TABLE OF CONTENTS

2
Foreword
The McNair Scholars Program

3
Syncrétism within Garifuna Belief and Ritual
Sonya L. Salazar

8
The Role of Parental Noun and Verb Prompts in Children’s Vocabulary Acquisition
Rachel A. Nevils

12
Woman of Light: Life History of a Spiritual Healer
Shani S. Settles

20
From Ceremony to Stage: An Historical Analysis of Native American Theatre
Lee Francis

26
Analysis of Vegetation Change in Deer Run State Forest from 1938 to 1998
Mark Wachter

34
1998-99 Research Topics

35
1998-99 McNair Scholars
INTRODUCTION

The Ozark Mountain region in southern Missouri is largely covered by forest. Most of the forested area in this region was not well inventoried until the 1940s. A portion of the southern Missouri forest was inventoried in 1938. One of the first areas to be inventoried was in Reynolds County, Missouri. All land that was outside the Clark National Forest (now called the Mark Twain National Forest) was inventoried. The inventory was conducted by the Works Project Administration. This inventory documented the type of vegetation cover observed throughout the county.

The 1938 inventory determined the amount of land in Reynolds County that was covered by forest. Reynolds County consisted of 529,920 acres. The area surveyed in Reynolds County (outside National Forest) was 377,390 acres. Forest was estimated to be on 310,079 acres, 82.2% of the area surveyed. The remaining area was either cleared for farmland, 57,737 acres (15.3%) or classified as water and barren land, 9,500 acres (2.5%).

This study focuses on the forest cover of Deer Run State Forest. This forest is located in Reynolds County, Missouri, near the town of Ellington (see Figure 1). The purpose of this study was to determine if any changes have occurred in the forest cover-type over a 60-year period, from 1938 to 1998.

A forest inventory is a method to estimate the type, size and density of trees in a forest. This is accomplished by setting plots throughout the forest. The data collected from each plot is then used to make maps and charts illustrating the inventory results.

BACKGROUND

The 1938 inventory only gives conditions that existed at that time. There have been two major disturbances to the forests prior to 1938, fire and timber harvest.

History of Fire Disturbance

Wildfire has been reported to affect many aspects of the Ozark forest ecosystem such as runoff, erosion, and water infiltration (Welsh, 1972), the regeneration of oak forest species, and the survival and dominance of post oak (Quercus stellata) over hickory and red oak species (Huddell and Pallardy, 1996).

Most fires in the Ozarks are human caused. Fire statistics for Missouri (Westin, 1992) indicate that less than 1 percent of fires are caused by lightning. Therefore, human population density
and cultures are important factors influencing the frequency of ignitions (Guyette and Larsen, in press). The average mean fire-free intervals (MFI) calculated for the sites by time period are the depopulated period, 1580-1700, MFI=17.7 years; the Native American repopulation period, 1701-1820, MFI=12.4 years; and the Euro-American settlement period, 1821-1940, MFI=3.7 years (Guyette and Larsen, in press). The current rate may be as high as 300 years.

Some reasons given for woods burning by local people in the Deer Run District during a 1938 survey include the following: destroys ticks and chiggers, keeps down brush, kills snakes, improves hunting conditions, and not burning increases fire hazards. The percentage of sites burned annually decreases about 20% from 1850 to 1940 and is correlated with an increase in population density approaching 4.6 people per km². Effective fire suppression motivated by the increased value of wood over forage, and education by agencies such as the Missouri Department of Conservation and the U.S. Forest Service began about 1938. The result was a reduction in the percentage of sites burned annually from about 21% of total sites studied in 1940 to less than 1% in the 1990s (Guyette and Larsen, in press). At higher population densities, (greater than 64 people per km²), fire frequency and the percentage of sites levels off and then begins to decrease. The decrease in the percentage of sites burned coincided with an increasing population density between 1890 and 1940 (Guyette and Larsen, in press). Factors for the decline in fire frequency may relate to grazing, fuel trampling by hogs, open range for livestock, roads, fire suppression, and land clearing (Guyette and Larsen, in press).

History of Logging in Reynolds County

Commercial logging operations in Reynolds County probably started in the 1870s, shortly after the St. Louis & Iron Mountain Railroad (it later became the Missouri Pacific) was put through near the eastern border of the county in 1869. Logging became an important industry about 1880. Prior to 1880, the lack of transportation limited forest products to local markets. The period between 1896 and 1905 was considered the boom days of pine logging. The St. Louis Lumberman printed statistics from the Missouri Labor Bureau which reported that in 1904, 60 million board feet of logs were shipped out of Reynolds County. This amount of material would build 6,000 houses. The Grandin Mill of the Missouri Lumber and Mining Company was the largest mill in the country at this time, and it produced 160,000 board feet per day, enough to build 16 houses each day (Oakley, 1968). This type of forest exploitation over a 35 year period marked the end to the virgin pine forests in Reynolds County.

The land use in Reynolds County has a unique history linked directly to the forest resource and the expansion of our nation. The volume and value of the forest products shipped was stable from the 1890's through the First World War period. Production reached a peak from 1896 to 1898. There was less production during the next 20 years, particularly from 1908 to 1910. The average production of 1916 to 1917 was nearly 3/4 of that for 1896 to 1901 (USFS, 1942). Interestingly, the value of the shipped products was higher during the 1920s than at the peak of production. This was caused primarily by an increase in the value of forest products. From 1894 to 1905 the price for one thousand board feet (M bd. ft.) was $8.00. From 1916 to 1929 the value jumped to $17.00 per M bd. ft. (USFS, 1942). As a comparison, the current value for one thousand board feet of white oak is around $150 (MDC, 1998).

History of Deer Run State Forest

Deer Run State Forest began as a game refuge and state park in 1925 with 6,625 acres. In 1926 the state’s first fire tower was erected to help protect Missouri’s forest land from fire. This area helped to re-establish Missouri’s deer population by distribution of 323 white-tail deer to be restocked elsewhere in the state at a time when Missouri’s deer herd was badly depleted. Deer Run has been protected from fire and grazing damage longer than any other timber tract in southern Missouri.

METHODS

The first method was to collect the 1938 forest inventory of Deer Run State Forest. The section needed for this study was a part of the Forest and Land Management of Reynolds County, Missouri, published by the U.S. Forest Service in 1942. This publication contained a hand drawn map of the type of vegetation cover present in 1938. The portion of this map used for this study is shown in Figure 2 on page 26. The next step was to scan the cover-type map into an electronic format. This scanned map had to be rectified into a coordinate system so the map would be oriented in a correct position. This process was accomplished using a geographic information system (GIS). The software used was ARC/INFO and ArcView.

The scanned cover-type map had to be digitized so each cover-type category could be clearly distinguished. Digitizing is the process of tracing over desired data on a map displayed on a screen with the control of a computer mouse. These data are then stored in electronic format. Each cover-type category was assigned a unique color. The map of this process is shown in Figure 3 on page 27. Also, this process determined the total acres covered by each cover-type.

The next major process was to collect current inventory data from Deer Run State Forest. This information was received from the Missouri Department of Conservation. These inventory data were contained on maps and tables. The tabular data that was needed for this study were input into Excel spreadsheets. The maps were scanned into electronic format and then rectified to the correct position. Individual forest stands were then digitized. This process involved many hours of work because a total of 600 stands had to be digitized. Information on the spreadsheets was joined to the designated stand on the digitized map. At the end of this process, each stand had a cover-type category and area covered in acres.

The final procedure was to compare the 1938 cover-type map with the current cover-type map. The two maps were analyzed using the geographic information system ArcView. Change in cover-type was determined by comparing the area an individual cover-type covered in 1938 to the area it currently covers.

RESULTS

The results are best illustrated by comparing the 1938 cover-type map (Figure 3, page 27) to the current cover-type map (Figure 4, page 27).
The following is a list of the cover-type categories found on the 1938 inventory map:

- White oak, scarlet oak, black oak, and hickory
- Pine-oak
- Pine
- Scarlet oak and black oak
- White oak
- Black oak and post oak
- Cultivation
- Field-open
- Blackjack oak and post oak
- Hickory
- Pasture

The following is a table comparing the changes that have occurred on cover-types that were present in 1938 and 1998.

<table>
<thead>
<tr>
<th>Cover Type</th>
<th>Acres 1938</th>
<th>Acres 1998</th>
<th>%change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black, Post Oak</td>
<td>341.4</td>
<td>116.6</td>
<td>-49</td>
</tr>
<tr>
<td>Pine</td>
<td>114.2</td>
<td>641.7</td>
<td>70</td>
</tr>
<tr>
<td>Pine - Oak</td>
<td>854.8</td>
<td>1101.0</td>
<td>30</td>
</tr>
<tr>
<td>Scarlet, Black Oak</td>
<td>1562.2</td>
<td>629.3</td>
<td>-43</td>
</tr>
<tr>
<td>White, Scarlet, Black</td>
<td>2792.3</td>
<td>2268.3</td>
<td>-10</td>
</tr>
<tr>
<td>Oak/Hickory</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Further results indicating changes in cover-type are found in chart 1. The change in volume per acre is shown in chart 2. Timber volume is expressed in board feet: One board foot is equal to 12 inches x 12 inches x 1 inch.

Chart 1
VEGETATION CHANGE BY AREA

Chart 2
VOLUME COMPARISON
CONCLUSION

The question this study addressed was whether a change in forest cover-type has occurred in Deer Run State Forest over a 60-year period. The results indicate that pine has increased in area covered by 70% since 1938. Also, the black oak-post oak cover-type decreased by 49%. We feel these results indicate that there has been a change in the cover-type.

There are several points to identify that make this study significant. (1) This is the first study to use the 1938 forest inventory and compare that with current inventories of Deer Run State Forest. (2) The period of 60 years is a significant amount of time to analyze change in vegetation. (3) The maps and databases generated for this study can be used for future analysis and management of Deer Run State Forest.

REFERENCES


