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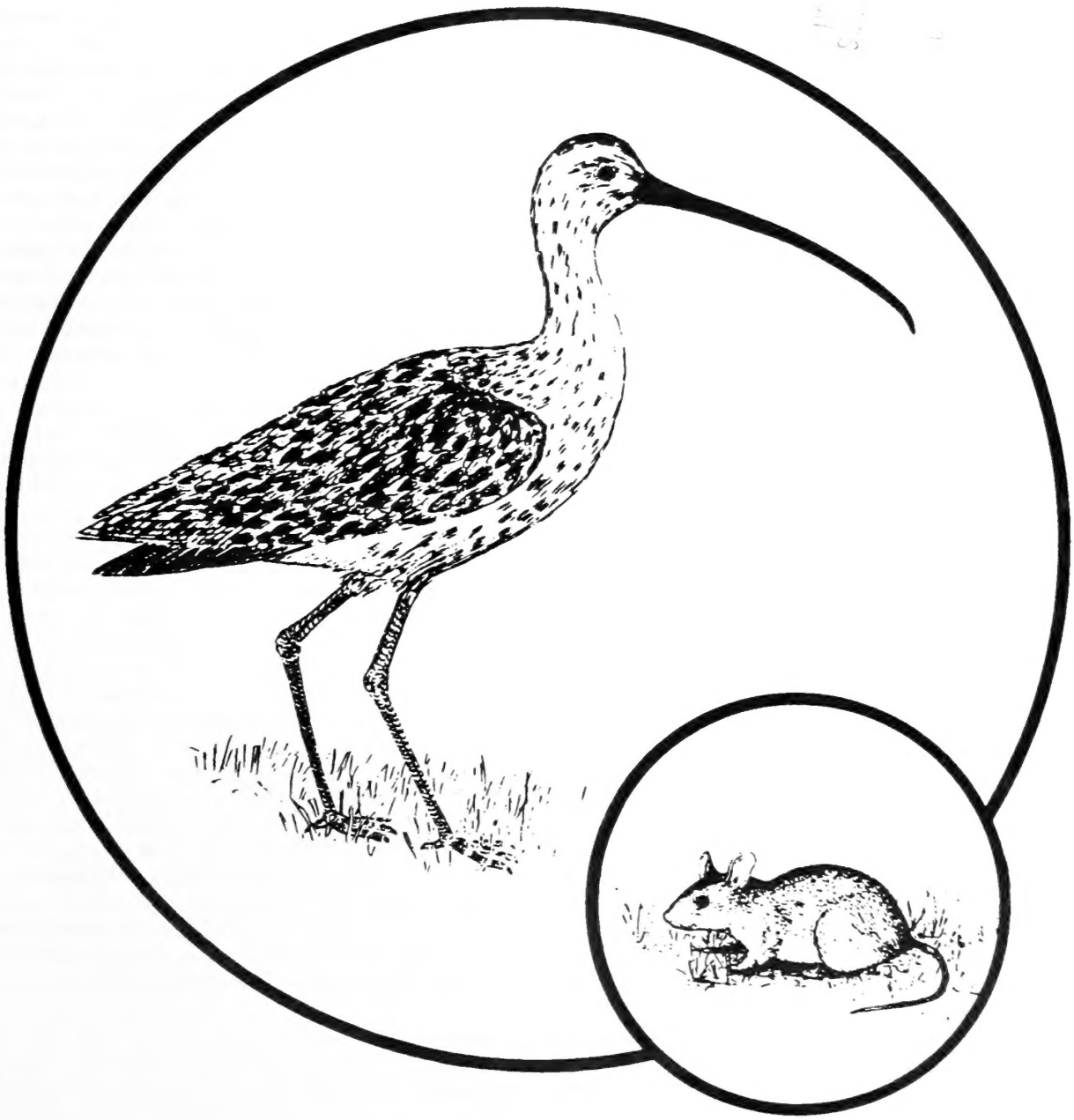
# Bird and Small Mammal Populations in a Grazed and Ungrazed Riparian Habitat in Idaho

**Dean E. Medin**
**Warren P. Clary**



## THE AUTHORS

**DEAN E. MEDIN** is a research wildlife biologist with the Intermountain Research Station at the Forestry Sciences Laboratory in Boise, ID. He earned a B.S. degree in forest management from Colorado State University in 1957, an M.S. degree in wildlife management from Colorado State University in 1959, and a Ph.D. degree in range ecosystems from Colorado State University in 1976. His research has included studies in mule deer ecology, big-game range improvement, mule deer population modeling, and nongame bird and small mammal ecology and habitat management.

**WARREN P. CLARY** is project leader of the Intermountain Station's Riparian-Stream Ecology and Management research work unit at Boise, ID. He received a B.S. degree in agriculture from the University of Nebraska and an M.S. degree in range management and a Ph.D. degree in botany (plant ecology) from Colorado State University. He joined the Forest Service in 1960 and has conducted research on forested and nonforested rangelands in Arizona, Louisiana, Utah, Idaho, Oregon, and Nevada.

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## RESEARCH SUMMARY

We compared breeding bird and small mammal populations between a riparian habitat seasonally grazed by cattle and a comparable adjacent riparian habitat protected from grazing for the previous 14 years by a fenced exclosure. The 122-ha exclosure, constructed in 1975, straddles Summit Creek in east-central Idaho. Bird populations were assessed by spot-mapping methods in the spring of 1989. Small mammal populations were compared by removal trapping in late summer of both 1988 and 1989.

There was little difference between grazed and ungrazed habitats in total breeding bird density. But total bird biomass, bird species richness, and bird species diversity were 1.87, 1.75, and 1.62 times higher, respectively, in the grazed habitat. The differences were almost entirely due to the presence of shorebirds—killdeer, willets, and long-billed curlews—as breeders only on the grazed area. Those species are frequently associated with the low vegetational profiles of grazed habitats. Other species, including savannah sparrows and red-winged blackbirds, were more numerous in the ungrazed habitat.

Small mammal populations were almost a third higher on the grazed area than on the ungrazed area. Conversely, both species richness and species diversity of small mammal communities were higher in the ungrazed habitat. Deer mice were the most frequently trapped small mammal on both the grazed and ungrazed areas. They were almost twice as common in the grazed habitat. Montane voles were found in highest densities in the ungrazed habitat. Those two species accounted for 94 percent of the total number of individual animals trapped at Summit Creek. Other species, including vagrant shrews, water shrews, and Great Basin pocket mice, were caught irregularly and in smaller numbers.



Intermountain Research Station
324 25th Street
Ogden, UT 84401

# Bird and Small Mammal Populations in a Grazed and Ungrazed Riparian Habitat in Idaho

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## INTRODUCTION

Livestock grazing in riparian ecosystems has been a recent focus of rangeland management in the Western United States (Swanson 1988). Cattle prefer riparian areas for the quality and variety of forage, for easy accessibility, for shade, and for a generally reliable source of water (Ames 1977; Gillen and others 1985; Martin 1979). Riparian ecosystems are similarly important to wildlife. Many species of wildlife are either directly dependent on riparian habitats or utilize them more than other habitats (Thomas and others 1979).

Several studies have reported adverse effects of cattle grazing on riparian vegetation, and recovery of vegetation when grazing is modified, reduced, or eliminated (Ames 1977; Knopf and Cannon 1982; Rickard and Cushing 1982; Taylor 1986; Winegar 1977). Recovery of riparian vegetation following removal of livestock can be dramatic. If habitat deterioration is not severe, herbaceous vegetation can increase significantly within several growing seasons (Platts and Nelson 1984), and woody vegetation may recover within 5 to 10 years (Rickard and Cushing 1982; Skovlin 1984). But severely deteriorated habitats may require long recovery times, perhaps decades (Knopf and Cannon 1982) or more (Platts and Raleigh 1984).

Exclosures, natural areas, and other areas that have received minimal use by livestock are often used as reference areas on rangelands (Kauffman and Krueger 1984; Ohmart and Anderson 1986). Livestock exclosures provide opportunities to study vegetation and associated wildlife communities on ungrazed as compared to grazed habitats. This report compares breeding bird and small mammal populations between a riparian habitat seasonally grazed by cattle and a comparable adjacent riparian area protected from grazing for the previous 14 years by a fenced exclosure. The 122-ha exclosure, constructed in late 1975, is on Summit Creek in east-central Idaho. Bird populations were assessed in the spring of 1989. Small mammal populations were compared by removal trapping during late summer of both 1988 and 1989.

Common and scientific names of birds and small mammals referred to in this paper are listed in the appendix.

## STUDY AREA

The Summit Creek study area is 41 km north of Mackay in Custer County, ID, at an elevation of about 1,975 m. It is near the southern boundary of the Northern Rocky Mountains physiographic province (Fenneman 1931) in the Little Lost River drainage. Summit Creek originates from springs and flows through a gently sloping, basinlike valley bounded on the east by the Lemhi Range and on the west by the Lost River Range. The mountain ranges are rugged and serrated and chiefly composed of limestone, dolomite, quartzite, shale, and schist (Kirkham 1927).

Regional climate is semiarid. Average annual precipitation at Mackay (elevation 1,797 m) is 247 mm, with peaks in May and June. The growing season is short, averaging less than 100 days at Mackay (USDC NOAA 1982). Microrelief in many parts of the riparian area is hummocky, with soils high in total salts (USDA SCS 1987). The riparian zone seldom exceeds 50 to 100 m in width.

Several vegetation community types were identified in the riparian area and adjoining upland. For our study, we consolidated the community types into three general categories: sagebrush (*Artemisia* spp.)/upland, mat muhly (*Muhlenbergia richardsonis*)/hummock, and mesic herbaceous. The sagebrush/upland type occupies the gentle slopes and terraces adjoining the riparian zone. The other two types—mat muhly/hummock and mesic herbaceous—were considered components of the riparian habitat.

Upland vegetation on the site is shrub-steppe (West 1983). The dominant shrubs are low sagebrush (*A. arbuscula*) and threetip sagebrush (*A. tripartita*), with occasional individuals of green rabbitbrush (*Chrysothamnus viscidiflorus*), gray horsebrush (*Tetradymia canescens*), and big sagebrush (*A. tridentata*). The herbaceous stratum commonly includes Sandberg's bluegrass (*Poa sandbergii*), bluebunch wheatgrass (*Agropyron spicatum*), aster (*Aster* spp.), and long-leaf phlox (*Phlox longifolia*). The hummocky areas are dominated by herbaceous species, most notably mat muhly and thick-spiked wheat-grass (*A. dasystachyum*), and including Kentucky bluegrass (*P. pratensis*), tufted hairgrass (*Deschampsia cespitosa*),

short-beaked sedge (*Carex simulata*), and Kelsey's phlox (*P. kelseyi*). The stream is closely bordered by clumped communities of Kentucky bluegrass, beaked sedge (*C. rostrata*), and Baltic rush (*Juncus balticus*). Associated forbs and graminoids include mannagrass (*Glyceria* spp.), water sedge (*C. aquatilis*), Nebraska sedge (*C. nebraskensis*), American bistort (*Polygonum bistortoides*), and large-leaved avens (*Geum macrophylum*).

The study area is located largely on public lands administered by the Bureau of Land Management, U.S. Department of the Interior. Recent (1976 to 1989) stocking levels have varied from about 1,000 to 2,000 animal unit months (AUM's), with a grazing season from about mid-May to late October (Hale 1989). Stocking levels and grazing periods are adjusted annually on the basis of current resource conditions.

## METHODS

Two 9-ha plots, one in the upper (westernmost) section of the exclosure and the other in the adjacent (upstream) grazed riparian area, were censused for breeding birds using the spot-map method (International Bird Census Committee 1970). Plot locations were selected on the basis of similarities in topography and vegetation between the grazed and ungrazed environments. The census plots, 600 by 150 m, were oriented lengthwise along Summit Creek and gridded with transects crossing the stream channel. Both plots straddled the riparian zone and included part of the extensive uplands. Grid points were surveyed and marked with numbered stakes at 25-m intervals.

Eleven census visits were made to each plot from May 17 to June 29, 1989. The same observer (DEM) conducted the censuses on both plots. Most of the spot-mapping was done from sunrise to early afternoon when birds were most active. Census routes were varied by choosing different routes through the plot, with different starting and ending points. To ensure complete coverage, the plot was censused by walking within 25 m of all points on the grid. Observations and registrations extended well beyond plot boundaries.

At the end of the sampling period, clusters of observations and coded activity patterns on species maps were circled as indicating areas of activity or approximate territories (International Bird Census Committee 1970). Fractional parts of boundary territories were included. Oelke (1981) summarized methodological difficulties and other special problems of the mapping method. We followed Hill (1973) for estimates of species diversity.

A 1.7-ha trapping grid was located in each of the grazed and ungrazed study plots to estimate small mammal populations. Trapping grids were placed near the center of the 9-ha plots established to census bird populations. Each grid measured 225 by 75 m and consisted of 40 trapping stations systematically spaced at 25-m intervals in 10 rows and 4 columns. The rectangular grids were positioned lengthwise along Summit Creek and straddled the stream channel. Two Museum Special mouse traps and one Victor rat trap were placed near each trapping station. Traps were baited with a mixture of peanut butter and rolled oats and examined daily for 5 consecutive days from August 3 to August 7, 1988, and from August 17 to August 21, 1989.

Vegetation and other features of the grazed and ungrazed study plots were measured from July 17 to August 30, 1989. Twenty sample locations were established within each of the three plant community types for a total sample size of 60 per study plot. A 50- by 50-cm (0.25-$m^2$) quadrat was located at each of the systematically positioned sample locations. Canopy cover (Daubenmire 1959) was ocularly estimated for the total of each plant life form (graminoid, forb, shrub) and recorded as the midpoint of one of eight percent-cover classes (0-1, 1-5, 5-10, 10-25, 25-50, 50-75, 75-95, 95-100). Percentages of litter, rock, bare ground, and lichen-moss were similarly estimated. The vegetative height (excluding flower and seed-head heights) of each graminoid, forb, and shrub nearest the center of each quadrat was measured.

Biomass of graminoids, forbs, and shrubs was determined by clipping vegetation from ground level upward within a vertical projection from the 0.25-$m^2$ quadrats. Clipped materials were bagged, ovendried, and weighed.

Plant names follow Hitchcock and Cronquist (1973). Bird nomenclature is from the 1983 AOU Check-list (American Ornithologists' Union 1983). Scientific and common names of mammals follow Jones and others (1986).

## RESULTS AND DISCUSSION

We found structural (physiognomic) differences in the vegetation between grazed and ungrazed habitats on Summit Creek. Those differences were apparently reflected in the organization of associated breeding bird and small mammal communities.

### Vegetation

The most evident structural difference in the vegetation was in the height values where graminoid, forb, and shrub height means were significantly reduced on the grazed site (table 1). Other differences were primarily in the herbaceous layer where graminoid and forb biomass and graminoid canopy cover values were lower on the grazed site. Graminoid biomass on the grazed plot was only about one-seventh that inside the exclosure. Estimates of forb and shrub cover were similar on the grazed and ungrazed areas. There was significantly more rock coverage on the grazed plot. Shrub biomass and shrub, bare ground, and litter coverage were similar. Lichen-moss cover values were slightly higher on the grazed site. There were no tall shrubs or trees on the study plots.

### Birds

We recorded eight species of birds breeding on the Summit Creek study site; seven species bred on the grazed plot and four species bred on the ungrazed plot (table 2). Vesper sparrows, savannah sparrows, and western meadowlarks were found as breeding birds on both the grazed and ungrazed plots. Killdeer, willets, long-billed curlews,

**Table 1**—Vegetation and other features of grazed and ungrazed study plots, Summit Creek, ID, 1989

| Item | Ungrazed | | Grazed | | |
|---|---|---|---|---|---|
| | Mean[1] | SD | Mean[1] | SD | P[2] |
| Graminoid | | | | | |
| Biomass (g/m²) | 267.6 | 254.2 | 36.7 | 30.8 | <0.01 |
| Canopy cover (%) | 61.6 | 30.5 | 51.9 | 30.3 | .08 |
| Height (m) | .18 | .09 | .06 | .03 | <.01 |
| Forb | | | | | |
| Biomass (g/m²) | 24.9 | 29.8 | 11.9 | 14.6 | <.01 |
| Canopy cover (%) | 12.0 | 13.2 | 11.5 | 11.9 | .81 |
| Height (m) | .07 | .05 | .03 | .02 | <.01 |
| Shrub | | | | | |
| Biomass (g/m²) | 71.1 | 164.5 | 75.0 | 212.7 | .91 |
| Canopy cover (%) | 7.4 | 14.5 | 7.3 | 13.9 | .97 |
| Height (m) | .34 | .21 | .26 | .12 | .01 |
| Other | | | | | |
| Bare ground (%) | 20.3 | 25.0 | 23.3 | 24.2 | .50 |
| Litter (%) | 10.4 | 11.5 | 9.1 | 11.6 | .55 |
| Rock (%) | .64 | 1.52 | 2.27 | 5.89 | .04 |
| Lichen-moss (%) | .30 | 1.15 | .84 | 2.27 | .10 |

[1] $n = 60$ except for forb and shrub height means for which $n$ ranged from 50 to 58.
[2] Probability associated with unpaired $t$-tests. $P$ of less than 0.10 was considered significant.

and Brewer's blackbirds were territorial only on the grazed area. Red-winged blackbirds nested only on the ungrazed plot. Wide-ranging raptorial birds, although commonly seen, were not included in the analysis. Transient species were also excluded. Other birds, observed as visitors to the study site, are listed in the appendix.

We found little difference between the grazed and ungrazed plots in total breeding bird density (table 2). But estimates of total bird biomass differed markedly on the two plots. Biomass on the grazed plot (226 g/ha) was almost twice that (121 g/ha) on the ungrazed plot (table 2). The difference in total biomass was almost entirely due to the presence of large shorebirds (killdeer, willet, long-billed curlew) that were breeders only on the grazed plot. Species richness and our estimate of bird species diversity (the reciprocal of Simpson's index) were larger on the grazed plot, again as a result of the presence of the three shorebirds that established breeding territories only on the grazed plot.

Curlew populations are declining in some areas of the Western United States as habitat is lost to agriculture and other land development (Ryser 1985). It is a short-to-midgrass prairie nesting species (Pampush 1980), often nesting in moist meadows near streams and lakes, as well as dry upland habitats (Harrison 1979). Long-billed curlews prefer breeding habitats containing short grass, bare ground, shade, and abundant invertebrate prey (Pampush 1980). Livestock grazing tends to maintain the low vegetational profile apparently preferred by curlews as breeding habitat. At Summit Creek, we observed them most often near the stream in mesic herbaceous communities dominated by grasses, sedges, and rushes.

Killdeer and willets also nest in open habitats where vegetation is sparse and low, usually within short flight distances to feeding areas (Palmer 1967). Both are ground-inhabiting species, building their nests and foraging there. We saw willets most often wading in the stream or pecking and probing for insects along the shoreline. Killdeer were usually seen either in flight or on the ground within a few meters of the stream in the most open habitats. Distraction displays and other territorial behaviors exhibited by both the killdeer and willet were noted only on the grazed plot. Taylor (1986) reported a positive response by killdeer to grazing in southeastern Oregon. In North Dakota, killdeer and willets were observed in significantly greater densities in grazed habitats (Renken and Dinsmore 1987).

Savannah sparrows, numerically dominant on both study plots, were found in greater numbers on the ungrazed plot (table 2). Kantrud (1981) similarly found a negative response by savannah sparrows to grazing in North Dakota native grasslands. A preference of this species for idle or lightly grazed areas was also noted by Owens and Myres (1973). This sparrow frequents open fields and meadows and is most commonly found in moist, grassy habitats in Idaho (Burleigh 1972). It is usually restricted to the vicinity of streams, ponds, lakes, and irrigation systems—often where soils are alkaline (Ryser 1985). Savannah sparrows have an affinity for habitats with a rank growth of vegetation and a dense ground cover (Linsdale 1938), a condition existing in more abundance in the ungrazed habitat on the Summit Creek site. Most savannah sparrow territories on the study area were located in the mat muhly/hummock community type although other plant communities were often included within territorial boundaries.

**Table 2**—Density (pairs/40 ha), diversity, and other attributes of breeding bird populations on grazed and ungrazed study plots, Summit Creek, ID, 1989

| Species | Foraging guild[1] | Nesting guild[2] | Density | |
|---|---|---|---|---|
| | | | Ungrazed | Grazed |
| Killdeer | GGI | GRN | [3]+ | 4.4 |
| Willet | SPI | GRN | + | 3.1 |
| Long-billed curlew | GFO | GRN | + | 1.8 |
| Vesper sparrow | GFO | GRN | 8.4 | 7.6 |
| Savannah sparrow | GFO | GRN | 39.1 | 24.9 |
| Red-winged blackbird | GFO | CRN | 12.0 | + |
| Western meadowlark | GGI | GRN | 8.0 | 6.2 |
| Brewer's blackbird | GFO | GBN | + | 17.3 |
| Total pairs/40 ha | | | 67.5 | 65.3 |
| Total individuals/km² | | | 338 | 327 |
| Biomass[4] (g/ha) | | | 121 | 226 |
| Species richness ($n$) | | | 4 | 7 |
| Species diversity[5] ($1/\Sigma p_i^2$) | | | 2.52 | 4.07 |

[1] After DeGraaf and others (1985). GGI = ground gleaning insectivore, SPI = shoreline probing insectivore, GFO = ground foraging omnivore.
[2] After Harrison (1979). GRN = ground nester, CRN = cattail, rush, sedge, reed, grass, and bush nester, GBN = ground and bush nester.
[3] + indicates bird observed infrequently (less than three registrations).
[4] Species weights from Dunning (1984).
[5] After Hill (1973). Here, $p_i$ is the proportional abundance of the $n$ species in a sample.

Vesper sparrows and western meadowlarks were both found in similar densities on grazed and ungrazed plots (table 2). Both species mainly frequent grasslands and open, low-growing shrub habitats (Ryser 1985). Both forage and nest on the ground. At Summit Creek, we found vesper sparrows most often in the sagebrush/upland community type. Western meadowlarks were distributed thoughout the grazed and ungrazed plots. Vesper sparrows and western meadowlarks were negatively affected by livestock grazing in northern Nevada (Page and others 1978). In North Dakota, western meadowlarks were about equally common under three levels of grazing intensity (Kantrud 1981), and in Oklahoma, Smith (1940) found that only severe overgrazing made conditions unsuitable for the western meadowlark.

Red-winged blackbirds were found as breeding birds only on the ungrazed plot (table 2). Conversely, Brewer's blackbirds were territorial only on the grazed plot. Nests of the red-winged blackbird were bound to tall, coarse stalks of beaked sedge found in thick stands near the stream. Heights of beaked sedge communities in the grazed plot were considerably reduced as a result of livestock grazing, thereby essentially eliminating potential nesting habitat for red-winged blackbirds. Nests of Brewer's blackbirds were on the ground in tussocks of grasses and forbs or beside a clod of dry manure. Taylor (1986) found red-winged blackbirds more abundant in undisturbed or rarely grazed riparian habitats in southeastern Oregon. In North Dakota, Kantrud (1981) found that red-winged blackbird populations were greatly reduced or extirpated by heavy grazing.

## Small Mammals

Six species of small mammals were trapped during two seasons of study at Summit Creek (table 3). Deer mice and montane voles accounted for over 94 percent of 115 individual animals trapped. Each of those species was trapped on both grazed and ungrazed study plots. Other species were caught irregularly and in smaller numbers.

**Table 3**—Relative abundance, naive density, and other attributes of small mammal populations on grazed and ungrazed study plots, Summit Creek, ID, 1988 and 1989

| Species | Foraging guild[1] | Relative abundance (*n*/100 trap nights) | | Naive density[2] (*n*/ha) | |
|---|---|---|---|---|---|
| | | Ungrazed | Grazed | Ungrazed | Grazed |
| Vagrant shrew | INS | | | | |
| 1988 | | 0.2 | 0.0 | 0.6 | 0.0 |
| 1989 | | .0 | .0 | .0 | .0 |
| Water shrew | INS | | | | |
| 1988 | | .2 | .0 | .6 | .0 |
| 1989 | | .3 | .0 | 1.2 | .0 |
| Northern pocket gopher | HER | | | | |
| 1988 | | .2 | .0 | .6 | .0 |
| 1989 | | .0 | .0 | .0 | .0 |
| Great Basin pocket mouse | GRA | | | | |
| 1988 | | .2 | .0 | .6 | .0 |
| 1989 | | .0 | .0 | .0 | .0 |
| Deer mouse | OMN | | | | |
| 1988 | | 2.7 | 5.2 | 9.5 | 18.3 |
| 1989 | | 1.3 | 4.8 | 4.7 | 17.2 |
| Montane vole | HER | | | | |
| 1988 | | 1.5 | .8 | 5.3 | 3.0 |
| 1989 | | 1.8 | .0 | 6.5 | .0 |
| Total naive density (*n*/ha) | | | | | |
| 1988 | | | | 17.2 | 21.3 |
| 1989 | | | | 12.4 | 17.2 |
| Biomass (g/ha) | | | | | |
| 1988 | | | | 304 | 354 |
| 1989 | | | | 283 | 282 |
| Species richness (*n*) | | | | | |
| 1988 | | | | 6 | 2 |
| 1989 | | | | 3 | 1 |
| Species diversity[3] ($1/\Sigma p_i^2$) | | | | | |
| 1988 | | | | 2.47 | 1.31 |
| 1989 | | | | 2.33 | 1.00 |

[1]After Martin and others (1951). INS = insectivore, HER = herbivore, GRA = granivore, OMN = omnivore.
[2]After Wilson and Anderson (1985). Effective trapping area and grid size are assumed to be equal.
[3]After Hill (1973). Here, $p_i$ is the proportional abundance of the *n* species in a sample.

Four species—vagrant shrews, water shrews, northern pocket gophers, and Great Basin pocket mice—were trapped only in the ungrazed habitat. In 1989, only the deer mouse was caught on the grazed site.

Estimated small mammal density was almost a third higher in the grazed habitat (table 3). Total biomass values, however, were similar between the grazed and ungrazed plots. Also, small mammal species richness and our estimates of small mammal species diversity were larger within the exclosure. Each of the six species recorded during the study was trapped in the ungrazed habitat. Only two species were trapped in the grazed habitat.

Deer mice were the most frequently trapped small mammal in both the grazed and ungrazed habitats (table 3). Naive density (Wilson and Anderson 1985) on the grazed plot was more than twice that on the ungrazed plot. Most of the deer mice were trapped in the sagebrush/upland community type that occupied the slopes and terraces adjoining the riparian zone. They were trapped infrequently in mesic herbaceous and mat muhly/hummock communities that made up the riparian habitat. Brown (1967a) also trapped deer mice more commonly in areas distant from water as compared to those adjacent to water.

The deer mouse is one of the most widespread and generalized of all North American rodents (Baker 1968). It is Idaho's most common mammal (Larrison and Johnson 1981). They are found in diverse habitats including swamps, waterways, forests, grasslands, and deserts, and among rocks and cliffs (Larrison and Johnson 1981). It occupies a variety of plant successional stages (Thomas 1979). Higher densities on the grazed plot at Summit Creek suggest a tolerance by the deer mouse of habitats with a low, sparse herbaceous layer. Samson and others (1988) found deer mice frequently associated with low values of grass and litter cover as well as the presence of shrubs.

Others have reported contradictory results when comparing the abundance of deer mice in grazed versus ungrazed habitats. Kauffman and others (1982) found more deer mice in eastern Oregon riparian habitats after late-season grazing (late August to mid-September) than in ungrazed riparian habitats. But by late summer of the following year, and before grazing, the species composition of small mammal communities was not significantly different between grazed and ungrazed plots. Similarly, Moulton (1978) reported a positive response by deer mice to grazing in a cottonwood (*Populus sargentii*) riparian habitat in eastern Colorado. Samson and others (1988) also found deer mouse densities consistently higher on grazed pastures. Conversely, Rucks (1978) reported fewer deer mice in grazed versus ungrazed riparian communities. Hanley and Page (1982) found a positive response by deer mice to grazing in mesic habitats and a negative response in dry habitats.

Unlike the deer mouse, highest densities of the montane vole occurred in the ungrazed area (table 3). Four times as many montane voles were trapped on the ungrazed plot than on the grazed plot. Most were trapped in streamside habitats with the frequency of capture highest in mesic herbaceous communities. None were trapped in the sagebrush/upland community type. Montane voles occur most commonly in moist, weedy, or brushy areas near water at the edge of grasslands (Larrison and Johnson 1981). The importance of vegetative cover to the montane vole has been well documented (Brown 1967a; O'Farrell and Clark 1986). Grass seems to be a desirable component of the habitat (Randall and Johnson 1979). In eastern Oregon, high pregrazing populations of montane voles were either drastically reduced or eliminated after late-season grazing (Kauffman and others 1982).

Vagrant shrews and water shrews, both scarce on the study plots, were trapped only on the ungrazed area (table 3). Captures were irregular and consisted of only one or two animals in each trapping period. All were caught near the stream in mesic herbaceous communities. Vagrant shrews prefer moist, grassy habitats (Spencer and Pettus 1966), but they occur in a variety of other habitats including forests and shrublands (Brown 1967b). Water shrews are typically found along edges of swift-flowing streams with rocks, logs, crevices, and overhanging banks (Beneski and Stinson 1987). Kauffman and others (1982) reported reduced populations of the vagrant shrew in postgrazing environments in eastern Oregon.

Other species of small mammals were either trapped or observed on the Summit Creek study site. The Great Basin pocket mouse, a species that generally occurs in arid and semiarid habitats (Verts and Kirkland 1988), was trapped only on the ungrazed plot (table 3). It was caught at a single location in the sagebrush/upland community type where giant wildrye (*Elymus cinereus*) was codominant with scattered individuals of sagebrush and rabbitbrush. Mounds of the northern pocket gopher were evident throughout the area, but it was trapped only in the ungrazed habitat. Columbian ground squirrels (*Spermophilus columbianus*) were occasionally seen on the study area, especially early in the season. Mink (*Mustela vison*) and muskrats (*Ondatra zibethicus*) were rarely observed and only in the ungrazed habitat.

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# APPENDIX: BIRDS AND MAMMALS OBSERVED ON OR OVER GRAZED AND UNGRAZED STUDY PLOTS, SUMMIT CREEK, ID, 1989

## Birds

| | |
|---|---|
| Great blue heron | *Ardea herodias* |
| Canada goose | *Branta canadensis* |
| Green-winged teal | *Anas crecca* |
| Mallard | *Anas platyrhynchos* |
| Northern pintail | *Anas acuta* |
| Cinnamon teal | *Anas cyanoptera* |
| American wigeon | *Anas americana* |
| Lesser scaup | *Aythya affinis* |
| Northern harrier | *Circus cyaneus* |
| Red-tailed hawk | *Buteo jamaicensis* |
| American kestrel | *Falco sparverius* |
| Sandhill crane | *Grus canadensis* |
| Killdeer | *Charadrius vociferus* |
| Willet | *Catoptrophorus semipalmatus* |
| Spotted sandpiper | *Actitis macularia* |
| Long-billed curlew | *Numenius americanus* |
| Wilson's phalarope | *Phalaropus tricolor* |
| Mourning dove | *Zenaida macroura* |
| Horned lark | *Eremophila alpestris* |
| Violet-green swallow | *Tachycineta thalassina* |
| Northern rough-winged swallow | *Stelgidopteryx serripennis* |
| Cliff swallow | *Hirundo pyrrhonota* |
| Barn swallow | *Hirundo rustica* |
| Black-billed magpie | *Pica pica* |
| Common raven | *Corvus corax* |
| Loggerhead shrike | *Lanius ludovicianus* |
| European starling | *Sturnus vulgaris* |
| Vesper sparrow | *Pooecetes gramineus* |
| Savannah sparrow | *Passerculus sandwichensis* |
| Red-winged blackbird | *Agelaius phoeniceus* |
| Western meadowlark | *Sturnella neglecta* |
| Yellow-headed blackbird | *Xanthocephalus xanthocephalus* |
| Brewer's blackbird | *Euphagus cyanocephalus* |
| Brown-head cowbird | *Molothrus ater* |

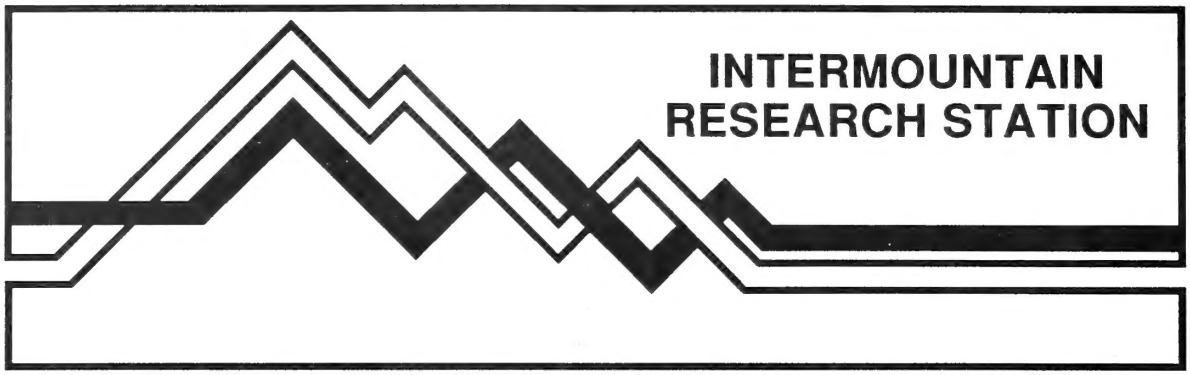
## Mammals

| | |
|---|---|
| Vagrant shrew | *Sorex vagrans* |
| Water shrew | *Sorex palustris* |
| Columbian ground squirrel | *Spermophilus columbianus* |
| Northern pocket gopher | *Thomomys talpoides* |
| Great Basin pocket mouse | *Perognathus parvus* |
| Deer mouse | *Peromyscus maniculatus* |
| Montane vole | *Microtus montanus* |
| Muskrat | *Ondatra zibethicus* |
| Coyote | *Canis latrans* |
| Mink | *Mustela vison* |
| Pronghorn | *Antilocapra americana* |

Medin, Dean E.; Clary, Warren P. 1990. Bird and small mammal populations in a grazed and ungrazed riparian habitat in Idaho. Res. Pap. INT-425. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Research Station. 8 p.

There was little difference between grazed and ungrazed habitats in total breeding bird density, but total bird biomass, bird species richness, and bird species diversity were 1.87, 1.75, and 1.62 times higher, respectively, in the grazed habitat. Small mammal populations were almost a third higher on the grazed area than on the ungrazed area.

KEYWORDS: density, diversity, biomass, nongame birds, shorebirds, rodents, shrews, rangeland, exclosure

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