DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
PANAMA CITY REGULATORY OFFICE
1002 WEST 23rd STREET, SUITE 350
PANAMA CITY, FLORIDA 32405-3648

REPLY TO
ATTENTION OF

April 10, 2007

North Permits Section
Panama City Regulatory Office
SAJ-2004-1864-NWP
Modification #1

The St. Joe Company
c/o Mr. Thomas O. Estes
245 Riverside Avenue
Suite 500
Jacksonville, FL 32202

Dear Mr. Estes:

Subject: Modifications to Devils Swamp Mitigation Bank (DSMB)
Mitigation Bank Instrument (MBI) - File # SAJ-2004-1864-NWP

The purpose of this letter is to authorize a requested modification by the bank sponsor, The St. Joe Company, to the MBI for the DSMB. The requested modification consists of replacing "Attachment B-8 – Monitoring Plan" with the attached revised "Attachment B-8 – Monitoring Plan."

The Corps has received concurrence for the approval of the proposed modification to the DSMB MBI from the Environmental Protection Agency (EPA) and the U.S. Fish and Wildlife Service (FWS).

The MBI for the DSMB is hereby modified as requested. This letter and the attached revised monitoring plan should be inserted into your copy of the DSMB MBI. This letter and the attachment will be posted on the Corps web site at: http://www.saj.usace.army.mil/permit/permitting/general_permits/SAJ_86/SAJ86_TOC.htm.

If you have any questions concerning this modification of the BPMB MBI, please contact the project manager, Mr. Don Hambrick, at the letterhead address, by telephone at 850-763-0717 ext. 25 or by electronic mail at gordon.a.hambrick@saj02.usace.army.mil.

BY AUTHORITY OF THE SECRETARY OF THE ARMY:

Paul L. Grosskruger
Colonel, U.S. Army
District Commander

Copies Furnished:
EPA, Atlanta (Cecelia Harper)
USFWS, Panama City (Hildreth Cooper)
FDEP, Tallahassee (Vicki Tauxe)
Ecological Resource Consultants, Inc., Tallahassee (John Tobe)

ATTACHMENT B-8 – MONIORING PLAN

(Revised Mod #1, April 10, 2007)

Performance Monitoring

Ecologic restoration of plant communities is dynamic and is expected to go through various seres or successional stages until a particular ecologic target is achieved. These targets are included in the DSMB instrument in part IV. Operation of the Bank, 2. Final Success Criteria, a. Community Requirements. As such, periodic evaluation regarding the attainment of target conditions requires monitoring of sample areas to measure the effectiveness of the restoration techniques. The annual monitoring will provide quantitative and qualitative information that can be objectively analyzed. The results of this analysis will allow for interpretation and conclusions from the data. These results will then be reported and if it is deemed that the current methodology is not producing the appropriate ecological response, the methodology will be rethought and adaptive management can be applied as needed.

Ecological monitoring or sampling techniques described in this attachment will allow for the objective measure of species composition, species richness, as well as the proportional distribution (frequency, density and coverage) of lifeforms (groundcover, shrubs and trees). The experimental design for sampling of populations that allows for objective conclusions is derived from widespread and generally accepted procedures/protocol found in Field and Laboratory Methods for General Ecology (Brower, et.al.,1990; Barbour, Burk and Pitts, 1980). The distribution, fecundity and overall health of the vegetation on this site is expected to respond favorable to the proposed hydrologic restoration and physical removal of primarily woody/fire suppressed vegetation by mechanical means and by prescribed fire. In order to track the changes in community structure, species composition and species diversity, we propose to use a transect along which plots will be sampled for the cover, density and frequency of groundcover/shrubs/subcanopy and trees. In areas where trees display a random distribution, *i.e.* outside of planted pine areas, point quarter sampling will be used.

Plants will be identified using vascular plant identification manuals appropriate for this area of Florida

Extensive observations of similar ecosystems and studies were utilized in the development of the protocols. In addition to using quantitative methods through such means as transects and plots, qualitative observations on the overall health and succession of plant assemblages will be noted by photography and notes during walking transects. Walking transects will provide qualitative observations on the overall conditions within a particular plant community, identified as polygons on aerials. This will be helpful in comparison to the quantitative sampling areas to the overall conditions within a particular polygon. The idea of

using walking transects is to ensure that the quantitative monitoring is indicative and representative of the overall plant community being sampled. Invasive exotics will also be noted during all sampling while on site. All vegetative sampling will be done in late summer/fall (August-November) to ensure that most species will be in flower or fruit, this will aid in identification.

Notes on the hydrologic restoration will be made in the form of standard qualitative observations of hydric soil characteristics as employed by the USACOE. Hydrologic restoration is based on standard modeling techniques. The hydrologic restoration will be carried out by Hayworth Engineering Science, Inc.

Protocols

Vegetative monitoring will be carried out pre-restoration in the summer/fall and annually thereafter through the time period as specified in the mitigation instrument. Two types of monitoring will be carried out, quantitative and qualitative. The quantitative monitoring/sampling will be through the use of transects, plots and point quarter method. The proposed locations of quantitative and qualitative (walking transects) transects are shown on exhibit A-1-7 of the mitigation plan documentation. The qualitative monitoring will use a walking transect to record species diversity and observations on the overall health, distribution, wildlife usage, as well as any sightings of invasive exotics. The walking paths will be designed to ensure maximal coverage of all typical landscape/community types in each phase. The specific parameters to be observed and recorded on the walking transects for all polygons include the following:

1. Estimated dominance of graminoids (grasses, sedges and rushes) based on the
   following cover classes as per Braun/Blanquet scale (Barbour, et.al., 1980):
   1= 0-1%; 2= 1-5%; 3=5-25%; 4=25-50%; 5=50-75%; 6=75-100%
2. Estimated dominance of canopy (if present) based on the following cover classes as per Braun/Blanquet scale: 1= 0-1%; 2= 1-5%; 3=5-25%; 4=25-50%; 5=50-75%; 6=75-100%
3. Estimated height class of the majority of woody shrubs using the following scale:
   1 <0.5m; 2=0.5-2m; 3=2-5m; 4=5-10m; 5=10-15m; 6=15-20m; 7=20-35m; 8>35m
4. Estimated abundance of weedy or ruderal species based on the following scale:
   1 absent; 2 occasional <5% of a given area; 3>5% of a given area. In conjunction
   with these observations a list of commonly seen ruderal species will be compiled.
5. Estimate of appropriateness of tree density and health.

6. Notes on the presence of a water table, hydrologic indicators, and hydric soil indicators at selected area along walking transects.
7. Wildlife usage and natural history notes. Observations concerning the fauna and their life histories as reflected in footprints, scat, herbivory, nests, etc.
8. Invasive exotics will be georeferenced and appropriate staff selected by the mitigation sponsor will be contacted. The mitigation sponsor is responsible for the eradication of invasive exotics.
9. Any notes on the general aspect of the site and how adaptive management techniques might be used toward restoration target/goals.
10. Photographs of selected areas of the transect to show general aspect of the landscape.

A descriptive summary that compares the observations made during the walking transects with the quantitative measurements will be included in the annual report. This summary will include interpretation and drawing conclusions from the data and how these findings are instructive of the overall progress toward the restoration goals as outlined in the DSMB instrument in part IV. Operation of the Bank, 2. Final Success Criteria, a. Community Requirements. This critical thinking will allow for evaluation, readjustment and interpretation of the restoration methodology and techniques. Adaptive management will be used to adjust and revise management activities accordingly. Photographs taken during the sampling will visually support written observations and overall trends toward restoration goals.

Quantitative Plant Sampling

1. Groundcover, shrubs and subcanopy (woody plants greater than 3 meters tall and with a stem less than 2.34 cm (4 in) at diameter of breast height or dbh (1.5 m)). The quantitative sampling will be designed along a 100 meter transect that will be placed in each polygon of a particular plant assemblage to be sampled. These representative samples will measure the proportional distribution of groundcover, shrub and tree species. Groundcover includes all herbaceous and some weakly wooded plants that are less than 1.5 m tall or have a (dbh) diameter at breast height (1.5 m) of less than 2.54 cm. Vines are not considered groundcover but will be listed in a separate category. Tree saplings will noted. Shrubs include woody plants of relatively low height, having several stems arising from the base and usually lacking a single trunk. Each sample point will be located along the transect, with each point distributed every ten meters (these will be georeferenced and marked by insertion of an iron piece) along the transect. At each point three, 1 m x 1 m subplots or square quadrats will be measured and sampled. These permanent plots will be georeferenced and marked by insertion of an iron piece for future location with a metal detector. The plots will be distributed in a linear fashion perpendicular to the 100 meter transect. Each transect will thus have thirty separate, 1 m x 1 m plots in which the cover, density, frequency and shrub (if any) height will be recorded. Shrub

height measure will use the following scale:1 >0.5m; 2=0.5-2m; 3=2-5m; 4=5-10m.

2. Trees. Trees in this sampling technique include woody plants with a main trunk greater than 2.34 cm dbh and have stem greater than 1.5 meter tall. Basal areas of trees are determined from trunk circumference measured 1.5 m above the ground. A direct measurement of foliage coverage is difficult in trees and the basal area generally is proportional to coverage.
Point quarter or quadrant plotless sampling will be employed in areas where the trees have not been planted in plantations, i.e. non-randomly. If non-random, highly aggregated or uniformly spaced trees are found within areas to be sampled along the transect, one 10 m x 10 m plot will be located along the transect and the trees within the plot will be measured for cover and density.

If point quarter sampling is used, each point along the 100 meter transect will be used as the center for four compass directions (N, S, E, W), which divide the sampling site into four quarters or quadrants. In each quadrant, the distance in meters to the center point of the nearest individual tree, regardless of species will be measured. Only one tree per quadrant is measured so that a total of four plants per point are measured. The tree is identified and the dbh (1. 5 m) is recorded as diameter or circumference. If foliage cover can be measured the circular outline of the canopy can be used however direct measurement of foliage coverage is difficult in trees. To approximate the foliage coverage, basal areas of trees will be determined at 1.5 m above the ground. The relative coverage of a species is the proportion of its coverage compared to that of all species in the community combined. Density, frequency and cover can be calculated from measuring basal area in the methodology described above.

If plots are used to measure trees, each will be 10 m x 10 m. One 10 m x 10 m plot will be distributed at a point on the transect, from one of the points used to sample groundcover as described above. Each 10 m x 10 m plot will be georeferenced and marked by insertion of an iron piece for future location with a metal detector. In each plot the trees will be identified and the dbh will be recorded along with an estimate of the tree height using the following scale:1=10m or less; 2=20m; 3=30m; 4=greater than 30m. Density and cover can be calculated from measuring basal area in the methodology described above.

Surface Water Monitoring

A certified professional engineer will perform all hydrologic modeling on site and set the surface water gauges and wells at locations as outlined in the mitigation instrument, these will be monitored continuously as per the instrument. A certified professional engineer will also supervise the installation of groundwater wells and the complete monthly monitoring. In conjunction with the vegetative monitoring and interpretation of quantitative and qualitative data, the gauges and wells will be used to interpret the invert elevation being tested at the stoplog weirs, in order

to fine tune the final elevation at which they will be set to best restore and maintain the intended ecological conditions. The stop logs may need to be removed periodically to allow the site to dry down for prescribed burn implementation or other access as needed. The drawdown is only intended long enough to allow for the prescribed burn. The hydrologist will also place gauges in the permanent transects to measure groundwater in the soils. These are not required as per the permit.

Photography

The photographic specifications used in conjunction with the quantitative plant sampling protocol will include photographing the sampling site at either end of the 100 meter transect line. The photographs will include as much view as is typical for a standard 35 mm digital camera. No editing of photos will be used other than that used to manipulate photos for processing into formats suitable for report writing. All photos will be dated and georeferenced whenever possible. All labeling of photographs in final reports will include the date of photo, location and figure or photo number. Photographs will be copied onto a CD for future reference.

Baseline Monitoring

Before ecological restoration activities that disrupt plant distributions are begun, the monitoring plots will be sampled. This data will be used for future comparison and will include the following information for each plot or quadrant.

1. General site conditions on, around and in the vicinity of the transects and plots.
2. Evidence of past land use activities will be noted, especially those that might effect plant distribution, composition and abundance.
3. The proportional distribution of groundcover, shrub and tree species using the protocol of sampling outlined in quantitative plant sampling, above.
4. Presence of invasive exotics in plots.

Analyzing the Data

The annual monitoring will provide quantitative and qualitative information that can be objectively analyzed with statistics. At this time we anticipate using importance values calculated from relative cover, relative frequency and relative density, to compare landscapes/plant communities at the restoration site to those at the reference sites.

Sampling data tables will be constructed. Each will contain a column of species measured and the relative cover, relative frequency, relative density and the importance value and importance rank. The following definitions will be used for relative cover, relative frequency, relative density, importance value and importance rank.

Relative frequency is the frequency of a particular species divided by the sum of the frequencies of all species, multiplied by 100.

Relative cover is the cover of a particular species divided by the sum of covers of all species, multiplied by 100.

Relative density is the density of a particular species divided by the sum of densities of all species, multiplied by 100.

Importance value is the sum of the relative frequency, the relative cover and the relative density of a species.

Importance rank % is the importance value of a particular species divided by the sum of all importance values for a transect, multiplied by 100.

The results of this analysis will allow for interpretation and conclusions from the data. These results will then be reported and evaluated. If it is determined that the restoration methodology is not producing the appropriate ecological response as this relates to the performance standards (part IV, section E), the methodology will be re-evaluated.

Reports and Record Keeping

Reports including all observations, raw and processed data, digital photographs will be compiled into a report. Annual monitoring will occur each fall. A copy of all records, in addition to those submitted, will be maintained at the offices of the Qualified Mitigation Specialist of record.

Success

The mitigation project is expected to be successful in restoring the pre-existing plant communities or at least show a strong trend toward this effect on the site. On site forensics and historic aerials have helped craft the understanding of the appropriateness of various species and how they might have been part of the ecology and biodiversity of this site in the past. Attachment A-7 of the mitigation plan documentation are lists of plants species typical for this area and are floristic lists of what are appropriate species for the plant communities at this site.

The monitoring results will be compared with the baseline data and evaluated against the performance standards (Part IV, Section E of the permit). We expect the importance values as recorded from the permanent transects on the restored site to move close to those found on appropriate reference sites. If after three years the vegetation, *i.e.* the relative coverage, density and frequency of appropriate species, is not clearly trending toward the target condition, selected areas may be seeded or planted with ecologically appropriate native species that would be typical for the intended natural community type.

Reference Sites

Appropriate reference communities will be selected from well managed public lands that contain comparable plant communities. This data will be used to help analyze the results from the quantitative measurements taken at the restoration site. The same sampling technique as described in the quantitative plant sampling above, will be used to collect relevant data that will be used for comparison. Target conditions of the permit may be modified in lieu of new information collected from reference communities. Target community type and realistic goals for this may need revision with the approval by the authorizing agencies.