

# **UPPER MISSOURI RIVER BREAKS NATIONAL MONUMENT**

## **ANALYSIS OF THE MANAGEMENT SITUATION**



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## **INTRODUCTION**

This Analysis of the Management Situation for the Upper Missouri River Breaks National Monument (the Monument) is comprised of two sections, the resource description and current management. The material contained herein will be used in the preparation of the resource management plan and environmental impact statement for the Monument. This information may change due to monitoring, inventories, and corrections.

This information has been described in previous planning documents and other publications and is largely excerpted from those earlier documents, in particular, the West HiLine Management Situation Analysis (1986), the Judith-Valley-Phillips Management Situation Analysis (1989), and the Upper Missouri National Wild and Scenic River Cultural Resource Management Plan (1992).

## Resource Description

# AIR QUALITY

## RESOURCE DESCRIPTION

A planning and management process, "Prevention of Significant Deterioration" (PSD), was introduced as part of the 1977 Amendments to The Clean Air Act. These PSD requirements set limits for increases in ambient pollution levels and established a system for preconstruction review of new major sources. Three PSD classes have been established. Class I allows very small increases in pollution; Class II allows somewhat larger increases; and Class III allows the air quality to "deteriorate" considerably more. In general, Class I is designed for "pristine" areas where almost any deterioration would be significant. Class II limits allow for moderate, well-controlled growth and Class III limits allow pollutant levels to increase considerably. The State of Montana determines the Class.

Under the Clear Air Act of 1970, EPA developed primary and secondary National Ambient Air Quality Standards (NAAQS) for each of the seven criteria pollutants: carbon monoxide, lead, nitrogen dioxide, ozone, particulate matter, fine particulate matter, and sulfur dioxide. These standards establish pollution levels in the United States that cannot legally be exceeded during a specified time period.

Primary standards are designed to protect human health, including "sensitive" populations, such as people with asthma and emphysema, children, and senior citizens. Primary standards were designed for the immediate protection of public health, with an adequate margin of safety, regardless of cost.

Secondary standards are designed to protect public welfare, including soils, water, crops, vegetation, buildings, property, animals, wildlife, weather, visibility, and other economic, aesthetic, and ecological values, as well as personal comfort and well-being. Secondary standards were established to protect the public from known or anticipated effects of air pollution.

Air Quality Table 1 shows the allowable PSD increases for the various classes. Air Quality Table 2 lists Montana and National Air Quality Standards.

Air quality within the Monument is regarded as good mainly due to the few industries and homes that exist in the area. All lands in the Monument are designated as Class II. No air quality monitoring sites currently exist in the Monument.

Potential pollution sources on public lands are:

- Gravel crushers used for road construction (particulates)
- Agricultural activities (particulates)
- Wind erosion (particulates)
- Automobiles (CO, NO<sub>x</sub>, re-entrained particulates)

- Smoke from wildland fire and prescription burning
- Natural gas and mineral development activities

**Air Quality Table 1. Federal Prevention of Significant Deterioration Allowable Increments (Micrograms per Cubic Meter)**

	Class I	Class II	Class III
<b>Particulate Matter</b>			
Annual Arith. Mean	4	17	34
Maximum 24-Hour	8	30	60
<b>Sulfur Dioxide</b>			
Annual Arith. Mean	2	20	40
Maximum 24-Hour	5	91	182
Maximum 3-Hour	25	512	700
<b>Nitrogen Dioxide</b>			
Annual Arith. Mean	2.5	25	50

**Air Quality Table 2. Federal and State Air Quality Standards**

Pollutant	Time Period	Federal (NAAQS)	Montana (MAAQS)	Standard Type
Carbon Monoxide	Hourly Average	35 ppm <sup>1</sup>	23 ppm <sup>b</sup>	Primary
	8-Hour Average	9 ppm <sup>1</sup>	9 ppm <sup>b</sup>	Primary
Fluoride in Forage	Monthly Average	--	50 µg/g <sup>c</sup>	--
	Grazing Season	--	35 µg/g <sup>c</sup>	--
Hydrogen Sulfide	Hourly Average	--	0.05 ppm <sup>b</sup>	--
Lead	90-Day Average	--	1.5 µg/m <sup>3c</sup>	--
	Quarterly Average	1.5 µg/m <sup>3c</sup>	--	Prim. & Sec.
Nitrogen Dioxide	Hourly Average	--	0.30 ppm <sup>b</sup>	--
	Annual Average	0.053 ppm <sup>3d</sup>	0.05 ppm <sup>e</sup>	Prim. & Sec.
Ozone	Hourly Average	0.12 ppm <sup>f</sup>	0.10 ppm <sup>b</sup>	Prim. & Sec.
	8-Hour Average	0.08 ppm <sup>g</sup>	--	Prim. & Sec.
PM -10	24-Hour Average	150 µg/m <sup>3k</sup>	150 µg/m <sup>3k</sup>	Prim. & Sec.
	Annual Average	50 µg/m <sup>3l</sup>	50 µg/m <sup>3l</sup>	Prim. & Sec.
PM-2.5	24-Hour Average	65 µg/m <sup>3n</sup>	--	Prim. & Sec.
	Annual Average	15 µg/m <sup>3n</sup>	--	Prim. & Sec.
Settleable Particulate	30-Day Average	--	10 g/m <sup>2c</sup>	--
Sulfur Dioxide	Hourly Average	--	0.50 ppm <sup>h</sup>	--
	3-Hour Average	0.50 ppm <sup>a</sup>	--	Secondary
	24-Hour Average	0.14 ppm <sup>a,i</sup>	0.10 ppm <sup>b,j</sup>	Primary
	Annual Average	0.03 ppm <sup>d</sup>	0.02 ppm <sup>e</sup>	Primary
Visibility	Annual Average	--	3 x 10 <sup>-5</sup> /m <sup>e</sup>	--

## Resource Description

- <sup>l</sup> Federal violation when exceeded more than once over any 12 consecutive months.
- <sup>a</sup> Federal violation when exceeded more than once per calendar year.
- <sup>b</sup> State violation when exceeded more than once over any 12 consecutive months.
- <sup>c</sup> Not to be exceeded (ever) for the averaging time period as described in the state and/or federal regulation.
- <sup>d</sup> Federal violation when the annual arithmetic mean concentration for a calendar year exceeds the standard.
- <sup>e</sup> State violation when the arithmetic average over any four consecutive quarters exceeds the standard.
- <sup>f</sup> Applies only to NA areas designated before the 8-hour standard was approved in July, 1997. Mt. has none.
- <sup>g</sup> Federal violation when 3-year average of the annual 4th-highest daily max. 8-hour concentration exceeds standard.
- <sup>h</sup> State violation when exceeded more than eighteen times in any 12 consecutive months.
- <sup>i</sup> Federal standard is based upon a calendar day (midnight to midnight).
- <sup>j</sup> State standard is based upon 24-consecutive hours (rolling).
- <sup>k</sup> State and federal violation when more than one expected exceedance per calendar year, averaged over 3-years.
- <sup>l</sup> State and Federal violation when the 3-year average of the arithmetic means over a calendar year at each monitoring site exceed the standard.
- <sup>m</sup> Federal violation when 3-year average of the 98th percentile values at each monitoring site exceed the standard.
- <sup>n</sup> Federal violation when 3-year average of the spatially averaged calendar year means exceed the standard.



# CULTURAL RESOURCES

## RESOURCE DESCRIPTION

### Historic Overview

Recorded history in the Monument area begins with the written records of the early 19th century explorers of European and American origin. The Lewis and Clark expedition camped at numerous locations along the Missouri River in 1805 and 1806. The expedition also described for the first time a large number of the plants and animals found in the region.

Organized fur traders of the Rocky Mountain Fur Company, American Fur Company, and smaller outfits followed the Lewis and Clark expedition into the Missouri River country in the early 1800s. The Hudson Bay Company undoubtedly had operated in the Monument area prior to this time, but there are no known records of its exploits. After 1829, the year the American Fur Company established Fort Union at the mouth of the Yellowstone River, several trading posts or “forts” were built in or near the Monument area, including Fort Piegan near the mouth of the Marias River, Fort McKenzie, Fort Campbell, and Fort Lewis near the present city of Fort Benton, and Fort Chardon at the mouth of the Judith River. Competition and hostile Indians often required the operations and the posts to be relocated to more favorable locations.

By the 1850s, the heyday of the fur trade was beginning to fade due to changes in world textile markets and the scarcity of certain fur-bearing animals in the North American west. However, buffalo hides, whiskey, and Indian annuities soon replaced beaver skins as the main items of trade in the Upper Missouri country. In addition to the American Fur Company, a number of trading companies began operating out of Fort Benton during this time, including the firms of I.G. Baker Company and T.C. Power and Bros. Steamboats, which had been in use on the Lower Missouri for twenty years, were finally able to reach Fort Benton in 1859 due to the development of shallow draft vessels. The establishment of a port at Fort Benton was one of the most important historic events for central and northern Montana because almost all immigration, commerce, and communication to and from the outside world came through there.

The influx of fur traders, hide hunters, gold seekers, businessmen, and settlers into the region eventually caused problems with the native tribes. During the mid-1800s, Blackfeet, Gros Ventre, and Sioux war parties raided outlying settlements and wagon trains with considerable frequency. In order to quell the white settlers' fears about Indian attacks, military posts were established at Camp Cooke near the mouth of the Judith River in 1866 and at Fort Maginnis near Lewistown in 1880. Army garrisons were also occasionally stationed at Indian agencies, trading posts, and steamboat landings.

In September 1877, the Nez Perce crossed the Missouri River near Cow Island Landing on their flight from the U.S. Army under the command of General Howard. The skirmish at Cow Island on September 23 was the final before their eventual surrender at the Bearpaw Battlefield.

After the disappearance of the buffalo by 1880, the hide and whiskey trade with the Indians abruptly ceased. The trading firms then shifted their focus to supplying military posts, mining camps, and ranching communities both in and adjacent to the region. Although the northern portion of the Monument area was officially Indian reservation land, a number of adjoining ranches grazed sheep and cattle there during the late 1870s and early 1880s.

In 1888, Congress ratified a treaty creating three smaller reservations for the region's Indian inhabitants (Fort Peck, Fort Belknap, and Blackfeet Indian Reservations) and ceding 17.5 million acres back to the U.S. Government.

The construction of James J. Hill's St. Paul, Minneapolis and Manitoba Railroad across the HiLine in 1887 changed the entire character of the region. The completion of the Montana Central Railroad and subsequent merger with Hill's company to form the Great Northern Railway in 1889 virtually eliminated steamboat traffic on the Missouri River. The last steamboat traffic between Bismarck, North Dakota and Fort Benton occurred in 1891.

A number of developments followed the coming of the railroad and ushered in the homestead boom of 1910-1918. These included the availability of larger homestead tracts, new dryland farming techniques, new mechanized farm equipment and a mammoth promotional campaign by the railroad companies. Homesteaders came by the thousands and the region was quickly settled by Germans and Scandinavians from the midwest, as well as by eastern European immigrants like Bohemians and Yugoslavs. Times were good during the boom period because the climate was abnormally favorable and the war in Europe kept the demand and prices for farm products high. However, by the end of World War I, a severe drought had begun and food prices had fallen drastically. These conditions lasted for several years and by 1925, one out of every two homesteaders had lost or abandoned his farm and half of the banks in the region had failed.

Beginning in the late 1920s, a canner horse industry emerged in the Missouri River breaks (breaks) according to Robert Eigell (1987). Meat packers would pay \$5 a head for horses delivered to the railroad shipping pens (Eigell, R. 1987, 167). While not profitable at this price, it gave rise to the canner horse industry.

During the Great Depression, the U.S. Government provided relief to the residents of the region in a variety of ways. Under the Work Projects Administration, federal funds were available for improving community infrastructure as well as more ambitious projects such as the construction of the Fort Peck Dam.

## **Historic Site Types**

The most visible historic remains in the Monument date to the homesteading period of 1910-1925. In the breaks, these remains often consist of locally available logs or stone. However, they also include purchased or manufactured materials such as concrete, cedar shingles, milled lumber, sheet metal and wire. Farm and ranch machinery, both engine-powered and horse-drawn, are also present.

Earlier historic sites are known from the literature, but many have not been definitively identified. These include Lewis and Clark campsites, trading posts, steamboat graffiti and landings, woodhawker graves and coal mining sites. Historic trails are also known from the Monument area, including the Cow Island Trail, and the Nez Perce National Historic Trail.

The Monument area may also contain places important to tribal histories and/or current spiritual practices. As noted in the Prehistoric Overview below, the Monument area was occupied for thousands of years prior to Lewis and Clark's 1805 visit. Such areas may not be widely known, as they tend to be group specific. The remote character of the Monument area is conducive to traditional Native American spiritual practices, and the unchanged natural settings recall tribal history.

Another class of historic period resources is the landscapes recorded by 19<sup>th</sup> century visitors to the area, most notably, Karl Bodmer. These are a historic resource and yet, are not historic "sites" as normally described.

## **Prehistoric Overview**

Based on archaeological evidence from the surrounding northwestern plains, it is believed that ice age hunters arrived in the region about 12,000 years ago in search of big game such as the now-extinct mammoth and giant bison. The chief weapon of the hunters was a thrusting spear tipped with a large stone point. Later, about 8,000 years ago, their descendants used an atlatl, or throwing stick, and a short spear tipped with a smaller stone point than that used previously. Big game animals remained important, but smaller species were also taken along with a variety of wild plant foods. By about 1,500 years ago, bow and arrow technology reached the plains, as did the manufacture of pottery.

The prehistoric cultures of the northwestern plains region were less complex socially than in other regions of the western hemisphere. Organized into small groups of hunter-gatherers, these cultures were largely dependent upon the naturally occurring resources of their environment. Because of environmental and technological limitations, little or no food production was practiced. Subsistence was oriented to resource availability and campsites were generally located near important, exploitable resources. As the most important resource was the highly nomadic bison, these groups were highly mobile in their settlement patterns.

Near the end of the prehistoric period, about A.D. 1700-1750, horses were acquired on the northern plains. The use of horses as a means of transportation and food procurement radically changed the subsistence pattern of the region's inhabitants. No longer were they dependent on the territory in which they lived to survive; the horse allowed them the mobility to exploit new territories and to be more efficient at that exploitation. Thus, even the marginal hunting and gathering cultures evolved into specialized horse-mounted bison hunters by A.D. 1800.

To the first Euro-American visitors, the native groups of the region shared many cultural traits. These traits included high mobility, dependence on horse-mounted bison hunting, similar material culture and religious practices and a common sign language in spite of many spoken languages and dialects. The Indian tribes inhabiting the region during the 19th century include

the Piegan (Blackfeet), Gros Ventre (Atsina), River Crow, Sioux, and Assiniboin. Frequent visitors to the Monument area include the Mountain Crow, Shoshoni, Flathead, and Nez Perce. Tribes not resident to the area passed through on buffalo hunts or war parties.

## **Prehistoric Site Types**

Prehistoric sites in the Monument area reflect millennia of occupation prior to the Lewis and Clark Expedition. The archaeological evidence also represents different activities by various groups over time. Ruebelmann's archaeological overview of the Lewistown District (Ruebelmann 1983, 44) divided prehistoric sites into four activity types: habitation, procurement, industrial, and ritual.

Habitation sites consist of features and material which indicate everyday domestic activities such as manufacturing tools, clothing, and ornaments; preparing food and medicine; cooking; and securing warmth and shelter. Examples of such sites in the Monument area are scatters of camp debris, hearths, stone piles (cairns), and tipi rings.

Procurement sites consist of features representing specific subsistence activities such as hunting bison, deer, or antelope and gathering wild plants. Procurement sites for buffalo and antelope have been recorded within the Monument area. Such sites are characterized by large deposits of bones at the base of bluffs and cliffs or in steep coulees.

Industrial sites represent locations of specific technological tasks such as the quarrying and production of stone tools. Industrial sites are made up of scatters of stone waste debris, hammer stones, rough or damaged tools, and chunks of fine-grained stone and quartzite. Quartzite and siliceous cherts, which were used in the making of stone tools, are widely dispersed within the Monument area.

Ritual sites or sites with spiritual associations include rock art, Native American burials or places of modern cultural practices, often called "traditional cultural properties."

Some sites may represent a single activity, but often have multiple components. Since the area was occupied by many different groups and over a long time period, favored locations had a succession of occupations and activities.

A complete listing of known cultural sites within the Monument is to be compiled by October, 2003. A listing will be made available upon request, but specific locations will not be released pursuant to the Archaeological Resources Protection Act of 1979.

# FISH and WILDLIFE

## RESOURCE DESCRIPTION

A complete list, including both common and scientific names, of all fish, wildlife, herptofauna, and avian species found within the Monument is located in Appendix A. If a species has been designated as a special status species, or threatened, endangered, candidate or proposed species, the designation is noted in the listing.

### Big Game

#### Elk

##### Distribution

The distribution of elk in Montana changed following settlement by white man. Early accounts of trappers and explorers indicate that elk were found in all parts of the state with the exception of northwestern Montana. During early expeditions, elk were killed along river bottoms and on the rolling plains. Following settlement, elk numbers decreased and by the turn of the century only small remnant herds of elk remained in the mountainous areas of Montana and in Yellowstone National Park. Elk were eliminated from eastern Montana. In recent years, elk have been transplanted to some areas they previously inhabited. Elk distribution today is the result of transplant efforts and big game management.

The last native elk vanished from the breaks area in the late 1860s. Elk were reintroduced to the Missouri River breaks near Fred Robinson Bridge in 1951. Thirty-one animals were transplanted from Yellowstone National Park. The elk population increased to around 150 to 200 by 1964. These elk move back and forth across the Missouri River. The population increase and expansion into unoccupied habitat has occurred west to the Stafford Ferry and the Bear Paw herd has moved as far south as the Stafford Wilderness Study Area during severe winters.

##### Habitat

Elk are primarily associated with the timbered portions of the breaks and riparian bottoms along the river corridor. Elk are scattered throughout the breaks habitat, generally concentrating in areas with good to excellent range condition and adequate water sources. Riparian bottoms are used in conjunction with upland areas for forage and security purposes. These bottoms become increasingly important during drought periods when upland reservoirs are dry. Fish and Wildlife Table 1 lists the seasonal vegetation preferences of elk.

**Fish and Wildlife Table 1. Vegetation Preferences of Elk by Seasons**

Season	First	Second	Third
Spring	Grass (90%)	Forbs (6%)	Browse (3%)
Summer	Forbs (91%)	Grass (6%)	Browse (3%)
Fall	Grass (80%)	Forbs (14%)	Browse (3%)
Winter	Grass (90%)	Browse (7%)	Forbs (3%)

Rouse (1957).

## Deer

Mule and white-tailed deer are the most numerous big game animals in the Monument. Mule deer typically inhabit drainage bottoms and the rough, broken side slopes, upland areas where sagebrush is common, wooded breaks, and mountain foothills, while white-tailed deer are primarily confined to riparian bottoms.

High mule deer populations were recorded in the mid 1950s in the area, followed by a decline in the late 1950s. Numbers remained at moderate to low densities until the late 1970s. During the late 1970s and early 1980s, deer numbers increased again in response to mild winters and wet springs.

Mackie (1965) described key mule deer ranges within the breaks in detail. He describes key areas as the ponderosa pine/juniper type on moderate to steep slopes and the sage/wheatgrass type on small ridge tops and along margins of more extensive ridges. Key habitat in the remaining prairie lands of the Monument area is found primarily along intermittent streams and/or rough breaks. Grassland, grassland-shrub and cropland provide succulents, small grains and forbs during warmer months.

In the spring during green-up, deer feed extensively on succulent green grasses until forbs are available. Forbs, supplemented by some browse, are used throughout the summer. Heavy use of browse occurs in the fall, winter and early spring on private, public, and State lands. Fish and Wildlife Tables 2 and 3 list the seasonal vegetation preferences of mule deer and white-tailed deer in the breaks.

**Fish and Wildlife Table 2. Vegetation Preferences of Mule Deer By Season in the Missouri River Breaks**

Season	First	Second	Third
Spring	Grass	Forbs	Browse
Summer	Forbs	Browse	Grass
Fall	Browse	Forbs	Grass
Winter	Browse	Forbs	Grass

Lovaas (1957), Kamps (1969), Wilkins (1956).

**Fish and Wildlife Table 3. Vegetation Preferences of White-Tailed Deer By Season in the Missouri River Breaks**

Season	First	Second	Third
Spring	Browse (43%)	Grass (38%)	Forbs (18%)
Summer	Forbs (54%)	Browse (45%)	Grass (T)
Fall	Browse (81%)	Forbs (17%)	Grass (2%)
Winter	Browse (65%)	Forbs (29%)	Grass (6%)

Allen (1968). (T) = Trace.

Deer in the breaks are essentially non-migratory, however they do concentrate on south and southwest facing open slopes and ridge tops during winter. During winters of heavy snowfall, sagebrush is often the only available forage plant and becomes crucial to the survival of many deer herds. Deer utilize private land throughout the year, but in severe winters, they may congregate on private agricultural lands and can cause severe haystack damage.

Escape and thermal cover is also important in maintaining deer populations; without sufficient cover, fawns are easily susceptible to predators and adverse weather. Woody vegetation is important in reducing the effects of weather, especially during severe spring and winter storms. Deer also use woody vegetation for bedding cover during the heat of the day and at night.

### **Antelope**

The pronghorn antelope population was estimated at 2.5 million at its peak before settlement of Montana. Populations have since declined. This can be attributed to disturbance of preferred habitat by human activities. Originally, antelope were found throughout the plains, foothills, and broad intermountain valley areas of Montana. By 1924, it was estimated that only about 3,000 antelope survived and were found in 44 areas of central and southwestern Montana. In the 1930s, many farmland areas were abandoned. Many of these areas were seeded to a perennial grass cover with a later forb invasion. Other areas, through the process of secondary succession, developed grass-forb-shrub communities. This has helped to extend the current range for antelope and the population has generally increased.

### Habitat

Habitat frequented by pronghorn antelope varies with the time of year (spring, summer, fall and winter). The seasonal change in habitat requirements is due to changes in food requirements, food preferences, food availability, cover requirements, and related factors.

During the winter, antelope use the sagebrush-grassland type almost exclusively. The greasewood-sagebrush type receives limited use. All other vegetation types are of minor importance for winter use.

Montana Fish, Wildlife and Parks (MFWP) has recorded periodic winter die-offs in the last 40 years. The two most recent die-offs occurred during the winters of 1964-1965 and 1977-1978. Most deaths were attributed to malnutrition. Antelope populations south of the Missouri River

are primarily non-migratory and rely on big sagebrush. Antelope in Phillips County will migrate south of the Missouri River in severe winters.

Antelope use a variety of vegetation types including grassland, grassland-shrub, shrub and cropland in the spring, summer, and early fall. They use primarily grassland-shrub and shrub types during winter months.

Browse, primarily sagebrush, is vital in the antelope's diet. Winter diet consists of at least 80% sagebrush. Generally, habitat containing sagebrush 12-24 inches in height with 20% canopy cover meets the winter needs of antelope. Forbs become important during the spring, summer, and fall. Grasses are of minor importance. Fish and Wildlife Table 4 lists the seasonal vegetation preferences of pronghorn antelope in central Montana.

**Fish and Wildlife Table 4. Vegetation Preferences of Pronghorn Antelope By Season in Central Montana**

Season	First	Second	Third
Spring	Browse (71%)	Forbs (21%)	Grass (8%)
Summer	Forbs (66%)	Browse (33%)	Grass (1%)
Fall	Browse (50%)	Forbs (48%)	Grass (2%)
Winter	Browse (98%)	Grass (1.5%)	Forbs (.5%)

Cole (1956).

### **Rocky Mountain Bighorn Sheep**

When Lewis and Clark first explored the Missouri River, they noted that populations of Audubon’s bighorn sheep (*Ovis canadensis auduboni*) in prairies and breaks along the river in what is now Montana (Buechner 1960) were abundant. This sub-species was driven to extinction in the early 1900s by overhunting, disease, and competition from domestic livestock (Geist 1971). The decline in populations in the Missouri breaks may have largely been due to anthrax introduced by domestic sheep in 1885 (Grinnell 1904:287 cited in Buechner 1960).

Bighorn sheep were originally found both in the mountains and on the plains. Their diet consists of mostly grasses and forbs and is supplemented by browse species such as sagebrush. Farming practices and livestock competition soon restricted bighorn sheep populations to rugged mountain habitat in Montana and other states. Distribution of bighorns in Montana has now been extended due to live trapping and transplanting to suitable areas they previously occupied.

Management agencies began using translocations to return bighorn sheep to parts of their historic range as early as the 1930s (Bleich, et al. 1990, Dunn 1996). In 1947, MFWP began efforts to re-establish sheep in the breaks region of Montana. From 1958 through 1961, a series of reintroductions placed 43 Rocky Mountain bighorn sheep in the Two Calf area of Fergus County, south of the Missouri River. A series of weather events, disease, and competition with domestic livestock and deer were reported as responsible for the failure (Eichhorn and Watts 1972). However, some remnants of this introduction were probably present when additional sheep were released at Chimney Bend (Stafford Ferry population) in 1980.

In 1980, 28 Rocky Mountain bighorn sheep from the Sun River area in Montana were again relocated to the Stafford Ferry area of Fergus County. The population introduced at the Stafford Ferry area has since grown and pioneered areas that include both sides of the Missouri River. In August 1998, this population had a minimum of 540 animals: 230 north of the Missouri River and 310 on the south side. The population appears to be healthy and expanding. In 2002, 35 permits (15 ram, 20 ewe) were available in hunting district 680 and 10 permits (8 ram, 2 ewe) were available in hunting district 482.

## **Predators**

### **Coyote**

Coyotes are an unprotected furbearer found throughout the Monument and generally demonstrate social organization through formation of pair bonds (Bowen 1982, Windberg and Knowlton 1988, Gese, et al. 1989) and, at times, packs or groups (Bekoff 1982, Gese, et al. 1988a). Territoriality generally is displayed by resident pairs or groups with home ranges showing little or no overlap (Gese, et al. 1988b, Windberg and Knowlton 1988, Gese, et al. 1989).

Coyotes eat a wide variety of food items including berries, insects, birds, reptiles, large and small mammals, and carrion (Bekoff 1982, Gese, et al. 1988a). Coyotes are able to hunt individually as well as in groups, which are generally formed during the winter (Gese, et al. 1988a).

Reproduction may occur in yearling females but occurs primarily in adults 2 years old or older (Bekoff 1982, Voigt and Berg 1987). Litter size may depend on food availability, habitat quality, and age of the female (Bekoff 1982).

Currently coyotes are classified as predatory animals in Montana. Hunting, trapping, and predator control activities were actively pursued in the past in Montana and persist in some areas today (Hamlin 1997). A bounty was placed on coyotes in the 1800s, and in the early 1900s the Montana Fish and Game Department retained employees solely for predator control (Smith 1929, Hamlin 1997). Although predator control activities occur yearly within the state, mortality rates due to hunting and trapping are largely determined by fur prices (Giddings 1995), which were high in the 1970s but have declined significantly since that time. Despite extensive predator control and occasional high hunting pressure, coyote populations in Montana have maintained or increased in many areas (Hamlin 1997).

### **Mountain Lion**

The mountain lion is a large predator found within the Monument and has reclaimed much of its former range in Montana since classification as a game animal in 1971. Mountain lions are currently found in 46 of 56 counties (MFWP 1996).

This solitary hunter commonly kills prey as large as or larger than itself, primarily deer and elk. The dispersion of prey and the necessary vertical and horizontal cover for stalking greatly determines the large areas required by lions.

Habitat fragmentation and degradation resulting from human development and disturbance are the most serious long-term threats to lion populations (Murphy 1983). Beier (1995) found that lions avoided corridors with excessive noise, lighting, and domestic dogs, yet readily used corridors with isolated residences without lighting, quiet motors, and trails heavily used by hikers, bicyclists, and equestrians.

MFWP developed a conservative hunting program because of the difficulty in obtaining accurate population survey data (Aune 1991). Current trends indicate that lion populations in Montana are increasing (Aune 1991).

### **Raccoon**

In Montana, raccoons are classified as non-game and are unprotected, allowing them to be trapped or hunted at any time with no limits or seasons.

The raccoon inhabits stream and lake borders near wooded areas or rocky cliffs, but is most abundant in riparian and wetland habitats.

Raccoons are omnivorous and will eat whatever is available. They are known to feed on carrion, mammals, birds, reptiles, insects, amphibians, grains, nuts, and fruits. Raccoons also readily consume food prepared for animal or human consumption.

### **Bobcat**

Bobcats are a furbearing predator found in the Monument area. They are managed and protected by regulated fur harvest seasons. With the international protection of the world's spotted cats, the fur trade turned to the North American bobcat. Almost overnight the pelt of the bobcat came into prominence as one of the most desirable and expensive furs that could be taken legally.

The bobcat uses a wide variety of terrestrial habitats including deep woods, open areas, riverine, and semideveloped residential areas. Bobcats prefer areas with heavy underbrush, adequate prey, protection from severe weather, availability of rest areas, and freedom from disturbance. Rock piles or broken rocky ledges are important bobcat denning areas.

Bobcats occupy areas from 1/4 of a square mile to as much as 25 square miles, depending on the habitat and sex of the bobcat. Female bobcats occupy smaller areas than males and normally do not associate with other female bobcats. Males roam wider than females; while they are not particularly tolerant of other males, the home ranges of males will overlap those of both males and females.

## Upland Game Birds

### Sage Grouse

The sage grouse is the largest member of the grouse family native to Montana. Sage grouse have many common names such as sage hen, sage chicken, and others. Usually, the word sage is associated with the common name. Both the early settlers and Indians used the name sage grouse. Photographers and naturalists are attracted to sage grouse “strutting” grounds in the spring.

#### Distribution

The distribution of the sage grouse has changed due to agricultural activities. Before the turn of the century, sage grouse were commonly found in nine western states, including Montana. Sage grouse have decreased in numbers but still inhabit the areas they have occupied for decades. Grouse populations in marginal areas of their range have been drastically reduced or eliminated. Sage grouse are closely associated with sagebrush (*Artemisia spp.*). In areas where sagebrush has been eliminated, the sage grouse has also been eliminated. They are presently found in 39 counties of eastern, central and southwestern Montana.

#### Habitat

Sage grouse are an important game bird in Montana. They are primarily associated with the big and silver sagebrush communities in grassland-shrub and shrub vegetation types. Sage grouse are considered sensitive and are decreasing in number throughout their range ( Draft 2002 Management Plan and Conservation Strategies for Sage Grouse in Montana). Faltering sage grouse populations can be attributed to a number of different factors. Habitat fragmentation and condition are the primary factors that a land management agency such as the BLM can manipulate.

The U.S. Fish and Wildlife Service (USFWS) received a petition in June 2002 to list the greater sage grouse, although the USFWS had insufficient funds to initiate a 90-day finding until fiscal year 2003. A working group that includes specialists from several state and federal agencies is currently preparing a sage grouse conservation plan for Montana (Montana Sage Grouse Work Group 2002 draft).

In eastern Montana, where close interspersions of wintering, nesting, and brood-rearing habitat rarely require large seasonal movements, sage grouse are essentially non-migratory. The importance of sagebrush to sage grouse is well documented. Due to their lack of a muscular gizzard, they eat only soft material (Patterson 1952). They prefer sagebrush with a canopy cover greater than 15% for cover and food. Seasonal movement often is elevational and related to availability of herbaceous vegetation during late summer and early fall. The following seasonal habitats are important for survival of sage grouse (Montana Sage Grouse Work Group 2002 draft).

### Breeding Habitat

Strutting grounds, or leks, where breeding actually occurs, are key activity areas and most often consist of clearings surrounded by sagebrush cover. Findings from research in central Montana reported a sagebrush canopy cover at feeding and loafing sites near leks of 20 to 50% with an average of 32%.

### Nesting Habitat

Sage grouse invariably prefer sagebrush for nesting cover, and quality of nesting cover directly influences nest success. Successful nesting requires concealment provided by a combination of shrub and residual grass cover. Sage grouse most frequently select nesting cover with a sagebrush canopy of 15 to 31%. Research findings in central Montana suggest that about two-thirds of nests occur within two miles of a lek.

### Brood-Rearing Habitat

Areas providing an abundance and diversity of succulent forbs, an important summer food source for young sage grouse, provide key brood-rearing habitat. Research in central Montana indicated that sage grouse broods prefer relatively open stands of sagebrush during summer, generally with a canopy ranging from 1 to 25%. As palatability of forbs declines, sage grouse move to moist areas that still support succulent vegetation, including alfalfa fields, roadside ditches, and other moist sites. During summers of high precipitation, sage grouse in Montana may remain widely distributed throughout the entire summer due to the wide distribution of succulent forbs. Sage grouse in southwest Montana and eastern Idaho often move to intermountain valleys during late summer where forbs remain succulent through summer and early fall. Reported sagebrush canopy on these sites varied from 8.5 to 14%.

### Winter Habitat

Sage grouse generally select relatively tall and large expanses of dense sagebrush during winter. Wintering areas in central Montana include sagebrush stands on relatively flat sites with a 20% canopy and an average height of 10 inches. The importance of shrub height increases with snow depth. Thus, snow depth can limit the availability of wintering sites to sage grouse.

### Population Dynamics

Counts of males on leks during the spring have been used to provide an index of relative size and trend of sage grouse breeding populations in Montana since the 1950s. Statewide, sage grouse numbers increased from the mid-1960s through 1973 and fluctuated at about that level until 1984. Sage grouse declined rather sharply statewide from 1991 through 1996 and increased through 2000. Long-term harvest trends, based on post-hunt surveys of hunters, when interpreted along with lek counts, also provide insight to long-term changes in sage grouse numbers at a statewide scale.

Productivity has been estimated from examination of wings of grouse taken by hunters. In addition to the quantity and quality of breeding and nesting habitat, the amount and timing of spring and summer rainfall may affect annual production and population dynamics of sage grouse. Nest success and early brood survival rates are some of the most significant vital rates influencing population dynamics of prairie grouse and other upland nesting species (Montana Sage Grouse Work Group 2002 draft).

Juvenile mortality during the first few weeks after hatching is typically high and can increase when drought reduces availability of important food sources such as insects and forbs, or herbaceous understory used as hiding and escape cover. Research documented an average mortality rate of 56% in central Montana from the egg-laying period in April to early September (Montana Sage Grouse Work Group 2002 draft).

Survival rates for adult sage grouse are generally considered high, thus population declines are usually not related to high levels of predation on adult birds. Adult hens are most vulnerable to predation during the nesting period, whereas adult males are most vulnerable during the spring breeding season (Montana Sage Grouse Work Group 2002 draft).

### **Sharp-tailed Grouse**

Sharp-tailed grouse are also native to Montana. The sharp-tailed grouse of North America have many common names such as: prairie chicken, prairie hen, brush chicken, fire grouse, sharp-tail, pintail, pintail grouse, spring-tailed grouse and brown legs. Six subspecies of sharp-tailed grouse are found in North America. The Great Plains sharp-tailed grouse is the most common subspecies in Montana and is found in the breaks area.

### Distribution

Great Plains sharp-tailed grouse were once abundant throughout the plains and lower foothills east of the Continental Divide. They are still relatively abundant in areas where native range is maintained in good condition. In the farming areas, where agricultural land uses have greatly intensified in recent years, a subsequent destruction of fencerow cover and other suitable living space has greatly reduced the number of sharp-tailed grouse. Under ideal conditions, sharp-tailed grouse, are more abundant on upland mixed prairie types and less abundant in sagebrush-saltbush types on the plains.

Sharp-tailed grouse are non-migratory birds. Both the male and female birds commonly remain in the same general areas throughout the year. Daily movements range from 0.5 to 5 miles while annual movements range from 2 to 10 miles.

### Habitat

Habitat for sharp-tailed grouse varies within its range. Habitat requirements change due to food, water, rest, and social interactions during various seasonal activities of the birds. In addition, suitable habitat must furnish the minimum cover required for nesting, brooding, loafing, and roosting as well as escape cover within the range of feeding areas. If these conditions are

provided, good populations of sharp-tailed grouse can exist with intensive cultivation and livestock grazing, even though these same operations have decreased the availability of suitable habitat in many areas.

Within the mixed prairie grasslands, sharp-tails use a variety of plant communities to meet their various needs. Some plant indicators of suitable habitat are needle-and-thread, little bluestem, big bluestem, bluebunch wheatgrass, prairie cordgrass, slender wheatgrass, rose, western snowberry, hawthorn, common chokecherry, juniper, and buffaloberry.

Nesting occurs on the uplands in dense stands of tall grass left from the previous growing season. This provides for protection against predators and adequate shelter while the hen is on the nest. If the grass cover is not available, the hen will seek out adjacent brushy coulees (Nielson 1978). Important habitats include grassland, grassland shrub, riparian, woodland, and agricultural types.

Females nest and raise their broods in grassy uplands normally within one mile of mating grounds. All nests are found within two miles of mating grounds. Tall residual cover is vital to the successful reproduction of sharp-tails. Brood rearing occurs in the same grassland area as nesting and, as long as cover is sufficient, grouse will remain in grassy uplands. If cover conditions are poor, woody draws or upland shrubs associated with the grassland-shrub type are used to rear the brood.

During the winter, woody draws and woodlands containing buffaloberry, snowberry, juniper, and wild rose are used extensively for food and cover. If snow is not available for burrowing during severe winters, shrubby vegetation must be available for thermal cover. Studies show that grouse may move some distance to find these shrubs. Other seasonal food habits are: spring-grasses, forbs and cultivated grains; summer-insects, succulent leaves, dry seeds and fruits; fall-grasses, seeds, cultivated grains, and fruits of various trees and shrubs. Important food plants include alfalfa, clover, common chokecherry, common dandelion, pussytoes and serviceberry.

### **Ring-necked Pheasants**

Pheasants are not native to the United States, but are the most successful exotic game bird introduced into North America. Ring-necked pheasants were introduced into Montana before 1895 (Knight 1997).

#### Distribution

Pheasants are present along the Missouri River bottom and along drainages where brushy vegetation and croplands are interspersed. Their habitat is closely tied to cereal croplands and brush vegetation. Much of the pheasant habitat along the Missouri River has been inundated by water fluctuation in Fort Peck Reservoir.

In the spring and summer, green grasses and forbs provide food for adult birds. Chicks eat insects during their first four to six weeks and then switch to vegetation. Small grains and weed seeds are utilized during the fall and winter.

### Brood Habitat

The habitat needed for brooding and nesting is similar. Brood habitat must provide abundant insect food because insects are the major food source for pheasants their first three weeks. Plant material becomes progressively more important after the first three weeks. Chick mortality is often high (30 to 50%). The mortality rate tends to increase if a chick's diet contains a lower percentage of insects (Knight 1997).

### Winter Habitat

In late fall and winter, pheasants often concentrate in areas of extensive loafing and roosting cover, in close proximity to a good food source. At this time of year, wooded areas or other areas are sought out to provide protection from snow, bitter cold, and high winds (Knight 1997).

### **Gray Partridge**

The gray or Hungarian partridge, commonly referred to as the hun, is an upland game bird introduced into Montana. Since its introduction in the early 1900s, the gray partridge has filled diverse habitats within the prairie region of the state, where it is now one of the leading game birds. It is most abundant in the northcentral and northeastern counties of the state (Mackie, et al.).

Gray partridge occur throughout the Monument area and are associated with most vegetation types and agricultural lands. As with most upland game birds, climate and vegetative cover are the two most important factors limiting the natural spread and abundance of the partridge. Conditions for a flourishing population are a cool, moderately dry climate and a mix of clover and food associated with cultivated and non-cultivated land.

Partridge populations have responded favorably to the increase in grain production in the state the past 30 years, and waste grain is one of their staple fall and winter foods. Areas of permanent cover such as was provided by the Soil Bank program of the late 1950s and early 1960s are of great benefit to the gray partridge. Such areas provide an abundance of weed seeds and insects, favorite summer foods, as well as excellent nesting cover.

### **Merriam's Turkey**

The Merriam's turkey is Montana's newest and largest upland game bird. A native of the pine-oak woodlands of Colorado, New Mexico, and Arizona, it was first introduced into central Montana in 1954 from birds obtained in Colorado. Wild turkeys have been hunted in Montana since 1958 with the hunter harvest varying from about 90 to nearly 1,000 birds a year (Mackie, et al.).

Merriam's turkey habitat in Montana is generally restricted to open ponderosa pine woodlands in rugged terrain. Turkeys have been most successful in woodlands where about one-half of the

vegetative cover consists of ponderosa pine with the remainder grasses, deciduous trees, and shrubs in scattered openings and drainage ways throughout the woodland (Mackie, et al.).

In summer, grasslands receive a great deal of use by turkeys. During winter, turkeys move into lower drainages that are occupied by deciduous trees and shrubs. Properly distributed small openings and a mosaic of vegetative types that maximize the edge effect are essential elements of good turkey habitat (Mackie, et al.).

Fifteen turkeys were introduced in the breaks in 1957 and in the Snowy and Moccasin Mountains in the late 1950s and early 1960s. A small number of turkeys still occur in the breaks along the river and south of the river. The turkeys are not widespread, apparently because of a lack of mast feed. Current known locations are in river bottoms and agricultural areas.

## **Migratory Birds**

### **Mourning Dove**

Mourning doves are abundant within the Monument area, occurring primarily in riparian and agricultural areas. Although little hunting occurs for doves, huntable populations are present.

### **Great Blue Heron**

The Great Blue Heron is a majestic wading bird from North America. The largest of the American herons, it lives in swamps, marshes, shores, and tide flats. The Great Blue Heron flies with slow wing beats. It is about 4 feet (1.3 meters) tall and has a wingspan of up to 6 feet (1.8 meters).

The Great Blue Heron eats fish, lizards, frogs, crawfish, rodents, and insects. It hunts in shallow water, usually impaling the prey on its long, sharp bill. It then tosses the dead prey into the air, and catches it with its mouth. The Great Blue Heron's nest is a platform of twigs and sticks that is built in trees, on cliffs, or on the ground. These birds nest in colonies called rookeries. Females lay three to seven pale green eggs in each clutch.

Historical data cites there are at least two rookeries on the Upper Missouri River within the Monument.

## **Fishes**

Forty-eight species of fish reside in Missouri River and its tributaries within the Monument. The pallid sturgeon is endangered and five other species are considered to be special status species: blue sucker, paddlefish, sauger, sicklefin chub, and sturgeon chub.

The most popular fish in the Monument from the standpoint of the recreational fishermen are the sauger and paddlefish. Walleye, channel catfish, and shovelnose sturgeon are also highly desired by fishermen. Of the 48 different species of fish, 32 are native to the river and 16 have been introduced to the system over the years. Fisheries habitat on the Missouri River within the

Monument has changed dramatically over the past 50 to 100 years with the advent of dams and subsequent flood control and the gradual reduction of cottonwoods and other deciduous trees. This can be evidenced by the high number of threatened and endangered and special status fish species in the relatively short section of river (U.S. Department of the Interior 2002).

## **Herptofauna**

Reptiles and amphibians (collectively referred to as “herptiles” or “herptofauna”) are sensitive to habitat conditions and changes, as well as changes in wildlife community composition and abundance. Furthermore, they constitute a significant portion of the environment’s biomass and are critical components of the food web (Maxell 2000, Koch and Peterson 1995). Amphibians play important ecological roles in transferring energy up the food chain and shaping terrestrial and aquatic communities (Maxell 2000).

Reptiles and amphibians serve as valuable bioindicators of an ecosystem’s health. Because of amphibian’s unique life history and developmental stages, they may be sensitive to environmental changes. Amphibian larvae may be sensitive to contaminants, and adults may bioaccumulate toxic pollutants from insect prey (Koch and Peterson 1995). Some amphibian populations in Montana have recently undergone, or are currently undergoing declines and extirpations (Carey 1993, Reichel and Flath 1995). Direct and indirect impacts from a variety of human activities may affect the viability of reptile and amphibian populations in Montana (Joslin and Youmans 1999).

The tiger salamander is the only salamander occurring in the Monument. The woodhouse toad, western chorus frog, and the northern leopard frog all occur in the area. Of concern are the northern leopard frog populations, which appear to be in a sharp decline. Spiny soft-shell and snapping turtles occur in the Monument and are listed as sensitive species. Recent interest has been shown in the spiny soft-shell turtles on the Upper Missouri River, because this population is a disjunctive population separate from the soft-shell on the Yellowstone and Lower Missouri Rivers. There is concern that concentration of livestock in soft-shell turtle nesting areas may impact nesting success. Snakes found in the area include the western rattlesnake, racer, bull snake, and two species of garter snake. Two additional snake species are hypothetical to the area, the milk snake and the Western hognose snake. The short-horned lizard is also known to be present in the Monument (U.S. Department of the Interior 2002).

## **Special Status Species**

Special status species include sensitive, State-listed, proposed, listed, and candidate species.

BLM sensitive species are those designated as sensitive by a State Director, usually in cooperation with the State agency responsible for managing the species and State natural heritage programs. Sensitive species are those species that: (1) could become endangered or extirpated from a State, or within a significant portion of its distribution; (2) are under status review by the USFWS; (3) are undergoing significant current or predicted downward trends in habitat capability that would reduce a species’ existing distribution; (4) are undergoing significant current or predicted downward trends in population or density such that Federal

listed, proposed, candidate, or State-listed status may become necessary; (5) typically have small and widely dispersed populations; (6) inhabit ecological refugia or other specialized or unique habitats; or (7) are State-listed but which may be better conserved through application of BLM sensitive species status. Sensitive species in the resource area include burrowing owl, canvasback duck, ferruginous hawk, hairy woodpecker, loggerhead shrike, long-billed curlew, northern goshawk, peregrine falcon, sage grouse (pending), Swainson's hawk, Merriam's shrew, Preble's shrew, Townsend's big-eared bat, blue sucker, paddlefish, sicklefin chub, sturgeon chub, snapping turtle, and spiny soft-shell turtle.

State-listed species of special concern are listed by a State in a category implying, but not limited to, potential endangerment or extinction and listing is either by legislation or regulation. The sauger is a State-listed species of special concern. There are other State-listed species, but they are also covered by Federal special status and defined as such.

Proposed species are species that have been officially proposed for listing as threatened or endangered by the Secretary of the Interior and a proposed rule has been published in the *Federal Register*. The mountain plover is the only proposed species found in the Monument area.

Listed species are listed as threatened or endangered by the Secretary of the Interior under the provisions of the Endangered Species Act and a final rule for the listing has been published in the *Federal Register*. The bald eagle is listed as threatened and the pallid sturgeon is listed as endangered.

Candidate species are designated as candidates for listing as threatened or endangered by the USFWS and have been published in the *Federal Register*. The black-tailed prairie dog is a candidate species that was warranted, but precluded from listing.

## **BLM Sensitive Species**

### **Peregrine Falcon**

The peregrine falcon is uniquely dependent on cliff/rock habitat for breeding. Dramatic population declines occurred from the 1950s through the 1970s, due to pesticide accumulation and eggshell thinning. The species has increased in recent decades as pesticide levels have decreased, and as reintroduction programs have placed birds back into suitable habitats. The species was delisted from the list of threatened/endangered species in 1999 (BLM 2002a).

The Missouri River corridor has excellent potential to support breeding pairs of peregrine falcons and any cliff nesting site along the river corridor has potential to be a peregrine aerie. Several adult peregrines have been seen near the river in the last few years, but no breeding pairs have been observed. Approximately 24 young peregrines have been released at a hack site near Stafford Ferry since 1993.

Peregrine falcons prefer large cliffs for nesting, in association with a wide variety of coniferous forest types. They prefer riparian habitats or other habitats with concentrated numbers of

medium-sized avian prey for feeding. The nest site itself may be selected based on prey abundance in nearby habitats, and is often situated near or overlooking water. Isolation from human activities is needed to avoid nest disturbance (USFWS 1977). Too much disturbance during the nesting season can cause nest abandonment.

### **Blue Sucker**

In 1989, the American Fisheries Society added the blue sucker to its list of rare North American fishes rated as special concern (Williams, et al. 1989). In 1994, the blue sucker was listed by the USFWS as a Category 2 species. In 1996, it was upgraded by the State of Montana as a species of special concern class C to class B (Hunter 1997). Montana populations appear to be stable and fairly abundant with a healthy size structure; however, special recognition is warranted because this species may be susceptible to population declines due to its unique biological characteristics (longevity, low recruitment, migratory nature, and reliance on high flows in tributary streams for spawning). Montana has some of the finest habitat for blue suckers found in their range and losses of the Montana populations would be significant to the overall gene pool.

#### Distribution

In Montana, the blue sucker is found in the Missouri as far upriver as Morony Dam near Great Falls, and in the Yellowstone upriver of Forsyth. Blue suckers have been found in many of the major tributary streams during their spawning season. Very few blue sucker have been sampled in Fort Peck Reservoir indicating their avoidance of lake environments.

#### Life History/Ecology

The blue sucker is adapted for and prefers life in swift current areas of large rivers, feeding on insects in cobble areas (Moss, et al. 1983). In the spring, blue suckers migrate upriver and congregate in fast rocky areas to spawn. Large numbers have been observed migrating up tributary streams to spawn. Blue suckers can live longer than 17 years. Berg (1981) reported that 93% of sampled fish in the upper Missouri were 9 to 14 years old.

Reproductive success may be a problem for this habitat-specific species. Very few young-of-year blue suckers have been collected while sampling with a variety of methods. Moreover, the populations are dominated by older fish indicative of minimal recruitment.

Blue sucker data records are sparse since most information collected on blue suckers is by-catch data collected in the course of targeting other species. Moreover, because of the blue suckers preference for main channel swift water habitats, they are difficult to sample and consequently have not been sampled in large numbers. Blue sucker sampled in Montana are typically older and large fish with lengths of 60 to 75 centimeters and 3 to 5 kilograms.

### Threats

Present information describes the species as widespread throughout the USA and in Montana. No known blue sucker populations have been extirpated. However, where extensive riverine losses have occurred due to impoundments, major population losses have occurred and blue sucker populations have been fragmented. In Montana, the blue sucker is present in most places that have available habitat.

### **Paddlefish**

Paddlefish, a game fish, is a long-lived, low reproduction, monogeneric species found in the upper Missouri River. Because of its biological vulnerability, it was listed as sensitive on the original list in 1979. Paddlefish are more commonly found seasonally in the Upper Missouri River during the spawning season (May-July). Paddlefish once migrated up the Marias River; however, recent surveys have failed to confirm its presence there. It is believed that past and present operations of Tiber Dam have attributed to the paddlefish abandoning this tributary stream. Studies have shown that it takes a trigger flow of 14,000 cfs or greater at Virgelle to initiate the paddlefish spawning migration. Paddlefish ascend the Missouri River upstream to the Marias confluence, typically in June. Evidence of spawning has been documented as far upriver as Coal Banks, although the bulk of spawning probably occurs downriver of Cow Creek. The paddlefish population in the Upper Missouri River appears to be stable.

### **Sicklefin Chub**

The sicklefin chub is presently listed as a species of special concern, class B, by the State of Montana (Hunter 1994). Despite a petition in 1994 to list the species as federally endangered, it is currently listed as a Category 1 species, meaning that there are sufficient data available to support a listing proposal (USFWS 1994). Following the proposal to list the sicklefin chub as endangered, MFWP conducted a population survey in the Missouri River above Fort Peck Reservoir (Grisak 1996) and continues to collect data on the population in the lower Missouri River (Liebelt 1996) in an effort to gain more knowledge of the species.

### Distribution

The first observation of sicklefin chub in Montana was in 1979 in the middle Missouri River upstream of Fort Peck Reservoir (Gould 1981; Gardner and Berg 1982). Until this time they were unknown to exist in the state, most likely because of the lack of sampling effort in eastern Montana. At present, the distribution of sicklefin chub in Montana includes the middle Missouri River from Cow Island downstream to the headwaters of Fort Peck Reservoir (Grisak 1996), the lower Missouri River from the mouth of Redwater River to the Yellowstone River confluence (Liebelt 1996).

### Life History/Ecology

Population characteristics of this species are not well known, but it generally does not reach high densities like other chub species. In 1994 and 1995, Grisak (1996) reported capturing a total of 121 and 123 sicklefin chubs while sampling in the middle Missouri River for three months each year.

The species reaches a maximum age of four years and generally becomes sexually mature at the age of two. Spawning occurs in main channel areas of large, turbid rivers which they inhabit. The spawning period is in the summer months and probably occurs over a wide time span, similar to other big river species. Young-of-year sicklefin chub have never been collected and early life history remains a mystery. Although the species has been sampled from shallow water and rocky substrate, there seems to be a general preference for deeper water and sandy substrate. Unlike the sturgeon chub, all of the Montana captures have been only from the Missouri and Yellowstone Rivers indicating a strong preference for large, turbid rivers. Although sympatric, there is no information that suggests this species hybridizes with the other member of its genus, the sturgeon chub.

### Threats

The major threat to the sicklefin chub is thought to be habitat alteration by dam operations, irrigation operations, and development. The pools created behind dams have inundated riverine habitats and replaced the river with lake conditions, which is probably unsuitable habitat for chubs. Dams also may create unsuitable habitat for chubs in downstream waters by reducing turbidities and/or altering temperature and flow regimes. Fortunately for the species, it appears unlikely that any new dam will be built on the Yellowstone or Missouri Rivers in Montana in the foreseeable future; however, water regulation at Fort Peck Dam and several other tributary dams continues to limit the distribution and abundance of chub populations in Montana.

### **Sturgeon Chub**

The sturgeon chub is widespread and commonly found in eastern Montana. The sturgeon chub is classified as a Montana species of special concern (Class B) because at one time it was perceived to have limited numbers and/or habitats (Hunter 1994). More recent collections have found this species is distributed over some 650 kilometers of the Missouri, Yellowstone and Powder Rivers in Montana, and in greater numbers than previously reported. This wide range protects the species from a potential catastrophic event that could eliminate it from the State. For these reasons, sturgeon chub appear to be relatively secure in Montana.

### Distribution

The sturgeon chub is indigenous to the Missouri-Mississippi River basins from Montana to Louisiana (Lee, et al. 1980; Werdon 1993). Historically, sturgeon chub have been collected in small numbers from only a few locations in Montana, so the MFWP designated it a state species of special concern over two decades ago (Holton 1980). More recently, Werdon (1993) reported the sturgeon chub was in possible danger of extinction over much of its former range, including all relevant Montana waters except the Powder River. However, recent collections of this species show it is more widespread and abundant than previously understood.

During the period 1990-1995, collections verified the persistence of sturgeon chub in much of their previously known range and established major range extensions including mid-Missouri River (1994 MSU collections by Gardner and Grisak).

### Life History/Ecology

The biology of sturgeon chub is not well known. It apparently spawns from June through July (Lee, et al. 1980; Stewart 1981; Werdon 1992; Gould 1994). Ripe fish have been found in waters of about 18°-25° C (Cross 1967; Werdon 1992; Gould 1994). Sexual maturity is obtained by age two at sizes of about 76 millimeters total length (Stewart 1981; Werdon 1992). Average lengths at ages one through three were calculated to be 48, 69 and 80 millimeters respectively (Werdon 1992). Apparently, few fish reach age four (Stewart 1981).

Sturgeon chub are highly adapted to life in turbid waters. They have small eyes and many external papillae on their bodies and fins, probably to aid in locating food (Cross 1967; Pflieger 1975). Chub are most closely associated with sites having moderate currents and depths and sand or rock substrates (Baxter and Simon 1970; Brown 1976; Lee, et al. 1980).

### Populations

Sturgeon chub have been classified as uncommon or rare in Montana because (until recently) they were collected infrequently and then only in small numbers (Brown 1976; Elser, et al. 1977; Elser, et al. 1980; Holton 1980; Werdon 1993). Sturgeon chub are reported as being common in portions of the middle Missouri River (Gardner 1995). These recent collections of relatively high numbers of sturgeon chub have shown them to be more numerous at some sites in Montana than previously believed. It seems highly likely that additional sites with relatively high numbers of specimens will be discovered in the next few years with the increased collecting efforts being devoted to this species and the use of trawling as a new collection technique.

### Threats

The major threat to the sturgeon chub is thought to be habitat alteration by dam operations, irrigation operations, and development. Chubs need riffles and runs in turbid shallow waters or deeper running waters. The pools created behind dams have inundated riverine habitats and replaced the river with lake conditions, which is probably unsuitable habitat for chubs. Dams also may create unsuitable habitat for chubs in downstream waters by reducing turbidities and/or altering temperature and flow regimes. Fortunately for this species, it appears unlikely that any new dam will be built on the Powder, Yellowstone or Missouri Rivers in Montana in the foreseeable future. However, water regulation at Fort Peck Dam and several other tributary dams continues to limit the distribution and abundance of chub populations in Montana.

Low stream flows probably have eliminated some peripheral sturgeon chub populations in smaller streams such as the lower Teton, Milk and Tongue Rivers, but dewatering poses little threat to the core populations of chubs in the Missouri and Yellowstone Rivers. This species has persisted in the Powder, Yellowstone and Missouri Rivers during the recent years of drought in Montana. Also, instream flow reservations provide some protection from extreme dewatering in the core habitats of chubs.

Two isolated tributaries of the Missouri River were found to be occupied by minnows during the field season of 2001. Minnows from Dog Creek, an intermittent stream on the PN allotment,

were collected in the spring and sent in for positive identification (U.S. Department of the Interior 2002).

## **State-Listed Species of Special Concern**

### **Sauger**

The sauger is a game fish recently added to the Montana species of special concern list in June 2000 because of the recent widespread declines in populations throughout Montana. This designation recognizes sauger are more vulnerable to relatively minor disturbances to its habitat and deserves careful monitoring of its status. A severe decline in sauger numbers was first noticed in 1989. Populations have remained very low, especially in the reach between Great Falls and the Judith River confluence. Sauger fingerlings depend on normal summer flows for maintaining adequate nursery habitat in side channels and backwater areas. A combination of drought years, flow control from the upstream dams, and lack of woody cover in the river have made for poor conditions for the survival of young sauger (U.S. Department of the Interior 2002).

## **Threatened, Endangered, Candidate, and Proposed Species**

### **Bald Eagle (Threatened Species)**

#### Status and Distribution

In 1978, the USFWS designated the bald eagle an endangered species. The bald eagle was reclassified as a threatened species in 1995. On July 6, 1999, the USFWS proposed to remove the bald eagle from the list of threatened and endangered species. Bald eagles range throughout the western United States and Canada. Montana's bald eagle nesting population is one of the most productive in the United States (BOR 1994).

#### Life History and Habitat Requirements

Nest building, courtship and egg-laying usually begin through the end of May. During egg laying and incubation, eagles are most vulnerable to disturbance. Human disturbances during this time may cause birds to temporarily leave the nest and allow eggs to cool, or to desert nests altogether. After the eggs have hatched, adult eagles are less likely to abandon nest areas. Hatching and rearing of young generally takes place from early May to mid-August. Fledging generally occurs from mid-June through mid-August. After fledging, nesting bald eagles are the least sensitive to human activities (BOR 1994).

Nests are generally located in forest stands larger than three acres with a moderately open canopy. Nest trees are predominantly live ponderosa pine, Douglas-fir, or cottonwood; however, snags also may be used (Magaddino 1989). Nests are generally located within 1.6 kilometers (one mile) of bodies of water that are generally at least 32 hectares (80 acres) in size. Territories and nests are usually used repeatedly, some for over 80 years (Magaddino 1989).

Eagles feed on a variety of items with primary prey consisting of waterfowl and fish. Eagles also feed on carrion and small mammals including jackrabbits (BLM 1986a).

Wintering habitat includes perching and roosting sites located near open water or in areas with ample carrion (e.g., big game winter range) and are not as sensitive to human disturbance as nest sites; however, continual disturbance in wintering areas may result in displacement. In Montana, wintering eagles are associated with unfrozen portions of river, along with upland areas where they feed on ungulate carrion, game birds, and lagomorphs (BOR 1994).

Like nests, roosts and perch sites may be used over many years. These sites usually consist of large trees with horizontal branches. Perches provide good views, usually near feeding areas, and may be occupied by one to several hundred eagles. Roosts provide thermal protection and may be occupied by several hundred eagles. Roosts may be several miles from feeding areas (Magaddino 1989). No large communal roosts have been discovered in Montana (BOR 1994).

### Reasons for Decline

Declines in bald eagle populations have been linked to poisoning, human disturbance, loss of nest trees, shooting, and the pesticide DDT. DDT caused poor reproduction and diseases in bald eagle populations. Since 1978, bald eagle populations have increased (BLM 1986a).

### Occurrence in the Monument Area

Two known active bald eagle nests occur in the Monument. The Evans Bend nest site is located approximately 11 kilometers (7 miles) downstream of Fort Benton, and the Little Sandy nest site is located approximately 5 kilometers (3 miles) downstream of Coal Banks (BLM 1986a). Both nest sites have fledged young in recent years. Suitable habitat may exist to support additional bald eagle nests on the river. In addition to the active nest territory, eagles are known to winter in the Monument area, feeding primarily on fish and waterfowl.

## **Pallid Sturgeon (Endangered Species)**

### Status and Distribution

The pallid sturgeon was listed by the USFWS as an endangered species in 1990. Its historic range included the Missouri River, the middle and lower reaches of the Mississippi River, and the lower reaches of the Yellowstone, Platte, and Kansas Rivers (Aderhold 1996). The current distribution of the pallid sturgeon in Montana includes the Missouri River between the mouth of the Marias River and Fort Peck Reservoir, between Fort Peck Dam and the North Dakota border, and in the 112 kilometers of the Yellowstone River below the mouth of the Powder River (Aderhold 1996, Holton and Johnson 1996). The areas of highest use appear to be, in Montana, the Yellowstone River below the intake diversion dam, and in North Dakota, the Missouri River from the confluence with the Yellowstone downstream to the headwaters of Lake Sacacawea (Gardner 2002, Aderhold 1996, Holton and Johnson 1996). Populations in Montana are comprised entirely of old, large fish, as there is no evidence of successful reproduction in at least 25 years (Gardner 2002). The Upper Missouri River population is thought to be comprised of

only 50 adult fish, and a small number of young hatchery-reared individuals (Gardner 2002). Information is not available to indicate distribution in Arrow Creek.

### Life History and Habitat Requirements

The preferred habitat of the pallid sturgeon is the bottom of large, swift, turbid, relatively warm, free-flowing rivers (USFWS 1993a; Aderhold 1996). Studies on microhabitat selection in Montana found that the fish are most frequently associated with water velocity ranging from 40 to 90 cm/x (USFWS 1993b). Turbidity levels where pallid sturgeon have been found in South Dakota range from 31.3 Nephilometric turbidity units (NTUs) to 137.6 NTU (USFWS 1993b). In Montana, pallid sturgeon were captured from depths that ranged from 1.2 to 3.7 meters during summer, but occurred in deeper water during winter (USFWS 1993b). Pallid sturgeon are most frequently captured over sand bottom in the Missouri and Mississippi Rivers, and have been caught over gravel and rock substrate in the Yellowstone River (USFWS 1993a). This species inhabits areas where water temperatures range from 0° to 30° C (USFWS 1993a).

Pallid sturgeon are primarily piscivorous, and likely consume large quantities of aquatic insect larvae, particularly early in life (USFWS 1993a). Little is known about the reproduction or spawning activities of pallid sturgeon. Basic parameters such as spawning locations, substrate preference, water temperature, and time of year have been poorly documented (USFWS 1993a). According to the Montana Natural Heritage Program, spawning in Montana is thought to occur between June 1 and mid-August (MNHP 2002).

### Reasons for Decline

Pallid sturgeon were listed as federally endangered in 1990. This species has also been listed as a Montana species of special concern since the list was first started in 1979. Some primary reasons for the species decline are destroyed or altered spawning areas, reduced food sources, or ability to obtain food (BLM 1997a).

Man's alteration of large river systems is believed to be the primary cause of the pallid sturgeon's decline. Most of the mainstream Missouri has been dammed, canalized, and diked, and many of the braided channels, sandbars, and backwaters are gone. Deposition of woody debris, organic material, and inorganic sediments has been curtailed. As a result, habitat diversity and productivity have been severely impaired. It is believed that construction and operation of Canyon Ferry, Tiber, and Fort Peck dams/reservoirs have altered habitat and fragmented pallid sturgeon populations to the point that they are now threatened with extinction. Pallid sturgeon recovery is in its initial stages and consists of protection of the gene pool by stocking hatchery-reared fish and re-creating the important spring pulse of the Marias River, an important tributary. Many of these fish still reach sexual maturity, but no evidence of successful reproduction has been documented since monitoring of the pallid sturgeon began in 1990 (USFWS 1993a).

The immediate goal for this fish is to prevent extinction by establishing three captive brood stock populations in separate hatcheries. The long-term objective is downlisting and eventual delisting through protection and habitat restoration in six recovery areas, two of which are in Montana: the

Missouri River above Fort Peck Reservoir, and the lower reach of the Yellowstone and the Missouri River below Fort Peck Dam.

The knowledge base regarding reproduction or spawning activities of pallid sturgeon has rapidly improved during the recent past. Even basic parameters such as the microhabitat characteristics of spawning locations, substrate preference, water temperature, or time of year are now beginning to be documented. Spawning occurs in late May or early June in the upper Missouri River, although no spawning beds have been located (Keenlyne and Jenkins 1993).

In the wild, the adhesive eggs are released in deep channels or rapids and are left unattended (Gilbraith, et al. 1988). The larvae are generally pelagic, becoming buoyant or active immediately after hatching (Moyle and Cech 1982). Although the behavior of young pallid sturgeon is poorly understood, recent work by Kynard, et al. (1998) indicates that a downstream migration period for larval pallid sturgeon begins day-0 at hatching and continues up to day-13, with a decline after day-8. With this information it has been possible to use water velocities to roughly estimate that larval pallid sturgeon may drift in the water column for a distance of 40 to over 400 miles (64 to 643 kilometers) (Krentz 1996).

Kallemeyn (1983) reported that pallid sturgeon males reach sexual maturity at 21 to 23 inches (53.3 to 58.4 centimeters); however, size and age of females at sexual maturity were unknown at that time. Conte, et al. (1988) indicated that females of most sturgeon in North America do not mature until at least age seven and typically require several years for eggs to mature between spawnings. Sexual maturity for males was estimated to be 7 to 9 years, with 2 to 3 year intervals between spawning years. Females were estimated to reach sexual maturity in 15 to 20 years, with 3 to 10 year intervals between spawning years (Keenlyne and Jenkins 1993). Time of sexual maturity and the age intervals between spawning years are likely to be influenced by available forage, environmental conditions, and other factors (USFWS 1993a), and thus, likely varies to some degree between river reaches.

While subtle differences likely exist in the spawning requirements of the pallid sturgeon and shovelnose sturgeon, the shovelnose sturgeon is believed to provide a good indication of spawning requirements for pallid sturgeon. The two species are reported to hybridize (Carlson, et al. 1985). Shovelnose sturgeon spawn over substrates of rock, rubble, or gravel in the main channel of the Missouri/Mississippi Rivers and major tributaries, or on wing dams in the main stem of larger rivers (Helms 1974, Elser, et al. 1977, Moos 1978). Spawning was suspected to occur in the relatively swift water in or near the main channel of the unchannelized Missouri River when water temperatures reach 64° to 66° F (18° to 19° C), which can be from late May through June (Moos 1978). Water temperatures and egg quality have been monitored prior to and during spawning, and analysis has shown that the optimum spawning temperature ranged from 60° to 65° F (15.5° to 18.5° C) immediately prior to the spawning (Krentz 1996).

Without increased flows in June and July, and warmer water temperatures during that period, the cues for pallid sturgeon to spawn probably are no longer present under existing main stem dam operations throughout much of the Missouri River. Natural reproduction has failed for at least one generation throughout the pallid sturgeon's range. Artificial propagation is being used to supplement wild populations until suitable spawning conditions in the wild can be restored.

About 7,000 hatchery-reared pallid sturgeons were released into the Mississippi River in 1994. To avoid potential hazards associated with inbreeding, domestication, and exposure to disease, extreme care is being taken in handling cultured stocks.

Attempts to spawn pallid sturgeon taken from the Missouri and Yellowstone Rivers in Montana have not been successful to date. When young are produced, the plan is to release them above Fort Peck Reservoir in a portion of the Missouri River where 27 pallid sturgeons have been recorded since 1990. The pallid sturgeon population in the Missouri River above Fort Peck is estimated at less than 100.

### **Black-tailed Prairie Dog (Candidate Species)**

Historically, black-tailed prairie dogs were one of the most conspicuous and characteristic residents of the short- and mixed-grass prairies of the United States. The French explorers called these squirrel-like animals "little dogs," because of the barking noise they make. Lewis and Clark, while on their famous journey up the Missouri River in 1804, noted that this "wild dog of the prairie ... appears here in infinite numbers." Naturalist Ernest Thompson Seton estimated that about 5 billion black-tailed prairie dogs inhabited North America in the early 1900s. What was most significant was that many prairie dog colonies were quite large and interconnected.

In July 1998, the National Wildlife Federation petitioned the USFWS to list the black-tailed prairie dog as threatened under the Endangered Species Act. In February 2000, the USFWS concluded that this species does warrant listing, but is precluded from being listed due to other higher priority species concerns and resource constraints. The term "warranted but precluded" means that there is enough scientific information available for the Service to list the species, but that there are other species that are in greater jeopardy and in need of the protections of the Endangered Species Act that need to be listed first. Therefore, the species is placed on the candidate list with a priority number, which shows where the species is in relation to other species waiting to be listed. The USFWS will evaluate the status of the species annually to decide when and if the species should be listed.

The U.S. Geological Survey estimated that the black-tailed prairie dog may occupy less than 0.5% of its original range and has experienced an estimated 98% decline in population throughout North America (Mac, et al. 1998). According to information the USFWS has reviewed, the decline of the black-tailed prairie dog may be due to many factors, the most influential and unpredictable of which, at the present time, may be the widespread occurrence of an introduced and completely lethal disease, sylvatic plague. In the past, poisoning and loss of habitat reduced most prairie dog colonies to small, fragmented colonies. Together with plague, continued poisoning, and unregulated shooting, the destruction and adverse modification of habitat may act upon fragmented populations to threaten the continued existence of the species.

Shooting of black-tailed prairie dogs occupying public land other than State school trust lands within the State of Montana was closed during the months of March, April and May, 2002. This seasonal prairie dog shooting closure did not apply to privately owned lands. Landowner permission is required to shoot black-tailed prairie dogs on private land.

### **Mountain Plover (Proposed Species)**

On December 30, 1982, the USFWS designated the mountain plover as a Category 2 candidate species, meaning that more information was necessary to determine whether the species status was declining, stable, or improving (47 FR 58458). In 1990, a status report on the mountain plover indicating that Federal listing may be warranted. The mountain plover was elevated to a Category 1 candidate species in the November 15, 1994, Animal Candidate Notice of Review (59 FR 58982). At that time, Category 1 candidate species were defined as those species for which we had sufficient information on biological vulnerability and threats to support issuance of a proposed rule to list. A proposed rule to list the mountain plover as threatened was published on February 16, 1999 (64 FR 7587). A final listing decision on this species is pending.

The mountain plover is a small bird, about the size of a killdeer and is the sole member of the plover family (Family *Charadriidae*) which inhabits grasslands on a year-long basis. There are no recognized subspecies. It is a compact bird (about 7 to 9 inches long) with light brown above and paler underparts, lacking the contrasting dark breast bands typical of many other plover species. In flight, its underwings are white. Breeding plumage differs only by the addition of a dark line between the bill and eyes contrasting with a pale forehead. The bill is black, the legs are gray to light brown-yellow, feet are dark brown, and claws are black. The sexes are similar in appearance.

The mountain plover is a migratory species of the shortgrass prairie and shrub-steppe ecoregions of the arid West. The universal characteristics of mountain plover habitat on both the breeding and wintering grounds are short vegetation, bare ground, and flat topography. They are found associated with prairie dog towns, plains, alkali flats, agricultural lands, cultivated lands, sod farms, prairie dog towns, and low shrubs at both breeding and wintering locales. Unlike other plovers, they are rarely associated with water.

In Montana, compelling evidence exists that mountain plover are dependent on active prairie dog colonies for nesting (Dinsmore 2000). Mountain plover selectively use black-tailed prairie dog towns for breeding, nesting, and feeding (Knowles, et al. 1982; Knowles and Knowles 1984; Olson 1985; Olson and Edge 1985; Olson-Edge and Edge 1987; Dinsmore 2000; Dinsmore 2001; Knowles and Knowles 2001). Not all prairie dog towns offer suitable habitat for mountain plover, mostly due to topographic incompatibility. Habitats other than prairie dog towns provide nesting, feeding, and breeding habitat for mountain plover in Montana. Knowles and Knowles (1998) demonstrated that barren areas with glacial till, stockwater sites grazed by sheep, cattle and ground squirrels, and dwarf shrub communities associated with silty overflow sites and bentonitic soils all have some levels of documented mountain plover use. Livestock and/or bison (*Bison bison*) grazing on prairie dog towns will increase mountain plover use substantially, according to Knowles and Knowles (2001), who still conclude that “based on historical notes and contemporary observations, viable populations of mountain plover are probably dependent upon extensive areas of black-tailed prairie dog colonies.”

# GEOLOGY

## RESOURCE DESCRIPTION

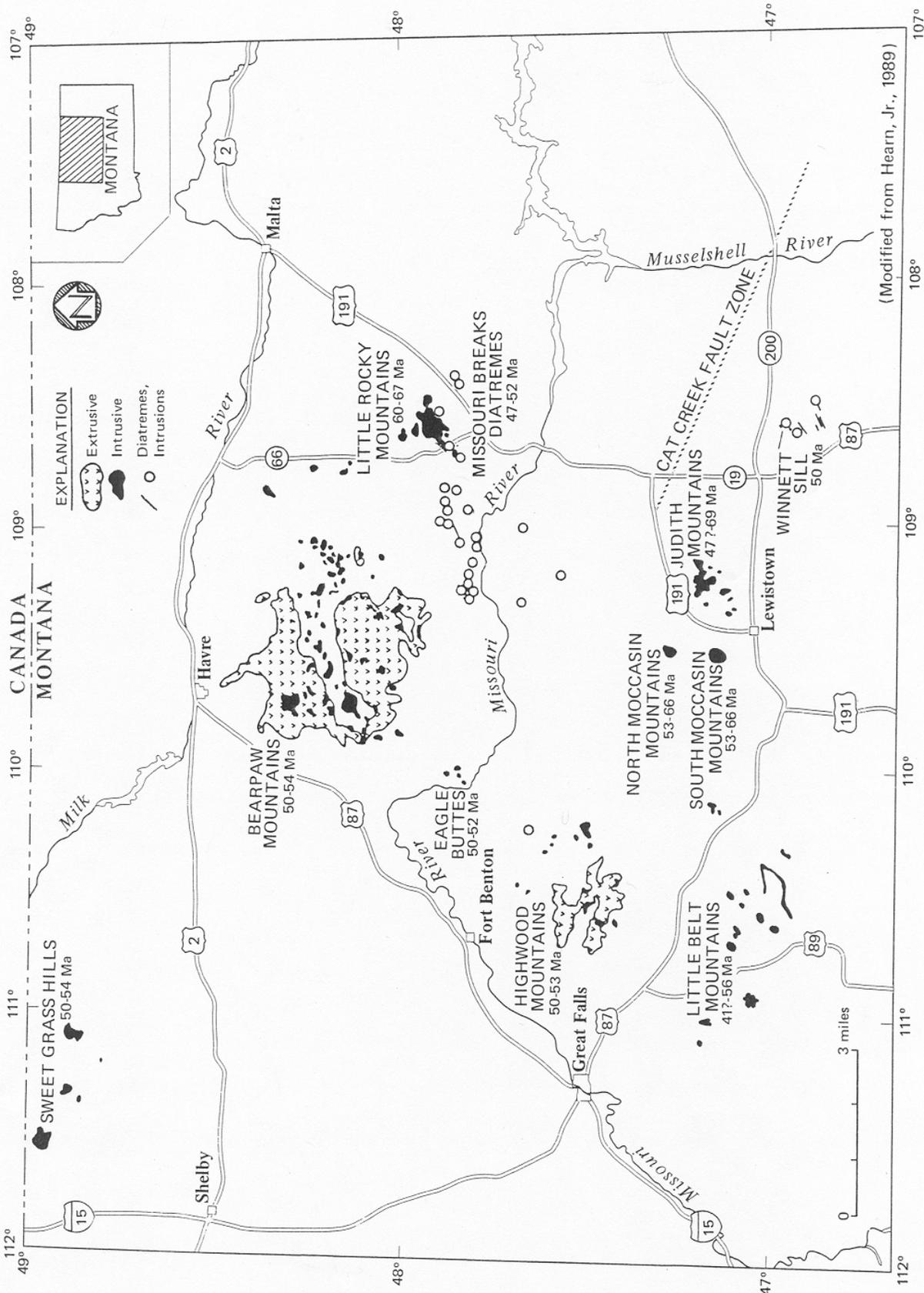
The Monument is a triangular wedge of federal land lying between three island mountain ranges. At the north apex of the triangle is the Bears Paw Mountain Range. On the east side are the Little Rocky Mountains and to the west side are the Highwood Mountains. All of these ranges are places where magma rose up from the mantle penetrating a two-mile thick layer of sedimentary rocks at various times during the Tertiary period. Geology Figure 1 is a map that shows the general area.

Geology Figure 2 shows the sedimentary formations exposed along the Missouri River Channel, which is the central geographic feature of the Monument. The Little Rocky Mountains are made up of plutonic igneous rock types while both the Bears Paw and Highwood ranges resulted in volcanic eruptions forming fine grained rocks near, or on the surface. The Bears Paw Mountains were covered by extensive heavy basalt layers. Over time, these slid away from the uplift deforming the near surface sedimentary rocks as they went. The Bears Paw Mountain Arch is surrounded by a jumble of tilted sections of rocks that are covered with slightly younger volcanics. Between the Highwood and Bears Paw Mountains sedimentary rocks are tilted and shot through by radiating dikes that, when eroded, form spires and walls of dark igneous rock that contrast with the lighter sedimentary layers they intrude. The gravity sliding produced a lot of the thrust faulting that formed the structural traps for natural gas that is discussed in the fluid mineral section of this document.

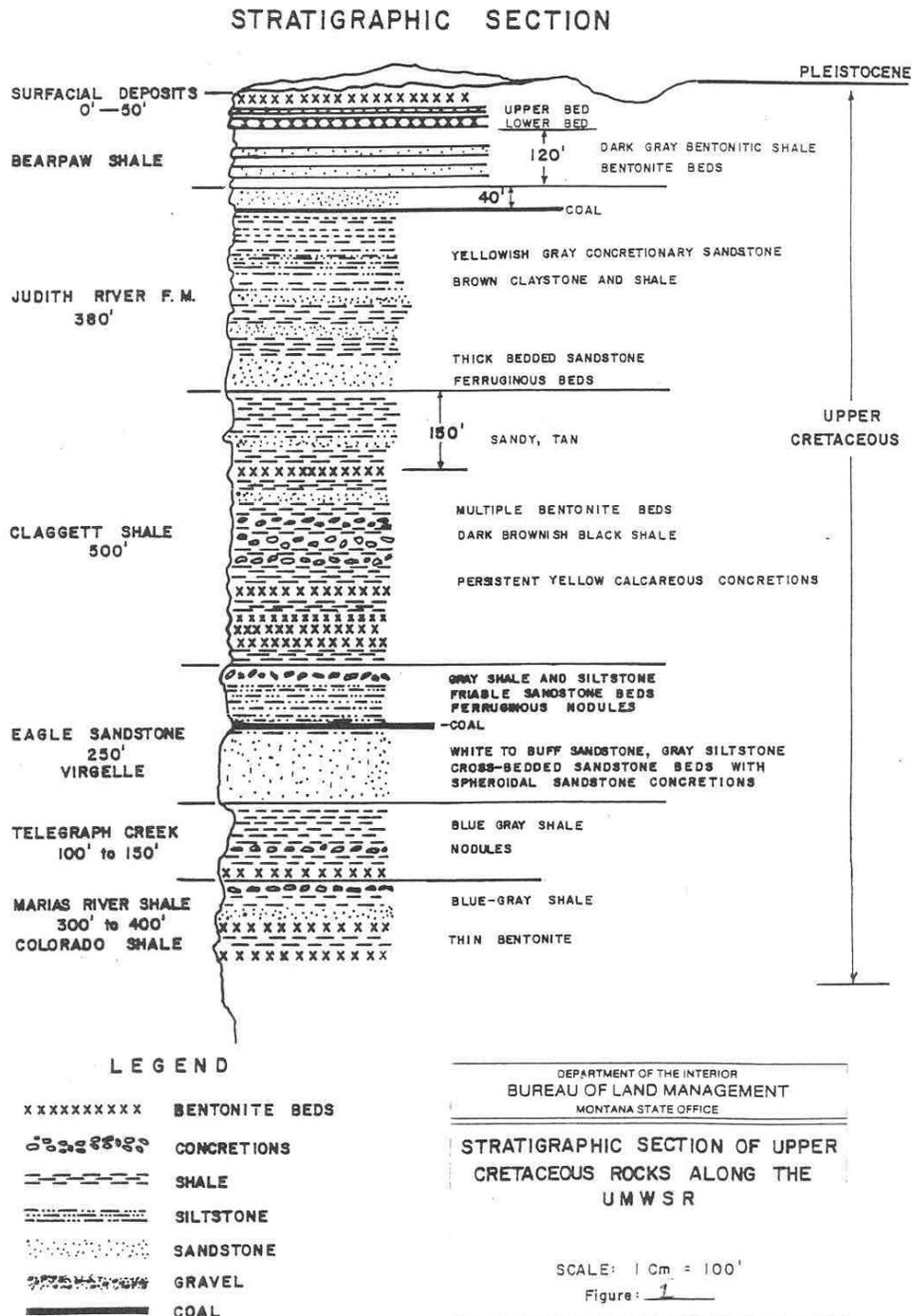
Following the mountain building events, the volcanic cones and much of the sedimentary rocks surrounding the Bears Paw Mountains were stripped away by erosion. Pediment and terrace deposits were formed in the foothills from the eroded material. During the last glacial age (50 thousand to 10 thousand years ago) continental ice sheets descending from the north were deflected east and west by the Bears Paw Mountains. The ice dammed the northward flow of the Missouri River and resulted in the formation of a new channel draining to the east into the Musselshell valley and thence south to the Gulf of Mexico. It is this younger portion of the Missouri River channel that forms the area known as the Missouri breaks.

### Locatable Minerals

Mineralization has been found associated with the veins and fracture zones near the margins of igneous dikes and intrusions. Over the years, the U.S. Geological Survey and the former U.S. Bureau of Mines examined various prospects and reported finding deposits that contain values for copper, lead, zinc, zeolites, uranium, niobium, zirconium, thorium, titanium, sulfur, tantalum, beryllium, lanthium, cerium and vermiculite. These occurrences are estimated to be unrecoverable and marginal in value. Minor amounts of placer gold were discovered in gravel beds of coulees flowing out of the mountain areas. These were soon depleted and abandoned.



Geology Figure 1



Geology Figure 2

Some unique igneous intrusions that are exposed in the Monument are up to a city block in size. The rock type resembles the material associated with the diamond-bearing kimberlite diatremes found in Africa and other places in the world. True kimberlite was found in Phillips County, but no diamonds have been discovered. Diamonds are extremely rare in outcrops of kimberlite. In Africa, they are mined in the ratio of 1 carat (1/5 of a gram) for each ton of gangue. Sixty-three lode claims are located on these features in the Monument (see diatremes on Geology Figure 1). Surface sampling for indicator minerals of potential diamond-bearing zones and geophysical mapping have been conducted at these claims over the years, but no drilling or bulk sampling has been conducted. Recent discovery of diamonds in the Northwest Territory of Canada has increased interest in these deposits; however, any future plans to further explore the potential of these claims would be subject to adjudication of valid existing rights that existed before the Proclamation date. No production of hard rock minerals is presently occurring in the Monument. Geology Table 1 lists unpatented mining claim locations within the Monument.

**Geology Table 1. Unpatented Mining Claims within the Monument**

Location of Claims <sup>1</sup>	Total Claims
<b>Blaine County</b>	
T.24N., R.19E., Sec. 11 (1), 14 (1), 24 (1), 25 (3), 26 (1), 27 (3)	10
T.24N., R.20E., Sec. 19 (12), 20 (3), 21 (4), 26 (3), 30 (2), 35 (1)	25
T.24N., R.21E., Sec. 10 (1), 17 (1), 31 (3), 32 (3), 33 (2)	10
T.24N., R.22E., Sec. 9 (1), 12 (2), 22 (1), 28(1)	5
T.25N., R.21E., Sec. 24 (2), 25 (1)	3
T.25N., R.22E., Sec. 29 (2)	2
<b>Phillips County</b>	
T.24N., R.22E., Sec. 22 (1)	1
T.24N., R.23E., Sec. 5 (6), Sec. 6 (1)	7
Grand Total	63

<sup>1</sup>( ) indicates number of claims per section.

### **Solid Leaseables (Bentonite, Expandable Clay, Coal)**

Three formations are known to carry thick layers of bentonite in the area: the Colorado, Claggett, and Bears Paw shales (see Geology Figure 2). Near the top of the Colorado shale, bentonite has been exposed in the Bears Paw Mountains. The beds were located in the Niobrara formation and ranged upward to 18 inches thick. The younger Claggett shale formation also contains bentonite beds in the lower one-fifth of the formation. Similarly, these have a maximum thickness of 18 inches. The youngest formation, Bears Paw shale, contains bentonite beds in the lower one-third of the 1000-foot section. Exposures of bentonite are found along Sand Creek in Section 5, T.25N., R.17E., and in the Al's Creek area in Section 32, T.26N., R.20E., several beds appear to be at least two feet thick.

No bentonite mining activity is presently occurring in the area. Locally, bentonite has probably been mined to line canals, stock ponds and reservoirs in the area. There are no leases or mining claims for these deposits in the Monument.

Generally, expandable clay was found to occur throughout the area in the Bears Paw shale formation; and ceramic and brick clay in the Judith River formation. The same area as that for bentonite may be considered an area for expandable clay (lightweight aggregate); also, the same area as that for coal (Judith River Formation) may be considered for brick and ceramic clay (see Geology Figure 2).

Coal occurs in the sedimentary rocks of the upper cretaceous eagle, Judith River and Hell Creek formations, and in the Fort Union formation of Tertiary age. The most continuous beds are found in the Fort Union formation which does not exist in the Monument.

During the steamboat era, and later when numerous homesteads were located on these lands, some small underground coal mines were developed to satisfy fuel needs. These were all abandoned by the 1930s and no coal activity is present today. The limited reserves of this area, combined with high transportation costs and abundance of higher BTU content coals in the Powder River Basin, Fort Union Basin and Alberta, Canada, make it appear very unlikely that this area will be of any competitive interest in the future.

### **Saleables (Sand and Gravel and Quarry Rock)**

Supplies of sand and gravel can be found in the area from deposits of water-worked till, in stream gravels and river terraces, and in glacial deposit features, eskers and kames. No active pit or quarry site is currently located on Federal land in the Monument.



# PALEONTOLOGY

## RESOURCE DESCRIPTION

The Cretaceous age sediments exposed along the Missouri River breaks are both marine and terrestrial sediments that contain fossil remains ranging from large vertebrates to extensive shell beds. During the early 19<sup>th</sup> century numerous dinosaur specimens were collected from the area. Several publications on these specimens attest to the importance of the area. Most of the specimens were transported downriver on steamboats and eventually shipped overseas and are now housed in European museums.

In 1984 and 1985, an inventory was conducted on the lands inside the river corridor. The results of that inventory identified several sites where terrestrial bone beds and marine fossil remains occur on Federal land. The area surrounding the river inside the Monument has not been inventoried. These lands have high potential to yield significant finds of both terrestrial and marine fossil assemblages.



# SOIL

## RESOURCE DESCRIPTION

Soils in the Monument generally are well-drained, shallow to moderately deep, with high clay contents. The soils were influenced by two geologic processes: sedimentary associated with the Missouri River, and glaciated deposits. The parent material on the majority of the public land is sedimentary plains that have been eroded by the rerouting of the Missouri River during the last ice age. Deep soils occur as alluvial deposits along drainages. Sloping to very steep slopes dominate the landscape. In the northeast portion of the Monument, glacial remnants are scattered over the land surface. The glaciated plains are a very small component, about 5%, of the three major soils provinces within the Monument. Soil Table 1 describes the significant physiographic provinces. It is further broken out by soil subgroups.

**Soil Table 1. Physiographic Provinces within the Monument**

Province	Soil Subgroup No. and Brief Description
Glaciated Plains and Wet Basins	1. Loamy glacial till soils on upland plains. 2. Dominantly claypan soils on glacial till uplands and local terraces. 7. Potholes and level basins subject to ponding.
Sedimentary Uplands	3. Clayey acid shale uplands. 4. Calcareous or bentonitic shale uplands. 5. Loamy sedimentary uplands. 16. Dissected clay shale upland slopes with forest canopy cover.
Alluvium on Floodplains, Terraces, Fans, and Footslopes	6. Loamy and clayey alluvial soils on floodplains and low terraces. 8. Moderately coarse and coarse textured soils on terraces, fans and footslopes. 9. Medium textured alluvial soils on terraces, fans and footslopes. 10. Clayey textured alluvial soils on terraces, fans and footslopes. 11. Dominantly, well drained, claypan and dense clay soils on terraces, fans and footslopes. 12. Dominantly, moderately well drained, claypan alluvial soils on terraces and fans and footslopes. 13. Very slowly permeable clay alluvial soils of terraces and fans. 14. Very gravelly, extremely gravelly and cobbly alluvial soils on terraces, fans and footslopes. 15. Loamy and clayey alluvial soils on floodplains and along drainages with more than 10% canopy cover of deciduous trees.

Active geologic erosion is observed throughout the Monument. Water erosion hazards are generally rated severe, while wind erosion is considered moderate to severe. The low water permeability and slow water infiltration properties of the predominating clay loams, clays, and silty clays, combined with widespread occurrence of bare ground areas, produce rapid surface runoff. This runoff erodes the shallow and moderately deep soils that overlie the rolling-to-steep terrain.

## Resource Description

The fine-textured soils (high in clay content) are especially susceptible to compaction from livestock trampling. Compaction--especially aggravated by trampling under wet soil conditions that occur during the spring months--results in reduced water infiltration (with less water available for plant growth) and increased surface runoff and associated erosion. (BLM 1979a, 2-3).

# VEGETATION - NATIVE PLANTS

## RESOURCE DESCRIPTION

### Vegetation

Vegetation in the Monument is a mixture of communities from the northern prairies and plains to the badland breaks. Overall, the climate is semiarid continental, often receiving less than 14 inches of precipitation with cool winters and springs and hot summers. Variability in geology, topography, soils, and effective precipitation lead to a complex mosaic of different vegetation communities and transitions between communities. In addition, influences of fire (or lack of fire), animal populations, and management practices have led to varying successional levels within plant communities. Plant species are a mixture of warm and cool season grasses, forbs, and shrubs with conifer and some deciduous trees. Vegetation by ecological site is detailed in Appendix B. Following is a discussion of the general vegetation communities found in the Monument.

### Forest and Woodlands

Four main forest types exist in the Monument: ponderosa pine, Douglas-fir, juniper, and mixed hardwoods.

The ponderosa pine forest exists in scattered pockets throughout the Monument on all aspects and elevations. Its ability to survive in this harsh environment is due, in part, to an aggressive tap root system. These forests are considered more savanna types, rather than open forest, with the break point being sites that are not capable of producing at least 25% canopy coverage.

Douglas-fir is commonly found on the cooler and wetter aspects (northerly and easterly). The Monument area represents some of the driest sites that are still capable of growing Douglas-fir. Trees that do survive are very slow growing and short in comparison to Douglas-fir that occurs in mountainous regions of central Montana.

The juniper forests are found mostly on dry, rocky sites. These stands are not capable of producing 20 cubic feet of wood fiber per year and, therefore, are not typically thought of as coniferous forests by themselves. They commonly occur with and throughout the ponderosa pine and Douglas-fir forests.

The mixed hardwoods, known as riparian forests, are characterized with stands of cottonwoods, aspen, chokecherry and box elder. These forests tend to be along the main river bottoms and wetter drainages feeding into the Missouri River. Disturbance is common in these forests due to a high site index leading to greater growth potential for all plants. The truly undisturbed sites exist mainly on islands that have not experienced recent fire or severe damage from ice drives. Expanded discussion of this vegetation community is in the Vegetation-Riparian section.

## **Rangelands**

### Sagebrush/Grassland

Sagebrush/grassland communities occur throughout the Monument on ridges and slopes. The conspicuous species is Wyoming big sagebrush with wheatgrasses, but also include silver sagebrush, rabbit brush, needle grasses, blue gramma, fringed sagewort and other mixed prairie species. These communities are in various successional stages from influences of wildlife, livestock, fire (or lack of), and human activities. They account for most of the forage resources that wildlife and livestock use in the Monument.

Other adapted shrubland communities occur in areas where particular site characteristics are present. Greasewood communities can be found on some bottomland areas and areas where saline/heavy clay sites prevail. These same communities may also have other drier-site shrubs such as nuttall saltbrush, shad scale, and grasses such as inland salt grass, foxtail and other harsh-site species.

Where soils are of better quality and soil moisture conditions are favorable, woody draw shrubland communities exist. These communities include chokecherry, currant, buffalo berry, and snowberry. These communities are particularly important to wildlife species.

### Grassland Communities

Grassland communities are found on a variety of sites south of the river. Common species include western and thickspike wheatgrass, needle-and-thread, bluebunch wheatgrass, green needle grass, sandberg bluegrass, plains reed grass, inland salt grass, blue grama, prairie junegrass, and threadleaf sedge. Common forbs include American vetch, scarlet globemallow, fringed sagewort, cudweed sagewort, pussytoes, and bastard toadflax. Shrubs include silver sagebrush, big sagebrush, rabbitbrush, and winterfat. Less common plant species include little bluestem, prairie sandreed, nuttall saltbrush, skunkbush sumac and rabbitbrush.

### Non-native Pastures

Non-native perennial pastures are mostly crested wheatgrass communities established on abandoned farm fields or as a range improvement to increase livestock forage. Seeded non-native pastures are commonly established to provide early season forage so grazing could be deferred on native range pasture on private and public land.

### Badlands

Much of the Monument consists of badlands and breaks. The breaks consist of steep, rugged topography interspersed with benches and rolling hills. Badlands support little vegetation because of steep terrain, shale and rock outcroppings, and the abundance of heavy clays. Badlands are known for a wide variety of remarkable geological formations and deeply incised drainages (coulees).

## Crops

Under a special use permit, some farming occurs on acquired public land in the Loma area that is part of an upland bird project. With this exception, no farming occurs on public land within the Monument.

The Conservation Reserve Program (CRP) is a program administered through the U.S. Department of Agricultural to take lands out of production. Except in special circumstances (e.g., drought), the CRP land cannot be used for crops or grazing. These areas are seeded with various blends of perennial species to slow erosion and to provide food and cover for wildlife species. Some land that the public acquired were enrolled in the CRP and remain unused for grazing or haying.

Standards for Rangeland Health, especially Standards 1 and 5, directly correlate to vegetation. A detailed description of the Standards for Rangeland Health is found in Appendix C. A summary of the Standards for Rangeland Health determinations made from 1999 through 2003 on the grazing allotments located within the Monument is found in Appendix D.

## Threatened, Endangered, and Sensitive Plant Species

No populations of federally listed plant species are found in the Monument. The following Vegetation Table 1 lists plant species of concern as designated by the Montana Natural Heritage Program.

**Vegetation Table 1. Montana Natural Heritage Program  
Plant Species of Concern**

<b>Plant</b>	<b>Common Name</b>	<b>Map Quad</b>
Phacelia thermalis	Phacelia	Grand Island
Psoralea hypogaea	scurf-pea	Cow Island Sturgeon Island PN Ranch
Rorippa calycina	yellow cress	Pilot Rock



# VEGETATION - RIPARIAN

## RESOURCE DESCRIPTION

### Wetlands/Riparian Areas

Wetlands are transitional lands between terrestrial and aquatic systems where the water table is usually at or near the surface or land is covered by shallow water. For purposes of this classification, wetlands must have one or more of the following attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is non-soil and is saturated with water or covered by shallow water at sometime during the growing season each year (BLM 1986b).

Riparian areas are those areas within wetlands geographically delineated by distinctive resource values and characteristics that are comprised of aquatic and riparian ecosystems. Riparian areas may be associated with lakes, reservoirs, estuaries, potholes, springs, bogs, wet meadows, and ephemeral, intermittent, or perennial streams.

Species common to this type vary widely from site to site. Vegetation-Riparian Table 1 lists the more common species which occur in riparian areas within the Monument. These areas are found along the Missouri River and its tributaries and other locally wet areas. Approximately 8,000 acres of riparian vegetation are located within the Monument.

Riparian communities along the perennial drainages and larger intermittent streams are often dominated by cottonwood and willow with occasional stands of green ash and boxelder. The understory often consists of woody plants such as chokecherry, buffalo berry, sumac, currant, grasses, and forbs. The higher terraces adjacent to the floodplains are often dominated by silver sage or greasewood with a grass understory.

Most of the wildlife found in the Monument area spends all or part of their life cycle in these riparian areas. Riparian areas also protect the soil from erosion and trap runoff to release later as stream flow. Their importance cannot be over emphasized.

Vegetation within riparian areas is utilized mainly by livestock, mule deer, white-tailed deer, elk, and ring-necked pheasants. This vegetation type is the primary habitat on public land for white-tailed deer, mourning doves, and pheasant due its dense understory. Many non-game birds are present in this type. In fact, a wider diversity of non-game species occurs within this vegetation type than in any other.

The riparian areas on public land in the Monument are generally not meeting BLM's goals of proper functioning condition. Riparian areas along the Missouri River are being impacted by flow regulation from upstream dams and continuous hot season grazing. Riparian areas on the tributaries to the Missouri River are being impacted by irrigation withdrawals and continuous hot season grazing.

Recent studies by the Bureau of Land Management and the U.S. Geological Survey show a severe lack of regeneration of cottonwood, willow, and understory species on the Missouri River. From Coal Banks Landing to Woodhawk Campground, no sapling or pole stage cottonwoods occur on public land bordering the Missouri River except on islands. Research indicates the major factors affecting regeneration are flow manipulation by upstream dams on the Missouri River and continual hot season use by livestock.

Hansen (1989) suggests that one acre of seedling/sapling/pole stage cottonwood trees be present for every acre of mature trees to maintain the current status of mature trees. Less than this one-to-one ratio indicates that if current trends continue, there will be a reduction in the acres of mature cottonwoods in the future. On all land (public, state, private) in the Wild and Scenic stretch of the Missouri River, there are presently 4,450 acres of seedling/sapling/pole cottonwoods and 5,893 acres of mature cottonwoods. On just the public land in this stretch, the ratio of replacement cottonwoods to mature cottonwoods appears to meet the criteria of the one-to-one ratio. However, the reach of the Missouri River from mile 41 to mile 127 has no sapling/pole stage cottonwoods except on islands.

A word of caution: this discussion examines the current status of cottonwoods on the Wild and Scenic stretch of the Missouri River. It does not consider the acres of cottonwoods removed by past practices such as agriculture, intense grazing, or wood cutting. Therefore, the total acres of cottonwoods currently found along the Upper Missouri River represents a fraction of what would be there if these past human-induced disturbances had not occurred. Hansen (1989) estimates that approximately 50% of the acres occupied by cottonwoods at the time of the Lewis and Clark Expedition are now gone.

The construction of dams on the Upper Missouri River has had a dramatic impact on the flow regime of the river and resulted in a reduction in regeneration of woody species, especially cottonwoods and willows. This reduction can be partially mitigated by managing livestock impacts to allow for regeneration. This regeneration occurs on newly exposed, bare alluvial materials. These are the sites where protection from livestock impacts should be reduced if the maintenance of cottonwood forests is a management objective.

Mature stands of cottonwoods also need protection from livestock impacts if the understory is to exhibit a diverse, dense shrub community. Once the shrub understory has been eliminated by intensive livestock grazing, resulting in an understory dominated by introduced herbaceous species, the prospect of the site returning to a shrub-dominated understory is lost. Therefore, protection must be implemented before the site is degraded.

**Vegetation-Riparian Table 1. Common Plant Species in Riparian Areas  
Within the Monument**

<b>Grasses</b>	<b>Forbs</b>	<b>Shrubs</b>	<b>Trees</b>
Alkali sacaton (Sporobolus airoides)	American licorice (Glycyrrhiza lepidota)	Big Sagebrush (Artemisia tridentata)	Boxelder (Acer negundo)
American sloughgrass (Becmannia syzigachne)	Bull thistle (Cirsium vulgare)	Buffaloberry (Shepherdia argentea)	Green ash (Fraxinus pennsylvanica)
Barnyardgrass (Echinochloa crusgalli)	Canada thistle (Cirsium arvense)	Chokecherry (Prunus virginiana)	Narrowleaf cottonwood (Populus angustifolia)
Basin wildrye (Elymus cinereus)	Cinquefoil (Potentilla anserine)	Diamond (Yellow) willow (salix lutea)	Plains cottonwood (Populus deltoids)
Bluejoint reedgrass (Calamagrostis Canadensis)	Cocklebur (Xanthium strumarium)	Golden current (Ribes aureum)	
Canada wildrye (Elymus Canadensis)	Common cattail (Typha latifolia)	Gooseberry (Ribes lacustre)	
Cheatgrass (Bromus tectorum)	Curled dock (Rumex crispus)	Greasewood (Sarcobatus vermiculatus)	
Foxtail barley (Hordeum jubatum)	Curlycup gumweed (Grindelia squarrosa)	Peachleaf willow (Salix amygdaloides)	<b>Grasslike</b>
Green needlegrass (Stipa viridula)	Dandelion (Taraxacum officinale)	Rabbitbrush (Chrysothamnus nauseosus)	Alkali bulrush (Scripus maritimus)
Inland saltgrass (Distichlis stricta)	Fanweed (Thlaspi arvense)	Redosier dogwood (Cornus stolonifera)	Baltic rush (Juncus balticus)
Intermediate wheatgrass (Agropyron intermedium)	Golden pea (Thermopsis rhombifolia)	Rose (Rosa woodsii)	Beaked sedge (Carex rostrata)
Japanese brome (Bromus japonicus)	Horsetail (Equisetum variegatum)	Russian olive (Elaeagnus anfastifolia)	Creeping spikesege (Eleocharis palustris)
June grass (Koeleria cristata)	Lambsquarter (Chenopodium album)	Sandbar willow (Salix exigua)	Hardstem bulrush (Scripus acutus)
Kentucky bluegrass (Poa pratensis)	Leafy spurge (Euphorbia esula)	Silver sagebrush (Artemisia cana)	Nebraska sedge (Carex nebraskensis)
Needle-and-thread (Stipa comata)	Milkweed (Asclepias speciosa)	Skunkbrush sumac (Rhus trilobata)	Three-square bulrush (Scripus pungens)
Nuttall alkaligrass (Puccinellia nuttalliana)	Pepperweed (cardaria draba)	Snowberry (Symphoricarpos occidentalis)	

Resource Description

Grasses	Forbs	Shrubs	Trees
Prairie cordgrass ( <i>Spartina pectinata</i> )	Russian knapweed ( <i>Centaurea repens</i> )		
Quack grass ( <i>Agropyron repens</i> )	Smartweed ( <i>Polygonum amphibium</i> )		
Reed canarygrass ( <i>Phalaris arundinacea</i> )	Spotted knapweed ( <i>Centaurea maculosa</i> )		
Sixweeks fescue ( <i>Festuca octoflora</i> )	White sweetclover ( <i>Melilotus alba</i> )		
Slender wheatgrass ( <i>Agropyron trachycaulum</i> )	Yarrow ( <i>Achillea millefolium</i> )		
Smooth brome ( <i>Bromus inermis</i> )	Yellow sweetclover ( <i>Melilotus officinalis</i> )		
Tufted hairgrass ( <i>Deschampsia caespitosa</i> )			
Western wheatgrass ( <i>Agropyron smithii</i> )			

# **VEGETATION – NOXIOUS and INVASIVE PLANTS**

## **RESOURCE DESCRIPTION**

### **History of Invasion**

The Monument has seen a significant increase in the amount and distribution of noxious weeds and invasive plants along the Missouri River and many of its major tributaries in the past two decades. Noxious and invasive species were absent during upland and riparian inventories conducted in 1975 and 1976 as part of the Wild and Scenic designation of the Missouri River Corridor. In 1983, efforts to find and treat all noxious/invasive plants in the river corridor began, and resulted in the treatment of 20 acres of noxious/invasive plants on public land. Efforts to control noxious weeds along the river corridor continued through the 1980s and 1990s. In spite of budget constraints and inadequate inventories, sites were treated with herbicides, weeds have been hand pulled, prescribed fire has been used to increase the effectiveness of herbicides and enhance the establishment of bio-control agents, which have been released to control a wide variety of weed species.

In 1999 and 2000, the BLM began an effort to survey the river corridor from Coal Banks Landing to the James Kipp Recreation area. In 2002, public land in the river corridor were inventoried from Fort Benton to Coal Banks Landing. The results of this survey are shown below in Vegetation-Noxious and Invasive Plants Table 1. Currently, every river bottom has at least one noxious or invasive plant established. All told, 19 noxious/invasive plant species occupy over 550 acres of public land within the Monument.

### **Distribution of Noxious and Invasive Species**

#### **Upper Missouri Wild and Scenic River Corridor**

Major waterways are a common means of invasive plant distribution with the Upper Missouri River being no exception. Currently, 19 invasive and/or noxious plants are being managed within the river corridor. Of these 19 species, 10 are currently designated as noxious by the State of Montana. The other nine species are included on the BLM nationwide list of invasive plants of concern, with several of these species being designated noxious in nearby states.

River bottoms and cut banks contain the majority of infested acres within the Monument. This is attributed to the many natural disturbances common with river systems such as: flooding, ice jams/scouring, and fluctuating surface water levels. These areas are also well used by livestock, wildlife, and people that can potentially create additional disturbance and/or supply noxious/invasive plant seed from other areas.

**Vegetation–Noxious and Invasive Plants Table 1. Noxious/Invasive Plants on Public land  
In the Wild and Scenic River Corridor (1999-2001)**

Common Name	Scientific Name	Status	BLM Acres Infested
Baby's Breath	<i>Gypsophila paniculata</i>	BLM Invasive	0
Black Henbane	<i>Hysocyamus niger</i>	BLM Invasive	1
Canada Thistle	<i>Cirsium arvense</i>	MT Category 1 Noxious	31*
Common Burdock	<i>Arctium minus</i>	BLM Invasive	Present/No Survey
Dalmatian Toadflax	<i>Linaria dalmatica</i>	MT Category 1 Noxious	1
Field Bindweed	<i>Convolvulus arvensis</i>	MT Category 1 Noxious	Present*
Hoary Cress	<i>Cardaria draba</i>	MT Category 1 Noxious	2
Houndstongue	<i>Cynoglossum officinale</i>	MT Category 1 Noxious	1*
Leafy spurge	<i>Euphorbia esula</i>	MT Category 1 Noxious	215
Musk Thistle	<u><i>Carduus nutans</i></u>	BLM Invasive	1
Perennial Pepperweed	<i>Lepidium latifolium</i>	BLM Invasive	14
Poison Hemlock	<i>Conium maculatum</i>	BLM Invasive	Present*
Purple Loosestrife	<i>Lythrium salicaria</i>	MT Category 2 Noxious	1
Russian knapweed	<u><i>Centaurea repens</i></u>	MT Category 1 Noxious	252
Russian Olive	<i>Elaeagnus angustifolia</i>	BLM Invasive	Present/No Survey
Salt Cedar	<i>Tamarix spp.</i>	MT Category 2 Noxious	1
Scentless Chamomile	<i>Anthemis arvensis</i>	MT Watch List	Present/No Survey
Scotch Thistle	<i>Onopordum acanthium</i>	BLM Invasive	1
Spotted knapweed	<i>Centaurea maculosa</i>	MT Category 1 Noxious	34

\* Incomplete survey.

### **Blaine, Fergus, and Phillips Counties Outside the Wild and Scenic River**

Inventories have not been conducted in areas outside the river corridor on upland sites in Blaine and Fergus Counties. Although documented infestations occur in a few areas, most of the upland areas are relatively free of noxious/invasive plants.

Upland sites in Phillips County were inventoried in 2001 and a few small infestations of leafy spurge and Russian knapweed were found.

Areas in these off-river sites that would be most at risk for invasion or may currently be infested are: roads, trails, wildlife/livestock gathering areas, riparian areas associated with springs or non-perennial streams, areas that see measurable recreational use and any areas experiencing natural or manmade disturbance.

## **Judith River and Arrow Creek**

### Judith River

Inventories have not been conducted for the Judith River and surrounding land within the Monument. Most of the river bottom where noxious/invasive plants would most likely occur is privately owned. Russian olive, leafy spurge, and Russian knapweed do occur in this area. Salt cedar has been documented and treated on public land along the PN Road approximately three miles south of the PN Bridge.

### Arrow Creek

The BLM participated in a cooperative project with local landowners in the Arrow Creek drainage in 1996. Russian knapweed, spotted knapweed, and leafy spurge were mapped in this effort. These infestations are mostly on the creek bottom and privately owned. The most common species documented in this inventory were Russian knapweed, spotted knapweed, and leafy spurge. Although the majority of infestation occurred on private land in 1996, more than adequate time has passed for these infestations to spread into outlying areas of public land. Salt cedar has also been identified at the confluence with the Missouri River, which suggests there is a potential seed source somewhere along the drainage. Most salt cedar infestations in Montana can be traced to ornamental plantings.

## **Areas of Special Concern**

### Recreational Use Areas

All of the recreational use areas within the Wild and Scenic River corridor are infested with at least three noxious/invasive plants. These areas are at further risk with the potential for movement of seed and plant material from site to site in the clothing, gear, and pet fur of the many visitors to these sites. The potential for the introduction of noxious/invasive species that are not currently present is also greater at these sites due to human activities.

Vegetation-Noxious and Invasive Plants Table 2 lists the noxious/invasive species that currently infest recreation sites along the river corridor.

**Vegetation–Noxious and Invasive Plants Table 2. Occurrence at River Corridor Recreation Sites within the Monument**

Recreation Site	River Mile No.	Noxious/Invasive Plant Species																
		Russian Knapweed	Leafy Spurge	Canada Thistle	Spotted Knapweed	Hoary Cress	Perennial Pepperweed	Poison Hemlock	Russian Olive	Salt Cedar	Dalmation Toadflax	Purple Loosestrife	Houndstongue	Black Henbane	Field Bindweed	Musk/Scotch Thistle	Burdock	Scentless Chamomile
Evans Bend	6.5	x	x	x	x										x			x
Rowe Island	13	x	x	x	x										x			
Senieurs Reach	16.3	x	x	x			x								x			x
Black Bluff Rapids	19.3	x	x	x	x		x	x	x		x				x		x	x
Wood Bottom Boat Ramp	20.6	x	x	x	x		x	x	x		x				x		x	x
Coal Banks Landing	42.5	x	x	x			x		x						x			
Little Sandy	46.7	x	x	x	x		x		x						x		x	
Monroe Island	53.8	x	x	x	x		x		x		x		x					
Eagle Creek	55.7	x	x	x			x				x							
Hole in the Wall	62.8	x	x	x	x		x			x	x				x			
Dark Butte	69	x	x	x	x		x		x									
Pablo Rapids	73.2	x	x	x	x		x		x					x		x		
Slaughter River	76.5	x	x	x					x									
The Wall	81.2	x	x	x			x											
Judith Landing	88.5	x	x	x	x				x									
McGarry Bar	103.3	x	x	x														
Stafford Ferry	101.8	x	x	x	x		x									x		
Gist Bottom	122.5	x	x	x			x		x	x					x	x		
Cow Island Landing	125.5	x	x	x			x											
Woodhawk Recreation Area	131	x	x	x	x													
Hideaway	136.5	x	x	x	x				x									
James Kipp Recreation Area	149	x	x	x		x									x			

### Wilderness Study Areas

All six of the Wilderness Study Areas (WSAs) have been infested with several species of noxious/invasive plants. Most of these infestations are along areas near the Missouri River. Upland portions of these areas are monitored regularly as required by the Interim Management Policy and Guidelines for Lands Under Wilderness Review (BLM Handbook H-8550-1). Salt cedar has been documented in three locations near the Dog Creek South WSA. These infestations are thought to have originated with ornamental plantings. These infestations have also been the most likely source of the two infestations of salt cedar on the riverbanks of the Stafford WSA just downstream from the mouth of Dog Creek.

The following Vegetation-Noxious and Invasive Plants Table 3 lists the noxious/invasive species that are found in the WSAs.

**Vegetation–Noxious and Invasive Plants Table 3. Occurrence of Noxious/Invasive Plant Species in WSAs within the Monument**

		Noxious/Invasive Plant Species						
		Russian Knapweed	Leafy Spurge	Canada Thistle	Spotted knapweed	Perennial Pepperweed	Russian Olive	Salt Cedar
WSA	Antelope Creek	x	x	x				
	Cow Creek	x	x	x				
	Woodhawk	x	x	x	x			
	Ervin Ridge	x	x	x		x		
	Stafford	x	x	x	x	x	x	x
	Dog Creek South	x	x	x	x		x	

### Non-Native Plant Species

Many non-native plant species occur within the Monument and are commonplace across the State of Montana. Many of these species (see Vegetation-Noxious and Invasive Plants Table 4 below) are considered naturalized plant species. These species have a very wide distribution in the United States and some are found throughout the world. Most of these plants have undesirable qualities, but are so widespread that they are tolerated in most management practices.

**Vegetation–Noxious and Invasive Plants Table 4. Some Common Non-Native Plant Species within the Monument**

Common Name	Scientific Name	Common Name	Scientific Name
Crested wheatgrass	<i>Agropyron cristatum</i>	Buckwheat	<i>Polygonum convolvulus</i>
Tall wheatgrass	<i>Agropyron elongatum</i>	Halogeton	<i>Halogeton glomeratus</i>
Intermediate wheatgrass	<i>Agropyron intermedium</i>	Kochia	<i>Kochia spp.</i>
Quackgrass	<i>Elytrigia repens</i>	Prickly lettuce	<i>Latua serriola</i>
Smooth Brome	<i>Bromus inermis</i>	Clasping pepperweed	<i>Lepidium perfoliatum</i>
Downy Brome	<i>Bromus tectorum</i>	Yellow sweetclover	<i>Melilotus officianalis</i>
Cheat grass	<i>Bromus spp.</i>	White sweetclover	<i>Melilotus alba</i>
Russian wildrye	<i>Elymus junceus</i>	Black medic	<i>Medicago lupulina</i>
Timothy	<i>Phleum pratense</i>	Alfalfa	<i>Medicago sativa</i>
Kentucky bluegrass	<i>Poa pratensis</i>	Knotweed	<i>Polygonum spp</i>
Yellow alyssum	<i>Alyssum alyssoides</i>	Common Purslane	<i>Portulaca oleracea</i>
Pigweed	<i>Amaranthus spp.</i>	Curly Dock	<i>Rumex spp.</i>
Absinth wormwood	<i>Artemisia absinthium</i>	Russian Thistle	<i>Salsola spp.</i>
Annual/biennial mustards	<i>Brassica spp.</i>	Groundsel	<i>Senico spp.</i>
Bluebell	<i>Campanula rotundifolia</i>	Tumble mustard	<i>Sisymbrium spp</i>
Shepard’s-purse	<i>Capsella bursa-pastoris</i>	Sowthistle	<i>Sonchus spp.</i>
Common Lambsquarter	<i>Chenopodium album</i>	Common Dandelion	<i>Tarazacum officinale</i>
Bull Thistle	<i>Cirsium vulgare</i>	Field Pennycress	<i>Thlaspi arvense</i>
Hawksbeard	<i>Crepis spp</i>	Common mullein	<i>Verbascum thapsus</i>

## State of Montana Noxious Weed List

Category 1 noxious weeds are those currently established and generally widespread in many counties of the State. Management criteria include awareness and education, containment, and suppression of existing infestations and prevention of new infestations. These weeds are capable of rapid spread and render land unfit or greatly limit beneficial uses. Vegetation-Noxious and Invasive Plants Table 5 lists the Category 1 noxious weeds by common name and scientific name.

**Vegetation-Noxious and Invasive Plants Table 5. State of Montana  
Category 1 Noxious Weeds**

Common Name	Scientific Name
Canada Thistle	<i>Cirsium arvense</i>
Field Bindweed	<i>Convolvulus arvensis</i>
Whitetop or Hoary Cress	<i>Cardaria draba</i>
Leafy Spurge	<i>Euphorbia esula</i>
Russian Knapweed	<i>Centaurea repens</i>
Spotted Knapweed	<i>Centaurea maculosa</i>
Diffuse Knapweed	<i>Centaurea diffusa</i>
Dalmation Toadflax	<i>Linaria dalmatica</i>
St. Johnswort	<i>Hypericum perforatum</i>
Sulfur (Erect) Cinquefoil	<i>Potentilla recta</i>
Common Tansy	<i>Tanacetum vulgare</i>
Ox-eye Daisy	<i>Chrysanthemum leucanthemum</i> L.
Houndstongue	<i>Cynoglossum officinale</i> L.

Category 2 noxious weeds have recently been introduced into the State or are spreading rapidly from current infestation sites. These weeds are capable of rapid spread and invasion of land, rendering land unfit for beneficial uses. Management criteria include awareness and education, monitoring and containment of known infestations and eradication where possible. Vegetation-Noxious and Invasive Plants Table 6 lists the Category 2 noxious weeds by common name and scientific name.

**Vegetation-Noxious and Invasive Plants Table 6. State of Montana  
Category 2 Noxious Weeds**

Common Name	Scientific Name
Dyers Woad	<i>Isatis tinctoria</i>
Purple Loosestrife or Lythrum	<i>Lythrum salicaria</i> , <i>L. virgatum</i> , and any hybrid crosses thereof
Tansy Ragwort	<i>Senecio jacobea</i> L.
Meadow Hawkweed Complex	<i>Hieracium pratense</i> , <i>H. floribundum</i> , <i>H. piloselloides</i>
Orange Hawkweed	<i>Hieracium aurantiacum</i> L.
Tall Buttercup	<i>Ranunculus acris</i> L.
Tamarisk [Saltcedar]	<i>Tamarix</i> spp.

Category 3 noxious weeds have not been detected in the State or may be found only in small, scattered, localized infestations. Management criteria include awareness and education, early detection and immediate action to eradicate infestations. These weeds are known pests in nearby states and are capable of rapid spread and render land unfit for beneficial uses. Vegetation-Noxious and Invasive Plants Table 7 lists the Category 3 noxious weeds by common name and scientific name.

**Vegetation-Noxious and Invasive Plants Table 7. State of Montana Category 3 Noxious Weeds**

Common Name	Scientific Name
Yellow Starthistle	<i>Centaurea solstitialis</i>
Common Crupina	<i>Crupina vulgaris</i>
Rush Skeletonweed	<i>Chondrilla juncea</i>

### BLM Invasive Weed Species of Concern in Montana

Vegetation-Noxious and Invasive Plants Table 8 lists the BLM invasive weed species of concern in Montana by common name and scientific name.

**Vegetation-Noxious and Invasive Plants Table 8. BLM Invasive Weed Species of Concern in Montana**

Common Name	Scientific Name	Common Name	Scientific Name
Common Burdock	<i>Arctium minus</i>	Babysbreath	<i>Gliphophila paniculata</i>
Russian knapweed	<i>Centaurea repens</i>	Halogeton	<i>Halogeton glomeratus</i>
Hoary Cress	<i>Cardaria draba</i>	Black Henbane	<i>Hyoscyamus niger</i>
Musk Thistle	<i>Carduus nutans</i>	Common St.	<i>Hypericum perforatum</i>
Diffuse knapweed	<i>Centaurea diffusa</i>	Johnswort	<i>Isatis tinctoria</i>
Spotted Knapweed	<i>Centaurea maculosa</i>	Dyers Woad	<i>Lepidium latifolium</i>
Yellow Starthistle	<i>Centaurea solstitialis</i>	Perennial	<i>Linaria dalmatica</i>
Rush Skeletonweed	<i>Chondrilla juncea</i>	Pepperweed	<i>Linaria vulgaris</i>
Canada Thistle	<i>Cirsium arvense</i>	Dalmatian Toadflax	<i>Lythrum salicaria</i>
Bull Thistle	<i>Cirsium vulgare</i>	Yellow Toadflax	<i>Onopordum acanthium</i>
Poison Hemlock	<i>Conium maculatum</i>	Purple Loosestrife	<i>Potentilla recta</i>
Field Bindweed	<i>Convolvulus arvensis</i>	Scotch Thistle	<i>Senecio jacobaea</i>
Houndstongue	<i>Cynoglossum officinale</i>	Sulfur Cinquefoil	<i>Sonchus arvensis</i>
Russian Olive	<i>Elaeagnus angustifolia</i>	Tansy Ragwort	Sowthistle
Leafy Spurge	<i>Euphorbia esula</i>	Perennial Salt Cedar	<i>Tamarix spp.</i>
		Common Tansy	<i>Tanacetum vulgare</i>



# VISUAL RESOURCES

## RESOURCE DESCRIPTION

The original inventory of the visual resources on public land in the Monument was completed in two phases. The area mostly south of the Missouri River was done in 1979 with the Missouri Breaks Environmental Impact Statement (EIS). The visual data for the remaining area north of the Missouri River was associated with the Prairie Pothole EIS project in 1981. Both of these projects were located within what was formerly the Lewistown District Office.

The inventory was undertaken to evaluate the visual characteristics of land, water surface, vegetation, and structures which provided the subsequent delineation of scenic quality, sensitivity to changes in the visual landscape, and distance zones. These three categories were factored together in a matrix (BLM Manual 8410) to determine visual resource management (VRM) Classes I through IV for individual geographical areas.

### VRM Class I

The VRM Class I areas include the “Wild” segments of the Upper Missouri National Wild and Scenic River (UMNWSR). A VRM Class I rating is intended to preserve the existing character of the landscape. It provides for natural ecological changes; however, it does not preclude very limited management activity. The level of change to the characteristic landscape should be very low and must not attract attention to the casual observer.

### VRM Class II

The VRM Class II areas are associated with the “Scenic” and “Recreational” segments of the UMNWSR, the lower portions of the Arrow Creek and Judith River watersheds, Black Coulee west of Ragland Bench, and the six WSAs (Dog Creek South, Stafford, Ervin Ridge, Woodhawk, Cow Creek, and Antelope Creek). The VRM Class II rating is intended to retain the existing character of the landscape. Management activities may be seen but should not attract the attention of the casual observer (viewer). The level of change to the characteristic landscape should be low. Any changes must repeat the basic elements of form, line, color, and texture found in the predominant natural features of the landscape.

### VRM Class III

The VRM Class III areas are found in the uplands portion of the Monument. This rating is intended to partially retain the existing character of the landscape. Management activities may attract attention but should not dominate the view of the casual observer. The level of change to the characteristic landscape should be moderate. These changes should repeat the basic elements found in the predominant natural features of the area.

### **VRM Class IV**

The VRM Class IV areas are also found in the uplands of the Monument. This rating is intended to provide for management activities which could result in major modifications to the existing character of the landscape. The level of change to the landscape can be high. These management activities may dominate the viewshed and be the major focus of the viewer's attention; however, every attempt should be made to minimize the impact of these activities through careful location, minimal disturbance, and repeating the basic elements (form, line, color, and texture).

# WATER

## RESOURCE DESCRIPTION

### Watersheds

#### Ground Water

Ground water occurs in the Monument area in unconsolidated materials (alluvium, glacial outwash, or terrace deposits) and in consolidated rocks such as sandstones, shaley sandstones, coal, limestone, or igneous rocks.

Most public land along Arrow Creek and the Judith River lies above the floodplains on the cretaceous age shales. No shallow aquifers are present for ground water development.

The Missouri River in the Monument area is a young river system in geologic terms. Floodplains are poorly developed or absent, reducing potential for ground water development. The adjacent breaks are in the Bearpaw shale. The Bearpaw shale contains thin, widely scattered and isolated sandstone stringers. Yields are seldom large enough for well development (less than 2 gallons per minute (gpm)) but several small springs and seeps do occur in the deeply incised drainages. Water quality is poor, with total dissolved solids (TDS) generally too high for domestic or livestock use.

The breaks region is underlain by the Judith River and Eagle sandstones. Depths from the surface to these aquifers range from 700 to 2,500 feet. Most wells in these formations flow at the surface yielding 2 to 60 gpm. Water quality is suitable for livestock but generally not for domestic use.

Occasionally, aquifers are present at the contact between terrace gravel deposits and the underlying Bearpaw shale. These aquifers usually appear as low yield springs and seeps (less than 2 gpm) on hillsides above drainages. Water quality is generally suitable for livestock but not for domestic use.

No other shallow aquifers (less than 500 feet) exist in the Monument area.

#### Surface Water

Stream flow volumes differ greatly within the Monument area. Flows in all unregulated streams have large seasonal variations, with the largest flows generally occurring during the spring or early summer as a result of snowmelt and rainstorms. The Missouri and Judith Rivers are the only perennial streams in the Monument area. Appendix E lists the perennial and intermittent streams within the Monument area. Numerous ephemeral streams also exist but flow only in response to snowmelt or intense summer storms.

Peak flows on prairie streams from snowmelt occur in March or April. Larger peak flows on small drainages can occur from intense summer thunderstorms, but generally not on an annual basis. Summer rainstorms can result in short intervals of increased stream flow during June through August.

During winter, stream flow in prairie streams is greatly reduced or absent as a result of little ground water inflow and ice formation.

Most precipitation that occurs in the Monument area is transpired, evaporated, added to soil moisture, or added to the supply of ground water. Average annual runoff is approximately 0.5 inches. Average annual precipitation ranges from 12 inches in the eastern part of the Monument to 14 inches in the western portion of the Monument (SCS 1977).

Surface water quality in the Monument area is variable depending on the geologic formations through which the water has passed and the volume of flow in the stream. Dissolved solids are derived primarily by the leaching of soluble minerals from soils and geologic formations underlying the drainage basin. The dissolved solids are composed largely of the cations calcium, magnesium, and sodium, and the anions bicarbonate, sulfate, and chloride.

Variations in the dissolved-solids concentration and composition in streams result primarily from changes in the amount and source of stream flow. During low flows, water in the streams is derived mostly from ground water sources and will reflect the dissolved-solids concentration and water type of contributing aquifers. During high flows, most of the water entering the streams is from precipitation runoff. The relatively short period of time that the runoff is in contact with the soils of the basin provides little opportunity for the dissolution of minerals. Consequently, the increased volume of water during high flows reduces the dissolved solids concentration by dilution.

In addition to stream flow variability and geology, other factors that affect the dissolved solids concentration of a stream include irrigation return flows, saline seeps, and water losses from evapotranspiration. Dissolved solids concentrations during low flow range from 1,500 to 3,500 milligrams per liter (mg/l). At high flows, concentrations range from 500 to 1,300 mg/l. The predominant ion in these prairie streams is sodium sulfate.

Streams in the Monument area normally exhibit a pH between 6.5 and 8.5, typical of well-buffered natural waters. Most streams have generally large alkalinities, which provide a buffering capacity that prevents large changes in pH from persisting far downstream. Because of the near-neutral pH, concentrations of dissolved trace elements rarely exceed water quality standards.

### **Wild and Scenic River Status**

Appendix F lists the streams in the Monument that are in the process of being assessed for Free-Flowing and Outstanding Remarkable Values. The BLM will adhere to Sections 1(b) and 16(b) of the Wild and Scenic Rivers Act when determining eligibility.

## Water Developments

Water Table 1 lists the types of water developments that are located on public land within the Monument.

**Water Table 1. Water Developments on Public Lands within the Monument**

<b>Description</b>	<b>Quantity</b>
Reservoirs	276
Springs	6
Wells	12
Water Savers/Catchments	19

## Water Rights

The Department of the Interior agreed to comply with the State of Montana water laws. The BLM will apply for water rights to its water sources on public land administered by BLM under the same regulations as all other appropriators. The State of Montana began adjudicating water rights in the early 1980s. The BLM filed claims on all its existing water developments and natural sources (springs, pot holes, lakes, etc.) occurring on public land. See Water Table 1 above for a description of the water developments that are located within the Monument.

BLM and the State of Montana entered into a compact for in-stream flow reservations on the 149-mile stretch of the Missouri River that comprises the Upper Missouri National Wild and Scenic River. The compact recognized all valid, existing rights prior to December 31, 1987 and created an “available water supply,” which is the volume of surface and ground waters available to meet the State’s projected demands. All depletions from appropriations completed after December 31, 1987, shall be subtracted from the available water supply. The State will not subtract from the available water supply groundwater uses of 35 gpm or less, not to exceed 10 acre-feet per year, and surface water appropriations of 35 gpm or less, not to exceed 10 acre-feet per year for domestic use.

## Climate

The climate of the Monument is semiarid continental. It is marked by cold winters, warm to rarely hot summers, 12 to 14 inches of precipitation annually, winds primarily from the west, and abundant sunshine.

Average annual precipitation ranges from less than 12 inches in the eastern portion of the Monument to 14 inches in the western portions of the monument. Snow on the plains more than 12 inches deep is uncommon but not rare. Snow generally falls between November and April, although traces have been reported at Lewistown in July and August.

Average precipitation recorded at weather stations in and adjacent to the Monument shows rainfall is concentrated in the period from April through June. Precipitation from July through

September is characterized by localized intense thunderstorms that can drop more than an inch of rain or hail on a small area in a few minutes. Low humidity, high temperatures, and moderate to strong winds cause rapid loss of soil moisture.

Winter temperatures in the Monument may be as low as -40° F for short periods, but the January mean monthly temperature is around 15° F. Summer temperatures as high as 110° F have been recorded, but the July mean monthly temperature is about 70° F. Temperatures may fluctuate widely during the course of a single day in either winter or summer, and local temperatures may be several degrees different than the average. Growing seasons, defined as the times between the last frost in spring and the first fall frost (temperatures of 32° F), range from 104 to 132 days within the Monument area. The breaks are subject to intense lightning storms from July through September, often resulting in wildfires.

### **Erosion and Sedimentation**

The susceptibility of land in the Monument to erosion varies widely. The soils most susceptible to erosion occur in the sedimentary uplands physiographic province, more specifically, the breaks. Eighty-eight percent of the breaks region falls in the severe to very severe erosion susceptibility category. The glacial till uplands are equally divided between the slight to moderate and severe categories with less than 15% in the very severe category. The loamy and clayey floodplains are the least susceptible to erosion mainly due to their vegetative cover. The other soil subgroups of this province are more susceptible and fall in the moderate to severe categories.

Natural geologic erosion is accelerated when a geomorphic threshold is exceeded. In the Monument area the threshold most often exceeded is destruction of vegetation/ground cover. The Missouri River above Fort Peck Dam drains the entire breaks region. Sediment studies conducted in Fort Peck reservoir reveal a 298% increase in average annual sediment load over the past thirty years (Corps of Engineers 1988). The increase may be an indication that the vegetation/ground cover threshold is being exceeded in the Monument area.

### **Water Quality Impaired Streams – 303(d) List of Impaired Streams**

The Environmental Protection Agency, in administering the Clean Water Act, requires all states to identify rivers, streams, lakes, and wetlands where beneficial uses are impaired or threatened by human activity, and to schedule those waters for development of water quality restoration plans. This process is known as the Total Maximum Daily Load (TMDL) process. Water Table 2 lists the impaired streams within the Monument that are on the Montana Department of Environmental Quality (DEQ) 2002 Draft 303(d) list.

The BLM has complied with the TMDL process by addressing the listed streams in its watershed plans. To date, DEQ has been satisfied that the BLM is implementing Standards and Guidelines to improve the health of range land and riparian areas, thus improving the quality of waters flowing from or across public land.

**Water Table 2. Water Quality Impaired Streams  
Located within the Monument**

Water Body	Probable Impaired Use	Probable Cause	Probable Source
Armells Creek	Aquatic life support	Metals, pH	Resource extraction, subsurface mining
Arrow Creek	Aquatic life support, recreation, warm water fishery, drinking water supply, swimmable, agriculture	Flow alteration, nutrients, other inorganics, salinity/TDS/chlorides	Agriculture, irrigation, natural
Bullwhacker Creek	Recreation, warm water fishery, drinking water supply, agriculture	Salinity/TDS/chlorides, suspended solids	Agriculture, natural
Coffee Creek	Aquatic life support, warm water fishery, agriculture, drinking water supply	Nutrients, other inorganics, salinity/TDS/chlorides	Agriculture, natural
Dog Creek	Drinking water supply, agriculture	Other inorganics, salinity/TDS/chlorides	Agriculture, natural
Eagle Creek	Warm water fishery, aquatic life support, cold water fishery	Flow alteration, siltation	Agriculture, irrigation, range land
Fargo Coulee	Aquatic life support	Other habitat alterations	Agriculture, range land
Judith River	Aquatic life support, cold water fishery	Nutrients, siltation, suspended solids, other habitat alterations	Agriculture, irrigation, range land, silviculture
Missouri River	Warm water fishery, aquatic life support	Nutrients, other inorganics, pathogens, salinity/TDS/chlorides, suspended solids	Agriculture, irrigation, stream-bank modification
Sourdough Creek	Warm water fishery, aquatic life support	Other habitat alterations	Agriculture, range land
Two Calf Creek	Warm water fishery, agriculture, recreation, drinking water supply	Metals, nutrients, salinity/TDS/chlorides, suspended solids	Domestic waste water lagoon, natural



# FOREST RESOURCES

## RESOURCE DESCRIPTION

### Forest Types

Four main forest types exist throughout the Monument area: ponderosa pine, Douglas-fir, juniper, and mixed hardwoods.

The ponderosa pine forest exists in scattered pockets throughout the Monument on all aspects and elevations. Its ability to survive in this harsh environment is due, in part, to an aggressive tap root system. These forests are considered more “savanna” types rather than open forest, with the break point being sites that are not capable of producing at least 25% canopy coverage.

The Douglas-fir type is commonly found on the cooler and wetter aspects (northerly and easterly). The Monument area represents some of the driest sites that are still capable of growing Douglas-fir. Trees that do survive are very slow growing and short in comparison to Douglas-fir that occurs in mountainous regions of central Montana.

The juniper forests are found mostly on dry, rocky sites. These stands are not capable of producing 20 cubic feet of wood fiber per year and, therefore, are not typically thought of as coniferous forests by themselves. They commonly occur with and throughout the ponderosa pine and Douglas-fir forests.

The mixed hardwoods, known as riparian forests, are characterized with stands of cottonwoods, aspen, chokecherry and box elder. These forests tend to be along the main river bottoms and wetter drainages feeding into the Missouri River. Disturbance is common in these forests due to a high site index leading to greater growth potential for all plants. The truly undisturbed sites exist mainly on islands that have not experienced recent fire.

### State of Montana Forested land

The Montana DNRC conducted an inventory on approximately 8,200 acres of State-owned forested land that falls within the Monument. Considering the random nature of State land and their respective forested portions, this inventory serves as an adequate random sampling of forested acres for public land. The five State of Montana Forest Resources tables that illustrate recent inventory data are located in Appendix G.



# LANDS and REALTY

## RESOURCE DESCRIPTION

### Land Status and Jurisdiction

The Monument contains those lands in north Fergus County adjacent to the Missouri River including the Armells Creek and Judith River drainages; southeast Chouteau County along the Missouri River and Arrow Creek drainages; south Blaine County along the Missouri River as well as the Lone Tree Bench, Cow Creek and Bullwhacker drainages; and southwest Phillips County including the Cabin Creek, Bull Creek and Antelope Creek drainages. Land ownership within the Monument boundary is comprised of Federal, State and private. Access in and to this area is dependent on the weather as roads can be impassable when it rains. The public land within the Monument come under the jurisdiction of the Lewistown Field Office, located in Lewistown, Montana, and the Malta Field Office, located in Malta, Montana.

Approximately 377,346 acres were set apart and reserved for the Monument with the Proclamation. It is difficult to determine the specific acreage as three of the boundary lines north of the Missouri River do not follow section lines or subdivision lines. Acres based on the Geographic Information System total approximately 375,000 acres.

With the exception of Corps of Engineers land consisting of islands in the Missouri River and the James Kipp Recreation Area, all of which are located at the eastern end of the Monument, all Federal land within the Monument are administered by the BLM. The James Kipp Recreation Area is currently under lease to the BLM by the Corps. The BLM has no jurisdiction over State or private land contained within the Monument boundary.

The majority of the large blocks of public land in the Monument are found below the Hole in the Wall area and along Arrow Creek. At about the Ervin Ridge area, the public land are concentrated over a much wider area, especially on the north side of the river where it extends beyond the river over 15 miles in places, and contains private inholdings.

Generally, the State of Montana owns sections 16 and 36 within each township. Some townships have additional small parcels of State-owned land. The State claims ownership of the riverbed from low water mark to low water mark.

The number of acres (rounded) administered by the various entities is shown below in Lands and Realty Table 1.

**Lands and Realty Table 1. Administrators of Land Within the Monument Boundary**

Owner/Manager	Acres
Bureau of Land Management Monument	375,000
Bureau of Reclamation Power site classification 301	29,645
Power site reserve 33	120
Power site reserve 757	50
Corps of Engineers	240
State of Montana	56,638
Private	81,715

Lands and Realty Table 1 Notes and Sources:

1. Power site Classification and Reserve acreage is based on BLM Master Title plats and is our best estimate due to the inability to read some acreage figures.
2. The State acreage is based on personal communication with Clive Rooney of DNRC in Lewistown.
3. All BLM acreage is based on BLM Master Title plats. Monument acreage is our best available estimate since the Monument boundary does not always follow section or subdivision lines.
4. All Corps of Engineers acreage is based on BLM Master Title Plats.

Several thousand acres of split estate are located within the Monument. Split estate occurs when the surface is patented or deeded into private ownership while the United States retains the mineral rights. There are also instances when the United States transferred both the surface and the minerals into private ownership, but the surface was subsequently deeded back to the United States and the minerals, or a portion of them, were retained by the private landowner. Lands and Realty Table 2 shows the number of acres according to mineral status within the Monument.

**Lands and Realty Table 2. Mineral Status by County within the Monument Boundary**

Mineral Status	Acres by County			
	Blaine	Chouteau	Fergus	Phillips
Public Domain (PD) & All Minerals	151,680.87	32,386.24	122,484.90	52,670.48
Reconveyed <sup>1</sup> Surface – PD All Minerals	1,461.58	41.72		
Reconveyed Surface – PD Oil & Gas	240.00			
Private Surface – PD All Minerals	4,531.42	3,731.70	2,773.47	2,389.99
Private Surface – PD Oil & Gas	995.94	1,040.00	1,184.89	326.41
Private Surface – PD Oil, Gas and Coal	320.00			
Acquired <sup>2</sup> Surface – Acquired All Minerals	289.73	2,042.98	6,303.01	
Acquired Surface – PD Oil & Gas			160.00	
Acquired Surface – PD Oil, Gas and Coal	319.57			
Acquired Surface – Acquired Restricted Minerals			320.87	
<b>Total Mineral Estate within Monument</b>	<b>159,839.11</b>	<b>39,242.64</b>	<b>133,227.14</b>	<b>55,386.88</b>

<sup>1</sup> Reconveyed: lands once patented or granted but later returned to federal ownership through exchange.

<sup>2</sup> Acquired: lands in Federal ownership that were obtained by the Government through purchase or donation.

## Rights-of-Way

Currently, 25 documented rights-of-way (ROW) occur within the Monument; they consist of roads and highways, electric lines, telephone lines, oil/gas pipelines, a communication site, and water-related facilities such as dams and ditches (see Lands and Realty Table 3). The ratio of right-of-way acreage to BLM-administered land is 1% or less, indicating relatively low demand for such use within the Monument.

**Lands and Realty Table 3. Rights-of-Way within the Monument**

ROW No.	Holder	Type	Acres	Legal Description	
M01673	Albert Lind	Irrigation	1.30	T24N R23E, sec. 5	
M013368	MT Dept of Transportation	Highway	40.00	T22N R24E, sec. 31	
M014191	Bureau of Reclamation	Power Line	5.45	T25N R 9E, sec. 23	
M049342	MidRivers Telephone Co-op	Phone Line	1.82	T22N R24E, sec. 31	
M73508		Comm Site	.11	T23N R22E, sec. 33	
M24219	Fergus Electric Co-op	Power Line	4.64	T22N R18E, sec. 3, 4 T23N R18E, sec. 27, 34	
M58077		Power Line	5.36	T22N R17E, sec. 1, 2 T22N R18E, sec. 6, 9	
M31621	Havre Pipeline	Oil/Gas Pipeline	6.14	T25N R19E, sec. 15, 27, 28	
M34075	Ocean Energy	Oil/Gas Pipeline	4.55	T26N R20E, sec. 4, 9	
M39347A	Triangle Telephone Co-op	Phone Line	13.82	T22N R16E, sec. 3, 10, 14, 15	
M40972		Phone Line	2.45	T26N R21E, sec. 21, 28	
M42864		Phone Line	2.73	T24N R23E, sec. 5, 6 T25N R23E, sec. 31	
M59069		Phone Line	1.41	T25N R10E, sec. 18 T25N R11E, sec. 6 T26N R13E, sec. 32	
M41268	Klabzuba	Oil/Gas Pipeline	28.85	T23N R18E, sec. 13, 14, 24 T23N R19E, sec. 7, 18, 19, 29, 30	
M57527	Big Flat Electric Co-op	Power Line	1.36	T24N R23E, sec. 5, 6	
M59070	Hill County Electric Co-op	Power Line	19.02	T25N R11E, sec. 6 T26N R13E, sec. 29 T23N R15E, sec. 30, 31 T22N R16E, sec. 3, 10 T23N R16E, sec. 28 T26N R21E, sec. 17, 21, 28	
M60030		Power Line	3.00	T23N R14E, sec. 25	
M73490	Hamilton Resources Mgmt	Oil/Gas Pipeline	18.82	T25N R19E, sec. 15, 22-25	
M79166		Oil/Gas Pipeline	.73	T26N R20E, sec. 26	
M78762	Chouteau County	Road	9.03	T25N R10E, sec. 18	
M82369	Express Pipeline	Oil/Gas Pipeline	N/A	T26N R12E, sec. 18	
M83688	Faith Drilling	Oil/Gas Pipeline	25.07	T24N R20E, sec. 12 T25N R20E, sec. 1-3, 11, 14, 23, 26, 35 T26N R20E, sec. 35 T25N R21E, sec. 6, 7	
M89564		Macum Energy	Oil/Gas Pipeline	2.45	T25N R20E, sec. 4, 10
M91509		Tom Walling	Road	.67	T22N R16E, sec. 12
M91813		Jim and Pat Ayers	Road/Waterline	1.45	T25N R11E, sec. 6

## **Electrical Systems**

Three electric power cooperatives operate within the Monument; the Bureau of Reclamation also holds a power line ROW. New construction incorporates safer designs for the protection of raptors; therefore, raptor mortality by electrocution is not significant in the area.

## **Telephone Systems**

Six ROWs for telephone lines are within the Monument, all held by cooperatives. These systems generally parallel the road network and nearly all are underground. The installation of the buried lines caused minimal disturbance and is nearly impossible to detect. Major improvements in the systems are not anticipated.

## **Oil and Gas Systems**

There are eight oil/gas pipelines on public land in the Monument. The Klabzuba (formerly Fuelco) pipeline is an eight-inch natural gas pipeline that crosses the Missouri River, and the Monument, two miles downstream from the McClelland/Stafford Ferry. This line is the largest in terms of pipe diameter and public land encumbered. It transports natural gas from northern Fergus County across the Missouri River to a gathering station in Blaine County. The other pipelines are smaller in diameter, with the exception of the Express Pipeline and the Havre Pipeline; however, the Havre Pipeline encumbers a much smaller area of public land. The Express Pipeline does not impact public land; it is located on private land halfway between the Virgelle Ferry and Coal Banks Landing in Chouteau County and crosses under the river and the Monument. The remaining pipelines, including the Havre Pipeline, are all located in Blaine County.

## **Road Transportation Systems**

U.S. Highway 191 crosses approximately one mile of the Monument, and together with Secondary Highway 236 and the McClelland/Stafford Ferry road, comprise the major roads intersecting the area.

Other county, State land, and private roads are numerous and provide access to Federal, State and private land. A provision in the Mining Act of 1866 states: "The right-of-way for the construction of highways over public land, not reserved for public uses, is hereby granted." This later became Section 2477 of the Revised Statute (RS 2477) and was the primary authority under which many existing state and county roads were constructed and used. No prior approval and no documentation were required.

When the Federal Land Policy and Management Act was enacted in 1976, which repealed RS 2477, these valid, existing rights-of-way were not terminated.

## Communication Sites

The right-of-way identified as a communication site is actually a 30-foot pole with a solar panel, two radio antennas and two equipment enclosures that provide telephone capability to a private residence just south of the Missouri River.

In addition to authorized rights-of-way to private landowners, local governments, and utility companies, the BLM recognizes many miles of road across public land as general public access. These roads fall into three different classifications:

## BLM Access Roads

There are three classifications of BLM roads: collector roads, local roads, and resource roads (BLM Manual 9113).

Collector Roads: These Bureau roads normally provide primary access to large blocks of land, and connect with or are extensions of a public road system. Collector roads accommodate mixed traffic and serve many uses. They generally receive the highest volume of traffic of all the roads in the Bureau road system. User cost, safety, comfort, and travel time are primary road management considerations. Collector roads usually require application of the highest standards used by the Bureau. As a result, they have the potential for creating substantial environmental impacts and often require complex mitigation procedures.

Local Roads: These Bureau roads normally serve a smaller area than collectors, and connect to collectors or public road system. Local roads receive lower volumes, carry fewer traffic types, and generally serve fewer uses. User cost, comfort, and travel time are secondary to construction and maintenance cost considerations. Low volume local roads in mountainous terrain, where operating speed is reduced by effort of terrain, may be single land roads with turnouts. Environmental impacts are reduced as steeper grades, sharper curves, and lower design speeds than would be permissible on collector roads are allowable.

Resource Roads. These Bureau roads normally are spur roads that provide point access and connect to local or collector roads. They carry very low volume and accommodate only one or two types of use. Use restrictions are applied to prevent conflicts between users needing the road and users attracted to the road. The location and design of these roads are governed by environmental compatibility and minimizing Bureau costs, with minimal consideration for user cost, comfort, or travel time.

## Withdrawals

The Monument Proclamation states: “All Federal lands and interests in lands within the boundaries of this Monument are hereby appropriated and withdrawn from all forms of entry, location, selection, sale, or leasing or other disposition under the public land laws, including but not limited to withdrawal from location, entry, and patent under the mining laws, and from disposition under all laws relating to mineral and geothermal leasing, other than by exchange that furthers the protective purposes of the Monument The establishment of this Monument is

subject to valid existing rights. The Secretary of the Interior shall manage development on existing oil and gas leases within the monument, subject to valid existing rights, so as not to create any new impacts that would interfere with the proper care and management of the objects protected by this proclamation.”

Within the Monument boundary there have been a number of previous withdrawals. Section 103(j) of the Federal Land Policy and Management Act defines a withdrawal as "withholding an area of Federal land from settlement, sale, location, or entry, under some or all of the general land laws, for the purpose of limiting activities under those laws in order to maintain other public values in the area or reserving the area for a particular public purpose or program; or transferring jurisdiction over an area of Federal land, other than "property" governed by the Federal Property and Administrative Services Act, as amended (40 U.S.C. 472) from one department, bureau or agency to another department, bureau or agency." The following is a listing of the withdrawals within the Monument.

### **Bureau of Land Management (BLM)**

#### Upper Missouri National Wild and Scenic River

The Upper Missouri National Wild and Scenic River (UMNWSR) is withdrawn. The withdrawal segregates public land from entry, sale or other disposition under the public land laws.

#### Power Site Reserve 33 and 757 and Power Site Classifications 301

Two types of Federal Energy Regulatory Commission withdrawals occur within the Monument. The power site reserves were created under the Pickett Act of June 25, 1910 (36 Stat. 847; 43 U.S.C. 141-143). The power site classifications were created by Secretarial Order dated August 31, 1937, pursuant to the authority of the Organic Act of March 3, 1879 (20 Stat. 394; 43 U.S.C. 31). Both types segregate against settlement, sale, or location under the public land laws but not from the mining or mineral leasing laws (CFR 2091.5.4a). The BLM has management jurisdiction of the Federal surface and subsurface resources but not the power values therein.

These withdrawn lands are scattered along the Judith and Missouri Rivers. In addition, these lands are within the UMNWSR. The legislative action establishing the UMNWSR precludes waterpower and water storage development.

### **U.S. Fish and Wildlife Service**

On December 11, 1936, Executive Order (EO) 7509 established the Fort Peck Game Range, now known as the Charles M. Russell National Wildlife Refuge. Administration was carried out jointly by the BLM, U.S. Fish and Wildlife Service (USFWS), and the Corps of Engineers.. In 1976, Public Law 94-223 amended the National Wildlife Refuge System Administration Act of 1966, and consolidated authorities relating to the various categories of areas that are administered by the Secretary of the Interior for the conservation of fish and wildlife. They were

designated as National Wildlife Refuge Systems, and consequently, the game range became part of the refuge system administered by the Secretary through the USFWS.

The Federal lands withdrawn for the Charles M. Russell National Wildlife Refuge that are included within the Monument boundary are located along the Missouri River in both Fergus and Phillips Counties. With the exception of the mineral estate, jurisdiction is exclusively under the USFWS, which has its Refuge headquarters at Lewistown, Montana.

### **Corps of Engineers**

The Fort Peck Project was created by three Executive Orders: EO 6491, EO 6707 and EO 7331, dated December 12, 1933, May 9, 1934, and April 3, 1936, respectively. The project was originally administered by the War Department, which later became the Corps of Engineers. The withdrawn lands are mostly located along the lake and the river below the dam. Most of the Fort Peck Project is within the Charles M. Russell National Wildlife Refuge, which is described above.

### **Access**

Currently, access to and within the Monument is provided to the public and private landowners alike by means of BLM roads, BLM easements across private land, and county roads. In addition, some private landowners have applied for and received rights-of-way across public land where needed to access their private inholdings.

### **Land Ownership Adjustment**

Nearly 82,000 acres of private land and nearly 56,638 acres of State land are located within the Monument. Since designation of the UMNWSR in 1976, over 6,800 acres of private land along the River have been acquired from willing sellers by the United States utilizing Land and Water Conservation Fund monies.



# LIVESTOCK GRAZING

## RESOURCE USE DESCRIPTION

Currently, 115 livestock operators are licensed to graze within the Monument. These operators use 122 allotments and harvest about 39,000 Animal Unit Months (AUMs) within the Monument annually. Cattle are the most prevalent class of livestock, although sheep and horses also graze some public land in the Monument. There is a wide range of management among the cattle operations. Most ranches run a cow/calf operation and sell all weaner calves in the fall. However, some operations hold over weaner calves and run yearling operations. For most operators, breeding season usually runs from mid-June to the end of August. Calves are born around mid-to-late winter/early spring.

Some grazing permits are held by operators that are primarily involved in farming. In these cases, livestock are often grazed on public land during the summer and on private land stubble fields in the fall and winter. In some cases, small isolated tracts of public land are grazed in conjunction with private land because the intermingled land ownership pattern and terrain make it difficult to manage public land separately from private land. Larger blocks of public land are usually managed under a specified grazing prescription that is outlined in a watershed plan or an allotment management plan.

In 1997, an Environmental Impact Statement was written to implement Standards for Rangeland Health and Guidelines for Livestock Grazing Management. These Standards and Guidelines were developed with assistance from the Central Montana Resource Advisory Council, local ranchers, and Montana State University. The Standards (see Appendix C) are ecologically based and revolve around the functioning and health of uplands, riparian areas, water, air quality, and biodiversity (BLM 1997). A detailed description of the Guidelines for Livestock Grazing Management is found in Appendix H.

In 1998, the BLM shifted from allotment-level planning to watershed planning. This was done so that Standards and Guidelines could be implemented and resources managed more effectively. During the planning process, 20 to 40 allotments are assessed within the watershed planning area. Livestock season and use dates are set, a specified grazing prescription is written and adjustments are made to the carrying capacity if the need exists. Other uses such as recreation and wildlife are considered in this planning process. Monitoring plans are established so that practices can be adjusted if they are not making progress towards the goals outlined in the watershed plan. The watershed plans that have been written and implemented include: Woodhawk (1998), Two Calf (1998), Armells (2000), and Upper Missouri (2002). Bearpaws to Breaks and Arrow Creek/Upper River/Whiskey Ridge watersheds are planned to be completed by 2003. Currently, 48 allotments within the Monument have undergone watershed planning.

## Grazing Systems

Due to a wide variety of management practices among livestock operators, season of use can range from a few weeks to year-round grazing. Various types of grazing systems are employed to manage livestock and resources on allotments. Some allotments are managed under rest rotation, deferred rotation, or short duration grazing. Others are managed with limited seasons and numbers, and a few are managed with a deferment period to allow a rest period for part of the growing season. Allotments that are made of small parcels of public land surrounded by private land are often permitted as year-round use. Although livestock use is usually not year-round on these allotments, the season is set as such to allow flexibility with management of intermingled lands. Livestock Grazing Table 1 below shows the type of grazing systems currently in place in the Monument. See Appendix I for a detailed description of the allotments.

**Livestock Grazing Table 1. Grazing Systems and Management Practices on Allotments within the Monument**

<b>Grazing System</b>	<b>Number of Operators</b>
Rest Rotation	6
Deferred Rotation	10
Rotation	18
Limited Season	52
Year Around	22
Short Duration	4
Herding	3
Total Operators	115

## **MINERALS – OIL and GAS**

### **RESOURCE DESCRIPTION**

The Monument area common to oil and gas development (the oil and gas study area) lies among three producing fields known as the Leroy, Sherard and Sawtooth Mountain Gas Fields. The oil and gas study area and these gas fields lie at the southeastern extent of the Bearpaw Uplift in northcentral Montana. Until the 1960s and 1970s drilling and exploration activity was low within the oil and gas study area. Although gas was known to exist, it was not an objective or target in the search for oil, due to gas prices as low as 10¢/MCF. With gas prices now ranging between \$3 to \$6/MCF, the incentive exists to further develop gas within the Monument. The oil and gas study area contains Federal, State, and private leases that have a chance of being further developed for oil and gas (specifically gas, since oil has not been discovered within the Monument). The oil and gas study area within the Monument can be further geographically described as an area starting from a point five miles southwest of the Stafford Ferry extending 31 miles to the northeast by 15 miles wide through the Bullwhacker area and continuing on up to the Chimney Butte/Al's Creek Drainage area.

Appendix J, Minerals Table 1 defines the oil and gas terms used in the discussion of leases within the Monument. Three administrative instruments allow oil and gas exploration and development to occur in the Monument: the Oil and Gas Lease, the Communitization Agreement, and the Unit Agreement. The Monument currently includes 44 authorized Federal oil and gas leases and three (3) State oil and gas leases. The authorized leases include 43,177 acres of Federal minerals and 1,918 acres of State minerals (see Appendix J, Minerals Tables 2 and 3, respectively). The authorized Federal and State leases are interspersed mainly within the boundary of the Monument; however, the majority of the Federal leases straddle the boundary where part of the lease lies outside the Monument boundary. These leases can occur in a non-contiguous manner. The Monument does include private land (surface and mineral ownership) and, therefore, the likelihood of private oil and gas leases exists. The majority of the leased Federal Monument lands are within Blaine County (92% north of the river) and the remainder lie in Fergus and Chouteau Counties (5% and 3% respectively). None of the existing authorized Federal leases within the Monument are within Phillips County.

The authorized leases within the Monument are considered to have valid existing rights based upon the Monument Proclamation, wherein it states that “The Secretary of the Interior shall manage development on existing oil and gas leases within the monument, subject to valid existing rights, so as not to create any new impacts that would interfere with the proper care and management of the objects protected by this proclamation.”

A lease within the Monument may also be or become part of a Communitization Agreement (CA) and/or Unit Agreement. The agreements provide for a proper administrative method to develop the gas resources, and they also allow a fair and equitable means for the allocation of production from the wells back to specific leases tied to the agreement based on acreage within the agreement. The CAs are necessary to protect the various mineral interests (Federal, State and

private) involved in spacing units where normally only one well is allowed. Currently, eleven existing CAs are within or straddle the Monument boundary. Another ten CAs lie outside of the Monument, yet are common to the Monument because a portion of the lease is common to both the CA and the Monument. The CAs are formed based on standard State spacing requirements for gas wells (one well per 640 acres, statewide well spacing) and State-approved Board of Oil and Gas Conservation orders allowing reduced spacing or allowing one well per 320 acres (State Board Order Nos. 19-75 and 31-87) to more sufficiently develop the gas resource (see Appendix J, Minerals Table 4).

In addition to leases contained in the mentioned CAs, two Federal leases are also located in a Unit within the Monument known as the Sherard Eagle Participating Area (PA) "E." PA "E" of the Sherard Unit was formed after discovering a geologic feature in Sections 27 and 28 of T. 25 N., R. 19 E., Blaine County by drilling the U.S. No. 6-28 well in late 1974. The 1280-acre PA currently contains three active wells located within the Monument producing from the Eagle Formation.

Outside of the 15-mile by 31-mile geographic area described above, the chance of further oil and gas discovery within the Monument is remote. Since the Monument Proclamation withdrew all Federal land within the Monument (unleased Federal minerals totaling 226,771 acres), and because no commercially productive oil or gas discoveries have been made within the Monument boundary west of Stafford Ferry (Federal, State or private) or east of the confluence of Bullwhacker Creek and the Missouri River, future exploration outside of the referenced geographic area within the Monument is unlikely.

Appendix J, Minerals Table 5 is a listing of all State-owned minerals within the Monument. Further leasing, exploration and development could occur on State and private minerals within the Monument.

## **Geology - Oil and Gas**

The Bearpaw Uplift in northcentral Montana was formed by igneous activity which commenced in the late Cretaceous Period and extended into the early Tertiary Period (Eocene Epoch). A large mass of igneous material was intruded into sediments at the top of the Cretaceous Colorado group. This action caused a doming effect of the overlying younger sediments on an elevational scale of thousands of feet. Concurrent with this doming effect on late Cretaceous strata was the eruption and deposition of thousands of feet of volcanic rocks in the form of lava flows and volcanic clastics. As a result of being uplifted, the late Cretaceous sediments were subject to extensive erosion, as well as being subsequently buried by the widespread deposition of volcanics.

Within the early Tertiary, a dramatic change came to the Bear Paw Uplift. Whether it was one titanic explosive event or a series of related events, the forces that caused the doming of the Bearpaw Uplift were suddenly removed by an enormous eruption and the central portion of the Bearpaw Uplift collapsed. This collapse caused a wide variety of structural features, most of them fault-related. Just like a broken plate of glass, the Bearpaw Uplift broke into a mosaic of randomly oriented individual fault blocks where each fault block can have its own unique

orientation and as a result can create its own separate gas trap/reservoir. Other tectonic features included gravity detachment blocks which slid away from the center of the dome. Scattered through a circular zone 20 to 30 miles wide on the plains surrounding the Bears Paw Mountains are long, sharp, narrow, anticlinal folds (perhaps 100 or more), usually cut near their crests by steeply dipping reverse faults. Strike of the folds and faults is peripheral to the circular mountain area. In cross-section, the folds and faults appear to have been caused by nearly horizontal thrusts outward from the mountains. The length of the folds differs greatly, but they average about ten miles. Between folds, upper Cretaceous strata lie nearly horizontal and apparently undisturbed. The faults and folds and other structural features mapped at the surface are essentially “rootless” as they disappear within the sediments of the upper Colorado Shale. Nonetheless, the intensive faulting which affects the Eagle and Judith River Sands provides an effective trap for the gas now produced from hundreds of wells within the Bearpaw Uplift.

### **Leroy Gas Field**

The majority of the existing Federal leases lie within the Leroy Gas Field. The field was discovered in November 1968 by the Federal 1-18 well drilled by El Santo Petroleum Corp in the NWNWNW Section 18, T. 23 N., R. 19 E (within the Monument boundary). The field as a whole is not one contiguous productive unit. Rather, it is made up of numerous discrete fault blocks that provide a series of reservoirs which have trapped gas within the subsurface strata. Each reservoir/trap in the Leroy Gas Field is unique (depth, reservoir pressure, pay thickness, porosity, water saturation, orientation, and gas/water content or extent); however, the reservoirs are common to one another since the majority of the wells produce from the upper Cretaceous Eagle Formation (Eagle).

The Eagle is and remains the primary target in the Leroy Gas Field for future exploration because of its relatively shallow depths (1,700 feet) and the chance of discovering additional gas-charged fault blocks. The Eagle Formation is composed of three distinct rock units. Depending on the structural orientation of the fault blocks within the Leroy Gas Field, the middle unit of the Eagle Formation is likely the most prolific formation to trap gas; however, if the conditions exist, the Virgelle Member (the lowermost unit of sandstone rock within the Eagle Formation) also can contain gas. The productive intervals can range from 4 to 60 feet thick.

Besides the Eagle Formation, the Judith River Formation (a shallower upper Cretaceous interval) can also be considered a target for development; however, unless there is a major discovery of gas in the Judith River Formation, it will remain a secondary target for development. Per historic operations, success has been limited at developing this formation within the Leroy Gas Field and, therefore, future development of the Judith River Formation will be a result of searching for gas in the deeper Eagle Formation.

Following the discovery of the Leroy Gas Field in 1968, 41 additional wells were drilled within the Monument, of which nine wells were completed for production, three were completed and shut-in waiting on a pipeline, and the remainder were drilled and abandoned as dry holes. Of the twelve wells, four have been plugged including the initial discovery well. Initial production from the field was delayed until June 1978 awaiting economic justification to build pipelines and allow production. Currently, 1.36 billion cubic feet of natural gas (BCF) have been produced

from ten Leroy Field wells that were drilled within the Monument. In addition to the 1.36 BCF, another 6.59 BCF has been produced from 26 peripheral wells that are within one-half mile of the Monument or are common to the Monument by lease/CA production (see Appendix J, Minerals Table 6).

Per the State Board Order Nos. 19-75 and 31-87, the Leroy Gas Field is allowed to be developed on 320-acre spacing units for the Judith River and Eagle/Virgelle with each unit consisting of half sections lying in a north-south or east-west direction.

### **Sawtooth Mountain Gas Field**

The Sawtooth Mountain Gas Field lies at the very north edge of the Monument boundary. It is common to the Monument because two Federal leases overlap the Monument and the Sawtooth Mountain Gas Field. Currently, there are no active Monument wells within the Sawtooth Mountain Gas field leases; however, two wells lie adjacent to the Monument (less than one-half mile from the Monument Boundary) and are contained in a lease and CA that straddle the Monument Boundary. Both wells were drilled in the mid 1970s and continue to produce. Combined, the two wells have produced over 1.67 BCF. Geologic characteristics of the Sawtooth Mountain Gas Field are similar in nature to those of the Leroy Gas Field as they are adjacent to one another near the northern edge of the Monument boundary.

### **Sherard Unit Area**

Six of the total authorized leases within the Monument fall within the Sherard Unit Area. The first successful well in this area was drilled in December 1974 and continues to produce. Three wells are currently active within this area. Together they have produced 3.80 BCF (these are the three PA wells discussed earlier). In addition to the 3.80 BCF, another 1.08 BCF has been produced from four peripheral wells within one-half mile of the Monument boundary. Geologic characteristics of the Sherard Unit Area in the Monument are similar in nature to those of the Leroy Gas field as a relatively short distance separates them.

Other than the wells discussed above, only three other wells are common to the Monument that do not lie in a defined gas field or unit area yet are not located within the Monument boundary. The three wells are common to the Monument because they lie within active CAs that also are common to the Monument by lease. They were drilled and completed in the 1970s and were shut in due to economic considerations. These wells currently wait on improved economics that would justify the construction of pipelines.

Combined production from wells drilled in the Monument is 5.17 BCF with an additional 9.35 BCF of gas from the peripheral wells outside the Monument. Together this area has produced 14.52 BCF of natural gas since 1968.

## Existing Infrastructure

With the exception of county roads in the Monument (e.g., Cow Island Road) an estimated 26 miles of access roads service twelve gas wells within the Monument. The majority of the access roads are resource roads that allow well service vehicles and company personnel to visit the wells and facilities.

Pipelines service eight wells on Federal minerals within the Monument. The estimated length of pipe supporting the eight wells is 22 miles. Currently, six pipeline sections service the Monument Federal wells and peripheral wells surrounding the Monument, as follows:

- Butch Camp 3.5 mile pipeline servicing the Federal No. 1-7 well, Section 7, T. 25 N., R.21 E.
- Robinson/N. Bullwhacker 5 mile pipeline servicing the Federal No. 1-12 well, Section 12, T. 24 N., R. 21 E. and the State No. 1, Section 16, T. 25 N., R. 20 E.
- W. Bullwhacker 4.5 mile pipeline servicing the Federal No. 31-25-20 well, Section 31, T. 25 N., R. 20 E.
- W. Coal Ridge 0.5 mile pipeline servicing the Federal No. 35-24-18A well, Section 35, T. 24 N., R. 18 E.
- Sherard "E" PA 1 mile pipeline servicing the three Federal Monument wells in Section 27 and 28, T. 25 N., R. 19 E.
- Missouri River Crossing 6.5 mile pipeline servicing one Monument well and six non-Monument wells in the southern portion of T. 23 N., R. 19 E.



# RECREATION

## RESOURCE DESCRIPTION

The recreation resources of the Monument are diverse in nature and provide an expanse of opportunities ranging from camping in developed campgrounds to camping in widely dispersed primitive campsites, from taking an upland vehicle tour on a Back Country Byway to taking a float trip down the Upper Missouri National Wild and Scenic River (UMNWSR), and from hunting elk in the breaks to hunting pheasants on river islands. Recreation resources are rich and diverse and provide opportunities for most every type of interest.

Much of the area is remote and spectacular landforms remain essentially unchanged. Settings vary from riparian corridors to the rolling pine and juniper-covered slopes of the breaks to expanses of sagebrush flatlands. The contrast and diversity provide for a plentiful wildlife population, numerous recreational opportunities, livestock grazing and multiple use activities. Flowing through the heart of the Monument is the Upper Missouri National Wild and Scenic River. Many of the resources and geologic features described by Lewis and Clark during their epic 1805-06 journeys on the river remain virtually unchanged. A boater on the Upper Missouri may pass cattle grazing operations, or the remains of old homesteads, but visually they find little has changed in 200 years.

The area encompassed by the Monument includes four counties: Blaine, Chouteau, Fergus and Phillips. These four counties cover a 17,800 square mile area with a population density of only about two persons per square mile. The population of the four-county area totaled 29,012 according to the Census Bureau's July 1, 1999 estimates (Burchfield and Moisey 2000). Major population areas and rural gateway communities to the Monument include Lewistown, Fort Benton, Havre, Winifred, Big Sandy, Chinook and Malta. The dominant population center of the region is the city of Great Falls (1990 pop. 55,000), located in Cascade County (Burchfield and Moisey 2000).

## RECREATION MANAGEMENT AREAS

Encompassed within the Monument are six Recreation Management Areas (RMAs), as shown below in Recreation Table 1.

**Recreation Table 1. Recreation Management Areas within the Monument**

<b>Recreation Management Area</b>	<b>Type of Designation</b>
South Phillips	Special RMA
Judith	Extensive RMA
Judith River	Special RMA
Nez Perce National Historic Trail	Special RMA
North Missouri Breaks	Special RMA
Upper Missouri River	Special RMA

In general, the Monument can be divided into two categories: the uplands and the Upper Missouri River. The first five RMAs listed in Recreation Table 1 above comprise the uplands portion of the Monument. The Upper Missouri River RMA comprises the 149-mile Upper Missouri National Wild and Scenic River. The majority of developed recreation opportunities and the majority of concentrated recreation use occur in the Upper Missouri River RMA. The uplands tend toward undeveloped and dispersed recreation opportunities. Subsequently, the majority of recreation data collection efforts to date have focused on the Upper Missouri River. The following is a visitor use and recreation overview of the Monument by RMA.

### **South Phillips Special Recreation Management Area**

The South Phillips Special Recreation Management Area is located between the Upper Missouri River and the south boundary of the Fort Belknap Indian Reservation in Phillips County. It is located in the far tip of the southeast portion of the Monument on the north side of the Upper Missouri River. No developed recreation sites are located in this RMA.

Most of the upland recreation activity in this area is big game hunting for mule deer. It is not uncommon for hunters to come to the area and camp out for extended weekends and, occasionally, for a week at a time. In addition, elk, bighorn sheep, and antelope permits are available on a drawing basis for the area. Elk hunting, especially during the archery season, is very popular. Lions are hunted during the take and chase season. Trapping predators and fur bearers is common in this area. Some sage grouse and sharptail grouse hunting also occurs.

Some hiking occurs, mostly in the summer, but has been increasing in all seasons. Hiking activity can be extended day trips, but until recently, most amounted to day hikes from existing roads or trails where camping occurs on undeveloped sites. No organized hiking trail network exists, which is one of the attractions of the area—providing a “search and discover” experience. Other attractions are historic sites, scenery, wildlife viewing, and solitude.

Motor touring/sightseeing is becoming more common in the summer season. Motorcycle off-road use has occurred in some areas of the Monument but is now prohibited under the Proclamation.

This area has some historic color of outlaw activity including the Kid Curry hideout.

### **Judith Extensive Recreation Management Area**

Within the Monument boundary the Judith Extensive RMA includes all the uplands beyond the rim of the river on the south side of the entire 149-mile length of the Upper Missouri National Wild and Scenic River except for the Judith River. Recreation use consists of hunting, scenic and wildlife viewing, and driving for pleasure. There are no developed sites within the Judith Extensive RMA. Most of the upland recreation activity in this area occurs during big game hunting season as hunters pursue elk, mule deer, and antelope. Elk hunting, especially during the archery season, is very popular. A predominant recreation use in this RMA is touring the Missouri Breaks Back Country Byway. River floaters also use the Byway as a vehicle route from river sites to the James Kipp Recreation Area.

### **Judith River Special Recreation Management Area**

Within the Monument boundary the Judith River Special RMA encompasses approximately the last 10 miles of the Judith River prior to its confluence with the Upper Missouri River. No developed sites are located within this RMA, and most recreation use consists of dispersed hunting, fishing, camping, and scenic and wildlife viewing.

### **Nez Perce National Historic Trail Special Recreation Management Area**

The Nez Perce National Historic Trail Special RMA traces a narrow corridor through the North Missouri Breaks RMA from the Upper Missouri River near Cow Island, north to the Bear Paw Battlefield. No developed sites are located in this RMA, but a specific use of this area is for trail rides by private and organized groups commemorating the historic trail of the Nez Perce to the Bear Paw Battlefield site.

Most of the upland recreation activity in this area is big game hunting for mule deer. In addition elk, bighorn sheep, and antelope permits are available on a drawing basis for the area. Mountain lions are hunted during the take and chase season. Trapping predators and fur bearers is common in this area. Some sage grouse and sharptail grouse hunting also occurs.

Some hiking occurs, mostly in the summer, but has been increasing in all seasons. Hiking activity can be extended day trips, but until recently, most amounted to day hikes from existing roads or trails where camping occurs on undeveloped sites. No organized hiking trail network exists, which is one of the attractions of the area—providing a “search and discover” experience. Other attractions are historic sites, scenery, wildlife viewing, and solitude.

### **North Missouri Breaks Special Recreation Management Area**

The North Missouri Breaks Special RMA comprises the bulk of concentrated public land within the Monument. It encompasses all the land within the Monument on the north side of the Upper Missouri River corridor between Virgelle and Cow Island. A considerable amount of dispersed use occurs within this RMA. Sites are mostly undeveloped. However, some sites do have signs and picnic tables.

Most of the upland recreation activity in this area is big game hunting for mule deer. The Bullwhacker area is a destination hunting location for residents and non-residents alike because of the block of public land. It is not uncommon for hunters to come to the area and campout for extended weekends and, occasionally, for a week at a time. In addition, elk, bighorn sheep, and antelope permits are available on a drawing basis for the area. Mountain lions are hunted during the take and chase season. Trapping predators and fur bearers is common in this area. Some sage grouse and sharp-tail grouse hunting also occurs. Approximately six commercial outfitters (hunting) operate in this area on an annual basis.

Some hiking occurs, mostly in the summer, but has been increasing in all seasons. Hiking activity can be extended day trips, but until recently most amounted to day hikes from existing roads or trails where camping occurs on undeveloped sites. No organized hiking trail network exists, which is one of the attractions of the area—providing a “search and discover” experience. Other attractions are historic sites, scenery, wildlife viewing, and solitude.

Motor touring/sightseeing is becoming more common in the summer season. Attractions include the Spencer Road Overlook on the Nez Perce National Historic Trail, Snake Point Overlook on the Lewis and Clark National Historic Trail, and the Gilmore Cabin. Motorcycle off-road use has occurred in some areas of the Monument, but is now prohibited since establishment of the Monument.

A few reservoirs have been planted with fish and will be a small sport fishery for the useful life of the reservoirs. This includes Butch Reservoir and Gazob Reservoir.

Private pilots occasionally use remote airstrips in the Monument for day stopovers with short day hikes.

Christmas tree cutting is an occasional recreation activity in the Bullwhacker and Cow Creek area.

## **Upper Missouri River Special Recreation Management Area**

### Wild and Scenic River Designation

The dominant recreation resource within the Monument is the 149-mile Upper Missouri National Wild and Scenic River. Congress identified the river as an example of the irreplaceable legacy of the American West that should be preserved for present and future generations (Burchfield and Moisey 2000). The Wild and Scenic management for the river extends rim to rim, or all land within the “seen” area of the river surface for most of the 149-mile length. Exceptions occur at each end of the designated segment.

From Fort Benton to Virgelle (river mile 1 to 41.3) the RMA and Wild and Scenic management is from bank-to-bank between the high water lines, except for recreation sites, historic sites and access sites. Throughout this section private land is predominant and bottomlands are farmed for grain or hay.

From river mile 41.3 to 138.8 the RMA and Wild and Scenic management is from rim-to-rim.

The Charles M. Russell National Wildlife Refuge encompasses the lower end of the river (river mile 138.8 to 149), and the RMA and Wild and Scenic management is from bank-to-bank.

The 1978 and 1993 management plans for the Wild and Scenic River affirmed three major classifications: Wild, Scenic, and Recreation. Miles of river in each segment are delineated in Recreation Table 2 below.

**Recreation Table 2. Classifications as Identified in the 1993 River Plan Update for the Upper Missouri National Wild and Scenic River (Burchfield and Moisey 2000)**

River Segment	Length	River Miles	Classification
Fort Benton to Ebersol Bottom	52 miles	1-52	Recreation
Ebersol Bottom to Deadman Rapids	33 miles	52-84.5	Wild
Deadman Rapids to Holmes Rapids	7 miles	84.5-92.5	Recreation
Holmes Rapids to Leslie Point	7 miles	92.5-99.5	Wild
Leslie Point to Magdall Homestead	5 miles	99.5-104.5	Scenic
Magdall Homestead to Cow Island	24 miles	104.5-128.5	Wild
Cow Island to Fred Robinson Bridge	21 miles	128.5-149	Scenic

Developed Sites and Access Points

Major access points to the river include the fairgrounds above Fort Benton, Fort Benton, Coal Banks Landing, Judith Landing and the James Kipp Recreation Area. Lesser-used points include Wood Bottom (Loma), Virgelle Ferry, and Stafford Ferry. Private land access points also exist. The following public sites and facilities support recreation activities taking place in the river corridor. The sites are listed geographically in downstream order, beginning at Fort Benton and ending at the James Kipp Recreation Area.

*Fort Benton Visitor Center* is a developed public access site staffed with volunteers and operated seven days a week from May 1 through September 15. Visitors can obtain information related to recreation opportunities within the Monument.

*Evans Bend* is a primitive boat camp with a metal fire ring.

*Senieurs Reach* is a primitive boat camp with a metal fire ring.

*Black Bluff Rapids* is a primitive boat camp with a metal fire ring.

*Wood Bottom* is a developed public access site with gravel parking area, a vault toilet, and an informal boat ramp. The access road to Wood Bottom is scheduled for reconstruction in September/October 2003.

*Decision Point Interpretive Trail* is a developed public access site with gravel parking area, interpretive kiosk, and interpretive signs on a short hiking trail.

*Coal Banks Landing* is a developed public access site and campground with tent and RV camping, 13 picnic tables, nine fire rings, two vault toilets, two parking areas, a concrete boat ramp, potable water, and a volunteer host contact station. Coal Banks is the primary launch point for visitors boating the Upper Missouri River. Reconstruction of the site is planned but not currently scheduled. Reconstruction will include a new potable water system, irrigated lawns, shade shelters, a new log building check-in center, and additional native landscaping and windbreaks.

*Little Sandy* is a developed boat camp with a vault toilet and two metal fire rings. An administrative road provides access to the site for the purpose of facility maintenance.

*Eagle Creek* is a developed boat camp with two vault toilets and five metal fire rings. Eagle Creek, located on private land, is part of a Recreation Easement purchased by the BLM. An administrative road provides access for the purpose of facility maintenance.

*Hole in the Wall* is a developed boat camp within a fenced enclosure with two vault toilets, five metal fire rings, and two shade shelters constructed of wood. The site has a non-potable well with a hand pump used to irrigate cottonwood and green ash plantings.

*Dark Butte* is primitive boat camp within a fenced enclosure and has two metal fire rings and two composting toilets.

*Pablo Rapids* is a primitive boat camp within an electric fence enclosure. The site has one metal fire ring and a solar panel that supplies power to the fence and power to irrigate cottonwood and green ash plantings.

*Slaughter River* is a developed boat camp within a fenced enclosure. The site has two vault toilets, one shade shelter constructed of wood, and five fire rings.

*The Wall* is a primitive boat camp within an electric fence enclosure. The site has one metal fire ring and a solar panel that provides power to the fence and power to irrigate cottonwood and green ash plantings.

*Judith Landing* is a developed public access site and campground with a concrete boat ramp, two vault toilets, a volunteer host contact station, 11 picnic tables, and nine fire rings.

*McGarry Bar* is a primitive boat camp with one metal fire ring.

*Gist Bottom* is a primitive boat camp with one metal fire ring.

*Cow Island* is a primitive boat camp with two wooden outhouses.

*Upper Woodhawk* is a primitive boat camp with one metal fire ring.

*Middle Woodhawk* is a primitive boat camp with one metal fire ring.

*Lower Woodhawk* is a developed public access site and campground with two picnic tables, two fire rings, and one vault toilet.

*Hideaway* is a primitive boat camp with two metal fire rings.

*James Kipp Recreation Area* is a developed public access site and campground. Kipp is a fee area with 34 tent and RV camping sites with picnic tables and fire rings, gravel access roads, six vault toilets, a concrete boat ramp, RV dump station, volunteer host contact station, interpretive kiosk, and a metal maintenance building.

*Sunshine Ridge Overlook* is an undeveloped scenic viewing site.

### Visitor Use Activities

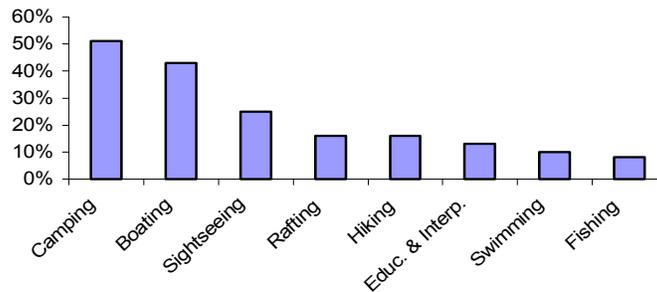
Visitors are attracted to the Upper Missouri River to see and learn about the country Lewis and Clark explored 200 years ago. The river is relatively easy to paddle and attracts visitors of all age groups. The river is popular with organized groups such as Boy Scouts and church groups.

Boating and associated camping and exploring is the predominant use of the river corridor and occurs primarily between June and August (Burchfield and Moisey 2000). A typical river trip on the Upper Missouri consists of a group of six people in canoes or kayaks paddling and camping three nights and four days from Coal Banks Landing to Judith Landing (river mile 41.3 to 88.5). The shoulder seasons in May and September receive fewer visitors. In April and May, anglers are active, and from September through November hunters become the primary user group and access the corridor from the rim by vehicle and the bottomlands by boat (Burchfield and Moisey 2000). Hunting activity is widely dispersed over the river corridor, but a significant portion occurs between Judith Landing and the James Kipp Recreation Area during the big game hunting season.

Hiking, hunting, and sightseeing are popular activities along several segments of the river corridor, and they are particularly popular among floaters, who can supplement their time on the water with exploratory day hikes near campgrounds or picnic sites. Some areas are attractive for non-technical climbs, such as the Hole in the Wall formation, which has a special trail leading from the minimally developed Hole in the Wall Campground. Data for off-site uses has not been collected in the past (Burchfield and Moisey 2000). There are no designated/managed trails along the river corridor, but hiking and exploring among the geologic formations is a popular activity.

The most common recreation activities visitors engage in while on the river are camping, boating, sightseeing, and rafting. See Recreation Figure 1 (Burchfield and Moisey 2000).

**Recreation Figure 1. Recreation Activities (Burchfield and Moisey 2000)**



### Visitor Use Data Collection

Visitor use data for the UMNWSR have been collected since the mid-1970s. Several early studies estimated visitor use and characterized existing use. The BLM has collected visitor use data and estimated annual visitation on an ongoing basis since 1975. More recently, the BLM has conducted several visitor surveys as part of the National Recreation Use Customer Survey conducted at geographically distributed BLM sites across the country (Burchfield and Moisey 2000). Further, the University of Montana conducted a visitor use survey during the 2001 and 2002 float seasons and has been instrumental in assisting BLM in the collection and analysis of visitor use data since May 2000.

The following studies and surveys have been conducted on the Upper Missouri River since 1975:

- 2001 and 2002 University of Montana Upper Missouri River Visitor Surveys
- 2000 BLM Recreation Use Customer Survey with additional questions regarding perceived crowding and potential management actions
- 2000, 2001, and 2002 BLM Exit Surveys
- BLM permitted outfitter visitor use data (1997-2002)
- BLM floater registration records (1996-2002)
- 1999 BLM Recreation Use Customer Survey
- 1998 Missouri Madison Recreation Survey
- 1994-95 Missouri Madison Recreation Survey
- 1979 National River Recreation Study conducted by the USDA Forest Service, North Central Forest Experiment Station
- Collection and Analysis of Visitor Use Information, 1975 by Jon Lee, University of Oregon

Specific responses to the 2001 and 2002 University of Montana Visitor Surveys are located in Appendix K.

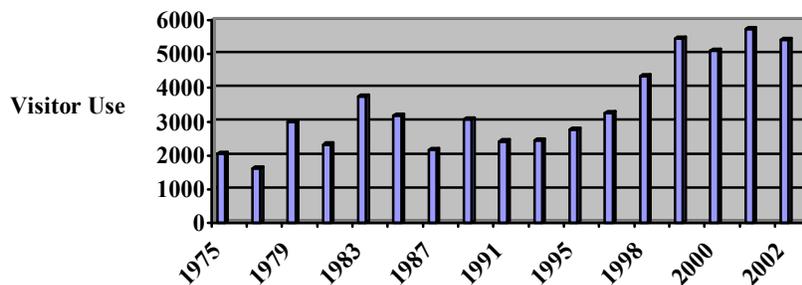
### Characteristics of Visitor Use

The majority of use on the Upper Missouri River occurs in the summer months between June and August. However, recreation along the river corridor in the spring and fall, particularly during hunting season, is also important to visitors. Unfortunately, data on visitor use are only collected

in the summer months, so it is difficult to estimate year-round use levels (Burchfield and Moisey 2000)

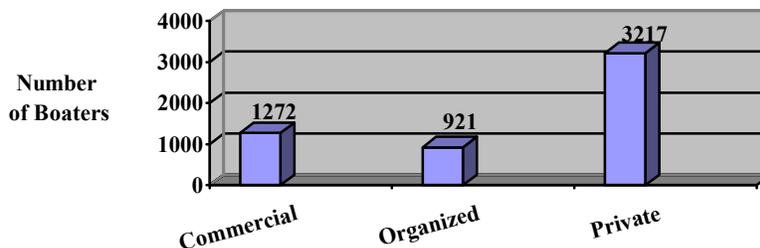
Historically, use increased from 2,060 boaters in 1975 to 3,256 in 1997, an annual increase of 2.6%. In 1998, the BLM stationed full-time hosts at each major access point on the river. During the same year *Undaunted Courage* by Stephen Ambrose was published. Use levels increased to 4,339 in 1998. Since then use has continued to increase with a peak in 2001 of 5,735. Use from 1975 through 2002 is reflected in Recreation Figure 2.

**Recreation Figure 2. Historic Visitor Use on Upper Missouri National Wild and Scenic River 1975 through 2002**



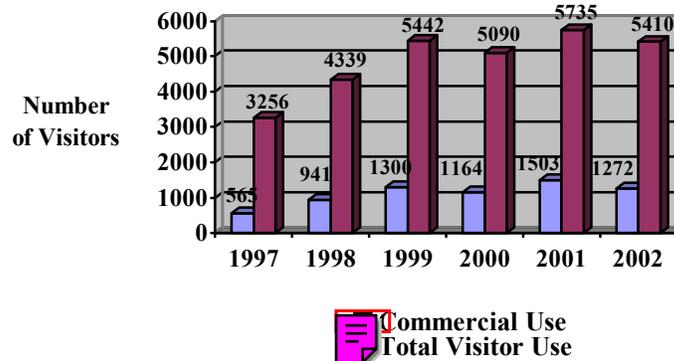
In 2002, visitor registration forms requested boaters identify a user category. Users were separated as guided, organized and private groups. Guided groups were those traveling with a BLM-authorized commercial outfitter. Organized groups were church groups, Boy Scouts, college and university groups, or any other type of formally organized group of users. Private boaters were individuals or groups of individuals that had no formal organized structure and typically were composed of friends and family floating the river. See Recreation Figure 3 for a 2002 breakdown of the number of visitors by group.

**Recreation Figure 3. Number of Boaters by Group Type**



Commercial outfitters have provided visitor services since prior to the Upper Missouri Wild and Scenic River designation in 1978. Commercial trips are an integral part of the visitor use pattern and in 2002 comprised 23.5% of total river use. Recreation Figure 4 compares commercial visitor use to overall visitor use from 1997 through 2002.

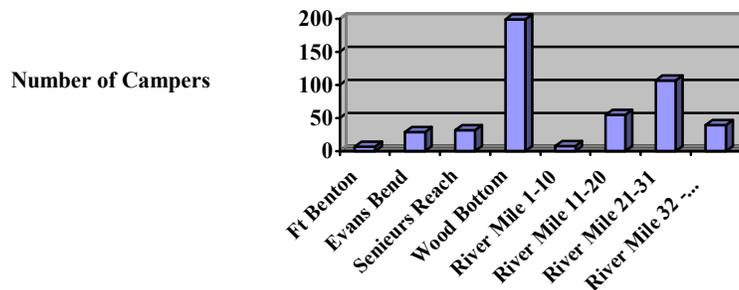
**Recreation Figure 4. Commercial Visitor Use 1997 through 2002**



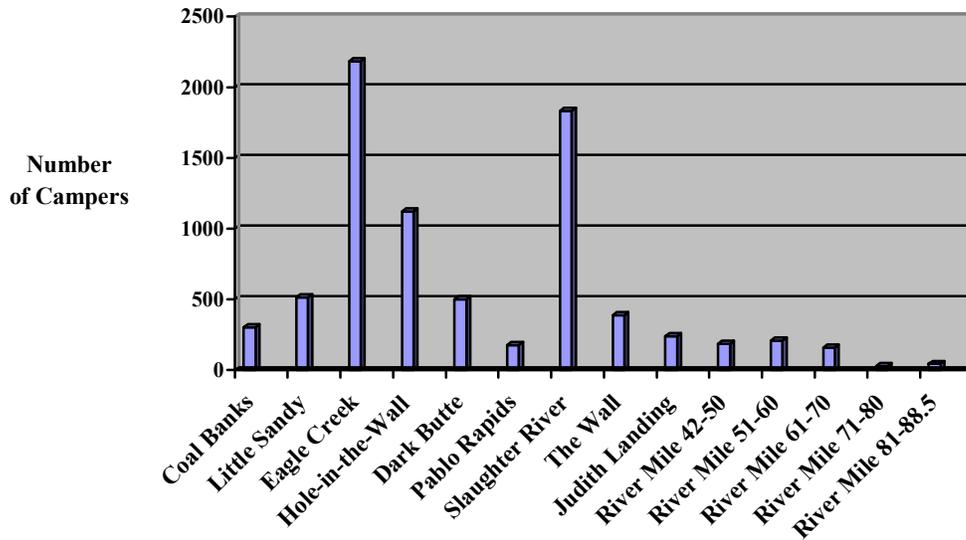
Distribution of use along the river corridor can be illustrated by campsite use. It is apparent most of the overnight use occurs at just a few sites within the river corridor and those are predominantly in the upper White Cliffs section of the river. The majority of overnight use is accounted for at Eagle Creek, Slaughter River, Coal Banks Landing, and Hole in the Wall campsites. Other campsites located within this area and having similar levels of development, such as Little Sandy or Dark Butte, are only lightly used. Sites from Judith Landing downriver are also noticeably less used (Burchfield and Moisey 2000). It is also apparent from the graphs that the majority of overnight use occurs in the White Cliffs section between river mile 41.45 and 88.5.

Recreation Figures 5 through 7 represent overnight camping use by registered boaters. Data were collected through completion of Exit Surveys. All sites listed were accessed only by boaters and do not reflect access by any other means. The three charts are divided by segment of river beginning at Fort Benton and river mile 1. The BLM generally considers Fort Benton to Coal Banks Landing (river mile 1 to 41.5) to be the upper segment, Coal Banks Landing to Judith Landing (river mile 41.5 to 88.5) to be the White Cliffs segment, and Judith Landing to James Kipp Recreation Area (river mile 88.5 to 149) to be the lower segment. Sites listed as a range of river miles were options on the Exit Survey for boaters uncertain exactly where they were and/or for boaters not camping at one of the formal campsites listed on the survey.

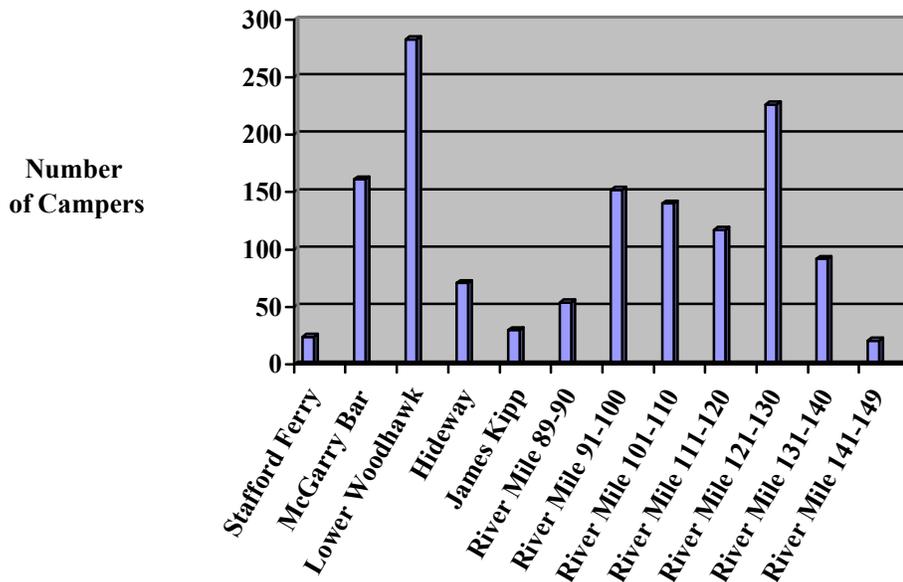
**Recreation Figure 5. 2002 Boater Overnight Use by Campsite Between Fort Benton and Coal Banks Landing (River Mile 1 to 41.5)**



**Recreation Figure 6. 2002 Boater Overnight Use by Campsite between Coal Banks Landing and Judith Landing (River Mile 41.5 to 88.5)**

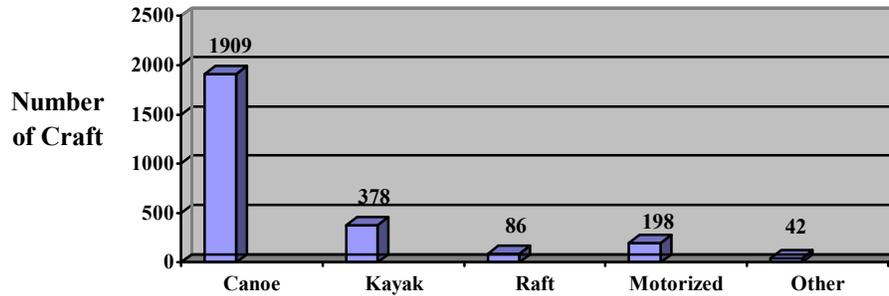


**Recreation Figure 7. 2002 Boater Overnight Use by Campsite Between Judith Landing and Kipp (River Mile 88.5 to 149)**



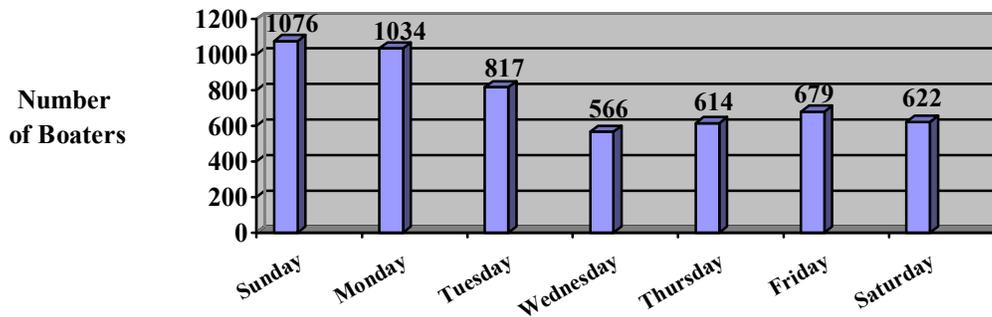
Boating on the Upper Missouri River takes place in a variety of watercraft, including canoes, rafts, motor boats and pontoon boats. Because of the relatively smooth water and the potential for upriver winds, the preferred craft is a canoe. In 2002, motorized craft made up 8% of the overall use. See Recreation Figure 8 for a breakdown of the type and number of watercraft used on the Upper Missouri River in 2002.

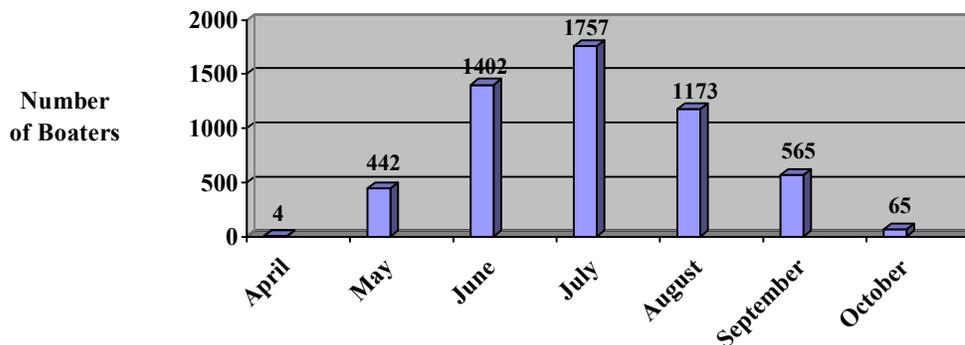
**Recreation Figure 8. Type and Number of Craft Used on The Upper Missouri River in 2002**



Another important use characteristic is the number of resident and non-resident boaters. In 2002, 2,728 residents and 2,682 non-residents registered to boat the Missouri River. The BLM has also collected data on the busiest launch days and which months receive the greatest or least number of users. Recreation Figures 9 and 10 provide a graphical representation of this data.

**Recreation Figure 9. Number of Boaters Launching By Day of Week in 2002**



**Recreation Figure 10. Number of Registered Boaters by Month in 2002**

### Visitor Preferences

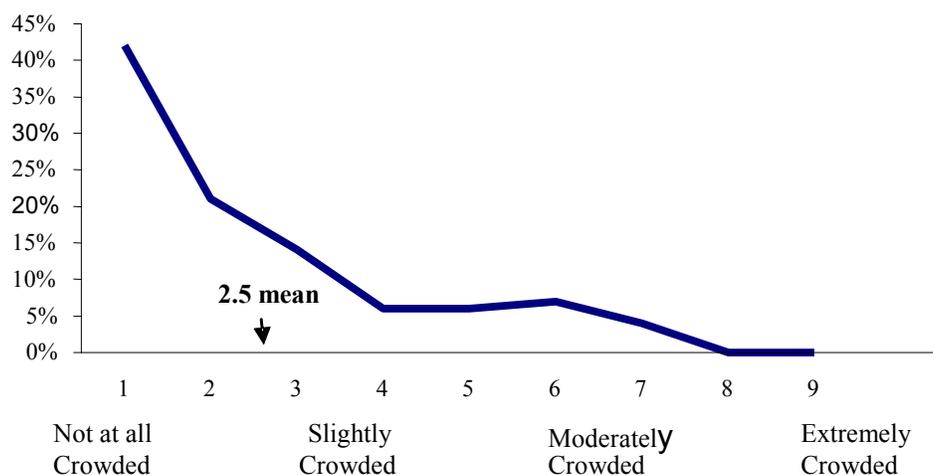
The University of Montana's Jim Burchfield and Neil Moisey completed a visitor use analysis of the Upper Missouri River in December 2000. The following are the results of the analysis, which was based primarily on the 1999 and 2000 BLM Recreation Use Customer Survey and 1999 and 2000 BLM visitor registration and exit surveys.

Much of the 2000 BLM survey replicates the information collected during 1999 and is useful to compare customer preferences over time and with other BLM areas in the country. Most of the survey questions ask visitors to rate the BLM in terms of managing the resources, physical facilities, and providing information and education, and to provide socio-demographic information (Burchfield and Moisey 2000).

Visitors rated the BLM performance quite highly – generally above a 6 on a 7-point scale. The lower rankings were mainly for provision of educational and interpretive information – even these ratings were 5.6 or above on a 7-point scale. Overall ratings of the recreation experience were also ranked highly (6.23) (Burchfield and Moisey 2000).

Visitor socio-demographics were as follows: The average floater was male (72%), about 48 years old, 19% had incomes greater than \$80,000, 61% had a college education or graduate degree, 96% were Caucasian, and 71% were non-residents of Montana (Burchfield and Moisey 2000).

Visitors were asked to rate their perceived level of crowding on their trip and where the crowding occurred. The results are shown in Recreation Figure 11. Perceptions of crowding were quite low – an average of 2.5 on a 9-point scale. These are comparable with the crowding perceptions visitors reported at similar recreation sites in the region. The most commonly cited places where crowding occurred was in the campsites – specifically Eagle Creek, Slaughter River, and Judith Landing. Several respondents also reported feeling crowded on the river (Burchfield and Moisey 2000).

**Recreation Figure 11. Visitor Perceptions of Crowding in 2000 (Burchfield and Moisey 2000)**

The data was further analyzed to identify differences in perceived crowding and any possible impact on trip satisfaction. There were no statistically significant differences in perceived crowding by month of the trip, Montana residents as compared with non-residents, or with overall satisfaction of the recreation experience. In addition, level of crowding had no significant impact on overall satisfaction with the recreational experience (Burchfield and Moisey 2000).

Significant differences in perceived crowding occurred, depending on where people filled in the survey. Visitors responding at Judith Landing (having just floated the White Cliffs section of the Missouri River) reported significantly higher levels of crowding, although these levels were similar to those reported by other river recreation users in the region. In addition, visitors responding to the survey at the two take-outs (Judith Landing and the James Kipp Recreation Area) had higher levels of perceived crowding than those at the two put-in areas (Fort Benton and Coal Banks Landing). Also, visitors reporting higher levels of crowding (5 or above on the 9-point scale) had taken significantly more trips on the river during the previous 12 months (8.3 trips as compared with 1.5 trips for the group reporting lower crowd levels). Those reporting higher levels of crowding accounted for about 17% of all users. About one-third of those reporting high levels of crowding were surveyed at Judith Landing (Burchfield and Moisey 2000).

Crowding is a perceptual construct in that visitors can report different perceptions of crowding even though they have been exposed to the same number of people. Research has shown that there is a weak, if non-existent, relationship between the actual number of visitors and the reported levels of crowding. Many other variables affect visitors' levels of perceived crowding such as expectations of the number of people that will be seen, the type of behaviors, activities, and socio-cultural similarities of other visitors, and prior experience at the site.

Although crowding does not seem to impact the satisfaction levels of current users, the survey did not include those visitors that may no longer use the river during the summer season or at all.

This is called recreation displacement and occurs when recreationists no longer visit a site due to some perceived negative attribute that has developed at that site. Understanding displacement is important because how visitors react to changes in site attributes can affect use and attributes at other sites in the area. Displacement is difficult to measure because managers cannot elicit responses from recreationists who no longer visit, and it is not known where displaced visitors now recreate or even if they continue to do so.

Displacement can occur for a variety of reasons. The most common are conflicts with other user groups, crowding and congestion, and changes in the setting attributes of a site (e.g., the level of site development or a change in management policy).

If visitors are displaced, the existence of substitute sites or experiences can affect how they react to displacement. Typical responses to being displaced are to change the time of the visit (e.g., off-season versus busy times), visit some other site in the region (substitute site), visit some other area (substitute area), engage in some other activity (activity substitute), or to not engage in any activity.

How displacement manifests itself along the river can only be measured by surveying visitors year round (temporal displacement) or at the less commonly used sections (spatial displacement). Visitors that no longer use this stretch of the river cannot be surveyed as we do not know what substitute sites or resources they may be using.

## **Visitor Preferences for Management Options**

Generally, visitors were more supportive of less intrusive management options (e.g., educational materials on low impact camping practices, providing more camping opportunities, etc.) than charging fees or instituting a permit system.

Montana residents were much more likely (76%) to support leaving the river as it is with uncontrolled private launches and not have a lottery than non-residents (48%). Montana residents were also much more likely to favor leaving facilities as they are and not have a fee system (62%) than non-residents (40%).

Visitors with higher perceptions of crowding were significantly more likely (56%) to favor primitive camping sites when compared with more developed camping sites than those with lower perceptions of crowding (33%).

Based on registration data, use has been mostly level for the past four seasons. It is expected, however, to spike in 2005 and 2006 during the Lewis and Clark Bicentennial celebration.



# TRANSPORTATION

## RESOURCE DESCRIPTION

This information is associated with a motorized travel and transportation system that currently exists to meet resource management and visitor services needs to and/or within the Monument. The travel plan inventory pertains to all modes of transportation from aircraft to motorized vehicles including ATVs/bikes. The inventory identifies: a) existing small aircraft landing strips, b) existing transportation routes and related facilities including cattleguards and culverts, c) length of route, d) whether the existing or designated route is improved or unimproved, e) type of road surface (aggregate or soil), f) single lane or two-track, and g) destination (end point) associated with the route. The information contained herein is incomplete at the time of this writing.

### Aviation

Four aircraft landing strips have been identified on the north side of the Missouri River in Blaine County. Five additional landing strips need to be located on a map as mentioned by the Montana Pilots Association in scoping comment letter No. 2017 (locations unknown by BLM staff).

### Roads

#### Inventory

A two-person seasonal crew inventoried 436 miles of BLM roads within the Monument using a GPS Trimble unit. Also included in the work were an additional 323 miles of State land, county, and private access routes to or within the Monument boundary. The inventory crew collected information on a total of 759 miles during the 2002 summer. This comprises essentially all the routes east of Stafford Ferry, or about 70% of the Monument.

#### **BLM Roads (only those BLM routes located within the Monument boundary)**

There are three classifications of BLM roads: collector roads, local roads, and resource roads (BLM Manual 9113.16). The latter include the unimproved or two-track routes and account for the majority of the roads inventoried

Collector Roads: These Bureau roads normally provide primary access to large blocks of land, and connect with or are extensions of a public road system. Collector roads accommodate mixed traffic and serve many uses. They generally receive the highest volume of traffic of all the roads in the Bureau road system. User cost, safety, comfort, and travel time are primary road management considerations. Collector roads usually require application of the highest standards used by the Bureau. As a result, they have the potential for creating substantial environmental impacts and often require complex mitigation procedures.

Local Roads: These Bureau roads normally serve a smaller area than collectors, and connect to collectors or public road systems. Local roads receive lower volumes, carry fewer traffic types, and generally serve fewer uses. User cost, comfort, and travel time are secondary to construction and maintenance cost considerations. Low volume local roads in mountainous terrain, where operating speed is reduced by effort of terrain, may be single lane roads with turnouts. Environmental impacts are reduced as steeper grades, sharper curves, and lower design speeds than would be permissible on collector roads are allowable.

Resource Roads: These Bureau roads normally are spur roads that provide point access and connect to local or collector roads. They carry very low volume and accommodate only one or two types of use. Use restrictions are applied to prevent conflicts between users needing the road and users attracted to the road. The location and design of these roads are governed by environmental compatibility and minimizing Bureau costs, with minimal consideration for user cost, comfort, or travel time.

### **State Lands (Department of Natural Resources and Conservation) Roads**

Eleven different segments have been designated as open roads within the Monument by the DNRC Northeastern Land Office located in Lewistown, as follows:

### **County Roads**

The BLM requested that the County Commissioners for Blaine, Chouteau, Fergus, and Phillips Counties identify county roads that provide public access routes to or within the Monument along with documentation to verify that designation. Although the four counties have not yet completely finished this task as cooperating agencies, they have provided maps indicating the majority of this road network.

#### Blaine County

Blaine County roads include:

Cow Island Road	Lloyd Road
Birdtail Road	Power Plant Ferry Road

#### Chouteau County

Chouteau County roads include:

Butte View Road	Graceville Road	Rowe Bench Road
Clear Lake Road	Hopp Road	Sheep Coulee Road
Eagleton Road	Judith Landing Road	Twin Lakes Road
Eight Mile Bench Road	Loma Bridge Road	Virgelle Ferry Road
Flat Creek Road	Panton Road	White Rocks Road
Gardiner Road		

Resource Description

Fergus County

Fergus County roads include:

DY Trail	PN Road
Everson Bench Road out of Denton	Stafford Ferry Road
Knox Ridge Road	Whiskey Ridge Road

Phillips County

Phillips County roads include:

Bull Creek Road  
Power Plant Ferry Road

**U.S. Fish and Wildlife Service Roads**

Included for the Charles M. Russell National Wildlife Refuge is the Knox Ridge Road westward from the James Kipp Recreation Area (U.S. Highway 191) to the Monument boundary.

**U.S. Bureau of Indian Affairs Roads**

Included for the Fort Belknap Reservation is the Cow Creek East Road to U.S. Highway 191 near Hays.



# **FIRE**

## **RESOURCE DESCRIPTION**

### **Wildland Fire Ecology**

General fire ecology conclusions for the entire Monument will be extrapolated from a study done in the Armells Creek drainage in 2002 and other available and published data. These conclusions will be revised after the vegetation and fire history survey of the Monument is completed in the summer of 2003.

The landform is a series of drainages and ridges running mostly north to south. The area is made up of rolling upland plateaus with moderate to deeply incised canyons. Native vegetation is primarily sagebrush and grasslands on the plateaus, changing to ponderosa pine, Douglas-fir and juniper forests on the canyon slopes. Riparian shrubs and cottonwood trees are found along the Missouri River and in the drainage bottoms throughout the area. Some of the private uplands are in annual cereal crop production, some are in the Conservation Reserve Program maintaining an undisturbed cover of perennial grass, and the remainder are native rangelands.

The entire breaks area is a fire-adapted ecosystem. For a period of time every year, usually from late May to late July, when wet thunderstorms are a regular occurrence, and lightning sparks numerous fires. In most cases, these fires remain small due to the moisture present in the thunderstorms and the green vegetation during the late spring and early summer months. The fires that do grow to a larger size (usually less than 500 acres) start in the timbered areas of the breaks. The larger size fires result from a combination of fuel buildup, drought conditions, and high winds after ignition.

Lightning fires alone do not account for the wide spread occurrence of fire and the fire-adapted nature of the vegetation in the Monument area. A growing body of research suggests that for over 10,000 years the vegetation in the northern Great Plains and the Monument area was maintained and manipulated by Native Americans' deliberate use of fire (i.e., the historical equivalent of prescribed fire). Of the Native American tribes that frequented the Monument area, Williams (2002) documents deliberate fire use among the Shoshone, Blackfoot, Assiniboine, and Gros Ventre. Early settlers observed Indians setting fires in the Shonkin Creek area (Geraldine Historical Society 1976). The season for these pre-settlement prescribed fires was usually during periods of vegetative dormancy between mid-September and mid-May, and outside the lightning fire season, after late July (Kay 1994). Some post-settlement burning occurred in the late 1800s or early 1900s for land clearing or to improve range forage. Since the early 1900s the deliberate use of fire to maintain desired vegetation and wildlife habitat has been almost non-existent in the Monument area.

### **Wildland Fire History**

Fire history for this area is based on vegetation types in the non-forested areas and fire scar data and tree age classes in the timbered areas. Based on analysis of the Fergus Triangle and Armells

Creek areas (Balison 2002), the beginning of noticeable settlement and active fire suppression was 1911. During the pre-settlement period from 1841-1911, the average fire frequency interval was 7.7 years. The range of actual fire occurrence for this period runs from 2 to 29 years. Most of the fires recorded were low intensity surface fires that killed few trees as multiple fire scars were common and the majority of trees were established in the 1860s.

Since settlement, every indication shows a decrease in fire return interval for the Monument area, but additional fire history analysis needs to be completed. The fieldwork for this analysis will be completed during summer 2003, and a geospatial analysis of fire regime and condition class (Schmidt, et al. 2002) will be completed for the Monument in fall 2003 through winter 2004.

Current fire history is based on fire reports from 1980 to 2003. During this period, the BLM and cooperating agencies have responded to 134 lightning fire and 10 human-caused fires in the Monument area that burned a total of 6,551 acres. The majority of the reported fires occurred in the timber/grass fuel type.

## **Fire Hazard**

Fire could be beneficial in much of this area by regenerating decadent shrubs, reducing the encroachment of juniper into grasslands and forest understory, and reducing the density of ponderosa pine and Douglas-fir in timbered areas. In order to improve and maintain ecosystem health and productivity, the pre-settlement fire regime should be restored. However, unplanned fire under uncontrolled conditions in certain areas could threaten structures on private and federal land in the Monument and could result in negative impacts to wildlife habitat and vegetation. Areas of heavy fuel loading such as timbered coulees and brushy draws that have been without fire for 50 to 80 years are most vulnerable to negative impacts from uncontrolled fires.

## **Wildland-Rural Intermix**

Rural intermix sites within the Monument consist mainly of scattered ranches and recreation areas along the Missouri River. Private ranches adjacent to public land are located within the Monument. Vegetation consists of grass and sagebrush with scattered pockets of timber and croplands near most ranches. Recreation sites along the Missouri River include the Richard Wood Watchable Wildlife Area, Coal Banks Landing, Judith Landing, Stafford Ferry, and the James Kipp Recreation Area.

# WILDERNESS STUDY AREAS

## RESOURCE DESCRIPTION

### Antelope Creek (MT-065-266)

#### Land Description

The Antelope Creek Wilderness Study Area (WSA) is located on the north side of the Missouri River in Phillips County and contains 12,350 acres of public land. It is contiguous on its south side with the Charles M. Russell National Wildlife Refuge (CMR). This WSA is bounded on the north by Fortress Butte, Hideaway Ridge and the Power Plant Ferry Road and private, State and public land; on the west by the Power Plant Ferry Road; on the south by the Missouri River, CMR and private land; and on the east by the Antelope Ridge Road.

The unit has typical river breaks topography with steep, highly eroded coulees formed by tributaries that drop toward the Missouri River. Most of the unit is barren or sparsely vegetated. Where slopes and soil allow, vegetation usually includes short prairie grasses, sagebrush and greasewood. Juniper, ponderosa pine, lodgepole pine and Douglas-fir grow along the coulees, covering about 20 to 30% of the area. An occasional cottonwood can be found there or along the river.

The Antelope Creek WSA is part of the Missouri Plateau in the Northern Great Plains, where the Missouri River has cut a canyon 600 to 800 feet deep. Exposed rock in the breaks is largely sedimentary shales and sandstone. The present topography of the unit was formed during the Pleistocene Period when the ice sheet covering the region melted. The Missouri River established a course south of the Bears Paw and Little Rocky Mountains, cutting deeply into the soft shales and sandstone of the area to form the numerous steep hills and deep coulees typical of the Antelope Creek area.

#### Naturalness

The WSA is apparently natural. The rough terrain of Antelope Creek has restricted most manmade features to ridge tops where 12 vehicle ways have provided vehicle access to the WSA. These ways are dispersed throughout, with several radiating out from the Antelope Creek Road, which forms the eastern boundary of the WSA. The WSA contains one reservoir which creates no impact on apparent naturalness of the WSA.

The few developments in the WSA are used to facilitate livestock grazing and provide hunting access, and would not require substantial rehabilitation if the area became wilderness. The vehicle ways on ridges, used mainly for seasonal hunting or sightseeing, would revegetate from lack of use. Because developments are scattered throughout the WSA, boundary modifications would not significantly increase the WSA's apparent naturalness.

## **Solitude**

The Antelope Creek WSA has outstanding opportunities for solitude. The rugged terrain, characterized by a number of parallel drainages opening to the Missouri River screens most activities that may occur on nearby ridge tops. The off-site impacts affecting solitude include vehicle use on the surrounding roads. The Antelope Creek Road forms the eastern boundary. Traffic volume on this road is low during the spring and early summer, but increases substantially during late summer and fall by hunters. The broken topography near the road limits the impacts to areas adjacent to the road. Periodic traffic is visible on the Power Plant Road along the northern and western borders during the dry summer months, but the traffic only impacts areas within one-half mile of the northern boundary of the WSA.

## **Primitive and Unconfined Recreation**

While no single recreational opportunity was identified as outstanding, the WSA provides a diversity of primitive recreation opportunities, including hunting, horseback riding, hiking, photography and rock climbing. Hunting is currently the most popular activity, normally occurring along ridges with vehicles. The Upper Missouri National Wild and Scenic River (UMNWSR) is also an important recreational addition. Visitors floating the river can camp along the unit's shoreline, fish from the bank, hike the coulees, or enjoy the outstanding scenery.

Public access into the WSA is available along the Power Plant Ferry Road, the Antelope Creek Road, and from the Missouri River by boat, but most other access routes are controlled by private landowners. Rain or snow can make any of the dirt access roads impassable. Weather conditions normally limit access to May-October or during dry weather.

## **Special Features**

The Antelope Creek WSA has a very scenic and rugged appearance. Its dry and heavily eroded terrain combines steep slopes of exposed shale with many narrow finger ridges. Trees are few and are normally concentrated near ridges.

Artifacts of both prehistoric and historic eras may be found in the WSA. Of particular historic significance is Kid Curry's Outlaw Hideaway, just north of the WSA on private land. In this WSA, 35.49% of the acreage is in the UMNWSR. The area has a scenic designation, which means the area will be managed to preserve the scenic and natural characteristics.

## **Cow Creek (MT-066-256)**

### **Land Description**

The Cow Creek WSA lies north of the Missouri River and contains approximately 34,050 acres. Of this total, 17,050 acres along the western side of the WSA is within the West HiLine Resource Management Plan area (Havre Field Station manages this portion), and along the eastern portion, 17,000 acres are within the Malta Field Office area. The river is the southern boundary of the Cow Creek WSA. Forming the east, west and northern boundary of the WSA

are roads, private land, and Montana State land, or the natural topographical contours. Boundaries are extremely difficult to locate on the ground except for along the roads.

The complete unit, with split management, lies within both Blaine and Phillips Counties, and approximately 2,018 acres are in the “Wild” section of the UMNWSR. Most of the “Wild” acreage of the UMNWSR is within Blaine County.

Most of the terrain is rugged and steep along the numerous drainages that feed into Cow Creek and the Missouri River. The Bull Creek-Winter Creek drainages have spectacular sandstone cliffs forming the drainage walls. In sharp contrast, some parts of the WSA are rolling open prairie, particularly toward the southeast corner. Where slopes and soil allow, the vegetative cover is predominantly short prairie grasses, sagebrush and greasewood. Ponderosa pine, lodgepole pine, Douglas-fir and juniper are prevalent throughout the WSA, with the densest stands growing along the northern end.

The Cow Creek WSA is part of the Missouri Plateau in the Northern Great Plains, where the Missouri River has cut a canyon 600 to 800 feet deep. Exposed rock in the breaks is largely sedimentary shales and sandstone.

The present topography of the area was formed during the Pleistocene Period when the ice sheet that covered the region melted. The Missouri River established a course south of the Bears Paw and Little Rocky Mountains, cutting deeply into the numerous, steep hills and deep coulees typical of the Cow Creek WSA.

### **Naturalness**

The majority of the Cow Creek WSA is apparently natural. The manmade developments in many cases are screened by the rugged topography and vegetation.

A number of vehicle ways, reservoirs, and fences are located on Winter Ridge in the area recommended suitable for wilderness. These developments are screened from view by rolling, hilly terrain, as well as by many trees and shrubs; but altogether this does not impact naturalness from some vantage points. The remainder of the area recommended suitable for wilderness is apparently natural.

Several developed areas are within parts recommended nonsuitable and adversely affect naturalness. A 600-acre area east of Saskatchewan Butte (T. 25 N., R. 23 E., Section 31 and T. 24 N., R. 23 E., Sections 5, 6, 7 and 8) has two reservoirs, one diversion dam, three vehicle ways and a power line, all easily visible. The WSA also contains two drilling pads, several miles of vehicle ways, reservoirs, and fences. Most of these features are screened by timber and broken terrain; however, they create an impact on naturalness from some vantage points.

## **Solitude**

Solitude opportunities are outstanding in the Cow Creek WSA. The topography provides excellent screening. Solitude opportunities are best along Gore, Cabin, and Winter Creeks and the lower reaches of Bull Creek, primarily in areas recommended suitable for wilderness designation. The size of these drainages, combined with their lack of development, supplement solitude. One cherry-stemmed road is in the area recommended suitable for wilderness. Some potential exists for disruption of solitude to persons on or near this road from periodic vehicle use.

Solitude values in the parts of the Cow Creek WSA recommended as non-suitable would be affected by the unit's configuration and three cherry-stemmed roads. A home site is occupied during the summer, and a road is also visible (T. 25 N., R. 23 E., Section 31 and T. 24 N., R. 23 E., Sections 5 and 6). Visitors to areas outside the major drainages and nearer the perimeter of the WSA, primarily parcels in the WSA that were recommended as nonsuitable, have more potential for human contact.

The small conifer groves in the prairie terrain of the WSA's southeast corner provide little screening, and traffic can be seen and heard from the southern boundary road and the Coyote Coulee cherry-stemmed road.

## **Primitive and Unconfined Recreation**

While no recreational activity is considered outstanding, the diversity of opportunities available make this area excellent for primitive recreational use.

Primitive forms of recreation in the Cow Creek WSA include hunting, horseback riding, hiking, photography and rock climbing. Hunting is the most popular activity at the present time. It is normally limited to areas around access roads because of the difficulty of retrieving game. The UMNWSR, adjacent to the part of the area recommended as suitable for wilderness, has increased the public's awareness of recreational opportunities in the WSA. People floating the river often stop to hike and explore within the unit. Several good camping sites can be found along ridges or near the river.

Hazards to recreationists include rattlesnakes, lack of drinking water, difficulty of travel in wet weather, and the area's steep terrain. Steep slopes may channel use to the major drainages or finger ridges, concentrating visitors in a few locations.

Most public access into the Cow Creek WSA is available along the southern boundary, either via the Missouri River or Bull Creek Road. Other access is controlled by private landowners. Wet weather and snow normally restrict access to May-October or during dry weather.

## **Supplemental Values**

Scenic features are a notable attribute of the Cow Creek WSA. Of particular beauty is a four-mile long, sheer wall of sandstone that lies on the west side of the Winter Creek drainage in a

portion of the WSA recommended as suitable for Wilderness. Wind and water have carved this wall into many castle-like formations suitable for climbing.

The WSA is also historically rich. The Winter Creek Drainage was used for catching wild horses at the turn of the century. The box canyon above the creek formed a natural corral called Horse Thief Pass. Along this canyon and near Shetland Divide names are etched in the sandstone that date back to the early 1900s. Additionally, tipi rings, rock cairns, and a buffalo jump indicate that the area was used extensively by early people. Along the west boundary, the Nez Perce Indians traveled the historic Cow Island Trail during their escape attempt to Canada in 1877.

## **Woodhawk (MT-068-246)**

### **Land Description**

The Woodhawk WSA is on the south side of the Missouri River in Fergus County and consists of 8,100 acres of public land. This WSA is bounded on the north by Sunshine Spur Road and public land; on the west by Woodhawk Trail Road, State and public land; on the south by the Two Calf and DeMars roads; and on the east by the Missouri River and private land.

The WSA is compact, 4 miles long by 2.5 to 4 miles wide, with the distance from the center to the perimeter about 1.5 to 2 miles. The WSA is typical of broken topography in the Missouri River breaks. The south slopes are open banded clay supporting short grasses. Two-thirds of the WSA support ponderosa pine, juniper, and a few Douglas-fir trees. Two major drainages flow east-west into the Missouri River, leaving a deeply eroded landform in their wake.

The Woodhawk WSA is part of the Missouri Plateau in the Northern Great Plains. Here, the Missouri River has cut a canyon 600 to 800 feet deep. Exposed rock in the breaks is largely sedimentary shales and sandstone.

The present topography of the Woodhawk WSA was formed during the Pleistocene Period when the ice sheet covering the region melted. The Missouri River established a course south of the Bears Paw and Little Rocky Mountains, cutting deeply into the soft shales and sandstone of the area. This formed the numerous steep hills and deep coulees typical of the Missouri River breaks.

### **Naturalness**

With the following exceptions, the area appears natural. A cluster of reservoirs are located in the southern third of the area in T. 23 N., R. 21 E., Sections 25, 26, and 27, which adversely affect natural values. The cherry-stemmed Deweese Ridge Road, which ends 1.5 miles inside the area's boundary, detracts from naturalness in the center of the unit.

The manmade features inside the unit are mostly associated with livestock grazing. Boundary modifications would not significantly increase the WSA's apparent naturalness because the manmade features are dispersed throughout the area.

## **Solitude**

There are areas where opportunities for outstanding solitude are available.

Approximately 60% of the Woodhawk WSA has good-to-excellent screening vegetation, but bare, south-facing slopes lack screening. The middle and the southwestern edge of the WSA lack forest vegetation because of a fire in the late 1980s. In portions of the unit, the topography also provides good screening, creating opportunities for solitude.

The Deweese Ridge Road, located in the middle of the WSA, is on a high, open ridge and is heavily used during the big game hunting season. This road is the only access to the central portion of the area and dead ends in the middle of the WSA. This dead end tends to concentrate both motorized and nonmotorized users, detracting from the wilderness quality. Vehicle traffic is not the only distraction. Farming operations to the south and north are visible and often audible, affecting the overall opportunity for solitude from the high ridges and hilltops.

## **Primitive and Unconfined Recreation**

The Woodhawk WSA does not contain outstanding primitive and unconfined recreational opportunities.

Primitive recreational possibilities in the unit consist of rock climbing on the cliffs (T. 23 N., R. 21 E., Sections 13 and 24), horseback riding on the ridgelines or main drainages, hiking, hunting, and sightseeing. Recreation users presently drive motorized vehicles on Deweese Ridge Road or on Sunshine Spur Road located in T. 23 N., R. 21 E., Sections 1, 2, 11, and 12. These roads are also used for fire control. Floaters use some camping areas along the river, even though no potable water is available in the unit. Good campsites can also be found along Deweese Ridge in the middle of the WSA. Although access is very good, rain or snow can quickly seal off the area, limiting the user season to May-October in dry conditions. Hunting quality is restricted by the difficulty of game retrieval and by fluctuating game populations. Rattlesnakes and the steep slopes provide hazards to unwary visitors.

## **Supplemental Values**

The Woodhawk WSA is characterized by colorful, broken topography. Most south slopes are open, banded clay. Two major drainages flow east-west into the Missouri, leaving a deeply eroded landform in their wake. The best view of this spectacular scenery is from the access roads and the cherry-stemmed Deweese Ridge Road.

The WSA contains several prehistoric occupation sites. In historic times, woodhawkers cut timber there to fuel steamboats on the Missouri River (hence the name of this area), and the unit was probably traversed by Chief Joseph's Nez Perce in their attempt to escape to Canada in 1877.

## **Dog Creek South (MT-068-244)**

### **Land Description**

The Dog Creek South WSA consists of about 5,150 acres of public land on the south side of the Missouri River in Fergus County. The WSA boundary on the north is the river's edge, and on the south a maintained road. Elsewhere, property ownership lines are not easily discernable on the ground.

The WSA is fairly compact, about 5 miles long and 1 to 3 miles wide. Drainages of intermittent streams are extremely steep and are separated by narrow, barren ridges. The WSA contains very little screening vegetation, but topographic screening is abundant due to the rugged river breaks topography. Since steep slopes run from the overlooking ridges down to the river, wilderness users would probably be channeled to a few areas along the Missouri River to isolated pockets between minor drainages or along flat ridge tops.

The drainages to the north and west drop directly toward the PN Ranch at the mouth of Dog Creek and toward other ranches north of the river.

### **Naturalness**

A total of ten manmade features are found on this WSA. They are mostly scattered and well screened, but one vehicle way (route) is the exception. Traversing the northern end of the unit for about 4.75 miles, this route is easily visible from the river and from the ridge tops. Although the route is revegetating in places through lack of use, it is a major infringement on the naturalness of the WSA's northern end. Mechanical rehabilitation would probably create more damage than if the way were allowed to revegetate over time.

The other manmade features are mostly associated with livestock grazing. Because of the location of most manmade features, boundary modifications would not significantly increase the apparent naturalness of this WSA.

### **Solitude**

Overall, solitude in this unit is seriously affected by continuing agricultural operations adjacent to the northern and western parts of the Dog Creek South WSA, and these opportunities are limited to isolated drainages in the center of the WSA.

Developments within a few hundred yards of the WSA's southern edge influence solitude because of the dust, noise, and reflections of moving vehicles and people. Extensive farming operations are also readily visible from the WSA, being from 400 yards to one-half mile away in much of the unit. From spring to fall, farm vehicles are regularly used on adjacent fields.

Motorized traffic down the Missouri River, and road traffic on Highway 236 and the PN Bridge across the Missouri further infringe on solitude, adversely affecting approximately 2,000 acres

on the north and west sides of the WSA. True solitude is available only in the center and eastern portions of the unit.

### **Primitive and Unconfined Recreation**

The WSA's location on the Missouri River contributes to the primitive recreation opportunities found here, which include fishing from the shore, waterfowl hunting, and camping. Other possible recreational uses include hiking, horseback riding, nature study, and photography. Present uses are limited to sightseeing (by vehicle), hunting for mule deer, and camping along the river. The nearness to Highway 236 traffic and farm-ranch operations in this general area makes the river campsites in the Dog Creek WSA less desirable than other locations along the Missouri River. Some camping sites can be found on the long ridges inside the unit, although the lack of trees and water make camping there less attractive. Like the other WSAs near the Missouri River, Dog Creek South provides good hunting. Possible detriments to hunting are restricted access through private land, the difficulty of retrieving game, and fluctuating game populations.

The area is remote from population centers and inaccessible in wet or snowy weather. The user season would be from May-October, in dry conditions only. Physical hazards to visitors in the area include rattlesnakes, steep terrain, lack of drinking water, and the difficulty of travel in wet weather. The lack of forest vegetation, outside distractions, the channeling of visitors into the deep drainages, narrow, long ridge lines, and the small size of this WSA all mean the Dog Creek South WSA does not offer outstanding opportunities for wilderness recreation.

### **Supplemental Values**

The Dog Creek WSA has striking vertical, heavily eroded scenery, a notable attribute. Most slopes are open clay with prairie vegetation on the ridge tops. There are very few trees. The WSA contains a remnant from the homesteading era and is next to the PN Ranch, which is important to the history of the area.

## **Stafford (MT-066-250)**

### **Land Description**

The 4,800 acre Stafford WSA is just north of the Missouri River between the PN Bridge and Stafford Ferry in Chouteau and Blaine Counties. This unit includes 4,346 acres in the UMNWSR Management Corridor; 425 acres in the "Scenic" section, 113 acres in the "Recreational" section, and 3,808, acres in the "Wild" section. Parts of the WSA are bounded by the Birch Creek Ridge Road, the Boiler Bottom vehicle way, State land, public land, the Missouri River, and private land. All the land within its border has Federal surface and subsurface ownership.

## **Naturalness**

The rugged terrain of the Stafford WSA has limited human imprints, which helps retain the natural appearance. Developments are few and scattered, lying primarily on the unit's periphery. The manmade features are of low significance being substantially unnoticeable. Because of their location, boundary modifications would not significantly increase the apparent naturalness of this WSA.

The few developments inside the unit are mostly associated with livestock grazing. As with all WSAs, facilities would not be rehabilitated if they were found to be unnecessary for grazing management. Vehicle ways that follow ridges and are used primarily for seasonal hunting or sightseeing would revegetate naturally if not used.

## **Solitude**

The Stafford WSA is long and narrow, stretching eight miles in length and 0.5 to 1.5 miles in width. It is found in a rugged portion of the Missouri breaks with steep and highly dissected coulees that are often sparsely vegetated. Where slopes and soils permit, vegetation is composed of prairie grasses, sagebrush, and juniper. Patches of cottonwood parallel the river and juniper and pine grow in a few isolated groves.

Since the unit has few tall plants, very little screening is available from vegetation, but topographic screening is abundant. Steep slopes running down from ridges overlooking the Missouri River would probably channel wilderness users into a few areas along the river to isolated pockets between minor drainages or along flat ridge tops. This decreases the opportunity for solitude in this unit.

The opportunity for solitude is also affected by adjacent homes, vehicle use along surrounding roads, boat travel on the river, and by four farm-ranch operations next to the WSA. Fields are farmed up to the WSA boundary in the northeast end and other farming operations are within 0.75 miles of the WSA. Farm equipment is occasionally visible and audible during the main recreational season of May-October. The farming operation in Section 13 has an aircraft runway and the operators regularly fly over the WSA.

The county road to the Stafford Ferry, immediately across the river from the east end of the Stafford WSA, is well used during the summer. A hayfield and home site are also just opposite the east end of Stafford, with the sight and sound of its irrigation system present throughout the summer growing season. Solitude in west Stafford is reduced by nearby farming operations. Use of the PN Bridge and the periodic maintenance of the county road will continue to be a distraction into the future. More traffic will also travel on the Birch Creek Road which forms part of the boundary of the WSA. These off-site impacts are well within both the sight and sound zone of 25% of the Stafford WSA.

## **Primitive and Unconfined Recreation**

Typical recreational opportunities in the Stafford WSA include horseback riding, hunting, hiking, sightseeing, photography, and shoreline fishing. Hunting is the major use, and usually involves vehicles traveling along the ridge tops of the north boundary. Travelers along the UMNWSR can find limited campsites along the shorelines of the WSA and can hike the coulees or enjoy the area scenery.

Although some opportunities exist for primitive recreation, use is limited in various ways. The steep terrain channels use along the river or the finger ridges, while the lack of screening vegetation limits campsites to the few scattered groves of trees along the Missouri River. Rattlesnakes, lack of water, and difficulty of travel during wet weather present hazards to the wilderness user.

This WSA, like almost all of the Missouri River breaks, contains features of scenic and historic value. Steep coulees and clay cliffs offer stark contrast to the Missouri River. Evidence of the area's use by Indians and homesteaders can be found in the WSA and an old wagon road forms its eastern border.

## **Ervin Ridge (MT-068-253)**

### **Land Description**

The 10,200 acre Ervin Ridge WSA is just north of the Missouri River and ten miles east of the Stafford (McClellan) Ferry Crossing. Nearly 50% of the WSA lies within the UMNWSR corridor. All the land within its border have Federal surface and subsurface ownership.

### **Solitude**

About 10 miles long and 0.25 to 0.75 miles wide, this unit is irregularly shaped. The rugged topography of steep and highly eroded ridge lines tapers to narrow edges before dropping to the Missouri River. The terrain provides solitude but the steep slopes also channel visitors along the river and to the ridge tops. Where slopes and soils allow, the vegetation cover is predominantly short prairie grasses and sagebrush, while 20% of the area has groves of ponderosa and lodgepole pine, juniper and Douglas-fir. An occasional cottonwood is found along the river. Vegetation growing along drainages and on some ridge tops provides some screening, primarily in the eastern half of the unit.

Solitude in certain parts of the Ervin Ridge WSA is affected by the configuration of this unit, outside impacts, and by two cherry-stemmed roads. Inside the unit, the wilderness user is never more than a mile from the boundary. Farming, vehicle traffic on the boundary, cherry-stemmed roads, and activities around three home sites near the west side are distracting. On the Barnard and Pendell Ridges, intensive wheat farming borders the WSA, while farming operations across the river can be seen from the unit's ridge tops. Motorized traffic on the Missouri River, while slight, is a further infringement on solitude. The best opportunity for solitude is in the southeastern part of the WSA.

### **Primitive and Unconfined Recreation**

Hunting and recreation on the UMNWSR are presently the two most common forms of recreational use in the Ervin Ridge WSA. Hunting usually involves vehicles traveling along the ridge tops or the use of boats. Inside the WSA, hunting is a challenge because retrieving game is complicated by the steep slopes.

Other forms of primitive recreation that could occur in the unit include horseback riding, hiking, sightseeing, photography, and shoreline fishing.

Access to the area is limited. The main access points are through the Ervin Ridge and Barnard Ridge Roads and by boat from the Missouri River. Wet weather and snow often make these dirt roads impassable and can quickly seal off the area, limiting access to May-October during dry weather.

Although opportunities exist for recreation, the WSA's steep terrain channels use along the river, along coulee bottoms or on finger ridges. The lack of vegetation and drinking water, difficulty of travel during wet weather, and rattlesnakes increase the hazards of recreation in the unit.

### **Supplemental Values**

The Ervin Ridge WSA is very scenic and rugged, combining steep slopes of exposed clay with narrow finger ridges. Trees are few. The area is historically significant with prehistoric artifacts being found and a few remnants of the homestead era still extant.



# SOCIAL

## RESOURCE DESCRIPTION

### Introduction

The BLM is required to integrate social science information in the preparation of informed, sustainable land use planning decisions. Section 102 of the National Environmental Policy Act requires Federal agencies to "... insure the integrated use of the natural and social sciences...in planning and decisionmaking ...." The BLM has recently developed an instruction memo containing guidance for social and economic analysis in land use planning (BLM 2002b). Also see the discussion on Environmental Justice in this section.

Below is a discussion on some of the social trends and changing attitudes that affect public land management, followed by a focus on the four counties in central Montana in which Monument land is located, and Hill County, which is adjacent to the Monument counties and contains the largest community in the northern tier of counties. The four counties with Monument land are: Chouteau, Blaine, Fergus, and Phillips. The social study area includes these four counties plus Hill County.

### Social Trends and Changing Attitudes

This section focuses on social trends and changing attitudes that affect public land management.

One trend is the increasing popularity of public land for recreation. A comprehensive report on recreation by Cordell (1999) indicates demand in the Rocky Mountain West for recreation activities will increase substantially (in days of demand) by the year 2020. The predicted increase in demand is set forth in Social Table 1.

**Social Table 1. Predicted Increase in Demand for Recreation Activities in Rocky Mountain West by 2020 (Cordell 1999)**

Activity	Predicted Increase		Activity	Predicted Increase
Nonconsumptive Wildlife Activities	49%		Rafting/Floating	17%
Sightseeing	41%		Primitive Camping	15%
Visiting Historic Places	40%		Off-Road Driving	20%
Motorboating	34%		Hiking	20%
Fishing	28%		Horseback Riding	14%
Developed Camping	25%		Hunting	10%
Canoeing	25%		Backpacking	7%

Another related trend is the increasing interest in the history of exploration and settlement in the western United States such as the Lewis and Clark Expedition. In a study of visitors to the Fort Benton riverfront area (McMahon 2001), nearly 50% of the respondents indicated they were motivated by an element of Lewis and Clark history to visit the site. Another study (Issues and Answers Network, Inc. 2000) suggests that Montana will experience a substantial increase in visits to this state during the Lewis and Clark Bicentennial in addition to the base visitation that would normally be expected.

A third trend that is occurring in the nation and Montana is the aging of the population. In 2000, 14% of the population in Blaine, Fergus, Chouteau, Hill and Phillips Counties was 65 years and over. In the state as a whole, the percentage of population 65 years and over is expected to increase to 25% in 2025. The percentage of people over 65 is actually increasing more rapidly in states like Montana because young people are more likely to leave for advanced education, military service and employment opportunities not available locally.

Changes in the management of public land are just one aspect of a broader debate on environmental issues and resource management that is occurring locally, nationally and globally. Social values for lands and natural resources take many forms such as commodity, amenity, environmental quality, ecological, recreation, spiritual health, and security (Stankey and Clark 1991). In the past, natural resource management has tended to emphasize commodity values. The emerging emphasis on other values has forced a reevaluation of the commodity emphasis. Stankey and Clark's (1991) report states, "A new focus on the part of the public involves a shift from commodities and services to environments and habitats. The public is much more concerned about forests as ecosystems than they have been previously and is more concerned with having access to decisions about them."

A nationwide survey conducted in 2000 by Roper Starch Worldwide (2001) offers information on attitudes toward environmental regulation. Respondents were asked whether they thought environmental laws and regulations had gone too far, had not gone far enough, or had achieved the right balance. Over three times as many respondents thought laws and regulations had not gone far enough (46%) as those who thought laws and regulations had gone too far (15%). Nearly a third of the respondents (32%) thought that the laws had struck the right balance. These three figures have been fairly stable since 1995. When respondents were segmented by residence in urban versus rural areas, the figures for "not gone far enough" were 52% and 38% respectively. In addition, only 36% of the respondents who hunted in the last year thought laws had "not gone far enough."

When similar questions were asked at the national level regarding the current regulation of specific environmental issues, the following percentages thought regulations for these specific issues had not gone far enough: water pollution (70%), air pollution (63%), wild or natural areas (50%), wetlands (44%), and endangered species (39%). Conversely, the following percentages thought regulation of specific environmental issues had gone too far: endangered species (5%), wetlands (11%), wild or natural areas (11%), air pollution (7%), and water pollution (5%). When respondents were segmented by residence in urban versus rural areas, the figures for "not gone far enough" to protect wild or natural areas were 54% and 44% respectively.

A growing countermovement has become more outspoken in the West, particularly in rural areas. In places where land use had been unrestricted, concern is increasing with regard to the control and management of public land. People with these concerns feel that change in public land management is being driven by government officials and environmental advocacy groups who do not have a true understanding of the lands or the people living nearby who depend upon these lands for their livelihood and recreation. Of particular concern is the loss of traditional uses of the land such as livestock grazing and cross-country vehicle use. People with these concerns seek to balance what they consider to be “environmental extremism” with economic and human concerns. They may feel that local elected officials, who deal with their problems on a daily basis, are better equipped to make decisions about public land.

## **Social Study Area Counties and Communities**

The 2000 population of the social study area (including Fergus, Chouteau, Hill, Phillips and Blaine Counties) was 46,140, an increase of less than 1% since 1990. The social study area population is projected to be about the same in 2020. The area is very sparsely settled with 2.2 persons per square mile compared to a figure of 6.2 for the State as a whole. The population density of the Monument itself is less than 2.2 because all of the communities in these counties are located outside of the Monument boundaries. The population of the social study area is 80% white and 17% American Indian. The American Indian population is concentrated in Blaine County, which is nearly 50% American Indian. The median family income in the social study area is lower than for the State (\$28,858 versus \$33,024), and the percentage of persons below the poverty level is higher (21.1% versus 14.6%).

Fergus County, which is located south of the Missouri River, had a 2000 population of 11,898. It lost 1.6% of its population between 1990 and 2000 and is projected to continue to lose population very slowly (with a decrease of less than 1% predicted in 2020). Fergus County has the highest percentage of population 65 and over of the social study area counties, and the lowest percentage of American Indians. Lewistown, the county seat, is home to the Monument Headquarters. Lewistown had a 2000 population of 5,813. Winifred, a ranching community located 14 miles south of the Missouri River, had a 1990 population of 156. In 1997, Fergus County had 816 farms and ranches. The number of farms, amount of land in farms, and average size of the farms has been relatively stable in the recent past (U.S. Census of Agriculture 1997). [Note: the 2002 Census of Agriculture data will be released starting in the Spring of 2004.] Farming/ranching was the principal occupation of 70% of the farm/ranch operators.

Chouteau County, which is located in the western part of the social study area, had a 2000 population of 5,970. Chouteau County had a population increase of nearly 10% during the decade 1990 to 2000, but is projected to decrease 3.5% by 2020. Fort Benton, the county seat, is home to the BLM Fort Benton Visitor Center and the place where many river floaters enter the river. Fort Benton had a 2000 population of 1,594 and lost 5% of its population between 1990 and 2000. Other small communities located close to the river include Loma with a population of 92 and Big Sandy with a population of 703. The Rocky Boy’s Indian Reservation is located in Chouteau and Hill Counties. Chouteau County is the home to 750 farms and ranches. The number of farms and ranches increased slightly between 1992 and 1997, while the amount of

land in farms and average size of farms decreased (U.S. Census of Agriculture 1997). Farming/ranching was the principal occupation of 83% of the farm/ranch operators.

A survey conducted for the City of Fort Benton (2002) indicated over 70% of the respondents thought it was an excellent or above average place to live. Things people liked best about living in the area included: safe/low crime, small size/small town feeling, the friendly caring people, the quiet and peacefulness, the river, and many other attributes related to the area and its residents. Lack of job opportunities and a stagnant/weak economy were two of the main things respondents did not like about living in the area. Bringing businesses to town and creating jobs to attract young people were two of the things respondents indicated could be done to make Fort Benton a better place to live. Nearly 75% of the respondents had lived in the area more than 10 years.

Hill County, located north of the Monument, does not actually contain any Monument land. Hill County had a 2000 population of 16,673, a 6% decrease from 1990. Havre, the county seat, is the largest community on the HiLine. Havre had a 2000 population of 9,621.

Blaine County, which is located north of the river, had a 2000 population of 7,009. It grew 4.2% during the decade 1990 to 2000 and is the only social study area county that is projected to grow by 2020. Of the social study area counties, Blaine has one of the lowest percentage populations 65 and over, and the highest percentage of American Indians. Chinook, the county seat, had a 2000 population of 1,386. Blaine County is home to the larger part of the Fort Belknap Indian Reservation. Two reservation communities are located within 50 miles of the river. These communities are Hays with a 2000 population of 702, and Lodge Pole with a population of 214. In 1997, Blaine County was home to 541 farms and ranches. The number of farms and ranches increased 5% during the period 1992 to 1997, while the amount of land in farms and ranches and the average size of these operations decreased by 3% and 8%, respectively (U.S. Census of Agriculture 1997). Farming/ranching was the principal occupation of 75% of the farm/ranch operators.

Phillips County is located north of the river and east of Blaine County. It had a 2000 population of 4,601 and lost over 10% of its population during the decade 1990 to 2000 due to the closing of gold mines in the Zortman and Landusky areas. The county population is expected to continue to decline by over 6% by 2020. Malta, the county seat, had a 2000 population of 2,120. In 1997, Phillips County was home to 489 farms and ranches. The number and amount of land in farms and ranches increased slightly from 1992 while the average size decreased slightly (U.S. Census of Agriculture 1997). Farming/ranching was the principal occupation of 69% of the farm/ranch operators.

Social Table 2 lists population and social characteristics for the five counties in the social study area and for the State of Montana as a whole.

**Social Table 2. Population and Social Characteristics for Counties in the Social Study Area in 2000**

	<b>Blaine</b>	<b>Chouteau</b>	<b>Fergus</b>	<b>Hill</b>	<b>Phillips</b>	<b>5-County Study Area</b>	<b>State of Montana</b>
2000 Population	7009	5970	11893	16673	4601	46146	902,195
% Change from 1990-2000	4.2	9.5	-1.6	-5.6	-10.9	.2	12.9
Projection 2020 (% Change)	7150 (2.0%)	5760 (-3.5)	11820 (-0.6%)	16650 (-0.1%)	4310 (-6.3%)	45690 (-1.0%)	1,085,520 (20.3%)
Persons/sq. mi.	1.7	1.5	2.6	5.8	0.9	2.2	6.2
% 65 & over	12.9	17.5	19.9	12.8	17.6	16.1	13.4
% White	52.6	84.0	97.1	79.5	89.4	80.5	90.6
% American Indian	45.4	14.6	1.2	17.3	7.6	17.2	6.2
% High School Grad 2000	78.7	87.1	86.3	86.8	82.4	84.3	87.2
Median Household Income 1999	\$25,247	\$29,150	\$30,409	\$30,781	\$28,702	\$28,858	\$33,024
% Persons Below Poverty Level	28.1	20.5	15.4	18.4	18.3	20.1	14.6

Source: U.S. Department of Commerce, Bureau of the Census



# ENVIRONMENTAL JUSTICE

## RESOURCE DESCRIPTION

### Laws, Regulations, and Policies

Executive Order 12898, Environmental Justice, requires each Federal agency to identify and address the "...disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations ...."

BLM has recently developed an instruction memo containing guidance for evaluating environmental justice issues in land use planning (BLM 2002c).

Instruction Memorandum No. 2002-164 identifies the following populations as minority populations: Black/African American, Hispanic, Asian and Pacific Islander, American Indian, Eskimo, Aleut, and other non-white persons.

American Indians (and Alaska Native persons) represented 17.2% of the population in the social study area. This population is concentrated in Blaine County whose population is nearly 50% American Indian. Two Indian Reservations are located in the social study area. The Fort Belknap Reservation is located in Blaine and Phillips Counties and the Rocky Boy's Reservation is located in Blaine and Hill Counties. The Fort Belknap Reservation, home to the Assiniboine, Assiniboine Sioux, and Gros Ventre Tribes, had a 2000 American Indian population of 2,790. The Rocky Boy's Reservation, home to the Chippewa Cree Tribe, had a 2000 American Indian population of 2,578. The tribes that have shown an interest in the area for cultural purposes include the Assiniboine of Fort Belknap and Fort Peck, and the Chippewa Cree of Rocky Boy's. (Fort Peck Reservation is located to the northeast of the social study area in Valley, Roosevelt, and Daniels Counties.)

In 1999, 14.6% of the persons living in the State of Montana had incomes below the poverty level. This compares to an average of 21.1% for the social study area. Figures for the individual counties range from a low of 15.4% in Fergus County to a high of 28.1% in Blaine County.



## **HEALTH AND SAFETY – EMERGENCY SERVICES**

### **RESOURCE DESCRIPTION**

The BLM Lewistown Field Office administers public land in 14 counties in central Montana. This involves the management of resources and public users on Bureau land in the region, including the Monument. Much of these lands are rugged and remote country which presents a wilderness setting in the context of emergency services availability.

A Lewistown Field Office Search and Rescue (SAR) Plan has been developed to define the BLM's role in search and rescue operations as stated in the Federal Land Policy and Management Act section 312 and to identify the interagency resources available in the area. This plan covers SAR operations and emergency services within the Monument.

County sheriffs statutorily coordinate SAR operations on public land, including the Monument. In most cases, the role of the BLM in SAR operations will be to support the county by providing assistance as requested.

Some situations exist that require the BLM to initiate actions on its own to provide the public emergency assistance in the most expeditious manner. BLM personnel usually work in remote areas and there is potential for them to be the first responders to an emergency. They work at access points and often receive initial requests for emergency assistance. BLM employees may have to initiate action and assume a temporary lead role in SAR activities. In many situations the emergency can be taken care of before local county authorities have to dispatch their SAR personnel.

A SAR is hereby defined as any incident where the BLM is called upon to assist in locating a stranded, lost, injured, or ill person; render emergency medical aid or assistance; and/or evacuate any of the above in an emergency situation.

Most SARs occur in non-developed backcountry areas or along the Upper Missouri National Wild and Scenic River where normal emergency responses such as ground ambulances are unavailable and/or inadequate to deal with an evacuation. There may be exceptions when dealing with a search for a lost child in a campground or rendering aid at a mass casualty motor vehicle accident or aircraft accident. In 2002, the Lewistown Field Office assisted with approximately seven SARs.

The BLM will provide assistance in SAR operations as outlined in the SAR Plan and take action in life-threatening emergencies until county authorities can take over as requested.



# **ECONOMIC**

## **RESOURCE DESCRIPTION**

Economic profiles for five counties in the Monument area (Blaine, Chouteau, Fergus, Hill, and Phillips Counties) are found in Appendix L. The Population, Employment, Earnings and Personal Income Trends are based on the Economic Profile System developed by the Sonoran Institute.



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## ACRONYMS

AMP	Allotment Management Plan
ANILCA	Alaska National Interest Lands Conservation Act
APD	Application for Permit to Drill
APHIS	Annual Plant and Health Inspection Service
AUM	Animal Unit Month
BCF	Billion Cubic Feet
BLM	Bureau of Land Management
CA	Communitization Agreement
CESU	Cooperative Ecosystem Studies Unit
CFR	Code of Federal Regulations
CMR	Charles M. Russell National Wildlife Refuge
CRP	Conservation Reserve Program
DEQ	Montana Department of Environmental Quality
EIS	Environmental Impact Statement
EO	Executive Order
FLPMA	Federal Land Policy and Management Act
LAC	Limits of Acceptable Change
LWCF	Land and Water Conservation Fund
MFWP	Montana Fish, Wildlife & Parks
MLA	Mineral Leasing Act
MLRA	Major Land Resource Areas
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NIA	Notice of Intent to Abandon
NOS	Notice of Staking
NPS	National Park Service
PL	Public Law
R and PP	Recreation and Public Purposes Act
RAC	Resource Advisory Council
RMA	Resource Management Area
RMP	Resource Management Plan
ROW	Right-of-Way
SAR	Search and Rescue
SMA	Surface Management Agency
SRA	Subsequent Report of Abandonment
SRMA	Special Recreation Management Area
SRP	Special Recreation Permit
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
UMNWSR	Upper Missouri National Wild and Scenic River
USFWS	U.S. Fish and Wildlife Service
VRM	Visual Resource Management
WFSA	Wild Fire Situation Analysis
WSA	Wilderness Study Area
WUG	Western Utility Group



## APPENDIX A

### Fish, Wildlife, Herptofauna, and Avian Species Found within the Monument

#### Fish

Common Name	Scientific Name	Native or Introduced	Occurrence	Status
Bigmouth Buffalo	<i>Ictiobus cyprinellus</i>	Native	Seasonally common	
Black Bullhead	<i>Ictalurus melas</i>	Introduced	Rare	
Black Crappie	<i>Pomoxis nigromaculatus</i>	Introduced	Uncommon	
<b>Blue Sucker</b>	<b><i>Cycleptus elongatus</i></b>	<b>Native</b>	<b>Common</b>	<b>Sensitive Species</b>
Brassy Minnow	<i>Hybognathus hankinsoni</i>	Native	Uncommon	
Brook Trout	<i>Salvelinus fontinalis</i>	Introduced	Incidental	
Brook Stickleback	<i>Culaea inconstans</i>	Native	Uncommon	
Brown Trout	<i>Salmo trutta</i>	Introduced	Uncommon	
Burbot	<i>Lota lota</i>	Native	Uncommon	
Carp	<i>Cyprinus carpio</i>	Introduced	Abundant	
Channel Catfish	<i>Ictalurus punctatus</i>	Native	Common	
Chinook Salmon	<i>Oncorhynchus tshawytscha</i>	Introduced	Rare	
Cisco	<i>Coregonus artedii</i>	Introduced	Uncommon	
Emerald Shiner	<i>Notropis atherinoides</i>	Native	Abundant	
Fathead Minnow	<i>Pimephales promelas</i>	Native	Common	
Flathead Chub	<i>Hybopsis gracilis</i>	Native	Abundant	
Freshwater Drum	<i>Aplodinotus grunniens</i>	Native	Uncommon	
Goldeye	<i>Hiodon alosoides</i>	Native	Abundant	
Goldfish	<i>Carassius auratus</i>	Introduced	Rare	
Iowa Darter	<i>Etheostoma exile</i>	Native	Uncommon	
Lake Chub	<i>Couesius plumbeus</i>	Native	Common	
Longnose Dace	<i>Rhinichthys cataractae</i>	Native	Common	
Longnose Sucker	<i>Catostomus catostomus</i>	Native	Common	
Mottled Sculpin	<i>Cottus bairdi</i>	Native	Uncommon	
Mountain Sucker	<i>Catostomus platyrhynchus</i>	Native	Uncommon	
Mountain Whitefish	<i>Prosopium williamsoni</i>	Native	Uncommon	
Northern Pike	<i>Esox lucius</i>	Introduced	Common	
<b>Paddlefish</b>	<b><i>Polyodon spathula</i></b>	<b>Native</b>	<b>Seasonally common</b>	<b>Sensitive Species</b>
<b>Pallid Sturgeon</b>	<b><i>Scaphirhynchus albus</i></b>	<b>Native</b>	<b>Rare</b>	<b>Endangered Species</b>
Plains Minnow	<i>Hybognathus placitus</i>	Native	Uncommon	
Pumpkinseed	<i>Lepomis gibbosus</i>	Native	Rare	
Rainbow Trout	<i>Salmo gairdneri</i>	Introduced	Uncommon	
River Carpsucker	<i>Carpoides carpio</i>	Native	Abundant	
Sand Shiner	<i>Notropis stramineus</i>	Native	Rare	

## Resource Description

Common Name	Scientific Name	Native or Introduced	Occurrence	Status
<b>Sauger</b>	<i>Stizostedion canadense</i>	Native	Common	<b>Species of Special Concern</b>
Shorthead Redhorse	<i>Moxostoma macrolepidotum</i>	Native	Abundant	
Shovelnose Sturgeon	<i>Scaphirhynchus platyrhynchus</i>	Native	Common	
<b>Sicklefin Chub</b>	<i>Macrhybopsis meeki</i>	Native	Common	<b>Sensitive Species</b>
Smallmouth Bass	<i>Micropterus dolomieu</i>	Introduced	Uncommon	
Smallmouth Buffalo	<i>Ictiobus bubalus</i>	Native	Common	
Spottail Shiner	<i>Notropis hudsonius</i>	Introduced	Uncommon	
Stonecat	<i>Noturus flavus</i>	Native	Common	
<b>Sturgeon Chub</b>	<i>Hybopsis gelida</i>	Native	Common	<b>Sensitive Species</b>
Walleye	<i>Stizostedion vitreum</i>	Introduced	Common	
Western Silvery Minnow	<i>Hybognathus nuchalis</i>	Native	Abundant	
White Crappie	<i>Pomoxis annularis</i>	Introduced	Uncommon	
White Sucker	<i>Catostomus commersoni</i>	Native	Common	
Yellow Perch	<i>Perca flavescens</i>	Introduced	Uncommon	

## Wildlife

Common Name	Scientific Name	Status
Badger	<i>Taxidea taxus</i>	
Beaver	<i>Castor canadensis</i>	
Big Brown Bat	<i>Eptesicus fuscus</i>	
Bighorn Sheep	<i>Ovis canadensis</i>	
<b>Black-tailed Prairie Dog</b>	<i>Cynomys ludovicianus</i>	<b>Candidate Species</b>
Bobcat	<i>Lynx rufus</i>	
Bushy Tail Woodrat	<i>Neotoma cinerea</i>	
Coyote	<i>Canis latrans</i>	
Deer Mouse	<i>Peromyscus maniculatus</i>	
Desert Cottontail	<i>Sylvilagus audubonii</i>	
Dwarf Shrew	<i>Sorex nanus</i>	
Hayden's Shrew	<i>Sorex haydeni</i>	
Hoary Bat	<i>Lasiurus cinereus</i>	
House Mouse	<i>Mus musculus</i>	
Least Chipmunk	<i>Tamias minimus</i>	
Least Weasel	<i>Mustela nivalis</i>	
Little Brown Bat	<i>Myotis lucifugus</i>	
Long-eared Bat	<i>Myotis evotis</i>	
Long-legged Bat	<i>Myotis volans</i>	
Long-tailed Vole	<i>Microtus longicaudus</i>	
Long-tailed Weasel	<i>Mustela frenata</i>	

Resource Description

Common Name	Scientific Name	Status
Masked Shrew	<i>Sorex cinereus</i>	
Meadow Vole	<i>Microtus pennsylvanicus</i>	
<b>Merriam's Shrew</b>	<b><i>Sorex merriami</i></b>	<b>Sensitive Species</b>
Mink	<i>Mustela vison</i>	
Montane Shrew	<i>Sorex monticolus</i>	
Mountain Cottontail	<i>Sylvilagus nuttallii</i>	
Mountain Lion	<i>Puma concolor</i>	
Mule Deer	<i>Odocoileus hemionus</i>	
Muskrat	<i>Ondatra zibethicus</i>	
Northern Grasshopper Mouse	<i>Onychomys leucogaster</i>	
Northern Pocket Gopher	<i>Thomomys talpoides</i>	
Northern Water Shrew	<i>Sorex palustris</i>	
Olive-backed Pocket Mouse	<i>Perognathus fasciatus</i>	
Ord's Kangaroo Rat	<i>Dipodomys ordii</i>	
Porcupine	<i>Erethizon dorsatum</i>	
Prairie Vole	<i>Microtus ochrogaster</i>	
<b>Preble's Shrew</b>	<b><i>Sorex preblei</i></b>	<b>Sensitive Species</b>
Pronghorn	<i>Antilocapra americana</i>	
Raccoon	<i>Procyon lotor</i>	
Red Bat	<i>Lasiurus borealis</i>	
Red Fox	<i>Vulpes vulpes</i>	
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	
Richardson's Ground Squirrel	<i>Spermophilus richardsonii</i>	
River Otter	<i>Lontra canadensis</i>	
Rocky Mountain Elk	<i>Cervus elaphus</i>	
Sagebrush Vole	<i>Lemmyscus curatus</i>	
Short-tailed Weasel	<i>Mustela erminea</i>	
Silver-haired Bat	<i>Lasionycteris noctivagans</i>	
Striped Skunk	<i>Mephitis mephitis</i>	
Thirteen-lined Ground Squirrel	<i>Spermophilus tridecemlineatus</i>	
<b>Townsend's Big-eared Bat</b>	<b><i>Corynorhinus townsendii</i></b>	<b>Sensitive Species</b>
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>	
Western Jumping Mouse	<i>Zapus princeps</i>	
Western Small-footed Bat	<i>Myotis ciliolabrum</i>	
White-footed Mouse	<i>Peromyscus leucopus</i>	
Whitetail Jackrabbit	<i>Lepus townsendii</i>	
White-tailed Deer	<i>Odocoileus virginianus</i>	
Yellow-bellied Marmot	<i>Marmota flaviventris</i>	
Yellow-pine Chipmunk	<i>Tamias amoenus</i>	
Yuma Bat	<i>Myotis yumanensis</i>	

## Herptofauna

Common Name	Scientific Name	Status
Bull Snake	<i>Pituopis melanoleucus sayi</i>	
Garter Snake	<i>Thamnophis spp.</i>	
Milk Snake	<i>Lampropeltis triangulum</i>	
Northern Leopard Frog	<i>Rana pipiens</i>	
Racer Snake	<i>Coluber constrictor mormon</i>	
Short-horned Lizard	<i>Phrynosoma douglassii douglassii</i>	
<b>Snapping Turtle</b>	<b><i>Chelydra spp.</i></b>	<b>Sensitive Species</b>
<b>Spiny Soft-shell Turtle</b>	<b><i>Trionyx spiniferus</i></b>	<b>Sensitive Species</b>
Tiger Salamander	<i>Ambystoma tigrinum</i>	
Western Chorus Frog	<i>Pseudacris triseriata</i>	
Western Hognose Snake	<i>Heterodon nasicus</i>	
Western Rattlesnake	<i>Crotalus viridis</i>	
Woodhouse Toad	<i>Bufo woodhousii</i>	

## Avian

Common Name	Scientific Name	Status
American Avocet	<i>Recurvirostra americana</i>	
American Bittern	<i>Botaurus lentiginosus</i>	
American Coot	<i>Fulica americana</i>	
American Crow	<i>Corvus brachyrhynchos</i>	
American Goldfinch	<i>Carduelis tristis</i>	
American Kestrel	<i>Falco sparverius</i>	
American Pipit	<i>Anthus rubescens</i>	
American Redstart	<i>Setophaga ruticilla</i>	
American Robin	<i>Turdus migratorius</i>	
American Tree Sparrow	<i>Spizella arborea</i>	
American White Pelican	<i>Pelecanus erythrorhynchos</i>	
American Wigeon	<i>Anas americana</i>	
Baird's Sandpiper	<i>Calidris bairdii</i>	
<b>Bald Eagle</b>	<b><i>Haliaeetus leucocephalus</i></b>	<b>Threatened Species</b>
Baltimore Oriole	<i>Icterus galbula</i>	
Bank Swallow	<i>Piparia riparia</i>	
Barn Swallow	<i>Hirundo rustica</i>	
Belted Kingfisher	<i>Ceryle alcyon</i>	
Black and White Warbler	<i>Mniotilta varia</i>	
Black Tern	<i>Chlidonias niger</i>	
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	
Black-billed Magpie	<i>Pica hudsonia</i>	

Resource Description

Common Name	Scientific Name	Status
Black-capped Chickadee	<i>Poecile atricapilla</i>	
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	
Black-headed Grosbeak	<i>Pheucticus melanocephalus</i>	
Black-necked Stilt	<i>Himantopus mexicanus</i>	
Blackpoll Warbler	<i>Dendroica striata</i>	
Blue-winged Teal	<i>Anas discors</i>	
Bobolink	<i>Dolichonyx oryzivorus</i>	
Bohemian Waxwing	<i>Bombycilla garrulus</i>	
Bonaparte's Gull	<i>Larus philadelphia</i>	
Brewer's Blackbird	<i>Euphagus cyanocephalus</i>	
Brewer's Sparrow	<i>Spizella breweri</i>	
Brown Creeper	<i>Certhia americana</i>	
Brown Thrasher	<i>Toxostoma rufum</i>	
Brown-headed Cowbird	<i>Molothrus ater</i>	
Bufflehead	<i>Bucephala albeola</i>	
Bullock's Oriole	<i>Icterus bullockii</i>	
<b>Burrowing Owl</b>	<i>Athene cunicularia</i>	<b>Sensitive Species</b>
California Gull	<i>Larus californicus</i>	
Canada Goose	<i>Branta canadensis</i>	
<b>Canvasback Duck</b>	<i>Aythya valisineria</i>	<b>Sensitive Species</b>
Cassin's Finch	<i>Carpodacus cassinii</i>	
Cedar Waxwing	<i>Bombycilla cedrorum</i>	
Chestnut-collard Longspur	<i>Calcarius ornatus</i>	
Chipping Sparrow	<i>Spizella passerina</i>	
Cinnamon Teal	<i>Anas cyanoptera</i>	
Clark's Nutcracker	<i>Nucifraga columbiana</i>	
Clay-colored Sparrow	<i>Spizella pallida</i>	
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	
Common Goldeneye	<i>Bucephala clangula</i>	
Common Grackle	<i>Quiscalus quiscula</i>	
Common Merganser	<i>Mergus merganser</i>	
Common Nighthawk	<i>Chordeiles minor</i>	
Common Poorwill	<i>Phalaenoptilus nuttallii</i>	
Common Raven	<i>Corvus corax</i>	
Common Redpoll	<i>Carduelis flammea</i>	
Common Snipe	<i>Gallinago gallinago</i>	
Common Tern	<i>Sterna hirundo</i>	
Common Yellowthroat	<i>Geothlypis trichas</i>	
Cooper's Hawk	<i>Accipiter cooperii</i>	
Dark-eyed Junco	<i>Junco hyemalis</i>	
Double-crested Cormorants	<i>Phalacrocorax auritus</i>	
Downy Woodpecker	<i>Picoides pubescens</i>	
Dusky Flycatcher	<i>Empidonax oberholseri</i>	

Resource Description

Common Name	Scientific Name	Status
Eared Grebe	<i>Podiceps nigricollis</i>	
Eastern Kingbird	<i>Tyrannus tyrannus</i>	
European Starling	<i>Sturnis vulgaris</i>	
Evening Grosbeak	<i>Coccothraustes vesterinus</i>	
<b>Ferruginous Hawk</b>	<b><i>Buteo regalis</i></b>	<b>Sensitive Species</b>
Forester's Tern	<i>Sterna forsteri</i>	
Fox Sparrow	<i>Passerella iliaca</i>	
Franklin's Gull	<i>Larus pipixcan</i>	
Gadwall	<i>Anas strepera</i>	
Golden Crowned Kinglet	<i>Regulus satrapa</i>	
Golden Eagle	<i>Aquila chrysaetos</i>	
Grasshopper Sparrow	<i>Ammodramus savannarum</i>	
Gray Catbird	<i>Dumetella carolinensis</i>	
Gray Partridge	<i>Perdix perdix</i>	
Gray-crowned Rosy-Finch	<i>Leucosticte tephrocotis</i>	
Great Blue Heron	<i>Ardea herodias</i>	
Great Horned Owl	<i>Bubo virginianus</i>	
<b>Greater Sage Grouse</b>	<b><i>Centrocercus urophasianus</i></b>	<b>Sensitive Species (pending)</b>
Greater Yellowlegs	<i>Tringa melanoleuca</i>	
Green-tailed Towhee	<i>Pipilo chlorurus</i>	
Green-winged Teal	<i>Anas crecca</i>	
<b>Hairy Woodpecker</b>	<b><i>Picoides villosus</i></b>	<b>Sensitive Species</b>
Harris's Sparrow	<i>Zonotrichia querula</i>	
Hermit Thrush	<i>Catharus guttatus</i>	
Herring Gull	<i>Larus argentatus</i>	
Hooded Merganser	<i>Lophocytes cucullatus</i>	
Horned Grebe	<i>Podiceps auritus</i>	
Horned Lark	<i>Eremophila alpestris</i>	
House Finch	<i>Carpodacus mexicanus</i>	
House Sparrow	<i>Passer domesticus</i>	
House Wren	<i>Troglodytes aedon</i>	
Killdeer	<i>Charadrius vociferus</i>	
Lapland Longspur	<i>Calcarius lapponicus</i>	
Lark Bunting	<i>Calamospiza melanocorys</i>	
Lark Sparrow	<i>Chondestes grammacus</i>	
Lazuli Bunting	<i>Passerina amoena</i>	
Least Flycatcher	<i>Empidonax minimus</i>	
Least Sandpiper	<i>Calidris minutilla</i>	
Least Tern	<i>Sterna antillarum</i>	
Lesser Scaup	<i>Aythya affinis</i>	
Lesser Yellowlegs	<i>Tringa flavipes</i>	
Lewis's Woodpecker	<i>Melanerpes lewis</i>	
Lincoln's Sparrow	<i>Melospiza lincolnii</i>	

Resource Description

Common Name	Scientific Name	Status
<b>Loggerhead Shrike</b>	<i>Lanius ludovicianus</i>	<b>Sensitive Species</b>
<b>Long-billed Curlew</b>	<i>Numenius americanus</i>	<b>Sensitive Species</b>
Long-billed Dowitcher	<i>Limnodromus scolopaceus</i>	
Long-eared Owl	<i>Asio otus</i>	
MacGillivray's Warbler	<i>Oporornis tolmiei</i>	
Mallard	<i>Anas platyrhynchos</i>	
Marbled Godwit	<i>Limosa fedoa</i>	
Marsh Wren	<i>Cistothorus palustris</i>	
McCown's Longspur	<i>Calcarius mccownii</i>	
Merlin	<i>Falco columbarius</i>	
Mountain Bluebird	<i>Sialia currucoides</i>	
Mountain Chickadee	<i>Poecile gambeli</i>	
<b>Mountain Plover</b>	<i>Charadrius montanus</i>	<b>Proposed Species</b>
Mourning Dove	<i>Zenaida macroura</i>	
Northern Flicker	<i>Colaptes auratus</i>	
<b>Northern Goshawk</b>	<i>Accipiter gentilis</i>	<b>Sensitive Species</b>
Northern Harrier	<i>Circus cyaneus</i>	
Northern Pintail	<i>Anas acuta</i>	
Northern Rough-winged Swallow	<i>Stelgidopteryx serripennis</i>	
Northern Shoveler	<i>Anas clypeata</i>	
Northern Shrike	<i>Lanius excubitor</i>	
Northern Waterthrush	<i>Seiurus noveboracensis</i>	
Olive-sided Flycatcher	<i>Contopus cooperi</i>	
Orange-crowned Warbler	<i>Vermivora celata</i>	
Osprey	<i>Pandion haliaetus</i>	
Ovenbird	<i>Seiurus aurocapillus</i>	
Pectoral Sandpiper	<i>Calidris melanotos</i>	
<b>Peregrine Falcon</b>	<i>Falco peregrinus</i>	<b>Sensitive Species</b>
Pied-billed Grebe	<i>Podilymbus podiceps</i>	
Pine Siskin	<i>Carduelis pinus</i>	
Piping Plover	<i>Charadrius melodus</i>	
Prairie Falcon	<i>Falco mexicanus</i>	
Red Crossbill	<i>Loxia curvirostra</i>	
Red-breasted Merganser	<i>Mergus serrator</i>	
Red-breasted Nuthatch	<i>Sitta canadensis</i>	
Red-eyed Vireo	<i>Vireo olivaceus</i>	
Redhead	<i>Aythya americana</i>	
Red-headed Woodpecker	<i>Melanerpes erythrocephalus</i>	
Red-naped Sapsucker	<i>Sphyrapicus nuchalis</i>	
Red-tailed Hawk	<i>Buteo jamaicensis</i>	
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	
Ring-billed Gull	<i>Larus delawarensis</i>	
Ring-necked Duck	<i>Aythya collaris</i>	

Resource Description

Common Name	Scientific Name	Status
Ring-necked Pheasant	<i>Phasianus colchicus</i>	
Rock Dove	<i>Columba livia</i>	
Rock Wren	<i>Salpinctes obsoletus</i>	
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	
Ross's Goose	<i>Chen rossii</i>	
Rough-legged Hawk	<i>Buteo lagopus</i>	
Ruby Crowned Kinglet	<i>Regulus calendula</i>	
Ruddy Duck	<i>Oxyura jamaicensis</i>	
Rusty Blackbird	<i>Euphagus carolinus</i>	
Sage Thrasher	<i>Oreoscoptes montanus</i>	
Sandhill Crane	<i>Grus canadensis</i>	
Savannah Sparrow	<i>Passerculus sandwichensis</i>	
Say's Phoebe	<i>Sayornis saya</i>	
Semipalmated Plover	<i>Chardrius semipalmatus</i>	
Semipalmated Sandpiper	<i>Calidris pusilla</i>	
Sharp-shinned Hawk	<i>Accipiter striatus</i>	
Sharp-tailed Grouse	<i>Tympanuchus phasianellus</i>	
Short-eared Owl	<i>Asio flammeus</i>	
Snow Bunting	<i>Plectrophenax nivalis</i>	
Snow Goose	<i>Chen caerulescens</i>	
Snowy Owl	<i>Nyctea scandiaca</i>	
Solitary Sandpiper	<i>Tringa solitaria</i>	
Song Sparrow	<i>Melospiza melodia</i>	
Sora	<i>Porzana carolina</i>	
Spotted Sandpiper	<i>Actitis macularia</i>	
Spotted Towhee	<i>Pipilo maculatus</i>	
Sprague's Pipit	<i>Anthus spagueii</i>	
<b>Swainson's Hawk</b>	<b><i>Buteo swainsoni</i></b>	<b>Sensitive Species</b>
Swainson's Thrush	<i>Catharus ustulatus</i>	
Tennessee Warbler	<i>Vermivora peregrina</i>	
Townsend's Solitaire	<i>Myadestes townsendi</i>	
Tree Swallow	<i>Tachycineta bicolor</i>	
Tundra Swan	<i>Cygnus columbianus</i>	
Turkey Vulture	<i>Cathartes aura</i>	
Upland Sandpiper	<i>Bartramia longicauda</i>	
Veery	<i>Catharus fuscescens</i>	
Vesper Sparrow	<i>Pooecetes gramineus</i>	
Violet-green Swallow	<i>Tachycineta thalassina</i>	
Virginia Rail	<i>Rallus limicola</i>	
Warbling Vireo	<i>Vireo gilvus</i>	
Western Bluebird	<i>Sialia mexicana</i>	
Western Grebe	<i>Aechmophorus occidentalis</i>	
Western Kingbird	<i>Tyrannus verticalis</i>	

Resource Description

<b>Common Name</b>	<b>Scientific Name</b>	<b>Status</b>
Western Meadowlark	<i>Sturnella neglecta</i>	
Western Tanager	<i>Piranga ludoviciana</i>	
Western Wood-Pewee	<i>Contopus sordidulus</i>	
White-breasted Nuthatch	<i>Sitta carolinensis</i>	
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	
White-fronted Goose	<i>Anser albifrons</i>	
White-throated Sparrow	<i>Zonotrichia albicollis</i>	
White-winged Crossbill	<i>Loxia leucoptera</i>	
Wild Turkey	<i>Meleagris gallopavo</i>	
Willet	<i>Catoptrophorus semipalmatus</i>	
Willow Flycatcher	<i>Empidonax traillii</i>	
Wilson's Phalarope	<i>Phalaropus tricolor</i>	
Wilson's Warbler	<i>Wilsonia pusilla</i>	
Wood Duck	<i>Aix sponsa</i>	
Yellow Warbler	<i>Dendroica petechia</i>	
Yellow-breasted Chat	<i>Icteria virens</i>	
Yellow-headed Blackbird	<i>Xanthocephalus xanthocephalus</i>	
Yellow-rumped Warbler	<i>Dendroica coronata</i>	

Resource Description

## APPENDIX B

### Vegetation by Ecological Site within the Monument

Below is a list of Major Land Resource Areas (MLRAs) and ecological sites that are found in the Monument in the western sedimentary plains and western glaciated plains 10-14 inch precipitation zone. MLRAs are broadly defined areas of similar soils, vegetation, climate, and geology (NRCS technical guide 1984). The planning area is located in two MLRAs: the western sedimentary plains and the western glaciated plains. The western glaciated plains MLRA formed under recent glaciation. It encompasses that part of the planning area from Arrow Creek upstream to Fort Benton. Glacial till underlies much of this MLRA. The terrain in this area is level to rolling and forms breaks near the river or on tributaries near the river.

The western sedimentary plains MLRA encompasses that part of the planning area south of the Missouri River from Arrow Creek downstream to the eastern edge of the Monument. Unlike the western glaciated plains MLRA, this area was not glaciated during the last glaciation period. Approximately 65% of the monument is located in the western sedimentary plains MLRA and approximately 35% is located in the western glaciated plains MLRA. MLRAs are broken down into ecological sites based on geology, soils, topography, climate, and plant communities. An ecological site is a distinct kind of range or forest land with specific physical characteristics that make it capable of producing and supporting a characteristic plant community that is different from other range or forest lands.

The following is a description of ecological sites found within the western glaciated and the western sedimentary plains.

#### **Wet Meadow Ecological Site**

Physiographic features: Lands where seepage, ponding, etc, raise the water table to above the surface during only a part of the growing season. It is too wet for cultivated crops, but too dry for common reed, cattails, or true aquatics. This site occurs on slopes of 1% to 10% on low terraces, fans, and floodplains. Elevations range from 2,300 feet to 4,100 feet above sea level.

Grasses and grasslikes: Tall reedgrass, tufted hairgrass, Am. sloughgrass, bearded wheatgrass, northern manna grass, prairie cord grass, sedges and rushes.

Forbs: Cow Parsnip, water parsnip, bogor orchid, blue-eyed grass, thermopsis.

Woody Species: Willows and cottonwood.

The taller, more palatable grasses such as reed grasses, bearded wheatgrass, cord grass and manna grasses decrease with heavy, continuous grazing pressure and are replaced by sedges, Baltic rush, cinquefoil and willows. Plants that are likely to invade include foxtail barley, weedy forbs, and annuals.

Soils associated with this site have seepage, ponding, etc. that raise the water table to above the surface during a portion of the growing season.

### **Subirrigated Ecological Site**

Physiographic Features: These lands have an effective subsurface ground water table with water rarely over the surface during the growing season. This site occurs on level terraces and floodplains on slopes of 0% to 2%. Elevations range from 2,300 feet to 4,100 feet above sea level on the western glaciated plains and 2,500 feet to 5,000 feet in the western sedimentary plains.

Grasses and grasslikes: Basin wildrye, tufted hairgrass, northern reed grass, prairie cordgrass, bearded wheatgrass, slender wheatgrass, mat muhly, tall sedges.

Forbs: Cow parsnip, thermopsis, cinquefoil, knotweed. Sites in the western glaciated plains will also have wild licorice, horsemint, goldenrod, and American vetch.

Shrubs: Willows, snowberry, cottonwood. Sites in the western glaciated plains will also have chokecherry, buffaloberry, rose, shrubby cinquefoil, and wild plum.

The taller, more palatable plants such as prairie cordgrass, reedgrasses, basin wildrye and wheatgrasses and tall sedges are likely to decrease with continuous, heavy grazing pressure. These plants are replaced by low sedges, baltic rush, northwest cinquefoil, thermopsis, and shrubby cinquefoil. Plants that are not part of the climax community that are likely to invade with continued grazing pressure are Kentucky bluegrass, redtop, foxtail, meadow barley, houndstongue, leafy spurge, thistle and weedy forbs.

The soils associated with this range site have an effective subsurface ground-water table and water rarely rises above the surface during the growing season.

### **Saline Lowland**

These sites are similar to subirrigated and overflow lands where salt and/or alkali accumulations are apparent and salt tolerant plants occur over most of the area. They occur on terraces or flood plains on slopes of 0% to 2%. Elevations range from 2,300 feet to 4,100 feet.

Most plants in this site are salt tolerant.

Grasses and grasslikes: Alkaligrass, alkali sacaton, alkali cordgrass, western wheatgrass, basin wildrye, inland saltgrass.

Forbs: Seepweed, knotweed.

Woody species: Greasewood, buffaloberry, nuttall saltbrush.

Taller species such as alkali sacaton, alkali cordgrass, nuttall saltgrass and wheatgrass decrease with continued grazing pressure. These plants are replaced by kochia, squirrel tail, poverty weed, inland saltgrass and bare ground. Invaders are foxtail barley and Russian olive.

Soils are subirrigated and overflow lands where salt and or alkali accumulations are apparent and salt tolerant plants occur over a major part of the area.

### **Overflow Ecological Site**

Physiographic features: These areas receive more than normal soil moisture as run in from higher elevations or stream overflow. They occur on flood plains and coulee bottoms. Elevations range from 2,300 feet to 4,100 feet above sea level and 2,500 to 5,000 feet in the western sedimentary plains.

Grasses and grasslikes: Bluebunch wheatgrass, Prairie cordgrass, green needle grass, western and thickspike wheatgrass, basin wildrye, prairie junegrass, Sandberg bluegrass, needle-and-thread, sedges. Sun sedge and needleleaf sedge will also be found in the western glaciated plains.

Forbs: Western Glaciated will have Penstemon, lomatium, winterfat American vetch, milk vetch, Western Sedimentary plains will have horsemint, milkvetch, bluebell, yarrow, thermopsis, American vetch, cudweed sagewort, fringed sagewort.

Woody Species: Snowberry, rose, plum, buffaloberry, green ash, chokecherry, silver sagebrush, gooseberry, skunkbush sumac. In addition to these species, service berry will also be found in the western glaciated plains.

The taller, more palatable grasses such as basin wildrye, green needle grass, prairie cordgrass decrease with heavy continuous grazing pressure. They are replaced by increased amounts of western wheatgrass, needle-and-thread, prairie junegrass, Sandberg bluegrass, cudweed sagewort, yarrow, snowberry, and rose. Invaders include Kentucky bluegrass, Canada bluegrass, thistles and other weedlike forbs.

The soils associated with this site regularly receive more than normal soil moisture because of run-in or stream overflow.

### **Silty Ecological Site**

Physiographic features: This site occurs on undulated or rolling uplands, low terraces and fans. Slopes range from 0% to 15% on all exposures. Elevations range from 2,300 feet to 4,100 feet above sea level for the western glaciated plains and 2,500 to 5,000 feet in the western glaciated plains.

Grasses and grasslike plants: Bluebunch wheatgrass, needle-and-thread, western wheatgrass, green needle grass, blue grama, prairie junegrass, Sandberg bluegrass, threadleaf sedge.

## Resource Description

Forbs: Fringed sagewort, yarrow, penstemon, milkvetches, scurfpea Western Sedimentary plains will have prairie clover, American vetch, milkvetches, black Sampson.

Woody Species: Silver sagebrush, winterfat, and snowberry. Western Sedimentary will also have skunkbush sumac and rabbitbrush.

The taller, more palatable grasses such as blue bunch wheatgrass, green needle grass and western wheatgrass decrease with heavy, continuous grazing pressure. They will be replaced with increasing amounts of prairie junegrass, Sandberg bluegrass, blue grama, threadleaf sedge and needle-and-thread.

The soils associated with this site are loams, very fine sandy loam, or silt loam. This includes soils with two inches or more of loam or silt loam over clayey subsoils.

### **Sands Ecological Site**

Physiographic features: This site is limited to the western glaciated plains and is found on undulating uplands, low terraces, and valley bottoms. Slopes range from 0% to 20% on all exposures. Elevations range from 2,300 feet to 4,100 feet.

Grasses and grasslike: Prairie sandreed, Indian rice grass, needle-and-thread, sand dropseed, blue grama, threadleaf sedge,

Forbs: Scurfpea, astragalus, prairie clover, erigonum spp., green sagewort, fringed sagewort and other native perennial forbs.

Woody plants: Yucca, rose, other native shrubs.

The taller, more palatable grasses such as Indian rice grass, prairie sand reed and needle-and-thread will decrease with continuous heavy grazing pressure. They are replaced by increasing amounts of sand dropseed, threadleaf sedge, fringed sagewort, cudweed sagewort, and green sagewort.

The soils associated with this site are sands and loamy sands more than 20 inches deep.

### **Sandy Ecological Site**

Physiographic features: In the western glaciated plains these upland sites occur on nearly level to moderately steep slopes. The soils are coarse to fine sandy loams more than 20 inches deep. Elevations range from 2,300 feet to 4,100 feet above sea level. In the western sedimentary plains these sites occur on undulating to rolling uplands on slopes from 0% to 15%, but generally 4% to 8%. Elevations range from 2,500 feet to 5,000 feet.

Grasses and grasslike: Prairie sandreed, needle-and-thread, Indian rice grass, western and thickspike wheatgrass, bluebunch wheatgrass, blue grama, threadleaf sedge and other native

perennial grasses. Sand dropseed and sun sedge can also be found in the western sedimentary plains.

Forbs: Scurfpea, American licorice, prairie clover, and hairy golden aster. Golden rod, green sagewort, fringed sagewort and milkvetches may also be found in the western sedimentary plains.

Woody plants: Rose, skunkbush sumac, snowberry, and yucca. Snowberry and silver sagebrush may also be found in the western sedimentary plains.

The taller more palatable grasses decrease with continuous, heavy grazing pressure. They are replaced by increased amount of needle-and-thread, threadleaf sedge, blue grama, fringed sagewort, silver sagebrush, snowberry and rabbitbrush. Plants that are likely to invade include red three awn, prickly pear cactus, annual bromes and weedlike forbs. Broom snakeweed will also invade in the western sedimentary plains.

The soils associated with this site are coarse to fine sandy loams more than 20 inches deep.

### **Clayey Ecological Site**

Physiographic features: This site occurs on undulating to rolling uplands, low terraces, and fans. Slopes range from 0% to 15% on all aspects. Elevations range from 2,300 feet to 4,100 feet above sea level for the western glaciated plains and 2,500 feet to 5,000 feet in the western sedimentary plains.

Grasses and grasslikes: Bluebunch wheatgrass, green needle grass, western wheatgrass, Sandberg bluegrass, plains reedgrass, prairie junegrass, blue grama, needle leaf sedge.

Forbs: Biscuitroot, milkvetch, American vetch, Scarlet globemallow, and scurfpea. Biscuit root, wild onion, thermopsis, eriogonum, black Sampson and dotted gayfeather may also be found in the western sedimentary plains.

Shrubs: Big sagebrush, winterfat, nuttall saltbrush, and rabbitbrush.

The taller, more palatable grasses such as bluebunch wheatgrass, green needle grass, and western wheatgrass decrease with heavy, continuous grazing pressure. They are replaced by increasing amounts of plains reed grass, prairie junegrass, blue grama, Sandberg bluegrass, needle leaf sedge, silver sagebrush, and big sagebrush. Plants likely to invade include fringed sagewort, broom snakeweed, rabbitbrush, annuals and weedlike forbs. Sasify, broom snakeweed, and Japanese brome are likely to invade in the western sedimentary plains.

The soils associated with this site are granular clay loam, silty clay loam, silty clay, sandy clay and clays more than 20 inches deep.

### **Dense Clay Ecological Site**

Physiographic features: This site occurs on nearly level to slightly rolling terraces. It often is a component of the panspots site. Elevations range from 2,300 feet to 4,100 feet in the western glaciated plains and 2,500 feet to 5,000 feet for the western sedimentary plains.

Grasses and grasslike: Western wheatgrass, green needle grass, canby bluegrass, plains wheatgrass, squirrel tail, and needle leaf sedge can found in the western glaciated plains. Bluebunch wheatgrass, western and thickspike wheatgrass, bluebunch wheatgrass, blue grama, Sandberg blue grass and plains reedgrass can be found in the western sedimentary plains.

Forbs: Scarlet globe mallow, American vetch, biscuit root, onion. Eriogonum and thermopsis may also be found in the western sedimentary plains.

Shrubs: Winter fat, greasewood, big sagebrush, nuttal saltbrush. In addition to these species, rabbitbrush can also be found in the western sedimentary plains.

In the western glaciated plains taller more palatable grasses such as green needle grass western wheatgrass, nuttal saltbrush and winterfat decrease with heavy, continuous grazing pressure. They are replaced by increasing amounts of squirrel tail, plains reed grass, Sandberg bluegrass, and big sagebrush. Plants likely to invade include annual bromes, curlycup gumweed, burdock and broom snakeweed.

In the western sedimentary plains, the taller, more palatable species such as western and thickspike wheatgrass and green needle grass decrease with heavy, continuous grazing pressure. Nuttal saltbrush decreases and greasewood decreases with spring summer grazing. They are replaced by increasing amount of blue grama, Sandberg bluegrass and big sagebrush. Plants likely to invade include annuals and weedlike forbs.

These soils are relatively impervious, deep, nongranular clays. They may be overlain by two inches or less of other materials. The dispersed layer is very hard to extremely hard when dry and very sticky when wet.

### **Shallow Clay Ecological Site**

Physiographic features: This site occurs on slopes generally greater than 15%--most often in the breaks of major and minor drainages. In the western sedimentary plains this site may be found on slopes between 15% to 35%. Elevation range from 2,300 feet to 4,100 feet above sea level for the western glaciated plains and 2,500 feet to 5,000 feet for the western sedimentary plains.

Grasses and grasslikes: Bluebunch wheatgrass, green needle grass, western wheatgrass, prairie junegrass, Sandberg bluegrass, blue grams, and needle leaf sedge.

Forbs: Biscuit root, eriogonum, scurfpea, scarlet globemallow, and onion. In addition to these species fringed sagewort, black Sampson, dotted gayfeather and mariposa lily may be found in the western sedimentary plains.

Shrubs: Big sagebrush, winterfat, nuttall saltbrush, and rabbitbrush. In addition to these species, juniper may also be found in the western glaciated plains.

The taller, more palatable grasses such as bluebunch wheatgrass, green needle grass, and western wheatgrass decrease with continuous, heavy grazing. They are replaced by increasing amounts of prairie junegrass, plains reedgrass, blue grama, Sandberg bluegrass. Fringed sagewort and big sagebrush will also increase in the western sedimentary plains.

Plants likely to invade include annual bromes, broom snakeweed, other annuals, and weedlike forbs. In addition to these species, salsify will also invade in the western sedimentary plains. Curly cup gumweed and leafy spurge may also invade in the western glaciated plains.

The soils are shallow granular clay soils that are 10 inches to 20 inches deep to underlying shale or nearly impervious clays.

### **Pan Spots Ecological Site**

Physiographic features: This site occurs on level to gently rolling uplands on slopes generally less than 15%. It is characterized by shallow depressions of nearly impervious materials. These shallow depressions or “pans” occupy 20% to 50% of this site. Elevations range from 2,300 feet to 4,100 feet above sea level. Ground cover outside of the pan areas is normally 65%. The areas inside of the pan depressions are barren or sparsely vegetated.

Specific plant species are not listed, however relative composition by weight of annual production is approximately 85% grass and grasslike plants, 5% forbs and 10% woody species. Trees do not occur on this site.

The taller, more palatable species such as western wheat grass, green needle grass and needle-and-thread decrease with heavy, continuous grazing pressure. They are replaced by increasing amounts of blue grama, plains reed grass, Sandberg bluegrass, prairie june grass, and cactus. Plants likely to invade include curly cup gumweed, broom snakeweed, annual bromes, and oyster plant.

The soils are silty, clayey, or sandy soils in complex with shallow depressions of hard clays or other nearly impervious materials at or near the surface. The shallow depressions occupy 20 to 50 percent of the range site.

### **Shallow Ecological Site**

Physiographic features: In the western glaciated plains, this site occurs on level areas to steep slopes in areas where soils are underlain at a depth of 10 inches to 20 inches by bedrock or other relatively impervious material. It is often associated with upland sites such as silty, sandy, or clayey. Elevations range from 2,300 feet to 4,100 feet above sea level. In the western sedimentary plains this site occurs on undulating to rolling hills of sedimentary and sandstone

upland with outcrops of shale or sandstone. Slopes range from 4% to 15%. Elevations range from 2,500 feet to 5,000 feet.

Grasses and grasslikes: in the western glaciated plains grasses include bluebunch wheatgrass, prairie sandreed, western wheatgrass, little bluestem, needle-and-thread, prairie junegrass, Sandberg bluegrass, and blue grama. In the western sedimentary grasses and grasslikes include bluebunch wheatgrass, western wheatgrass, needle-and-thread, prairie junegrass, Sandberg bluegrass, blue grama, plains muhly, and sideoats grama.

Forbs: In the western glaciated plains include astragalus, prairie clovers, fringed sagewort, hairy golden aster. In the western sedimentary plains forbs include yucca.

Shrubs: Western Juniper and ponderosa pine.

Trees are an important component of this site in the western sedimentary plains. They are not significant in the western glaciated plains.

The taller, more palatable grasses such as bluebunch wheatgrass, prairie sandreed, western wheatgrass, and little bluestem decrease with continuous, heavy grazing pressure and are replaced by increasing amounts of prairie junegrass, threadleaf sedge, and needle-and-thread. Big sagebrush may increase with heavy grazing in the western sedimentary plains. In the western glaciated plains, annual bromes, red three awn and weedlike forbs are likely to invade. Annual grasses, weedlike forbs and broom snakeweed are likely to invade in the western sedimentary plains.

The soils are 10 inches to 20 inches deep to hard rock and soft beds of decomposed granite, angular coarse fragments, siltstone, or sandstone.

### **Saline Upland Ecological Site**

Physiographic features: This site occurs generally on slopes of 0% to 8% on all exposures. It is generally associated with shale beds. Elevations range from 2,300 feet to 4,100 feet above sea level for the western glaciated plains and 2,500 feet to 5,000 feet in the western sedimentary plains. Salt and alkali accumulations are common on this site.

Grasses and grasslikes: Alkali sacaton, western wheatgrass, inland saltgrass, Sandberg bluegrass, plains reed grass. In addition to these plants, alkali bluegrass, nuttall alkaligrass and bottlebrush squirrel tail can be found in the western sedimentary plains.

Forbs: Poverty sumpweed. In addition to sumpweed, eriogonum can also be found in the western sedimentary plains.

Shrubs: Greasewood and nuttall saltbrush. Fourwing saltbrush may be found in the western sedimentary plains.

Alkali sacaton, and western wheatgrass will decrease with heavy, continuous grazing pressure. They are replaced by increasing amounts of saltgrass, Sandberg bluegrass, poverty sumpweed and greasewood. In addition to these species, Bottlebrush squirrel tail will increase and greasewood will decrease with spring/summer grazing in the western sedimentary plains.

Soils are loams, clay loams, and clays more than 20 inches deep with salt or salt accumulations.

### **Shale Ecological Site**

Physiographic features: This site occurs on steep uplands with raw shale outcrops. Slopes range from 20% to 50%. Elevations range from 2,300 feet to 4,100 feet above sea level in the western glaciated plains and 2,500 feet to 5,000 feet in the western sedimentary plains.

Grasses and grasslikes: Western wheatgrass, alkali sacaton, inland saltgrass, plains reedgrass, Sandberg bluegrass. In addition to these species, thickspike wheatgrass and sedges may be found in the western sedimentary plains.

Forbs: Eriogonum spp. and poverty sumpweed. In addition to these species thermopsis may be found in the western sedimentary plains.

Shrubs: Greasewood and nuttall saltbrush.

Western wheatgrass and alkali sacaton will decrease with continuous, heavy grazing pressure. They are replaced by increasing amounts of inland saltgrass, Sandberg bluegrass, and greasewood. Plants likely to invade include squirreltail, foxtail barley, annuals and weedlike forbs.

Soils are readily puddled uplands where some unweathered angular raw shale fragments are exposed at the surface and little, if any, soil profile is evident.

### **Badlands Ecological Site**

Physiographic features: This site is a complex of ecological sites and class VIII land. It is rough broken land. The only forage for wildlife or domestic animals is found on small mesas, benches, and deeply eroded stream channels.

Grasses and grasslikes: Western and thickspike wheatgrass, green needle grass, bluebunch wheatgrass, blue grama, prairie sandreed, little bluestem, basin wildrye, plains muhly.

Forbs: American vetch, penstemon, prairie clovers, astragalus.

Woody Species: Juniper sp, nuttall saltbrush, big sagebrush, silver sagebrush, and greasewood.

Bluebunch wheatgrass, green needle grass, basin wildrye, and western wheatgrass will decrease with continuous, heavy grazing pressure. They are replaced by increasing amount of blue gram,

big sagebrush, and others. Invaders are annual bromes, rabbitbrush, red three awn, and curly cup gumweed.

Trees may be present but are small and stunted.

Soils consist of a wide variety of soils mixed with nearly barren lands broken by drainages and intermingled with small grazeable lands.

### **Thin Breaks Ecological Site**

Physiographic features: This site is found in the western sedimentary plains only. It occurs on steep slopes where parent material outcrops at different levels down the slope. A typical thin breaks range site has a stair step appearance.

Grasses and grasslikes: Bluebunch wheatgrass, needle-and-thread, western and thickspike wheatgrass, green needle grass, little bluestem, prairie sandreed, Indian rice grass, blue grama, plains muhly, Sandberg bluegrass, and sand dropseed.

Forbs: Native legumes, phlox, hairy golden aster, scarlet globemallow, sagewort.

Woody species: Snowberry, rose, service berry, skunkbush sumac, and juniper.

Bluebunch wheatgrass, western wheatgrass, green needle grass and prairie sandreed will decrease with continuous, heavy grazing. They are replaced by increasing amounts of blue grama, sand dropseed, and Sandberg bluegrass.

Invaders are red three awn, curlycup gumweed, annual bromes, broom snakeweed, and rabbitbrush.

Soils are mixed soils of various depths with hard rock or other resistant bed outcroppings at different levels on different irregular slopes. Individual soils are not practical to map.

### **Very Shallow Ecological Site**

Physiographic features: This site occurs on escarpment edges and in rough-broken uplands. It is characterized by sparse vegetation. In the western glaciated plains it may have scattered juniper trees growing in the cracks and fissures of the bedrock.

Grasses and grasslikes: Bluebunch wheatgrass, needle-and-thread, western and thickspike wheatgrass, blue grama, prairie junegrass, and threadleaf sedge.

Forbs: Eriogonum spp. Hairy golden aster, phlox. In addition to these species penstemon, milkvetches, prairie clovers, arrowleaf balsamroot may be found in the western sedimentary plains.

Woody species include juniper and skunkbush sumac. In addition to these species natal saltbush, shadscale saltbush and conifer may be found in the western sedimentary plains.

Bluebunch wheatgrass, prairie sandreed, and Indian ricegrass decrease with continuous, heavy grazing pressure. They are replaced by increasing amounts of needle-and-thread, blue grama, prairie junegrass, threadleaf sedge, and forbs. Rubber rabbitbrush will also increase in the western sedimentary plains. Invaders are annuals, red three awn, weedlike forbs and other exotic species. Clubmoss will also invade in the western sedimentary plains.

The soils associated within this site have a root restriction zone within 10 inches of the surface and are characterized by rock outcroppings.

### **Thin Sandy Ecological Site**

Physiographic features: This site occurs in the western sedimentary plains only. It occurs on moderately steep terrain, smooth undulating and rolling hills dissected by narrow, rounded stream valleys. This site may also occur on steep side slopes of narrow ridges. Slopes range from 8% to 45%.

Grasses and grasslike: Prairie sandreed, bluebunch wheatgrass, needle-and-thread, Indian ricegrass, sun sedge, thickspike wheatgrass, threadleaf sedge, blue grama, prairie junegrass, Sandberg bluegrass, and red three awn.

Forbs: American vetch, scurfpea, prairie clovers, hairy golden aster, paint brush, fringed sagewort, milkvetches, phlox, low larkspur, and prickly pear.

Shrubs: Wyoming big sagebrush, black sagebrush, rabbitbrush, skunkbush sumac, yucca, rose, and winterfat.

Juniper and pine may occur in some locations.

As the ecological condition deteriorates, this site tends to become dominated by big sagebrush, needle-and-thread, red three awn, threadleaf sedge, fringed sagewort, and cactus. Invaders include broom snakeweed, cheatgrass brome, other annuals, and weedlike forbs.

Soils are coarse to fine sandy loams more than 20 inches deep on steep or hilly landscapes. Plant roots can easily penetrate deeper than 20 inches.

### **Thin Silty Ecological Site**

Physiographic features: This site occurs in the western sedimentary plains only. It occurs on moderately steep to smooth undulating and rolling hills dissected by narrow, rounded stream valleys. This site also occurs on steep side slopes of narrow ridges. Slopes range from 8% to 45%, but are mainly more than 20%.

## Resource Description

Grasses and grasslikes: Bluebunch wheatgrass, western wheatgrass, thickspike wheatgrass, green needle grass, threadleaf sedge, prairie junegrass, blue grama, and Sandberg bluegrass.

Forbs: Scurfpea, black Sampson, lomatium, fringed sagewort, phlox, low larkspur, and paintbrush.

Shrubs: Winter fat, black sagebrush, Wyoming big sagebrush, rabbitbrush, and skunkbush sumac.

As the ecological conditions of this site deteriorates, big sagebrush, fringed sagewort, forbs, and perennial native shortgrasses tend to become dominant. Invaders include broom snakeweed, cheatgrass brome, and other annuals, and weedlike forbs.

Soils are fine sandy loams, loams and silt loams, more than 20 inches deep on steep or hilly landscapes. Plant roots can easily penetrate deeper than 20 inches.

### **Thin Clayey Ecological Site**

Physiographic features: This site occurs in the western sedimentary plains only. It occurs on moderately steep to smooth undulating and rolling hills dissected by narrow, rounded stream valleys. This site also occurs on steep side slopes of narrow ridges. Slopes range from 8% to 45%, but are mainly more than 20%.

Grasses and grasslikes: Bluebunch wheatgrass, western wheatgrass, thickspike wheatgrass, green needle grass, threadleaf sedge, prairie junegrass, blue grama, plains muhly, bottlebrush squirrel tail, and Sandberg bluegrass.

Forbs: American vetch, prairie clovers, biscuitroot, onion, scarlet globemallow, paintbrush, wild buck wheat, fringed and sagewort.

Shrubs: Winterfat, Wyo. big sagebrush, nuttall saltbrush, shadscale, and rabbitbrush.

### **Shallow to Gravel Ecological Site**

Physiographic features: This site occurs in the western sedimentary plains only. It occurs on moderately steep to steep, rounded terraces edges and rolling uplands. Slopes range from 4% to 15%.

Grasses and grasslike: Bluebunch wheatgrass, western wheatgrass, threadleaf sedge, prairie junegrass, blue grama, and Sandberg bluegrass.

Forbs: Arrowleaf balsamroot, fringed sagewort, milkvetches.

Shrubs: Wild rose, skunkbush sumac, and yucca.

## Resource Description

Bluebunch wheatgrass and western wheatgrass decrease with continuous, heavy grazing pressure. They are replaced by increased amounts of blue grama, needle-and-thread, threadleaf sedge, and fringed sagewort. Invaders include broom snakeweed, cheatgrass brome, other annuals, and weedlike forbs.

Soils are granular clay loam, silty clay loam, silty clay, sandy clay, and clay soils more than 20 inches deep on steep or hilly landscapes. Plant roots can easily penetrate deeper than 20 inches.

### **Gravel Ecological Site**

Physiographic features: This site occurs on the western sedimentary plains only. It occurs on uplands, terrace breaks, and flood plains with undulating to very steep slopes.

Grasses and grasslike: Bluebunch wheatgrass, western wheatgrass, threadleaf sedge, prairie junegrass, blue grama, and Sandberg bluegrass.

Forbs: Green sagewort, fringed sagewort, hairy golden aster, and phlox.

Shrubs: Rubber rabbitbrush, skunkbush sumac, yucca, juniper spp. and rose.

Bluebunch wheatgrass, and needle-and-thread decrease with heavy, continuous grazing pressure. They are replaced by increased amounts of prairie junegrass, Sandberg bluegrass, blue grama, and threadleaf sedge.

Invaders include annuals, weedlike forbs and clubmoss.

Soils are gravelly sandy loam to gravelly loamy sands that are 40% to 50% gravel and cobbles in the upper part of the profile and more than 60% in the lower part. Most of the soil surface is covered by gravel and cobbles.



# APPENDIX C

## Standards for Rangeland Health

### Standards

Standards are statements of physical and biological condition or degree of function required for health sustainable rangelands. Achieving or making significant and measurable progress towards these functions and conditions is required of all uses of public rangelands. Historical data, when available, should be used when assessing progress towards these standards.

#### **Standard #1: Uplands are in proper functioning condition.**

This means that soils are stable and provide for capture, storage and safe release of water appropriate to soil type, climate and landform. The amount and distribution of ground cover (i.e., litter, live and standing dead vegetation, microbiotic crusts, and rock/gravel) for identified ecological site(s) or soil-plant associations are appropriate for soil stability.

Evidence of accelerated erosion in the form of rills and/or gullies, erosional pedestals, flow patterns, physical soil crusts/surface scaling and compaction layers below the soil surface is minimal. Ecological processes including hydrologic cycle, nutrient cycle and energy flow are maintained and support healthy biotic populations. Plants are vigorous, biomass production is near potential and there is a diversity of species characteristic of and appropriate to the site. Assessing proper functioning conditions will consider use of historical data.

As indicated by:

#### Physical Environment

- erosional flow patterns
- surface litter
- soil movement by water and wind
- soil crusting and surface sealing
- compaction layer
- rills
- gullies
- cover amount
- cover distribution

#### Biotic Environment

- community richness
- community structure
- exotic plants
- plant status
- seed production
- recruitment
- nutrient cycle

#### **Standard #2: Riparian and wetland areas are in proper functioning condition.**

This means that the functioning condition of riparian-wetland areas is a result of the interaction among geology, soil, water and vegetation. Riparian-wetland areas are functioning properly when adequate vegetation, landform or large woody debris is present to dissipate stream energy associated with high water flows, thereby reducing erosion and improving water quality; filter sediment, capture bedload, and aid floodplain development; improve flood water retention and groundwater recharge;

develop root masses that stabilize streambanks against cutting action; develop diverse ponding and channel characteristics to provide the habitat and the water depth, duration, and temperature necessary for native fish production, waterfowl breeding, and other uses appropriate for the area that will support greater species richness.

The riparian-wetland vegetation is a mosaic of species richness and community structure serving to control erosion, shade water, provide thermal protection, filter sediment, aid floodplain development, dissipate energy, delay flood water, and increase recharge of groundwater where appropriate to landform. The stream channels and flood plain dissipate energy of high water flows and transport sediment appropriate for the geomorphology (e.g., gradient, size, shape, roughness, confinement, and sinuosity), climate, and landform. Soils support appropriate riparian-wetland vegetation, allowing water movement, filtering sediment, and slowing ground water movement for later release. Stream channels are not entrenching beyond natural climatic variations and water levels maintain appropriate riparian-wetland species.

Riparian areas are defined as land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lake shores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependent upon free water in the soil. Assessing proper functioning conditions will consider use of historical data.

As indicated by:

### Hydrologic

- floodplain inundated in relatively frequent events (1-3 years)
- amount of altered streambanks
- sinuosity, width/depth ratio, and gradient are in balance with the landscape setting (i.e., landform, geology, and bioclimatic region)
- upland watershed not contributing to riparian degradation.

### Erosion/Deposition

- floodplain and channel characteristics; i.e., rocks, coarse and/or woody debris adequate to dissipate energy
- point bars are being created and older point bars are being vegetated
- lateral stream movement is associated with natural sinuosity
- system is vertically stable
- stream is in balance with water and sediment being supplied by the watershed (i.e., no excessive erosion or deposition)

### Vegetation

- reproduction and diverse age class of vegetation
- diverse composition of vegetation
- species present indicate maintenance of riparian soil moisture characteristics
- streambank vegetation is comprised of those plants or plant communities that have deep binding root masses capable of withstanding high streamflow events
- utilization of trees and shrubs
- riparian plants exhibit high vigor
- adequate vegetative cover present to protect banks and dissipate energy during high flows
- where appropriate, plant communities in the riparian area are an adequate source of woody debris

**Standard #3: Water quality meets Montana State standards.**

This means that surface and ground water on public lands fully support designated beneficial uses described in the Montana Water Quality Standards. Assessing proper functioning conditions will consider use of historical data.

As indicated by:

- dissolved oxygen concentration
- pH
- turbidity
- temperature
- fecal coliform
- sediment
- color
- toxins
- others: ammonia, barium, boron, chlorides, chromium, cyanide, endosulfan, lindane, nitrates, phenols, phosphorus, sodium, sulfates, etc.

**Standard #4: Air quality meets Montana State standards.**

This means that air quality on public lands helps meet the goals set out in the State of Montana Air Quality Implementation Plan. Efforts will be made to limit unnecessary emissions from existing and new point or non-point sources.

The BLM management actions or use authorizations do not contribute to air pollution that violates the quantitative or narrative Montana Air Quality Standards or contributes to deterioration of air quality in selected class area.

As indicated by:

Section 176(c) Clean Air Act which states that activities of all federal agencies must

conform to the intent of the appropriate State Air Quality Implementation Plan and not:

- cause or contribute to any violations of ambient air quality standards
- increase the frequency of any existing violations
- impede the State's progress in meeting their air quality goals

**Standard #5: Habitats are provided to maintain healthy, productive and diverse populations of native plant and animal species, including special status species (federally threatened, endangered, candidate or Montana species of special concern as defined in BLM Manual 6840, Special Status Species Management).**

This means that native plant and animal communities will be maintained or improved to ensure the proper functioning of ecological processes and continued productivity and diversity of native plant lifeforms. Where native communities exist, the conversion to exotic communities after disturbance will be minimized. Management for indigenous vegetation and animals is a priority. Ecological processes including hydrologic cycle, and energy flow, and plant succession are maintained and support healthy biotic populations. Plants are vigorous, biomass production is near potential, and there is a diversity of plant and animal species characteristic of and appropriate to the site. The environment contains components necessary to support viable populations of a sensitive/threatened and endangered species in a given area relative to site potential. Viable populations are wildlife or plant populations that contain an adequate number of reproductive individuals distributed on the landscape to ensure the long-term existence of the species. Assessing proper functioning

conditions will consider use of historical data.

As indicated by:

- plants and animals are diverse, vigorous and reproducing satisfactorily; noxious weeds are absent or insignificant in the overall plant community
- spatial distribution of species is suitable to ensure reproductive capability and recovery
- a variety of age classes are present
- connectivity of habitat or presence of corridors prevents habitat fragmentation
- species richness (including plants, animals, insects and microbes) are represented
- plant communities in a variety of successional stages are represented across the landscape.

APPENDIX D													
Assessment of Standards for Rangeland Health on Allotments within the Monument													
Allotment Name	Allotment Number	Standard 1: Upland Health			Standard 2: Riparian Health			Standard 3: Water Quality		Standard 4: Air Quality		Standard 5: Biodiversity	
		Meeting	No. Acres	Cause of	Meeting	No. Miles	Cause of	Meeting	Cause of	Meeting	Cause of	Meeting	Cause of
		Yes or No*	Not Meeting	Not Meeting	Yes or No*	Not Meeting	Not Meeting	Yes or No	Not Meeting	Yes or No	Not Meeting	Yes or No*	Not Meeting
Balzok	6424	Yes			MSP	FAR 1.3			ND		Yes		Yes
Barnard Ridge	6209	Yes			N/A			ND		Yes		Yes	
Bear Point	6273	Yes			N/A			ND		Yes		Yes	
Black Butte	6211	MSP			N/A			ND		Yes		Yes	
Bullwhacker	6181	Yes			MSP	FAR 10.5, PFC 12.6		ND		Yes		Yes	
Cabin	6434	Yes			Yes			ND		Yes		Yes	
Cabin Creek	5609	Yes						ND		Yes		Yes	
Chase Hill	6198	Yes			N/A			ND		Yes		Yes	
Chimney Butte	6169	Yes			MSP	FAR 8.9		ND		Yes		Yes	
Clinard Coulee	6420	Yes			N/A			ND		Yes		Yes	
Coal Mine Coulee	5629	Yes						ND		Yes		Yes	
Dark Butte	6215	Yes			MSP	FAR 6.1	Dams	ND		Yes		Yes	
Dauphine Rapids	6225	Yes			N/A			ND		Yes		Yes	
Deadman Rapids	6221	No	1646	LS	N/A			ND		Yes		No	LS
Eight Mile Bench	6220	Yes			N/A			ND		Yes		Yes	
Ervin Rigetop	6212	Yes			MSP	FAR 12		ND		Yes		Yes	
Gallatin Rapids	6222	Yes			Yes			ND		Yes		Yes	
Greasewood Bottom	6282	Yes			MSP	FAR 1.5	L.S,NC,Weeds, Recreation	ND		Yes		Yes	
Halley	6201	Yes			N/A			ND		Yes		Yes	
Hay Coulee	6182	No	4100	LS	No	FAR 1.4, PFC 0.3	LS	ND		Yes		No	LS
Jurenka	6481	Yes			MSP	FAR 0.5		ND		Yes		Yes	
Lion Coulee	6193	Yes			N/A			ND		Yes		Yes	
Little Bullwhacker	6214	Yes			MSP	FAR 8, PFC 0.6		ND		Yes		Yes	
Little Suction	6171	Yes			N/A			ND		Yes		Yes	
Lost Bird	6254	Yes			N/A			ND		Yes		Yes	
Lost Ridge	6208	Yes			MSP	FAR 3.4		ND		Yes		Yes	
Lower Squaw Ck	5608	Yes			N/A			ND		Yes		Yes	
Maxwell	6210	Yes			N/A			ND		Yes		Yes	
N Hanging 5	6422	No	435	Weeds and Farm Permit	No	FAR 0.7	Weeds	ND		Yes		No	Weeds & Farming
N. Fk Lion Coulee	6192	MSP			MSP			ND		Yes		Yes	
North Timber Ridge	6269	Yes			N/A			ND		Yes		Yes	
Osterman	6428	Yes			N/A			ND		Yes		Yes	
Pablo Rapids	6216	Yes			MSP	FAR 0.4	Dams	ND		Yes		Yes	
Piedras	6425	Yes			MSP	FAR 2.5		ND		Yes		Yes	
Puma	6429	Yes			N/A			ND		Yes		Yes	
Ragland Ridge	6207	Yes			N/A			ND		Yes		Yes	
Sanford pasture	820	Yes			N/A			ND		Yes		Yes	
Sneath Common	6218	Yes			No	FAR 7.9	L.S,NC, Dams, Weeds	ND		Yes		No	Prairie Dogs
South Vimy	16350	Yes			N/A			ND		Yes		Yes	
Spencer Ridge	6194	Yes			N/A			ND		Yes		Yes	
Sturgeon Island	6284	MSP		LS	MSP	FAR 6	L.S, NC, Weeds	ND		Yes		Yes	
T26N R12E sc1	855	No	40	LS	N/A			ND		Yes		Yes	
T26N R12E Sec 11&12	912	N/A			No	FAR .2	Weeds	ND		Yes		No	Weeds
T26N R12E Sec 3	868	No	15	Weeds	No	FAR 0.2	Weeds	ND		Yes		No	Weeds
T26N R12E Sec 4	864	No	29	Weeds	No	FAR 0.1	Weeds	ND		Yes		No	Weeds



Resource Description

South Side of the Missouri River													
Allotment Name	Allotment Number	Standard 1: Upland Health			Standard 2: Riparian Health			Standard 3: Water Quality		Standard 4: Air Quality		Standard 5: Biodiversity	
		Meeting	No. Acres	Cause of	Meeting	No. Miles	Cause of	Meeting	Cause of	Meeting	Cause of	Meeting	Cause of
		Yes or No*	Not Meeting	Not Meeting	Yes or No*	Not Meeting	Not Meeting	Yes or No	Not Meeting	Yes or No	Not Meeting	Yes or No	Not Meeting
Able Place	9653	Yes			Yes			ND		Yes		Yes	
ABN	9649	Yes			Yes			ND		Yes		Yes	
Armells	20037	No		LS	No	PFC 0.9, FAR 2.9, NF 0.5	LS, NC	ND		Yes		Yes	
Arrow Ck East	20040	Yes			N/A			ND		Yes		Yes	
Arrow Ck West	9707	Yes			No	PFC 0.125, FAR 0.5	LS, NC	ND		Yes		Yes	
Arrow Ck Bench	9761	Yes			N/A			ND		Yes		Yes	
B Lazy M	9825	Yes			N/A			ND		Yes		Yes	
Barnes Ridge	238	No	40	LS	No	FAR 3.4		ND		Yes		Yes	
Baker Bar	2521	Yes			No	FAR 0.25		ND		Yes		Yes	
Big View	9664	Yes			Yes			ND		Yes		Yes	
Big Sag	2522	Yes			N/A			ND		Yes		Yes	
Blind Cyn AMP	20010	Yes			N/A			ND		Yes		Yes	
Churchill Butte	19807	Yes			N/A			ND		Yes		Yes	
Cimrhakl	2003	Yes			No	FAR 7.4 m.	NC	ND		Yes		Yes	
Coffee Creek	9683	Yes			Yes			ND		Yes		Yes	
Dammel	9687	Yes			No	FAR 1.8 m.	LS	ND		Yes		Yes	
Deadman Coulee	9778	Yes			No	FAR 2.4 m.	LS	ND		Yes		Yes	
Demars	20026	Yes			No	PFC 1.2 NF 0.5		ND		Yes		Yes	
Dog Ck 20	15124	Yes			No	2.4	LS, NC	ND		Yes		Yes	
Dog Ck 21	15125	Yes			No	FAR 1.2	LS, NC	ND		Yes		Yes	
Dog Ck 19	15126	No	500	Historical use	No	FAR 1.3	LS, NC	ND		Yes		No	LS
Dostal	9693	Yes			Yes			ND		Yes		Yes	
Evans Bend	9797	No	200	Non-native grass, weeds	Yes			ND		Yes		Yes	
Evers Bench	2002	Yes			N/A			ND		Yes		Yes	
Fink EUI	2000	Yes			N/A			ND		Yes		Yes	
Flat Ck	9826	Yes			Yes			ND		Yes		Yes	
Grace Bench	9864	No	246	LS	N/A			ND		Yes		No	LS
Hole in the Wall	9799	Yes			No	NF 1	LS	ND		Yes		Yes	
Iron City Island	20066	Yes			No	FAR 1.6	LS, NC	ND		Yes		Yes	
Kipps Rapdis	9729	Yes			Yes			ND		Yes		Yes	
Knox Ridge	20078	Yes			N/A	PFC 6.1		ND		Yes		Yes	
Komarek Ranch	2015	Yes			N/A			ND		Yes		Yes	
Komarek Place	2016	Yes			N/A			ND		Yes		Yes	
Lower Fargo Coulee	2040	Yes			N/A			ND		Yes		Yes	
Lower Armells	2021	Yes			N/A			ND		Yes		Yes	
Mattuschek	20045	Yes			No	PFC 1.5, FAR 2	LS, NC	ND		Yes		Yes	
Mayberry	2018	Yes			No	FAR 0.8, NF 1.6	LS, NC	ND		Yes		Yes	
Melton Coulee	9703	Yes			N/A			ND		Yes		Yes	
Mud Springs Coulee	9662	Yes			N/A			ND		Yes		Yes	
Mutton Coulee	20039	Yes			Yes			ND		Yes		Yes	
PN Sag	15123	No	5000	LS	N/A			ND		Yes		Yes	
Rattlesnake Coulee	9714	Yes			No	FAR .45	NC	ND		Yes		Yes	
Reed Coulee	20071	No	200	LS	N/A			ND		Yes		Yes	
Reservation Bench	10041	No	2760	LS	N/A			ND		Yes		Yes	
Ritland	9802	No	40	LS	N/A			ND		Yes		Yes	
River	20046	Yes			No	FAR 0.3	NC	ND		Yes		Yes	
Rowe Coulee	9767	Yes			Yes			ND		Yes		Yes	
Sawmill Coulee	2024	Yes			No	FAR 6.4, NF 3.2	LS	ND		Yes		Yes	
Seventy Nine Coulee	20012	Yes			Yes			ND		Yes		Yes	
Seventy Nine Coulee (Stulc)	20079	Yes			Yes			ND		Yes		Yes	
Sheep Shed Coulee	19837	Yes			No	FAR 1.6	LS	ND		Yes		Yes	
Sherry Coulee	9681	Yes			N/A			ND		Yes		Yes	



## APPENDIX E

### Perennial and Intermittent Streams on Public Lands within the Monument

Name	Stream Status	Total Miles	No. Miles on BLM Public Lands	Percentage on BLM Public Lands
Missouri River	P	149	68	46%
Arrow Creek	I	18	1.3	7%
Judith River	P	10.4	0.4	4%
Dog Creek	I	7	2	29%
Woodhawk	I	13	12	98%
Antelope Creek	I	14	6	40%
Bull Creek	I	15	14	91%
Squaw Creek	I	10	10	100%
Cow Creek	I	27	15	54%
Bullwhacker Creek	I	21	21	100%

P = Perennial  
I = Intermittent



## APPENDIX F

### Evaluation of Rivers and Streams within the Monument for Free-Flowing and Outstanding Remarkable Values

#### BLM Lewistown Field Office

Stream Name	Location of Mouth	Total Miles	Miles on Public Lands	% Flowing on Public Lands	Free-Flowing	Outstanding Remarkable Values
Armells Creek	21N, 22E, S24	13	5.5	42%	No	No <sup>1</sup>
Fargo Coulee	21N, 23E, S18	10	9	90%	Yes	
Sourdough Creek	21N, 22E, S28	6	6	100%	Yes	
Two Calf Creek	22N, 23E, S28	17	15	88%	Yes	
Reed Coulee	22N, 22E, S19	8	8	100%	Yes	
S.F. Two Calf Creek	22N, 22E, S34	8.5	5	59%	Yes	
Woodhawk Creek	23N, 22E, S19	17	16	94%	Yes	
Road Coulee	23N, 18E, S33	4	4	100%	Yes	
Dog Creek	22N, 18E, S20	8	2.5	31%	Yes	No <sup>1</sup>
Judith River	23N, 16E, S26	14	0	0%	Yes	Yes <sup>2</sup>
Evers Coulee	22N, 16E, S15	10	1	10%	Yes	
Big Sag Coulee	22N, 16E, S22	9	0	0%	Yes	
Mutton Coulee	22N, 16E, S27	5	4	80%	Yes	
79 Coulee	22N, 16E, S34	3	0.5	17%	Yes	
Arrow Creek	19N, 12E, S31	19	1.5	8%	Yes	No <sup>1</sup>
Flat Creek	22N, 15E, S6	2	0.5	25%	Yes	
Fahlgren Coulee	23N, 15E, S6	1.5	1	67%	Yes	
Deadman Coulee	22N, 15E, S18	0.5	0	0%	Yes	
Woodcock Coulee	21N, 15E, S30	2	0.7	35%	Yes	
Spring Coulee	21N, 15E, S31	2.5	1.5	60%	Yes	
Coffee Creek	21N, 15E, S31	5	1	20%	Yes	No <sup>1</sup>
Sheep Shed Coulee	23N, 14E, S10	1.5	1	67%	Yes	

Resource Description

Stream Name	Location of Mouth	Total Miles	Miles on Public Lands	% Flowing on Public Lands	Free-Flowing	Outstanding Remarkable Values
Mud Spring Coulee	24N, 13E, S22	4	3.8	95%	Yes	
McLeish Coulee	24N, 13E, S27	2	1.5	75%	Yes	
Sherry Coulee	24N, 13E, S16	3	1.5	50%	Yes	
Pugsley Coulee	24N, 13E, S3	1.5	1	67%	Yes	
Coal Mine Coulee	25N, 13E, S33	2.5	2	80%	Yes	
Rattlesnake Coulee	25N, 13E, S15	0.2	0	0%	Yes	
Jackson Coulee	26N, 12E, S18	0	0	0%	Yes	
Crow Coulee	26N, 11E, S29	0	0	0%	Yes	
Rowe Coulee	25N, 10E, S28	0	0	0%	Yes	
O Hanlon Coulee	24N, 9E, S11	0	0	0%	Yes	No <sup>1</sup>
Shonkin Creek	24N, 9E, S17	0	0	0%	Yes	No <sup>1</sup>

<sup>1</sup> Judith-Valley-Phillips Resource Management Plan Wild and Scenic River Evaluation (1992)

<sup>2</sup> Note: One segment of the Judith River from Ming Coulee to Anderson Bridge was found eligible. However, this segment of the Judith River was determined nonsuitable due to severe manageability problems.

**BLM Havre Field Station**

Stream Name	Location of Mouth	Total Miles	Miles on Public Lands	% Flowing on Public Lands	Free-Flowing	Outstanding Remarkable Values
Cow Creek	23N, 22E, S6	23	6	26%	Yes	
Cabin Creek	24N, 22E, S20	10	8.5	85%	Yes	
Squaw Creek	24N, 22E, S18	6	6	100%	Yes	
Hay Coulee	25N, 22E, S30	9	9	100%	Yes	
Coal Mine Coulee (John?)	25N, 22E, S30	2	2	100%	Yes	
Right Coulee	25N, 21E, S27	10	8.5	85%	Yes	
Left Coulee	25N, 21E, S27	9	9	100%	Yes	
Middle Coulee	25N, 21E, S27	5	4.5	90%	Yes	
Das Coulee (Davidson?)	25N, 21E, S5	6	4.5	75%	Yes	
Suction Creek	26N, 21E, S21	1.5	0	0%	Yes	

Resource Description

Stream Name	Location of Mouth	Total Miles	Miles on Public Lands	% Flowing on Public Lands	Free-Flowing	Outstanding Remarkable Values
Al's Creek	26N, 21E, S17	8.5	0.5	6%	Yes	
Bullwacker Creek	24N, 21E, S34	26	25.3	97%	Yes	
Little Bullwacker	24N, 21E, S34	7	6	86%	Yes	
Lion Coulee	24N, 20E, S15	9	3	33%	Yes	
N.F. Lion Coulee	25N, 19E, S34	1.5	1.5	100%	Yes	
W.F. Bullwacker (Coal Mine Coulee?)	25N, 20E, S20	6	6	100%	Yes	
Christenson Branch	25N, 20E, S18	4.5	4.5	100%	Yes	
Williamson Coulee	23N, 20E, S6	10	7	70%	Yes	
Greasewood	23N, 20E, S2	7	4	56%	Yes	
Coal Coulee	23N, 19E, S19	6	6	100%	Yes	
Birch Creek	23N, 17E, S20	3	0.5	17%	Yes	
Chip Creek	23N, 16E, S27	1.5	0	0%	Yes	
Dry Lake Coulee	23N, 16E, S33	4	2	50%	Yes	
Pablo	23N, 14E, S12	7	4.5	64%	Yes	
Dark Butte	23N, 14E, S4	4	3	75%	Yes	
Winter Camp Coulee	24N, 13E, S3	1.5	0	0%	Yes	
Butcher Knife Coulee	24N, 13E, S3	2	1	50%	Yes	
Eagle Creek	25N, 13E, S16	2.5	0	0%	Yes	
Sheep Coulee	25N, 13E, S15	0.3	0	0%	Yes	
Cut Bank Coulee	25N, 13E, S9	1.5	0	0%	Yes	
Crooked Coulee	26N, 13E, S30	0.7	0	0%	Yes	
Lone Tree Coulee	26N, 13E, S19	1	0.2	20%	Yes	
Alkali Coulee	26N, 13E, S19	1	0	0%	Yes	
Little Sandy Creek	26N, 12E, S12	4.5	0	0%	Yes	
Coal Banks Coulee	26N, 12E, S6	0.8	0.8	100%	Yes	
Spring Coulee	26N, 11E, S16	0	0	0%	Yes	
6 Mile Coulee	26N, 11E, S16	0	0	0%	Yes	

Resource Description

Stream Name	Location of Mouth	Total Miles	Miles on Public Lands	% Flowing on Public Lands	Free-Flowing	Outstanding Remarkable Values
Beede Coulee	26N, 10E, S9	0	0	0%	Yes	
Marias River	25N, 10E, S18	0.5	0.5	100%	No	

**BLM Malta Field Office**

Stream Name	Location of Mouth	Total Miles	Miles on Public Lands	% Flowing on Public Lands	Free-Flowing	Outstanding Remarkable Values
Antelope Creek	22N, 23E, S21	13	8.5	65%	Yes	
Bull Creek	23N, 22E, S6	11	10.5	95%	Yes	
Lind Coulee (Winter Cr?)	23N, 22E, S2	12	11	92%	Yes	

## APPENDIX G

### Forest Resources on State of Montana Lands Within the Monument Boundary

Forest Resources Tables 1 through 4 are based on the preliminary inventory (PI) taken in Montana Department of Natural Resources and Conservation (DNRC) parcels within the Monument. They include land cover data from the GAP Analysis Map. The forestland mapping conducted by the PI is more accurate than the GAP data, but the GAP data does provide an overview of the total DNRC ownership within the Monument boundary.

**Forest Resources Table 1. DNRC Forestland Area by Slope Class and Stand Size Class**

Slope Class	Poletimber Acres	Sawtimber Acres	Total Acres
0 - 5%		63.4	63.4
6 - 15%	75.7	114.9	190.6
16 - 25%	299.7	1,003.7	1,303.4
26 - 35%	1,179.0	2,925.2	4,104.2
36 - 45%	414.3	1,389.4	1,803.7
56 - 65%	160.5	518.2	678.7
66 - 75%	12.1	101.3	113.4
Total	2,141.3	6,116.1	8,257.4

**Forest Resources Table 2. DNRC Sawtimber Area by Slope Class and Stocking Class**

Slope Class	PP Acres	MP Acres	WP Acres	MM Acres	WM Acres	Total Acres
0 - 5%	53.5			9.9		63.4
6 - 15%	104.9	6.1			3.9	114.9
16 - 25%	676.3	198.6	12.4	54.1	62.3	1,003.7
26 - 35%	1,254.7	948.5	41.8	346.0	334.2	2,925.2
36 - 45%	598.0	261.1	250.4	66.5	213.4	1,389.4
56 - 65%	215.5	158.4	61.8	13.5	69.0	518.2
66 - 75%	13.4	68.0		7.0	12.9	101.3
Total	2,916.3	1,640.7	366.4	497.0	695.7	6,116.1

PP = poorly stocked overall and poor (10-39%) crown density of the saw timber

MP = medium stocking overall and poor (10-39%) crown density of the saw timber

WP = well stocked overall and poor (10-39%) crown density of the saw timber

MM = medium stocking overall and medium (40-69%) crown density of the saw timber

WM = well stocked overall and medium (40-69%) crown density of the saw timber

**Forest Resources Table 3. DNRC Poletimber Area by Slope Class and Stocking Class**

Slope Class	PN Acres	PS Acres	MS Acres	WN Acres	Total Acres
6 - 15%		75.7			75.7
16 - 25%	32.2	267.5			299.7
26 - 35%	71.7	1,030.3	73.5	3.5	1,179.0
36 - 45%	34.6	365.9	13.8		414.3
56 - 65%	23.4	137.1			160.5
66 - 75%		12.1			12.1
Total	161.9	1,888.6	87.3	3.5	2,141.3

PN = poorly stocked overall and nonstocked or 0% crown density for pole timber

PS = poorly stocked overall and slight (1-9%) crown density for pole timber

MS = medium stocking overall and slight (1-9%) crown density for pole timber

WN = well stocked overall and nonstocked or 0% crown density for pole timber

**Forest Resources Table 4. DNRC Area by Land Use and Forest Type/Stand Size Class**

Land Use Class	Nonforest Acres	DF-PP Mix Poletimber Acres	PP Poletimber Acres	DF-PP Mix Sawtimber Acres	PP Sawtimber Acres	Total Acres
Forestland		350.0	1,791.3	3,590.1	2,526.0	8,257.4
Shrubland	26.8					26.8
Cropland	2.1					2.1
Range	9,449.2					9,449.2
Unproductive	374.2					374.2
Extractive	32.0					32.0
Total	9,884.3	350.0	1,791.3	3,590.1	2,526.0	18,141.7

DF = Douglas-fir

PP = ponderosa pine

The PI estimates there are 8,257 acres of DNRC forestland in the Monument. Using U.S. Forest Service FIA data from the 1970s for similar forest types, the average board foot volume per acre for forestland is about 2,100 board feet Scribner (BFS). Using this average volume per acre of 2,100 board feet, an estimated 17.3 million BFS are located on DNRC forestland within the Monument. The best timber opportunities are going to be located on the sawtimber polygons that have stocking codes of MM and WM on slopes less than 46%. The PI estimates 1,090 acres meet those criteria within the Monument. The volume on those polygons is probably somewhere between 3.3 million BFS and 4.4 million BFS. Access to the polygons may be a problem in this area.

Forest Resources Table 5 was generated using the GAP data which was developed by using ground-truthed data to classify satellite imagery. It used a 1991 image and 90-meter pixels. The "PI'd Sections in Monument area" column reflects the portion of the DNRC-owned land within

the Monument that was PI inventoried and is a subset of the "DNRC in Monument Area" column. The GIS estimates a total of 38,771 acres of DNRC land within the Monument. Total area for all ownerships is 505,556 acres. A crosstab on the GAP data against the PI Inventory was run to determine how the GAP data did in relation to the PI data. The PI Inventory called 3,700 acres of the acres classed as grassland by GAP as forestland. There were 700 acres of the River Breaks and Badlands class that were called forestland by the PI Inventory. Part of what the crosstab illustrates is how different data can look when one set is based on a minimum mapping size of a 90-meter by 90-meter pixel versus a 5-acre minimum. There are probably several grassland pixels within our lightly stocked forestland polygons.

**Forest Resources Table 5. GAP Landcover Groupings**

<b>Forest Type</b>	<b>GAP Data Acres</b>	<b>DNRC Acres</b>	<b>DNRC PI'd Sections</b>
Forest	82,643	5,416	4,923
Hardwood Forest	3,260	80	46
Grassland	322,769	26,313	10,325
River Breaks and Badlands	72,206	4,709	2,779
Range or Pasture Lands	12,974	2,127	60
Unproductive Lands	606	48	4
Water	11,098	78	16
Total	505,556	38,771	18,153



# APPENDIX H

## Guidelines for Livestock Grazing Management

### **Grazing Management Guidelines:**

Guidelines for management of herbivory (including domestic animals and wildlife) are preferred or advisable approaches to ensure that standards can be met or that significant progress can be made toward meeting the standard(s). Responsible state and Federal wildlife agencies must be involved in this management if standards are to be achieved.

Guidelines are provided to maintain or improve resource conditions in upland and riparian habitats. In both riparian and upland habitats, these guidelines focus on establishing and maintaining proper functioning conditions. The application of these guidelines is dependent on individual management objectives. Desired future conditions in plant communities and streambank characteristics will be determined on a case-by-case basis.

### **Lewistown GUIDELINE #1:**

Grazing will be managed in a manner that will maintain the proper balance between soils, water, and vegetation over time. This balance varies with location and management objectives, historic use, and natural fluctuations, but acceptable levels of use can be developed that are compatible with resource objectives.

### **Lewistown GUIDELINE #2:**

Manage grazing to maintain watershed vegetation, species richness, and flood plain function. Maintain riparian vegetative cover and structure to trap and hold sediments during run-off events to build streambanks, recharge aquifers, and dissipate flood energy. Grazing management should promote deep-rooted herbaceous vegetation to enhance streambank stability. Where non-native species are contributing to proper functioning conditions,

they are acceptable. Where potential for palatable woody shrub species (willows, dogwood, etc.) exists, promote their growth and expansion within riparian zones.

### **Lewistown GUIDELINE #3:**

Pastures and allotments will be managed based on their sensitivity and suitability for livestock grazing. Where determinations have not been previously documented, suitability for grazing will be determined by: topography, slope, distance from water, vegetation habitat types, and soil types must be considered when determining grazing suitability. Unsuitable areas should be excluded from grazing.

### **Lewistown GUIDELINE #4:**

Management strategies for livestock grazing will ensure that long-term resource capabilities can be sustained. End of season stubble heights, streambank moisture content, and utilization of herbaceous and woody vegetation are critical factors which must be evaluated in any grazing strategy. These considerations are essential to achieving long-term vegetation or stream channel objectives and should be identified on a site-specific basis and used as terms and conditions.

### **Lewistown GUIDELINE #5:**

Grazing will be managed to promote desired plants and plant communities of various age classes, based on the rate and physiological conditions of plant growth. Management approaches will be identified on a site-specific basis and implemented through terms and conditions. Caution should be used to avoid early spring grazing use when soils and streambanks are wet and susceptible to compaction and physical damage that occurs with animal trampling. Likewise, late summer

and fall treatments in woody shrub communities should be monitored closely to avoid excessive utilization.

**Lewistown GUIDELINE #6:**

The development of springs and seeps or other projects affecting water and associated resources shall be designed to protect the ecological functions and processes of those sites.

**Lewistown GUIDELINE #7:**

Locate facilities (e.g., corrals, water developments) away from riparian-wetland areas.

**Lewistown GUIDELINE #8:**

When provided, supplemental salt and minerals should not be placed adjacent to watering locations or in riparian-wetland areas so not to adversely impact streambank stability, riparian vegetation, water quality, or other sensitive areas (i.e., key wildlife wintering areas). Salt and minerals should be placed in upland sites to draw livestock away from watering areas or other sensitive areas and to contribute to more uniform grazing distribution.

**Lewistown GUIDELINE #9:**

Noxious weed control is essential and should include: cooperative agreements, public education, and integrated pest management (mechanical, biological, chemical).

**Lewistown GUIDELINE #10:**

Livestock management should utilize practices such as those referenced by the NRCS published prescribed grazing technical guide to maintain, restore or enhance water quality.

**Lewistown GUIDELINE #11:**

Grazing management should maintain or improve habitat for federally listed threatened, endangered, and sensitive plant and animals.

**Lewistown GUIDELINE #12:**

Grazing management should maintain or promote the physical and biological conditions to sustain native populations and communities.

**Lewistown GUIDELINE #13:**

Grazing management should give priority to native species. Non-native plant species should only be used in those situations where native seed is not readily available in sufficient quantities, where native plant species cannot maintain or achieve the standards, or where non-native plant species provide an alternative for the management and protection of native rangelands.

**Lewistown GUIDELINE #14:**

Allotment monitoring determines how on-going management practices are affecting the rangeland. To do so, the evaluations should be based on: measurable management objectives; permanent and/or repeatable monitoring locations; and short-term and long-term data.

## APPENDIX I

### Grazing Allotments within the Monument

Allotment Name	Allotment No.	No. of Acres on Public Lands	No. of AUMs on Public Lands	Percent of Allotment in Monument	Grazing Season
<b>North Side of the Missouri River</b>					
3 Mile Ridge	6164	10321	1440	10	4/1 - 5/31
Al's Creek	6168	3385	369	75	5/1 - 9/22
Antelope Creek	5610	45010	4701	100	5/1 - 12/31
Balzek	6424	336	90	50	5/15 - 11/14
Barnard Ridge	6209	3197	279	100	6/1 - 8/30
Bear Point	6273	279	28	100	5/1 - 11/30
Black Butte	6211	8305	730	100	5/1 - 11/14
Bullwhacker	6181	40535	4400	90	4/1 - 2/28
Cabin	6434	1825	429	20	6/1 - 12/07
Cabin Creek	5609	6734	762	100	5/1 - 10/31
Chase Hill	6198	923	98	60	3/1 - 2/28
Chimney Butte	6169	7112	720	30	7/15 - 10/10
Clinard Coulee	6420	280	70	60	3/1 - 2/28
Coal Mine Coulee	5629	423	53	100	3/1 - 2/28
Dark Butte	6215	4404	329	90	6/1 - 10/05
Dauphine Rapids	6225	214	33 or 25	100	6/1 - 8/5
Deadman Rapids	6221	1646	110	100	7/1 - 9/30
Eight Mile Bench	6220	1425	357	60	5/1 - 11/30
Ervin Rigetop	6212	9973	650	100	6/15 - 10/10
Gallatin Rapids	6222	6105	287	100	5/1 - 11/01
Golf Bench	6203	3319	230	10	6/1 - 8/31
Greasewood Bottom	6282	517	100	100	7/1 - 9/30 varies
Halley	6201	6071	531	90	5/15 - 10/19
Hay Coulee	6182	12956	1267	100	5/1 - 11/21 decision pending
Jurenka	6481	130	7	100	3/1 - 2/28
Lion Coulee	6193	3351	410	60	5/15 - 11/15
Little Bullwhacker	6214	22278	1368	100	5/15 - 10/15
Little Suction	6171	1405	139	10	6/1 - 6/30
Lost Bird	6254	40	6	100	3/1 - 2/28
Lost Ridge	6208	6253	487	95	5/15 - 11/15
Lower Squaw Ck	5608	170	43	0	3/1 - 2/28
Lutge Place	944	2265	90	100	4/15 - 5/31, 10/1 - 11/15
Maxwell	6210	100	10	100	3/1 - 2/28
N Hanging 5	6422	444	52	90	3/1 - 2/28
N. Fk Lion Coulee	6192	3930	592	60	5/15 - 10/01
North Timber Ridge	6269	1125	145	10	5/15 - 5/31
Osterman	6428	200	42	50	5/1 - 12/31
Pablo Rapids	6216	2644	105	90	6/1 - 9/22

Resource Description

Allotment Name	Allotment No.	No. of Acres on Public Lands	No. of AUMs on Public Lands	Percent of Allotment in Monument	Grazing Season
<b>North Side of the Missouri River (Continued)</b>					
Piedras	6425	1002	54	90	3/1 - 2/28
Puma	6429	156	53	50	3/1 - 2/28
Ragland Ridge	6207	1085	25	70	3/1 - 2/28
Sanford pasture	820	701	72	100	3/1 - 2/28
Sneath Common	6218	5800	419	100	6/10 - 10/21
South Vimy	16350	920	95	30	5/1 - 9/1
Spencer Ridge	6194	7250	588	100	5/1 - 10/31
Sturgeon Island	6284	558	70	100	7/1 - 9/30 varies
T26N R12E Sec 1	855	40	0	100	not allocated
T26N R12E Sec 11&12	912	30	0	100	not allocated
T26N R12E Sec 3	868	15	0	100	not allocated
T26N R12E Sec 4	864	29	0	100	not allocated
T26N R12E Sec 5	867	40	0	100	not allocated
T27N R12E Sec 26	866	40	0	100	not allocated
Timber Ridge	6172	11599	1662	50	3/1 - 10/22
Upper Cyprian Ck	5611	2569	427	72	3/1 - 2/28
Upper Dauphine Rapids	6224	1663	75	100	5/1 - 11/30
West Gist	6285	312	56	100	7/1 - 9/30 varies
White Rocks	6426	186	42	100	3/1 - 5/10
Williamson Bottom	6283	479	32	100	7/1 - 9/30 varies
Wood Property	905	2169	0	100	not allocated
<b>South Side of the Missouri River</b>					
Able Place	9653	1345	170	100	7/1 - 12/1
ABN	9649	237	66	75	4/1 - 1/1
Armells	20037	3200	378	15	5/15 - 10/15
Arrow Ck East	20040	1380	287	100	11/1 - 2/28
Arrow Ck West	9707	575	111	100	1/1 - 2/28
Arrow Ck Bench	9761	2079	153	50	year round
B Lazy M	9825	252	41	5	year round
Barnes Ridge	2038	1200	114	100	6/1 - 7/1, 10/1 - 10/31
Baker Bar	2521	80	19	5	year round
Big View	9664	124	11	5	year round
Big Sag	2522	40	7	100	year round
Blind Cyn AMP	20010	2300	287	30	5/1 - 10/31
Churchill Butte	19807	269	29	10	6/1 - 9/30
Cimrhakl	2003	1440	270	100	year round
Coffee Creek	9683	2591	288	70	year round
Dammel	9687	920	138	90	5/1 - 9/30
Deadman Coulee	9778	2725	263	10	year round
Demars	20026	4936	401	100	6/1 - 10/31
Dog Ck 20	15124	2597	395	100	5/15 - 8/10

Resource Description

Allotment Name	Allotment No.	No. of Acres on Public Lands	No. of AUMs on Public Lands	Percent of Allotment in Monument	Grazing Season
<b>South Side of the Missouri River (Continued)</b>					
Dog Ck 21	15125	1596	342	90	8/11 - 11/19
Dog Ck 19	15126	1199	157	100	year round
Dostal	9693	1590	182	70	year round
Evans Bend	9797	1148	131	10	5/1 - 9/30
Evers Bench	2002	60	12	100	year round
Fink EUI	2000	160	41	100	7/12 - 8/25
Flat Ck	9826	333	160	50	8/1 - 10/15
Grace Bench	9864	246	31	5	year round
Hole in the Wall	9799	625	94	100	5/1 - 11/15
Iron City Island	20066	1689	193	100	6/1 - 9/30
Kipps Rapids	9729	820	104	100	6/15 - 10/8
Knox Ridge	20078	11,270	1629	100	5/16 - 12/15
Komarek Ranch	2015	125	19	50	year round
Komarek Place	2016	519	102	5	year round
Lower Fargo Coulee	2040	940	325	80	5/1 - 6/30, 11/15 - 2/28
Lower Armells	2021	2112	386	100	11/16 - 4/15
Mattuschek	20045	2435	187	85	9/13 - 10/31
Mayberry	2018	2933	393	50	5/1 - 11/1
Melton Coulee	9703	1503	157	100	year round
Mud Springs Coulee	9662	800	94	100	year round
Mutton Coulee	20039	880	179	100	year round
PN Sag	15123	6696	980	100	year round
Rattlesnake Coulee	9714	1174	172	60	year round
Reed Coulee	20071	3332	644	70	5/1 - 10/31
Reservation Bench	10041	2760	169	100	5/1 - 11/30
Ritland	9802	40	7	5	year round
River	20046	4192	347	90	5/10 - 9/15
Rowe Coulee	9767	450	108	10	year round
Sawmill Coulee	2024	1300	567	70	5/1 - 10/31
Seventy Nine Coulee	20012	40	10	100	year round
Seventy Nine Coulee (Stulc)	20079	1113	180	50	year round
Sheep Shed Coulee	19837	4740	468	40	6/1 - 9/15
Sherry Coulee	9681	160	23	100	year round
Slide Coulee	9847	2235	373	100	5/1 - 12/31
Slide Coulee	9847	1200	121	100	5/1 - 12/31
Spring Coulee	20075	1639	358	100	6/10 - 10/20
Starve Out Flat	9808	958	291	30	5/15 - 11/15
Stulc AMP	20081	4390	654	80	5/1 - 11/30
Tonne	9838	1345	170	80	7/1 - 12/1
Two Calf	2039	10183	1270	100	6/1 - 11/15
Upper Two Calf	20070	11496	1532	95	6/16 - 10/30
W. Indian Butte	2013	11490	1138	100	5/16 - 11/15

Resource Description

<b>Allotment Name</b>	<b>Allotment No.</b>	<b>No. of Acres on Public Lands</b>	<b>No. of AUMs on Public Lands</b>	<b>Percent of Allotment in Monument</b>	<b>Grazing Season</b>
<b>South Side of the Missouri River (Continued)</b>					
Whiskey Ridge	15132	2694	399	20	5/15 - 9/15
Wilson Coulee	9866	1207	653	40	5/1 - 11/30
Woodcock Coulee	2517	918	112	50	5/1 - 10/30
WoodHawk	20031	25000	2700	70	5/1 - 10/31

## APPENDIX J

### Minerals Table 1. Oil and Gas Terms

Term	Definition
Actual Production	Actual production that originates from a well within a Unit PA or CA that is reported to the Unit PA or CA case number. From a Federal or Tribal standpoint, it usually denotes that actual production originated from a Federal or Tribal well.
Allocated Production	Production that is allocated to a Federal or Tribal tract/lease within a Unit PA or CA from a non-Federal or Tribal well. This frequently occurs within CAs where gas is produced from a Fee or State well and production is allocated back to the Federal or Tribal tract(s)/lease(s) within the CA.
Communitization Agreement (CA)	An agreement to combine two or more mineral leases in order to have sufficient acreage to comply with the spacing required to drill a well. A CA is formed when a Federal lease cannot be independently developed in conformity with an established spacing pattern. Well spacing is determined based on State regulation.
Extended Term or Held by Production Lease	A period of time in the life of a lease beyond the initial primary term. A lease can be extended or held by production (HBP) so long as oil or gas is produced in paying quantities. Leases are also allowed to be HBP if they contain a well that is capable of production in paying quantities and may remain shut-in due to the lack of infrastructure.
Federal Minerals	The title or minerals ownership of land is owned by the United States Government. All Federal oil and gas mineral interests are administered by the Bureau of Land Management (an agency within the Department of Interior).
Fee Minerals	The title or minerals ownership of land; short for “owned-in-fee” or private ownership.
Primary Term Lease	A legal instrument by which a leasehold is created in minerals. A contract that, for a stipulated sum, conveys to an operator the right to drill for oil and gas. The oil and gas lease is not to be confused with the usual lease of land or buildings. Competitive leases are set up on a primary term of five years. Non-competitive leases are set up on primary terms of 10 years.
Production in Paying Quantities (Lease Basis)	The volume of oil or gas that is needed to exceed direct daily operating costs and the costs for lease rentals or minimum royalty of a well. This means that the well must be capable of generating enough revenue to exceed the ongoing operating costs of the well, no matter how small.
Production in Paying Quantities (Unit Basis)	The volume of oil or gas that is needed from a well to return reasonable profit over the costs of drilling, equipping, completing and operating said well.
Split Estate	A term used to describe land status when the mineral estate ownership varies from the surface ownership (i.e. Federal minerals/Fee surface). This occurs on approximately 1,640 acres within the Monument.
Spud Date	Date operator begins drilling the well (i.e. the date operator begins drilling through the surface of the earth).
State Minerals	The title or minerals ownership of land is owned by the State. The minerals are owned by the state in which they reside.
Unit Agreement (Exploratory)	An agreement or plan for the development and operation which provides for the recovery of oil and/or gas from the lands made subject thereto as a single consolidated entity without regard to separate ownerships and for the allocation of costs and benefits on a basis as defined in the agreement or plan.
Unit Participating Area (PA)	That part of a unit area which is considered reasonably proven to be productive in paying quantities or which is necessary for unit operations and to which production is allocated in the manner prescribed in the unit agreement.

Minerals Table 2. Federal Oil and Gas Leases within the Monument Boundary											
Ref. No.	Lease No.	Lease Stips	Lease Effective Date	Section(s)	Township and Range	County	Leased Acreage within Monument Boundary	Leased Acreage Outside Monument Boundary	Total Lease	Lease Status - HBP Actual, Allocated or No Production	
1	MTM 1565	A	5/1/67	24 25 26 27	25N/19E	Blaine	1,680.00	1,680.00	3,360.00	Actual/Allocated	
2	MTM 1568	A	5/1/67	11 12 13 14	25N/19E	Blaine	2,320.00	240.00	2,560.00	Actual	
3	MTM 1578	A	5/1/67	28 29 30 31 32	25N/19E	Blaine	1,600.00	962.69	2,562.69	Actual	
4	MTM 1885	A	6/1/67	1 2	26N/20E	Blaine	40.00	611.41	651.41	Allocated	
5	MTM 1886	A	6/1/67	9 10 11 12	26N/20E	Blaine	1,920.00	640.00	2,560.00	Actual	
6	MTM 1888	A	6/1/67	2 3 4 6	26N/20E	Blaine	480.00	1,981.62	2,461.62	Actual	
7	MTM 1903	A	6/1/67	23 24 25 35	26N/20E	Blaine	1,240.00	320.00	1,560.00	Allocated	
8	MTM 1903-B	A	6/1/67	26	26N/20E	Blaine	320.00	240.00	560.00	Actual	
9	MTM 1914	A	6/1/67	15	25N/20E	Blaine	200.00	440.00	640.00	Actual	
10	MTM 2060	A	7/1/67	15 21 22 28 29 32	24N/20E	Blaine	640.00	0.00	640.00	Actual	
11	MTM 2061	A	7/1/67	21 28 29 31 32	24N/20E	Blaine	640.00	0.00	640.00	Allocated	
12	MTM 13816 *	A	11/1/69	7	24N/21E	Blaine	461.99	0.00	461.99	Actual	
12	MTM 13816 *	A	11/1/69	11 12 13 14 15	24N/20E	Blaine	2,028.46	0.00	2,028.46	Actual	
13	MTM 13818	A	11/1/69	20 21 28 29 30 31	24N/20E	Blaine	2,492.32	0.00	2,492.32	Allocated	
14	MTM 13821-A	A	11/1/69	29 30 31 32	24N/21E	Blaine	1,098.90	0.00	1,098.90	Actual	
15	MTM 13827	A	11/1/69	11 27 29 30	24N/21E	Blaine	1,155.72	0.00	1,155.72	Allocated	
16	MTM 16098	A	9/1/70	14 15 17 19 20 21 22	24N/19E	Blaine	1,160.00	1,360.00	2,520.00	Allocated	
17	MTM 16102	A	9/1/70	3 20 30	25N/20E	Blaine	1,506.35	163.09	1,669.44	Allocated	
18	MTM 16103	A	9/1/70	22 27 28 33 34	26N/20E	Blaine	60.00	2,460.00	2,520.00	Actual	
19	MTM 16327	A	10/1/70	9 10 11 14 15 22 23 27 34	24N/18E	Chouteau	80.00	2,358.12	2,438.12	Actual/Allocated	
20	MTM 16458	A	10/1/70	21 23 24 25 27 33	26N/20E	Blaine	720.00	1,240.00	1,960.00	Actual	
21	MTM 16461	A	10/1/70	29 31 32 33	25N/20E	Blaine	2,547.36	0.00	2,547.36	Actual	
22	MTM 16617	A	11/1/70	7 8 10 17 18 19 22 25	22N/18E	Fergus	330.44	1,088.70	1,419.14	Allocated	
23	MTM 16618	A	11/1/70	23 24 25 26 35 36	24N/18E	Chouteau	320.00	2,240.00	2,560.00	Actual/Allocated	
24	MTM 16939	A	12/1/70	7 17 18 19	25N/21E	Blaine	2,529.92	0.00	2,529.92	Actual	
25	MTM 17376	A	2/1/71	7 33 35	24N/18E	Chouteau	40.00	80.00	120.00	Allocated	
26	MTM 18274	B	7/1/71	4 5 9 10 13 14 15 17 22 23 24	22N/18E	Fergus	1,367.04	1,160.00	2,527.04	Allocated	
27	MTM 19446	A	9/1/71	30 31	24N/17E	Chouteau	110.43	1,112.66	1,223.09	Actual/Allocated	
28	MTM 18282	C	5/1/73	29 30 31 32 33	23N/19E	Blaine	539.13	1,992.35	2,531.48	Actual	
29	MTM 18283	C	5/1/73	22 23 24 26 27 28 29	23N/19E	Blaine	1,000.00	1,560.00	2,560.00	Actual/Allocated	
30	MTM 53751	D	6/1/82	20 21 22 23 24	23N/19E	Blaine	680.00	160.00	840.00	Actual	
31	MTM 82786	E	3/1/94	7 8 9 10 11 12 13	24N/19E	Blaine	1,434.12	1,104.42	2,538.54	No Prod.	
32	MTM 84559	E	11/1/95	5 6 7	25N/20E	Blaine	1,879.92	0.00	1,879.92	No Prod.	
33	MTM 84560	E	11/1/95	6 7 31	26N/20E	Blaine	120.00	1,132.81	1,252.81	No Prod.	
34	MTM 87212	E	9/1/97	3	25N/19E	Blaine	122.45	527.87	650.32	No Prod.	
35	MTM 87658	E	2/1/98	25	24N/20E	Blaine	485.00	0.00	485.00	No Prod.	
36	MTM 89082	F	5/1/99	1 2	25N/19E	Blaine	1,131.40	167.00	1,298.40	No Prod.	
37	MTM 89452	F	11/1/99	4 5 9	23N/17E	Chouteau	800.00	333.47	1,133.47	No Prod.	
38	MTM 89460	F	11/1/99	7 11	22N/18E	Fergus	400.00	40.00	440.00	No Prod.	
39	MTM 89469	F	11/1/99	35	25N/19E	Blaine	360.00	280.00	640.00	No Prod.	
40	MTM 89473	F	11/1/99	15 21 22	24N/20E	Blaine	1,240.00	0.00	1,240.00	No Prod.	
41	MTM 89474	F	11/1/99	10	25N/20E	Blaine	80.00	480.00	560.00	No Prod.	
42	MTM 89482	F	11/1/99	19 20 29	24N/21E	Blaine	1,416.40	0.00	1,416.40	No Prod.	
43	MTM 89475	F	12/1/99	13 17	25N/20E	Blaine	1,280.00	0.00	1,280.00	No Prod.	
44	MTM 89476	F	12/1/99	21 22	25N/20E	Blaine	1,120.00	160.00	1,280.00	No Prod.	
Total							43,177.35	28,316.21	71,493.56		
							Acres	Acres	Acres		
* - Note that lease lies within two townships.											
A - No Lease Stipulations Attached.											
B - Lease Stipulation Attached: MSO 3100-11											
C - Lease Stipulations Attached: MSO 3100-24 (9/72); MSO 3100-28 (3/73); Rider regarding assignments											
D - Lease Stipulations Attached: 3109-5 (8/73), MT-3109-1 (12/81) Formerly MSO 3100-47c; MT-3109-4 (12/81) Formerly MSO 3100-51; MT-3100-52 (4/82)											
E - Lease Stipulation Attached: MT3109-1 (4/87)											
F - Lease Stipulation Attached: Standard (9/98)											
Current unleased Federal Mineral Acreage within the Monument is 226,771 acres.											
Current leased Federal Mineral Acreage within the Monument is 43,177 acres.											
Current Federal Mineral Acreage within the Monument is 269,948 acres.											

Resource Description

<b>Minerals Table 3. State of Montana Oil and Gas Leases within the Monument Boundary</b>										
<b>Ref. No.</b>	<b>Lease No.</b>	<b>Lease Stips</b>	<b>Lease Effective Date</b>	<b>Section(s)</b>	<b>Township and Range</b>	<b>County</b>	<b>Acreage within Monument Boundary</b>	<b>Acreage outside Monument Boundary</b>	<b>Total Lease</b>	<b>Lease Status - HBP Actual, Allocated or No Production</b>
1	12,660-71	?	?	36	24N/20E	Blaine	638.40	0.00	638.40	HBP
2	32,805-98	?	?	36	25N/19E	Blaine	640.00	0.00	640.00	Lease Expires 06/02/08
3	33,453-99	?	?	16	25N/20E	Blaine	640.00	0.00	640.00	HBP
Total							1,918.40	0.00	1,918.40	
							Acres	Acres	Acres	

Resource Description

<b>Minerals Table 4. Communitization Agreements (CAs) within or Common to the Monument by Lease</b>									
<b>Ref. No.</b>	<b>CA No.</b>	<b>Lease Nos. within CA</b>	<b>Section</b>	<b>Township and Range</b>	<b>County</b>	<b>Acreage within Monument Boundary</b>	<b>Acreage outside Monument Boundary</b>	<b>Total CA Acreage</b>	<b>% Federal Mineral Interest within CA</b>
1	MTM69515	MTM16618, MTM16327, Fee Lease & County Lease	N/2, 23	24N/18E	Blaine	0.00	320.00	320.00	87.5
2	MTM69544	MTM53751, MTM18283 & Fee Lease	S/2, 22	23N/19E	Blaine	160.00	160.00	320.00	62.5
3	NCR269	MTM16098 & Fee Leases	E/2, 20	24N/19E	Blaine	40.00	280.00	320.00	50
4	NRM1167	MTM16327 & Fee Lease	N/2, 22	24N/18E	Blaine	0.00	320.00	320.00	12.5
5	NRM1176	MTM19446 & Fee Leases	30	24N/17E	Chouteau	0.00	921.72	921.72	67.3795
6	NRM1185	MTM19446, MTM19492 & Fee Leases	31	24N/17E	Chouteau	120.00	802.04	922.04	80.48
7	NRM1191	MTM1903A & MTM16103	34	26N/20E	Blaine	0.00	640.00	640.00	100
8	NRM1196	MTM2313 & MTM1903B	26	26N/20E	Blaine	320.00	320.00	640.00	100
9	NRM1213	MTM2060, MTM2061 & MTM13818	29	24N/20E	Blaine	640.00	0.00	640.00	100
10	NRM1240	MTM16327 & Fee Leases	E/2, 10	24N/18E	Blaine	0.00	257.53	257.53	31.0644
11	NRM1512	MTM18283 & Fee Lease	E/2, 27	23N/19E	Fergus	0.00	320.00	320.00	50
12	NRM1513	MTM18283 & Fee Lease	E/2, 29	23N/19E	Fergus	160.00	160.00	320.00	50
13	NRM1560	MTM16102 & Fee Leases	3	25N/20E	Blaine	240.00	405.56	645.56	62.823
14	NRM1739	MTM18274, MTM16617 & Fee Leases	10	22N/18E	Blaine	360.00	280.00	640.00	56.25
15	NRM1764	MTM13821A & MTM13827	30	24N/21E	Blaine	618.24	0.00	618.24	100
16	NRM768	MTM16458, MTM1903 & MTM1977	23	26N/20E	Blaine	0.00	640.00	640.00	100
17	NRM944	MTM16618 & MTM17376	S/2, 35	24N/18E	Blaine	320.00	0.00	320.00	100
18	NRM972	MTM1888 & MTM1885	2	26N/20E	Blaine	160.00	488.04	648.04	100
19	NRM995	MTM16327 & Fee Leases	S/2, 15	24N/18E	Blaine	0.00	320.00	320.00	62.5
20	NRM996	MTM16618, MTM16327 & Fee Lease	S/2, 23	24N/18E	Blaine	0.00	320.00	320.00	62.5
21	NRM997	MTM16618 & Fee Lease	N/2, 26	24N/18E	Blaine	0.00	320.00	320.00	62.5

Resource Description

<b>Minerals Table 5. State-Owned Minerals within the Monument Boundary</b>											<b>Estimated Monument Acreage</b>	
<b>Twp</b>	<b>Range</b>	<b>Section</b>	<b>Description</b>	<b>Acres</b>	<b>County</b>	<b>Minerals</b>	<b>Lease Status</b>	<b>Lease Expires</b>	<b>Net Acres</b>	<b>Inside</b>	<b>Adjacent</b>	
20N	15E	16	All	640.00	Fergus	All	Open		640.00		640.00	
20N	22E	12	W2SW4, SE4SW4	120.00	Fergus	All	Open		120.00		120.00	
21N	14E	36	All	640.00	Chouteau	All	Open		640.00		640.00	
21N	15E	16	All	640.00	Fergus	O; C	Open		640.00		640.00	
21N	15E	16	W2	320.00	Fergus	M	Open					
21N	21E	36	All	640.00	Fergus	All	Open		640.00	640.00		
21N	22E	16	All	640.00	Fergus	All	Open		640.00	640.00		
21N	22E	36	All	640.00	Fergus	All	Open		640.00	640.00		
22N	14E	36	All	640.00	Chouteau	All	Open		640.00		640.00	
22N	15E	1	Lots 9, 10, 11, 12	134.39	Fergus	All	Open		134.39	134.39		
22N	15E	2	Lots 5, 8, 9, 10, 11	158.43	Fergus	O; M	Open		158.43	158.43		
22N	15E	2	Lots 5, 8, 10, 11	109.33	Fergus	C	Open					
22N	15E	3	Lot 6	22.65	Fergus	All	Open		22.65	22.65		
22N	15E	4	Lots 5, 6, 7	160.85	Fergus	All	Open		160.85	160.85		
22N	15E	5	S2NW4, E2SW4, SW4SW4	200.00	Fergus	O; M	Open		200.00	200.00		
22N	15E	5	SW4NW4	40.00	Fergus	C	Open					
22N	15E	6	Lots 13, 14, 22, NW4SE4, SE4NE4, E2SE4	280.00	Chouteau	All	Open		280.00	280.00		
22N	15E	7	Lots 1, 10, W2NE4, E2NE4, NE4SE4	280.00	Chouteau	All	Open		280.00	280.00		
22N	15E	8	W2	320.00	Fergus	O; M	Open		320.00	320.00		
22N	15E	8	W2SW4	80.00	Fergus	C	Open					
22N	15E	9	SE4	160.00	Fergus	All	Open		160.00	160.00		
22N	15E	10	S2	320.00	Fergus	All	Open		320.00	320.00		
22N	15E	11	S2S2	160.00	Fergus	O	Open		160.00	160.00		
22N	15E	12	E2E2, S2SW4, SW4SE4	280.00	Fergus	O; M	Open		280.00	280.00		
22N	15E	13	N2N2, S2SW4, SE4	400.00	Fergus	O	Open		400.00	400.00		
22N	15E	13	N2N2	160.00	Fergus	M	Open					
22N	15E	14	N2N2, SE4SW4, S2SE4	280.00	Fergus	O	Open		280.00	280.00		
22N	15E	14	N2NW4	80.00	Fergus	M	Open					
22N	15E	15	All	640.00	Fergus	O	Open		640.00	640.00		
22N	15E	16	All	640.00	Fergus	O; C	Open		640.00	640.00		
22N	15E	16	W2	320.00	Fergus	M	Open					
22N	15E	17	NE4, NE4NW4, W2NW4, NE4SW4, SW4SW4, W2SE4, SE4SE4	480.00	Fergus	O; M	Open		480.00	480.00		
22N	15E	17	W2NW4, SW4SW4	120.00	Fergus	C	Open					
22N	15E	18	E2E2	160.00	Chouteau	All	Open		160.00	160.00		
22N	15E	19	E2E2	160.00	Chouteau	All	Open		160.00	160.00		
22N	15E	20	N2N2, SW4NW4, W2SW4	280.00	Fergus	All	Open		280.00	280.00		
22N	15E	21	N2	320.00	Fergus	O	Open		320.00	320.00		

Resource Description

Twp	Range	Section	Description	Acres	County	Minerals	Lease Status	Lease Expires	Net Acres	Estimated Monument Acreage	
										Inside	Adjacent
22N	15E	21	NW4	160.00	Fergus	M	Open				
22N	15E	22	NE4, S2NW4, S2	560.00	Fergus	O	Open		560.00	560.00	
22N	15E	22	S2	320.00	Fergus	M	Open				
22N	15E	23	W2NE4, SE4NE4, NW4, W2SW4, SE4SW4, SE4	560.00	Fergus	O	Open		560.00	560.00	
22N	15E	23	W2SW4, SE4SW4	120.00	Fergus	C	Open				
22N	15E	23	W2NE4, SE4NE4, W2SW4, SE4SW4	240.00	Fergus	M	Open				
22N	15E	24	S2NE4, W2, SW4SE4, E2SE4	520.00	Fergus	O	Open		520.00	520.00	
22N	15E	24	SE4SW4, SW4SE4, E2SE4	160.00	Fergus	C	Open				
22N	15E	24	S2NE4, NW4, SE4SW4, SW4SE4, E2SE4	400.00	Fergus	M	Open				
22N	15E	25	N2N2	160.00	Fergus	All	Open		160.00	160.00	
22N	15E	26	N2	320.00	Fergus	O	Open		320.00	320.00	
22N	15E	27	N2	320.00	Fergus	O	Open		320.00	320.00	
22N	15E	27	NW4	160.00	Fergus	M	Open				
22N	15E	28	N2, N2SW4, SW4SW4	440.00	Fergus	All	Open		440.00	440.00	
22N	15E	29	NE4NE4, NW4NW4, S2N2, S2	560.00	Fergus	All	Open		560.00	560.00	
22N	15E	30	E2E2	160.00	Chouteau	All	Open		160.00	160.00	
22N	15E	36	All	640.00	Fergus	O; C	Open		640.00	80.00	560.00
22N	15E	36	S2	320.00	Fergus	M	Open				
22N	16E	15	N2NW4, SW4NW4, NW4SW4	160.00	Fergus	All	Open		160.00	160.00	
22N	16E	16	All	640.00	Fergus	O; C	Open		640.00	640.00	
22N	16E	16	E2, SW4	480.00	Fergus	M	Open				
22N	16E	17	N2, N2S2	480.00	Fergus	All	Open		480.00	480.00	
22N	16E	18	N2NE4, SE4NE4, NE4NW4	160.00	Fergus	All	Open		160.00	160.00	
22N	16E	19	Lot 4, NE4, SE4SW4	238.14	Fergus	O; M	Open		238.14	238.14	
22N	16E	19	NE4	160.00	Fergus	C	Open				
22N	16E	20	N2	320.00	Fergus	All	Open		320.00	320.00	
22N	16E	21	NW4	160.00	Fergus	All	Open		160.00	160.00	
22N	16E	27	W2	320.00	Fergus	All	Open		320.00	320.00	
22N	16E	34	W2	320.00	Fergus	All	Open		320.00	320.00	
22N	16E	35	N2	320.00	Fergus	All	Open		320.00	320.00	
22N	16E	36	All	640.00	Fergus	All	Open		640.00	640.00	
22N	17E	16	All	640.00	Fergus	All	Open		640.00		640.00
22N	18E	7	SW4NE4, NE4SW4, N2SE4	160.00	Fergus	All	O&G Lease #33,158-99	6/2/09	160.00	160.00	
22N	18E	8	SE4NW4, N2SW, SWSW, NWSE	200.00	Fergus	All	O&G Lease #33,159-99	6/2/09	200.00	200.00	
22N	18E	9	SW4SW4	40.00	Fergus	All	O&G Lease #33,160-99	6/2/09	40.00	40.00	
22N	18E	11	N2SE4	80.00	Fergus	All	O&G Lease #33,161-99	6/2/09	80.00	80.00	
22N	18E	16	All	640.00	Fergus	All	Open		640.00	640.00	
22N	19E	6	SE4	160.00	Fergus	All	Open		160.00	160.00	
22N	21E	2	SW4NE4, SE4NW4, NE4SW4, S2SW4	200.00	Fergus	All	Open		200.00	200.00	

Resource Description

Twp	Range	Section	Description	Acres	County	Minerals	Lease Status	Lease Expires	Net Acres	Estimated Monument Acreage	
										Inside	Adjacent
22N	21E	10	N2NE4, NE4NW4, S2NW4, S2S2	360.00	Fergus	All	Open		360.00	160.00	200.00
22N	21E	11	N2N2, S2SW4, SW4SE4	280.00	Fergus	All	Open		280.00	280.00	
22N	21E	12	SE4SW4, S2SE4	120.00	Fergus	All	Open		120.00	120.00	
22N	21E	13	N2N2	160.00	Fergus	All	Open		160.00	160.00	
22N	21E	14	N2N2	160.00	Fergus	All	Open		160.00	160.00	
22N	21E	15	N2N2	160.00	Fergus	All	Open		160.00	160.00	
22N	21E	16	All	640.00	Fergus	All	Open		640.00	640.00	
22N	21E	17	SE4NE4, NE4SE4	80.00	Fergus	All	Open		80.00	40.00	40.00
22N	21E	20	SE4NE4, NE4SE4	80.00	Fergus	All	Open		80.00	80.00	
22N	21E	22	SE4NE4	40.00	Fergus	All	Open		40.00	40.00	
22N	21E	23	SW4NW4, SE4SW4	80.00	Fergus	All	Open		80.00	80.00	
22N	21E	25	S2N2, SE4	320.00	Fergus	All	Open		320.00	320.00	
22N	21E	26	SW4NE4, NE4NW4, N2SW4, SE4SW4, SE	360.00	Fergus	All	Open		360.00	360.00	
22N	21E	28	W2NE, N2NW	160.00	Fergus	All	Open		160.00		160.00
22N	21E	36	All	640.00	Fergus	All	Open		640.00	640.00	
22N	22E	16	All	640.00	Fergus	All	Open		640.00	640.00	
22N	22E	36	Lots 1, 2, 3, 4, W2E2, W2	640.35	Fergus	All	Open		640.35	640.35	
22N	23E	16	Lots 1, 2, 3, E2, SE4NW4, SW4	602.22	Fergus/Phillips	All	Open		602.22		602.22
22N	23E	36	Lots 1, 2, 3, NW4NW4, S2N2, S2	602.72	Fergus	All	Open		602.72		602.72
23N	14E	16	All	640.00	Chouteau	All	Open		640.00	160.00	480.00
23N	14E	36	All	640.00	Chouteau	All	Open		640.00		640.00
23N	15E	36	All	640.00	Chouteau	All	Open		640.00	640.00	
23N	16E	12	SW4	160.00	Chouteau	All	Open		160.00		160.00
23N	16E	13	W2W2	160.00	Chouteau	All	Open		160.00		160.00
23N	16E	16	All	640.00	Chouteau	All	Open		640.00		640.00
23N	16E	27	Lots 6, 7, 8	112.39	Chouteau	All	Open		112.39	112.39	
23N	16E	33	E2E2, S2SW4, SW4SE4	280.00	Fergus	All	Open		280.00	280.00	
23N	16E	34	SW4, S2SE4	240.00	Fergus	All	Open		240.00	240.00	
23N	16E	35	SE4SW4, SE4	200.00	Fergus	O	Open		200.00	200.00	
23N	16E	35	SE4	160.00	Fergus	M	Open				
23N	16E	36	All	640.00	Fergus	O; C	Open		640.00	640.00	
23N	16E	36	S2	320.00	Fergus	M	Open				
23N	17E	16	E2, N2NW4, SW4NW4, SE4SW4	480.00	Chouteau	All	Open		480.00	480.00	
23N	17E	36	E2, N2NW4, SE4NW4, SW4	600.00	Fergus	All	Open		600.00	600.00	
23N	18E	16	W2E2, S2NW, SW, SESE	440.00	Blaine	All	Open		440.00		440.00
23N	18E	36	All	640.00	Fergus	All	Open		640.00	640.00	
23N	19E	16	All	640.00	Blaine/Fergus	All	Open		640.00	640.00	
23N	20E	16	All	640.00	Fergus	All	Open		640.00	640.00	
23N	21E	16	All	640.00	Fergus	All	Open		640.00	640.00	
23N	21E	36	All	640.00	Fergus	All	Open		640.00	640.00	

Resource Description

Twp	Range	Section	Description	Acres	County	Minerals	Lease Status	Lease Expires	Net Acres	Estimated Monument Acreage	
										Inside	Adjacent
23N	22E	16	All	640.00	Blaine	All	Open		640.00	640.00	
23N	22E	36	All	640.00	Fergus/Phillips	All	Open		640.00	640.00	
23N	23E	16	All	640.00	Phillips	All	Open		640.00	640.00	
23N	23E	36	All	640.00	Phillips	All	Open		640.00		640.00
24N	9E	12	SW4	160.00	Chouteau	All	Open		160.00		160.00
24N	9E	16	Lots 1, 2, NE4, S2NW4, S2	618.25	Chouteau	All	Open		618.25		618.25
24N	13E	16	Lots 1-8, NW4NE4, W2, NE4SE4	563.99	Chouteau	All	Open		563.99	563.99	
24N	13E	36	All	640.00	Chouteau	All	Open		640.00	480.00	160.00
24N	14E	36	All	640.00	Chouteau	All	Open		640.00		640.00
24N	16E	36	All	640.00	Chouteau	All	Open		640.00		640.00
24N	18E	36	NWNE, W2, SE	520.00	Blaine	All	Open		520.00		520.00
24N	19E	16	N2NE, W2, SE	560.00	Blaine	All	Open		560.00		560.00
24N	19E	36	All	640.00	Blaine	All	Open		640.00	640.00	
24N	20E	16	All	640.00	Blaine	All	Open		640.00	640.00	
24N	20E	36	Lots 1, 2, 3, 4, N2, N2S2	638.40	Blaine	All	O&G Lease #12,660-71	HBP	638.40	638.40	
24N	21E	16	All	640.00	Blaine	All	Open		640.00	640.00	
24N	21E	36	Lots 1, 2, E2, NW4, N2SW4	602.47	Blaine	All	Open		602.47	602.47	
24N	22E	16	All	640.00	Blaine	All	Open		640.00	640.00	
24N	22E	36	All	640.00	Phillips	All	Open		640.00	640.00	
24N	23E	16	All	640.00	Phillips	All	Open		640.00	640.00	
24N	23E	36	All	640.00	Phillips	All	Open		640.00	640.00	
25N	9E	36	All	640.00	Chouteau	O; C	Open		640.00		640.00
25N	9E	36	E2	320.00	Chouteau	M	Open				
25N	10E	33	N2	320.00	Chouteau	All	Open		320.00		320.00
25N	12E	12	SE	160.00	Chouteau	All	Open		160.00		160.00
25N	12E	13	NE	160.00	Chouteau	All	Open		160.00		160.00
25N	13E	14	W2, SE	480.00	Chouteau	All	Open		480.00		480.00
25N	13E	15	E2	320.00	Chouteau	All	Open		320.00	320.00	
25N	13E	16	Lots 1, 2, 5, 6, 7, 8, W2NW4, SE4NW4, SW	490.83	Chouteau	All	Open		490.83	490.83	
25N	19E	16	All	640.00	Blaine	All	Open		640.00		640.00
25N	19E	36	All	640.00	Blaine	All	O&G Lease #32,805-98	6/2/08	640.00	640.00	
25N	20E	16	All	640.00	Blaine	All	O&G Lease #33,453-99	HBP	640.00	640.00	
25N	20E	36	All	640.00	Blaine	All	Open		640.00	640.00	
25N	21E	16	All	640.00	Blaine	All	Open		640.00	640.00	
25N	21E	36	All	640.00	Blaine	All	Open		640.00	640.00	
25N	22E	16	All	640.00	Blaine	All	Open		640.00		640.00
25N	22E	36	Lots 1, 2, 3, 4, W2E2, W2	623.80	Phillips	All	Open		623.80	623.80	
26N	10E	36	Lots 1, 2, 3, W2E2, W2, SE4SE4	633.21	Chouteau	All	Open		633.21		633.21
26N	11E	16	Lots 2, 3, 6, 7, W2	402.87	Chouteau	O; C	Open		402.87		402.87
26N	11E	16	W2, plus R/W's in Lots	341.18	Chouteau	M	Open				



**Minerals Table 6. Active Wells or Wells with a Permit to Drill within the Monument, On Any Part of a Lease where the Lease is Contained within the Monument Or the Well(s) that are within One-Half Mile of the Monument**

Mineral Ownership	Lease, CA or Unit	Operator	Well Name	American Petroleum Institute Well No.	Well Type	Well Status	Field Name	Well Locations				Total Depth	
								Well within Monument Area? (See Footnote Below)	Sec	Township and Range	Spot		County
FED	MTM53751	Klabzuba Oil & Gas, Inc.	Fed L-22-23-19N	25-027-21222-00-00	Gas	Producing	Leroy	Yes		22 23N 19E	SE NW SW	Fergus	1808
FED	MTM16618/CA-NRM944	Klabzuba Oil & Gas, Inc.	35-24-18A	25-005-21724-00-00	Gas	Producing	Leroy	Yes		35 24N 18E	SE NE SW	Blaine	1505
FED	MTM13816	Macum Energy Inc.	Federal 1-12	25-005-21542-00-00	Gas	Producing	Leroy	Yes		12 24N 20E	NE SW	Blaine	1847
FED	MTM13816	Macum Energy Inc.	Macum Federal 13-14	25-005-22893-00-00	Gas	Permit to Drill	Leroy	Yes		14 24N 20E	NW SW	Blaine	N/A
FED	MTM2060	Macum Energy Inc.	Macum Federal 22-28	25-005-22895-00-00	Gas	Permit to Drill	Leroy	Yes		28 24N 20E	SE NW	Blaine	N/A
FED	MTM2060/CA-NRM1213	Macum Energy Inc.	Federal 29-15	25-005-21712-00-00	Gas	Shut In - WOPL	Leroy	Yes		29 24N 20E	NW SW SE	Blaine	1680
STATE	N/A	Klabzuba Oil & Gas, Inc.	State 36-24-20	25-005-21651-00-00	Gas	Shut In - WOPL	Leroy	Yes		36 24N 20E	NW SE NE	Blaine	1608
FED	MTM13821-A/CA-NRM1764	Macum Energy Inc.	Federal 30-1	25-005-21333-00-00	Gas	Shut In - WOPL	Wildcat Blaine	Yes		30 24N 21E	NE SW SE	Blaine	1400
FED	MTM1565/Sherard PA E	Ocean Energy, Inc.	U.S. 4-27	25-005-21872-00-00	Gas	Shut In	Sherard, Area	Yes		27 25N 19E	SE NW NW	Blaine	1621
FED	MTM1578/UA-Sherard PA E	Ocean Energy, Inc.	U.S. 6-28	25-005-21718-00-00	Gas	Producing	Sherard, Area	Yes		28 25N 19E	SE NW	Blaine	1595
FED	MTM1578/UA-Sherard PA E	Ocean Energy, Inc.	U.S. 28-1	25-005-23044-00-00	Gas	Producing	Wildcat Blaine	Yes		28 25N 19E	NE NE	Blaine	1800
FED	MTM16102	Macum Energy Inc.	Macum Federal 31-3	25-005-22897-00-00	Gas	Permit to Drill	Leroy	Yes		3 25N 20E	NW NE	Blaine	N/A
FED	MTM84559	Klabzuba Oil & Gas, Inc.	Federal 6-25-20B	25-005-22921-00-00	Gas	Permit to Drill	Leroy	Yes		6 25N 20E	SE SW	Blaine	N/A
STATE	N/A	Macum Energy Inc.	State 1	25-005-21652-00-00	Gas	Shut In	Leroy	Yes		16 25N 20E	NE SW SW	Blaine	1795
FED	MTM16102	Macum Energy Inc.	Macum Federal 42-30	25-005-22899-00-00	Gas	Permit to Drill	Leroy	Yes		30 25N 20E	SE NE	Blaine	N/A
FED	MTM16461	Klabzuba Oil & Gas, Inc.	Federal 31-25-20	25-005-21790-00-00	Gas	Shut In	Leroy	Yes		31 25N 20E	NW NE SW	Blaine	1825
FED	MTM16939	Macum Energy Inc.	Federal 1-7	25-005-21565-00-00	Gas	Shut In	Leroy	Yes		7 25N 21E	SE NW NW	Blaine	1694
FEE	CA-NRM1739	Macum Energy Inc.	Manuel 1	25-027-21043-00-00	Gas	Shut In - WOPL	Wildcat Fergus	No 1/3		10 22N 18E	SE NE SW	Fergus	1879
FED	MTM53751/CA-MTM69544	Klabzuba Oil & Gas, Inc.	P21-23-19N	25-027-21208-00-00	Gas	Producing	Leroy	No 3/5		21 23N 19E	SE NE	Fergus	1722
FEE \$#	N/A	Macum Energy Inc.	Osburnsen 2	25-027-21046-00-00	Gas	Shut In	Leroy	No 3		25 23N 19E	SE NW NW	Fergus	1980
FED	MTM18283	Klabzuba Oil & Gas, Inc.	N 27-23-19-B	25-027-21197-00-00	Gas	Producing	Leroy	No 3/5		27 23N 19E	NESESW	Fergus	1850
FED	MTM18283/CA-NRM1512	Klabzuba Oil & Gas, Inc.	Federal 27-23-19	25-027-21115-00-00	Gas	Producing	Leroy	No 3/4		27 23N 19E	SESE	Fergus	1837
FED	MTM18283	Klabzuba Oil & Gas, Inc.	Federal A-28-23-19-N	25-027-21206-00-00	Gas	Shut In	Leroy	No 3/5		28 23N 19E	NW NE NE	Fergus	1900
FEE	NRM1513	Klabzuba Oil & Gas, Inc.	OSBUR> 29-23-19	25-027-21131-00-00	Gas	Shut In	Leroy	No 1/3		29 23N 19E	NE SW SE	Fergus	1690
FED	MTM18282	Klabzuba Oil & Gas, Inc.	31-23-19	25-027-21102-00-00	Gas	Producing	Leroy	No 3/5		31 23N 19E	NE SW SE	Fergus	1830
FEE	CA - NRM1176	Klabzuba Oil & Gas, Inc.	BROWN /30-24-<1	25-015-21371-00-00	Gas	Shut In	Sherard, Area	No 4		30 24N 17E	NE SW SE	Chouteau	1435
FED	MTM19446/CA-NRM1185	Klabzuba Oil & Gas, Inc.	USA 31-24-17-1	25-015-21352-00-00	Gas	Shut In - WOPL	Sherard, Area	No 1/3/5		31 24N 17E	SW NW NE	Chouteau	1580
FEE	CA - NRM1240	Klabzuba Oil & Gas, Inc.	Bleha 10-24-18	25-005-22366-00-00	Gas	Shut In	Leroy	No 4		10 24N 18E	S2 W2 NE	Blaine	1840
FED	MTM16327/CA - NRM995	Klabzuba Oil & Gas, Inc.	P-15-24-18N	25-005-22404-00-00	Gas	Producing	Leroy	No 4		15 24N 18E	W2 SE SE	Blaine	1579
FEE	CA - NRM1167	Klabzuba Oil & Gas, Inc.	22-24	25-005-21849-00-00	Gas	Producing	Leroy	No 4		22 24N 18E	SW NE NE	Blaine	1644
FEE	CA - MTM69515	Klabzuba Oil & Gas, Inc.	D-23-24-18-N	25-005-22405-00-00	Gas	Shut In	Leroy	No 4		23 24N 18E	NW NW	Blaine	1641
FEE	CA - NRM996	Klabzuba Oil & Gas, Inc.	23-24	25-005-21748-00-00	Gas	Shut In	Leroy	No 4		23 24N 18E	NE SW NW	Blaine	1702
FED	MTM16618	Klabzuba Oil & Gas, Inc.	26-24	25-005-21692-00-00	Gas	Producing	Leroy	No 5		26 24N 18E	SE NW SW	Blaine	1649
FED	CA - NRM997	Klabzuba Oil & Gas, Inc.	B-26-24	25-005-21730-00-00	Gas	Producing	Leroy	No 4		26 24N 18E	NE SW NW	Blaine	1612
FED	MTM16618	Klabzuba Oil & Gas, Inc.	35-24	25-005-21739-00-00	Gas	Producing	Leroy	No 3/5		35 24N 18E	W2 NE NW	Blaine	1530
FEE	NCR269	Klabzuba Oil & Gas, Inc.	20-24	25-005-22185-00-00	Gas	Producing	Leroy	No 1/3		20 24N 19E	NE SE SE	Blaine	1805
FED	MTM89082	Klabzuba Oil & Gas, Inc.	Fed. Robinson 1-25-19	25-005-22920-00-00	Gas	Shut In - WOPL	Wildcat Blaine	No 3/5		1 25N 19E	NE NW	Blaine	2000
FED	MTM1568	Klabzuba Oil & Gas, Inc.	11-25-19 Fed	25-005-22453-00-00	Gas	Producing	Sherard, Area	No 2/3/5		11 25N 19E	NE SW SW	Blaine	1803
FED	MTM1578	Ocean Energy, Inc.	U.S. 29-10	25-005-22633-00-00	Gas	Shut In	Sherard, Area	No 3/5		29 25N 19E	NW SE	Blaine	1600
FEE	NRM1560	Macum Energy Inc.	D. Kincaid 1	25-005-21456-00-00	Gas	Producing	Leroy	No 1/3		3 25N 20E	W2 SW	Blaine	1893
FED	MTM1914	Macum Energy Inc.	Federal 15-1	25-005-21109-00-00	Gas	Producing	Leroy	No 2/3/5		15 25N 20E	W2 NE SW	Blaine	1987
FEE \$#	Sherard PA A	Ocean Energy, Inc.	34-15	25-005-22574-00-00	Gas	Producing	Sherard Area	No 3		34 26N 19E	SWSE	Blaine	1800
STATE \$#	N/A	Klabzuba Oil & Gas, Inc.	State 36-26-19	25-005-22784-00-00	Gas	Producing	Wildcat Blaine	No 3		36 26N 19E	NESE	Blaine	1900
FED	MTM1888/CA-NRM972	Ocean Energy, Inc.	Federal 1-2	25-005-21238-00-00	Gas	Producing	Sawtooth Mountain	No 1/3		2 26N 20E	W2 SW NE	Blaine	1339
FED	MTM1886	Ocean Energy, Inc.	Federal 15-9	25-005-21892-00-00	Gas	Shut In	Sawtooth Mountain	No 3/5		9 26N 20E	NW SW SE	Blaine	1737
FED	MTM16458/CA-NRM768	Klabzuba Oil & Gas, Inc.	Fed 23-26-20	25-005-21656-00-00	Gas	Shut In	Leroy	No 3/4		23 26N 20E	SW NW NE	Blaine	1775
FED	MTM1903-B/CA-NRM1196	Ranck Oil Company, Inc.	Federal 21X-26	25-005-21467-00-00	Gas	Producing	Sawtooth Mountain	No 1/3		26 26N 20E	SW NE NW	Blaine	1948
FED	MTM16103/CA-NRM1191	Macum Energy Inc.	Federal 34-1	25-005-21369-00-00	Gas	Shut In	Leroy	No 3/4		34 26N 20E	N2 NW SE	Blaine	922
FED	MTM1903-A	Macum Energy Inc.	Macum Federal 42-34	25-005-22900-00-00	Gas	Permit to Drill	Leroy	No 3		34 26N 20E	SE NE	Blaine	N/A

1 - Well lies within a CA that straddles the Monument Boundary.  
 2 - Well lies within a narrow finger protruding the Monument.  
 3 - Well lies within a half mile of the Monument Boundary.  
 4 - Well lies within a CA that includes a Federal lease that also lies within the Monument Boundary.  
 5 - Well lies within a Federal lease that straddles the Monument Boundary.  
 \$# - No Bearing on Federal Mineral Interest  
 WOPL - Waiting on Pipeline

# APPENDIX K

## 2001 Visitor Survey – Upper Missouri National Wild and Scenic River

REACH River Section

Value Label	Valid			Cum	
	Value	Frequency	Percent	Percent	Percent
Fort Benton to Coal	1.00	43	5.8	5.8	5.8
Coal Banks to Judith	2.00	535	72.6	72.7	78.5
Judith to Kipp	3.00	158	21.4	21.5	100.0
.		1	.1	Missing	
----- Total		737	100.0	100.0	

Valid cases 736 Missing cases 1

RESID Residency

Value Label	Valid			Cum	
	Value	Frequency	Percent	Percent	Percent
Montana	1.00	239	32.4	32.4	32.4
Nonresident	2.00	498	67.6	67.6	100.0
----- Total		737	100.0	100.0	

Valid cases 737 Missing cases 0

OUTFIT Outfitted

Value Label	Valid			Cum	
	Value	Frequency	Percent	Percent	Percent
Outfitted guest	1.00	111	15.1	15.1	15.1
Private visitor	2.00	626	84.9	84.9	100.0
----- Total		737	100.0	100.0	

Valid cases 737 Missing cases 0

Table 1. Trip Characteristics.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
First Visit?								
Yes	79.5%	72.0%	76.1%	48.3%	85.0%	86.2%	70.9%	73.2%
No	20.5%	27.8%	23.9%	51.3%	15.0%	13.8%	28.9%	26.6%
How many years have you been visiting?								
Less than 1		4.0%	10.3%	3.3%	7.8%		5.4%	5.0%
1 to 2	12.5%	21.9%	20.5%	15.6%	31.2%	40.0%	20.1%	21.6%
3 to 5	50.0%	20.5%	23.1%	25.4%	16.9%	33.3%	21.2%	22.1%
6 to 10	12.5%	13.2%	17.9%	14.8%	13.0%	13.3%	14.1%	14.1%
more than 10	25.0%	40.4%	28.2%	41.0%	31.2%	13.3%	39.1%	37.2%
How many nights staying								
Mean	4.21	3.39	6.07	3.43	4.30	4.14	4.00	4.02
Canoeing								
Yes	93.0%	93.6%	83.5%	89.1%	92.6%	94.6%	90.9%	91.5%
No	7.0%	6.4%	16.5%	10.9%	7.4%	5.4%	9.1%	8.5%
Powerboating								
Yes		3.6%	5.1%	7.5%	1.8%	2.7%	3.8%	3.7%
No	100.0%	96.4%	94.9%	92.5%	98.2%	97.3%	96.2%	96.3%
Sightseeing								
Yes	74.4%	80.2%	71.5%	81.6%	76.1%	83.8%	76.8%	77.9%
No	25.6%	19.8%	28.5%	18.4%	23.9%	16.2%	23.2%	22.1%
Hiking								
Yes	53.5%	85.0%	80.4%	81.2%	82.7%	96.4%	79.7%	82.2%
No	46.5%	15.0%	19.6%	18.8%	17.3%	3.6%	20.3%	17.8%
Nature study								
Yes	48.8%	36.8%	41.1%	43.1%	36.3%	45.0%	37.4%	38.5%
No	51.2%	63.2%	58.9%	56.9%	63.7%	55.0%	62.6%	61.5%

(continued)

Table 1. Trip Characteristics.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
Auto or RV Camping								
Yes	7.0%	2.2%	5.7%	1.7%	4.0%	.9%	3.7%	3.3%
No	93.0%	97.8%	94.3%	98.3%	96.0%	99.1%	96.3%	96.7%
Viewing cultural or historical sites								
Yes	67.4%	63.2%	68.4%	64.9%	64.5%	71.2%	63.4%	64.6%
No	32.6%	36.8%	31.6%	35.1%	35.5%	28.8%	36.6%	35.4%
Fishing								
Yes	16.3%	22.8%	19.6%	31.0%	17.3%	2.7%	25.1%	21.7%
No	83.7%	77.2%	80.4%	69.0%	82.7%	97.3%	74.9%	78.3%
Swimming								
Yes	48.8%	53.6%	55.7%	56.5%	52.6%	58.6%	53.0%	53.9%
No	51.2%	46.4%	44.3%	43.5%	47.4%	41.4%	47.0%	46.1%
Photography								
Yes	69.8%	68.6%	72.8%	63.2%	72.7%	68.5%	69.8%	69.6%
No	30.2%	31.4%	27.2%	36.8%	27.3%	31.5%	30.2%	30.4%
Hunting								
Yes		.7%	5.1%	4.2%	.4%		1.9%	1.6%
No	100.0%	99.3%	94.9%	95.8%	99.6%	100.0%	98.1%	98.4%
Viewing Wildlife								
Yes	81.4%	77.6%	88.6%	79.5%	80.5%	75.7%	81.0%	80.2%
No	18.6%	22.4%	11.4%	20.5%	19.5%	24.3%	19.0%	19.8%

Table 2. Expenses.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
\$ spent on food and drink	\$101.81	\$101.91	\$128.29	\$97.99	\$113.76	\$102.95	\$109.66	\$108.65
\$ spent on motels and camping	\$66.95	\$70.05	\$78.91	\$12.85	\$103.52	\$125.11	\$65.08	\$74.12
\$ spent on gas	\$51.12	\$74.22	\$66.87	\$63.62	\$75.03	\$67.43	\$72.02	\$71.33
\$ spent on guides	\$147.42	\$193.26	\$212.99	\$59.59	\$280.82	\$726.88	\$117.26	\$209.08
\$ spent on licenses	\$5.81	\$8.77	\$9.64	\$5.70	\$10.25	\$3.83	\$9.65	\$8.77
\$ spent on retail goods	\$21.51	\$40.86	\$38.44	\$50.31	\$33.81	\$27.34	\$41.25	\$39.16
Other	\$39.77	\$10.61	\$18.73	\$18.49	\$11.90	\$10.90	\$14.59	\$14.04
TOTAL EXP	\$434.40	\$499.69	\$553.87	\$308.55	\$629.08	\$1,064.45	\$429.51	\$525.14

Table 3. Crowding, Sense of Place, and Camping Ops.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
During the visit, how crowded did you feel?	2.0	2.7	2.3	3.0	2.4	2.3	2.7	2.6
There are not enough primitive camping opportunities	-.1	-.1	.1	.0	-.1	-.1	.0	.0
There are not enough developed camping opportunities	-.9	-.4	-.4	-.5	-.4	-.6	-.4	-.4
A lot of life organized around this place	-1.5	-1.3	-1.3	-1.0	-1.5	-1.4	-1.3	-1.3
This area is best for what I like to do	.6	.3	.3	.5	.3	.5	.3	.4
I feel no commitment to this place	-.8	-1.0	-1.0	-1.4	-.8	-.9	-1.0	-1.0
Time spent here could be just as easily be spent somewhere else	-1.0	-.9	-.6	-1.1	-.7	-.9	-.8	-.8
I am very attached to this place	.6	.6	.8	.8	.5	.7	.6	.6
I identify strongly with this place	.7	.7	.8	.9	.6	.8	.7	.7
This place makes me feel like no other can	.4	.5	.5	.5	.5	.8	.4	.5
Doing what I do here is more important to me than doing it in any other place	-.5	-.2	-.2	.0	-.3	.0	-.3	-.2

-2 Strongly agree to 2 Strongly agree

Table 4. Trip Satisfaction.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
This trip was better than any recreation experience I remember								
Mean	.14	-.07	.03	-.10	-.01	.14	-.07	-.04
This trip was better than any other trip to this area I remember								
Mean	.42	.46	.58	.37	.54	.55	.47	.48
This trip was so good I would like to take it again								
Mean	.94	1.07	.95	1.29	.91	.94	1.05	1.04

-2 Strongly agree to 2 Strongly agree

Table 5. Trip Motivations (mean response).

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
This trip was better than any recreation experience I remember	.14	-.07	.03	-.10	-.01	.14	-.07	-.04
To improve my physical health	.28	-.06	.19	-.07	.05	.10	.00	.01
So I can be with friends	1.32	1.04	1.08	1.31	.94	.72	1.12	1.07
To have fun	1.69	1.61	1.59	1.65	1.59	1.52	1.63	1.61
To observe scenic beauty	1.74	1.69	1.70	1.66	1.72	1.74	1.69	1.70
To get away from my everyday responsibilities for a while	1.49	1.30	1.47	1.42	1.32	1.12	1.39	1.35
For the solitude and privacy	1.35	1.18	1.42	1.21	1.26	1.09	1.27	1.25
To develop my physical skills and abilities	.72	.31	.62	.21	.50	.50	.39	.40
For the adventure	1.64	1.38	1.52	1.31	1.48	1.46	1.42	1.43
To understand the natural world better	1.16	.87	1.14	.80	1.01	1.14	.91	.94
To explore new places	1.62	1.41	1.57	1.22	1.57	1.48	1.45	1.45
To learn history of the UMR	1.38	.97	1.14	.87	1.11	1.26	.99	1.03

-2 Strongly disagree

to 2 Strongly agree

Table 6. Encounters and Evaluations.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
Canoes on the river								
0	18.9%	5.5%	18.6%	8.5%	9.3%	6.4%	9.5%	9.0%
1-5	40.5%	39.6%	48.1%	38.5%	42.9%	41.8%	41.4%	41.4%
6-10	18.9%	20.4%	18.6%	15.4%	22.1%	20.0%	19.9%	19.9%
11-20	8.1%	21.3%	10.3%	20.9%	16.9%	20.0%	17.9%	18.2%
21-30	8.1%	7.4%	3.2%	7.7%	6.2%	9.1%	6.2%	6.7%
31+	5.4%	5.7%	1.3%	9.0%	2.7%	2.7%	5.1%	4.7%
Canoes								
Enjoyed	52.6%	38.4%	38.9%	29.4%	44.1%	49.5%	37.4%	39.3%
Didn't mind	23.7%	54.0%	47.8%	60.4%	46.4%	45.9%	51.9%	51.0%
Disliked	5.3%	4.0%	3.8%	3.8%	4.1%	1.8%	4.4%	4.0%
Not applicable	18.4%	3.6%	9.6%	6.4%	5.4%	2.7%	6.2%	5.7%
Hikers								
0	75.8%	62.2%	78.2%	60.4%	69.2%	54.2%	68.6%	66.3%
1-5	18.2%	23.6%	17.0%	25.8%	20.0%	26.2%	21.0%	21.9%
6-10	6.1%	8.4%	2.0%	7.4%	6.9%	11.2%	6.2%	7.0%
11-20		4.3%	2.0%	5.5%	2.7%	5.6%	3.2%	3.6%
21-30		.6%	.7%	.5%	.7%	.9%	.5%	.6%
31+		.8%		.5%	.7%	1.9%	.4%	.6%
Hikers								
Enjoyed	21.2%	23.4%	15.5%	17.8%	23.5%	32.7%	19.6%	21.7%
Didn't mind	18.2%	35.6%	26.8%	43.2%	27.6%	31.7%	32.9%	32.7%
Disliked		.6%	.7%	.9%	.5%	1.0%	.5%	.6%
Not applicable	60.6%	40.4%	57.0%	38.0%	48.4%	34.6%	47.0%	45.0%

(continued)

Table 6. Encounters and Evaluations.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
Powerboats								
0	45.5%	47.0%	53.6%	43.4%	50.9%	42.1%	49.7%	48.5%
1-5	54.5%	51.4%	44.4%	53.4%	48.3%	57.9%	48.4%	49.9%
6-10		1.2%	1.3%	2.3%	.6%		1.4%	1.2%
11-20		.2%		.5%			.2%	.1%
21-30		.2%			.2%		.2%	.1%
31+			.7%	.5%			.2%	.1%
Powerboats								
Enjoyed		3.6%	1.4%	5.1%	1.8%	1.0%	3.3%	2.9%
Didn't mind	39.4%	24.8%	23.4%	34.1%	20.9%	25.7%	25.1%	25.2%
Disliked	18.2%	37.9%	37.9%	33.6%	38.4%	42.6%	35.8%	36.9%
Not applicable	42.4%	33.7%	37.2%	27.1%	38.9%	30.7%	35.8%	35.0%
People in campsites								
0	39.5%	11.7%	31.6%	14.8%	18.8%	11.8%	18.5%	17.5%
1-5	15.8%	26.6%	43.4%	23.0%	32.8%	30.9%	29.3%	29.6%
6-10	15.8%	17.8%	12.5%	16.5%	16.5%	18.2%	16.2%	16.5%
11-20	7.9%	19.1%	7.2%	18.7%	14.8%	20.0%	15.3%	16.1%
21-30	10.5%	11.7%	3.3%	11.3%	9.1%	8.2%	10.1%	9.8%
31+	10.5%	13.1%	2.0%	15.7%	8.0%	10.9%	10.5%	10.5%
People in campsites								
Enjoyed	6.1%	16.8%	12.7%	15.7%	15.4%	22.4%	14.2%	15.5%
Didn't mind	48.5%	62.7%	62.0%	61.0%	62.1%	61.7%	61.8%	61.8%
Disliked	9.1%	13.6%	7.3%	15.2%	10.4%	10.3%	12.3%	12.0%
Not applicable	36.4%	7.0%	18.0%	8.1%	12.1%	5.6%	11.8%	10.8%
Livestock								
0	10.8%	8.0%	9.7%	8.6%	8.5%	6.3%	9.0%	8.5%
1-5	18.9%	14.1%	12.3%	14.0%	14.0%	18.0%	13.2%	14.0%
6-10	18.9%	11.2%	7.1%	9.0%	11.5%	7.2%	11.3%	10.7%
11-20	13.5%	9.6%	9.7%	8.6%	10.6%	10.8%	9.8%	10.0%
21-30	8.1%	12.5%	9.1%	12.2%	11.3%	14.4%	11.0%	11.5%
31+	29.7%	44.5%	51.9%	47.7%	44.2%	43.2%	45.7%	45.3%
Livestock								
Enjoyed	8.1%	15.6%	9.9%	10.8%	15.5%	16.4%	13.5%	14.0%
Didn't mind	56.8%	49.5%	37.1%	49.1%	46.2%	46.4%	47.3%	47.1%
Disliked	27.0%	29.1%	45.7%	34.2%	32.0%	33.6%	32.5%	32.7%
Not applicable	8.1%	5.7%	7.3%	5.9%	6.4%	3.6%	6.7%	6.2%

(continued)

Table 6. Encounters and Evaluations.

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
Vehicles								
0	43.2%	62.2%	43.6%	56.8%	57.2%	59.8%	56.6%	57.1%
1-5	35.1%	31.0%	45.0%	33.3%	34.6%	33.6%	34.3%	34.2%
6-10	8.1%	3.4%	7.4%	4.5%	4.5%	3.7%	4.7%	4.5%
11-20	8.1%	2.2%	2.0%	4.5%	1.7%	.9%	2.9%	2.6%
21-30	5.4%	.4%	2.0%	.9%	1.1%	1.9%	.9%	1.0%
31+		.8%			.9%		.7%	.6%
Vehicles								
Enjoyed		2.3%	2.1%	2.8%	1.8%	2.0%	2.2%	2.1%
Didn't mind	45.7%	26.1%	37.1%	32.2%	28.1%	29.4%	29.5%	29.5%
Disliked	17.1%	21.2%	28.0%	22.0%	22.9%	22.5%	22.6%	22.6%
Not applicable	37.1%	50.4%	32.9%	43.0%	47.2%	46.1%	45.8%	45.8%

Table 7. Preferred Options to management options

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
More camping sites along the river corridor to handle addt'l visitors	77.1%	57.7%	57.5%	62.4%	56.7%	49.5%	60.4%	58.6%
Control the number of river users with the same number of camp sites	22.9%	42.3%	42.5%	37.6%	43.3%	50.5%	39.6%	41.4%
A lottery system for use of the river by private boats	29.7%	36.8%	36.7%	31.3%	39.1%	46.5%	34.7%	36.5%
Leave as is with an uncontrolled number of private landowner	70.3%	63.2%	63.3%	68.8%	60.9%	53.5%	65.3%	63.5%
More people traveling with outfitter/guides along the river	18.8%	25.5%	18.5%	11.7%	30.1%	71.9%	14.9%	23.6%
More private boats with fewer outfitter guides	81.3%	74.5%	81.5%	88.3%	69.9%	28.1%	85.1%	76.4%
A fee system (\$10-20 per boat) to pay for improving facilities	46.2%	38.4%	35.2%	34.4%	40.0%	36.0%	38.5%	38.1%
Leave facilities as they are	35.9%	39.0%	44.1%	45.5%	37.1%	39.0%	40.1%	39.9%
Control the number of river users with the same number of camp sites	17.9%	22.5%	20.7%	20.1%	22.9%	25.0%	21.4%	22.0%
Mainly primitive camping sites with no facilities	44.7%	37.9%	58.0%	45.9%	41.4%	39.3%	43.5%	42.8%
Mainly developed camping sites with facilities (fire rings & toilets)	55.3%	62.1%	42.0%	54.1%	58.6%	60.7%	56.5%	57.2%

Table 8. Satisfaction with UMR conditions

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
Campsite conditions	1.31	1.38	.97	1.34	1.27	1.29	1.29	1.29
Maintenance of facilities	1.56	1.49	1.29	1.52	1.43	1.45	1.46	1.46
Cleanliness of area	1.54	1.51	1.28	1.43	1.48	1.56	1.45	1.46
Interaction with BLM staff	1.81	1.68	1.61	1.67	1.67	1.71	1.66	1.67
Availability of interpretive and educational information	1.07	.68	.94	.71	.78	.55	.80	.76
Historical information	.94	.67	.86	.64	.77	.63	.75	.73
Camping information	.72	.94	.47	.87	.79	.93	.80	.82
Hiking information	.52	.37	.04	.40	.27	.44	.29	.31
Appropriateness of site developments	1.12	1.16	.89	1.16	1.07	1.08	1.11	1.10
Low amount of development	1.52	1.27	1.40	1.27	1.33	1.45	1.29	1.31
Privacy of area	1.33	1.21	1.43	1.23	1.28	1.38	1.24	1.26
Seeing/hearing few others	1.16	1.07	1.41	1.05	1.20	1.17	1.14	1.15
Number of campsites within sight or sound	.92	.92	1.30	.93	1.04	1.12	.98	1.00
High degree of naturalness	1.39	1.45	1.45	1.36	1.48	1.47	1.44	1.44
Condition of natural features	1.56	1.51	1.49	1.40	1.56	1.57	1.50	1.51
Behavior of other people	1.45	1.34	1.39	1.33	1.37	1.46	1.33	1.36
Little conflict with other users	1.65	1.46	1.50	1.49	1.48	1.50	1.48	1.48
Few rules or restrictions	1.58	1.52	1.54	1.54	1.52	1.49	1.54	1.53

-2 Strongly disagree

to 2 Strongly agree

Table 9. Visitor characteristics

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
Group type								
Alone	7.1%	2.2%	4.6%	1.8%	3.6%		3.6%	3.0%
Family	35.7%	23.3%	16.3%	19.4%	23.9%		26.8%	22.5%
Outfitted guest	7.1%	17.6%	13.1%	8.1%	19.9%	100.0%		16.1%
Friends	28.6%	30.8%	42.5%	36.5%	31.6%		39.6%	33.2%
Friends and family	21.4%	26.1%	23.5%	34.2%	20.9%		30.1%	25.2%
#Males	3.35	4.76	4.38	4.95	4.43	7.48	4.09	4.60
# Females	2.56	3.44	2.63	3.51	3.08	5.74	2.77	3.22
# children	1.05	2.35	1.24	2.79	1.67	1.35	2.15	2.03
Group Size	6.95	10.55	8.25	11.25	9.18	14.57	9.01	9.85
Does anyone in group have disabilities?								
No	85.7%	92.6%	91.7%	93.2%	91.4%	90.8%	92.2%	92.0%
Yes	14.3%	7.4%	8.3%	6.8%	8.6%	9.2%	7.8%	8.0%
AGE	49.36	45.63	44.69	43.51	46.66	46.55	45.44	45.62
SEX								
Male	50.0%	56.9%	63.6%	57.9%	58.1%	47.2%	60.0%	58.1%
Female	50.0%	43.1%	36.4%	42.1%	41.9%	52.8%	40.0%	41.9%
Level of education								
Grade School		3.5%	2.6%	3.8%	2.7%	1.8%	3.3%	3.1%
High School	4.8%	9.1%	9.0%	10.5%	8.0%	9.2%	8.8%	8.8%
College	33.3%	41.6%	40.4%	43.5%	39.6%	33.9%	42.1%	40.9%
Graduate school	61.9%	45.8%	48.1%	42.2%	49.7%	55.0%	45.8%	47.2%
Occupation								
Professional	63.4%	45.9%	50.7%	44.0%	50.0%	50.5%	47.5%	48.0%
Managerial	2.4%	3.9%	6.7%	3.9%	4.6%	1.9%	4.8%	4.4%
Sales	2.4%	3.7%	3.3%	3.0%	3.8%	2.9%	3.6%	3.5%

(continued)

Table 9. Visitor characteristics

	River Section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted Guest	Private Visitor	
Clerical	2.4%	.6%	2.7%	.9%	1.3%	1.0%	1.2%	1.2%
Craftsmen	4.9%	3.0%	2.0%	4.3%	2.2%	1.0%	3.3%	2.9%
Operatives		.4%	1.3%	.9%	.4%	1.0%	.5%	.6%
Laborers		4.5%	6.0%	6.0%	3.8%		5.3%	4.5%
Farmers		2.2%	.7%	3.4%	.9%		2.1%	1.8%
Service workers	2.4%	7.5%	6.7%	7.8%	6.9%	8.7%	6.9%	7.2%
Student		6.7%	6.0%	8.6%	4.9%	4.9%	6.4%	6.1%
Housewife	2.4%	2.2%	.7%	3.4%	1.1%	2.9%	1.7%	1.9%
Retired	19.5%	18.1%	13.3%	12.5%	19.5%	25.2%	15.7%	17.1%
Armed Services		.4%		.4%	.2%		.3%	.3%
Unemployed, disabled		.8%		.9%	.4%		.7%	.6%
Annual household income								
less than \$10,000	2.6%	6.4%	3.7%	9.0%	4.1%	7.2%	5.4%	5.7%
\$10,000 to \$19,999	2.6%	3.2%	2.2%	5.5%	1.7%	5.2%	2.5%	2.9%
\$20,000 to \$29,999	7.7%	4.3%	12.6%	8.5%	5.4%	1.0%	7.4%	6.4%
\$30,000 to \$39,999	10.3%	11.4%	9.6%	12.9%	10.0%	11.3%	10.9%	10.9%
\$40,000 to \$49,999	10.3%	10.3%	11.9%	10.9%	10.5%	8.2%	11.1%	10.6%
\$50,000 to \$59,999	7.7%	12.8%	10.4%	11.9%	11.9%	11.3%	12.0%	11.9%
\$60,000 to \$69,999	7.7%	9.8%	10.4%	11.4%	9.0%	11.3%	9.5%	9.8%
\$70,000 or more	51.3%	41.6%	39.3%	29.9%	47.4%	44.3%	41.2%	41.7%
Residency								
Montana	39.5%	36.6%	16.5%	32.4%		2.4%	30.0%	32.4%
Nonresident	60.5%	63.4%	83.5%		67.6%	12.6%	55.0%	67.6%

Resource Description

**2002 Visitor Survey – Upper Missouri National Wild and Scenic River**

REACH River section

Value Label	Value	Frequency	Percent	Valid Percent	Cum Percent
Fort Benton to Coal	1.00	2	1.8	2.0	2.0
Coal Banks to Judith	2.00	69	62.2	67.6	69.6
Judith to Kipp	3.00	31	27.9	30.4	100.0
.	.	9	8.1	Missing	
	Total	111	100.0	100.0	

Valid cases 102 Missing cases 9

Table 1. Trip Characteristics.

	River section			Residency		Oufitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Oufitted guest	Private visitor	
First Visit?								
Yes	100.0%	72.1%	64.5%	48.6%	78.7%	75.0%	67.4%	69.1%
No		27.9%	35.5%	51.4%	21.3%	25.0%	32.6%	30.9%
How many years have you been visiting?								
Less than 1		9.1%	10.0%	15.8%	5.9%	37.5%	3.6%	11.1%
1 to 2		9.1%	30.0%	21.1%	11.8%		21.4%	16.7%
3 to 5		9.1%	30.0%	10.5%	23.5%	12.5%	17.9%	16.7%
6 to 10		18.2%		15.8%	5.9%	12.5%	10.7%	11.1%
more than 10		54.5%	30.0%	36.8%	52.9%	37.5%	46.4%	44.4%
How many nights staying								
Mean	6.50	3.25	4.58	3.24	3.97	2.63	4.06	3.75
Canoeing								
Yes	100.0%	92.8%	93.5%	88.6%	94.7%	83.3%	95.4%	92.8%
No		7.2%	6.5%	11.4%	5.3%	16.7%	4.6%	7.2%
Powerboating								
Yes		17.4%	9.7%	17.1%	13.2%	45.8%	5.7%	14.4%
No	100.0%	82.6%	90.3%	82.9%	86.8%	54.2%	94.3%	85.6%
Sightseeing								
Yes	50.0%	85.5%	67.7%	80.0%	77.6%	87.5%	75.9%	78.4%
No	50.0%	14.5%	32.3%	20.0%	22.4%	12.5%	24.1%	21.6%
Hiking								
Yes	50.0%	82.6%	87.1%	88.6%	78.9%	87.5%	80.5%	82.0%
No	50.0%	17.4%	12.9%	11.4%	21.1%	12.5%	19.5%	18.0%
Nature study								
Yes		37.7%	35.5%	45.7%	31.6%	41.7%	34.5%	36.0%
No	100.0%	62.3%	64.5%	54.3%	68.4%	58.3%	65.5%	64.0%
Auto or RV Camping								
No	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

(continued)

Table 1. Trip Characteristics.

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
Viewing cultural or historical sites								
Yes	50.0%	63.8%	61.3%	57.1%	65.8%	79.2%	58.6%	63.1%
No	50.0%	36.2%	38.7%	42.9%	34.2%	20.8%	41.4%	36.9%
Fishing								
Yes	50.0%	24.6%	19.4%	28.6%	22.4%	8.3%	28.7%	24.3%
No	50.0%	75.4%	80.6%	71.4%	77.6%	91.7%	71.3%	75.7%
Swimming								
Yes	50.0%	65.2%	45.2%	80.0%	48.7%	58.3%	58.6%	58.6%
No	50.0%	34.8%	54.8%	20.0%	51.3%	41.7%	41.4%	41.4%
Photography								
Yes	50.0%	58.0%	67.7%	51.4%	67.1%	58.3%	63.2%	62.2%
No	50.0%	42.0%	32.3%	48.6%	32.9%	41.7%	36.8%	37.8%
Hunting								
Yes		1.4%	3.2%	2.9%	1.3%		2.3%	1.8%
No	100.0%	98.6%	96.8%	97.1%	98.7%	100.0%	97.7%	98.2%
Viewing Wildlife								
Yes	50.0%	69.6%	83.9%	71.4%	77.6%	62.5%	79.3%	75.7%
No	50.0%	30.4%	16.1%	28.6%	22.4%	37.5%	20.7%	24.3%

Table 2. Expenses.

	River section			Residency		Oufitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Oufitted guest	Private visitor	
\$ spent on food and drink	\$125.00	\$112.12	\$184.58	\$124.89	\$124.89	\$115.08	\$127.60	\$124.89
\$ spent on motels and camping	\$105.00	\$73.07	\$160.13	\$6.03	\$133.46	\$161.46	\$74.47	\$93.28
\$ spent on gas	\$500.00	\$65.43	\$132.58	\$23.46	\$119.46	\$123.54	\$79.71	\$89.19
\$ spent on guides	\$727.50	\$328.19	\$489.52	\$45.00	\$508.55	\$1,232.29	\$122.41	\$362.39
\$ spent on licenses	\$100.00	\$8.10	\$2.81	\$4.74	\$9.74	\$0.00	\$10.41	\$8.16
\$ spent on retail goods	\$510.00	\$27.13	\$30.16	\$6.43	\$49.30	\$18.12	\$40.66	\$35.78
Other	\$0.00	\$16.14	\$7.10	\$2.86	\$16.24	\$0.00	\$15.33	\$12.02
TOTALEXP	\$2,067.50	\$630.19	\$1,006.87	\$213.40	\$961.64	\$1,650.50	\$470.60	\$725.71

Table 3. Crowding, sense of place, and camping ops.

	River section			Residency		Oufitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Oufitted guest	Private visitor	
During the visit, how crowded did you feel?	2.0	2.3	2.6	2.7	2.2	1.6	2.6	2.4
There are not enough primitive camping opportunities	.0	-.3	-.4	-.4	-.2	-.7	-.2	-.3
	.0	-.3	-.4	-.4	-.2	-.7	-.2	-.3
There are not enough developed camping opportunities	-1.0	-.2	-.4	.0	-.4	-.1	-.3	-.3
A lot of life organized around this place	-2.0	-1.1	-1.8	-1.0	-1.5	-.5	-1.5	-1.3
This area is best for what I like to do	1.0	.3	.4	.3	.3	.5	.3	.3
I feel no commitment to this place	.	-1.3	-.9	-1.2	-1.2	-1.0	-1.2	-1.2
Time spent here could be just as easily be spent somewhere else	-1.0	-1.0	-.8	-1.1	-.9	-1.3	-.8	-1.0
I am very attached to this place	.	.8	.4	.7	.6	1.1	.5	.6
I identify strongly with this place	1.0	.9	.5	.8	.6	1.0	.6	.7
This place makes me feel like no other can	.	.6	.7	.7	.7	1.1	.6	.7

-2 Strongly agree to 2 Strongly agree

(continued)

Table 3. Crowding, sense of place, and camping ops.

	River section			Residency		Oufitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Oufitted guest	Private visitor	
Doing what I do here is more important to me than doing it in any other place	.	-.3	-.9	-.2	-.6	.1	-.6	-.5

-2 Strongly agree to 2 Strongly agree

Table 4. Trip Satisfaction

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
This trip was better than any recreation experience I remember								
Mean	-0.50	0.11	-0.19	0.09	0.01	0.63	-0.14	0.04
This trip was better than any other trip to this area I remember								
Mean	0.50	0.50	0.46	0.58	0.48	0.74	0.44	0.51
This trip was so good I would like to take it again								
Mean	1.00	1.18	0.87	1.10	1.08	1.33	1.01	1.09

-2 Strongly agree to 2 Strongly agree

Table 5. Trip motivations (mean response)

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
To improve my physical health	.00	-.26	-.20	-.17	-.28	-.42	-.19	-.25
So I can be with friends	1.50	1.06	1.17	1.03	1.12	.58	1.24	1.09
To have fun	1.50	1.54	1.67	1.45	1.61	1.35	1.62	1.56
To observe scenic beauty	1.50	1.74	1.83	1.71	1.79	1.92	1.72	1.77
To get away from my everyday responsibilities for a while	1.00	1.39	1.47	1.32	1.40	1.25	1.41	1.37
For the solitude and privacy	1.00	1.15	1.53	1.26	1.32	.96	1.40	1.30
To develop my physical skills and abilities	1.00	.15	.30	.30	.15	.25	.19	.20
For the adventure	2.00	1.25	1.37	1.26	1.33	1.13	1.36	1.31
To understand the natural world better	.00	.88	1.10	.88	1.00	.96	.96	.96
To explore new places	1.50	1.36	1.53	1.38	1.46	1.13	1.52	1.44
To learn history of the UMR	.50	1.15	1.07	.91	1.26	1.42	1.07	1.15

-2 Strongly disagree to 2 Strongly agree

Table 6. Encounters and evaluations

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
-----								
Canoes on the river								
0		1.5%	23.3%	11.8%	6.8%		10.7%	8.3%
1-5	50.0%	47.8%	40.0%	52.9%	40.5%	50.0%	42.9%	44.4%
6-10		29.9%	13.3%	23.5%	28.4%	25.0%	27.4%	26.9%
11-20	50.0%	17.9%	16.7%	8.8%	20.3%	25.0%	14.3%	16.7%
21-30		3.0%	3.3%		4.1%		3.6%	2.8%
31+			3.3%	2.9%			1.2%	.9%
-----								
Canoes								
Enjoyed		45.5%	31.0%	31.3%	41.1%	58.3%	32.1%	38.1%
Didn't mind	100.0%	53.0%	48.3%	53.1%	53.4%	37.5%	58.0%	53.3%
Disliked			6.9%	9.4%	1.4%	4.2%	3.7%	3.8%
Not applicable		1.5%	13.8%	6.3%	4.1%		6.2%	4.8%
-----								
Hikers								
0	100.0%	54.0%	89.7%	59.4%	68.6%	45.5%	71.3%	65.7%
1-5		36.5%	3.4%	28.1%	25.7%	45.5%	21.3%	26.5%
6-10		7.9%	6.9%	9.4%	5.7%	9.1%	6.3%	6.9%
11-20		1.6%		3.1%			1.3%	1.0%
-----								
Hikers								
Enjoyed		24.6%	14.8%	25.8%	20.0%	36.4%	17.6%	21.9%
Didn't mind		41.0%	11.1%	32.3%	30.8%	36.4%	29.7%	31.3%
Disliked				3.2%			1.4%	1.0%
Not applicable	100.0%	34.4%	74.1%	38.7%	49.2%	27.3%	51.4%	45.8%
-----								
Powerboats								
0	100.0%	33.3%	48.3%	45.5%	38.9%	29.2%	44.4%	41.0%
1-5		66.7%	44.8%	54.5%	58.3%	70.8%	53.1%	57.1%
6-10			6.9%		2.8%		2.5%	1.9%
-----								
Powerboats								
Enjoyed		15.6%		9.1%	10.1%	25.0%	5.1%	9.8%
Didn't mind		28.1%	24.1%	15.2%	30.4%	41.7%	20.5%	25.5%
Disliked		34.4%	41.4%	39.4%	36.2%	25.0%	41.0%	37.3%
Not applicable	100.0%	21.9%	34.5%	36.4%	23.2%	8.3%	33.3%	27.5%
-----								

(continued)

Table 6. Encounters and evaluations

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
-----								
People in campsites								
0		17.9%	41.4%	27.3%	24.3%	25.0%	25.3%	25.2%
1-5	50.0%	19.4%	24.1%	9.1%	28.4%	12.5%	25.3%	22.4%
6-10		16.4%	17.2%	21.2%	14.9%	20.8%	15.7%	16.8%
11-20		25.4%	17.2%	24.2%	18.9%	25.0%	19.3%	20.6%
21-30		17.9%		15.2%	10.8%	12.5%	12.0%	12.1%
31+	50.0%	3.0%		3.0%	2.7%	4.2%	2.4%	2.8%
-----								
People in campsites								
Enjoyed		10.6%	10.7%	6.1%	12.7%	8.3%	11.3%	10.6%
Didn't mind	100.0%	60.6%	53.6%	57.6%	57.7%	70.8%	53.8%	57.7%
Disliked		16.7%	14.3%	18.2%	15.5%	8.3%	18.8%	16.3%
Not applicable		12.1%	21.4%	18.2%	14.1%	12.5%	16.3%	15.4%
-----								
Livestock								
0	50.0%	25.8%	13.3%	23.5%	23.3%	20.8%	24.1%	23.4%
1-5	50.0%	13.6%	10.0%	14.7%	15.1%	20.8%	13.3%	15.0%
6-10		9.1%	20.0%	8.8%	12.3%	16.7%	9.6%	11.2%
11-20		13.6%	6.7%	8.8%	11.0%	8.3%	10.8%	10.3%
21-30		10.6%	6.7%	8.8%	9.6%	16.7%	7.2%	9.3%
31+		27.3%	43.3%	35.3%	28.8%	16.7%	34.9%	30.8%
-----								
Livestock								
Enjoyed	100.0%	12.7%	6.7%	6.3%	12.9%	20.8%	7.7%	10.8%
Didn't mind		31.7%	60.0%	31.3%	45.7%	37.5%	42.3%	41.2%
Disliked		30.2%	23.3%	37.5%	24.3%	33.3%	26.9%	28.4%
Not applicable		25.4%	10.0%	25.0%	17.1%	8.3%	23.1%	19.6%
-----								

(continued)

Table 6. Encounters and evaluations

	River section			Residency		Oufitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Oufitted guest	Private visitor	
Vehicles								
0	50.0%	53.0%	56.7%	57.6%	52.7%	65.2%	51.2%	54.2%
1-5		40.9%	40.0%	39.4%	40.5%	34.8%	41.7%	40.2%
6-10	50.0%	3.0%			4.1%		3.6%	2.8%
11-20		3.0%		3.0%	1.4%		2.4%	1.9%
21-30			3.3%		1.4%		1.2%	.9%
Vehicles								
Didn't mind	100.0%	36.9%	32.1%	37.5%	35.7%	29.2%	38.5%	36.3%
Disliked		16.9%	25.0%	15.6%	21.4%	29.2%	16.7%	19.6%
Not applicable		46.2%	42.9%	46.9%	42.9%	41.7%	44.9%	44.1%

Table 7. Preferred Options to management options

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
More camping sites along the river corridor to handle addt'l visitors	50.0%	69.4%	69.0%	80.6%	64.3%	83.3%	64.9%	69.3%
Control the number of river users with the same number of camp sites	50.0%	30.6%	31.0%	19.4%	35.7%	16.7%	35.1%	30.7%
A lottery system for use of the river by private boats	50.0%	31.8%	20.7%	18.8%	33.3%	25.0%	30.0%	28.8%
Leave as is with an uncontrolled number of private landowner	50.0%	68.2%	79.3%	81.3%	66.7%	75.0%	70.0%	71.2%
More people traveling with outfitter/guides along the river		48.3%	20.0%	43.3%	36.5%	95.5%	21.1%	38.7%
More private boats with fewer outfitter guides	100.0%	51.7%	80.0%	56.7%	63.5%	4.5%	78.9%	61.3%
A fee system (\$10-20 per boat) to pay for improving facilities	50.0%	24.1%	23.3%	32.1%	20.0%	19.0%	24.7%	23.5%
Leave facilities as they are	50.0%	55.2%	50.0%	60.7%	52.9%	71.4%	50.6%	55.1%
Control the number of river users with the same number of camp sites		20.7%	26.7%	7.1%	27.1%	9.5%	24.7%	21.4%
Mainly primitive camping sites with no facilities	100.0%	39.3%	70.0%	48.4%	51.4%	25.0%	56.8%	50.5%
Mainly developed camping sites with facilities (fire rings & toilets)		59.0%	30.0%	51.6%	47.1%	70.0%	43.2%	48.5%

(continued)

Table 8. Satisfaction with UMR conditions

	River section			Residency		Oufitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Oufitted guest	Private visitor	
Campsite conditions	2.00	1.39	1.15	1.47	1.26	1.48	1.28	1.33
Maintenance of facilities	2.00	1.51	1.39	1.58	1.46	1.55	1.48	1.49
Cleanliness of area	2.00	1.43	1.62	1.47	1.51	1.65	1.45	1.50
Interaction with BLM staff	2.00	1.40	1.54	.96	1.71	.36	1.64	1.45
Availability of interpretive and educational information	1.00	.73	.41	.83	.62	.87	.64	.69
Historical information	1.00	1.06	.52	.86	.90	1.42	.73	.89
Camping information	1.00	.91	.48	.59	.91	1.40	.69	.82
Hiking information	.	.71	-.55	.21	.29	1.13	-.02	.26
Appropriateness of site developments	.	1.31	1.13	1.07	1.36	1.46	1.17	1.26
Low amount of development	1.00	1.40	1.31	1.41	1.37	1.53	1.34	1.38
Privacy of area	1.00	1.25	1.46	1.31	1.34	1.09	1.41	1.33
Seeing/hearing few others	1.00	1.24	1.41	1.38	1.25	1.29	1.28	1.28
Number of campsites within sight or sound	1.50	1.23	1.00	1.16	1.22	1.47	1.12	1.20
High degree of naturalness	2.00	1.38	1.56	1.55	1.41	1.38	1.48	1.45
Condition of natural features	2.00	1.62	1.61	1.50	1.67	1.61	1.61	1.61
Behavior of other people	1.00	1.54	1.31	1.39	1.51	1.58	1.44	1.47
Little conflict with other users	2.00	1.53	1.50	1.55	1.52	1.52	1.53	1.53
Few rules or restrictions	.00	1.57	1.62	1.55	1.56	1.50	1.57	1.55

-2 Strongly disagree to 2 Strongly agree

Table 9. Visitor characteristics

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
-----								
Group type								
Family		15.9%	16.7%	6.5%	19.4%		20.3%	15.5%
Outfitted guest		30.2%	10.0%	29.0%	20.8%	100.0%		23.3%
Friends		34.9%	53.3%	38.7%	41.7%		53.2%	40.8%
Friends and family	100.0%	19.0%	20.0%	25.8%	18.1%		26.6%	20.4%
#Males	16.50	4.84	2.87	3.54	4.68	6.04	3.85	4.32
# Females	.00	3.88	1.68	3.69	2.67	7.54	1.74	2.99
# children	6.50	1.46	.61	1.49	1.20	.58	1.48	1.29
GRPSZ	23.00	10.19	5.16	8.71	8.55	14.17	7.07	8.60
Does anyone in group have disabilities?								
No	100.0%	95.5%	93.3%	81.8%	100.0%	95.8%	94.0%	94.4%
Yes		4.5%	6.7%	18.2%		4.2%	6.0%	5.6%
AGE	46.00	48.42	50.70	48.26	49.54	52.42	48.17	49.13
SEX								
Male	100.0%	50.0%	82.8%	60.6%	63.0%	45.8%	67.1%	62.3%
Female		50.0%	17.2%	39.4%	37.0%	54.2%	32.9%	37.7%
Level of education								
High School		6.0%	3.3%	5.9%	6.8%	4.2%	7.1%	6.5%
College		44.8%	23.3%	41.2%	36.5%	29.2%	40.5%	38.0%
Graduate school	100.0%	49.3%	73.3%	52.9%	56.8%	66.7%	52.4%	55.6%
Occupation								
Professional	100.0%	54.1%	48.3%	43.3%	53.6%	47.4%	51.2%	50.5%
Managerial		3.3%	10.3%	3.3%	5.8%	5.3%	5.0%	5.1%
Sales		1.6%	6.9%	6.7%	5.8%	5.3%	6.3%	6.1%
Clerical					1.4%		1.3%	1.0%
Craftsmen		3.3%		3.3%	1.4%		2.5%	2.0%

(continued)

Table 9. Visitor characteristics

	River section			Residency		Outfitted		Total
	Fort Benton to Coal Banks	Coal Banks to Judith	Judith to Kipp	Montana	Nonresident	Outfitted guest	Private visitor	
Laborers		3.3%	6.9%	6.7%	2.9%		5.0%	4.0%
Farmers		1.6%			1.4%		1.3%	1.0%
Service workers		6.6%	6.9%	10.0%	4.3%	5.3%	6.3%	6.1%
Student		4.9%	3.4%	3.3%	4.3%	5.3%	3.8%	4.0%
Housewife		4.9%		3.3%	2.9%		3.8%	3.0%
Retired		11.5%	17.2%	20.0%	11.6%	31.6%	10.0%	14.1%
Armed Services		1.6%			1.4%		1.3%	1.0%
Unemployed, disabled		3.3%			2.9%		2.5%	2.0%
Annual household income								
less than \$10,000		1.7%			1.6%		1.4%	1.1%
\$10,000 to \$19,999		1.7%		3.6%	1.6%	4.5%	1.4%	2.2%
\$20,000 to \$29,999		13.6%	4.3%	21.4%	4.8%	13.6%	8.7%	9.9%
\$30,000 to \$39,999		8.5%	4.3%	10.7%	4.8%	4.5%	7.2%	6.6%
\$40,000 to \$49,999		15.3%		10.7%	12.7%	13.6%	11.6%	12.1%
\$50,000 to \$59,999		5.1%	17.4%	10.7%	9.5%	9.1%	10.1%	9.9%
\$60,000 to \$69,999		16.9%	13.0%	14.3%	15.9%	22.7%	13.0%	15.4%
\$70,000 or more	100.0%	37.3%	60.9%	28.6%	49.2%	31.8%	46.4%	42.9%
Residency								
Montana		33.3%	25.8%	31.5%		8.1%	23.4%	31.5%
Nonresident	100.0%	66.7%	74.2%		68.5%	13.5%	55.0%	68.5%



## **APPENDIX L**

### **POPULATION, EMPLOYMENT, EARNINGS AND PERSONAL INCOME TRENDS**

**for**

**Blaine County, MT  
Chouteau County, MT  
Fergus County, MT  
Hill County, MT  
Phillips County, MT**

**(For a complete copy, please contact the BLM Lewistown Field Office at 406-538-1911.)**



## **MAPS**

**Maps are available for viewing in the Lewistown Field Office.**