

Annual Monitoring Report

FINAL

Project Name: East Fork Pigeon River Wetland

Monitoring Year 2

NCDMS Contract No.: 006035

NCDMS Project No.: 94203

Haywood County, North Carolina

Data Collected: 6/3/2015-12/10/2015

Date Submitted: 12/14/2015



Submitted to:

North Carolina Division of Mitigation Services

North Carolina Department of Environmental Quality

1652 Mail Service Center

Raleigh, NC

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1.0 PROJECT SUMMARY

1.1. Project History and Background

The East Fork Pigeon River Wetlands Project Site (project site) is located in the French Broad River Basin (HUC8- 06010106) near Cruso in Haywood County, NC. The site is situated between the right-descending bank of the East Fork of the Pigeon River and Old Micheal Road, off of Highway 276.

On November 3, 2010, the USACE approved a wetland Jurisdictional Determination on the project site. The mitigation plan for the project was completed by Mactec Engineering and Consulting, Inc (Currently AMEC Environment and Infrastructure, Inc.) in March 2011.

The established mitigation goals for the Site were to enhance and protect existing wetlands and wildlife habitat along the East Fork Pigeon River. Specifically, the target goal was the vegetative enhancement of the existing wetland community on the site. The project objectives included:

- Enhance existing wetlands by removing identified invasive plant species through manual and/or chemical methods and by planting native species within the site.
- Protecting the wetlands on the site with a permanent Conservation Easement.

The project did not require Clean Water Act Section 404 / Section 401 permits as no ground disturbing activities within jurisdictional wetlands were anticipated or completed on the site. Additionally, the project was instituted prior to July 28, 2010 and did not require a mandatory IRT mitigation plan review.

The control of nuisance plant species within the bottomland hardwood forest and shrub/groundstory open areas on the Site entailed the treatment of the seven invasive nuisance plant species: Bamboo (*Phyllostachys* sp.), common cattail (*Typha latifolia*), multiflora rose (*Rosa multiflora*), Japanese knotweed (*Reynoutria japonica*), Japanese honeysuckle (*Lonicera japonica*), kudzu (*Pueraria montana*), and Chinese privet (*Ligustrum sinense*).

A majority of the invasive species were mapped in the 2011 mitigation plan; however Chinese privet and multiflora rose were essentially scattered throughout the entire bottomland hardwood forest. The control methods entailed the treatment of small-sized plants with foliar spray and larger stems by hack and squirt. The chemical ‘aquatic glyphosate’ was used for the herbicide applications. The cut bamboo was placed in a slash pile and burned on the site. New shoots of bamboo, which developed after the initial treatment, were treated with aquatic glyphosate. All invasive control treatments and planting efforts were conducted by Habitat Assessment & Restoration Professionals (HARP) (Charlotte, NC). The nuisance plant species were treated for two growing seasons prior to the planting of the site. DMS postponed the planting of the site to allow for an additional growing season of nuisance species control prior to planting. Additionally, DMS will be completing follow up invasive treatments through the 5 year monitoring term.

The 2011 mitigation plan estimated an approximately 5.64 acre wetland planting area. Based on 2013 site conditions and the implemented invasive plant treatment areas, approximately 2.26 acres of the total area of USACE jurisdictional wetlands on the site (13.95 acres) were planted in December 2013. The wetland areas that were excluded from the planting operation encompassed: (1) a deepwater wetland drainageway which occurred along the southern shoulder of Old Michael Road and was determined to be an historic channel of the East Fork Pigeon River; (2) the stream banks of East Fork Pigeon River (bankfull bench and spoil areas); and (3) the heavily forested portions of the bottomland hardwood forest. Therefore, the planting operation primarily encompassed the areas of the bottomland hardwood forest that were open and lacking an overstory of trees or a dense shrub component. The planting of trees (seedlings) within these open areas will essentially restore the hardwood overstory of the wetlands.

The 2011 Mitigation plan and project implementation did not include any enhancement activities for the East Fork Pigeon River or the unnamed perennial stream that occurs within the western portion of the Site. These surface waters are essentially unimpaired and provide suitable habitat for fish and benthic macro-invertebrates. The proposed stream preservation assets have a minimum 30-foot buffer from edge of bank on each side of the channel.

1.2. Project Goals and Objectives

The established mitigation goals for the Site were to enhance and protect existing wetlands and wildlife habitat along the East Fork Pigeon River. Specifically, the target goal was the vegetative enhancement of the existing wetland community on the Site. The project objectives included:

- Enhance existing wetlands by removing identified invasive plant species through manual and/or chemical methods and by planting native species within the Site.
- Protecting the wetlands on the Site with a permanent Conservation Easement.

1.3. Project Success Criteria

The project success criteria are as follows:

- Vegetation success within the wetland areas that were planted and proposed for Wetland Enhancement (2.26-acres) will be based on the criteria established in the USACE Stream Mitigation Guidelines (2003). This document states that vegetation monitoring results indicate the following planted stem density minimums in the corresponding monitoring years: 320 stems/acre through year three, 288 stems/acre in year four, and 260 stems/acre in year five.
- Vegetation monitoring will not be conducted in the wetland preservation areas; however, the entire site will be monitored via yearly photo points. Invasive plant species and beaver colonization will be suppressed on the entire site until project closeout; however, there will be no success criteria linked to treatment of the invasive plant species or beaver removal.

1.4. Annual Monitoring Results

Monitoring Year 2 data collection consisted of monitoring three previously established vegetation plots in three of the four planted areas. Results from vegetation monitoring indicate that all plots are currently meeting the interim success criteria of 320 planted stems per acre (Table 6). Planted stem density averaged 688 stems per acre across all plots. Stem density ranged from 486 stems per acre to 850 stems per acre. When naturally recruited stems are included, densities ranged from 729 to 1,012 stems per acre with an annual mean of 1,106 stems per acre across all plots. A total of twelve woody species were documented in the vegetation plots.

Visual assessment, performed on June 4, 2015 and December 10, 2015, focused on planted stems outside of the permanent vegetation plots and the status of invasive exotic vegetation. Although no quantifiable data related to planted stems were collected during the visual assessment, observations suggest that the planted stems are surviving throughout the easement. Dead stems were noted; however, these were limited to isolated stems and not large areas. Several small areas of dense dodder vine (*Cuscuta pentagona*) growth continue within the bamboo treatment area and could potentially affect planted stems. Additionally, the southern side of the easement receives high flows from the East Fork Pigeon River. Wrack lines and scour in the floodplain was noted, however, planted stems appear to be coping.

In addition to planted stems, an inventory of invasive exotic vegetation was performed. Japanese honeysuckle (*Lonicera japonica*), Oriental bittersweet (*Celastrus orbiculatus*), and Chinese privet (*Ligustrum sinense*) were documented throughout drier, upland areas of the easement and scattered in low densities throughout the easement (Figure 2). Initial treatments of invasive-exotic vegetation occurred in October of 2015, targeting bamboo (*Phyllostachys* spp.), Kudzu (*Pueraria montana*), and Chinese Privet.

Treatments showed good efficacy; however, populations of invasive-exotic vegetation still persist throughout the easement (Figure 2).

Summary information/data related to the occurrence of items such as beaver or easement encroachment and statistics related to performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the restoration plan on NCDMS's website (NCEEP 2014). All raw data, supporting tables, and figures in the appendices are available from NCDMS upon request.

2.0 METHODOLOGY

Vegetation plot monitoring data were collected following the standard CVS-EEP Protocol for Recording Vegetation, Level II, Version 4.2 (Lee et al. 2008). A total of three plots were monitored for this project.

3.0 REFERENCES

Lee, Michael T., R.K. Peet, S.D. Roberts, and T.R. Wentworth. 2008. CVS-EEP Protocol for Recording Vegetation, Version 4.2 (<http://cvs.bio.unc.edu/methods.htm>)

NCEEP (North Carolina Ecosystem Enhancement Program). 2014. Final Wetland Mitigation Report-East Fork Pigeon River Wetlands Project. Haywood County, North Carolina. Raleigh.

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Appendix A
General Tables and Figures

Figure 1. Vicinity Map of the East Fork of the Pigeon River Wetland Site

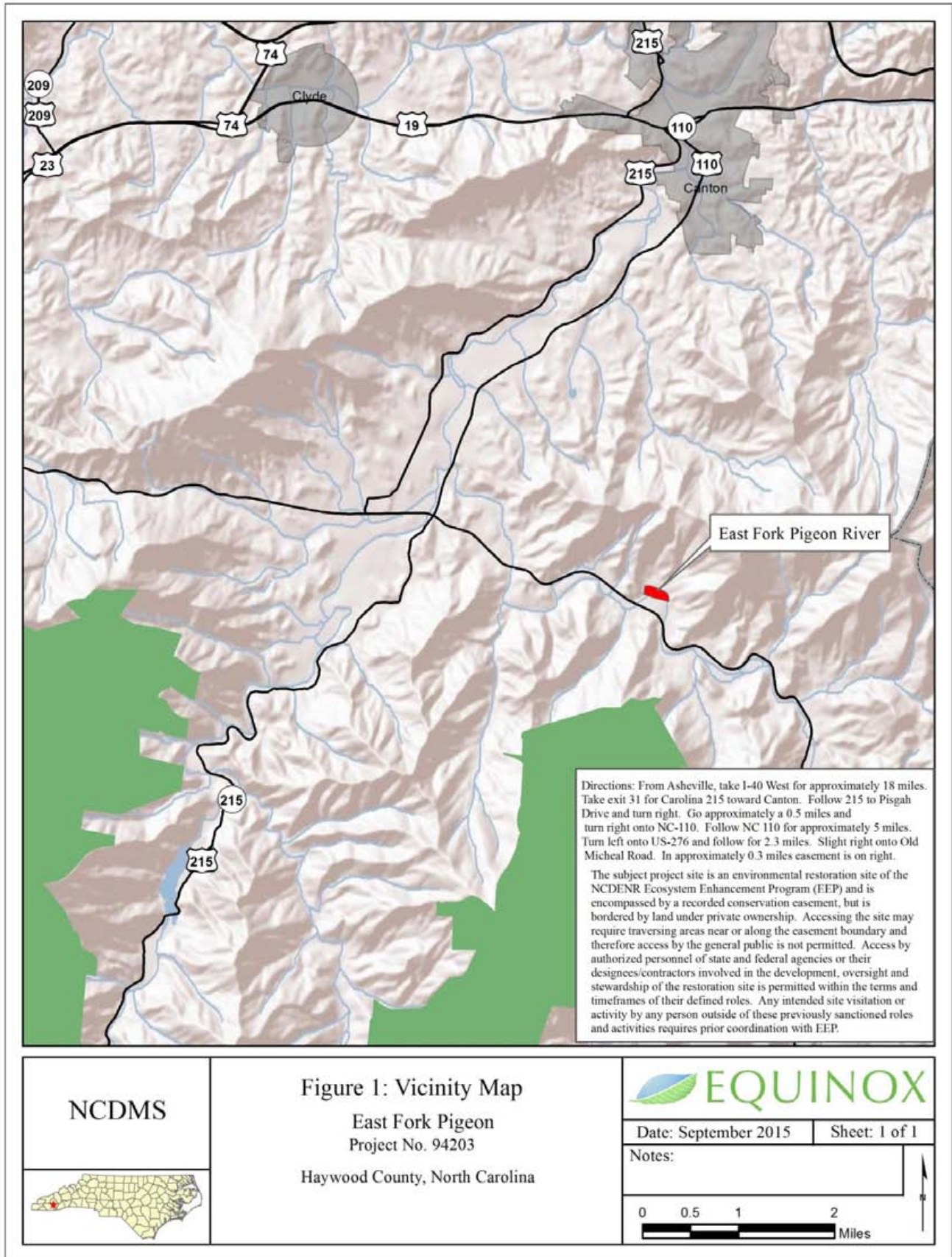


Table 1. Project Components and Summation East Fork of Pigeon Wetland / Project No. 94203				
Feature	Mitigation Approach	Quantity (Linear Footage/Acreage)	Ratio	Mitigation Units (SMU/WMU)
Stream				
Perennial Stream	P	664	5:1	133
East Fork of the Pigeon River	P	1,411	5:1	282
Total:		2,075	Total:	415
Wetland				
Bottomland Hardwood Forest	E	2.26	2:1	1.13
Bottomland Hardwood Forest	P	11.69	5:1	2.34
Total		13.95	Total	3.47

Table 2. Project Activity & Reporting History East Fork of Pigeon Wetland / Project No. 94203		
Activity or Report	Data Collection Complete	Actual Completion or Delivery
Land Acquisition	-	Dec 2010
Environmental Resource Technical Report	N/A	N/A
Restoration Plan	N/A	N/A
Permit Date	N/A	N/A
Initial Wetland Delineation	-	Oct-10
Initial Invasive Exotic Reconnaissance	-	Oct-10
Topographic Survey	-	Nov-10
Initial Mitigation Plan / As-built	-	Mar-11
Invasive Exotic Treatment	-	Jun-12
Invasive Exotic Treatment	-	Nov-12
Invasive Exotic Treatment	-	Jul-13
Invasive Exotic Treatment	-	Nov-13
Invasive Exotic Treatment	-	Dec-13
Wetland Planting	-	Dec-13
Final Mitigation Plan (Year 0 Monitoring - Baseline)	-	Mar-14
Year 1 Monitoring	Oct-14	Nov-14
Invasive Exotic Treatment	-	Oct-15
Year 2 Monitoring	Dec-15	Dec-15
Year 3 Monitoring		
Year 4 Monitoring		
Year 5 Monitoring		

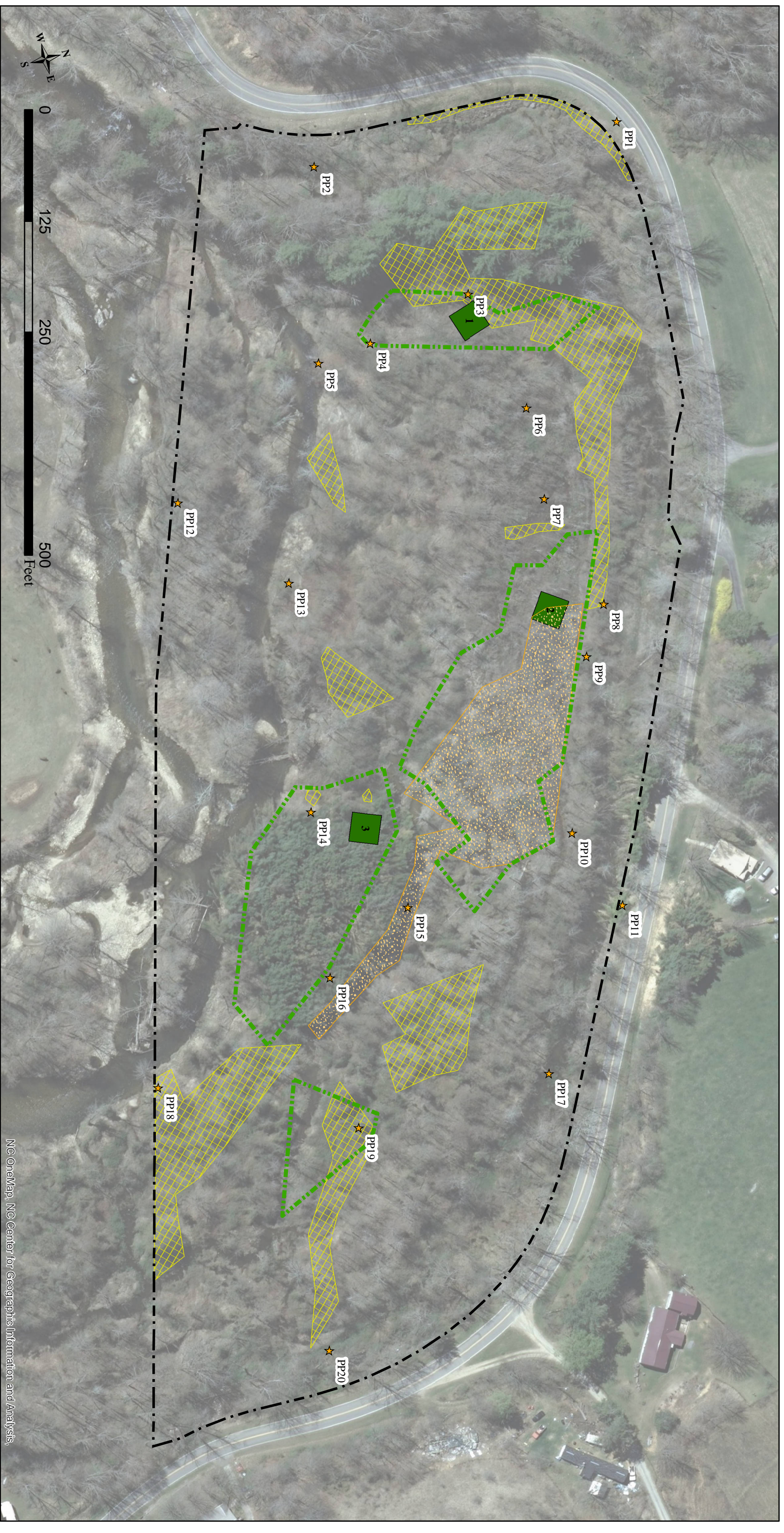
N/A - Item does not apply.

- Information Unavailable

Table 3. Project Contacts East Fork of the Pigeon Wetland / Project No. 94203	
Designer	AMEC Environment and Infrastructure, INC.
	4021 Stirrup Creek Drive, Suite 100
	Durham, North Carolina 27701
Primary Project Design POC	Richard Harmon (919)381-9909
Construction Contractor	N/A
	N/A
	N/A
Construction Contractor POC	N/A
Planting Contractor	Habitat Assessment and Restoration Professionals
	301 McCullough Drive, 4th Floor
	Charlotte, North Carolina 28262
Planting Contractor POC	(704) 841-2841
Seeding Contractor	Habitat Assessment and Restoration Professionals
	301 McCullough Drive, 4th Floor
	Charlotte, North Carolina 28262
Seeding Contractor POC	(704) 841-2841
Seed Mix Sources	-
	-
Nursery Stock Suppliers	-
	-
Monitoring Performers (Y0) - 2013	AMEC Environment and Infrastructure, INC.
	4021 Stirrup Creek Drive, Suite 100
	Durham, North Carolina 27701
Monitoring POC	Richard Harmon (919)381-9909
Monitoring Performers (Y1-Y2) - 2015	Equinox
	37 Haywood Street, Suite 100
	Asheville, North Carolina 28801
Monitoring POC	Hunter Terrell (828) 253-6856
Invasive Control Contractor (Y2)- 2015	Carolina Silvics
	908 Indian Trail Road
	Edonton, NC 27932
Invasive Contractor POC	(252) 482-8491
N/A - Item does not apply.	
- Information Unavailable	

Appendix B
Visual Assessment Data

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NC OneMap, NC Center for Geographic Information and Analysis,

Prepared for:

NCDMS

Figure 2. Current Condition Plan View
 East Fork Pigeon River Wetlands
 Monitoring Year 2
 NCDMS Project No. 94203
 Haywood County, North Carolina

- ★ Photo Point
- ⋯ Easement
- ▭ Planted Areas
- ▭ Cattails (*Typha latifolia*)-
Very Low Density
- Vegetation Plot Success
- Criteria Met
- Criteria Unmet
- ▭ Vegetation Problem Areas
- ▭ Present
- ▭ Dense
- ▭ Treated



Date: December 2015 Sheet: 1 of 1

Notes:
 -This figure is not a survey and should not be construed as such.
 -NCOneMap Aerial Imagery (2010).
 -Planting Areas digitized/georeferenced from AMEC Mitigation Report (2014)

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Table 4. Vegetation Condition Assessment East Fork of the Pigeon Wetland / Project No. 94203					
Planted Acreage: 2.29					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material.	N/A	0	0.00	0%
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria.	Stipple Orange Dots White Background	0	0.00	0%
Totals			0	0.00	0%
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
Cumulative Totals			0	0.00	0%
Easement Acreage: 16.53					
Vegetation Category	Definitions	CCPV Depiction	Number of Polygons	Combined Acreage	% of Easement Acreage
4. Invasive Areas of Concern	Areas or points (if too small to render as polygons at map scale).	Cross Hatch (Red - Dense/Yellow - Present)	11	1.65	10%
5. Easement Encroachment Areas	Areas or points (if too small to render as polygons at map scale).	Stipple Purple Dots White Background	0	0.00	0%

N/A - Item does not apply.

Appendix B



East Fork Pigeon River-Permanent Photo Station 1
East/Southeast



East Fork Pigeon River-Permanent Photo Station 4
North



East Fork Pigeon River-Permanent Photo Station 2
West



East Fork Pigeon River-Permanent Photo Station 5
Upstream



East Fork Pigeon River-Permanent Photo Station 3
North



East Fork Pigeon River-Permanent Photo Station 6
Southwest

Appendix B



East Fork Pigeon River-Permanent Photo Station 7
East



East Fork Pigeon River-Permanent Photo Station 10
South/Southwest



East Fork Pigeon River-Permanent Photo Station 8
South/Southeast



East Fork Pigeon River-Permanent Photo Station 11
Southeast



East Fork Pigeon River-Permanent Photo Station 9
Southwest



East Fork Pigeon River-Permanent Photo Station 12
East

Appendix B



East Fork Pigeon River-Permanent Photo Station 13
Upstream



East Fork Pigeon River-Permanent Photo Station 15
North



East Fork Pigeon River-Permanent Photo Station 13
Downstream



East Fork Pigeon River-Permanent Photo Station 16
West



East Fork Pigeon River-Permanent Photo Station 14
East/Southeast

Appendix B



East Fork Pigeon River-Permanent Photo Station 17
Northwest



East Fork Pigeon River-Permanent Photo Station 20
North



East Fork Pigeon River-Permanent Photo Station 18
North/Northeast



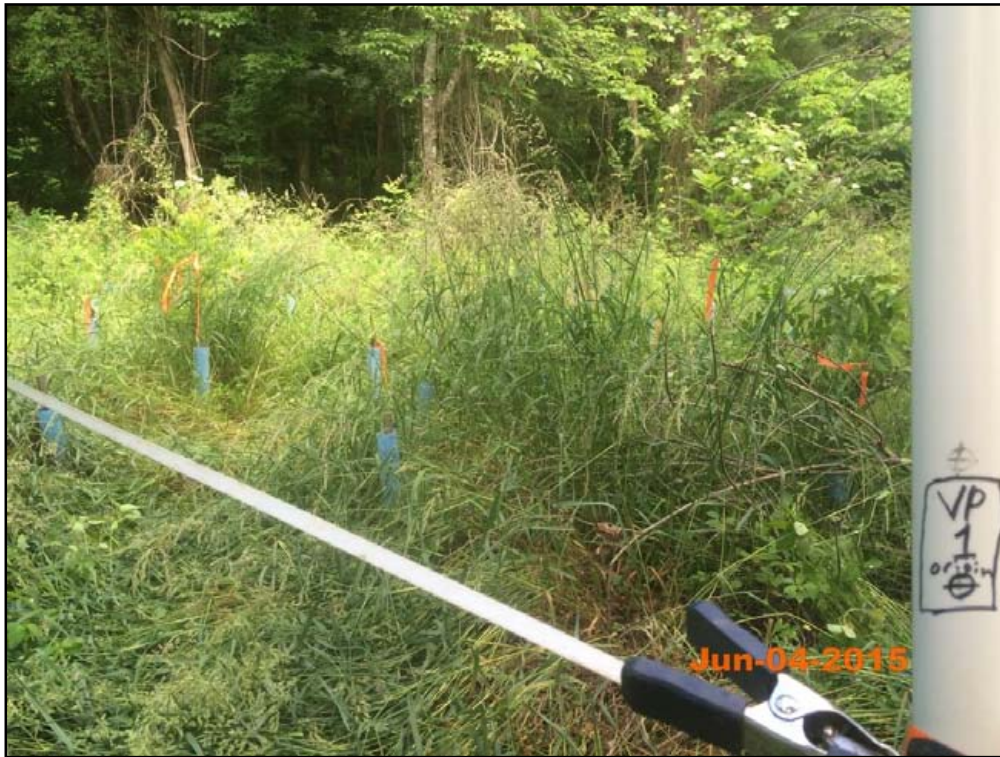
East Fork Pigeon River-Permanent Photo Station 19
South/Southwest

Appendix C

Vegetation Data

Table 5. Vegetation Plot Criteria Attainment East Fork Pigeon River Wetland / Project No. 94203		
Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
1	Yes	100%
2	Yes	
3	Yes	

Table 6. Planted and Total Stem Counts (Species by Plot with Annual Means) East Fork Pigeon River Wetland / Project No. 94203																	
Scientific Name	Common Name	Species Type	Current Plot Data (MY2 2015)									Annual Means					
			Plot 1			Plot 2			Plot 3			MY2 (2015)			MY1 (2014)		
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T
<i>Acer rubrum</i> var. <i>rubrum</i>	Red maple	Tree						1							1		
<i>Aesculus</i>	Buckeye				2										2		
<i>Alnus serrulata</i>	Hazel alder	Shrub						1							1		
<i>Cornus amomum</i>	Silky dogwood	Shrub				1	1	1	3	3	3	4	4	4	4	4	4
<i>Fraxinus pennsylvanica</i>	Green ash	Tree	4	4	4	6	6	6	4	4	4	14	14	14	12	12	12
<i>Lindera benzoin</i> var. <i>benzoin</i>	Northern spicebush	Shrub									1			1			
<i>Liriodendron tulipifera</i> var. <i>tulipifera</i>	Tulip-tree, Yellow Poplar, Whitewood	Tree													6	6	6
<i>Morus rubra</i>	Red mulberry	Tree									1			1			
<i>Nyssa sylvatica</i>	Blackgum	Tree	5	5	5				5	5	5	10	10	10	12	12	12
<i>Platanus occidentalis</i> var. <i>occidentalis</i>	Sycamore, Plane-tree	Tree	12	12	12	5	5	5	5	5	6	22	22	23	24	24	24
<i>Salix nigra</i>	Black willow	Tree						4			18			22			
<i>Sambucus</i>	Elderberry	Shrub			2									2			
<i>Sambucus canadensis</i>	Common Elderberry	Shrub							1	1	1	1	1	1	1	1	1
Stem count			21	21	25	12	12	18	18	18	39	51	51	82	59	59	59
size (ares)			1			1			1			3			3		
size (ACRES)			0.02			0.02			0.02			0.07			0.07		
Species count			3	3	5	3	3	6	5	5	8	5	5	12	6	6	6
Stems per ACRE			850	850	1,012	486	486	728	728	728	1,578	688	688	1,106	796	796	796



Vegetation Monitoring Plot 1
Monitoring Year 2 – June 4, 2015



Vegetation Monitoring Plot 2
Monitoring Year 2 – June 4, 2015



Vegetation Monitoring Plot 3
Monitoring Year 2 – June 4, 2015