SHORT COMMUNICATIONS

J. Raptor Res. 35(2):159–161

IDENTIFICATION OF ECTOPARASITES ON BURROWING OWLS IN SOUTHWESTERN IDAHO

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KEY WORDS: *Burrowing Owl*; Athene cunicularia; *ectoparasites*; *fleas*; *lice*; *Idaho.*

Burrowing Owls (*Athene cunicularia*) nest in burrow systems, and their nests harbor at least 39 different species of arthropods (21 families; Philips and Dindal 1977), some of which potentially parasitize adult owls and their young. In southern Idaho, adult and young Burrowing Owls can have >100 ectoparasites (pers. obs.). Similar high levels of ectoparasitism have had negative effects on other bird species (e.g., Møller 1990, Clayton 1991, Møller 1993, Richner et al. 1993, Møller et al. 1994, McFadzen and Marzluff 1996). Information on the incidence of ectoparasitism is particularly important because Burrowing Owl populations are declining throughout many portions of the range (James and Espie 1997, Sheffield 1997, Wellicome et al. 1997, Kirk and Hyslop 1998, Clayton and Schmutz 1999).

The objective of our study was to collect and identify ectoparasites on Burrowing Owls that were nesting in the Snake River Birds of Prey National Conservation Area (SRBPNCA) in southwestern Idaho. Herein, we identify the relative abundance of the four species of ectoparasites that we collected from adults and broods of young. We also report two new species of flea from Burrowing Owl nests in Idaho, one of which has never been reported throughout the owl's range.

STUDY AREA AND METHODS

We collected ectoparasites from Burrowing Owls nesting in the SRBPNCA during the breeding periods of 1997–98. The study area was a mosaic of big sagebrush (*Artemisia tridentata*), shrubland, and disturbed grasslands, dominated by cheatgrass (*Bromus tectorum*) and tumble mustard (*Sisymbrium altissimum*). Surrounding areas consisted of irrigated agricultural fields (primarily alfalfa, mint, and sugar beets), scattered residential homes, several dairy farms, rangeland, and dirt, gravel, and paved roads. The topography was flat to slightly rolling with a few isolated buttes and rock outcroppings.

Burrowing Owls in this study either nested in or fledged from artificial burrow systems (ABS; $N = 11$, Smith and Belthoff 2001) or natural burrows ($N = 1$) dug by American badgers (*Taxidea taxus*). Ectoparasite loads and species diversity were similar for owls using both burrow types (unpubl. data). We captured adult and nestling owls using one-way basket traps, modified from Banuelos (1997) or by hand from chambers after excavating ABS.

We made detailed examinations of 11 adult owls and nestlings ($N = 6$, 10, 10, and 11 nestlings) ranging in age from 8–15 d at four nests. We removed ectoparasites using surgical tweezers and by dusting owls with 5% Malathion (ORTHO Hi-Yield®) dust. After dusting an individual or brood, we placed the bird(s) in a plastic container for 10 min, which was sufficient time for the insecticide to operate on ectoparasites. We preserved specimens of all ectoparasites in 70% alcohol for later identification

RESULTS

We collected four species representing two orders of arthropods that were potentially ectoparasitic on Burrowing Owls (Table 1). We collected three species of fleas *Pulex irritans* (Family: Pulicidae) was most prevalent (86.7% of fleas collected; Table 1). We found *P. irritans* on three of 11 (27%) adult owls and on three of four (75%) broods containing 6, 10, and 11 juvenile owls. We collected 15 (10.5% of total fleas collected) *Aetheca wagneri* (Family: Ceratophyllidae), each of which came from one brood ($N = 10$) of owls. We collected four (2.8% of total fleas collected) specimens of *Meringis hubbardi* (Family: Hystrichopsyllidae); individual fleas of this species came from three adult owls and one nestling from a brood of 10 young.

Eight specimens of lice were collected and all were *Strigiphilus speotyti* (Family: Philopteridae; Table 1). The specimens included adult males and females, as well as immatures of unknown sex. We collected this species from five different adult owls.

DISCUSSION

Prior to this, only two species of fleas had been collected from Burrowing Owls or their nests in Idaho: *Pulex irritans* and *Foxella ignota* (Baird and Saunders 1992). The three species of fleas we collected typically infest mammals that inhabit drier regions of western North America

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Table 1. Species and demographics of ectoparasites collected from Burrowing Owls in southwestern Idaho during 1997 and 1998. Ectoparasites were collected from adult (N = 11) and juvenile (N = 4 broods) owls.

SPECIES	SEX	AGE	NUMBER COLLECTED
Siphonaptera			
Pulex irritans	Male	Adult	53
	Female	Adult	71
Aetheca wagneri	Male	Adult	1
	Female	Adult	14
Meringis hubbardi	Male	Adult	3
	Female	Adult	1
Ischnocera			
Strigiphilus speotyti	Male	Adult	2
	Female	Adult	3
	Unknown	Juvenile	3

(Hubbard 1968, Lewis et al. 1988). *P. irritans* is mainly a parasite of wild carnivores and is especially common on those that live in burrows or caves (R.E. Lewis pers. comm.). In Idaho, this species of flea has been found on American badgers, red foxes (*Vulpes vulpes*), coyotes (*Canis latrans*), deer mice (*Peromyscus maniculatus*), and Burrowing Owls (Baird and Saunders 1992). *P. irritans* was the most common ectoparasite on the Burrowing Owls we examined.

Until our study, neither *Aetheca wagneri* nor *Meringis hubbardi* had been previously collected from Burrowing Owls in Idaho, although *A. wagneri* had been collected from Burrowing Owls in nearby Montana (Hubbard 1968). *A. wagneri* probably was associated accidentally with Burrowing Owls as it normally parasitizes small rodents such as deer mice, harvest mice (*Reithrodontomys megalotis*), and voles (*Microtus* spp.; Baird and Saunders 1992, Lewis et al. 1988), each of which was common in our study area. *M. hubbardi* probably also was an accidental associate of Burrowing Owls (R.E. Lewis pers. comm.), as these fleas usually parasitize kangaroo rats (*Dipodomys* spp.) but also infest deer mice, harvest mice, and Townsend's ground squirrels (*Spermophilus townsendii*) in Idaho (Baird and Saunders 1992). However, our study is the first to document *M. hubbardi* from Burrowing Owl nests throughout the owl's range.

In addition to acting as potential sources of food, fleas may use Burrowing Owls as phoretic hosts after their normal mammalian host has succumbed to predation. Fleas also likely benefit from associations with Burrowing Owls through protection from predators, thermoregulatory advantages, and gaining access to habitat for larvae within the nest substrate. Finally, two of the three flea species we collected, *P. irritans* and *A. wagneri*, are among those important in transmission and maintenance of plague in nature (Baird and Saunders 1992, Perry and Fetherston 1997). Therefore, the role of Burrowing Owls in the life cycles of these flea species also may have important epidemiological ramifications for both other wildlife species and humans.

The lice (*S. speotyti*) we collected are highly specific to Burrowing Owls (Clayton 1990). There were few individual lice per bird, and these often attached themselves to shafts of underwing coverts or primary feathers of adult owls. The presence of immature lice indicates that successful reproduction of *S. speotyti* occurs on Burrowing Owls in southwestern Idaho. Because of their relatively low occurrence, effects of this parasite on owls in southwestern Idaho are predominately subtle, except when rare heavy infestations occur. For example, Smith (1999) captured an adult female Burrowing Owl during incubation that harbored >50 individual lice and who showed extreme signs of infestation (denuded feather shafts, poor feather condition; Turner 1971). The nest of this female failed soon after eggs hatched, and it appeared that the high parasite load contributed to the reproductive failure.

RESUMEN.—Nuestro estudio identificó cuatro especies de ectoparásitos en *Athene cunicularia* en el suroeste de Idaho, dos de los cuales representaron nuevos registros. Recolectamos la mosca *Pulex irritans* y a *Strigiphilus speotyti* como las únicas especies de piojo encontradas en los buhos. Las moscas normalmente son parásitos de pequeños mamíferos que infestaron a los buhos después de que los hospederos normales se convirtieron en presas o cuando estos pequeñós mamíferos utilizaron las madrigueras como refugio. Las especies de piojo que colectamos son altamente específicas de *Athene cunicularia* pero generalmente poco comunes, especialmente cuando son comparados con la prevalencia de las moscas.

[Traducción de César Márquez]

ACKNOWLEDGMENTS

We thank E. Garcia, L. Hannon, B. Nelson, H. Smith, and R. Smith for assistance with fieldwork. Financial and logistical support for this study was provided through challenge cost share grants from the Bureau of Land Management to J. Belthoff, by the Department of Biology and Raptor Research Center at Boise State University, and by the Snake River Field Station, Forest and Rangeland Ecosystem Science Center, U.S. Geological Survey, Boise, Idaho. J. Clark, J. Doremus, and J. Sullivan facilitated our work in the Lower Snake River District and SRBPNCA. M. Fuller, Director of the Raptor Research Center at Boise State University, also was helpful in numerous ways. M. Cowing and S. Finn of the Richard R Olendorff Memorial Library at the Snake River Field Station provided assistance with literature searches. Finally, we thank R. Adams, C. Baird, C. Baker, L. Butler, D. Clayton, D. Grimaldi, J. Johnson, and R. Lewis for assistance with ectoparasite identification, and M. Bechard, A. Dufty, S. Novak, J. Philips, and an anonymous reviewer for comments on previous versions of the manuscript.

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Received 27 July 2000; accepted 17 February 2001