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## **Food Habits of Seven Species of Lizards from Malheur County, Southeastern Oregon**

### **Abstract**

Food habits of 110 lizards of 7 species are examined and related to habitat in the high desert rangelands of southeastern Oregon. The lizards include: 11 collared lizards (*Crotaphytus collaris*), 21 leopard lizards (*Crotaphytus wislizeni*), 24 western whiptails (*Cnemidophorus tigris*), 39 western fence lizards (*Sceloporus occidentalis*), 8 side-blotched lizards (*Uta stansburiana*), 5 desert horned lizards (*Phrynosoma platyrhinos*), and 2 short-horned lizards (*Phrynosoma douglassi*).

### **Introduction**

Relatively little information exists on foods of lizards (Oliver, 1955; Otvos, 1977; Simon, 1976) and none on foods of lizards in Oregon. The purpose of this paper is to present such information and to examine the degree of food and habitat resource partitioning, if any, among species.

### **Methods and Materials**

Lizards were collected over a 3-year period (1975-1977) from May through September by hand and by shooting with a .22 caliber rifle and shot cartridges. Carcasses were frozen and returned to the laboratory for dissection. Stomach contents were preserved in 10 percent formalin. Food items were identified; volume percentages of each food in each stomach were visually estimated using a 10 to 70 power zoom dissection microscope.

### **Description of Study Area**

The study area was located in the dominant shrub-steppe communities of the Owyhee Upland Province in southeastern Oregon (Franklin and Dyrness, 1973). Plant communities referred to in this study have been discussed by and names follow Dealy *et al.*, 1981).

### **Results and Discussion**

Foods eaten by the seven species of lizards are detailed in Table 1, and summarized by Order in Table 2.

TABLE 1. Foods of seven species of lizards from Oregon.

n =	Sceloporus occidentalis		Cnemidophorus tigris		Crotaphytus wislizeni		Crotaphytus collaris		Uta stansburiana		Phrynosoma platyrhinos		Phrynosoma douglassi	
	vol	%	vol	%	vol	%	vol	%	vol	%	vol	%	vol	%
Orthoptera	41.3	53.8	19.0	33.3	39.8	61.9	53.2	81.8	31.3	50.0				
Acridae	10.8	20.5	0.6	4.2	6.4	9.5	5.9	18.2						
Gryllidae			7.5	8.3										
Unidentified														
Hymenoptera							1.4	9.1						
Andrenidae					9.3	33.3								
Apidae	5.0	10.6			0.7	4.8	1.4	18.2						
Chrysididae	0.4	7.7			1.4	14.3	1.4	18.2						
Formicidae	2.7	30.8	1.8	20.8					3.8	12.5	89.4	100	2.5	50.0
Sphecidae	2.1	5.1											93.0	10.0
Vespidae					3.6	4.8	1.4	9.1						
Unidentified	0.4	2.6												
Coleoptera														
Carabidae	3.7	10.3	4.4	8.3	1.7	4.8			3.8	12.5	0.4	20.0		
Cerambycidae					1.4	4.8								
Cleridae	0.4	2.6												
Curculionidae			1.3	4.2										
Elatridae	1.3	2.6												
Histeridae	0.3	2.6												
Melyridae	0.4	5.1												
Nitidulidae			1.9	4.2										
Scarabaeidae	1.1	12.8	0.2	4.2	1.4	9.5								
Staphylinidae	0.5	2.6												
Tenebrionidae-adult	8.7	33.3	2.1	12.5	7.4	14.3	2.7	18.2	1.9	12.5	6.4	60.0	2.0	50.0
Tenebrionidae-larva			1.7	4.2										
Unident. Larvae					0.4	4.8	0.5	9.1						
Unident. Adult	1.7	7.7	0.04	4.2			2.7	9.1			0.6	20.0	1.0	50.0
Hemiptera														
Anthocoridae														
Lygaeidae	0.1	2.6					0.5	9.1	0.6	12.5				
Pentatomidae	1.0	2.6	5.6	8.3			4.5	27.3	6.3	25.0				
Reduviidae														
Unidentified	0.9	7.7			5.2	14.3	5.2	18.2	13.1	25.0			1.5	50.0



TABLE 2. Summary of major foods of seven species of lizards from Oregon in percent volume by order of prey species.

	n	Orthoptera	Coleoptera	Hymenoptera	Hemiptera	Homoptera	Lepidoptera	Araneida
<i>Sceloporus occidentalis</i>	39	52.1	18.1	10.6	2.0	0.1	5.5	2.7
<i>Cnemidophorus tigris</i>	24	27.1	11.6	1.8	5.6	7.9	28.8	11.3
<i>Crotaphytus wislizeni</i>	21	46.2	12.3	15.0	5.2	5.2	3.1	7.4
<i>Crotaphytus collaris</i>	11	56.1	5.9	4.4	10.2	2.7	13.7	—
<i>Uta stansburiana</i>	8	31.3	5.7	3.8	20.0	1.9	14.4	16.3
<i>Phrynosoma platyrhinos</i>	5	—	9.0	89.4	—	—	—	0.6
<i>Phrynosoma douglassi</i>	2	—	3.0	95.5	1.5	—	—	—

#### Specific Habitat and Food Considerations

Western fence lizards (*Sceloporus occidentalis*), the most adaptable Oregon lizards, occupy a wide range of habitats (Clark, 1973; Davis and Verbeek, 1972; Rose, 1976; Stebbins, 1966). In southeastern Oregon, they were associated with a variety of man-made habitats, such as homesteads, rock walls, rock jacks, and rock cribs; and geomorphic habitats, such as cliffs, talus, and lava flows (Maser *et al.*, 1979a,b). The major habitat component for western fence lizards was igneous rock, such as rhyolite and basalt, with crevices into which the lizards could move at will. The major foods of these lizards were orthopterans (52.1 percent) and coleopterans (18.1 percent) by volume.

Western whiptails (*Cnemidophorus tigris*) inhabited a variety of plant communities in southeastern Oregon, such as Wyoming big sagebrush (*Artemisia tridentata wyomingensis*)/bunchgrass, black greasewood (*Sarcobatus vermiculatus*)/grass, and shadscale saltbrush (*Atriplex confertifolia*)/bunchgrass. The soils must be friable, however, or these lizards cannot inhabit an area (Burt, 1931; Maser, unpubl. data; Pianka, 1970). Major foods of western whiptails were lepidopterans (28.8 percent) and orthopterans (27.1 percent) by volume.

Leopard lizards (*Crotaphytus wislizeni*) were widely distributed in southeastern Oregon. Although they may have been sympatric with western whiptails in shrub communities, such as Wyoming big sagebrush/bunchgrass, black greasewood/grass, or shadscale saltbrush/bunchgrass, leopard lizards tended to occupy areas of sparser herbaceous vegetation than did whiptails. Leopard lizards therefore often concentrated along edges of roads where soils were friable and where they had ample running room (Maser, unpubl. data; Storm, 1966). Major foods of leopard lizards were orthopterans (46.5 percent) and hymenopterans (15.0 percent) by volume.

Collared lizards (*Crotaphytus collaris*) inhabit talus in areas of low, sparse vegetation. Talus is their main habitat component (Fitch, 1956; Maser *et al.*, 1979a; Stebbins, 1966; Storm, 1966). Because of the sparse distribution of this habitat in southeastern Oregon, the distribution of collared lizards was limited to widely scattered colonies. Major foods were orthopterans (59.1 percent) and lepidopterans (13.7 percent) by volume.

Side-blotched lizards (*Uta stansburiana*) occur generally throughout central and eastern Oregon (Nussbaum and Diller, 1976); but they were uncommon in southeastern Oregon during this study. Associated with rocky habitats in most of central and eastern Oregon, side-blotched lizards in our study area were also found in the

component; but fence lizards did most of their feeding on the rocks, whereas collared lizards did most of their feeding on the ground. So except for use of the ubiquitous grasshoppers, their major foods differed. The fence lizards concentrated on coleopterans (18.1 percent) and hymenopterans (10.6 percent) by volume; collared lizards concentrated on lepidopterans (13.7 percent) and hemipterans (10.2 percent) by volume.

Where collared lizards and leopard lizards (both ground predators) were sympatric, their diets differed in that the leopard lizards ate primarily hymenopterans (15.0 percent) and coleopterans (12.3 percent) by volume. Again, where fence lizards were also sympatric with collared and leopard lizards, they fed mainly on whatever alighted on the rocks.

Western whiptails were most abundant in the black greasewood/grass community where they fed under the greasewood plants, which accounts for the dominance of lepidopterans (28.8 percent by volume) and araneidans (11.3 percent by volume) in their diet. Although collared lizards also had a high percent of lepidopterans (13.7 percent by volume) in their diet, they fed mostly on adults (12.3 percent by volume), whereas whiptails ate primarily larvae (16.9 percent by volume). Collared lizards did not eat araneidans as did western whiptails.

Lepidopterans and araneidans were not major dietary items of leopard lizards (3.1 percent and 7.4 percent by volume, respectively). Hymenopterans, on the other hand, were an important dietary item for leopard lizards (15.0 percent by volume) as opposed to 1.8 percent by volume for whiptails. In addition, whiptails had a more catholic diet than did either the collared lizard or the leopard lizard.

Side-blotched lizards were the smallest of the five species. They concentrated on hemipterans (20.0 percent by volume) and araneidans (16.3 percent by volume). Although some interspecific competition for food may have existed between adult side-blotched lizards and the young of western fence lizards, collared lizards, leopard lizards, and whiptails, there were enough differences in microhabitat and prey selection to allow a certain amount of sympatry. Further, side-blotched lizards were more restricted in their diet than were the other four species. Such selectivity may be related to the small size of adult individuals, preference for certain prey types, or both, but we assume it was partly related to the small sample size.

### Conclusions

There was considerable resource overlap, both in food and habitat, among the seven species of lizards studied. When food habits and habitat use were viewed independently, a clear picture of resource partitioning did not emerge. For example, a rank order correlation coefficient was calculated between sample size and number of the most common order (Orthoptera) from data in Table 2. The correlation ( $r = 0.67$ ) is significant ( $P < .05$ ), and indicates that variation in the abundance of Orthoptera may be caused by variation in sample size.

When food habits and habitat use were viewed simultaneously some resource partitioning became apparent, but it also became obvious that, to demonstrate resource partitioning clearly, sample sizes for food habit analyses should be considerably larger per species.

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