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## The Diet of the Barn Owl in Central Chile and Its Relation to the Availability of Prey

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Little information has been published about the diet of the Barn Owl (*Tyto alba*) in Chile (Johnson 1965, Schamberger and Fulk 1974, Fulk 1976). In this paper we report the prey in 1,035 pellets collected from 1974 through 1978 in 6 localities of central Chile, between 32°45′S–34°36′S and 70°31′W–71°34′W: San Felipe (N = 116), Parque Peñuelas (N = 168), Los Dominicos (N = 283), Las Vizcachas (N = 156), Talagante (N = 183), and San Fernando (N = 129). Vegetation and climate for the entire region have been documented by Thrower and Bradbury (1977). We also compared data on consumption of prey items by the Barn Owl, as estimated from their occurrence in the pellets, with the availability of prey in the field, as estimated from trapping results obtained simultaneously with pellet collection. This kind of comparison was possible for three localities of central Chile: Fray Jorge (30°30′S, 71°40′W; data

TABLE 1. Prey of Barn Owl in central Chile.

| | N | % |
|---|---|---|
| MAMMALIA | | |
| Rodentia | | |
| *Abrocoma bennetti* (chinchilla rat) | 50 | 3.7 |
| *Akodon longipilis* (long-haired akodon) | 162 | 12.0 |
| *Akodon olivaceus* (olivaceous akodon) | 76 | 5.6 |
| *Mus musculus* (house mouse) | 125 | 9.3 |
| *Octodon degus* (degu) | 73 | 5.4 |
| *Oryzomys longicaudatus* (rice rat) | 405 | 30.0 |
| *Phyllotis darwini* (leaf-eared mouse) | 225 | 16.7 |
| *Rattus rattus* (black-rat) | 108 | 8.0 |
| *Spalacopus cyanus* (coruro) | 8 | 0.6 |
| Subtotal rodents | (1,232) | (91.3) |
| Marsupialia | | |
| *Marmosa elegans* (mouse opossum) | 46 | 3.4 |
| Chiroptera | | |
| unidentified | 14 | 1.1 |
| Subtotal mammals | (1,292) | (95.8) |
| AVES | | |
| unidentified | 56 | 4.2 |
| TOTAL PREY | 1,348 | 100.0 |
| PELLETS EXAMINED | 1,035 | — |

TABLE 2. Prey consumption by Barn Owls versus prey availability in three localities of central Chile. O = observed values; E = expected values; Sign = O − E values (see text for further explanation); N = nocturnal; C = crepuscular; D = diurnal.

| Prey | Activity period | Fray Jorge | | Illapel | | Dominicos | | Sign |
|---|---|---|---|---|---|---|---|---|
| | | O | E | O | E | O | E | |
| *Abrocoma bennetti* | N | 6 | 3 | — | — | 47 | 7 | + |
| *Akodon longipilis* | N | — | — | — | — | 27 | 0[a] | + |
| *Akodon olivaceus* | C | 58 | 208 | 26 | 62 | 27 | 38 | − |
| *Marmosa elegans* | N | 30 | 15 | — | — | 32 | 4 | + |
| *Mus musculus* | C | — | — | 12 | 33 | — | — | − |
| *Octodon degus* | D | 1 | 10 | 6 | 10 | 65 | 321 | − |
| *Oryzomys longicaudatus* | N | 46 | 51 | 127 | 86 | 79 | 9 | + |
| *Phyllotis darwini* | N | 366 | 220 | 14 | 6 | 128 | 26 | + |
| *Rattus rattus* | N | — | — | 22 | 10 | — | — | + |
| Total | | 507 | 507 | 207 | 207 | 405 | 405 | |
| $\chi^2$ (*P*) | | 231.7 | (<.001) | 80.5 | (<.001) | 2,136.8 | (<.001) | |

[a] Tied with *M. elegans* because of low expected value (Sokal and Rohlf 1969).

provided by Schamberger and Fulk 1974), Illapel (31°38′S, 71°10′W; unpublished data generously supplied by Daniel Torres), and Los Dominicos (33°23′S, 70°31′W; data collected by the authors during 1976).

Statistical analysis was separately applied to data from each locality by means of $\chi^2$ goodness-of-fit test (Sokal and Rohlf 1969), where "observed values" are the absolute frequencies of occurrence of prey species in the pellet sample, and "expected values" are calculated as the relative frequency of each prey species in the trapping sample, matched up with the grand total of prey individuals detected in the pellets. Activity periods of identified prey (nocturnal, crepuscular, or diurnal) were described by Glanz (1977) and Meserve (1977).

Results are summarized in Tables 1 and 2. It is apparent that rodents are the main prey for the Barn Owl in central Chile, accounting for 91.3% of items in its diet (Table 1). Similar results were reported by Schamberger and Fulk (1974), and by Fulk (1976) for the Fray Jorge region. A high proportion of rodents has also been found in pellets of the Barn Owl from Spain (Herrera 1973), and south Australia (Morton 1975), where a similar mediterranean-type climate and vegetation prevails (Thrower and Bradbury 1977).

There were statistically significant differences between prey consumption and prey availability in all three sites examined (Table 2). This phenomenon is usually interpreted as selective predation, or prey-preference by the predator (Rapport and Turner 1970). On the other hand, it is clear from Table 2 that positive deviations from expected values are the rule for the observed frequency of nocturnal prey items, the opposite being true for diurnal or crepuscular prey. The overall effects of these positive or negative deviations are the great values of calculated $\chi^2$ values in the prey consumption-prey availability comparisons. These results, however, may not be reflecting selective predation, or predator's preference, but simply the fact that diurnal and crepuscular prey are relatively unavailable for a strictly nocturnal predator like the Barn Owl (Johnson 1965). This could explain the under-representation of these items in the pellets. The over-representation of nocturnal prey items could be interpreted as if the Barn Owl, which actively searches for its prey, were more efficient than a trap, which merely "waits" for it. Other nocturnal prey available in the area sampled (which excludes both Andean and Coastal ranges) are Norway rats (*Rattus norvegicus*), European hares (*Lepus europaeus*), and European rabbits (*Oryctolagus cuniculus*), all of them introduced species much larger than any prey reported in Table 1 (whose sizes may be seen in Glanz 1977).

In conclusion, the Barn Owl in central Chile can be characterized as a specialist predator on rodents that preys more heavily upon nocturnal than on crepuscular or diurnal small mammals.

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## Short-term Change in Vegetation Structure and its Effect on Grasshopper Sparrows in West Virginia

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Numerous studies have documented the changes in bird communities that follow plant succession (e.g. Johnston and Odum 1956, Shugart and James 1973). Most studies of this kind have looked at a variety of plant communities in various seral stages and then measured their accompanying avifaunas. However, the effect of short-term change in bird populations caused by vegetation change is not widely documented. Webb et al. (1977) followed the plants and birds of 4 logged and 1 control area for 10 yr and found that over the long term only a few species were adversely affected by the logging operations and that, in fact, many were benefitted. They did not attempt to correlate the change to specific habitat variables, however.

In vegetational communities with a relatively simple structure, short-term changes in floristic composition may be pronounced. This is especially true in newly created sites such as reclaimed surface mines. After initial reclamation, successional change may be rapid (Staples 1977), and within a few years the site may have changed significantly in plant species presence, density, and diversity. If bird species do in fact select habitats based upon a predetermined search image (i.e. "niche gestalt," James 1971), and if this search image is based on a complex series of vegetation structure variables, then changes in one or more of these variables may bring about a change in avian presence and density.

The Grasshopper Sparrow (see Table 2 for scientific names) is a common breeding bird in suitable short- to middle-height grassland throughout much of temperate North America (Smith 1963). Owing to its recent population increase as a result of using reclaimed surface mines (Whitmore and Hall 1978), this species is ideal for studying vegetation-caused changes in avian density. Here I document changes in the vegetation structure of reclaimed surface mines in northern West Virginia and their effects on Grasshopper Sparrow population densities.

Three reclaimed surface mines in Preston County, West Virginia, were studied during the spring and summer of 1976–78. The mines were located at 39°37′N, 79°40′W; ranged in size from 9.1 ha to 41.5 ha; and were 3–6 yr old. Dominant species planted on the sites included tall fescue (*Festuca arundinacea*), birdsfoot trefoil (*Lotus corniculatus*), red top (*Agrostis alba*), timothy (*Phleum pratense*), and oats (*Avena sativa*). Dominant pioneers included orchard grass (*Dactylis glomerata*), poverty grass (*Danthonia spicata*), velvet grass (*Holcus lanatus*), rye grass (*Lolium perenne*), and black locust (*Robina pseudo-acacia*) (Staples 1977, Whitmore and Hall 1978). Bird territories were delineated by using the flush technique described for grassland birds by Wiens (1969). Once territory locations were outlined, they were drawn on scale maps and absolute densities were calculated for each mine.

The center of each territory served as the starting point for two 25-m-long line transects, the directions of which were determined by a random numbers table and a compass. Six vegetation structure variables measured along these transects were selected for detailed study (Table 1).