OPTIMIZING WILDLIFE HABITAT QUALITY AND OAK REGENERATION IN BOTTOMLAND HARDWOODS USING MIDSTORY CONTROL AND PARTIAL HARVESTS

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ABSTRACT

Bottomland hardwoods can provide both wildlife habitat and timber. However, past high-grading practices limit future income potential and have resulted in undesirable species composition in many areas. Thus, prevalence of desirable oak species should be increased. Our study will attempt to determine the proper harvest level for bottomland hardwoods which will optimize wildlife habitat quality and conditions for oak regeneration. We will conduct partial harvests on six hardwood stands in minor stream bottoms in Mississippi. Each of the six study areas will consist of four 5-acre experimental units, in which three of the experimental units will receive a partial harvest with residual basal areas of 30, 50, or 70 square feet per acre with one unharvested control experimental unit. To determine the correct amount of trees to be harvested, overstory stems were inventoried using five inventory plots, 1/5th acre in size, within each experimental unit. Inventory of overstory stems consisted of species identification, total tree height, number of logs, and diameter at breast height (d.b.h.) measurements for each tree. To ensure that the correct amount of basal area was marked for removal from each experimental unit, a post-marking cruise was completed. Each experimental unit receiving a partial harvest received a midstory injection. Each midstory stem, except for oak species, received one hack per three inches d.b.h. and 0.03 fl. oz. of a 20 percent volume to volume Arsenal AC aqueous solution in each hack.

Utilizing deer exclosures and transects, we will inventory plant species during years one and two post-harvest and determine the crude protein levels of each species. Hundred-foot line transects will be used pre- and post-harvest to provide the following percentages: woody stems, herbaceous stems, and vines present. In addition, herbaceous and woody plants will be identified and recorded by species, size, and height class. Eight circular deer exclosures, 10.8 square feet in area, will be placed in the field after harvest, but prior to the growing season, within each experimental unit. Clippings will be taken inside the exclosures in July. The clippings will be dried in a forced-air oven to eliminate moisture. Forages will be identified by species and categorized accordingly into forbs, grasses, legumes, vines, woody species, and total forage. The amount of crude protein present in each species will be determined using a Kjeldahl procedure. Vegetation structure will be measured using a Nudds Density Board, by taking a reading in each cardinal direction from a randomized plot center. The reading will be recorded at 33 feet from an established plot center.

We will measure the amount of light that reaches the forest floor to determine the relationship between light availability and oak regeneration or plant species on our study areas valuable to white-tailed deer. Oak regeneration will be measured on five plots inside of each experimental unit. These plots will be centrally

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located inside an 80-foot buffer from the edge of each experimental unit to eliminate edge effect. The abundance of oak regeneration will be determined by counting all the stems inside 120, 1/100th-acre sample plots. The number of stems of non-oak woody regeneration will be counted and categorized based on species. Light availability will be measured at plot centers before and after harvest using a LI-COR light spectographer quantum sensor (LI-COR Environmental, Lincoln, NE), which measures photosynthetically active radiation in the 400- to 700-nm waveband.

The experimental design for this project is a randomized complete block design blocked by study area. The experimental units are the treatment plots, and treatments are randomly assigned within each study site. We will test the null hypotheses that species richness, diversity, abundance of preferred forages, oak regeneration, crop tree growth, sunlight penetration, and nutritional carrying capacity do not differ among treatments using a repeated-measures mixed model analysis of variance. Nutritional carrying capacity for white-tailed deer will be compared among treatments using estimates of nutrient quality and biomass with a nutritional carrying capacity model. Overall habitat quality for white-tailed deer will be compared qualitatively among treatments.

ANTICIPATED OUTCOMES

Upon conclusion of the study, we will have established a preferred level of partial harvest for optimizing white-tailed deer forage, oak regeneration, and light availability. Our findings will allow us to develop and disseminate educational materials for optimizing oak regeneration and wildlife habitat. The materials will be used to improve sustainable forestry land management decisions in the Southeast.