

**SURVEY OF RED IMPORTED FIRE ANT MOUND DENSITIES  
IN MANAGED NATIVE PRAIRIES  
- THE ATTWATER PRAIRIE CHICKEN NATIONAL WILDLIFE REFUGE:  
FINAL REPORT**

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The Attwater's prairie chicken, *Tympanuchus cupido attwateri*, is a subspecies, like the Greater prairie-chicken, of the Heath hen. The Attwater Prairie-Chicken National Wildlife Refuge was established in 1972 to preserve and restore critical habitat for this endangered subspecies. Approximately 8,000 acres are currently managed by the U.S. Fish and Wildlife Service. Native grasses and forbes of the prairie are critical components of prairie-chicken habitat.

The five-month mating season of the Attwater's prairie-chicken begins in late December when males congregate on courtship or "booming" grounds. Booming grounds vary in shape and size (usually 0.1 to 10 acres or less) and have short plant cover. Females are attracted to the booming grounds by the spirited fighting and booming of the males. Mating usually occurs there, and nests are normally located within one-half mile. Hens prefer to nest in medium to heavy grass cover and lay an average of 12 eggs which incubate for 26 days. Chicks are escorted from dense cover soon after hatching and can fly when they are two weeks old. The nesting occurs in April and is completed by mid-May.

The refuge is intensively managed for the preservation of the Attwater's prairie-chicken, one of the few National Wildlife Refuges designated specifically for an endangered species. Management techniques to improve habitat include controlled grazing, prescribed burning, strip row cropping, mowing, pest plant control and predator control. Snakes, opossums, raccoons, coyotes, armadillos and especially skunks prey upon the eggs and young birds.

The red imported fire ant, *Solenopsis invicta* Buren, has been documented to prey on hatching eggs of several ground-nesting birds including waterfowl and quail. However, no ant-related mortality of the Attwater's prairie-chicken has been documented. This survey was initiated to monitor fire ant mound nesting density in the managed native prairie to determine if management practices produced any changes in mound density over time.

### **Materials and Methods**

The Reichardt Prairie, a section of managed native prairie approximately 4,000 by 10,000 ft. (918 acres) and containing no internal fencing, was subdivided into four managed areas or plots under a rotational cultural management regime of prescribed burning, shredding and controlled grazing as

described below:

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- Plot 1) 106 acres (this area contains a booming area)
  - Not burned since 1979
  - Burned 24 Jan. 1992
  - Strips of this plot were shredded 14 to 18 September 1992
- Plot 2) 137 acres
  - Not burned since 1983/84
  - Burned 24 Jan. 1992
- Plot 3) 234 acres (this area serves as good nesting/brood habitat)
  - Burned in 1990
  - Shredded early August 1991
  - Shredded, 11 to 14 August 1992
- Plot 4) 175 acres (this area serves as a primary nesting habitat)
  - Burned in February 1991
  - Shredded early August 1991
  - Strips of this plot were shredded 14 to 18 September 1992

Notes: All areas serve as nesting/brood habitat following a burn.

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No transects were burned during 1993. All were under continuous grazing throughout the year.

On March 16, 1991 within each plot, four permanent subplot sites were established using metal fence posts and were arranged in transect lines initiating from road intersections that separate managed areas within the prairie. The number of active red imported fire ant mounds within an 80 ft. radius (0.46 acre or 0.19 hectare) of these fence posts were counted using the minimal disturbance method. This process was repeated on 12 March 1992 and 16 March 1993. Average density of fire ant mounds and the effect of cultural management practices were evaluated over the three year period. Data were analyzed across years for each managed area (plot) individually and together using analysis of variance (ANOVA) and Duncan's Multiple Range Test ( $P \leq 0.05$ ).

## **Results and Discussion**

Population densities of fire ants throughout this study were found to be within the range normally associated with areas inhabited by the single queen or monogynous form of the red imported fire ant (40 to 150 mounds per acre)(Table 1). These densities are dramatically lower than those associated with the multiple queen or polygynous form of this species (200 or more mounds per acre). Although mound numbers declined after 1991, no significant differences in mound density occurred in the analysis of combined data from the four managed areas over this 3 year study. These results indicate that this population of fire ants is rather stable (Table 2).

On 9 March 1991 fire ant mound numbers were found to be remarkably consistent between plots except in the recently burned Plot 4. There, mound density averaged 89 mounds per acre, 45 percent greater than in plots with forage cover and the higher density encountered through this 3 year study (Table 1). Apparently, the lack of cover allowed more mounds to be detected in these subplots.

The 12 March 1992 evaluation revealed that fire ant mound numbers had remained constant or declined from the previous year, even though plots 1 and 2 had recently been burned (Table 1). Mound numbers in Plots 3 and 4, burned in 1990 and 1991 and now supporting dense vegetation, were significantly lower than in 1991 (Table 2). Whether this decline resulted from the burn, weather conditions or ant mound monitoring ability can not be conclusively determined from these data. No significant changes in mound numbers occurred from 1992 through the last monitoring date, 16 March 1993 (Table 2). The only managed area (plot) in which a significant increase in mound numbers occurred over the three years was in Plot 2. The only management practice implemented there was a prescribed burning in January 1992.

Results of this fire ant population monitoring effort suggest that prescribed burning and the other cultural practices implemented do not eliminate fire ant colonies. During a short period following a burn, fire ant mounds may be more noticeable and more accurately sampled because of lack of cover vegetation. Shredding practices produced no noticeable differences in mound numbers.

**Table 1.** Number of red imported fire ants per 0.46 acre subplots within culturally managed areas of the Reichardt Prairie, Attwater Prairie Chicken National Wildlife Refuge, Colorado County, Texas, 1991 through 1993.

<u>Plot/management practices</u>	No. fire ant mounds per 80 ft. radius circular				<u>Mean<sup>a</sup></u>	
	-----Subplot-----					
	<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>		
<b>6 March 1991:</b>						
1. not burned since 1979	19	24	22	23	22.0b	(48 <sup>b</sup> )
2. not burned since 1983/84	24	23	21	21	22.2b	(48)
3. burned in 1990	24	24	30	18	24.0b	(52)
4. burned in February 1991	34	50	40	40	41.0a	(89)
<b>12 March 1992:</b>						
1. not burned since 1979 <sup>c</sup>	23	20	22	19	21.0ab	(46)
2. not burned since 1983/84 <sup>c</sup>	32	23	16	29	25.0a	(54)
3. burned in 1990 <sup>d</sup>	14	9	13	11	11.8bc	(26)
4. burned in February 1991 <sup>d</sup>	9	17	14	15	13.8bc	(30)
<b>16 March 1993:</b>						
1. not burned since 1979 <sup>e</sup>	14	24	27	19	21.0b	(46)
2. not burned since 1983/84	28	32	29	38	31.8a	(70)
3. burned in 1990 <sup>f</sup>	17	17	9	12	13.8bc	(31)
4. burned in February 1991 <sup>e</sup>	14	13	11	14	13.0c	(28)

<sup>a</sup> Means in columns for each monitoring date followed by the same letter are not significantly different using analysis of variance (ANOVA) and Duncan's Multiple Range Test (DMRT)( $P \leq 0.05$ ): 6 March 1991,  $F = 19.328$ ,  $P = 0.0001$ ; 12 March 1992,  $F = 7.450$ ,  $P = 0.0300$ ; 16 March 1993,  $F = 14.788$ ,  $P = 0.0003$ .

<sup>b</sup> Number of mounds per acre

<sup>c</sup> Burned 24 Jan. 1992

<sup>d</sup> Shredded early August 1991

<sup>e</sup> Strips of this plot were shredded 14-18 September 1992

<sup>f</sup> Shredded, 11 to 14 August 1992

**Table 2.** Mean number of red imported fire ants per managed area (plot), Attwater Prairie Chicken National Wildlife Refuge, Colorado County, Texas 1991-1993.

-----No. red imported fire ants per 0.46 acre <sup>a</sup> -----					
	Managed area (plot)				
Year	1	2	3	4	Mean
1991	22.0a	22.3b	24.0b <sup>b</sup>	41.0b <sup>c</sup>	27.3a
1992	21.0a <sup>d</sup>	25.0ab <sup>d</sup>	11.8a	13.8a	18.0a
1993	21.0a	31.8a	13.8a	13.0a	19.5a
<i>F</i>	0.105	4.57	10.67	75.26	1.372
<i>P</i>	0.9017		0.0622	0.0106	0.0001 0.3345

<sup>a</sup> Means in columns followed by the same letter are not significantly different using analysis of variance (ANOVA) and Duncan's Multiple Range Test (DMRT)( $P \leq 0.05$ ).

<sup>b</sup> Burned Feb. 1990

<sup>c</sup> Burned Feb. 1991

<sup>d</sup> Burned Jan. 1992