TABLE 1.—*Road crossing activity for three species of rodents in southeastern Texas. Magnitude of crossing classified by number of strips of pavement crossed. Approximation of minimum distances involved for each magnitude indicated in parentheses (calculated from mean road and median widths for all three highways).*

Parameter	*Sigmodon hispidus*	*Baiomys taylori*	*Reithrodontomys fulvescens*
Number Marked[1]			
Male	730	129	47
Female	705	141	26
Total	1,532	272	99
Total Crossing			
Individuals	86	5	1
	44♂♂, 42♀♀	2♂♂, 3♀♀	0♂♂, 1♀♀
Percent of Marked	2.9♂♂, 2.7♀♀	0.7♂♂, 1.1♀♀	0♂♂, 1♀♀
Crossing Magnitude			
1 Strip (9.5—12.5 m)			
Number of Individuals	47	5	
Percent of Crossings	55	100	
2 Strips (40.2—43.2 m)			
Number of Individuals	18		
Percent of Crossings	21		
3 Strips (70.9 m)			
Number of Individuals	16		1
Percent of Crossing	18		100
4 Strips (91.1 m)			
Number of Individuals	5		
Percent of Crossings	6		

[1]Sum of males and females is less than total due to individuals of unknown sex.

posed the use of mown strips of habitat (plant height of or less than 6 cm) as a means of manipulating movements of rodents. He found that frequently mown 10—15 m wide strips of grassy habitat reduced between-plot movement of *Microtus ochrogaster* to as little as 4% of the individuals present in adjacent plots. The tendencies of rodents to cross barriers probably vary not only by species, but also according to a variety of other factors (e. g., population densities, resource availability, and various physical parameters of the potential barrier) whose effects should be examined before relying on discontinuities such as mown habitat or paved roads to check movement of individuals into or out of study areas.

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SUMMER FOODS OF THE AUBUBONS COTTONTAIL (*SYLVILAGUS AUDUBONI: LEPORIDAE*) ON TEXAS PANHANDLE PLAYA BASINS.—Audubons cottontail rabbits have adapted to a wide variety of habitats and are found throughout the western portion of Texas (Davis, Texas Parks and Wildlife Dep. Bull, No. 41., 294 pp., 1974). In the Texas Pandhandle available habitat is limited and cottontail distribution is restricted. In this region playa basins frequently provide most of the year-round available habitat (Bolen et al., Great Plains Agric. Coun. Publ. 91, pp. 23—30, 1979). Because of the importance of these areas for cottontail forage and cover requirements, this study was conducted to determine dietary composition of Audubons cottontail relative to forage availability on playa basins subjected to different adjoining land use practices.

Water is a limiting factor in the Texas Panhandle and vegetative composition was contingent on latency of water retention which is directly related to irrigation runoff, topographic relief, and

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TABLE 1. *Comparison of forage availability, frequency of occurrence (FO), cummulative dietary frequency (DF) and preference of major plants identified in cottontail stomach contents collected Summer 1980 on eleven range playa basins in the Texas Panhandle.*

Plant Species[1]	Availability (%)	FO (%) N=66	DF (%)	CI[2]	Preference[3]
GRASSES:					
Glue grama					
(*Bouteloua gracilis*)	20.50	66.67	20.40	$.094 \leq p^1 \leq .314$	*0*
Western wheatgrass					
(*Agropyron smithii*)	6.30	21.90	5.50	$.000 \leq p^2 \leq .118$	*0*
Buffalograss					
(*Buchloe dactyloides*)	6.00	23.81	5.30	$.000 \leq p^3 \leq .114$	*0*
Silver bluestem					
(*Bothriochloa saccharoides*)	4.30	39.24	5.70	$.000 \leq p^4 \leq .120$	*0*
Hairy tridens					
(*Erioneuron pilosum*)	3.70	3.81	2.20	$.000 \leq p^5 \leq .063$	*0*
Hairy tridens					
(*Chloris* spp.)	3.20	4.04	2.20	$.000 \leq p^6 \leq .063$	*0*
Sand dropseed					
(*Sporobolus cryptandrus*)	2.80	32.38	3.40	$.034 \leq p^7 \leq .084$	*0*
Vine mesquite					
(*Panicum obtusum*)	2.30	11.43	1.70	$.000 \leq p^8 \leq .052$	*0*
FORBS:					
Kochia					
(*Kochia scoparia*)	15.20	70.48	19.70	$.087 \leq p^9 \leq .307$	*0*
Common ragweed					
(*Ambrosia psilostacha*)	9.70	51.43	6.70	$.000 \leq p^{10} \leq .136$	*0*
Blueweed sunflower					
(*Helianthus ciliaris*)	7.30	21.90	2.40	$.000 \leq p^{11} \leq .066$	–
Silverleaf nightshade					
(*Solanum elaeognifolium*)	1.60	20.95	3.50	$.000 \leq p^{12} \leq .05$	0
Common sunflower					
(*Helianthus onnuus*)	1.60	33.33	3.70	$.000 \leq p^{13} \leq .088$	0
Scarlet globemallow					
(*Sphaeralcea coccinea*)	1.60	32.38	3.60	$.000 \leq p^{14} \leq .087$	0
Dock					
(*Rumex crispus*)	1.30	3.81	0.30	$.010 \leq p^{15} \leq .016$	0
Texas croton					
(*Croton texansis*)	0.30	9.52	1.40	$.000 \leq p^{16} \leq .047$	0
Careless weed					
(*Amaranthus retroflexus*)		10.48	1.20	$.000 \leq p^{17} \leq 0.41$	0

[1]Plants listed were those available or ingested in frequencies of >1.1%. [2] CI = confidence interval for DF (90% confidence coefficient); p^i designates the DF for the species divided by 100, i ranges from 1—17 species. [3] Relationship of DF to availability; (+) indicates item observed more than expected, (o) observed as expected, (−) less than expected (Neu et al., 1974).

effective drainage area. Spikerush (*Elochoris* spp.), smartweed (*Polygonum* spp.), and cattail (*Typha* spp.) dominated more mesic locations while koshia (*Kochia scoparia*), ragweed (*Ambrosia tomestosa*), common ragweed (*A. psilostachya*), and other native grasses and forbs were more prevalent on peripheral areas of the basin. Basins were classified as either range (n=11) or agricultural (n=9) contingent upon at least one-half of the surrounding lands being in range or crop respectively.

From June 15—July 15, 1980, 172 cottontails were collected (2100—200 hrs) from playa basins throughout Castro County, Texas. Cottontails were collected with 20 ga shotgun by walking randomly through the basins with gas powered Honda backpack generator and helmeted 250 watt spot light. No more than 10 animals were taken from any one basin.

Cottontails were autopsied within 8 hrs after collection. Stomach contents were fixed and stored in 10% formalin. Microscope slides of reference and stomach materials were prepared as described by Free et al. (J. Range Manage. 23:300—302, 1970). Microhistological examination of stomach

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TABLE 2. *Comparison of forage availability, frequency of occurrence (FO), cummulative dietary frequency (DF), and preference of major plants identified in cottontail stomach contents collected summer 1980 on nine agricultural playa basins in the Texas Panhandle.*[1]

Plant Species	Availability (%)	FO (%) N=106	DF (%)	Confidence Intervals for DF	Preference
GRASSES:					
Spikerush (*Eleocharis* spp.)	8.40	68.18	12.20	$.032 \leq p^1 \leq .212$	0
Johnsongrass (*Sorghum halepense*)	5.60	19.70	2.80	$.000 \leq p^2 \leq .072$	0
Western wheatgrass (*Agropyron smithii*)	4.70	30.30	6.60	$.000 \leq p^3 \leq .134$	0
Bulrush (*Scirpus* spp.)	3.00	13.64	2.70	$.000 \leq p^4 \leq .071$	0
Barnyard grass (*Echinochloa crusgalli*)	1.40	12.12	1.40	$.000 \leq p^5 \leq .047$	0
Buffalo grass (*Buchloe dactyloides*)	1.20	12.12	2.90	$.000 \leq p^6 \leq .076$	0
Bluegrama (*Bouteloua gracilis*)	0.20	13.64	1.00	$.000 \leq p^7 \leq .037$	0
FORBS:					
Kochia (*Kochia scoparia*)	17.70	90.91	32.10	$.192 \leq p^8 \leq .450$	+
Ragweed (*Ambrosia tomentosa*)	12.30	36.36	5.10	$.000 \leq p^9 \leq .112$	−
Blueweed sunflower (*Helianthus ciliaris*)	8.00	24.24	3.60	$.000 \leq p^{10} \leq .098$	0
Lambs quarter (*Chenopodium album*)	4.40	18.18	3.10	$.000 \leq p^{11} \leq .078$	0
Scarlet globemallow (*Sphaeralcea coccinea*)	3.90	22.73	4.60	$.000 \leq p^{12} \leq .104$	0
Careless weed (*Amaranthus retroflexus*)	3.70	36.36	5.90	$.000 \leq p^{13} \leq .125$	0
Common sunflower (*Helianthus annuus*)	2.90	25.76	3.80	$.000 \leq p^{14} \leq .072$	0
Horsetail conyza (*Conyza canadensis*)	2.70	24.24	4.10	$.000 \leq p^{15} \leq .096$	0

[1]Calculations are as described in Table 1.

material to determine species composition followed Sparks and Malechek (J. Range Manage. 21:264—265, 1968). Twenty microscope fields were examined at 100X magnification for each animal. Plant species were recorded by frequency of occurrence (% of all stomachs where the species was found) and dietary frequency (sum of all fragments of a plant species divided by total plant fragments). Cummulative dietary frequencies were obtained by summing dietary frequencies over both basin categories.

Vegetation availability on each playa was obtained using a Parker Loop (Parker and Harris, U.S.F.S. Proc. South and Southeast Exp. Sta., pp. 55—69, 1959). Fifty sample points were taken on each of two 250 m perpendicular transect lines. Transects approximated the area covered during the cottontail collection. Forage availability was expressed as the relation between the number of sampling points in which the species was present and the total number of sampling points. Samples were compiled into range and agricultural categories.

The Bonferroni *z* statistic (Neu et al., J. Wild. manage. 38:541—545, 1974) was used to determine if cottontail forage plants were utilized more or less than expected, based on availability data. Students *t*-test was used to determine significant dietary differences between cottontail sex and age groups on both playa types.

Forty-three plant species (18 grasses and 25 forbs) were found to be present on the study area. Of these 51.2% were found on both range and agricultural playas. Seven species (2 grasses and 5 forbs) were observed only on agricultural playas while 14 species (7 grasses and 7 forbs) were found exclusively on range basins.

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Grasses constituted 51.2% and forbs 45.4% of the diet on range basins. Cottontails inhabiting agricultural basins consumed 32.1% grasses and 66.0% forbs.

Chi-square analysis (Sedecor and Cochran, Statistical Methods, Iowa State Univ. Press, 6th Ed., pp. 236—238, 1976) was used to test the hypothesis that food item proportions in the observed diet were equal to playa forage availability (expected diet). The expected diets differed significantly from observed diets on both range (x^2=55.89, df=36, $0.01 \leq p \leq 0.05$) and agricultural playas (x^2=41.29, df=27, $0.01 \leq p \leq 0.05$).

Cottontails showed selection or avoidance of few forage plants (Tables 1 and 2). Kochia was the only forage plant preferred by cottontails but preference of this plant was limited to agricultural playas. Condition of this plant possibly explains utilization differences between types of playa basins. On agricultural playas kochia remained green and succulent throughout the summer months because of irrigation runoff. However on range playas kochia growth and succulence was retarded as summer progressed because of insufficient water. Cottontails inhabiting agricultural playas avoided ragweed. Production of spiny bur-like fruits during the summer months could have inhibited cottontail utilization. Blueweed and sunflower (*Helianthus celaris*) was avoided by cottontails inhabiting range playas.

Our results parallel those of prior studies of the food habits of the desert cottontail (de Calesta, Southwestern Nat. 24(3):549—553; 1979; Turkowski, J. Wildl. Manage. 39:748—756, 1975; Fitch, California Fish and Game 33:19—184, 1947) and other cottontail species (Dalke and Sime, J. Wild. Manage. 5:216—228, 1941; Hosley, Unpubl. M.S. Thesis, Univ. Michigan, 97 pp., 1939; Trippensee, Trans, N. Am. Wildl. Conf. 3:794—803, 1938), which have shown these animals to have great dietary diversity. Our data show cottontails to be generalists, utilizing a wide variety of herbaceous vegetation during the summer season.

Contiguous agriculture and intensive grazing restrict cottontails to playa habitats for most of the year. Playa basins provide mesic sites in a semi-arid region and support richer, denser vegetative cover and forage than surrounding areas (Guthery, U.S.F.W.S., Playa Lakes Symposium, pp. 47—52, 1981). Floral diversity and species composition differ between basin categories based on water availability. Cottontails associated with playa basins have generalized food habits.

This study was supported by the Caesar Kleberg Foundation for Wildlife Conservation and is a contribution of the Wildlife Food Habits Analysis Laboratory in the Department of Range and Wildlife Management, Texas Tech University. The authors are grateful to the playa landowners for permission to collect field data during the study period. Special thanks go to Dr. Robert Warren for his help and suggestions during the course of this study. This research paper is No. T-9-251 of the College of Agricultural Science, Texas Tech University.—KIM T. SCRIBNER, AND LESLIE J. KRYSL, *Dept. of Range and Wildlife Management, Texas Tech Univ., Lubbock, TX 79409*; (present address of LJK: *Box 335, Dept. of Animal Sciences, Univ. of Wyoming, Laramie, WY.*)

CAVE MYOTIS ROOSTING IN BARN SWALLOW NESTS.—On 18 August 1979 we found several Cave Myotis (*Myotis velifer*) roosting in Barn Swallow (*Hirundo rustica*) nests in concrete box culverts. The two culverts were under U.S. highway 57 approximately 2 km west of Batesville, Zavalla County, Texas, and were separated only by a concrete wall. Each culvert was 32 m long and 2.8 m wide; one was 2.1 m tall and the other 1.4 m. Both were oriented north-south in open brushy habitat. Attached to the vertical walls of the taller culvert were 28 swallow nests of which 15 were empty, 11 held a single bat each, and two held nestling swallows. The shorter culvert had 29 swallow nests; 17 were empty, 7 held single bats, 1 had nestling swallows, and one had swallow eggs. The bats were of two slightly different shades of brown, and one individual of each color morph was collected for identification. The specimens were sent to the U.S. National Museum (USNM 530283 and USNM 530284) where both were identified as *Myotis velifer*.

As the bats were disturbed from their roosts within the swallow nests, they fluttered about within the culverts, but did not leave. They frequently fluttered up to swallow nest that were empty or that contained other bats, but avoided nests occupied by swallows. Swallows continually entered and left the culverts simultaneous with flights of disturbed *Myotis*, yet we observed no indication of interaction between the species. Each time a bat within a nest was approached by a flying bat, the nest occupant raised its head above the nest rim and emitted an audible squeak—apparently in defense of its roost. Some of the disturbed bats settled to roost in vacated swallow nests, none settled into an occupied nest.

Myotis velifer has been noted roosting in abandoned Cliff Swallow (*Petrochelidon pyrrhonota*) nests (Milstead and Tinkle, Southwestern Nat., 4:134-412, 1959; Tinkle and Patterson, J. Mamm., 46:612—633, 1965), though seasonality of this behavior was not discussed. Barn Swallow nests are

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