

Appendix J: Monitoring Plan

Monitoring Protocol:

Parameters to be monitored at the points are based on the objectives of the treatment project and its anticipated secondary effects. The parameters to be monitored include:

- density and cover of trees and tree saplings by species
- understory cover by physiognomic type and species
- frequency of understory species
- percent cover of bare ground
- percent cover of down litter; and plot appearance (photographs).

Permanent monitoring plots are randomly established on each of the treatment areas using a criterion of one plot per 150 acres. Plots are randomly located on the areas by overlaying maps of the areas with a systematic grid of potential monitoring points. A random number generator or random number table will then be used to select actual monitoring points and potential alternate points. The geographic coordinates of all the selected points are recorded. The selected monitoring points are located on the ground using GPS to navigate to the recorded geographic coordinates. Upon locating each of the selected points, the field crew determines the suitability of the selected point. If the point is deemed suitable, the crews will permanently mark the plot location with a metal stake and identification tag. If the plot is not suitable, the crews will navigate to an alternate monitoring plot location, continuing to do so until a suitable location is found.

The monitoring plan employs combination of square quadrats, line transects, and photo points to measure the selected parameters. The sampling design for each parameter is as follows.

- **Tree Cover**

Tree cover is measured by the point intercept method at 2 m intervals along each of the 100 meter line transects. Cover of saplings and shrubs is measured by line transect method along the same 100 m transects. Transects are placed at the randomly selected monitoring point and are oriented perpendicular to the slope direction.

- **Tree Sapling and Shrub Density**

Tree, sapling, and shrub density is measured in 1000 sq. meter quadrats (10m x 100m). The quadrats are centered along the length of the transect line and extend 5 m to either side of the line. Each tree, sapling, and shrub within the quadrat is counted and identified by species, height, DBH, and stage class (tree/sapling/shrub).

- **Herbaceous Cover**

Cover of understory herbaceous (grass and forb) species is measured by standard Daubenmire cover plots (20 x 50 cm) located at 3 m intervals along one side of the transect line. The first plot is randomly located within the first five meters of

the line. Additional plots are placed at 3 m intervals along the same side of the line. Cover of bare ground and downed litter is also measured in these plots.

- **Frequency of Dominant Species**

Frequency of dominant or indicator understory species is measured using a 1 sq. meter nested frequency frame placed at 2 m intervals along the line beginning at the point one meter beyond the random starting point for the herbaceous cover plots. The frame is graduated to provide nested plots of 1 sq. m, 0.25 sq. m, and 0.1 sq. m.

- **Plot Appearance**

Photo points are established at the middle of each transect (25 meter mark). Four digital photos are taken at each plot, with one taken toward each end point of the line and one taken perpendicular to each side of the line. The photos will be taken with uniform camera settings to minimize variations in the appearance of the plots. The date, time, and GPS coordinates of the photos is recorded.