UT to JUMPING RUN CREEK STREAM & WETLAND RESTORATION
MONITORING REPORT (YEAR 2 OF 5)

Cumberland County, North Carolina
EEP Project Number 92345

Prepared for:
North Carolina Ecosystem Enhancement Program
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1.0 Executive Summary / Project Abstract

The overall goal of the UT to Jumping Run Creek Restoration Project was to restore a Coastal Plain headwater stream and wetlands, a Coastal Plain Small Stream Swamp, and nonriparian wetlands. The objectives of the project were to restore wetland hydrology to small stream swamp wetlands, restore stream stability and improve aquatic habitats, restore historic flow paths and flooding processes, improve floodplain functionality, establish native vegetation within the permanent conservation easement, and investigate the ecological benefits of installing larger containerized trees in select smaller designated areas.

The Monitoring Year 2 [MY2] stem counts within each of the vegetative monitoring plots are included in Tables 7 and 9 in Appendix C. Both planted and total stem counts are included in Table 9. Six of the plots have over 320 planted stems per acre (the success criteria for MY2) while six of the plots have less than 320 planted stems per acre. When volunteers are included in the stem count, eleven of twelve plots have over 320 total stems per acre. Four of the five random transects monitored had over 320 total stems per acre. There were no vegetation problem areas large enough to be delineated or mapped. However, it was noted in the field that small areas of *Typha latifolia* need to be monitored during future visits as they could pose a threat to vegetation survival in the future. Minor areas of *Murdannia keisak* were observed in the stream channel along the downstream portion of UT1B and also the upstream portion of UT1C. Currently, these areas do not pose a threat to native vegetation establishment or stream stability, but they will continue to be monitored during future field visits to document any changes. Additionally, bare roots planted during construction did not meet their warranty. Additional planting will occur this winter (2011/2012) to meet the original planting warranty.

The upstream braided reach (UT1A) is stable and appears to be functioning as designed. There are signs that water is flowing through the multiple braids and collecting in the shallow pool areas. The UT to Jumping Run single thread restoration reach (UT1B) was observed to be in generally stable condition. Over the approximately 3600 linear feet of channel restoration, the channel's profile and cross-section has only adjusted minimally from baseline conditions. The channel has good connection to its floodplain and vegetation seems to be establishing on the banks. Two small areas of aggradation, approximately 80 feet in total length, were observed between Station 52+50 and Station 55+50. *Typha latifolia* has also begun to move into these aggraded areas of the channel. Additionally, an exposed structure was observed in the field near Station 51+00. Currently, neither of these issues is significant and they are not predicted to affect the stability of the restored channel. Both areas will be monitored during future field visits to document any changes. The enhancement reach UT1C appears to be stable, with bank pin surveys showing no aggradation or degradation. No beaver dams were observed on the restoration reaches. No evidence of bankfull events were observed during field visits. A second crest gauge will be installed on-site, approximately 200 feet upstream of the road crossing on UT1B.

The reference well met the success criteria, with a 78-day consecutive period of soil saturation within 12 inches of the ground surface. This 78-day period comprises 30% of the growing season. Thirteen of the 15 groundwater monitoring wells onsite met the success criteria. Two wells did not meet the success criteria, and the water tables measured at these wells were not within 12 inches of the ground surface at any time during the 2011 growing season. Monthly precipitation totals for 2011 fell between the 30th and

70th percentiles during the growing season in March, June, August, and September. For the months of July and October precipitation fell below the 30th percentile. For the months of April and May precipitation fell above the 70th percentile.

Summary information, data, and statistics related to the performance of various project and monitoring elements can be found in the tables and figures in the report appendices. Narrative background and supporting information formerly found in these reports can be found in the mitigation and restoration plan documents available on EEP's website. All raw data supporting the tables and figures in the appendices is available from EEP upon request.

2.0 Methodology

Channel stability, vegetation survival, and viability of wetland function were monitored on the project site. Post-restoration monitoring will be conducted for a minimum of five years or until the success criteria are met following the completion of construction to document project success. The Monitoring Year 2 stream survey was completed using survey grade GPS on September 22, 2011. The vegetation monitoring was conducted on October 12, 2011.

2.1 MORPHOLOGIC PARAMETERS AND CHANNEL STABILITY

2.1.1 Dimension

Reaches UT1A and UT1C involved restoration techniques to restore historic flow patterns and flooding functions. Monitoring efforts for reaches UT1A and UT1C focus on visual documentation of stability. Dimensional characteristics obtained from cross-sectional surveying of 10 permanent cross-sections on UT1B were compared to baseline conditions. All monitored cross-sections should fall within the quantitative parameters defined for channels of the design stream type. Natural variability is expected, however the system should not experience trends toward excessive increasing bank erosion, channel degradation, or channel aggradation.

2.1.2 Pattern and Profile

The entire longitudinal profile of reach UT1B was surveyed (3,661 lf). Stationing from the as-built survey was used. The longitudinal profiles should show that the bedform features are remaining stable. The pools should remain deep with flat water surface slopes, and the riffles should remain steeper and shallower than the pools.

2.1.3 Substrate

Since the streams throughout the project site are dominated by sand-size particles, pebble count procedures would not show a significant change in bed material size or distribution over the monitoring period; therefore, as per NCEEP guidance, bed material analyses will not be undertaken for this project.

2.2 VEGETATION

The Carolina Vegetation Survey (CVS) Level 2 methodology was utilized to sample vegetation in October of 2011. Twelve 100m^2 plots have been established throughout the project site. In each plot, four plot corners have been permanently located with conduit or rebar. Additionally, five random transect plots (2m x 50m (100m^2)) were monitored for surviving species count. The location of the transect plots were selected at random, but stratified to be spread across the different planting zones. These plots are aimed at providing a more thorough account of the vegetation condition across the site outside the permanent vegetation plots.

As per the as-built and baseline monitoring report, the vegetative success criteria are based on the US Army Corps of Engineers Stream Mitigation Guidelines (USACE, 2003). The final vegetative success criteria will be the survival of 260 5-year old planted trees per acre at the end of the year 5 monitoring period. Interim measures of vegetation planting success will be the survival of at least 320 planted trees per acre at the end of the 3-year monitoring period and 280 planted trees per acre at the end of the 4-year monitoring period. As planted versus volunteer stems cannot be differentiated for the random transect plots, the stem counts for the random transects include both planted and volunteer woody stems.

2.3 HYDROLOGY

2.3.1 Streams

One crest gauge has been installed onsite and is located just downstream from cross-section 2. Each visit to the site includes documentation of the highest stage for the monitoring interval and a reset of the device. Other indications of bankfull flow including the presence of wrack lines, sediment, or flooding are recorded and documented photographically. Refer to Figure 2 in Appendix B for the location of the crest gauge. The headwater stream reach (Reach UT1A) is visually assessed during each monitoring visit to evaluate indicators that the braided channel is exhibiting flow. A visual assessment form was created for this purpose by NCEEP and is included in Appendix B.

2.3.2 Wetlands

Fifteen automated groundwater monitoring gauges have been installed across the project area to document the hydrologic conditions of the site. Refer to Figure 2 in Appendix B for the location of the groundwater monitoring gauges. Eleven gauges have been installed in the riparian areas and four have been installed in the non-riparian areas of the site. Groundwater gauges will be downloaded on at least a bi-monthly basis during the growing season. A reference well is located in the existing wetlands onsite in the northeast corner of the property and is depicted on Figure 2 in Appendix B. The success criteria for the hydrology monitoring in the wetlands is for the site to be saturated within 12 inches of the soil surface consecutively for at least 6% of the growing season in the riparian wetlands, and 9% of the growing season in the non-riparian wetlands.

3.0 References

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