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Woody Biomass Utilization

On National Forest System Lands:

Opportunities and Lessons Learned



PROJECT INFORMATION

In 2006, a group of Alabama partners received a grant from the USDA Forest Service to explore the possibility of developing woody biomass markets for Alabama.

Project Summary: The project originated to address significant forest health concerns on the National Forests in Alabama (NFAL) by removing small diameter stems and unmerchantable woody material. This material was removed from the Talladega National Forest and co-fired with coal at Alabama Power's Gadsden Steam Plant. The project had several complementing goals:

- ◆ Determine suitable harvesting and chipping methods of harvested understory for electric power production.
- ◆ Determine the potential available market for woody biomass.
- ◆ Assess forest health as a result of understory removal.
- ◆ Determine if the US Forest Service can use suggested methods to reduce costs of forest management.



REDUCTION OF COSTS

The National Forests in Alabama (Bankhead, Talladega, Tuskegee, and Conecuh) currently have significant forest health issues related to insect infestation, storm damage, over-stocked conditions, decline of key ecosystem components, and build-up of fuels.



To restore native woodland conditions and to implement restoration plans, considerable amounts of small diameter stems, such as those used for woody biomass, need to be removed. Additionally, these National Forests lie within the native range of the red-cockaded woodpecker. Habitat requirements for this species include open, park-like conditions with ground covers > 40% herbaceous without mid-story hardwoods greater than 7 feet in height.

Depending on the treatment method, cost estimates of improving these lands range from \$125—\$660 per acre. Utilization of woody biomass for fuels would decrease costs of treating these areas.



FOREST HEALTH

Study plots were established to support two studies:

Study #1:

“Forest Health Evaluation of Stand Health in Association with Biomass Removal and Standard Silvicultural Practices between Two Land Managers” evaluated the treatments implemented in comparison with traditional treatments. Initial data suggests that herpetofaunal communities respond to prescribed burning in the Talladega National Forest not by a presence-absence relationship of species between burn intervals, but rather by changes in community composition as a result of shifts in relative



abundances of those species.

Study #2

The Joint Fire Science Program field research was completed in September 2008. While some data analysis continues at the University of Alabama, the final report indicated that the presence-absence relationship of herpetofaunal communities relative to burn interval were not that distinct. However, it is the dynamic mosaic burn intervals that shift across the landscape that are most important.



HARVESTING & CHIPPING

Wood for these tests was harvested as part of a National Forestry Service Project from a forested tract in the Talladega National Forest near Heflin, AL. The trees stand primarily consisted of loblolly pine trees that averaged 8” diameter at breast height.



The trees were all chipped with a Precision Husky PH3045 Horizontal Grinder, powered with a 500 hp diesel engine.

The machine blades could be adjusted to change the size of the chips produced. Precision Husky worked with grant partners to develop equipment to meet the specifications needed for coal-fired power generation. At the time, equipment in current use did not produce the size specifications required for co-fired application at Alabama Power’s Gadsden Steam Plant.



POWER GENERATION

During October and November of 2007, chips from the Talladega National Forest were co-fired in the Unit 2 boiler at Alabama Power's Gadsden Steam Plant. A total of 55 performance, emissions, and operations tests were performed over a period of 3 weeks.

The objectives of this study were to determine under what conditions of size, composition, and moisture content that green wood chips could be successfully co-fired with coal, and how co-milling green wood chips affects power plant operations, efficiency, and emissions. Most of the boiler performance and emissions test data were measured and recorded by a test team from Southern Company's Generating Plant Performance group.

These tests were successful, and showed that up to 15% (equivalent to 3.8 MW biomass power) by weight wood could be co-fired with coal at Alabama Power's Plant Gadsden Unit 2.



LOCAL MARKETS

The objective of the *Green County Steam Plant Woody Biomass Availability Assessment Study* was to identify potential consumers, sources and volumes of woody biomass within a 75 mile radius of the Alabama Power Green County Steam Plant near Demopolis, Alabama. Findings are as follows:

- ◆ There is a growing interest in woody biomass as an alternative fuel source.
- ◆ Forest residues are an under utilized resource, and offer a significant opportunity for certain operations that can justify the costs.
- ◆ There are abundant forest residues potentially available within the study area (estimated to be approximately 3.8 million green tons per year.)
- ◆ There are abundant wood products mill residues produced and sold within the study area (estimated to be approximately 6.9 million green tons per year.)
- ◆ With over 10 million green tons of forest and mill residues potentially available, the study area has the resources needed to support the use of wood for energy production at Plant Green County.

