Annual Monitoring Report

FINAL

Project Name: East Fork Pigeon River Wetland

Monitoring Year 3

NCDMS Contract No.: 006035

NCDMS Project No.: 94203

Haywood County, North Carolina

Data Collected: 6/2/2016-10/26/2016

Date Submitted: 11/23/2016

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 (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 Micheal 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 3 (MY3) data collection consisted of monitoring 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 513 stems per acre across all plots. Stem density ranged from 324 stems per acre to 850 stems per acre. When naturally recruited stems are included, densities ranged from 607 to 1,214 stems per acre with an MY3 mean of 917 stems per acre across all plots. Ten woody species were documented in the vegetation plots.

Visual assessments performed on June 2, 2016 and October 26, 2016 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). Along

the southeastern portion of the easement, a large swath of Japanese knotweed was noted in the floodplain of the Pigeon River. Along the road in the northwestern portion of the easement, a patch of Kudzu was documented. Bamboo was also noted in the wetter, more central portions of the easement. Treatments of invasive exotic vegetation during MY3 occurred in May and September 2016. During the May treatments, Chinese privet, Japanese Knotweed, Oriental bittersweet, multiflora rose, and bamboo were treated with foliar spray of Element 3a and glyphosate. During the September site visit, Japanese honeysuckle, Chinese privet, Multiflora rose, Oriental bittersweet, Japanese knotweed, and kudzu were treated. Larger vines of kudzu were treated using cut and stump spray of Garlon 3a, while matted infestations were sprayed with a foliar spay of Garlon 3a. The remaining invasive exotic species were treated using a foliar spray of glyphosate. 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 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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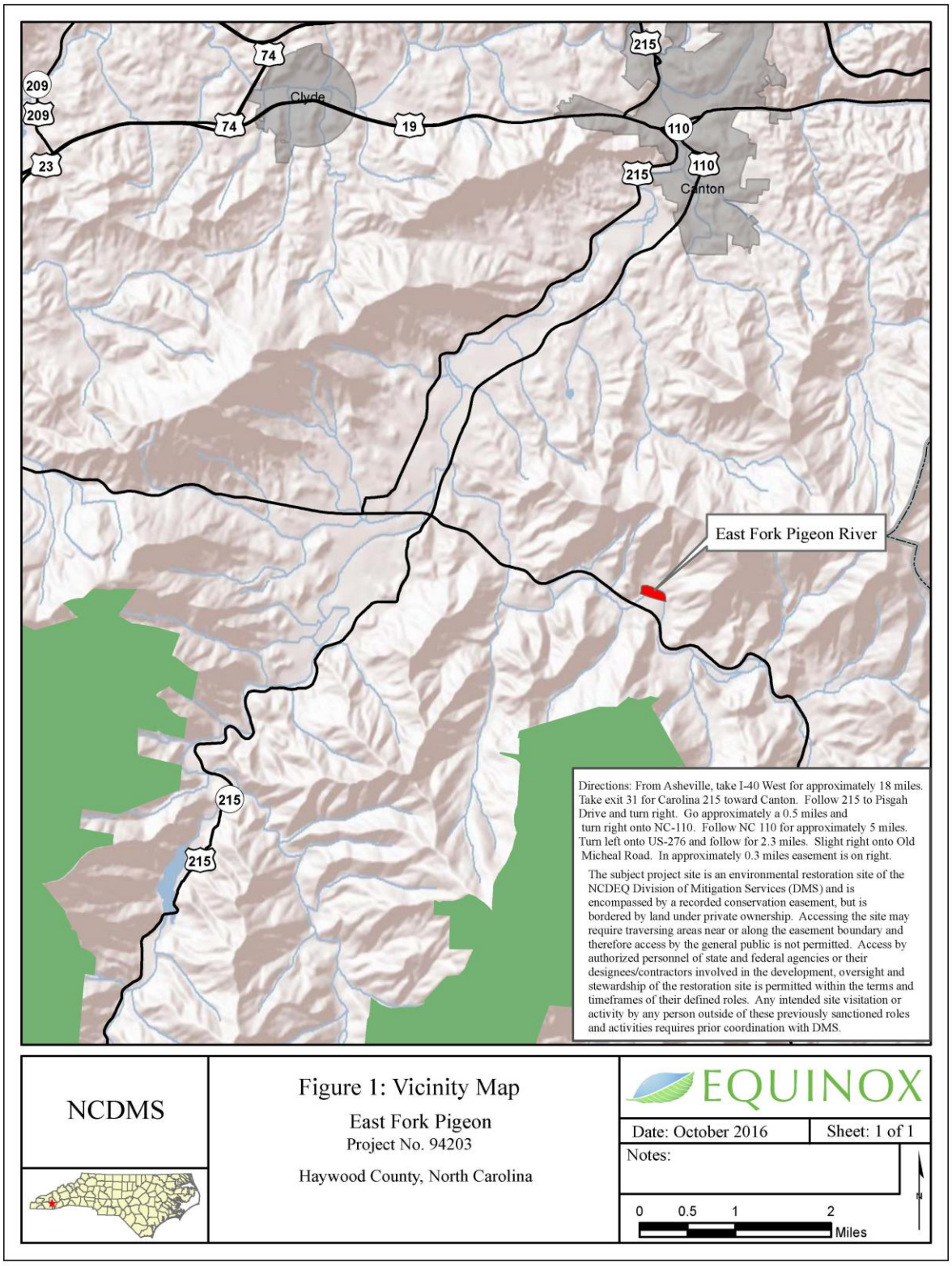
Appendix A
General Tables and Figures

Appendix A

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



Appendix A

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	March 2011
Permit Date	N/A	N/A
Initial Wetland Delineation	-	Oct 2010
Initial Invasive Exotic Reconnaissance	-	Oct 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	-	Sep 2016
Invasive Exotic Treatment	-	Oct 2016
Year 3 Monitoring	Oct 2016	Nov 2016
Year 4 Monitoring		
Year 5 Monitoring		

N/A - Item does not apply.

- Information Unavailable

Appendix A

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-Y3) - 2015- 2016**	Equinox 37 Haywood Street, Suite 100 Asheville, North Carolina 28801
Monitoring POC	Drew Alderman (828) 253-6856
Invasive Control Contractor **(Y2-Y3) - 2015-2016**	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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Prepared for:

NCDMS

Figure 2. Current Condition Plan View

East Fork Pigeon River Wetlands
Monitoring Year 3

NCDMS Project No. 94203

Haywood County, North Carolina

- Photo Point
- UT- Preservation
- E. Fork Pigeon- Preservation
- Easement
- Planted Areas
- Cattails (Typha latifolia)- Very Low Density

Invasive Status

- Present
- Dense
- Treated

Vegetation Plot Success

- Criteria Met

EQUINOX

Date: October 2016 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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Appendix B

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)	18	1.71	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

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

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. 64203

			Current Plot Data (MY3 2016)									Annual Means											
			94203-EQX-0001			94203-EQX-0002			94203-EQX-0003			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**
Acer rubrum	Red maple	Tree						2						2			1						
Acer rubrum var. rubrum	Red maple	Tree																		1			
Aesculus	Buckeye																2			2			
Aesculus flava	Yellow Buckeye	Tree			2									2									
Alnus serrulata	Hazel Alder	Shrub						1						1			1			1			
Cornus amomum	Silky Dogwood	Shrub				1	1	1				1	1	1	4	4	4	4	4	4	4	4	4
Fraxinus pennsylvanica	Green Ash	Tree	4	4	4	5	5	5	4	4	8	13	13	17	14	14	14	14	14	14	12	12	12
Lindera benzoin	Northern Spicebush	Shrub															1						
Lindera benzoin var. benzoin	Northern Spicebush	Shrub																		1			
Liriodendron tulipifera var. tulipifera	Tulip-tree, Yellow Poplar, Whitewood	Tree																			6	6	6
Morus rubra	Red Mulberry	Tree									4			4			1			1			
Nyssa sylvatica	Blackgum	Tree	5	5	5				1	1	1	6	6	6	10	10	10	10	10	10	12	12	12
Platanus occidentalis	American Sycamore	Tree															1						
Platanus occidentalis var. occidentalis	Sycamore, Plane-tree	Tree	12	12	12	3	3	3	3	3	3	18	18	18	22	22	22	22	22	23	24	24	24
Salix caroliniana	Coastal Plain Willow	Tree			3									3									
Salix nigra	Black Willow	Tree			1			3			14			18			22			22			
Sambucus	Elderberry	Shrub															2			2			
Sambucus canadensis	Common Elderberry	Shrub													1	1	1	1	1	1	1	1	1
		Stem count	21	21	27	9	9	15	8	8	30	38	38	72	51	51	82	51	51	82	59	59	59
		size (ares)	1			1			1			3			3			3			3		
		size (ACRES)	0.02			0.02			0.02			0.07			0.07			0.07			0.07		
		Species count	3	3	6	3	3	6	3	3	5	4	4	10	5	5	13	5	5	12	6	6	6
		Stems per ACRE	850	850	1,093	364	364	607	324	324	1,214	513	513	971	688	688	1,106	688	688	1,106	796	796	796

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

[1]PnoLS: No livestakes included in tally; P-all: All planted stems included in tally; T: Total stems including recruitment.

Appendix C

Vegetation Monitoring Plot 1

Monitoring Year 3 – June 2, 2016

Vegetation Monitoring Plot 2

Monitoring Year 3 – June 2, 2016

Appendix C

Vegetation Monitoring Plot 3

Monitoring Year 3 – June 2, 2016