Fla Field Nat. 22(3):78-80, 1994.

PELLET ANALYSIS OF BURROWING OWLS IN SOUTH CENTRAL FLORIDA

REUVEN YOSEF[1] AND MARK DEYRUP
MacArthur Agro-ecology Center, Archbold Biological Station, P.O Box 2057, Lake Placid, Florida 33852
[1]Present Address: *International Ornithological Station, P. O. Box 774, Eilat 88106, Israel*

The Florida Burrowing Owl (*Athene cunicularia floridana*) is crepuscular and diurnal in its habits (Fisher 1974), hunts from conspicuous observation porches, and nests in a burrow in the ground. It is listed as a Species of Special Concern by the Florida Game and Fresh Water Fish Commission (Millsap et al. 1990), and has been Blue-listed since 1981 (Tate 1981). Although Evans (1982) reported that the Florida population was increasing, population trends are mostly unknown (Smith et al. 1990). Bent (1938) was among the first to mention that land-use changes caused Burrowing Owls to desert nesting colonies. Persecution by illegal shooting (Nicholson 1954, Butts 1973), agricultural practices (Evans 1982), secondary poisoning (Butts 1973), collision with vehicles (Smith et al. 1990), and insecticides (James and Fox 1987) are some of the explanations posed for the decline of Burrowing Owls.

Burrowing Owls use open country habitats and prefer short grass with sandy soil (Hamel et at. 1982). They exhibit a flexible diet that depends on local prey abundance (Bent 1938). They are known to eat small mammals and reptiles but feed predominantly on invertebrates (Bent 1938, Pearson 1936, Fisher 1974, Zarn 1974). Our objective was to identify prey taken while raising young. We believe that data from semi-natural habitats are of importance because of the extensive land-use changes occurring at present in Florida.

Two pairs of Burrowing Owls were observed, and data on reproductive success were collected during 1990 and 1991 at the MacArthur Agro-ecology Research Center of the Archbold Biological Station, Lake Placid, Highlands County, Florida. The site is a 4170 ha working cattle ranch. Pellets regurgitated at the burrow entrances were collected and analyzed for prey remains.

During 1990 two pairs fledged three young; only one pair bred in 1991, fledging two young. The overall fledging success for the two years was 1.25 young per pair per season, or 1.67 young per breeding attempt. One pair of Burrowing Owls disappeared during the winter of 1990 and 1991 and the second pair disappeared after the young fledged in mid-summer 1992. The second pair disappeared within two weeks of a selective spraying of pesticide on soda apple (*Solanum aculeatissimum*) plants that grew near the burrow.

Twenty-three pellets and additional prey remains collected at the burrows suggested that the owls fed exclusively on invertebrates found in the pastures (Table 1). These are large, slow-crawling, hard-bodied arthropods, predominantly giant waterbugs, scarab beetles, and longhorn beetles. Some of these insects are diurnal, while others are nocturnal or crepuscular. Six of the species belong to genera whose members are known to have chemical defenses (Blum 1981). There is information on the effectiveness of defenses of two species: the secretions of *Romalea microptera* protect them against most vertebrate predators (Blum 1981), and *Acanthocephala femorata* were rejected when offered to Florida Scrub Jays (*Aphelocoma coerulescen*) at the Archbold Biological Station (pers. obs.). Some of the prey species belong to families whose members often have chemical defenses (Hydrophilidae, Belostomatidae, Scarabaeidae), though we found no references to the particular genera found in this study. Our data indicate that

Table 1. Prey identified from analysis of 23 pellets and other prey remains of two pairs of Burrowing Owls in peninsular Florida.

Order and family	Genus and species	Number of items
Hemiptera		
Coreidae, leaf-footed bugs	*Acanthocephala femorata* (*~)	4
Belostomatidae, giant water bugs	*Lethocerus griseus* (+~#)	7
	L. uhleri (+~#)	8
	Belostoma lutarium (+#)	2
Orthoptera		
Acrididae, short-horned grasshoppers	*Romalea microptera* (*~)	6
Coleoptera		
Scarabaeidae, scarab beetles	*Phaeneus vindex* (*)	13
	P. igneus (*)	2
	Dyscinetus morator (+)	12
	Canthon viligans (+)	3
Hydrophilidae, water scavenger beetles	*Hydrobiomorpha casta* (+#)	5
	Hydrophilus tiangularis (+#)	3
Dytiscidae, predaceous diving beetle	*Cybister fimbriolatus* (+~#)	6
Carabidae, ground beetles	*Chlaenius erythropus* (+~#)	1
Cerambycidae, long-horned beetles	*Zagymnus clerinus* (*)	1
	Orthosoma brunneus (+)	18
Curculionidae, snout beetles	*Rhyncophorus cruentatus* (*)	4
	Selenophorus sp. (*)	1

* Diurnally active
+ Nocturnally active
#Aquatic, flies at night
~ Genus known to have chemical defenses (Blum 1981)

the Burrowing Owls we observed collected large, slow-crawling, and slow flying arthropods. A high percentage of these arthropods have chemical defenses that are adaptive compensation for their poor agility. Burrowing Owls and their young seem remarkably undeterred by these chemicals. Thus, we feel that although our observations and sample sizes are too small for inferring reproductive strategies and dietary patterns, they suggest the need for additional studies to examine the connection between a diet without vertebrates and low reproductive success of the Burrowing Owls in agricultural/semi-natural habitats.

We thank Fred E. Lohrer, Brian A. Millsap, Jack Gardner, and an anonymous reviewer for improving earlier drafts of this manuscript. This is contribution No. 15 of the MacArthur Agro-ecology Research Center of the Archbold Biological Station.

LITERAURE CITED

BENT, A. C. 1938. Life histories of North American birds of prey. Part 2. Smithsonian Inst., U. S. Natl. Mus. Bull. 170.

BLUM, M. S. 1981. Chemical defenses of arthropods. Academic Press, New York.

BUTTS, K. O. 1973. Life history and habitat requirements of burrowing owls in western Oklahoma. M.S. Thesis, Okla. State Univ.. Stillwater.

EVANS, D. L. 1982. Status reports on twelve raptors. USFWS Spec. Sci. Rep. Wildl. 238.

FISHER, A. K. 1974. The hawks and owls of the United States in their relation to agriculture. USDA Bull. No. 3. Amo Press, New York.

HAMEL, P. B., H. E. LEGRAND, JR., M. R. LENNARTZ, AND S. A. GAUTHREAUZ, JR. 1982. Bird-habitat relationships on southeastern forest lands. USDASE., For. Exp. Stn. Gen. Tech. Rep. SE-22.

JAMES, P. C., AND G. A. FOX. 1987. Effects of some insecticides on productivity of burrowing owls. Blue Jay 45:65-71.

MILLSAP, G. A., J. A. GORE, D. E. RUNDE, AND S. I. CERULEAN. 1990. Setting priorities for the conservation of fish and wildlife species in Florida. Wildl. Monogr. 111:1-57.

NICHOLSON, D. L. 1954. The Florida Burrowing Owl, a vanishing species. Fla. Nat. 27:3-4.

PEARSON, G. T. 1936. Birds of America. Garden City Publ. Co., Inc. New York.

SMITH. D. G., D. H. ELLIS, AND B. A. MILLSAP. 1990. Owls. Pages 89-117 *in* Proc. Southeast raptor management symposium and workshop. National Wildlife Federation, Washington, D.C.

TATE, J., JR. 1981. The Blue list for 1981. Am. Birds 35:1-10.

ZARN, M. 1974. Habitat management series for unique or endangered species: Burrowing Owl. USDI., BLM Tech. Note 11.