Little River
Stream and Wetland Enhancement Project

SCO No. 070715501
DENR Contract No. D08049S
EEP Project No. 226
Moore County, North Carolina

Year 1 of 5 Monitoring Report
Data Collection: March through December 2011
Submission Date: March 23, 2012

Prepared for:

North Carolina Department of Environment and Natural Resources
Ecosystem Enhancement Program
2728 Capital Boulevard, Suite 1H-103 Raleigh, NC 27606

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Prepared by:

Land Management Group, Inc.
P.O. Box 2522
Wilmington, NC 28402
(910) 452-0001

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3.0 EXECUTIVE SUMMARY/PROJECT ABSTRACT

The Little River Stream and Wetland Enhancement Site is located on a 125-acre conservation easement along Little River near Vass, NC (Moore County) within the Cape Fear River Basin #03030004 Cataloging Unit (Figure 1). It is located within a larger tract owned by J.J. Barnes and his family. The larger tract is actively managed for wildlife habitat to facilitate hunting on the overall tract. Prior to mitigation activities, the project site was a jurisdictional wetland with planted loblolly pine. The pine plantation was planted in the early 2000s as part of the CREP program. The project is funded by the North Carolina Ecosystem Enhancement Program (EEP).

The overall goal for the Little River Stream and Wetland Enhancement Site is to preserve and enhance a natural bottomland hardwood forest which exhibits desired functions appropriate to the existing geomorphic setting of the site.

Specific goals include:

1) Preservation of wildlife habitat; and
2) Natural community enhancement.

The project objectives include:

1) Partial removal of undesired vegetation via burning to promote desired species growth; and
2) Planting of the project site with specific native species to enhance natural habitat.

To accomplish these goals, the site was burned in December of 2010 and planted in January of 2011. The baseline field monitoring was performed by Stantec in February of 2011.

Stream enhancement II and preservation are both components of this project (Table 1). Three stream channels traverse the project site. Small portions of the channels have been altered in the past but currently appear stable. The project includes 3,593 linear feet of stream enhancement II on two tributaries to the Little River (Reach 1 & Reach 2) and 210 linear feet of stream preservation of one associated tributary (Reach 3).

Wetlands within the conservation easement boundary were enhanced or preserved. Approximately 39 acres of wetlands in the bottomland hardwood forest adjacent to the Little River channel and approximately nine acres of successional wetlands located in the northwest portion of the project site have been preserved. The wetlands within the approximately 48-acre loblolly pine plantation area and 7-acre grassy field area have been enhanced through the planting of native hardwood trees (See Table 1 for Project Components and Figure 2 for Component Location).

Vegetation monitoring is conducted on an annual basis using sixteen (16) permanent vegetation plots (Figure 2). The vegetation success criterion for the pine plantation area is

the survival of 150 planted woody stems per acre at the end of the five-year monitoring period. The success criterion for the grassy field area is the survival of 260 planted woody stems per acre at the end of the five-year monitoring period. Monitoring Year 1 (MY1 2011) observed a mean stem density of 327 planted stems per acre in the plots. The plots located within pine plantation area (Plots 4-16) had an average of 289 planted stems per acre. The plots located in the grassy field area (Plots 1-3) had an average of 377 planted stems per acre. Plots 2 and 13 had stem densities lower than the five-year monitoring success criterion. Plots 9 and 12 meet the five-year monitoring success criterion, but by less than 20%. All other plots meet the success criterion by greater than 20%. When volunteer stems are included, the site had an overall mean stem density of 1105 stems per acre in the plots. The plots located within pine plantation area had an average of 968 planted and volunteer stems per acre. The plots located in the grassy field area had an average of 1699 planted and volunteer stems per acre.

The project consisted of the enhancement and preservation of existing wetlands and streams within the site. Prior to mitigation, wetlands were determined and confirmed by a jurisdictional determination. Therefore, there is no hydrological success criterion. However, five continuous groundwater monitoring gauges were installed on the site in order to monitor and confirm hydrology. Four of the gauges are located in wetlands of the pine plantation and a fifth is a reference gauge located in a preserved wetland area on the west side of the project. During the growing season of MY1 (2011), the groundwater monitoring gauges located within the enhancement site demonstrated a water level within 12" of the soil surface for between 0% and 12% of the growing season.

- Gauge #1: 7% (17 days)
- Gauge #2: 1% (2 days)
- Gauge #3: 12% (28 days)
- Gauge #4: 0% (Gauge 4 was not functioning for first half of 2011)
- Reference Gauge: 23% (54 days)

Streams are visually assessed each year to monitor for stability. One crest gauge was installed on-site and is located adjacent to Vegetation Plot 7. Streams were stable during the MY1 monitoring assessment. The crest gauge was evaluated several times throughout 2011. During these visits, some water was noted within the channel, but no indications of overbank flooding were noted.

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 the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEP's website. All raw data supporting the tables and figures in the appendices are available from EEP upon request.

4.0 METHODOLOGY

Vegetation

Sixteen (16) permanent vegetation plots are used for annual vegetation monitoring (Figure 2). All vegetation monitoring was completed in October 2011 utilizing the Carolina Vegetation Survey (CVS) – EEP protocol Level 2 (version 4.2).

Hydrology

A crest gauge was installed within a stream to monitor flow and is assessed through visual evaluation. Five groundwater monitoring gauges were installed on site (4 within the enhancement area and 1 within the reference area). All groundwater monitoring gauges were downloaded quarterly utilizing Remote Data System, Inc. data loggers and software. Data from the groundwater monitoring gauges are not used toward success criteria of the wetland.

Photo documentation was performed at prescribed locations across the site. A digital camera was used to take photos at each predetermined photo point location (Figure 2).

5.0 References

NCEEP. 2011. Little River Stream and Wetland Enhancement As-Built & Baseline Monitoring Report. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, NC. December, 2011.

NCEEP. 2010. Procedural Guidance and Content Requirements for EEP Monitoring Reports. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, NC. Version 1.3 January 15, 2010.

NCEEP. 2008. CVS-EEP Vegetation Sampling Protocol. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, NC. Version 4.2, 2008.

NCEEP. 2007. Little River Wetland Enhancement Restoration Plan. North Carolina Department of Environment and Natural Resources, Ecosystem Enhancement Program. Raleigh, NC. September 28, 2007.

Army Corps. Of Engineers. 1987. U.S. Army Corps. of Engineers. Tech Report Y-87-1, 1987 Wetland Delineation Manual, Washington, DC. AD/A176.

Army Corps. Of Engineers. 2005. U.S. Army Corps. of Engineers. Information Regarding Stream Restoration in the Outer Coastal Plain of North Carolina, Wilmington Regulatory Field Office.

6.0 Project Condition and Monitoring Data Appendices

Appendix A.
Project Vicinity Map and Background Tables

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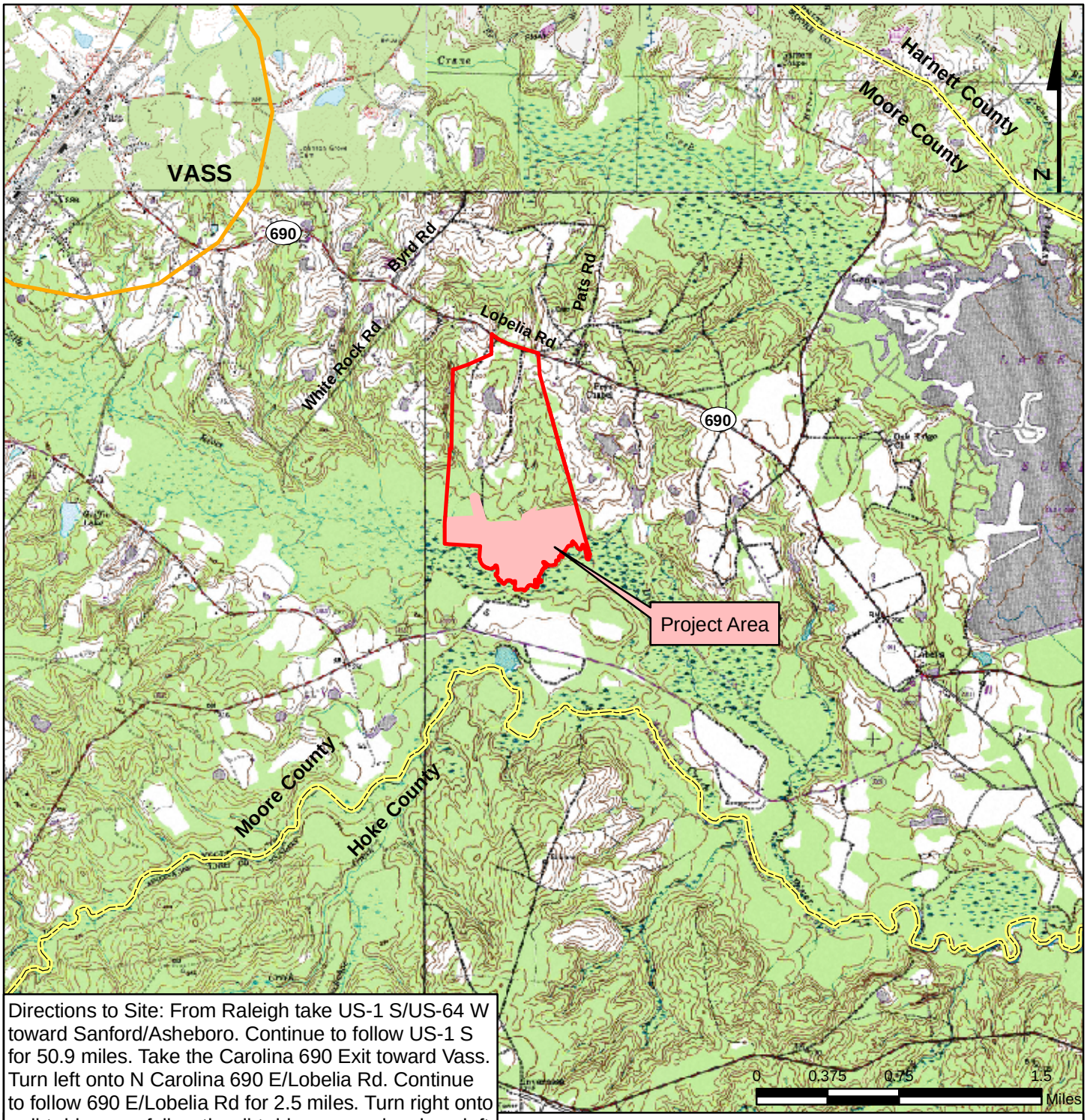

Directions to Site: From Raleigh take US-1 S/US-64 W toward Sanford/Asheboro. Continue to follow US-1 S for 50.9 miles. Take the Carolina 690 Exit toward Vass. Turn left onto N Carolina 690 E/Lobelia Rd. Continue to follow 690 E/Lobelia Rd for 2.5 miles. Turn right onto a dirt driveway, follow the dirt driveway and make a left at the fork. Continue down the dirt road to the NW corner of the site.

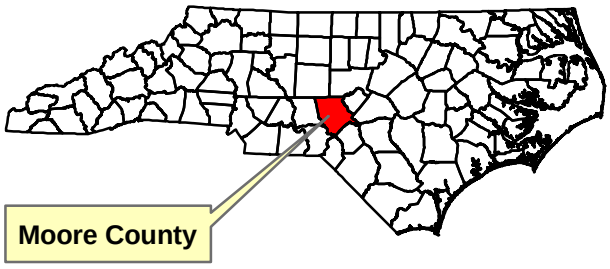

Figure 1. Vicinity Map

Little River Stream and Wetland Enhancement
EEP Project #226
Moore County, NC

7.5' USGS Topoquad Lobelia

Project boundary

J-Bar Ranch parcel boundary

Municipal boundary

Ecosystem Enhancement Program

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Table 1. Project Components and Mitigation Credits									
Little River Stream and Wetland Enhancement Project/EEP Project No. 226									
Mitigation Credits									
	Stream		Riparian Wetland		Non-Riparian Wetland		Buffer	Nitrogen Nutrient Offset	Phosphorus Nutrient Offset
Type	R	RE	R	RE	R	RE			
Totals	1437	42		32.4					
Project Components									
Project Component or Reach ID	Stationing/Location	Existing Footage/ Acreage	Approach	Restoration or Restoration Equivalent	Restoration Footage or Acreage	Mitigation Ratio	Comment		
Reach 1	Flows NW to SE across the middle of site	1,726	E11	R	1,726	2.5:1	Enhancement - planting occurred in the riparian area of both banks		
Reach 2	Flows NW to SE across the middle of site	1,867	E11	R	1,867	2.5:1	Enhancement - planting occurred in the riparian area of both banks		
Reach 3	Enters the site on middle N boundary, tributary of Reach 2	210	P	RE	210	5:1	Preservation - area is protected by a conservation easement with signage around the boundary		
Wetland 1	Pine Plantation	47.8	E11	RE	47.8	2.5:1	Enhancement - weedy vegetation was suppressed with fire and area was planted		
Wetland 2	Grassy Field	7.0	E11	RE	7.0	2:1	Enhancement - EI as a result of no trees present in this area. Area was burned and planted		
Wetland 3	NW portion of the site and S boundary of site	48.7	P	RE	48.7	5:1	Preservation - area is protected by a conservation easement with signage around the boundary		
Component Summation									
Restoration Level	Stream (lf)		Riparian Wetland (ac)		Non-Riparian Wetland (ac)		Buffer (sq ft)	Upland (ac)	
			Riverine	Non-Riverine					
Restoration									
Enhancement			54.8						
Enhancement I									
Enhancement II	3,593								
Creation									
Preservation	210		48.7						
HQ Preservation									
BMP Elements									
Element	Location		Purpose/Function		Notes				
n/a	n/a		n/a		n/a				

Table 2. Project Activity and Reporting History Little River Stream and Wetland Enhancement Project -EEP Project No. 226		
Elapsed Time Since Grading Complete: n/a		
Elapsed Time Since Planting Complete: 13 months		
Number of Reporting Years[1]: 1		
Activity or Deliverable	**Data Collection Complete**	**Actual Completion or Delivery**
Mitigation Plan	Sep-07	Oct-07
Final Design – Construction Plans	n/a	n/a
Construction	n/a	n/a
Seeding	n/a	n/a
Prescribed Burn	n/a	Dec-10
Planting	n/a	Jan-11
As-built (Year 0 Monitoring -baseline)	Feb-11	Dec-11
Year 1 Monitoring	Dec-11	Feb-12
Year 2 Monitoring	n/a	n/a
Year 3 Monitoring	n/a	n/a
Year 4 Monitoring	n/a	n/a
Year 5 Monitoring	n/a	n/a

1 = number of reports or data points produced excluding the baseline

Table 3. Project Contacts Table Little River Stream and Wetland Enhancement Project -EEP Project No. 226	
Designer	Stantec Consulting Services, Inc. 801 Jones Franklin Road Suite 300; Raleigh, NC 27606
Primary project design POC	Amber Coleman (919) 865-7399
Construction Contractor	None
Planting Contractor	Carolina Silvics, Inc. 908 Indian Trail Road; Edenton, NC 27932
Planting Contractor POC	Mary-Margaret McKinney (252) 482-8491
Seeding Contractor	None
Seed Mix Sources	None
Nursery Stock Suppliers	ArborGen and Superior Trees
	Arborgen - 180 Westvaco road; Summerville, SC 29483
	Superior Trees - 12493 E US Highway; Lee, FL 32059
Monitoring Performers (MY0)	Stantec Consulting Services, Inc. 801 Jones Franklin Road Suite 300; Raleigh, NC 27606
Stream Monitoring POC	Amber Coleman (919) 865-7399
Vegetation Monitoring POC	Amber Coleman (919) 865-7399
Wetland Monitoring POC	Amber Coleman (919) 865-7399
Monitoring Performers (MY1)	Land Management Group, Inc. P.O. Box 2522; Wilmington, NC 28402
Stream Monitoring POC	Kim Williams (910) 452-0001
Vegetation Monitoring POC	Kim Williams (910) 452-0001
Wetland Monitoring POC	Kim Williams (910) 452-0001

Table 4. Project Baseline Information and Attributes				
Little River Stream and Wetland Enhancement Project -EEP Project No. 226				
Project Information				
Project Name	Little River Stream and Wetland Enhancement Project			
Project County	Moore			
Project Area (ac)	125.8			
Project Coordinates (Lat and Long)	35.223562, -79.240977			
Project Watershed Summary Information				
Physiographic Region	Sandhills			
River Basin	Cape Fear			
USGS HUC for Project (14 digit)	03030004070050			
NCDWQ Subbasin	03-03-14			
Project Drainage Area (sq mi)	0.52			
Project Drainage impervious cover estimate (%)	< 1%			
CGIA Land Use Classification	Active Forest Management and Harvesting; Unused			
Reach Summary Information				
Parameters	**Reach 1**	**Reach 2**	**Reach 3**	
Length of Reach (linear feet)	1,726	1,867	210	
Valley Classification	VIII			
Drainage Area (ac)	335			
NCDWQ Stream Identification Score	30	28	28	
NCDWQ Water Quality Classification	Perennial			
Morphological Description (stream type)	C5	E5	E5	
Evolutionary Trend	C5	C5	C5	
Underlying Mapped Soils	Bibb			
Drainage Class	Poorly Drained			
Soil Hydric Status	Yes			
Slope	0-1%			
FEMA Classification	Zone X			
Native Vegetation Community	Riverine bottomland hardwood			
Percent Composition Exotic Invasive Vegetation	0%	0%	0%	
Wetland Summary Information				
Parameter	**Wetland 1**	**Wetland 2**	**Wetland 3**	
Size (ac)	47.8	7	48.7	
Wetland Type	Riparian Riverine			
Mapped Soils Series	Bibb			
Drainage Class	Poorly Drained			
Soil Hydric Status	Hydric			
Source of Hydrology	Overbank flooding and groundwater			
Hydrologic Impairment	None			
Native Vegetation Community	Riverine bottomland hardwood			
Percent of Exotic/Invasive Vegetation	0%	0%	0%	
Regulatory Considerations				
Regulation	**Applicable?**	**Resolved?**	**Supporting Documentation**	
Waters of the United States - Section 404	Yes	Yes	USACE 404 Permit	
Waters of the United States - Section 401	Yes	Yes	NCDWQ 401 Permit	
Endangered Species Act	No	n/a	n/a	
Historic Preservation Act	No	n/a	n/a	
Coastal Zone Management Act (CZMA) Coastal Area Management Act (CAMA)	No	n/a	n/a	
FEMA Floodplain Compliance	No	n/a	n/a	
Essential Fisheries Habitat	No	n/a	n/a	

Appendix B.
Visual Assessment Data

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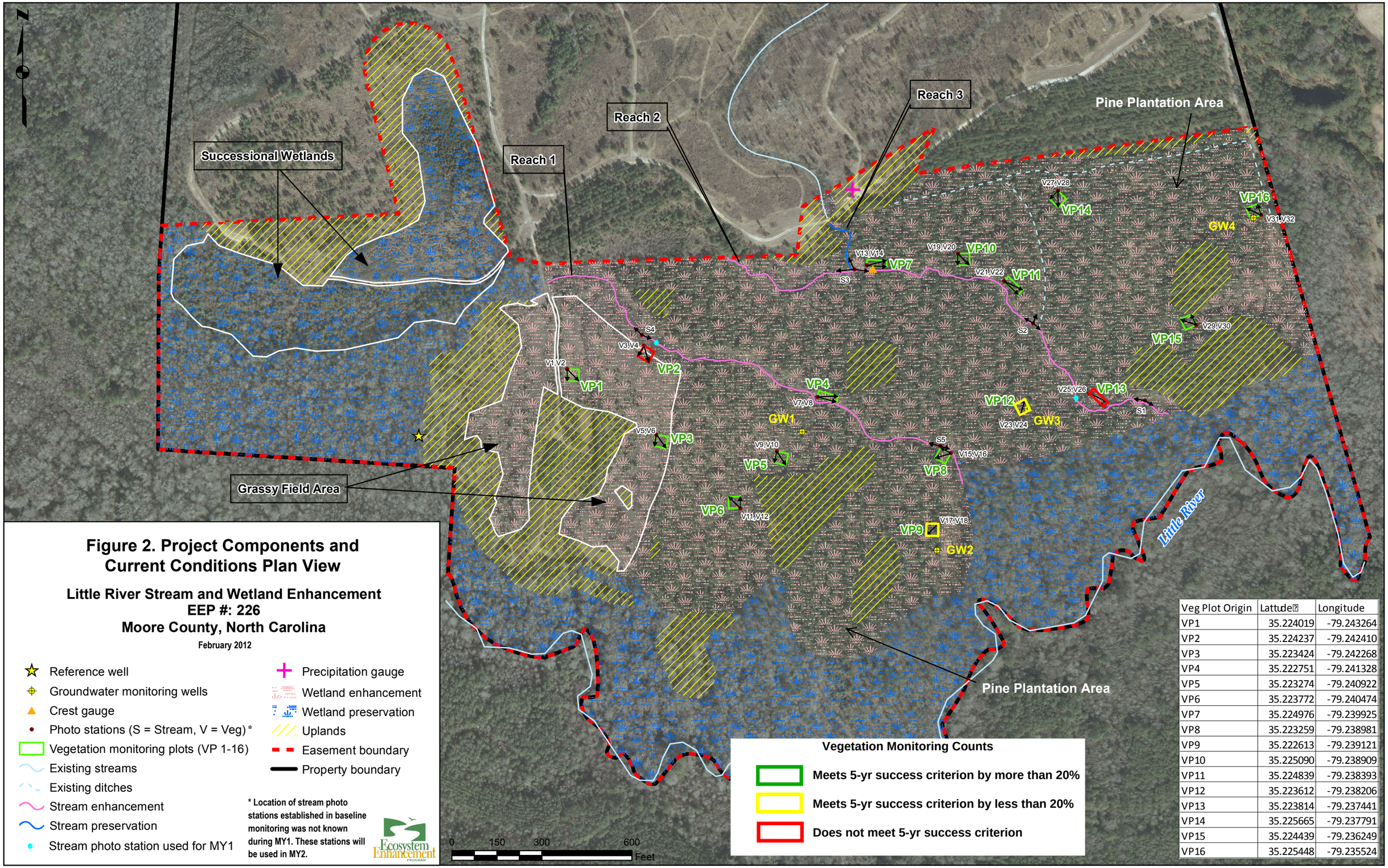

Figure 2. Project Components and Current Conditions Plan View

Little River Stream and Wetland Enhancement
EEP #: 226
Moore County, North Carolina

February 2012

- Reference well
- Groundwater monitoring wells
- Crest gauge
- Photo stations (S = Stream, V = Veg) *
- Vegetation monitoring plots (VP 1-16)
- Existing streams
- Existing ditches
- Stream enhancement
- Stream preservation
- Stream photo station used for MY1
- Precipitation gauge
- Wetland enhancement
- Wetland preservation
- Uplands
- Easement boundary
- Property boundary

* Location of stream photo stations established in baseline monitoring was not known during MY1. These stations will be used in MY2.

Ecosystem Enhancement Program

Vegetation Monitoring Counts

- Meets 5-yr success criterion by more than 20%
- Meets 5-yr success criterion by less than 20%
- Does not meet 5-yr success criterion

Veg Plot Origin	Lattude	Longitude
VP1	35.224019	-79.243264
VP2	35.224237	-79.242410
VP3	35.223424	-79.242268
VP4	35.222751	-79.241328
VP5	35.223274	-79.240922
VP6	35.223772	-79.240474
VP7	35.224976	-79.239925
VP8	35.223259	-79.238981
VP9	35.222613	-79.239121
VP10	35.225090	-79.238909
VP11	35.224839	-79.238393
VP12	35.223612	-79.238206
VP13	35.223814	-79.237441
VP14	35.225665	-79.237791
VP15	35.224439	-79.236249
VP16	35.225448	-79.235524

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Table 5. Vegetation Condition Assessment Table

Vegetation Category	Definitions	Mapping Threshold	CCPV Depiction	Number of Polygons	Combined Acreage	% of Planted Acreage
1. Bare Areas	Very limited cover of both woody and herbaceous material	Not evaluated in MY1	N/A	N/A	N/A	N/A
2. Low Stem Density Areas	Woody stem densities clearly below target levels based on MY3, 4, or 5 stem count criteria	Not evaluated in MY1	N/A	N/A	N/A	N/A
3. Areas of Poor Growth Rates or Vigor	Areas with woody stems of a size class that are obviously small given the monitoring year	Not evaluated in MY1	N/A	N/A	N/A	N/A

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Stream Photo Station - Reach 1: looking upstream (northwest) (Oct 5, 2011)

Stream Photo Station - Reach 1: looking downstream (southeast) (Oct 5, 2011)

Stream Photo Station - Reach 2: looking upstream (northwest) (Oct 6, 2011)

Stream Photo Station - Reach 2: looking downstream (southeast) (Oct 6, 2011)

Vegetation Plot Photos (all photos recorded on October 5 and 6, 2011)

Photo Station V1 - Veg Plot 1 looking along X-axis (Oct 5, 2011)

Photo Station V2 - Veg Plot 1 looking across (Oct 5, 2011)

Photo Station V3 - Veg Plot 2 looking along X-axis (Oct 5, 2011)

Photo Station V4 - Veg Plot 2 looking across (Oct 5, 2011)

Photo Station V5 - Veg Plot 3 looking along X-axis (Oct 5, 2011)

Photo Station V6 - Veg Plot 3 looking across (Oct 5, 2011)

Photo Station V7 - Veg Plot 4 looking along X-axis (Oct 6, 2011)

Photo Station V8 - Veg Plot 4 looking across (Oct 6, 2011)

Photo Station V9 - Veg Plot 5 looking along X-axis (Oct 5, 2011)

Photo Station V10 - Veg Plot 5 looking across (Oct 5, 2011)

Photo Station V11 - Veg Plot 6 looking along X-axis (Oct 5, 2011)

Photo Station V12 - Veg Plot 6 looking across (Oct 5, 2011)

Photo Station V13 - Veg Plot 7 looking along X-axis (Oct 6, 2011)

Photo Station V14 - Veg Plot 7 looking across (Oct 6, 2011)

Photo Station V15 - Veg Plot 8 looking along X-axis (Oct 6, 2011)

Photo Station V16 - Veg Plot 8 looking across (Oct 6, 2011)

Photo Station V17 - Veg Plot 9 looking along X-axis (Oct 6, 2011)

Photo Station V18 - Veg Plot 9 looking across (Oct 6, 2011)

Photo Station V19 - Veg Plot 10 looking along X-axis (Oct 6, 2011)

Photo Station V20 - Veg Plot 10 looking across (Oct 6, 2011)

Photo Station V21 - Veg Plot 11 looking along X-axis (Oct 6, 2011)

Photo Station V22 - Veg Plot 11 looking across (Oct 6, 2011)

Photo Station V23 - Veg Plot 12 looking along X-axis (Oct 6, 2011)

Photo Station V24 - Veg Plot 12 looking across (Oct 6, 2011)

Photo Station V25 - Veg Plot 13 looking along X-axis (Oct 6, 2011)

Photo Station V26 - Veg Plot 13 looking across (Oct 6, 2011)

Photo Station V27 - Veg Plot 14 looking along X-axis (Oct 6, 2011)

Photo Station V28 - Veg Plot 14 looking across (Oct 6, 2011)

Photo Station V29 - Veg Plot 15 looking along X-axis (Oct 6, 2011)

Photo Station V30 - Veg Plot 15 looking across (Oct 6, 2011)

Photo Station V31 - Veg Plot 16 looking along X-axis (Oct 6, 2011)

Photo Station V32 - Veg Plot 16 looking across (Oct 6, 2011)

Appendix C.
Vegetation Plot Data

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Table 6. Vegetation Plot Criteria Attainment Little River Stream and Wetland Enhancement Project EEP		
Vegetation Plot ID	Vegetation Survival Threshold Met?	Tract Mean
VP1	Y	88%
VP2	N	
VP3	Y	
VP4	Y	
VP5	Y	
VP6	Y	
VP7	Y	
VP8	Y	
VP9	Y	
VP10	Y	
VP11	Y	
VP12	Y	
VP13	N	
VP14	Y	
VP15	Y	
VP16	Y	

Table 7. CVS Vegetation Plot Metadata Little River Stream and Wetland Enhancement Project EEP No. 226	
Report Prepared By	Kim Williams
Date Prepared	3/23/2012 9:30
Database Name	LittleRiver_226 _MY1_2011.mdb
Database Location	L:\Wetlands\2008\LittleRiver\Annual Monitoring Report\Year 1
Computer Name	KWILLIAMS
Description Worksheets in This Document	
Metadata	Description of database file, the report worksheets, and a summary of project and project data.
Proj Planted	Each project is listed with its PLANTED stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Proj Total Stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc)
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
Project Summary	
Project Code	226
Project Name	Little River
Description	Stream and Wetland Enhancement
River Basin	Cape Fear
Length (ft)	
Stream-to-Edge Width (ft)	
Area (sq m)	
Required Plots (calculated)	16

Table 8. Planted and total stem counts (species by plot with annual means)

			Current Plot Data (MY1 2011)																									
			E226-LMG-0001			E226-LMG-0002			E226-LMG-0003			E226-LMG-0004			E226-LMG-0005			E226-LMG-0006			E226-LMG-0007			E226-LMG-0008			E226-LMG-0009			E226-LMG-0010		
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			5			2						5			2			3						8			6			
Aronia arbutifolia	Red Chokeberry	Shrub																														
Cyrilla racemiflora	swamp titi	Shrub Tree			8			5						15	1	1	4			2			1			25						1
Diospyros virginiana	common persimmon	Tree															1															
Fraxinus pennsylvanica	green ash	Tree	1	1	1				1	1	1	2	2	2	2	2	2	1	1	1	6	6	11	7	7	7				2	2	2
Ilex glabra	inkberry	Shrub				1	1	1	2	2	2						2	3	3	3							2	2	2			5
Ilex opaca	American holly	Shrub Tree						2																								
Juniperus virginiana	eastern redcedar	Tree																														
Lindera benzoin	northern spicebush	Shrub Tree																														
Liquidambar styraciflua	sweetgum	Tree			25			2			15															3						
Liriodendron tulipifera	tuliptree	Tree																														
Lyonia lucida	fetterbush lyonia	Shrub																														3
Magnolia virginiana	sweetbay	Shrub Tree																					1			3						
Nyssa sylvatica	blackgum	Tree	7	7	32	4	4	9	5	5	9				4	4	6	8	8	13				5	5	5	1	1	1			4
Prunus serotina	black cherry	Shrub Tree																														
Quercus	oak	Shrub Tree	3	3	3																											
Quercus laurifolia	laurel oak	Tree				1	1	1	3	3	3													2	2	2						
Quercus lyrata	overcup oak	Tree										3	3	3	1	1	1							2	2	2	2	2	2	4	4	4
Rhus copallinum	flameleaf sumac	Shrub Tree																														3
		Stem count	11	11	74	6	6	22	11	11	30	5	5	25	8	8	18	12	12	22	6	6	13	16	16	55	5	5	11	6	6	22
		size (ares)	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		
		Species count	3	3	6	3	3	7	4	4	5	2	2	4	4	4	7	3	3	5	1	1	3	4	4	8	3	3	4	2	2	7
		Stems per ACRE	445.2	445.2	2995	242.8	242.8	890.3	445.2	445.2	1214	202.3	202.3	1012	323.7	323.7	728.4	485.6	485.6	890.3	242.8	242.8	526.1	647.5	647.5	2226	202.3	202.3	445.2	242.8	242.8	890.3

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%

Grassy Field Area 5-yr Success Criterion: **260 stems/ac**

Pine Plantation Area 5-yr Success Criterion: **150 stems/ac**

Table 8. Planted and total stem counts contd.

(species by plot with annual means)

Scientific Name	Common Name	Species Type	E226-LMG-0011			E226-LMG-0012			E226-LMG-0013			E226-LMG-0014			E226-LMG-0015			E226-LMG-0016			Annual Means MY1 (2011)			Annual Means MY0 (2010)		
			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			5			8			4						5			2			55			0
Aronia arbutifolia	Red Chokeberry	Shrub																4	4	4	4	4	4	5	5	5
Cyrilla racemiflora	swamp titi	Shrub Tree						10	1	1	6						8				2	2	85	2	2	2
Diospyros virginiana	common persimmon	Tree																					1			0
Fraxinus pennsylvanica	green ash	Tree	2	2	2							4	4	4	3	3	3	1	1	1	32	32	37	30	30	30
Ilex glabra	inkberry	Shrub	1	1	1	1	1	1						12			1			15	10	10	45	12	12	12
Ilex opaca	American holly	Shrub Tree																		4			6			0
Juniperus virginiana	eastern redcedar	Tree			2																		2			0
Lindera benzoin	northern spicebush	Shrub Tree													1	1	1				1	1	1	6	6	6
Liquidambar styraciflua	sweetgum	Tree									2			4			1			2			54			0
Liriodendron tulipifera	tuliptree	Tree			3									1									4			0
Lyonia lucida	fetterbush lyonia	Shrub																					3			0
Magnolia virginiana	sweetbay	Shrub Tree			1			1			1			2									9			0
Nyssa sylvatica	blackgum	Tree	2	2	2	3	3	8							2	2	2				41	41	91	46	46	46
Prunus serotina	black cherry	Shrub Tree												1									1			0
Quercus	oak	Shrub Tree																			3	3	3	4	4	4
Quercus laurifolia	laurel oak	Tree	1	1	1			3			1							3	3	3	10	10	14	7	7	7
Quercus lyrata	overcup oak	Tree	2	2	2				2	2	2	1	1	1	2	2	2				19	19	19	13	13	13
Rhus copallinum	flameleaf sumac	Shrub Tree																					3			0
		Stem count	8	8	19	4	4	31	3	3	16	5	5	25	8	8	23	8	8	31	122	122	437	125	125	125
		size (ares)	1			1			1			1			1			1			16			16		
		size (ACRES)	0.02			0.02			0.02			0.02			0.02			0.02			0.40			0.40		
		Species count	5	5	9	2	2	6	2	2	6	2	2	7	4	4	8	3	3	7	9	9	19	9	9	9
		Stems per ACRE	323.7	323.7	768.9	161.9	161.9	1255	121.4	121.4	647.5	202.3	202.3	1012	323.7	323.7	930.8	323.7	323.7	1255	308.6	308.6	1105	316.2	316.2	316.2

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%

Grassy Field Area 5-yr Success Criterion: **260 stems/ac**

Pine Plantation Area 5-yr Success Criterion: **150 stems/ac**

Table 9. CVS - Damage by Plot
Little River Stream and Wetland Enhancement - EEP #226

	plot	Count of Damage Categories	(no damage)	_Enter other damage_	Deer	Unknown
	226-LMG-0001-year:1	8	4		4	4
	226-LMG-0002-year:1	3	3			3
	226-LMG-0003-year:1	2	9			2
	226-LMG-0004-year:1	0	5			
	226-LMG-0005-year:1	1	7			1
	226-LMG-0006-year:1	6	6			6
	226-LMG-0007-year:1	0	6			
	226-LMG-0008-year:1	1	18			1
	226-LMG-0009-year:1	0	5			
	226-LMG-0010-year:1	1	5	1		
	226-LMG-0011-year:1	0	8			
	226-LMG-0012-year:1	0	7			
	226-LMG-0013-year:1	0	4			
	226-LMG-0014-year:1	1	4			1
	226-LMG-0015-year:1	0	8			
	226-LMG-0016-year:1	0	9			
TOT:	**16**	**23**	**108**	**1**	**4**	**18**

Table 10. CVS - Planted Stems by Plot and Species
Little River Stream and Wetland Enhancement - EEP #226

Comment	Species	CommonName	Total Planted Stems	# plots	avg# stems	plot 226-LMG-0001-year:1	plot 226-LMG-0002-year:1	plot 226-LMG-0003-year:1	plot 226-LMG-0004-year:1	plot 226-LMG-0005-year:1	plot 226-LMG-0006-year:1	plot 226-LMG-0007-year:1	plot 226-LMG-0008-year:1	plot 226-LMG-0009-year:1	plot 226-LMG-0010-year:1	plot 226-LMG-0011-year:1	plot 226-LMG-0012-year:1	plot 226-LMG-0013-year:1	plot 226-LMG-0014-year:1	plot 226-LMG-0015-year:1	plot 226-LMG-0016-year:1
	Aronia arbutifolia	red chokeberry	4	1	4																4
	Cyrilla racemiflora	swamp titi	2	2	1					1							1				
	Fraxinus pennsylvanica	green ash	32	12	2.67	1		1	2	2	1	6	7		2	2			4	3	1
	Ilex glabra	inkberry	10	6	1.67		1	2			3			2		1	1				
	Lindera benzoin	northern spicebush	1	1	1															1	
	Nyssa sylvatica	blackgum	40	9	4.44	7	4	5		4	8		5			2	3			2	
	Quercus	oak	3	1	3	3															
	Quercus laurifolia	laurel oak	10	5	2		1	3					2			1					3
	Quercus lyrata	overcup oak	19	9	2.11				3	1			2	2	4	2		2	1	2	
TOT:	**0**	**9**	**9**	**121**	**9**		**11**	**6**	**11**	**5**	**8**	**12**	**6**	**16**	**4**	**6**	**8**	**4**	**3**	**5**	**8**	**8**

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%

Appendix D.
Hydrologic Data

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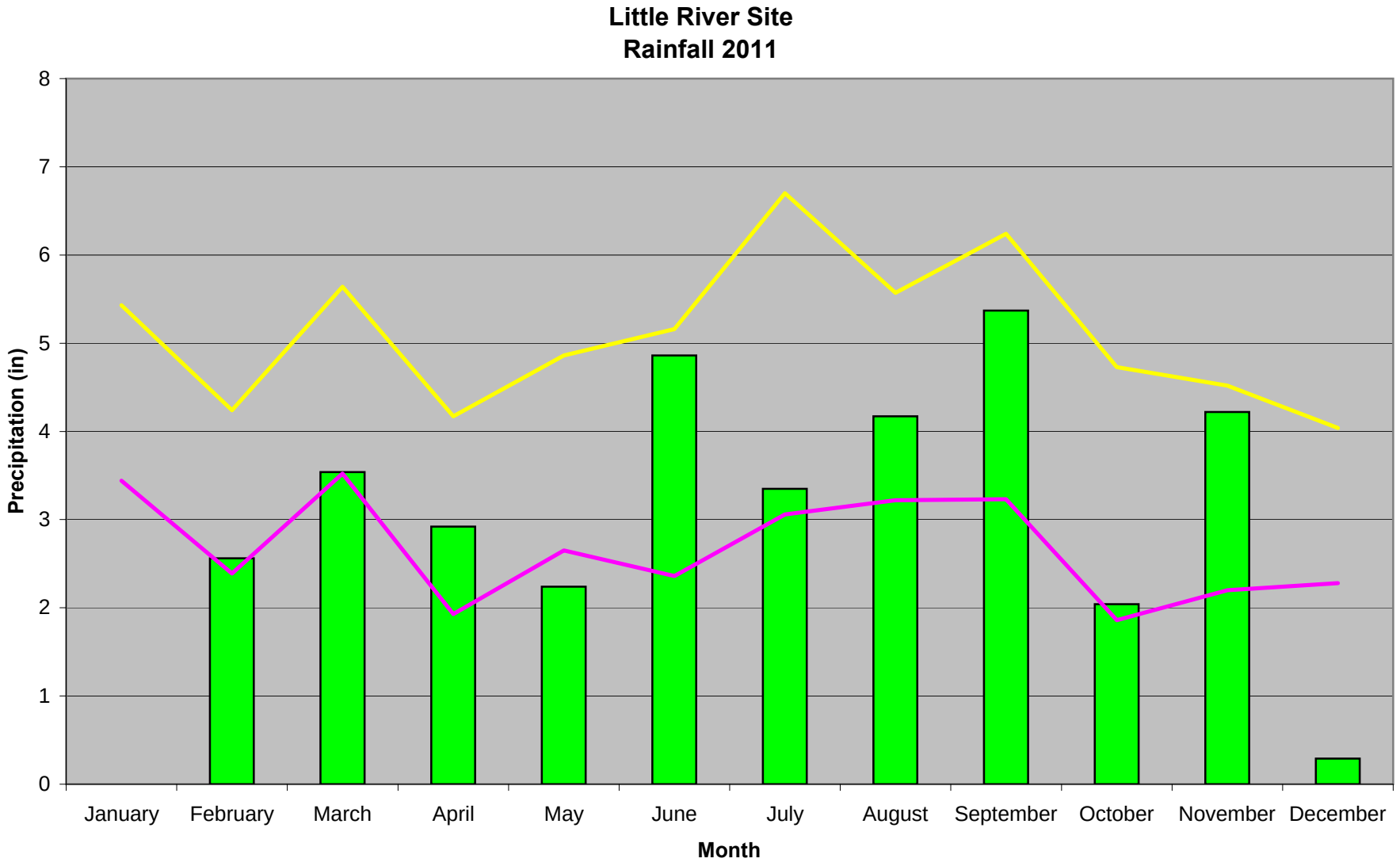
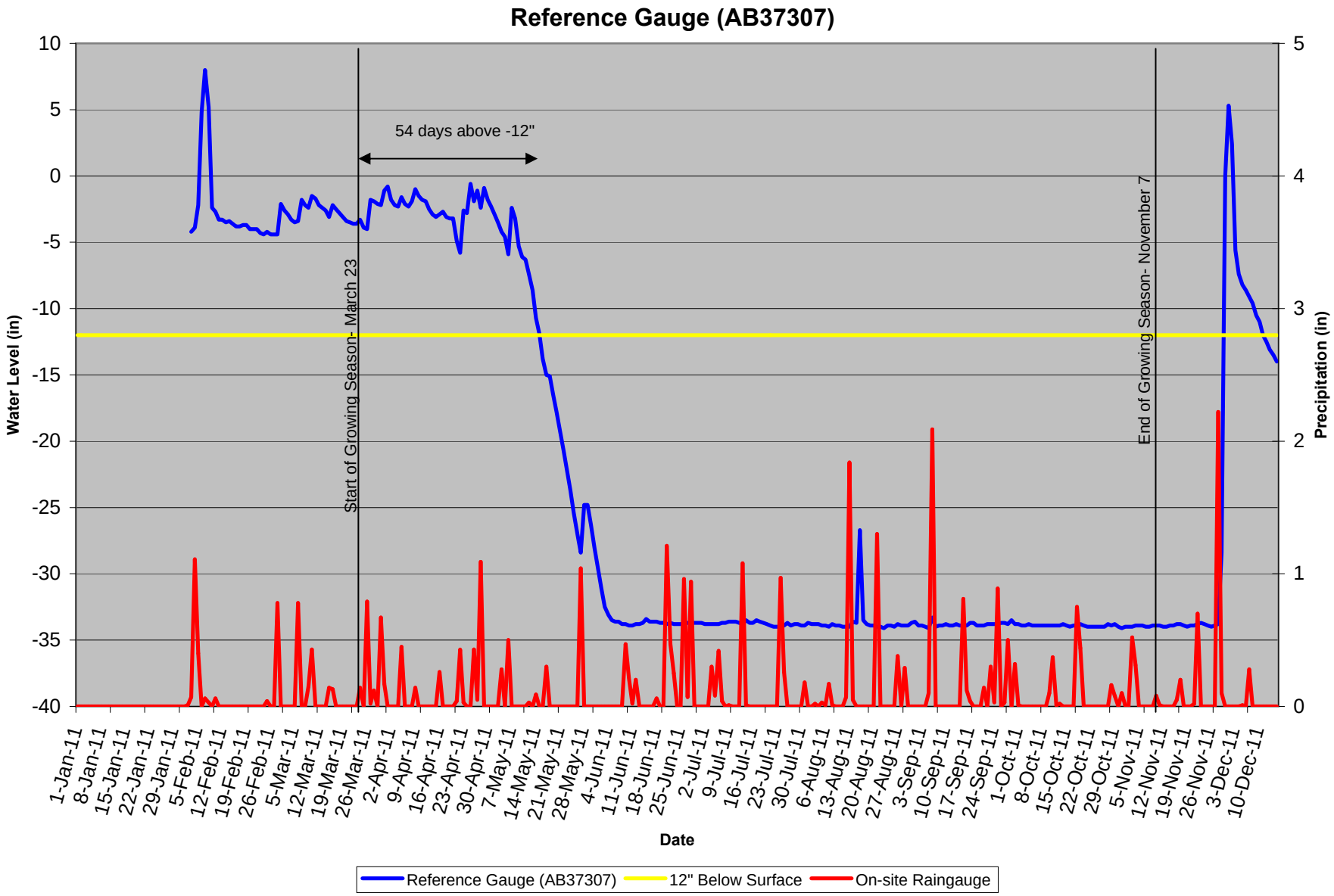
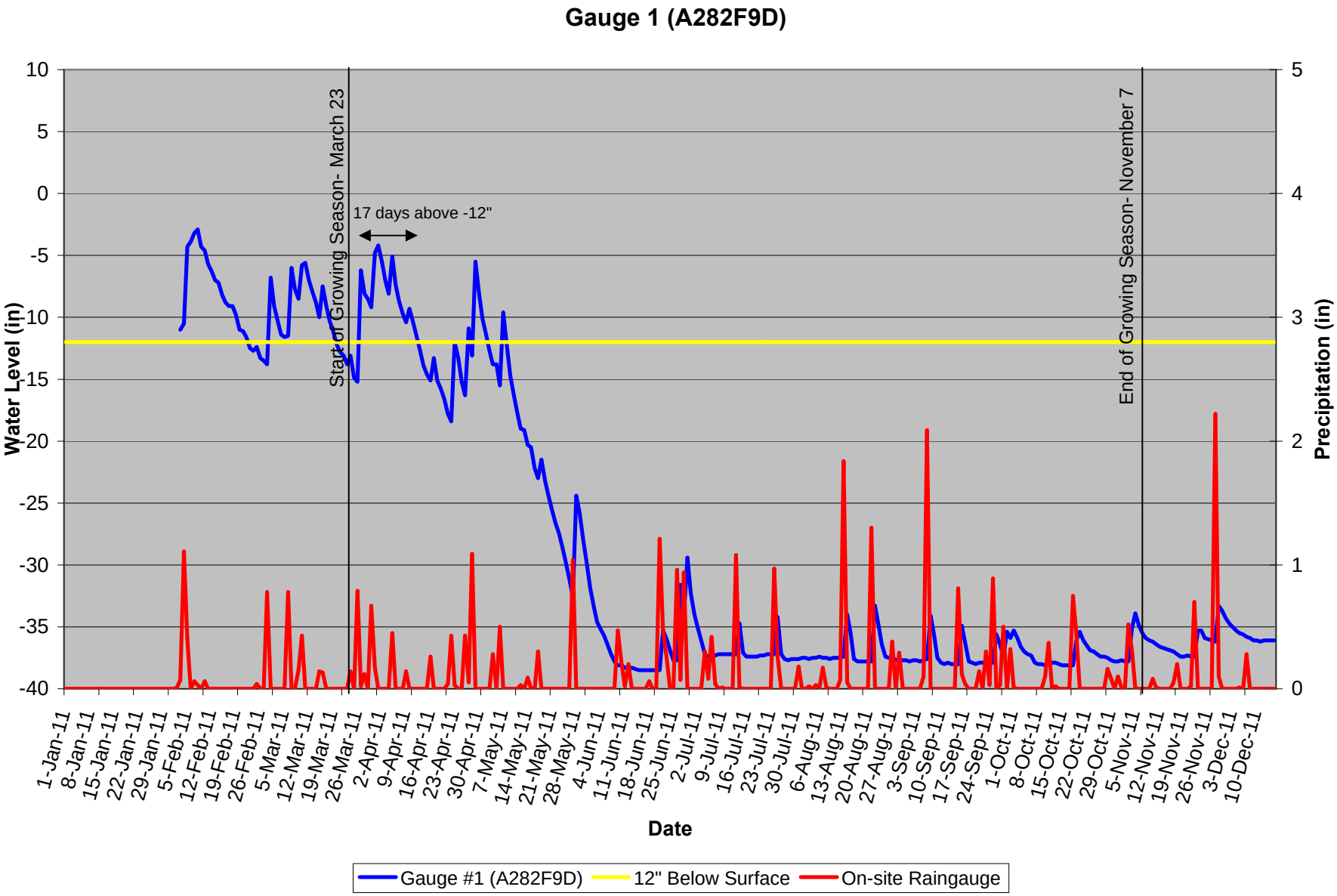
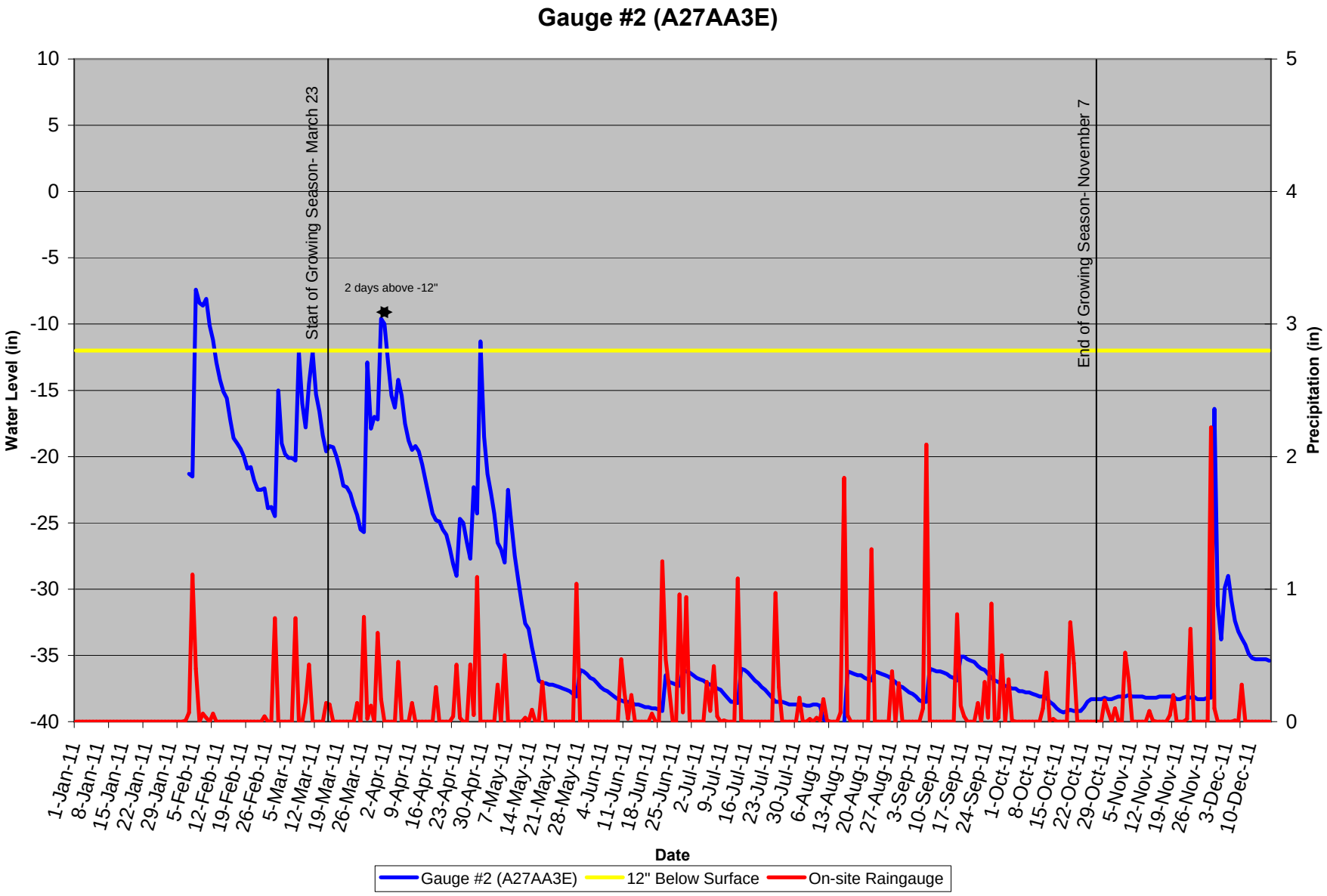


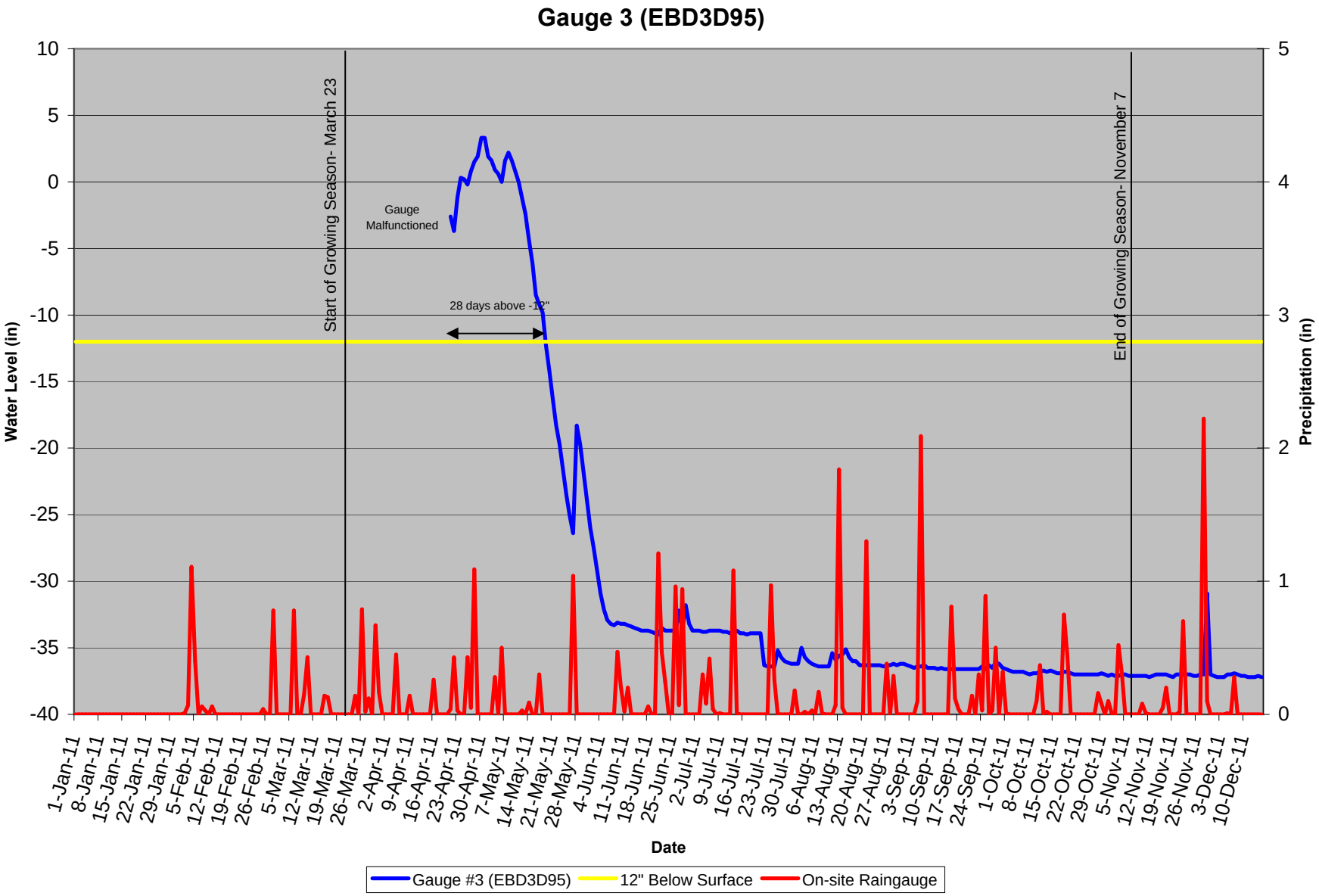
Precipitation data obtained from:
On-site rain gauge

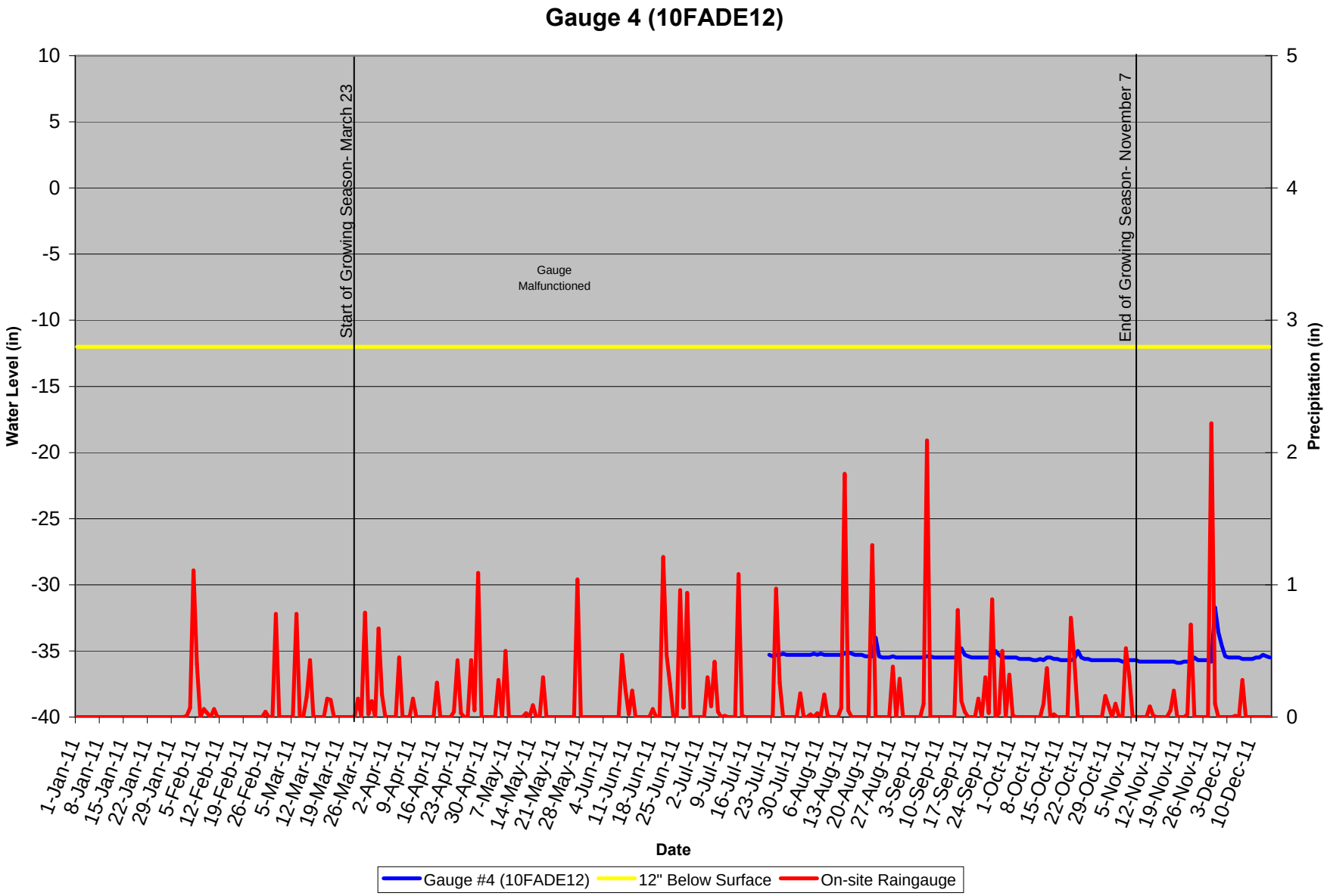
30% & 70% precipitation data obtained from Moore County WETS Station: Carthage 8 SE, NC1515 1971-2000 (wcc.nrcs.usda.gov)


Reference Gauge (AB37307)
Water Level (in)
Precipitation (in)
54 days above -12"
Start of Growing Season- March 23
End of Growing Season- November 7
Date
Reference Gauge (AB37307)
12" Below Surface
On-site Raingauge


Gauge 1 (A282F9D)
Water Level (in)
Precipitation (in)
Date
Start of Growing Season- March 23
End of Growing Season- November 7
17 days above -12"
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
5
4
3
2
1
0
1-Jan-11
8-Jan-11
15-Jan-11
22-Jan-11
29-Jan-11
5-Feb-11
12-Feb-11
19-Feb-11
26-Feb-11
5-Mar-11
12-Mar-11
19-Mar-11
26-Mar-11
2-Apr-11
9-Apr-11
16-Apr-11
23-Apr-11
30-Apr-11
7-May-11
14-May-11
21-May-11
28-May-11
4-Jun-11
11-Jun-11
18-Jun-11
25-Jun-11
2-Jul-11
9-Jul-11
16-Jul-11
23-Jul-11
30-Jul-11
6-Aug-11
13-Aug-11
20-Aug-11
27-Aug-11
3-Sep-11
10-Sep-11
17-Sep-11
24-Sep-11
1-Oct-11
8-Oct-11
15-Oct-11
22-Oct-11
29-Oct-11
5-Nov-11
12-Nov-11
19-Nov-11
26-Nov-11
3-Dec-11
10-Dec-11
Gauge #1 (A282F9D)
12" Below Surface
On-site Raingauge


Gauge #2 (A27AA3E)
Water Level (in)
Precipitation (in)
Start of Growing Season- March 23
End of Growing Season- November 7
2 days above -12"
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
5
4
3
2
1
0
1-Jan-11
8-Jan-11
15-Jan-11
22-Jan-11
29-Jan-11
5-Feb-11
12-Feb-11
19-Feb-11
26-Feb-11
5-Mar-11
12-Mar-11
19-Mar-11
26-Mar-11
2-Apr-11
9-Apr-11
16-Apr-11
23-Apr-11
30-Apr-11
7-May-11
14-May-11
21-May-11
28-May-11
4-Jun-11
11-Jun-11
18-Jun-11
25-Jun-11
2-Jul-11
9-Jul-11
16-Jul-11
23-Jul-11
30-Jul-11
6-Aug-11
13-Aug-11
20-Aug-11
27-Aug-11
3-Sep-11
10-Sep-11
17-Sep-11
24-Sep-11
1-Oct-11
8-Oct-11
15-Oct-11
22-Oct-11
29-Oct-11
5-Nov-11
12-Nov-11
19-Nov-11
26-Nov-11
3-Dec-11
10-Dec-11
Date
Gauge #2 (A27AA3E)
12" Below Surface
On-site Raingauge


Gauge 3 (EBD3D95)
Water Level (in)
Precipitation (in)
Start of Growing Season- March 23
End of Growing Season- November 7
Gauge Malfunctioned
28 days above -12"
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
5
4
3
2
1
0
1-Jan-11
8-Jan-11
15-Jan-11
22-Jan-11
29-Jan-11
5-Feb-11
12-Feb-11
19-Feb-11
26-Feb-11
5-Mar-11
12-Mar-11
19-Mar-11
26-Mar-11
2-Apr-11
9-Apr-11
16-Apr-11
23-Apr-11
30-Apr-11
7-May-11
14-May-11
21-May-11
28-May-11
4-Jun-11
11-Jun-11
18-Jun-11
25-Jun-11
2-Jul-11
9-Jul-11
16-Jul-11
23-Jul-11
30-Jul-11
6-Aug-11
13-Aug-11
20-Aug-11
27-Aug-11
3-Sep-11
10-Sep-11
17-Sep-11
24-Sep-11
1-Oct-11
8-Oct-11
15-Oct-11
22-Oct-11
29-Oct-11
5-Nov-11
12-Nov-11
19-Nov-11
26-Nov-11
3-Dec-11
10-Dec-11
Date
Gauge #3 (EBD3D95)
12" Below Surface
On-site Raingauge


Gauge 4 (10FADE12)
Water Level (in)
Precipitation (in)
Start of Growing Season- March 23
End of Growing Season- November 7
Gauge
Malfunctioned
10
5
0
-5
-10
-15
-20
-25
-30
-35
-40
5
4
3
2
1
0
1-Jan-11
8-Jan-11
15-Jan-11
22-Jan-11
29-Jan-11
5-Feb-11
12-Feb-11
19-Feb-11
26-Feb-11
5-Mar-11
12-Mar-11
19-Mar-11
26-Mar-11
2-Apr-11
9-Apr-11
16-Apr-11
23-Apr-11
30-Apr-11
7-May-11
14-May-11
21-May-11
28-May-11
4-Jun-11
11-Jun-11
18-Jun-11
25-Jun-11
2-Jul-11
9-Jul-11
16-Jul-11
23-Jul-11
30-Jul-11
6-Aug-11
13-Aug-11
20-Aug-11
27-Aug-11
3-Sep-11
10-Sep-11
17-Sep-11
24-Sep-11
1-Oct-11
8-Oct-11
15-Oct-11
22-Oct-11
29-Oct-11
5-Nov-11
12-Nov-11
19-Nov-11
26-Nov-11
3-Dec-11
10-Dec-11
Date
Gauge #4 (10FADE12)
12" Below Surface
On-site Raingauge