

FOOD HABITS OF BURROWING OWLS IN NORTHWESTERN IOWA*

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Incidental to the 1933 summer studies carried on at the Iowa State College wild life research station, at Ruthven, Iowa, pellet collections were gathered from local burrowing owl (*Speotyto cunicularia hypugaea* Bonaparte) colonies encountered. Analyses of these pellets revealed considerable variations in proportions of vertebrate to invertebrate prey.

Beetles comprised the greater part of the invertebrate prey, including ground beetles (Carabidae and *Harpalus* in particular), dung beetles (*Canthon*, *Copris*, *Geotrupes*), water beetles (*Hydrophilus*), carrion beetles (*Necrophorus*, *Silpha*), click beetles (*Melanotus*), tiger beetles (*Canthon*, *Corpis*, *Geotrupes*), water beetles (*Hydrophilus*, *plus*) made up most of the balance.

Vertebrate prey was of relatively few types: meadow mice (*Microtus*), deer mice (*Peromyscus*), harvest mice (*Reithrodontomys*), jumping mice (*Zapus*), house mice (*Mus*), ground squirrels (*Citellus*), frogs, small birds.

Area "A". Twenty miles southwest of Ruthven. Colony of undetermined number of owls visited but once. Late June and early July—9 pellets. Contents: deer mouse, 1; mouse (*Reithrodontomys?*), 1; horned lark (*Otocoris alpestris*), 1; insects, as follows: *Bolbocerosoma*, 16; *Canthon*, 13; *Hydrophilus*, 1; *Harpalus*, 16; *Ligyris*, 3; *Melanoplus*, 2.

Area "B". One and a half miles southeast of Ruthven. A maximum of 13 owls frequenting holes in a pasture once a golf course was to be seen.

Late June and early July—bulk material representing about 30 pellets. Meadow mouse, 9; deer mouse, 13; frog, 7; insects: *Copris*, 3; *Melanotus*, 1; *Harpalus*, 11; *Anisodactylus*, 1; *Pasimachus*, 3; unidentified Coleoptera, 2.

Mid-July—21 pellets. Meadow mouse, 16; deer mouse, 7; few unidentified feathers in one pellet; frog, 5; insects: *Geotrupes*, 1; *Copris*, 4; *Canthon*, 1; *Silpha*, 1; *Hydrophilus*, 1; *Harpalus*, 28; *Anisodactylus*, 5; *Cicindela*, 1; unidentified Coleoptera, 1; *Melanoplus*, 1.

Late July—6 pellets. Meadow mouse, 5; deer mouse, 1; insects: *Hydrophilus*, 1; *Harpalus*, 23; unidentified Coleoptera, 1; *Melanoplus*, 1.

First week of August—5 pellets. Meadow mouse 3; deer mouse, 3; frog, 1; insects: *Bolbocerosoma*, 1; *Canthon*, 1; *Necrophorus*, 1; *Harpalus*, 17; *Pasimachus*, 2; unidentified Coleoptera, 1.

Second week of August—9 pellets. Deer mouse, 3; insects: *Ves-*

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pidae (Wasps), 9; *Scarab*, 1; *Scarites*, 23; *Harpalus*, 37; unidentified Carabidae, 45; *Melanoplus*, 3.

Third week of August—7 pellets. Deer mouse, 1; frog, 1; insects: unidentified *Tenebrionidae*, 2; *Bolbocerosoma*, 2; *Copris*, 1; *Canthon*, 2; *Harpalus*, 10; unidentified Carabidae, 80; *Melanoplus*, 3.

Last week of August—9 pellets. Meadow mouse, 1; deer mouse, 3; insects: *Eleodes*, 3; unidentified *Tenebrionidae*, 4; *Harpalus*, 2; *Pasimachus*, 1; unidentified Carabidae, 148; *Melanoplus*, 7.

Early September—16 pellets. Meadow mouse, 2; deer mouse, 10; house mouse (*Mus*), 1; unidentified small bird, 1; frog, 5; insects: unidentified *Tenebrionidae*, 1; *Tigyrodeus*, 1; *Bolbocerosoma*, 2; *Canthon*, 5; *Harpalus*, 4; unidentified Carabidae, 38.

Mid-September—2 pellets. Deer mouse, 1; house mouse, 1; insects: *Eleodes*, 1; unidentified Carabidae, 1.

Area "C". Two and a half miles southwest of Ruthven. Seven owls in pasture, of which some were doubtless juvenals.

Late June—about 20 pellets gathered in bulk. Juvenile striped ground squirrel (*Citellus tridecemlineatus*), 2; meadow mouse, 10; deer mouse, 8; frog, 1; insects: *Canthon*, 3; *Necrophorus*, 1; *Ligyris*, 1; *Cicindela*, 1; unidentified Carabidae, 3.

Early July—19 pellets. Meadow mouse, 11; deer mouse, 10; jumping mouse (*Zapus*), 1; unidentified mice, 2; Maryland yellowthroat (*Geothlypis trichas*), 1; frog, 1; insects: *Bolbocerosoma*, 1; *Canthon*, 3; *Chrysobothris*, 2; *Necrophorus*, 2; *Hydrophilus*, 2; *Calosoma*, 1; *Pterostichus*, 1; *Harpalus*, 1; unidentified Carabidae, 1; unidentified Coleoptera, 1.

Mid-July—6 pellets. Meadow mouse, 4; deer mouse, 3; frog, 1; insects: *Bolbocerosoma*, 1; *Canthon*, 1; *Necrophorus*, 1; *Hydrophilus*, 2.

Late July—5 pellets. Deer mouse 3; mouse (*Reithrodontomys?*), 1; field sparrow (*Spizella pusilla*), 1; insects: *Bolbocerosoma*, 1; *Canthon*, 1; *Hydrophilus*, 2; *Pasimachus*, 2; *Harpalus*, 22; unidentified Carabidae, 6; *Melanoplus*, 1.

Early August—2 pellets. Insects: unidentified *Tenebrionidae*, 1; *Bolbocerosoma*, 2; *Canthon*, 1; unidentified Carabidae, 15; unidentified Coleoptera, 2; *Melanoplus*, 1.

Area "D". One-half mile west of Ruthven. Five owls seen in vicinity of a hole that had the appearance of a breeding den.

Mid-July—11 pellets. Meadow mouse, 2; deer mouse, 8; harvest mouse, 1; mouse (*Peromyscus?*), 1; frog, 4; insects: *Phyllophaga*, 1; *Harpalus*, 18; *Pasimachus*, 2; *Melanoplus*, 5.

Late July—6 pellets. Meadow mouse, 9; deer mouse, 3; insects: *Harpalus*, 3; unidentified Coleoptera, 1; *Melanoplus*, 1; *Gryllus*, 1.

August 13—1 pellet. Insects: *Canthon*, 1; unidentified Carabidae, 7.

August 20—3 pellets. Insects: *Eleodes*, 3; other *Tenebrionidae*, 4; *Bolbocerosoma*, 2; *Canthon*, 1; unidentified Carabidae, 11; *Melanoplus*, 3.

Area "E". Two miles west of Ruthven. A few owls moved into a badger digging and stayed for a time.

Mid-August to early September—5 pellets. Deer mouse, 2; frog (?), 1; insects: *Bolbocerosoma*, 2; *Canthon*, 1; *Anisodactylus*, 3; *Harpalus*, 2; unidentified Carabidae, 34; unidentified Coleoptera, 3; *Melanoplus*, 5.

The food habits of these owls may be presumed to reflect a certain availability of prey, as do predator food habits on the whole. Mice, young ground squirrels, small birds, frogs, and insects may be taken in numbers varying with the season and the locality. Just how much the summer's growth of cover and the increasing pressure of livestock on pasture lands affected the availability of Burrowing Owl prey is not evident.

Data from the areas collectively, with the exception of those from "A", showed strongly vertebrate diet from late June to early August, from which time until September insects chiefly were taken. The limited September pellet collections revealed a swing upward to vertebrate prey again. The vertebrate prey was represented mainly by mice, with a scattering representation of small birds, and an irregular occurrence of frogs throughout the summer. Incidence of frogs as well as of mice rose abruptly for early September, the significance of which is weakened by the departure of the owls and the consequent lack of later pellets.

In an attempt to derive more meaning from pellet analyses, let us review changes in prey types according to dates and areas. The incidence of individuals of vertebrate prey per average pellet should provide an index as to importance; the insects, however, are so much smaller than the vertebrates and vary so much in size that listing their occurrence numerically may not be of equal value.

For area "A", vertebrates (two mice and a small bird) were found in a third of the nine late June and early July pellets. This leaves two-thirds of the pellets made up entirely of insects. None of the owls of other areas fed upon such a high proportion of insects so early in the season.

DATA TABULATED FOR OTHER AREAS

Date	AREA "B"		Vertebrate ratios	Average No. insects per pellet
	No. of pellets	Vertebrates per pellet		
Late June and early July.....	30	.97	22 mice, 7 frogs	.7
Mid-July	21	1.38	23 mice, 5 frogs, 1 bird	2.1
Late July	6	1.0	6 mice	4.3
First week August.....	5	1.4	6 mice, 1 frog	4.6
Second week August.....	9	.33	3 mice	12.0
Third week August.....	7	.28	1 mouse, 1 frog	14.3
Fourth week August.....	9	.44	4 mice	18.3
First week September.....	16	1.19	13 mice, 5 frogs, 1 bird	5.4
Second week September.....	2	1.0	2 mice	1.0

AREA "C"			
Date	No. of pellets	Vertebrates per pellet	Average No. insects per pellet
Late June and early July.....	39	1.2	42 mice, 2 striped ground squirrels, 2 frogs, 1 bird
Mid-July	6	1.33	7 mice, 1 frog
Late July	5	1.0	4 mice, 1 bird
First week August.....	2	0.0	
			.7 .8 7.0 11.0

AREA "D"			
Date	No. of pellets	Vertebrates per pellet	Average No. insects per pellet
Mid-July	11	1.45	12 mice, 4 frogs
Late July	6	2.0	12 mice
Second week August.....	1	0.0	
Third week August.....	3	0.0	
			2.4 1.0 8.0 8.0

AREA "E"			
Date	No. of pellets	Vertebrates per pellet	Average No. insects per pellet
Fourth week August.....	5	.6	2 mice, 1 frog
			10.0

The simple explanation for the August ascendancy of insect prey may be, of course, that the owls merely responded to rising insect populations which by reason of their greater numbers became more convenient to feed upon than vertebrates. On the other hand, the relatively high availability of the insects may be correlated with the "weaning" of young owls by the parent birds.

The horned owl (see Errington, Paul L. "Studies on the behavior of the great horned owl", WILSON BULLETIN, XLIV, December, 1932, pp. 212-220) completes the "weaning" of its young about the first part of August. Prior to this time the food eaten by the young is prey furnished to a diminishing extent by adults; thereafter, the young have to look out for themselves and they do not immediately find hunting so easy, judging from their hunger calls in the woods. Barred owl and screech owl young, too, appear to be self-hunting by August, and this conceivably may hold true for other owls, including the burrowing owl.

Only a little better than a third of the pellets for the last three weeks of August contained vertebrates. It was our general impression that about a third of the owls seen were adults. Hence, the temptation is to suspect that the adults were the owls taking the vertebrates, while the clumsy youngsters, not being adept enough at this stage to catch their own mice and frogs and not being able to live off the old ones any more, had to eat insects and similar slow, small prey or nothing at all. A darting mouse may be unavailable to a young owl, but it doesn't require any great skill to pick up dung beetles.

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