

EFFECTS OF FIRE ON BIRD AND SMALL MAMMAL COMMUNITIES  
IN THE GRASSLANDS OF WIND CAVE NATIONAL PARK

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Objectives

Wind Cave National Park initiated a prescribed burning program in 1972. Yearly burns have been conducted since to evaluate the effects of fire on the park biota. This project was begun to study what effects burning is having on bird and small mammal populations within the grassland community.

The objectives of this investigation include:

1. Comparisons of population level will be made between pre- and post-burn levels on the same plots and between burned and control areas.
2. Vegetation sampling will be conducted on each of the study plots to demonstrate the importance of certain plant specie densities and stand composition for the various species of birds and small mammals.

Methods

Breeding Bird Census. Species composition and breeding density of birds were estimated using the transect method developed by Emlen (1971, 1977). A detectability coefficient was determined by species and applied to the census count for that species in a series of traverses through the study area.

Prior to the census period, transect lines were established on each of the study areas. Stakes with plastic flagging attached were placed 201.2 m apart along a 804.7 m line.

The census was used to determine peak population levels following the technique of Davis (1965). All transects within the burn and control areas were traversed each day for three 5-day periods during the first weeks in June, July, and August. The census was initiated at sunrise (Jarvinen et al. 1977) with random starting points selected to eliminate possible bias.

The census was confined to a six chain wide strip bisected by the transect line. A walking speed of 1.2 km/hr combined with a three chain recording radius allowed for a six minute detection period for each bird.

Small Mammal Census. The census of small mammal populations was conducted using two different methods: the snap trap removal method and the capture-recapture method.

Paired victor snap traps were placed on a 10m x 7m grid with a pattern centered on the transect line. There was a one chain interval between each of the 10 rows and 15m between each of the seven stations on the same row. Traps were checked daily and all catches were aged, sexed, and weighed. Trapping took place between July 15 and August 6, 1980 and 1981.

A capture-recapture technique was also used on each of the study transects. This technique used Sherman rat-sized live traps placed on a 1.52m x 2.13m grid with approximately 1.4 chains between each of the seven rows and one chain between each of the five stations in a row. This grid was centered on the transect line. The traps were prebaited with a peanut butter-bacon grease mixture for two nights prior to setting. Traps were then set for five nights and closed during the day due to a number of animals succumbing to the heat. Captured animals were toe-clipped, sexed, aged, and weighed before being released.

Due to a limit on time and live traps, plots 4, 5, and y were excluded from this type of census. All other plots were live trapped for a five day period in the summer, fall, winter, and spring quarters.

Vegetative Analysis. The technique used for analysis of vegetation was the canopy-coverage method described by Daubenmire (1968). It encompasses estimating the percentage of cover within a Daubenmire frame occupied by a given species (a bare ground estimate was also made). To facilitate the percentage use of a computer to analyze the data, it was then coded in the following manner: 1 = 0-5% coverage; 2 = 5-25%; 3 = 25-50%; 4 = 50-75%; 5 = 75-95%; 6 = 95-100%. A total of 126 plots per transect were coded using the above technique. The sampling was done during both periods when cool season and warm season plants were mature.

## Results

Results indicate prescribed burning is altering the bird and small mammal communities within the Park. Numbers of singing males of the grasshopper sparrow (Ammodramus savannarum) were greatly reduced on areas burned in 1981 (Table 1). Corresponding control areas increased in numbers of singing males for the same period. The singing male population of the western meadowlark (Sturnella neglecta) was only slightly affected.

The snap trap results indicated an increase in the numbers of animals captured per 100 trap days on the ground plots (Table 2). The average number of captures per 100 trap nights for burned areas was .940 as compared to .535 captures/100 trap nights for control areas. This increase is an increase in numbers of white footed mouse (Peromysus sp.).

Table 1. Populations of singing males of the grasshopper sparrow and western meadowlark during Summer, 1980, and Summer, 1981 (# birds/40 acres).

Plot	Grasshopper Sparrow		Western Meadowlark	
	1980	1981	1980	1981
1	15.2	23.4	11.7	9.1
2 <sup>a</sup>	10.1	3.8	8.2	3.5
3	11.1	19.6	8.4	8.4
7	23.8	39.1	12.9	13.4
8 <sup>a</sup>	33.9	12.0	11.7	7.7
9 <sup>a</sup>	20.7	1.5	7.8	7.0
10 <sup>a</sup>	30.8	4.4	11.7	8.4
11	37.9	27.2	9.5	16.2

a Plots burned in 1981

Table 2, Number of small mammals caught per 100 trap days.

Plot	# Animals/100 trap days	
	1980	1981
1	.73	.452
2 <sup>a</sup>	.98	.710
3	2.21	.603
4	1.97	.463
5	2.30	.208
6	1.10	.161
7	1.04	.154
8 <sup>a</sup>	0.00	.773
9 <sup>a</sup>	.29	1.830
10 <sup>a</sup>	.14	.447
11	.14	.929

a Plots burned in 1981

Analysis on other data collected is in progress.

#### Literature Cited

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