	**Riparian Wetland (acreage)**	**Nonriparian Wetland (acreage)**
Restoration	3486	5.20	--
Enhancement (Level I)	832	--	--
Enhancement (Level II)	1903	1.61	--
Preservation	21,327	--	
Totals	**27,548**	**6.81**	--
Mitigation Units	**8817 SMUs**	**5.97 Riparian WMUs**	**0.00 Nonriparian WMUs**

* Martin's Creek proper is located beneath a power line; therefore, a credit ratio of 5:1 has been used to calculate mitigation units.
** UT1 (Reach 4) stations 05+91 to 06+35 and 15+75 to 16+75 are located beneath a power line; therefore, a credit ratio of 2:1 has been used to calculate mitigation units.
*** UT1-3 (Reach 2) station 05+90 to 06+10 is located beneath a power line; therefore, a credit ratio of 2:1 has been used to calculate mitigation units.
^0.06 acres of wetland restoration is located beneath a power line; therefore, a credit ratio of 2:1 has been used to calculate mitigation units.
[+]0.006 acres of wetland enhancement is located beneath a power line; therefore, a credit ratio of 4:1 has been used to calculate mitigation units.

Table 2. Project Activity and Reporting History
Martin's Creek II Mitigation Site

Activity or Deliverable	Data Collection Complete	Completion or Delivery
Mitigation Plan	January 2010-July 2010	September 2010
Final Design – Construction Plans	September 2010-March 2011	March 2011
Construction	--	October 2012-July 2013
Temporary S&E Mix applied to Entire Project Site	--	October 2012-July 2013
Permanent Seed Mix applied to the Entire Project Site	--	October 2012-July 2013
Bare Root; Containerized; and B&B Plantings for the Entire Project Site	--	March 2014
Mitigation Plan/ As-Built (Year 0 Monitoring Baseline)	April 2014	April 2014
Invasive Species Treatment	--	July 2014
Year 1 Monitoring	October 2014	December 2014
Warranty Supplemental Planting	--	March 2015
Year 2 Monitoring	November 2015	December 2015
Warranty Supplemental Planting	--	February 2016
Invasive Species Treatment	--	July 2016
Invasive Species Treatment		September 2016
Year 3 Monitoring	November 2016	December 2016
Year 4 Monitoring	November 2017	December 2017
Year 5 Monitoring	November 2018	December 2018
Year 5 Vegetation Monitoring	September 24, 2018	--
Year 5 Stream Monitoring	April 3, 2018	--

Table 3. Project Contacts Table
Martin's Creek II Mitigation Site

Designer	Michael Baker Engineering, Inc. 797 Haywood Road, Suite 201 Asheville, NC 28806 Micky Clemmons 828-350-1408
Construction Plans and Sediment and Erosion Control Plans	Michael Baker Engineering, Inc. 797 Haywood Road, Suite 201 Asheville, NC 28806 Micky Clemmons 828-350-1408
Construction Contractor	River Works, Inc. 6105 Chapel Hill Rd. Raleigh, NC 27607 919-582-3574
Planting Contractor	Carolina Silvics, Inc. 908 Indian Trail Road Edenton, NC 27932 (252) 482-8491
As-built Surveyor	Turner Land Surveying. PLLC 3201 Glenridge Drive Raleigh, NC 27604 919-875-1378
Baseline Data Collection	Axiom Environmental, Inc. 218 Snow Avenue Raleigh, NC 27603 Grant Lewis 919-215-1693

Table 4. Project Attribute Table
Martin's Creek II Mitigation Site

Project County	Cherokee County, North Carolina							
Physiographic Region	Blue Ridge							
Ecoregion	Broad Basins							
Project River Basin	Hiwassee							
USGS HUC for Project (14 digit)	06020002170010							
NCDWQ Sub-basin for Project	04-05-02							
Planning Area	Yes – Peachtree-Martins Creek LWP							
WRC Class (Warm, Cool, Cold)	Cold							
% of project easement fenced or demarcated	100							
Beaver activity observed during design phase?	No							
	Right Prong Martin's Creek		Martin's Creek					
	RP UT1	RP Mainstem	MC UT1		MC UT1-3		MC UT2	MC Mainstem
			LII Enh	PI Rest	LI Enh	PI Rest		
Drainage Area	.17	0.6	0.02 – 0.18		0.07 – 0.08		0.39	6.81
Stream Order (USGS topo)	1st	3rd	2nd		1st		1st	3rd
Restored Length (feet)								
Perennial or Intermittent	I/P	I/P	P	P	P	P	P	P
Watershed Type	Rural							
Watershed impervious cover	<10%							
NCDWQ AU/Index number	1-49 (Martin's Creek), 1-49-3 (Right Prong Martins Creek)							
NCDWQ Classification	C		C		C		C	C
303d listed?	No							
Upstream of a 303d listed	No							
Reasons for 303d listed segment	NA							
Total acreage of easement	93.87							
Total existing vegetated acreage of easement	-							
Total planted restoration acreage	17 acres							
Rosgen Classification of preexisting	B	B	Eb/Fb/B/G	Cb/G	Eb/B	C/F	B	C
Rosgen Classification of As-built	B	B	B/C	B/C	B	C	B	C
Valley type	II		II		VIII		VIII	VIII
Valley slope	N/A		0.015 - 0.05		0.007 – 0.04		N/A	N/A
Cowardin classification of proposed	N/A		N/A		N/A		N/A	N/A
Trout waters designation	No							
Species of concern, endangered etc.	No							
Dominant Soil Series	Cullowhee fine sandy loam		Thurmont-Dillard Complex Arkaqua loam		Dillard loam Arkaqua loam		Arkaqua loam	Arkaqua loam

APPENDIX B

VISUAL ASSESSMENT DATA

Figures 2 and 2A-2C. Current Conditions Plan View (CCPV)

Tables 5A-5E. Visual Stream Morphology Stability Assessment

Table 6. Vegetation Condition Assessment

Stream Station Photographs

Vegetation Plot Photographs

Fig. 2C

Right Prong Tributaries

Martins Creek Tributaries

Fig.2B

Fig. 2A

Legend

Easement Boundary

Streams

N

0 500 1,000 2,000 3,000 Feet

NCCGIA

Axiom Environmental
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Raleigh, NC 27603
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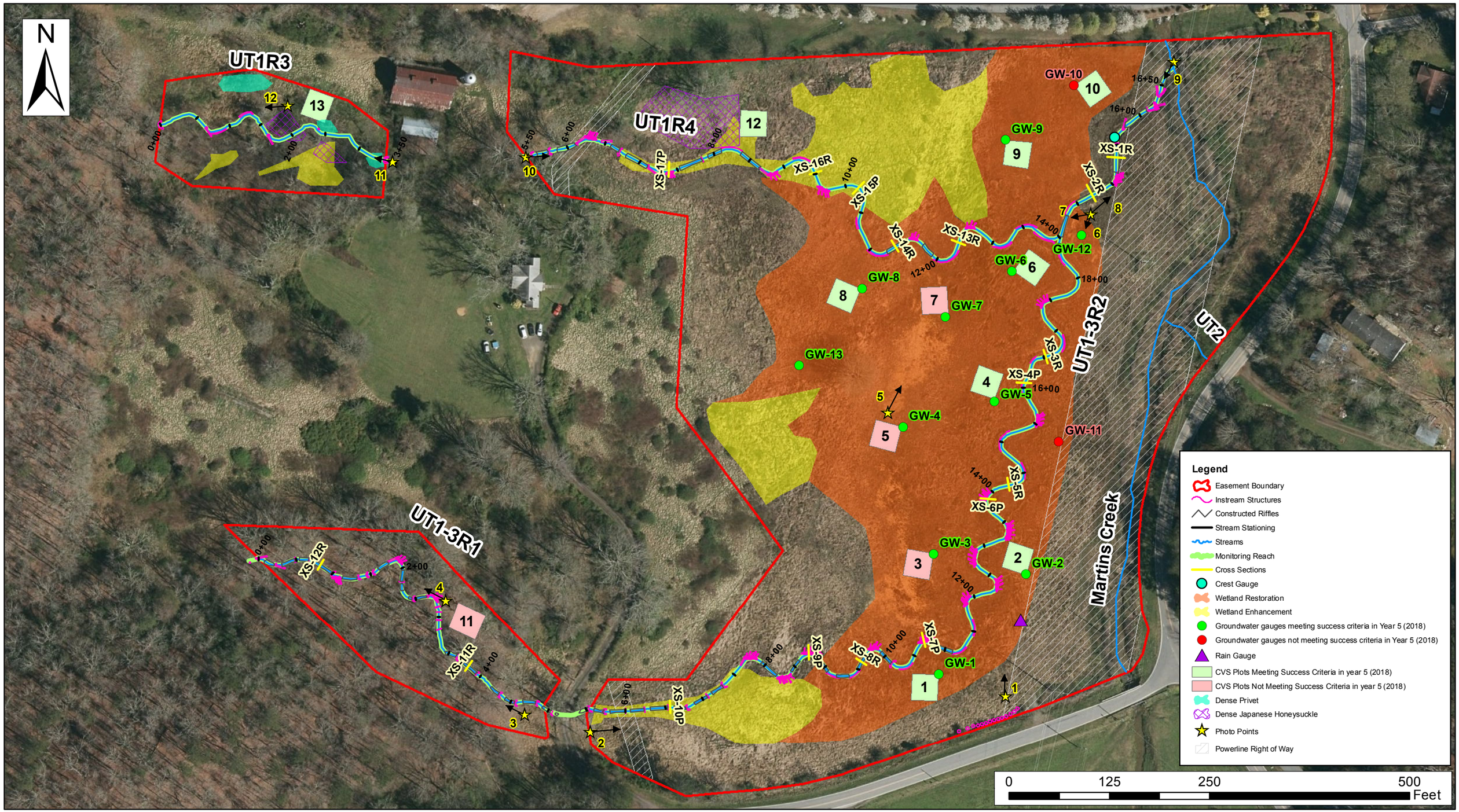
Axiom Environmental, Inc.

CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II
DMS PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
Date: Nov 2018	2
Project: 12-004.16	



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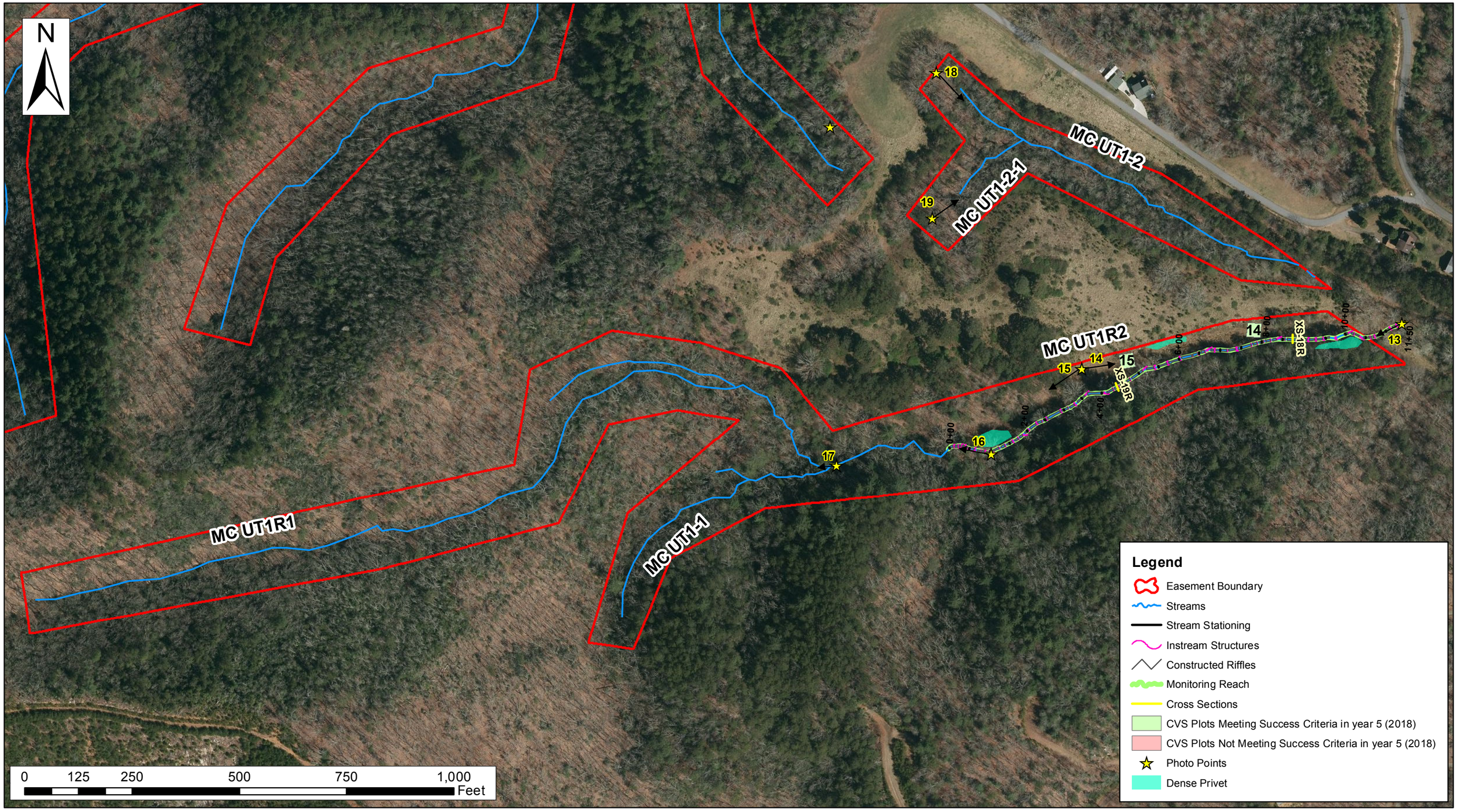
Axiom Environmental, Inc.

CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II
DMS PROJECT # 92633
Cherokee County, North Carolina

Dwn. by.	KRJ
Date:	Nov 2018
Project:	12-004.16
FIGURE	2A



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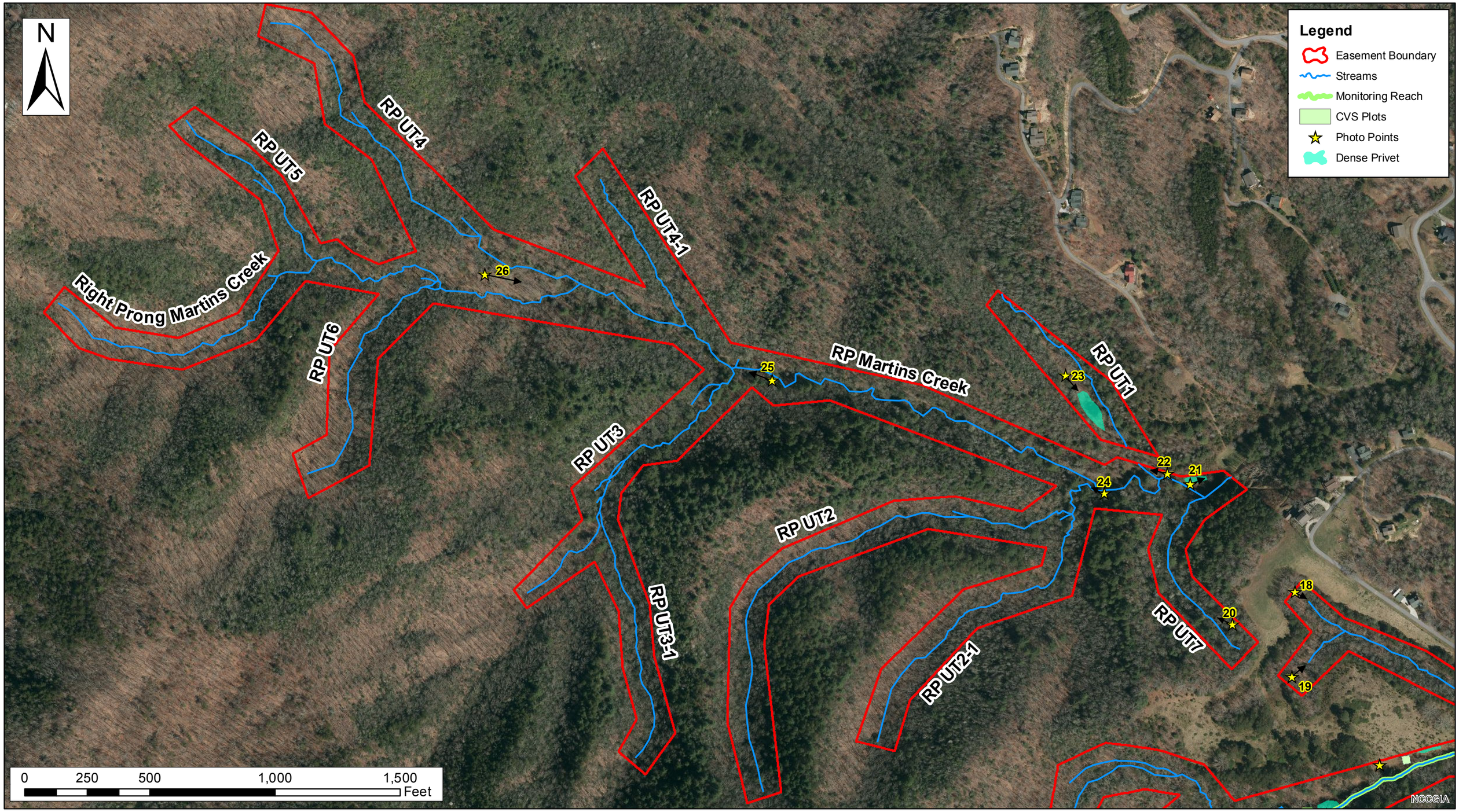
Axiom Environmental, Inc.

CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II (MARTINS CREEK TRIBUTARIES)
DMS PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
Date: Nov 2018	2B
Project: 12-004.16	



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CURRENT CONDITIONS PLAN VIEW
MARTINS CREEK II (RIGHT PRONG TRIBUTARIES)
DMS PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
Date: Nov 2018	2C
Project: 12-004.16	

Table 5A **Visual Stream Morphology Stability Assessment**
Reach ID **UT1 Reach 4**
Assessed Length **1129**

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	23	23			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	25	25			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	25	25			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	25	25			100%			
		2. Thalweg centering at downstream of meander (Glide)	25	25			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			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%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	8	8			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	8	8			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	8	8			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)	8	8			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	8	8			100%			

Table 5B **Visual Stream Morphology Stability Assessment**
Reach ID **UT1 Reach 3**
Assessed Length **337**

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	10	10			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	10	10			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	10	10			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	10	10			100%			
		2. Thalweg centering at downstream of meander (Glide)	10	10			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			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%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			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 5C **Visual Stream Morphology Stability Assessment**
Reach ID **UT1-3 Reach 2**
Assessed Length **1305**

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	32	32			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	32	32			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	32	32			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	32	32			100%			
		2. Thalweg centering at downstream of meander (Glide)	32	32			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			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%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	10	10			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	10	10			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	10	10			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)	10	10			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	10	10			100%			

Table 5D **Visual Stream Morphology Stability Assessment**
Reach ID **UT1-3 Reach 1**
Assessed Length **495**

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	16	16			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	22	22			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	22	22			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	22	22			100%			
		2. Thalweg centering at downstream of meander (Glide)	22	22			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			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%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	21	21			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	21	21			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	21	21			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)	21	21			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	21	21			100%			

Table 5E **Visual Stream Morphology Stability Assessment**
Reach ID **UT1 Reach 2**
Assessed Length **1051**

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	55	55			100%			
	3. Meander Pool Condition	1. Depth Sufficient (Max Pool Depth : Mean Bankfull Depth ≥ 1.6)	55	55			100%			
		2. Length appropriate (>30% of centerline distance between tail of upstream riffle and head of downstrem riffle)	55	55			100%			
	4.**Thalweg Position**	1. Thalweg centering at upstream of meander bend (Run)	55	55			100%			
		2. Thalweg centering at downstream of meander (Glide)	55	55			100%			
2. Bank	**1. Scoured/Eroding**	Bank lacking vegetative cover resulting simply from poor growth and/or scour and erosion			0	0	100%			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%			100%
	3. Mass Wasting	Bank slumping, calving, or collapse			0	0	100%			100%
				Totals	0	0	100%	0	0	100%
3. Engineered Structures	**1. Overall Integrity**	Structures physically intact with no dislodged boulders or logs.	57	57			100%			
	2. Grade Control	Grade control structures exhibiting maintenance of grade across the sill.	57	57			100%			
	2a. Piping	Structures lacking any substantial flow underneath sills or arms.	57	57			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)	57	57			100%			
	4. Habitat	Pool forming structures maintaining ~ Max Pool Depth : Mean Bankfull Depth ratio ≥ 1.6 Rootwads/logs providing some cover at base-flow.	57	57			100%			

Table 6 Vegetation Condition Assessment

Martins Creek II Mitigation Project

Planted Acreage[1] **17**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	None	0.1 acres	none	0	0.00	0.0%
2. Low Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
2B. Low Planted Stem Density Areas	None	0.1 acres	none	0	0.00	0.0%
			Total	0	0.00	0.0%
3. Areas of Poor Growth Rates or Vigor	None	0.25 acres	N/A	0	0.00	0.0%
			Cumulative Total	0	0.00	0.0%

Easement Acreage[2] **93.87**

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern[4]	Dense Chinese privet and Japanese honeysuckle throughout Site	1000 SF	Blue and Purple hatched Polygons	11	0.58	0.6%
5. Easement Encroachment Areas[3]	None	none	none	0	0.00	0.0%

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.

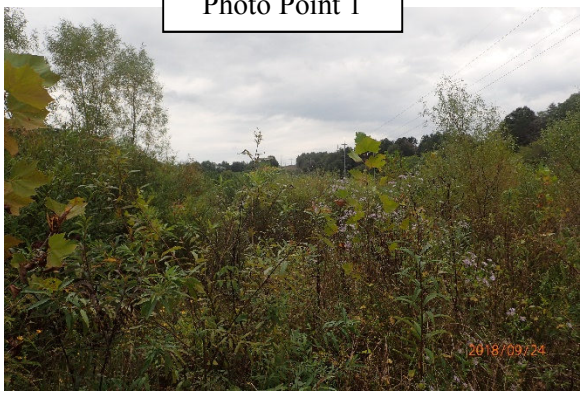
2 = The acreage within the easement boundaries.

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 DMS 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.

Martin's Creek II
Fixed Station Photographs
Taken May/September 2018

Photo Point 1



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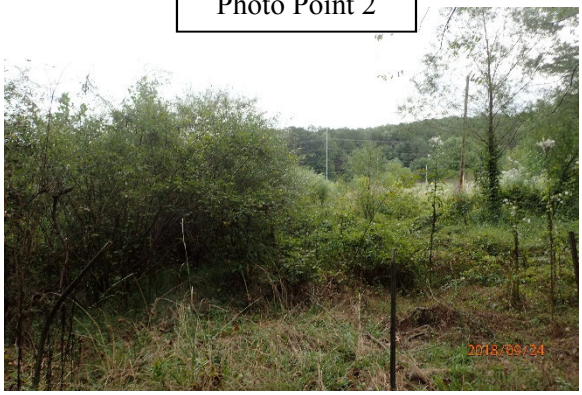

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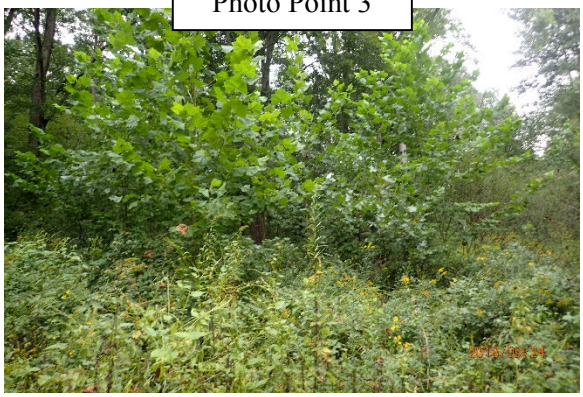
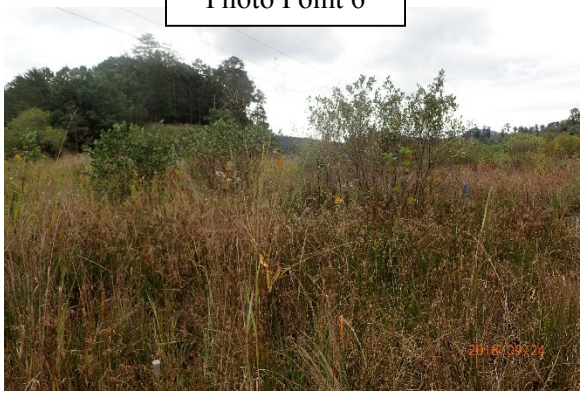


Photo Point 4

Photo Point 5

Photo Point 6



Martin's Creek II
Fixed Station Photographs
Taken May/September 2018 (continued)

Photo Point 7

Photo Point 8

Photo Point 9

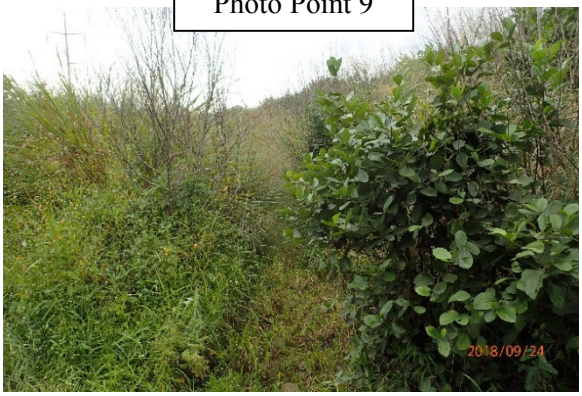


Photo Point 10

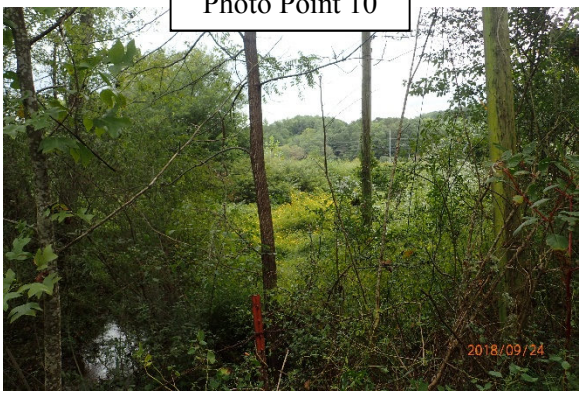


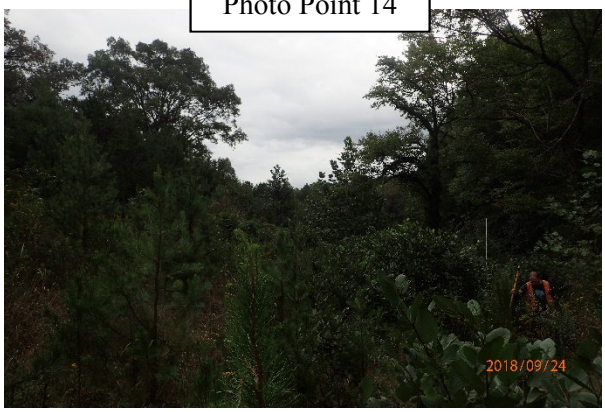
Photo Point 11

Photo Point 12

Martin's Creek II
Fixed Station Photographs
Taken May/September 2018 (continued)

Photo Point 13

Photo Point 14



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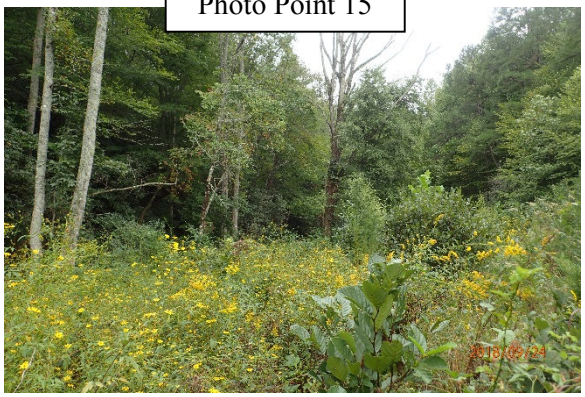
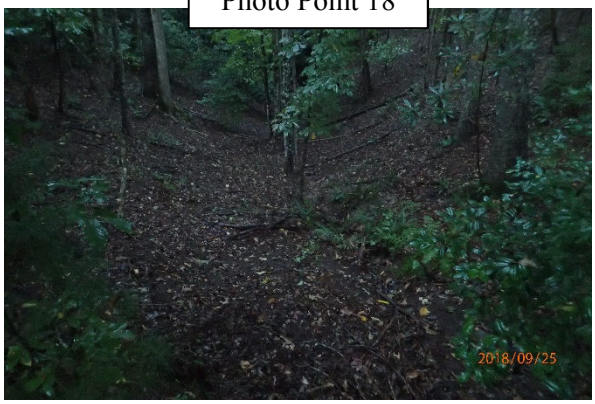


Photo Point 16

Photo Point 17

Photo Point 18



Martin's Creek II
Fixed Station Photographs
Taken May/September 2018 (continued)

Photo Point 19

Photo Point 20

Photo Point 21

Photo Point 22

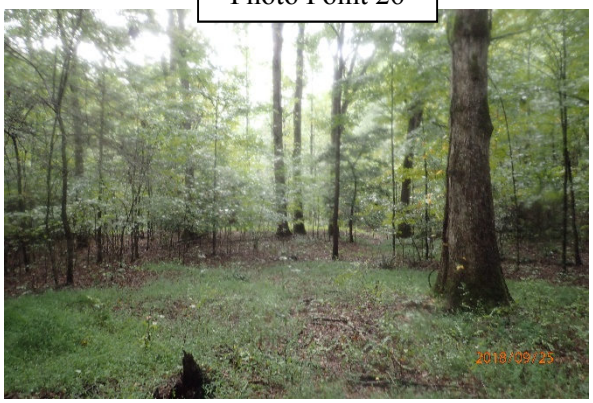
Photo Point 23

Photo Point 24

Martin's Creek II
Fixed Station Photographs
Taken May/September 2018 (continued)

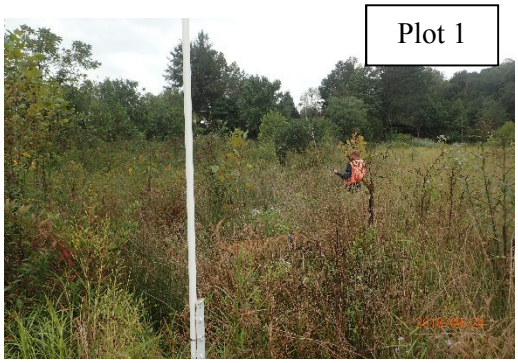
Photo Point 25

Photo Point 26



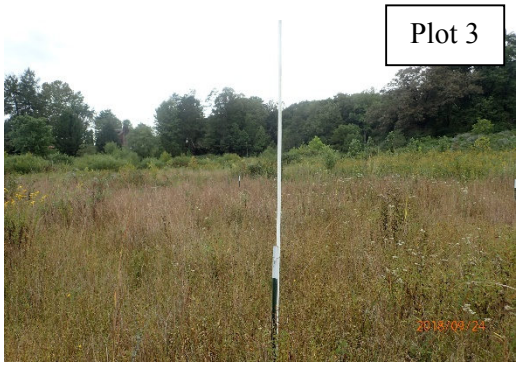
Martin's Creek II
Vegetation Monitoring Photographs
Taken September 2018

Plot 1

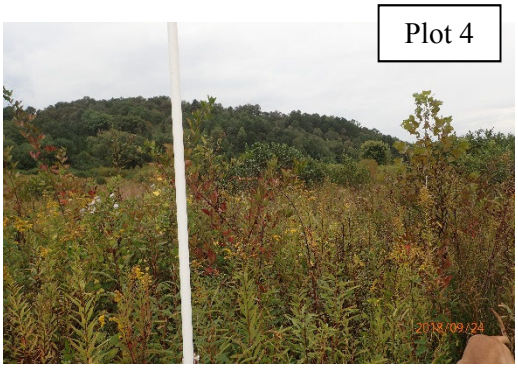


Plot 2

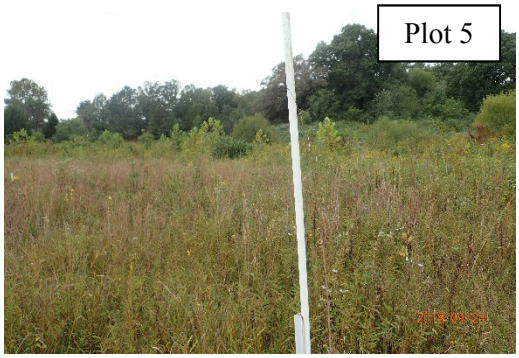
Plot 3



Plot 4



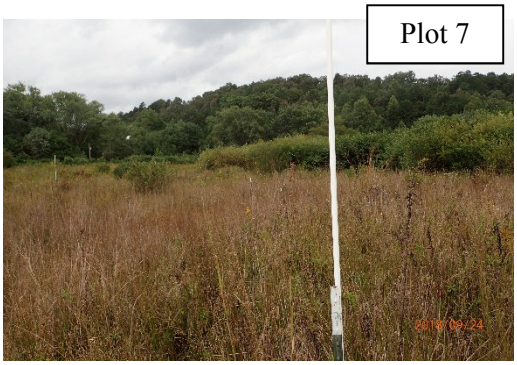
Plot 5



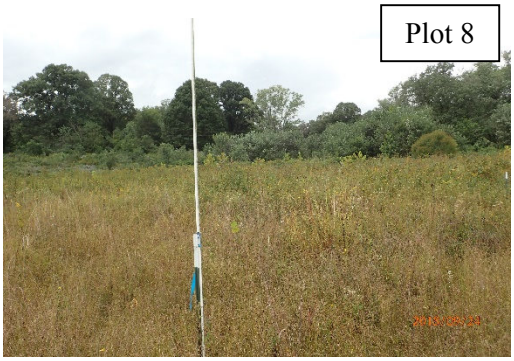
Plot 6

Martin's Creek II
Vegetation Monitoring Photographs
Taken September 2018
(continued)

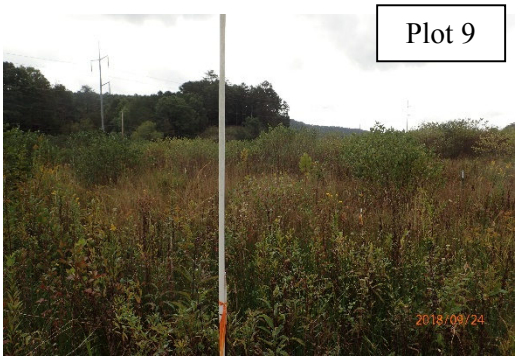
Plot 7



Plot 8



Plot 9



Plot 10

Plot 11

Plot 12

Martin's Creek II
Vegetation Monitoring Photographs
Taken September 2018
(continued)

Plot 13

Plot 14

Plot 15

APPENDIX C

VEGETATION PLOT DATA

Table 7. Vegetation Plot Criteria Attainment

Table 8. CVS Vegetation Plot Metadata

Table 9. Total and Planted Stems by Plot and Species

Table 7. Vegetation Plot Criteria Attainment Based on Planted Stems

Martin's Creek II Mitigation Site (DMS Project Number 92633)

Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	73%
2	Yes	
3	No	
4	Yes	
5	No	
6	Yes	
7	No	
8	Yes	
9	Yes	
10	Yes	
11	No	
12	Yes	
13	Yes	
14	Yes	
15	Yes	

Table 8. CVS Vegetation Plot Metadata
Martin's Creek II Mitigation Site (DMS Project Number 92633)

Report Prepared By	Corri Faquin
Date Prepared	11/8/2018 10:47
database name	Axiom-MartinsII-2018MY5-A-v2.3.1.mdb
database location	S:\Business\Projects\12\12-004 EEP Monitoring\12-004.16 UT to Martins and Martins\Martins II\2018\CVS
computer name	KEENAN-PC
file size	49156096
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	92633
project Name	Martin's Creek II
Description	Stream and Wetland Restoration
River Basin	Hiwassee
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	15

Table 9. Total and Planted Stems by Plot and Species
DMS Project Code 92633. Project Name: Martin's Creek II

			Current Plot Data (MY5 2018)																												
			92633-01-0001			92633-01-0002			92633-01-0003			92633-01-0004			92633-01-0005			92633-01-0006			92633-01-0007			92633-01-0008			92633-01-0009			92633-01-0010			92633-01-0011		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree			1									4												2								
Alnus serrulata	hazel alder	Shrub						2																				2			8			
Betula nigra	river birch	Tree							1	1	1				1	1	1	2	2	2	2	2	2	1	1	1				4	4	4	1	1	1
Carpinus caroliniana	American hornbeam	Tree																																4
Carya	hickory	Tree																																
Carya alba	mockernut hickory	Tree																																
Carya glabra	pignut hickory	Tree																																
Celtis laevigata	sugarberry	Tree																																
Cornus amomum	silky dogwood	Shrub																								1								
Crataegus	hawthorn	Tree																																
Diospyros virginiana	common persimmon	Tree																						1	1	1								
Fagus grandifolia	American beech	Tree																																
Fraxinus pennsylvanica	green ash	Tree																																
Juglans nigra	black walnut	Tree																																
Liriodendron tulipifera	tuliptree	Tree	1	1	1										1	1	1							1	1	1	2	2	2	2	2	2	1	1	3
Malus	apple	Tree																																
Nyssa	tupelo	Tree	1	1	1	1	1	1	1	1	1	2	2	2							1	1	1	2	2	2								
Nyssa sylvatica	blackgum	Tree																						1	1	1								
Oxydendrum arboreum	sourwood	Tree																																
Pinus strobus	eastern white pine	Tree																																
Pinus taeda	loblolly pine	Tree																																
Pinus virginiana	Virginia pine	Tree																																
Platanus occidentalis	American sycamore	Tree	4	4	4	5	5	5				3	3	3	1	1	1	5	5	5	1	1	1	2	2	3	2	2	6	3	3	3	3	3	3
Quercus	oak	Tree										1	1	1																				
Quercus alba	white oak	Tree																																
Quercus coccinea	scarlet oak	Tree																									1	1	1	1	1	1		
Quercus michauxii	swamp chestnut oak	Tree																			1	1	1				2	2	2					
Quercus nigra	water oak	Tree				1	1	1													1	1	1											
Quercus pagoda	cherrybark oak	Tree																																
Quercus rubra	northern red oak	Tree	2	2	2	1	1	1				1	1	1	2	2	2							3	3	3				1	1	1	1	1	1
Quercus shumardii	Shumard's oak	Tree																																
Salix nigra	black willow	Tree																																
Unknown		Shrub or Tree																																
		Stem count	8	8	9	8	8	10	2	2	2	7	7	11	5	5	5	7	7	7	6	6	6	11	11	15	7	7	13	11	11	19	6	6	12
		size (ares)	1			1			1			1			1			1			1			1			1			1			1		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02		
		Species count	4	4	5	4	4	5	2	2	2	4	4	5	4	4	4	2	2	2	5	5	5	7	7	9	4	4	5	5	5	6	4	4	5
		Stems per ACRE	323.7	323.7	364.2	323.7	323.7	404.7	80.94	80.94	80.94	283.3	283.3	445.2	202.3	202.3	202.3	283.3	283.3	283.3	242.8	242.8	242.8	445.2	445.2	607	283.3	283.3	526.1	445.2	445.2	768.9	242.8	242.8	485.6

Color for Density
Exceeds requirements by 10%
Exceeds requirements, but by less than 10%
Fails to meet requirements, by less than 10%
Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes
P-all = Planting including livestakes
T = All planted and natural recruits including livestakes
T includes natural recruits

Table 9. Total and Planted Stems by Plot and Species (Continued)
DMS Project Code 92633. Project Name: Martin's Creek II

			Current Plot Data (MY5 2018)												Annual Means																	
			92633-01-0012			92633-01-0013			92633-01-0014			92633-01-0015			MY5 (2018)			MY4 (2017)			MY3 (2016)			MY2 (2015)			MY1 (2014)			MY0 (2014)		
Scientific Name	Common Name	Species Type	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
Acer rubrum	red maple	Tree															7			6			4			18			4			1
Alnus serrulata	hazel alder	Shrub									22						34			38			45			71			25			
Betula nigra	river birch	Tree				1	1	1	1	1	1				14	14	14	15	15	15	18	18	18	19	19	19	9	9	9	9	9	9
Carpinus caroliniana	American hornbeam	Tree															4			1						7			1			
Carya	hickory	Tree																1	1	1	1	1	1	1	1	1	1	1	2	2	2	2
Carya alba	mockernut hickory	Tree																									3	3	3	3	3	3
Carya glabra	pignut hickory	Tree																			2	2	2	2	2	2	3	3	3			
Celtis laevigata	sugarberry	Tree																					1									
Cornus amomum	silky dogwood	Shrub															1			1												
Crataegus	hawthorn	Tree																		1												
Diospyros virginiana	common persimmon	Tree													1	1	1	3	3	3	3	3	3	3	3	3						
Fagus grandifolia	American beech	Tree																											5			5
Fraxinus pennsylvanica	green ash	Tree																											1			
Juglans nigra	black walnut	Tree																		3						4						2
Liriodendron tulipifera	tuliptree	Tree						1							8	8	11	12	12	17	13	13	15	20	20	23	20	20	20	24	24	24
Malus	apple	Tree																								1						
Nyssa	tupelo	Tree													8	8	8	8	8	8	7	7	7	9	9	9	4	4	4			
Nyssa sylvatica	blackgum	Tree													1	1	1	1	1	1	1	1	1									
Oxydendrum arboreum	sourwood	Tree									1						1															
Pinus strobus	eastern white pine	Tree																		14						3						
Pinus taeda	loblolly pine	Tree																					12									
Pinus virginiana	Virginia pine	Tree									4			7			11															
Platanus occidentalis	American sycamore	Tree	2	2	2	2	2	2	4	4	4				37	37	42	35	35	36	38	38	46	39	39	40	27	27	27	27	27	27
Quercus	oak	Tree													1	1	1	3	3	3	5	5	5	6	6	6	8	8	8	40	40	40
Quercus alba	white oak	Tree																											1			
Quercus coccinea	scarlet oak	Tree	1	1	1				1	1	1				4	4	4	4	4	4	7	7	7	7	7	7	7	7	7	3	3	3
Quercus michauxii	swamp chestnut oak	Tree				1	1	1							4	4	4	6	6	6	2	2	2	1	1	1	1	1	1	4	4	4
Quercus nigra	water oak	Tree													2	2	2	4	4	4	7	7	7	10	10	10	14	14	14	17	17	17
Quercus pagoda	cherrybark oak	Tree				1	1	1				1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1
Quercus rubra	northern red oak	Tree	4	4	4	4	4	4	3	3	3	6	6	6	28	28	28	37	37	37	46	46	46	50	50	50	25	25	25	2	2	2
Quercus shumardii	Shumard's oak	Tree																1	1	1	1	1	1	1	1	1						
Salix nigra	black willow	Tree																		2						3						
Unknown		Shrub or Tree																												2	2	2
		Stem count	7	7	7	9	9	10	9	9	36	7	7	14	110	110	176	132	132	204	153	153	225	170	170	281	124	124	162	134	134	142
		size (ares)	1			1			1			1			15			15			15			15			15			15		
		size (ACRES)	0.02			0.02			0.02			0.02			0.37			0.37			0.37			0.37			0.37			0.37		
		Species count	3	3	3	5	5	6	4	4	7	2	2	3	12	12	18	14	14	22	15	15	19	14	14	21	13	13	19	12	12	15
		Stems per ACRE	283.3	283.3	283.3	364.2	364.2	404.7	364.2	364.2	1457	283.3	283.3	566.6	296.8	296.8	474.8	356.1	356.1	550.4	412.8	412.8	607	458.6	458.6	758.1	334.5	334.5	437.1	361.5	361.5	383.1

Color for Density

Exceeds requirements by 10%

Exceeds requirements, but by less than 10%

Fails to meet requirements, by less than 10%

Fails to meet requirements by more than 10%

PnoLS = Planted excluding livestakes

P-all = Planting including livestakes

T = All planted and natural recruits including livestakes

T includes natural recruits

APPENDIX D

STREAM SURVEY DATA

Cross-section Plots

Longitudinal Profile Plots

Substrate Plots

Tables 10a-f. Baseline Stream Data Summary

Tables 11a-f. Monitoring Data

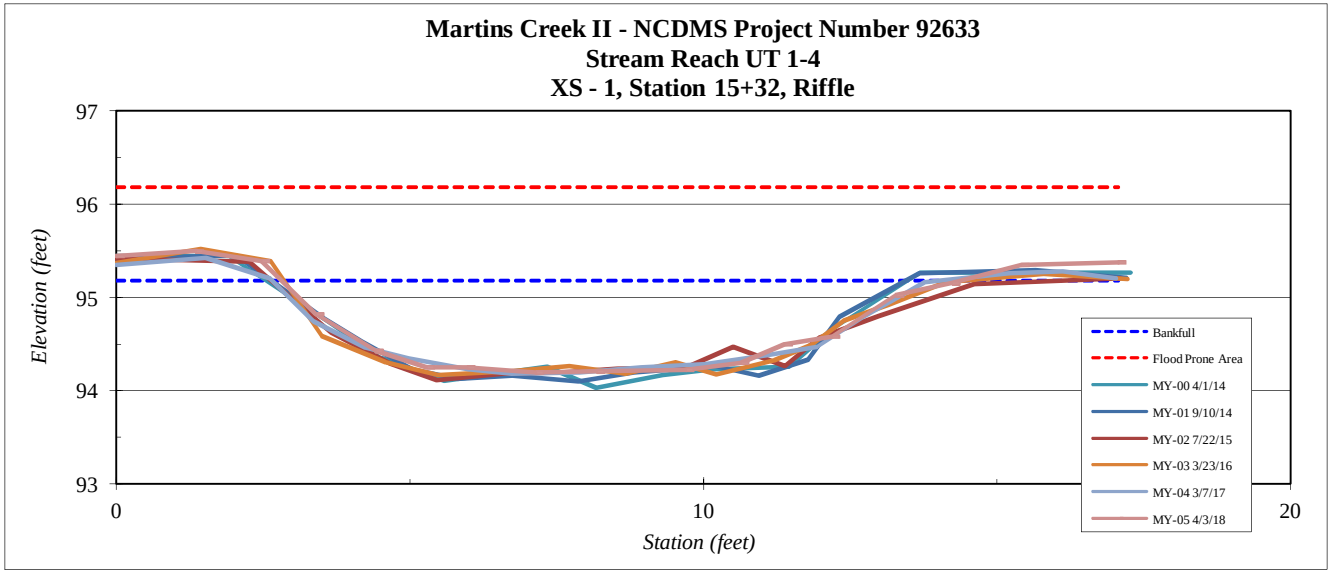
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 1, Riffle
Reach	UT 1- 4
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	95.45
1.3	95.50
2.5	95.39
3.4	94.82
4.4	94.43
5.3	94.25
6.0	94.25
7.1	94.20
8.2	94.21
9.7	94.23
10.6	94.30
11.4	94.50
12.2	94.58
13.3	95.02
14.2	95.15
15.4	95.35
17.1	95.38

SUMMARY DATA	
Bankfull Elevation:	95.2
Bankfull Cross-Sectional Area:	8.1
Bankfull Width:	11.6
Flood Prone Area Elevation:	96.2
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.0
Mean Depth at Bankfull:	0.7
W / D Ratio:	16.6
Entrenchment Ratio:	8.6
Bank Height Ratio:	1.0

XS 1 Looking Upstream

Stream Type	E

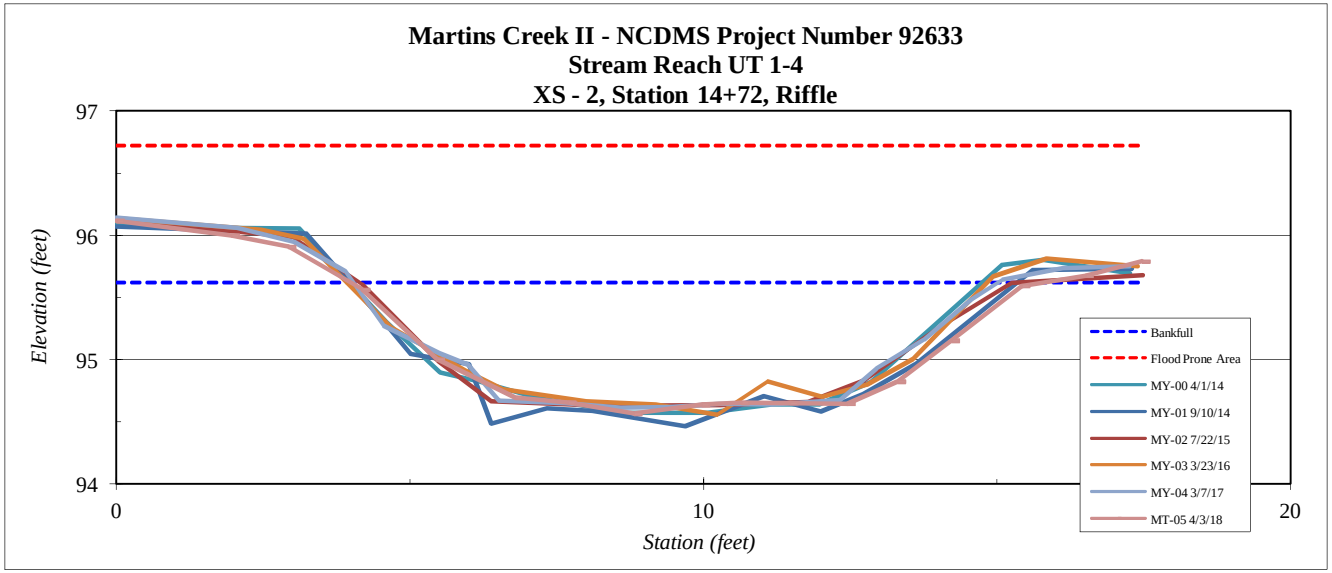


Site	Martins Creek II
Project Number:	92633
XS ID	XS - 2, Riffle
Reach	UT 1- 4
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	96.12
2.0	96.00
2.9	95.91
4.2	95.56
5.5	95.00
6.8	94.70
7.7	94.66
8.8	94.56
10.0	94.64
10.6	94.65
11.5	94.65
12.4	94.65
13.3	94.82
14.2	95.15
15.4	95.59
16.5	95.67
17.5	95.79

SUMMARY DATA	
Bankfull Elevation:	95.6
Bankfull Cross-Sectional Area:	8.7
Bankfull Width:	11.8
Flood Prone Area Elevation:	96.7
Flood Prone Width:	100.0
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	16.0
Entrenchment Ratio:	8.5
Bank Height Ratio:	1.0

Stream Type	E

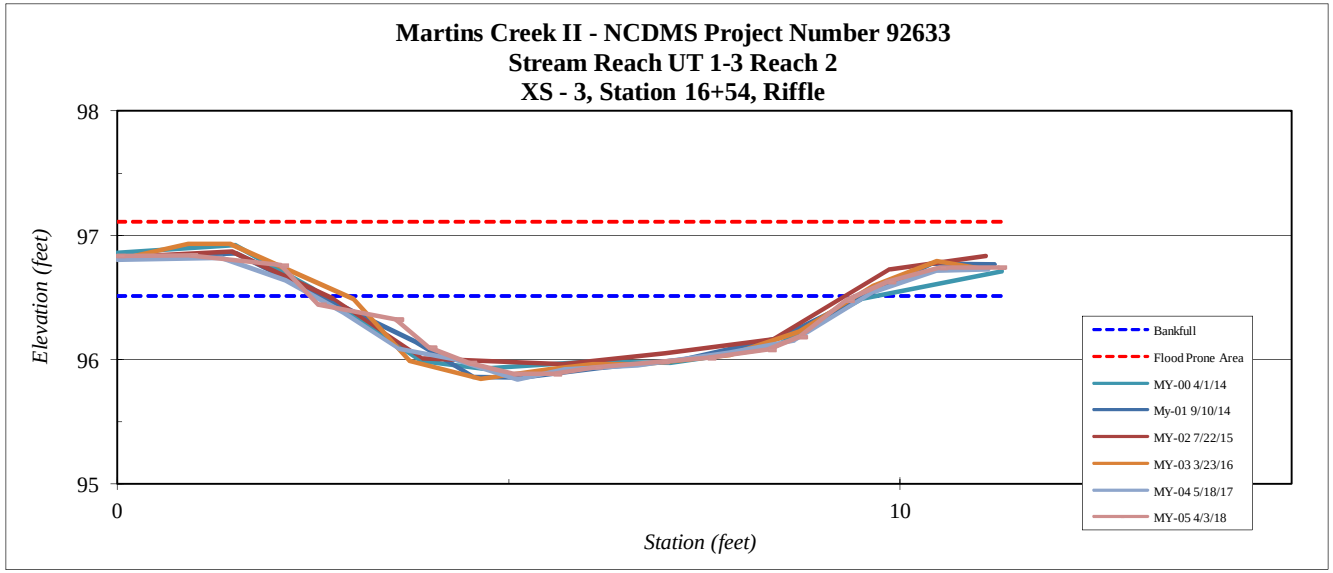


Site	Martins Creek II
Project Number:	92633
XS ID	XS - 3, Riffle
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	96.84
0.9	96.84
2.1	96.76
2.6	96.44
3.6	96.32
4.0	96.10
4.5	95.97
5.1	95.88
5.6	95.89
6.1	95.94
6.9	95.98
7.5	96.01
8.3	96.08
8.7	96.18
9.3	96.48
9.8	96.63
10.5	96.74
11.3	96.74

SUMMARY DATA	
Bankfull Elevation:	96.5
Bankfull Cross-Sectional Area:	2.9
Bankfull Width:	7.0
Flood Prone Area Elevation:	97.1
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.4
W / D Ratio:	16.9
Entrenchment Ratio:	14.3
Bank Height Ratio:	1.2

Stream Type	E



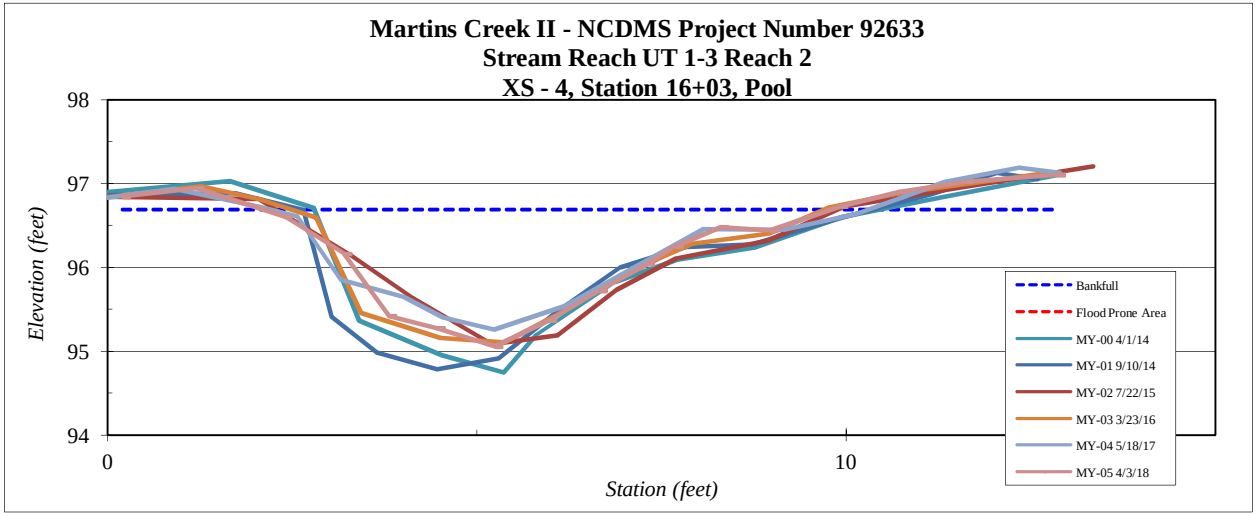
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 4, Pool
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.2	96.8
1.2	96.9
2.4	96.6
3.2	96.2
3.8	95.4
4.5	95.3
5.2	95.1
6.0	95.4
6.7	95.7
7.3	96.0
7.7	96.2
8.3	96.5
9.0	96.4
9.9	96.7
10.7	96.9
11.6	97.0
12.9	97.1

SUMMARY DATA	
Bankfull Elevation:	96.7
Bankfull Cross-Sectional Area:	5.9
Bankfull Width:	7.7
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.6
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 4 Looking Upstream

Stream Type	E

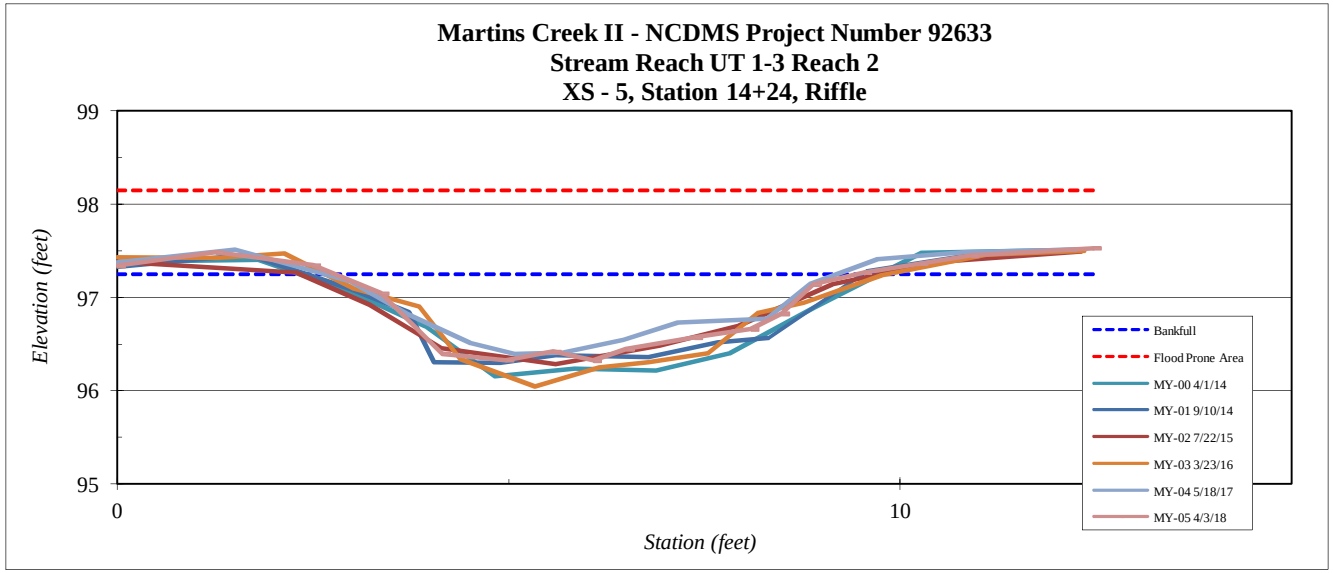


Site	Martins Creek II
Project Number:	92633
XS ID	XS - 5, Riffle
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	97.34
1.3	97.48
2.5	97.35
3.4	97.05
4.2	96.40
5.0	96.33
5.6	96.42
6.1	96.32
6.5	96.45
7.4	96.57
8.1	96.66
8.5	96.83
8.9	97.14
9.5	97.27
10.2	97.36
10.9	97.45
12.5	97.53

SUMMARY DATA	
Bankfull Elevation:	97.3
Bankfull Cross-Sectional Area:	4.0
Bankfull Width:	6.7
Flood Prone Area Elevation:	98.2
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.6
W / D Ratio:	11.2
Entrenchment Ratio:	14.9
Bank Height Ratio:	1.0

Stream Type	E



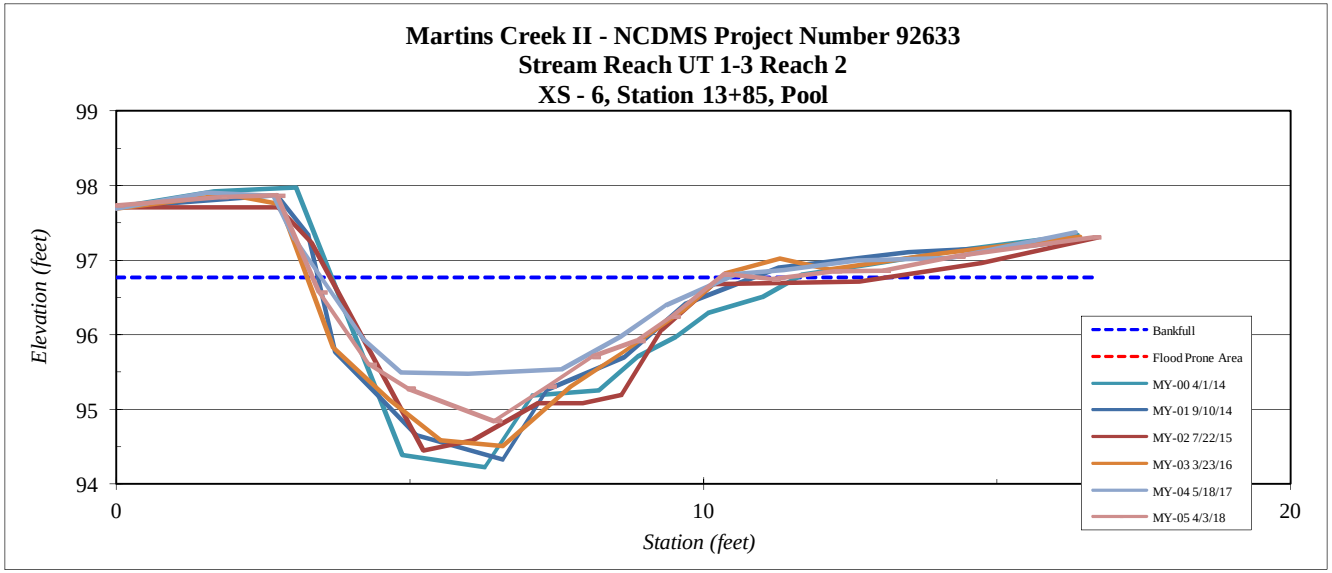
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 6, Pool
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	97.74
1.77	97.85
2.73	97.87
3.45	96.57
4.30	95.60
4.95	95.28
6.42	94.84
7.36	95.31
8.11	95.71
8.87	95.92
9.47	96.25
10.35	96.81
11.17	96.75
12.21	96.85
13.05	96.86
14.32	97.05
16.63	97.31

SUMMARY DATA	
Bankfull Elevation:	96.8
Bankfull Cross-Sectional Area:	7.9
Bankfull Width:	6.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.9
Mean Depth at Bankfull:	1.1
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 6 Looking Upstream

Stream Type	E



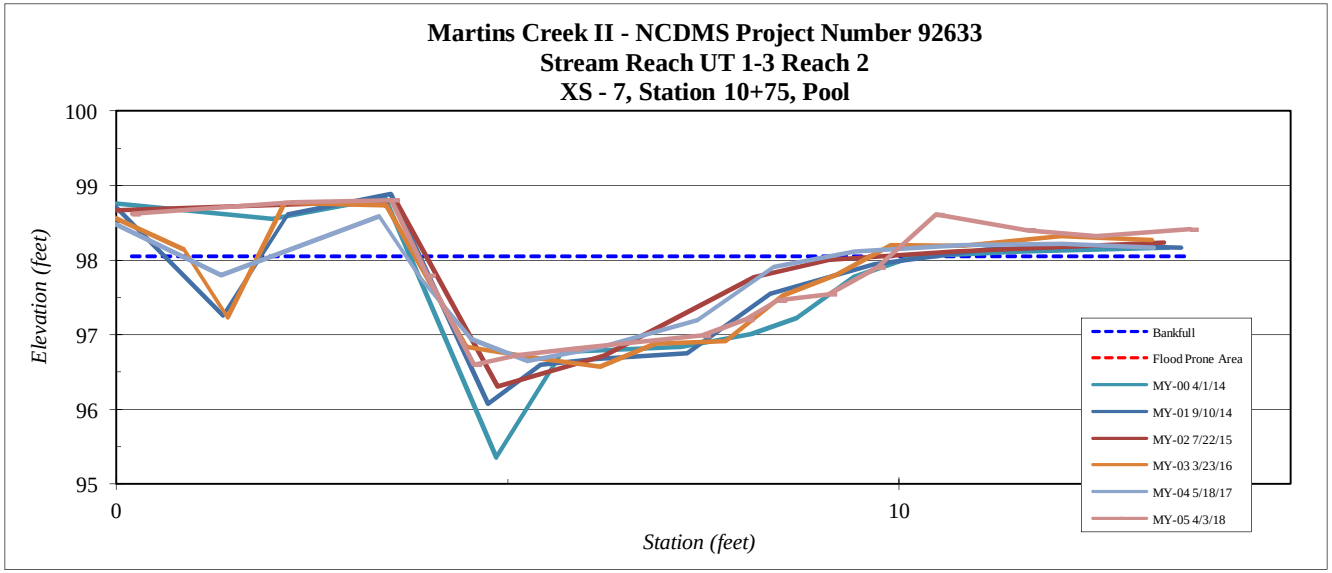
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 7, Pool
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.20	98.62
2.26	98.78
3.51	98.81
3.97	97.80
4.56	96.60
5.12	96.73
5.83	96.81
7.49	96.99
8.04	97.20
8.46	97.46
9.10	97.54
9.72	97.90
10.47	98.61
11.64	98.40
12.52	98.32
13.72	98.41

SUMMARY DATA	
Bankfull Elevation:	98.1
Bankfull Cross-Sectional Area:	5.5
Bankfull Width:	6.0
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.4
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 7 Looking Upstream

Stream Type	E



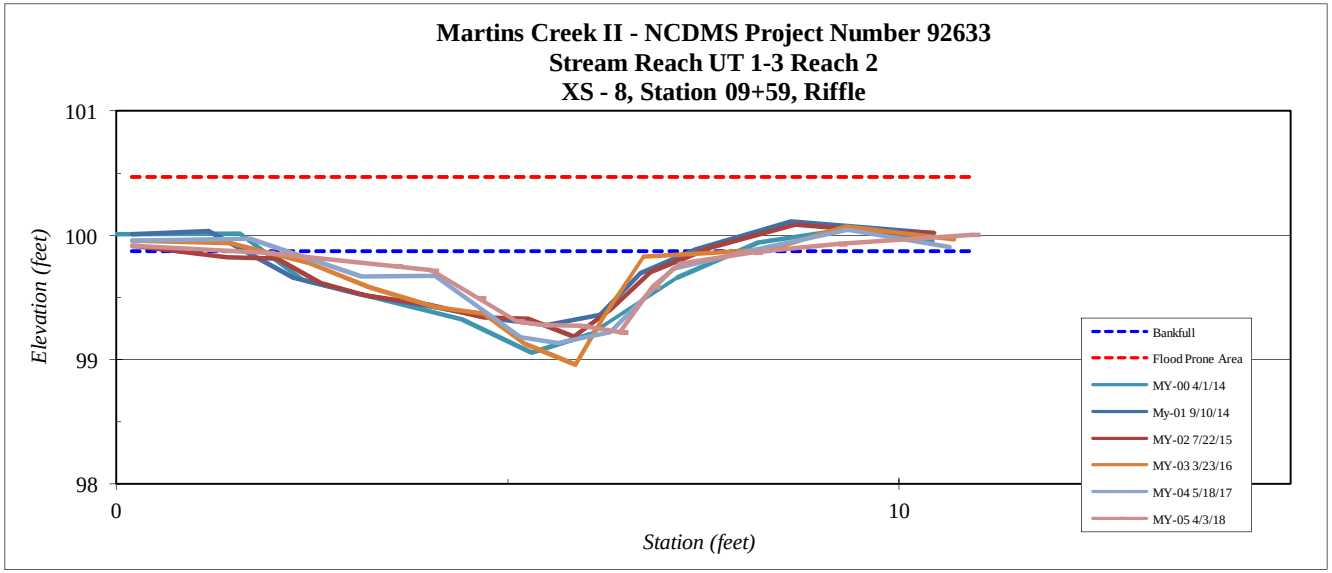
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 8, Riffle
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.2	99.92
1.9	99.86
3.6	99.75
4.0	99.72
4.6	99.50
5.1	99.31
5.5	99.28
5.9	99.27
6.4	99.22
6.8	99.58
7.2	99.77
8.2	99.86
9.2	99.93
10.9	100.00

SUMMARY DATA	
Bankfull Elevation:	99.9
Bankfull Cross-Sectional Area:	1.7
Bankfull Width:	6.7
Flood Prone Area Elevation:	100.5
Flood Prone Width:	100.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.3
W / D Ratio:	26.4
Entrenchment Ratio:	14.9
Bank Height Ratio:	1.0

XS 8 Looking Upstream

Stream Type	E



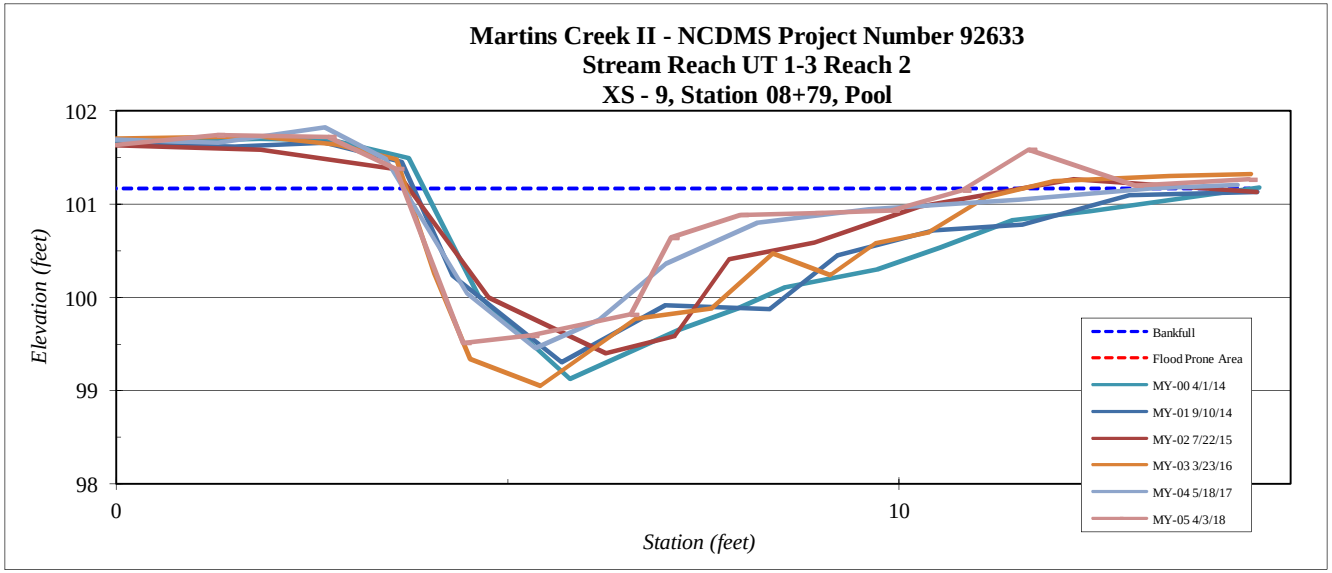
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 9, Pool
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
-0.30	101.61
1.29	101.74
2.70	101.72
3.57	101.38
4.43	99.51
5.29	99.59
6.57	99.82
7.09	100.64
7.97	100.89
8.93	100.91
9.90	100.93
10.82	101.15
11.66	101.58
13.01	101.20
14.47	101.27

SUMMARY DATA	
Bankfull Elevation:	101.2
Bankfull Cross-Sectional Area:	5.4
Bankfull Width:	7.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.7
Mean Depth at Bankfull:	0.8
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 9 Looking Upstream

Stream Type	E



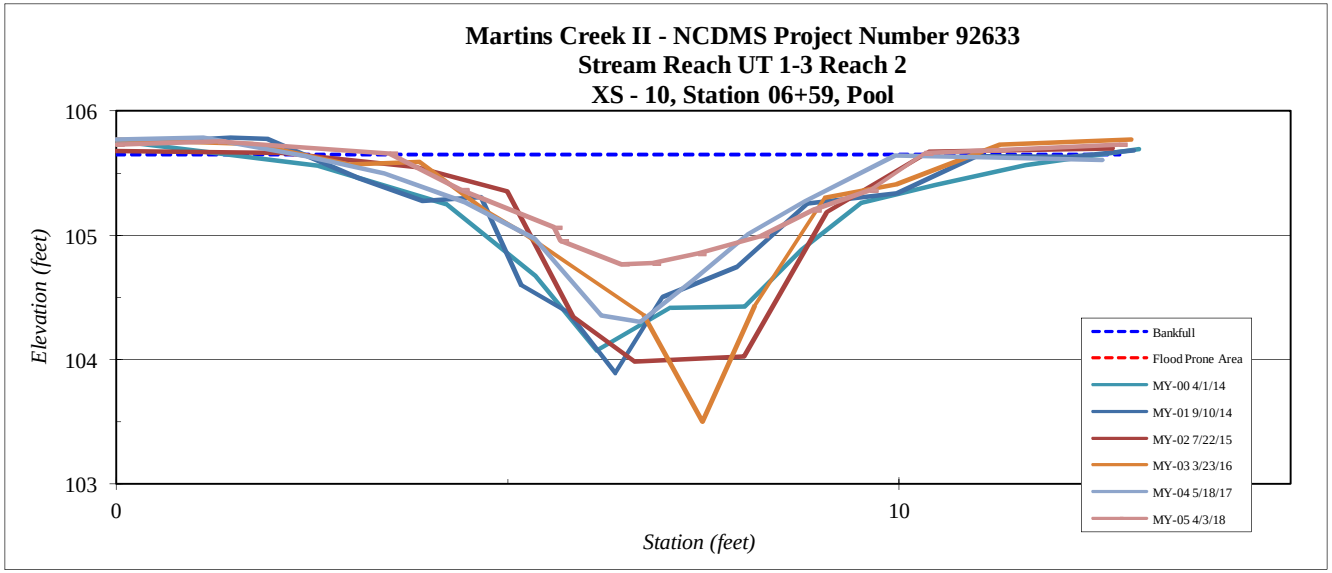
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 10, Pool
Reach	UT 1- 3, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	105.73
1.29	105.75
3.49	105.66
4.40	105.36
5.59	105.06
5.67	104.95
6.45	104.77
6.85	104.78
7.43	104.85
8.23	104.99
8.90	105.20
9.63	105.36
10.33	105.66
11.19	105.69
12.81	105.73

SUMMARY DATA	
Bankfull Elevation:	105.7
Bankfull Cross-Sectional Area:	3.5
Bankfull Width:	6.8
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 10 Looking Upstream

Stream Type	E



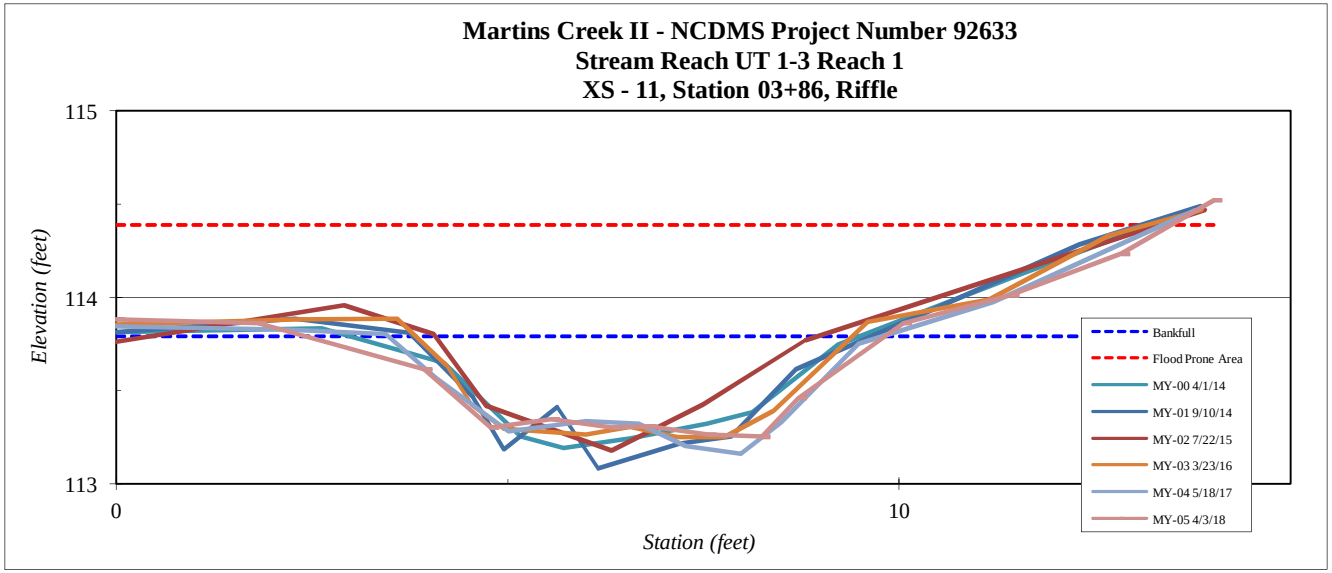
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 11, Riffle
Reach	UT 1- 3, Reach 1
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	113.88
1.8	113.86
3.9	113.62
4.8	113.30
5.6	113.35
6.3	113.30
6.8	113.31
7.6	113.27
8.2	113.25
8.7	113.46
10.1	113.86
11.4	114.01
12.8	114.23
14.0	114.52

SUMMARY DATA	
Bankfull Elevation:	113.8
Bankfull Cross-Sectional Area:	2.5
Bankfull Width:	7.4
Flood Prone Area Elevation:	114.4
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.3
W / D Ratio:	21.9
Entrenchment Ratio:	3.4
Bank Height Ratio:	1.0

XS 11 Looking Upstream

Stream Type	E



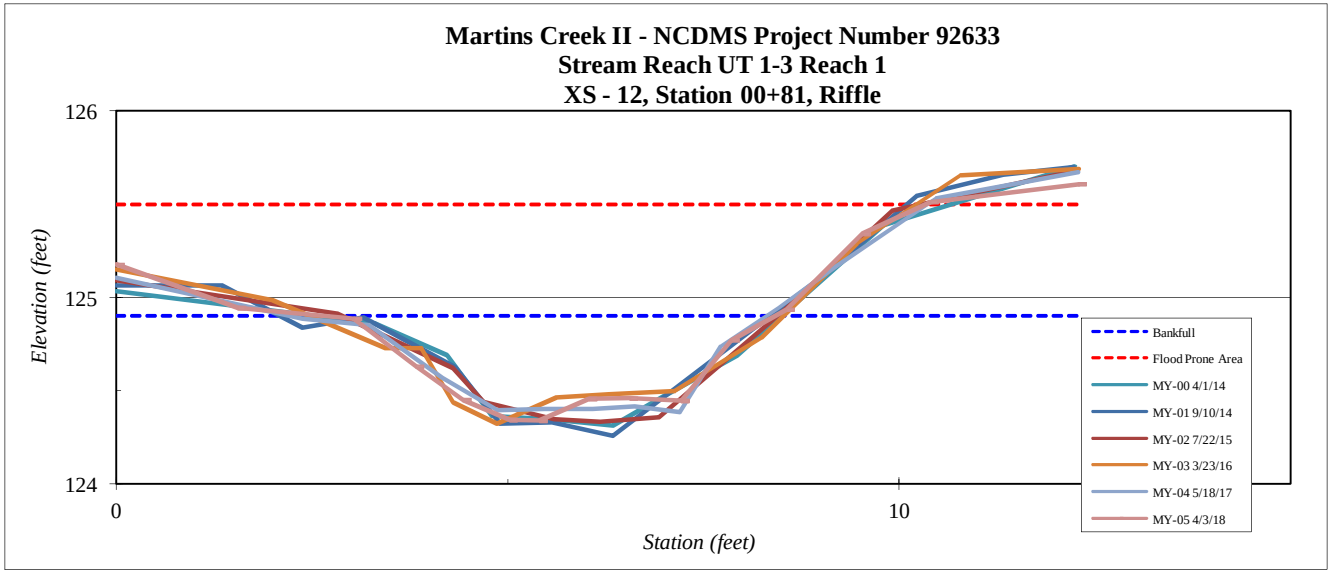
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 12, Riffle
Reach	UT 1- 3, Reach 1
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	125.18
1.5	124.94
3.0	124.89
3.8	124.63
4.4	124.45
5.0	124.34
5.4	124.34
6.0	124.46
6.6	124.46
7.2	124.45
7.9	124.77
8.6	124.94
9.5	125.34
10.4	125.51
12.3	125.61

SUMMARY DATA	
Bankfull Elevation:	124.9
Bankfull Cross-Sectional Area:	1.9
Bankfull Width:	5.7
Flood Prone Area Elevation:	125.5
Flood Prone Width:	14.0
Max Depth at Bankfull:	0.6
Mean Depth at Bankfull:	0.3
W / D Ratio:	17.1
Entrenchment Ratio:	2.5
Bank Height Ratio:	1.0

XS 12 Looking Upstream

Stream Type	E

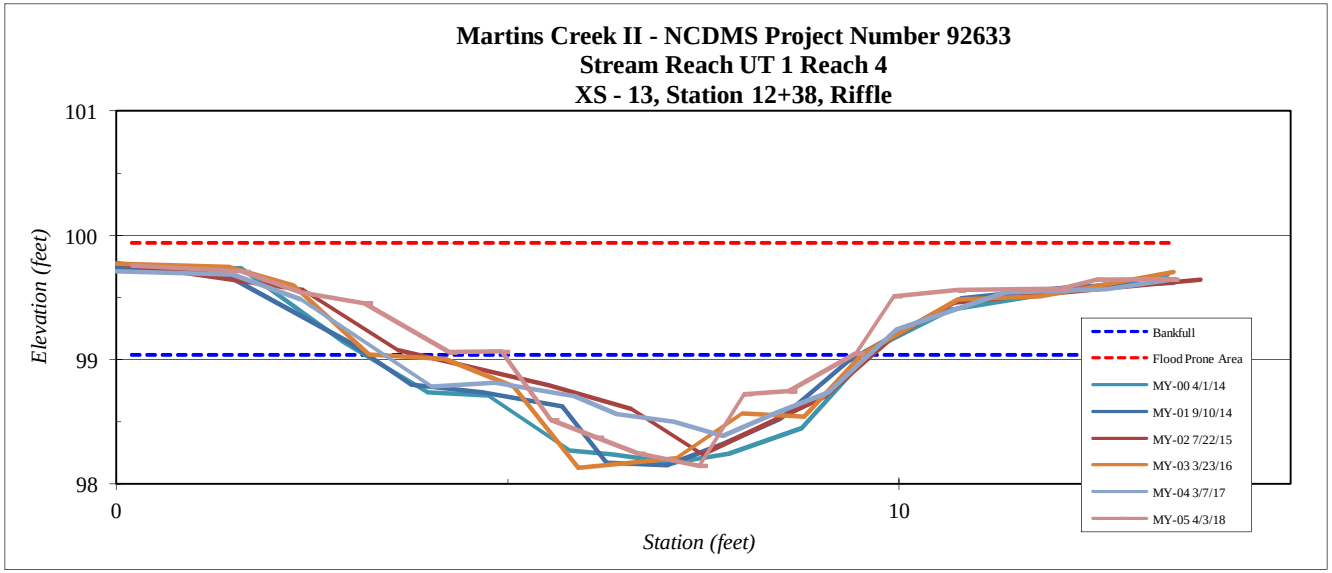


Site	Martins Creek II
Project Number:	92633
XS ID	XS - 13, Riffle
Reach	UT 1, Reach 4
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.2	99.76
1.6	99.71
2.4	99.54
3.2	99.45
4.2	99.06
4.9	99.07
5.6	98.51
6.1	98.37
6.7	98.25
7.4	98.15
8.0	98.72
8.6	98.75
9.5	99.05
9.9	99.51
10.7	99.56
12.1	99.57
12.5	99.64
13.5	99.65

SUMMARY DATA	
Bankfull Elevation:	99.0
Bankfull Cross-Sectional Area:	2.2
Bankfull Width:	4.5
Flood Prone Area Elevation:	99.9
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	9.2
Entrenchment Ratio:	5.6
Bank Height Ratio:	1.4

Stream Type	E



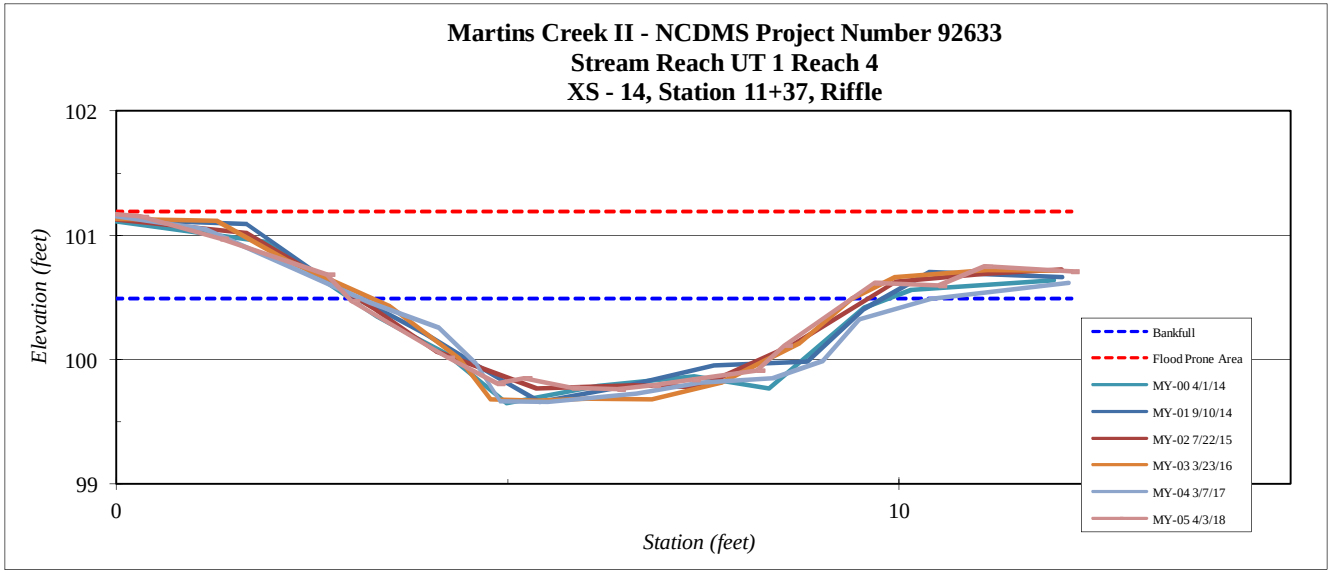
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 14, Riffle
Reach	UT 1, Reach 4
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
-1.2	101.23
0.3	101.15
1.3	100.97
2.7	100.69
3.0	100.47
4.2	100.02
4.9	99.81
5.2	99.85
5.8	99.77
6.4	99.76
6.8	99.79
7.4	99.84
8.2	99.91
8.5	100.11
9.7	100.62
10.5	100.60
11.1	100.75
12.2	100.71

SUMMARY DATA	
Bankfull Elevation:	100.5
Bankfull Cross-Sectional Area:	3.2
Bankfull Width:	6.4
Flood Prone Area Elevation:	101.2
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.7
Mean Depth at Bankfull:	0.5
W / D Ratio:	12.8
Entrenchment Ratio:	3.9
Bank Height Ratio:	1.1

XS 14 Looking Upstream

Stream Type	E



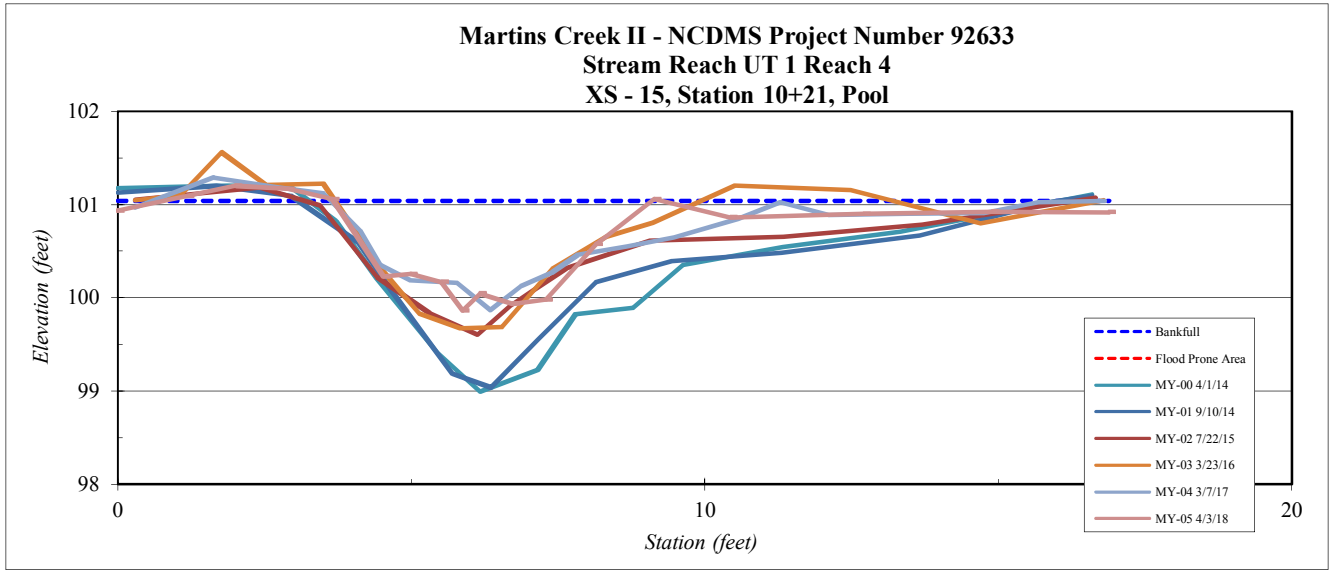
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 15, Pool
Reach	UT 1, Reach 4
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	100.93
1.18	101.09
2.00	101.20
2.90	101.17
3.66	101.06
4.53	100.23
4.99	100.25
5.52	100.17
5.87	99.86
6.17	100.04
6.73	99.93
7.29	99.98
8.14	100.57
9.14	101.06
10.44	100.86
12.71	100.90
14.90	100.92
16.89	100.92

SUMMARY DATA	
Bankfull Elevation:	101.0
Bankfull Cross-Sectional Area:	4.9
Bankfull Width:	13.9
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.2
Mean Depth at Bankfull:	0.4
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 15 Looking Upstream

Stream Type	E



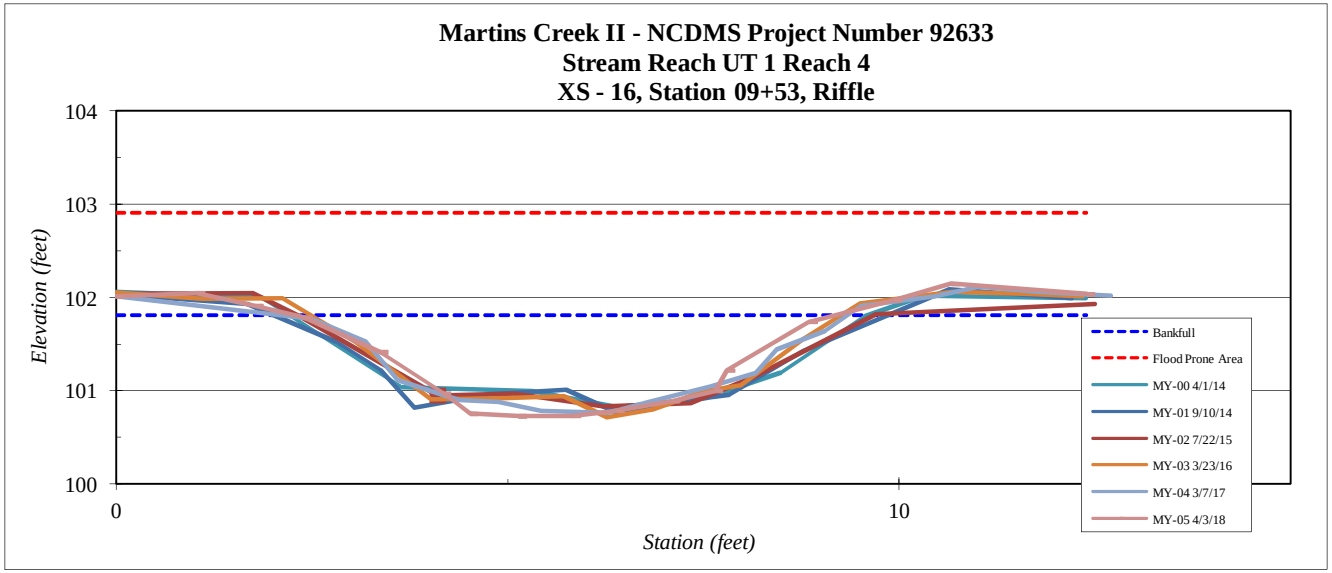
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 16, Riffle
Reach	UT 1, Reach 4
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	102.01
1.0	102.05
1.8	101.91
2.4	101.79
3.4	101.41
4.2	100.97
4.5	100.75
5.1	100.73
5.8	100.73
6.4	100.79
7.1	100.89
7.6	101.00
7.8	101.22
8.9	101.74
9.9	101.97
10.7	102.15
12.4	102.04

SUMMARY DATA	
Bankfull Elevation:	101.8
Bankfull Cross-Sectional Area:	4.7
Bankfull Width:	6.9
Flood Prone Area Elevation:	102.9
Flood Prone Width:	25.0
Max Depth at Bankfull:	1.1
Mean Depth at Bankfull:	0.7
W / D Ratio:	10.1
Entrenchment Ratio:	3.6
Bank Height Ratio:	1.0

XS 16 Looking Upstream

Stream Type	E



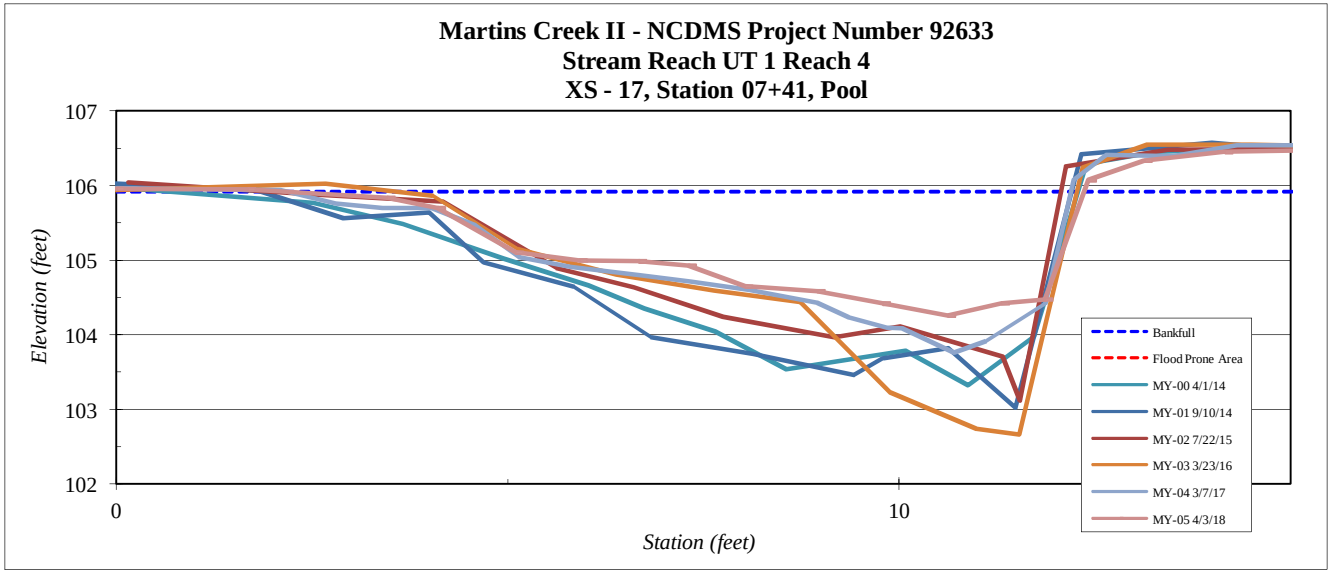
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 17, Pool
Reach	UT 1, Reach 4
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.00	105.96
1.68	105.95
3.46	105.84
4.10	105.70
5.10	105.11
5.91	105.00
6.67	104.99
7.30	104.93
8.03	104.65
8.95	104.59
9.79	104.42
10.62	104.26
11.30	104.42
11.86	104.47
12.42	106.07
13.13	106.34
14.16	106.45
15.69	106.48

SUMMARY DATA	
Bankfull Elevation:	105.9
Bankfull Cross-Sectional Area:	9.5
Bankfull Width:	10.2
Flood Prone Area Elevation:	NA
Flood Prone Width:	NA
Max Depth at Bankfull:	1.7
Mean Depth at Bankfull:	0.9
W / D Ratio:	NA
Entrenchment Ratio:	NA
Bank Height Ratio:	1.0

XS 17 Looking Upstream

Stream Type	E

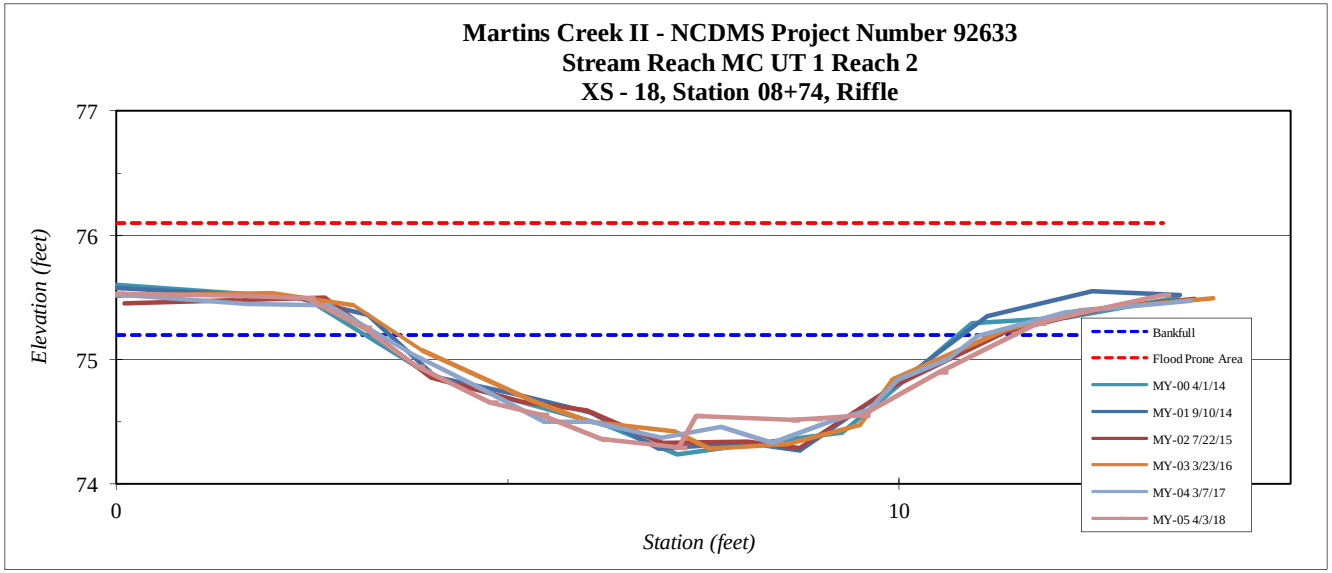


Site	Martins Creek II
Project Number:	92633
XS ID	XS - 18, Riffle
Reach	MC UT 1, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	75.53
1.5	75.51
2.4	75.50
3.2	75.26
3.8	74.95
4.8	74.66
5.4	74.56
6.2	74.36
7.2	74.29
7.4	74.55
8.6	74.52
8.9	74.52
9.5	74.55
10.5	74.90
11.8	75.29
12.6	75.42
13.4	75.52

SUMMARY DATA	
Bankfull Elevation:	75.2
Bankfull Cross-Sectional Area:	4.5
Bankfull Width:	8.2
Flood Prone Area Elevation:	76.1
Flood Prone Width:	25.0
Max Depth at Bankfull:	0.9
Mean Depth at Bankfull:	0.5
W / D Ratio:	14.9
Entrenchment Ratio:	3.0
Bank Height Ratio:	1.1

Stream Type	E



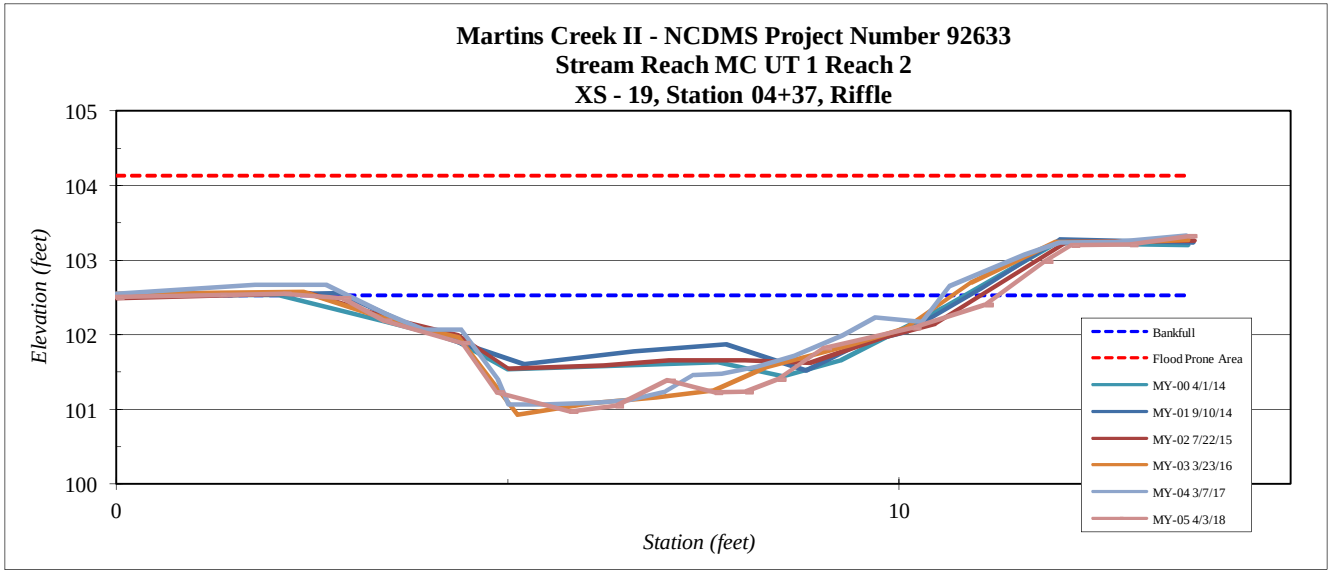
Site	Martins Creek II
Project Number:	92633
XS ID	XS - 19, Riffle
Reach	MC UT 1, Reach 2
Date:	4/3/2018
Field Crew:	Perkinson, Butler

Station	Elevation
0.0	102.50
1.3	102.54
2.1	102.55
2.9	102.49
3.4	102.19
4.4	101.89
4.9	101.23
5.8	100.97
6.4	101.04
7.0	101.39
7.6	101.23
8.0	101.24
8.5	101.40
9.0	101.82
10.2	102.09
11.1	102.40
11.9	102.99
12.2	103.20
13.0	103.21
13.7	103.32

SUMMARY DATA	
Bankfull Elevation:	102.5
Bankfull Cross-Sectional Area:	7.3
Bankfull Width:	8.9
Flood Prone Area Elevation:	104.1
Flood Prone Width:	25.0
Max Depth at Bankfull:	1.6
Mean Depth at Bankfull:	0.8
W / D Ratio:	10.9
Entrenchment Ratio:	2.8
Bank Height Ratio:	1.0

XS 19 Looking Upstream

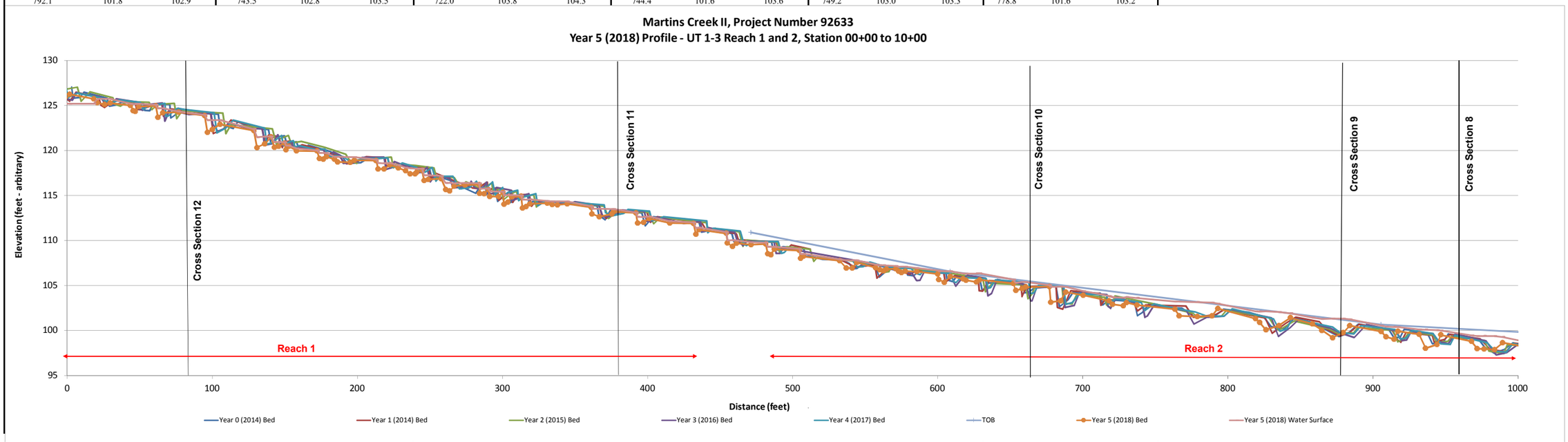
Stream Type	E



Project Name Martins Creek II
Reach UT 1 - 3 Reach 1 and 2, Station 00+00 - 10+00
Project Number 92633
Date 4/3/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
996.5	98.7	99.1	1016.0	98.2	98.3	1016.9	98.2	98.5	1001.5	98.6	99.2	1021.5	97.6	98.3	1008.5	98.1	98.6
990.2	97.9	99.1	996.9	98.6	99.0	992.6	98.4	99.1	992.5	97.6	99.2	996.5	98.6	99.1	989.4	98.7	99.3
983.6	97.5	99.1	991.3	97.7	99.0	990.2	97.4	99.2	985.0	97.3	99.3	992.0	97.6	99.1	983.8	97.9	99.4
977.2	98.1	99.1	980.6	97.9	99.0	979.8	97.7	99.2	977.9	98.8	99.4	984.2	97.7	99.1	976.5	98.0	99.4
972.7	99.1	99.4	973.8	99.1	99.4	976.9	98.9	99.4	956.9	99.6	100.2	978.6	98.7	99.1	971.9	98.0	99.4
958.7	99.2	99.7	952.9	99.6	100.0	954.7	99.4	100.1	952.1	98.6	100.2	956.5	99.5	100.0	967.9	98.8	99.5
952.1	99.6	100.0	949.0	99.0	100.0	951.8	98.8	100.1	945.2	98.8	100.2	953.5	98.4	100.0	946.7	99.5	100.0
948.5	98.7	100.0	942.2	98.7	100.0	943.5	98.7	100.1	941.4	99.7	100.3	946.8	98.5	100.1	944.2	98.5	100.0
944.4	98.6	100.0	941.0	99.5	100.0	941.6	99.5	100.1	926.5	99.9	100.6	941.4	99.7	100.1	936.3	98.0	100.1
941.0	98.6	100.0	922.8	99.8	100.4	925.3	99.9	100.4	923.3	99.0	100.6	927.3	100.0	100.4	931.9	99.6	100.1
937.6	99.7	100.0	919.3	98.7	100.3	921.4	99.0	100.5	920.1	98.9	100.6	922.8	99.2	100.4	917.2	99.9	100.4
921.8	100.2	100.4	917.1	98.9	100.3	917.1	98.7	100.4	915.6	100.0	100.6	918.6	99.1	100.4	914.6	99.0	100.4
919.2	99.3	100.4	913.2	100.0	100.3	914.0	100.0	101.2	895.4	100.7	101.3	915.3	100.1	100.5	908.9	99.3	100.4
914.8	99.2	100.3	890.4	100.7	101.1	889.8	100.4	101.3	887.1	99.2	101.4	891.8	100.6	101.2	905.7	99.9	100.6
911.0	100.1	100.5	884.2	99.8	101.1	886.8	99.7	101.3	877.6	99.7	101.3	886.9	99.6	101.2	884.0	100.6	101.3
889.7	100.7	101.1	877.4	99.4	101.2	875.5	99.7	101.3	870.3	100.3	101.4	876.6	99.8	101.2	879.3	99.8	101.3
882.6	99.7	101.2	867.7	100.2	101.1	869.0	100.2	101.3	848.3	101.2	102.1	872.0	100.4	101.2	872.2	99.2	101.3
876.7	99.3	101.2	863.0	101.0	101.2	845.9	101.1	102.1	842.8	100.3	102.2	844.2	101.3	101.9	864.9	100.0	101.3
867.3	100.1	101.2	846.9	101.5	101.9	835.2	100.0	102.1	834.9	99.3	102.1	840.9	100.2	101.9	858.2	100.8	101.4
861.5	100.7	101.3	839.9	100.8	101.9	832.5	100.4	102.1	830.1	101.4	102.2	835.7	100.0	101.9	843.2	101.4	101.9
846.0	101.4	101.8	830.6	99.7	102.0	828.3	101.4	102.1	802.5	102.3	103.0	831.4	101.3	102.0	835.1	100.6	102.1
839.0	100.2	101.8	825.8	101.4	102.0	799.1	102.3	103.1	797.4	101.6	103.1	803.0	102.4	102.8	826.3	100.1	102.1
829.8	100.4	101.8	797.2	102.3	102.8	795.5	101.6	103.1	785.9	101.5	103.2	797.0	101.6	102.8	821.8	100.9	102.1
824.9	101.5	101.9	791.6	101.8	102.9	779.4	101.5	103.1	776.8	100.7	103.3	785.3	101.6	102.9	819.0	101.3	102.2
814.6	102.0	102.4	776.1	101.5	102.9	775.9	101.9	103.2	771.4	102.2	103.3	777.5	102.1	102.9	793.1	102.5	103.0
796.9	102.4	102.9	771.2	102.7	103.0	755.2	102.8	103.4	748.7	102.7	103.6	755.5	102.7	103.1	789.1	101.6	103.1
792.1	101.8	102.9	743.5	102.8	103.5	722.0	103.8	104.3	744.4	101.6	103.6	749.2	103.0	103.3	778.8	101.6	103.2

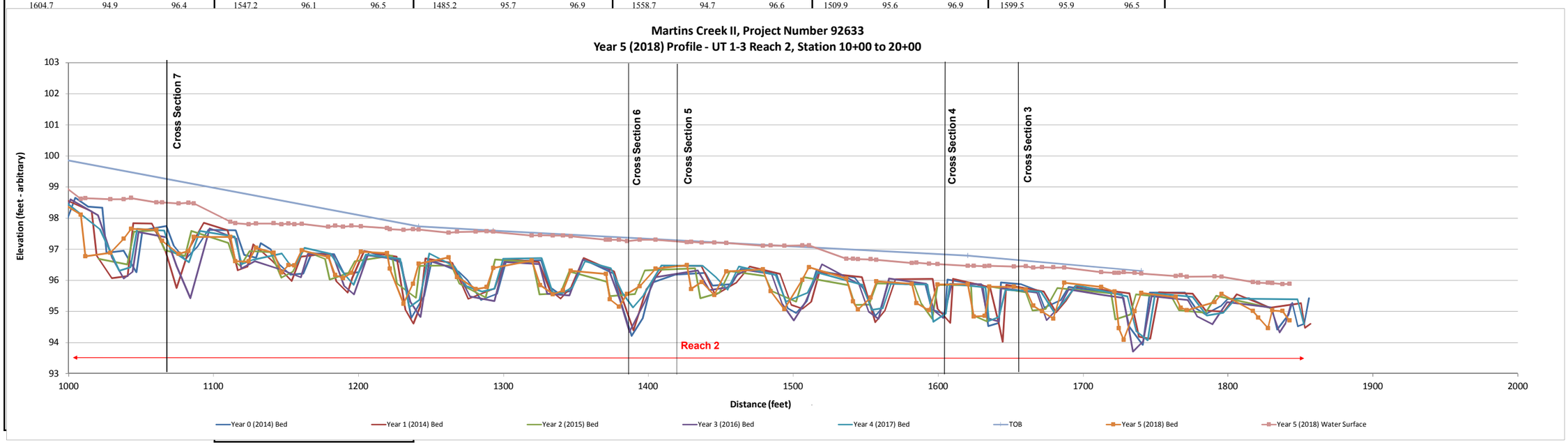
	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0161	0.0162	0.0174	0.0170	0.0166	0.0159
Riffle Length	20	20	22	19	21	19
Avg. Riffle Slope	0.0185	0.0209	0.0163	0.0197	0.0142	0.0187
Pool Length	14	16	13	16	15	14
Pool to Pool Spacing	34	34	35	33	33	32



Project Name Martins Creek II
Reach UT 1 - 3 Reach 2, Station 10+00 - 20+00
Project Number 92633
Date 4/3/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
1855.8	95.4	95.9	1856.9	94.6	95.7	1829.0	95.1	96.0	1844.9	95.2	95.9	1852.4	94.6	95.8	1842.4	94.7	95.9
1852.5	94.6	95.8	1853.2	94.5	95.7	1791.8	95.5	96.0	1843.2	95.2	95.9	1847.9	95.4	95.8	1837.7	95.0	95.9
1848.3	94.5	95.9	1850.5	95.3	95.8	1784.6	95.0	96.0	1839.7	94.6	95.9	1805.3	95.4	95.8	1830.4	95.0	95.9
1844.3	95.3	95.9	1828.7	95.1	95.7	1766.2	95.0	96.1	1835.7	94.3	95.9	1796.8	95.0	95.8	1827.6	94.5	95.9
1841.9	94.9	95.9	1806.0	95.5	95.8	1761.4	95.4	96.1	1829.5	95.1	95.9	1785.4	94.9	95.8	1820.9	94.8	95.9
1834.0	94.4	95.8	1797.1	95.0	95.8	1736.6	95.5	96.1	1799.4	95.3	95.9	1775.6	95.5	95.8	1817.1	95.0	95.9
1830.6	95.1	95.9	1784.6	95.0	95.8	1732.7	94.9	96.1	1789.2	94.6	96.0	1749.7	95.6	95.9	1795.5	95.6	96.1
1814.5	95.4	96.0	1775.5	95.6	95.8	1722.3	94.7	96.1	1778.8	94.8	96.0	1744.4	94.1	95.9	1790.7	95.3	96.1
1799.6	95.4	95.9	1752.2	95.6	95.9	1719.2	95.6	96.1	1772.3	95.4	96.0	1736.7	94.4	95.9	1771.6	95.0	96.1
1794.8	95.2	96.0	1746.3	94.1	95.9	1682.4	95.8	96.3	1747.1	95.5	96.1	1730.7	95.5	95.9	1767.3	95.1	96.2
1784.4	94.9	96.0	1738.4	94.2	95.9	1674.4	95.1	96.3	1741.3	94.0	96.1	1695.4	95.8	96.1	1763.9	95.5	96.1
1777.9	95.1	96.0	1731.8	95.6	95.9	1665.0	95.0	96.3	1734.4	93.7	96.0	1687.5	95.4	96.1	1740.2	95.6	96.2
1770.2	95.6	96.0	1694.6	95.8	96.1	1660.4	95.6	96.3	1727.7	95.4	96.1	1680.2	95.0	96.1	1735.6	95.0	96.2
1746.1	95.6	96.0	1688.2	95.3	96.1	1634.7	95.8	96.3	1712.4	95.5	96.2	1670.9	95.6	96.0	1728.1	94.1	96.3
1741.1	93.9	96.0	1681.4	95.0	96.2	1633.5	94.7	96.4	1690.1	95.7	96.3	1646.5	95.7	96.1	1724.7	94.5	96.2
1732.1	94.5	96.1	1673.0	95.6	96.1	1623.5	94.9	96.3	1684.1	95.2	96.3	1641.8	94.8	96.1	1721.7	95.6	96.2
1726.8	95.5	96.0	1646.9	95.9	96.1	1622.6	95.8	96.3	1674.8	94.7	96.2	1635.0	94.7	96.1	1712.4	95.8	96.3
1690.1	95.8	96.2	1644.5	94.0	96.2	1599.6	95.9	96.4	1668.4	95.6	96.3	1632.5	95.8	96.1	1687.0	95.9	96.4
1684.6	95.4	96.2	1641.4	94.7	96.1	1595.8	94.8	96.4	1643.4	95.7	96.3	1608.0	95.9	96.3	1679.4	94.8	96.4
1673.3	95.1	96.2	1635.7	95.8	96.1	1588.4	95.3	96.4	1641.7	94.7	96.3	1605.2	94.9	96.3	1671.8	95.0	96.4
1669.0	95.7	96.2	1610.2	96.0	96.3	1583.4	95.9	96.4	1634.2	94.8	96.3	1596.6	94.7	96.2	1665.7	95.2	96.4
1656.8	95.9	96.2	1608.3	94.6	96.4	1557.9	95.9	96.6	1629.6	95.9	96.3	1592.4	95.9	96.3	1660.6	95.7	96.5
1643.3	95.9	96.3	1599.6	95.1	96.3	1552.4	95.2	96.6	1609.2	95.9	96.4	1567.5	95.9	96.3	1652.2	95.8	96.4
1641.8	94.6	96.3	1596.1	96.0	96.3	1542.8	95.2	96.6	1603.4	94.8	96.4	1561.8	95.1	96.4	1635.4	95.8	96.5
1634.6	94.5	96.3	1570.6	96.0	96.5	1538.4	95.8	96.6	1597.3	95.0	96.4	1554.2	95.0	96.4	1632.2	94.9	96.5
1630.6	95.8	96.3	1563.3	95.0	96.5	1507.0	96.1	97.0	1591.7	95.9	96.4	1547.8	95.9	96.4	1624.6	94.8	96.5
1606.4	96.0	96.4	1556.6	94.7	96.5	1501.9	95.3	96.9	1566.1	96.1	96.6	1516.8	96.3	96.9	1620.4	95.9	96.5
1604.7	94.9	96.4	1547.2	96.1	96.5	1485.2	95.7	96.9	1558.7	94.7	96.6	1509.9	95.6	96.9	1599.5	95.9	96.5

	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0161	0.0162	0.0174	0.0170	0.0166	0.0159
Riffle Length	20	20	22	19	21	19
Avg. Riffle Slope	0.0185	0.0209	0.0163	0.0197	0.0142	0.0187
Pool Length	14	16	13	16	15	14
Pool to Pool Spacing	34	34	35	33	33	32

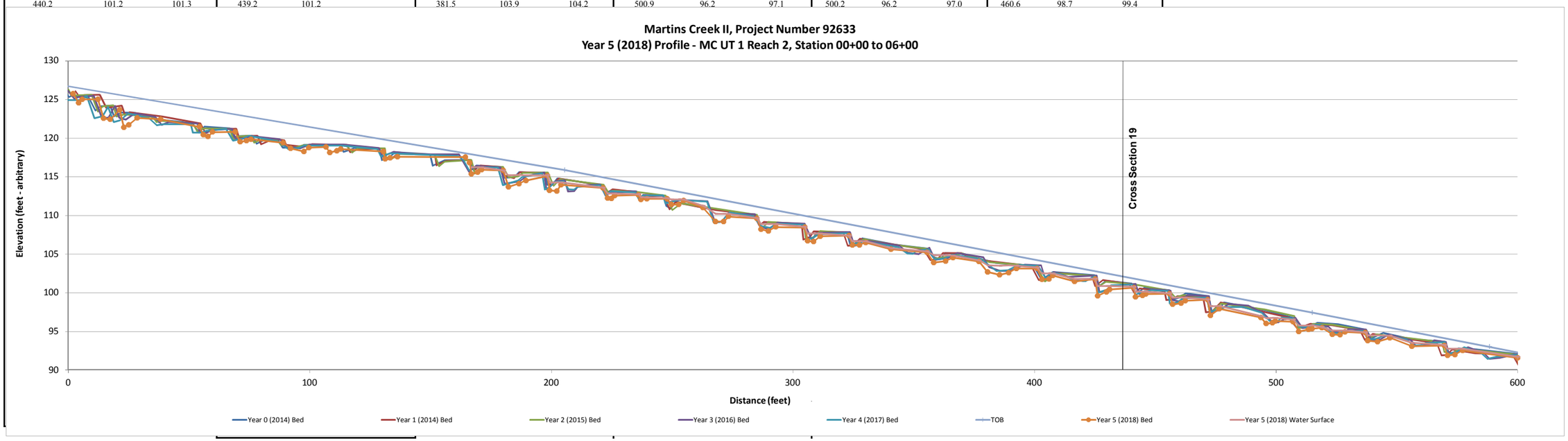


Project Name	Martins Creek II
Reach	MC UT 1 Reach 2, Station 00+00 - 06+00
Project Number	92633
Date	4/3/18
Crew	Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 8 Monitoring \Survey		
Station	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**	**Station**	**Bed Elevation**	**Water Elevation**
603.4	90.7	91.5	603.8	91.2		600.5	92.0	92.0	607.3	90.4	91.2	601.1	90.1	91.2	601.0	89.6	90.6
601.2	92.0	92.2	600.7	90.5		575.8	92.7	93.1	602.0	90.0	91.2	600.3	92.0	92.1	599.9	91.6	91.7
583.1	92.7	92.9	597.8	92.0		572.8	92.1	93.1	600.2	92.1	92.2	593.1	91.8	92.1	577.2	92.5	92.8
575.4	92.8	93.0	582.4	92.2		569.7	92.3	93.0	592.6	91.6	92.2	591.3	91.7	92.2	574.1	92.0	92.8
573.4	92.1	93.0	572.9	92.7		568.7	93.6	93.7	588.4	91.4	92.2	587.5	91.5	92.2	571.0	91.9	92.8
570.9	92.3	93.0	570.7	91.9		541.7	94.6	94.9	586.1	92.2	92.5	585.4	92.1	92.3	569.7	93.2	93.3
569.9	93.7	93.8	568.5	91.9		538.1	94.0	94.9	579.5	93.0	93.3	577.9	92.9	93.2	556.2	93.1	93.5
556.2	94.0	94.3	566.6	93.5		536.0	95.2	95.3	575.4	92.3	93.3	574.6	92.3	93.3	547.1	94.2	94.5
544.5	94.8	95.0	540.0	94.7		523.2	95.9	96.2	571.6	92.2	93.3	571.2	92.1	93.2	542.0	93.7	94.5
539.5	94.1	95.0	536.8	93.9		515.5	96.0	96.2	570.4	93.6	93.8	569.9	93.6	93.7	537.9	93.8	94.5
537.3	95.2	95.3	534.7	95.2		512.6	95.5	96.2	565.4	93.9	94.0	562.1	93.5	94.0	536.9	94.8	94.9
525.6	95.9	96.2	523.2	95.8		509.3	95.4	96.2	564.3	93.4	94.0	560.0	93.2	93.9	528.6	94.9	95.1
517.2	96.1	96.3	514.2	96.0		507.6	97.0	96.9	557.9	93.1	94.0	556.5	93.2	93.9	526.5	94.5	95.1
514.1	95.6	96.3	511.5	95.7	96.1	495.3	97.8	97.9	555.7	93.9	94.1	554.2	94.0	94.1	523.3	94.6	95.1
510.6	95.6	96.3	508.4	95.5	96.1	477.2	98.6	98.9	546.7	94.6	94.9	545.4	94.5	94.9	518.9	95.5	95.6
507.6	96.7	97.1	505.3	96.8		472.7	97.3	98.9	543.4	94.0	94.9	541.4	94.0	94.8	514.8	95.3	95.8
495.4	97.8	98.0	493.9	97.6	97.7	471.3	99.5	99.5	539.5	93.9	94.9	537.7	94.0	94.9	513.5	95.2	95.7
478.4	98.7	99.0	477.0	98.7		461.4	99.7	100.0	537.1	95.2	95.4	536.5	95.1	95.2	509.4	95.0	95.7
476.3	97.8	99.0	473.3	97.6	98.8	458.2	99.4	100.0	530.0	95.3	95.6	528.3	95.0	95.5	507.1	96.2	96.5
473.4	97.7	99.0	470.9	97.5	98.8	455.7	100.3	100.3	527.8	94.8	95.7	525.9	94.8	95.5	499.7	96.3	96.7
472.2	99.6	99.7	469.7	99.4		440.9	101.1	101.2	523.8	94.9	95.7	523.5	94.8	95.5	498.5	96.1	96.7
462.6	99.9	100.1	459.3	99.6		429.7	101.4	101.8	521.7	95.6	95.8	518.6	95.8	96.1	495.9	96.0	96.7
460.0	99.4	100.1	456.5	99.1	99.6	427.0	100.9	101.8	516.2	95.8	96.2	515.2	95.8	96.1	493.7	96.8	97.0
457.1	99.2	100.1	454.5	99.0	99.6	425.3	102.2	102.2	515.0	95.6	96.2	513.4	95.5	96.2	476.5	97.9	98.3
455.9	100.3	100.4	453.8	100.2		409.3	102.5	102.8	510.9	95.5	96.2	509.8	95.6	96.3	472.8	97.1	98.3
445.4	100.6	100.9	443.5	100.6		404.3	101.5	102.8	508.0	96.7	97.1	507.4	96.7	96.9	471.6	99.1	99.2
443.4	100.1	100.9	441.4	100.0	100.7	400.6	103.5	103.6	503.6	96.6	97.1	502.2	96.8	97.0	462.5	99.0	99.4
440.2	101.2	101.3	439.2	101.2		381.5	103.9	104.2	500.9	96.2	97.1	500.2	96.2	97.0	460.6	98.7	99.4

	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0577	NA*	0.0582	0.0578	0.0576	0.0579
Riffle Length	19	16	17	13	13	15
Avg. Riffle Slope	0.0457	NA*	0.0447	0.0386	0.0406	0.0373
Pool Length	6	6	6	8	7	8
Pool to Pool Spacing	25	22	24	21	19	21

NA* No water in channel during field surveys

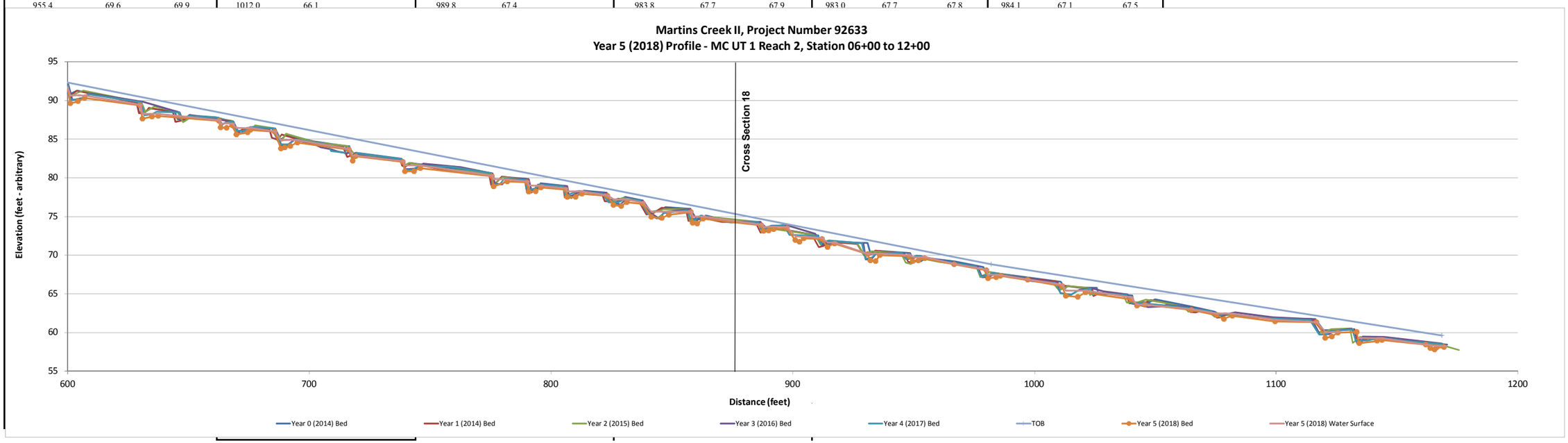


Project Name Martins Creek II
Reach MC UT 1 Reach 2, Station 06+00 - 12+00
Project Number 92633
Date 4/3/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
1170.7	58.4	58.5	1169.9	58.4	58.4	1175.6	57.7	58.0	1168.6	58.6	58.8	1169.4	58.5	58.6	1169.4	58.1	58.3
1137.5	59.4	59.6	1153.8	58.8	58.9	1167.4	58.5		1144.7	59.4	59.5	1153.0	58.9	59.1	1166.4	58.1	58.3
1134.1	58.7	59.5	1138.0	59.2	59.3	1134.6	59.5		1135.7	59.5	59.5	1142.5	59.3	59.5	1165.5	57.8	58.3
1132.5	60.4	60.5	1135.4	58.8	59.3	1131.7	58.7	59.4	1133.3	58.7	59.5	1137.9	59.0	59.5	1163.8	58.0	58.3
1119.6	60.3	60.6	1133.5	58.7	59.3	1130.6	60.5		1131.3	60.5	60.6	1132.9	58.9	59.5	1161.9	58.4	58.4
1116.2	61.8	61.8	1132.4	60.4		1122.9	60.4		1124.3	60.2	60.7	1131.6	60.4		1143.8	59.0	59.3
1099.7	61.8	62.1	1124.3	60.2		1120.3	60.1		1122.0	59.8	60.7	1122.5	60.2	60.4	1141.8	58.9	59.3
1081.3	62.3	62.4	1122.3	60.0		1117.4	60.1		1118.1	59.8	60.7	1120.7	59.7	60.5	1134.3	58.6	59.3
1077.3	62.2	62.5	1118.7	60.3		1114.0	61.7		1114.8	61.7	61.7	1117.8	59.8	60.5	1133.3	60.1	
1074.5	62.7	62.9	1115.6	61.7		1094.3	61.9		1098.6	62.0	62.1	1114.0	61.6	61.7	1125.6	60.0	60.1
1064.6	63.4	63.3	1091.2	62.0		1077.2	62.3		1082.9	62.6	62.9	1097.1	61.8	62.1	1123.1	59.5	60.0
1049.9	64.3	64.5	1079.4	62.3		1074.4	62.1		1078.4	62.3	62.9	1079.1	62.5	62.9	1120.3	59.3	60.0
1047.7	63.9	64.5	1077.1	62.0		1072.2	62.6		1074.5	62.1	62.9	1076.1	62.1	62.9	1116.7	61.3	61.3
1041.2	63.9	64.5	1075.5	61.9		1066.1	62.8		1073.5	62.7	62.9	1074.7	62.1	62.9	1099.5	61.4	61.7
1040.6	64.8	64.9	1074.1	62.6		1063.5	62.7		1062.9	63.3	63.4	1073.2	62.7	62.9	1081.8	62.1	62.4
1031.8	65.0	65.4	1068.2	62.8		1061.7	63.3		1054.5	63.6	63.8	1058.1	63.4	63.6	1078.3	61.7	62.5
1030.0	65.0	65.4	1066.6	62.6		1052.3	63.9		1053.1	63.4	63.8	1043.1	63.8	63.9	1075.3	62.3	62.5
1026.5	65.0	65.4	1064.6	62.6		1046.0	64.3		1047.0	63.3	63.8	1040.1	63.9	64.0	1064.8	62.9	63.0
1025.8	65.8	65.8	1063.6	63.2		1042.4	63.9		1040.0	63.8	64.1	1038.1	64.8	64.9	1045.7	63.6	63.6
1017.7	65.8	66.0	1053.6	63.9		1038.1	63.9		1038.4	64.9	64.9	1026.2	65.1	65.4	1042.4	63.5	63.6
1013.8	66.0	66.2	1048.0	64.2		1036.8	64.7		1028.5	65.3	65.5	1024.1	64.8	65.4	1040.0	64.3	64.5
1012.6	65.7	66.2	1044.7	63.7		1025.7	65.2		1023.6	65.7	65.8	1023.2	65.7	65.8	1021.1	65.2	65.4
1011.0	66.5	66.7	1039.2	63.8		1022.9	64.8		1018.8	65.6	65.8	1018.0	65.4	65.8	1018.0	64.6	65.4
984.7	67.6	67.9	1038.1	64.9		1022.3	65.8		1015.3	64.9	65.8	1015.2	64.9	65.8	1012.9	64.7	65.4
980.6	67.2	67.9	1027.3	65.1		1014.1	66.0		1010.8	65.1	65.8	1010.8	65.1	65.8	1011.4	66.0	66.2
978.9	68.5	68.7	1024.5	64.7		1010.2	65.4		1009.4	66.4	66.6	1008.5	66.4	66.5	997.2	66.8	66.9
967.1	69.2	69.4	1023.8	65.7		1007.8	66.3		996.5	67.0	67.1	999.0	66.6	66.8	985.9	67.3	67.4
955.4	69.6	69.9	1012.0	66.1		989.8	67.4		983.8	67.7	67.9	983.0	67.7	67.8	984.1	67.1	67.5

	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0577	NA*	0.0582	0.0578	0.0576	0.0579
Riffle Length	19	16	17	13	13	15
Avg. Riffle Slope	0.0457	NA*	0.0447	0.0386	0.0406	0.0373
Pool Length	6	6	6	8	7	8
Pool to Pool Spacing	25.0	22	24	21	19	21

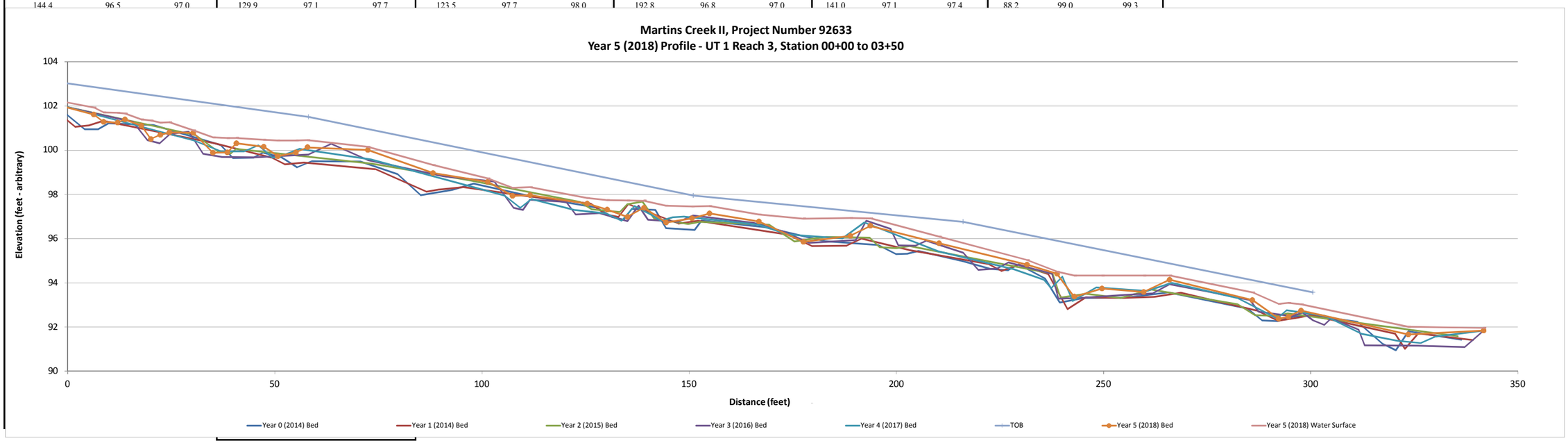
NA* No water in channel during field surveys



Project Name Martins Creek II
Reach UT 1 Reach 3, Station 00+00 - 03+50
Project Number 92633
Date 4/3/18
Crew Perkinson, Butler

2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
336.4	91.4	91.5	339.1	91.4	91.5	335.5	91.6	91.7	341.7	91.8	91.9	341.7	91.8	91.9	341.7	91.8	92.0
323.6	91.8	92.1	326.0	91.7	92.0	313.4	92.1	92.5	337.1	91.1	91.9	330.2	91.6	91.9	323.5	91.7	92.0
320.5	90.9	92.1	322.7	91.0	92.0	294.4	92.6	93.0	325.9	91.2	91.9	326.5	91.3	91.9	297.6	92.7	93.0
317.3	91.2	92.0	320.3	91.7	92.0	291.9	92.5	93.0	313.0	91.2	91.9	320.9	91.4	91.9	294.6	92.5	93.1
311.2	92.2	92.6	299.9	92.5	92.8	286.5	92.5	93.0	311.6	91.9	92.2	312.1	91.7	92.0	292.3	92.4	93.0
299.7	92.5	92.8	296.9	92.4	92.8	282.3	93.0	93.3	304.9	92.4	92.7	303.4	92.5	92.7	285.9	93.2	93.6
295.8	92.5	92.9	292.0	92.3	92.8	261.5	93.7	94.0	303.2	92.1	92.7	294.2	92.8	93.0	266.0	94.1	94.3
292.0	92.3	92.8	286.9	92.7	93.0	254.1	93.3	94.0	300.5	92.3	92.7	291.8	92.4	93.1	259.7	93.6	94.3
288.2	92.3	92.8	268.6	93.6	93.8	245.7	93.5	94.0	298.0	92.6	93.0	288.4	92.7	93.1	249.6	93.7	94.3
284.7	92.8	93.1	262.1	93.4	93.8	239.6	93.3	94.0	295.4	92.5	93.0	282.3	93.3	93.6	242.9	93.4	94.3
265.6	93.6	93.8	254.3	93.3	93.8	237.7	94.4	94.8	287.4	92.7	93.3	266.4	94.0	94.3	238.8	94.4	94.5
255.6	93.3	93.8	245.8	93.3	93.8	225.0	94.9	95.2	285.4	93.2	93.5	260.4	93.6	94.3	231.5	94.8	95.0
245.2	93.3	93.8	241.3	92.8	93.8	203.2	95.7	96.0	274.9	93.6	93.8	248.4	93.8	94.3	210.3	95.8	96.1
239.5	93.1	93.8	236.7	94.4	94.7	200.0	95.6	96.0	266.0	93.9	94.2	242.6	93.2	94.3	193.8	96.6	96.9
235.9	94.2	94.9	229.6	94.8	95.0	195.9	95.6	96.1	261.9	93.5	94.2	240.0	94.3	94.4	188.9	96.1	96.9
229.6	94.8	95.3	225.4	94.5	95.1	193.5	96.0	96.3	254.1	93.4	94.3	237.4	93.8	94.4	177.6	95.8	96.9
227.0	94.6	95.3	222.1	94.9	95.1	183.1	96.1	96.5	244.4	93.3	94.3	235.6	94.1	94.6	166.8	96.8	97.1
222.6	94.6	95.3	203.3	95.5	95.7	179.2	96.0	96.5	239.1	93.3	94.3	228.3	94.6	95.0	154.9	97.1	97.5
216.1	95.0	95.3	191.6	96.0	96.2	175.3	95.9	96.5	237.6	94.4	94.6	210.1	95.4	95.7	150.6	96.9	97.5
205.3	95.4	95.8	188.0	95.7	96.3	169.2	96.6	96.9	227.1	94.9	95.3	192.3	96.7	97.0	144.4	96.7	97.5
202.6	95.3	95.8	179.6	95.7	96.3	152.5	96.8	97.3	224.4	94.6	95.3	187.1	96.0	97.0	139.1	97.4	97.7
199.9	95.3	95.8	173.6	96.2	96.4	149.7	96.7	97.3	219.7	94.6	95.2	179.7	96.1	96.9	135.1	97.0	97.7
195.5	95.7	96.0	152.1	96.8	97.1	141.6	96.9	97.3	216.1	95.4	95.6	173.9	96.2	97.0	130.2	97.3	97.7
182.7	95.9	96.3	147.3	96.7	97.1	138.7	97.7	97.7	207.3	95.9	96.2	166.6	96.6	97.0	125.4	97.6	97.8
168.2	96.5	96.8	144.2	96.9	97.1	135.0	97.6	97.8	204.7	95.7	96.2	148.8	97.0	97.4	111.6	98.0	98.3
153.0	96.8	97.0	135.3	97.5	97.8	133.2	97.2	97.8	200.5	95.7	96.2	146.0	97.0	97.4	107.4	97.9	98.3
151.3	96.4	97.0	132.9	97.0	97.8	126.4	97.3	97.8	198.6	96.4	96.7	143.1	96.8	97.4	101.4	98.6	98.7
144.4	96.5	97.0	129.9	97.1	97.7	123.5	97.7	98.0	192.8	96.8	97.0	141.0	97.1	97.4	88.2	99.0	99.3

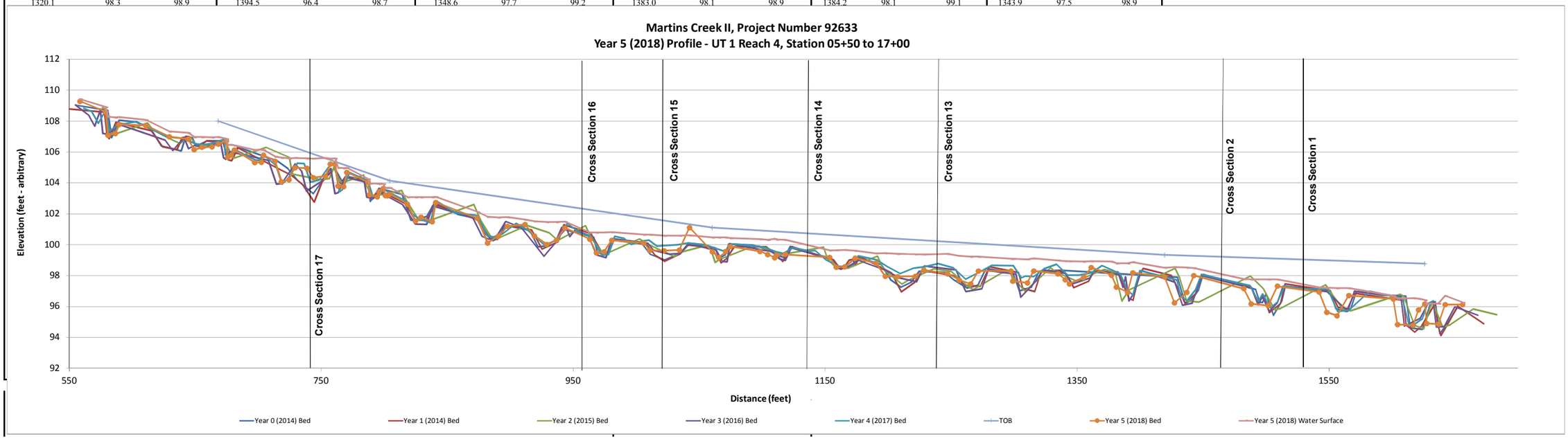
	2014	2014	2015	2016	2017	2018
Avg. Water Surface Slope	0.0305	0.0304	0.0305	0.0315	0.0281	0.0297
Riffle Length	17	21	21	13	22	22
Avg. Riffle Slope	0.0388	0.0395	0.0310	0.0459	0.0404	0.0412
Pool Length	13	13	14	16	14	14
Pool to Pool Spacing	31	34	44	27	31	34



Project Name Martins Creek II
Reach UT 1 Reach 4, Station 05+50 - 17+00
Project Number 92633
Date 4/3/18
Crew Perkinson, Butler

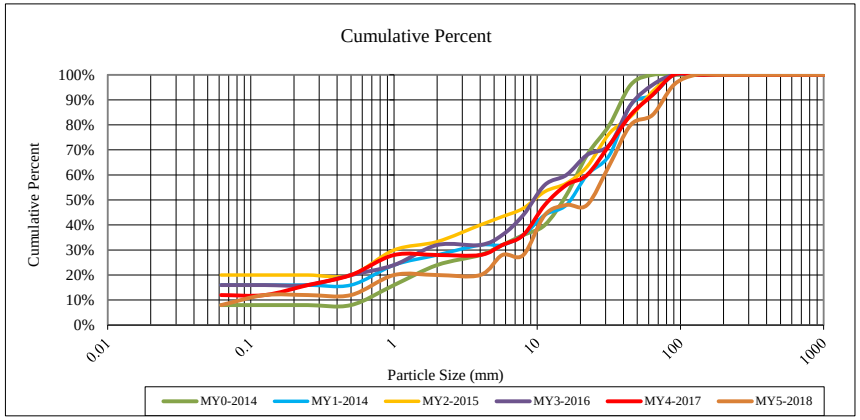
2014 Year 0 Monitoring \Survey			2014 Year 1 Monitoring \Survey			2015 Year 2 Monitoring \Survey			2016 Year 3 Monitoring \Survey			2017 Year 4 Monitoring \Survey			2018 Year 5 Monitoring \Survey		
Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation	Station	Bed Elevation	Water Elevation
1651.4	95.9	96.3	1672.7	94.9	95.6	1683.1	95.5	95.8	1668.1	95.4	95.9	1633.0	96.3	96.5	1656.0	96.1	96.3
1644.5	95.0	96.3	1652.2	96.0	96.1	1664.7	95.8	96.3	1649.8	96.0	96.3	1628.1	96.2	96.7	1642.2	96.1	96.7
1638.0	94.2	96.4	1643.3	94.7	96.2	1646.4	94.8	96.3	1641.6	94.7	96.3	1624.0	95.2	96.7	1636.9	94.9	96.2
1634.4	96.3	96.4	1638.9	94.1	96.2	1640.1	94.7	96.3	1635.1	94.7	96.3	1616.9	94.8	96.7	1627.6	94.9	96.2
1630.0	96.0	96.4	1636.1	95.0	96.2	1632.3	96.2	96.4	1632.6	96.3	96.4	1613.4	94.8	96.7	1626.0	96.2	96.4
1624.0	94.5	96.4	1634.1	96.2	96.3	1630.1	95.9	96.5	1628.4	96.2	96.6	1608.2	96.5	96.8	1620.9	95.8	96.5
1614.7	94.6	96.4	1623.8	94.8	96.3	1625.2	94.5	96.5	1622.3	95.2	96.6	1582.1	97.0	97.4	1616.8	94.8	96.5
1611.1	96.7	96.8	1617.9	94.3	96.3	1618.0	94.8	96.5	1609.8	94.7	96.6	1565.6	95.8	97.5	1604.3	94.8	96.5
1591.5	96.7	97.0	1611.2	94.8	96.3	1609.3	96.6	96.8	1607.1	96.7	96.8	1556.7	95.7	97.3	1601.0	96.5	96.7
1571.8	97.0	97.2	1609.1	96.4	96.6	1606.4	96.8	97.4	1570.1	97.0	97.5	1548.9	97.1	97.5	1565.6	96.7	97.2
1567.2	95.9	97.3	1570.4	96.9	97.1	1567.1	95.7	97.4	1564.8	95.7	97.5	1528.2	97.2	97.7	1556.4	95.4	97.2
1563.9	95.7	97.3	1564.9	95.9	97.1	1561.2	95.8	97.3	1548.2	97.0	97.5	1514.8	97.3	97.9	1548.4	95.6	97.2
1555.3	95.9	97.3	1557.1	95.9	97.1	1551.2	96.9	97.4	1513.5	97.3	97.9	1509.3	96.3	98.0	1542.1	96.9	97.2
1551.1	97.0	97.2	1551.1	97.0	97.2	1547.3	97.4	97.9	1509.0	96.2	97.9	1503.5	95.9	98.0	1509.1	97.3	97.8
1515.5	97.3	97.8	1515.2	97.5	97.6	1511.8	95.9	97.8	1502.5	95.7	97.9	1497.3	96.8	97.9	1501.8	96.1	97.8
1512.7	96.4	97.8	1511.4	96.2	97.6	1506.9	95.8	97.9	1496.9	96.6	97.9	1493.9	96.3	98.0	1488.3	96.2	97.8
1505.9	95.4	97.8	1502.7	95.6	97.6	1497.8	97.1	97.8	1494.1	96.1	97.9	1490.8	96.8	97.9	1482.4	97.2	97.8
1500.0	96.8	97.7	1498.0	96.7	97.6	1487.5	98.0	98.4	1489.0	97.2	97.9	1487.2	97.3	98.0	1442.7	98.0	98.5
1497.4	96.3	97.7	1493.6	96.1	97.6	1446.9	96.3	98.4	1449.1	98.0	98.5	1469.2	97.7	98.1	1437.1	96.9	98.5
1495.0	96.3	97.8	1488.2	97.3	97.6	1436.9	96.4	98.4	1441.3	96.2	98.5	1448.8	98.1	98.5	1427.2	96.2	98.5
1491.6	97.1	97.7	1448.8	98.0	98.2	1431.6	97.8	98.4	1433.7	96.1	98.5	1444.0	97.1	98.6	1419.5	97.9	98.5
1450.2	98.1	98.3	1444.2	96.8	98.3	1427.8	98.5	98.9	1427.6	97.6	98.5	1437.4	96.4	98.6	1394.2	98.2	98.9
1446.5	97.1	98.4	1435.5	96.2	98.2	1391.2	97.1	99.0	1401.2	98.3	98.9	1432.5	96.6	98.5	1390.1	96.9	98.8
1440.5	96.4	98.3	1432.4	96.8	98.3	1385.5	96.3	99.0	1395.4	96.9	98.9	1429.3	97.7	98.6	1381.3	97.3	98.8
1435.8	96.2	98.4	1424.8	98.0	98.2	1380.2	98.2	99.0	1391.0	96.4	98.9	1399.8	98.3	99.0	1377.2	98.0	98.9
1429.6	97.9	98.3	1402.7	98.5	98.6	1371.8	98.4	99.1	1388.3	97.9	98.8	1394.2	96.7	99.0	1361.3	98.5	98.9
1336.8	98.3	98.8	1398.5	97.8	98.7	1353.1	97.8	99.1	1386.4	97.2	98.9	1389.9	97.1	99.0	1355.0	97.9	98.9
1320.1	98.3	98.9	1394.5	96.4	98.7	1348.6	97.7	99.2	1383.0	98.1	98.9	1384.2	98.1	99.1	1343.9	97.5	98.9

	2014	2014	2015	2016	2017	2017
Avg. Water Surface Slope	0.0135	0.0123	0.0116	0.0120	0.0117	0.0118
Riffle Length	21	23	6	22	19	21
Avg. Riffle Slope	0.0166	0.0161	0.1220	0.0197	0.0209	0.0160
Pool Length	22	19	40	18	22	20
Pool to Pool Spacing	42	40	46	37	39	40



Project Name: Martin's Creek II					
Cross-Section: 2					
Feature: Riffle					
			2018		
Description	**Material**	**Size (mm)**	**Total #**	**Item %**	**Cum %**
Silt/Clay	silt/clay	0.062	2	8%	8%
Sand	very fine sand	0.125	1	4%	12%
	fine sand	0.250	0	0%	12%
	medium sand	0.50	0	0%	12%
	coarse sand	1.00	2	8%	20%
	very coarse sand	2.0	0	0%	20%
Gravel	very fine gravel	4.0	0	0%	20%
	fine gravel	5.7	2	8%	28%
	fine gravel	8.0	0	0%	28%
	medium gravel	11.3	4	16%	44%
	medium gravel	16.0	1	4%	48%
	course gravel	22.3	0	0%	48%
	course gravel	32.0	4	16%	64%
	very coarse gravel	45	4	16%	80%
	very coarse gravel	64	1	4%	84%
Cobble	small cobble	90	3	12%	96%
	medium cobble	128	1	4%	100%
	large cobble	180	0	0%	100%
	very large cobble	256	0	0%	100%
Boulder	small boulder	362	0	0%	100%
	small boulder	512	0	0%	100%
	medium boulder	1024	0	0%	100%
	large boulder	2048	0	0%	100%
Bedrock	bedrock	40096	0	0%	100%
TOTAL % of whole count			25	100%	100%

Summary Data	
D16	0.707
D35	9.2
D50	23.1
D84	64
D95	87



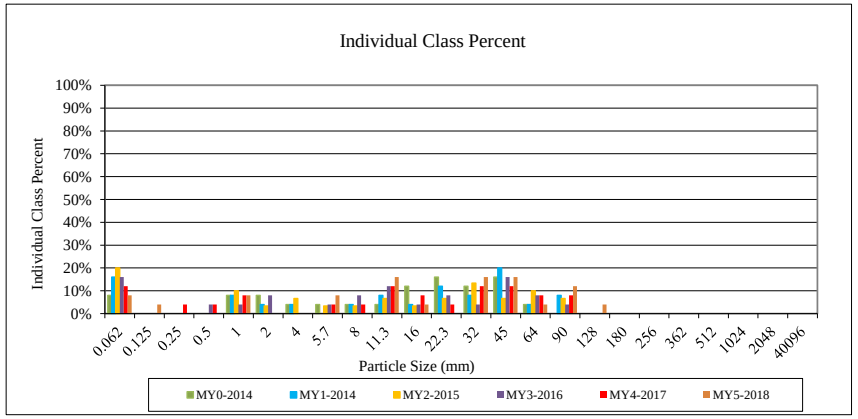


Table 10a. Baseline Stream Data Summary (UT -1 to Martin's Creek)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Gauge	Regional Curve			Pre-Existing Condition (UT-1)					Reference Reach(es) Data					Design (UT-1)			Monitoring Baseline (UT-1 Reach 4)				
Dimension and Substrate - Riffle Only		**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Max**	**Med**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)					5.9	8.5	7.6	14.0	3.0	11.7			21.7		7.7	8.5		6.4	7.1	6.6	8.4	1.1
Floodprone Width (ft)					9.0	17.0	16.2	30.8	8.2	20			410		16	100		25	25	25	25	0
BF Mean Depth (ft)					0.3	0.6	0.6	0.8	0.2	0.6			1.0		0.5	0.7		0.5	0.6	0.6	0.8	0.2
BF Max Depth (ft)					0.6	0.9	1.0	1.1	0.2	0.9			2.5		0.7	0.9		0.8	1.0	0.9	1.2	0.2
BF Cross Sectional Area (ft^2)					3.6	4.7	4.3	6.2	1.2	10.2			13.1		4.1	6.0		3.2	4.5	3.8	6.4	1.7
Width/Depth Ratio					7.6	18.8	12.6	55.0	18.0	10.7			17.0		12.0	14.3		10.5	11.4	11.0	12.8	1.2
Entrenchment Ratio					1.2	2.0	2.0	2.9	0.6	1.7			32.0		2.0	11.8		1.5	1.5	1.5	1.6	0.1
Bank Height Ratio					1.0	2.0	1.8	4.1	1.1	1.0			1.0		1.0	1.0		1.0	1.0	1.0	1.0	0.0
Profile																						
Riffle length (ft)																		5	21	20	40	8
Riffle slope (ft/ft)					0.025			0.170		0.2000			1.9000		0.0100	0.1600		0.0009	0.0166	0.0148	0.0337	0.0111
Pool length (ft)																		8.0	22.0	22.0	37.0	9.5
Pool Max depth (ft)										2.2			2.5		1.6	2.0		2.1	2.3	2.3	2.4	0.2
Pool spacing (ft)					30.0			85.0		48.0			231.0		12.0	45.0		27.0	42.0	40.0	61.0	11.0
Pattern																						
Channel Beltwidth (ft)										16			55				40			40		
Radius of Curvature (ft)										28			47		30	40		30			40	
Rc:Bankfull width (ft/ft)										2			3		3.8	4.7		3.8			4.7	
Meander Wavelength (ft)										70			260		15	30		15			30	
Meander Width ratio										1.1			4.1				4.7			4.7		
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					Eb/Fb/B/G/Cb					Aa/Bc					B/C			B/C				
Bankfull Velocity (fps)					4.2-4.4										3.9-4.3							
Bankfull Discharge (cfs)					16 - 25																	
Valley Length (ft)					1565					----												
Channel Thalweg Length (ft)					1747					----					----			781				
Sinuosity					1.06 - 1.18					1.19					1.05-1.4			1.05-1.4				
Water Surface Slope (ft/ft)					0.015 - 0.05					0.0333					.01-.057			0.0135				
BF slope (ft/ft)					----					----					----			----				
Bankfull Floodplain Area (acres)					----					----					----			----				
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 10b. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																											
SC%/SA%/G%/C%/B%BE%																											
d16/d35/d50/d84/d95	.6-.8	2-4.4	3.6-8.7	15.9-28	66.8-																						
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																											
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																											

Table 10c. Baseline Stream Data Summary (UT -1 to Martin's Creek)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Gauge	Regional Curve			Pre-Existing Condition (UT-1)					Reference Reach(es) Data					Design (UT-1)			Monitoring Baseline (UT-1 Reach 2)				
Dimension and Substrate - Riffle Only		**LL**	**UL**	**Eq.**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Max**	**Med**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)					5.9	8.5	7.6	14.0	3.0	11.7			21.7		7.7	8.5		8.0			8.7	
Floodprone Width (ft)					9.0	17.0	16.2	30.8	8.2	20			410		16	100			25			
BF Mean Depth (ft)					0.3	0.6	0.6	0.8	0.2	0.6			1.0		0.5	0.7			0.7			
BF Max Depth (ft)					0.6	0.9	1.0	1.1	0.2	0.9			2.5		0.7	0.9			1.1			
BF Cross Sectional Area (ft^2)					3.6	4.7	4.3	6.2	1.2	10.2			13.1		4.1	6.0		5.2			5.9	
Width/Depth Ratio					7.6	18.8	12.6	55.0	18.0	10.7			17.0		12.0	14.3		12.3			12.8	
Entrenchment Ratio					1.2	2.0	2.0	2.9	0.6	1.7			32.0		2.0	11.8		2.9			3.1	
Bank Height Ratio					1.0	2.0	1.8	4.1	1.1	1.0			1.0		1.0	1.0			1.0			
Profile																						
Riffle length (ft)																		5	21	20	40	8
Riffle slope (ft/ft)					0.025			0.170		0.2000			1.9000		0.0100	0.1600		0.0009	0.0166	0.0148	0.0337	0.0111
Pool length (ft)																		8.0	22.0	22.0	37.0	9.5
Pool Max depth (ft)										2.2			2.5		1.6	2.0		2.1	2.3	2.3	2.4	0.2
Pool spacing (ft)					30.0			85.0		48.0			231.0		12.0	45.0		27.0	42.0	40.0	61.0	11.0
Pattern																						
Channel Beltwidth (ft)										16			55				40			40		
Radius of Curvature (ft)										28			47		30	40		30			40	
Rc:Bankfull width (ft/ft)										2			3		3.8	4.7		3.8			4.7	
Meander Wavelength (ft)										70			260		15	30		15			30	
Meander Width ratio										1.1			4.1				4.7			4.7		
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					Eb/Fb/B/G/Cb					Aa/Bc					B/C			C				
Bankfull Velocity (fps)					4.2-4.4										3.9-4.3							
Bankfull Discharge (cfs)					16 - 25																	
Valley Length (ft)					1565					----												
Channel Thalweg Length (ft)					1747					----					----			1176				
Sinuosity					1.06 - 1.18					1.19					1.05-1.4			1.05-1.4				
Water Surface Slope (ft/ft)					0.015 - 0.05					0.0333					.01-.057			0.0577				
BF slope (ft/ft)					----					----					----			----				
Bankfull Floodplain Area (acres)					----					----					----			----				
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 10d. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																											
SC%/SA%/G%/C%/B%BE%																											
d16/d35/d50/d84/d95	.6-.8	2-4.4	3.6-8.7	15.9-28	66.8-																						
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																											
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																											

Table 10e. Baseline Stream Data Summary (UT 1-3 to Martin's Creek)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Gauge	Regional Curve			Pre-Existing Condition					Reference Reach(es) Data					Design			Monitoring Baseline (UT 1-3)				
Dimension and Substrate - Riffle Only		LL	UL	Eq.	Min	Mean	Med	Max	SD	Min	Mean	Med	Max	SD	Min	Max	Med	Min	Mean	Med	Max	SD
BF Width (ft)					5.0	7.5	6.9	11.4	2.7	11.7			21.7		6.0	6.5		5.1	8.0	6.8	11.4	2.5
Floodprone Width (ft)					10.3	15.4	12.6	26.2	7.3	20			410		11	100		14	77	100	100	39
BF Mean Depth (ft)					0.3	0.4	0.4	0.6	0.1	0.6			1.0		0.5	0.5		0.3	0.6	0.5	0.9	0.2
BF Max Depth (ft)					0.9	0.9	0.9	1.0	0.1	0.9			2.5				0.6	0.5	0.9	0.9	1.2	0.3
BF Cross Sectional Area (ft^2)					2.9	3.0	3.0	3.3	0.2	10.2			13.1		2.9	3.2		1.7	5.1	3.0	9.9	3.5
Width/Depth Ratio					8.6	19.9	15.6	39.7	13.6	10.7			17.0				12.5	11.9	15.5	14.3	22.7	3.8
Entrenchment Ratio					1.5	2.1	2.0	2.7	0.6	1.7			32.0		3.8	15.4		2.7	9.4	9.4	15.4	5.0
Bank Height Ratio					1.0	1.7	1.4	3.0	0.9	1.0			1.0		1.0	1.0		1.0	1.0	1.0	1.0	0.0
Profile																						
Riffle length (ft)																		7	19	18	51	10
Riffle slope (ft/ft)					0.013			0.100		0.2000			1.9000		0.0100	0.1800		0.0215	0.0457	0.0445	0.0667	0.0125
Pool length (ft)																		3.0	6.0	6.0	10.0	2.0
Pool Max depth (ft)										2.2			2.5				1.6					
Pool spacing (ft)					20.0			100.0		48.0			231.0		10.0	60.0		15.0	25.0	23.0	58.0	10.0
Pattern																						
Channel Beltwidth (ft)					22			46		16			55		26	50				40		
Radius of Curvature (ft)					14			28		28			47		15	40		30			40	
Rc:Bankfull width (ft/ft)					1.2			5.6		2			3		2.5	6.7		3.8			4.7	
Meander Wavelength (ft)					56			81		70			260		65	110		15			30	
Meander Width ratio					1.9			9.2		1.1			4.1		4.3	8.3				4.7		
Transport parameters																						
Reach Shear Stress (competency) lbs/ft^2																						
Max part size (mm) mobilized at bankfull																						
Stream Power (transport capacity) W/m^2																						
Additional Reach Parameters																						
Rosgen Classification					Eb/B/C/F					Aa/Bc					B/C			E				
Bankfull Velocity (fps)					6-Feb										3.8 - 4.9							
Bankfull Discharge (cfs)					11.0 - 14.0																	
Valley Length (ft)					1320					----												
Channel Thalweg Length (ft)					1584					----					----			2092				
Sinuosity					1.2					1.19					1.26-1.42			1.2				
Water Surface Slope (ft/ft)					0.007-0.04					0.0333					0.005-0.054			0.0161				
BF slope (ft/ft)					----					----					----			----				
Bankfull Floodplain Area (acres)					----					----					----			----				
% of Reach with Eroding Banks					----					----												
Channel Stability or Habitat Metric					----					----												
Biological or Other					----					----												

Table 10f. Baseline Stream Data Summary (Substrate, Bed, Bank, and Hydrologic Containment Parameter Distributions)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Pre-Existing Condition							Reference Reach(es) Data							Design							Monitoring Baseline						
Ri%/RU%P%G%/S%																											
SC%/SA%/G%/C%/B%BE%																											
d16/d35/d50/d84/d95	0.3	1.1	3.5	12.1	15.7																						
Entrainment Class <1.5/1.5-1.99/2.0-4.9/5.0-																											
Incision Class <1.2/1.2-1.49/1.5-1.99/>2.0																											

Table 11a. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Cross Section 1 (UT 1 Reach 4)							Cross Section 2 (UT 1 Reach 4)							Cross Section 3 (UT 1-3)							Cross Section 4 (UT 1-3)							Cross Section 5 (UT 1-3)							Cross Section 6 (UT 1-3)						
	Riffle							Riffle							Riffle							Pool							Riffle							Pool						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	11.4	11.2	11.9	11.4	11.2	11.6		11.4	11.8	11.3	11.1	11.4	11.8		6.8	6.8	6.5	6.4	6.9	7.0		7.7	7.7	7.8	7.4	8.4	7.7		8.3	9.3	7.6	7.4	7.2	6.7		9.2	8.3	9.0	7.0	9.3	6.9	
Floodprone Width (ft) (approx)	100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0	100.0		100.0	100.0	100.0	100.0	100.0	100.0		NA	NA	NA	NA	NA	NA		100.0	100.0	100.0	100.0	100.0	100.0		NA	NA	NA	NA	NA	NA	
BF Mean Depth (ft)	0.8	0.8	0.7	0.7	0.7	0.7		0.9	0.9	0.7	0.8	0.8	0.7		0.4	0.4	0.4	0.4	0.4	0.4		0.9	0.9	0.8	0.9	0.7	0.8		0.7	0.7	0.6	0.6	0.6	0.6		1.3	1.3	1.0	1.3	0.8	1.1	
BF Max Depth (ft)	1.2	1.2	1.0	1.0	1.0	1.0		1.2	1.3	1.0	1.1	1.1	1.1		0.6	0.6	0.5	0.6	0.6	0.6		2.0	1.9	1.6	1.6	1.5	1.6		1.2	1.2	1.0	1.2	0.9	0.9		2.7	2.6	2.3	2.2	1.5	1.9	
BF Cross Sectional Area (ft^2)	9.6	9.4	8.2	8.4	8.1	8.1		9.9	10.2	8.2	8.6	8.7	8.7		2.8	2.8	2.5	2.8	2.9	2.9		7.3	7.3	6.4	6.5	5.9	5.9		6.2	6.3	4.3	4.7	4.0	4.0		12.0	11.1	9.1	9.3	7.9	7.9	
Width/Depth Ratio	13.5	13.3	17.3	15.5	15.5	16.6		13.1	13.7	15.6	14.3	14.9	16.0		16.5	16.5	16.9	14.6	16.4	16.9		NA	NA	NA	NA	NA	NA		11.1	13.7	13.4	11.7	13.0	11.2		NA	NA	NA	NA	NA	NA	
Entrenchment Ratio	8.8	8.9	8.4	8.8	8.9	8.6		8.8	8.5	8.8	9.0	8.8	8.5		14.7	14.7	15.4	15.6	14.5	14.3		NA	NA	NA	NA	NA	NA		12.0	10.8	13.2	13.5	13.9	14.9		NA	NA	NA	NA	NA	NA	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.33	1.50	1.60	1.50	1.16	1.17		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	----	----	----	----	----	----		15.0	16.9	9.4	9.4	12.1	23.1		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----	

Parameter	Cross Section 7 (UT 1-3)							Cross Section 8 (UT 1-3)							Cross Section 9 (UT 1-3)							Cross Section 10 (UT 1-3)							Cross Section 11 (UT 1-3)							Cross Section 12 (UT 1-3)						
	Pool							Riffle							Pool							Pool							Riffle							Riffle						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	6.5	8.1	9.5	7.6	8.5	6.0		6.5	6.7	5.7	4.5	5.3	6.7		10.6	10.6	8.5	8.3	9.5	7.2		5.3	4.1	6.2	6.5	6.5	6.8		6.8	6.0	5.7	5.9	6.4	7.4		5.1	5.4	5.6	6.1	6.2	5.7	
Floodprone Width (ft) (approx)	NA	NA	NA	NA	NA	NA		100.0	100.0	100.0	100.0	100.0	100.0		NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		25.0	25.0	25.0	25.0	25.0	25.0		14.0	14.0	14.0	14.0	14.0	14.0	
BF Mean Depth (ft)	1.1	0.8	0.6	0.9	0.6	0.9		0.5	0.4	0.3	0.4	0.3	0.3		0.9	0.8	0.8	1.1	0.6	0.8		0.6	0.7	0.8	0.7	0.5	0.5		0.3	0.4	0.4	0.4	0.4	0.3		0.3	0.3	0.4	0.3	0.3	0.3	
BF Max Depth (ft)	2.7	2.1	1.9	1.7	1.6	1.4		0.9	0.7	0.6	0.9	0.7	0.6		2.0	1.8	1.9	2.2	1.7	1.7		1.2	1.4	1.6	2.0	1.2	0.9		0.6	0.7	0.7	0.6	0.6	0.5		0.5	0.6	0.6	0.6	0.5	0.6	
BF Cross Sectional Area (ft^2)	7.1	6.8	6.1	6.8	5.5	5.5		3.0	2.8	1.8	1.8	1.7	1.7		9.3	8.0	7.2	9.1	5.4	5.4		3.3	2.7	5.1	4.7	3.5	3.5		2.3	2.5	2.0	2.6	2.5	2.5		1.7	1.7	2.0	2.0	1.9	1.9	
Width/Depth Ratio	NA	NA	NA	NA	NA	NA		14.1	16.0	18.1	11.3	16.5	26.4		NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		20.1	14.4	16.2	13.4	16.4	21.9		15.3	17.2	15.7	18.6	20.2	17.1	
Entrenchment Ratio	NA	NA	NA	NA	NA	NA		15.4	14.9	17.5	22.2	18.9	14.9		NA	NA	NA	NA	NA	NA		NA	NA	NA	NA	NA	NA		3.7	4.2	4.4	4.2	3.9	3.4		2.7	2.6	2.5	2.3	2.3	2.5	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.20		1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----	

Table 11b. Monitoring Data - Stream Reach Data Summary
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Baseline (UT 1-3)					MY-1 (UT 1-3)					MY-2 (UT 1-3)					MY-3 (UT 1-3)					MY-4 (UT 1-3)					MY-5 (UT 1-3)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)	5.1	8.0	6.8	11.4	2.5	5.4	8.2	6.8	11.8	2.6	5.6	7.8	6.5	11.9	2.7	4.5	7.5	6.4	11.4	2.7	5.3	7.8	6.9	11.4	2.5	5.7	8.1	7.0	11.8	2.5
Floodprone Width (ft)	14	77	100	100	39	14	77	100	100	39	14	77	100	100	39	14	77	100	100	39	14	77	100	100	39	14	77	100	100	39
BF Mean Depth (ft)	0.3	0.6	0.5	0.9	0.2	0.3	0.6	0.4	0.9	0.2	0.3	0.5	0.4	0.7	0.2	0.3	0.5	0.4	0.8	0.2	0.3	0.5	0.4	0.8	0.2	0.3	0.5	0.4	0.7	0.2
BF Max Depth (ft)	0.5	0.9	0.9	1.2	0.3	0.6	0.9	0.7	1.3	0.3	0.5	0.8	0.7	1.0	0.2	0.6	0.9	0.9	1.2	0.3	0.5	0.8	0.7	1.1	0.2	0.5	0.8	0.6	1.1	0.2
BF Cross Sectional Area (ft^2)	1.7	5.1	3.0	9.9	3.5	1.7	5.1	2.8	10.2	3.5	1.8	4.1	2.5	8.2	2.9	1.8	4.4	2.8	8.6	2.9	1.7	4.3	2.9	8.7	2.9	1.7	4.3	2.9	8.7	2.9
Width/Depth Ratio	11.9	15.5	14.3	22.7	3.8	13.1	15.3	15.0	18.0	2.0	12.7	15.6	16.1	19.0	2.1	11.3	15.0	14.8	20.3	3.0	13.0	16.1	16.4	20.2	2.2	11.2	18.0	16.9	26.4	4.8
Entrenchment Ratio	2.7	9.4	9.4	15.4	5.0	2.6	9.2	9.2	14.9	4.7	2.5	10.0	10.0	17.5	5.6	2.3	10.8	10.8	22.2	6.9	2.3	10.2	10.2	18.9	6.0	2.5	9.6	9.6	14.9	5.3
Bank Height Ratio	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.1	1.0	1.2	0.1
Profile																														
Riffle length (ft)	4	20	19	41	8.9	4	20	20	44	9	4.1	22.2	22.7	63.5	11.5	2	19	19	38	7	4	21	21	43	8	3.5	18.5	18.1	33.3	7
Riffle slope (ft/ft)	0.0000	0.0185	0.0166	0.0550	0.0145	0.0000	0.0209	0.0183	0.0578	0.0153	0.0000	0.0163	0.0154	0.0418	0.0123	0.0000	0.0197	0.0197	0.0715	0.01	0.0000	0.0118	0.0142	0.0495	0.0132	0.0000	0.0187	0.0178	0.0755	0.0154
Pool length (ft)	3	14	12	33	9	3	16	12	37	10	3	13	10	30	8	3	16	12	49	10	3	12	15	35	9	3	14	11	35	9
Pool Max depth (ft)	1.2	2.1	2.0	2.7	0.6	1.4	2.0	1.9	2.6	0.4	1.6	1.9	1.9	2.3	0.3	1.6	1.9	2.0	2.2	0.3	1.2	1.5	1.5	1.7	0.2	0.9	1.5	1.6	1.9	0.4
Pool spacing (ft)	7	34	31	63	15	7	34	33	75	16	7	35	35	71	15	9	33	30	67	16	7	33	33	72	16	6	32	30	61	15
Pattern																														
Channel Beltwidth (ft)	26			50																										
Radius of Curvature (ft)	15			40																										
Rc:Bankfull width (ft/ft)	2.5			6.7																										
Meander Wavelength (ft)	65			110																										
Meander Width ratio	4.3			8.3																										
Additional Reach Parameters																														
Rosgen Classification	E-type					E-type					E-type					E-type					E-type					E-type				
Channel Thalweg Length (ft)	2092					2099					1833					1847					1851					1848				
Sinuosity	1.3					1.3					1.3					1.3					1.3					1.3				
Water Surface Slope (Channel) (ft/ft)	0.0161					0.0162					0.0174					0.017					0.0166					0.0159				
BF slope (ft/ft)	-----					-----					-----					-----					-----					-----				
Ri%/RU%/P%/G%/S%																														
SC%/SA%/G%/C%/B%/BE%																														
d16/d35/d50/d84/d95																														
% of Reach with Eroding Banks																														
Channel Stability or Habitat Metric																														
Biological or Other																														

Table 11c. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Cross Section 13 (UT 1 Reach 4) Riffle							Cross Section 14 (UT 1 Reach 4) Riffle							Cross Section 15 (UT 1 Reach 4) Pool							Cross Section 16 (UT 1 Reach 4) Riffle							Cross Section 17 (UT 1 Reach 4) Pool						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	6.6	6.6	6.6	6.3	6.2	4.5		6.4	6.3	6.1	5.7	6.5	6.4		13.4	13.6	12.4	7.0	13.2	13.9		8.4	8.6	7.4	6.8	7.2	6.9		9.7	9.9	7.8	8.1	9.4	10.2	
Floodprone Width (ft) (approx)	25.0	25.0	25.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0	25.0	25.0		NA	NA	NA	NA	NA	NA		25.0	25.0	25.0	25.0	25.0	25.0		NA	NA	NA	NA	NA	NA	
BF Mean Depth (ft)	0.6	0.5	0.5	0.4	0.4	0.5		0.5	0.5	0.4	0.5	0.5	0.5		0.8	0.8	0.5	0.8	0.4	0.4		0.8	0.7	0.7	0.7	0.7	0.7		1.4	1.4	1.4	1.5	1.0	0.9	
BF Max Depth (ft)	0.9	0.9	0.9	0.9	0.7	0.9		0.8	0.8	0.6	0.7	0.8	0.7		2.1	2.1	1.4	1.5	1.2	1.2		1.2	1.2	1.0	1.1	1.0	1.1		2.4	2.7	2.7	3.1	2.0	1.7	
BF Cross Sectional Area (ft^2)	3.8	3.3	3.0	2.8	2.2	2.2		3.2	2.9	2.7	3.0	3.2	3.2		10.9	10.2	6.2	5.6	4.9	4.9		6.4	6.1	4.9	4.8	4.7	4.7		13.2	13.9	10.6	12.1	9.5	9.5	
Width/Depth Ratio	11.5	13.2	14.5	14.2	17.5	9.2		12.8	13.7	13.8	10.8	13.2	12.8		NA	NA	NA	NA	NA	NA		11.0	12.1	11.2	9.6	11.0	10.1		NA	NA	NA	NA	NA	NA	
Entrenchment Ratio	3.8	3.8	3.8	4.0	4.0	5.6		3.9	4.0	4.1	4.4	3.8	3.9		NA	NA	NA	NA	NA	NA		3.0	2.9	3.4	3.7	3.5	3.6		NA	NA	NA	NA	NA	NA	
Bank Height Ratio	1.33	1.44	1.33	1.55	1.71	1.44		1.0	1.0	1.0	1.0	1.0	1.14		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0	1.0	1.0	
d50 (mm)	----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----		----	----	----	----	----	----	

Table 11d. Monitoring Data - Stream Reach Data Summary
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Baseline (UT 1 Reach 4)					MY-1 (UT 1 Reach 4)					MY-2 (UT 1 Reach 4)					MY-3 (UT 1 Reach 4)					MY-4 (UT 1 Reach 4)					MY-5 (UT 1 Reach 4)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)	6.4	7.1	6.6	8.4	1.1	6.3	7.2	6.6	8.6	1.3	6.1	6.7	6.6	7.4	0.7	5.7	6.3	6.3	6.8	0.6	6.2	6.6	6.5	7.2	0.5	4.5	5.9	6.4	6.9	1.3
Floodprone Width (ft)	25	25	25	25	0	25	25	25	25	0	25	25	25	25	0	25	25	25	25	0	25	25	25	25	0	25	25	25	25	0
BF Mean Depth (ft)	0.5	0.6	0.6	0.8	0.2	0.5	0.6	0.5	0.7	0.1	0.4	0.5	0.5	0.7	0.2	0.4	0.5	0.5	0.7	0.2	0.4	0.5	0.5	0.7	0.1	0.4	0.6	0.5	0.7	0.1
BF Max Depth (ft)	0.8	1.0	0.9	1.2	0.2	0.8	1.0	0.9	1.2	0.2	0.6	0.8	0.9	1.0	0.2	0.7	0.9	0.9	1.1	0.2	0.7	0.8	0.8	1.0	0.2	0.7	0.9	0.9	1.1	0.2
BF Cross Sectional Area (ft^2)	3.2	4.5	3.8	6.4	1.7	2.9	4.1	3.3	6.1	1.7	2.7	3.5	3.0	4.9	1.2	2.8	3.5	3.0	4.8	1.1	2.2	3.4	3.2	4.7	1.3	2.2	3.4	3.2	4.7	1.3
Width/Depth Ratio	10.5	11.4	11.0	12.8	1.2	12.3	12.7	12.6	13.2	0.5	10.6	13.0	13.2	15.3	2.3	9.7	12.3	11.4	15.8	3.1	11.0	13.9	13.2	17.5	3.3	9.2	10.7	10.1	12.8	1.9
Entrenchment Ratio	1.5	1.5	1.5	1.6	0.1	2.9	3.6	3.6	4.0	0.6	3.4	3.8	3.8	4.1	0.4	3.7	4.0	4.0	4.4	0.4	3.5	3.8	3.8	4.0	0.3	3.6	4.4	4.4	5.6	1.0
Bank Height Ratio	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	0.0	1.0	1.2	1.10	1.44	0.2
Profile - Upstream																														
Riffle length (ft)	5	21	20	40	8	3	23	22	43	9	0.4	5.8	4.1	20.9	4.9	3	22	22	40	11	4	19	16	57	13	3.3	20.6	19	54.6	12.1
Riffle slope (ft/ft)	0.0009	0.0166	0.0148	0.0337	0.0111	0.0000	0.0161	0.0192	0.0426	0.0131	0.0031	0.1220	0.0556	1.0788	0.2138	0.0001	0.0197	0.0151	0.0516	0.01	0.0000	0.0209	0.0180	0.0463	0.0145	0.0000	0.0160	0.0142	0.0482	0.0142
Pool length (ft)	8	22	22	37	10	6	19	18	34	8	21	40	39	57	11	5	18	18	32	8	8	22	20	51	10	5	20	20	38	8
Pool Max depth (ft)	2.1	2.3	2.3	2.4	0.2	2.1	2.4	2.4	2.7	0.4	1.4	2.1	2.1	2.7	0.9	1.5	2.3	2.3	3.1	1.1	1.2	1.6	1.6	2.0	0.6	1.2	1.5	1.5	1.7	0.4
Pool spacing (ft)	27	42	40	61	11	15	40	42	57	12	23	46	49	66	11	5	37	39	61	16	10	39	41	67	17	7	40	38	66	16
Pattern																														
Channel Beltwidth (ft)			40																											
Radius of Curvature (ft)	30			40																										
Rc:Bankfull width (ft/ft)	3.8			4.7																										
Meander Wavelength (ft)	15			30																										
Meander Width ratio			4.7																											
Additional Reach Parameters																														
Rosgen Classification	B/C - Type					Cb-Type					Cb-Type					Cb-Type					Cb-Type					Cb-Type				
Channel Thalweg Length (ft)	781					786					1107					1113					1072					1098				
Sinuosity	1.2					1.2					1.2					1.2					1.2					1.2				
Water Surface Slope (Channel) (ft/ft)	0.0135					0.0123					0.0116					0.012					0.0117					0.0118				
BF slope (ft/ft)	-----					-----					-----					-----					-----					-----				
Ri%/RU%/P%/G%/S%																														
SC%/SA%/G%/C%/B%/BE%																														
d16/d35/d50/d84/d95																														
% of Reach with Eroding Banks																														
Channel Stability or Habitat Metric																														
Biological or Other																														

Table 11e. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters - Cross Sections)
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Cross Section 18 (UT 1 Reach 2) Riffle							Cross Section 19 (UT 1 Reach 2) Riffle						
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY5+	MY0	MY1	MY2	MY3	MY4	MY5	MY5+
BF Width (ft)	8.0	7.9	8.2	7.8	8.0	8.2		8.7	8.0	8.6	8.3	8.3	8.9	
Floodprone Width (ft) (approx)	25.0	25.0	25.0	25.0	25.0	25.0		25.0	25.0	25.0	25.0	25.0	25.0	
BF Mean Depth (ft)	0.7	0.7	0.6	0.6	0.6	0.5		0.7	0.6	0.7	0.9	0.9	0.8	
BF Max Depth (ft)	1.1	1.1	0.9	0.9	0.9	0.9		1.1	1.0	1.0	1.6	1.6	1.6	
BF Cross Sectional Area (ft^2)	5.2	5.5	4.7	4.4	4.5	4.5		5.9	5.0	5.8	7.3	7.3	7.3	
Width/Depth Ratio	12.3	11.3	14.3	13.8	14.2	14.9		12.8	12.8	12.8	9.4	9.4	10.9	
Entrenchment Ratio	3.1	3.2	3.0	3.2	3.1	3.0		2.9	3.1	2.9	3.0	3.0	2.8	
Bank Height Ratio	1.0	1.0	1.0	1.0	1.0	1.1		1.0	1.0	1.0	1.1	1.1	1.0	
d50 (mm)	----	----	----	----	----	----		----	----	----	----	----	----	

Table 11f. Monitoring Data - Stream Reach Data Summary
Martin's Creek II Mitigation Project - DMS Project Number 92633

Parameter	Baseline (UT 1 Reach 2)					MY-1 (UT 1 Reach 2)					MY-2 (UT 1 Reach 2)					MY-3 (UT 1 Reach 2)					MY-4 (UT 1 Reach 2)					MY-5 (UT 1 Reach 2)				
Dimension and Substrate - Riffle Only	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**	**Min**	**Mean**	**Med**	**Max**	**SD**
BF Width (ft)	8.0			8.7		7.9			8		8.2			8.6		7.8			8.3		7.5			8		8.2			8.9	
Floodprone Width (ft)		25					25					25					25					25					25			
BF Mean Depth (ft)		0.7				0.6			0.7		0.6			0.7		0.6			0.9		0.6			0.8		0.9			1.6	
BF Max Depth (ft)		1.1				1.0			1.1		0.9			1.0		0.9			1.6		0.9			1.4		0.9			1.6	
BF Cross Sectional Area (ft^2)	5.2			5.9		5.0			5.5		4.7			5.8		4.4			7.3		4.5			6.2		4.5			7.3	
Width/Depth Ratio	12.3			12.8		11.4			12.5		12.7			14.3		9.4			13.7		9.2			14.0		10.7			15.0	
Entrenchment Ratio	2.9			3.1		3.1			3.2		2.9			3.1		3.0			3.2		3.1			3.3		2.8			3.1	
Bank Height Ratio		1.0					1.0					1.0				1.0			1.1		1.0			1.1		1.0			1.1	
Profile																														
Riffle length (ft)	7	19	18	51	10	4	16	12	37	9	4.3	16.5	12.8	46.7	9.4	4	13	11	37	8	3	10	13	35	8	3	14.5	11.8	34.9	7.8
Riffle slope (ft/ft)	0.0215	0.0457	0.0445	0.0667	0.0125	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	NA*	0.0000	0.0386	0.0396	0.1171	0.03	0.0000	0.0382	0.0406	0.1209	0.0257	0.0000	0.0737	0.0383	0.1077	0.0222
Pool length (ft)	3	6	6	10	2	3	6	5	12	2	3	6	6	14	2	2	8	7	17	3	3	8	7	16	3	3	8	7	25	4
Pool Max depth (ft)																														
Pool spacing (ft)	15	25	23	58	10	9	22	19	45	9	9	24	19	55	11	9	21	17	46	9	6	17	19	41	8	6	21	19	41	8
Pattern																														
Channel Beltwidth (ft)			40																											
Radius of Curvature (ft)	30			40																										
Rc:Bankfull width (ft/ft)	3.8			4.7																										
Meander Wavelength (ft)	15			30																										
Meander Width ratio			4.7																											
Additional Reach Parameters																														
Rosgen Classification	C - Type					C - Type					C - Type					C - Type					C - Type					C - Type				
Channel Thalweg Length (ft)	1176					1167					1176					1169					1169					1167				
Sinuosity	1.2					1.2					1.2					1.2					1.2					2.2				
Water Surface Slope (Channel) (ft/ft)	0.0577					NA*					0.0582					0.0578					0.0576					0.0579				
BF slope (ft/ft)	-----					-----					-----					-----					-----					-----				
Ri%/RU%P%G%/S%																														
SC%/SA%/G%/C%/B%BE%																														
d16/d35/d50/d84/d95																														
% of Reach with Eroding Banks																														
Channel Stability or Habitat Metric																														
Biological or Other																														

NA* No water in channel during field surveys.

APPENDIX E

HYDROLOGY DATA

Table 12. Verification of Bankfull Events

Table 13. Wetland Hydrology Criteria Attainment Summary

Figure E1. Martin's Creek II 30-70 Percentile Graph for Rainfall

Groundwater Gauge Graphs

Sample Time-Lapse Photos from MC UT1R2

Table 12. Verification of Bankfull Events
Martin's Creek II Mitigation Site (DMS Project Number 92633)

Date of Data Collection	Date of Occurrence	Method	Photo (if available)
August 25, 2014	April 7, 2014	Crest gauge data indicates a bankfull event after approximately 2.4 inches of rain documented in one day at an onsite rain gauge.	---
August 25, 2014	July 1, 2014	Crest gauge data indicates a bankfull event after approximately 2.02 inches of rain was documented over two days at an onsite rain gauge.	---
August 25, 2014	August 24, 2014	Crest gauge data indicates a bankfull event after approximately 1.39 inches of rain documented over two days at an onsite rain gauge.	---
October 27, 2014	September 3, 2014	Crest gauge data indicates a bankfull event after approximately 1.67 inches of rain documented in one day at an onsite rain gauge.	---
October 27, 2014	October 14, 2014	Crest gauge data and laid back vegetation indicate a bankfull event after approximately 2.5 inches of rain documented in one day at an onsite rain gauge.	1
April 12, 2015	November 17, 2014	Crest gauge data indicates a bankfull event after approximately 1.44 inches of rain documented in one day at an onsite rain gauge.	---
July 13, 2015	June 11, 2015	Crest gauge data indicates a bankfull event after approximately 1.68 inches of rain documented in one day at an onsite rain gauge.	---
July 13, 2015	June 26, 2015	Crest gauge data indicates a bankfull event after approximately 1.57 inches of rain was documented in one day at an onsite rain gauge.	---
September 11, 2015	August 19, 2015	Crest gauge data indicates a bankfull event after approximately 2.94 inches of rain was documented over three days at an onsite rain gauge.	---
November 18, 2015	September 26, 2015	Crest gauge data indicates a bankfull event after approximately 2.65 inches of rain was documented over two days at an onsite rain gauge.	---
November 18, 2015	October 3, 2015	Crest gauge data indicates a bankfull event after approximately 4.50 inches of rain was documented over three days at an onsite rain gauge.	---
August 22, 2016	June 5, 2016	Crest gauge data, floodplain scour, and laid back vegetation indicate a bankfull event after approximately 2.28 inches of rain was documented over two days at an onsite rain gauge.	2
August 29, 2017	June 23, 2017	Crest gauge data indicates a bankfull event after approximately 1.85 inches of rain was documented in one day at an onsite rain gauge.	--
November 8, 2017	October 8, 2017	Crest gauge data indicates a bankfull event after approximately 1.97 inches of rain was documented in one day at an onsite rain gauge.	--
September 25, 2018	August 2, 2018	Crest gauge data indicates a bankfull event after approximately 3.47 inches of rain was documented over three days at a nearby rain gauge.	---
September 25, 2018	August 11, 2018	Crest gauge data indicates a bankfull event after approximately 2.94 inches of rain was documented over three days at a nearby rain gauge.	---
September 25, 2018	August 31, 2018	Crest gauge data indicates a bankfull event after an approximately 2.86-inch rain event documented over three days at a nearby rain gauge.	3-4

Photo 1: Laid back vegetation after a bankfull event

Photo 2: Scour and laid back vegetation after a bankfull event

Photos 3-4: Wrack after bankfull events

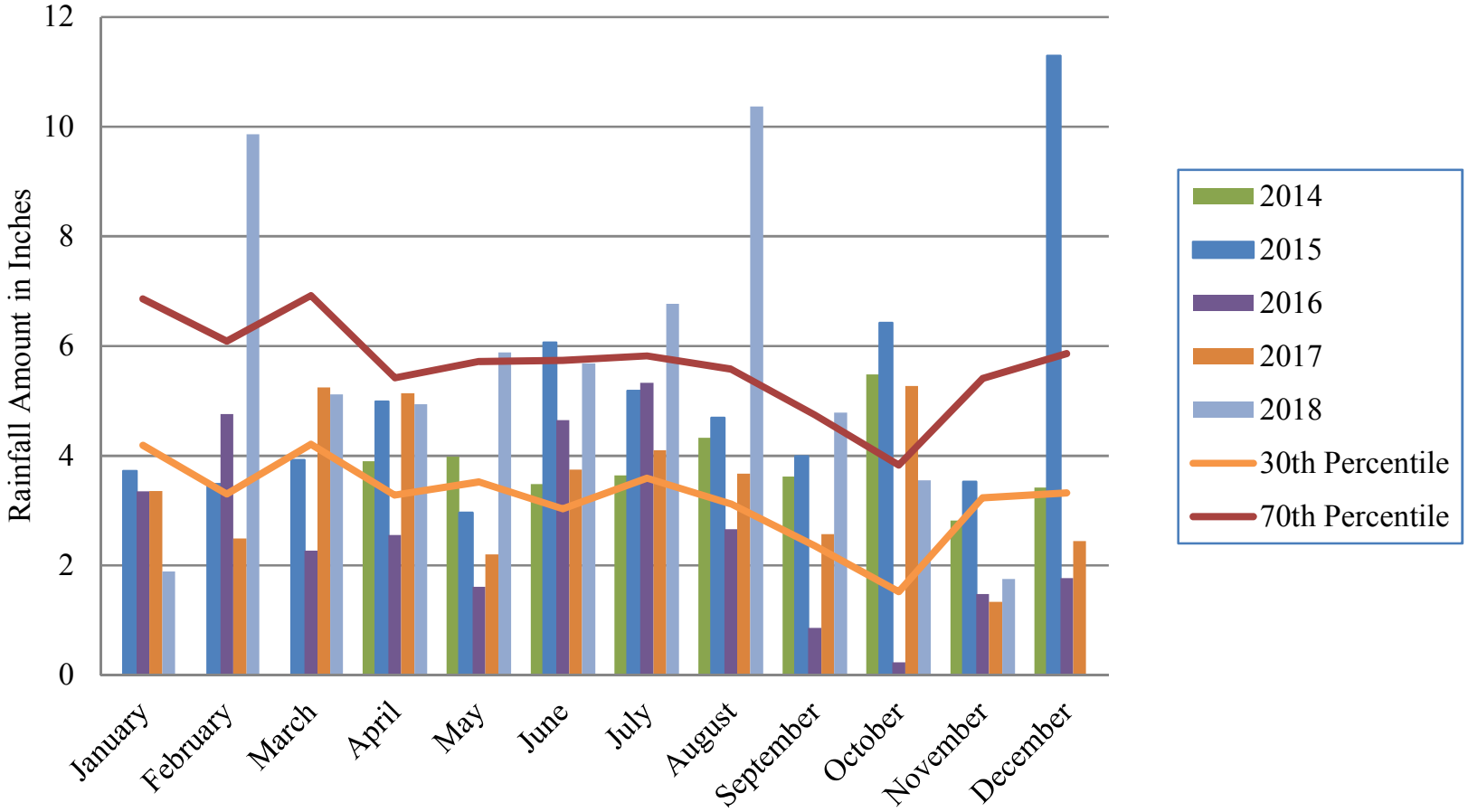
Table 13. Wetland Hydrology Criteria Attainment Summary
Martin's Creek II Mitigation Site (DMS Project Number 92633)

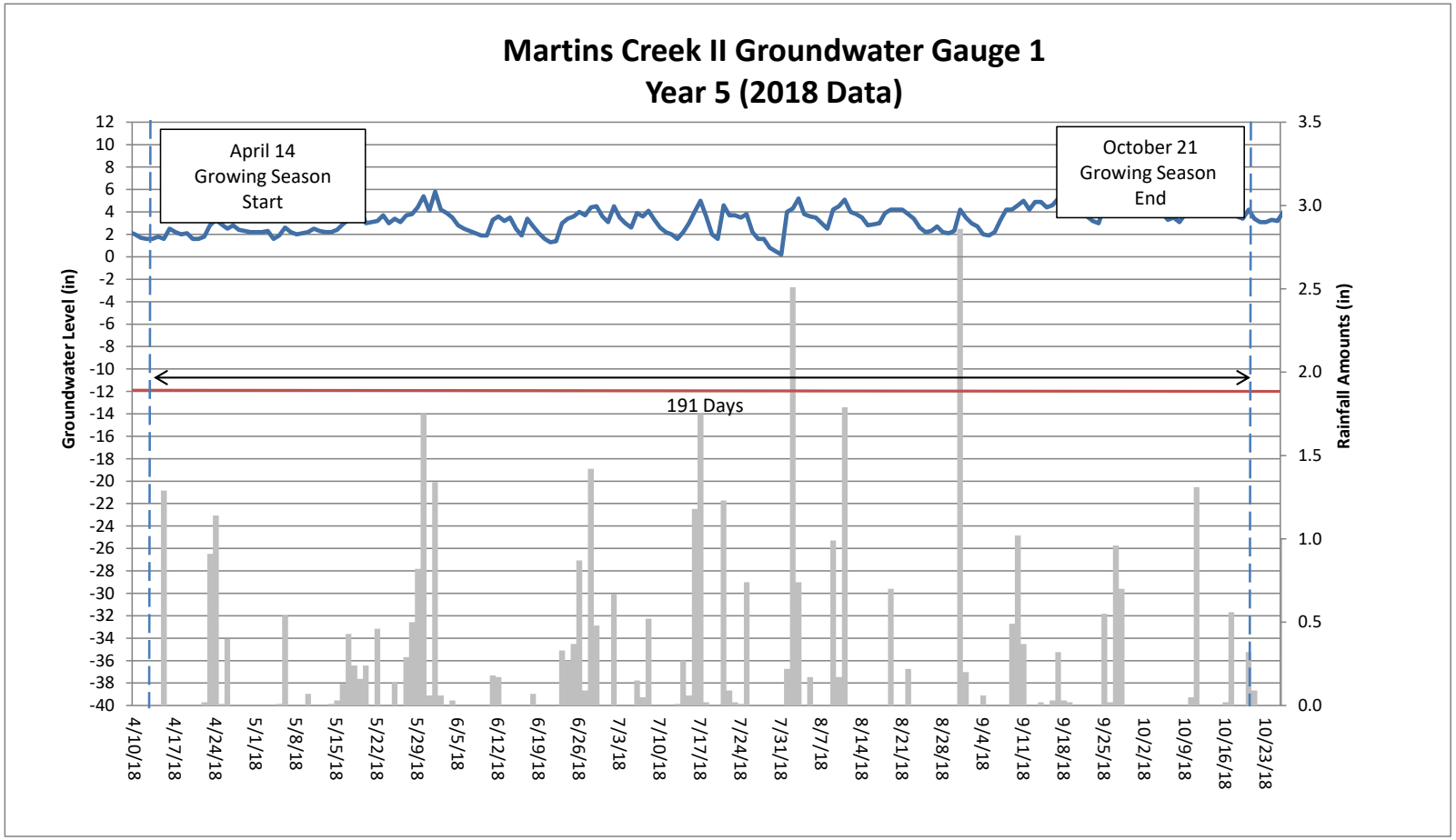
Gauge	Success Criteria Achieved/Max Consecutive Days During Growing Season (Percentage)				
	Year 1 (2014)	**Year 2 (2015)**	**Year 3 (2016)**	**Year 4 (2017)**	**Year 5 (2018)**
1	Yes/75 Days (39%)	Yes/118 Days (61.8%)	Yes/49 Days (25.7%)	Yes/137 Days (71.7%)	Yes/191 Days (100%)
2	No/21 Days (11%)	Yes/36 Days (18.8%)	No/12 Days (6.3%)	Yes*/42 Days (22.0%)	Yes/107 Days (56.0%)
3	Yes/52 Days (27%)	Yes/72 Days (37.7%)	Yes/45 Days (23.6%)	Yes/58 Days (30.4%)	Yes/191 Days (100%)
4	No/21 Days (11%)	Yes/27 Days (14.1%)	No/12 Days (6.3%)	No/31 Days (16.2%)	Yes/74 Days (38.7%)
5	No/15 Days (7.8%)	Yes/25 Days (13.1%)	No/12 Days (6.3%)	No/23 Days (12.0%)	Yes/82 Days (42.9%)
6	Yes/58 Days (30%)	Yes/69 Days (36.1%)	Yes/47 Days (24.6%)	Yes/58 Days (30.4%)	Yes/78 Days (40.8%)
7	Yes/85 Days (44%)	Yes/69 Days (36.1%)	Yes/27 Days (14.1%)	Yes/99 Days (51.8%)	Yes/191 Days (100%)
8	Yes/65Days (34%)	Yes/72 Days (37.7%)	Yes/45 Days (23.6%)	Yes/55 Days (28.8%)	Yes/191 Days (100%)
9	No/22 Days (11.5%)	Yes/27 Days (14.1%)	Yes/27 Days (14.1%)	No/24 Days (12.6%)	Yes/63 Days (33.0%)
10	No/24 Days (12.5%)	Yes/28 Days (14.7%)	No/12 Days (6.3%)	No/31 Days (16.2%)	No/29 Days (15.2%)
11	No/18 Days (9%)	No/22 Days (11.5%)	No/7 Days (3.7%)	No**/16 Days (8.4%)	No/32 Days (16.8%)
12	No/20 Days (10%)	Yes/27 Days (14.1%)	No/12 Days (6.3%)	Yes/38 Days (20%)	Yes/191 Days (100%)
13	Yes/116 Days (61%)	Yes/117 Days (61.2%)	Yes/66 Days (34.6%)	Yes/96 Days (50.3%)	Yes/191 Days (100%)

*This gauge malfunctioned on July 1, 2017 and was replaced on August 30, 2017. The new gauge collected data for just 6 days before malfunctioning again for the remainder of the growing season; however, it was saturated/inundated for 42 days prior to its malfunction.
**This gauge malfunctioned on August 29, 2017 resulting in loss of data for the remainder of the growing season. The gauge had not met success criteria prior to its malfunction, and it is not expected to have met success criteria during the period of its malfunction.

Figure E1: Martin's Creek II 30-70 Percentile Graph vs. Onsite Rainfall

Data from WETS Station : MURPHY, NC 6001




Martins Creek II Groundwater Gauge 1
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
191 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
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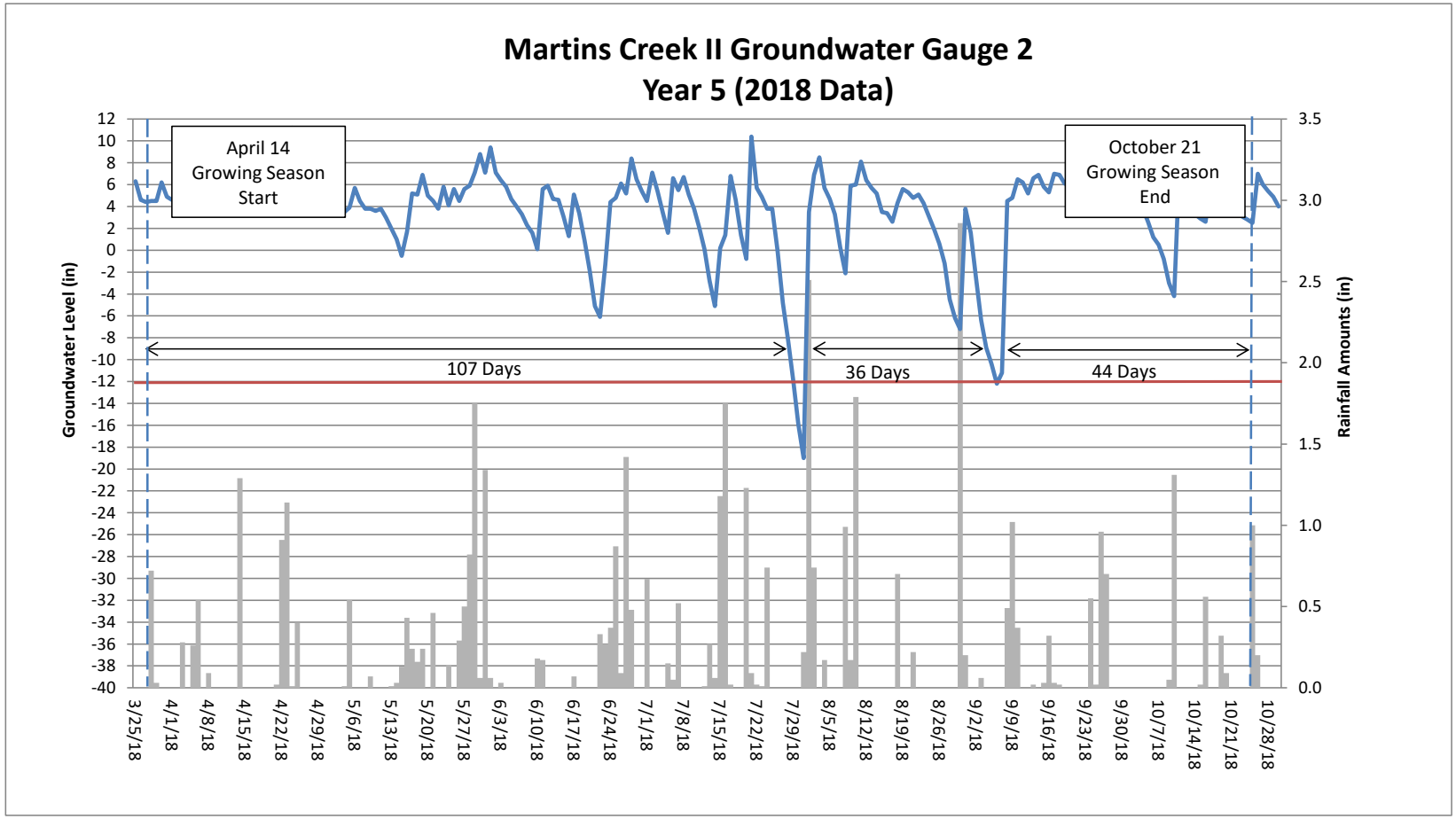
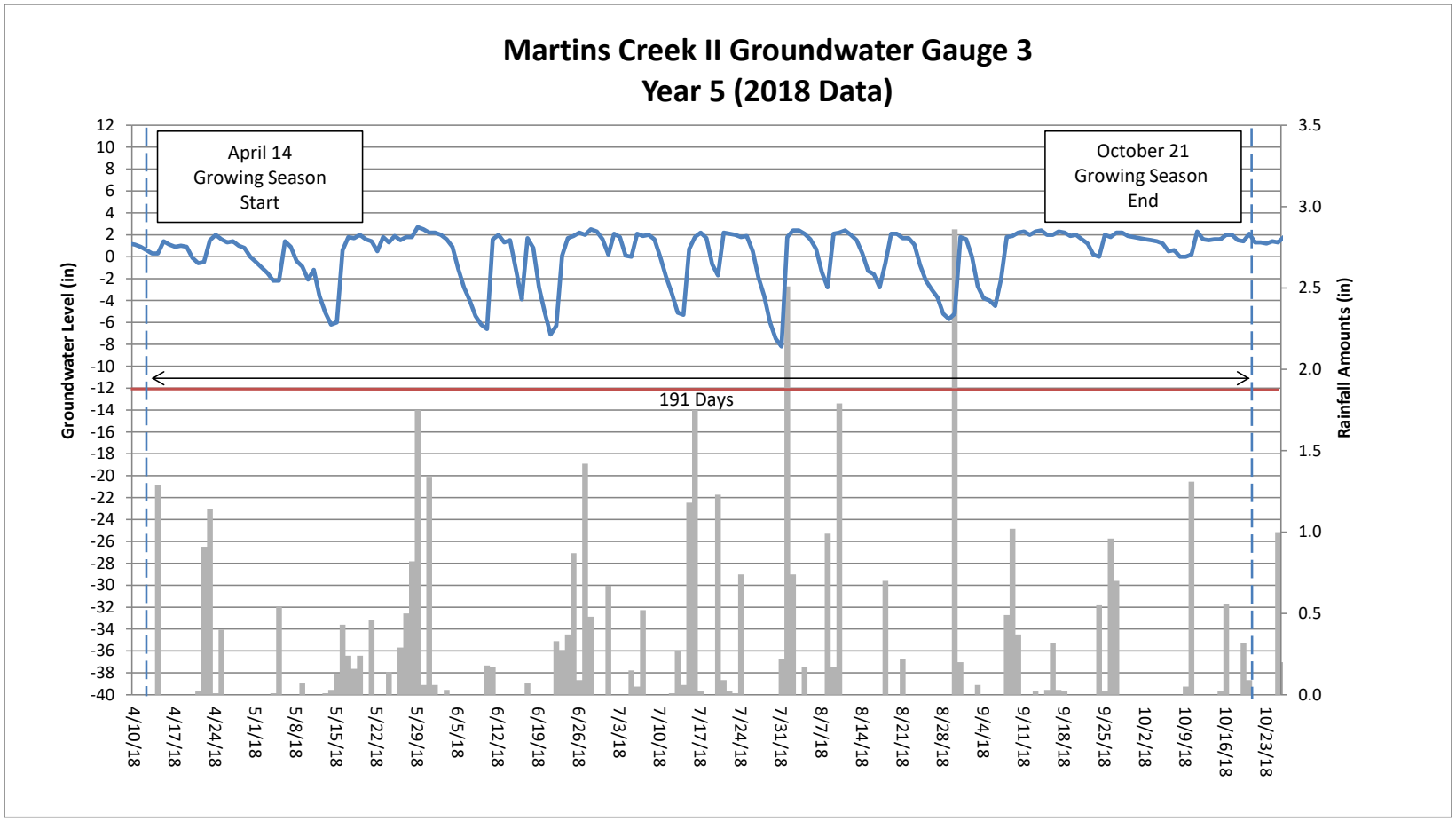
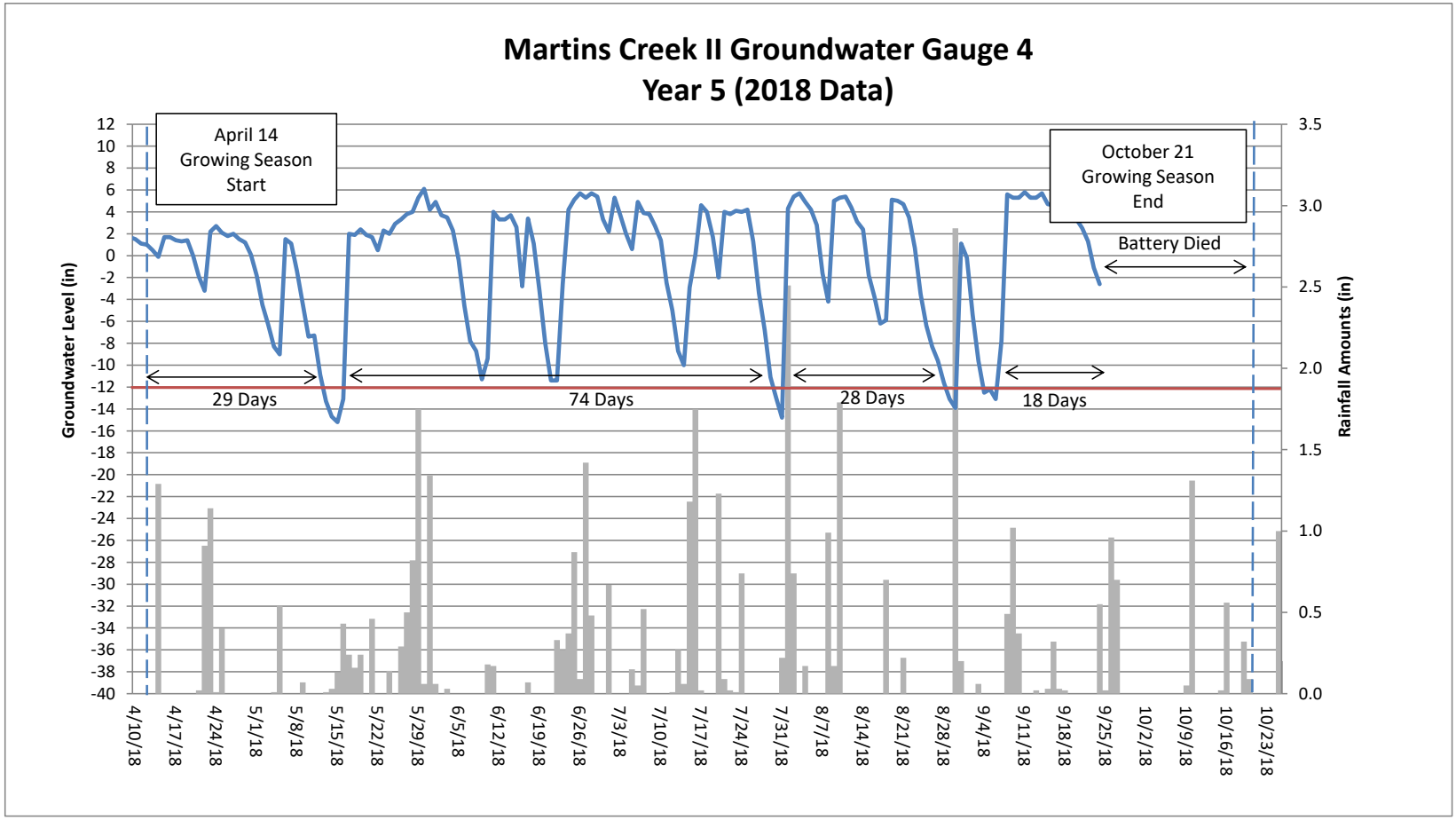
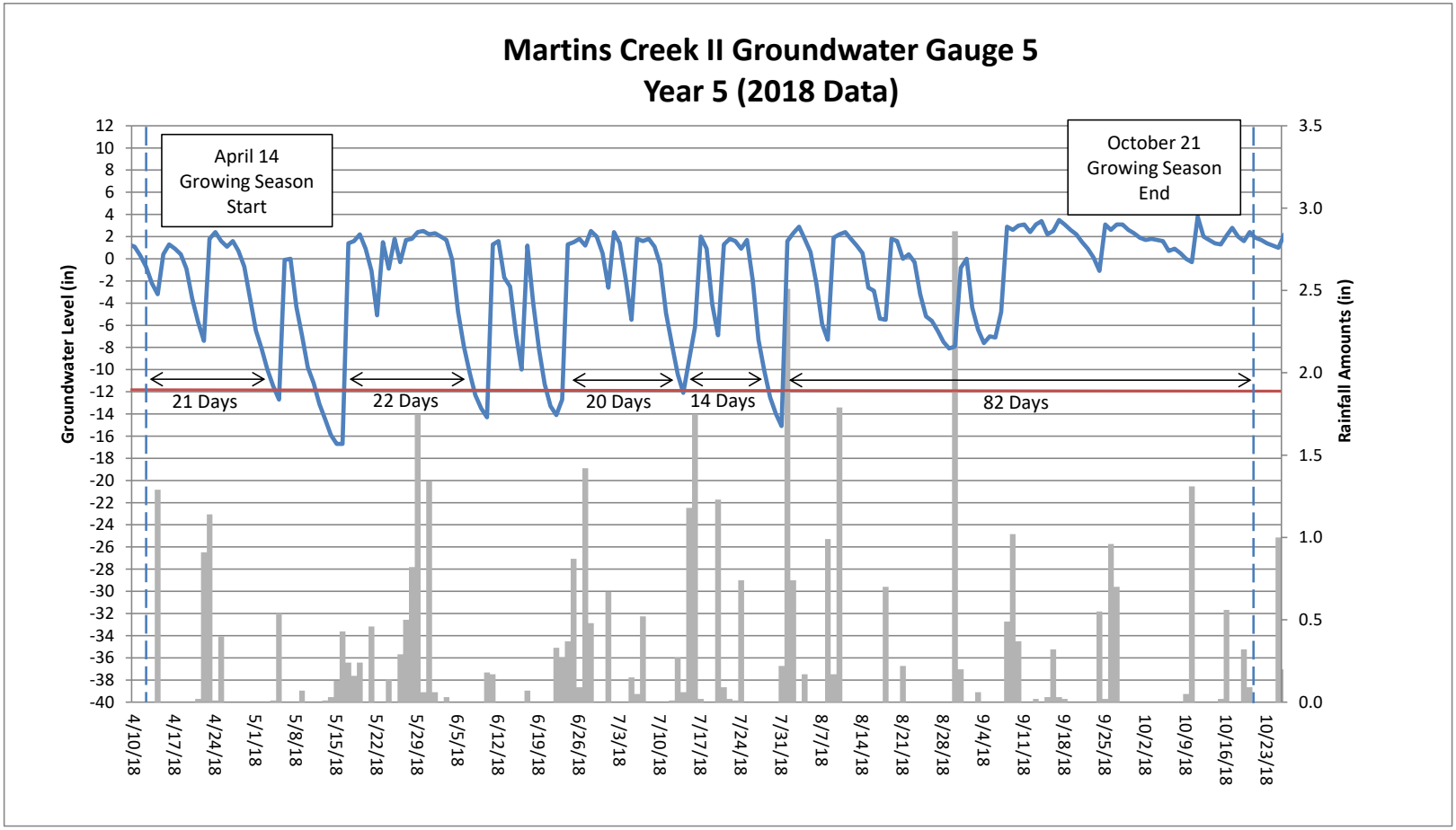
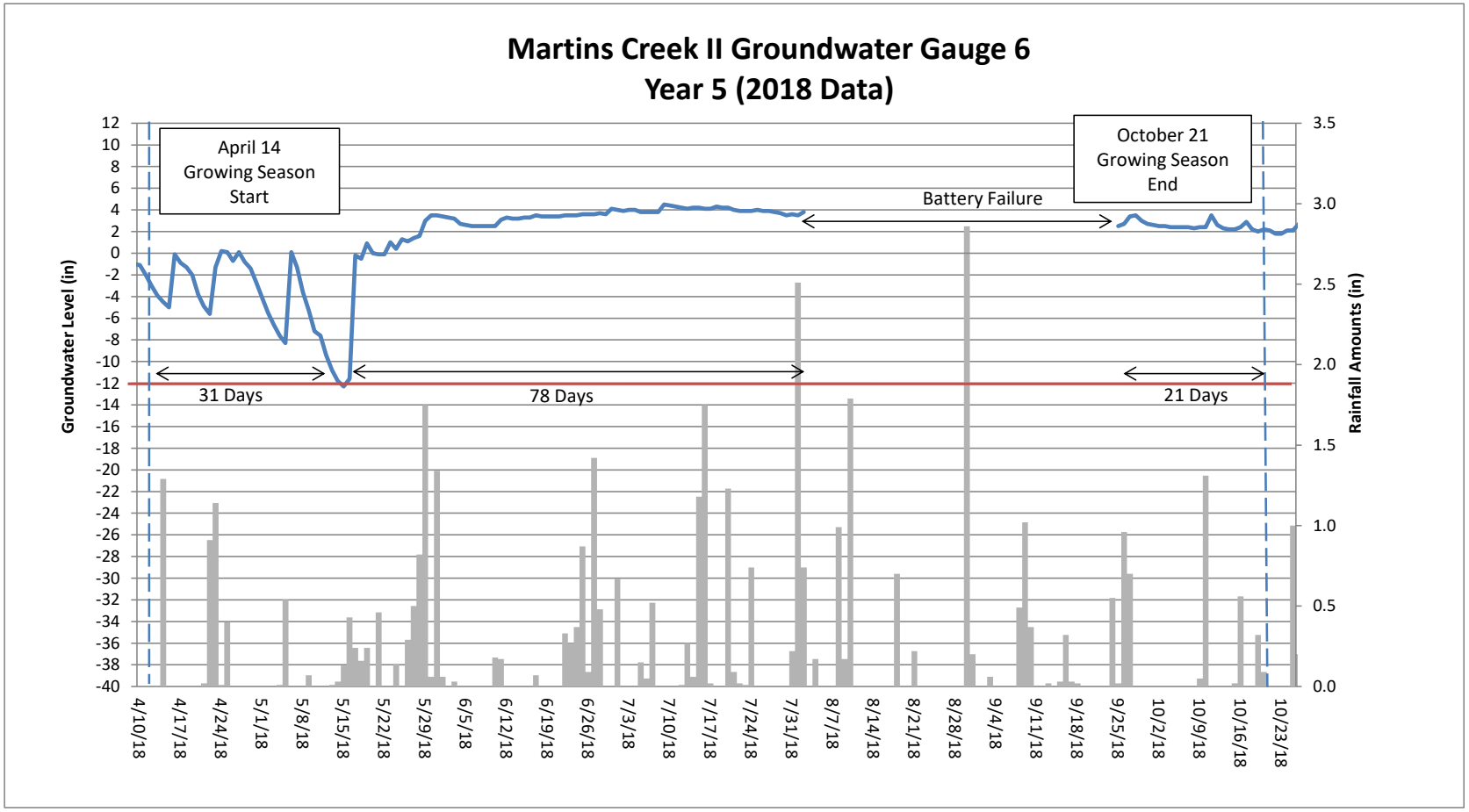
10/16/18
10/23/18

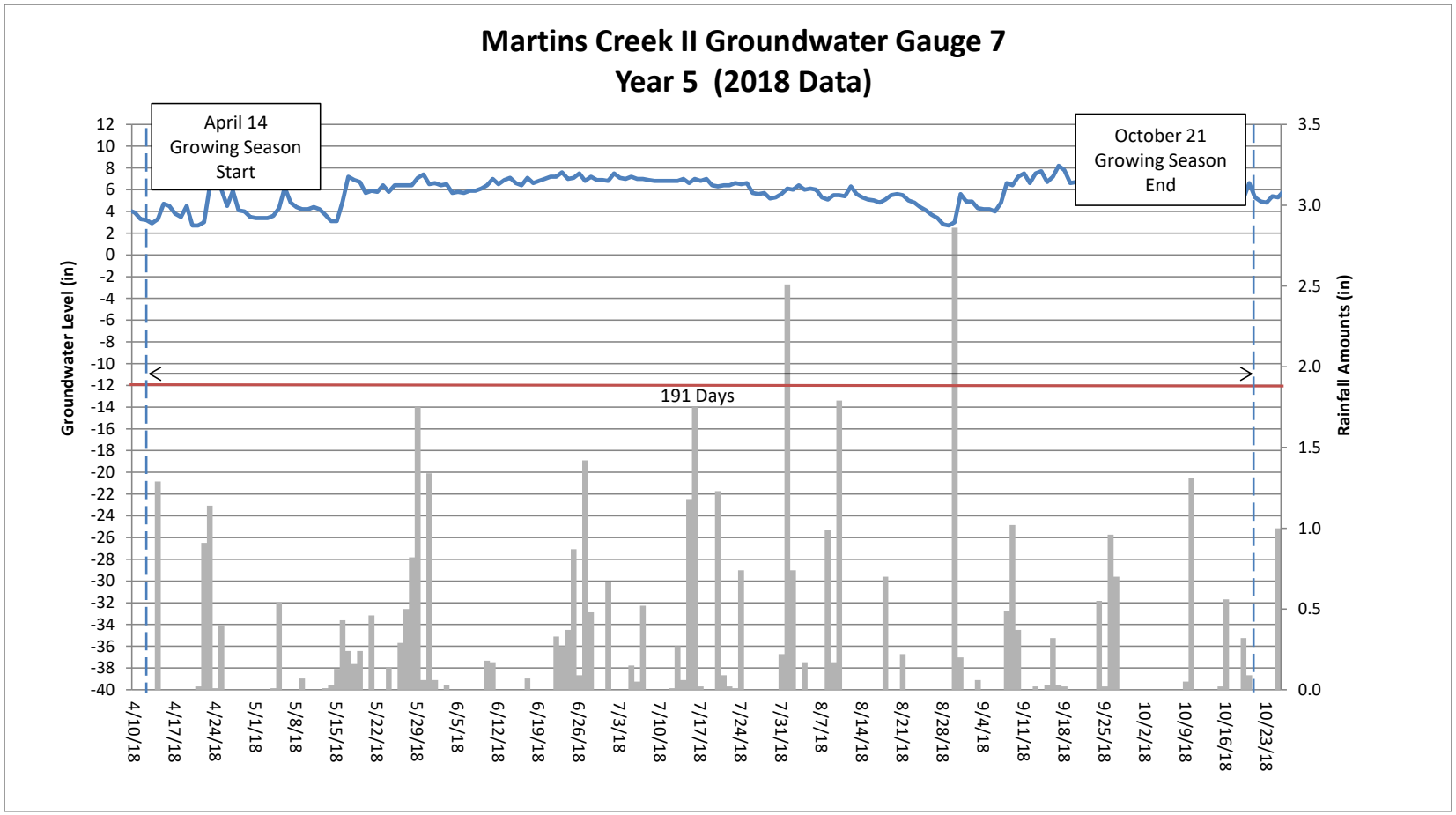

Martins Creek II Groundwater Gauge 2
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
107 Days
36 Days
44 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
3/25/18
4/1/18
4/8/18
4/15/18
4/22/18
4/29/18
5/6/18
5/13/18
5/20/18
5/27/18
6/3/18
6/10/18
6/17/18
6/24/18
7/1/18
7/8/18
7/15/18
7/22/18
7/29/18
8/5/18
8/12/18
8/19/18
8/26/18
9/2/18
9/9/18
9/16/18
9/23/18
9/30/18
10/7/18
10/14/18
10/21/18
10/28/18

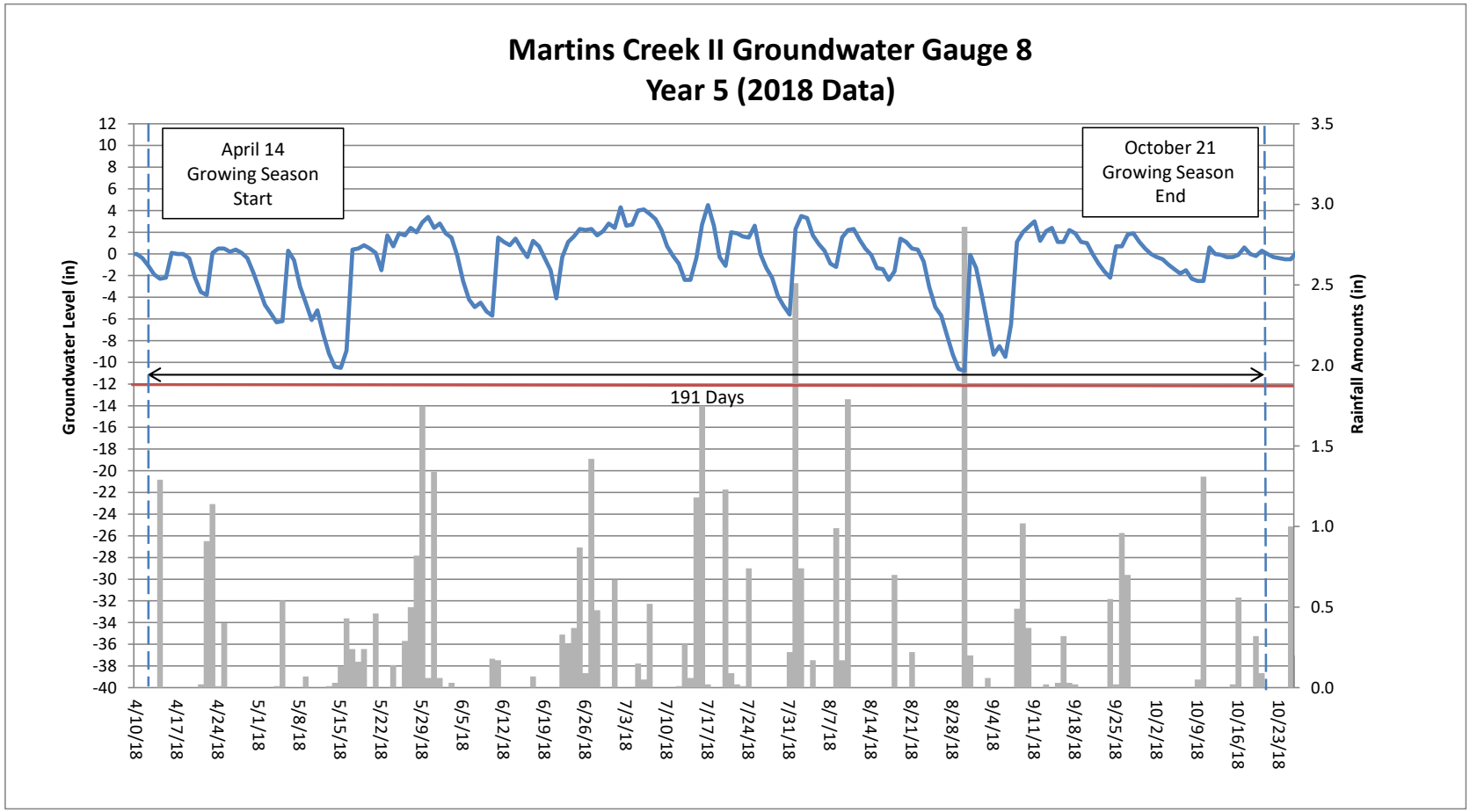

Martins Creek II Groundwater Gauge 3
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
191 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18

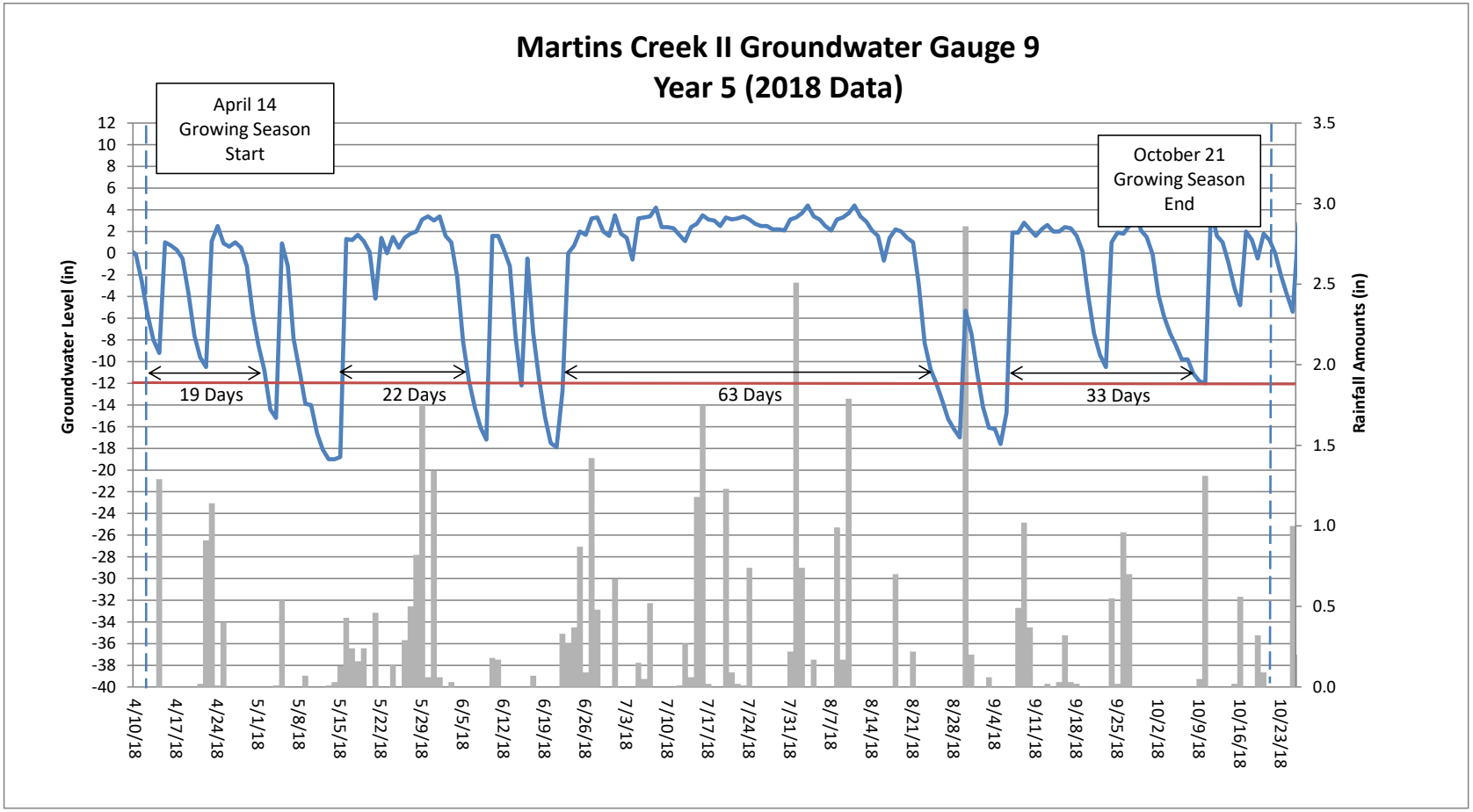

Martins Creek II Groundwater Gauge 4
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
Battery Died
29 Days
74 Days
28 Days
18 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 5
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
21 Days
22 Days
20 Days
14 Days
82 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 6
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
Battery Failure
31 Days
78 Days
21 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 7
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
191 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 8
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
191 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 9
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
19 Days
22 Days
63 Days
33 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
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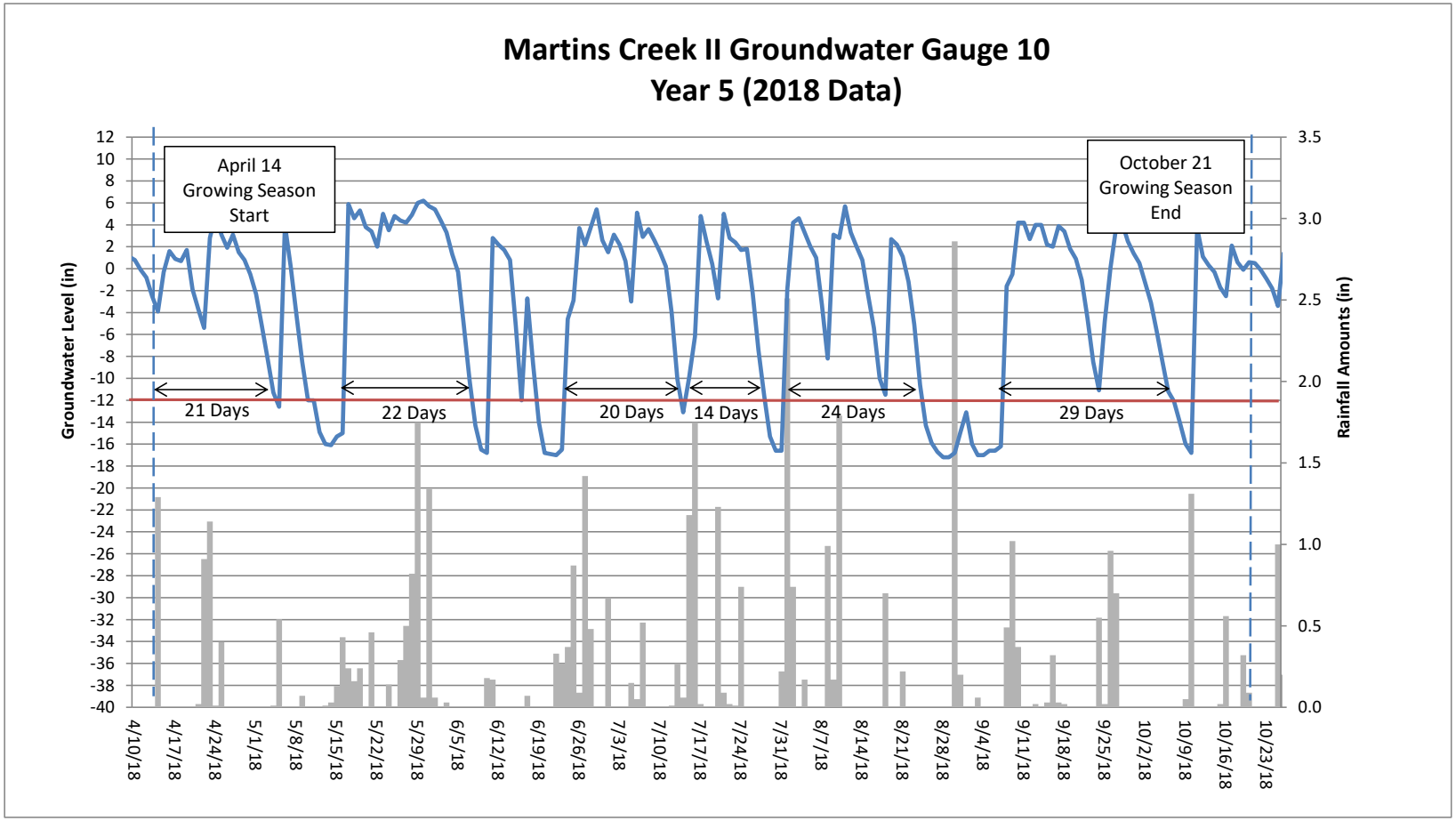
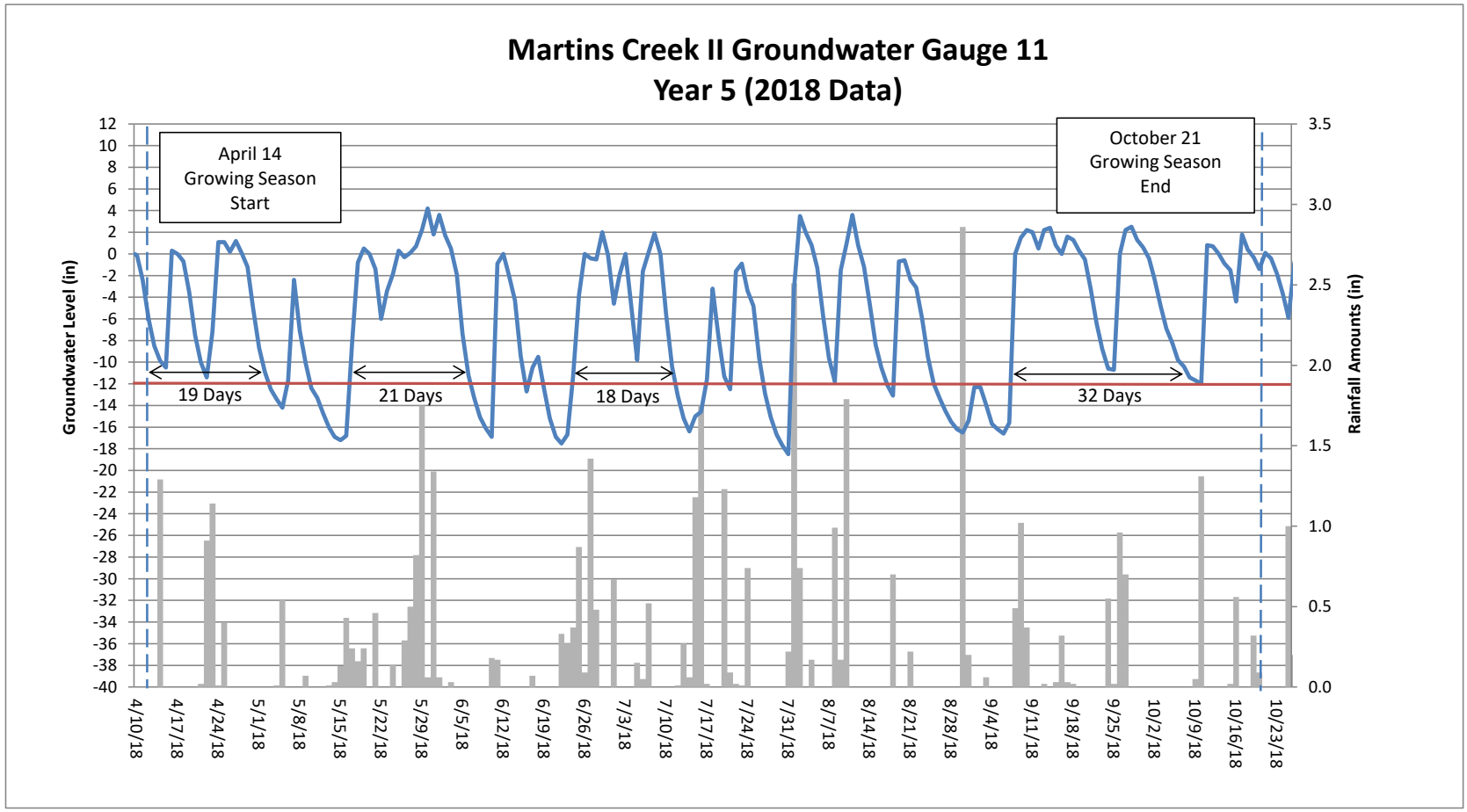
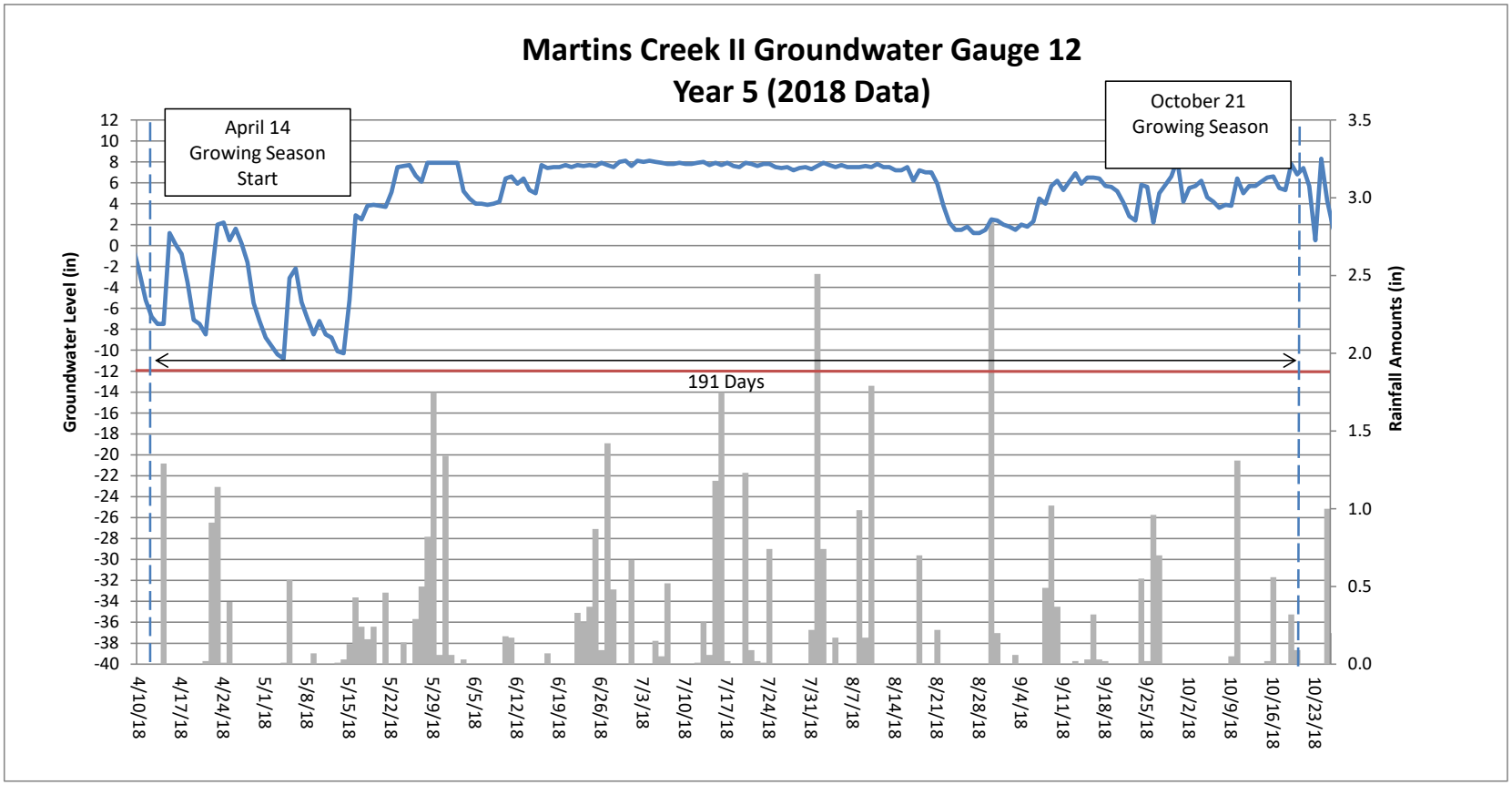
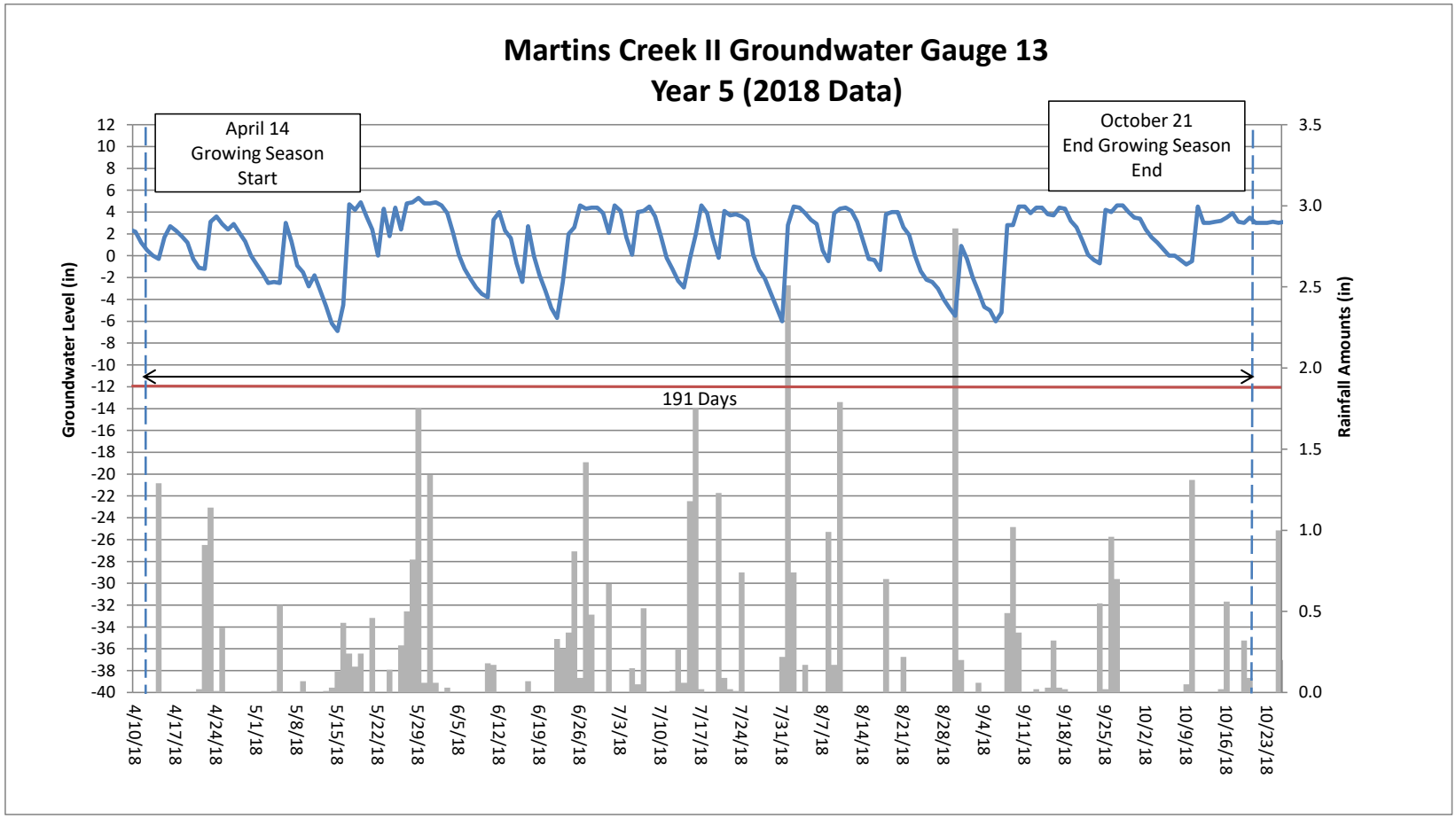
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 10
Year 5 (2018 Data)
Groundwater Level (in)
Rainfall Amounts (in)
April 14
Growing Season
Start
October 21
Growing Season
End
21 Days
22 Days
20 Days
14 Days
24 Days
29 Days
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 11
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
End
19 Days
21 Days
18 Days
32 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18

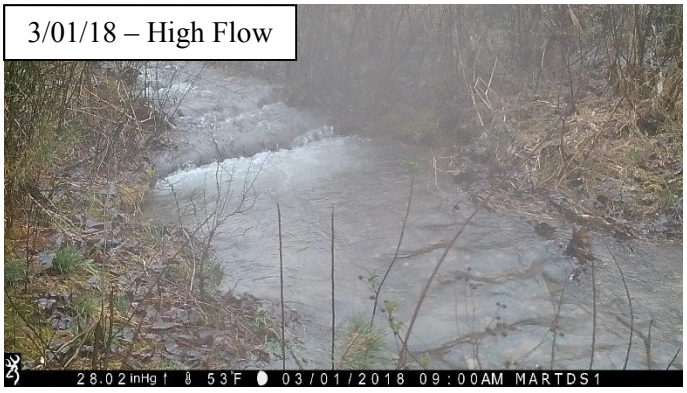

Martins Creek II Groundwater Gauge 12
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
Growing Season
191 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18


Martins Creek II Groundwater Gauge 13
Year 5 (2018 Data)
April 14
Growing Season
Start
October 21
End Growing Season
End
191 Days
Groundwater Level (in)
Rainfall Amounts (in)
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-22
-24
-26
-28
-30
-32
-34
-36
-38
-40
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
4/10/18
4/17/18
4/24/18
5/1/18
5/8/18
5/15/18
5/22/18
5/29/18
6/5/18
6/12/18
6/19/18
6/26/18
7/3/18
7/10/18
7/17/18
7/24/18
7/31/18
8/7/18
8/14/18
8/21/18
8/28/18
9/4/18
9/11/18
9/18/18
9/25/18
10/2/18
10/9/18
10/16/18
10/23/18

Martin's Creek II
Sample Time-Lapse Photos from MC UT1R2 (Downstream Camera)

2/11/18 – High Flow

3/01/18 – High Flow



4/24/18 – Flow

5/30/18 – Flow

9/25/18 – Flow

10/15/18 – Flow

10/16/18 – Flow

11-07-2018 – Last MY05 download

Martin's Creek II
Sample Time-Lapse Photos from MC UT1R2 (Upstream Camera)

1/16/18 – Flow (just before battery died)

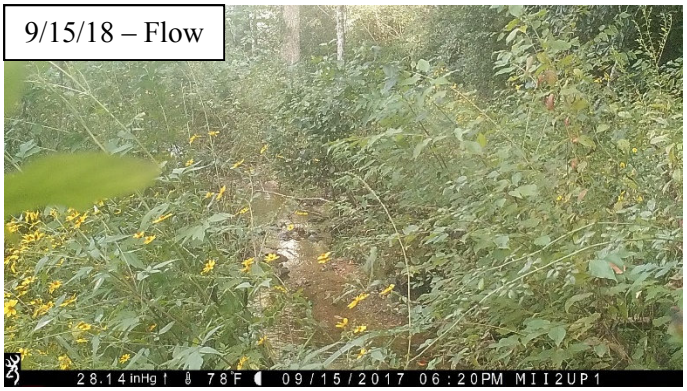
4/5/18 – Flow (First photo after battery was replaced)

4/24/18 – Bankfull Flow

5/3/18 – Flow

8/14/18 – Flow

9/15/18 – Flow



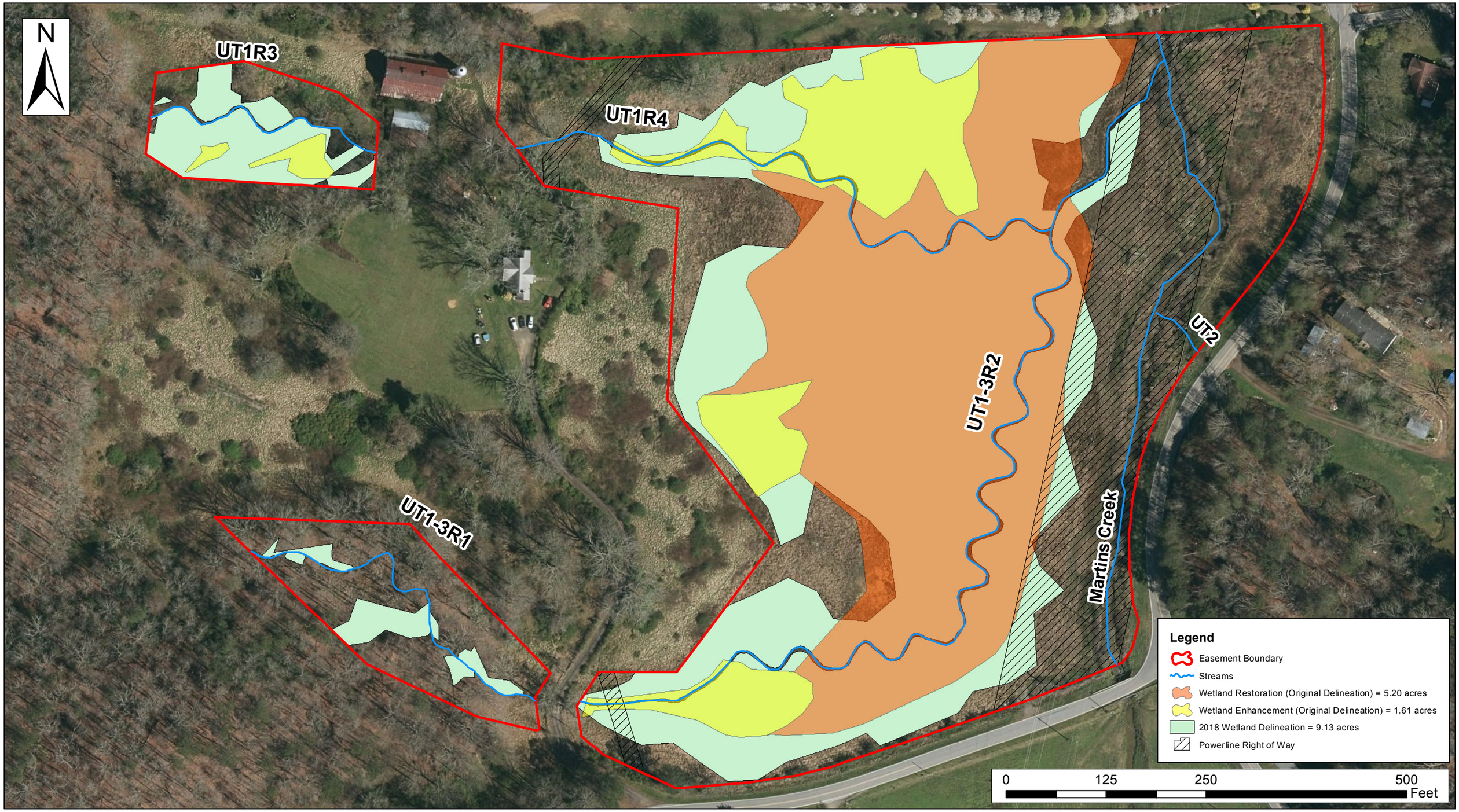
10/15/18 – Flow

11-07-2018 – Last MY05 download

APPENDIX F

WETLAND CONFIRMATION DATA

Figure 3. Wetland Confirmation Overview
Wetland Dataforms



Axiom Environmental
218 Snow Avenue
Raleigh, NC 27603
(919) 215-1693
Axiom Environmental, Inc.

WETLAND CONFIRMATION OVERVIEW
MARTINS CREEK II
DMS PROJECT # 92633
Cherokee County, North Carolina

Dwn. by. KRJ	FIGURE
Date: Nov 2018	3
Project: 12-004.16	

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: Martins Creek II City/County: Murphy/Cherokee Sampling Date: 180503

Applicant/Owner: NC DMS State: NC Sampling Point: PG_05up

Investigator(s): Perkinson, Keith - Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Concave Slope (%): 8

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.053553 Long: -84.027654 Datum: WGS-84

Soil Map Unit Name: Thurmont-Dillard Complex NWI classification: Upland

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Upland

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PG_05up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liriodendron tulipifera*	15	Yes	FACU
2. *Quercus alba*	5	Yes	FACU
3.			
4.			
5.			
6.			
7.			
	20	=Total Cover	
50% of total cover: 10		20% of total cover:	4
Sapling/Shrub Stratum (Plot size: 15)			
1. *Carpinus caroliniana*	5	Yes	FAC
2. *Ilex opaca*	5	Yes	
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2
Herb Stratum (Plot size: 5)			
1. *Dennstaedtia punctilobula*	10	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2
Woody Vine Stratum (Plot size: 30)			
1. *Smilax rotundifolia*	10	Yes	FAC
2.			
3.			
4.			
5.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	30	x 4 =	120
UPL species	0	x 5 =	0
Column Totals:	45 (A)		165 (B)

Prevalence Index = B/A = 3.67

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PG_05up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10yr 3/3	100					Loamy/Clayey	
4-7	10yr 5/2	100					Loamy/Clayey	
7-12	10yr 6/3	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Upland

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: Martins Creek II City/County: Murphy/Cherokee Sampling Date: 180503

Applicant/Owner: NC DMS State: NC Sampling Point: PG_05w

Investigator(s): Perkinson, Keith - Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Hillside Local relief (concave, convex, none): Concave Slope (%): 8

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.053553 Long: -84.027654 Datum: WGS-84

Soil Map Unit Name: Thurmont-Dillard Complex NWI classification: Headwater Forest

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n, Soil n, or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n, Soil n, or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Average rainfall for past three months prior to assessment

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- X Surface Water (A1)
- X High Water Table (A2)
- x Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- X Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes X	No ____	Depth (inches): 1
Water Table Present?	Yes X	No ____	Depth (inches): 1
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 1

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Shallow water table

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PG_05w

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Carpinus caroliniana*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Tiarella cordifolia*	10	Yes	FAC
2. *Arisaema triphyllum*	10	Yes	FACW
3. *Osmundastrum cinnamomeum*	10	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
	30 =Total Cover		
50% of total cover: 15	20% of total cover: 6		
Herb Stratum (Plot size: 5)			
1. *Microstegium vimineum*	10	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10 =Total Cover		
50% of total cover: 5	20% of total cover: 2		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 5 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	20	x 2 =	40
FAC species	35	x 3 =	105
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	55 (A)		145 (B)

Prevalence Index = B/A = 2.64

Hydrophytic Vegetation Indicators:

- ___ 1 - Rapid Test for Hydrophytic Vegetation
- X 2 - Dominance Test is >50%
- X 3 - Prevalence Index is ≤3.0[1]
- ___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- ___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PG_05w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-2	10yr 3/1	100					Muck	thin layer of mucky
2-5	10yr 3/1	100					Mucky Loam/Clay	Rock/saprolite

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- X 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

thin mucky layer, soil profile is very shallow. Couldn't dig below rocky saprolite layer..

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: Martins Creek II City/County: Murphy/Cherokee Sampling Date: 180503

Applicant/Owner: NC DMS State: NC Sampling Point: PI_103up

Investigator(s): Perkinson, Keith - Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): Convex Slope (%): 7

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.055151 Long: -84.027849 Datum: WGS-84

Soil Map Unit Name: Braddock loam 8-15% slopes NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ____	No X	**Is the Sampled Area**
Hydric Soil Present?	Yes ____	No X	**within a Wetland?** **Yes** ____ **No** X
Wetland Hydrology Present?	Yes ____	No X	

Remarks:
Upland

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- ___ High Water Table (A2)
- ___ Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes ____	No X	Depth (inches): ____
Saturation Present? (includes capillary fringe)	Yes ____	No X	Depth (inches): ____

Wetland Hydrology Present? **Yes** ____ **No** X

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
outside of seep near top of crenulation

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PI_103up

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Liriodendron tulipifera*	15	Yes	FACU
2.			
3.			
4.			
5.			
6.			
7.			
	15	=Total Cover	
50% of total cover: 8		20% of total cover:	3
Sapling/Shrub Stratum (Plot size: 15)			
1. *Acer rubrum*	10	Yes	FAC
2. *Rhododendron maximum*	5	Yes	FAC
3. *Ilex opaca*	5	Yes	FACU
4.			
5.			
6.			
7.			
8.			
9.			
	20	=Total Cover	
50% of total cover: 10		20% of total cover:	4
Herb Stratum (Plot size: 5)			
1. *Rubus spp.*	10	Yes	
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	10	=Total Cover	
50% of total cover: 5		20% of total cover:	2
Woody Vine Stratum (Plot size: 30)			
1. *Lonicera japonica*	15	Yes	FACU
2.			
3.			
4.			
5.			
	15	=Total Cover	
50% of total cover: 8		20% of total cover:	3

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 33.3% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	0	x 2 =	0
FAC species	15	x 3 =	45
FACU species	35	x 4 =	140
UPL species	0	x 5 =	0
Column Totals:	50 (A)		185 (B)

Prevalence Index = B/A = 3.70

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

___ 2 - Dominance Test is >50%

___ 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** ___ **No** X

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PI_103up

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-3	10yr 4/2	95					Loamy/Clayey	o/a horizon
3-12	10yr 4/3	100					Loamy/Clayey	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** ___ **No** X

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

Upland

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins Creek II City/County: Murphy/Cherokee Sampling Date: 180503

Applicant/Owner: NC DMS State: NC Sampling Point: PI_103w

Investigator(s): Perkinson, Keith - Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): hillside Local relief (concave, convex, none): Convex Slope (%): 7

Subregion (LRR or MLRA): LRR N, MLRA 130B Lat: 35.055151 Long: -84.027849 Datum: WGS-84

Soil Map Unit Name: Braddock loam 8-15% slopes NWI classification: Headwater Forest

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation n , Soil n , or Hydrology n significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation n , Soil n , or Hydrology n naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Rainfall is average for three month period prior ro delineation

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- X Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 4
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 0

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
spring at top of hill just outside of easement, heavy flow many obligate wetland plants

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PI_103w

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Acer rubrum*	15	Yes	FAC
2.			
3.			
4.			
5.			
6.			
7.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Nyssa sylvatica*	10	Yes	FAC
2. *Rhododendron maximum*	5	Yes	FAC
3. *Ilex decidua*	5	Yes	FACW
4.			
5.			
6.			
7.			
8.			
9.			
	20 =Total Cover		
50% of total cover: 10	20% of total cover: 4		
Herb Stratum (Plot size: 5)			
1. *Osmundastrum cinnamomeum*	10	Yes	FACW
2. *Impatiens capensis*	10	Yes	FACW
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20 =Total Cover		
50% of total cover: 10	20% of total cover: 4		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 6 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	0	x 1 =	0
FACW species	25	x 2 =	50
FAC species	30	x 3 =	90
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	55 (A)		140 (B)

Prevalence Index = B/A = 2.55

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PI_103w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-4	10yr 4/1	95	10yr 5/6	5	c	m	Loamy/Clayey	Prominent redox concentrations
4-8	10yr 6/1	90	10yr 5/8	10	c	m	Loamy/Clayey	Prominent redox concentrations
8-12	n 5/	97	10yr 5/6	3	C	M	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- X Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016.

WETLAND DETERMINATION DATA SHEET – Eastern Mountains and Piedmont Region

Project/Site: UT to Martins II City/County: Murphy/Cherokee Sampling Date: 180503

Applicant/Owner: NCDMS State: NC Sampling Point: PI-112w

Investigator(s): Perkinson Axiom Section, Township, Range: Murphy

Landform (hillside, terrace, etc.): Floodplain Local relief (concave, convex, none): Convex Slope (%): 2

Subregion (LRR or MLRA): LRR N, MLRA 130A Lat: 35.053862 Long: -84.024789 Datum: WGS-84

Soil Map Unit Name: AkA Arkaqua loam, 0-2% slopes occasionally flooded NWI classification: Bottomland Hardwood

Are climatic / hydrologic conditions on the site typical for this time of year? Yes X No ____ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes X No ____

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes X	No ____	**Is the Sampled Area**
Hydric Soil Present?	Yes X	No ____	**within a Wetland?** **Yes** X **No** ____
Wetland Hydrology Present?	Yes X	No ____	

Remarks:
Rainfall is within normal limites per WETS Tables at time of delineation

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (minimum of one is required; check all that apply)

- ___ Surface Water (A1)
- X High Water Table (A2)
- X Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Water-Stained Leaves (B9)
- ___ Aquatic Fauna (B13)
- ___ True Aquatic Plants (B14)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Oxidized Rhizospheres on Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Recent Iron Reduction in Tilled Soils (C6)
- ___ Thin Muck Surface (C7)
- ___ Other (Explain in Remarks)

Secondary Indicators (minimum of two required)

- ___ Surface Soil Cracks (B6)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Drainage Patterns (B10)
- ___ Moss Trim Lines (B16)
- ___ Dry-Season Water Table (C2)
- ___ Crayfish Burrows (C8)
- ___ Saturation Visible on Aerial Imagery (C9)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- X FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ____	No X	Depth (inches): ____
Water Table Present?	Yes X	No ____	Depth (inches): 6
Saturation Present? (includes capillary fringe)	Yes X	No ____	Depth (inches): 4

Wetland Hydrology Present? **Yes** X **No** ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Wetland restoration site, gaugesthroughout restoration areas have generally been within 12" of ground surface during growing season t

VEGETATION (Four Strata) – Use scientific names of plants. Sampling Point: PI-112w

Tree Stratum (Plot size: 30)	Absolute % Cover	Dominant Species?	Indicator Status
1. *Salix nigra*	15	Yes	OBL
2.			
3.			
4.			
5.			
6.			
7.			
	15 =Total Cover		
50% of total cover: 8	20% of total cover: 3		
Sapling/Shrub Stratum (Plot size: 15)			
1. *Salix nigra*	10	Yes	OBL
2. *Alnus serrulata*	10	Yes	OBL
3.			
4.			
5.			
6.			
7.			
8.			
9.			
	20 =Total Cover		
50% of total cover: 10	20% of total cover: 4		
Herb Stratum (Plot size: 5)			
1. *Juncus effusus*	20	Yes	FACW
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
	20 =Total Cover		
50% of total cover: 10	20% of total cover: 4		
Woody Vine Stratum (Plot size: 30)			
1.			
2.			
3.			
4.			
5.			
	=Total Cover		
50% of total cover:	20% of total cover:		

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100.0% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	35	x 1 =	35
FACW species	20	x 2 =	40
FAC species	0	x 3 =	0
FACU species	0	x 4 =	0
UPL species	0	x 5 =	0
Column Totals:	55 (A)		75 (B)

Prevalence Index = B/A = 1.36

Hydrophytic Vegetation Indicators:

___ 1 - Rapid Test for Hydrophytic Vegetation

X 2 - Dominance Test is >50%

X 3 - Prevalence Index is ≤3.0[1]

___ 4 - Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

___ Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Definitions of Four Vegetation Strata:

Tree – Woody plants, excluding vines, 3 in. (7.6 cm) or more in diameter at breast height (DBH), regardless of height.

Sapling/Shrub – Woody plants, excluding vines, less than 3 in. DBH and greater than or equal to 3.28 ft (1 m) tall.

Herb – All herbaceous (non-woody) plants, regardless of size, and woody plants less than 3.28 ft tall.

Woody Vine – All woody vines greater than 3.28 ft in height.

Hydrophytic Vegetation Present? **Yes** X **No** ___

Remarks: (Include photo numbers here or on a separate sheet.)

SOIL

Sampling Point: PI-112w

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth	Matrix		Redox Features					
(inches)	Color (moist)	%	Color (moist)	%	Type[1]	Loc[2]	Texture	Remarks
0-5	10yr 4/3	90	10yr 4/6	10	C	M	Loamy/Clayey	Distinct redox concentrations
5-12	10yr 4/2	90	10yr 4/6	10	c	m	Loamy/Clayey	Prominent redox concentrations

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, MS=Masked Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Stratified Layers (A5)
- ___ 2 cm Muck (A10) **(LRR N)**
- ___ Depleted Below Dark Surface (A11)
- ___ Thick Dark Surface (A12)
- ___ Sandy Mucky Mineral (S1)
- ___ Sandy Gleyed Matrix (S4)
- ___ Sandy Redox (S5)
- ___ Stripped Matrix (S6)
- ___ Dark Surface (S7)
- ___ Polyvalue Below Surface (S8) **(MLRA 147, 148)**
- ___ Thin Dark Surface (S9) **(MLRA 147, 148)**
- ___ Loamy Mucky Mineral (F1) **(MLRA 136)**
- ___ Loamy Gleyed Matrix (F2)
- X Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- X Redox Depressions (F8)
- ___ Iron-Manganese Masses (F12) **(LRR N, MLRA 136)**
- ___ Umbric Surface (F13) **(MLRA 122, 136)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 148)**
- ___ Red Parent Material (F21) **(MLRA 127, 147, 148)**

Indicators for Problematic Hydric Soils[3]:

- ___ 2 cm Muck (A10) **(MLRA 147)**
- ___ Coast Prairie Redox (A16) **(MLRA 147, 148)**
- ___ Piedmont Floodplain Soils (F19) **(MLRA 136, 147)**
- ___ Red Parent Material (F21) **(outside MLRA 127, 147, 148)**
- ___ Very Shallow Dark Surface (F22)
- ___ Other (Explain in Remarks)

[3]Indicators of hydrophytic vegetation and wetland hydrology must be present, unless disturbed or problematic.

Restrictive Layer (if observed):

Type: _____

Depth (inches): _____

Hydric Soil Present? **Yes** X **No** ___

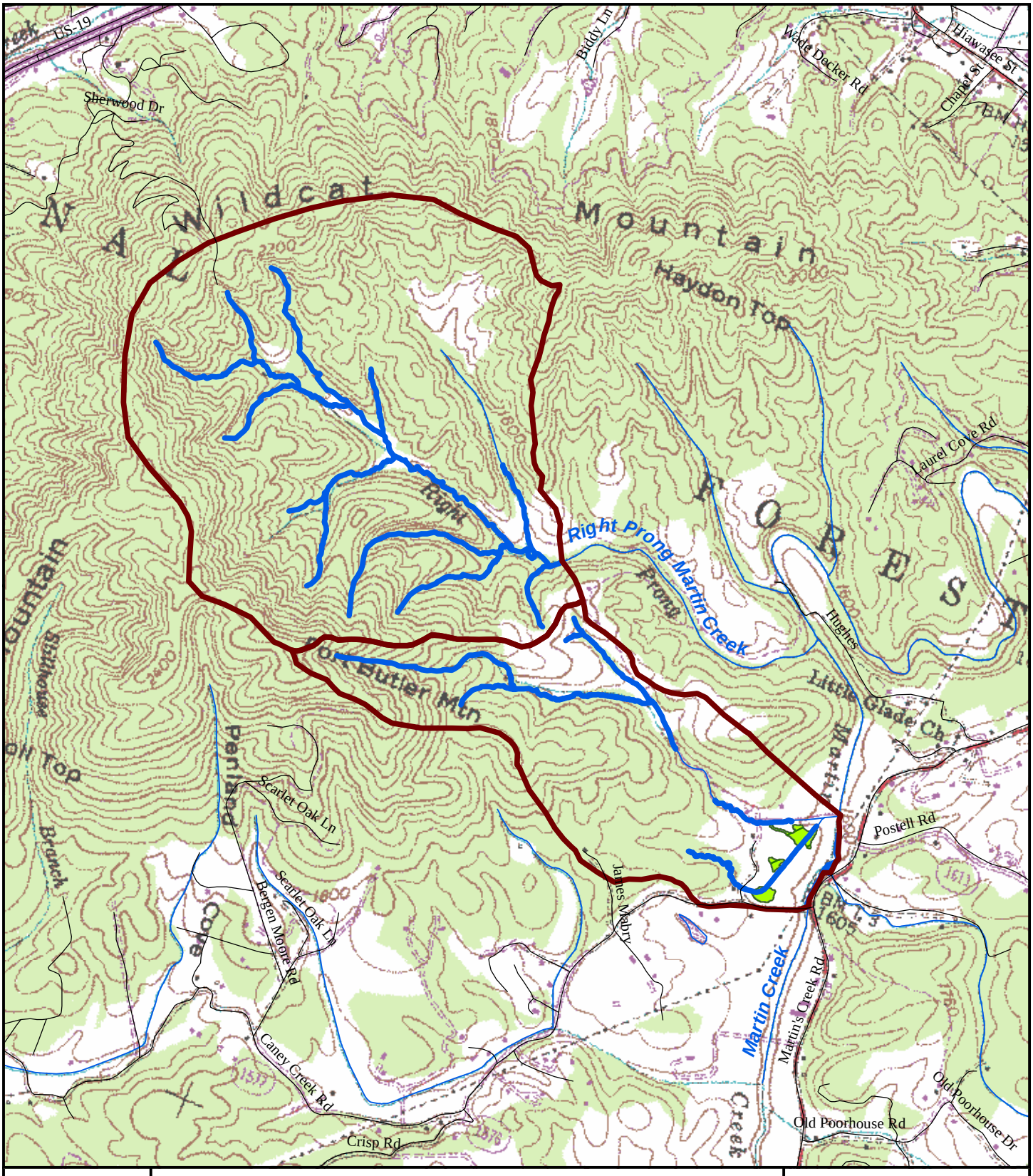
Remarks:

This data sheet is revised from Eastern Mountains and Piedmont Regional Supplement Version 2.0 to include the NRCS Field Indicators of Hydric Soils, Version 8.0, 2016. Reduced matrix at boundary, wetlands also include F8 indicator. Site generally has standing water throughout winter month, drying through summer.

APPENDIX G

SUPPLEMENTAL DATA

Figure 4. USGS Topography Map
Figure 5. Soils Map
Preconstruction Photographs



LEGEND:

- Project Reach
- Streams
- Watershed Boundary
- Project Wetlands

0 400 800 1,600 Feet

Ecosystem Enhancement Program

Figure 4. USGS Topography Map (Murphy Quad)

Martin Creek Mitigation Project
Cherokee County, NC

Baker

Table 2.1 Project Soil Types and Descriptions
Martin's Creek II Mitigation Project-NCEEP Project #92633

Soil Name	Taxonomic Class	Location	Description
Thurmont - Dillard complex (2-8% and 8-15% slopes)	Fine-loamy, Active, Mesic Oxyaquic Hapludults/ Fine-loamy, mixed, semiactive, mesic Aquic Hapludults	Footslopes, colluvial fans, benches, stream terraces	Moderately permeable, deep, well drained soils; developed in colluvium and alluvium from a mixture of metamorphic rocks. Dillard soils are formed from Holocene-aged loamy alluvium.
Sylco-Cataska complex (50-95% slopes)	Loamy-skeletal, mixed, active, mesic Typic Dystrudepts/ Loamy-skeletal, mixed, semiactive, mesic, shallow Typic Dystrudepts	Mountain summits, side slopes of Southern Appalachians	Moderately rapid permeability, deep, very well drained soils; weathered, low-grade metasedimentary residuum/ Shallow, moderately rapid permeability, very well drained soils; weathered from low-grade metasedimentary residuum.
Cullowhee fine sandy loam (0-3% slopes)	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, mesic Fluvaquentic Dystrudepts	Floodplains in upper reaches of watersheds in Southern Appalachians	Rapidly permeable, somewhat poorly drained soils; developed from loamy alluvium over sandy and gravel alluvium.
Dillard loam (1-5% slopes)	Fine-loamy, mixed, semiactive, mesic Aquic Hapludults	Footslopes, colluvial fans, benches, stream terraces	Moderately permeable, deep, well drained soils; formed from Holocene-aged loamy alluvium.
Arkaqua loam (0-2% slopes)	Fine-loamy, mixed, active, mesic Fluvaquentic Dystrudepts	Floodplains	Moderately permeable, somewhat poorly drained soils; developed from loamy alluvial sediments washed largely from metamorphic rock residuum.

Note:
NRCS, USDA. Official Soil Series Descriptions
http://ortho.ftw.nrcs.usda.gov/cgi-bin/osd/osdname.cgi
http://soildatamart.nrcs.usda.gov/Default.aspx

Legend
- Easement Boundary
- Stream
- NRCS Soil Boundaries

0 1,000 2,000 4,000 Feet

NC Center for Geographic Information & Analysis

Axiom Environmental, Inc.

Prepared for:
North Carolina Department of Environmental Quality
Division of Mitigation Services

Project:
MARTINS CREEK II MITIGATION PROJECT
DMS Project Number 92633
Cherokee County, NC

Title:
NRCS SOILS MAP

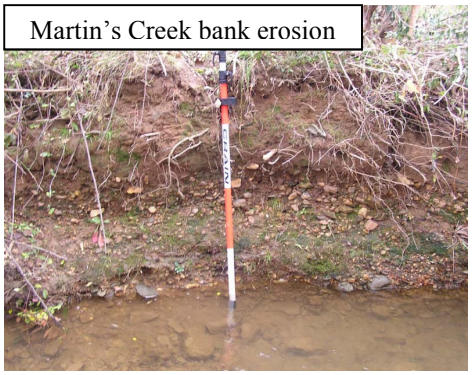
Drawn by: KRJ
Date: Nov 2018
Scale: 1:7,500
Project No.: 12-004.16

FIGURE
5

Martin's Creek II
Preconstruction Photographs
Taken from Mitigation Plan (dated September 2010)

Martin's Creek

Martin's Creek bank erosion



UT1R3 upstream of barn

UT1R3 at barn

UT1-3

UT1-3 bank erosion

UT1R2

UT1R4 confluence with Martin's Creek