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## THE FIRST DOCUMENTED BREEDING OF THE BOREAL OWL IN COLORADO

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After they collected a recently fledged Boreal Owl (*Aegolius funereus*) in north-central Colorado, Baldwin and Koplín (1966) hypothesized that the species "occurs in Colorado as a relict of a more widespread multilattitudinal Pleistocene population of Boreal Owls." Such isolated breeding

units in the Rocky Mountains would parallel a similar distribution throughout the species' Eurasian range (Mysterud 1970). Several recent records from the breeding season throughout the Rocky Mountains (Tables 1 and 2) support Baldwin and Koplín's (1966) theory and may also show that the species has a contiguous distribution along the range from Canada to southern Colorado. The owl's status as a breeding bird in Colorado has not hitherto been fully confirmed, but we now present such evidence.

From 1979 to 1983, intensive searches for nesting Boreal Owls have been centered near Cameron Pass in Larimer County, approximately 35 km southeast of the Deadman Lookout area searched by Baldwin and Koplín (1966), and the site of several recent records. This area is characterized by climax spruce-fir (*Picea engelmanni-Abies lasiocarpa*) forests above 2,900 m in elevation. Snowfall in the region is typically heavy with an average snow depth on 1 April of 188 cm (Soil Conservation Service 1983) and with snow covering the ground until mid-June or later.

We began censusing the owls in April 1980 in order to estimate their density in the Cameron Pass area. The late

TABLE 1. Breeding season records of Boreal Owls in Colorado—1963-1979.

Date	Number	Locality	County	Source
14 August 1963	1 juvenile specimen (CSU 9662) <sup>1</sup>	1.6 km S of Deadman Mt. Lookout	Larimer	Bailey and Niedrach (1965)
23 July 1966	1 heard	Deadman Mt.	Larimer	DFO 1(11):3 <sup>2</sup>
22-23 July 1967	1 heard	Deadman Mt.	Larimer	DFO 2(11):3
29 July 1967	1 heard	Webster Pass	Summit	DFO 2(11):3
2 August 1967	1 seen	Webster Pass	Summit	DFO 2(11):3
1 April 1970	1 specimen (DMNH 36064) <sup>3</sup>	5.6 km S of Estes Park	Larimer	Collister (1971)
6 September 1970	1 seen	Keebler Pass	Gunnison	DFO 6(1):2
31 August 1971	1 juvenile photographed	1.5 km NE of Gothic	Gunnison	Calder and Calder (1972)
15 June 1973	1 specimen	Rabbit Ears Pass	Routt	Reddall (1976)
13 July 1974	1 juvenile seen	8.1 km N of Chambers Lake	Larimer	Reddall (1976)
19 July 1975	1 seen	75 km S of Powderhorn	Gunnison	Hyde (1979)
15 July 1978	1 seen	0.8 km NE Deadman Lookout	Larimer	Webb (1982)
July 1978	1 captured & released	Rocky Mountain National Park, W entrance	Grand	Webb (1982)
25-27 June 1979	1 heard	0.8 km S Deadman Lookout	Larimer	Webb (1982)
14 July 1979	1 juvenile specimen (DMNH 36862) <sup>3</sup>	fresh road kill on Trail Ridge Road	Grand	Webb (1982)

<sup>1</sup> CSU: Colorado State University.

<sup>2</sup> DFO: Denver Field Ornithologists' Newsletter.

<sup>3</sup> DMNH: Denver Museum of Natural History.

TABLE 2. Breeding season records of Boreal Owls in the western United States (excluding Colorado).

State	Date	Number	Locality	County	Source
Idaho	26 February– 1 April 1980	4 heard	River of No Return Wilderness Area	Idaho	Hayward and Garton (1983)
	24 January 1981	1 adult captured	River of No Return Wilderness Area	Idaho	Hayward and Garton (1983)
	2 June 1981	1 adult and 2 juveniles	River of No Return Wilderness Area	Idaho	Hayward and Garton (1983)
	Early March 1982	2 heard	River of No Return Wilderness Area	Idaho	Hayward and Garton (1983)
Montana	12 September 1976	1 observed	Albicaulis Lake	Powell	Seegerstrom (1977)
	July 1973	3 juveniles seen	Waterton Lake	Glacier	Rogers (1973)
Washington	4 May–16 June 1979	2 adults and 3 juveniles	Pullman	Whitman	Batey et al. (1980)
Wyoming <sup>1</sup>	May 1980	1 adult heard	Togowotee Pass	Fremont	B. Oakleaf, Wyoming Dept. of Game & Fish, Lander (pers. comm.)
	Summer 1975	1 adult specimen, Los Angeles County Museum	Togowotee Pass	Fremont	Kingery (1976)
	24 June 1974	1 road kill	Yellowstone National Park		Kingery (1975)

<sup>1</sup> Oakleaf et al. (1982) stated that there have been 11 Boreal Owl records in Wyoming of which 3 were in summer.

winter–early spring period is the best time for censusing because this is when the birds are most vocal, just before they begin to nest (Bondrup-Nielsen 1978). Since non-breeding males are generally more vocal than breeding ones (Lundberg 1978), the estimates that we generated were probably not representative of the number of breeding pairs. We drove census routes along 12 km of paved all-weather highway and along 20 km of dirt roads, which

were only passable late in the census period. We stopped every 0.8 km to listen for vocalizations (cf. Holmberg 1979). We censused the area 9 times in 1980, 11 in 1981, 9 in 1982, and 41 times in 1983. One report was received for 1979. From 1979–1983 the number of owls located each year has increased with the exception of 1982 when only a limited amount of time was spent censusing and our efforts were concentrated on nesting owls (Table 3).

TABLE 3. Breeding season records of Boreal Owls in Colorado—present survey 1979–1983.

Date	Number	Locality	County	Comments
13–15 March 1979	1 heard	Cameron Pass	Larimer	W. Alldredge, Colorado State Univ. (pers. comm.)
5 April–3 June 1980	5 heard	Cameron Pass	Larimer	This study
17 April–21 May 1981	8 heard, 2 seen 4 eggs in abandoned nest	Cameron Pass	Larimer	This study
25 April 1981	1 heard	Brown's Lake	Larimer	D. Reed, Colorado State Univ., (pers. comm.)
9 May 1981	1 heard	Bear Lake	Larimer	W. Reeser, Estes Park (pers. comm.)
20 March 1982	1 heard	Chamber's Lake	Larimer	R. DeFusco, Colorado State Univ. (pers. comm.)
10 April 1982	1 heard	Chamber's Lake	Larimer	R. DeFusco, Colorado State Univ. (pers. comm.)
5 July 1982	1 adult seen (photo)	Cataract Lake	Summit	S. Westendorf, Denver (pers. comm.)
26 March–15 August 1982	4 adults heard or observed, 3 juveniles observed	Cameron Pass	Larimer	This study
9 March–10 June 1983	9 heard	Cameron Pass	Larimer	This study
	2 seen	Cameron Pass	Larimer	This study

The densities that we estimated are comparable to densities of owls estimated by Bondrup-Nielsen (1978) in historic Boreal Owl range in Alberta and Ontario, Canada.

On 17 April 1981 we searched one of the territories we had located and found an owl occupying a natural cavity in a lodgepole pine (*Pinus contorta*) snag. We checked the cavity two weeks later and found the female on eggs, but two weeks later the owls had abandoned the nest leaving four unhatched eggs (fragments deposited in the Denver Museum of Natural History). We do not know why the owls departed but it could have been due to a late and heavy snowfall or to our activity around the nest during egg laying and incubation (Van Camp and Henny 1975; P. Hegdal, U.S.F.W.S., Denver Res. Center, pers. comm.). The nest tree, with a diameter at breast height of 47 cm, was in an isolated stand of lodgepole pine surrounded by a large subalpine meadow. The nest, in a natural cavity 5 m from the ground, had an entrance diameter of 10 cm. We found 10 montane voles (*Microtus montanus*) in the nest before the owl laid eggs, indicating that the owl found much of its prey in the meadow in late spring. Boreal Owls seem to prefer forests that are interspersed with meadows and other openings, rather than the dense forests with which they have commonly been associated (Kallander 1964). Holmberg (1982) found breeding densities 25 times higher in such mixed areas compared with large tracts of forest.

We revisited the nest site in June 1982 and again found Boreal Owls occupying the cavity, apparently a common practice for this species (Kampp 1982). Egg laying was later in 1982 than in 1981, perhaps owing to greater snowfall that year. In 1982 eggs were laid approximately the first week in June. Three of four eggs hatched in early July and all three young fledged successfully, the first between 26–30 July and the other two in early August. The nest cavity was not used in 1983 and no owls were seen or heard in the vicinity. Spring in 1983 was exceptionally snowy with snowfall 150% of normal (Soil Conservation Service Snow Survey Unit, Denver, Colorado).

Recently Boreal Owls have been seen or heard throughout the Rocky Mountain Region (Colorado, Wyoming, Montana, Idaho and Washington; Tables 1 and 2). Of 56 breeding season records known in this region, one additional nest has been documented, that in Idaho (Hayward and Garton 1983), and four sightings have been made of juvenile owls (Tables 1 and 2). These records seem to indicate that a contiguous breeding range extends in the Rocky Mountains from Canada south to Colorado, supporting the theory advanced by Baldwin and Koplín (1966). The accumulation of records in recent years is more likely a result of greater human penetration into the Boreal Owl's habitat during the peak singing period rather than an increase in owl numbers in the region. This finding, in conjunction with the discovery of Boreal Owls nesting in Minnesota (Eckert 1979), should justify a revision of descriptions and maps of the species' breeding range in North America.

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