SHORT COMMUNICATIONS

J Raptor Res. 39(2):156–159
© 2005 The Raptor Research Foundation, Inc.

INTERSPECIFIC AGGRESSION AND NEST-SITE COMPETITION IN A EUROPEAN OWL COMMUNITY

INIGO ZUBEROGOITIA
Estudios Medioambientales Icarus s.l., Pintor Sorolla 6, 1ºC, 26007 Logroño, La Rioja, Spain

JOSÉ ANTONIO MARTÍNEZ
Juan de la Cierva 43, E-03560 El Campello, Alicante, Spain

JABI ZABALA
Severo Ochoa, 45, 5ª B, 48480 Arrigorriaga, Bizkaia, Spain

JOSE ENRIQUE MARTÍNEZ
Dpto de Ecología e Hidrología, Universidad de Murcia, Campus de Espinardo, E-30100 Espinardo, Murcia, Spain

KEY WORDS: Barn Owl; Tyto alba; Little Owl; Athene noctua; Scops Owl; Otus scops; Tawny Owl; Strix aluco; community; competition; predation.

Interspecific killing among predators of the same guild has been extensively reported, but is still relatively un-studied (Mikkola 1983, Kostrzewa 1991, Palomares and Caro 1999). Although Mikkola (1983) summarized 1363 cases of owls killed by other owls, it was not always clear whether birds were taken as prey or killed for other reasons. Indeed, some of these owls may have been killed during defense of nest sites, as food competitors, or a few may have been found dead and scavenged. Others may have been killed, but not actually eaten. Palomares and Caro (1999) pointed out that interspecific killing may remove potential predators or their offspring, free up resources that would otherwise be consumed by competitors or provide energetic benefits as prey, although atypical in the diet.

On the other hand, Jaksic and Braker (1983) and Martí et al. (1993) showed that predator assemblages can be organized in feeding guilds (i.e., clusters of species within which interspecific dietary overlap is more extensive), although they did not take into account the habitat dimension of these respective niches. Herrera and Hiraldo (1976) showed a weak clustering effect due to interspecific dietary overlap in owl communities in the Iberian Peninsula. In this case, we would expect that spatial segregation would be the most common dimension of resource partitioning in the owl community (Schoener 1974, Nilsson 1984, Danielson 1991, Venier and Fahrig 1996).

Competition among species is difficult to assess, and in spite of great interest in such interactions, the actual influence of direct and indirect effects of this process is still far from clear (Palomares and Caro 1999). Mikkola (1983) explained that existing data are too circumstantial to allow an evaluation of the important benefits related to the competition. As several factors may be influencing population dynamics, the importance and degree of interspecific killing among raptors needs to be assessed by long-term, intensive studies exploring owl interactions. Bizkaia offers a unique opportunity to examine this issue in Europe, as the owl population has been studied for over a decade (e.g., Zuberogoitia and Campos 1998, Zuberogoitia and Martínez 2000, Zuberogoitia 2002). Here, we report rates of interspecific aggression and nest-site competition among seven species of owls that we censused during the above-mentioned research.

METHODS

Study Area. This work was conducted in Bizkaia, in northern Spain (43°22′N, 2°41′W) between 1992–2002. This is a 2900-km² area covered primarily by forest (70%), mainly conifers, especially Monterey pine (Pinus radiata), which occupies 53% of the forested area (Departamento de Ordenación del Territorio y Medio Ambiente 2001). In Bizkaia, Tawny Owls (Strix aluco) reach one of the highest densities found in Europe, with 1700 known territories (Zuberogoitia and Campos 1998, Zuberogoitia 2002). The lowlands and rural areas are surrounded by old fields and agriculture, where owls more characteristic of open space live (e.g., Barn Owl [Tyto alba], Little Owl [Athene noctua], Scops Owl [Otus scops]), with 407, 272, and 26 known territories, respectively (Zuberogoitia 2002). The rest of the owl guild is comprised of Long-eared Owls (Asio otus), with nine known territories; Short-eared Owls (Asio flammeus), present only dur-
Table 1. Number and proportion of total playbacks and territories where interspecific attacks occurred. For calculating the percentages we considered all the cases when we used the broadcast method (2056) and used the number of known territories for each attacked species.

<table>
<thead>
<tr>
<th>Prey</th>
<th>Attack on Tape Recorder</th>
<th>Attack on Another Owl</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>Percent</td>
</tr>
<tr>
<td>Little Owl</td>
<td>4</td>
<td>0.2</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0.1</td>
</tr>
<tr>
<td>Long-eared Owl</td>
<td>2</td>
<td>0.1</td>
</tr>
</tbody>
</table>

Table 2. Number of cases in which two or more owl species nested in the same building at the same time. The percentage data were obtained considering all nests monitored for each species.

<table>
<thead>
<tr>
<th>N</th>
<th>Percent</th>
<th>Percent</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Little Owl</td>
<td>2.4</td>
<td>Barn Owl</td>
</tr>
<tr>
<td>2</td>
<td>Little Owl</td>
<td>2.4</td>
<td>Barn Owl</td>
</tr>
<tr>
<td>2</td>
<td>Barn Owl</td>
<td>1.1</td>
<td>Tawny Owl</td>
</tr>
</tbody>
</table>
and Long-eared owls and expelling Barn Owls from their nests. Similarly, Tawny Owls can show a high degree of intraspecific competition, as territoriality is often the cause of fights that can lead to the killing of an intruder (Zuberogoitia and Martínez 2000). Hence, it may not be surprising that such an aggressive species would defend its resources vigorously against other species.

Barn Owls were also aggressive against other species. All observed cases were aimed at Little Owls, although the frequencies of such interactions were almost negligible. Our results are similar to those of Mikkola (1983), who found that the only owls killed by Barn Owls were Little Owls, but very infrequently. In our study areas in Valencia (eastern Spain), we also have witnessed two cases of resident male Barn Owls expelling Long-eared Owls from their territories after brief aerial fights (J.A. Martínez and I. Zuberogita, unpubl. data). According to Mikkola (1983), shortage of suitable breeding places for owls may lead to interspecific conflicts. Natural cavities are in short supply, and therefore, presumably a limited resource for owls in Bizkaia, which helps explain why owls tend to breed in alternative sites. Such sites include vaults of churches, attics of houses, and piles of hay or branches (Zuberogoitia 2002). Thus, both interspecific and intraspecific competition for such limited resources would be expected (Newton 1979), especially if food availability is high, and the structural characteristics of the habitat suit the hunting mode of several species. Tawny Owls are extremely abundant in our study area despite that availability of suitable nest holes is low because of timber harvesting (Zuberogoitia 2002). Accordingly, these owls recently have increased use of anthropogenic structures (mainly buildings) for nesting. Barn Owls also select buildings for nesting (Zuberogoitia 2002), but they seem to be at a disadvantage when confronted by the more aggressive Tawny Owls in competition for nest sites. Nevertheless, Bunn et al. (1982) described a single case of a pair of Barn Owls chasing away a Tawny Owl that had entered a barn where they were nesting.

Therefore, even if we were not monitoring all the nests in the owl guild, our results suggest that competition between Tawny Owls and Barn Owls occurred at least at the nest-site level, although sharing of structures supporting breeding sites occurred occasionally. Current land management practices favoring timber plantations over deciduous woods (which provide natural cavities for forest owls) have created Tawny Owl hunting habitat artificially by increasing the availability of edges within forests (Zuberogoitia 2002). In these habitats, Tawny Owls have adapted to breeding in diurnal-raptor nests and even in buildings, which may support a high density of Tawny Owls (Zuberogoitia 2002) competing for a limited number of nest sites with less aggressive, open-space dwellers such as Barn Owls, Little Owls, and Scops Owls (Taylor 1994, Zuberogoitia 2002).

Jaksic (1988) wondered about effects of removing dominant owls on the abundance and diversity of local predator assemblages. For example, Eurasian Eagle-Owls can kill smaller owls and raptors (Mikkola 1983, Saurola 1995) or influence the composition of predator guilds (Sergio et al. 2003). Whether the wide range of habitats occupied by Tawny Owls and their high density in Bizkaia are also a consequence of the lack of competition by a larger owl is still an open question.

AGRESIÓN INTERESPECÍFICA Y COMPETENCIA POR SITIOS DE NIDIFICACIÓN EN UNA COMUNIDAD EUROPEA DE BÚHO

RESUMEN.—La depredación entre depredadores de una misma comunidad no ha sido bien estudiada. Con objeto de comprender la frecuencia y la magnitud de las agresiones interespecíficas en una comunidad europea de rapaces nocturnas, analizamos la frecuencia de contactos agresivos (ataques) y apropiaciones de nidos entre las siete especies de búhos presentes en un área de 2300 km² ubicada en Bizkaia (España) entre 1992-2002. Reprodujimos reclamos previamente grabados de las siete especies en 2056 puntos de censo, comenzando con los de la especie más pequeña y finalizando con los de la más grande. Durante los reclamos registramos (1) la frecuencia con la que se producían ataques interespecíficos, y (2) las especies implicadas. Sólo registramos ocho ataques, los cuales fueron dirigidos a especies de menor tamaño que la especie atacante. Además, durante más de 3000 horas de observaciones de rapaces nocturnas en el área de estudio, registramos tres casos de ataque directo de una especie contra otra. Por último, constatamos siete casos de competencia directa por los lugares de nidificación, en los que una especie fue desplazada del nido por otra especie antes de finalizar el periodo reproductivo. Sugerimos que el nivel de agresión está relacionado con el tamaño de la especie, de forma que las especies de mayor tamaño atacan a las más pequeñas. Sin embargo, las agresiones son muy poco frecuentes, por lo que nuestros datos sugieren que estas especies rara vez compiten directamente entre sí de forma directa o apropiándose de los nidos. En cambio, las especies podrían estar compitiendo de forma menos evidente.

[Traducción de los autores]

ACKNOWLEDGMENTS

Agurtzane Iraeta, Ainara Azkona, Sonia Hidalgo, Luisa Fernanda Campos, Lander Astorkia, Julen Zuberogoitia, Itxaki Castillo, Fernando Ruiz-Moneo, Javier Elorriaga, and Raúl Alonso helped in the fieldwork. The manuscript was greatly improved by comments from Geir A Sonerud, Kent Livezey, Tania Tripp, Jim Belthoff, and an anonymous referee.

LITERATURE CITED


Received: 31 December 2003; accepted 22 February 2005

Associate Editor: James R. Belthoff

**Prey Partitioning between Mates in Breeding Booted Eagles (Hieraaetus pennatus)**

José E. Martínez and José E. Calvo1

Departamento de Ecología e Hidrología, Universidad de Murcia, Campus de Espinardo, 30100 Murcia, Spain

Key Words: Booted Eagle, Hieraaetus pennatus; food partitioning; forest; prey provisioning; reversed size dimorphism (RSD).

Reversed sexual-size dimorphism (RSD) is widespread in raptors and owls, with females being larger than males (Newton 1979). Several researchers have proposed that this trait is driven by different selective forces acting on breeding adults (Mueller and Meyer 1985, Massemín et al. 2000, Simoons 2000). However, no explanation has gained universal acceptance (Bildstein 1992). One of the most popular explanations is the prey-partitioning hypothesis or female supplementary feeding hypothesis (Reynolds 1972, Korpinäki 1985), which suggests that RSD is advantageous because it allows females to hunt larger prey, widening the prey base available for the pair and reducing intersexual competition for food (Snyder and Wiley 1976, Andersson and Norberg 1981, Massemín et al. 2000). Several authors (e.g., Snyder and Wiley 1976,