Mitigation Performance Standards for Wet Pine Flats

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Derived from Rheinhardt, R. D., Rheinhardt, M. C., and Brinson, M. M. (2002). "A Regional Guidebook for Applying the Hydrogeomorphic Approach to Assessing Wetland Functions of Wet Pine Flats on Mineral Soils in the Atlantic and Gulf Coastal Plains," ERDC/EL TR-02-9, U.S. Army Engineer Research and Development Center, Vicksburg, MS and Lewis, P. L. & Teaford, J.W. (1995) *Wetlands Evaluation System: An Overview of a Proposed System for Forested Palustrine Wetlands in South Mississippi.* Unpublished Manuscript.

The Performance standards were developed by assessing the appropriate variables from the Wet Pine Flats HGM guidebook. Variables selected were those that are typically manipulated in ecosystem restoration. Familiarity with the HGM Wet Pine Flats model is strongly recommended (http://www.wes.army.mil/el/wetlands/pdfs/trel02-9.pdf). The goal of this system is to develop a sound, repeatable metric for determining ecological lift gained in enhancement/restoration activities undertaken as part of a mitigation plan pursuant to Section 404/401of the Clean Water Act and the State Coastal Zone Management Plan.

Hydrology

Landscape variables that depict hydrologic regime are based on both site reconnaissance and interpretation of maps. These variables are most appropriately measured in the office after a thorough visual assessment of the Wetland Assessment Area (WAA) and the surrounding topography. All impediments to natural surface flow should be removed and/or restored. Characteristic water level regime may be altered by (a) impediments to flow (dams including roads acting as dams), (b) drainage of water from the site, (c) surface water storage affected by an addition or excavation of material, (d) importation of water into a site from elsewhere, (e) alterations to evapotransportation rates by removal of vegetation or fire exclusion, and (f) alterations to microtopography or (g) to topsoil. If all impediments to natural surface flow cannot be removed or restored specific assessments may be made using the HGM Variables <Vsurflow>, <Voutflow>, <Vstorage>, <Vmicro>, <Vpore>.

Plant Community

Assessment of this function reflects the ability of a Wetland Assessment Area (WAA) to maintain a characteristic plant community composition and diversity. This is called the Functional Capacity Index or FCI. The Functional Capacity Index of the Plant community (FCIplant) is the average of the relative groundcover, subcanopy and pine composition as shown in the equation below. The Groundcover is the maximum of the herbaceous (Herb), native bunch grass (Nbg), or sedge (Sedges) scores. The wetland assessment area is an area of wetland within a bank that is relatively homogeneous with respect to the site-specific criteria used to assess wetland functions (i.e. hydrologic regime, vegetation structure, topography, soils, successional stage, etc.). The presence of invasive and exotic species (Exotics) reduces the groundcover functional capacity index as the aerial coverage of exotic species increases. Elimination of invasive species is preferred, however, less than 1% aerial coverage of exotic species is not reflected in the functional capacity index as long as control measures continue.

$$\text{FCIplant} = \left(\text{Groundcover} + \text{Subcanopy} + \text{Pines}\right) \div 3$$

Where;

$$\text{Groundcover} = \text{Exotics} \times \left[\text{MAX}\left(\text{Herb}, \text{Nbg}, \sqrt{\left(\text{Cypress} \times \left(\text{Sedges} + \text{Subc}\right)/2\right)} \right) \right]$$

The site-scale variables are assessed at one (1) fixed location and one (1) location chosen at random within each wetland assessment area (WAA) or 100ha (247 acres). Random monitoring plots should be located using a grid system and random number table. Monitoring will be assessed in four (4) nested plots at each location. A permanent pole placed vertically in the ground to mark the center of the nested plots should mark the center of the

nested monitoring points; 1m^2 plot, 2m radius, 10m radius, and 100m radius. The center of the monitoring plots should be permanently marked, preferably with a metal pipe or a steel fence post.

Herb =   1m^2 plot: 1 point for each species below,
　　　　　　　2m radius: 0.5 points for each additional species
　　　　　　　Divide the mean herbaceous indicator score of each WAA by 8.0; for Cypress/Pine Savanna (if Cypress present) divide the mean indicator score by 7.0.

Aletris spp.	*Aristida spp.*	*Balduina spp.*	*Biglowia nudata*	*Carphephorus spp.*
Chaptalia tomentosa	*Coreopsis spp.*	*Ctenium aromaticum*	*Dichromena spp.*	*Erigeron vernus*
Eriocaulon spp.	*Erygium intergrifolium*	*Eupatroium leucolepis*	*Helianthus spp.*	*Lycopodium spp.*
Muhlenbergia expansa	*Rhexia spp.*	*Sarracenia spp.*	*Schizachyrium scoparium*	*Xyris spp.*

Nbg =　　　　Native Bunch Grasses - 2m radius: Combined % cover area of the following; Ctenium spp., Muhlenbergia spp., Aristida spp., Sporobolus spp., Schizachyrium spp.
　　　　　　　Divide cover by 0.50
　　　　　　　Average scores by WAA

Sedges =　　　2m radius: Combined % cover area of the following; Carex spp., Sclaria spp., Rynchospora spp.
　　　　　　　Divide by 0.50
　　　　　　　Average scores by WAA

Cypress =　　　Stems per hectare (2.47 acres). See alternative density calculation strategy below.* Determine for density of pond cypress the following class sizes; (1)sapling >1m tall and less than 7.5 cm dbh (3 inches), x=density/250 (if the resulting score is >1.0, reduce to 1.0), (2) midcanopy > 1 m tall and 7.5-15 cm (3-6 inches) dbh, y=density/50 (if the resulting score is >1.0, reduce to 1.0), (3) canopy >15cm (6 inches) dbh, z=density/100 (if the resulting score is >1.0, reduce to 1.0). Cypress score = (x+ y+ z)/3.
　　　　　　　Average scores by WAA

Pines =　　　10m radius: Measure the basal area of all pine species > 1m high.   Score $\geq 0 \leq 6.25$ sq.ft = 1.0, 6.25-12.0 = 0.5, $\geq$ 12.0 = 0 (Lewis and Teaford, 1995)

Subc =　　　Subcanopy Vegetation - 10m radius: Count all stems at one meter in height even if they originate from same plant. If Subc < 200, then Subc = 1.0, If Subc is 201-300, then Subc = 0.5, If Subc > 300, then Subc = 0 (Modified HGM)

Exotics =　　　100m radius: Estimate % aerial coverage of all invasive species (i.e. Sapium Sebiferum, Panicum Repens, Imperata Cylindrica, etc.) If Exotics < 1% then Exotics = 1.0, If >1% then Exotics = (1.0-(% coverage)/10).

*For Cypress density, another way to determine density is determine the distance to the closest individual in each size class from randomly selected points in the WAA. To do this, at each center point, measure the distance in meters from the center point to the nearest sapling, midcanopy, and canopy stem of pond cypress. (Sample at least three points, more is better). Determine the average distance to individuals in each of three size classes. Calculate density as follows: Density=10,000/[2 x (average distance)^2].

Credit Release Schedule

20% - Authorization of the MBI, execution of the conservation easement, and establishing financial assurances.

15% - Restoration of the characteristic hydrologic regime and first incremental credit release.

15% - Second incremental credit release.

15% - Third incremental credit release.

15% - Fourth incremental credit release.

20% - Final credit release.

Incremental Credit Releases

In order to determine functional lift gained the functional assessment should be assessed to determine a baseline (FCIbaseline). The difference between the target FCI of 0.9 and the baseline is divided by four (4). Credits will be released when the assessment demonstrates a 25% increase in functional capacity. FCI assessments for credit release must occur no sooner than 6 months following the last successful burn. The standard for credit release is based on the following:

$$FCIrelease = FCIbaseline + (release\#)FCIincremental;$$

where:

$$FCIincremental = (0.9 - FCIbaseline) / 4$$

and

$$FCIbaseline = FCIplant(1st\ assessment)$$

Final Credit Release

FCI must be calculated for an additional 4 random sampling areas in each wetland assessment area. Timing of the evaluation must occur no sooner than 3 years following last successful burn. Hydrology must be fully restored to the entire WAA, FCIplants $\geq$0.9 and the total area of fire-maintained landscape must be at least 90 ha (222.4 acres).

Long Term Monitoring/ Stewardship

Assessment must be repeated at one random point per WAA every 3 years. Long-term management strategies must also include one growing season burn every 4 burns. The entire site should be visually assessed along transects 100m apart every 3 years to assess homogeneity.

Example

The Acme Mitigation Bank is now entering its second year of operation. The bank is approximately 1000 acres in size with 900 acres of wet pine flat restoration. Hydrologic restoration was completed through removal of an access road and the entire site was burned about seven months ago. The baseline FCI assessment was completed prior to any management activities.

<Herb> 1m^2 plot (1pt each):
      Aletris spp.
      Carphephorus spp.

2m radius (0.5pt each):
Lycopodium spp.
Helianthus spp.
Sarracenia spp.
Xyris spp.

$\langle Herb \rangle = 2 + 4(0.5) = 4/8 = 0.50$ (Note: no cypress present so divide by 8)

$\langle Nbg \rangle = 0$

$\langle Sedges \rangle$ = Carex spp. Approximately 5% $= 0.05/.50 = 0.1$

$\langle Cypress \rangle = 0$

$\langle Pines \rangle = 11$ sq. ft. $= 0.5$

$\langle Subc \rangle = 330$ stems $= 0$

$\langle Exotics \rangle$ = Approx. 2% Imperata Cylindrica $= (1.0 - (2/10))=0.8$

Groundcover $=0.8(MAX(0.50, 0, 0.1)= 0.8(0.50)= 0.40$

FCIbaseline $= (0.40+0.50+0)/3= 0.30$

With a baseline FCI of 0.30 and a target of 0.9 incremental credit releases would require an increase of:

FCIincremental $= (0.9 - 0.30)/4 = 0.15$

So the first incremental credit release will require;

FCIrelease $= 0.30 + (1)0.15 = 0.45$

And the remaining releases;

FCIrelease $= 0.30 + (2)0.15 = 0.60$
FCIrelease $= 0.30 + (3)0.15 = 0.75$
FCIrelease $= 0.30 + (4)0.15 = 0.90$

Final credit release will occur after 3 years of maintaining an FCI of 0.9 without the need for further management activities.