Survey of Owl Species Diversity and Relative Abundance on Eldorado Open Space: Boulder, Colorado

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ABSTRACT

This study replicated a survey of species diversity and relative abundance of small owls on the Eldorado Open Space property in Boulder County (Richardson and Hammer, 1995). I played the territorial calls of four species of owls and noted vocal responses. This portion of Boulder County is known to support Northern Saw-whet Owls (*Aegolius acadicus*), Eastern Screech Owls (*Otus asio*), and Northern Pygmy Owls (*Glaucidium gnoma*). In addition, I played the call of the Long-eared Owl (*Asio otus*), a rare and sensitive species. This study confirmed the presence of one Northern Saw-whet Owl in the study area as well as a Great-horned Owl (*Bubo virginianus*), a dominant species whose presence may have an effect on the calling behavior of other species. Small forest owls are elusive and under-studied. Further study is needed in areas like Boulder Open Space to ensure that human presence is not having unnoticed harmful effects on biodiversity.

INTRODUCTION

The lower elevations of Boulder County contain nesting habitat for seven species of owls: Flammulated Owl (*Otus flammeolus*), Northern Saw-whet Owl (*Aegolius acadicus*), Eastern Screech Owl (*Otus asio*), Northern Pygmy Owl (*Glaucidium gnoma*), Long-eared Owl (*Asio otus*), Great-horned Owl (*Bubo virginianus*), and Burrowing Owl (*Athene cunicularia*) (Jones, 1991). The Burrowing Owl is associated with prairie dog colonies and has declined with population growth and development in the County. Similarly, the Long-eared Owl is considered "rare and declining" in Boulder County. Boulder County is marginal habitat for the Eastern Screech Owl and this species has been place on the Audubon Society's Blue List (Richardson and Hammer, 1995, Jones, pers. comm.).

In his five year study of small forest owls, Stephen Jones (1991) used more than 50 volunteers to locate singing owls throughout Boulder County. He found significant numbers of Northern Saw-whet Owls: 34, Northern Pygmy Owls: 31, and Flammulated Owls: 31. Jones concluded that Northern Saw-whet Owls are "uncommon but widely distributed inhabitants of the mountains of Colorado." Northern Pygmy-Owls are known to breed in the same vicinity as Saw-whet Owls, but have been thought to exist in lower numbers (Webb, 1982). Jones concluded, however, that "Pygmy-Owls may be more common along the Front Range than was previously thought, and that highest densities of breeding populations may occur in the lower foothills."(Jones, 1991, 57).

Little is known about the effects of human disturbance and management practices on owl species. Areas near urban centers that are designated for wildlife protection, for example Boulder Open Space, provide a unique opportunity to study the species diversity and abundance of owls as a possible indicator of ecosystem health.

METHODS

During late April and early May 2000, I conducted four nocturnal surveys (April 23, 25, 26 and May 1). Surveys were conducted at six points starting approximately 30 minutes after sunset and continuing for 2-3 hours. I used a portable tape recorder to play the calls of four owl species: Long-eared, Northern Saw-whet, Northern Pygmy, and Eastern Screech Owls. Two calls were played at each survey point for five minutes each, alternating 30 seconds on, 30 seconds off. I alternated the calls played at each survey point so that each call was played at least twice at each site. The order of study sites was also altered with each visit to provide temporal variability. These study methods replicated those used by Richardson and Hammer (1995) and Jones (1991, 1994).

The calls of two owl species known to reside in this area were not played. I did not play the call of the Great Horned Owl for two reasons. First, this species is known to call spontaneously throughout the spring and summer. Second, since this species preys upon the smaller owls, its call may have the tendency to quiet other species (Jones, pers. comm.). I also did not play the call of the Flammulated Owl even though this species has been shown to reside in the area (Jones, 1991). Flammulated Owls are insectivorous migrants and do not arrive in Boulder County until May 10 on average, after the end of this study (Jones, pers. comm.).

STUDY AREA

This study was conducted on the Eldorado Open Space property in southern Boulder County. This property is accessed via Highway 170 approximately one mile east of the town of Eldorado Springs. I conducted surveys at six points (see attached map). The survey points

varied in elevation from 1900 meters to 2050 meters. Ponderosa pine is the dominant vegetation in all six survey sites, though some sites also contain significant quantities of Douglas fir.

My survey points were the same as those used by Richardson and Hammer based on their descriptions and an aerial map that accompanied their study. Richardson and Hammer described the locations of their individual survey points as follows:

> Survey point one is within 25 meters of the Mesa Trail and South Shadow Canyon Trail intersection. It is surrounded by large junipers, open Ponderosa pine and Douglas fir forest, and is bordered on one side by an open grassy area. Survey point two is on the edge of a moderately dense forest that is bordered on one side by open grassy areas. Survey point three is just inside a more densely forested area with many young Douglas firs. It is located approximately 100 meters South of the Northern Shadow Canyon trail and Mesa Trail intersection. Survey point four is approximately 35 meters west of the Mesa Trail on a densely wooded hill. This hill leads up to site five which approximately 60 meters from the Mesa Trail. Site six is further up the slope from site five. It is approximately 100 meters from the Mesa Trail and borders a skree slope below Devil's Thumb.(Richardson and Hammer, 1995)

RESULTS

Four responses were recorded to the twenty-four surveys I conducted, although only two of these responses were definitively identified. Table 1 shows the results of this study by survey point and habitat type. Table 2 provides a comparison of the 2000 data to the results obtained by Richardson and Hammer in their 1995 study using the same survey points.

DISCUSSION

My observation of a Great Horned Owl at survey point 5 supports the conclusion drawn by Richardson and Hammer that a pair of Great Horned Owls reside near survey point 6. Survey points 5 and 6 are separated by only 30 meters and both are close to the rocky cliff habitat favored by this species for nesting. This conclusion is further supported by the

observation that the nearby Peregrine Falcon nest on the Matron was predated by Great Horned Owls in 1999 (Richardson, pers. comm.).

This study also illustrates the presence of a Northern Saw-whet Owl near survey point 1. A further call that might have been an additional Saw-whet Owl was recorded on 4/26 at this same point. Northern Saw-whet Owls are known to have considerable diversity in their calls (Otter, 1996) making it difficult for amateurs to make definitive identifications from single calls.

It is noteworthy that no Northern Pygmy-Owls were identified. Jones (1991) found similar numbers of Pygmy-Owls and Saw-whet Owls. One possible explanation is that the frequency of Saw-whet owl calls is much higher during the time of this study while Pygmy-Owls call more frequently earlier in the spring (Jones, 1991). The call recorded on 5/1 at survey point 4 may have been a Northern Pygmy-Owl, but again a definite identification was impossible.

This study indicates the need for further monitoring of owls on Boulder Open Space properties. Owls are understudied and may prove to be a good indicator of ecosystem health and the effects of human recreation, urbanization, and management practices.

Table 1. Responses to Tape Playbacks of 4 owl species, 2000.

Survey Point	Habitat Type	Response
Site 1	Ponderosa Pine	Northern Saw-whet Owl responded three times to Northern Saw-whet Owl call (4/25/00) Unidentified owl responded once to Northern Saw-whet Owl call (4/26/00)
Site 2	Ponderosa Pine	no response to any survey
Site 3	Mixed Coniferous Forest	Unidentified owl responded once to Northern Pygmy Owl call (5/1/00)
Site 4	Mixed Coniferous Forest	no response to any survey
Site 5	Mixed Coniferous Forest	Great-horned Owl swooped overhead in response to Eastern Screech Owl call (4/23/00)
Site 6	Mixed Coniferous Forest	no response to any survey

Note: Great-horned Owls were heard calling spontaneously in the general study area on both 4/25/00 and 4/26/00. Also, an Eastern Screech Owl was heard calling earlier in the evening on 4/26/00 near the study area.

Table 2. Comparison to Richardson and Hammer, 1995.

Survey Point	1995 Response	2000 Response
Site 1	no response to any survey	Northern Saw-whet Owl responded three times to Northern Saw-whet Owl call (4/25/00) Unidentified owl responded once to Northern Saw-whet Owl call (4/26/00)
Site 2	no response to any survey	no response to any survey
Site 3	Northern Saw-whet Owl responded twice to Flammulated and Long-Eared Owl calls (4/4/95)	Unidentified owl responded once to Northern Pygmy Owl call (5/1/00)
Site 4	Northern Saw-whet Owl responded twice to Northern Saw-whet Owl and Northern Pygmy Owl calls (4/4/95)	no response to any survey
Site 5	no response to any survey	Great-horned Owl swooped overhead in response to Eastern Screech Owl call (4/23/00)
Site 6	Two Great-horned Owls responded five times to the call of the Northern Pygmy Owl (4/6/95). These calls differed slightly in pitch.	no response to any survey

Note: Great-horned Owls were heard calling spontaneously in the general study area in both 1995 (4/6/95) and 2000 (4/25/00, 4/26/00). Also, an Eastern Screech Owl was heard calling earlier in the evening on 4/26/00 near the study area.

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