BOREAL OWL (*Aegolius funereus*) AND FLAMMULATED OWL (*Otus flammeolus*) SURVEY RESULTS FOR THE LIVINGSTON DISTRICT OF THE GALLATIN NATIONAL FOREST

by

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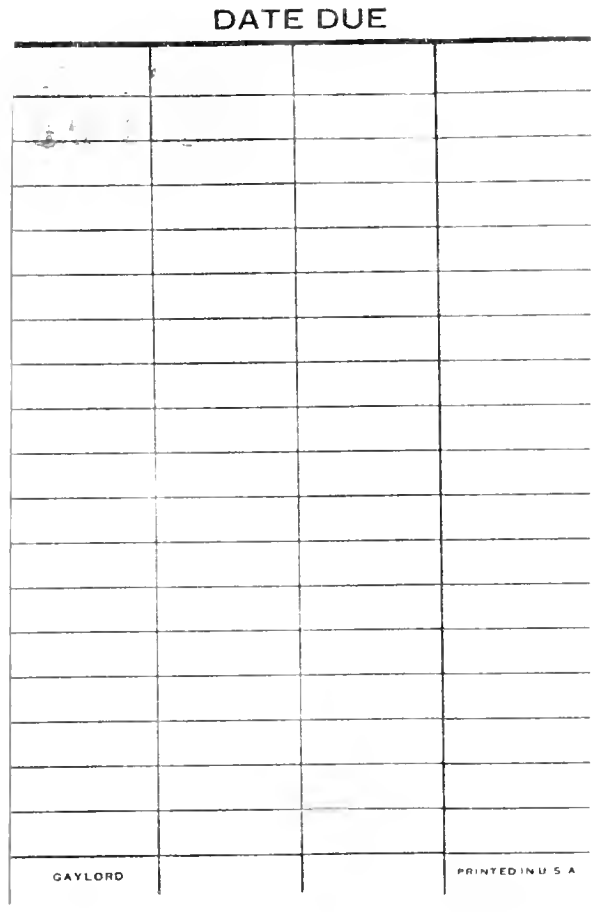

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SUMMARY

Two owl surveys were conducted on the Livingston District of the Gallatin National Forest during the spring of 1992. The first survey was for boreal owls and was conducted between 26 February and 4 April. The second survey was for flammulated owls and was conducted between 21 May and 7 June. The call playback method was used to survey for owls on 26 survey routes. A total of 104 miles were covered with 194 calling stations. Owls were heard on 19 routes and at 39 calling stations. Elevation ranged from 5560 feet to 7900 feet.

A total of 11 boreal owls, 1 unverified flammulated owl, 10 great horned owls, 15 northern saw-whet owls, 4 northern pygmy-owls, 2 great gray owls, 2 western screech-owls, and 1 barred owl was counted.

Boreal owls were heard on 7 routes and elevation ranged from 6580 feet to 7900 feet. Boreal owls were detected on all aspects, west was most common. Four locations were on private land and timber stand information was not available. All seven of the observations on National Forest land were in timber stands with at least 40% crown cover. Three locations were associated with subalpine fir/lodgepole timber, two with douglas fir/lodgepole, and two with subalpine fir. This survey demonstrates that boreal owls are present on the Livingston District of the Gallatin National Forest in the Crazy Mountains, and the Gallatin and Absaroka Mountain Ranges.

An unverified flammulated owl was heard in the Crazy Mountains. The owl was heard among second growth lodgepole pine and mature subalpine fir forests.

Surveys for the flammulated owl should continue on the Gallatin National Forest to build evidence for their presence or absence in the area. Future surveys for the boreal owl should concentrate on locating nests. Information that could be gathered once nest sites are found include: nesting success, food habits, micro and macro habitat requirements, dispersal of young and interconnection of geographically distinct populations.

INTRODUCTION

The boreal owl (Aegolius funereus) is a small, nocturnal owl found in northern forests around the world (Hayward 1989). Boreal owls are gernerally observed in mature-old growth high elevation forests with a major component of subalpine fir (Abies spp.) and spruce (Picea spp.). The breeding season begins in February and continues through March. During this time, male boreal owls can be identified by hearing their distinctive winnowing territorial song (Palmer 1987).

The flammulated owl (Otus flammeolus) is also a small, nocturnal owl found in northwestern forests of North America during the summer months. This owl is believed to be migratory in the northern part of its range (Balda et al. 1975). The flammulated owl feeds primarily on insects and has been observed in mature-old growth montane yellow-pine forests consisting of ponderosa pine (Pinus ponderosa) or Jeffrey pine (Pinus jeffreyi), but has also been found in western larch (Larix occidentalis), Douglas fir (Pseudotsuga menziesii), and aspen (Populus tremuloides) forests among or near yellow pine forests (Reynolds and Linkhart 1984). The breeding season begins in May and continues into June and during this time males can be identified by hearing their distinctive low toned "boop...boop" territorial song (Reynolds and Linkhart 1984).

Both species are secondary cavity nesters and depend on medium-large size woodpeckers for excavating nest cavities

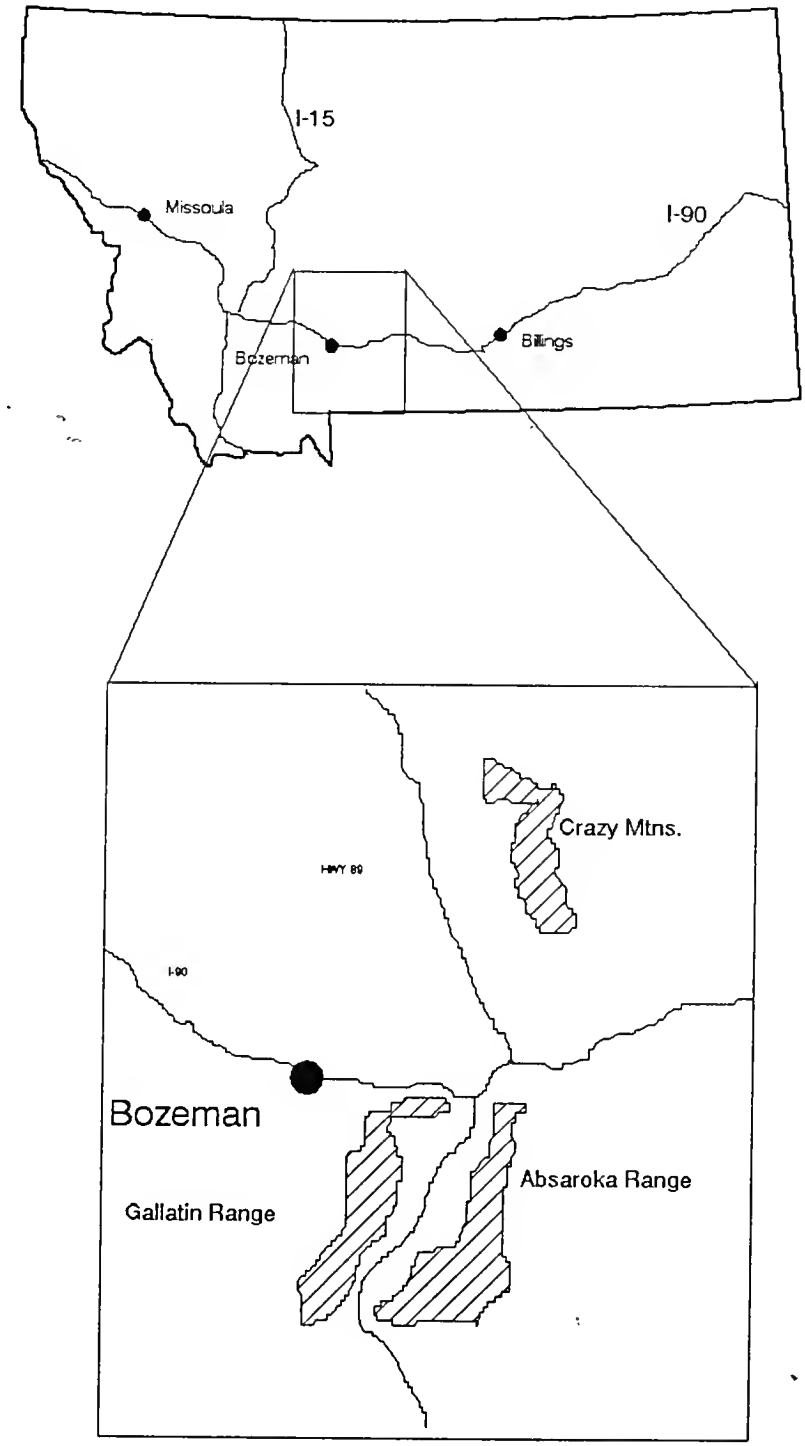
(Reynolds et al. 1989). Woodpeckers nest in large-diameter dead and/or disease trees which are commonly removed during commercial tree harvests and for firewood. Reductions in woodpecker populations, resulting from snag removal and changes in the structure or composition of stands used for nesting and foraging, may be occurring in intensively managed forests which will dramatically affect these small forest owl species. Concern for the boreal and flammulated owls has led to the listing of these two species as Sensitive Species in Region 1 of the United States Forest Service and as Species of Special Concern in Montana by the Montana Natural Heritage Program. The Forest Service is required to monitor their status and maintain population viability on National Forest lands.

Boreal owls are known to occur in Yellowstone National Park (pers. comm. T. McEneaney), the Beaverhead and Bitterroot national forests (Mullen 1990), the Lewis and Clark National Forest (Carlson 1991), and the Lolo National Forest (Holt and Ermatinger 1989) in Montana. Flammulated owls have been observed in western Montana (pers comm. D. Holt). The presence of these owls on the Gallatin National Forest is unknown.

SURVEY AREA

Survey routes were conducted on the Livingston District of the Gallatin National Forest in southwestern Montana (Figure 1). The district covers the east half of the Gallatin Mountain Range,

Figure 1. The Livingston District of the Gallatin National Forest, study area for boreal and flammulated owl surveys conducted in the spring of 1992.



the west half of the Absaroka Mountain Range and most of the west side of the Crazy Mountains.

The dominate forests on the district are lodgepole pine (Pinus contorta) and Douglas fir (Pseudotsuga menziesii). Engelmann spruce (Picea engelmannii), subalpine fir (Abies lasiocarpa) and aspen (Populus tremuloides) occur on the wetter sites. Whitebark pine (Pinus albicaulis) occurs at high elevations.

METHODS

Boreal owl and flammulated owl surveys were conducted on the Livingston District of the Gallatin National Forest during the spring of 1992. Survey routes were selected that represented a variety of habitat types including; low elevation (below 6200 ft.), high elevation (above 6200 ft.), riparian, forests fragmented by past timber harvest, and continuous forests (roaded and roadless). Routes were surveyed from snowmobiles, vehicles, skis, snowshoes and foot between 26 February and 7 June. Surveys were only conducted on nights with winds predicted at less than 10 mph.

Surveys were started one half hour after sunset and lasted 2-7 hours. The call playback method was used to survey for owls (Fuller and Mosher 1981). Playback stations were one half to one mile apart along the survey route. The spacing varied widely on some routes due to the topographic and/or habitat variation. At

each station surveyors listened for calling owls for 2-3 minutes, played the boreal or flammulated owl territorial call for 2-3 minutes in one direction, listened for 2-3 minutes and then played the boreal or flammulated owl call again for 2-3 minutes in another direction and listened for 2-3 minutes. A second species call was then played for 2-3 minutes and surveyors listened for 2-3 minutes. When an owl was heard, the direction and estimated distance to the owl was recorded on a 7.5 minute U.S.G.S. topographic map. Dominant tree species were recorded for each station. Slope, aspect, moon phase, and timber type were recorded for the estimated location of boreal and flammulated owls. Timber types were derived from stand data found in Form 22 at the District Office. They are named for the major volume species in the stand and describe tree size (sapling, pole, mature) and canopy closure (0-39%, 40-69%, 70+%).

RESULTS

Two owl surveys were completed on the Livingston District of the Gallatin National Forest in the spring of 1992 (Figures 2 and 3). The first survey was for boreal owls and was conducted between 26 February and 4 April. Survey routes were mostly high elevation and in forests that had at least some subalpine fir and/or spruce. The second survey was for flammulated owls and was conducted between 21 May and 7 June. Survey routes were high

Figure 2. Routes surveyed in the Crazy Mountains for boreal owl and flammulated owl on the Livingston District of the Gallatin National Forest in 1992.

L1 Smith Cr.
L2 Shields River
L3 Ibex-Horse
L4 Trespass Cr.
L5 Cottonwood Cr.
L6 Rock Cr. (N)
LFL1 Smith Cr.
LFL2 Shields River
LFL3 Ibex-Horse
LFL4 Cottonwood Cr.

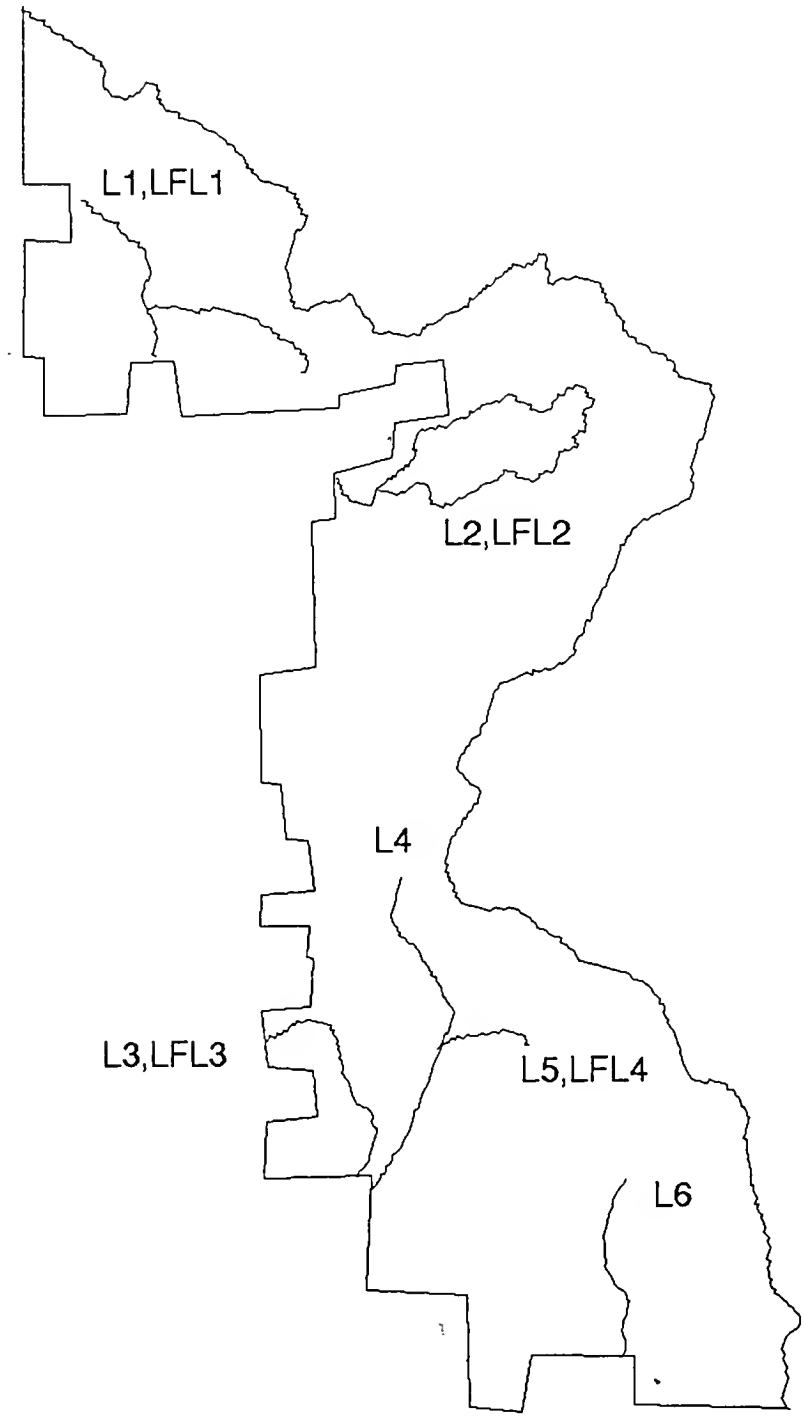
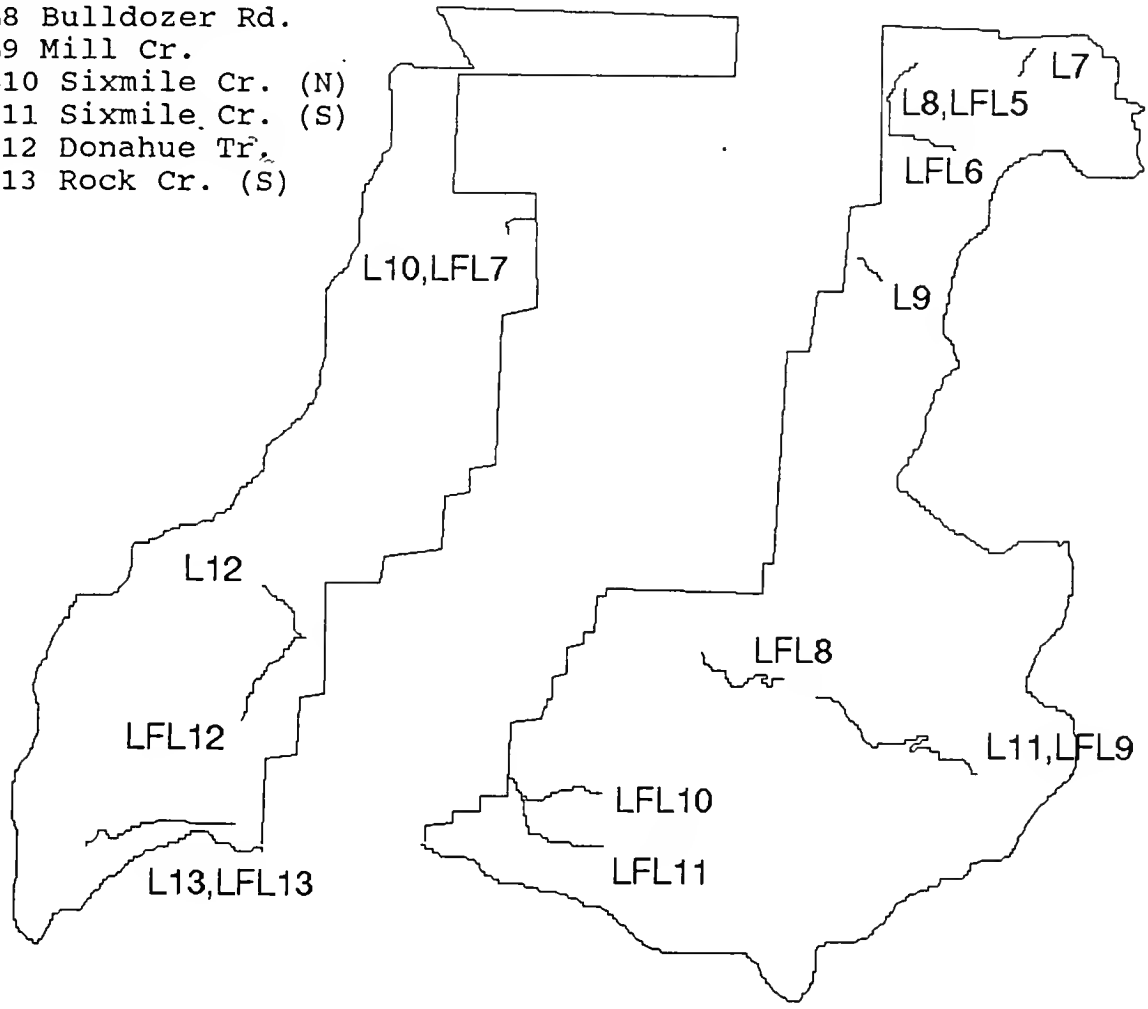


Figure 3. Routes surveyed in the Gallatin and Absaroka Mountain Ranges for boreal owl and flammulated owl on the Livingston District of the Gallatin National Forest in 1992.

L7 Mission Cr.
L8 Suce Cr.
L9 Pine Cr.
L10 W. Pine Cr.
L11 Mill Cr.
L12 Lewis Cr.
L13 Rock Cr. (S)
LFL5 Suce Cr.
LFL6 Deep Cr.
LFL7 W. Pine Cr.
LFL8 Bulldozer Rd.
LFL9 Mill Cr.
LFL10 Sixmile Cr. (N)
LFL11 Sixmile Cr. (S)
LFL12 Donahue Tr.
LFL13 Rock Cr. (S)



and low elevation, and in forests dominated by mature Douglas fir.

The primary objective of these surveys was to determine if boreal and flammulated owls were present on the Livingston District (Table 1). Most routes were surveyed only once, and data should only be used as evidence of owl activity. Population estimates are not possible with these data.

The boreal owl survey covered 13 routes. Nine boreal owls, 10 great horned owls (Bubo virginianus), 14 northern saw-whet owls (Aegolius acadicus), 3 northern pygmy-owls (Glaucidium gnoma), 2 western screech-owls (Otus kennicottii), 1 barred owl (Strix varia) and 14 unknown owls were counted. Unknown owls were not identified due to adverse conditions or because territorial calls were not heard.

The flammulated owl survey also covered 13 routes. One unverified flammulated owl, 2 boreal owls, 1 great horned owl, 1 northern saw-whet owl, 1 northern pygmy-owl, 2 great gray owls (Strix nebulosa), and 3 unknowns were counted.

The secondary objective of these surveys was to describe the distribution of all owls found on the Livingston District (Table 2). Because only one azimuth reading was obtained per owl, precise locations were subject to observer bias in determining distance and direction accurately.

Great horned owls were observed in a variety of habitats, ranging from low elevation aspen riparian zones to high elevation

Table 1. Route description and owl observations for owl surveys conducted on the Livingston District of the Gallatin National Forest in the spring of 1992.

					Owls observed								
Route # and Name	Date	Travel	Miles	Elevation	BO	GH	SW	NP	GG	FL	BA	WS	UK
L1 Smith Cr.	3-11-92	snmo	3.0	5900-6600	0	0	2	0	0	0	1	0	1
L2 Shields River	3-20,3-21-92	snmo	12.0	6400-6800	1	3	2	0	0	0	0	0	1
L3 Ibex-Horse	3-31-92	walk	1.5	6350-6600	1	0	0	0	0	0	0	0	0
L4 Trespass Cr.	4-02-92	snmo	4.0	6800-8300	1	1	0	0	0	0	0	0	0
L5 Cottonwood Cr.	3-26-92	snmo	3.5	6500-7200	3	1	0	0	0	0	0	0	0
L6 Rock Cr. (N)	4-03-92	walk	4.0	6500-7100	0	0	3	0	0	0	0	0	1
L7 Mission Cr.	2-28-92	walk	2.0	5600-6000	0	1	2	0	0	0	0	0	0
L8 Suce Cr.	3-12-92	walk	2.5	5300-6200	0	0	0	2	0	0	0	1	3
L9 Pine Cr.	3-09-92	walk	3.0	5620-6000	0	0	2	0	0	0	0	0	0
L10 W. Pine Cr.(2)*	3-5,3-28-92	walk	3.0	5800-6250	0	2	2	0	0	0	0	1	1
L11 Mill Cr.(2)	2-26,4-09-92	snmo	10.0	5650-7200	1	0	0	0	0	0	0	0	4
L12 Lewis Cr.	3-16-92	walk	1.0	5680-6600	0	0	0	0	0	0	0	0	1
L13 Rock Cr. (S)	3-03-92	snmo	4.0	6100-7760	2	0	1	1	0	0	0	0	2
LFL1 Smith Cr.	5-29-92	walk	3.0	6000-6380	2	0	0	0	0	0	0	0	1
LFL2 Shields River	6-02-92	walk	8.0	6450-6820	0	2	0	0	0	1	0	0	1
LFL3 Ibex-Horse	6-03-92	walk	4.0	6300-6900	0	0	0	0	1	0	0	0	0
LFL4 Cottonwood Cr.	6-03-92	vhcl	4.5	6500-7220	0	0	0	0	0	0	0	0	0
LFL5 Suce Cr.	5-27-92	walk	3.0	5320-6690	0	0	0	0	0	0	0	0	0

Table 1. Continued.

Route # and Name	Date	Travel	Miles	Elevation	Owls observed								
					BO	GH	SW	NP	GG	FL	BA	WS	UK
LFL6 Deep Cr.	6-01-92	v/w+	3.0	5340-7360	0	0	0	0	0	0	0	0	1
LFL7 W. Pine Cr.	6-04-92	v/w	1.5	6200-7480	0	0	0	0	0	0	0	0	0
LFL8 Bulldozer Rd.	5-28-92	vhcl	4.5	5760-7090	0	0	1	1	0	0	0	0	0
LFL9 Mill Cr.	5-21-92	vhcl	4.0	5750-6880	0	0	0	0	0	0	0	0	0
LFL10 Sixmile Cr.(N)	5-22-92	v/w	5.0	5800-7150	0	0	0	0	0	0	0	0	0
LFL11 Sixmile Cr.(S)	6-07-92	v/w	4.0	6150-7540	0	0	0	0	0	0	0	0	1
LFL12 Donahue Tr.	5-30-92	walk	2.0	5800-7000	0	0	0	0	0	0	0	0	0
LFL13 Rock Cr. (S)	5-30-92	vhcl	4.0	6200-7200	0	0	0	0	1	0	0	0	0
TOTALS			104.0		11	10	15	4	2	1	1	2	17

BO-boreal owl, GH-great horned owl, SW-northern saw-whet, NP-northern pygmy, GG-great gray, FL-flammulated, BA-barred, WS-western screech, UK-unknown owl
* (2) these routes were surveyed twice
+ v/w transportation was vehicle and walking

Table 2. Other owl species observed during boreal and flammulated owl surveys conducted on the Livingston District of the Gallatin National Forest in 1992.

Species	Number Observed	Route-Station	Elevation	Timber Type
Great Horned	1	L2-04	6600	DF,LP[a]
Great Horned	1	L2-09	6720	LP,SAF
Great Horned	2	L2-09	6720	LP,SAF
Great Horned	1	L4-07	6600	DF,LP
Great Horned	1	L5-07	6600	DF,LP
Great Horned	1	L7-01	6160	ES,SAF
Great Horned	1	L10a-03	6000	DF,ES,QA
Great Horned	1	L10a-04	5920	DF,QA,cottonwood
Great Horned	1	LFL2a-02	6860	LP
Northern Saw-whet	1	L1-04	6360	LP,SAF
Northern Saw-whet	1	L1-05	6240	LP,SAF
Northern Saw-whet	1	L2-03	6440	DF,LP,SAF
Northern Saw-whet	1	L2-09	6580	DF,LP,ES,SAF
Northern Saw-whet	1	L6-06	6620	DF,LP,cottonwood
Northern Saw-whet	1	L6-07	6540	DF
Northern Saw-whet	1	L6-08	6400	DF
Northern Saw-whet	1	L7-01	6160	ES,SAF
Northern Saw-whet	1	L7-02	5960	ES,SAF
Northern Saw-whet	1	L9-03	6000	DF,ES,cottonwood
Northern Saw-whet	1	L9-07	5560	DF,ES,cottonwood
Northern Saw-whet	1	L10a-02	6080	DF,LP,ES
Northern Saw-whet	1	L10a-03	6000	DF,ES,QA
Northern Saw-whet	1	L13-05	7240	LP,ES,SAF
Northern Saw-whet	1	LFL8-01	7090	DF,LP

Table 2. Continued.

Species	Number Observed	Route-Station	Elevation	Timber Type
Northern Pygmy	2	L8-01	6480	LP,SAF
Northern Pygmy	1	L13-01	7760	LP,SAF
Northern Pygmy	1	LFL8-01	7090	DF,LP
Barred	1	L1-01	6480	DF,LP
Western Screech	1	L8-03	6080	DF,ES
Western Screech	1	L10a-02	6080	DF,LP,ES
Great Gray	1	LFL3-08	6760	DF,LP,ES
Great Gray	1	LFL13-05	6820	DF,LP
Unknown	1	L1-03	6440	DF,LP,SAF
Unknown	1	L2-14	6580	DF,LP,ES,SAF
Unknown	1	L6-06	6620	DF,LP,cottonwood
Unknown	1	L8-03	6080	DF,ES
Unknown	1	L8-04	5720	DF,cottonwood
Unknown	1	L8-06	5660	DF,LP,QA
Unknown	1	L10a-01	5560	DF,ES,cottonwood
Unknown	1	L11a-01	7160	DF,LP
Unknown	1	L11a-02	7160	DF,LP
Unknown	1	L11A-03	7000	DF,LP
Unknown	1	L11A-04	6840	DF,LP,ES
Unknown	1	L12-02	6000	DF,ES
Unknown	1	L13-01	7760	LP,SAF
Unknown	1	L13-05	7240	LP,ES,SAF
Unknown	1	LFL1-05	6220	LP,ES

Table 2. Continued.

Species	Number Observed	Route-Station	Elevation	Timber Type
Unknown	1	LFL6-05	6640	DF
Unknown	1	LFL11-04	6480	DF,ES,QA

[a] DF Douglas fir, LP lodgepole pine, ES Engelmann spruce, SAF subalpine fir, QA quaking aspen

subalpine fir/lodgepole forests. Elevation of observations ranged from 5920 feet to 6720 feet.

Northern saw-whet owls were generally heard in draws near riparian zones. Elevation ranged from 5560 feet to 7240 feet.

Northern pygmy-owls were heard at dusk and generally not during survey hours. However, pygmy-owls were heard during the setting up of the route stations or at the first station. Elevation ranged from 6480 feet to 7760 feet.

Two great gray owls were observed. The elevations were 6760 and 6820 feet.

Two western screech-owls were observed at different sites near creek bottoms. The estimated elevations for each owl were the same, 6080 feet.

One barred owl was observed in Douglas fir/lodgepole pine forest at a trailhead. The elevation was 6480 feet.

The majority of the unknown owl observations were noted in response to our recorded territorial calls. After playing a call (boreal, saw-whet, western screech) we heard 4 unknowns respond at a very close distance, possibly in the trees above the observers with a "nyett" or "oo-wheat". Several observations were visuals and no calls were made, and at least 4 vocalizations were so distant that the sounds were not identifiable. Two unknown vocalizations sounded like the 'food beg' of a juvenile great horned owl.

A total of 11 boreal owls were heard on 7 routes (Table 3).

Table 3. Boreal and flammulated owl locations, habitat descriptions and moon phase for the 1992 surveys conducted on the Livingston Districts of the Gallatin National.

Species	Date	Route and Station no.	Legal Description	Elevation	Slope	Aspect	Moon Phase[a]	Timber Type[b]
Boreal	3-21-92	L2-04	T5N R10E sec25 1/4SE	6580	5%	N	FM	-[c]
Boreal	3-31-92	L3-04	T3N R10E sec14 1/4SE	6640	8%	W	LQ	LPDF22,LP13 DF12,LP11
Boreal	4-02-92	L4-04	T3N R11E sec 6 1/4NW	7320	4%	SW	LQ	SAF12,SAF13
Boreal	3-26-92	L5-01	T3N R11E sec 8 1/4NE	7260	4%	W	LQ	SAF13,SAF23
Boreal	3-26-92	L5-02	T3N R11E sec 8 1/4NW	7200	4%	SW	LQ	LP13,SAFNCF
Boreal	3-26-92	L5-04	T3N R11E sec 7 1/4SW	6760	4%	N	LQ	LP13,SAF12
Boreal	2-26-92	L11a-02	T6S R10E sec 2 1/4SE	7160	60%	N	LQ	DF13,LP23
Boreal	3-03-92	L13-01	T7S R5E sec23 1/4SE	7900	15%	NW	LQ	-
Boreal	3-03-92	L13-01	T7S R5E sec26 1/4NE	7860	2%	N	LQ	SAF13,LP13
Boreal	5-29-92	LFL1-01	T6N R10E sec18 1/4NW	6000	2%	W	LQ	-
Boreal	5-29-92	LFL1-01	T6N R10E sec18 1/4NW	6000	2%	W	LQ	-
Flammulated	6-02-92	LFL2-06	T5N R11E sec20 1/4NW	6700	4%	N	NM	LP23,SAF13

[a] NM = new moon, FQ = first quarter, FM = full moon, LQ = last quarter
[b] DF = Douglas fir, LP = lodgepole pine, SAF = subalpine fir
The first number is tree age, 1 = mature, 2 = pole size, 3 = sapling size
The second number is canopy closure, 1 = 10-39%, 2 = 40-69%, 3 = 70-100%
[c] Private land, timber type not available

Tree species, size and crown cover were identified for boreal owl locations on National Forest land. The information on timber stands was on file at the Livingston District office. Timber stands are categorized according to major species; however several other tree species may also occur within the stand. Most categorization is interpreted with the use of aerial photographs, and also by using averages from surrounding timber stands. Boreal owl habitat, as described in this report, may be subject to surveyor bias and incomplete data.

Boreal owl locations ranged in elevation from 6580 to 7900 feet. Boreal owls were detected on all aspects except east; west aspect was most common. Four boreal owl locations were on private land and therefore timber stand information was not available. Boreal owls were generally associated with stands of at least 40% crown cover. Three boreal owls were found in association with subalpine fir/lodgepole pine stands, two with Douglas fir/lodgepole pine, and two in subalpine fir.

One unverified flammulated owl was observed in the Crazy Mountains. The observer noted that the vocalization was slightly higher pitched. The elevation was at 6700 feet on a north aspect. The timber stands were classified as second growth lodgepole pine and mature dense subalpine fir.

DISCUSSION

These surveys demonstrate that boreal owls are present on

the Livingston District of the Gallatin National Forest in the Crazy Mountains, and the Gallatin and Absaroka Mountain Ranges. One unverified flammulated owl was observed in the Crazy Mountains.

Boreal owls were heard at high elevations, 6580-7900 feet and on all aspects except east. The most common aspect was west. On the Lewis and Clark National Forest the elevation for locations were 6400-8080 feet (Carlson 1991), similar to surveys in southwestern Montana where elevations were 6000-7800 feet (Mullen 1989). The Lewis and Clark survey also found west to be the most common aspect, while in southwest Montana east was the most common aspect.

Boreal owls were most frequently found in association with subalpine fir forests as identified by stand information available at the Livingston District office. This is consistent with findings on the Beaverhead and Bitterroot National Forests, where 5 out of 7 of the boreal owl locations were associated with subalpine fir stands (P. Mullen 1990). Stands are identified by the most abundant tree species, and several other species may be present. Hayward (1989) observed boreal owl singing locations and nest sites were found frequently (39.4% of the time) in mixed conifer.

The unverified flammulated owl was heard in a nontypical habitat type, second growth lodgepole pine and mature subalpine fir timber stands. The vocalization was heard at two consecutive stations under good weather conditions. The surveyor noted the

owl vocalization to be slightly higher in pitch than the recorded flammulated owl calls used for surveying. Near Helena, Montana in 1990, a flammulated owl nest was found in an aspen snag in a lodgepole pine/spruce forest (Pers comm. D. Genter). In British Columbia these owls are found in dry, mature Douglas fir forests with canopy closure of 35-65% (Howie and Ritcey 1987). In Colorado, Reynolds and Linkhart (1987) found flammulated owls more associated with mature-old growth ponderosa pine.

RECOMMENDATIONS

Surveys for the flammulated owl should continue on the Livingston District and elsewhere in Montana. So little is known about this species in Montana that distribution data is vital to the U. S. Forest Service when making decisions in forest management. Boreal owls have been found throughout western Montana and it is now more important to focus on boreal owl habitat and population dynamics in relation to timber management. Surveys should focus on locating nests. Information that could be gathered once nest sites are found includes: nesting success, food habits, and micro and macro habitat requirements. By conducting more comprehensive studies with telemetry, information could be gathered on critical foraging habitat, roosting habitat, dispersal of fledglings and the interconnection of geographically distinct populations.

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