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AUTUMN AND WINTER FOODS OF THE LESSER PRAIRIE-CHICKEN (*TYMPANUCHUS PALLIDICINCTUS*) (GALLIFORMES: TETRAONIDAE)

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ABSTRACT.—Descriptions of Lesser Prairie-Chicken (*Tympanuchus pallidicinctus*) foods in New Mexico have not included comparison between autumn and winter seasons. We analyzed and compared prairie-chicken crop contents in autumn 1976 (n = 9) and 1977 (n = 17) and winter 1977 (n = 4) and 1978 (n = 2) in a shinnery oak (*Quercus havardii*) grassland in southeastern New Mexico. Autumn foods were a mixture of seeds ($\bar{x}$ = 43%), vegetative material ($\bar{x}$ = 39%), and insects ($\bar{x}$ = 18%), especially shinnery oak acorns and insect galls ($\bar{x}$ = 49%). Short-horned grasshoppers (Acrididae, $\bar{x}$ = 15%) also were an important food. Winter foods were shinnery oak acorns ($\bar{x}$ = 69%) and wild buckwheat (*Eriogonum annuum*, $\bar{x}$ = 14%). Use of vegetative material and insects decreased from autumn to winter, whereas use of acorns increased. High Plains Bluestem Subtype in the Southern Mixed Prairie is an important habitat that provides many of the foods eaten by prairie-chickens. Therefore, broad-scale disturbances of this community should be avoided.

Key words: food, feeding, Lesser Prairie-Chicken, New Mexico, shinnery oak, Tympanuchus pallidicinctus.

Lesser Prairie-Chickens (*Tympanuchus pallidicinctus*) occupy semiarid grasslands that typically include a large component of shrubs, either shinnery oak (*Quercus havardii*) or sand sagebrush (*Artemisia filifolia*). A description of foods used by prairie-chickens in the shinnery oak grasslands is incomplete. Davis et al. (1981) compared spring and summer diets in shinnery oak grasslands of eastern New Mexico. They found that prairie-chickens feed on green, leafy vegetation in spring but change to insects in summer. Frary (1957) found that insects are important in early autumn (Sep–Oct) in eastern New Mexico. Crawford and Bolen (1976) evaluated autumn diets of 90 Lesser Prairie-Chickens collected in mid-October from shinnery oak habitats of west Texas. Despite the fact that their study area included cultivated grains, shinnery oak and insects were the principal natural foods.

A seasonal description and comparison of foods used by Lesser Prairie-Chickens in shinnery oak grasslands through the entire annual cycle could be used to assist land managers in manipulating habitats to provide food resources throughout the year. However, published descriptions of Lesser Prairie-Chicken foods in shinnery oak grasslands do not differentiate between autumn and winter. The purpose of this study was to provide a description of autumn and winter foods of Lesser Prairie-Chickens. The objectives were to collect crops of prairie-chickens during autumn and winter, to analyze crop contents to determine the type and amount of foods consumed, and to compare and contrast diets between seasons and years.

STUDY AREA

The study area is approximately 15,500 ha of Bureau of Land Management lands in Chaves County in southeastern New Mexico. Topography is gently undulating. Climate is semiarid with distinct seasons and wide ranges of diurnal and annual temperatures. Nearly 75% of the annual precipitation (30-year $\bar{x}$ = 345 mm/yr) falls during the growing season, May through October, mainly from brief but often intense thunderstorms (U.S. Department of Commerce 1976, 1977).

The study area is in the Southern Mixed Prairie Type, where the High Plains Bluestem Subtype grades westward into the Desert Prairie Subtype (Holechek et al. 1989:79). Most of the study area (89%) is on deep, sandy soils

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where vegetation is dominated by various combinations of bluestem grasses (*Andropogon hallii* and *A. scoparius*) and shinnery oak that characterize the High Plains Bluestem Subtype. The remaining 11% of the area comprises scattered inclusions of tighter soils where vegetation is dominated by short grasses, especially grama (*Bouteloua* spp.) and buffalograss (*Buchloe dactyloides*), characteristic of the Desert Prairie Subtype. Snakeweed (*Xanthocephalum sarothrae*) and mesquite (*Prosopis glandulosa*) are conspicuous invaders of this subtype in some parts of the study area.

METHODS

Crop contents were from birds collected during autumn (Oct–Dec 1976, $n = 9$, and 1977, $n = 17$) and winter (Jan–Feb 1977 and 1978, $n = 6$), mostly by shotgun or small-caliber rifle. Two were taken from birds that died as a result of trapping in autumn 1977, and two were donated by hunters in autumn 1978. Data from empty crops were not used in the analysis. We stored the frozen crops in 100-ml plastic storage bottles until analysis. Contents from each crop were analyzed separately. Foods were measured by volumetric displacement to the nearest 0.1 ml, and items measuring <0.1 ml were classified as "trace." Composition of diet was determined by the aggregate percent method (Martin et al. 1946). We used Borror and White (1970) and Correll and Johnston (1970) to identify food items.

Means and standard errors were calculated when an individual food item was detected in two or more crops. Small sample sizes reduced the power of statistical tests, but we used Student's t test to test the hypothesis that there were no differences in the composition of food items between seasons and years (Snedecor and Cochran 1989). Differences were considered significant at $P < .05$.

RESULTS

Autumn diets primarily consisted of shinnery oak acorns, short-horned grasshoppers (Acrididae), broom groundsel (*Senecio spartioides*) leaves, and insect galls from shinnery oak (Table 1). Thirty different food items were identified, nearly half of which were green vegetation. Crop contents from birds collected by hunters and from birds that died as a result of trapping were similar to those collected by other methods within the same season.

Between-year differences were noted for autumn diets (Table 1). Use of mast and seeds (primarily shinnery oak acorns) in 1976 diets ($\bar{x} = 65\%$) was significantly greater ($P < .05$) than in 1977 ($\bar{x} = 21\%$). Insects ($\bar{x} = 30\%$, primarily short-horned grasshoppers) and a variety of vegetative material ($\bar{x} = 49\%$) comprised a greater ($P < .05$) proportion of diets in 1977 than in 1976 (animal material $\bar{x} = 7\%$, vegetative material $\bar{x} = 28\%$).

Winter samples were combined between years because of the small sample size (1977 $n = 4$, 1978 $n = 2$). Foods consumed by Lesser Prairie-Chickens in winter primarily consisted of shinnery oak acorns ($\bar{x} = 69\%$), with lesser amounts of green vegetation ($\bar{x} = 26\%$) and insects ($\bar{x} = 5\%$, Table 1). No differences ($P > .05$) were detected in crop contents between autumn 1976 and winter 1977–78. Shinnery oak acorn composition of winter crops ($\bar{x} = 69\%$) was greater ($P < .05$) than in autumn 1977 crops. Use of vegetative material and insects (resulting primarily from lack of short-horned grasshoppers in winter) was lower ($P < .05$) in winter crops than in crops collected in autumn 1977.

DISCUSSION

Differences in autumn diets of prairie-chickens between years might be explained by the fact that annual precipitation was nearly 100 mm (27%) below normal in 1977 ($\bar{x} = 250$ mm; U.S. Department of Commerce 1976, 1977). Lower-than-normal precipitation in 1977 might have affected the availability of food resources.

Shinnery oak provided acorns, insect galls, and leaves, which together constituted 50% of the autumn diet in our study and 36% of natural foods in Crawford and Bolen's (1976) study. Despite the fact that Crawford and Bolen's (1976) study area included grain fields, shinnery oak was the principal natural food in autumn. In both studies short-horned grasshoppers were the principal animal food in autumn. Frary (1957) reported crop contents from 17 Lesser Prairie-Chickens collected in eastern New Mexico about 45 km northeast of our study area. His sample was pooled across 6 months, and so seasonal comparisons with our data are not possible. He did find, however, that insects were important in early autumn (Sep–Oct).

TABLE 1. Mean composition (%) of autumn (Oct–Dec) and winter (Jan–Feb) crop contents of Lesser Prairie-Chickens, Chaves County, New Mexico, 1976–78.

Food item	Autumn 1976 (n = 9)		Autumn 1977 (n = 17)		Winter (n = 6)	
Mast and seeds						
Quercus havardii						
Acorns	61	(12.7)[a]	17	(6.9)	69	(6.4)
Euphorbia spp.	4	(2.2)				
Lithospermum incisum			4			
Dithyraea wislizeni	t[b]					
Total	65	(13.0)	21	(6.8)	69	(6.4)
Vegetative material						
Quercus havardii						
Insect galls	14	(8.2)	5	(1.7)		
Leaves	1		2			
Senecio spartioides			12	(6.1)	5	(3.4)
Dalea nana	6	(5.0)	7	(2.4)		
Eriogonum annum			7	(2.7)	14	(4.2)
Phlox spp.	4	(1.9)			4	(2.0)
Lithospermum incisum			4		t[b]	
Composite			4			
Oenothera spp.			4		t[b]	
Euphorbia spp.	3		1		t[b]	
Hymenoxys spp.			2		t[b]	
Xanthocephalum sarothrae			1		t[b]	
Penstemon buckelyi			t[b]		2	
Others	t[b]				t[b]	
Total	28	(13.8)	49	(9.3)	26	(6.3)
Animal material						
Acrididae	2	(1.4)	28	(8.2)		
Gryllidae	3	(0.3)				
Lepidoptera	2					
Carabidae			t[b]		5	(3.6)
Others	t[b]		2		t[b]	
Total	7	(3.6)	30	(8.2)	5	(3.7)

[a]SE
[b]Trace (<1%)

Similarities between autumn 1976 and winter 1977–78 diets probably were a result of the fact that most (4/6) crops collected in winter were from 1977 and the availability of acorns was similar between seasons. Differences between autumn 1977 and winter 1977–78 diets probably resulted from the fact that winter diets were more a reflection of winter 1977 than 1978, and below-normal precipitation in 1977 might have reduced acorn production in the area and increased the demand on other food sources during autumn. Frary (1957) found that vegetative material is important in winter diets and that acorns are important in winter. Jones (1963), working with prairie chickens in Oklahoma, showed the importance of mast and seeds in the winter diet.

MANAGEMENT IMPLICATIONS

Lesser Prairie-Chickens are closely associated with the shinnery oak–grassland community in much of their occupied range. Within this community, in New Mexico, Lesser Prairie-Chickens obtain most of their autumn and winter diets from a rather small number of plants and associated insects that are common in the less grassy habitat. Shinnery oak is the most heavily utilized food of prairie-chickens on an annual basis. Shinnery oak acorns, catkins, leaves, and galls in various combinations provide adult birds with >50% of their diet in autumn and winter. Because of the importance of shinnery oak grassland to prairie-chickens for both food and cover, broad-scale eradication of this community should be avoided.

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