FIRE HISTORY AND AGE STRUCTURE ANALYSIS IN THE SHERBURNE NATIONAL WILDLIFE REFUGE, MINNESOTA: ESTABLISHING REFERENCE CONDITIONS IN A REMNANT OAK SAVANNA WOODLAND

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Oak savanna woodlands were once a dominant ecotone in southwestern Minnesota and throughout the upper Midwest. These ecosystems represented a transitional zone between prairie communities to the west that eventually graded into Big Woods forest. Most of the oak savanna landscape of southern Minnesota (and indeed most of the Midwest) were extensively homesteaded and farmed during the middle 1800s and few intact savanna landscapes remain today. The structure, origin, and factors that have maintained presettlement oak savanna have not been well documented or established. Fires, perhaps ignited by Native Americans, are thought to have maintained these landscapes, but the disturbance regime of these landscapes prior to widespread Euro-American impact remains elusive. Given the current interest in preserving, maintaining, and restoring these systems, it is imperative that the natural factors that have shaped these areas be investigated. Prescribed fires have become an important tool in this regard, but fire management activities can be better implemented if the natural role of fire is uncovered. Reconstructing the historic fire regime in oak savanna woodlands is challenging because few people are of sufficient age to extend to periods before appreciable impacts by human activities. However, this information is critical for establishing reference conditions that can be utilized to guide restoration activities and initiate management activities. This research will investigate the potential of developing reference conditions in a relatively intact oak savanna in the Sherburne National Wildlife Refuge (Minnesota). Vegetation plots will be established throughout the remnant to determine the variability in savanna structure and composition. Fire scars will be collected throughout the remnant to determine the variability in fire frequency and associated changes in savanna age-structure and composition related to fire activity. This research will provide a context for current management activities centered on maintaining and restoring oak savanna ecosystems. The principal questions to be answered include: What is the fire frequency of the oak savanna remnant and how much variation exists over space? How has fire frequency changed over time? Are there particular time periods when fire was more/less prominent? Are forest compositional and structural characteristics related to fire frequency? Has the seasonality of fire changed over time? Identifying the historic fire regime of oak savanna landscapes, the associated forest structures, and spatial variations is critical to developing sound management guidelines for the restoration of these landscapes. Since the proposed study area is one of the few old-growth remnants of this ecosystem in the refuge, information developed in this study will be useful in managing other parts of the refuge. Few detailed investigations of oak savanna fire history and age structure have been completed. This research will add substantially to our understanding of the vegetation dynamics and disturbance regime that characterize this landscape.