EFFECTS OF SUMMER AND WINTER BURNING ON VEGETATION AND WILDLIFE IN A SAND SAGEBRUSH / HONEY MESQUITE SAVANNA

by

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ABSTRACT

There is substantial information on the generalized affects of fire in some grassland ecosystems. However, studies addressing seasonality of fire are less common. The Rolling Plains have high climatic variability with periodic droughts, however, little information is available on the potential role of burning in these communities under these conditions. Therefore, I initiated a project to explore the effects of seasonality of fire on a sand prairie ecosystem. We established 5 blocks of 3 18-ha plots at Matador Wildlife Management Area (WMA) in Cottle County, Texas. Each plot, within a block, was randomly assigned to a summer burn (August), winter burn (February), or a control (no fire) treatment. Herbaceous vegetation cover and frequency were measured twice annually (May-June and August-September) using 0.1 m^2 quadrats, while woody cover was measured during late summer using the line-intercept method. Invertebrates, herpetofauna, and small mammals were sampled utilizing drift fence arrays during the spring and summer. Invertebrates were also sampled in late summer using sweep nets and small mammals were also sampled twice annually using Sherman Live traps. Summer burning appeared to benefit forbs, species richness, evenness and diversity. In general, forbs were not affected by winter burning, but forbs were similar to grasses, in that individual species' responses to winter burning were variable. My results indicated that prescribed summer burning appears to be effective at reducing, but not eliminating

sand sagebrush, honey mesquite, prickly pear, yucca, and total woody canopy cover. Summer burning was the most effective treatment at reducing honey mesquite and sand sagebrush, which may have promoted the observed increases in herbaceous vegetation bymaking resources, such as light and water, available to grasses and forbs. However, many of the wildlife speciesexamined did not respond to the application of summer and winter burning, but responded to onset of drought conditions. Therefore, a combination of both summer and winter burning treatments are recommended for suppressing woody plant cover and increasing overall plant diversity by promoting desirable herbaceous species for a wide variety of wildlife and livestock. Longer term research on the effects of summer and winter burning on herbaceous and woody vegetation, especially in drought years, is needed to fully evaluate the effects of burning in the Rolling Plains of Texas.

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This thesis is dedicated to my grandmother Helen; for her never ending love, support and encouragement. I only wish I was able to finish before she left us.

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	Control		Summer		Winter	
	2005	2006	2005	2006	2005	2006
Baiomys taylori	48	1	99	4	109	0
Chaetodipus hispidus	2	1	1	0	2	0
Cryptotis parva	6	0	9	0	2	1
Geomys bursarius	1	1	0	0	0	0
Mus musculus	1	0	0	0	0	0
Notiosorex crawfordi	0	0	1	0	0	0
Onychomys leucogaster	0	0	1	1	0	0
Perognathus merriami	0	0	2	5	0	1
Reithrodontomys fulvescens	1	0	0	0	0	0
Reithrodontomys montanus	50	5	54	0	41	2
Scalopus aquaticus	1	0	0	0	0	0
Spermophilus mexicanus	0	0	2	0	1	0
Spermophilus spilisoma	0	1	0	0	0	0

Table III.2: Number of individuals of each species captured from the 3 burning treatments using Sherman live trap sampling at Matador WMA in Cottle County, Texas, 2005-2006.

	Control		Summer		Winter	
	2005	2006	2005	2006	2005	2006
Baiomys taylori	16	1	7	0	1	0
Chaetodipus hispidus	19	28	25	37	25	22
Cryptotis parva	0	4	0	29	2	37
Geomys bursarius	5	4	0	8	4	2
Mus musculus	2	1	3	0	1	0
Notiosorex crawfordi	0	2	0	1	1	6
Onychomys leucogaster	11	10	5	49	17	51
Perognathus merriami	13	17	15	14	11	9
Reithrodontomys fulvescens	25	10	13	9	15	2
Reithrodontomys montanus	4	3	8	1	0	2
Scalopus aquaticus	2	3	3	0	0	0
Spermophilus mexicanus	33	12	38	0	3	1
Spermophilus spilisoma	2	2	5	6	5	10

Table III.3: Number of individuals of each species captured from the 3 burning treatments using drift fence arrays at Matador WMA in Cottle County, Texas, 2005-2006.

	Control		Summer		Winter	
	2005	2006	2005	2006	2005	2006
Ambystoma mavortium	0	0	0	0	1	0
Bufo debilis	7	0	0	4	1	0
Cnemidophorus gularis	0	0	0	0	2	1
Cnemidophorus sexlineatus	2	9	0	4	2	14
Eumeces obsoletus	13	16	15	4	13	10
Gastrophryne olivacea	5	1	0	0	0	2
Heterodon nasicus	1	0	0	0	0	0
Leptotyphlops dulcis	3	5	6	1	6	4
Masticophis flagellum	2	1	1	0	2	1
Phrynosoma cornutum	1	0	0	2	0	1
Scaphiopus couchii	0	0	0	1	0	0
Sceloporus undulatus	8	13	10	0	4	4
Sonora semiannulata	0	2	2	0	2	0
Spea bombifrons	0	1	0	7	0	1
Tantilla nigriceps	3	0	0	0	0	1
Terrapene ornata	0	0	5	2	0	1