

## Public Abstract

First Name:Nicholas

Middle Name:Joseph

Last Name:Krekeler

Adviser's First Name:Dan

Adviser's Last Name:Dey

Co-Adviser's First Name:John

Co-Adviser's Last Name:Kabruck

Graduation Term:SP 2010

Department:Forestry

Degree:MS

Title:ESTABLISHING PIN OAK REPRODUCTION IN BOTTOMLAND FORESTS IN SOUTHEASTERN MISSOURI

Long term effects of silvicultural treatments on oak reproduction in bottomland forests are not well understood. In pin oak bottomland hardwood forests in southeast Missouri, we revisited research plots in clearcuts shelterwood harvests and controls within the Mingo Basin. 17 years later, we found significant changes, in both the change in basal area and changes in trees per acre for each of the species and genera present in the treatments, than were reported five years since the cuttings occurred. Regardless of harvest treatment, the reproduction was dominated by red maple and green ash, which were originally abundant in the advance reproduction layer. Maple and ash were abundant because they are more tolerant of shade and flooding than pin oak, and consequently had become well established in the understory as advance reproduction at Duck Creek Conservation Area. Successful regeneration of pin oak in bottomland forests will be more likely if a silvicultural prescription includes the control of competing woody vegetation in combination with a reduction in overstory density to increase available sunlight in the understory, and enrichment plantings of oak to ensure adequate numbers of advance reproduction are present.

Predicting the mortality of overstory and midstory trees during a thinning treatment is critical when creating a light environment suitable for the establishment and recruitment of oak reproduction in existing bottomland forests. In greentree reservoirs within the Mingo Basin in southeast Missouri, we compared pretreatment midstory tree species conditions (crown class, initial dieback, live crown ratio, and diameter) with their mortality following a dormant season herbicide injection given at a rate of 1 mL and hack per three inches in diameter of a 20% Imazipure solution. Tree mortality rates varied significantly by species. Models developed suggest that green ash and American elm trees were effectively deadened by the midstory treatment, and sweetgum and red maple trees were not deadened effectively. Changes to the herbicide prescription are presented. Utilizing these prediction models will allow managers to write prescriptions that will create light levels that favor oak reproduction in existing bottomland forests.

In greentree reservoirs within the Mingo Basin in southeastern Missouri, we compared the survival and growth of underplanted pin oak (*Quercus palustris* Muenchh.) acorns, bareroot seedlings, and RPM(R) container seedlings in plots that were thinned with and without ground flora control. After one growing season, we found that RPM(R) container seedlings had the greatest survival (87 percent without ground flora control and 77 percent with) followed by bareroot seedlings (86 percent without ground flora control and 66 percent without). Survival of planted stock was similar to natural reproduction (85 percent in thinned-only plots, 60 percent where thinned with ground flora control and in untreated plots). Direct-seeded seedlings had the poorest survival (9 percent without ground flora control and 4 percent with). Diameter growth of planted stock was significantly less than that of direct-seeded or natural stock; height growth of bareroot was significantly less than the other stock types.