

FOOD HABITS OF BURROWING OWLS IN SOUTHEASTERN IDAHO

R. L. Gleason¹ and T. H. Craig²

ABSTRACT.— Food habits of a population of the Burrowing Owl (*Athene cunicularia*) at the Idaho National Engineering Laboratory, Butte County, were studied. The 421 pellets examined yielded 2,436 prey items of at least 22 prey species. Invertebrates, largely insects, constituted 91 percent of the total prey items, but only 29 percent of the total biomass; mammals constituted 8 percent of the prey items, but 68 percent of the biomass. The prey were mostly nocturnal species; diurnal species were poorly represented.

The Burrowing Owl (*Athene cunicularia*) is widely distributed in the dry prairies and grasslands of western North America. In Idaho, Burrowing Owls are breeding residents on the Snake River Plains, generally arriving in April and departing in October. Although the food habits of Burrowing Owls have been documented in much of their range (Robertson 1929, Errington and Bennett 1935, Hamilton 1941, Sperry 1941, Bond 1942, Longhurst 1942, Thomsen 1971, Butts 1973, Marti 1974), including Oregon (Maser et al. 1971) and Utah (Smith and Murphy 1973a), this paper provides the first information from Idaho.

The study population was located within and adjacent to the 2315 km² Idaho National Engineering Laboratory (INEL) Site in Butte Co. Elevation on the INEL Site ranges from 1454 m to 1554 m. Rainfall averages less than 25 cm a year, with large annual variations. The average monthly temperatures are below 0 C for November through March, and approach 20 C for the hottest month, July. Vegetation is dominated by big sagebrush (*Artemisia tridentata*), which covers about 80 percent of the site (Harniss and West 1973).

Pellets were collected at nine active burrows from 4 June to 29 July 1975. This was approximately the period from hatching of the young to dispersal of the family groups. Burrows were visited about every four days and pellets were usually found within a radius of several meters from the burrow en-

trances. Pellets were dissected in the laboratory and the number and identity of prey remains in each pellet were recorded. Mammalian remains were identified by dental characteristics, and mandibles were paired to determine the total number of individuals represented. Invertebrate prey were identified and counted using recovered mandibles, heads, and/or elytra. Average body weights were taken from Smith and Murphy (1973b), Evans and Emlen (1974), Johnson (1977), and Diller (pers. comm.).

A total of 421 pellets yielded 2,436 prey items and indicated that the owls utilized at least 22 species of prey (Table 1). Invertebrates were the most frequent prey of Burrowing Owls on the INEL Site, constituting about 91 percent of the total number of prey items. However, invertebrates represented only 29 percent of the total biomass. Conversely, mammals represented 8 percent of the total prey items, and 68 percent of the total biomass. Similarly, Smith and Murphy (1973b) found that over two breeding seasons invertebrates constituted 80 percent of the total prey by number, but only 5 percent of the biomass. Marti (1974) found that over three seasons in Colorado invertebrates made up 90 percent of the prey by number, but only 9 percent of the biomass. Earhart and Johnson (1970) and Murray (1976), in theoretical discussions of sexual dimorphism and geographical variation in clutch sizes in North American owls, suggest

¹Department of Zoology, University of Idaho, Moscow, Idaho 83843.
²Route 3, Box 170, Cottonwood, Idaho 83255.

that Burrowing Owls are primarily insectivorous. Though this conclusion can be drawn from reports on food habits which rank the relative importance of prey only in terms of percent of the total of prey items, it does not appear justified when considering the prey composition in terms of total biomass. For predators such as Burrowing Owls which utilize prey differing greatly in size, biomass estimates should be included to present an accurate picture of diet composition.

Sixty-six percent of the total prey biomass of Burrowing Owls on the INEL Site was represented by three species, Ord kangaroo rat (*Dipodomys ordii*), montane vole (*Microtus montanus*), and Jerusalem cricket (*Stenopelmatus fuscus*). All of the burrows we studied were probably originally excavated by badgers (*Taxidea taxus*) in pursuit of either kangaroo rats or Great Basin pocket mice (*Perognathus parvus*). Thus all the burrows

were in or near established colonies of these species. In addition, seven of the burrows were in areas adjacent to cultivated fields of alfalfa (*Medicago sativa*), which frequently harbor large populations of montane voles. Jerusalem crickets, which composed almost half of the prey by number, are extremely common insects in arid regions of western North America. They are large, slow, and conspicuous, traits which make them very vulnerable to predation by Burrowing Owls.

From this study it would appear that Burrowing Owls in southeastern Idaho are primarily nocturnal predators. All of the mammal and the majority of invertebrate prey of the owls are most active at night. The most frequently occurring prey species, Jerusalem crickets, are strictly nocturnal. Grasshoppers and passerine birds, both principally diurnal, contributed little to the total diet, even though both were abundant in the area.

TABLE 1. Food habits of Burrowing Owls in southeastern Idaho as determined by pellet analysis.

| | Number | Percent | Biomass (g) | Percent biomass |
|---------------------------------|--------|---------|----------------|--------------------|
| Mammals | (200) | (8) | (6882) | (68) |
| <i>Dipodomys ordii</i> | 44 | 2 | 2420 | 24 |
| <i>Microtus montanus</i> | 54 | 2 | 2052 | 20 |
| <i>Perognathus parvus</i> | 60 | 3 | 900 | 9 |
| <i>Peromyscus maniculatus</i> | 35 | 1 | 595 | 6 |
| <i>Thomomys talpoides</i> | 6 | tr | 900 | 9 |
| <i>Mus musculus</i> | 1 | tr | 15 | tr |
| Birds | (10) | (tr) | (140) | (1) |
| <i>Eremophila alpestris</i> | 6 | tr | 84 | 1 |
| Unidentified passerine | 4 | tr | 56 | tr |
| Amphibians | | | | |
| <i>Scaphiopus intermontanus</i> | 19 | tr | 266 | 3 |
| Arachnids | (283) | (12) | (338) | (4) |
| Scorpionidae | 123 | 5 | 178 | 2 |
| Solpugidae | 160 | 7 | 160 | 2 |
| Insects | (1924) | (79) | (2501) | (25) |
| Gryllacrididae | 1122 | 46 | 2244 | 22 |
| Acrididae | 8 | tr | 5 | tr |
| Cicadidae | 29 | 1 | 29 | tr |
| Carabidae | 62 | 3 | 14 | tr |
| Silphidae | 133 | 5 | 40 | tr |
| Scarabaeidae | 129 | 5 | 39 | tr |
| Tenebrionidae | 42 | 2 | 23 | tr |
| Formicidae | 61 | 3 | 6 | tr |
| Unidentified Coleoptera | 338 | 14 | 101 | 1 |
| Totals | 2436 | | 10,127 | |

We thank D. R. Johnson, University of Idaho, for reviewing the manuscript, and W. F. Barr, University of Idaho, for his very generous contribution of time and expertise in identifying innumerable insect fragments. This research was funded by the Division of Biomedics and Environmental Research (DOE) and is a contribution of the INEL Site Ecology Studies Program.

LITERATURE CITED

- BOND, R. M. 1942. Food of the Burrowing Owl in western Nevada. *Condor* 44:183.
- BUTTS, K. O. 1973. Life history and habitat requirements of Burrowing Owls in western Oklahoma. Unpublished thesis, Oklahoma State University, Stillwater, Oklahoma. 188 p.
- EARHART, C. M., AND N. K. JOHNSON. 1970. Size dimorphism and food habits of North American owls. *Condor* 72:251-264.
- ERRINGTON, P. L., AND J. L. BENNETT. 1935. Food habits of Burrowing Owls in northwestern Iowa. *Wilson Bull.* 47:125-128.
- EVANS, F. C., AND J. T. EMLEN, JR. 1947. Ecological notes on the prey selected by a Barn Owl. *Condor* 49:3-9.
- HAMILTON, W. J. 1941. A note on the food of the western Burrowing Owl. *Condor* 43:74.
- HARNISS, R. O., AND N. E. WEST. 1973. Vegetation patterns of the National Reactor Testing Station, southeastern Idaho. *Northwest Sci.* 47:30-43.
- JOHNSON, W. C. 1977. Examination of consuming techniques for small mammals in a high desert ecosystem. Task No. 8, Idaho National Engineering Site Ecological Studies, Idaho Falls, Idaho. 95 p.
- LONGHURST, W. M. 1942. The summer food of Burrowing Owls in Costilla County, Colorado. *Condor* 44:281-282.
- MARTI, C. D. 1974. Feeding ecology of four sympatric owls. *Condor* 76:45-61.
- MASER, C. E., E. W. HAMMER, AND S. H. ANDERSON. 1971. Food habits of the Burrowing Owl in central Oregon. *Northwest Sci.* 45:19-26.
- MURRAY, G. A. 1976. Geographic variation in the clutch sizes of several owl species. *Auk* 93:602-613.
- ROBERTSON, J. 1929. Some observations on the feeding habits of the Burrowing Owl. *Condor* 31:38-39.
- SMITH, D. C., AND J. R. MURPHY. 1973a. Late summer food habits of adult Burrowing Owls in central Utah. *Raptor Research* 7:112-115.
- . 1973b. Breeding ecology of raptors in the eastern great Basin of Utah. *Brigham Young Univ. Sci. Bull., Biol. Ser.* 18(3):1-76.
- SPERRY, C. C. 1941. Burrowing Owls eat spadefoot toads. *Wilson Bull.* 53:45.
- THOMSEN, L. 1971. Behavior and ecology of Burrowing Owls on the Oakland Municipal Airport. *Condor* 73:177-192.