

**Scope of Services**  
**Croatan Wetland Mitigation Bank (R-1015WM)**  
**2003 Hydrological Success Monitoring**

The Croatan Wetland Mitigation Bank (CWMB) consists of approximately 4035 acres bordering Long Lake in Craven County. **Consultant** has been assisting the North Carolina Department of Transportation (NCDOT) with monitoring success criteria for Phase I of the CWMB following construction completion of this phase. Construction activities required for implementing Phase II of the CWMB were completed prior to the start of the 2003-growing season. For 2003 NCDOT has requested assistance in the second year of monitoring hydrological success of Phase I and the first year of monitoring hydrological success of Phase II. **Consultant** proposes to provide the following monitoring gauge installation and maintenance, data collection, and report services.

**Task 1. Installation of Additional Reference Gauges**

The CWMB Mitigation Bank Review Team (MBRT) has requested that hydrological success criteria be tied to reference wetland hydroperiods representing the ten soil types and hydrologic regimes of the CWMB. Prior to the 2002 growing season there was an attempt to install three suitable reference gauges to cover a range of hydrologic conditions for each of the ten soil types.

Monitoring in 2002 indicates that the existing Murville reference gauges are not suitable for depicting reference hydrology conditions. Recent activity adjacent to the CWMB seems to have altered jurisdictional hydrology of the Murville reference locations. The onsite Murville monitoring gauges have a longer hydroperiod than the existing reference gauges. Previous efforts have not located other usable reference sites for verified Murville soils on the CWMB. The reference site search will be expanded to include comparable areas for this series. **Consultant** will attempt to locate two (2) new Murville reference locations prior to the beginning of the 2003-growing season.

**Consultant** will attempt to locate one (1) additional reference location for the Rains soil type prior to the beginning of the 2003-growing season. This gauge will be sited to demonstrate a larger range of expected reference hydroperiods for this soil series.

In summary, a total of three (3) new reference gauges will be sited. Soil series at potential reference gauge sites will be verified under the direction of a state licensed soil scientist. Potential reference sites will be located in areas of the CWMB identified as preservation areas, or on nearby U.S. Forest Service property. As in previous efforts, **Consultant** will obtain any necessary permission for the siting of reference gauges on U.S. Forest Service property.

The reference gauges are expected to consist of either WL-20 or WL-40 RDS gauges to be provided by NCDOT. Borings for the gauges will be advanced using hand-held augers. Following gauge casing installation the boring hole will be packed with sand and capped with a bentonite seal. Free water in the gauge casing will be pumped to remove suspended particles from the gauge casing. The gauges will be checked to verify operation prior to the start of the 2003-growing season (March 18). As a deterrent

against bear damage, fencing strung together with barbed wire stands will be placed at each gauge location, unless prohibited on U.S. Forest Service property. Gauge locations will be mapped using NCDOT-approved GPS equipment.

## **Task 2. Installation of Additional Monitoring Gauges**

Additional monitoring gauge sites will be identified in the Phase II area of CWMB. The goal will be to document hydrologic conditions along transects representative of the various soil types and mitigation treatments implemented in Phase II. An emphasis will be placed on locating transects in areas that will utilize existing monitoring gauges to anchor the transects. These transects will be across 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. **Consultant** will arrange to review potential monitoring sites with NCDOT prior to gauge installation. Following NCDOT approval of additional monitoring sites, **Consultant** will install the monitoring gauges.

Up to 98 additional monitoring gauges are expected to be sited and installed in Phase II. NCDOT will provide 10 WL-40 and 73 WL-20 RDS gauges, or equivalents, for installation. **Consultant** will re-deploy approximately 15 WL-20 or WL-40 RDS gauges currently used in paired clusters at existing gauge sites in Phase II for use in the transects unless these gauges are needed as replacements for existing gauges that are non-operational (see Task 3).

Borings for the gauges will be advanced using hand-held augers. Soil series will be verified under the direction of a licensed soil scientist. Following gauge casing installation the boring hole will be packed with sand and capped with a bentonite seal. Free water in the gauge casing will be pumped to remove suspended particles from the gauge casing. The gauges will be checked to verify operation prior to the start of the 2003-growing season (March 18). As a deterrent against bear damage, fencing strung together with barbed wire stands will be placed at each gauge location. New gauge locations will be mapped using NCDOT-approved GPS equipment.

## **Task 3. Maintenance of Existing Gauges**

The 128 existing groundwater gauges in Phase I and reference sites will be serviced to ensure proper operation at the onset of the 2003-growing season. Maintenance will consist of battery replacement and cleaning of the gauge wand and copper wire. This scope assumes that NCDOT will provide the batteries for replacement. If necessary, the gauge casings will be reset and repacked with sand and bentonite cap. Gauges will be checked to verify proper operation. Gauges that are not operational will be replaced using re-deployed gauges from paired clusters in Phase II if available or using replacements supplied by NCDOT.

The 90 existing groundwater monitoring sites at the CWMB have not been downloaded or serviced since monitoring in conjunction with the jurisdictional evaluation concluded in January 2001. Gauges at the 90 monitoring sites in Phase II will be serviced to ensure proper operation at the onset of the 2003-growing season. Maintenance will consist of

battery replacement and cleaning of the gauge wand and copper wire. This scope assumes that NCDOT will provide the batteries for replacement. If necessary, the gauge casings will be reset and repacked with sand and bentonite cap. Gauges will be checked to verify proper operation. Gauges that are not operational will be replaced using re-deployed gauges from paired clusters in Phase II if available or using replacements supplied by NCDOT.

Batteries for all gauges will be replaced and gauges cleaned again in July following Spring drawdown of the local water table. This scope assumes that NCDOT will provide the batteries for replacement. The July maintenance will include an estimated 319 RDS gauges (Phases I and II and reference gauges) as well as the three rain gauges.

To ensure safe and efficient gauge checking, trails to the gauges will be maintained through limited clearing and reflagging. Trail maintenance will be undertaken prior to the onset of the 2003-growing season in conjunction with gauge reactivation and again in July in conjunction with routine gauge maintenance. New trails will be developed as necessary to access gauges isolated by road removal and site rehydration.

#### **Task 4. Monitoring**

Monitoring gauges will be programmed to record water depth once a day. **Consultant** will download the estimated 319 groundwater monitoring gauges (33 reference and 286 Phase I and II) as well as the three existing onsite rain gauges seven (7) times during the 2003 monitoring period.

Gauges will be monitored monthly from March through June to coincide with the early part of the growing season and again in late November after the end of the growing season. Downloading once a month during these periods ensures that large amounts of data are not lost if a gauge malfunctions during these critical periods.

Gauges will be downloaded on average once every other month from July through October. **Consultant** will plan to download approximately half of the gauges in alternating months during this period such that all gauges are downloaded during a two-month period. All reference gauges and rain gauges will be downloaded each month during this period.

Based on safety concerns given the history of hunters trespassing on the CWMB, **Consultant** personnel will cease work on downloading the monitoring gauges if hunters are encountered or reasonably suspected of being onsite during a site visit. **Consultant** will notify NCDOT immediately if this situation arises and will reschedule a site visit to complete the interrupted downloading. If hunters are encountered or reasonably suspected of being onsite on a second occasion, **Consultant** will cease downloading gauges until after the end of the rifle season for deer. **Consultant** will notify NCDOT immediately if this situation arises. Given the data storage capacity of the gauges, no data is expected to be lost other than by malfunction of individual gauges if downloading ceases during this period.

### **Task 5. Data Compilation and Reports**

As part of the data quality control and quality assurance, the RDS data will be compiled and checked after each collection effort. "**Consultant**" will use the current NCDOT monitoring spreadsheet as a template for analyzing hydrology data to document whether hydrological success criteria are being met. Hydrological success criteria have been outlined in the November 7, 2001, memorandum from Michael F. Bell (COE) to the MBRT.

"**Consultant**" will prepare the annual monitoring report following a template provided by NCDOT and used for the Phase I monitoring report for 2002. "**Consultant**" will prepare the summary of the hydrology data and evaluation of hydrologic success. NCDOT will provide the results of the vegetation success monitoring and photo documentation for inclusion in the annual monitoring report. "**Consultant**" will provide the draft annual monitoring report in electronic format (Word format) for NCDOT review and comment before finalizing the annual monitoring report for electronic submission by NCDOT to the Mitigation Bank Review Team.

### **Task 6. Project Administration**

NCDOT coordination and project administration will be ongoing throughout the project period. Monthly status reports will be provided to the NCDOT project manager. Four (4) NCDOT/"**Consultant**" administrative meetings (in Raleigh) are projected to review project data, summary reports, and general project status.