

River Sinks Northwest Tract Upland Restoration Plan April, 2011

Goal:

The goal of this plan is to restore the upland community of the River Sinks Northwest tract at Wakulla Springs State Park from its current status as a loblolly pine plantation to a longleaf pine upland forest.

Specific Objectives:

- A stand of dominant, uneven size longleaf pine overstory. The stocking of longleaf pine significant enough to aid as a natural carrier of frequent fires through the plant community.
- Diversity of scattered upland hardwoods and oaks such as turkey oak, bluejack oak, post oak southern red oak, and live oak.
- Understory comprised of native vegetation that can be maintained by and carry frequent fire. Increase native target understory vegetation and litter including grasses and woody shrubs to 80% cover in order to carry fire through 80% of the restoration areas within 5 years after final removal of the planted loblolly pine and planting of desired vegetation.
- Restore original topography by flattening windrows and “bedded” areas as needed dependent on response of groundcover and erosion control.
- Prevent establishment of invasive exotics.
- Increase diversity of flora and fauna. Target flora similar to what is found on the adjacent Apalachicola National Forest.
- Return of /increase in fauna native to upland pine forest community. Indicator species include gopher tortoise, red-headed woodpecker, fox squirrel, eastern diamondback rattlesnake, indigo snake and gopher frog.
- Protection of the adjacent basin swamp and sinkhole areas during the restoration process.

Description of Desired Future Condition:

Upland pine forest dominated by a longleaf pine overstory with a sparse overstory of scattered oaks such as live, turkey, bluejack and post oak, containing a groundcover that has the ability to carry frequent fire through the community. No establishment of exotics. An understory of herbaceous plants with some woody shrubs that is maintained with frequent fire. The presence of fauna native to longleaf pine uplands, which would include gopher tortoise, diamondback rattlesnakes, fox squirrel, gopher frog, red-headed woodpecker, insects, etc. Topography of the area returned to the characteristics of the Woodville Karst Plain – mostly flat to gently rolling land surface adjacent to karst

features such as sinkholes, springs, caves and depressional wetlands. Maintenance of adjacent basin swamp areas.

Pre-restoration Conditions:

The River Sinks Northwest tract at Wakulla Springs State Park contains approximately 145 acres of row-planted loblolly pines from pre-park silvicultural practices. The loblolly pines were planted in 1978-1980 in 10 foot rows with 6 feet between trees for about 725 trees per acre and as of 2011 are about 30 years old. Due to very low soil fertility and water-holding capability, site index is low on a portion of the tract and thus the growth rate of the pines in those areas is poor. DBH range for the pines is 4 – 12 inches, making them of pulpwood and chip-n-saw value on the timber market.

In the loblolly pine plantation, the St. Joe Company, to prepare the sites for tree planting, scraped logging slash and some topsoil to create north-south running windrows spaced about 200 feet apart throughout most of the 145 acre tract. In the last 3 decades, these windrows have been colonized by shrubs, hardwood trees and some longleaf pines. Some of these hardwood trees are on-site species that add diversity to the community. The rows where the loblolly pines are planted were “bedded” as part of the site preparation. “Bedding” is the site preparation process where soil is pulled from the sides of the rows and then piled in the area where the trees are planted. These “beds” now range in height from 6 inches to 3 feet and have the loblolly pines growing on the top of them.

Most of the loblolly pine plantation in River Sinks Northwest tract has scattered clumps of remnant wiregrass and other desired native shrubs and plants still growing on site. The St. Joe Company also left a buffer zone of the original upland pine community along the southern and eastern boundaries of the tract that border up to the two highways adjacent to the property. These buffer areas are about 100 feet wide and contain mature longleaf pine and desired hardwood trees, shrubs, and herbaceous plant species. Portions of the River Sinks Northwest tract have been prescribed burned in recent years. Management Zone BB (44 acres) was burned in February of 2003 and then again in February of 2009. Management Zone FF (63 acres) was burned in April of 2009. The upland pine community that has been planted to loblolly pine, borders several basin swamp areas within the tract. The basin swamp areas are in good condition and have been mostly left undisturbed.

The tract lies in the Woodville Karst Plain topographic region. This region is characterized by a mostly flat to gently rolling land surface with karst features such as sinkholes, springs, caves and depressional wetlands found within the area.

Constraints:

Climate - Weather constraints dictate when prescribed burning is permissible and effective.

Location – Tract is within a critical smoke management area which limits when burning can be accomplished.

Staffing - Shortage of staff and other competing priorities can make staff time difficult to devote to this task at appropriate times.

Public perceptions - Prescribed burning and tree harvesting can create a negative reaction in some public forums.

Lack of seed source - Lack of vast areas, accessible and suitable for collecting desired species seed could constrain the pace of restoration. Commercial seed source may or may not be available.

Planting - Large hardwood trees, shrubs and stumps may impede access to the planting area and limit the amount of seed-soil contact needed for seed germination.

Lack of knowledge - The response of groundcover to timber harvesting and various site preparation methods for this community and location are unknown.

Budget - Uncertainty about future budget allocations may slow down the restoration schedule or prohibit the funding of certain restoration activities.

Strategies to be employed to do the restoration:

Set-up experimental plots - Experimental plots will be established prior to total timber clearing. Groundcover and treatment plot monitoring will be conducted during the restoration process. See the experimental monitoring plan for more specifics on plots.

Burn donor zones - A burn plan is needed annually for areas deemed as appropriate donor sites. Schedule of burning for these sites will need to be projected two to three years in advance in anticipation of wiregrass harvesting for proper planting in newly cleared and prepared areas. The donor sites should be burned in the growing season, April-July to ensure good seed viability prior to the anticipated seed harvesting and planting.

Removal of loblolly - Over time, it is the goal of this restoration process to remove all the planted loblolly pine and to convert the site to longleaf pine. During the removal of the loblolly pine, desirable tree species such as longleaf pine, post oak, turkey oak, live oak and bluejack oak will be left on-site. Turkey oak litter has been shown to burn with similar intensity as longleaf. This litter will be important to help reintroduce the process of fire into the landscape. Removal of the loblolly pines is expected to be gradual over most of the tract with several thinning operations required to successfully convert the site to longleaf pine while maintaining an effective prescribed fire burning rotation. The first thin should remove every fifth row of trees and then selectively remove diseased, deformed, damaged, and suppressed trees from the remaining residual rows. About half (50%) of the timber volume will be removed. Future tree harvesting after the first thin will be determined based on several factors influencing successful restoration. This

gradual conversion to longleaf pine will allow knowledge to be gained and seed to be collected from a limited availability area. It is necessary to quickly establish groundcover that can carry fire through 80% of the pine area in order to burn the site to control off-site hardwood invasion and promote grassy upland vegetation.

There will be one site on the tract where conversion from loblolly pine to longleaf pine will be swift. An 11 acre site in the northern portion of the tract with poor growth loblolly pine will be clearcut and then site prepared and planted to longleaf pine. The loblolly pines within this area are small and of poor value. There is a good amount of wiregrass growing in portions of the 11 acre site.

Flattening windrows – If areas of the widely scattered windrows need to be reduced so that they are level with the surrounding grade, then flattening of the windrows should be done after all loblolly pines have been removed. The site preparation should be done during the late summer and early fall so that the prepared areas are ready for seeding in December, January and February.

Leveling of the raised “beds” – Research will be conducted on what methods to use to level the many elevated “beds” while minimizing negative impacts to the desired native vegetation including wiregrass. Once a successful method is discovered, that system will be used to level the “beds” after all loblolly pine trees have been harvested. The timing of this leveling will be similar to that used for the flattening of the windrows.

Harvest groundcover seed - Wiregrass seed needs to be harvested in a narrow window during the month of November after a burn of the donor site earlier in the year. The seed is collected using front mount or pull behind rotary brush harvesters mounted on ATV's. The seed can be transferred to paper lawn-debris bags and stored briefly in a cool location for planting from December to February of that same season. Seed viability is very poor if the seed is stored longer than a few months. It should be harvested and used in the same season.

Plant groundcover seed - Seed needs to be planted from December to February in any newly cleared and prepared areas. Planting rate is 6 pounds of bulk seed per acre. Planting is done with a 6-foot Grasslander seed drill.

Prescribed burning - Burning of the tract should be conducted after any timber harvesting is completed. There should be a time lag of several months between the timber harvest and burning. Burning would be preferred to be done in the late fall to early spring. Pile burning of logging slash, debris, and stump piles may also be required.

Hardwood control - Control of off-site hardwoods such as laurel oak and sweetgum, if not harvested or controlled with fire, will require spot treatment with an approved herbicide or mechanical mowing.

Near-term actions (year 1-2) after complete removal of loblolly pines:

1. *Monitor timber harvest.* Insure directions and requirements are followed and met by loggers for the first thinned area and the 11 acre clear-cut site.
2. *Monitor groundcover in experimental plots.* The experimental plots should be monitored annually in March - May for groundcover response.
3. *Burn donor sites in April - July.* If it is determined that additional herbaceous vegetative seed is required for the 11 acre clear-cut site, then the selected donor sites for groundcover harvest should be burned during the growing season prior to seed harvest.
4. *Harvest groundcover seed.* If it is determined that additional groundcover vegetation is required, then groundcover seed should be harvested November to December from the donor sites that were burned during the growing season.
5. *Prescribe burn the tract.* The tract should be prescribed burned in the November – December – January time period following the timber harvest. Stump piles, if present, could be burned at anytime as long as they have dried out for a significant time. The burning must be completed prior to any tree seedling planting and planting of vegetative seed. Some additional firebreaks will need to be established prior to burning.
6. *Plant groundcover seed.* If it is determined that additional groundcover vegetation is required within the 11 acre clear-cut site, then the collected groundcover seed should be evaluated for viability to determine seeding ratio. Groundcover should be planted using the Grasslander seeder with the disk in place when possible.
7. *Plant longleaf pine-* Plant containerized (tublings) longleaf pine seedlings within the 11 acre clear-cut site. Seedlings will not be planted in rows, but in a random manner that gives 300 – 400 trees per acre when completed. Planted can be done in January, February, or late summer (August, September).

Long term action (>2 years):

1. *Burning-* Burning and burn planning should continue for the River Sinks Northwest tract. Burn rotation will range from 2 – 5 years. The first burns after longleaf pine tree planting should be during the winter months to protect seedlings in their growth (candle) stage. Later burns, when longleaf pines are established, could be conducted during the growing season.
2. *Monitoring-* Monitoring for groundcover inventory needs to be conducted yearly during the growing season, April – July. If prescribe burning has been completed, allow ample time for groundcover to sprout before inventory is surveyed.
3. *Evaluate other areas ready for harvest.* Evaluate remainder of the tract for additional and final harvest of loblolly pines from the area that was only thinned. Prepare these areas for loblolly pine harvest and work with the Florida Division of Forestry to get bids on the loblolly pine harvest.
4. *Restoration of harvested pine areas –* Restore when the larger loblolly pine area is harvested. Use the restoration methods and any discovered research methods that were described for the original 11 acre clear-cut area.

Monitoring Plan:

Experimental Plan to Determine the Response of Groundcover to Various Bedding Removal Restoration Techniques

A long term experiment to guide future management and restoration decisions at Wakulla Springs State Park, 2011

By Tova Spector

Objective: To determine the response in groundcover to different restoration treatments that level bedded areas and restores topography.

Hypothesis:

1. Cover of target groundcover will increase from 2011-2015 in all treatments.

The following treatments will be used:

Treatments

Treatment A. Mechanical loblolly pine removal and burn.

Treatment B. Mechanical loblolly pine removal and flatten bedding using a root rake and burn

Treatment C. Mechanical loblolly pine removal, flatten bedding by strip disking (harrowing) and burn.

Objective:

1. Management Objective: Increase native target groundcover to 60% and litter 20% for a total of 80% cover in order to carry fire within 5 years.

Sampling objective: Want to be 80% certain of detecting a 20% increase in native target cover between 2011 and 2015. Willing to accept a 10% chance that there will be a false-change error.

Design:

Plot sizes: Plots for each treatment are 3 acres in size.

Replicates:

- 3 treatments with 6 permanent transects per treatment

Sampling Method:

For ground cover- 6 permanent 50 m line transects stratified every 25 m and placed at least 1 m from the edge in each treatment plot running perpendicular to existing or former bedding with point intercept every $\frac{1}{2}$ m using the following categories.

- Native – target herbaceous species (fine fuels, wildflowers, etc)
- Native-Target woody species (saw palmetto, fetterbush, gallberry, etc)
- Native – non-target species (*i.e.* sand pine, laurel oak)
- Ruderal
- Non-native
- Target litter (longleaf pine, turkey oak, live oak, etc.) Litter is plant material that is disconnected from the plant. Dead plant material connected to a plant is still part of a plant.
- Non-target litter (loblolly pine, laurel oak, etc)
- Bare ground
- Wiregrass (*Sporobolus spp.* or *Aristida spp.*)
- Lichen

Transects were selected randomly by selecting random numbers along the length and width of the grid. The transect locations were stratified along the width of the plot to ensure spacing between transects and sampling of the entire plot. The width was stratified every 25 m. If start points were selected that were immediately adjacent then another start point was randomly selected within the stratification in order to prevent over lap. This left at least 1 m in between transects. The transects were 50 m long so start points were between 0-10 m lengthwise along the grid. Sampling took place on the right side of the transect line. Only the first cover class hit starting at $\frac{1}{2}$ m above the ground was counted. Photo points have been established at the beginning point of each transect.

Groundcover will be sampled prior to timber harvest and then after one full growing season post-timber harvest. Subsequent sampling will take place prior to prescribed burning and then after one growing season post-burn.

Analysis: Groundcover changes from the different methods will be analyzed by a one factor analysis of variance with repeated measures.

Field equipment:

Camera

Wire flags

Paint

Survey stakes

Measuring tapes

Random number table

Data sheets

Compass

Clipboard

Flagging

Pencil

GPS

Rebar

Wire

Hammer

Tags