

Technical Report No. 37
COMPREHENSIVE NETWORK SITE DESCRIPTION
BISON

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GRASSLANDS BIOME
U. S. International Biological Program

I. *Site name:* Bison.

- a. National Bison Range. Branch of Wildlife Refuges, Bureau of Sport Fisheries and Wildlife, U. S. Department of Interior.

II. *Location and elevation.*

- a. Entrance to area near Moiese, Montana in the western portion of Montana. Elevation 2585-4885 ft.
- b. Entrance approximately 45 miles northwest of Missoula, Montana. Take U. S. 10 or Interstate 90 west from Missoula to turnoff on U. S. 93 north to Ravalli junction then west to Dixon on U. S. 10A. Turn north at road junction just east of Dixon and take county road north to Bison Range entrance. Conspicuous sign and gateway will indicate entrance. Headquarter office about one mile east. See attached map.
- c. Access to study site. A scenic self-conducted road system open to public on Conservation Fee basis. Secondary patrol and access road to study site leads off tour road about one mile south of headquarters. Key to lock on road barrier necessary. Desirable that contact be made with project leader prior to planned visit to study site.

III. *Size.*

The National Bison Range comprises an 18,500-acre area, five and one-half miles from east to west and six miles from north to south. It is bounded approximately by the Jocko River on the south and Mission Creek on the north. The Flathead River is near the western boundary. The area is fenced to prevent movement of

large mammals as well as to provide administrative control for protection and management.

- a. Two treatment areas each four acres in size (to be fenced) are located in the west portion of the range. As a result of stocking rates, topography and grazing habits of bison on the range, the rough fescue stand exists because of light grazing use for 30 or more years. The Idaho fescue stand represents a history of a moderately-used but selectively-grazed vegetation because of topography and water supply for grazing animals.

IV. *Vegetation.*

The grasslands of the Bison Range represent a transition between the Palouse Prairie of Clements and Weaver and the Fescue Grassland of Coupland and Moss. In general, the preference for classification would be a Palouse Prairie Grassland. Topography is a major factor delimiting habitat types or plant communities. North-facing slopes are dominated primarily by rough fescue and Idaho fescue. South-facing slopes are dominated by either a bluebunch wheatgrass, prairie junegrass, native bluegrass complex or, if the site is steep and rocky, a bluebunch wheatgrass--three awn association may be present. Flat ridges contain a mixture of Idaho fescue, bluebunch wheatgrass, and rough fescue. Benchlands consist largely of bluebunch wheatgrass and a variety of associated plants depending on soil texture and possibly soil structure. See attached map for details of vegetation near the treatment area. See attached list of plants and mammals.

a. Principal vegetation types.

1. Forest types

- a) Ponderosa Pine (south slopes)
- b) Douglas fir (north slopes)
- c) Pine, juniper (Mission Creek)

2. Stream bank

- a) Hawthorne, serviceberry, chokecherry

3. Rock outcrop

- a) Mock orange, chokecherry, serviceberry, maple

4. Grassland

- a) Rough fescue (north slopes and swales)
- b) Idaho fescue (ridge tops and shallow soils)
- c) Bluebunch wheatgrass (south slopes)
- d) Three awn grass (south slopes)
- e) Basin wild rye, snowberry, western wheatgrass

b. Animals.

The area is characterized by a population of large mammals including some 400 bison, 200 whitetail deer, 200 mule deer, 100 pronghorn antelope, 50 wapiti (elk) and 50 mountain sheep. Other mammals including badger, coyote, long-tailed weasel, striped skunk, Columbia ground squirrel, yellow pine chipmunk, pine squirrel, pocket gopher, deer mouse, bushy-tailed wood rat, mountain vole, muskrat, porcupine, snowshoe hare, white-tailed jackrabbit, mountain cottontail.

Reptiles present are the western rattlesnake, common garter snake, and others. Care should be exercised in working in the

area because of the possibility of contact with either bison or rattlesnakes.

Birds, including resident and migratory ones, are night hawk, violet-green swallow, golden eagle, red-tailed hawk, sparrow hawk, rough-legged hawk, marsh hawk, ring-neck pheasant, Hungarian partridge, mourning dove, great horned owl, short-eared owl, and a large number of perching birds. See attached list.

- c. Insects of particular notice include an introduced feeder on St. Johnswort (*Hypericum perforatum*). The insect is *Chrysolina gemellata*. Grasshoppers are common. Mormon crickets, while not in the area, are found west of the range. Heavy feeding by the larvae of an unknown insect is common on immature lupine pods.
- d. Fairy rings, caused by activity of a fungus, are common in the rough fescue type in some years.

V. *Climate.*

- a. The attached table contains information on precipitation and temperature. Data for other locations are included for comparative purposes. Loneline and Missoula are more nearly representative of a bluebunch wheatgrass habitat while Polson and St. Ignatius are perhaps somewhat more humid than the rough fescue site. The interpretation made of the weather records would indicate that the grasslands of the refuge are near the average of much of the dry grassland sites in the western portion of the state and somewhat similar to much of the Mixed Prairie east of the Continental Divide. The rough fescue type would be above average if the site could be measured comparatively. The point made here is that the site

probably does not receive more than the amount shown for the gauge at headquarters but due to exposure (mainly north slopes) temperatures and evaporation are lower. Another feature of precipitation which is significantly different from Mixed Prairie is the seasonal pattern showing a dry July and August and a major high period in May and June and a slight rise in the fall.

- b. The mean annual temperature for this area is nearly the highest for the state. Spring growth is consequently early, and plant growth is completed by early summer. Summarizing for precipitation and temperature, it can be said that an average precipitation of 13 inches and a mean annual temperature of 45°F is representative of the study site.
- c. Topography plays a major role in determining the microclimate. Moderate to steep east-west ridges modify the angle of the direct rays of the sun, affect the air and soil temperatures and indirectly the rate of evaporation of moisture from soil, and affect transpiration rate of the plants.
- d. The nearest weather station is at St. Ignatius, about nine miles east of the refuge.

VI. *Soils, topography, exposure.*

- a. The soils of the Bison Range represent at least three main groups based on geology, topography, and climate. The extensive silt beds on the northwest portion of the area belong to the Post Series and are derived from glacial lake bed deposits. They are Brown or Chestnut grassland soils. The soils derived from weathered Precambrian rocks are either Chestnut or Chernozem soil. The rough fescue study site is a Chernozem or a Typic hapluboroll

- (7th Approximation) and identified as representing the Rattle Cobbly Loam Series and has an ABC profile A horizon 0 - 25 cm, B horizon 25 - 60 cm, and a C horizon 60 cm plus. See attachment.
- b. Topography is characterized by an array of lake terrace material exhibiting a moderately level to gently rolling surface. A system of ridges of various lengths central to the Game Range radiates in all directions. Those on the west side have a strong east to west orientation. Elevational differences on the refuge are from 2585 ft in the northwest corner to 4885 ft at High Point. The attached vegetation map shows elevations and general topography in relation to vegetation.

VII. *Physical facilities.*

- a. Work space is available at the refuge for general processing and storage of herbage and soil samples. (Slaughter House has room 20 X 30 ft for this purpose.) Electricity, water, and gas are available. An office with a herbarium and aerial photographs and other records is at the headquarters. Telephone service is available there as well as at the slaughter house. The telephone number is (406) 644-2354. The refuge manager is Marvin Kasche; the assistant manager is Bob Barker.
- b. A shop with facilities for minor repairs of equipment is available. Emergency transportation also is available.
- c. Lodging. Excellent space facility near headquarters for authorized tents or trailer use is available. The nearest location for motel service is approximately 10 to 15 miles east. No camping is allowed at public picnic areas on the Range.

VIII. *Previous studies and continuing projects.*

- a. Bison Range administration has a series of Parker transects and Photo Plots on key areas which are reexamined periodically as a test of management on vegetation. Mr. Marvin Kasche, refuge manager, Bob Ross, and Joe Zacek of the Soil Conservation Service have evaluated effect of a shift in grazing systems on the vegetation of the Bison Range.
- b. Currently studies underway by other investigators include an antelope behavior study by a graduate student (Mr. Kitchens) from the University of Michigan; a bison behavior study by personnel from the University of California at Los Angeles; a long-time rodent population trend study by Dr. Phil Wright and Dr. Metzgar from the University of Montana Zoology Department; remote sensing study by Professor Gerlach and Professor Morris of the Forestry School on vegetation analysis; a wildlife inventory by remote sensing by Professor Gerlach and graduate student Beal; a study on rodent distribution in relation to vegetation types by Professor Morris and Dr. Metzgar; a general ecological study of soil-vegetation relations by Professor Morris; and a grazing history evaluation through comparative range inventory methods by Melvin S. Morris.
- c. Aerial photos, topographic maps, etc. are available from the U. S. Geological Survey or Western Cartography, Inc., 2005 South Avenue West, Missoula, Montana. Dixon and Ravalli Quadrangles (Two quadrangles), Scale 1:24000 are 75 cents each.

IX. *Publications.*

Hoffman, R. S. 1957. Changes in vole populations associated with "cyclic" density fluctuations. *Bull. Ecol. Soc. Amer.* 38:65. (Abstr.).

Hoffman, R. S. 1958. The role of reproduction and mortality in population fluctuations of voles (*Microtus*). *Ecol Monogr.* 28: 79-109.

Hoffman, R. S. and D. L. Pattie. 1968. A guide to Montana mammals. Ass. Stud. Store, Univ. Montana mimeo. 133 p.

Koplin, J. R. and R. S. Hoffman. 1968. Habitat overlap and competitive exclusion in voles (*Microtus*). *Amer. Midl. Natur.* 80:494-507.

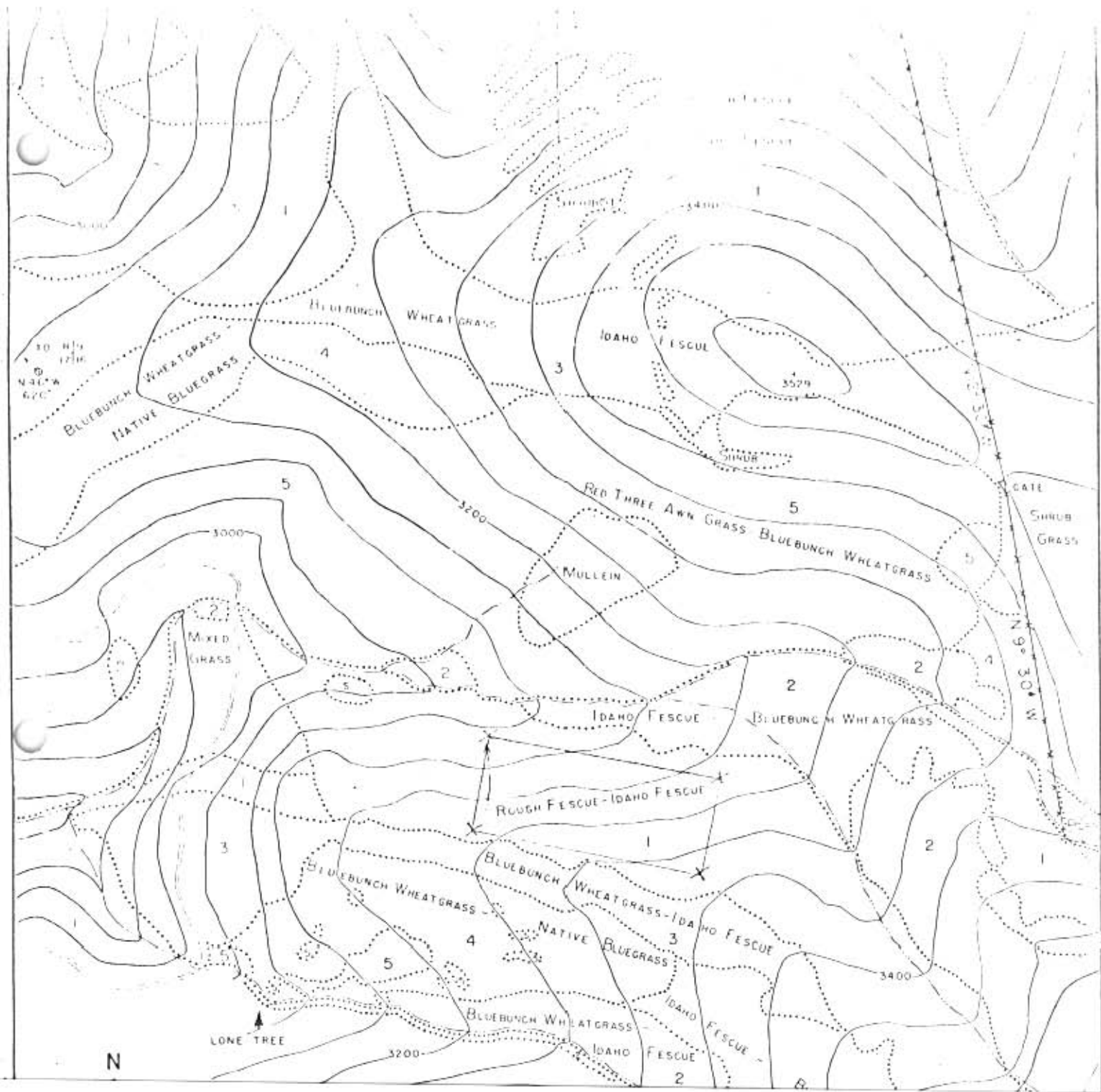
Murie, J. O. 1963. Investigations of habitat segregation in *Microtus* in western Montana. M. A. Thesis, Univ. Montana. 81 p.

Morris, M. S. and J. E. Schwartz. 1957. Mule deer and elk food habits on the National Bison Range. *J. Wildl. Manage.* 21:189-193.

Nellis, Carl H. 1968. Productivity of mule deer on the National Bison Range, Montana. *J. Wildl. Manage.* 32:2.

Nellis, C. H. and R. L. Ross. 1969. Changes in mule deer food habits associated with herd reduction. *J. Wildl. Manage.* 33:191.

- X. The area is one of the most scenic locations in Montana and the United States for spectacular landscape. Tour road on the area leads to viewpoint of the Mission Mountains; Flathead River and Flathead Lake are within ready distance of the area; Glacier Park is 115 miles north, and it is a photographer's paradise in June. Many other areas in western Montana are of scientific and aesthetic value.



SUMMARY OF FREQUENCY AND CANOPY COVERAGE VALUES FOR SEVERAL HABITAT TYPES ON THE NATIONAL BISON RANGE (PAULINE AREA) EXPRESSED FOR 100 SQUARE FOOT PLOTS. ABUNDANCE IN SQUARE FEET PER 100 SQUARE FEET OF AREA. 1968-1969 DATA FROM M. S. MORRIS, UNIVERSITY OF MONTANA.

SPECIES	North Aspects		RidgeTypes		Swale Types		South Aspects		S.W. Aspects	
	F%	Abund.	F%	Abund.	F%	Abund.	F%	Abund.	F%	Abund.
<i>Festuca scabrella</i>	93	23.30	29	3.12	25	3.06			3	0.48
<i>Festuca idahoensis</i>	61	5.89	76	7.34	67	9.06				
<i>Agropyron spicatum</i>	26	1.50	68	7.74	69	5.45	43	4.91	76	10.48
<i>Aristida longiseta</i>							72	13.33	7	1.13
<i>Poa secunda</i>	5	0.12	74	3.13	46	1.37	9	0.23	61	2.08
<i>Koeleria cristata</i>	23	0.63	29	1.20	29	1.25	2	0.03	5	0.15
<i>Bromus tectorum</i>	4	0.11	36	3.82	48	3.58	83	6.22	76	7.66
<i>Bromus japonicus</i>	41	1.49	64	4.30	66	2.49	30	0.47	32	0.51
<i>Festuca octoflora</i>			2	0.3			33	0.37	33	0.46
Other grasses		0.25		0.24		0.72				
<i>Achillea millefolium</i>	49	1.63	38	1.48	56	1.65	7	0.32	34	1.02
<i>Agoseris glauca</i>	14	0.46			2	0.04				
<i>Antennaria rosea</i>	11	0.69	6	0.23	1	0.03	T	T		
<i>aphalis margitacea</i>	8	0.21								
<i>Arnica fulgens</i>	31	0.63	17	0.41	28	0.50			2	0.07
<i>Artemisia dracunculus</i>							13	1.53	2	0.18
<i>Artemisia frigida</i>	2	0.11	4	0.36			1	0.03	18	1.12
<i>Balsa morrhiza sagittata</i>	10	2.31	14	3.46	17	3.50	14	3.70	38	9.57
<i>Castilleja sulfurea</i>	8	0.13			1	0.07				
<i>Cerastium arvensis</i>	10	0.45	4	0.06	6	0.19				
<i>Chrysopsis villosa</i>	3	0.05	28	1.25	15	0.76	6	0.43	12	0.96
<i>Cirsium undulatum</i>	T	0.01	T	0.03	2	0.18	6	0.26		
<i>Collomia linearis</i>	26	0.33	3	0.03	18	0.16	9	0.26	10	0.04
<i>Crepis acuminata</i>	6	0.16			T	0.02				
<i>Draba lonchocarpa</i>	4	0.08	15	0.09	19	0.08			6	0.03
<i>Gaura coccinea</i>							7	0.14	7	0.10
<i>Seum triflorum</i>	8	.94			1	0.10				
<i>Hieracium cynoglossoides</i>	13	0.65			2	0.06				
<i>Heuchera cylindrica</i>	9	0.48								
<i>Lithospermum ruderales</i>	11	0.98	2	0.16	3	0.23			T	0.05
<i>Lupinus sericeus</i>	55	6.11	16	0.70	37	0.34			3	0.05
<i>Opuntia fragilis</i>							T	0.03		
<i>Orthocarpus tenuifolius</i>	3	0.04	2	0.01	8	0.04			1	T
<i>Phacelia heterophylla</i>							9	0.31		
<i>Phacelia linearis</i>			4	0.50			7	0.06	3	0.06

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	F%	Abund.	F%	Abund	F%	Abund	F%	Abund.	F%	Abund.
<i>Plantago purshii</i>	6	0.06	10	0.06	2	0.01	19	0.17	36	0.55
<i>Polygonum douglasii</i>									2	0.01
<i>Stollaria</i> spp.	33	0.85	35	0.51	52	0.79			11	0.06
<i>Taraxacum officinale</i>	30	0.58	24	0.28	17	0.22			1	0.02
<i>Tragopogon dubia</i>	12	0.14	34	0.50	38	0.51	19	0.35	47	1.22
<i>Veronica arvensis</i>	13									
Other forbs		1.09		0.42		0.30		0.24		0.26
Lichens			58		19				23	
Moss	64		72		116				35	

PLANT LIST - NATIONAL BISON RANGE
Grasslands and Associated Types

Trees, Shrubs and Half-Shrubs

Acer glabrum	Juniperus scopulorum
Alnus incana	Philadelphus lewisi
Amelanchier alnifolia	Pinus ponderosa
Artemisia dracunculus	Prunus virginiana
Artemisia frigida	Pseudotsuga menziesii
Artemisia tridentata	Rhus glabra
Betula occidentalis	Rhus radicans
Chrysothamnus nauseosus	Ribes
Chrysothamnus viscidiflorus	Rosa woodsii
Clematis columbiana	Symphoricarpos albus
Crataegus douglasii	

Grasses, Sedges and Rushes

Agropyron desertorum	Echinochloa crusgalli
Agropyron spicatum	Elymus cinereus
A. smithii	Festuca idahoensis
Aristida longiseta	Festuca octoflora
Bouteloua gracilis	F. scabrella
Bromus japonicus	Koeleria gracilis
B. tectorum	Poa ampla
Calamagrostis rubescens	Poa bulbosa
Carex filifolia	P. compressa
Carex geyeri	P. secunda

Grasses, Sedges and Rushes, continued

Danthonia intermedia
D. unispicata
Sporobolus cryptandrus
Stipa comata

P. pratensis
Puccinella nuttallii
Stipa columbiana
Stipa viridula

Forbs

Achillea millefolium
Agoseris glauca
Allium
Amaranthus blitoides
Arnica fulgens
A. Sororia
Antennaria dimorpha
A. parvifolia
A. rosea
Arabis holboellii
Artemisia ludoviciana
Aster
Astragalus (large)
Astragalus (small)
Balsamorhiza sagittata
Besseyia Wyomingensis
Brodiaea grandiflora
Castilleja
C. sulfurea

Collinsia parvifolia
Collomia linearis
Chrysopsis villosa
Cirsium arvense
C. undulatum
Crepis acuminata
Delphinium bicolor
Dianthus armeria
Dodecatheon conjugens
Draba
Erigeron pumila
Eriogonum
E. heracleoides
E. multiceps
E. ovalifolium
E. umbellatum
Erodium cicutarium
Filago

Forbs, continued

Centaurea maculata	Fritillaria
Cerastium arvense	Gaura coccinea
Geranium viscosissimum	Phacelia hastata
Geum triflorum	Phacelia heterophylla
Grindelia squarosa	Phacelia linearis
Heuchera cylindrica	Phlox
Hieracium albertinum	Polygonum aviculare
Hypericum perforatum	Potentilla arguta
Lactuca	P. glandulosa
Lepidium perfoliatum	Ranunculus
Lithophragma	Salsola kali
Lomatium dissectum	Senecio canus
L. macrocarpum	Sisymbrium altissimum
L. montanum	Saxifraga rhomboidea
L. simplex	Synthesis pinnatifida
L. triternatum	Taraxicum officinale
Lupinus	Tragopogon dubia
Lupinus sericeus	Verbascum blattaria
Orthocarpus luteus	Verbascum thapsus
Pentstemon	Zygadenus
P. confertus	



FROM OFFICIAL BISON RANGE BIRD LIST

Part of the Bison Range is visible from U. S. Highway 93. To reach the headquarters, not far from the junction of U. S. Highway 93 and Montana Highway 200, turn off 200 about a mile east of Dixon and drive five miles over an oiled road, State Highway 212, to the main entrance at Moiese. Correspondence about a visit should be addressed to the Refuge Manager, National Bison Range, Moiese, Montana 59824, or you can telephone the refuge through the Charlo exchange, (406) 644-2955.

The following list of birds that are found here contains 186 species that have been observed by various individuals since the establishment of the refuge in 1908. Species nesting locally are preceded by an asterisk. Season and abundance symbols are defined as follows:

S - March-May	a - abundant
S - June-August	c - common
F - September-November	u - uncommon
W - December-February	o - occasional
	r - rare

	<u>S</u> <u>S</u> <u>F</u> <u>W</u>		<u>S</u> <u>S</u> <u>F</u> <u>W</u>
Red-necked Grebe	r r r	*Hooded Merganser	u o u o
Eared Grebe	r r r	*Common Merganser	c u c c
Western Grebe	r r	Turkey Vulture	o
Pied-billed Grebe	r r r	Goshawk	r r r r
Great Blue Heron	c c c u	Sharp-shinned Hawk	o o o
American Bittern	u u u	Cooper's Hawk	o o o
Whistling Swan	o o o	*Red-tailed Hawk	c c c
*Canada Goose	c u c u	Swainson's Hawk	u u u
Snow Goose	u u	Rough-legged Hawk	c c c
*Mallard	c c a a	Ferruginous Hawk	u u u
*Gadwall	o o o	*Golden Eagle	c c c c
*Pintail	c u c o	Bald Eagle	o o o
*Green-winged Teal	c c c u	*Marsh Hawk	c c c u
*Blue-winged Teal	c c u	Osprey	u u u
Cinnamon Teal	u u u	Prairie Falcon	u u u u
American Widgeon	u u c	Peregrine Falcon	o o
Shoveler	o o o	Pigeon Hawk	o o
*Wood Duck	o o o	*Sparrow Hawk	a a a u
Redhead	o o o	*Blue Grouse	u u u u
Ring-necked Duck	r r	*Ruffed Grouse	o o o o
Canvasback	r r	*Ring-necked Pheasant	c c a c
Lesser Scaup	r r	*Chukar	c c c c
*Common Goldeneye	c o c c	*Gray Partridge	c c c c
Barrow's Goldeneye	u u	Virginia Rail	r r r
Bufflehead	r r	*Sora	o o o
Ruddy Duck	r r r	*American Coot	u u u o

	<u>S</u> <u>S</u> <u>F</u> <u>W</u>		<u>S</u> <u>S</u> <u>F</u> <u>W</u>
*Killdeer	c c c o	Traill's Flycatcher	u u
Semipalmated Plover	o	Western Flycatcher	u u
Black-bellied Plover	o o	*Western Wood Pewee	u u
Common Snipe	c u c o	Horned Lark	u u u c
Long-billed Curlew	r r r	*Violet-green Swallow	c c u
*Spotted Sandpiper	c c c	*Tree Swallow	a a c
Solitary Sandpiper	u u	*Bank Swallow	a a c
Willet	r r r	*Rough-winged Swallow	c c u
Greater Yellowlegs	u u u	*Barn Swallow	c c c
Lesser Yellowlegs	o o o	*Cliff Swallow	c a a
Dowitcher	o o	Gray Jay	r
Semipalmated Sandpiper	o o	Steller's Jay	o
Marbled Godwit	r	*Black-billed Magpie	a a a a
American Avocet	o o	Common Raven	o o u u
*Wilson's Phalarope	u c	*Common Crow	c u c
Northern Phalarope	o	*Clark's Nutcracker	c c c c
Ring-billed Gull	o o	*Black-capped Chickadee	c c c c
Forster's Tern	r r	Mountain Chickadee	c u c c
Common Tern	o o o	White-breasted Nuthatch	o o o o
Black Tern	o u u	*Red-breasted Nuthatch	c u c c
*Mourning Dove	a a a u	*Pigmy Nuthatch	c u c c
Black-billed Cuckoo	r	Brown Creeper	u u u u
Screech Owl	o o o o	*Dipper	u u u u
*Great Horned Owl	c c c c	*House Wren	c c c
Pygmy Owl	o o o	Long-billed Marsh Wren	o o
Burrowing Owl	o o o	*Rock Wren	c c c
Long-eared Owl	u u	Catbird	o o o
*Short-eared Owl	c u u c	*Robin	a a a o
Saw-whet Owl	o	Varied Thrush	r
*Common Nighthawk	c a	Swainson's Thrush	o
Black Swift	u u u	Veery	o o o o
Vaux's Swift	r	Mountain Bluebird	c u c
Black-chinned Hummingbird	r	Townsend's Solitaire	u o c c
Broad-tailed Hummingbird	r	Golden-crowned Kinglet	o
Rufous Hummingbird	u u	*Ruby-crowned Kinglet	c c c
Calliope Hummingbird	o o	Water Pipit	u c
*Belted Kingfisher	u u u o	Bohemian Waxwing	c c a
*Red-shafted Flicker	c c c o	*Cedar Waxwing	c c u
Pileated Woodpecker	o o o o	Northern Shrike	o u u
*Lewis' Woodpecker	c c u	*Starling	a a a u
*Yellow-bellied Sapsucker	c c c	Solitary Vireo	r
*Hairy Woodpecker	c c c u	*Red-eyed Vireo	c c u
*Downy Woodpecker	c c c u	*Warbling Vireo	c c u
*Eastern Kingbird	c c	Orange-crowned Warbler	o o
*Western Kingbird	c c	*Yellow Warbler	c c u
Say's Phoebe	r r r	*Audubon's Warbler	c c u
Northern Waterthrush	o	Hoary Redpoll	o o
*MacGillivray's Warbler	c c u	Common Redpoll	u u
*Yellowthroat	c c u	Pine Siskin	u u u

	<u>S</u>	<u>S</u>	<u>F</u>	<u>W</u>		<u>S</u>	<u>S</u>	<u>F</u>	<u>W</u>
Yellow-breasted Chat	u	u			*American Goldfinch	c	c	c	
Wilson's Warbler	o	o			*Red Crossbill	u	c	u	u
American Redstart	u	u			White-winged Crossbill			r	
*House Sparrow	c	c	c	c	*Rufous-sided Towhee	c	c	c	
Bobolink	r				Lark Bunting	r			
*Western Meadowlark	a	a	a	o	*Savannah Sparrow	u	u		
Yellow-headed Blackbird	o	o	o		*Grasshopper Sparrow	c	c		
*Redwinged Blackbird	a	a	c	o	*Vesper Sparrow	c	c	c	
*Bullock's Oriole	c	c			Lark Sparrow		u		
*Brewer's Blackbird	a	a	a		Slate-colored Junco	o		o	o
Brown-headed Cowbird	r	r			*Oregon Junco	c	c	c	c
*Western Tanager	c	c	u		Tree Sparrow				c
*Lazuli Bunting	c	c			*Chipping Sparrow	c	c	u	
Evening Grosbeak	u	o	c	c	White-crowned Sparrow	c	c	c	
Cassin's Finch				u	Fox Sparrow	o			
Black-headed Grosbeak	o	o			Lincoln's Sparrow	u			
Pine Grosbeak	r		o		*Song Sparrow	a	a	a	u
Gray-crowned Rosy Finch	c		c	c	Snow Bunting	o		u	o

NATIONAL BISON RANGE SOIL MOISTURE 1969

Rough Fescue Site

Depth in inches	7/5	5/3	6/7	6/30	8/1	9/2	10/4	11/2
0- 6	28.9%	33.2%	28.7%	35.9%	14.5%	9.2%	19.6%	19.5%
6-12	24.1	26.9	23.4	34.3	10.0	7.8	6.9	7.5
12-18	14.0	14.9	6.0	16.8	10.3	5.1	4.8	4.4
13-36	9.3	11.6	5.4	12.8	7.1	4.2	3.9	3.5
24-30	9.0	10.1	7.5	5.2	5.5	3.0	3.9	3.2
30-36	14.5	6.4	9.1	10.3	4.6	-	-	3.1

Idaho Fescue Site

Depth in inches	4/5	5/3	6/7	6/30	8/1	9/2	10/4	11/2
0- 6	18.4%	26.7%	21.0%	25.1	8.9	5.6	13.7	20.8
6-12	25.9	25.9	15.3	26.6	10.0	6.2	7.3	9.9
12-18	12.1	13.7	6.3	13.2	6.6	4.5	3.6	5.3
18-24	7.5	7.6	4.2	6.4	4.2	2.9	1.1	4.3
24-30	9.7	6.1	4.0	4.3	3.9	3.2	-	3.3
30-36	9.5	6.7	4.5	4.1	3.3	3.5	3.4	-

Silt Bed Area - Arlo, Agsp, Agsm

Depth in inches	4/12	5/3	6/7	6/30	8/1	9/2	10/4	11/2
0- 6	14.4%	9.9%	12.4%	15.7%	4.3%	1.4%	6.3%	10.6
6-12	21.1	15.8	8.8	20.2	5.9	3.9	4.9%	6.3%
12-18	19.0	20.2	21.2	26.6	5.9	4.3	3.4%	4.7%
18-24	0.3	11.8	17.0	16.5	19.5	7.4	6.3%	6.0%
24-30	28.1	2.6	3.8	12.2	19.8	13.5	14.7%	20.4%
30-36	15.6	26.3	22.3	2.5	6.1	10.6	12.1%	10.2%

Bluebunch Wheatgrass Site

Depth in inches	4/12	5/3	6/7	6/30	8/1	9/2	10/4	11/2
0- 6	16.6%	11.7%	17.7%	22.2%	6.2%	5.2%	9.7%	14.0%
6-12	14.7	7.7	9.8	18.4	5.9	4.7	4.3	5.0
12-18	9.0	9.7	5.9	10.0	5.7	4.6	4.3	5.9
18-24	12.9	12.1	8.5	18.8	12.7	9.3	8.3	-
24-30	11.9	12.7	11.1	19.1	10.3	11.5	-	-
30-36	13.2	12.2	12.9	13.9	12.0	11.0	-	-

PLANT DEVELOPMENT - NATIONAL BISON RANGE (1969)

Species & Location	Max. Leaf Ht. inches	Date Seed Stk. Emerg.	Max. Height Growth	
			Date	Inches
Rough Fescue				
Slope	13	5/3	6/7	45.5
Swale	12	do	6/14	41.5
Ridge	12	do	6/28	38.8
Idaho Fescue				
Slope	10	5/17	6/14	27
Swale	11	5/10	do	28
Ridge	10	5/10	do	26
Bluebunch Wh. gr.				
Slope	-	5/31	6/14	30
Swale	17	5/24	6/21	30
Ridge	14	-	do	29
Siltbeds	12	5/10	do	27
Three awn type	16	do	6/7	28
Wheatgrass type*	12	do	do	32
Three Awn Gr.				
Siltbeds	13	6/7	6/14	12
Three awn type	10	5/24	6/21	13
Wheatgrass type*	12	6/7	6/14	12
Cheatgrass				
Siltbeds			6/7	10
Three awn type			do	12
Wheatgrass type*		5/3	do	14
Native bluegrass				
Siltbeds		5/3	5/24	10
Three awn type				
Wheatgrass type*		5/3	6/7	14

*Bluebunch wheatgrass type

Table 1. Herbage production on paired stands of western wheatgrass and cheatgrass brome near Missoula and Dixon, Montana for 1968 and 1969. Data expressed in pounds per acre air dryweight.

Forage Class	Wheatgrass Stands				Cheatgrass Stands			
	Missoula		Dixon		Missoula		Dixon	
	1968	1969	1968	1969	1968	1969	1968	1969
	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a	lbs/a
Prin. Grass*	1011.5	1130	288.4	1292	551.1	526	283.2	764
Other Grasses**	90.1	73	62.0	154	32.3	69	23.6	70
Forbs	189.8	199	110.4	156	170.0	317	127.6	332
Total	1291.4	1402	460.8	1622	753.4	891	434.4	1166

* Principal grass in wheatgrass stands is blueband wheatgrass and cheatgrass brome and Japan brome in the cheatgrass stands.

** Other grasses may include cheatgrass in the wheatgrass stands and wheatgrass in the cheatgrass stands. 1968 clippings in late June and 1969 clippings in August.

Principal effect on yield is from main grass.

CLIMATIC DATA WESTERN MONTANA*

Precipitation, 1931 - 1960

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Mean
Lonepine	1.03	.82	.70	.72	1.12	1.62	.61	.62	.88	1.06	1.20	1.08	11.45
Missoula	.89	.74	.65	.96	1.82	1.99	.91	.75	1.06	.96	.93	1.12	12.78
Polson	1.02	.97	.89	1.16	1.93	2.27	1.00	.94	1.23	1.29	1.17	1.16	15.03
St. Ignatius	.84	.85	.99	1.32	2.21	2.51	.98	1.04	1.25	1.20	1.01	.90	15.10
Bison Range**	.95	.66	.69	1.08	1.78	1.99	1.00	.87	.98	1.06	.80	.88	12.74

Mean Monthly Temperature, 1931 - 1960

Station	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual Mean
Lonepine	22.9	26.2	34.7	45.7	54.2	60.3	68.2	65.9	57.3	46.4	33.0	27.8	45.2
Missoula	22.4	27.5	36.0	46.4	54.6	60.5	68.3	66.3	57.4	46.2	33.4	26.8	45.5
Polson	25.1	27.7	35.1	45.1	53.1	59.7	67.4	65.7	56.9	46.3	34.6	29.7	45.5
St. Ignatius	25.1	28.4	36.2	46.3	54.3	60.2	67.6	65.6	57.2	46.9	34.7	29.7	46.0
Bison Range**	23.4	30.0	34.7	44.8	53.1	60.4	66.9	64.3	56.4	45.5	33.7	28.6	45.1

* Data from Climatology of the U. S. No. 86-20, 1965 and records of the National Bison Range.

** 1950 - 1964.

BISON STUDY SITE: FESCUE GRASSLAND

Soil Group: Chernozem or Typic haploboroll; Soil Series: Rattle Cobbly Silt Loam

Soil Characteristics

Depth cm	Horizon	Color	Munsell (dry)	% Particles above 2 mm	Sand %	Silt %	Clay %	Structure	pH
0-5	A11	very dark gray	10 yr 3/1	33	12	68	20	Coarse crumb	6.4
5-10		very dark grayish br	10 yr 3/2	41	13	65	21	Coarse crumb	6.6
10-15	A12	very dark gray	10 yr 3/1	41	12	67	21	Coarse crumb	6.6
15-20		very dark gray brn	10 yr 3/2	40	13	66	21	Coarse crumb	6.7
20-25		very dark gray	10 yr 3/1	40	13	68	19	Coarse crumb	6.8
25-30	B21c	dark gray dark brn	10 yr 3/3	31	13	72	15	Gran.	6.8
30-35		brn to dark brn	10 yr 4/3	49				Gran.	6.9
35-40	B22c	dark yell brown	10 yr 4/4	62				Coarse gran.	6.8
40-45		do	10 yr 4/4	66				Coarse gran.	71
45-50	B23c	yellowish brown	10 yr 5/4	72				Subang.blocky	71
50-60	B3	do	10 yr 5/4	75				Subang.blocky	6.8
60-70+	C	light yell brown	10 yr 6/4	46				Gravel	7.0