

# **Annual Monitoring Report**

**FINAL**

Project Name: East Fork Pigeon River Wetland

Monitoring Year 5

NCDMS Contract No.: 006035

NCDMS Project No.: 94203

Haywood County, North Carolina

Data Collected: 5/23/2018-11/7/2018

Date Submitted: November 2018



**Submitted to:**

**North Carolina Division of Mitigation Services**

**North Carolina Department of Environmental Quality**

**1652 Mail Service Center**

**Raleigh, NC**

November 16<sup>th</sup>, 2018

Mr. Paul Wiesner  
Project Manager  
NCDEQ Division of Mitigation Services  
5 Ravenscroft Dr., #102  
Asheville, NC 28801

Subject: East Fork Pigeon River Wetland Project (EEP Project #94203) – MY5 Final Report Comments

Dear Mr. Wiesner:

The North Carolina Division of Mitigation Services (DMS) contracted the services of Equinox to perform project assessment and monitoring services for the East Fork Pigeon River Wetland Project Site, per contract # 006035. Comments provided by DMS are listed below with the red text indicating how each was addressed by Equinox within the final report.

- **Section 1.4:** In the report text, please note that an additional invasive treatment will be completed on the site in the growing season of 2019 prior to closeout. **Text about a growing season treatment in 2019 has been added to the report.**
- **Table 1:** The MY5 monitoring report needs to match the DMS internal project credit database. Please update the report assets as follows: The preservation wetland WMUs should be 2.338 WMUs; the TOTAL WMUs should be updated to 3.468 WMUs. **Table 1 has been updated to show that the total preservation WMUs are 2.338 and that the total WMUs for the project are 3.468.**
- **Table 3:** In the table, please note that HARP was the planting contractor and the invasive control contractor from 2012-2014. Also, the “Seeding Contractor” section of the table can be removed from the table as no seeding was conducted. **HARP was added to Table 3 as the invasive control contractor for 2012-2014. The “Seeding Contractor” section has been removed from Table 3.**
- **Table 3:** Monitoring Performers (Y1-Y5): MY1 was 2014. Please update the cell to show that 2014-2018 as the applicable monitoring years. Also; Edenton is misspelled in the Carolina Silivis cell. **The cell has been updated to show 2014-2018 as the applicable monitoring years. Edenton has been corrected in the Carolina Slivics cell.**
- **Figure 2 and Table 4:** The map shows numerous areas of invasives on the site and the able reports a 1.94 combined acreage of invasives on the site. DMS visited the site on 10/24/18 and did not observe the magnitude of invasives reported in the draft. Honeysuckle is not a major invasive of concern and should not be reported in the mapping and table unless it is inhibiting tree growth. Please update the map and table in the final report as necessary. **Areas of honeysuckle not inhibiting the growth of planted stems have been removed from Figure 2 and Table 4.**

- **Table 6:** The table incorrectly reports MY1 as 2015. MY1 was 2014. Please update the table accordingly. **Table 6 has been updated to show MY1 as 2014.**

The project manager for this project is Mr. Drew Alderman. His contact information is as follows:

Drew Alderman, Natural Resource Specialist  
Equinox Environmental Consultation & Design, Inc.  
37 Haywood Street  
Asheville, NC 28801  
828-253-6856 ext. 213 direct office line  
828-253-8256 fax

The contracting entity for this work is Equinox Environmental Consultation & Design, Inc., with federal tax ID number 55-0789032.



Sincerely,  
Drew Alderman

**Prepared by:**



**EQUINOX**

*balance through proper planning*

37 Haywood Street, Suite 100  
Asheville, NC 28801

Project Contact: Drew Alderman  
Email: [drew@equinoxenvironmental.com](mailto:drew@equinoxenvironmental.com)

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## 1.0 PROJECT SUMMARY

### 1.1. Project History and Background

The East Fork Pigeon River Wetlands Project (EFPR) restoration site is located in the French Broad River Basin (HUC8- 06010106) near Cruso in Haywood County, NC. It is a North Carolina Division of Mitigation Services (DMS) site whose purpose is to provide wetland mitigation for unavoidable losses at other locations within the basin. The site is situated between the right-descending bank of the East Fork of the Pigeon River and Old Michael Road, off of Highway US 276.

The established goals for the EFPR site were as follows:

- Enhance and protect existing wetlands and wildlife habitat along the East Fork Pigeon River. Specifically, the target goal was to enhance the vegetative community of the wetlands by removing identified invasive plant species through manual and/or chemical methods and by replanting the site with native species.
- Protect the wetlands on the site with a permanent Conservation Easement.
- Preserve approximately 1,411 feet of the East Fork of the Pigeon River and approximately 664 feet of Perennial Stream 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 occurred on the site. Additionally, the project was instituted prior to July 28, 2010 and did not require a mandatory IRT mitigation plan review.

On November 3, 2010, the U.S. Army Corps of Engineers approved a wetland Jurisdictional Determination (JD) on the project site. The JD was used to prepare a mitigation plan that would result in enhanced wetland function. The mitigation plan for the project was completed by Mactec Engineering and Consulting, Inc (Currently AMEC Environment and Infrastructure, Inc.) in March 2011

The control of nuisance plant species within the bottomland hardwood forest and shrub/understory 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 infestations 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. Upon review, however, DMS postponed the planting of the site for a third growing season to allow for additional nuisance species control before replanting. Spot treatments of invasive species will continue through the scheduled 5-year monitoring term.

The 2011 mitigation plan estimated the wetland planting area to be approximately 5.64 acres. Based on 2013 site conditions and the extent of the invasive plant treatment areas, approximately 2.26 acres of the project’s 13.95 acres were planted in December 2013. The wetland areas that were excluded from the planting operation encompassed: (1) a deepwater wetland drainageway that occurred along the southern shoulder of Old Michael Road and was determined to be an historical 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 both sides of the channel.

## **1.2. Project Goals and Objectives**

The established mitigation goals for the EFPR 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. The project objectives included:

- Enhance existing wetlands by removing identified invasive plant species through manual and/or chemical methods and by replanting the site with native species.
- Protecting the wetlands with a permanent Conservation Easement.
- Preservation of 2,075 feet of perennial stream.

## **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 5 (MY5) data collection consisted of monitoring previously established vegetation plots in three of the four planted areas. Results from vegetation monitoring indicate all three of the plots are meeting the final MY5 success criteria of 260 planted stems per acre (Table 6). Planted stem density averaged 472 stems per acre across all plots. Stem density ranged from 283 stems per acre to 850 stems per acre. When naturally recruited stems are included, densities ranged from 769 to 931 stems per acre with an MY5 mean of 836 stems per acre across all plots. Seven woody species were documented in the vegetation plots.

Visual assessments performed on May 25, 2018 and November 7, 2018 focused on planted stems outside of the permanent vegetation monitoring 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.

In addition to planted stems, an inventory of invasive exotic vegetation was performed. Japanese honeysuckle, oriental bittersweet, multiflora rose, and Chinese privet were documented throughout drier, upland areas of the easement and scattered in low densities throughout the easement (Figure 2, CCPV).



Along the road in the northwestern portion of the easement, a patch of kudzu was documented. This infestation has responded well to treatments and has been reduced to only a few small vines. Bamboo was also noted in the wetter, more central portions of the easement. Specifically two smaller infestations were noted just north of Vegetation Plot 3 along the backwater channel. A third small bamboo infestation was noted in the southern portion of the easement along the Pigeon River just south of Photo Point 14. Other small infestation of invasive exotic vegetation occur in various spots throughout the easement and consists mostly of Japanese honeysuckle, however these population are not inhibiting planted tree growth. Treatments of invasive exotic vegetation during MY5 occurred in June and October 2018. During the June treatment, kudzu, multiflora rose, Japanese knotweed, privet sp., and oriental bittersweet were treated with both a foliar spray of glyphosate in a 3% and 7% solution and a cut and stump spray of a 50% solution of Refuge (glyphosate). During the October treatments, 2% solution of Transline (clopyralid) was foliar sprayed on kudzu vines present along the roadside infestation. Foliar sprays of 3% and 7% glyphosate were used on infestations of bamboo, privet, multiflora rose, and knotweed. Cut and stump spray treatments of a 50% solution of glyphosate were also used to treat oriental bittersweet and kudzu vines. Treatments showed good efficacy; however, populations of invasive-exotic vegetation still persist in small quantities throughout the easement (Figure 2). Additional invasive-exotic treatments will be completed on site in the growing season of 2019 prior to project closeout.

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 Final Wetland Mitigation Report 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.

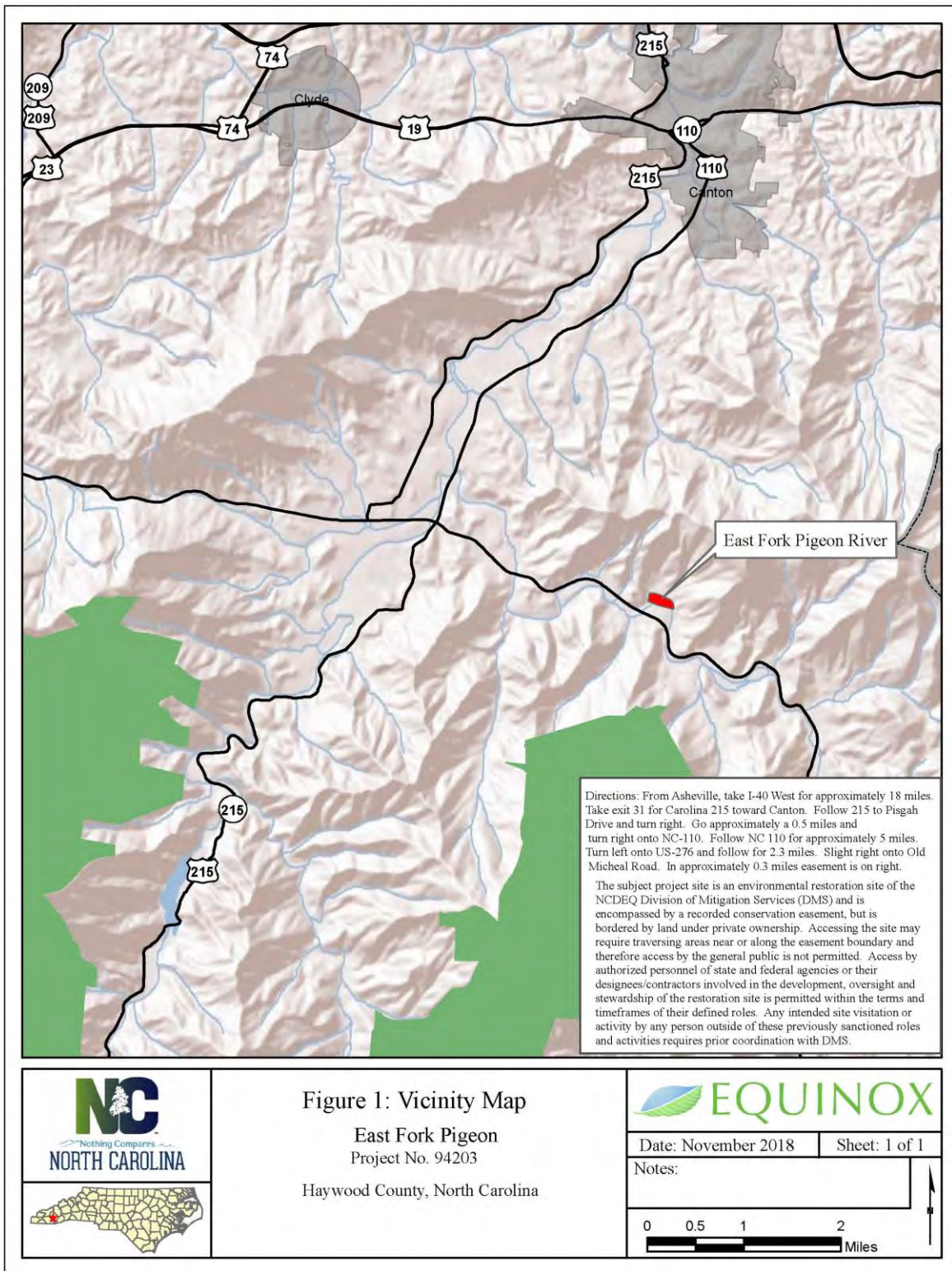
## **3.0 REFERENCES**

- 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



<b>Table 1. Project Components and Summation East Fork of Pigeon Wetland / Project No. 94203</b>				
<b>Feature</b>	<b>Mitigation Approach</b>	<b>Quantity (Linear Footage/Acreage)</b>	<b>Ratio</b>	<b>Mitigation Units (SMU/WMU)</b>
<b>Stream</b>				
Perennial Stream	P	664	5:1	133
East Fork of the Pigeon River	P	1,411	5:1	282
<b>Total:</b>		<b>2,075</b>	<b>Total:</b>	<b>415</b>
<b>Wetland</b>				
Bottomland Hardwood Forest	E	2.26	2:1	1.13
Bottomland Hardwood Forest	P	11.69	5:1	2.338
<b>Total</b>		<b>13.95</b>	<b>Total</b>	<b>3.468</b>

<b>Table 2. Project Activity &amp; Reporting History East Fork of Pigeon Wetland / Project No. 94203</b>		
<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Actual Completion or Delivery</b>
Land Acquisition	-	Dec 2010
Environmental Resource Technical Report	N/A	N/A
Restoration Plan	N/A	March 2011
Permit Date	N/A	N/A
Initial Wetland Delineation	-	Oct 2010
Initial Invasive Exotic Reconnaissance	-	Oct 2010
USACE Jurisdictional Determination		Nov 2010
Topographic Survey	-	Nov 2010
Initial Mitigation Plan / As-built	-	March 2011
Invasive Exotic Treatment	-	June 2012
Invasive Exotic Treatment	-	Nov 2012
Invasive Exotic Treatment	-	July 2013
Invasive Exotic Treatment	-	Nov 2013
Invasive Exotic Treatment	-	Dec 2013
Wetland Planting	-	Dec 2013
Final Mitigation Plan (Year 0 Monitoring - Baseline)	-	March 2014
Invasive Exotic Treatment	-	July 2014
Year 1 Monitoring	Oct 2014	Nov 2014
Year 2 Monitoring	Dec 2015	Dec 2015
Invasive Exotic Treatment (MY3)	-	Sep 2016
Invasive Exotic Treatment (MY3)	-	Oct 2016
Year 3 Monitoring	Oct 2016	Nov 2016
Invasive Exotic Treatment (MY4)	-	May 2017
Invasive Exotic Treatment (MY4)	-	Aug 2017
Year 4 Monitoring	Oct 2017	Nov 2017
Invasive Exotic Treatment (MY5)	-	June 2018
Invasive Exotic Treatment (MY5)	-	Oct 2018
Year 5 Monitoring	Nov 2018	Nov 2018

N/A - Item does not apply.

- Information Unavailable

<b>Table 3. Project Contacts</b> <b>East Fork of the Pigeon Wetland / Project No. 94203</b>	
<b>Designer</b>	AMEC Environment and Infrastructure, INC. 4021 Stirrup Creek Drive, Suite 100 Durham, North Carolina 27701
Primary Project Design POC	Richard Harmon (919)381-9909
<b>Construction Contractor</b>	N/A
	N/A
Construction Contractor POC	N/A
<b>Planting Contractor</b>	Habitat Assessment and Restoration Professionals 301 McCullough Drive, 4th Floor Charlotte, North Carolina 28262
Planting Contractor POC	(704) 841-2841
<b>Monitoring Performers (Y0) - 2013</b>	AMEC Environment and Infrastructure, INC. 4021 Stirrup Creek Drive, Suite 100 Durham, North Carolina 27701
Monitoring POC	Richard Harmon (919)381-9909
<b>Monitoring Performers (Y1-Y5) - 2014- 2018</b>	Equinox 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Monitoring POC	Drew Alderman (828) 253-6856
<b>Invasive Control Contractor 2012-2014</b>	Habitat Assessment and Restoration Professionals 301 McCullough Drive, 4th Floor Charlotte, North Carolina 28262
Invasive Contractor POC	(704) 841-2841
<b>Invasive Control Contractor (Y2-Y5) - 2015-2018</b>	Carolina Silvics 908 Indian Trail Road Edenton, NC 27932
Invasive Contractor POC	(252) 482-8491

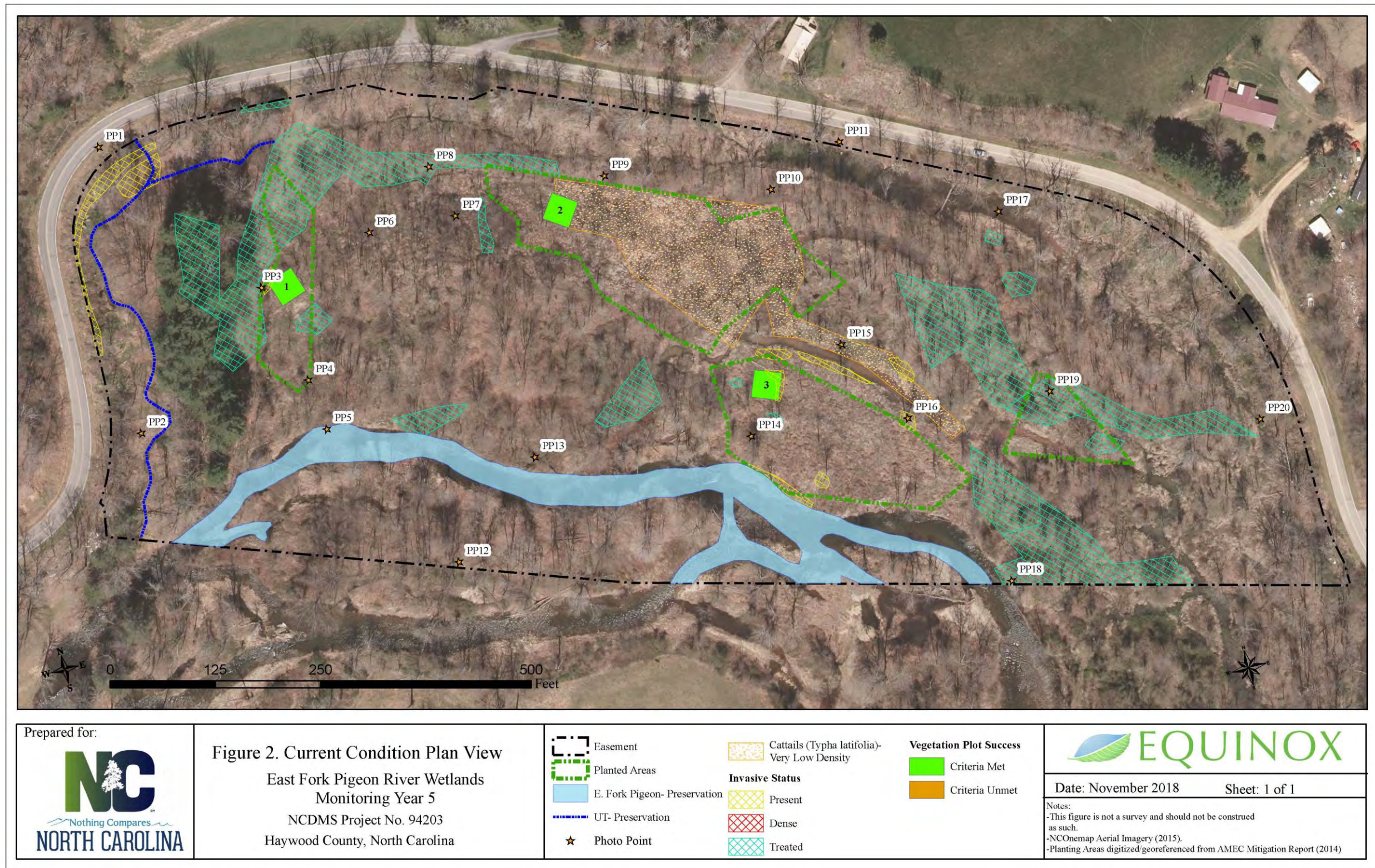
N/A - Item does not apply.

- Information Unavailable

## Appendix B Visual Assessment Data

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**Table 4. Vegetation Condition Assessment  
East Fork of the Pigeon Wetland / Project No. 94203**

<b>Planted Acreage: 2.29</b>					
<b>Vegetation Category</b>	<b>Definitions</b>	<b>CCPV Depiction</b>	<b>Number of Polygons</b>	<b>Combined Acreage</b>	<b>% of Planted Acreage</b>
<b>1. Bare Areas</b>	Very limited cover of both woody and herbaceous material.	N/A	0	0.00	0%
<b>2. Low Stem Density Areas</b>	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%
<b>Totals</b>			0	0.00	0%
<b>3. Areas of Poor Growth Rates or Vigor</b>	Areas with woody stems of a size class that are obviously small given the monitoring year.	N/A	0	0.00	0%
<b>Cumulative Totals</b>			0	0.00	0%
<b>Easement Acreage: 16.53</b>					
<b>Vegetation Category</b>	<b>Definitions</b>	<b>CCPV Depiction</b>	<b>Number of Polygons*</b>	<b>Combined Acreage*</b>	<b>% of Easement Acreage</b>
<b>4. Invasive Areas of Concern</b>	Areas or points (if too small to render as polygons at map scale).	Cross Hatch (Red - Dense/Yellow - Present)	10	0.17	1%
<b>5. Easement Encroachment Areas</b>	Areas or points (if too small to render as polygons at map scale).	Stipple Purple Dots White Background	0	0.00	0%

\*Includes treated areas (marked with green cross hatch on CCPV)

N/A - Item does not apply.

Appendix B



Permanent Photo Station 1  
East/Southeast



Permanent Photo Station 4  
North



Permanent Photo Station 2  
West



Permanent Photo Station 5  
Upstream



Permanent Photo Station 3  
North



Permanent Photo Station 6  
Southwest



Appendix B



Permanent Photo Station 7  
East



Permanent Photo Station 10  
South/Southwest



Permanent Photo Station 8  
South/Southeast



Permanent Photo Station 11  
Southeast



Permanent Photo Station 9  
Southwest



Permanent Photo Station 12  
East



Appendix B



Permanent Photo Station 13  
Upstream



Permanent Photo Station 15  
North



Permanent Photo Station 13  
Downstream



Permanent Photo Station 16  
West



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



Appendix B



Permanent Photo Station 17  
Northwest



Permanent Photo Station 20  
North



Permanent Photo Station 18  
North/Northeast



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. 64209																													
Scientific Name	Common Name	Species Type	Current Plot Data (MY5 2018)									Annual Means																	
			Plot 1			Plot 2			Plot 3			MY5 (2018)			MY4 (2017)			MY3 (2016)			MY2 (2015)			MY1 (2014)			MY0 (2014)		
			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
<i>Acer rubrum</i>	Red Maple	Tree						4						4						2			1						
<i>Acer rubrum var. rubrum</i>	Red Maple	Tree														4									1				
<i>Aesculus</i>	Buckeye																						2			2			
<i>Aesculus flava</i>	Yellow Buckeye	Tree																				2							
<i>Alnus serrulata</i>	Hazel Alder	Shrub						4					4			3			1			1			1				
<i>Cornus amomum</i>	Silky Dogwood	Shrub				1	1	1				1	1	1	1	1	1	1	1	1	1	4	4	4	4	4	4		
<i>Fraxinus pennsylvanica</i>	Green Ash	Tree	4	4	5	4	4	4	4	4	4	6	12	12	15	12	12	12	13	13	17	14	14	14	14	14	12		
<i>Lindera benzoin</i>	Northern Spicebush	Shrub																					1						
<i>Lindera benzoin var. benzoin</i>	Northern Spicebush	Shrub																							1				
<i>Liriodendron tulipifera var. tulipifera</i>	Tulip-tree, Yellow Poplar, Whitewood	Tree																								6	6		
<i>Morus rubra</i>	Red Mulberry	Tree																				4			1				
<i>Nyssa sylvatica</i>	Blackgum	Tree	5	5	5				1	1	1	6	6	6	6	6	6	6	6	6	6	10	10	10	10	10	12		
<i>Platanus occidentalis</i>	American Sycamore	Tree			1								1										1						
<i>Platanus occidentalis var. occidentalis</i>	Sycamore, Plane-tree	Tree	12	12	12	2	2	2	2	2	2	16	16	16	16	16	18	18	18	22	22	22	22	22	23	24			
<i>Salix caroliniana</i>	Coastal Plain Willow	Tree																				3							
<i>Salix nigra</i>	Black Willow	Tree						5									10												
<i>Sambucus</i>	Elderberry	Shrub																											
<i>Sambucus canadensis</i>	Common Elderberry	Shrub																											
<b>Stem count</b>			21	21	23	7	7	20	7	7	19	35	35	62	35	35	60	38	38	72	51	51	82	51	51	82	59		
<b>size (ares)</b>			1			1			1			3			3			3			3			3			3		
<b>size (ACRES)</b>			0.02			0.02			0.02			0.07			0.07			0.07			0.07			0.07			0.07		
<b>Species count</b>			3	3	4	3	3	6	3	3	4	4	4	8	4	4	7	4	4	10	5	5	13	5	5	12	6		
<b>Stems per ACRE</b>			850	850	931	283	283	809	283	283	769	472	472	836	472	472	809	513	513	971	688	688	1106	688	688	1106	796		

<sup>1</sup>PnoLS: No livestock included in tally; P-all: All planted stems included in tally; T: Total stems including recruitment.

**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%
- Recruit Stems



Vegetation Monitoring Plot 1  
Monitoring Year 5 – October 5, 2018



Vegetation Monitoring Plot 2  
Monitoring Year 5 – October 5, 2018





Vegetation Monitoring Plot 3  
Monitoring Year 5 – October 5, 2018