

ANNUAL REPORT FOR 2005



Croatan Wetland Mitigation Bank Craven County, North Carolina

Prepared for:

**The Ecosystem Enhancement Program
EEP Project No. 103**

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SUMMARY

The following report summarizes the monitoring and construction activities that have occurred prior to and during 2005 at the 4035-acre Croatan Wetland Mitigation Bank (CWMB). The CWMB site is expected to provide compensatory wetland mitigation for several NCDOT projects in the Neuse River Basin (Hydrologic Unit 03020204). This site was designed and implemented in two phases, Phase I (1469.3 acres) and Phase II (2565.3 acres). Phase I construction was completed in the winter of 2001 and Phase II construction was completed in the spring of 2002. Each Phase has been divided into Management Units (MU) to aid in the report presentation. In 2005, hydrologic and vegetative monitoring in Phase II (MU 1-11) continued into the third year and monitoring in Phase I (MU 12A-18) continued into the fourth year.

The CWMB contains both non-riverine mitigation areas and riverine mitigation areas; non-riverine and riverine mitigation areas are tracked separately. In addition, pursuant to the request of the Mitigation Banking Review Team (MBRT), there are separate hydrologic monitoring success criteria for the non-riverine mineral and organic soils. Non-riverine mineral soils are expected to make jurisdictional hydrology for a minimum of 12.5 percent (%) of the growing season (Success Criterion 1) and be within 50% of the Reference Range for years one through three and 20% of the Reference Range for years four and five (Success Criterion 2). Non-riverine organic soils and riverine restoration/enhancement areas are expected to make jurisdictional hydrology for a minimum of 25% of the growing season and be within 50% of the reference range for years one through three and 20% of the Reference Range for years four and five.

Prior to the beginning of the 2005 growing season 286 ground water monitoring gauges were installed throughout Phase I and II for monitoring success. A total of 33 reference gauges were installed either onsite or offsite in areas of minimal disturbance to provide a range of reference conditions for the ten hydric soil mapping units present on the CWMB. Rain Gauge 2 was used for hydrologic analysis. Rain Gauge 3 malfunctioned several times and Rain Gauge 4 malfunctioned during Hurricane Ophelia, therefore these gauges were not used for data analyses.

The majority of the gauges in the CWMB showed that groundwater levels dropped below 12 inches of the ground surface either in June or the beginning of September and then rose to within 12 inches of the ground surface at the end of September due to hurricane events.

Entire Growing Season (March-November)

Hydrologic monitoring in 2005 showed 243 of 286 (84.6%) monitoring gauges in the CWMB met both respective hydrologic success criteria [$\geq 12.5\%$ (mineral soils) or $\geq 25\%$ (organic/riverine soils) of the growing season and within 20% and 50% of Reference Range] (Figures 3a and 3b). Of the 43 gauges that did not meet both of its respective success criteria, 30 made jurisdictional hydrology for $\geq 12.5\%$ of the growing season, 10 made jurisdictional hydrology between 5 and 12.5% of the growing season, and three (Gauges 75, 144, and 287) did not make jurisdictional hydrology for at least 5% of the growing season.

Of the 204 monitoring gauges in non-riverine mineral soils, 166 met both hydrologic success criteria and 12 did not meet either hydrologic success criterion; the remaining 26 gauges met Success Criterion 1 only. Of the 62 monitoring gauges in non-riverine organic soils, 61 met both hydrologic success criteria and only one gauge (Gauge 159) did not meet either of its success criteria. However, Gauge 159 met jurisdictional hydrology for 22.3% of the growing season. Of

the 12 monitoring gauges in riverine organic soils, 11 met both hydrologic success criteria and only one gauge (Gauge 227) did not meet either of its hydrologic success criteria. Of the eight monitoring gauges in riverine mineral soils five met both hydrologic success criteria, one gauge (Gauge 256) met Success Criterion 1 only and the remaining two gauges (Gauges 102 and 243) did not meet either hydrologic success criterion.

Hydrologic monitoring in 2005 showed 81 of 102 (79.4%) monitoring gauges in Phase I met both respective hydrologic success criteria. Of the 71 monitoring gauges in non-riverine mineral soils, 51 met both hydrologic success criteria and six did not meet either hydrologic success criterion; the remaining 14 gauges met Success Criterion 1 only. Of the 14 gauges in Phase I that met only Success Criterion 1, 10 made jurisdictional hydrology for between 36.3 and 42.2% of the growing season. Of the 31 monitoring gauges in Phase I in non-riverine organic soils, 30 met both hydrologic success criteria and the remaining gauge (Gauge 159) did not meet either of its hydrologic success criterion. However, Gauge 159 met jurisdictional hydrology for 22.3% of the growing season.

Hydrologic monitoring in 2005 showed 162 of 184 (88.0%) monitoring gauges in Phase II met both respective hydrologic success criteria. Of the 133 monitoring gauges in non-riverine mineral soils, 115 met both hydrologic success criteria and 6 did not meet either hydrologic success criterion; the remaining 12 gauges met Success Criterion 1 only. Of the 31 of the monitoring gauges in non-riverine organic soils, all 31 met both hydrologic success criteria. Of the 12 monitoring gauges in riverine organic soils, 11 met both hydrologic success criteria and the remaining gauge (Gauge 227) met Success Criterion 1 only. Of the eight monitoring gauges in riverine mineral soils, five met both hydrologic success criteria, two gauges (Gauges 102 and 256) did not meet either hydrologic success criterion, and the remaining gauge (Gauge 259) met Success Criterion 1. Of the 184 monitoring gauges in Phase II, 139 (75.5%) met both of their respective hydrologic success criteria established for years one through three and met the hydrologic success criteria established for years four and five [$\geq 12.5\%$ (mineral soils) or $\geq 25\%$ (organic/riverine soils) of the growing season and within 20% of Reference Range] under normal rainfall conditions.

Of the 43 monitoring gauges that did not meet both of their respective hydrologic success criteria, 28 met Success Criterion 1 and the remaining 15 did not meet either of their respective hydrologic success criteria. In years with normal rainfall these areas may not be returned to jurisdictional hydrology. The non-jurisdictional areas around these monitoring gauges may need to be delineated and removed from mitigation credits if they are not returned to jurisdictional hydrology in years four and five.

Rainfall

Overall, the rainfall for the 2005 growing season was normal (≥ 28.7 to 39.0 inches onsite compared to normal 28.7 to 49.9 inches). Rainfall between November 2004 and February 2005 was on the low side of normal (10.5 inches at the New Bern Airport compared to normal 10.2 to 18.4 inches).

Vegetation

The vegetative success criterion states that there must be a minimum of 320 trees per acre surviving for three consecutive years. Ecosystem Enhancement Program (EEP) has agreed to continue monitoring this site for the remainder of the five years or until success criteria are met. The required survival criterion will decrease by 10% per year after the third year of vegetation monitoring (*i.e.*, for an expected 288 stems per acre for year four, and 260 stems per acre for year five), such that there are 260 5-year old planted stems per acre at the end of year five.

Of the 4,035-acre CWMB, approximately 224.5 acres were involved in tree planting for Phase I and 466.0 acres were involved in tree planting for Phase II. There were 25 vegetation monitoring plots established throughout the Phase I planting areas, and 23 vegetation monitoring plots established throughout the Phase II planting areas. The 2005 vegetation monitoring of the Phase I portion of the site revealed an average tree density of 349 trees/ acre, which exceeds the minimum success criteria of 288 trees/acre for year four. The vegetation monitoring of the Phase II portion of the site revealed an average tree density of 357 trees/acre, which exceeds the minimum success criteria of 320 trees per acre for year three.

Recommendations

It is recommended that monitoring of Phase I and II continue into 2006. However, due to the high rate of hydrologic success under normal rainfall conditions, Environmental Services, Inc., (ESI) recommends that selected interior gauges that are meeting success criteria for years four and five be removed from monitoring. Seventy-three interior gauges should be considered for removal from hydrologic monitoring. Figures 6a and 6b (in Appendix E) designate the gauges that should be considered for early removal from hydrologic monitoring. Figures 7a and 7b (in Appendix E) depict how the remaining gauges will provide representative coverage across the CWMB. Each of the gauges considered for early removal has met or exceeded both expected hydrologic success criteria in each year of monitoring. The majority of these gauges have met jurisdictional hydrology for 100% of the growing season in years with normal rainfall. Mitigative measures have successfully enhanced and/or restored the areas represented by these gauge locations. The areas represented by these gauges sites should be considered to have successfully met all success criteria through year five as established by the MBRT.

Gauge sites that should be monitored through years four and five include: gauges that are adjacent to roads and point plugged ditches, areas where riverine credit might be gained, areas that are not meeting the success criteria established for years four and five, and areas that provide representative coverage across the CWMB.

ESI documented that many of the gauges along transects 258-260 (MU 3/4A), 286-287 (MU 10C), and 182-183 (MU 12B) did not meet both expected hydrologic success criteria. Additional gauges may need to be installed along these transects in order to capture the zone of influence that may remain adjacent to the open areas of the ditch. ESI also recommends that additional areas in MU 6, 5, and 2B (for example Gauges 241, 240, 242, and 251) be re-evaluated for riverine function. These areas showed prolonged surface flooding and flowing water throughout much of the growing season and may be considered riverine mitigation areas due to the surface connection with the unnamed tributary to East Prong Brice Creek.

It is recommended that Rain Gauge 3 be replaced due to repeated malfunction and unreliable data collected during 2005. For subsequent years, it is recommended that additional follow-up trips be scheduled after routine gauge downloads to check gauges that malfunction, particularly reference gauges, and take appropriate measures to avoid extended and frequent data gaps, especially for Ecotone gauges. Ecotone gauges tended to have frequent gauge malfunctions, including dead batteries, chewed external wires, and broken battery connections.

Of the vegetation surveys performed in the CWMB, 10 plots in Phase I and 12 plots in Phase II do not meet the established success criteria. The Non-Riverine Swamp Forest Target Community in Phase 1 does not meet the success criteria of 288 trees/acre for year four. The Non-Riverine Wet Hardwood Forest Types A and B Target Communities in Phase II do not meet

the success criteria of 320 trees/acre for year three. Further investigation may be needed in these Target Communities to determine why success criteria are not being met. Vegetation surveys should continue to be conducted in 2006.

1.0 INTRODUCTION

1.1 Project Description

The Croatan Wetland Mitigation Bank (CWMB) is located in Craven County, North Carolina approximately 3.6 miles northwest of Havelock. The site is situated west of US 70 and south of Catfish Lake Road (SR 1100) (Figure 1). The CWMB was created to provide compensatory mitigation for several projects in the Neuse River Basin (Hydrologic Unit 03020204). The site encompasses approximately 4,035 acres and was designed and implemented in two phases (Phase I and Phase II). Each phase was divided into Management Units (MU) to aid in planning, and this is continued for presentation of monitoring results. Phase I is approximately 1469.3 acres and contains approximately 1446.5 acres targeted for a combination of non-riverine wetland restoration (311.6 acres), enhancement (1026.9 acres), and preservation (108.0 acres). The remaining 22.8 acres of Phase I consists of non-hydric soils (3.9 acres) and areas considered non-restorable (18.9 acres). Phase II is approximately 2565.3 acres and contains approximately 2333.5 acres targeted for a combination of non-riverine wetland restoration (1123.6 acres), enhancement (956.9 acres), and preservation (253.0 acres). Approximately 179 acres are targeted for a combination of riverine restoration (49.6 acres), enhancement (91.6 acres), and preservation (37.8 acres). The remaining 52.8 acres of Phase II consists of non-hydric soils (25.7 acres) and areas considered non-restorable (27.1 acres). In 2005, hydrologic and vegetative monitoring continued for a third year in Phase II and continued for a fourth year in Phase I.

1.2 Purpose

In order to demonstrate successful mitigation, vegetative and hydrologic monitoring will be conducted for a minimum of five years. Success criteria were established by the Mitigation Bank Review Team (MBRT). The following report describes the results of the hydrologic and vegetation monitoring for Phase I and II during the 2005 growing season at the CWMB. Included in this report are analyses of both hydrologic and vegetative monitoring results, as well as local climate conditions throughout the growing season and site photographs.

1.3 Project History

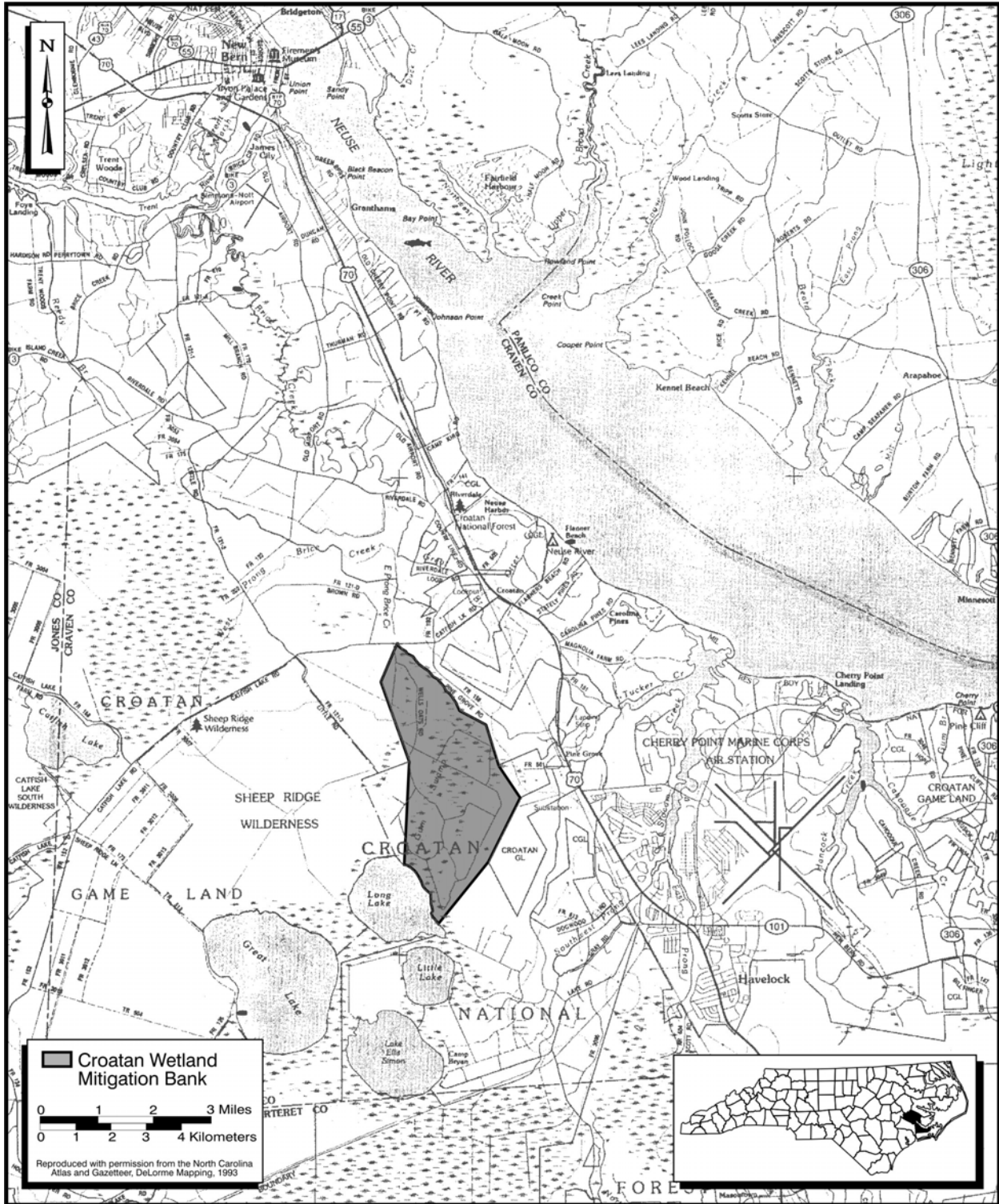
Phase I

1998-2000	Gauges Installed to Aid Delineation
November 2000	Drum-chopping of Phase I Planting Areas
December 2000	Herbicide of Phase I Planting Areas
February 2001	Planting of Phase I
September 2001 – February 2002	Construction of Phase I
February 2002	Additional Monitoring Gauges Installed
March – November 2002	Hydrologic Monitoring (1 yr.)
July 2002	Vegetation Monitoring (1 yr.)
March – November 2003	Hydrologic Monitoring (2 yr.)
August 2003	Vegetation Monitoring (2 yr.)
March – November 2004	Hydrologic Monitoring (3 yr.)
August 2004	Vegetation Monitoring (3 yr.)
March – November 2005	Hydrologic Monitoring (4 yr.)
August 2005	Vegetation Monitoring (4 yr.)

Phase II

1999-2000	Gauges Installed to Aid Delineation
August 2001	Drum-chopping of Phase II Planting Areas
December 2001 – June 2002	Construction of Phase II
July 2002	Herbicide of Phase II Planting Areas
February – March 2003	Additional Monitoring Gauges Installed
February 2003	Tree Planting
March - November 2003	Hydrologic Monitoring (1 yr.)
August 2003	Vegetative Monitoring (1 yr.)
March - November 2004	Hydrologic Monitoring (2 yr.)
August 2004	Vegetative Monitoring (2 yr.)
March - November 2005	Hydrologic Monitoring (3 yr.)
August 2005	Vegetative Monitoring (3 yr.)

Figure 1. Site Location Map



2.0 HYDROLOGY

2.1 Success Criteria

In accordance with federal guidelines for wetland mitigation, success criteria for hydrology states that the area must be inundated or saturated (within 12 inches of the surface) by surface or groundwater for at least a consecutive 12.5% of the growing season. Areas inundated less than 5% are always classified as non-wetlands. Areas inundated between 5% and 12.5% of the growing season can be classified as wetlands depending upon factors such as the presence of hydrophytic vegetation and hydric soils.

The MBRT required additional conditions to the hydrologic monitoring requirements for the CWMB beyond the minimum established by the federal guideline for wetland mitigation success criteria.

Hydrologic success criteria will include both of the following:

- 1) inundation or saturation within 12 inches of the surface for at least 12.5% of the growing season for mineral soils and 25% of the growing season for organic soils and riverine restoration/enhancement areas (**Success Criterion 1**); and
- 2) the hydroperiod for restoration/enhancement areas shall be within 50% of reference saturation or inundation depth, duration and frequency for the first three years and shall be within 20% for years four and five (**Success Criterion 2**).

If the 50% and 20% reference goals are not attained, a site visit will be conducted by the MBRT to determine the viability of the site.

The growing season in Craven County begins March 18 and ends November 14. These dates correspond to a 50% probability that air temperatures will drop to 28° F or lower after March 18 and before November 14. Thus, the growing season is 242 days. A jurisdictional hydroperiod of 12.5% of the growing season is approximately 30 days. A jurisdictional hydroperiod of 25% of the growing season is approximately 60 days. However, the site must also experience average climatic conditions for the data to be valid. Use of reference gauge data collected concurrently with site data for evaluating success is expected to provide more meaningful means for evaluating success following initial site re-hydration regardless of rainfall conditions. Table 1 provides a summary of hydrologic success criteria.

Table 1. Expected Wetland Conditions 2005

Wetland Type	Soil Mapping Unit	Success Criterion 1	Success Criterion 2	MUs with Representative Gauges
Non-riverine, Mineral	Bayboro (Ba)	≥ 12.5 %	Phase I 20% 55.7-100% Phase II 50% 34.7-100%	1, 2A, 2B, 3, 4A, 4B, 5, 6, 7, 8, 9, 10A, 10B, 11, 12A, 13A, 13B, 14, 15, 17
	Leaf (La)	≥ 12.5 %	Phase I 20% 31.8-86% Phase II 50% 19.8-100%	1, 2A, 2B, 3, 5, 6
	Leon (Ln)	≥ 12.5 %	Phase I 20% 12.4-19.4% Phase II 50% 7.9-24.4%	13B, 16, 18
	Murville (Mu)	≥ 12.5 %	Phase I 20% 57.9-100% Phase II 50% 36.2-100%	12A, 12B, 13A, 13B, 15, 16
	Pantego (Pa)	≥ 12.5 %	Phase I 20% 22.3-100% Phase II 50% 14.1-100%	1, 2B, 4B, 5, 6, 7, 8, 10B, 10C, 11, 12A, 12B, 13A, 13B, 14, 15, 16, 17, 18
	Rains (Ra)	≥ 12.5 %	Phase I 20% 20.7-86.8% Phase II 50% 13.2-100%	5, 6, 10B, 10C, 12A
Non-riverine, Organic	Croatan (CT)	≥ 25.0 %	Phase I 20% 24-100% Phase II 50% 14.9-100%	4B, 6, 8, 9, 10A, 10B, 10C, 11, 12B, 13A, 15, 16, 17, 18
	Dare (DA)	≥ 25.0 %	Phase I 20% 80.2-100% Phase II 50% 50-100%	16, 17
Riverine	Dorovan (DO)	≥ 25.0 %	Phase I 20% 80.2-100% Phase II 50% 50-100%	6
	Masontown/Muckalee (MM)	≥ 25.0 %	Phase I 20% 57.9-100% Phase II 50% 36.2-100%	5, 6

2.2 Hydrologic Description

Phase I construction was completed prior to the onset of the 2002 growing season. Phase I began monitoring for hydrologic success in 2002 and continued into 2005. Phase II construction was completed in the spring of 2002 and hydrologic monitoring began in the spring of 2003. Hydrologic monitoring was conducted in 2005 by Environmental Services, Inc. (ESI). In 2005, 286 monitoring gauges were monitored (Figures 2a and 2b). Gauges consist of a combination of Remote Data Systems (RDS) WL-20, WL-40, and Ecotone monitoring gauges. In addition, three to four monitoring gauges were monitored per soil mapping unit in areas of minimal disturbance to provide reference conditions for the CWMB (a total of 33 reference monitoring gauges located onsite and offsite); reference gauges are also either RDS WL-20, WL-40, or Ecotone monitoring gauges. The automatic monitoring gauges record the depth to the groundwater level and duration of jurisdictional hydrology. Daily readings were taken throughout the growing season. Three Infinity rain gauges are spaced across the site; however, one rain gauge (Rain Gauge 4) malfunctioned repeatedly in 2005 and Rain Gauge 3 malfunctioned during Hurricane Ophelia, therefore the data for these two gauges could not be used. Data for Rain Gauge 2 were used for the entire site.

The CWMB is being tracked by riverine and non-riverine wetland restoration (R), enhancement (E), and preservation (P) areas (Figures 2a and 2b). The monitoring gauges installed throughout the CWMB between 1998 and 2000 were used to collect data in support of jurisdictional determinations and to assist in mitigation planning. Additional gauges were installed in Phase I in 2002 and Phase II in 2003 after mitigation construction activities were completed and used to supplement the previous gauges for monitoring success.

Gauges established in Phase I in 2002 and Phase II in 2003 were installed in transects across the different mitigation treatments in order to monitor the success of these treatments in the major soil types present. These treatments can be summarized as areas where: 1) ditches have been reach-plugged and the road remains; 2) ditches have been point-plugged and the road remains; 3) ditches have been reach-plugged and the road removed; and 4) ditches have been point-plugged and the road removed. Reach-plugging is the back-filling of the entire ditch or extensive section of the ditch. Point-plugging involves shorter plugs of fill spaced along the length of the ditch to render the drainage system inoperable. Six additional gauges were installed in Phase I in 2003 to document hydrologic changes resulting from the removal of the road and/or ditch along the phase boundary during Phase II construction.

In 2004, one additional gauge (Gauge 321) was installed to document hydrology between Gauges 84 and 85, and Gauge 196 was removed due to safety concerns (alligator).

Table 2 provides a list of gauge locations within each MU and the number of gauges within each mitigation type.

Figure 2a. Hydrologic Monitoring Gauge Location Map, Phase II

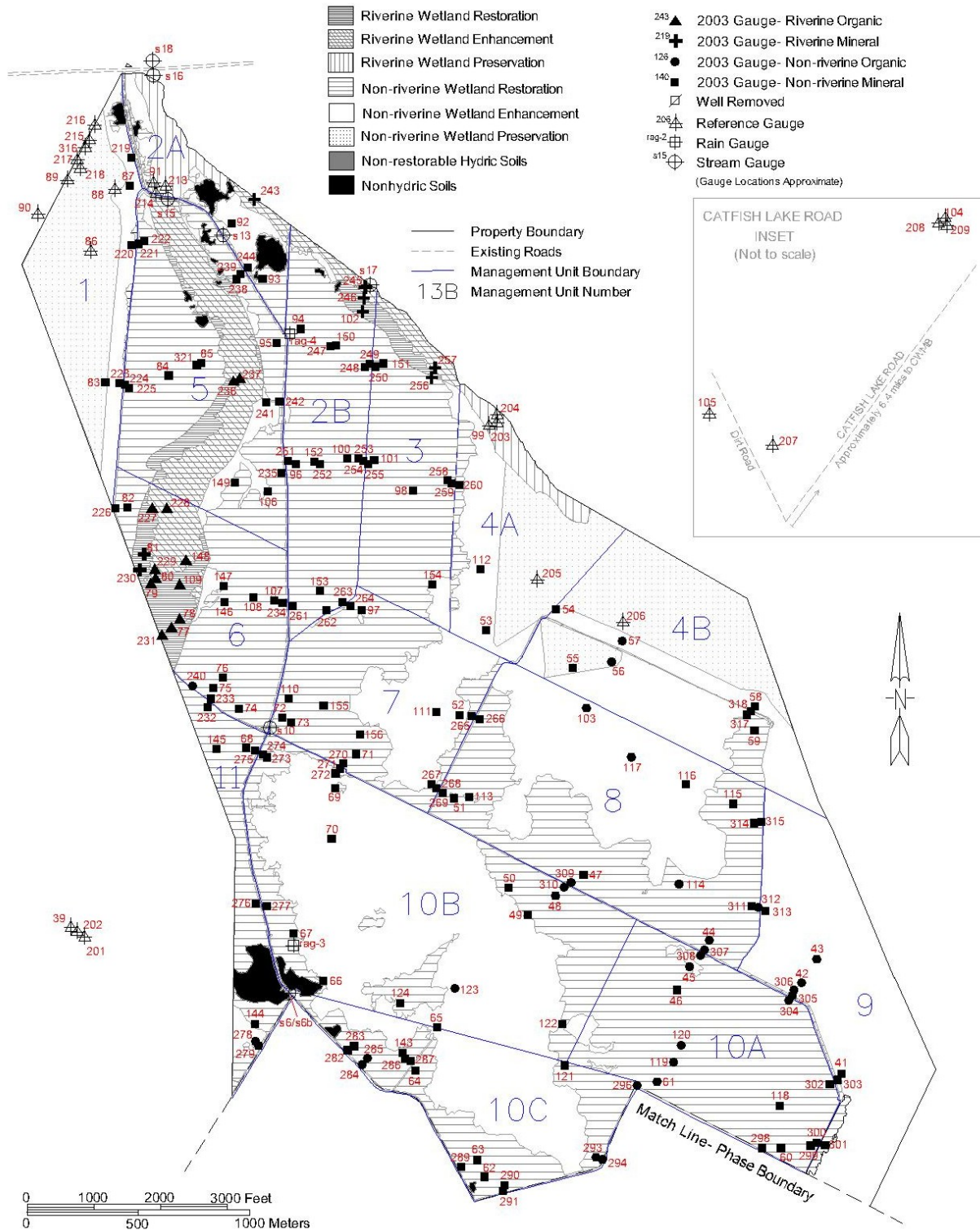


Figure 2b. Hydrologic Monitoring Gauge Location Map, Phase I

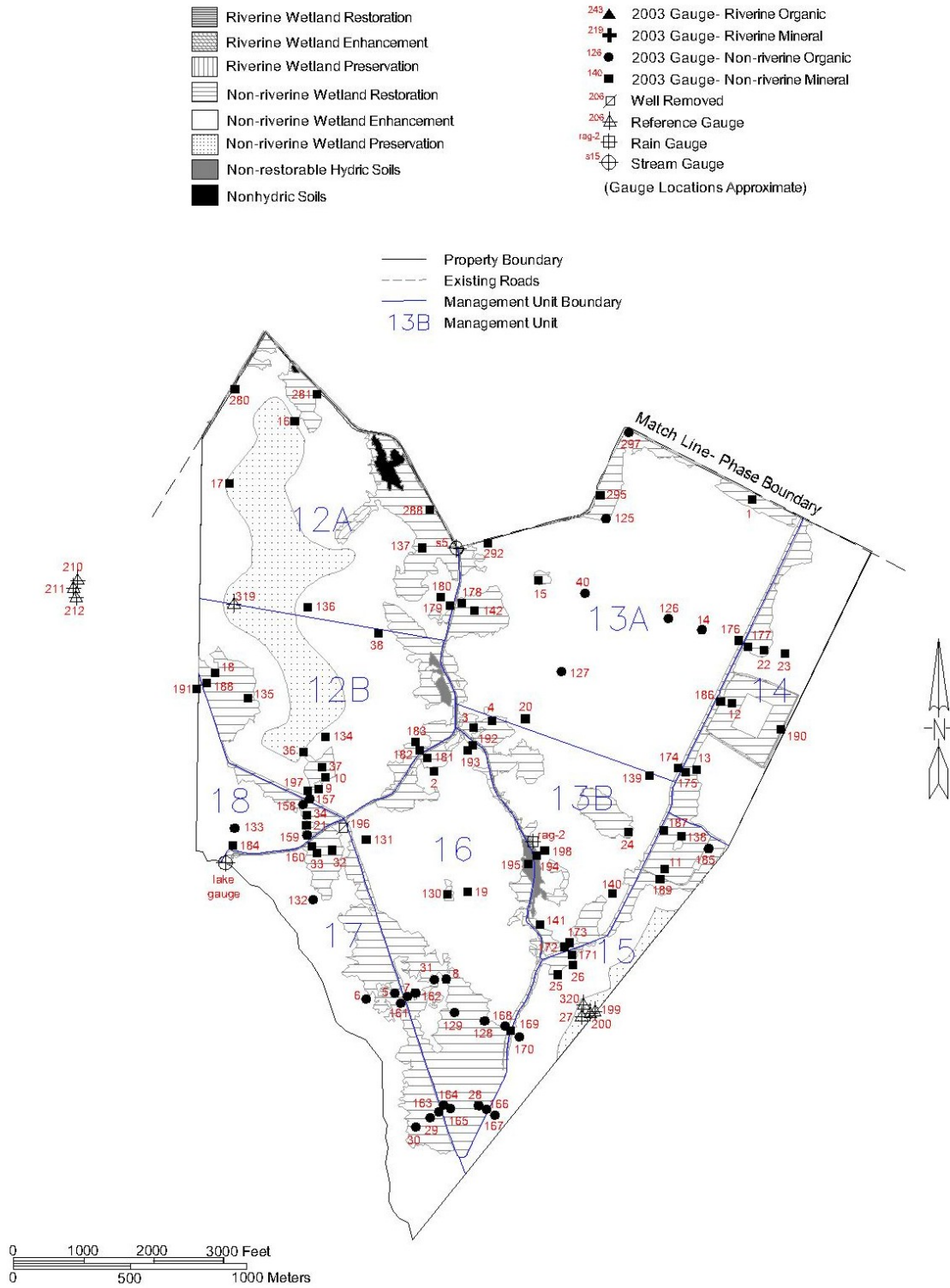


Table 2. Phase II (MU: 1-11) and I (MU: 12A-18) Gauge Locations

Phase II			
MU	Location	Total # of Gauges	# of Gauges per Mitigation Type (NR, NE, NP,RR, RE, RP)^a
1	Northwestern portion of Phase II along western boundary	5 (+ 8 Reference)	NE-4, NP-1 + 8*
2A	Northern portion of Phase II adjacent to Catfish Lake Rd. and East Prong Brice Creek	4 (+3 Reference)	NR-1, NE-2, RE-1, and RP-3*
2B	North-central portion of Phase II east of 2A and west of 3	19	NR-17, RE-2
3	North-central portion of Phase II east of 2B and west of 4A	10	NR-7, NE-1, RE-1, RR-1
4A	North-central portion of Phase II east of 3 and west of 4B	3 (+4 Reference)	NR-1, NE-2, NP-1*, and RP-3*
4B	Northeastern portion of Phase II along the boundary north of transmission line	8 (+ 1 Reference)	NR-3, NE-3, and NP-2 + 1*
5	Northwestern portion of Phase II east of 1 and north of transmission line	17	NR-13 ^b , NE-2, RR-1, RE-1
6	West-central portion of Phase II south of the transmission line along the western boundary	24	NR-11, NE-1 RR-8, RE-4
7	Central portion of Phase II east of 6 and west of 8	14	NR-11, NE-3
8	Central portion of Phase II east of 7 and west of 9	17	NR-11, NE-6
9	Southeastern portion of Phase II along the eastern boundary	8	NR-3, NE-5
10A	Southeastern portion of Phase II, along Phase boundary	14	NR-14
10B	Southern portion of Phase II, east of 11 and north of 10C	17	NR-13, NE-4
10C	Southern portion of Phase II, south of 10B and north of 13A	16	NR-16
11	Southwestern portion of Phase II, along western boundary	8	NR-7, NE-1

Table 2 Continues.

Table 2 Concluded.			
Phase I			
MU	Location	Total # of Gauges	# of Gauges per Mitigation Type (R, E, P) ^a
12A	Northwestern portion of Phase I along western boundary	9 (+1 Reference)	NR-4, NE-5, NP-1
12B	Western portion of Phase I south of 12A	13	NR-9, NE-4
13A	Center of Phase I adjacent to the northern Phase I Boundary	15	NR-9, NE-6
13B	Center of Phase I south of 13A	10	NR-4, NE-6
14	Northeastern portion of Phase I along eastern boundary	8	NR-7, NE-1
15	Southeastern portion of Phase I south of 14	10 (+ 4 Reference)	NR-8, NE-2, and NP-4*
16	Center of Phase I south of 13B	20	NR-17, NE-3
17	Southeastern portion of Phase I adjacent to Long Lake	10	NR-8, NE-2 ^c
18	Southwestern portion of Phase I adjacent to Long Lake	7	NR-3, NE-4
Off-site	Catfish Lake Road	5 Reference	N/A
Off-site	Forest Service Land adjacent to the Croatan WMB western boundary	7 Reference	N/A

^a Mitigation Type: NR = Non-riverine Restoration, NE = Non-riverine Enhancement, NP = Non-riverine Preservation, RR = Riverine Restoration, RE = Riverine Enhancement, RP = Riverine Preservation (* = Reference)

^b Gauge 321 in MU 5 was installed in 2004.

^c Gauge 196 in MU 17 was removed due to safety concerns (alligator).

* Onsite Reference gauges

Appendix A contains a numerical list of all monitoring and reference gauges monitored in 2005. Appendix A also contains a plot of the water depth for each of the monitoring gauges. Due to the number of gauges within the CWMB some gauges have been plotted on the same graph. The gauges that are plotted on the same graph are within the same MU and soil series. Reference gauges are plotted individually in the Reference section of Appendix A. Precipitation events are included on each graph as bars. Historical precipitation data used for establishing rainfall normalcy were obtained from the North Carolina State Climate Office rain gauge in New Bern, Craven County, North Carolina. Rainfall data for 2005 came from one onsite rain gauge (Rain Gauge 2).

2.3 Results of Hydrologic Monitoring

2.3.1 Site Data

As described previously, each monitoring gauge must meet both of its respective hydrologic success criteria based on soil type in order to achieve hydrologic success. In order to achieve Success Criterion 1 monitoring gauges in mineral soils must have jurisdictional hydrology for 12.5% of the growing season and monitoring gauges in riverine or organic soils must have jurisdictional hydrology for 25% of the growing season. In order to achieve Success Criterion 2 each monitoring gauge must be within 50% of the Reference Range for its respective soil series for years one through three and within 20% of the Reference Range for its respective soil series for years four and five.

Reference Gauges

Overall, the reference gauges met or exceeded the number of days and time of year for the high water table values published for each soil type in the Craven County soil survey (pre and post hurricane events). The reference gauges for Leon soils did not meet the published values for the high water table during the early part of the growing season (pre-hurricane events), but exceeded the published values for the high water table during the later part of the growing season (post hurricane events).

Appendix A contains a table with the reference gauges within each soils series, the maximum number of consecutive days that jurisdictional hydrology was met and the percentage of the 242-day growing season that jurisdictional hydrology was met. These reference gauges have been used to establish a reference range. Table A1 provides the 50% and 20% range from reference conditions in days and percentage of the growing season. This is the number of days in which each soil series must have jurisdictional hydrology in order to achieve Success Criterion 2. Success Criterion 2 is based on restoring the jurisdictional hydroperiod for each soil series to within 50% of the Reference Range for years one through three and 20% of the Reference Range for years four and five (Appendix D).

For example, in 2005 all monitoring gauges within the Bayboro (mineral) soil series must have jurisdictional hydrology for 12.5% of the growing season in order to achieve Success Criterion 1. A gauge in Phase I must also have jurisdictional hydrology between 134 and 242 days (55.4% to 100%) of the growing season to achieve Success Criterion 2. A gauge in Phase II must also have jurisdictional hydrology between 84 and 242 days (34.7% to 100%) of the growing season to achieve Success Criterion 2. Thus, a gauge could achieve success for overall percentage of the growing season (Criterion 1), but not achieve the expected percentage of the Reference Range (Criterion 2).

Monitoring Gauges

Phase II is separated into 15 MUs, identified as MU 1 through 11 and Phase I is separated into nine MUs, identified as MU 12A through MU 18. Tables 3 through 26 and Figures 3a and 3b provide overviews of which monitoring gauges achieved hydrologic success. Each table lists gauges within each MU, the soil series in which the gauge is installed, mitigation type, expected jurisdictional hydroperiod, actual jurisdictional hydroperiod, and whether the gauge met both respective hydrologic success criteria.

Several of the monitoring gauges have missing data because there were no gauges available for installation to replace non-functioning gauges at the beginning of the growing season. In addition, several of the monitoring gauges have missing data due to the lack of available gauges for installation to replace broken or malfunctioning gauges later in the growing season. ESI replaced these gauges as the gauges were made available by Ecosystem Enhancement Program (EEP). Where reasonable, ESI extrapolated the missing data for each gauge by using reference gauges, nearby gauges in the same soil type, rainfall events, and adjacent data points. ESI analyzed the hydrographic response to rainfall events prior to and subsequent to the missing data gap and then extrapolated the missing data based on comparison to data for a comparable gauge that exhibited similar groundwater levels and hydrographic responses to precipitation events. Missing data are discussed in the report relative to the largest number of consecutive days $\geq 12.5\%$ of the growing season.

Non-riverine minerals soils, such as Bayboro, Pantego, Leaf, and Rains, occupy a large portion of the CWMB. These soil types typically have a high water table that is within 12 inches of the ground surface during the winter and early spring. The water table tends to drop below 12 inches of the ground surface in late spring or early summer. Therefore these soil types should meet the jurisdictional hydrology requirement in the spring and early summer (the critical defining hydroperiod for many wetlands in eastern North Carolina).

The majority of the gauges in the CWMB demonstrated that groundwater levels dropped below 12 inches of the ground surface at the end of May/beginning of June and then rose to within 12 inches of the ground surface in September due to a hurricane event.

Figure 3a. 2005 Hydrologic Monitoring Results, Phase II

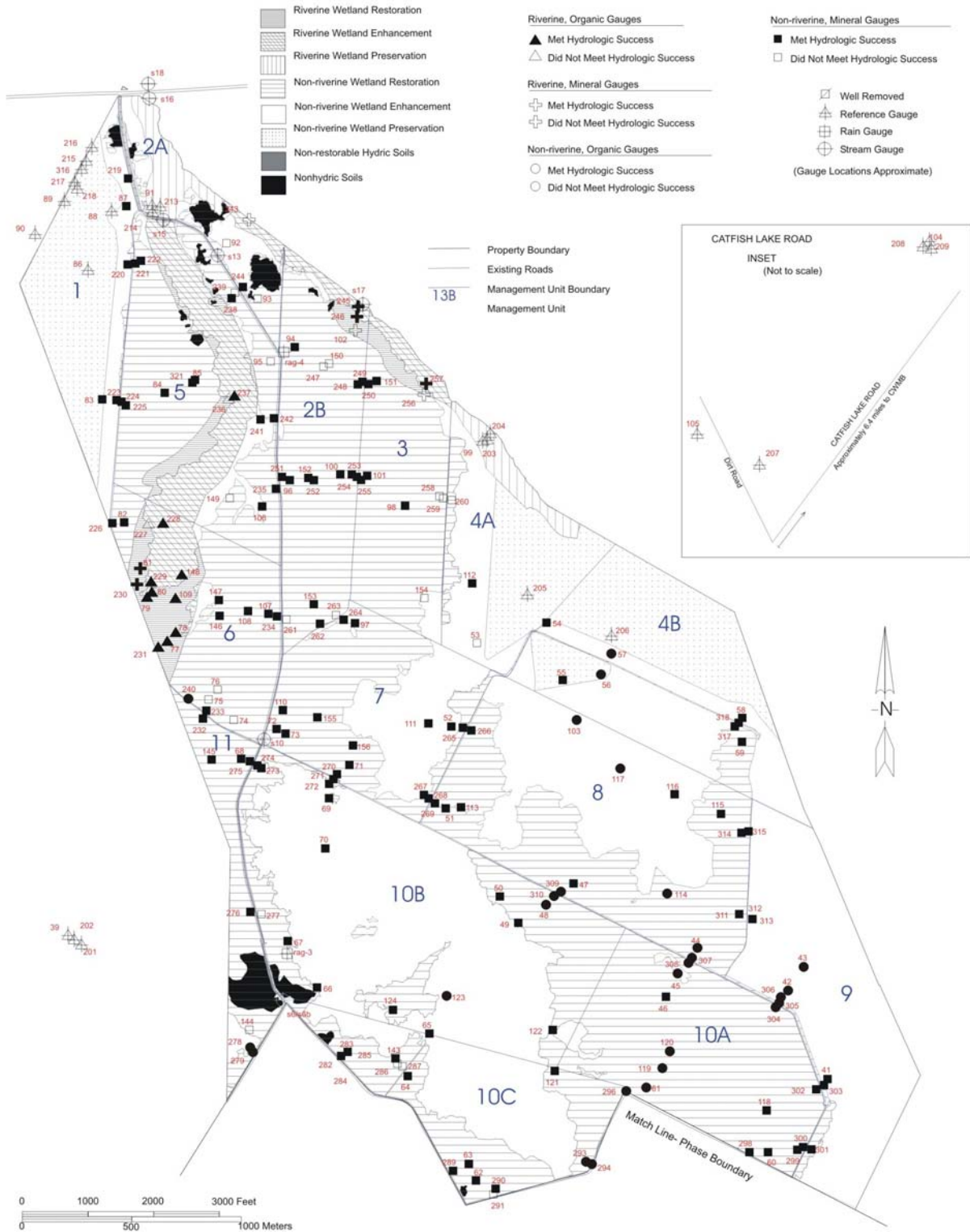


Figure 3b. 2005 Hydrologic Monitoring Results, Phase I

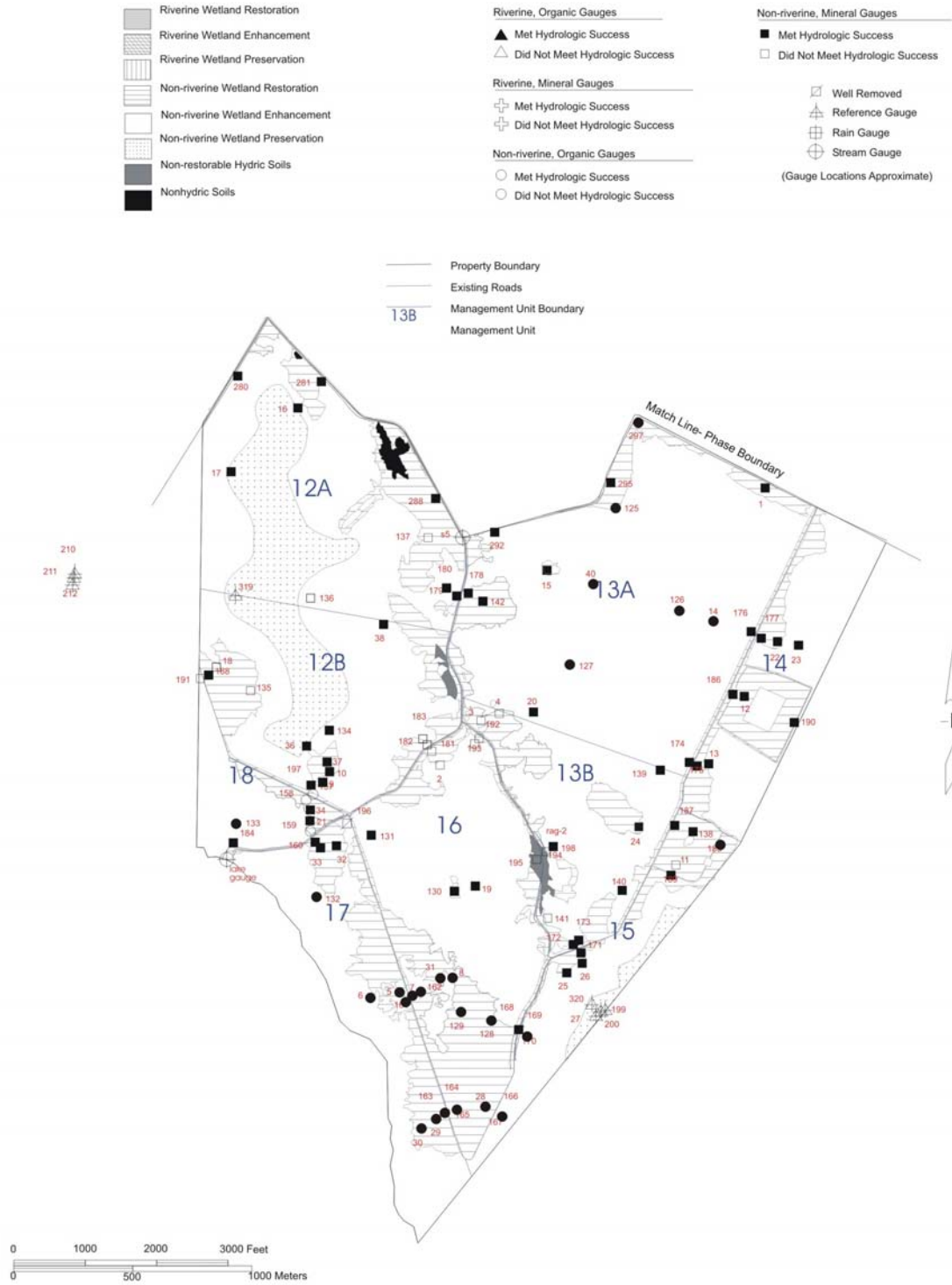


Table 3. Hydrologic Monitoring Results – MU 1

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
83	Pa/NP	100 ^b	√	√	√ ^d
87	La/NE	38.4	√	√	√ ^d
219	Ra/NE	42.6	√	√	√ ^d
220	La/NE	≥29.8 ^c	√	√	√
223	Pa/NE	100	√	√	√ ^d

^a Soils: Pa – Pantego, La – Leaf, and Ra – Rains.

Mitigation Types: Non-riverine Enhancement – NE, and Non-riverine Preservation – NP.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

^d Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 3 MU 1 Discussion

March-November

All five monitoring gauges in MU 1 met both of their expected hydrologic success criteria for Year 3. In addition, four of the five gauges met the hydrologic success criteria established for years one through three (≥ 12.5 % of the growing season and within 50% of Reference Range) and the success criteria established for years four and five (≥ 12.5 % of the growing season and within 20% of Reference Range). Gauges 83 and 220 have missing data because there were no replacement gauges available for installation at the beginning of the growing season.

Gauge 220 has missing data during critical drawn-down periods and the hydrograph is too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauge 83 has recorded data for 127 consecutive days (52.5% of the growing season) and one data gap. Using Gauge 223, it can be assumed that Gauge 83 would have made jurisdictional hydrology for approximately 100% of the growing season.

In the past three years, four of the five monitoring gauges in MU 1 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that a portion of the gauges in MU 1 be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 83 and 223 should be considered for removal from hydrologic monitoring. The remaining gauges in MU 1 are located adjacent to existing roads or along transects where roads have been removed and these areas should be monitored through years four and five.

Table 4. Hydrologic Monitoring Results – MU 2A

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation \geq 12.5% of Growing Season; \leq 50% of Reference Range)					
92	La/NE	14.5	√	–	–
93	La/NR	12.8	√	–	–
244	La/NE	\geq 22.3 ^b	√	√	√
Riverine, Mineral (Success = Saturation/inundation \geq 25% of Growing Season; \leq 50% of Reference Range)					
243	Ba/RE	\geq 22.3 ^b	–	–	–

^a Soils: Ba – Bayboro and La – Leaf.

Mitigation Types: Non-riverine Restoration – NR, Non-riverine Enhancement – NE, and Riverine Enhancement – RE.

^b Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

Table 4 MU 2A Discussion
March-November

Only one of the four monitoring gauges in MU 2A met both of their expected hydrologic success criteria for Year 3. Gauges 243 and 244 have missing data because there were no replacement gauges available for installation at the beginning of the growing season.

Gauges 92 and 93 met jurisdictional hydrology for at least 12.5% of the growing season and therefore met Success Criterion 1. However, these gauges did not meet Success Criterion 2 (50% of Reference Range) for the Leaf soil series (19.8 - 100% of the growing season). Mitigative measures appear to be successful at returning jurisdictional hydrology to these gauges, but were not successful at returning these gauge sites to within 50% of reference conditions under the normal rainfall conditions. Additional mitigative measures may need to be addressed if jurisdictional hydrology is not restored in years four and five.

Gauge 243 was not installed for the majority of the 2005 growing season and the hydrograph for this gauge is too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available. Gauge 243 did not meet either of its expected hydrologic success criteria. In a year with normal rainfall, Gauge 243 made

jurisdictional hydrology ($\geq 12.5\%$ of the growing season), but did not meet either of its expected success criteria for riverine mineral soils ($\geq 25\%$ of the growing season and 50% of Reference Range).

In 2005, none of the gauges in MU 2A met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the low rate of hydrologic success, ESI recommends that all of the gauges in MU 2A be monitored through years four and five.

Table 5. Hydrologic Monitoring Results – MU 2B

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
94	Pa/NR	≥16.1 ^b	√	√	√
96	La/NR	42.2	√	√	√ ^d
100	La/NR	40.9 ^c	√	√	√ ^d
150	La/NR	16.5	√	–	–
152	Ba/NR	57.0 ^c	√	√	√ ^d
153	Ba/NR	70.7 ^c	√	√	√ ^d
247	La/NR	≥14.5 ^b	√	–	–
248	La/NR	≥21.1 ^b	√	√	√
249	La/NR	40.9	√	√	√ ^d
251	Ba/NR	70.3	√	√	√ ^d
252	Ba/NR	41.3	√	√	√
253	Ba/NR	40.5	√	√	√
254	Ba/NR	41.3	√	√	√
261	Ba/NR	≥30.6 ^b	√	–	–
262	Ba/NR	74.0 ^c	√	√	√ ^d
263	Ba/NR	≥25.6 ^b	√	–	–
Riverine, Mineral (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
102	Ba/RR	10.3	–	–	–
245	Ba/RE	100	√	√	√ ^d
246	La/RE	≥26.0 ^b	√	√	√

^a Soils: Pa – Pantego, Ba – Bayboro, and La – Leaf.

Mitigation Types: Non-riverine Restoration – NR, Riverine Restoration – RR, and Riverine Enhancement – RE.

^b Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

^c Actual %: Missing data extrapolated from comparable gauges.

^d Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 5 MU 2B Discussion

March-November

Fourteen of the nineteen monitoring gauges in MU 2B met both of their expected hydrologic success criteria for Year 3. Eight gauges that met the hydrologic success criteria established for years one through three, also met the success criteria established for years four and five. Gauges 94, 246, 248, 252, and 253 met the hydrologic success criteria established for years one through three, but did not meet the success criteria established for years four and five. Gauges 100, 153, and 262 have missing data due to gauge malfunction. Gauges 94, 152, 246, 247, 248, 261, and 263 have missing data because there were no replacement gauges available for installation at the beginning of the growing season.

Gauges 94, 246, 247, 248, 261, and 263 have missing data during critical drawn-down periods and the hydrographs for these gauges are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauges 150 and 247 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. However, these gauges did not meet Success Criterion 2 (50% of Reference Range) for the Leaf soil series (19.8 - 100% of the growing season). Mitigative measures appear to be successful at returning jurisdictional hydrology to Gauges 150 and 247, but were not successful at returning the gauge site to within 50% of reference conditions under the normal rainfall conditions.

Gauges 261 and 263 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. However, these gauges did not meet Success Criterion 2 (50% of Reference Range) for the Bayboro soil series (34.7 - 100% of the growing season). Mitigative measures appear to be successful at returning jurisdictional hydrology to Gauges 261 and 263, but were not successful at returning the gauge site to within 50% of reference conditions under the normal rainfall conditions.

Gauge 102 did not meet either of its expected hydrologic success criteria. In a year with normal rainfall the areas around Gauge 102 did not make jurisdictional hydrology. This gauge is located on the upper edge of the floodplain and may be on a topographic high. Additional measures may need to be addressed if jurisdictional hydrology is not restored in years four and five.

Gauge 100 has recorded data for 61 consecutive days (25.2% of the growing season) and one data gap. Using nearby Gauge 96 and adjacent data points to extrapolate missing data, it can be assumed that Gauge 100 would have made jurisdictional hydrology for approximately 40.9% of the growing season.

Gauge 152 has recorded data for 98 consecutive days (40.5% of the growing season) and one data gap. Using nearby Gauge 252 and adjacent data points to extrapolate missing data, it can be assumed that Gauge 152 would have made jurisdictional hydrology for approximately 57.0% of the growing season.

Gauge 153 has recorded data for 75 consecutive days (31.0% of the growing season) and two data gaps. Using adjacent data points and rainfall events to extrapolate missing data, it can be assumed that Gauge 153 would have made jurisdictional hydrology for approximately 70.7% of the growing season.

Gauge 262 has recorded data for 68 consecutive days (28.1% of the growing season) and one data gap. Using Reference Gauges 203 and 204, it can be assumed that Gauge 262 would have made jurisdictional hydrology for approximately 74.0% of the growing season.

In the past three years of monitoring, eight of the nineteen monitoring gauges in MU 2B have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. The overall hydrologic success rate of MU 2B is not as high as other portions of Phase II. Therefore, ESI would recommend that all of the gauges in MU 2B be monitored through years four and five.

Table 6. Hydrologic Monitoring Results – MU 3

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
98	Ba/NR	39.3	√	√	√
101	Ba/NR	39.7 ^b	√	√	√
151	La/NR	39.3	√	√	√
154	Ba/NE	≥25.2 ^c	√	–	–
250	La/NR	64.1 ^b	√	√	√ ^d
255	Ba/NR	64.9 ^b	√	√	√ ^d
258	Ba/NR	≥17.4 ^e	√	–	–
259	Ba/NR	≥16.1 ^e	√	–	–
Riverine, Mineral (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
256	Ba/RR	≥27.3 ^c	√	–	–
257	Ba/RE	100 ^b	√	√	√ ^d

^a Soils: Ba – Bayboro and La – Leaf.

Mitigation Types: Non-riverine Restoration – NR, Non-riverine Enhancement – NE, Riverine Restoration – RR, and Riverine Enhancement – RE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

^d Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

^e Missing data could not be extrapolated with any degree of certainty.

Table 6 MU 3 Discussion

March-November

Six of the ten monitoring gauges in MU 3 met both of their expected hydrologic success criteria for Year 3. Only Gauges 250, 255, and 257 met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five. Gauges 154 and 256 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 101, 250, 255, 257, 258, and 259 have missing data due to gauge malfunction.

Gauges 154, 256, 258, and 259 have missing data during critical drawn-down periods and the hydrographs for these gauges are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauges 154, 258, and 259 met jurisdictional hydrology for at least 12.5% of the growing season and therefore met Success Criterion 1. However, these gauges did not meet Success Criterion 2 (50% of Reference Range) for the Bayboro soil series (34.7 - 100% of the growing season). Mitigative measures appear to be successful at returning jurisdictional hydrology to these gauges, but were not successful at returning these gauge sites to within 50% of reference conditions under the normal rainfall conditions.

Gauge 256 met jurisdictional hydrology for at least 25% of the growing season and therefore met Success Criterion 1. However, this gauge did not meet Success Criterion 2 (50% of Reference Range) for the Bayboro soil series (34.7 - 100% of the growing season). Mitigative measures appear to be successful at returning jurisdictional hydrology to Gauge 256, but were not successful at returning the gauge site to within 50% of reference conditions under the normal rainfall conditions.

Gauge 101 has recorded data for 69 consecutive days (28.5% of the growing season) and multiple data gaps. Using nearby Gauge 255 to extrapolate missing data, it can be assumed that Gauge 101 would have made jurisdictional hydrology for approximately 39.7% of the growing season.

Gauge 250 has recorded data for 52 consecutive days (21.5% of the growing season) and multiple data gaps. Using nearby Gauge 151 to extrapolate missing data, it can be assumed that Gauge 250 would have made jurisdictional hydrology for approximately 64.0% of the growing season.

Gauge 255 has recorded data for 146 consecutive days (60.3% of the growing season) and one data gap. Using nearby Gauge 254 to extrapolate missing data, it can be assumed that Gauge 255 would have made jurisdictional hydrology for approximately 64.9% of the growing season.

Gauge 257 has recorded data for 96 consecutive days (39.8% of the growing season) and one data gap. Using nearby Gauge 256 to extrapolate missing data, it can be assumed that Gauge 257 would have made jurisdictional hydrology for approximately 100% of the growing season.

In 2005, only Gauges 255 and 257 met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five. Due to the low rate of hydrologic success, ESI would recommend that all of the gauges in MU 3 be monitored through years four and five.

Table 7. Hydrologic Monitoring Results – MU 4A

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
53	Ba/NE	67.8 ^b	√	√	√ ^c
112	Ba/NE	39.3	√	√	√
260	Ba/NR	17.4 ^b	√	–	–

^a Soils: Ba – Bayboro.

Mitigation Types: Non-riverine Restoration – NR, and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

**Table 7 MU 4A Discussion
March-November**

Two of the three monitoring gauges (Gauges 53 and 112) in MU 4A met both of their expected hydrologic success criteria for Year 3. Only Gauge 53 met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five for the Bayboro soil series. Gauges 53 and 260 have missing data due to gauge malfunction.

Gauge 53 has recorded data for 68 consecutive days (28.1 % of the growing season) and one data gap. Using nearby Gauge 112 and Reference Gauges 99 and 203 to extrapolate missing data, it can be assumed that Gauge 53 would have made jurisdictional hydrology for approximately 67.8% of the growing season.

Gauge 260 has recorded data for 36 consecutive days (14.9% of the growing season) and one data gap. Using nearby Reference Gauges 99 and 204 to extrapolate missing data, it can be assumed that Gauge 260 would have made jurisdictional hydrology for approximately 17.4% of the growing season. Gauge 260 made jurisdictional hydrology for 17.4% of the growing season, and therefore met Success Criterion 1. However, this gauge did not meet Success Criterion 2 (50% of Reference Range) for the Bayboro soil series (34.7 - 100% of the growing season). Mitigative measures appear to be successful at returning jurisdictional hydrology to Gauge 260, but were not successful at returning the gauge site to within 50% of reference conditions under the normal rainfall conditions.

Due to the low rate of hydrologic success in 2005, ESI recommends that all of the gauges in MU 4A continue to be monitored in years four and five.

Table 8. Hydrologic Monitoring Results – MU 4B

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
54	Pa/NP	68.6	√	√	√ ^c
55	Ba/NE	100 ^b	√	√	√ ^c
58	Ba/NE	39.7	√	√	√
59	Ba/NR	69.0	√	√	√ ^c
317	Ba/NR	69.0	√	√	√ ^c
318	Ba/NR	65.3	√	√	√ ^c
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
56	CT/NP	100 ^b	√	√	√ ^c
57	CT/NE	72.7 ^b	√	√	√ ^c

^a Soils: Ba – Bayboro, CT – Croatan, and Pa - Pantego.

Mitigation Types: Non-riverine Restoration – NR, Non-riverine Enhancement – NE, and Non-riverine Preservation – NP.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 8 MU 4B Discussion

March-November

All eight monitoring gauges in MU 4B met both of their expected hydrologic success criteria for Year 3. In addition, seven of the eight monitoring gauges that met the hydrologic success criteria established for years one through three also met the success criteria established for years four and five. Gauges 55, 56, and 57 have missing data because there were no replacement gauges available for installation at the beginning of the growing season.

Gauge 55 has recorded data for 147 consecutive days (60.7% of the growing season) and one data gap. Using Reference Gauge 99 to extrapolate missing data, it can be assumed that Gauge 55 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 56 has recorded data for 147 consecutive days (60.7% of the growing season) and one data gap. Using nearby Reference Gauge 206 to extrapolate missing data, it can be assumed that Gauge 56 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 57 has recorded data for 80 consecutive days (33.1% of the growing season) and one data gap. Using nearby Reference Gauge 206 to extrapolate missing data, it can be assumed that Gauge 57 would have made jurisdictional hydrology for approximately 72.7% of the growing season.

In all three years of monitoring, all of the gauges in MU 4B, except Gauge 58, have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI would recommend that a portion of the gauges in MU 4B be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 54, 55, and 56 should be considered for removal from hydrologic monitoring.

Table 9. Hydrologic Monitoring Results – MU 5

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
84	Ra/NR	≥27.7 ^b	√	√	√ ^e
85	Pa/NR	14.1	√	√	√
95	La/NR	≥13.2 ^c	√	–	–
106	Ba/NE	71.1 ^d	√	√	√ ^e
149	Pa/NR	5.4	–	–	–
221	La/NR	≥30.2 ^c	√	√	√
222	La/NR	37.6 ^d	√	√	√ ^e
224	Pa/NR	100	√	√	√ ^e
225	Pa/NR	100 ^d	√	√	√ ^e
235	Ba/NR	71.1	√	√	√ ^e
238	Ra/NR	≥14.5 ^c	√	√	√
239	Ra/NR	13.6	√	√	√
241	Ra/NE	100	√	√	√ ^e
242	La/NR	69.4 ^d	√	√	√ ^e
321	Pa/NR	100	√	√	√ ^e
Riverine, Mineral (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
236	MM/RR	39.3 ^d	√	√	√
237	MM/RE	100	√	√	√ ^e

^a Soils: Ra – Rains, Pa – Pantego, Ba – Bayboro, La –Leaf, and MM –Masontown/Muckalee.

Mitigation Types: Non-riverine Restoration – NR, Non-riverine Enhancement – NE, Riverine Restoration – RR, and Riverine Enhancement – RE.

^b Missing data could not be extrapolated with any degree of certainty.

^c Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

^d Actual %: Missing data extrapolated from comparable gauges.

^e Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 9 MU 5 Discussion March-November

Fifteen of the seventeen monitoring gauges in MU 5 met both of their expected hydrologic success criteria for Year 3. Ten monitoring gauges met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five. Gauges 95, 221, and 238 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 84, 106, 222, 224, 236, and 242 have missing data due to gauge malfunction.

Gauges 84, 95, 221, and 238 have missing data during critical drawn-down periods and the hydrographs for these gauges are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauge 95 made jurisdictional hydrology for 13.2% of the growing season, and therefore met Success Criterion 1. However, this gauge did not meet Success Criterion 2 (50% of Reference Range) for the Leaf soil series (19.8 - 100% of the growing season). Mitigative measures appear to be successful at returning jurisdictional hydrology to Gauge 95, but were not successful at returning the gauge site to within 50% of reference conditions under the normal rainfall conditions.

Gauge 149 did not meet either of its expected hydrologic success criteria. In a year with normal rainfall, Gauge 149 did not make jurisdictional hydrology. This gauge is located on the upper edge of the floodplain and may be on a topographic high. Additional measures may need to be addressed if jurisdictional hydrology is not restored in years four and five.

Gauge 106 has recorded data for 67 consecutive days (27.7% of the growing season) and multiple data gaps. Using nearby Gauge 235 to extrapolate missing data, it can be assumed that Gauge 106 would have made jurisdictional hydrology for approximately 71.7% of the growing season.

Gauge 225 has recorded data for 119 consecutive days (49.2% of the growing season) and one data gap. Using nearby Gauge 224 to extrapolate missing data, it can be assumed that Gauge 225 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 236 has recorded data for 83 consecutive days (34.3% of the growing season) and one data gap. Using nearby Gauge 237 to extrapolate missing data, it can be assumed that Gauge 236 would have made jurisdictional hydrology for approximately 39.3% of the growing season.

Gauge 242 has recorded data for 112 consecutive days (46.3% of the growing season) and two data gaps. Using adjacent data points and rainfall events to extrapolate missing data, it can be assumed that Gauge 242 would have made jurisdictional hydrology for approximately 69.4% of the growing season.

Ten of the seventeen monitoring gauges in MU 5 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that a portion of the gauges in MU 5 be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 224 and 225 should be considered for removal from hydrologic monitoring. The remaining gauges in MU 5 are located adjacent to existing roads or along

transects where roads have been removed and these areas should be monitored through years four and five.

Table 10. Hydrologic Monitoring Results – MU 6

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation \geq 12.5% of Growing Season; \leq 50% of Reference Range)					
74	Ba/NR	16.9	√	–	–
75	Ba/NR	2.5	–	–	–
76	Ba/NR	10.3	–	–	–
82	Pa/NR	100	√	√	√ ^d
107	Ba/NR	72.3 ^b	√	√	√ ^d
108	Ba/NR	71.5 ^b	√	√	√ ^d
146	La/NR	37.2	√	√	√ ^d
147	Ba/NE	100 ^b	√	√	√ ^d
226	Pa/NR	100 ^b	√	√	√ ^d
233	Ra/NR	37.6	√	√	√ ^d
234	Ba/NR	72.3 ^b	√	√	√ ^d
Non-riverine, Organic (Success = Saturation/inundation \geq 25% of Growing Season; \leq 50% of Reference Range)					
240	CT/NR	100 ^b	√	√	√ ^d
Riverine, Mineral (Success = Saturation/inundation \geq 25% of Growing Season; \leq 50% of Reference Range)					
81	Ba/RR	100	√	√	√ ^d
230	Ba/RR	100 ^b	√	√	√ ^d

Table 10 Continues

Table 10 Concluded.

Riverine, Organic, Mineral					
(Success = Saturation/inundation \geq 25% of Growing Season; \leq 50% of Reference Range)					
Gauge	Soil Series and Mitigation Type^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
77	CT/RE	100	√	√	√ ^d
78	MM/RR	100 ^b	√	√	√ ^d
79	DO/RR	100	√	√	√ ^d
80	DO/RR	100 ^b	√	√	√ ^d
109	MM/RR	100	√	√	√ ^d
148	MM/RE	100	√	√	√ ^d
227	MM/RR	$\geq 17.8^c$	–	–	–
228	MM/RE	100 ^b	√	√	√ ^d
229	CT/RE	100 ^b	√	√	√ ^d
231	CT/RR	100	√	√	√ ^d

^a Soils: Ra – Rains, Pa – Pantego, Ba – Bayboro, La –Leaf, MM –Masontown/Muckalee, CT – Croatan, and DO - Dorovan.

Mitigation Types: Non-riverine Restoration – NR, Non-riverine Enhancement – NE, Riverine Restoration – RR, and Riverine Enhancement – RE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

^d Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 10 MU 6 Discussion **March-November**

Twenty of the twenty-four monitoring gauges in MU 6 met both of their expected hydrologic success criteria for Year 3. All twenty of the monitoring gauges that met the hydrologic success criteria established for years one through three also met the success criteria established for years four and five. Gauges 107, 108, 226, 227, 229, 234, and 240 have missing data because there were no replacement gauges available for installation for a portion of the growing season. Gauges 74, 78, 80, 147, 228, and 230 have missing data due to gauge malfunction.

Gauges 74 and 227 have missing data during critical draw-down periods and the hydrographs for these gauges are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauge 74 made jurisdictional hydrology for 16.9% of the growing season, and therefore met Success Criterion 1. However, this gauge did not meet Success Criterion 2 (50% of Reference Range) for the Bayboro soil series (34.7 - 100% of the growing season). Gauge 74 is missing data during the initial draw-down period, but the hydrograph is too flashy to extrapolate data with any certainty.

Gauges 75 and 76 did not meet either of their expected hydrologic success criteria. In a year with normal rainfall Gauges 75 and 76 did not make jurisdictional hydrology. These gauges are located on the upper edge of the floodplain and may be on a topographic high. Additional measures may need to be addressed if jurisdictional hydrology is not restored in years four and five.

Gauge 227 did not meet either of its expected hydrologic success criteria. Mitigative measures appear to be successful at exceeding jurisdictional hydrology (12.5% of the growing season) to Gauge 227, but was not successful at returning jurisdictional hydrology to the gauge site for 25% of the growing season (Criterion 1) or to within 50% of reference conditions under the normal rainfall conditions in 2005. Gauge 227 may be on a topographic high compared to the surrounding landscape. Adjacent Gauge 228 showed 7 to 20 inches of surface water for the entire year and Gauge 82 showed 1 to 3 inches of surface water for extended periods during the beginning and later parts of the growing season. Due to its location in the landscape, Gauge 227 may not meet success criteria in years with normal rainfall.

Gauge 78 has recorded data for 127 consecutive days (52.5% of the growing season) and two data gaps. Using nearby Gauges 80, 81, 229, and 230 to extrapolate missing data, it can be assumed that Gauge 78 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 80 has recorded data for 216 consecutive days (89.3% of the growing season) and one data gap. Using nearby Gauges 79, 81, 229, and 230 to extrapolate missing data, it can be assumed that Gauge 80 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 107 has recorded data for 79 consecutive days (32.6% of the growing season) and one data gap. Using Reference Gauges 99, 203, and 204 and rainfall events to extrapolate missing data, it can be assumed that Gauge 107 would have made jurisdictional hydrology for approximately 72.3% of the growing season.

Gauge 108 has recorded data for 77 consecutive days (31.8% of the growing season) and one data gap. Using Reference Gauges 99, 203, and 204 and rainfall events to extrapolate missing data, it can be assumed that Gauge 108 would have made jurisdictional hydrology for approximately 71.5% of the growing season.

Gauge 147 has recorded data for 185 consecutive days (76.5% of the growing season) and one data gap. Using adjacent data points and rainfall events to extrapolate missing data, it can be assumed that Gauge 147 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 226 has recorded data for 146 consecutive days (60.3% of the growing season) and one data gap. Using nearby Gauge 82 to extrapolate missing data, it can be assumed that Gauge 226 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 227 has recorded data for 43 consecutive days (17.8% of the growing season) and multiple data gaps. The hydrograph for Gauge 227 is too flashy to extrapolate the missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauge 228 has recorded data for 215 consecutive days (88.8% of the growing season) and one data gap. Using Reference Gauges 213 and 214 and rainfall events to extrapolate missing data, it can be assumed that Gauge 228 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 229 has recorded data for 130 consecutive days (53.7% of the growing season) and one data gap. Using nearby Gauges 231, 240, and 80 to extrapolate missing data, it can be assumed that Gauge 229 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 230 has recorded data for 130 consecutive days (53.7% of the growing season) and two data gaps. Using Reference Gauges 99, 203, and 204 and rainfall events to extrapolate missing data, it can be assumed that Gauge 230 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 234 has recorded data for 54 consecutive days (22.3% of the growing season) and multiple data gaps. Using nearby Gauge 107 and References Gauges 99, 203, and 204 to extrapolate missing data, it can be assumed that Gauge 234 would have made jurisdictional hydrology for approximately 72.3% of the growing season.

Gauge 240 has recorded data for 165 consecutive days (68.2% of the growing season) and one data gap. Using nearby Gauges 229 and 230 to extrapolate missing data, it can be assumed that Gauge 240 would have made jurisdictional hydrology for approximately 100% of the growing season.

In all three years of monitoring, all of the gauges in MU 6, except Gauges 74, 75, 76, and 227 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, a portion of the gauges in MU 6 could be removed from hydrologic monitoring. However, the majority of the gauges in MU 6 are located in riverine wetland restoration areas or adjacent to existing roads. Therefore, all of the gauges in MU 6 should be monitored through years four and five.

Table 11. Hydrologic Monitoring Results – MU 7

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
52	Ba/NE	73.6 ^b	√	√	√ ^c
71	Ba/NR	71.1 ^b	√	√	√ ^c
72	Ba/NR	71.5 ^b	√	√	√ ^c
73	Pa/NR	70.3	√	√	√ ^c
97	Ba/NR	71.1	√	√	√ ^c
110	Pa/NR	71.1	√	√	√ ^c
111	Ba/NE	100 ^b	√	√	√ ^c
155	Ba/NR	40.5 ^b	√	√	√
156	Ba/NR	71.1 ^b	√	√	√ ^c
264	Ba/NR	70.7 ^b	√	√	√ ^c
265	Ba/NR	73.6 ^b	√	√	√ ^c
267	Ba/NE	70.7	√	√	√ ^c
268	Ba/NR	72.3	√	√	√ ^c
270	Ba/NR	100	√	√	√ ^c

^a Soils: Pa – Pantego and Ba – Bayboro.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

**Table 11 MU 7 Discussion
March-November**

All fourteen of the monitoring gauges in MU 7 met both of their expected hydrologic success criteria for Year 3. In addition, thirteen monitoring gauges that met the hydrologic success criteria established for years one through three also met the success criteria established for years four and five. Gauges 52, 155, and 264 have missing data because there were no replacement gauges available for installation for a portion of the growing season. Gauges 71, 72, 111, 156, and 265 have missing data due to gauge malfunction.

Gauge 52 has recorded data for 78 consecutive days (32.2% of the growing season) and two data gaps. Using nearby Gauges 71 and 155 to extrapolate missing data, it can be assumed that Gauge 52 would have made jurisdictional hydrology for approximately 73.6% of the growing season.

Gauge 71 has recorded data for 96 consecutive days (39.7% of the growing season) and one data gap. Using nearby Gauges 52 and 156 to extrapolate missing data, it can be assumed that Gauge 71 would have made jurisdictional hydrology for approximately 71.1% of the growing season.

Gauge 72 has recorded data for 78 consecutive days (32.2% of the growing season) and one data gap. Using nearby Gauge 71 to extrapolate missing data, it can be assumed that Gauge 72 would have made jurisdictional hydrology for approximately 71.5% of the growing season.

Gauge 11 has recorded data for 116 consecutive days (47.9% of the growing season) and one data gap. Using nearby Gauge 71 to extrapolate missing data, it can be assumed that Gauge 111 would have made jurisdictional hydrology for approximately 100% of the growing season.

Gauge 155 has recorded data for 61 consecutive days (25.2% of the growing season) and two data gaps. Using nearby Gauges 72 and 156 to extrapolate missing data, it can be assumed that Gauge 155 would have made jurisdictional hydrology for approximately 40.5% of the growing season.

Gauge 156 has recorded data for 62 consecutive days (25.6% of the growing season) and two data gaps. Using nearby Gauges 71 and 155 to extrapolate missing data, it can be assumed that Gauge 156 would have made jurisdictional hydrology for approximately 71.1% of the growing season.

Gauge 264 has recorded data for 75 consecutive days (31.0% of the growing season) and one data gap. Using nearby Gauge 97 to extrapolate missing data, it can be assumed that Gauge 264 would have made jurisdictional hydrology for approximately 70.7% of the growing season.

Gauge 265 has recorded data for 94 consecutive days (38.8% of the growing season) and one data gap. Using nearby Gauge 267 to extrapolate missing data, it can be assumed that Gauge 265 would have made jurisdictional hydrology for approximately 73.6% of the growing season.

In all three years of monitoring, all of the gauges in MU 7, except Gauge 155, have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI would recommend that a portion of the gauges in MU 7 be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 52, 111, 156, and 265 should be considered for removal from hydrologic monitoring.

Table 12. Hydrologic Monitoring Results – MU 8

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation \geq 12.5% of Growing Season; \leq 50% of Reference Range)					
47	Ba/NR	73.1	√	√	√ ^c
51	Ba/NE	100 ^b	√	√ ^c	√ ^c
113	Ba/NE	100 ^b	√	√	√ ^c
115	Pa/NR	60.3	√	√	√ ^c
116	Pa/NE	71.5	√	√	√ ^c
266	Ba/NR	100 ^b	√	√	√ ^c
269	Ba/NE	100	√	√	√ ^c
311	Ba/NR	70.7	√	√	√ ^c
314	Ba/NR	65.3	√	√	√ ^c
315	Ba/NR	69.0	√	√	√ ^c
Non-riverine, Organic (Success = Saturation/inundation \geq 25% of Growing Season; \leq 50% of Reference Range)					
44	CT/NR	70.3	√	√	√ ^c
103	CT/NE	100 ^b	√	√	√ ^c
114	CT/NR	70.7 ^b	√	√	√ ^c
117	CT/NE	100	√	√	√ ^c
307	CT/NR	70.3 ^b	√	√	√ ^c
309	CT/NR	72.7	√	√	√ ^c
312	CT/NR	70.7	√	√	√ ^c

^a Soils: Pa – Pantego, Ba – Bayboro, and CT - Croatan.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 12 MU 8 Discussion

March-November

All seventeen monitoring gauges in MU 8 met both of their expected hydrologic success criteria for Year 3. In addition, all seventeen gauges that met the hydrologic success criteria established for years one through three also met the success criteria established for years four and five. Gauges 103 and 266 have missing data because there were no replacement gauges available for installation for a portion of the growing season. Gauges 51, 113, 114, and 307 have missing data due to gauge malfunction.

Gauge 51 has recorded data for a minimum of 89 consecutive days (36.8%) and multiple data gaps. Using nearby Gauges 113 and 266 to extrapolate the missing data, it can be assumed that Gauge 51 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 103 has recorded data for a minimum of 160 consecutive days (66.1%) and one data gap. Using nearby Gauges 56 and 117 to extrapolate the missing data, it can be assumed that Gauge 103 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 113 has recorded data for a minimum of 146 consecutive days (60.3%) and one data gap. Using nearby Gauge 266 to extrapolate the missing data, it can be assumed that Gauge 113 would have made jurisdictional hydrology 100% of the growing season.

Gauge 114 has recorded data for a minimum of 151 consecutive days (62.4%) and one data gap. Using nearby Gauges 44 and 312 to extrapolate the missing data, it can be assumed that Gauge 114 would have made jurisdictional hydrology for 70.7% of the growing season.

Gauge 266 has recorded data for a minimum of 147 consecutive days (60.7%) and one data gap. Using nearby Gauges 113 and 265 to extrapolate the missing data, it can be assumed that Gauge 266 would have made jurisdictional hydrology 100% of the growing season.

Gauge 307 has recorded data for a minimum of 114 consecutive days (47.1%) and one data gap. Using nearby Gauge 309 to extrapolate the missing data, it can be assumed that Gauge 307 would have made jurisdictional hydrology 70.3% of the growing season.

In all three years of monitoring, all of the gauges in MU 8 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI would recommend that a portion of the gauges in MU 8 be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 47, 103, 113, 114, 117, 266, and 309 should be considered for removal from hydrologic monitoring.

Table 13. Hydrologic Monitoring Results – MU 9

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
41	Ba/NE	70.3	√	√	√ ^c
301	Ba/NR	100 ^b	√	√	√ ^c
303	Ba/NR	69.8 ^b	√	√	√ ^c
313	Ba/NE	70.7 ^b	√	√	√ ^c
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
42	CT/NE	69.0	√	√	√ ^c
43	CT/NE	65.3	√	√	√ ^c
305	CT/NR	69.0	√	√	√ ^c
306	CT/NE	72.7	√	√	√ ^c

^a Soils: Ba – Bayboro and CT - Croatan.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 13 MU 9 Discussion March-November

All eight of the monitoring gauges in MU 9 met both of their expected hydrologic success criteria for Year 3. All eight of the monitoring gauges met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five. Gauge 301 has missing data because there were no replacement gauges available for installation for a portion of the growing season. Gauges 303 and 313 have missing data due to gauge malfunction.

Gauge 301 has recorded data for a minimum of 59 consecutive days (24.4%) and two data gaps. Using nearby Gauges 299 and 300 to extrapolate the missing data, it can be assumed that Gauge 301 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 303 has recorded data for a minimum of 76 consecutive days (31.4%) and one data gap. Using nearby Gauges 302 and 313 to extrapolate the missing data, it can be assumed that Gauge 303 would have made jurisdictional hydrology for 69.8% of the growing season.

Gauge 313 has recorded data for a minimum of 146 consecutive days (60.3%) and one data gap. Using nearby Gauges 311 and 312 to extrapolate the missing data, it can be assumed that Gauge 313 would have made jurisdictional hydrology for 70.7% of the growing season.

In all three years of monitoring, all of the gauges in MU 9 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that a portion of the gauges in MU 9 be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 41, 301, and 303 should be considered for removal from hydrologic monitoring.

Table 14. Hydrologic Monitoring Results – MU 10A

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
60	Ba/NR	100	√	√	√ ^c
118	Ba/NR	71.9	√	√	√ ^c
298	Ba/NR	100 ^b	√	√	√ ^c
299	Ba/NR	100 ^b	√	√	√ ^c
300	Ba/NR	100 ^b	√	√	√ ^c
302	Ba/NR	100 ^b	√	√	√ ^c
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
45	CT/NR	100 ^b	√	√	√ ^c
46	CT/NR	70.3 ^b	√	√	√ ^c
61	CT/NR	69.0	√	√	√ ^c
119	CT/NR	65.3 ^b	√	√	√ ^c
120	CT/NR	65.3 ^b	√	√	√ ^c
296	CT/NR	69.8 ^b	√	√	√ ^c
304	CT/NR	70.3	√	√	√ ^c
308	CT/NR	100 ^b	√	√	√ ^c

^a Soils: Ba – Bayboro and CT – Croatan.

Mitigation Types: Non-riverine Restoration – NR.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 14 MU 10A Discussion

March-November

All fourteen monitoring gauges in MU 10A met both of their expected hydrologic success criteria for Year 3. All fourteen of the monitoring gauges met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five. Gauges 119, 120, 298, 299, and 302 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 45, 46, 296, 300, and 308 have missing data due to gauge malfunction.

Gauge 45 has recorded data for a minimum of 148 consecutive days (61.2%) and one data gap. Using nearby Gauge 61 to extrapolate the missing data, it can be assumed that Gauge 45 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 46 has recorded data for a minimum of 143 consecutive days (59.1%) and one data gap. Using nearby Gauge 45 to extrapolate the missing data, it can be assumed that Gauge 46 would have made jurisdictional hydrology for 70.3% of the growing season.

Gauge 119 has recorded data for a minimum of 74 consecutive days (30.6%) and two data gaps. Using nearby Gauge 120 to extrapolate the missing data, it can be assumed that Gauge 119 would have made jurisdictional hydrology for 65.3% of the growing season.

Gauge 120 has recorded data for a minimum of 63 consecutive days (26.0%) and one data gap. Using nearby Gauge 119 to extrapolate the missing data, it can be assumed that Gauge 120 would have made jurisdictional hydrology for 65.3% of the growing season.

Gauge 296 has recorded data for a minimum of 74 consecutive days (30.6%) and two data gaps. Using nearby Gauge 61 to extrapolate the missing data, it can be assumed that Gauge 296 would have made jurisdictional hydrology for 69.8% of the growing season.

Gauge 298 has recorded data for a minimum of 146 consecutive days (60.3%) and one data gap. Using nearby Gauge 299 to extrapolate the missing data, it can be assumed that Gauge 298 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 299 has recorded data for a minimum of 147 consecutive days (60.7%) and one data gap. Using nearby Gauge 298 to extrapolate the missing data, it can be assumed that Gauge 299 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 300 has recorded data for a minimum of 95 consecutive days (39.3%) and one data gap. Using nearby Gauge 302 to extrapolate the missing data, it can be assumed that Gauge 300 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 302 has recorded data for a minimum of 147 consecutive days (60.7%) and one data gap. Using nearby Gauge 300 to extrapolate the missing data, it can be assumed that Gauge 302 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 308 has recorded data for a minimum of 235 consecutive days (97.1%) and one data gap. Using nearby Gauge 300 to extrapolate the missing data, it can be assumed that Gauge 308 would have made jurisdictional hydrology for 100% of the growing season.

In all three years of monitoring, all of the gauges in MU 10A have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that a portion of the gauges in MU 10A be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 119, 120, 299, 300, and 302 should be considered for removal from hydrologic monitoring.

Table 15. Hydrologic Monitoring Results – MU 10B

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
49	Ba/NR	73.1	√	√	√ ^c
50	Ba/NR	100	√	√	√ ^c
65	Pa/NE	69.4	√	√	√ ^c
66	Ra/NE	100 ^b	√	√	√ ^c
67	Pa/NR	40.9 ^b	√	√	√ ^c
69	Ba/NR	70.3	√	√	√ ^c
70	Ba/NE	70.3	√	√	√ ^c
122	Pa/NR	38.0 ^b	√	√	√ ^c
124	Pa/NR	38.0	√	√	√ ^c
271	Ba/NR	100	√	√	√ ^c
272	Ba/NR	100 ^b	√	√	√ ^c
273	Ba/NR	71.1 ^b	√	√	√ ^c
274	Ba/NR	71.1 ^b	√	√	√ ^c
277	Ra/NR	16.5	√	√	√
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
48	CT/NR	100	√	√	√ ^c
123	CT/NE	69.8	√	√	√ ^c
310	CT/NR	73.1 ^b	√	√	√ ^c

^a Soils:, Ba – Bayboro, CT – Croatan, Ra – Rains, and Pa - Pantego.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table15 MU 10B Discussion March-November

All seventeen monitoring gauges in MU 10B met both of their expected hydrologic success criteria for Year 3. In addition, sixteen of the seventeen monitoring gauges that met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five. Gauges 122, 272, 273, 274, and 310 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 66, 67, and 227 have missing data due to gauge malfunction.

Gauge 66 has recorded data for a minimum of 127 consecutive days (52.5%) and one data gap. Using adjacent data points and rainfall events to extrapolate the missing data, it can be assumed that Gauge 66 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 67 has recorded data for a minimum of 64 consecutive days (26.5%) and one data gap. Using nearby Gauge 65 to extrapolate the missing data, it can be assumed that Gauge 67 would have made jurisdictional hydrology for 40.9% of the growing season.

Gauge 122 has recorded data for a minimum of 64 consecutive days (26.5%) and one data gap. Using nearby Gauge 124 to extrapolate the missing data, it can be assumed that Gauge 122 would have made jurisdictional hydrology for 38.0% of the growing season.

Gauge 272 has recorded data for a minimum of 146 consecutive days (60.3%) and one data gap. Using nearby Gauge 271 to extrapolate the missing data, it can be assumed that Gauge 272 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 273 has recorded data for a minimum of 54 consecutive days (22.3%) and multiple data gaps. Using nearby Gauge 274 to extrapolate the missing data, it can be assumed that Gauge 273 would have made jurisdictional hydrology for 71.1% of the growing season.

Gauge 274 has recorded data for a minimum of 77 consecutive days (31.8%) and one data gap. Using nearby Gauge 273 to extrapolate the missing data, it can be assumed that Gauge 274 would have made jurisdictional hydrology for 71.1% of the growing season.

Gauge 310 has recorded data for a minimum of 81 consecutive days (33.5%) and one data gap. Using nearby Gauge 123 to extrapolate the missing data, it can be assumed that Gauge 310 would have made jurisdictional hydrology for 73.1% of the growing season.

In all three years of monitoring, all of the monitoring gauges, except 277, in MU 10B have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that a portion of the gauges in MU 10B be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 48, 49, 50, 122, and 310 should be considered for removal from hydrologic monitoring.

Table 16. Hydrologic Monitoring Results – MU 10C

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
62	Ra/NR	≥14.5 ^b	√	√	√
63	Pa/NR	65.7 ^c	√	√	√
64	Ra/NR	39.7	√	√	√ ^e
121	Pa/NR	72.3	√	√	√ ^e
143	Pa/NR	40.9 ^c	√	√	√ ^e
282	Pa/NR	70.7 ^c	√	√	√ ^e
283	Pa/NR	70.7 ^c	√	√	√ ^e
286	Ra/NR	10.3	–	–	–
287	Ra/NR	3.7	–	–	–
289	Pa/NR	≥16.5 ^b	√	√	√
290	Pa/NR	40.9 ^c	√	√	√ ^e
291	Pa/NR	≥16.1 ^d	√	√	√
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
284	CT/NR	70.3 ^c	√	√	√ ^e
285	CT/NR	73.1 ^c	√	√	√ ^e
293	CT/NR	100	√	√	√ ^e
294	CT/NR	100 ^c	√	√	√ ^e

^a Soils: Pa - Pantego, CT – Croatan, and Ra – Rains.

Mitigation Types: Non-riverine Restoration – NR.

^b Missing data could not be extrapolated with any degree of certainty.

^c Actual %: Missing data extrapolated from comparable gauges.

^d Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

^e Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 16 MU 10C Discussion

March-November

Fourteen of the sixteen monitoring gauges in MU 10C met both of their expected hydrologic success criteria for Year 3. Ten of the fourteen monitoring gauges that met the hydrologic success criteria established for years one through three also met the success criteria established for years four and five. Gauges 286 and 287 did not meet either of their expected hydrologic success criteria. Gauges 63, 143, 282, 283, 284, 285, 291, and 294 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 62, 284, 289, and 290 have missing data due to gauge malfunction.

Gauges 62, 289, and 291 have missing data during critical draw-down periods and the hydrographs for these gauges are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauge 63 has recorded data for a minimum of 112 consecutive days (46.3%) and two data gaps. Using nearby Gauge 143 to extrapolate the missing data, it can be assumed that Gauge 63 would have made jurisdictional hydrology for 65.7% of the growing season.

Gauge 143 has recorded data for a minimum of 61 consecutive days (25.2%) and one data gap. Using nearby Gauge 63 to extrapolate the missing data, it can be assumed that Gauge 143 would have made jurisdictional hydrology for 40.9% of the growing season.

Gauge 282 has recorded data for a minimum of 56 consecutive days (23.1%) and two data gaps. Using nearby Gauges 283 and 285 to extrapolate the missing data, it can be assumed that Gauge 282 would have made jurisdictional hydrology for 70.7% of the growing season.

Gauge 283 has recorded data for a minimum of 95 consecutive days (39.3%) and one data gap. Using nearby Gauge 285 to extrapolate the missing data, it can be assumed that Gauge 283 would have made jurisdictional hydrology for 70.7% of the growing season.

Gauge 284 has recorded data for a minimum of 94 consecutive days (38.8%) and one data gap. Using nearby Gauge 285 to extrapolate the missing data, it can be assumed that Gauge 284 would have made jurisdictional hydrology for 70.3% of the growing season.

Gauge 285 has recorded data for a minimum of 101 consecutive days (41.7%) and three data gaps. Using adjacent data points and rainfall event to extrapolate the missing data, it can be assumed that Gauge 285 would have made jurisdictional hydrology for 73.1% of the growing season.

Gauge 290 has recorded data for a minimum of 74 consecutive days (30.6%) and three data gaps. Using nearby Gauge 289 to extrapolate the missing data, it can be assumed that Gauge 290 would have made jurisdictional hydrology for 40.9% of the growing season.

Gauge 294 has recorded data for a minimum of 165 consecutive days (68.2%) and one data gap. Using nearby Gauge 293 to extrapolate the missing data, it can be assumed that Gauge 294 would have made jurisdictional hydrology for 100% of the growing season.

Gauges 286 and 287 did not meet either of their expected hydrologic success criteria. These gauges are located on either side of the ditch adjacent to the removed roadbed. Point-plugs instead of reach plugs were used to fill this ditch. The point plugs do not appear to be

successful at returning jurisdictional hydrology within the zone of influence off the western side of the former ditch.

In all three years of monitoring, 10 of the sixteen monitoring gauges in MU 10C have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that a portion of the gauges in MU 10C be removed and leave gauges in representative areas to be monitored through years four and five. Gauges 121, 293 and 294 should be considered for removal from hydrologic monitoring. The majority of the remaining gauges in MU 10C are adjacent to existing roads or in transects along removed roads. These areas should be monitored through years four and five.

Table 17. Hydrologic Monitoring Results – MU 11

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥12.5% of Growing Season; ≤ 50% of Reference Range)					
68	Ba/NR	39.7	√	√	√ ^c
144	Pa/NR	3.7	–	–	–
145	Ba/NR	70.3 ^b	√	√	√ ^c
232	Ra/NR	38.8 ^b	√	√	√ ^c
275	Ba/NR	70.7	√	√	√ ^c
276	Ra/NR	37.6 ^b	√	√	√ ^c
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 50% of Reference Range)					
278	CT/NE	100	√	√	√ ^c
279	CT/NR	100	√	√	√ ^c

^a Soils: Pa – Pantego, Ba – Bayboro, Ra – Rains, and CT - Croatan.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge meets or exceeds both Hydrologic Success Criteria for years four and five.

Table 17 MU 11 Discussion
March-November

Seven of the eight monitoring gauges in MU 11 met both of their expected hydrologic success criteria for Year 3. All seven monitoring gauges met the hydrologic success criteria established for years one through three and met the success criteria established for years four and five. Gauge 144 did not meet either of its expected hydrologic success criteria. Gauges 145 and 276 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauge 232 has missing data due to gauge malfunction.

Gauge 145 has recorded data for a minimum of 70 consecutive days (28.9%) and one data gap. Using nearby Gauge 68 to extrapolate the missing data, it can be assumed that Gauge 145 would have made jurisdictional hydrology for 70.3% of the growing season.

Gauge 232 has recorded data for a minimum of 41 consecutive days (16.9%) and two data gaps. Using nearby Gauge 276 to extrapolate the missing data, it can be assumed that Gauge 232 would have made jurisdictional hydrology for 37.6% of the growing season.

Gauge 276 has recorded data for a minimum of 40 consecutive days (16.5%) and one data gap. Using nearby Gauges 232 and 277 to extrapolate the missing data, it can be assumed that Gauge 276 would have made jurisdictional hydrology for 37.6% of the growing season.

In all three years of monitoring, all of the gauges in MU 11, except Gauge 144, have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, a portion of the gauges in MU 11 could be considered for removal. However, the majority of the gauges in MU 11 are adjacent to existing roads and these areas should be monitored through years four and five.

Table 18. Hydrologic Monitoring Results – MU 12A

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral					
(Success = Saturation/inundation \geq12.5% of Growing Season; \leq 20% of Reference Range)					
16	Pa/NE	72.3 ^b	√	√	√
17	Pa/NP	69.8 ^b	√	√	√
136	Mu/NE	42.2	√	–	–
137	Mu/NR	10.7	–	–	–
179	Pa/NR	69.4	√	√	√
180	Ba/NE	59.1 ^b	√	√	√
280	Pa/NE	100 ^b	√	√	√
281	Ra/NE	39.3 ^b	√	√	√
288	Ra/NR	37.6 ^b	√	√	√

^a Soils: Pa – Pantego, Mu – Murville, Ba – Bayboro, and Ra - Rains.

Mitigation Types: Non-riverine Restoration – NR, Non-riverine Enhancement – NE, and Non-riverine Preservation – NP.

^b Actual %: Missing data extrapolated from comparable gauges.

Table 18 MU 12A Discussion

March-November

Seven of the nine monitoring gauges in MU 12A met both of their expected hydrologic success criteria for Year 4. Gauges 16, 180, and 280 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 17, 281, and 288 have missing data due to gauge malfunction.

Gauge 137 did not meet either of its expected hydrologic success criteria established for the Murville soil series for Year 4, but did have a hydroperiod between 5 and 12.5% of the growing season.

Gauge 136 made jurisdictional hydrology for 42.2% of the growing season, and therefore met Success Criterion 1. However, this gauge did not meet Success Criterion 2 (20% of Reference Range) for the Murville soil series (57.9 - 100% of the growing season).

Gauge 16 has recorded data for a minimum of 99 consecutive days (40.9%) and two data gaps. Using Gauge 17 to extrapolate the missing data, it can be assumed that Gauge 16 would have made jurisdictional hydrology for 72.3% of the growing season.

Gauge 17 has recorded data for a minimum of 115 consecutive days (47.5%) and one data gap. Using Gauge 16 to extrapolate the missing data, it can be assumed that Gauge 17 would have made jurisdictional hydrology for 69.8% of the growing season.

Gauge 180 has recorded data for a minimum of 68 consecutive days (28.1%) and one data gap. Using Gauge 179 to extrapolate the missing data, it can be assumed that Gauge 180 would have made jurisdictional hydrology for 59.1% of the growing season.

Gauge 280 has recorded data for a minimum of 166 consecutive days (68.6%) and one data gap. Using Gauges 16 and 17 to extrapolate the missing data, it can be assumed that Gauge 280 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 281 has recorded data for a minimum of 61 consecutive days (25.2%) and one data gap. Using adjacent data points and rainfall events to extrapolate the missing data, it can be assumed that Gauge 281 would have made jurisdictional hydrology for 39.3% of the growing season.

Gauge 288 has recorded data for a minimum of 41 consecutive days (16.9%) and one data gap. Using adjacent data points and rainfall events to extrapolate the missing data, it can be assumed that Gauge 288 would have made jurisdictional hydrology for 37.6% of the growing season.

All of the gauges in MU 12A, except Gauges 136 and 137, have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, a portion of the gauges in MU 12A could be considered for removal. However, the majority of the gauges in MU 12A are adjacent to existing roads and these areas should be monitored through year five.

Table 19. Hydrologic Monitoring Results – MU 12B

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥ 12.5% of Growing Season; ≤ 20% of Reference Range)					
9	Pa/NR	40.5	√	√	√
10	Pa/NR	40.9	√	√	√
18	Pa/NR	19.4	√	–	–
36	Pa/NE	70.3	√	√	√
37	Pa/NR	39.3	√	√	√
38	Mu/NE	71.5	√	√	√
134	Pa/NE	40.5	√	√	√
135	Pa/NR	16.5	√	–	–
182	Mu/NR	5.0	–	–	–
183	Mu/NR	5.4	–	–	–
188	Pa/NR	37.2	√	√	√
197	Pa/NE	64.9	√	√	√
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 20% of Reference Range)					
157	CT/NR	71.9	√	√	√

^a Soils: Pa – Pantego, Mu – Murville, and CT – Croatan.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

Table 19 MU 12B Discussion

March-November

Nine of the thirteen monitoring gauges in MU 12B met both of their expected hydrologic success criteria for Year 4.

Gauges 18 and 135 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. Neither of the gauges met Success Criterion 2 (20% of Reference Range) for the Pantego soil series (22.3 - 100% of the growing season).

Gauges 182 and 183 did not meet either of their expected hydrologic success criteria, but did achieve hydroperiods between 5 and 12.5% of the growing season. These gauges are located adjacent to the north-south ditch that maintains the main access road. Point-plugs instead of reach-plugs were used to fill this ditch. The point-plugs may be successful at returning jurisdictional hydrology to some areas within the zone of influence of the ditch and not in others. The ditch adjacent to 182 and 183 may still have a zone of influence extending a greater distance off the ditch than can be measured with existing gauges. Another gauge installed along the same transect may capture the zone of influence.

Nine of the thirteen monitoring gauges in MU 12B have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, a portion of the gauges in MU 12B could be considered for removal. However, the majority of the gauges in MU 12B met jurisdictional hydrology for less than 50% of the growing season and these areas should be monitored through year five.

Table 20. Hydrologic Monitoring Results – MU 13A

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation \geq 12.5% of Growing Season; \leq 20% of Reference Range)					
1	Ba/NR	100 ^b	√	√	√
15	Pa/NR	70.7	√	√	√
20	Pa/NE	69.8 ^b	√	√	√
142	Pa/NR	38.8	√	√	√
174	Ba/NR	100	√	√	√
176	Ba/NR	100 ^b	√	√	√
178	Mu/NR	64.9	√	√	√
292	Pa/NE	40.9 ^b	√	√	√
295	Pa/NR	100 ^b	√	√	√
Non-riverine, Organic (Success = Saturation/inundation \geq 25% of Growing Season; \leq 20% of Reference Range)					
14	CT/NE	100	√	√	√
40	CT/NE	73.1	√	√	√
125	CT/NR	100	√	√	√
126	CT/NE	100	√	√	√
127	CT/NE	72.7	√	√	√
297	CT/NR	73.1	√	√	√

^a Soils: Ba – Bayboro, Pa – Pantego, Mu – Murville, and CT – Croatan.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

Table 20 MU 13A Discussion

March-November

All fifteen monitoring gauges in MU 13A met both of their expected hydrologic success criteria for Year 4. Gauges 1 and 176 have missing data due to gauge malfunction. Gauges 20, 292, and 295 have missing data because there were no replacement gauges available for installation at the beginning of the growing season.

Gauge 1 has recorded data for a minimum of 102 consecutive days (42.2%) and two data gaps. Using Gauge 60 to extrapolate the missing data, it can be assumed that Gauge 1 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 176 has recorded data for a minimum of 105 consecutive days (43.4%) and two data gaps. Using Gauge 174 to extrapolate the missing data, it can be assumed that Gauge 176 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 20 has recorded data for a minimum of 94 consecutive days (38.8%) and one data gap. Using Gauge 15 to extrapolate the missing data, it can be assumed that Gauge 20 would have made jurisdictional hydrology for 69.8% of the growing season.

Gauge 292 has recorded data for a minimum of 61 consecutive days (25.2%) and one data gap. Using nearby Gauges 290 and 291 to extrapolate the missing data, it can be assumed that Gauge 292 would have made jurisdictional hydrology 40.9% of the growing season.

Gauge 295 has recorded data for a minimum of 165 consecutive days (68.2%) and one data gap. Using nearby Gauges 293, 294, and 292 to extrapolate the missing data, it can be assumed that Gauge 295 would have made jurisdictional hydrology for 100% of the growing season.

All of the gauges in MU 13A have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that Gauges 14, 125, 126, 127, 174, 176, and 295 be considered for removal from hydrologic monitoring.

Table 21. Hydrologic Monitoring Results – MU 13B

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥ 12.5% of Growing Season; ≤ 20% of Reference Range)					
3	Mu/NR	5.4	–	–	–
4	Mu/NR	≥14.5 ^b	√	–	–
24	Mu/NR	12.4	–	–	–
139	Ba/NE	72.7	√	√	√
140	Pa/NE	63.6 ^c	√	√	√
141	Pa/NE	16.9	√	–	–
172	Ba/NR	41.3 ^c	√	–	–
173	Ba/NE	72.7 ^c	√	√	√
194	Mu/NE	36.4 ^c	√	–	–
198	Ln/NE	38.0 ^b	√	√	√

^a Soils: Ba – Bayboro, Pa – Pantego, Mu – Murville, and Ln - Leon.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Gauge was not installed for a portion of the 2005 growing season. Data could not be extrapolated with any degree of certainty.

^c Actual %: Missing data extrapolated from comparable gauges.

Table 21 MU 13B Discussion

March-November

Four of the ten monitoring gauges in MU 13B met both of their expected hydrologic success criteria for Year 4. Gauges 3 and 24 did not meet either of its expected hydrologic success criteria for Year 4, but did achieve hydroperiods between 5 and 12.5% of the growing season. Gauges 4 and 198 have missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 140, 172, 173, 194, and 198 have missing data due to gauge malfunction.

Gauges 4 and 198 have missing data during critical draw-down periods and the hydrographs for these gauges are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauges 4 and 194 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. Neither of the gauges met Success Criterion 2 (20% of reference) for the Murville soil series (57.9 to 100% of the growing season).

Gauge 141 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. However, Gauge 141 did not meet Success Criterion 2 (20% of reference) for the Pantego soil series (22.3 to 100% of the growing season).

Gauge 172 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. However, Gauge 172 did not meet Success Criterion 2 (20% of reference) for the Bayboro soil series (55.4 to 100% of the growing season).

Gauge 140 has recorded data for a minimum of 79 consecutive days (32.6%) and two data gaps. Using nearby Gauge 141 to extrapolate the missing data, it can be assumed that Gauge 140 would have made jurisdictional hydrology for 63.6% of the growing season.

Gauge 172 has recorded data for a minimum of 70 consecutive days (28.9%) and one data gap. Using nearby Gauge 173 to extrapolate the missing data, it can be assumed that Gauge 172 would have made jurisdictional hydrology for 41.3% of the growing season.

Gauge 173 has recorded data for a minimum of 99 consecutive days (40.9%) and one data gap. Using nearby Gauge 139 to extrapolate the missing data, it can be assumed that Gauge 173 would have made jurisdictional hydrology for 72.7% of the growing season.

Gauge 194 has recorded data for a minimum of 51 consecutive days (21.1%) and one data gap. Using nearby adjacent data points and rainfall events to extrapolate the missing data, it can be assumed that Gauge 194 would have made jurisdictional hydrology for 36.4% of the growing season.

The hydrologic success rate in MU 13B is not as high as in the remainder of Phase I. The majority of the gauges in MU 13B are adjacent to existing roads and these areas should be monitored through year five.

Table 22. Hydrologic Monitoring Results – MU 14

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥ 12.5% of Growing Season; ≤ 20% of Reference Range)					
12	Pa/NR	100 ^b	√	√	√
13	Ba/NR	100 ^b	√	√	√
22	Pa/NR	100	√	√	√
23	Pa/NE	100	√	√	√
175	Ba/NR	72.3	√	√	√
177	Pa/NR	100	√	√	√
186	Pa/NR	100 ^b	√	√	√
190	Pa/NR	100	√	√	√

^a Soils: Ba – Bayboro and Pa – Pantego.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

**Table 22 MU 14 Discussion
March-November**

All eight monitoring gauges in MU 14 met both of their expected hydrologic success criteria for Year 4. Most of the gauges had between 2 to 15 inches of surface water for the majority of the growing season. Gauge 12 has missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 13 and 186 have missing data due to gauge malfunction.

Gauge 12 has recorded data for a minimum of 166 consecutive days (68.6%) and one data gap. Using nearby Gauge 186 to extrapolate the missing data, it can be assumed that Gauge 12 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 13 has recorded data for a minimum of 143 consecutive days (59.1%) and one data gap. Using nearby Gauge 175 to extrapolate the missing data, it can be assumed that Gauge 13 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 186 has recorded data for a minimum of 110 consecutive days (45.5%) and one data gap. Using nearby Gauge 12 to extrapolate the missing data, it can be assumed that Gauge 186 would have made jurisdictional hydrology for 100% of the growing season.

Gauges 175 and 177 are interior gauges that have met jurisdictional hydrology for 50 to 100% of the growing season for the past 3 years. The surrounding gauges meet jurisdictional hydrology for 100% of the growing season. The gauges are located adjacent to reach-filled ditches where the road has been removed. The jurisdictional hydrology for these gauge sites may differ from surrounding gauges due to a small zone of influence in the removed roadbed and ditch or they may be on topographic highs.

All of the gauges in MU 14 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI recommends that Gauges 12, 13, 22, 23, 175, 177, 186, and 190 be considered for removal from hydrologic monitoring. All of the gauges are located in non-riverine restoration or enhancement mitigation areas indicating that mitigative measures have been successful at returning or enhancing the jurisdictional hydrology in these areas.

Table 23. Hydrologic Monitoring Results – MU 15

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥ 12.5% of Growing Season; ≤ 20% of Reference Range)					
11	Pa/NR	13.2	√	–	–
25	Pa/NR	38.4	√	√	√
26	Mu/NR	40.1	√	–	–
138	Pa/NR	65.3	√	√	√
171	Ba/NR	38.8	√	–	–
187	Ba/NR	100 ^b	√	√	√
189	Pa/NR	40.5	√	√	√
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 20% of Reference Range)					
167	CT/NE	100	√	√	√
170	CT/NE	100	√	√	√
185	CT/NR	71.9	√	√	√

^a Soils: Ba – Bayboro, CT – Croatan, Mu – Murville, and Pa – Pantego.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

Table 23 MU 15 Discussion

March-November

Seven of the ten monitoring gauges in MU 15 met both of their expected hydrologic success criteria for Year 4. Gauge 187 has missing data due to gauge malfunction.

Gauge 11 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. However, Gauge 11 did not meet Success Criterion 2 (20% of reference) for the Pantego soil series (22.3 to 100% of the growing season).

Gauge 26 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. However, Gauge 26 did not meet Success Criterion 2 (20% of reference) for the Murville soil series (57.9 to 100% of the growing season).

Gauge 171 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. However, Gauge 171 did not meet Success Criterion 2 (20% of reference) for the Bayboro soil series (55.4 to 100% of the growing season).

Gauge 187 has recorded data for a minimum of 170 consecutive days (70.3%) and one data gap. Using adjacent data points and rainfall events to extrapolate the missing data, it can be assumed that Gauge 187 would have made jurisdictional hydrology for 100% of the growing season.

Gauges 11, 26, and 171 are located in non-riverine restoration mitigation areas. Mitigative measures have been successful at returning jurisdictional hydrology to these areas. However, these gauges may never meet Success Criterion 2 (20% of reference) for their respective soil series.

Due to the high rate of hydrologic success in portions of MU 15 over the past 3 years, ESI recommends that Gauges 167 and 170 be considered for removal from hydrologic monitoring. Both gauges are interior gauges that have met jurisdictional hydrology for 100% of the growing season for the past three years. However, the hydrologic success rate in MU 15 is not as high as in the remainder of Phase I and the majority of the gauges in MU 15 should be monitored through year five.

Table 24. Hydrologic Monitoring Results – MU 16

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥ 12.5% of Growing Season; ≤ 20% of Reference Range)					
2	Mu/NE	38.0	√	–	–
19	Pa/NE	100	√	√	√
130	Pa/NR	100	√	√	√
131	Mu/NE	100	√	√	√
169	Pa/NR	100 ^b	√	√	√
181	Mu/NR	37.2	√	–	–
192	Mu/NR	40.1	√	–	–
193	Mu/NR	40.9	√	–	–
195	Ln/NR	≥12.8 ^c	√	√	√
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 20% of Reference Range)					
7	CT/NR	100	√	√	√
8	CT/NR	100	√	√	√
28	DA/NR	100	√	√	√
31	CT/NR	100	√	√	√
128	CT/NR	100	√	√	√
129	CT/NR	100	√	√	√
162	CT/NR	100 ^b	√	√	√
164	CT/NR	100	√	√	√
165	CT/NR	100	√	√	√
166	DA/NR	100 ^b	√	√	√
168	CT/NR	100	√	√	√

^a Soils: DA – Dare, CT – Croatan, Ln – Leon, Mu – Murville, and Pa – Pantego.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Hydrograph is too flashy to extrapolate missing data with any degree of certainty.

Table 24 MU 16 Discussion

March-November

Sixteen of the twenty monitoring gauges in MU 16 met both of their expected hydrologic success criteria for Year 4. Gauges 162, 166, 169, and 195 have missing data due to gauge malfunction.

Gauge 195 has missing data during critical draw-down periods and the hydrograph for this gauge are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauges 2, 181, 192, and 193 made jurisdictional hydrology for at least 12.5% of the growing season, and therefore met Success Criterion 1. None of these gauges met Success Criterion 2 (20% of reference) for the Murville soil series (57.9 to 100% of the growing season).

Gauge 162 has recorded data for a minimum of 186 consecutive days (76.9%) and one data gap. Using nearby Gauge 161 to extrapolate the missing data, it can be assumed that Gauge 162 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 166 has recorded data for a minimum of 167 consecutive days (69.0%) and one data gap. Using nearby Gauge 28 to extrapolate the missing data, it can be assumed that Gauge 166 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 169 has recorded data for a minimum of 189 consecutive days (78.1%) and one data gap. Using nearby Gauges 168 and 170 to extrapolate the missing data, it can be assumed that Gauge 169 would have made jurisdictional hydrology for 100% of the growing season.

Gauges 181, 192, and 193 are located in non-riverine restoration mitigation areas. Mitigative measures have been successful at increasing the jurisdictional hydrology in these areas from < 5% of the growing season to >37% of the growing season. These gauges are located adjacent to existing roads and point-plugged ditches. Jurisdictional hydrology has been returned to these areas. However, these gauges may never meet Success Criterion 2 (20% of reference) for the Murville soil series.

Sixteen of the twenty monitoring gauges in MU 16 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI would recommend that a portion of the gauges in MU 16 be removed and leave gauges in representative areas to be monitored through year five. Gauges 7, 8, 19, 28, 31, 128, 129, 130, 131, 162, 164, 165, 166, 168, and 169 should be considered for removal from hydrologic monitoring. The majority of the gauges are located in non-riverine restoration mitigation areas indicating that jurisdictional hydrology has been successfully restored to these areas.

Table 25. Hydrologic Monitoring Results – MU 17

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥ 12.5% of Growing Season; ≤ 20% of Reference Range)					
32	Ba/NR	100	√	√	√
33	Ba/NR	64.9	√	√	√
160	Ba/NR	71.9	√	√	√
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 20% of Reference Range)					
5	DA/NR	100	√	√	√
6	DA/NE	100	√	√	√
29	CT/NR	100	√	√	√
30	DA/NR	100 ^b	√	√	√
132	CT/NE	40.1	√	√	√
161	CT/NR	100	√	√	√
163	CT/NR	100 ^b	√	√	√

^a Soils: Ba – Bayboro, DA – Dare, and CT – Croatan.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

Table 25 MU 17 Discussion

March-November

All ten of the monitoring gauges in MU 17 met both of their expected hydrologic success criteria for Year 4. Gauge 196 was removed from monitoring due to safety concerns (alligator). Gauge 196 was in a semi-permanently ponded area. Gauges 30 and 163 have missing data due to gauge malfunctions.

Gauge 30 has recorded data for a minimum of 216 consecutive days (89.3%) and one data gap. Using nearby Gauge 29 to extrapolate the missing data, it can be assumed that Gauge 30 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 163 has recorded data for a minimum of 167 consecutive days (69.0%) and one data gap. Using nearby Gauge 161 to extrapolate the missing data, it can be assumed that Gauge 163 would have made jurisdictional hydrology for 100% of the growing season.

All of the gauges in MU 17 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, ESI would recommend that a portion of the gauges in MU 17 be removed and leave gauges in representative areas to be monitored through year five. Gauges 5, 6, 29, 30, 132, 161, and 163 should be considered for removal from hydrologic monitoring. The majority of the gauges are located in non-riverine restoration mitigation areas indicating that jurisdictional hydrology has been successfully restored to these areas.

Table 26. Hydrologic Monitoring Results – MU 18

Gauge	Soil Series and Mitigation Type ^a	Actual %	Criterion 1 Met (% of Growing Season)	Criterion 2 Met (% of Reference Range)	Hydrologic Success Met
Non-riverine, Mineral (Success = Saturation/inundation ≥ 12.5% of Growing Season; ≤ 20% of Reference Range)					
21	Pa/NE	100 ^b	√	√	√
34	Pa/NR	69.8	√	√	√
184	Ln/NE	≥16.1 ^d	√	√	√
191	Pa/NE	12.4	–	–	–
Non-riverine, Organic (Success = Saturation/inundation ≥ 25% of Growing Season; ≤ 20% of Reference Range)					
133	CT/NE	36.8	√	√	√
158	CT/NR	71.1	√	√	√
159	CT/NR	≥22.3 ^c	–	–	–

^a Soils: CT – Croatan, Ln – Leon, and Pa – Pantego.

Mitigation Types: Non-riverine Restoration – NR and Non-riverine Enhancement – NE.

^b Actual %: Missing data extrapolated from comparable gauges.

^c Gauge was not installed for a portion of the 2005 growing season. Missing data could not be extrapolated with any degree of certainty.

^d Hydrograph is too flashy to extrapolate missing data with any degree of certainty.

Table 26 MU 18 Discussion March-November

Five of the seven monitoring gauges in MU 18 met both of their expected hydrologic success criteria for Year 4. Gauges 159 and 191 did not meet either of their expected hydrologic success criteria for Year 4. Gauge 159 has missing data because there were no replacement gauges available for installation at the beginning of the growing season. Gauges 21 and 184 have missing data due to gauge malfunction.

Gauges 159 and 184 have missing data during critical draw-down periods and the hydrographs for these gauges are too flashy to extrapolate missing data with any certainty. As a result, the hydroperiod reported is the longest for which data are available.

Gauge 21 has recorded data for a minimum of 215 consecutive days (88.8%) and one data gap. Using nearby Gauge 34 to extrapolate the missing data, it can be assumed that Gauge 21 would have made jurisdictional hydrology for 100% of the growing season.

Gauge 159 has recorded data for a minimum of 54 consecutive days (22.3%) and multiple data gaps. Gauge 159 was not installed until the end of June and then malfunctioned during August

and September. At a minimum, mitigative measures have been successful at returning the area represented by Gauge 159 to jurisdictional hydrology.

Gauge 191 did not meet either of its expected hydrologic success criteria, but did achieve a hydroperiod of 12.4% of the growing season. Point-plugs were used to fill the adjacent ditch and the ditch is open on the adjacent U.S. Forest Service property. The point plugs appear to be successful at enhancing hydrology, but may not be enough to return jurisdictional hydrology to the area represented by this gauge site.

Five of the seven monitoring gauges in MU 18 have met the hydrologic success criteria established for years one through three and the success criteria established for years four and five. Due to the high rate of hydrologic success, a portion of the gauges in MU 18 could be removed. However, the majority of the gauges in MU 18 met jurisdictional hydrology for less than 50% of the growing season and these areas should be monitored through year five.

2.3.2 Climatic Data

Figure 4 is a comparison of 2005 monthly rainfall to historical precipitation for the area. The two lines represent the 30th and 70th percentiles of monthly precipitation for Craven County, North Carolina. The bars are monthly rainfall totals for the 2005 growing season as well as the rainfall for November and December of 2004. The historical data were collected from the North Carolina State Climate Office rain gauge in Craven County, North Carolina. An onsite rain gauge (Rain Gauge 2) provided 2005 rainfall data.

Rain Gauge 3 malfunctioned multiple times during the 2005 growing season. Rain Gauge 4 was clogged after Hurricane Ophelia and the data collected from Rain Gauge 4 in August and September 2005 is unreliable when compared to the data collected from the other on-site rain gauges during the hurricane events. Rain Gauge 3 was not used to determine normal rainfall, due to the malfunctions and unreliable data. The onsite rain gauges were not monitored in the end of November and December 2004, January and February 2005. Therefore, the rainfall data for this period is from the New Bern Airport.

Overall, the rainfall for the 2005 growing season was normal (\geq 28.7 to 39.0 inches onsite compared to normal 28.7 to 49.9 inches). Rainfall between November 2004 and February 2005 was on the low side of normal (10.5 inches at the New Bern Airport compared to normal 10.2 to 18.4 inches).

2.4 Conclusions

The majority of the monitoring gauges showed that groundwater levels dropped below 12 inches of the ground surface either in June through the beginning of September and then rose to within 12 inches of the ground surface at the end of September due to a hurricane rainfall event. Therefore, the longest number of consecutive days reported for success criteria occurred during the critical defining hydroperiod for many of the non-riverine minerals soils that occupy a large portion of the CWMB.

Entire Growing Season (March-November)

Hydrologic monitoring in 2005 showed 243 of 286 (84.6%) monitoring gauges in the CWMB met both respective hydrologic success criteria [$\geq 12.5\%$ (mineral soils) or $\geq 25\%$ (organic/riverine soils) of the growing season and within 20% and 50% of Reference Range] (Figures 3a and 3b). Of the 43 gauges that did not meet both of its respective success criteria, 30 made jurisdictional hydrology for $\geq 12.5\%$ of the growing season, 10 made jurisdictional hydrology 5 – 12.5% of the growing season, and three (Gauges 75, 144, and 287) did not make jurisdictional hydrology for at least 5% of the growing season.

Of the 204 monitoring gauges in non-riverine mineral soils, 166 met both hydrologic success criteria and 12 did not meet either hydrologic success criterion; the remaining 26 gauges met Success Criterion 1 only. Of the 62 monitoring gauges in non-riverine organic soils, 61 met both hydrologic success criteria and only one gauge (Gauge 159) did not meet either of its success criteria. However, Gauge 159 met jurisdictional hydrology for 22.3% of the growing season. Of the 12 monitoring gauges in riverine organic soils, 11 met both hydrologic success criteria and only one gauge (Gauge 227) did not meet either of its hydrologic success criteria. Of the eight monitoring gauges in riverine mineral soils five met both hydrologic success criteria, one gauge (Gauge 256) met Success Criterion 1 only and the remaining two gauges (Gauges 102 and 243) did not meet either hydrologic success criterion.

Hydrologic monitoring in 2005 showed 81 of 102 (79.4%) monitoring gauges in Phase I met both respective hydrologic success criteria. Of the 71 monitoring gauges in non-riverine mineral soils, 51 met both hydrologic success criteria and six did not meet either hydrologic success criterion; the remaining 14 gauges met Success Criterion 1 only. Of the 14 gauges in Phase I that met only Success Criterion 1, 10 made jurisdictional hydrology for between 36.3 and 42.2% of the growing season. Of the 31 monitoring gauges in Phase I in non-riverine organic soils, 30 met both hydrologic success criteria and the remaining gauge (Gauge 159) did not meet either of its hydrologic success criterion. However, Gauge 159 met jurisdictional hydrology for 22.3% of the growing season.

Hydrologic monitoring in 2005 showed 162 of 184 (88.0%) monitoring gauges in Phase II met both respective hydrologic success criteria. Of the 133 monitoring gauges in non-riverine mineral soils, 115 met both hydrologic success criteria and 12 did not meet either hydrologic success criterion; the remaining 12 gauges met Success Criterion 1 only. Of the 31 of the monitoring gauges in non-riverine organic soils, all 31 met both hydrologic success criteria. Of the 12 monitoring gauges in riverine organic soils, 11 met both hydrologic success criteria and the remaining gauge (Gauge 227) met Success Criterion 1 only. Of the eight monitoring gauges in riverine mineral soils, five met both hydrologic success criteria, two gauges (Gauges 102 and 256) did not meet either hydrologic success criterion, and the remaining gauge (Gauge 259) met Success Criterion 1. Of the 184 monitoring gauges in Phase II, 139 (75.5%) met both of their respective hydrologic success criteria established for years one through three and met the hydrologic success criteria established for years four and five [$\geq 12.5\%$ (mineral soils) or $\geq 25\%$ (organic/riverine soils) of the growing season and within 20% of Reference Range] under normal rainfall conditions.

Of the 43 monitoring gauges that did not meet both of their respective hydrologic success criteria, 28 met Success Criterion 1 and the remaining 15 did not meet either of their respective hydrologic success criteria. In years with normal rainfall these areas may not achieve 20% of Reference Range. The non-jurisdictional areas around the monitoring gauges that do not meet jurisdictional criteria may need to be delineated and removed from mitigation credits if they are not returned to jurisdictional hydrology by year five.

Areas of Concern

Gauges 4, 95, 260, 258, 259, 154, 263, 261, 247, 243, 227, 256, 172, and 159 met jurisdictional hydrology ($\geq 12.5\%$ of the growing season). These gauges are missing data because there were no replacement gauges available for installation and the hydrograph is too flashy to extrapolate the missing data with any degree of certainty.

Gauges 92, 93, 95, 261, 260, 258, 259, 286, 287, and 141 occur adjacent to ditches that remain partially open where point-plugs were used to fill the ditch. These gauges were placed in non-jurisdictional areas within the zone of influence of the ditch. These gauges met jurisdictional hydrology ($\geq 12.5\%$ of the growing season), but may not meet Success Criterion 2 (% of Reference Range) within the zone of influence off the former ditch under normal rainfall conditions. These partially open ditches may still have a zone of influence extending a greater distance off the ditch than can be measured with existing gauges. Another gauge installed along the same transect may capture the zone of influence or measures should be taken to remove these non-jurisdictional areas around these monitoring gauges (may need to be delineated) from mitigation credits if they are not returned to jurisdictional hydrology in years four and five.

Gauges 3, 137, 182, 183, 191, 286, and 287 occur adjacent to ditches that remain partially open where point-plugs were used to fill the ditch. These gauges were placed in non-jurisdictional areas within the zone of influence of the ditch. These gauges sites did not achieve jurisdictional hydrology greater than 12.5% of the growing season within the zone of influence off the former ditch under normal rainfall conditions. These partially open ditches may still have a zone of influence extending a greater distance off the ditch than can be measured with existing gauges. Another gauge installed along the same transect may capture the zone of influence or measures should be taken to remove these non-jurisdictional areas around these monitoring gauges (may need to be delineated) from mitigation credits if they are not returned to jurisdictional hydrology in years four and five.

Gauges 102, 149, 227, 74, 75, 76, 24, and 11 appear to be located on topographic highs compared to the surrounding landscape. In years with normal rainfall these areas may not achieve hydroperiods greater than 12.5% of the growing season, but all except Gauge 75 achieved at least 5% of the growing season. The non-jurisdictional areas around these monitoring gauges may need to be delineated and removed from mitigation credits if they are not returned to jurisdictional hydrology in years four and/or five.

Gauges 2, 26, 136, 172, 171, 194, 181, 192, and 193 met jurisdictional hydrology for between 36.3 and 42.2% of the growing season. These gauges met Success Criterion 1, but did not meet Success Criterion 2. Mitigative measures have been successful at returning jurisdictional hydrology to these areas, but these gauges may never meet Success Criterion 2 (20% of reference) for their respective soil series because of their location adjacent to existing roads and point-plugged ditches or on topographic highs.

Of the 20 monitoring gauges in riverine areas, two (Gauges 102 and 227) did not show evidence of surface water throughout much of the growing season. These gauge sites may be too high in the landscape to function as riverine influenced wetlands. However, additional areas in MU 6, 5, and 2B (for example Gauges 241, 240, 242, and 251) showed prolonged surface flooding and flowing water throughout much of the growing season. These areas are headwater wetlands that have a surface connection to the unnamed tributary to East Prong Brice Creek and should be re-evaluated for riverine function and credit.

Rainfall

Overall, the rainfall for the 2005 growing season was normal (≥ 28.7 to 39.0 inches onsite compared to normal 28.7 to 49.9 inches). Rainfall between November 2004 and February 2005 was on the low side of normal (10.5 inches at the New Bern Airport compared to normal 10.2 to 18.4 inches).

Recommendations

It is recommended that monitoring of Phase I and II continue into 2006. However, due to the high rate of hydrologic success under normal rainfall conditions, ESI would recommend that selected interior gauges that are meeting success criteria for years four and five be removed from monitoring. Seventy-three interior gauges should be considered for removal from hydrologic monitoring. Figures 6a and 6b (in Appendix E) designate the gauges that should be considered for early removal from hydrologic monitoring. Figures 7a and 7b (in Appendix E) depict how the remaining gauges will provide representative coverage across the CWMB. Each of the gauges considered for early removal has met or exceeded both expected hydrologic success criteria in each year of monitoring. The majority of these gauges have met jurisdictional hydrology for 100% of the growing season in years with normal rainfall. Mitigative measures have successfully enhanced and/or restored jurisdictional hydrology to the areas represented by these gauge sites. The areas represented by these gauges sites should be considered to have successfully met all success criteria through year five established by the MBRT.

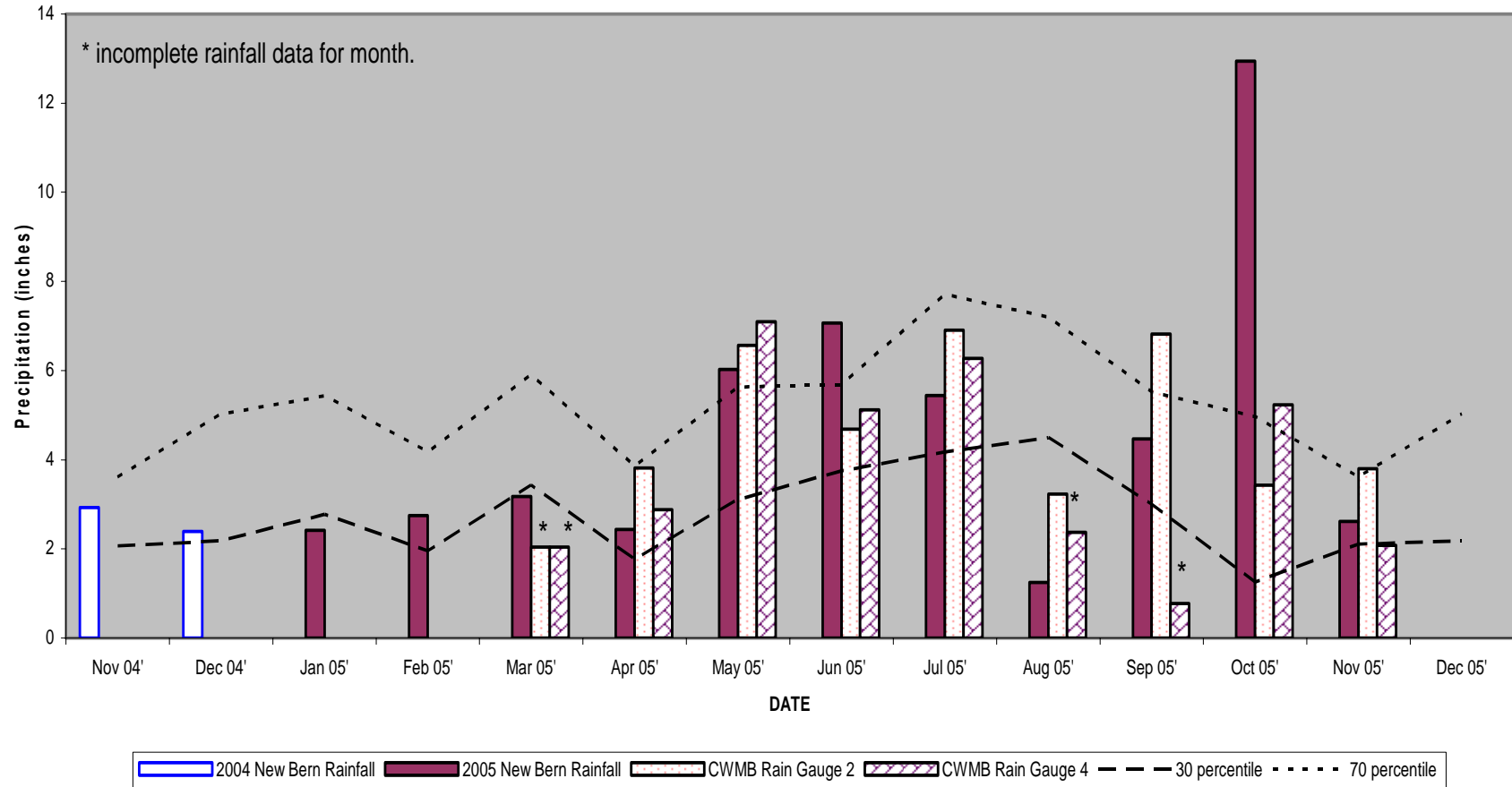
Gauge sites adjacent to roads or point-plugged ditches, areas where riverine credit may be gained, areas that are not meeting the success criteria established for years four and five, and representative areas across the CWMB should continue to be monitored through years four and five.

ESI documented that many of the gauges along transects 258-260 (MU 3/4A), 286-287 (MU 10C), and 182-183 (MU 12B) did not meet both expected hydrologic success criteria. Additional gauges may need to be installed along these transects in order to capture the zone of influence that may remain adjacent to the open areas of the ditch. ESI also recommends that additional areas in MU 6, 5, and 2B (for example Gauges 241, 240, 242, and 251) be re-evaluated for riverine function. These areas showed prolonged surface flooding and flowing water throughout much of the growing season and may be considered riverine mitigation due to the surface connection with the unnamed tributary to East Prong Brice Creek.

It is recommended that Rain Gauge 3 be replaced due to repeated malfunction and unreliable data collected during 2005. For subsequent years, it is recommended that additional follow-up trips be scheduled after routine gauge downloads to check gauges that malfunction, particularly reference gauges, and take appropriate measures to avoid extended and frequent data gaps, especially for Ecotone gauges. Ecotone gauges tended to have frequent gauge malfunctions, including dead batteries, chewed external wires, and broken battery connections.

Consideration should be given to evaluating the need for one or more additional reference gauges. For instance, existing Bayboro reference gauges achieve hydroperiods between 69 and 100% of the growing season, yet the expected hydroperiod from the published county soil survey is approximately 30%. Many of the gauges in Phase II that achieved Criterion 1, but not Criterion 2 (% of Reference Range) are in Bayboro soils and would achieve hydroperiods within 20% of the published seasonal high water table duration.

Figure 4. Croatan WMB 30-70 Percentile Graph



3.0 VEGETATION

3.1 Success Criteria

Success Criteria state that there must be a minimum of 320 trees per acre surviving for three consecutive years. The required survival criterion will decrease by 10% per year after the third year of vegetation monitoring (i.e., for an expected 288 trees/acre for year 4, and 260 trees/acre for year 5), such that at the end of year 5, there are at least 260 5-year old trees per acre.

3.2 Description of Species

The listing below provides a listing of tree species that were planted in each mitigation area. Specific information regarding tree counts in each plot is provided in Tables 27a and 27b associated with Section 3.3. Summaries for 2005 stem counts, plot density, and success criteria for each plot, target community (also known as planting zones) and phase is provided in Tables 28a and 28b associated with Section 3.3. Other observations concerning each Target Community are presented in Section 3.4. Figures 5a and 5b depict the vegetation plot locations, Target Communities, and photo locations.

Phase I

Target Community: Wet Pine Flat (63.2 acres)

Pinus taeda, loblolly pine
Pinus palustris, longleaf pine
Pinus serotina, pond pine

Target Community: Pond Pine Woodland (89.3 acres)

Pinus taeda, loblolly pine
Pinus serotina, pond pine

Target Community: Non-Riverine Wet Hardwood Forest (Type A) (60.6 acres)

Quercus falcata var. *pagodifolia*, cherrybark oak
Quercus laurifolia, laurel oak
Quercus lyrata, overcup oak
Nyssa aquatica, water tupelo
Quercus michauxii, swamp chestnut oak
Quercus nigra, water oak
Quercus phellos, willow oak

Target Community: Non-Riverine Swamp Forest (11.4 acres)

Taxodium distichum, bald cypress
Fraxinus pennsylvanica, green ash
Nyssa aquatica, water tupelo
Pinus serotina, pond pine
Chamaecyparis thyoides, Atlantic white cedar

Phase II

Target Community: Wet Pine Flat

Pinus taeda, loblolly pine
Pinus palustris, longleaf pine
Pinus serotina, pond pine

Target Community: Mesic Pine Flat

Pinus palustris, longleaf pine

Target Community: Non-Riverine Wet Hardwood Forest (Type A)

Quercus falcata var. *pagodifolia*, cherrybark oak
Quercus laurifolia, laurel oak
Quercus lyrata, overcup oak
Nyssa sylvatica var. *biflora*, swamp blackgum
Quercus nigra, water oak
Quercus phellos, willow oak

Target Community: Non-Riverine Wet Hardwood Forest (Type B)

Quercus falcata var. *pagodifolia*, cherrybark oak
Quercus laurifolia, laurel oak
Quercus lyrata, overcup oak
Nyssa sylvatica var. *biflora*, swamp Blackgum
Quercus nigra, water oak
Quercus phellos, willow oak
Pinus serotina, pond pine

Target Community: Coastal Plain Small Stream Swamp

Nyssa sylvatica var. *biflora*, swamp blackgum
Pinus serotina, pond pine
Quercus laurifolia, laurel oak
Taxodium distichum, bald cypress
Fraxinus pennsylvanica, green ash

3.3 Results of Vegetation Monitoring

Vegetation monitoring was conducted in 2005 by Environmental Services, Inc. and by David Dummond, a botanist utilized as a sub-consultant to conduct more qualitative assessments of herbaceous vegetation in the monitoring plots. Figures 6a and 6b depict the monitoring results for the vegetation plot and overall Target Communities by Phase. These results are shown in Appendix B along with photo pages that depict the changing vegetation patterns from years 2003 to 2005. Previous vegetation monitoring was conducted for NCDOT by another consultant.

Figure 5a. Target Communities and Vegetative Plot Location Map, Phase II

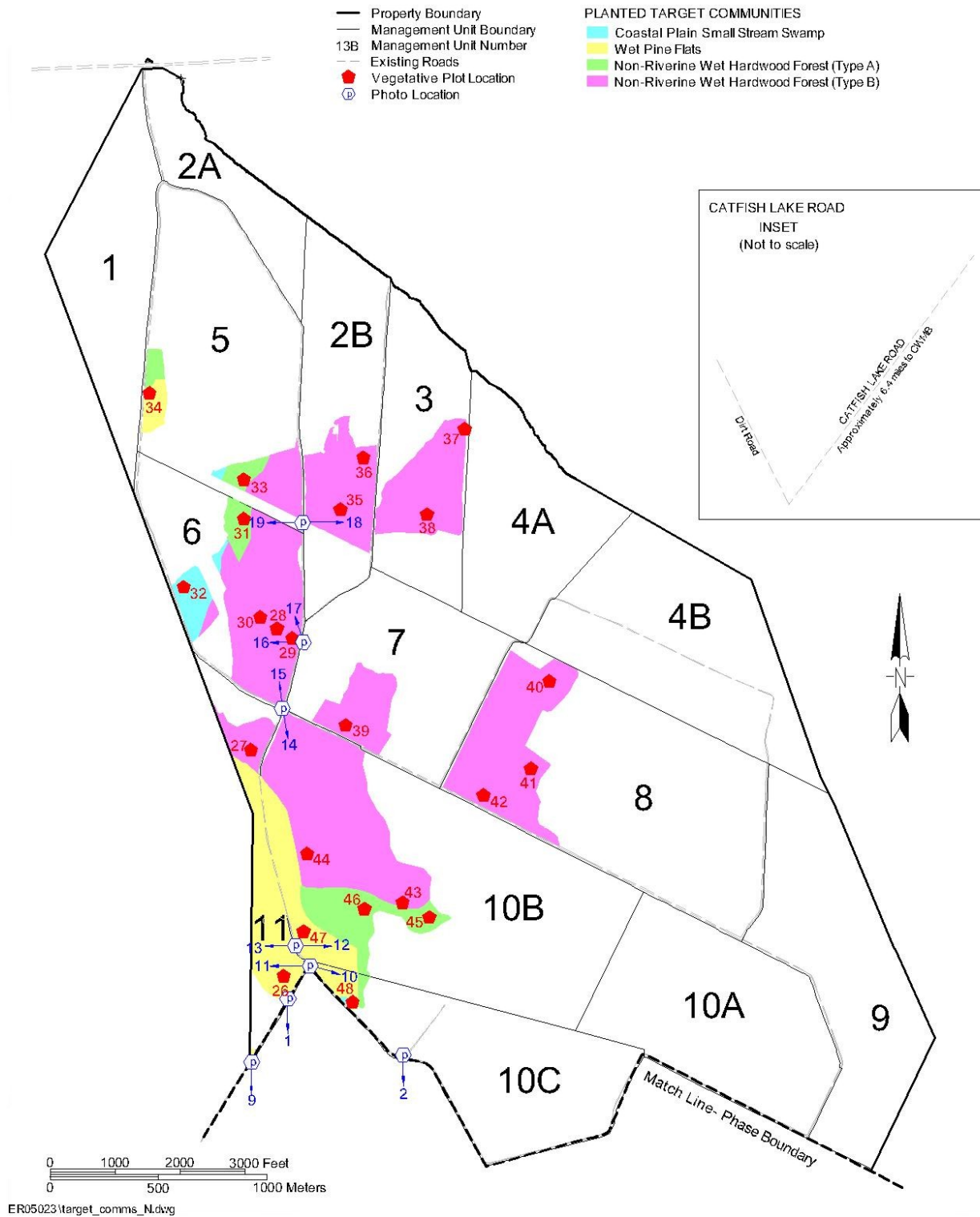
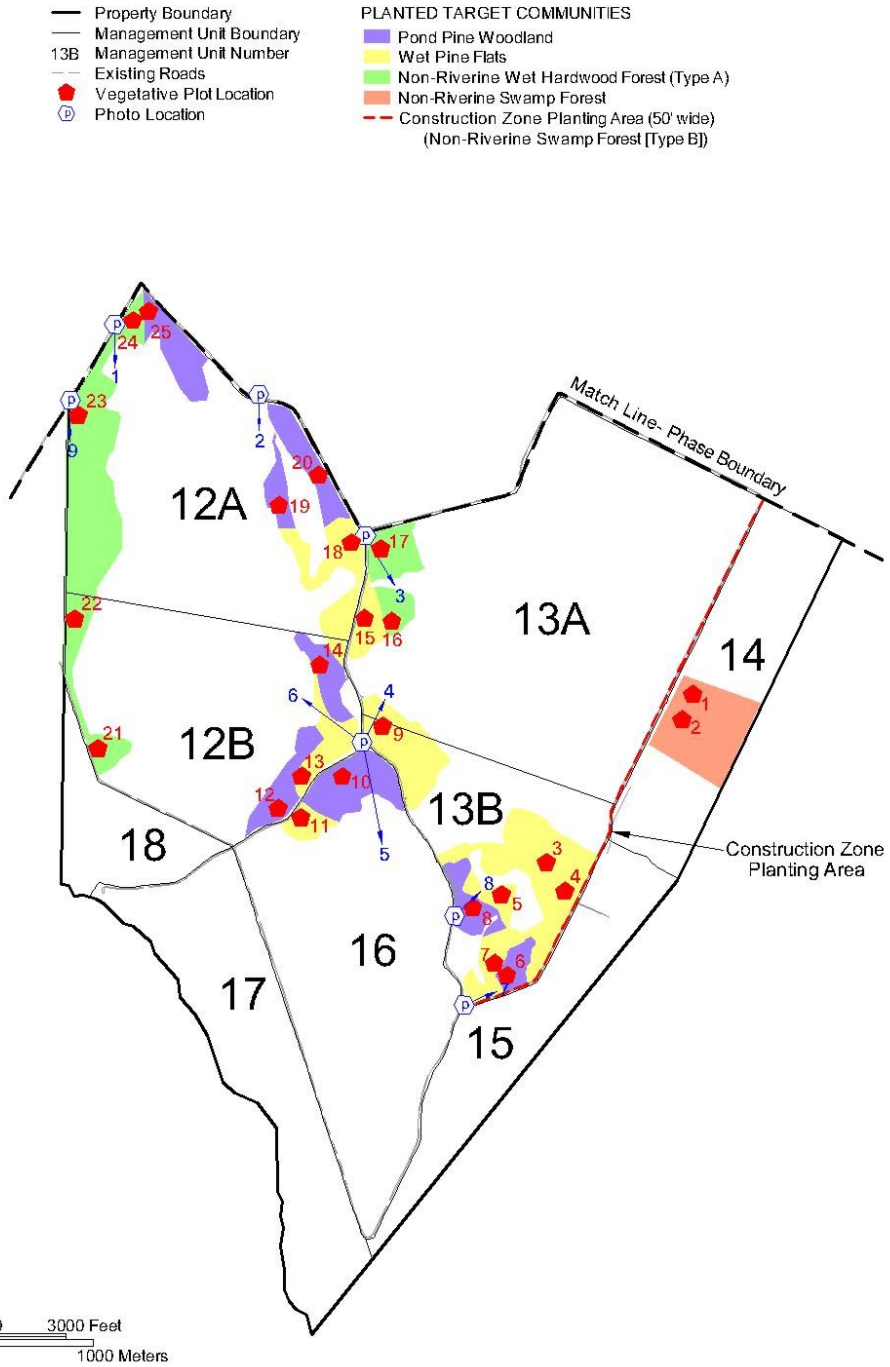


Figure 5b. Target Communities and Vegetative Plot Location Map, Phase I



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Table 27a. Phase I Vegetation Monitoring Statistics 2005

Target Community ^a	Plot Number	Cherrybark Oak	Laurel Oak	Overcup Oak	Water Tupelo	Swamp Chestnut Oak	Water Oak	Willow Oak	Oak sp. (no leaves)	Pond Pine	Longleaf Pine	Bald cypress	Green Ash	Pond/Loblolly Pine	Atlantic White Cedar	Total 2005 (Year 4)	Total (at planting)
WPF	6													27		27	36
	8										7			33		40	42
	10													26		26	30
	12													23		23	31
	14													14		14	28
	19 ^b													38		38	35
	20													25		25	33
	25													15		15	44
PPW	3													20		20	24
	4													10		10	22
	5													7		7	12
	7													17(2)		19	21
	9													22		22	36
	11													14		14	30
	13													25		25	40
	15 ^b													24		24	23
	18													29		29	32
NRWH (A)	16 ^c	1	6	2		1(1)	9	5								25	30
	17	2				3	7									12	16
	21			4(1)		6										11	27
	22 ^d			6	1		9	6								22	30
	23	4		13(2)		16	1	2								38	76
	24					2	1	2						1		6	40
NRSF	1											2				2	40
	2								2		4	1				7	37

a- Target Community: WPF – Wet Pine Flat, PPW – Pond Pine Woodland, NRWH (A) – Non-Riverine Wet Hardwood Forest (Type A), NRSF – Non-Riverine Swamp Forest.

b- Total flagged and/or tagged trees found exceeded the original amount planted.

c- One water oak was previously labeled as cherrybark oak, four water oaks were previously labeled as overcup oaks, one laurel oak was previously labeled as overcup oak.

d- Five water oaks were previously labeled as overcup oaks.

Notes: The counts for pond pine and loblolly pine have been combined due to the difficulty in differentiating between the two species at such an early age. Longleaf pine was only planted in the higher areas of the Wet Pine Flat Target Community. Specific information regarding each Target Community is presented after the tables. All stem count numbers in parenthesis represent unflagged and untagged tree species that appear to be planted. These tree species are believed to be planted due to their appearance in rows with planted trees, similar size/ages with planted trees, and/or lack of naturally occurring species of the same type within the immediate vicinity.

Table 27b. Phase II Vegetation Monitoring Statistics 2005

Target Community ^a	Plot Number	Cherrybark Oak	Laurel Oak	Overcup Oak	Water Tupelo	Swamp Chestnut Oak	Water Oak	Willow Oak	Oak sp. (no leaves)	Pond Pine	Longleaf Pine	Bald cypress	Green Ash	Pond/Loblolly Pine	Atlantic White Cedar	Total 2005 (Year 3)	Total (at planting)
WPF	26													34		34	39
	34													8		8	39
	47									4(1)				47		52	39

NRWH (A)	31 ^a	4		1	11				1(1)			(1)		3		22	39
	33 ^b		1				2									3	39
	45			1(1)	5(1)									2		10	39
	46			4(1)	9(4)							1				19	39

NRWH (B)	27 ^c			4			2			3			9(5)			23	39
	28 ^b	8(2)		17			1			8			2(1)			39	39
	29	3		2(1)	1		1					3	4			15	39
	30	1(1)		6	1		1	1(2)		13			1			27	39
	35	1								7						8	39
	36	2	1	2	6					19			3			33	39
	37	2	1	1			1	1(1)								7	39
	38		2		4					5			5			16	39
	39			2						(1)		1	5			9	39
	40				11(8)											19	39
	41				1											1	39
	42													1		1	39
	43				6(5)								3			14	39
	44 ^b		2		4					5						11	39

CPSSS	32				5					16		22	1			44	39
	48 ^d						28			10	18					56	39

a- Target Community: WPF – Wet Pine Flat, PPW – Pond Pine Woodland, NRWH (A) – Non-Riverine Wet Hardwood Forest (Type A), NRWH (B) – Non-Riverine Wet Hardwood (Type B), CPSSS – Coastal Plain Small Stream Swamp.

b- Two oak sp. were flagged and/or tagged but too small to differentiate between overcup or cherrybark oaks.

c- One water oak was previously labeled as overcup oak.

d- Two titi were previously labeled as laurel oak, one water oak was previously labeled as laurel oak

e- The 25 water oaks found in 2005 were apparently previously identified as overcup oaks.

Notes: The counts for pond pine and loblolly pine have been combined due to the difficulty in differentiating between the two species at such an early age. Specific information regarding each Target Community is presented after the tables. No “at-planting counts” were conducted for Phase II since no consultants were under contract during that period. Therefore, it is assumed that 39 total stems were planted in each plot. All stem count numbers in parenthesis represent unflagged and untagged tree species that appear to be planted. These tree species are believed to be planted due to

their appearance in rows with planted trees, similar sizes/ages as planted trees, and/or lack of naturally occurring species of the same type within the immediate vicinity.

Table 28a. Phase I 2005 Summaries

Target Community ^a	Plot Number	Total (at planting)	Total 2005 (Year 4)	Plot Density 2005 (Trees/Acre)	Meets Success Criteria (Y/N)
WPF	6	36	27	470	Y
	8	42	40	697	Y
	10	30	26	453	Y
	12	31	23	401	Y
	14	28	14	244	N
	19 ^b	35	38	662	Y
	20	33	25	436	Y
	25	44	15	261	N
Wet Pine Flat Average				453	Y
PPW	3	24	20	348	Y
	4	22	10	174	N
	5 ^c	12	7	122	N
	7	21	19	331	Y
	9	36	22	383	Y
	11	30	14	244	N
	13	40	25	436	Y
	15 ^b	23	24	418	Y
18	32	29	505	Y	
Pond Pine Woodland Average				329	Y
NRWH (A)	16	30	25	436	Y
	17 ^c	16	12	209	N
	21	27	11	192	N
	22	30	22	383	Y
	23	76	38	662	Y
	24	40	6	105	N
Non-Riverine Wet Hardwood (Type A) Average				331	Y
NRSF	1	40	2	35	N
	2	37	7	122	N
Non-Riverine Swamp Forest Average				79	N
Phase I Average				349	Y

a- Target Community: WPF – Wet Pine Flat, PPW – Pond Pine Woodland, NRWH (A) – Non-Riverine Wet Hardwood Forest (Type A), NRSF – Non-Riverine Swamp Forest.

b- Total flagged and/or tagged trees found exceeded the original amount planted.

c- Total trees at planting do not meet plot density (trees/acre) success criteria for year four of 288 trees/acre.

Notes: Density calculations were completed by taking the number of trees counted in 2005 and dividing by the plot size in acres (0.0573921ac). Specific information regarding each Target Community is presented after the tables. Environmental Services, Inc. began Croatan vegetation monitoring in 2005, therefore all data and calculations prior to 2005 were obtained from previous consultants.

Table 28b. Phase II 2005 Summaries

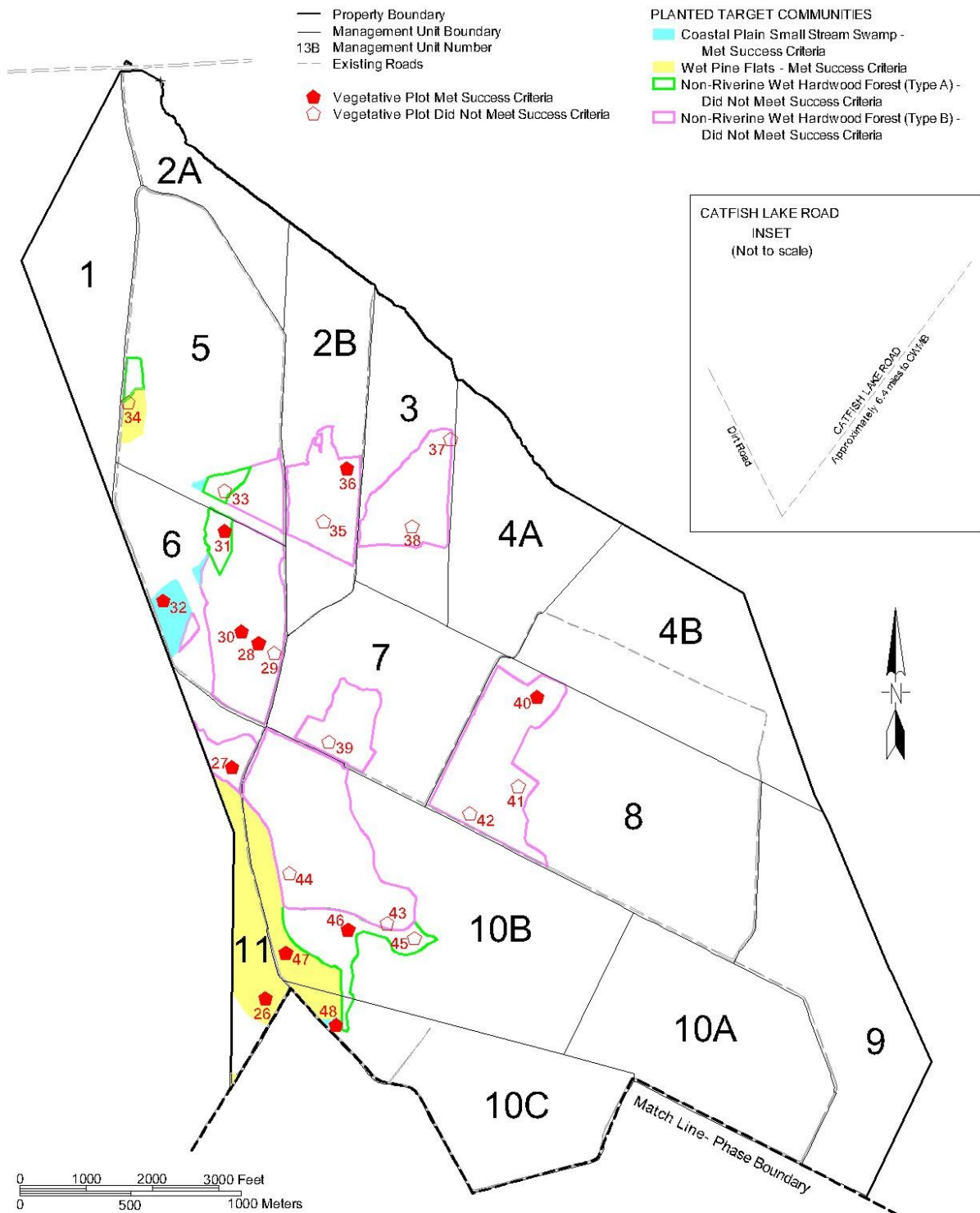
Target Community ^a	Plot Number	Total (at planting)	Total 2005 (Year 3)	Plot Density 2005 (Trees/Acre)	Meets Success Criteria (Y/N)
WPF	26	39	34	592	Y
	34	39	8	139	N
	47 ^b	39	52	906	Y
Wet Pine Flat Average				546	Y
NRWH (A)	31	39	22	383	Y
	33	39	3	52	N
	45	39	10	174	N
	46	39	19	331	Y
Non-Riverine Wet Hardwood (Type A) Average				235	N
NRWH (B)	27	39	23	401	Y
	28	39	39	680	Y
	29	39	15	261	N
	30	39	27	470	Y
	35	39	8	139	N
	36	39	33	575	Y
	37	39	7	122	N
	38	39	16	279	N
	39	39	9	157	N
	40	39	19	331	Y
	41	39	1	17	N
	42	39	1	17	N
	43	39	14	244	N
	44	39	11	192	N
Non-Riverine Wet Hardwood (Type B) Average				278	N
CPSSS	32 ^b	39	44	767	Y
	48 ^b	39	56	976	Y
Coastal Plain Small Stream Swamp Average				872	Y
Phase II Average				357	Y

a- Target Community: WPF – Wet Pine Flat, PPW – Pond Pine Woodland, NRWH (A) – Non-Riverine Wet Hardwood Forest (Type A), NRWH (B) – Non-Riverine Wet Hardwood Forest (Type B), CPSSS – Coastal Plain Small Stream Swamp.

b- Total flagged and/or tagged trees found exceeded the original amount planted.

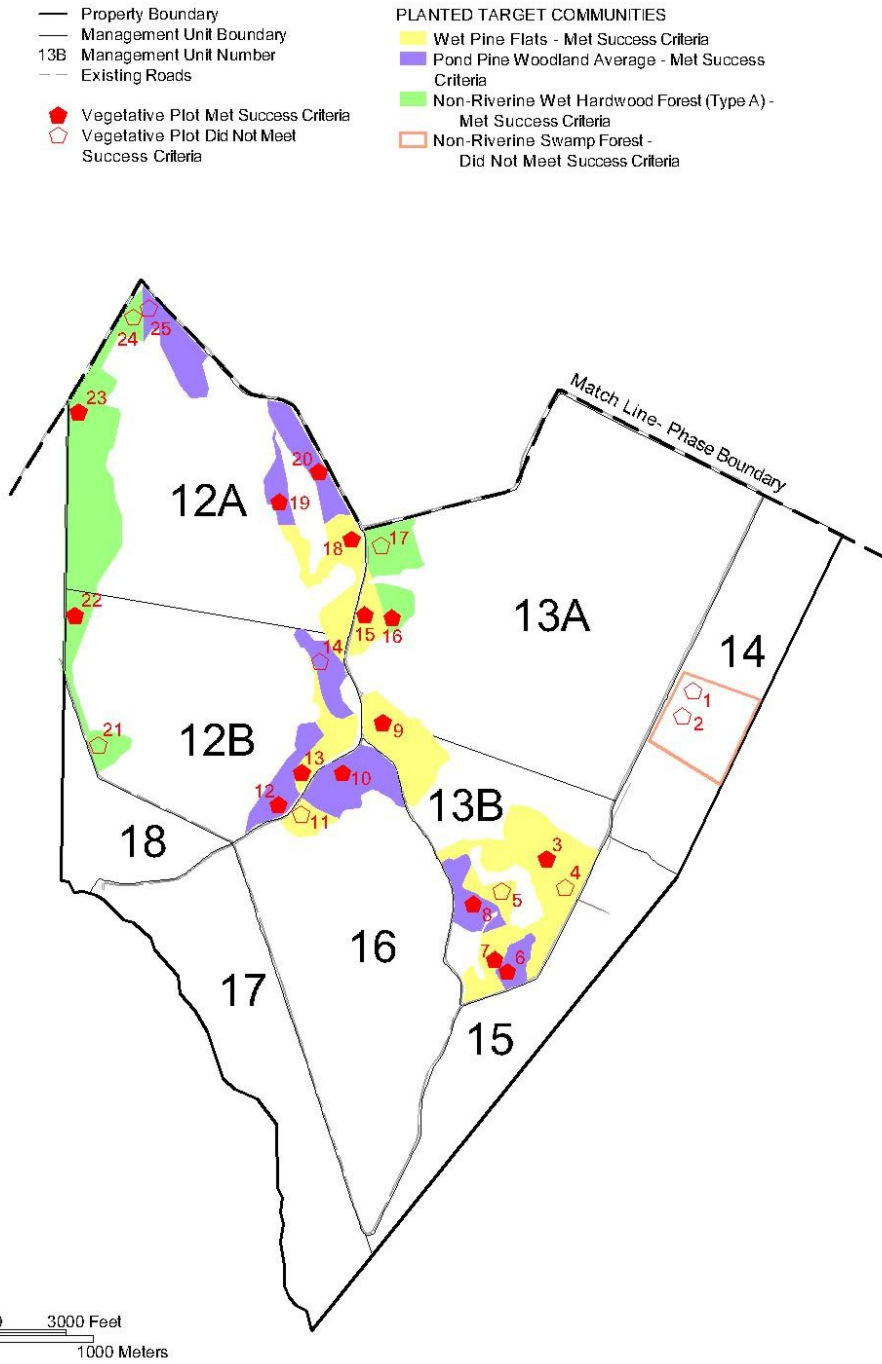
Notes: Density calculations were completed by taking the number of trees counted in 2005 and dividing by the plot size in acres (0.0573921ac). Specific information regarding each Target Community is presented after the tables. No “at-planting counts” were conducted for Phase II since no consultants were under contract during that period. Therefore, it is assumed that 39 total stems were planted in each plot. Environmental Services, Inc. began Croatan vegetation monitoring in 2005, therefore all data and calculations prior to 2005 were obtained from previous consultants.

Figure 6a. Target Communities and Vegetative Plot Monitoring Results Map, Phase II



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Figure 6b. Target Communities and Vegetative Plot Monitoring Results Map, Phase I



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3.4 Plot Descriptions

Qualitative assessments for vegetative species composition in each plot were conducted concurrently by sub-consultant Dave Dummond. Mr. Dummond gave each species identified a subjective, non-quantitative designation of relative abundance of either dominant or co-dominant (D), common (C), uncommon (U), or rare (R). These results can be found in Appendix B, *Relative Abundance of Vascular Plant Species Recorded within 50' x 50' Plots at the Croatan Mitigation Bank*. The qualitative assessment was requested by EEP to provide better documentation as to the vegetative species re-colonizing the planting areas.

The Phase I assessment included fourth year vegetation surveys associated with the existing 25 total plots. Commonly observed (D) species in the Wet Pine Flat Target Community, in addition to the planted species, included blue huckleberry (*Gaylussacia frondosa*), shinyleaf (*Lyonia lucida*), swamp bay (*Persea palustris*), northern bracken fern (*Pteridium aquilinum* var. *pseudocaudatum*), creeping blueberry (*Vaccinium crassifolium*), and Virginia chain fern (*Woodwardia virginica*). Overall the Wet Pine Flat Target Community meets the average success criteria for year four with an average density of 453 trees/acre, only plots 14 and 25 do not meet success criteria. Commonly observed (D) species in Pond Pine Woodland Target Community, in addition to the planted species, included blue huckleberry, swamp bay, and northern bracken fern. Overall the Pond Pine Woodland Target Community meets the average success criteria for year four with an average density of 329 trees/acre, only plots 4, 5, and 11 do not meet success criteria. Of those three plots not meeting success criteria, plot 5 was not originally planted dense enough to meet the success criteria. Commonly observed (D) species in the Non-Riverine Wet Hardwood (Type A) Target Community, in addition to the planted species, included swamp titi (*Cyrilla racemiflora*) and sweet-gum (*Liquidambar styraciflua*). Overall the Non-Riverine Wet Hardwood (Type A) Target Community meets the average success criteria for year four with an average density of 331 trees/acre, only plots 17, 21, and 24 do not meeting success criteria. Of those three plots not meeting success criteria plot 17 was not originally planted dense enough to meet the success criteria. Commonly observed (D) species in the Non-Riverine Swamp Forest Target Community, in addition to the planted species, included Canadian rush (*Juncus canadensis*), lamp rush (*Juncus effusus*), and cottongrass bulrush (*Scirpus cyperinus*). The Non-Riverine Swamp Forest Target Community with an average density of 79 trees/acre falls well below the success criteria of 288 trees/acre for year four, with neither plot 1 or 2 meeting success criteria. Plots 1 and 2 are located in an area that remains inundated year round and contains dense emergent vegetation. These two factors may be preventing the success of planted species.

The Phase II assessment included third year vegetation surveys associated with 23 established plots covering four of five planted Target Communities. Commonly observed (D) species in the Wet Pine Flat Target Community, in addition to the planted species, included slender goldentop (*Euthamia caroliniana*). Overall the Wet Pine Flat Target Community meets the average success criteria of 320 trees/acre for year three. With an average density of 546 trees/acre, only plot 34 does not meet success criteria. Commonly observed (D) species in the Non-Riverine Wet Hardwood Forest (Type A) Target Community, in addition to the planted species, included red maple (*Acer rubrum*), southern waxy sedge (*Carex glaucescens*), and woolly rosette grass (*Dichanthelium scabriusculum*). The Non-Riverine Wet Hardwood Forest (Type A) Target Community does not meet success criteria of 320 trees/acre for year three. Non-Riverine Wet Hardwood Forest (Type A) Target Community has an average density of 235 trees/acre, both plots 33 and 45 do not meet success criteria. Additional investigation may be needed to determine why this Target Community is not meeting minimum success criteria and if

further action is needed. Commonly observed (D) species in the Non-Riverine Wet Hardwood Forest (Type B) Target Community, in addition to the planted species, included cypress rosette grass (*Dichanthelium dichotomum*), small dog-fennel (*Eupatorium capillifolium*), slender goldentop, cottongrass bulrush, and pine-barren goldenrod (*Solidago fistulosa*). The Non-Riverine Wet Hardwood Forest (Type B) Target Community does not meet the success criteria of 320 trees/acre for year three. With an average density of 278 trees/acre, plots 29, 35, 37, 38, 39, 41, 42, 43, and 44 all fail to meet the success criteria. The Non-Riverine Wet Hardwood Forest (Type B) Target Community with 14 plots is the largest Target Community in Phase II, with nine plots failing to meet success criteria; further investigation may be needed to determine why success criteria are not being met. Commonly observed (D) species in the Coastal Plain Small Stream Swamp Target Community, in addition to the planted species, included small dog-fennel. Overall the Coastal Plain Small Stream Swamp Target Community meets the average success criteria of 320 trees/acre for year four with an average density of 872 trees/acre.

3.5 Conclusions

Of the 4,035-acre CWMB, approximately 224.5 acres were involved in tree planting for Phase I and 466.0 acres were involved in tree planting for Phase II. There were 25 vegetation monitoring plots established throughout the Phase I planting areas, and 23 vegetation monitoring plots established throughout the Phase II planting areas. The 2005 vegetation monitoring of the Phase I portion of the site revealed an average tree density of 349 trees/acre, which exceeds the minimum success criteria of 288 trees/acre for year four. The vegetation monitoring of the Phase II portion of the site revealed an average tree density of 357 trees/acre, which exceeds the minimum success criteria of 320 trees per acre for year three.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

Monitoring of Phase I hydrology and vegetation should continue in 2006 (Year 5) and Phase II hydrology and vegetation will continue in 2006 (Year 4). Monitoring is required to continue for a minimum of 5 years in each phase. However, due to the high rate of hydrologic success under normal rainfall conditions, it is recommended to the MBRT that selected interior gauge sites that are already meeting success criteria for years four and five be removed from monitoring. Gauge sites adjacent to roads, point-plugged ditches, areas where riverine credit may be gained, areas that are not meeting the success criteria established for years four and five, and representative areas across the CWMB should continue to be monitored through years four and five. Figures 7a and 7b depict the monitoring results for the monitoring gauges, vegetation plots, and overall Target Communities by Phase.

It is recommended that Rain Gauge 3 be replaced due to repeated malfunction and unreliable data collected during 2005. For 2005 and subsequent years, it is recommended that additional follow-up trips be scheduled after routine gauge downloads to check gauges that malfunction, particularly reference gauges, and take appropriate measures to avoid extended and frequent data gaps, especially for Ecotone gauges. Ecotone gauges tended to have frequent gauge malfunctions, including dead batteries, chewed external wires, and broken battery connections.

Of the vegetation surveys performed in the CWMB, 10 plots in Phase I and 12 plots in Phase II do not meet the established success criteria. The Non-Riverine Swamp Forest Target Community in Phase 1 does not meet the success criteria of 288 trees/acre for year four. The Non-Riverine Wet Hardwood Forest Types A and B Target Communities in Phase II do not meet

the success criteria of 320 trees/acre for year three. Further investigation may be needed in these Target Communities to determine why success criteria are not being met. Vegetation surveys should continue to be conducted in 2006.

Figure 7a. Overall Monitoring Results Map, Phase II

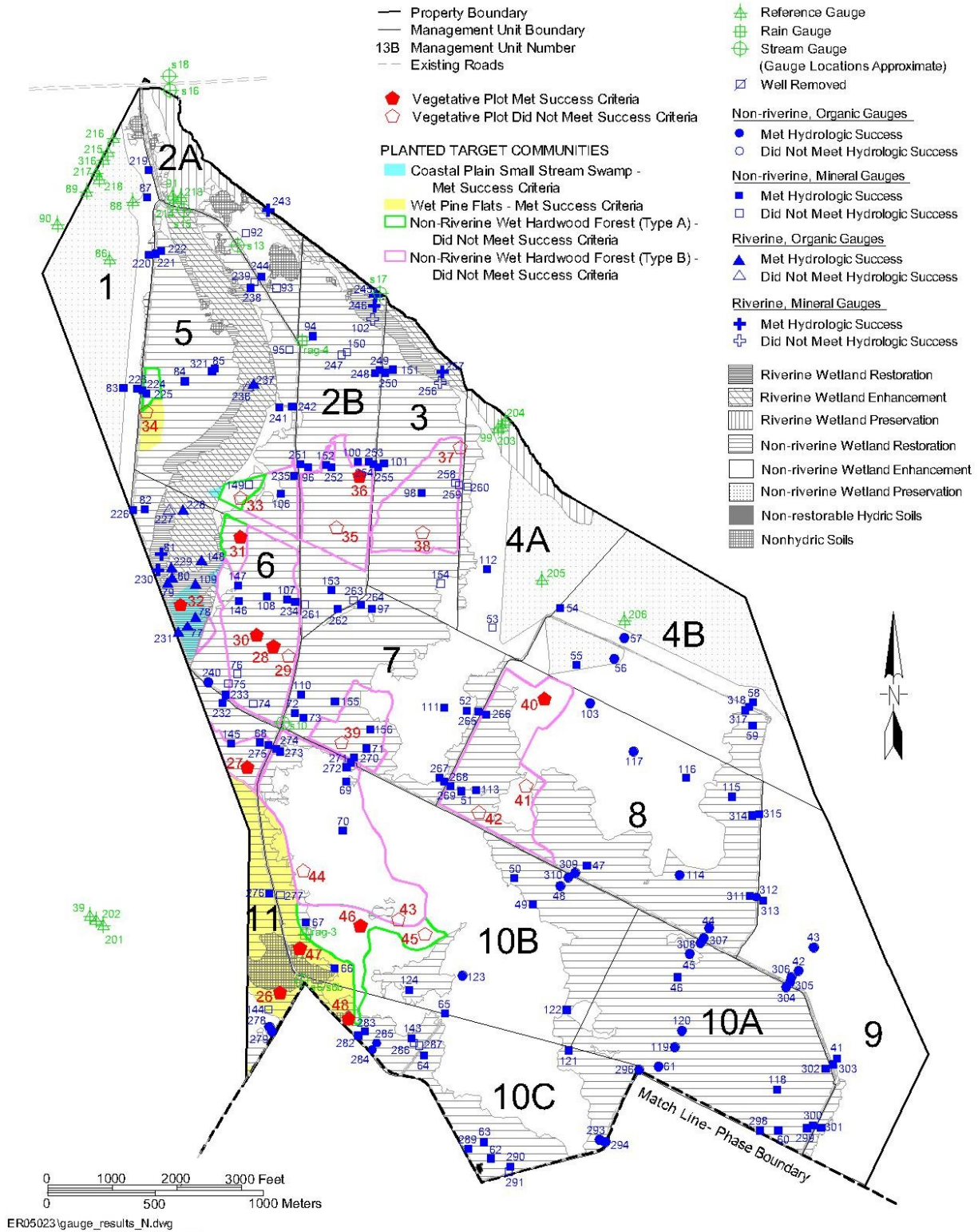
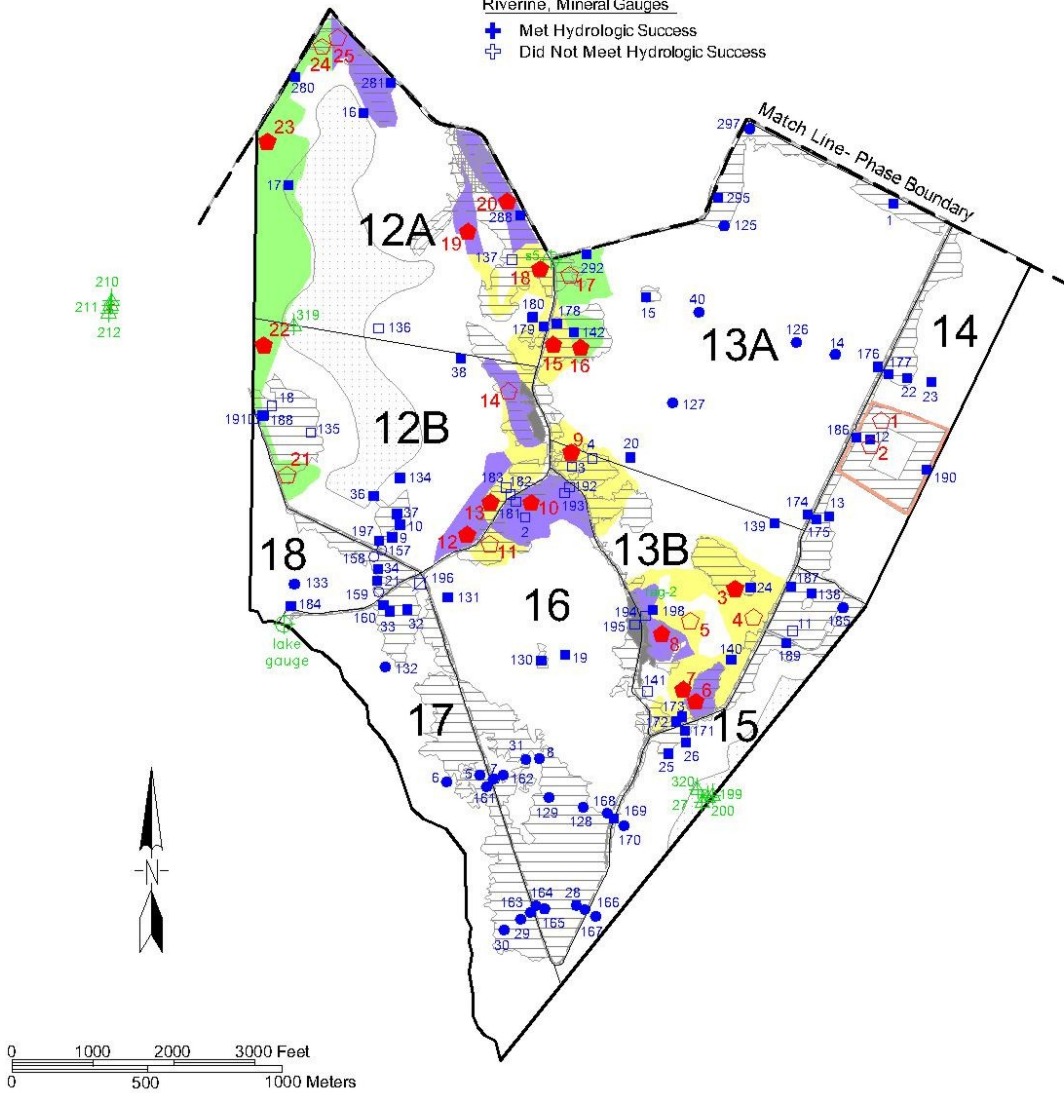


Figure 7b. Overall Monitoring Results Map, Phase I

- Property Boundary
 - Management Unit Boundary
 - 13B Management Unit Number
 - - Existing Roads
 - Vegetative Plot Met Success Criteria
 - Vegetative Plot Did Not Meet Success Criteria
- PLANTED TARGET COMMUNITIES**
- Pond Pine Woodland - Met Success Criteria
 - Wet Pine Flats - Met Success Criteria
 - Non-Riverine Wet Hardwood Forest (Type A) - Met Success Criteria
 - Non-Riverine Swamp Forest - Did Not Meet Success Criteria
- ▲ Reference Gauge
 - Rain Gauge
 - Stream Gauge (Gauge Locations Approximate)
 - ☒ Well Removed
- Non-riverine, Organic Gauges**
- Met Hydrologic Success
 - Did Not Meet Hydrologic Success
- Non-riverine, Mineral Gauges**
- Met Hydrologic Success
 - Did Not Meet Hydrologic Success
- Riverine, Organic Gauges**
- ▲ Met Hydrologic Success
 - △ Did Not Meet Hydrologic Success
- Riverine, Mineral Gauges**
- ⊕ Met Hydrologic Success
 - ⊖ Did Not Meet Hydrologic Success
- Riverine Wetland Restoration
 - Riverine Wetland Enhancement
 - Riverine Wetland Preservation
 - Non-riverine Wetland Restoration
 - Non-riverine Wetland Enhancement
 - Non-riverine Wetland Preservation
 - Non-restorable Hydric Soils
 - Nonhydric Soils



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Click on the Desired Link Below

Appendix A

Appendix B

Appendix C

Appendix D

Appendix E