CHAPTER THREE
Affected Environment

INTRODUCTION

Chapter 3 contains a description of the pertinent natural resources and economic and social conditions found in the planning area. Much of this information is summarized from the Judith-Valley-Phillips Management Situation Analysis which is available for review at the Lewistown District Office and the Judith, Valley and Phillips Resource Area (RA) Offices.

TOPOGRAPHY

The topography of the planning area varies considerably. This area is part of the Northern Great Plains region and consists of rolling prairies, slightly to heavily dissected by drainage systems. Plains mountains punctuate the landscape in the Phillips and Judith RAs and rise 2,000 to 4,000 feet above the surrounding area. Portions of the Judith and Phillips RAs provide a unique transitional environment between the Rocky Mountains of western Montana and the vast plains of eastern Montana and the Dakotas. By comparison, the Valley RA contains less relief.

The planning area is part of the Missouri River basin. The major tributary systems of the Missouri River include Arrow Creek and the Judith, Musselshell and Milk Rivers. Each of these large drainage systems has dissected the land; forming cliffs, broad valleys or badlands-type topography.

CLIMATE

The climate is semiarid continental; marked by cold winters, warm to rarely hot summers, 11 to 40 inches of precipitation annually, winds primarily from the west and abundant sunshine.

The average annual precipitation ranges from 11 inches around Glasgow to more than 40 inches in the Snowy Mountains south of Lewistown; with most of the area in the 10 to 14 inch precipitation zones. Snow in the mountain areas may be several feet deep. On the plains, snow 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 planning area shows rainfall is concentrated between April and 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. The mountains, foothills and Breaks areas are subject to intense lightning storms from July through September, often resulting in wildfires.

Winter temperatures may be as low as -40 degrees Fahrenheit (°F) for short periods, but the average January temperature is around 15°F. Summer temperatures as high as 110°F have been recorded, but the average July 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. The higher mountains generally are cooler than the plains and Breaks areas during the summer. Growing seasons, defined as the time between the last frost in spring and the first fall frost (temperatures of 32°F) range from 104 to 132 days.

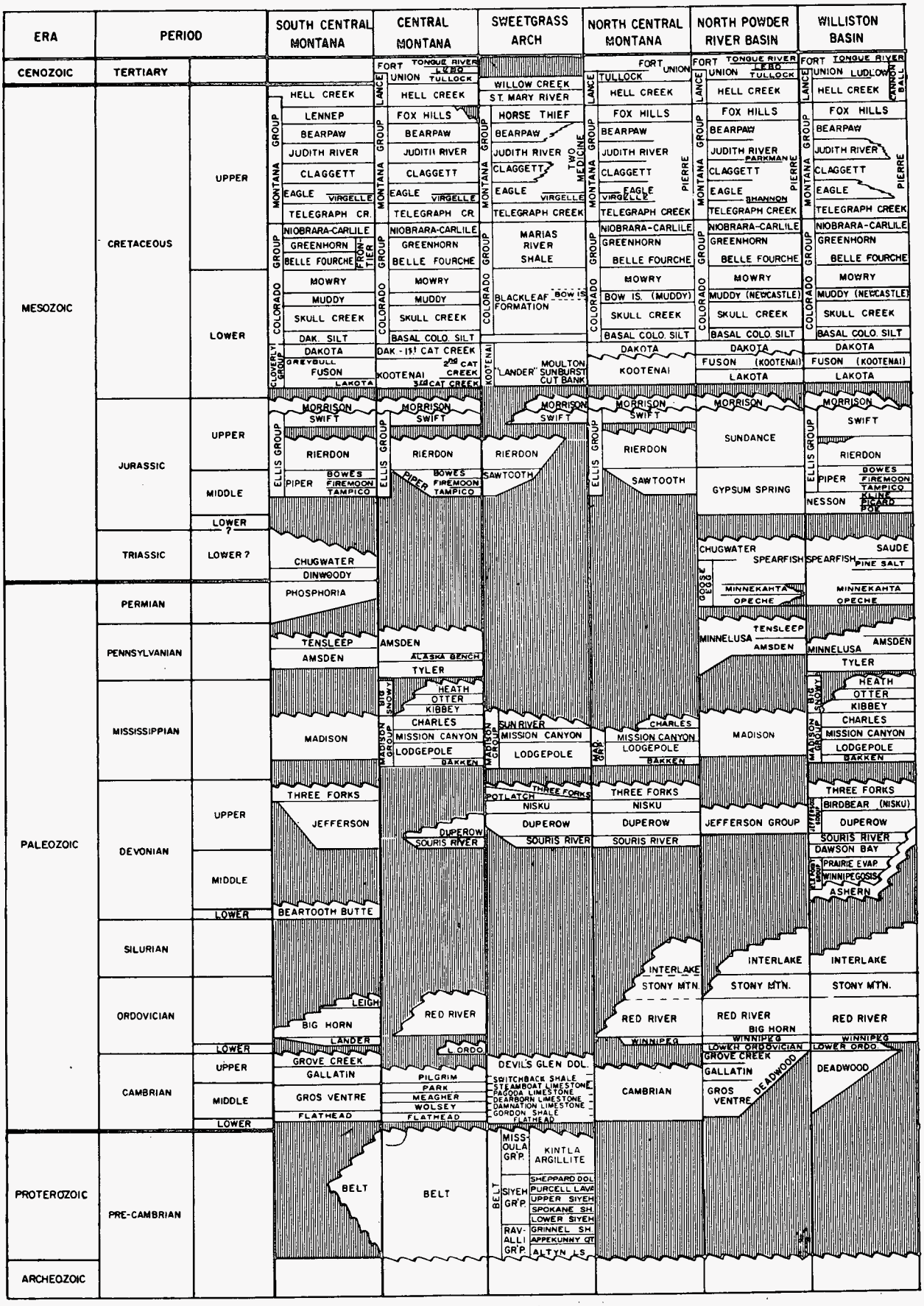
GENERAL GEOLOGY

The geology includes extremes in age and physiography. The land ranges from upland prairie, glaciated as recently as 10,000 years ago, to the nearly 3 billion year old exposed Precambrian material in mountainous areas.

The oldest rocks in the planning area are Precambrian age metamorphic gneisses and schists, exposed in the Little Rocky Mountains. The overlying, late Precambrian Belt Series rocks outcrop in the Little Belt Mountains.

During the Paleozoic Era, 570 to 240 million years ago, 5,000 to 10,000 feet of Cambrian, Ordovician, Silurian, Devonian, Mississippian, Pennsylvanian and Permian rock was deposited (see Figure 3.1). The rocks are dominantly limestone and dolomite, but sandstone and shale also occur, particularly near the bottom and top. The massive Madison Limestone was deposited during this time. This formation can be over a 1,000 feet thick and is resistant to erosion, thus forming the spectacular cliffs in the mountain ranges of the planning area. In addition, caves in Paleozoic limestones occur in most mountain ranges of the planning area. The Mesozoic Era, from 240 to 66 million years ago, is divided into three periods: Triassic, Jurassic and Cretaceous (see Figure 3.1). Toward the middle of Jurassic time marine sea spread over this portion of the state depositing 200 to 600

FIGURE 3.1
Stratigraphic Column



MONTANA BOARD OF OIL AND GAS CONSERVATION

feet of sandy, shaley, and limy sediments. These include the Ellis Group (Sawtooth, Rierdon and Swift Formations) and the Morrison Formation. Jurassic gypsum and coal have been mined in the planning area.

The Cretaceous period began with deposition of the Kootenai Formation. It includes sandstone and bright red shale which, on weathering, color the soils. These red soils are conspicuous in central Montana. During late Cretaceous time an inland sea extended from the Gulf of Mexico to the Arctic Ocean, covering all of eastern and central Montana. During the three major times the sea pushed westward the Colorado, Claggett and Bearpaw Formations were deposited. As the sea retreated, it deposited the Eagle Sandstone and Judith River Formation (Perry, 1962). Cretaceous age strata in central Montana have three major divisions: 1) the Colorado Group which developed during the first marine advance and is about 2,000 feet thick; 2) the Montana Group, about 1,500 feet thick, deposited during the multiple marine advances and retreats containing several different formations (see Figure 3.1); and 3) the Hell Creek Formation, about 700 feet thick, deposited after the complete retreat of the sea as a series of sediments laid down on a broad coastal plain as outwash from the rising Rocky Mountains (Perry, 1962). Several Cretaceous formations contain coal and bentonite beds.

The Cenozoic Era extended from 66 million years ago to the present. The era is divided into the Tertiary and Quaternary Periods (see Figure 3.1).

The early Tertiary time was a period of intense volcanism and mountain building activity in this portion of Montana. The region is broken by centers of intrusive and/or extrusive igneous activity. Such areas include the Bearpaw Mountains, the Little Rocky Mountains, the Highwood, Little Belts, Judith Mountains, Big and Little Snowy Mountains, and the North and South Moccasin Mountains. Along the margins of these uplifts the upturned stratigraphic section may include units as old as Precambrian up to those deposited just prior to uplift. Tertiary sedimentary rocks include the Fort Union Formation, which contains massive sandstone beds. Most of Montana's coal is from the Fort Union formation. The youngest Tertiary rock are the Flaxville gravels that can be found in parts of the Phillips and Valley RAs.

During the Quaternary Period, two major glacial advances occurred. The ice blocked many of the north-flowing rivers, creating large glacial lakes across central Montana. As the ice melted, its load of soil and rock material was deposited over most of northern Montana, filling preglacial valleys and covering the upland plains with glacial drift or moraines consisting of gravels, sand, and clay; but characterized by numerous large boulders of igneous rock. These glacial deposits cover most of the area north of the Missouri River and vary in thickness from several feet to several hundred feet. The Missouri River, which used to flow in the current Milk River Valley and drain into Hudson Bay, was diverted to its present course. Many other streams and rivers either disappeared totally or had their courses radically altered.

In more recent time, erosion has dissected the landscape to its present form. Alluvial material derived from eroding mountains or from reworked glacial deposits, occurs at several levels above current drainages. Large areas of gravels with abundant pebbles and cobbles of limestone blanket the surface for many miles north of Harlowton, Roundup, and west of Lewistown.

PALEONTOLOGY

Paleontological resources consist of fossil plants and animals, or their impressions, found in the rocks of former surface and marine deposits. Fossils are found where erosion has exposed the fossil-bearing strata.

All paleontological formations in the Valley and Phillips RAs, except the Little Rocky Mountains, date from the late Cretaceous Era. The earliest unit is the Judith River Formation, which contains small quantities of terrestrial dinosaur, crocodilian and turtle fossils. Occasionally small mammal remains are found. A later unit is the Bearpaw shale, which contains marine dinosaur, fish and invertebrate fossils. The latest and most productive deposit is the famous Hell Creek Formation which contains abundant fossils of terrestrial dinosaurs, including those of Tyrannosaurus Rex. These formations are exposed along the Missouri River Trench and on the surface in the southern part of the planning area where glacial till is absent.

The paleontological formations in the Judith RA include the Bear Gulch Formation in the Little Snowy Mountains and foothills. This formation represents the earlier Mississippian Period of the Paleozoic Era, and contains abundant invertebrate and fish fossils. Paleozoic invertebrate fossils can be found in all of the planning area's mountain ranges. The Judith RA also contains late Cretaceous units found in the Valley and Phillips RAs since the Missouri River Trench is the boundary. There are also exposures of the Hell Creek Formation along the Musselshell River and in much of Petroleum County.

ENERGY MINERAL RESOURCES

Oil and Gas

There are three primary requirements for the presence of oil and gas deposits. The first is a hydrocarbon source rock. The most readily identifiable source rocks are the thick carbonaceous shales of Cretaceous age and the rich organic shales and limestones in the Mississippian Big Snowy

Group. The second requirement is a suitable host rock with adequate porosity and permeability to serve as a reservoir for the fluid mineral. The many sandstone and limestone rocks are the local reservoir rocks currently producing oil and gas. These formed as the alternating beaches and deltas gave way to coral reefs when an inland sea repeatedly invaded and receded. The third requirement is the presence of a geologic condition in the subsurface known as a trap. Structural trapping of hydrocarbons results when rocks are subjected to stress, causing them to be folded or faulted. Stratigraphic traps result when permeability between or within rock units decreases, preventing the movement of the oil and/or gas.

Historic development and production of oil and gas dates back to the early part of this century. The Cat Creek oil field was discovered in 1920 and gas fields in Bowdoin and Armells were discovered in 1913 and 1921, respectively. These fields, as well as later discoveries (Rattlesnake Butte and Leroy), have since been developed (see Table 3.1).

TABLE 3.1
OIL AND GAS FIELDS IN THE PLANNING AREA

Field	Type	Total Wells	Producing Wells	Year Discovered	1987 Production
Armells	Gas	8	0	1921	0
Bowdoin	Gas	683	547	1913	2,713,761 MCF
Cat Creek	Oil	222+	72	1920	42,937 BO
Leroy	Gas	29	24	1968	706,773 MCF
Rattlesnake Butte	Oil	23	8	1984	84,056 BO

BO = Barrels of oil
MCF = Thousand cubic feet

Source: Montana Oil and Gas Summary, 1987

In 1919, the first major oil find in Montana was established in the Cat Creek field. By the end of 1920, there were 60 drill rigs at work and Montana was on the map as an important oil producing state. The Cat Creek field is located at the eastern edge of Petroleum County. The productive portion of this fold is about 14-miles long with 10 miles in Petroleum County and the remaining 4 in Garfield County. In 1954, a refinery was constructed adjacent to the East Dome of the Cat Creek field to produce jet fuel under government contract for the Air Force bases in Great Falls and Glasgow.

The Rattlesnake Butte field, located in Petroleum County, produces oil from the same formations as Cat Creek field.

The Bowdoin Dome was discovered in 1913, and has expanded to include a roughly circular area, 50-miles in diameter, with over 800 active wells. This gas-producing field has more wells than any other field in the planning area. The gas production of this area originates in shallow sandstone rocks. The unique feature of the gas reservoirs is their low permeability which prolongs the life of wells and limits the horizontal distance each well can effectively drain. All of the gas produced in this area is collected into sales lines operated by Williston Basin Interstate Pipeline Company.

The Leroy gas field in the Judith RA is located on the northern edge of Fergus County. This field was discovered in 1968, but many of the wells were shut-in after completion due to the rough terrain and the low demand and price of natural gas. The 10 wells which make up the Fergus County portion of the field were not put on line until 1983.

The eastern portion of the Valley RA includes the western edge of the Williston Basin geologic province. It is an extensive feature which includes most of eastern Montana and the western half of North Dakota. There are numerous oil and gas fields within this basin, some of them within 30 miles of the planning area. There are no producing wells in the planning area associated with this feature, but both the southern and northern portions of the Valley RA have had unsuccessful deep wells drilled within the last 5 years.

Historically, most oil and gas exploration in the planning area has been geared toward natural gas. The planning area has been a significant contributing oil and gas source for Montana and this trend is expected to continue. Appendix B provides more information on oil and gas resources.

Geothermal

In 1947, a test well was drilled to 5,500 feet in the Bowdoin Dome. This well encountered large volumes of hot water (108°F) above the Madison Limestone, but no shows of oil or gas. The well was eventually converted to commercial use supplying hot water to the Sleeping Buffalo Resort, which still operates today.

Oil Shale

An oil-shale bearing unit informally designated the Forest Grove Member is found within the Mississippian-age Heath Formation of central Montana (Derkey et al, 1985). The Cox Ranch oil-shale bed, within the Heath Formation, is a metalliferous oil shale with an average thickness of 6.2 feet. The bed has been correlated within a 120 square mile area, centered approximately 15 miles southeast of Lewistown. The thinness, low oil yield and low metal content of the Cox Ranch oil shale bed are major factors that discourage exploration.

Coal

Coal beds are present in the Cretaceous Kootenai Formation, the Eagle Sandstone, the Judith River Formation, and the Paleocene Fort Union Formation. Coal has been reported at one location in the Jurassic Morrison Formation on the flank of the Little Rocky Mountains uplift near Zortman.

There are no federal coal leases in the planning area. Based on the nature of the coal beds in the planning area, the most likely locations for development would be the small area of Fort Union Formation coal in northeastern Valley RA and the Kootenai Formation coal in the Lewistown and Great Falls coal fields in the Judith RA.

The Fort Union Formation, in northeast Valley RA, is at the western limit of the Scobey coal field. This area contains the only identified strippable coal resources in the planning area. An assessment of the development potential (Gruber, 1986) listed federal coal resources at 49.1 million tons of high/moderate development potential; including both demonstrated and inferred tonnages.

NONENERGY MINERAL RESOURCES

Hardrock

Hardrock mineral resources include precious and base metals such as gold, silver, copper, lead, zinc, and gemstones such as sapphires. Other mineral commodities which may be locatable include uncommon varieties of bentonite, building stone, limestone and gypsum.

Table 3.2 presents an inventory of mining claims located in the planning area along with the believed commodity of interest. This table includes claims for hardrock resources and uncommon varieties.

The following section describes the geology, mining history, and current activity in the Judith Mountains, North and South Moccasin Mountains, Little Belt Mountains and Little Rocky Mountains.

Judith Mountains

Geology

The Judith Mountains are a group of coalescing igneous domes formed in early Tertiary time. The main intrusive masses are stocks composed mostly of quartz monzonite and rhyolite. Smaller intrusive masses may be dikes, sills, or perhaps laccolithic in character. Four general types of ore deposits are recognized in the Judith Mountains; contact metasomatic, open cavity, fissure filling and replacement deposits (Forrest, 1971). Also present are a few placer deposits.

TABLE 3.2
UNPATENTED MINING CLAIM INVENTORY

Number	Claim Type	Suspected Commodity	Remarks
JUDITH RESOURCE AREA:			
Judith Mountains			
1054	Lode	Au, Ag	
9	Placer	Au	
1063	Total Mining Claim, Judith Mountains		
North Moccasins			
241	Lode	Au	
241	Total Mining Claims, North Moccasins		
South Moccasins			
234	Lode	Au	
234	Total Mining Claims, South Moccasins		
*Little Belts**			
4	Lode	Au*	Does not include
8	Lode	Sapphires	mining claims with National Forest surface
12	Total Mining Claims, Little Belts		
Petroleum County			
13	Lode	Bentonite	
41	Placer	Bentonite	
54	Total Mining Claims, Petroleum County		
1604	TOTAL MINING CLAIMS, JUDITH RESOURCE AREA		
PHILLIPS RESOURCE AREA:			
Little Rocky Mountains area			
1193	Lode	Au, Ag	
2	Placer	Au	
9	Lode	Diamond/ Garnet	Diatremes
1204	Total Mining Claims, Little Rocky Mountains area		
South Phillips County			
83	Placer	Bentonite	No current production
83	Total Mining Claims, South Phillips County		
1287	TOTAL MINING CLAIMS, PHILLIPS RESOURCE AREA		
VALLEY RESOURCE AREA:			
South Valley County			
228	Placer	Bentonite	No current production
228	Total Mining Claims, South Valley County		
228	TOTAL MINING CLAIMS, VALLEY RESOURCE AREA		

Source: BLM Mining Claim Recordation System, October, 1988.

Contact metasomatic deposits are restricted to isolated areas immediately adjacent to the larger igneous masses.

Open cavity and fissure filling form a small but important group containing both base and precious metals, including the high grade gold ore in the Spotted Horse Mine.

Replacement deposits are the most extensive and economically productive of all deposit types. These deposits are typically small, carrying a moderate to good grade of ore. They are occasionally found as vein zones, which may reach a few feet in width and contain an excellent grade of ore.

Placer gold deposits are the least important source of metal in the area. Placer mining has been conducted in the recent gravels of Warm Springs Creek, Alpine Gulch and Whiskey Gulch with a small amount of success. Though the value of some gravels is apparently good, the quantity is small and the water supply is insufficient through the summer.

Mining History

In 1880, placer gold was discovered in Alpine Gulch. These deposits were small and quickly played out, yielding only a few thousand dollars in gold. Lode mining began in 1881, in the Maiden area, and quickly spread to the Giltedge area. In the period from 1881 to 1916, two mining districts, Warm Spring and Cone Butte, developed over 26 claim groups and numerous individual claims.

The Warm Spring District covers land around the Maiden area, on the west side of the Judith Mountains; and the Giltedge area on the east side of the Judith Mountains. The main activity was concentrated in these areas, but also occurred in the New Years Gulch area. Production figures before 1932 are not available, but it is estimated that the value of precious metals recovered prior to 1914 was in excess of 7 million dollars (350,000 oz. gold equivalent at $20/oz. in 1914 dollars). From 1932 to 1947 the Warm Spring District produced 1,292 ounces of gold, 30,325 ounces of silver, 8,339 pounds of copper, and 5,787 pounds of lead (Robertson, 1950). Mining from 1947 until the early 1980s produced only a minimal amount of metals.

The Cone Butte District covers the northeastern portion of the Judith Mountains extending from Judith Peak to Black Butte. From the early 1880s to 1947 there were over 20 group operations and numerous individual operations. Production records prior to 1932 are not available. From 1932 through 1947 the district is estimated to have produced 393 ounces of gold, 3,994 ounces of silver, 5,563 pounds of lead, and 5,694 pounds of copper (Robertson, 1950). Mining operations from 1950 until the early 1980s was sporadic and produced only a minimal amount of metals.

Recent Activity

Within the last 3 years two new gold/silver mines started production in the Judith Mountains. The Spotted Horse Mine, near the head of Maiden Canyon reopened with a new mill, and then closed in 1990. The mine was reportedly producing 50 tons per day (TPD) of ore, with plans to expand the operation to 100 TPD. The Gies Mine, up the East Fork of Fords Creek, and the Virgin Gulch Mine near Giltedge, are operating and hauling the ore to the old gypsum plant in Heath, where the mill is located. Mill tailings are disposed of underground in the old gypsum mine. Both mines are underground operations located on patented mining claims adjacent to BLM land. Only a small portion of the access roads and facilities for these mines are located on BLM land. This operation was suspended in 1991.

There is active exploration in both the Warm Spring and Cone Butte Mining Districts. Current exploration drilling is taking place in the Giltedge, Alpine Gulch, Pekay Peak, Gold Hill, Collar Gulch, Red Mountain, Elk Peak, New Year Gulch and Linster Peak areas.

North and South Moccasin Mountains

Geology

The North and South Moccasin Mountains are laccolithic and sill-like intrusions of syenite porphyry that uplifted the mountains. The North Moccasins were formed by doming and faulting that was concentric to a single large, laccolith-intrusive center. The South Moccasins reflect uplift by a cluster of stocks, laccoliths and domes.

The main area of economic interest lies near the old mining town of Kendall. Gold and silver mineralization occurs in a breccia zone at the top of the Madison Group and from associated hydrothermally altered syenite porphyry that locally invaded the limestone along the breccia zone (Blixt, 1933; Robertson, 1950). The mineralized zone extends from the Kendall open pit to the Horseshoe mine and possibly further in both directions. Mapping shows that the mineralized zone is associated with faulting and syenite intrusion (Lindsey, 1982). The zone follows the footwall of a major fault that, with few exceptions, is parallel to the strike of bedding.

Another area of economic interest is the breccia pipes in both the North and South Moccasins. Breccia pipes occur in the North Moccasins at the head of Plum Creek, and in the South Moccasins near Peak 5798 and at the Republic claim northeast of Hanover Dome. Analysis for gold and other metals show that all of the pipes are mineralized (Lindsey, 1982).

Mining History

About 450,000 ounces of gold and 31,445 ounces of silver were mined near Kendall between 1890 and 1947 (Robertson, 1950). During the early 1980s several attempts were made at open pit, heap leach mining without much success.

Recent Activity

Current mining is focused in the historic Kendall Mining District. The property was recently purchased by CR Kendall. Production at the mine resumed in September, 1988. An active mine exploration program has greatly expanded reserves. Gold production from pen pit mining and cyanide heap leaching is expected to peak at around 40,000 oz. per year. Though most of the operation is located on private lands, future exploration and development will involve more BLM land.

There have been several exploration projects in the Plum Creek area of the North Moccasins and the area is still being assessed. In the South Moccasin Mountains, several companies believe there is high potential for precious metal deposits due to the geologic similarity with the North Moccasins.

The Iron Creek drainage in the North Moccasins contains several small scale placer operations. Past production from these deposits is unknown, but not believed to be significant.

Little Belt Mountains

Geology

The Little Belt Mountains are a broad northwest/southeast trending series of igneous uplifts forming one continuous mountain range. The majority of the intrusions have been described as domes of laccolithic origin with associated dikes and sills. The Judith Basin County portion of the Little Belt Mountains contains several mining districts. Because of their proximity to BLM land only the Barker and Yogo Districts are discussed.

The Barker District contains the Dry Fork of Belt Creek, and its tributaries west of the divide between the Dry Fork of Belt Creek and Dry Wolf Creek and the areas drained by headwater branches of Otter and Arrow Creeks. Deposits of precious metals are found in the various igneous units and as irregular replacement deposits in the sedimentary rocks.

The Yogo District includes the areas south and east of the divide between Yogo and Running Wolf Creek and areas above the headwaters of the Middle Fork of the Judith River and as far south as the main divide along the southern border of the county. The geologic setting is similar to the Barker District, but Madison Limestone is the predominant rock type. It is estimated that the total metal production for this district is less than one-quarter of that of the Barker District.

The Yogo District is noted for its sapphire mining. Sapphires were discovered by accident in the process of placer mining in 1895 along Yogo Creek (Zeihen, 1987). A lamprophyre dike is the host rock for the disseminated sapphires. Sapphire mining has used both surface and underground methods. Oxidized ore, generally from the surface to a depth of 60 feet, is crushed and then washed over a series of screens and riffles, like those used for placer gold mining. Non-oxidized ore must first be crushed and then treated to an oxidizing process to free the trapped sapphires. This treatment in the past has been simply exposure to the air for a period of months.

Mining History

Placer gold was first discovered in 1860, along Yogo Gulch. Seventeen years later, one of Montana's larger silver-lead deposits was discovered in what is now called the Barker Mining District. The Barker Mining District has a sporadic production history (Robertson and Roby, 1951). The major production in this district was from the Block P Mine, near Hughesville. This mine operated from 1915 to 1948, under various owners. This was an underground operation mining lead, zinc, silver and gold ores. By 1948, it produced 405,852 tons of ore with an average grade of 0.05 ounces of gold per ton and 50.0 ounces of silver per ton. Since 1948, mining and development has been very sporadic (Robertson and Roby, 1951).

The Yogo District's history of production and ownership is varied and sporadic. There was somewhat continuous production from the late 1800s to 1929. During that time it is estimated that over 200,000 tons of ore was mined from three separate operations and recovered 13 million carats of sapphires. Records of sapphire production from 1929 to the early 1980s is currently not available, but it is thought that very little mining was conducted.

Recent Activity

Currently, in the Judith Basin County portion of the Little Belt Mountains there are only three mining operations listed with the state of Montana (Lawson, 1987). Each operation has produced or been listed as being in the developing stages since 1948. In 1984, a westward extension of the sapphire-bearing dike was discovered. This resulted in the formation of the Vortex Mining Company of Utica, Montana. This is a small surface operation, which so far has been successful in establishing new sapphire production for Montana.

Little Rocky Mountains

Geology

The Little Rocky Mountains form a roughly elliptical dome extending 10-miles northeast/southwest and 8-miles northwest/southeast. The core of the mountains is composed of late Cretaceous to Paleocene age alkalic igneous rocks. The dominant rock types are quartz monzonite, syenite and trachyte. These rocks have been intruded through the Precambrian basement into the overlying sedimentary section. Engulfed blocks of Precambrian and Paleozoic rocks, measuring from thousands of feet to less than one inch, are very abundant within the intrusive units. Sedimentary units surrounding the intrusive core were steeply upturned during emplacement. The more resistant units, notably the Madison Limestone, now form a series of near vertical cliffs which encircle the mountain range.

The epithermal syenite hosted gold deposits of the Little Rocky Mountains vary from vein like at one extreme to disseminated fracture stockworks at the other extreme. The gold and silver deposits occur in structurally prepared areas within the intrusive rocks. The deposits are localized in strongly fractured areas which have undergone repeated intrusion. Mineralization appears most directly related to the mechanical behavior of the host rock. Those lithologies which shattered most and maintained open fracture systems became the major host for these deposits (Rogers and Enders, 1982).

Gold and silver are the only mineral commodities of the ore. The primary minerals identified in the veins include gold and silver bearing pyrite, arsenopyrite, sylvanite, native gold and native silver. Investigations of stockwork ore have shown only gold and silver bearing pyrite and arsenopyrite to be present. Knowles (1982) was unable to locate any gold in nine samples of ore using a microprobe. He suggested the gold and part of the silver are contained in the pyrite crystal structure. Trace amounts of base metal sulfides have been identified in the stronger sulfide zones. Chalcopyrite, molybdenite, sphalerite, galena and covellite have been identified in strongly silicified syenite (Rogers and Enders, 1982).

The upper, oxidized portion of the ore body is the current focus of economic interest. The ore mineralogy is even more simple within the oxidized portion than in the sulfide zone. Gold and silver occur finely mixed in a matrix of clays, hydrous iron and manganese oxides and quartz. Oxidation has developed in the ore body in a typical funnel shape extending to 500 feet. Oxidation is greatest in the ore zones where the increased fracturing has allowed oxidation to penetrate a greater depth. The finely divided nature of the gold and silver and its release and concentration along natural fractures upon oxidation makes it extremely amenable to cyanide heap leaching and is responsible for the success of the current mining operations.

The Zortman and Landusky deposits differ somewhat in detail. In Zortman, mineralization is developed predominantly in a fracture stockwork system in syenite porphyry adjacent to a strong fault zone between syenite porphyry and a large block of metamorphic gneisses and schists. In Landusky, mineralization is developed predominantly along shear zones in syenite porphyry and quartz monzonite porphyry within a major shear structure (Rogers and Enders, 1982). The silver-to-gold ratio averages about 7 to 1 at both mines, though some places may run higher than 20 to 1 (Ryzak, 1988).

Mining History

Prospectors reportedly first discovered gold in the Little Rocky Mountains as early as 1864 (Murray, 1978). It was not until 1884 that the first paying placer deposits were discovered in Alder Gulch near present day Zortman. A small and short lived rush developed, providing only minor production. A renewed interest in placer deposits occurred between 1928 and 1948, but yielded only 326 ounces of gold (Lyden, 1948).

The extremely fine grained gold caused recovery problems for both placer miners and early lode miners. Most of the gold was far too fine to be recovered in placer operations, even with amalgam. This alone probably accounts for the low placer gold recovery over the years as well as the failure of the early lode mining attempts. Intensive development in the district began in 1903 with introduction of the cyanide process. Cyanide mills were constructed in Zortman in 1903 and Landusky in 1907. This began a period of continuous operation in the district which lasted until low gold prices forced shut down in 1923.

Discontinuous small operations from 1923 to 1934 consisted mainly of clearing out old leach tanks, or mining an occasional high grade pocket of ore. The increase in the price of gold to $35/per ounce in 1934 spurred a small mining boom. The mines were again active from 1935 to 1942 at which time War Production Board Order L-208 ended most gold mining in the United States (Murray, 1978). Sporadic efforts were made to reopen the mines after World War II and all serious mining had ceased by 1951.

Recent Activity

In 1979, large scale mining began in the Little Rocky Mountains. The ore was extremely amenable to the cyanide heap leaching process. This is due primarily to the finely disseminated gold particles occurring along natural fractures in the rock, allowing contact between the cyanide and gold without requiring crushing. The heap leaching process, as used at the Zortman and Landusky mines, involves construction of retaining dikes in ephemeral drainages,

lining the impoundment area with bentonitic shale and PVC, loading mined ore onto the liner, spraying the ore with a weak cyanide solution (< 0.1%), recovering the gold bearing cyanide solution, and removing the gold from the leachate using either the Merrill Crowe or carbon adsorption method.

The Zortman Mine consists of seven leach pads containing total mined ore estimated at 20 million tons. Average ore grade is 0.028 ounces per ton (opt) gold, and 0.171 opt silver. Total disturbed acres at the Zortman Mine is approximately 450; one-fourth of which is on BLM land.

The Landusky Mine consists of nine leach pads that will ultimately contain about 120 million tons of ore. One of the valley-fill leach pads, constructed in 1987, contains 40 million tons of ore. Another leach pad, under construction, will contain an estimated 50 million tons of ore when fully loaded in the next 3 to 4 years. Mined ore to date averages 0.022 (opt) gold and 0.125 opt silver. The total disturbed area at the Landusky Mine totals 810 acres; two-thirds of which is on BLM land.

Production from the Zortman and Landusky Mines from 1979 to present is over 1 million ounces of gold, and 2 million ounces of silver. For detailed production figures see Table 3 in Appendix C.

Diatremes

South of the Little Rocky Mountains, in a line trending from Coburn Butte to Saskatchewan Butte, are a series of ultramafic outcrops termed diatremes. These igneous intrusions originated at extreme depth. Potassium-argon dating indicates emplacement occurred between 46 and 52 million years ago (Hearn, 1979). Only the Williams diatremes, near Thornhill Butte, can be considered a kimberlite on the basis of mineral content. The other diatremes have chemical and mineralogical affinities similar, but not identical to kimberlites.

The main importance in recognizing kimberlites is their association with diamond occurrences. Kimberlite intrusions are currently being mined for diamonds in South Africa. The Montana diatremes and associated kimberlites have been mapped and prospected for some time. Earlier studies by Brockunier (1936) and Buie (1941) recognized and mapped several of these features. It was not until the late 1950s that their importance as possible kimberlites were published (Knechtel, 1959; Hearn, 1968).

Currently, there are 11 lode claims located on the diatreme outcrops. Although there has been small scale prospecting for commercial grade garnets and diamonds along the outcrops of these intrusions, sampling has not revealed any diamonds or diamond deposits.

Bentonite

Bentonite is composed of clay minerals from the montmorillonite group. The rock commonly has great ability to absorb water and swell from 10 to 15 times its dry volume. Swelling properties of the individual clay minerals determine the commercial use of the deposit (Berg, 1969). Deposits of bentonite are generally created from metamorphism of volcanic ash deposited in a marine environment. The geologic formations that contain the most noted bentonite deposits are the Bearpaw Shale of the Montana Group, and the Mowry in the Colorado Group. Although bentonite does occur in other formations, it is these two formations that are considered to have the necessary thickness and physical properties to contain commercial deposits. The Bearpaw Shale in the Phillips and Valley RAs contains commercial bentonite deposits.

Bentonite has been mined for the production of brick, drilling fluids, sealing reservoirs, fertilizer, foundry sand, pottery and the production of taconite pellets used in iron ore refining. Commercial mining has occurred across the state since the turn of the century. Until the late 1970s the general use of bentonite in the Phillips and Valley RAs was pit run bentonitic shale for sealing stock ponds and canal lining.

In 1978, after several years of exploration, American Colloid Company opened a bentonite processing plant in Malta. This was an open-pit operation capable of processing approximately 250,000 tons annually. The final product was used for drilling fluid additives, or in the production of taconite pellets for the iron industry. The bentonite deposits were located south of Malta, along outcrops of the Bearpaw Shale. When the plant closed in 1986, American Colloid had processed approximately 1 million tons of bentonite, had patented 222 mining claims and had an active interest in another 83 unpatented claims. The plant was forced to close due to lack of a market for oil and gas drilling mud additives and taconite pellets. In 1988, American Colloid withdrew its patent application on 28 mining claims located for bentonite.

In 1976, after several years of exploration, Federal Bentonite, a division of Aurora Industries, Aurora Illinois, opened a small bentonite processing plant southeast of Glasgow. The bentonite deposits mined were from a middle member of the Bearpaw Formation. There is an upper and lower bentonite bed in this member, each 2 to 3 feet thick. The upper bed has the best quality, but is the most difficult to mine due to limestone and iron concretions. The bentonite claims were leased from Brazil Creek Bentonite Company of Glasgow. This was an open-pit mine with plant processing capacities of approximately 200,000 tons annually. The final product was used for production of taconite pellets. The plant was in production until 1979, and processed less than 1 million tons of bentonite. Although the plant was closed, bentonite was mined from 1983 through 1985.

Federal Bentonite produced approximately 180,000 tons during that 3-year period. The bentonite was solar dried and shipped in bulk by rail. The approximate value of bentonite from the Glasgow area was $27 per ton in 1985. Currently, there is no bentonite mining in the Valley RA. The 228 unpatented mining claims located for bentonite by Brazil Creek Bentonite Company were recently abandoned.

In southern Petroleum County there are 54 mining claims located for bentonite held by Kaoben Corporation. This deposit is located in an area underlain by the Cretaceous Colorado shale. To date, only prospecting is known to have occurred on these claims.

There are no bentonite leases or sale permits in the planning area, but some claims are maintained as discussed above. The future for bentonite mining in the planning area is marginal. The viability of mining is tied closely to activity in the oil and gas industry. Even if the good market conditions of the late 1970s and early 1980s return, developers may be more cautious with mine investments, considering the past experience of bentonite operations in the area.

Gypsum

Gypsum is a mineral used in producing plasters, cements, tile, sheetrock and similar products and has been mined in Montana since the turn of the century. Commercial grade deposits of gypsum are scattered across central Montana.

The two major gypsum operations within the Judith RA were located near Hanover and Heath, Montana. The Hanover mine was operated by the Three Forks Portland Division of the Ideal Cement Company. The company produced crude and calcined gypsum. Approximately 18,000 tons of gypsum rock was produced yearly from 1918 to 1954. The capacity of the plant was 100 to 150 tons per day (Miller, 1959). This mine and processing plant was closed because of market conditions.

The Heath Gypsum Plant is located at Heath, Montana. The operation was controlled by the United States Gypsum Company. The mine capacity was approximately 500 tons of raw gypsum per day from an underground room and pillar method. The processing plant produced sheetrock, calcined gypsum for plasters and fertilizers, and blocks and tile. The mining and processing of the gypsum at this site was initiated by the Northwest Gypsum Company in 1905. It was later purchased by the U.S. Gypsum and ran continuously until 1986. The mine and plant closed due to poor market conditions.

Limestone and Lime

Limestone was probably one of the first exploited mineral resources in Montana. It is used in the construction industry for producing lime and quicklime mining and industrial chemical usage for controlling pH, and in agriculture use in soil conditioning. Occurrence of minable limestone and its reserves are limitless across western and central Montana. Production of limestone has occurred mostly along the vast outcrops of the Mississippian age Madison Group. The potentially productive formations within this group occurs in all the mountain ranges within the Judith RA. Although there are vast reserves of limestone throughout the Judith RA, there has been little mining. The mining that has occurred has been in small isolated pits almost entirely on private surface. There is a limestone pit in the Beaver Creek area of the Little Rocky Mountains that was used for pH control in the early mining activities. This commodity may be of value in present day mineral processing, if development of the sulphide portion of the ore body occurs.

MINERAL MATERIALS

The planning area contains deposits of sand and gravel that originated from fluvial and glacial sources. Tertiary gravels make good material for road surfacing and construction projects. Most deposits contain adequate fines for roadwork, though some may require crushing. Some of the Quaternary terrace deposits consist almost entirely of limestone pebbles and cobbles, and may not be as durable as deposits containing more igneous material. The deposits of glacial origin contain a large percentage of igneous material. The amount of fines is variable, depending on the specific depositional environment. The till or moraine material has a high clay content and makes a good low permeability liner for ponds and canals.

Extensive deposits of bentonitic shale occur throughout the planning area. This material is useful in construction projects where low permeability barriers are required; such as for reservoirs or irrigation canals. The gold mines at Zortman and Landusky use bentonitic shale as liner material for cyanide leach pad and pond construction. To date several hundred thousand cubic yards of bentonitic shale has been mined from locations all within 10 miles of the mines.

Mineral material development is primarily for sand and gravel sources needed for road surfacing. Pits are usually located within 20 miles of the particular project and generally require little in the way of access development. Other mineral material activity is related to specific construction jobs such as liners for reservoirs, canals and heap-leach

mining operations; riprap for irrigation or retention structures; aggregate for concrete mix and building stone for general use. Virtually all this material is used in the immediate area. Some building stone may be economic to transport for considerable distance, if a deposit with high enough value is found.

The large majority of mineral material permits have been free use permits issued to the county or state governments for road construction or maintenance. Several other small sales have been made to local contractors for maintenance of Air Force missile roads.

HAZARDOUS MATERIALS

Hazardous material are used in connection with a variety of authorized activities. Mining, oil and gas activity, military facilities, powerline/pipeline ROWS, weed and insect control and prairie dog control are a few examples.

Transporting hazardous materials into or through the planning areas occurs by commercial truck or rail traffic and military convoy. The major routes used are U.S. Highways 2, 87, and 191; and Montana Highways 19, 66, and 200. There are no sites on BLM land known or suspected to be contaminated with hazardous materials.

AIR QUALITY

Air quality is good, mainly due to the few industries and low population density in the area. A Class I airshed exists in the U. L. Bend Wilderness area within the Charles M. Russell National Wildlife Refuge (CMR) and on the Fort Peck Indian Reservation adjacent to the planning area. All other land in the planning area is designated as Class II.

A planning and management process, "Prevention of Significant Deterioration" (PSD), was introduced as part of the 1977 Amendment 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 pollution 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. In general, Class I is designed for pristine areas where almost any deterioration would be significant. Class II allows for moderate, well-controlled growth and Class III allows pollutant levels to increase considerably.

One air quality monitoring site exists at Malta. No other sites are needed in the planning area, due to the sparse population and scarcity of pollutant producers. Gold mines in the North Moccasin, Judith and Little Rocky Mountains; asphalt plants; gravel crushers; agricultural activities; wind erosion; and automobiles are potential sources of pollution.

GROUNDWATER

Shallow water sources (less than 500 feet) are scarce. Shallow aquifers occur in the alluvium of major drainages, in buried alluvial, ice marginal, glacial outwash channels and terrace deposits. Depth, yield and quality vary widely. This water is generally marginal for domestic use due to high total dissolved solids (TDS) but suitable for livestock and wildlife use.

Deeper aquifers (greater than 500 feet) are shown in Table 3.3. Except for the Madison these aquifers are generally marginal to unsuitable for domestic use due to TDS levels. They are generally too deep to be economical for livestock and wildlife use.

TABLE 3.3
MAJOR GROUND WATER AQUIFERS
UNDERLAYING BLM LAND

Aquifer	Resource Area	Depth	Yield/ GPM	Quality Domestic	Quality Livestock
Judith River	Judith	700-2500	2-60	Marginal to Unsuitable	Suitable
"	Phillips	200-1000	3-4	"	"
"	Valley	200-1200	3-12	"	"
Eagle	Judith	700-2500	2-60	"	"
Third Cat Creek	Judith	700-2000	7-60	"	"
Bearpaw Shale	All	varied	<2	Unsuitable	Unsuitable
Madison	All	800-4000	10-200	Suitable	Suitable

GPM = Gallons per minute

Source: BLM, 1990

The Madison Aquifer is generally suitable for domestic use. Its extreme depth increases drilling costs, but completed wells often flow at the surface or have static water levels within 200 feet of the surface.

SURFACE WATER

Streamflow volumes differ greatly within the planning area. Flows in all unregulated streams have large seasonal variations, with the largest flows generally occurring during spring or early summer as a result of snowmelt and rainstorms. Peak flows on prairie streams occur in March or April resulting from snowmelt. Larger peak flows on small drainages can occur from intense summer thunderstorms, but generally not on an annual basis. Peak flows on mountain streams occur from late May to early June. The peaks are less sharp than on prairie streams. Summer rainstorms can result in short intervals of increased streamflow during June through September. During winter, streamflow in prairie streams is greatly reduced or absent as a result of little ground water inflow and ice formation.

Most precipitation is lost through runoff, transpiration or evaporation. Approximately 80 to 90% is lost through evaporation and transpiration. About 9 to 19% is lost as runoff and generally less than 1% recharges ground water aquifers. Average annual runoff is approximately 0.5 inch. Average annual precipitation ranges from 11 inches in the Glasgow area to 40 inches in the Snowy Mountains. Most BLM land is in 10 to 14 inch precipitation zones.

The Missouri, Milk, Musselshell, and Judith Rivers are the major drainages in the planning area. Table 3.4 lists the BLM stream miles for these perennial streams as well as for significant intermittent streams.

Surface Water Quality

Dissolved solids are derived by leaching soluble minerals from soils and geologic formations under 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 streamflow. 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 that runoff is in contact with soils provides little opportunity for dissolution of minerals. Consequently, the increased volume of water during high flows reduces the dissolved-solids concentration by dilution.

In addition to streamflow variability and geology other factors that affect the dissolved-solids concentration of a stream include irrigation return flows, saline seep, discharge from mines and water losses from evapotranspiration. Dissolved solids concentrations during low flow from mountain streams ranged from about 250 to 600 milligrams per liter (mg/l). Prairie streams range from 1500 to 3500 mg/l. At high flows, mountain streams range from 150 to 250 mg/l and prairie streams 500 to 1300 mg/l. The predominate ions in the mountain streams are calcium, magnesium, bicarbonate and sulfate. Prairie streams are predominately sodium sulfate.

Streams normally exhibit a pH between 6.5 and 8.5, which is typical of natural waters. Most streams have large alkalinities which prevent large changes in pH from persisting far downstream. Because of the near-neutral pH, most concentrations of dissolved trace elements rarely exceed water quality standards. An exception is the concentration of arsenic in the Missouri River. Arsenic concentrations exceed the federal and state instream standard in the Madison and Missouri River mainstems in Montana. Arsenic is a known carcinogen. EPA's standard for carcinogens is based on a risk level that would result in one case of skin cancer per million people. Based on this standard, the risk of skin cancer for arsenic is as high as one case per 77 people at West Yellowstone to about one case in 10,000 people at Landusky. The Montana Department of Health and Environmental Sciences also lists several other streams in the planning area as impaired in the 1990 Montana 305 (b) report to the Environmental Protection Agency. These streams are the Judith River below Ross Fork, Montana Gulch near Landusky, the Musselshell River below Flatwillow Creek, the Milk River from the Blaine/Phillips County line to Hinsdale, Whitewater Creek, and McDonald Creek. All these streams contain significant parcels of BLM land within their watersheds and may be contributing to the impairment of the streams. All except Montana Gulch exhibit high levels of siltation, total dissolved solids (TDS), total suspended solids (TSS), nutrients, and flow alterations. The probable sources of the impairments (non-point source pollution) originating on BLM land are from livestock grazing, habitat modification, and natural geological erosion. Montana Gulch is impaired due to high metal concentrations originating from past and present mining activities in the upper watershed.

TABLE 3.4
PERENNIAL AND INTERMITTENT STREAMS

Stream	Status	Total Miles	BLM Miles	% Stream on BLM Land
Phillips Resource Area				
Whitewater Creek	P	59	35	59
Cottonwood Creek	I	53	11	21
Garland Coulee	I	12	8	67
Beaver Creek	P	171	20.4	12
Black Coulee	I	13	11	85
N. Whiterock Creek	I	12	9	75
Whiterock Creek	I	17	15	88
Flat Creek	I	28	13	46
Sage Creek	I	16	15	94
Assiniboine Creek	I	43	4	9
Little Cottonwood	I	37	3	8
Wilson Coulee	I	18	4	22
Exeter Creek	I	20	5	25
Martins Coulee	I	16	4	25
White Creek	I	43	6	14
First Creek	I	14	2	14
Second Creek	I	15	3	20
Third Creek	I	11	1	9
Fourth Creek	I	17	1	6
West Alkali Creek	I	27	3	11
Alkali Creek	P	37	3	8
Seven Mile Creek	I	12	1	8
Wild Horse Creek	I	41	1	3
Rudolph Coulee	I	26	5	19
Little Warm Creek	I	44	1	2
Big Warm Creek	I	71	2	3
DHS Creek	I	13	2	15
Dodson Creek	I	34	1	3
Austin Coulee	I	27	2	7
Milk River	P	114	5	4
Subtotal		1,061	196.4	
Valley Resource Area				
Milk River	P	130	0.5	0
Rock Creek	P	52	17.5	34
McEachran Creek (W.Rock)	I	6	0.5	8
S. Fork Rock Creek	I	11	6	55
Deep Creek(N.Fk.Willow)	I	17	15	88
Willow Creek	P	19	0.8	4
E. Fork Willow Creek	I	18	8	44
Chishom Creek	I	16	14	88
Bitter Creek	I	6	5	83
Eagle Creek	I	9	8	89
Unger Coulee	I	13	10	77
Buggy Creek	I	11	7	64
Canyon Creek	I	13	9	69
Brush Fork (W.Bear)	I	9	4	44
E. Fork Bear Creek	I	5	3	60
Bear Creek	I	6	0.5	8
Bluff Creek	I	12	5	42
E. Fork Crow Creek	I	11	10	91
Crow Creek	I	18	12	67
Snake Creek	I	16	9	56
Cash Creek	I	13	2	15
E. Fork Cash Creek	I	6	2	33
W. Fork Cash Creek	I	3	0.3	10
Brazil Creek	I	18	8	44
N. Fork Willow Creek	I	12	7	58
S. Fork Willow Creek	I	9	3	33
Willow Creek (South)	I	36	24	67
Larb Creek	I	36	12	33
Timber Creek	I	18	8	44
Sutherland Creek	I	16	7	44
Lone Tree Creek	I	14	14	100
Little Beaver Creek	I	18	17	94
Antelope Creek(Dry Run)	I	15	3	20
Subtotal		612	252.1	
Judith Resource Area				
Arrow Creek	P	61	5	8
Judith River	P	125	8	16
Armells Creek	I	60	13	22
Dog Creek	I	60	13	22
Box Elder Creek	P	86	10	12
Ford Creek	I	26	7	27
Crooked Creek	I	62	15	24
Little Box Elder Creek	I	29	4	14
Sand Creek	I	17	5	29
Antelope Creek	I	14	2	14
Dovetail Creek	I	27	7	26
Blood Creek	I	37	13	35
Dry Blood Creek	I	12	4	33
Cottonwood Creek	I	15	10	67
Drag Creek	I	13	7	54
Buffalo Creek	I	11	3	27
Cat Creek	I	16	3	19
S. Fork Flatwillow	I	21	0.3	1
S. Fork Elk Creek	I	9	1	11
Yellow Water Creek	I	37	12	32
Musselshell River	P	91	8.9	10
Subtotal		829	151.2	
Total		2,502	599.7	

P. = Perennial
I. = Intermittent

Source: BLM, 1990

Water Rights

The State of Montana began adjudicating its water rights in the early 1980s. BLM filed claims on all BLM water developments and natural sources (springs, pot holes, lakes, etc.). The total number of water developments by resource area are shown in Table 3.5.

TABLE 3.5
WATER DEVELOPMENTS/
RANGELAND IMPROVEMENTS
ON BLM LAND*

Type of Improvement	Units by Resource Area			
	Valley	Phillips	Judith	Total
Reservoirs (Number)	1,367	1,943	555	3,865
Wells (Number)	27	33	47	107
Pipelines (Miles)	36	16	96	148
Springs (Number)	29	31	55	115
Waterspreaders (Acres)	5,755	—	—	5,755
Watersavers (Number)	—	4	19	23
Fences (Miles)	1,500	1,383	827	3,710
Land Treatments (Acres)	6,040	6,989	7,177	20,206
Cattle Guards (Number)	100	125	65	290

*Water sources claimed for water rights as of December 31, 1988. Does not include sources built from 1989 to present.

Source: BLM, 1990

BLM developed a memorandum of understanding (MOU) with the Bureau of Reclamation (BR) in 1981, limiting the size of reservoirs built by BLM in the Milk River Basin, an overallocated basin. BLM may only build structures capable of storing more than 2 acre-feet of water if draw-down capabilities are installed or through negotiations with BR. This MOU allows BLM to continue improving its rangelands with water developments while protecting BR's senior irrigation rights on the Milk River.

Erosion and Sedimentation

The susceptibility of the planning area to erosion varies widely. The soils most susceptible to erosion occur in the Sedimentary Uplands Physiographic Province, including the Missouri River Breaks, the Willow Creek basin and the Bitter Creek badlands in Valley County; and the Frenchman and Cottonwood Breaks in Phillips County. Much of the Breaks areas are in the severe to very severe erosion susceptibility category. The Soils section gives detailed descriptions of the erosion hazard for each soil subgroup.

SOILS

Soils in the planning area are derived from glacial till, sedimentary or igneous bedrock and alluvium from mixed rock sources. This creates complex and diverse soil patterns, varying greatly in character capability, limitations and productivity. Specific soil information is available from the county soil surveys.

The soil surveys for Judith Basin, Fergus, Petroleum, Valley and part of Phillips Counties have been completed by the U.S. Soil Conservation Service (SCS). An Order II survey for dominantly agricultural land and an Order III survey for dominantly rangeland and forest land is underway in Chouteau and Phillips Counties. The reconnaissance soil survey of the BLM land in Chouteau and Phillips Counties was done in 1979, and the unpublished manuscripts and maps are available for review at the BLM offices in Malta and Havre. This Order III survey was made primarily for rangeland and forestry management uses.

For descriptive purposes the soils were grouped into 19 soil subgroups (see Appendix D). Each soil subgroup has unique capabilities and limitations for land uses and treatments based upon climate, parent material, topography and soil properties. Appendix D describes the soils briefly, dominant soil series, and ecological site names.

The SCS and BLM soil surveys identified four distinct Physiographic Provinces that encompass the 19 soil subgroups. The four Physiographic Provinces and their descriptions follow (see Figure 2.1).

Glacial Till Upland Province

The Glacial Till Upland Province, with associated wet basins, make up the northern part of the planning area. These uplands formed during several periods of late Wisconsin glaciation. The landscapes range from nearly level to gently rolling and from strongly rolling to steep along drainageways. The glacial till ranges from a few feet to about 200-feet thick and is generally underlain by clayey and loamy shale. Major drainage systems are deeply entrenched, and they drain into the Milk and Missouri Rivers. The elevation ranges from about 3,300 to 6,000 feet. Precipitation in this province averages from 11 to 16-inches annually. The most common soil subgroups in this province are 1,2,7 and lesser amounts of 3,6,8 and 17.

Steep shale, siltstone, sandstone bedrock exposures and gravel-capped rims along the valley walls of deeply dissecting drainages are common. Upland potholes, valley bottoms, terraces, fans and valley footslopes are also significant inclusions with complex soil patterns and physical properties.

These nearly level to rolling, glaciated uplands have slight to moderate erosion hazards, due to dominantly gently rolling topography and short slopes with prominence of dense clubmoss-blue grama sod. When disturbed or cultivated, erosion hazards increase, especially the wind erosion hazard.

Sedimentary Uplands Province

The Sedimentary Uplands Province is composed mostly of clayey soils weathered from calcareous and acid shales. Loamy and sandy sedimentary uplands with complex soil patterns and physical properties are common. The sedimentary parent material ranges from shale to sandstone. Precipitation in this province averages from 11 to 20 inches. The most common soil subgroups in this province are 3,4,5,16 and lesser amounts of 6,10,11,12,13 and 17.

The acid shale-dominated areas are very fragile due to the granular clay surface soil textures, the low vegetation ground cover potentials and strongly sloping to steep slopes. Very high wind and water erosion forces are accelerated when vegetation ground cover is reduced. These soils are found along the dissected slopes of valley walls. The other soils in this province are usually fragile and highly erosive because of the dominance of moderately steep and steep slopes and extreme physical properties such as high clay content, slow permeability, high salt content, relatively shallow depth to bedrock and sparse vegetation ground cover on soils weathered from shale resulting in rapid surface water runoff. Active geologic erosion is obvious throughout the sedimentary uplands. The shale areas are dissected by numerous drainages and valley walls that rise abruptly above the narrow floodplains. The high erosion and sedimentation rates have a detrimental impact on the life span of reservoirs in the area and on fish habitat.

The sedimentary soils in the Breaks are highly susceptible to compaction and due to the fragile nature of the soils and topography, vehicle travel and access are severely limited during seasonally wet periods. Unrestricted vehicle travel in these soil types on unimproved roads or in connection with cross country travel can lead to severe rutting, soil erosion and resource damage, depending on the soil conditions and slopes. Mass soil movement, or slumping, is a naturally occurring process in these sedimentary Breaks areas, but it can also be the result of surface disturbing activities (like cutting roads into hillsides dominated by clays over shale).

Alluvial Soils Province

The Alluvial Soils Province includes the deep, clayey, loamy and sandy soils of the valley bottoms, valley side slopes and upland terraces. Local areas have rock fragments throughout the soil or in the underlying parent material. Precipitation in this province averages from 11 to 20 inches. The most common soil subgroups in this province are 6,8,9,10,11,12,13,14,17 and lesser amounts of 3,4 and 16 along the associated steep dissected valley walls.

Many narrow valleys and terraces are very important due to their high vegetation production potential. The nine most common subgroups in this province separate the significantly different and contrasting soils developed in alluvium from mixed rock sources. These soils are in heavy livestock and wildlife use areas next to water sources, shade and low topographic relief for trailing and grazing. Water erosion ratings range from slight to high when vegetation cover is reduced significantly.

The fine textured soils (high in clay content) are especially susceptible to compaction from trampling. Compaction under wet soil conditions during the spring months results in reduced water infiltration (with less water available or plant growth) and increased surface runoff and associated erosion. Accelerated erosion occurs near water sources and along streams and drainage bottoms with active gullying and headcutting in disturbed soil areas. Livestock trails are incised, particularly near existing water sources.

Mountains and Foothills Province

The Mountains and Foothills Province is composed primarily of loamy and clayey soils in mountainous areas with forest and intermixed grassland cover on foothills. The most common soil subgroups in this province are 15,18,19 and lesser amounts of 6 and 9.

These shallow to deep soils are found on hard bedrock ridges and on footslopes forming rolling to very steep terrain with areas of bare rock and talus. Many areas have rock fragments throughout the soil.

These areas generally receive more precipitation than the surrounding prairie (precipitation in this province averages from 11 to 22 inches) and therefore have greater vegetation ground cover. Erosion hazards are slight to high and compaction susceptibility is moderate to high. Those areas that are shallow to bedrock are difficult to rehabilitate after surface disturbing activities. This province is a valuable watershed for many streams.

VEGETATION

The planning area supports a diverse number of plant species because of the wide range of soil types, geology and climatic conditions. Livestock grazing and wildlife habitat are the major uses of vegetation. Forested lands provide sawtimber, firewood, and Christmas trees on a limited basis. Grass seed and hay are also sold on a limited basis primarily from crested wheatgrass fields.

The following descriptions of major vegetation types describe the physiographic provinces, range sites, plant communities, landforms and major uses. Detailed descriptions of plant communities, and forage production by ecological site can be found in the Soil Conservation Service Technical Guides.

Upland Prairie and Breaks Vegetation Types

Grass

The grass vegetation type consists mainly of short and mid-grasses and is predominately associated with silty, sandy, claypan and thin, silty ecological sites. This vegetation type occurs mainly on rolling uplands of the glaciated plains, sedimentary plains and mountain foothills. On the glaciated plains, silver sagebrush is often a significant component of the plant community. Clubmoss carpets most silty and claypan ecological sites in the glaciated plains as understory.

Common plant species in this vegetative type include western and thickspike wheatgrass, needleandthread, green needlegrass, Sandberg bluegrass, plains reedgrass, inland saltgrass, blue grama, little bluestem, and threadleaf sedge. Common forbs include American vetch, scarlet globemallow, fringed sagewort, cudweed sagewort, pussytoes and bastard toadflax; and shrubs including silver sagebrush, rubber rabbitbush, prickly pear and winterfat are common. Less common plant species include bluebunch wheatgrass, prairie sandreed, Nuttall saltbush, rabbitbush and skunkbush sumac.

This vegetation type is valuable for livestock forage production, primarily spring through fall. Mule deer, antelope, sharp-tailed grouse, waterfowl and many species of non-game birds and mammals utilize this area. Antelope use this area yearlong when silver sagebrush is a subdominant species. Sharp-tailed grouse generally prefer tall residual grass areas for yearlong use, while waterfowl use these areas in the spring, summer and fall for pair bonding, breeding, nesting, broodrearing and staging.

Crested wheatgrass, an introduced species, was planted throughout the planning area in the 1930s on farmed land purchased by the federal government under the Bankhead-Jones Farm Tenant Act. Large acreages of this farmed land were allowed to recover naturally as well. The crested wheatgrass receives little livestock use in many cases because the seeded areas are intermingled with native range and livestock prefer the native vegetation. When crested wheatgrass is fenced separately, it is valuable as spring pasture, deferring use of the native range. Monotypic stands have little value as wildlife habitat, but stands that include substantial sagebrush and native forbs are valuable sage grouse and waterfowl habitat.

Big Sagebrush/Grass

This vegetation type is the dominant type throughout the sedimentary uplands. Included in this type are the plains south of the Missouri River, parts of the Missouri Breaks, much of south Phillips County, the Willow Creek Basin in southern Valley County, and numerous areas of badlands topography intermingled in the glaciated plains, including the Frenchman, Cottonwood and Bitter Creek areas.

Western and thickspike wheatgrass, prairie Junegrass, Sandberg bluegrass, green needlegrass, prairie sandreed, bluebunch wheatgrass, little bluestem, blue grama, and needleandthread are the most common grasses. Common forbs include broom snakeweed, American milkvetch, wild onion, Astragalus species, fringed sagewort, bastard toadflax, scarlet globemallow, lomatium and scurfpeas. The most prevalent shrub is big sagebrush and greasewood is associated with saline soils within this vegetation type.

This vegetation is of moderate to high value for livestock forage. Antelope, mule deer, elk, sharp-tailed grouse, sage grouse, waterfowl, and many species of non-game mammals and birds use this vegetation type. Antelope and mule deer use these areas yearlong and are dependent on sagebrush for winter browse. Mule deer and elk use the edges of sagebrush ridges adjacent to conifer forests for food yearlong. Sage grouse are dependent on sagebrush yearlong. Sharp-tailed grouse may utilize this type yearlong, depending on habitat conditions. Waterfowl use these areas heavily in the spring and summer when this vegetation type is associated with reservoirs or potholes.

Saltbush

Nuttalls saltbush is the dominant plant on broad alluvial valleys associated with sedimentary badlands, especially in southern Valley County. BLM has converted substantial acreages of this type to grassland by contour furrowing and constructing water spreader structures. The ecological site is dense clay and forage productivity is normally very low due to the extremely slow water infiltration. Livestock seek out this vegetation type in spite of its low productivity because of the mineral and protein content of saltbush and the accessibility of its location.

Associated grass species in this vegetation type include Sandberg bluegrass and western wheatgrass. Important forbs include prickly pear, wild onion and wild parsley. Greasewood is often associated as a fringe type. This vegetation type is important habitat for antelope and sage grouse yearlong.

Ponderosa Pine/Juniper

This vegetation type, within the Sedimentary Uplands Province, is on the sideslopes of drainages within the Missouri, Musselshell and Judith River Breaks and is associated with the shallow clay and coarse clay ecological sites. It can overlap with the big sagebrush/grass type on the edges of ridges and benches.

Ponderosa pine and juniper are prominent but can be scattered, leaving open parks. The understory is scant in the ponderosa pine and juniper stands. The big sagebrush/grass vegetation type is the primary understory in the open timbered areas and open parks. In addition to a variety of non-game species, mule deer, elk, bighorn sheep and sharp-tailed grouse use this vegetation type for food and cover. Livestock forage production is low in the dense stands and use is often limited by slopes. Burning dense stands, where escape cover remains, improves forage production and use by both livestock and wildlife. Erosion hazards are high following fire, but recovery is quite rapid. Ponderosa pine and juniper provide material for fuel, posts and poles. Ponderosa pine provides a limited opportunity for lumber.

Douglas-Fir/Ponderosa Pine

This vegetation type is found on the north and east facing slopes in the river Breaks. Other than the presence of Douglas-fir, the vegetation composition is the same as the ponderosa pine/juniper type. Where timber is dense, the available forage for either livestock or wildlife is negligible, but increases in less dense timber.

These areas provide excellent cover for mule deer, bighorn sheep and elk. Due to the scant understory, few food plants are available and livestock forage value is low. Douglas-fir and ponderosa pine provide fuel, posts and poles and a limited opportunity for lumber. Douglas-fir provides a source of Christmas trees.

Mountain Forest Types

The Mountains and Foothills Province includes the Little Rocky, Judith, Moccasin, Snowy and a small part of the Little Belt Mountains. The vegetation within these areas is extremely variable because of a wide range of soil, parent material, aspect and climate.

Existing forest cover types include lodgepole pine, Douglas-fir, ponderosa pine, Engelmann spruce, white spruce and subalpine fir. The major types are lodgepole pine, Douglas-fir and ponderosa pine. All the listed tree species, except lodgepole pine, form climax series in some part of the area. Ponderosa pine is the potential forest overstory on the drier aspects of the Little Rocky, Moccasin, Big Snowy, Little Snowy and Judith Mountain ranges.

Douglas-fir is the natural forest overstory on soils with a higher moisture regime and cold temperatures. Subalpine fir lies above the Douglas-fir potential climax sites. Common forest understory plants associated with these forests are pinegrass, common snowberry, Idaho fescue, bluebunch wheatgrass, grouse whortleberry, elk sedge, heartleaf Arnica, Columbia needlegrass, bearded wheatgrass, mountain brome, Richardson needlegrass, twinflower, kinnikinnick, Utah honeysuckle, Woods rose, lupine, dwarf Vaccinium and blue huckleberry.

Common components of the associated grasslands are Idaho fescue, bearded wheatgrass, tufted hairgrass, Richardson needlegrass, Columbia needlegrass, mountain brome, threadleaf sedge, lupine and sticky geranium. Tufted hairgrass is often the dominant grass on more moist sites.

Mule deer, elk, Rocky Mountain goat, bighorn sheep, blue grouse, ruffed grouse, Merriam's turkey and numerous non-game mammals and birds are found in this vegetation type. This vegetation type provides yearlong food and cover for these species. Mule deer use browse and forbs as a food source and timbered areas for escape and thermal cover. White-tailed deer can be found in aspen groves within this vegetation type. Livestock grazing on forested BLM land is limited. Portions of the Judith and Little Rocky Mountains are unsuitable for livestock use.

Riparian-Wetland Vegetation Types

BLM's 1987 policy statement on riparian area management defines a riparian area as "an area of land directly influenced by permanent water. It has visible vegetation or physical characteristics reflective of permanent water influence. Lakeshores and streambanks are typical riparian areas. Excluded are such sites as ephemeral streams or washes that do not exhibit the presence of vegetation dependant on free water in the soil".

BLM defines wetlands as areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and which, under normal circumstances, do support a prevalence of vegetation typically adapted for life in saturated soil conditions (Riparian-Wetland Initiative for the 1990s, 1991). Wetlands include marshes, shallows, swamps, bogs muskegs, wet meadows, estuaries and riparian areas.

The typical "prairie pothole" on the glaciated plains of the Phillips and Valley Resource Areas is a wetland by the above definition because they support vegetation "adapted for life in saturated soil conditions". The typical pothole does not get flooded every year and often has water for only a short time, but when it is flooded is supports wetland vegetation.

Although there are technical distinctions between riparian areas and wetlands, they are linked for discussion purposes in this document.

There are approximately 14,000 acres of riparian-wetland habitat in the planning area (see Table 3.6). Riparian-wetland areas are one of the most productive wildlife habitats and are generally preferred by livestock because the grass is green longer and water and shade may be available. Through the work of the Montana Riparian Association, riparian dominance types, habitat types and community types have been classified for Montana (Hansen, Chadde and Pfister, 1988, and Hansen, Chadde, Boggs and Joy, 1991).

TABLE 3.6
TYPE AND EXTENT OF RIPARIAN WETLAND AREAS ON BLM LAND*

Type	Judith	Valley	Phillips	Total
Streams, (miles)	151	252	196	599
Potholes (number)	—	66	2,456	2,522
Springs (number)	55	29	31	115
Seeps/Bogs (number)	—	226	—	226
Reservoirs (number)	555	1,367	1,943	3,865
Waterspreaders (acres)	—	5,755	—	5,755
Acre/feet Water Storage	6,257	52,639	6,218	65,114

*Water sources claimed for water rights as of December 31, 1988. Does not include sources built from January 1, 1989 to present.

Source: BLM, 1990

Dominance type refers to the dominant species, which are those with at least 25% canopy in the tallest layer of a sample plot (Hansen, Chadde and Pfister 1988).

Habitat type is defined as the land area which supports, or has the potential of supporting, the same climax vegetation. This is very similar in concept to ecological site, but ecological site is much broader; each ecological site contains may contain many dissimilar habitat types. This is because the habitat type is a vegetation based classification while ecological site is a soil based classification.

Community type represents seral or disclimax communities, a lower level of succession for a habitat type (Hansen, Chadde, Boggs and Joy, 1991).

The habitat type and community type classifications can be used to make judgments concerning the potential natural vegetation of a given site (habitat type) as well as identifying seral stage of the current vegetation community (community type). A determination can thus be made concerning the desired plant community for a site.

With some exceptions, the late seral and potential natural vegetation stages of succession provide the most stable watershed protection and would be the desired plant community. Notable exceptions are the cottonwood and sandbar willow communities, which are successional to green ash or boxelder and are most prevalent in early and mid seral stages (Hansen, Boggs, Pfister and Joy, 1991). These community types are very desirable wildlife habitats and would normally be considered as a desired plant community.

Table 3.7 shows riparian habitat and community types known to be found on public lands in the planning area.

TABLE 3.7
RIPARIAN AND WETLAND HABITAT TYPES AND COMMUNITY TYPES OF THE PLANNING AREA

Coniferous Trees

Douglas Fir / Red-Osier Dogwood Habitat Type
Ponderosa Pine / Common Chokecherry Habitat Type
Ponderosa Pine/ Red-Osier Dogwood Habitat Type
Rocky Mountain Juniper/ Red Osier Dogwood Habitat Type

Deciduous Trees

Box Elder / Common Chokecherry Habitat Type
Great Plains Cottonwood / Kentucky Bluegrass Community Type
Great Plains Cottonwood / Recent Alluvial Bar Community Type
Great Plains Cottonwood / Red Osier Dogwood Community Type
Green Ash/ Common Chokecherry Habitat Type
Peach-leaf Willow Community Type
Quaking Aspen / Red Osier Dogwood Habitat Type
Quaking Aspen / Kentucky Bluegrass Community Type
Russian Olive Community Type

Willow Communities

Sandbar Willow Community Type
Yellow Willow / Beaked Sedge Habitat Type
Yellow Willow / Bluejoint Reedgrass Habitat Type
Yellow Willow / Kentucky Bluegrass Community Type

Non- Willow Shrub Communities

Black Greasewood / Western Wheatgrass Habitat Type *
Common Chokecherry Community Type
Red-Osier Dogwood Habitat Type
Silver Sagebrush / Western Wheatgrass Habitat Type *
Succulent Hawthorne Community Type *
Thorny Buffaloberry Community Type *
Western Snowberry Community Type *
Wood's Rose Community Type *

Sedge Communities

Beaked Sedge Habitat Type
Nebraska Sedge Community Type
Water Sedge habitat Type

TABLE 3.7
RIPARIAN AND WETLAND HABITAT TYPES AND COMMUNITY TYPES OF THE PLANNING AREA
(continued)

Non-Sedge Communities
Alkali Bulrush Habitat Type
American Licorice Community Type
Baltic Rush Community Type
Common Cattail Habitat Type
Common Reed Habitat Type
Common Spikesedge Habitat Type
Fowl Bluegrass Community Type
Foxtail Barley Community Type
Hardstem Bulrush Habitat Type
Inland Saltgrass Habitat Type *
Kentucky Bluegrass Community Type *
Leafy Spurge Community Type *
Prairie Cordgrass Habitat Type
Red Glasswort Community Type
Redtop Community Type
Reed Canarygrass Habitat Type
Smooth Bromegrass Community Type *
Sharp Bulrush Habitat Type
Spotted Knapweed Community Type *
Water Smartweed Community Type
Western Wheatgrass Habitat Type *

* These species can occur on upland as well as riparian-wetland sites.

Source: Hansen, Boggs, Pfister and Joy, 1991 and personal communication with Scott Miles, Montana Riparian Association...The reader is referred to the above publication for detailed descriptions of the above habitat types and community types including location, landform, vegetation characteristics, soil characteristics, potential natural community, disturbance stages, adjacent communities, management information and relationship to other classification systems.

Some of the most common and important riparian vegetation associations are discussed below. This discussion is intended to illustrate the vegetation associated with the typical riparian-wetland area on BLM land in the planning area. These discussions include combinations of habitat and community types.

Western Wheatgrass/Rushes/Sedges

The wet basins associated with glaciated plains are commonly called prairie potholes. Most of these basins are in the overflow ecological site. Typically, the smaller are flooded during early spring and dry in the late spring and summer. Western wheatgrass is the dominant plant species on the margins of the flooded area and on potholes that are only briefly flooded. Potholes that are flooded for over a month are often barren of vegetation for the summer, but will fill in with grasses the next season, if not subject to prolonged flooding again. During wet periods, emergent sedges, forbs and rushes are the dominant vegetation. Common species include prairie bulrush, hardstem bulrush, northern arrowweed, water smartweed, beaked sedge and Baltic rush. Shallow water in reservoirs produces similar emergent vegetation. These temporary wetlands produce large numbers of waterfowl during wet springs. The lush vegetation is sought out by livestock when it is green. After about mid-July, cattle make little use of the coarse mature forage on dry potholes.

Rose/Snowberry

The rose/snowberry vegetation type is primarily on alluvial soils associated with slopes dropping into small drainages and drainage bottoms. It is typically found on overflow ecological sites. The grass/silver sagebrush vegetation type overlaps into this type on the sideslopes of drainages. This vegetation type will also occur as understory in the cottonwood/willow type. It is probably the most common riparian association on BLM land.

This vegetation type is dominated by deciduous shrubs such as rose and snowberry. Sandbar willow is typically found on the inner banks of intermittent streams. Buffaloberry, western wheatgrass, slender wheatgrass, Canada wildrye, alkali cordgrass, needleandthread, green needlegrass, American vetch, perennial sunflower, two-grooved milkvetch, western yarrow, lomatium, fringed sagewort, dotted gayfeather, scurfpea, hairy goldenaster and white milkweed are also common. Buffaloberry is an important associated dominance type, with the rose snowberry community as the understory type.

This vegetation type is important to many non-game mammals and birds, mule deer and sharp-tailed grouse for food and cover. Sharp-tailed grouse also use these areas for brood rearing and are heavily dependant on the buffaloberry as a food source and for cover. When adjacent to water, this vegetation type is important as nesting cover for waterfowl. When adjacent to small grain cropland, the habitat is used by pheasants and gray partridges. Livestock forage production can be high in open stands. Dense rose/snowberry stands are avoided by cattle.

Cottonwood/Willow

This vegetation type exists mainly on overflow, subirrigated or wet meadow ecological sites that are wet for long periods or the water table is high. The understory on most of these sites is of the rose/snowberry type. Common species are the same as the rose/snowberry type with an increased proportion

of willow and cottonwood. Boxelder and green ash trees also occur in this vegetation type.

This vegetation type is used by mule deer, white-tailed deer, sharp-tailed grouse, ring-necked pheasants, mourning dove, Merriam's turkey and high populations of non-game birds. It is the primary habitat on BLM land for white-tailed deer and pheasant, due to the dense understory. Livestock forage production is high.

Silver Sagebrush

Silver sagebrush is the dominant species on many overflow ecological sites, occupying alluvial soils on the upper reaches and drier zones adjacent to prairie streams. Associated species include western wheatgrass, green needlegrass, blue grama, sweetclover, dandelion and western yarrow.

This vegetation type is often associated with the rose snowberry type and the cottonwood willow type. It provides important habitat for a variety of non-game species. Antelope, mule deer, sage grouse and sharp-tailed grouse utilize this vegetation type for food and cover. Forage production varies from high in open sagebrush stands to scant in dense stands.

Greasewood

Greasewood is a common dominant plant on alluvial terraces of rivers and streams. The ecological site may be dense clay, claypan, saline upland or saline lowland. Understory vegetation is usually sparse and includes western and thickspike wheatgrass, Sandberg bluegrass, Nuttall alkaligrass, inland saltgrass, blue grama, knotweed, seepweed and cactus. This vegetation type provides cover for mule deer, antelope, sage grouse, sharp-tailed grouse and a variety of non-game. It is a valuable winter forage source for livestock and mule deer.

Threatened and Endangered Plant Species

No plants listed as endangered or threatened under the Endangered Species Act are known to occur within the planning area. Four species of special concern, Psilocarpus brevissimus (dwarf woolyheads), Plagiobothrys leptocladux (Slender-Branched Popcorn Flower), Bacopa rotundi-folia (Roundleaf Water-Hyssop) and Elodea longivaginata (long-sheath waterweed) have been identified in the planning area. Others that could occur include; Ammania coccinea (Scarlet Ammania), Bidens comosa (Begger-Ticks) and Phacelis thermalis (Hotsprings Phacelia).

Noxious Plants

Noxious plant infestations on BLM land are concentrated along the Missouri River, in the Rock Creek area of Valley County, in the Grass Range area of Fergus County, and in other scattered locations. Table 3.8 identifies the noxious plant species present and BLM's control efforts. Table 3.9 estimates the noxious plant infestations by resource area.

TABLE 3.8
NOXIOUS PLANT CONTROL
ON BLM LAND

Resource Area	Target Species	Acres Treated Herbicide 1988	Acres Treated Grazed 1988	Biological Agent	Average $ 1986-1988
Judith	Leafy Spurge Knapweeds	167	0	Flea Beetle Hawk Moth	$11,000
Valley	Leafy Spurge Knapweed	100	200	Hawk Moth Flea Beetle	$6,000
Phillips	Leafy Spurge Knapweed	6	0		$320

Source: BLM, 1990

TABLE 3.9
ACREAGE INFESTATION ESTIMATES
BY RESOURCE AREA FOR BLM LAND

	Judith RA*	Valley RA	Phillips RA
Leafy Spurge	538	2,000	2
Spotted Knapweed	156	0	1
Diffuse Knapweed	400	0	0
Russian Knapweed	322	0	1
Canada Thistle	0	500	1,200
Whitetop	150	0	0

*This RMP includes that portion of Chouteau County south of the Missouri River. The figures shown are for the complete county. These figures reflect current inventories on BLM land.

Source: BLM, 1990

Ecological Status and Trend

The current ecological status and/or condition of BLM land is shown in Table 3.10 and the current trend is shown in Table 3.11. Riparian acres are included in the totals and riparian condition and trend is discussed in more detail as follows.

TABLE 3.10
ECOLOGICAL CONDITION (STATUS) ON BLM LAND

Resource Area	Condition Class: Excellent PNC Acres	%	Good LateSeral Acres	%	Fair MidSeral Acres	%	Poor EarlySeral Acres	%	Unclass. Rock/Shale Acres	%
Valley	30,899	3	534,959	53	421,053	41	10,757	1	22,218	2
Phillips	6,442	1	765,844	70	282,405	26	10,010	1	24,591	2
Judith	74,102	10	540,950	78	125,975	17	2,530	<1	0	0
Total	111,443	4	1,841,753	65	829,433	29	23,297	1	46,809	1

Source: BLM, 1990.

TABLE 3.11
ECOLOGICAL TREND (BLM LANDS)

Resource Area	Static	Up	Down
Judith	557,668	185,889	0
Valley	934,989	84,897	0
Phillips	915,005	163,394	10,893
Total	2,407,662	434,180	10,893

Source: BLM, 1990.

Ecological Status of Riparian Areas

An intensive inventory of stream riparian communities and current conditions is underway in cooperation with the Montana Riparian Association. Preliminary estimates from the Riparian Association inventory are that 65% of the stream riparian miles are in proper functioning condition. Proper functioning condition is a result of: reduced erosion; improved water quality; increased ground water recharge; more stabilized stream banks, more productive habitat; and more diverse stream channels (Hansen, Montana Riparian Association, personal communication). This preliminary estimate supports the conclusions of the 1989 inventory in the Valley RA. This sampling of 67 monitoring sites found that 68% were in late seral or PNC status. Both inventories correlate well with the 1979 Prairie Potholes Vegetation Environmental Impact Statement (EIS) condition inventory which showed that 64.7% of the floodplains were in good ecological condition.

It is conservatively projected that 60% of the acres in stream riparian zones are in late seral to PNC (proper to excellent) and 40% are in early or mid seral status (poor to fair). Its estimated that 60% of the stream riparian miles are also in proper functioning condition and 40% are in less than proper functioning condition.

GRAZING MANAGEMENT

BLM land complements private grazing land for about 48% of the area's ranchers that graze sheep or cattle. About 74,732 cattle use BLM land during the average 6-month grazing period. This represents about 40% of the summer forage requirements for the 186,700 beef cows on inventory in counties within the planning area (Montana Agricultural Statistics, 1988). Currently there are 867 livestock grazing permittees or lessees authorized to graze livestock on 1,163 allotments. The BLM administers permits and leases for 452,380 AUMs of livestock grazing (see Table 3.12).

TABLE 3.12
BLM PERMITTEES, ALLOTMENTS, PREFERENCE AUMS AND ACRES ALLOCATED*

Resource Area	Permittees	Allotments	AUMs(BLM)	Acres
Valley	187	266	139,236	1,019,530
Phillips	225	335	179,911	1,060,925
Judith	455	562	133,233	735,202
Total	867	1,163	452,380	2,815,657

*This includes lands within the UMNWSR.

Source: BLM, 1990

Cow/calf and yearling cattle are the most significant classes of livestock authorized. A few horses are authorized in conjunction with cattle permits. Three permittees graze sheep on allotments in the Judith RA. The Phillips RA has one sheep operation. No sheep are currently authorized to graze in the Valley RA under a regular permit. A band of sheep is being used for experimental leafy spurge control in the Rock Creek area of north Valley County.

Most of the BLM land within the planning area is allocated for livestock grazing. Unallocated lands are shown in Table 3.13 by resource area. The unallocated lands in the Judith RA consist of numerous small tracts of Section 15 lands plus the Square Butte Outstanding Natural Area (ONA). They also include parts of the Judith Mountains that are reserved for wildlife and watershed purposes. The area unallocated in the Phillips RA is in the Little Rocky Mountains, the Whitewater Lake Waterfowl Management Area and other small tracts. In the Valley RA, the unallocated acreage is in numerous small tracts.

TABLE 3.13
BLM LAND UNALLOCATED FOR LIVESTOCK GRAZING (ACRES)

Resource Area	Acres
Valley	356
Phillips	28,367
Judith	8,355
Total	37,078

Source: BLM, 1990.

Allotment Categorization

Livestock grazing is managed by developing and monitoring allotment management plans (AMPs) and supervising grazing use. It is BLM policy to categorize allotments into a three-tier ranking system to determine priorities for implementation of AMPs and expenditure of range improvement funds. The three categories are I (Improve), M (Maintain), and C (Custodial) and reflect resource conditions and economic considerations for each allotment. The terms maintain, improve, and custodial relate to resource objectives for the allotment (i.e. whether conditions need to be improved, maintained, or if custodial management is appropriate because of relatively small amounts of BLM land). Current categorization of the allotments is shown in Table 3.14.

TABLE 3.14
ALLOTMENT CATEGORIZATION

Resource Area	Allotment Category					
	Category I		Category M		Category C	
	No.	Acres	No.	Acres	No.	Acres
Valley	60	641,346	163	363,609	43	14,931
Phillips	166	950,311	22	66,143	154	72,838
Judith	17	104,521	109	375,914	436	263,122
Total	243	1,696,178	294	805,666	633	350,891

Source: BLM, 1990

Grazing EIS Implementation

The Missouri Breaks Grazing and Prairie Potholes Vegetation EISs, direct development and management for allotments. Through fiscal year 1988, 207 AMPs have been implemented in the planning area. These AMPS involve 1,573,209 acres of BLM land. AMPs are shown in Table 3.15 by allotment category and resource area and also in Appendix M.

TABLE 3.15
LIVESTOCK ALLOTMENT MANAGEMENT PLANS

Resource Area	Allotment Category					
	Category I		Category M		Category C	
	No.	Acres	No.	Acres	No.	Acres
Valley	37	566,362	25	228,984	0	0
Phillips	74	488,888	6	25,243	3	4,349
Judith	10	36,331	51	221,757	1	1,295
Total	121	1,091,581	82	475,984	4	5,644
Percent	58	69	40	30	2	<1

Source: BLM, 1990

Overall, 54% of the BLM land in the planning area is included in allotment management plans. Each AMP varies in complexity from season-long grazing to combinations of rest rotation and deferred rotation grazing methods. Improvement or maintenance of ecological condition to meet objectives established in the Missouri Breaks Grazing and Prairie Potholes Vegetation EISs is the primary goal of each AMP. Table 3.16 shows the proposed AMPs that remain to be completed.

TABLE 3.16
PROPOSED AMPs TO BE COMPLETED

Missouri Breaks		Prairie Potholes	
Judith	41	Valley	16
Valley	1	Phillips	7
Phillips	12		
Total	54	Total	23

Source: BLM, 1990

Although 60% of the riparian areas are in good or better condition, in many cases management objectives have not been met.

Riparian Management

As each AMP with manageable riparian habitat is prepared or revised, riparian objectives are included and management practices are keyed to improve or maintain riparian values. Under current management, 126 miles of streams are meeting objectives, 90 miles are not meeting objectives and for 383 miles it is unknown if objectives are being met. This is because either the AMP has been in effect only a short time or the potential of the stream reach is unknown (see Appendix J).

Typical grazing management practices used to enhance riparian areas include riparian pastures, scheduling all grazing in either early spring or fall to avoid hot season use, or shortening the length of grazing. Rotational grazing, which limits hot season use to one year in three, has also proven effective in enhancing riparian areas. Other management prescriptions will be used to improve degraded riparian areas, based on each individual area's characteristics and the livestock operators needs. Currently, 25 allotments and 58 miles of stream are managed under an AMP that meet these criteria. Riparian exclosures have been constructed as shown in Table 3.17.

TABLE 3.17
RIPARIAN EXCLOSURES ON BLM LAND

Resource Area	Purpose	No.	Acres
Judith	Riparian Potential	2	41
Valley	Riparian Potential	5	214
	Reservoir Exclosure	18	667
	Seeps Below Reservoirs	965	
	Springs	2	3
Phillips	Reservoir Exclosure	26	1,502
	Springs	13	10
	Riparian Potential	9	191
Total		84	2,693

Source: BLM, 1990

Rangeland Improvements

Most rangeland improvements are planned as part of the AMP process, to meet multiple use objectives. The purpose of these improvements is to provide livestock water, establish areas of use, allow for pasture rotations, and to improve forage and watershed conditions. Table 3.5 shows the improvements in each resource area.

WILDLIFE AND FISHERIES

The responsibility for managing wildlife on BLM land is divided among the Montana Department of Fish, Wildlife and Parks (MDFWP), which manages the wildlife and the BLM, which manages the wildlife habitat on BLM land.

A variety of habitat types on BLM land support many types of wildlife. Riparian, shrub and woodland habitats support the greatest diversity and quantity of wildlife because of diverse layers of trees, shrubs, grasses and forbs.

Threatened and Endangered Wildlife Species

An endangered species is one that faces extinction throughout all, or a significant portion of its range. Threatened species are those likely to become endangered in the foreseeable future.

Historical and potential habitat for six species of wildlife which are federally classified as endangered or threatened occur within the planning area. These species are the bald eagle, peregrine falcon, black-footed ferret, gray wolf, least tern and piping plover.

The bald eagle is the only endangered species which routinely uses BLM land within the planning area. Very few breeding pairs nest in the planning area, however, historical nesting sites exist along the Missouri, Judith and Milk Rivers and at Frenchmen Creek Reservoir. The planning area is used during spring and fall migration. Peak use months for the bald eagle are March, April and November. The Missouri and Milk Rivers provide good habitat for eagles during migration. Bald eagles are present during mild winters on and in the vicinity of the Missouri and Milk Rivers; concentrating in areas of open water where waterfowl and fish are available as food or where carrion can be found. Bald eagles migrate through the area somewhat concurrent with the waterfowl spring and fall migrations.

Peregrine falcons have been sighted during spring and fall migrations. There are no known breeding pairs or historical nesting areas in the planning area. Peak months for falcon occurrence are March, April and November. Falcons have been observed in the Phillips RA during late April and May; suggesting nestings may be occurring. Peregrine falcons migrate through the area following the waterfowl migration.

There are historical records of black-footed ferrets in the Phillips RA. Flath and Clark (1986) list two specimens for Phillips County (December, 1923 and January, 1924). There have been recent (1983-present) unconfirmed sightings in Phillips County, and skeletal remains were found in 1983 on the Fort Belknap Indian Reservation. The

historic range of the ferret in Montana corresponds to the range of the black-tailed prairie dog. Additional information is available in the Prairie Dog Complex ACEC discussion later in this chapter.

Gray wolves (suspected transients from Canada) have been reported in the planning area. No critical habitat exists in the area, though an occasional wolf is seen.

The least tern has been found near the planning area on islands at Fort Peck Reservoir and on an island in the Missouri River below Fort Peck Dam near Poplar. Potential habitat may exist in areas with piping plover habitat. The two species often nest together in colonies where sandy to gravelly beaches occur on permanent water bodies.

Piping plovers have gained national, as well as local attention, since the bird was listed as a threatened species in January, of 1986. The first record of nesting piping plovers in Montana was at Bowdoin National Wildlife Refuge in 1967. Plovers were first observed at Nelson Reservoir in 1986. Successful nesting has occurred at both locations since 1986, but not every year and/or at both locations. A 1984 survey in central and southern Saskatchewan, just north of the Phillips and Valley RAs found 773 plovers. The Phillips and Valley RAs are in the migration corridor of the Saskatchewan population. Plovers in Montana primarily nest on sand/pebble beaches of large permanent reservoirs and natural lakes. Plovers in North Dakota use saline wetlands. Both habitats occur in the planning area, however no piping plovers have been observed on BLM land in the planning area.

The planning area contains habitat for several ESA candidate species identified by the FWS. Those species are the Swainson's hawk, ferruginous hawk, mountain plover and long-billed curlew. The ferruginous hawk, mountain plover and long-billed curlew are Category 2 species that are being considered for listing. The Swainson's hawk is a Category 3C which was considered for listing, but at this time is no longer subject to substantial threats and will not receive special attention in this document.

The ferruginous hawk is also found on the prairies. They migrate into the area in late March and leave in late October. Ferruginous hawks nest on the ground, using outcrops of sand stone or bentonite. The hawk normally roosts on the ground, but is occasionally seen in a tree or on a post. Ferruginous hawks hunt the prairie for small mammals including prairie dogs and ground squirrels.

The mountain plover is found on the open shortgrass (blue grama clubmoss) prairies. They migrate into the area in late April and are gone by early September. The plover nests on open ground associated with gravel pavement. Most of the known plovers in the planning area are associated with black-tailed prairie dog towns. This is unique to this area. Throughout the remainder of the plover's range (Colorado and Wyoming) the plover uses the short-grass prairie. The plover relies on insects and seeds for summer food.

The long-billed curlew is found on the grasslands. They migrate into the area in late March and leave in late September. The curlew nests in the grasslands and forages nearby for insects and seeds.

Big Game

Elk

Elk can be found in most mountainous areas and in the Missouri River Breaks. Elk were transplanted from Yellowstone Park into most of these areas. The largest elk herd in the planning area, approximately 3,000 head, is in the Missouri River Breaks (MDFWP, 1989). Population increases and expansion into unoccupied habitat has occurred on the south side of the Missouri River from Cottonwood Creek in the Musselshell Breaks and west to the Judith River and south to the North Moccasins. Elk on the north side of the Missouri River extend along the Breaks in south Blaine County and east through Valley County. Scattered elk sightings have been reported in extreme southwest Phillips County along Bull, Antelope and Cabin Creeks. Although habitat conditions are similar to the CMR, only a few elk are present and no permanent elk herd exists at this time. Elk migrate to and from the Missouri River Breaks to the Little Rocky Mountains. Habitat exists for elk in these mountains; however, a permanent elk herd does not exist at this time. The Judith Mountains contain a population of about 100 to 200 elk. Approximately 100 to 150 elk reside in the Little Snowy Mountains and another 100 to 150 elk reside in the Big Snowy Mountains. A large population of elk reside in the Little Belt Mountains. Most of these elk occur on FS, private and Judith Game Range lands.

Elk inhabit about 594,000 acres of crucial habitat on BLM land (see Table 3.18). Food habit studies have been conducted in the Breaks and in various mountain ranges throughout the planning area. These studies show a food preference for grasses, except during the spring when forbs are preferred. Ground and aerial surveys indicate major winter and spring use in open grassy parks on south facing slopes surrounded by thermal cover, usually in the form of conifers, while summer and early fall use occurs on the cooler north facing slopes.

TABLE 3.18
ACRES OF CRUCIAL HABITAT ON BLM LAND FOR IMPORTANT WILDLIFE SPECIES IN THE PLANNING AREA

Animal Species	Resource Area			
	Judith	Valley	Phillips	Total
Elk	411,000	51,000	132,000	594,000
Mule Deer	382,000	328,000	244,000	954,000
White-tailed Deer	7,000	5,000	7,000	19,000
Pronghorn Antelope	219,000	165,000	264,000	648,000
Bighorn Sheep	17,000	N/A	4,000	21,000
Rocky Mountain Goat	2,000	N/A	N/A	2,000
Sage Grouse	208,000	117,000	122,000	447,000
Sharp-tailed Grouse	70,000	128,000	100,000	298,000
Ring-necked Pheasant	1,000	4,000	3,000	8,000
Gray Partridge	Unknown	Unknown	Unknown	Unknown
Turkey	28,000	N/A	2,000	30,000

Source: Dept. of Fish, Wildlife and Parks and BLM, 1990.

Deer

Mule and white-tailed deer are the most numerous big game animals in the planning area. Mule deer easily outnumber white-tailed deer. Mule deer inhabit drainage bottoms, broken side slopes, wooded breaks and mountain foothills; while white-tailed deer use drainage bottoms with riparian and brushy vegetation and areas adjacent to private cropland. BLM land provides about 954,000 acres of crucial habitat for mule deer and about 19,000 acres of crucial whitetail habitat. Deer populations vary depending on the severity of winters; quantity and quality of forage, and other factors. Currently mule deer and white-tailed deer populations appear to be increasing or remaining stable.

Grasses are used for a short time during the spring, until forbs become available, followed by extensive use of forbs with some browse during the summer. Heavy use of big sagebrush, silver sagebrush, rubber rabbitbrush, skunkbrush sumac, western snowberry and rose occurs during the fall, winter and early spring. Sagebrush may be the only available food source during periods of deep snow on the plains.

The deer populations in the various mountain ranges migrate from higher elevation summer ranges to lower elevation winter ranges, often relying on private agricultural lands. The plains deer populations do not migrate, but concentrate on south facing slopes which are more snow free and warmer during winter months. These deer move into the Breaks during severe weather. Escape and thermal cover is very important. Agricultural lands are important to plains deer throughout the year.

Antelope

Pronghorn antelope habitat and populations are abundant. Current survey data from the MDFWP indicates good fawn production and increasing antelope populations. There are approximately 648,000 acres of crucial antelope habitat on BLM land (Table 3.18).

Habitat frequented by pronghorn antelope varies with the time of year. Seasonal changes in habitat requirements are due to changing food requirements, preferences, availability, cover requirements and related factors. The optimum habitat for antelope consists of open, rolling sagebrush-grassland, as free from human encroachment as possible.

Resident and Canadian herds migrate along major drainages to in the Milk River Valley during severe winters. These herds are dependent on browse species, primarily silver sagebrush and creeping juniper. Antelope populations south of the Milk River are primarily non-migratory and rely on big sagebrush. Antelope in Phillips and Valley Counties migrate south of the Missouri River in severe winters.

Antelope use a variety of vegetation types which include grassland, grassland-shrub, shrub and cropland in the spring, summer and early fall. 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. Browse, primarily sagebrush, is vital in the antelope's diet. Their winter diet consists of at least 80% sagebrush. Generally, quality habitat contains sagebrush 12 to 24 inches in height with 15 to 50% canopy cover. Forbs become important during the spring, summer and fall, while grasses are of minor importance yearlong.

Rocky Mountain Bighorn Sheep

Bighorn sheep were originally found both in the mountains and on the plains. Homestead settlement soon restricted bighorn sheep populations to rugged mountain habitat. The distribution of bighorns in Montana has been reestablished, due to live trapping and transplanting to suitable areas they previously occupied.

In 1957, the MDFWP selected the Two Calf area in northern Fergus County as the site for reestablishing bighorns in the Missouri River Breaks. Between 1958 and 1961, they released 43 bighorns, of Montana origin in the Two Calf enclosure. The population increased to between 75 to 100 bighorns by 1971. During the winter of 1971-1972, most of the bighorns died, only 18 survived. The present population is estimated at 30 sheep.

Bighorn sheep were transplanted into the Little Rocky Mountains in 1972, and again in 1974. A total of 42 sheep were released, 21 animals in each transplant. Today the estimated bighorn sheep population is 60.

Twenty-eight bighorn sheep were released on the Knox Ranch in the Judith RA along the Missouri River in 1980. A portion of the herd crossed the river and have been periodically observed in small groups. Current data indicates a population of about 100 to 110 sheep, of which 30 to 40 are north of the river. The population appears to be healthy and has expanded from the mouth of the Judith River down to Two Calf Creek.

The Mickey-Brandon Butte herd was released in March of 1980, in the Phillips RA. The herd has remained primarily on the CMR. A small herd from Mickey-Brandon Butte is now becoming established near Iron Stake Ridge, which may involve BLM land in the future.

There are approximately 21,000 acres of crucial bighorn sheep habitat within the planning area (see Table 3.18). Their preferred habitat is governed by availability of escape cover, protection from severe weather and forage availability during the winter. Typical escape areas include cliffs, talus slopes, caves, steep rocky ridges and dense timber. Protection areas are leeward slopes, caves, rock overhangs, dense timber stands and bottomland areas. Preferred wintering areas are rocky ridges, steep southerly slopes blown free of snow in grassland, sagebrush-grassland and conifer types.

Bighorn sheep rely heavily upon grass in the yearlong diet. Forbs, browse, lichens and mosses make up the rest of the diet of the bighorns and are used when available to supplement the grass diet of bighorns.

Rocky Mountain Goats

A successful introduction of goats, one male and three females, was made on Square Butte in 1941, however after 1965 the population decreased to near zero for unknown reasons. A reintroduction of seven goats was made on Square Butte in 1971 and the current population now varies from 35 to 50. About 2,000 acres of crucial goat habitat exist in the area (see Table 3.18).

Mountain goats are found in rough habitat consisting of rugged and broken terrain with cliffs, ledges, projecting pinnacles and talus slopes. Timber is used during severe winter snow storms, spring kidding and extremely hot summer days.

Their food preferences vary throughout the year and depend upon palatability and digestibility. Grasses, sedges and rushes are important in their yearlong diet. Browse, forbs, and conifers supplement their diet during the various seasons of the year.

Upland Game Birds

Sage Grouse

Sage grouse occupy approximately 447,000 acres of crucial habitat (see Table 3.18). They are primarily associated with the big and silver sagebrush communities in grassland-shrub and shrub vegetation types. Populations fluctuate within the habitat perimeters and appear to be declining due to the continual reduction of sagebrush habitat, principally because of expanding croplands and drought.

The importance of sagebrush to sage grouse is well documented. Due to their lack of a muscular gizzard, they eat only soft material. They prefer sagebrush with a canopy cover greater than 15% for cover and food. Sagebrush provides 80 to 100% of the sage grouse's winter diet. Winter ranges contain shrubs that are at least 12 inches tall and are usually within 2 miles of mating grounds.

Nesting habitat is located under sagebrush, usually within 2 miles of mating grounds. The tallest and most robust sagebrush plants in the stand ranging from 6.6 to 31.6 inches in height with a canopy cover between 20 to 50% are normally used. Forbs become an important dietary component for both juveniles and adults in the spring and summer. There are currently 237 known sage grouse leks, 122 of which are on BLM land.

Sharp-tailed Grouse

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 in good condition. Sharp-tailed grouse, under ideal conditions, are more abundant on upland mixed prairie and less abundant in sagebrush-saltbush on the plains. A severe winter kill of buffaloberry shrubs in 1984 severely reduced winter forage and cover for sharptails. The droughts during the 1980s also contributed to the shrub loss.

The planning area has about 298,000 acres of crucial habitat (see Table 3.18). Important habitats include grassland, grassland shrub, riparian, woodland and agricultural types. There are 569 known sharp-tail leks in the planning area, 192 of which are on BLM land.

Habitat for sharp-tailed grouse varies. Habitat requirements change due to food, water, rest and social interactions during various seasonal activities. 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.

Sharptails use a variety of plant communities within the mixed prairie grasslands. Nesting occurs on the uplands in dense stands of tall grass left from the previous growing season. This provides protection against predators and adequate shelter during nesting. If the grass cover is not available, the hen will seek out adjacent brushy coulees.

During the winter, woody draws and woodlands are used. If snow is not available for burrowing during severe winter weather, shrubby vegetation must be available for thermal cover. Sharp-tailed grouse may move some distance to find these shrubs.

Other Upland and Migratory Game Birds

BLM lands in the planning area also contain 28,000 acres of occupied Merriam's turkey habitat. These populations are located mostly in the Moccasin, Judith, Big and Little Snowy Mountains with a small population still existing in the Little Rockies. These populations have grown from introductions made in 1954, and supplemented in the late 50s and early 60s. An introduction of turkeys in 1957 in the Missouri Breaks was ultimately unsuccessful with the last turkeys disappearing in the mid 1970s.

Ring-necked pheasants inhabit about 8,000 acres of public land, mostly in wetland areas. Gray partridge habitat occurs throughout the planning area. Blue grouse and ruffed grouse inhabit forested mountain and mountainous brush areas respectively. Mourning dove, a migratory game bird, is found throughout the planning area.

Waterfowl

The northern portion of the planning area is within the Prairie Potholes region (300,000 square miles), the most important waterfowl producing area in North America. In wet years, the Prairie Potholes region has the potential of producing over half of the annual duck population in North America, while containing only 10% of the duck breeding area. Approximately 458,000 acres per year of wetland habitat has been lost to agriculture and drainage in the Prairie Potholes region from the mid 1950s to the mid 1970s. This has increased the importance of wetland habitat on BLM land in Montana, even though this habitat makes up less than 1% of the Prairie Potholes region in North America.

Canada geese, snow geese, white-fronted geese, tundra swans and 20 species of ducks occur in the planning area. In addition to the Canada goose, common nesting species are the mallard, northern pintail, blue-winged teal, green-winged teal, American wigeon, northern shoveler, lesser scaup and gadwall.

While natural potholes are crucial for waterfowl nesting, reservoirs have become increasingly important during dry years. They are often the only water sources for waterfowl during drought periods (see Table 3.19).

TABLE 3.19
BLM WATER IMPOUNDMENTS (PITS, RESERVOIRS, POTHOLES) AND ISLANDS WITHIN THE PLANNING AREA*

Resource Area	Impoundments	Islands
Judith	555	142
Valley	1,433	563
Phillips	4,399	1,079
Total	6,387	1,784

*Water sources claimed for water rights as of December 31, 1988. Does not include sources built from January 1, 1989 to present.

Source: BLM, 1990

Waterfowl depend primarily on cover in the upland areas and on islands in reservoirs during spring nesting. It is estimated that duck production varies from one to nine ducks per surface acre of water, depending on grazing management and amount of nesting cover in upland areas. Early nesters, such as mallards and northern pintail, begin nesting in late April and are dependent upon old growth, residual cover, from the previous year. Blue-winged teal, American wigeon, and gadwall begin nesting about 4 weeks later and are dependent on the current year's cover conditions. Broods use emergent aquatic and shoreline vegetation for food and cover during the summer. Nesting and brood cover in the area is generally in poor condition where there is heavy livestock use. The planning area produces about 78,500 ducks annually during a normal year (Gjersing, 1971 and Mundinger, 1975).

Manmade islands, important to Canada geese, some duck species and many non-game birds have been constructed throughout the planning area (see Table 3.19). These islands provide security from predators during nesting. It is estimated there is a 70% goose nesting pair occupancy on the ponds containing islands compared to 30% on ponds without islands. Production averages four goslings per pair. Canada geese are expanding their range from large historic breeding waters to reservoirs scattered throughout the planning area. About 5,000 geese are produced on the known structures (McCarthy, 1973).

Major rivers within the planning area, namely the Milk, Judith and Missouri also provide waterfowl habitat. Canada geese, mallards, common mergansers, wood ducks and goldeneyes are the primary species nesting on the rivers. Canada geese nest primarily on river islands. The largest number and variety of waterfowl occur during fall and spring migration, when the birds use grain crops and marshes away from the river and return to the river for roosting, cover and some feeding. Many smaller creeks also provide important waterfowl nesting habitat when precipitation is normal or above.

Fisheries

Fisheries are primarily confined to reservoirs and the Milk, Judith and Missouri Rivers at the lower reaches of their major tributaries and a few short stretches of mountain streams. Both warm and cold water fish species occur.

There are 53 reservoirs that support fisheries on BLM land within the planning area. Major species include rainbow trout, largemouth bass, crappie and yellow perch. Game fish in reservoirs are generally stocked by the MDFWP every other year. Many of these populations winter kill about every 4 years. Trout do not reproduce in these areas and must be restocked periodically. Current grazing management on most reservoirs does not allow establishment of a good riparian zone or provide adequate bank protection. Water quality is dramatically reduced in fishing reservoirs under livestock use.

Nongame Birds and Mammals

Numerous nongame species occur throughout the planning area. Several species have been identified by the MDFWP to be of Special Interest or Concern (see Table 2.1, Chapter 2). These are species whose numbers and/or habitat are limited or may be in future years if not properly managed. These species receive special management consideration in all phases of land use planning for maintenance or enhancement of their respective habitat.

The Tate-Poetter Cave is a hibernaculum for big-eared bats. Big-eared bats are a Montana Species of Special concern and a FWS Candidate 2 species.

The most abundant terrestrial furbearers in the area include coyote, red fox, striped skunk, badger, raccoon, long-tailed weasel and bobcat. Common aquatic species include the muskrat, beaver and mink.

At least 253 black-tailed prairie dog towns, covering over 22,789 acres, occur in the planning area (see Table 3.20 and Figure 3.2). The Fort Belknap Indian Reservation and CMR are adjacent to the planning area and contain about 16,500 additional acres of prairie dog towns. The prairie dog towns are being studied as a potential reintroduction site for the black-footed ferret. Additional information is given in the Prairie Dog Complex Area of Critical Environmental Concern (ACEC) discussion later in this chapter.

TABLE 3.20
KNOWN BLACK-TAILED PRAIRIE DOG TOWNS IN THE PLANNING AREA

Resource Area	Number of Towns	BLM Acres	State Acres	Private Acres	Total Acres
Judith	7	71	0	12	183
Valley	11	800	40	20	960
Phillips	235	13,220	2,070	6,356	21,646
Total	253	14,091	2,110	6,588	22,789

Source: BLM, 1990

Black-tailed prairie dogs have become a significant resource since prairie dog shooting began increasing in the Phillips RA in 1983. This has taken on national importance and is considered one of the best areas of its kind in the United States. Approximately 300 shooters visit the Phillips RA annually. The shooters spend an average of 4 days in the area. Shooting prairie dogs has slowed their town expansion rate and from 15% to 3% per year.

The prairie dog towns also provide sightseers with an opportunity to see black-tailed prairie dogs and mountain plover, burrowing owl, ferruginous hawk and other species. Prairie dog towns provide an island of unique habitat that attracts a large number of wildlife species (Koford, 1958 and Reading et al, 1989).

FORESTRY

There is an estimated 78,200 productive forested acres of BLM land in the planning area (in the Judith and Phillips RAs). Approximately 29,000 of these acres are located in the Little Rocky Mountains and the mountain ranges in the Judith RA. These forested lands are part of the Central Montana Sustained Yield Unit which furnishes an annual cut of about 650,000 board feet on a sustained yield basis. Timber is located on all three soil subgroups of the Mountain and Foothill Physiographic Province. These 29,000 acres furnish 95% of the forest products from BLM land. The remaining 49,200 acres are located in the Breaks of Phillips, Fergus and Petroleum Counties. Timber in the Breaks is found on clay shale uplands of the sedimentary plains.

Figure 3.2 Prairie Dog Towns in the Valley and Phillips Resource Areas.

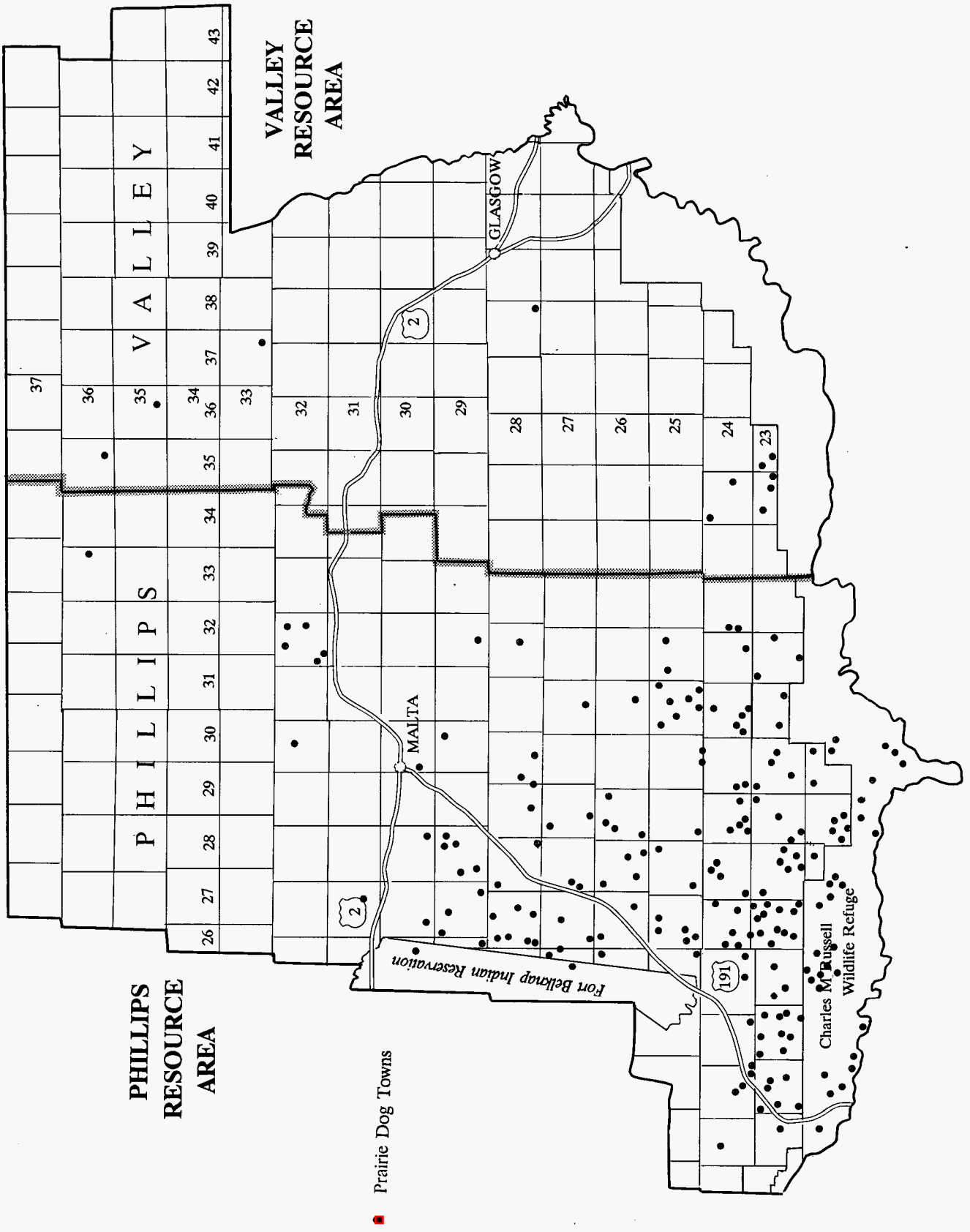
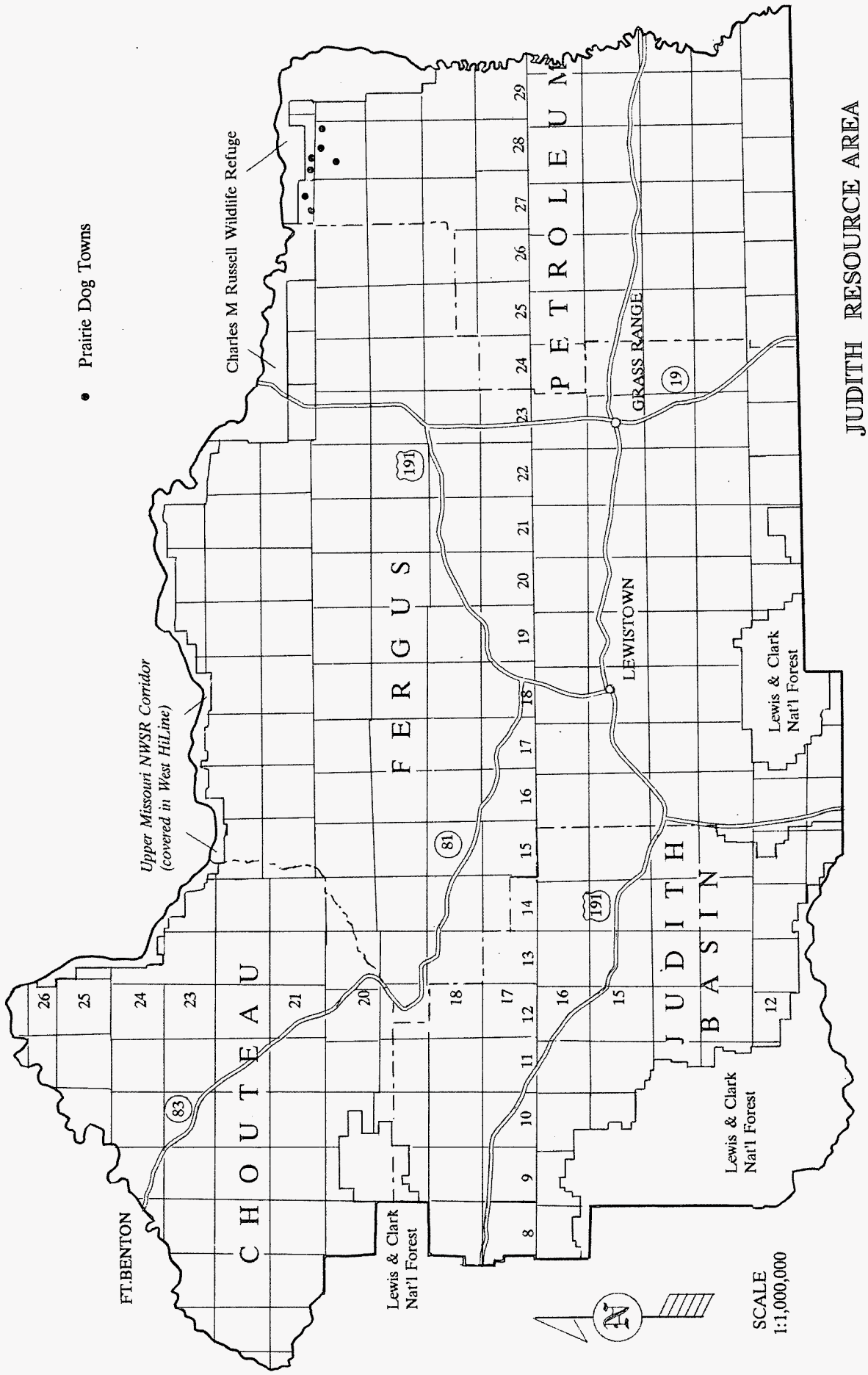


Figure 3.2 Prairie Dog Towns in the Valley and Phillips Resource Areas. (continued)



Ponderosa pine is the dominant commercial tree species with lesser amounts of Douglas-fir, lodgepole pine, Engelmann spruce and Rocky Mountain juniper. Ponderosa pine and Douglas-fir are the most wide spread species ranging from the Breaks to the mid-elevation (2,400 to 5,200 feet) level of the mountain ranges. Lodgepole pine is found on the mid to upper mountain elevations (4,600 to 6,400 feet). Engelmann spruce is confined to a few moist areas on BLM land at the mid and upper elevations. Rocky Mountain juniper is found in the Breaks.

Groves of cottonwood and willows grow along the loamy and clayey floodplains of the Missouri, Judith, Musselshell and Milk Rivers. The total acreage of these two species on BLM land is very small.

Past demand for forest products from the Little Rocky Mountains has been high since the mountain range is so isolated. Most products are used locally. Table 3.21 shows the forest products sold from the Little Rocky Mountains from 1978 through 1987. The value is the amount received for the various forest products.

TABLE 3.21
FOREST PRODUCTS SOLD FROM 1978 THROUGH 1987 FOR BLM LAND

	Little Rocky Mtns.		Judith RA	
Product	No. Sold	Value	No. Sold	Value
Sawtimber (MBF)	222	$3,996	6,908	$232,288
Houselogs	964	1,446	290	435
Corral Poles	11,330	1,699	9,510	1,499
Fence Posts	33,800	2,704	137,045	11,060
Christmas Trees	3,215	3,215	2,369	2,369
Fuelwood (Cords)	1,490	1,490	6,080	6,281
Total		$14,550		$253,932

Source: BLM, 1990

Forest products, especially sawtimber, have been in high demand from the Judith RA since the mid 1970s. Every sawtimber sale advertised has been sold to sawmills at Lewistown, Judith Gap, Roundup, Grass Range, Utica, Hobson and Garneill. Table 3.21 shows the forest products sold in the Judith RA from 1978 through 1987.

CULTURAL RESOURCES

Cultural resources are broadly defined by BLM as any cultural property or traditional lifeway value. Cultural properties are definite locations of past human activity, occupation or use. Traditional lifeway values are the traditional systems of religious belief, cultural practice or social interaction that are not closely identified with definite locations.

Cultural properties are generally similar in terms of type, composition, and significance throughout the planning area. The major differences are the archaeological site density and distribution patterns which differ north and south of the Missouri River.

The prehistoric period began around 14,000 years ago and ended around 1855, with the signing of the Blackfeet Stevens Treaty. The inhabitants of this area were mostly hunters and gatherers utilizing the natural resources (plant and animals) for subsistence activities. Even though some species of big game became extinct and changes in weapon technology improved hunting proficiency, hunting and gathering was a stable life style for prehistoric Native Americans that lasted thousands of years.

Based on previous archaeological investigations, the average site density for prehistoric sites in the Valley and Phillips RAs is one site per 100 acres or six to seven sites per section on unfarmed or undisturbed terrain of glacial origin. The site density is believed to be somewhat lower in the Breaks area and throughout the Judith RA. One area, the Big Bend in the Phillips RA, has archaeological resources of particularly high site density and unusual significance. A more detailed discussion is given in the Big Bend, of the Milk River ACEC description later in this chapter.

There are approximately 600 archaeological sites recorded in the Judith RA, 900 in the Valley RA, and 2,180 in the Phillips RA. The difference in numbers is not only a reflection of the inventories conducted, but a difference in site densities. Most of the sites in the Judith RA are habitation and industrial sites, represented by hearth and lithic scatters. The overwhelming majority of the sites in the Valley and Phillips RAs are habitation sites and consist of tipi rings and cairns.

Archaeological sites are classified into four functional 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 planning 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. Buffalo jumps, traps, and impoundments (with associated processing areas) are the most common procurement sites. Such sites are characterized by large deposits of bones at the base of bluffs and cliffs or in steep coulees. 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.

The major source of tool-quality stone in the Valley and Phillips RAs is the ubiquitous glacial deposits; in the Judith

RA, the major sources are at the base of the mountains and in outwash terraces. Ritual or ceremonial sites include rock art sites, burials, medicine wheels, intaglios, specific cairns, and rock or wooden structures which may have been used as shaman or vision quest facilities. These sites (potential traditional cultural properties) occur throughout the planning area, but are concentrated in the Phillips and Valley RAs. Known and currently used traditional cultural properties are limited to the Phillips RA. However, continued information gathering efforts in the Judith and Valley RAs indicate that the potential exists for currently used traditional cultural properties in those areas.

The protohistoric period is a bridge between the prehistoric period between when no written records were kept and the historic period when reasonably accurate and complete written records were kept (roughly 1805 to 1855). There are important protohistoric period cultural properties in the planning area, but most are located on private land or other federal and state land. Such sites include Lewis and Clark campsites, trading posts, military posts, steamboat landings, woodhawk cabins and U.S. Army and Indian battle sites. Historic trails once passed through the planning area, including the Carroll Trail, the North Overland Road and the Nez Perce Trail. Most of the historic sites and trails exist mainly in the historical literature; few have ever been documented and evaluated on the ground.

Later in the historic period, homesteading brought settlers into the planning area by the thousands. The region was quickly settled by Germans and Scandinavians from the midwest, as well as by eastern European immigrants like Bohemians and Yugoslavs. By the end of World War I however, a severe drought had begun and food prices had fallen drastically. By 1925, one out of every two homesteaders had lost or abandoned his farm. Many homesteads reverted to the government through provisions of the Bankhead-Jones Farm Tenant Act which authorized the government to buy homesteaded lands and rehabilitate them for grazing use; these lands are now managed by the BLM.

The distribution of historic sites on BLM land coincides primarily with the Bankhead-Jones lands, and are homestead related. Homestead sites consist mainly of foundations, depressions and artifact scatters primarily from the homesteading period of 1910 to 1925. Homestead sites are classified as homesteads or farmsteads, townsites, railroad sidings, rural schools and rural churches.

Other historic sites likely to be found on BLM land in the Judith and Phillips RAs are those related to gold mining in the Judith, Moccasin and Little Rocky Mountains. These sites consist of the remnants of mines, adits, tramways, kilns, cabins, dumps and equipment. The larger sites such as mills and towns (Maiden, Giltedge, Kendall, Zortman, Landusky) usually occur on private land.

There are approximately 150 historic sites recorded in the Judith RA, 40 in the Valley RA, and 170 in the Phillips RA. The variation in the number of sites primarily reflects the amount of inventory conducted.

RECREATION

BLM land provides a wide range of recreational opportunities from picnicking, sightseeing and watching wildlife to hunting and fishing. These opportunities meet a diversity of visitor preferences. Participation in specific recreational activities varies with the season of the year. Hunting dominates the scene in the fall with limited snowmobiling and cross-country skiing during the winter. Springtime activities include fishing, sightseeing and photography. Camping, picnicking, pleasure driving, sightseeing, fishing, hiking, boating, collecting and shooting prairie dogs dominate recreation during the summer months along with some dispersed ORV use. Overall, BLM land supports some type of recreational activity throughout the year, with the heaviest use occurring during the fall hunting seasons. BLM land received about 88,700 recreation visits in 1988. Of this use, the Valley RA provided 12,500 visits, the Phillips RA 35,400, and the Judith RA 40,800 (see Table 3.22). Recreation use on BLM land is expected to increase approximately 2% per year.

TABLE 3.22
RECREATION USE ON BLM LAND (VISITS)

Recreation Category	Resource Area			
	Judith	Valley	Phillips	Total
Hunting	16,800	8,900	11,400	37,100
Sightseeing, picnicking, & watching wildlife	5,100	200	9,400	14,700
Fishing	3,300	2,800	5,700	11,800
Pleasure driving	9,800	200	1,100	11,100
Camping	1,200	200	6,200	7,600
Hiking, horseback riding, & bicycling	1,900	0	1,000	2,900
Other	2,700	200	600	3,500
Total	40,800	12,500	35,400	88,700

Source: BLM, 1990

Twelve recreation management areas (RMA) comprise the planning area. Most are dispersed recreation oriented, with little or no intensive use or facilities present. These RMAs are Square Butte, Judith, Judith Mountains, Snowy Mountains, Judith River, Lewis and Clark National Historic Trail, Nez Perce Historic Trail, Little Rocky Mountains, Phillips, South Phillips, Valley and South Valley.

VISUAL RESOURCE MANAGEMENT

An inventory of the visual resources was completed for the Prairie Potholes Vegetation and Missouri Breaks Grazing EISs. This inventory evaluated the visual features of land, water surface, vegetation and structures which provided the subsequent delineation of scenic quality, visual sensitivity, visual zones and visual resource management (VRM) classes. Scenic quality, sensitivity to changes in the landscape and distance zones were factored together to determine the VRM classes. Additional VRM information is given in the VRM section of Management Common to All Alternatives in Chapter 2.

Most of the planning area has common prairie type scenery. Those areas with above average or outstanding scenery which should be noted here, include Square Butte, the Judith and South Moccasin Mountains, the Judith River Breaks and the Missouri Breaks.

OFF-ROAD VEHICLES

Off-road vehicle (ORV) use is primarily associated with other activities such as hunting, fishing and driving for pleasure. These activities account for 68% of the total visitor use in the planning area. The major types of vehicles used for off-road travel are the two-wheel or four-wheel drive pickup and the all terrain vehicle (ATV). The numerous unimproved roads and trails scattered throughout the planning area provide access for off-road travel. Most snowmobiling (approximately 800 visits annually) is done for the enjoyment derived from operating the machine and is considered dispersed recreation use. ORV use in a limited area, a concentrated time span or during the wrong conditions can cause social problems and resource damage. These problems include resource damage such as soil erosion on steep slopes, soil compaction and rutting from use during wet periods, destruction of vegetation and loss of ground cover as roads and trails are created and/or expanded.

Harassment of wildlife and a loss of scenic quality may occur due to additional roads and trails.

Social problems can also occur between hunters on foot or horseback and hunters using vehicles. Extensive use of motorized vehicles is causing some conflicts among the various user groups.

The highest concentration of ORV use (cross-country travel) occurs during the fall hunting season. Hunters use their vehicles and ATVs extensively to search for or retrieve game. Problems associated with ORV use are found throughout the planning area, especially in the southern part of the Valley RA and in northeastern Petroleum County and northern Fergus County of the Judith RA. One intensive ORV use area is located near Glasgow in the Valley RA. No other intensive use sites have been identified.

WILDERNESS

There are currently no designated BLM wilderness areas within the planning area. Seven wilderness study areas (WSAs) have been studied as a result of the BLM's Intensive Wilderness Inventory. These WSAs are Burnt Lodge, Antelope Creek, Cow Creek, Bitter Creek, Woodhawk, Dog Creek South and Square Butte. Square Butte is discussed under ACECs. These seven WSAs contain 134,987 acres of which 90,067 were recommended as nonsuitable and 44,920 acres were recommended suitable for wilderness designation.
The Burnt Lodge WSA is located on the north side of Fort Peck Reservoir in the Phillips and Valley RAs. It contains 13,730 acres and is bounded on the north by Plum Creek Road, private and state lands; on the east and west by private lands; and on the south by Ball Creek Road, the CMR, private lands and state lands. All of this WSA was recommended as suitable for wilderness designation.

The Antelope Creek WSA is located on the north side of the Missouri River in the Phillips RA. It is contiguous on the south side to the CMR. The WSA contains 12,350 acres of BLM land and is bounded on the north by Fortress Butte, Highway Ridge Road, Power Plant Ferry Road, and private, state and public lands; on the west by the Power Plant Ferry Road; on the south by the Missouri River, CMR, and private lands; and on the east by the Antelope Ridge Road. Approximately 9,600 acres of this WSA were recommended as suitable for wilderness designation.

Half of the Cow Creek WSA, 17,050 acres, lies in the Phillips RA. The other half is located in the Havre RA which was included in the West HiLine RMP. It is bounded on the north by private, state, and other public lands; on the west by that portion of the WSA in the Havre RA; on the south by Cow Island Recreation Road, Power Plant Ferry Road, and private lands; and on the east by Cabin Coulee Road, Coyote Road, private lands, and state lands. Approximately 21,590 acres of this WSA were recommended as suitable for wilderness designation.

The Bitter Creek WSA is located in the Valley RA, approximately 25 miles northwest of Glasgow, and 18 miles south of the Canadian border. The WSA contains 59,660 acres of BLM land located in three roadless segments identified as Bitter Creek South, Bitter Creek West and Bitter Creek East.

The Woodhawk WSA, approximately 8,100 acres, is located on the south side of the Missouri River in the Judith RA. It is bounded on the north by Sunshine Spur Road and public

lands; on the west by Woodhawk Trail Road, state and public lands; on the south by Two Calf and DeMars Roads; and on the east by the Missouri River and private lands.

The Dog Creek South WSA consists of about 5,150 acres on the south side of the Missouri River in the Judith RA. The WSA is bounded by the Missouri River, other public lands and a county road. The WSA is fairly compact, about 5 miles long and 1 to 3 miles wide. Drainages of intermittent streams are steep and separated by narrow, barren ridges. 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.

LANDS

BLM land ranges from very scattered tracts in Judith Basin and Chouteau Counties to well blocked lands in portions of the remaining counties. Concentrations of BLM land are located in northern Fergus, northern and eastern Petroleum, southern Phillips, and southern and northwestern Valley Counties. A significant amount of BLM land throughout the planning area are lands reacquired from private ownership via the Bankhead-Jones Farm Tenant Act.

Blocks of public land have been withdrawn from multiple-use management for various purposes such as national wildlife refuges, Native American reservations, Bureau of Reclamation (BR) lands, Corps of Engineers (COE) lands and powersites. Table 3.23 describes the withdrawing agency and size of withdrawals by resource area.

Rights-of-way (ROW) are issued for various utility and transportation purposes, communications sites, oil and gas pipelines and water related facilities such as reservoirs, dams, ditches, canals, dikes, wells and water pipelines. Table 3.24 identifies type, numbers, and acres of ROWs by resource area.

Few leases and permits are issued in the planning area. Permits and leases have been issued for agricultural purposes and recreation and public purposes. Table 3.25 identifies these permits and leases by type and acres for each resource area.

Land acquisitions and disposals are primarily accomplished by exchange. Five sales were completed within the planning area in the last 10 years; three at the D-Y Junction in Phillips County and two in Valley County at Hinsdale and Tiger Butte. Table 3.26 identifies acres of acquired and disposed lands by resource area.

TABLE 3.23
AGENCY AND SIZE OF WITHDRAWALS BY RESOURCE AREA (ACRES)

Agency	Judith	Valley	Phillips	Total
BLM	15,581*	434	1,061	17,076
USFS	1,420	-	-	1,420
USFWS	144,592	421,790	249,091	815,473
USAF	92	-	-	92
COE	23,203	144,111	81,310	248,624
BR	-	2,150	32,219	34,369
BIA	-	-	114,057	114,057
STATE DEPT.	-	352	323	675
Total	184,888	568,837	478,061	1,231,786

*Includes Power Site classification and reservations totalling 13,195 acres.

Source: BLM, 1990.

TABLE 3.24
FEDERAL RIGHTS-OF-WAY BY RESOURCE AREA (NO./ACRES)

Type	Judith No./Size	Valley No./Size	Phillips No./Size	Total
Powerlines	32/724	2/1,671	25/1,305	59/3,700
Telephone	17/641	8/221	11/1,283	36/2,145
Comm.Sites	10/4	2/1	17/45	29/50
O&G Pipe.	2/273	7/38	60/124	69/1,525
Mat. Sites	6/37	3/21	5/43	14/101
Roads & Highways	54/1,432	24/944	39/1,908	117/4,284
Railroads	8/69	2/272	4/315	14/356
Water Related	22/2,402	20/617	38/8741	80/11,760
Total	151/5,582	68/3,785	199/14,854	418/24,221

Source: BLM, 1990.

TABLE 3.25
FEDERAL LEASES & PERMITS BY RESOURCE AREA (NO./ACRES)

Type	Judith No./Size	Valley No./Size	Phillips No./Size	Total
302 (b) Permit	5/40	2/11	2/34	9/85
302 (b) Lease	2/10	1/11	-	3/21
R & PP Lease	1/3	2/80	5/21	8/104
Total	8/53	5/142	7/55	20/210

Source: BLM, 1990.

TABLE 3.26
BLM ACQUISITION/DISPOSAL
BY RESOURCE AREA (NO./ACRES)

Type	Judith No./Size	Valley No./Size	Phillips No./Size	Total
Acquis.	7/3,786	4/6,860	6/9,987	17/20,633
Disposal	7/7,848	*6/7,083	*9/10,355	*21/10,355

*Includes exchanges and sales

Source: BLM, 1990.

TRANSPORTATION AND ACCESS

BLM maintains approximately 338 miles of roads annually; 117 miles in the Judith RA, 135 miles in the Phillips RA, and 86 miles in the Valley RA. A map of the existing transportation system can be examined in the Lewistown District Office. The information in this system includes maintained and unmaintained road status.

AREAS OF CRITICAL ENVIRONMENTAL CONCERN

ACECs are areas that may require special management to protect resource values. The Square Butte Outstanding Natural Area is currently the only designated emphasis area in the planning area. There are seven other areas identified as potential ACECs that meet the relevance and importance criteria. They are the Judith Mountains Scenic Area, Acid Shale-Pine Forest, Collar Gulch, Azure Cave, Big Bend of the Milk River, Prairie Dog Complex 1, and Prairie Dog Complex 2. Prairie Dog complexes 1 and 2 have been combined into one potential ACEC. Each of these areas has resource and/or human values that are unique within the planning area. These values will be discussed for each area. Designation and management prescriptions for ACECs only apply to public lands administered by BLM.

Judith Mountains Scenic Area

Significant scenic, wildlife and recreation values are found in an area that includes a portion of the Judith and South Moccasin Mountains that form the backdrop for the City of Lewistown. This backdrop is the key area that provides the scenic setting for the residents and travelers living in or passing through Lewistown. The Class "B" category is indicative of the excellent scenic quality rating for the area. This area is the dominant visual feature on the landscape and can be seen quite readily from the community of Lewistown and from area highways U.S. 191 and U.S. 87. This area is shown on Supplemental Color Map B at the conclusion of Chapter 2.

Sightseeing, driving for pleasure (scenic drives), hiking, mountain biking and hunting are all considered as main recreational activities in this area. Some off road vehicle use occurs mainly on unimproved roads and trails in the upper end of Limekiln Canyon in the Judith Mountains. There is a small picnic area located in the lower end of Limekiln Canyon. Legal public access to the South Moccasin Mountains is currently unavailable.

The BLM land in this area currently provides yearlong, medium to high value habitat for mule deer, white-tailed deer, merriam turkey, blue grouse, and ruffed grouse. Prairie falcons may nest in the cliffs of the Judith Mountains.

Livestock grazing rarely occurs on any of the public land within the proposed ACEC. Factors such as distance to water, steep slopes and thick timber all contribute to making this area mostly unsuitable for grazing.

The area is rated as having moderate occurrence potential for oil and gas. No leases on public lands have been issued in this scenic area nor have any wells been drilled in the past to explore for oil and gas prospects.

Small areas of the forest have been harvested for sawtimber, post and poles and fuelwood. There are 1,500 acres of productive forest land currently available for that type of product use.

The area has a high occurrence potential for locatable minerals, notably precious metals, and has a moderate development potential. One exploration project has been proposed and there are no active mines. It is anticipated that the area will continue to attract exploration projects and may, given the right conditions, see active mining in the future.

Acid Shale-Pine Forest

These unique areas have limited occurrence across the planning area and are characterized by dominantly slow growing ponderosa pine trees with almost bare shale beneath the trees and limited creeping juniper and grass understory between the trees. Small openings or parks produce grasses, forbs and shrubs. The plant community is unique to the acid shale landscapes. These areas have little value for livestock, except shade and shelter from storms or the hot summer sun yet many species of wildlife use these areas for food, shelter and reproduction. This area is shown on Supplemental Color Map C at the conclusion of Chapter 2.

These communities are for the most part, isolated and of limited range and extent. It appears they are only found in general areas of central and eastern Montana and comprise only a small fraction of the normal vegetative community. It appears some of the best examples of this unique plant association are found within the planning area in the eastern portion of the Judith Resource Area.

The acid shale forests have clayey soils that produce sparse vegetation; are very fragile; and are subject to water and wind erosion. Landscapes are gently rolling to very steep with much rill and gully activity.

The acid shale derived soil landscapes with characteristic unique vegetation are primarily in soil subgroup 3 (see Appendix D). The soils exhibit severe erosion potential and are vulnerable to changes such as increased grazing pressure, intense rains and rapid runoff. Sedimentary accumulations are from 5,000 to 8,000-feet deep. Geologic formations exposed at the surface are Colorado Group shales of marine origin (Ross, 1955) and the area has a moderate occurrence potential for oil and gas. Cretaceous sands are the primary target of gas exploration while mesozoic to paleozoic strata would be likely targets for oil exploration. The cretaceous Cat Creek formation produces both gas and oil. There is also some oil production from deeper paleozoic Amsden formation at Cat Creek field.

The bedrock formation underlying the potential ACEC is the Cretaceous Colorado Group formations (Ross, 1955). This formation is composed of marine shales and does contain bentonite beds. Bentonite in this formation is not of a minable thickness.

Square Butte ONA

Square Butte is a well known regional and national landmark rising abruptly from the plains in southern Chouteau County near the junction of the Arrow Creek and Shonkin Sag valleys. It is highly scenic (Class A scenery) and rises some 1,500 vertical feet above the surrounding plains. This area is shown on Supplemental Color Map A at the conclusion of Chapter 2.

The butte is the remnant of a laccolith intruded into the Eagle sandstone and is composed entirely of igneous rocks. The lower portion of Square Butte is composed of dark colored igneous rock termed shonkinite. This rock erodes into cliffs, spires and crags that gradually recede as one proceeds upward.

Square Butte was designated an Outstanding Natural Area in the Little Belt Management Framework Plan of 1972 by Secretarial Order and then as a National Natural Landmark in 1980.

The area is made more unique and diverse by the opportunity to observe mountain goats, elk, mule deer, prairie falcons and a host of other wildlife. A successful introduction of goats, was made on Square Butte in 1941. Hunting seasons from 1957 to 1965 produced high hunter success. The population decreased to near zero, for unknown reasons after 1965. A reintroduction of seven goats was made in 1971. The current population varies from 35 to 50. In the late 1970s elk migrated from the Highwood Mountains to Square Butte via Round Butte during the winter. In the 1980s these elk became yearlong residents with a population of approximately 50. Hikers may see elk, mountain goat and more common wildlife such as mule deer. This makes Square Butte a unique and significant recreational experience.

There a number of prehistoric vision quest sites and other cultural resource sites on the summit and slopes of Square Butte. These cultural properties could be considered sacred by Indian peoples of the region.

The geology of this area has enhanced hydrocarbon potential due to the likelihood of stratigraphic traps and increasing porosity and permeability in the reservoir rock known to exist in the area. The ACEC is considered to have moderate potential for oil and gas resources.

The grazed portion at the base of Square Butte is in very good range condition. It is used during late fall, which allows the vegetation to grow the entire grazing season. Most of Square Butte is inaccessible to livestock; therefore 1,200 acres are not allocated to livestock grazing.

Collar Gulch

The westslope cutthroat trout, which inhabits Collar Gulch Creek, in the Judith Mountains has become increasingly rare in Montana due to a loss of habitat, loss of populations and genetic dilution. The westslope cutthroat trout is a Montana State species of special concern. The trout from Collar Gulch Creek were identified as pure westslope trout by the University of Montana genetics laboratory. According to R. Leary and F. Allendorf of the University of Montana, "most of the genetic variation in westslope cutthroat trout is contained between populations instead of within populations. Thus, each population represents a potentially valuable source of genetic variation. Because the westslope cutthroat trout in Collar Gulch Creek is a pure population, this population should be preserved." The trout inhabit about a mile of the creek partially on BLM and partially on private land. The main threats to this population are extreme drought and water pollution. Water quality samples collected in 1982 indicate high levels of lead, possibly from abandoned mining activities. This area is shown on Supplemental Color Map D at the conclusion of Chapter 2.

The Collar Gulch area is part of the historic Judith Mountains Mining District, established in the early 1880s. The potential ACEC contains scattered remains of historic mining activity such as adits, mineshafts, prospects, collapsed cabins and a millsite. Most of these remains probably date from the turn of the century.

The Tate-Poetter Cave is located on BLM land within the potential ACEC. Inventory data indicates this cave is an important bat hibernaculum for big-eared bats as well as

possessing significant cave resources such as spelothems. The FWS lists Townsend's big-eared bat as a Candidate 2 species.

The potential ACEC contains land with high and moderate hardrock mineral development potential. Since 1985, this drainage has been the target of exploration drilling by three different companies. Most of the recent activity is centered around the old Tail Holt Mine on the northeast side of Big Grassy Peak. The mine has a history of gold and silver production from the mid 1930s (Robertson, 1949). Present efforts are underway to reopen the old workings (BLM, 1990).

The rough terrain and close proximity to igneous plutonic rocks at the surface make the likelihood of exploratory oil and gas activity inside the area negligible.

The Collar Gulch drainage contains some productive forest land. Lodgepole pine and Douglas-fir are the most common commercial timber species. An intensive inventory is needed to determine the total number of productive forest acres in the Collar Gulch drainage.

The Collar Gulch and Collar Peak trails cross through the drainage and a jeep road penetrates the area from the south. There is a BLM campsite located on the southern boundary of the drainage.

Azure Cave

Azure cave is a limestone solution cavern located near Zortman, in the Little Rocky Mountains and is shown on Supplemental Color Map E at the conclusion of Chapter 2.

Azure cave has national significance because of its bat hibernaculum values. A colony of bats, nine species including little brown myotis (Myotis lucifugus) and least brown bat (Myotis leibii), occupies the cave during the winter. It is one of several hibernaculums in the Pacific Northwest and possibly the northern most in the United States (Chester et al., 1979).

Azure Cave is located at an altitude of 4,465 ft. The inner temperature is 41°F. The entrance is a 20-foot diameter opening on the south side of a steep canyon which leads to a 6-foot high passage into the top of the Big Room. A 70-foot drop is required to reach its floor. Big Room has two pits leading 40-feet downward to the lower level. Most of the lower level is horizontal and contains several rooms connected by small crawlways. One crawlway leads upward to a series of small rooms and dome pits. Many of the rooms are partially clay filled and most of the crawlways are plugged with red clay after a short distance. The cave reaches a depth of -220 feet and has 1,580 feet of mapped passage.

Azure Cave contains a significant amount of speleothems. The lower level has many stalactites and stalagmites, some of which are more than 6-feet long. Cave popcorn and flowstone decorate the walls of the cave. In one room, a very large cluster of helectites are found which are probably the best in Montana. Formations are still growing since the cave is active and wet.

The surface geology at the site of the cave is Mississippian limestone of the Mission Canyon or Lodgepole Formation. Based on the stratigraphy and the potential for both stratigraphic and structural traps the area is rated as having moderate occurrence potential for oil and gas.

The lands within the potential ACEC boundary have high and moderate development potential for gold and silver. Mineralization is located along north-south trending structures in the Paleozoic limestones. This formation also contains the cave resources that the existing withdrawal and the potential ACEC seek to protect. An ore body of 1.5 to 2 million tons has been identified north of the cave, part of which may lie inside the potential ACEC boundary.

The lands were transferred to the BLM from the National Forest System by Public Land Order No. 3938 on February 23, 1966. This order withdrew 139.41 acres around the entrance to the Azure cave for the protection of public recreation values and the significant cave values and resources it contains. This withdrawn area is within the potential ACEC boundary. The withdrawal removed the land from all forms of appropriation under the public land laws, including the mining laws (Title 30, U.S.C., Ch. 2) and reserved under the jurisdiction of the Secretary of Interior for the protection of public recreation values. The withdrawal does not alter the applicability of the public land laws governing the use of the land under lease, license, or permit, or governing the disposal of their mineral or vegetative resources other than under the mining laws.

Big Bend of the Milk River

The Big Bend area of the Milk River, northeast of Malta, has a high density of archaeological resources, many with rare or unique characteristics and scientific values. The cultural resources are between 1,000 and 2,000 years old and provide an exceptional opportunity for the study of relatively pristine sites encompassing a broad range of cultural functions established during a short period of prehistory. Sites include prehistoric bison kills in the form of traps, jumps and pounds with associated drivelines; prehistoric ceremonial and religious locales such as petroglyph boulders, medicine wheels, intaglios and burials; and complex habitation and resource exploitation manifestations characterized by large numbers of stone circles and cairns. This area is shown on Supplemental Color Map F at the conclusion of Chapter 2.

Two archaeological sites have been nominated to and are currently listed on the National Register of Historic Places

(NRHP) (24PH188 and 24PH189). Collectively termed the Beaucoup Site Complex, the two sites represent the nearly intact archaeological remains of Besant and Avonlea bison hunting cultures in primary archaeological context.

The Henry Smith Buffalo Jump Site (24PH794), an Avonlea bison kill site, is also within the Big Bend area, but is not currently listed on the NRHP. It is, however, considered eligible for listing. This site contains bison kill areas, drive lines, meat processing areas, petroglyph boulders and numerous concentrations of tipi rings and intaglios.

Although the Big Bend area has not been completely inventoried or evaluated the resources thus far located are nationally or regionally significant and represent a rare and irreplaceable cultural resource.

The Big Bend area is well known to local artifact collectors. These individuals have vandalized portions of the area (through unauthorized excavation) thus endangering the value of the entire area by destroying part of the resource. In addition to vandalism, the natural erosion process is degrading portions of archaeological sites throughout the Big Bend area. The archaeological resource in this area is extremely vulnerable to continued damage through intentional and casual vandalism.

All of the area is rated as high occurrence potential for oil and gas. This is due to the gas production from the Phillips and Bowdoin Formations which were discovered to have commercial quantities of gas in 1913. The discovery well is within the boundary of this area. There are three producing fields in this area; Ashfield, Bowdoin and Whitewater. The gas production is from shallow wells drilled into sandstone which is sandwiched between layers of impermeable marine shale. The producing zones are relatively thin and rarely have water associated with them. The overall structure of the area is a broad dome. Big Bend is located near the center of the dome where many of the most prolific gas producing wells are located.

The bedrock formation underlying the potential ACEC is the Cretaceous Claggett Formation (Ross, 1955). This formation does contain bentonite beds, but they are not of a minable thickness favorable for development.

Vegetation types in the area include grassland, grassland-sagebrush and woodland. The latter type occupies a narrow strip of land along the Milk River and in coulee bottoms. Tree and shrub species include chokecherry, common snowberry, creeping juniper, plains cottonwood, silver sage, big sage, rose, silver buffaloberry, willow, boxelder and a half shrub, fringed sagewort. Grass species include blue grama, green needlegrass, western wheatgrass, inland saltgrass, little bluestem, needleandthread, plains muhly, and prairie junegrass. There are no known endangered, sensitive, or threatened plant species in the area. There may be small patches of noxious plants (Canada thistle, leafy spurge, and knapweed) in the area.

Topography in the area varies from gentle rolling grasslands to level terraces along the Milk River, to river Breaks composed of exposed shales, clays, and sandstones.

Prairie Dog Complex

The Prairie Dog 7km Complex is in the southern portion of the Phillips RA and includes both the Complex 1 and Complex 2 ACEC nominations. This area contains a significant amount of high quality habitat for endangered black-footed ferret. Prairie dogs are essential as the primary preys species for the black-footed ferret. The 7kmComplex is based on the FWS habitat assumptions for ferret management: the area encompasses two or more prairie dog towns that are not more than 7 kilometers apart (Biggins et al, 1989). The area includes 12,346 acres of prairie dog towns on BLM land. Only BLM land would be part of the ACEC. Map 7 in the back of this document shows the location of the 7km Complex.

The black-footed ferret, thought to be nearly extinct was rediscovered at Meeteese, Wyoming late in 1981, and has become a nationally important species. It is now considered the rarest mammal in North America, with all known ferrets in captivity. A successful captive breeding program has allowed U.S. Fish and Wildlife Service (FWS) to plan reintroduction of the ferret in its natural environment. The existence of suitable habitat for this species is a critical national resource.

In 1986, the Montana Black-Footed Ferret Working Group proposed eight possible reintroduction sites (Clark, et al, 1987). In 1987, they narrowed the selection to the top four Montana sites which are all in or associated with the Phillips RA. The four sites were further evaluated after additional inventory data in 1988, and a paper by Clark and Minta (1989) selected this as the best possible site for reintroduction of the ferret in Montana.

Prairie dog towns have a unique assemblage of associated species that depend on these towns for habitat. Some of these species include the burrowing owl and the mountain plover another rare species which depends on the bare rocky soil found in prairie dog colonies for suitable nesting habitat. Prairie dog towns in this area also provide a recreational opportunity for a significant number of prairie dog shooters from the local area and across the country. The prairie dog towns in this complex are located within 61 livestock grazing allotments. Prairie dog expansion and use of vegetation and expansion can reduce available vegetation and hold the potential natural community at an early seral stage of development. The lands in this area have various values connected with fluid mineral potential. These three townships are rated as having high occurrence potential as a result of the favorable stratigraphy and recent drilling activity; T. 23 N., R. 28 E. and R. 29 E. and T. 27 N., R. 27 E. The rest of the area is rated as moderate potential.

ECONOMIC CONDITIONS

The planning area is a predominantly rural region with an economy based on production, extraction and use of natural resources. These resources include land used for crop and livestock production, oil and gas production, hardrock mineral production and water and wildlife that offer outdoor recreation opportunities. The industries dependent upon these resources are primarily export-based in that goods and services produced are exported from the planning area; providing an important source of new dollars to the area's economy. The following section describes the major industries in the planning area that could be affected by BLM management actions.

Agriculture

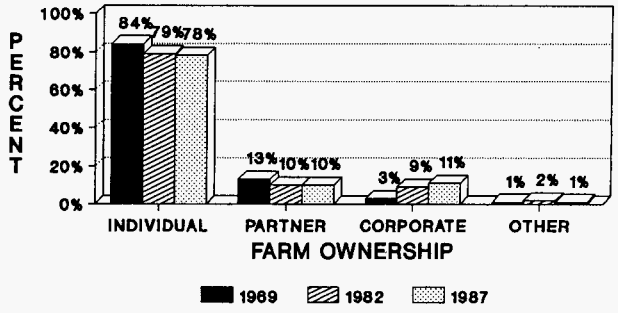
Livestock grazing first occurred in the Judith Basin during the late 1870s and expanded with the open-range boom until the mid-1880s. Ranchers during the open-range era owned only small portions of the vast areas of land under their control. With the drought and bad winter of 1886-1887, ranch management moved toward more local ownership, raising hay, developing water resources and grazing sheep. Homesteading in the early 1900s, increased farming with scattered operations along the irrigated river bottoms of the Missouri and Milk Rivers. There was an exodus of homesteaders throughout the 1920s and 1930s and many surviving agricultural operations began to diversify by raising both livestock and grain. New farming machines and methods, liberal land policies, and the advent of farming combined to form the area's social and economic base of ranching and farming, which has continued to modern times.

The majority of agricultural operations raise both livestock and grain. The major agricultural products are cattle, wheat, barley, oats and hay. Fergus, Judith Basin, Valley and Phillips Counties have an approximately even balance between livestock and crop receipts. A larger percentage of cash receipts from agriculture in Petroleum County come from livestock production than crop production. Chouteau County is primarily a grain producer. In 1987, Chouteau County ranked first in wheat production and second in barley production in Montana.

Ownership of farms and ranches is primarily by individuals and families (see Figures 3.3 and 3.4). The number of individual and family farms has declined over the years, while corporate ownership has increased. However, corporate ownership remains a small percent of the total farms in the planning area.

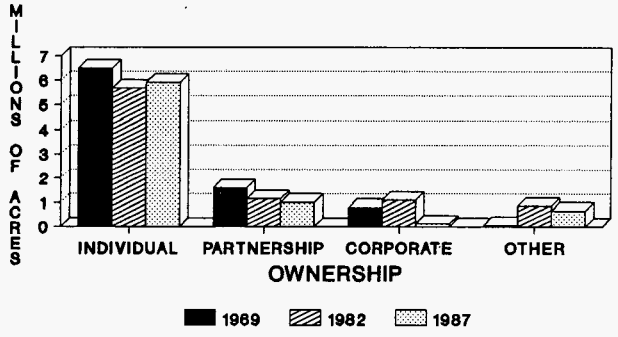
Figure 3.5 shows total farm employment between 1981 and 1988. There has been a general decline in farm employment during this period, which is expected to continue. The Montana Department of Labor and Industry projects a statewide decline of 3,000 jobs in agriculture by 1995, which is a 0.7% decline from 1988. This reflects the continued trend of consolidation and mechanization in the agricultural sector of the economy; a trend likely to continue as average ranch size increases.

FIGURE 3.3
Farm Ownership in the Planning Area (Percent)



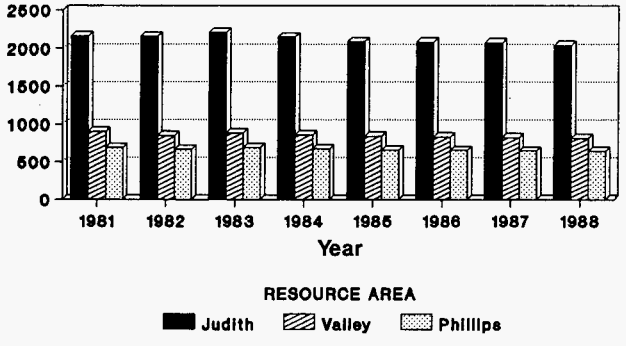
INCLUDES ALL OF CHOUTEAU COUNTY
SOURCE: US CENSUS OF AGRICULTURE 1987

FIGURE 3.4
Farm Ownership in the Planning Area (Acres)



FIGURES FOR CORPORATE AND OTHER NOT AVAILABLE FOR SOME COUNTIES (ESP 1987)
SOURCE: U.S. CENSUS OF AGRICULTURE 1987

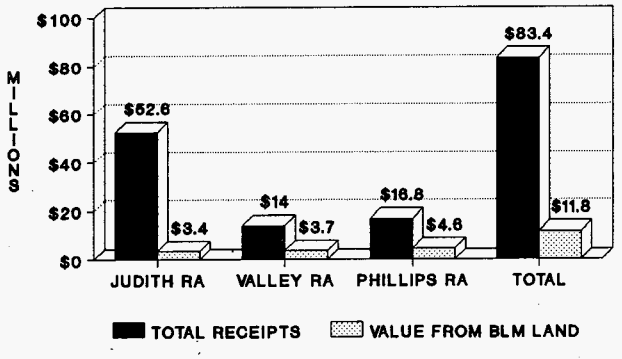
FIGURE 3.5
Total Farm Employment by Resource Area (1981-1988)



SOURCE: MONTANA COUNTY DATA PACKAGE 1990

The BLM's relationship to the agricultural economy of the area involves livestock on BLM land. BLM forage contributes approximately 3% of the area's personal income and employment. BLM forage contributes an estimated $11.8 million annually to livestock receipts in the planning area and averages 14% of the area's total livestock receipts. Figure 3.6 shows the portion of total livestock receipts attributable to BLM land. These livestock sales account for an estimated $40.5 million in total economic activity (including direct and secondary spending), $12.3 million in earnings and would generate approximately 483 jobs. Most of the economic activity and employment occurs in the agriculture and agricultural processing sectors of the economy along with the retail trade and service sectors. Table 3.27 shows livestock receipts, total economic activity, employment and earnings associated with livestock grazing on BLM land.

FIGURE 3.6
Regional Livestock Receipts (1986)



SOURCE: MONTANA AGRICULTURAL STATISTICS 1988 and BLM, 1990

TABLE 3.27
LIVESTOCK RECEIPTS, ECONOMIC ACTIVITY, EMPLOYMENT AND EARNINGS ASSOCIATED WITH LIVESTOCK GRAZING ON BLM LAND ($1,000)

Resource Area	Livestock Receipts	Total Economic Activity	Total Employment	Total Earnings
Judith	$3,434	$11,838	137	$3,591
Valley	3,684	12,700	153	3,853
Phillips	4,637	15,987	193	4,850
Total	$11,755	$40,525	483	$12,294

Source: BLM, 1990. Business activity, employment and earnings were estimated using coefficients from the Montana BLM Economic/Demographic Model.

Hardrock Minerals

Gold and silver mining in the planning area began in the 1880s. Gold was first discovered in the Judith Mountains in 1880 at Maiden Gulch, followed by other discoveries in 1881. Mining activity has occurred in the Judith, Moccasin, Little Rocky and the Little Belt Mountains.

Most mines in the area have operated intermittently since the early 1900s. Since the late 1970s, five gold and/or silver mines have been developed on sites of previous mining activity. This includes two mines in the Little Rocky Mountains, two in the Judith Mountains, and one in the North Moccasin Mountains. Bentonite is a mineral with previous high levels of mining activity in Valley and Phillips Counties, but is currently not being mined in the planning area. The immediate prospect for bentonite mining in the area is poor. If oil drilling activity were to increase the demand for bentonite would likely increase which could lead to renewed interest in bentonite mining in Phillips and Valley Counties.

The Landusky/Zortman gold and silver mines in the Little Rocky Mountains are operated by Zortman Mining Inc. opened in 1979, and employ approximately 200 workers. In the winter months, the work force drops to about 140. Most employees come from local communities including Malta, Landusky, Zortman and the Fort Belknap Indian Reservation. Residents of the Fort Belknap Indian Reservation comprise 16% to 18% of the Landusky/Zortman work force. Zortman Mining estimates that about 77% of its work force has been hired from the local area. The current projected life of these mines is through 1999, given present identified reserves.

The other three gold and silver mines in the area are in Fergus County. Blue Range Mining began underground development of the Gies Mine in the Judith Mountains in September, 1986. Current employment at the mine is 55, with an additional 43 employees at the Lewistown Mill. These two operations as well as other projects bring the local Blue Range work force to approximately 110, of which an estimated 80% have been hired from the local labor pool. Blue Range also received permit approval for the Virgin Gulch Mine in the Judith Mountains and is currently assessing whether or not to proceed with that project. If developed, the mine could employ 25 to 30 workers.

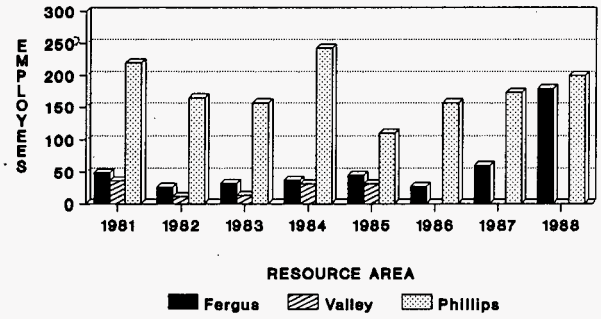
The Kendall mine in the North Moccasin Mountains was taken over by its present operator, Kendall Venture, in 1988. Current employment at the mine is 68 workers (about 66% hired locally). Kendall Venture has identified 3 years of reserves; however, the mining plan is being amended to cover an 8-year period.

The Spotted Horse mine in the Judith Mountains opened in the summer of 1986 and closed in 1990. The mine had a work force of 50 employees.

In addition to these mining operations, there are approximately 25 exploration projects in various stages of activity (see Appendix C) on BLM land as well as non-BLM land.

Figure 3.7 shows total employment in the minerals industry since 1981. Most of this employment is associated with the mining operations just described. The decline shown for Phillips County from 1984 to 1985 was due to reductions in bentonite employment. These losses were later offset by increases in employment at the Zortman/Landusky gold mines. Employment in Valley County was primarily associated with bentonite production. Mining employment figures for Valley County for 1986 through 1988 were unavailable. Mining is likely to continue with levels of mining and mine employment for gold and silver dependent on sustained high market prices.

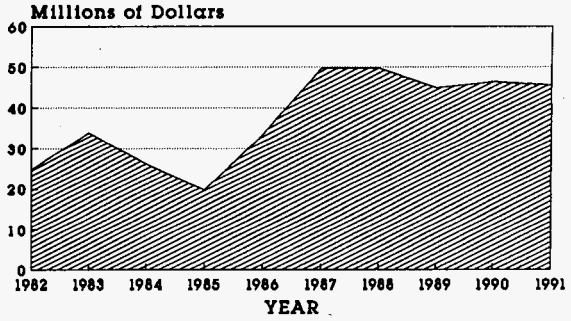
FIGURE 3.7
Total Mining Employment in Fergus, Phillips & Valley Counties (1981-1988)



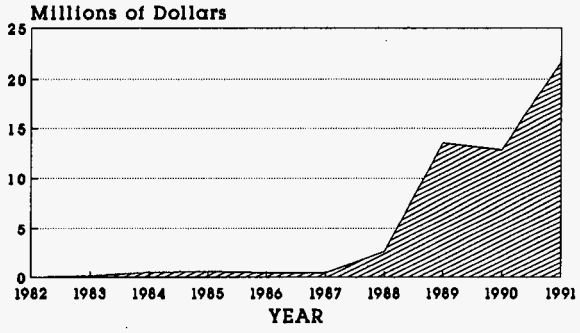
SOURCE: MONTANA COUNTY DATA PACKAGE (1990)

Figure 3.8 shows the gross value of metal mine production for both Phillips and Fergus Counties. Estimated expenditures for these operations were generally unavailable. The current annual payroll for mining operations is estimated to be $10.2 million, not including fringe benefits. Assuming an estimated 65% of this total to be disposable income, mining employment would generate $14 million in total economic activity primarily in retail trade and services, a total of 545 jobs (380 directly associated with mining and an additional 165 jobs resulting from secondary spending activity), and $2.9 million in additional earnings. The level of direct and indirect employment generated by mining represents 3% of total employment in the planning area. The increases in total economic activity, employment and earnings in the regional economy include increases associated with exploration-related local expenditures for the estimated 25 exploration projects currently underway. It is estimated that an exploration project in this area would cost $200,000; with $40,000 spent locally. These figures do not include increased economic activity associated with nonlabor operating expenditures that may occur locally; this omission may understate the actual economic impact of mineral development in the area. Most mining production occurs on nonfederal land in the planning area, with the exception of the Landusky/Zortman operations which are partially situated on BLM land; thus, only a portion of the economic activity estimated here would be attributable to BLM land.

FIGURE 3.8
Metal Mine Production
Gross Value - Phillips County



Gross Value - Fergus County



Source: MT Dept of Revenue

Oil and Gas

Nearly all of the federal mineral estate has been leased or is available for leasing.

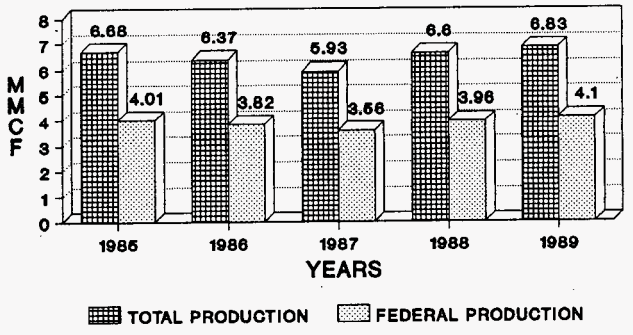
Oil production in the planning area is concentrated in two fields in Petroleum County: the Cat Creek field discovered in 1920, and the Rattlesnake Butte field, discovered in 1984. About 70% of the entire production from Cat Creek is federal; all other production is nonfederal. From 1985 to 1989, oil production from federal leases accounted for an average 30% of the area's total oil production. This percent has been increasing since 1985 as the production from the nonfederal Rattlesnake Butte field has been declining. Figure 3.9 shows oil production from all lands and from BLM land in the planning area.

Gas production in the area comes from fields in Fergus, Phillips and Valley Counties. The principal fields are Bowdoin (Phillips and Valley Counties), and Leroy (Fergus County). The first gas discovery in the area was the Bowdoin field in 1913. This field continues to be the largest gas producer in the area. From 1985 to 1989, gas production from federal leases accounted for about 60% of the area's total gas production. Figure 3.10 shows total gas production and gas production attributable to BLM land.

The total value of oil and gas production in the area is estimated to be $12.4 million. Of this total, $7.2 million would be attributable to production from federal leases (see Figure 3.11). From 1985 through 1989, production from federal leases averaged 55% of the total value of production. Production from federal leases account for an estimated $13.4 million in total economic activity, $1.8 million in earnings and generates approximately 89 jobs, including those jobs directly related to oil and gas activity, in the regional economy. This level of economic activity and employment includes drilling an average of 50 wells per year on federal leases, 40 of which would be development gas wells and the remainder exploratory. It is estimated that a development well in this area would cost $60,000 and an exploratory well would cost $290,000 to drill, 20% of which would be spent locally. These figures represent less than 1% of the area's personal income and total employment. Most of the economic activity and employment occurs in the petroleum and natural gas extraction, construction and transportation sectors of the economy, along with the retail trade and service sectors. Employment directly related to the oil and gas industry is included in Figure 3.7. Annual employment in Petroleum County was unavailable for confidentiality reasons.

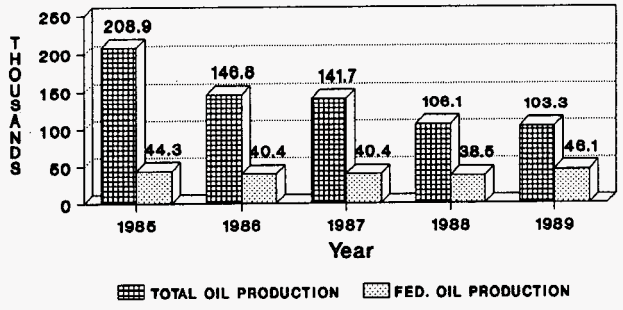
The outlook for exploration and development of oil and gas will depend on both domestic and world market conditions. Producing oil fields are in the declining stages of development, but favorable market conditions may spur new exploration activity. Exploration and development for gas has been relatively stable and should remain so for the foreseeable future. However, favorable market conditions could spur a large exploration or development program throughout the planning area.

FIGURE 3.10
Natural Gas Production in the Planning Area 1985-1989 (MMCF)



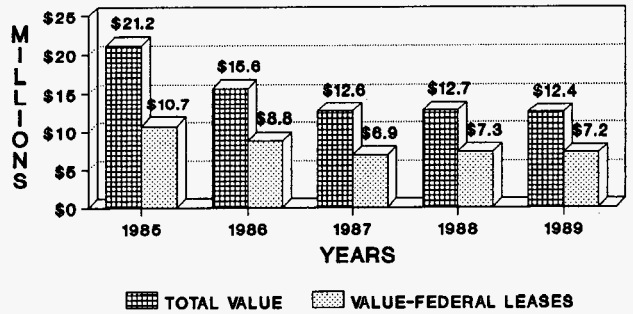
SOURCE: OIL & GAS ANNUAL REVIEW
MMCF-MILLION CUBIC FEET

FIGURE 3.9
Oil Production in the Planning Area 1985-1989 (Barrels)



INCLUDES CAT CREEK IN GARFIELD COUNTY
SOURCE: MT OIL & GAS ANNUAL REVIEW

FIGURE 3.11
Value of Oil & Gas Production 1985-1989 (Current $)

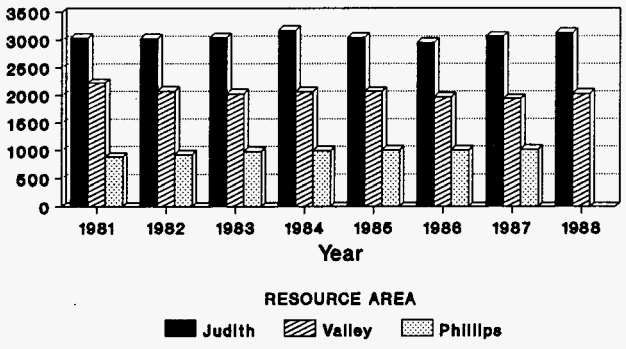


SOURCES: HISTORICAL ENERGY STATISTICS
AND MONTANA OIL & GAS REVIEWS

Tourism and Recreation

Tourism is closely associated with several sectors of the regional economy, most notably the trade and services sectors. These sectors provide substantial employment in each of the counties in the planning area. Included in the services sector are such industries as legal, personal, health, social, and business services, as well as hotels and lodging. Retail trade includes such businesses as eating and drinking establishments, clothing, automobiles and general merchandise. Wholesale trade, which includes both durable goods and nondurable goods, is more important in the area trade centers of Lewistown, Malta and Glasgow. Jobs and income in these sectors depend on the health not only of the tourism industry and those resources that draw visitors to the area, but other regional industries as well, such as agriculture, mining, and timber. Figure 3.12 shows total employment in the trade and services sectors from 1981 to 1988.

FIGURE 3.12
Total Employment in Trade & Services (1981-1988)



* SOME SECTOR DATA NOT AVAILABLE
SOURCE: MT COUNTY DATA PACKAGE (1990)

Visitors attracted to the area by recreation opportunities provided both by public and private lands spend money on goods and services such as food, lodging, meals, transportation, clothing and outfitter services. These expenditures are an important source of income and can help offset declines in the trade and services sectors created by fluctuations in the region's other major industries, agriculture and mining.

The State of Montana has divided the state into six "tourism countries" for promotional purposes. Two of those countries, the Charlie Russell Country and the Missouri River Country, incorporate 21 counties, including the six-county planning area. Nonresident travel to the two tourism countries containing the planning area was estimated to have contributed $98 million dollars in direct expenditures in the trade and services sectors during the 12-month period from April 1988 through March 1989. These expenditures are estimated to result in $177 million in total economic activity including secondary spending; $47 million in additional earnings; and 3,500 jobs throughout the 21-county area (Yuan, et al., 1989). Because nonresident travel data was unavailable at the county level, an estimate of nonresident travel expenditures for the planning area could not be made.

BLM land in the planning area provides a considerable amount of recreational opportunities for the public, such as hunting, fishing, camping and sightseeing. Direct expenditures associated with recreation on BLM land are estimated to be $4.9 million annually. These expenditures represent about 5% of the total nonresident travel expenditures for the Charlie Russell and Missouri River tourism countries. As this money circulates through the economy, an estimated $9 million in total economic activity will result with an additional $2.7 million in earnings and the equivalent of 113 jobs, primarily in the retail trade and service sectors. This level of employment comprises less than 1% of total employment in the planning area, but represents 2% of the trade and services sectors employment. Table 3.28 shows the expenditures, total economic activity, employment and earnings associated with recreation on BLM land within the planning area.

TABLE 3.28
EXPENDITURES, BUSINESS ACTIVITY, EMPLOYMENT AND EARNINGS ASSOCIATED WITH RECREATION ON BLM LAND ($1,000).

Resource Area	Direct Expenditures	Total Economic Activity	Total Employment	Total Earnings
Judith	$1,920	$3,535	45	$1,075
Valley	905	1,667	21	507
Phillips	2,058	3,789	47	1,152
Total	$4,883	$8,991	113	$2,734

Source: BLM, 1990. Business activity, employment and earning were estimated using coefficients from the Montana BLM Economic/Demographic Model.

In addition to economic activity associated with recreation-related expenditures, recreation provides benefits above those dollar values actually expended. These benefits are termed net willingness to pay, and provide a measure of the resource value people would have been willing to pay over and above actual expenditures. Net willingness to pay exists not only for recreation, but for other goods and services as well. However, estimates are not available for commodities in the other sectors described in this section.

The net willingness to pay for recreation on BLM land in the planning area is estimated to be $3.5 million. Table 3.29 shows total economic benefit of recreation on BLM land in the planning area. Total economic benefit, estimated to be

$12.5 million, includes economic activity associated with recreational opportunities and the net willingness to pay for that level of recreation.

TABLE 3.29
TOTAL ECONOMIC BENEFIT OF RECREATION ON BLM LAND WITHIN THE PLANNING AREA ($1,000)

Resource Area	Total Economic Activity+	Net Willingness to Pay	Total Economic =Benefit
Judith	$3,535	$1,325	$4,860
Valley	1,667	852	2,519
Phillips	3,789	1,361	5,150
Total	$8,991	$3,538	$12,529

Source: BLM, 1990

Tourism is expected to continue to grow in importance in the regional economy as well as throughout the state. The outlook for the tourism industry is dependent on the health of the economy overall and on the region's ability to attract more visitors under increasingly-competitive conditions. More broadly speaking, the trade and services sectors, which the tourism industry feeds into, are expected to continue to provide stable levels of employment and personal income, with Lewistown, Glasgow and Malta serving as the major trade centers. But the trade and services sectors, in turn, depend on the economic vitality of the region's other major industries such as agriculture, mining and tourism.

Forest Products

The forest products industry in the planning area is relatively small. This industry is a source of outside income to the area with some timber processed locally at sawmills in Lewistown, Judith Gap, Roundup, Grass Range, Lodgepole, Hobson, Utica and Garneill and subsequently exported. However, most timber is processed at mills outside the planning area. In 1988, an estimated 17.7 million board feet (MMBF) were harvested from the six counties in the planning area. Most of this harvest comes from private land with some supply from U.S. Forest Service and BLM land.

BLM's productive forest land furnishes an annual cut of about 650,000 board feet on a sustained yield basis, but the actual harvest level may vary from year to year. Most of the BLM timber harvested in the planning area comes from Fergus County in the Judith RA, with the remainder harvested from the Phillips RA. In 1988, timber harvest attributable to BLM land totaled 300,000 board feet, less than 2% of the total timber harvest of the area.

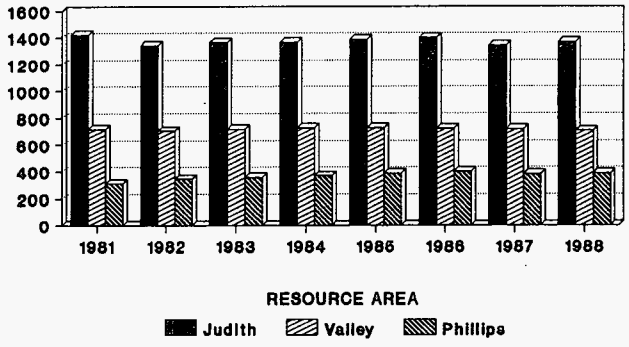
The value of timber products harvested in the planning area is estimated to be $3.8 million. This would generate $7.4 million in total regional economic activity, 142 jobs, and $1.6 million in additional earnings. The employment generated by the forest products industry represents about 1% of total employment in the planning area. Only a small portion of this economic activity, less than 2%, would be attributable to BLM land.

The value of BLM timber to local mills could increase if the general supply of available timber in the area decreases. Cutbacks in Forest Service timber harvest in the area could create a demand for larger BLM harvest levels to maintain the present wood products industry in the planning area.

Government

The government has provided a significant and stable portion of total employment and personal income in the planning area for the past 10 years. Excluding federal military employment, government employment currently comprises about 16% of total employment. Figure 3.13 shows federal civilian, state, and local government employment in the planning area from 1981 through 1988. In 1988, there was a total of 2,460 people employed in the civilian government sector.

FIGURE 3.13
Federal, State and Local Government Employment in the Planning Area
(1981-1988)



• EXCLUDING FEDERAL MILITARY
SOURCE: MT COUNTY DATA PACKAGE (1990)

BLM currently employs approximately 83 workers in three locations in the planning area: the Lewistown District Office, including the Judith RA; the Valley RA in Glasgow; and the Phillips RA in Malta. This level of employment comprises a relatively small portion, about 3%, of the total civilian government labor force in the planning area.

Direct expenditures by governmental units triggers secondary spending activity as described for the other major industries discussed in this section. Direct expenditures by BLM in the planning area are estimated to total $3.1 million annually. Included in these expenditures are salaries, building lease and maintenance, vehicle fuel and maintenance, contracting for local items, utilities, nonfire aircraft use, communication site rental and local purchases. These expenditures are estimated to account for $5.7 million in total economic activity, $1 million in earnings, and the equivalent of 152 jobs (including BLM employment) in the regional economy. Most of this economic activity would occur in the trade and services sectors. Table 3.30 summarizes these impacts.

TABLE 3.30
ECONOMIC ACTIVITY, EMPLOYMENT, AND EARNINGS ASSOCIATED WITH BLM EXPENDITURES IN THE PLANNING AREA ($1,000)

District/ Resource Area	Direct Expenditures	Total Economic Activity	Total Employment*	Total Earnings
Lewistown District*	$2,267	$4,174	51	$702
Phillips RA	491	904	11	194
Valley RA	328	604	7	130
Total	$3,086	$5,682	69	$1,026

*Total Employment does not include BLM employment. Including BLM, employment totals 152.

*Lewistown District Office includes the Judith Resource Area

Source: BLM, 1990. Business activity, employment and earnings were estimated using coefficients from the Montana BLM Economic/Demographic Model.

Fiscal Conditions

Revenue to the state, county, and local governments comes from a variety of sources, including transfers from federal and state government, property taxes, severance taxes, income taxes and a variety of fuel and license taxes. Generally, property taxes, severance taxes and federal transfer payments are the categories of revenue most likely to be affected by management actions in this RMP.

The federal government collects rents on nonproducing oil and gas leases situated on federal land and collects royalties on producing leases. Half of these payments are returned to the state and are used to help fund the school foundation program which provides funds for each public school district in the state. In fiscal year 1990, these rents and royalties totaled $2 million for oil and gas activities, half of which ($1 million) was returned to the state.

The federal government also makes payments in lieu of taxes (PILT) to counties that contain federal land. These payments, which are based on county population and federal acreage, are designed to compensate for the loss of property taxes that counties would earn if the land were in private ownership. In fiscal year 1990, PILT payments to the counties in the planning area was $1,048,637 (see Table 3.31).

TABLE 3.31
PAYMENT IN LIEU OF TAXES, STATE EQUALIZATION PAYMENTS, AND TAXABLE VALUATION FOR THE PLANNING AREA

County	Fiscal Year 1990 PILT	Fiscal Year 1989 SEP	Fiscal Year 1990 Taxable Valuation
Chouteau	$112,775	$78,084	$24,799,050
Fergus	344,478	0	20,698,105
Judith Basin	107,803	17,134	8,785,812
Petroleum	30,000	0	1,748,015
Phillips	138,660	0	19,533,004
Valley	314,921	5,877	26,269,360
Total	$1,048,637	$101,095	$101,833,346

PILT = Payments in Lieu of Taxes
SEP = State Equalization Payments
Phillips County Taxable Valuation is for 1991

Source: Division of Finance, BLM 1990
Department of State Lands, unpublished, 1990
Montana Department of Revenue Biennial Report 1986-1988
Phillips County Tax Assessor, unpublished, 1991

State Equalization Payments are paid by the state to counties when over 6% of the land area is state owned. Chouteau, Judith Basin, and Valley Counties receive these payments. In fiscal year 1989, these payments totaled $101,095 (see Table 3.31).

The state collects a variety of other taxes, virtually all of which are deposited into the state's general fund and subsequently allocated to governmental programs at the state, county and local levels, although the bulk of the revenues fund programs at the state level.

Property taxes are levied primarily by counties on both real and personal property. This includes a gross-proceeds tax on metal-mine production (e.g. gold and silver), a net-proceeds tax on new production of oil and gas and a net-proceeds tax on nonmetal-mine production (e.g. bentonite). In addition, the 1989 Legislature enacted HB28 which removed the net and gross valuation of oil and gas from the property tax base. Lost property taxes were replaced with flat tax gross proceeds and local government severance taxes. These taxes are the primary source of funding for local government and schools.

In all counties in the planning area taxable valuation of agricultural land, livestock production and farm machinery constituted a significant portion of the total taxable valuation; Petroleum 77%, Chouteau 67%, Fergus 44%, Judith Basin 44%, Phillips 35%, and Valley 27%. In Phillips County, hardrock mining (including gross proceeds) constituted a significant 20% of taxable valuation. Valley County's most significant source of taxable valuation came from utilities, comprising 41% of that county's total valuation. Fiscal year 1990 taxable valuation for all counties in the planning area appears in Table 3.31 (figures reported for Phillips County are fiscal year 1991).

Severance taxes are levied by the state on nonrenewable natural resources such as oil, gas, metal, and nonmetal production. Severance and license taxes levied by the state that would affect resources in the planning area include the Resource Indemnity Tax, Metalliferous Mines License Tax, Micaceous Mineral Mines License Tax, Oil and Gas Producers Privilege and License Tax, the Oil and Natural Gas Severance Tax. Most of the revenue from these sources accrues to state government, although a portion of the Metalliferous Mines License Tax is allocated to county governments.

Demographics

The population in 1988 was approximately 35,000 for the six-county planning area (see Table 3.32). The average population density was 1.6 persons per square mile, less than one-third of Montana's overall population density of 5.5 (U.S. Bureau of the Census). Sixteen incorporated communities are located in the planning area.

In 1988, the incorporated communities ranged in size from Lewistown (6,400), Glasgow (3,410), and Malta (2,480), to Winifred, which had a population of 140. The area's three largest communities contained approximately 35% of the planning area's total population. Overall, approximately 52% of the total population lived in incorporated communities.

TABLE 3.32
POPULATION 1940-1988
COUNTIES AND COMMUNITIES
IN THE PLANNING AREA

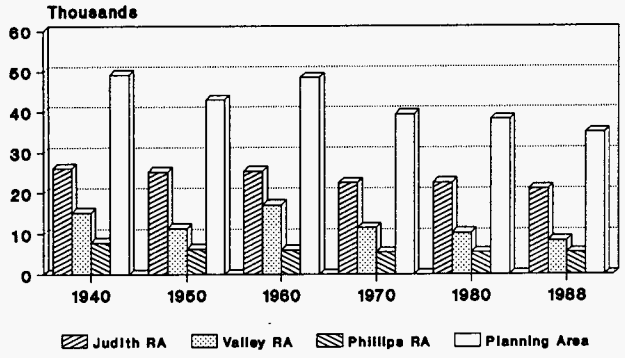
	1940	1950	1960	1970	1980	1988
Judith Resource Area						
Fergus County						
Lewistown*	_	_	7,400	6,440	7,100	6,400
Moore	_	_	210	220	230	190
Winifred	_	_	220	190	160	140
Grass Range	_	_	220	180	140	150
Denton	_	_	410	390	360	350
Other	_	_	5,560	5,190	7,990	4,870
Subtotal	14,040	14,020	14,020	12,610	13,080	12,100
Judith Basin County						
Stanford*	_	_	600	500	600	490
Hobson	_	_	200	190	260	290
Other	_	_	2,290	1,980	1,790	1,720
Subtotal	3,660	3,200	3,090	2,670	2,650	2,500
Petroleum County						
Winnett*	_	_	360	270	200	200
Other	_	_	530	410	460	400
Subtotal	1,080	1,030	890	680	660	600
Chouteau County						
Geraldine	_	_	360	370	300	250
Other	_	_	6,990	6,100	5,790	5,550
Subtotal	7,320	6,970	7,350	6,470	6,090	5,800
Total	26,100	25,220	25,350	22,430	22,480	21,000
Valley Resource Area						
Valley County						
Glasgow*	_	_	6,400	4,700	4,460	3,410
Opheim	_	_	460	310	210	170
Nashua	_	_	800	510	500	550
Fort Peck	_	_	_	_	_	250
Other	_	_	9,440	3,880	5,130	4,020
Total	15,200	11,400	17,100	11,500	10,300	8,400
Phillips Resource Area						
Phillips County						
Malta*	_	_	2,240	2,200	2,370	2,480
Saco	_	_	490	360	250	250
Dodson	_	_	310	200	160	180
Other	_	_	2,960	2,640	2,620	2,490
Total	7,900	6,300	6,000	5,400	5,400	5,400
JVP TOTAL	49,200	42,920	48,450	39,330	38,180	34,800

Note: * indicates community is a county seat.

Source: U.S. Bureau of the Census

The 1988 population reflects a pattern of steady decline since 1940, when approximately 49,200 people lived in the planning area. Between 1940 and 1950 the population declined by 13% to 42,900, then increased 13% to a level of 48,450 in 1960. The population declined approximately 3% between 1970 and 1980 and between 1980 and 1988 there was a decrease of approximately 9%. Approximately 29% fewer people lived in the planning area in 1988 than in 1940 (see Table 3.32 and Figure 3.14).

FIGURE 3.14
Population In The Planning and Resource Areas



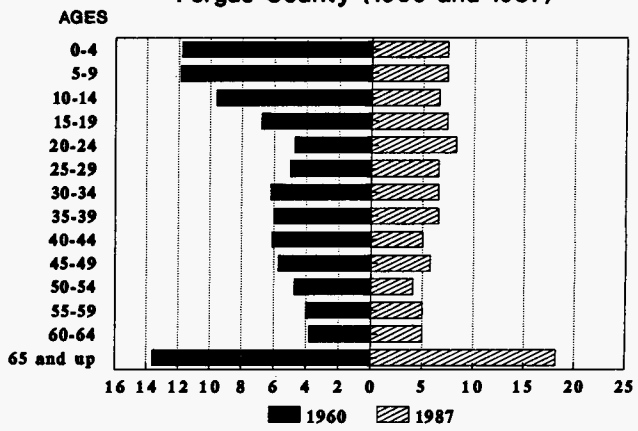
SOURCE: US CENSUS BUREAU

The population declines are due to people migrating from rather than into the area. Net migration rates between 1960 and 1987 indicate a population in each county except between the years 1970 and 1975 in Fergus, Judith Basin and Valley Counties. Because these are rural agricultural counties with minimal economic diversity, the net migration rates are more severe than for all of Montana.

Between 1970 and 1987, the loss of population in Valley County was greater than the loss for all other counties in the planning area combined. The changes in Valley County's population were mainly due to the opening (1958) and closing (beginning in 1968) of the Glasgow Air Force Base.

Age distribution for each county in the planning area for 1960, 1970, 1980, and 1987 indicate an aging population with decreasing numbers of people in the 0 through 19 age group, increases in the 20 through 39 age group, and large increases in the 65 plus age group. Patterns of age distribution are consistent for each county in the planning area and reflect state and national trends. Figure 3.15 represents the pattern of age distribution for Fergus County and is consistent with the patterns for the other counties in the planning area.

FIGURE 3.15
Population by Age
Fergus County (1960 and 1987)



SOURCE: US CENSUS BUREAU

The population in the planning area is predominately white, with a significant number of Native Americans living in Phillips and Valley Counties. A portion of the Fort Belknap Indian Reservation is located in Phillips County and a portion of the Fort Peck Indian Reservation is located in Valley County. The 1980 Native American population on Fort Belknap, which is mostly located in Blaine County, was 1,700.

In 1980, 378 Native Americans resided in Phillips County. This figure comprised 7% of Phillips County's population and represented a 40% increase from 1970. In Valley County, the 1980 Native American population was 927 or 9% of the total, up from 8% in 1970. Both Native American and white populations declined between 1970 and 1980 in Valley County, with the white population declining at a higher rate than the Native American population (U.S. Bureau of the Census).

The population of the planning area is expected to continue to decrease through the year 2005, due to outmigration primarily among young adults who leave for advanced education, military service and employment. Projections for Montana based on data for the period 1975 to 1986 indicate outmigration will reduce the state's population to 792,000 in 2005, a decline of 4% from the 1985 peak of 825,000. If the population of the planning area declines at a rate similar to the rest of Montana, total population in 2005 is expected to be between 33,000 and 34,000.

Other demographic trends anticipated for the nation, state and planning area in the next 15 years include an increasing population in the United States, migration from farm and ranch to towns due to farmer and rancher retirement and farm and ranch consolidation, an aging population, and increases in the number of households and in the disposable income/buying power per household in the state and nation.

TABLE 3.33
OBJECTIVE INDICATORS OF SOCIAL WELL-BEING

	Chouteau	Fergus	Judith Basin	Petroleum	Phillips	Valley	Montana	United States
Physicians per 100,000 population 1980[1]	32.8	114.7	0	0	37.3	78.0	127.1	173.7
Education levels, percent population completing at least 4 yr high school 1980[1]	76.7	72.5	74.4	71.9	66.0	72.8	74.4	66.5
Percent housing lacking some or all plumbing facilities 1980[1]	1.6	2.3	5.6	3.3	1.6	2.3	5.6	3.3
Per capita personal income 1986[2]	$14,604	$11,953	$11,555	$10,263	$11,278	$12,881	$12,385	NA
Median family income 1979[1]	$17,139	$15,297	$14,717	$12,277	$13,724	$17,270	$18,413	$19,917
Percent families below the poverty level 1979[1]	8.6	14.2	14.6	25.6	15.0	11.4	9.2	9.6
Percent population in the working age group 18-64 yrs old 1980[1]	57.6	55.5	55.3	58.1	55.3	56.5	59.8	60.6
Percent net migration 1980-1987[3]	-8.7	-8.9	-10.0	-10.7	-4.1	-21.1	-3.7	NA
Unemployment rate 1986[2]	6.6	8.8	5.3	4.5	7.5	8.0	8.1	NA
Crime rate per 100,000 population (major crimes) 1987[4]	1646.9	3174.4	856.4	NA	3478.1	2590.3	4270.8	NA
Marital termination rate (per 1000 population) 1986[5]	2.2	4.7	1.9	3.3	2.2	5.0	5.3	NA

NA = Not Available

Sources:
[1]County and City Data Book
[2]MT Economic Conditions 1988, MT Dept of Commerce, forthcoming
[3]Census and Economic Information Center, MT Dept of Commerce, 1988
[4]Crime in MT 1987 Annual Report, Criminal Justice Data Center of the MT Board of Crime Control August 1988
[5]Montana Vital Statistics 1986, MT Dept of Health and Environmental Sciences

SOCIAL CONDITIONS

Social Well-Being

Indicators of social well-being (see Table 3.33) present a mixed picture, suggesting the planning area possesses the positive and negative factors associated with rural areas. The counties are lacking some basic services; the number of physicians per 100,000 population is much lower than for the state and nation, education levels are lower in some counties than for the state; and the proportion of housing lacking some or all plumbing (a housing quality indicator) is higher in several of the counties than for the state. Per capita income (1986) and median family income (1980) are lower than for the state. The percent of families below the poverty level (1980) was higher in all of the counties, except Chouteau, than for the state and nation. Also, unemployment has been a historic problem resulting in a loss of people in the working age group (18 to 64 years). Outmigration from all planning area counties continues to occur at a rate much higher than for the state as a whole.

Positive factors include the area's remoteness and sparse population which result in freedom from many urban problems such as high crime rates and overcrowding. In addition, divorce and crime rates are low, recreational opportunities are plentiful and family ranch operations remain predominant.

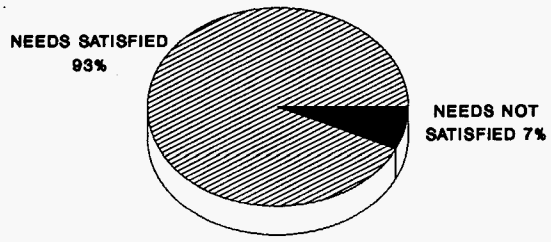
Many aspects of social well-being and local attitudes are not captured in reports on changes in employment or personal income. Often these qualities are referred to as intangibles, or subjective indicators of social well-being because they are difficult to quantify. However these qualities are part of what makes life pleasurable and worth living. These intangibles can include feeling a part of your community, close relationships with people, access to outdoor recreational opportunities, having a sense that you and people in your community have control over the

decisions that affect your future, feeling confident that your children will get a fair start in life, etc.

Discussions held with planning area residents indicate these people feel their important lifestyle needs are being met (see Figure 3.16). However, these discussions also showed an ambivalence about the future, including health of the economy and level of employment, maintenance of present lifestyles, and concern about impacts to the environment.

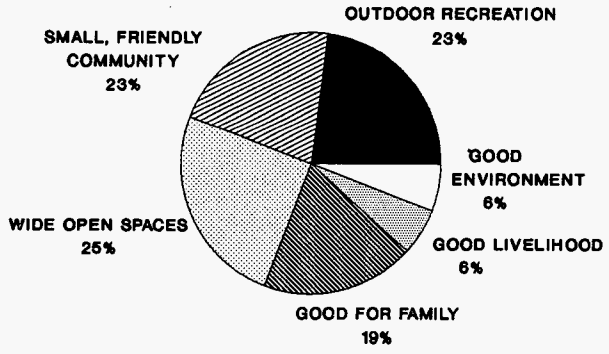
Objective indicators of social well-being for the Fort Belknap Indian Reservation, which is adjacent to the planning area and directly north of the Little Rocky Mountains, indicate much higher levels of poverty and unemployment than for the planning area. There is concern on the reservation about mining in the Little Rocky Mountains. This is further discussed in the issue specific attitude information.

FIGURE 3.16
Perceptions of Lifestyle Needs
Planning Area Discussion Participants



NEEDS SATISFIED/NEEDS UNSATISFIED

SOURCE: BLM, 1989 (N=57)



SOURCE: BLM, 1989 (N=57)
LIFESTYLE NEEDS IDENTIFIED BY DISCUSSION PARTICIPANTS AND SATISFIED BY THE AREA

Social Trends

These recreation related social trends are anticipated for the nation, state and the planning area: there will be a long-term increase in recreation demands on BLM land; the types of recreation desired will change due to the aging population; state and national populations will have increased leisure time; and tourism, vacationing and travel will grow nationally.

Trends related to providing services will include changes in the types of public and private services required with aging populations in the planning area, state and nation, and decreases in the tax base to support planning area and state public services.

A trend that could affect attitudes is the increasing education levels in the state and nation. In addition, increasing concern about the effects of resource related activities on the environment and on recreational opportunities will be become more evident among the general public, the media and regional and national politicians.

Regional Attitudes

This information is based on two surveys conducted among Montana residents: Natural Resource Development in Montana, Susan Selig Wallwork and Maxine Johnson, Bureau of Business and Economic Research, University of Montana, 1986; and Montana Futures: 1984 Update, Department of Sociology, University of Montana, 1984. The former study surveyed a random sample of 624 adult Montanans in November of 1985. The latter study surveyed a random sample of 400 adult Montanans in early, 1984.

The following information is summarized from Natural Resource Development in Montana. Nearly two-thirds of the respondents indicated natural resource development, in general, to be very essential to the state's future economic health. Nearly half indicated the pace of development was about right; slightly over one-third indicated the pace or level of development was too slow or too low. The primary advantages or benefits associated with natural resource development are jobs and income, help to state and local economy, tax revenues and providing needed products. The primary costs or disadvantages associated with natural resource development include environmental impacts, pollution, poor reclamation, population growth and boomtown and boom and bust cycles. About three-fifths of the respondents saw little or no conflict between natural resource development and outdoor recreation while one-quarter felt the two activities did conflict. Respondents were also asked what activities should be allowed on government lands other than areas adjacent to national parks and wilderness areas. Most respondents felt these activities should be allowed on government lands: timber cutting (85%), oil and gas extraction (83%), coal mining

(78%), and hardrock mining (79%). Other respondents felt these activities should be prohibited on government lands; timber cutting (11%), oil and gas extraction (12%), coal mining (17%), and hardrock mining (15%).

This survey also asked specific questions about oil and gas leasing and development. About half of the respondents felt oil and gas development to be very essential to the state's future economic health, with this number being higher in the eastern part of the state. Another one-third of the respondents indicated oil and gas development was fairly essential. About two-fifths felt the pace of development was about right, with nearly an equal number indicating the pace of development was too slow. Nearly half of the respondents indicated the state of the industry was static, one-fifth said it was thriving and successful and another fifth said it was unhealthy and declining. Respondents from the eastern part of the state were more likely to say the industry was unhealthy and declining. Nearly three-fourths of the respondents said they had a favorable impression of the industry. About two-fifths of the respondents rated industry as excellent or pretty good in its behavior as a responsible citizen of the state. Another two-fifths rated the industry as only fair or poor in its behavior as a responsible state citizen.

The survey also asked specific questions about hardrock mining. A little less than one-third of the respondents felt hardrock mining to be very essential to the state's future economic health, with this number being higher in the western part of the state. Another two-fifths indicated hardrock mining was fairly essential. About one-third felt the pace of development was about right, with nearly an equal number indicating the pace of development was too slow. One-third of the respondents indicated the state of the industry was static, while two-fifths indicated it was unhealthy and declining. Respondents from the western part of the state were more likely to say the industry was unhealthy and declining. About half of the respondents said they had a favorable impression of the industry; about one-fourth indicated they had an unfavorable impression. One-fourth of the respondents rated industry as excellent or pretty good in its behavior as a responsible citizen of the state. Two-fifths rated industry as only fair or poor in its behavior as a responsible state citizen.

The Montana Futures: Update 1984 survey is directed at attitudes toward state government. However, some of these issues also have implications for federal land management. When asked to rank 40 issues as important for state government, the following issues with implications for the RMP emerged; economic development (rated as issue number 5), the environment (issue number 6), government spending (7), utilities-energy (8.5), water issues (10), agriculture-ranching (11), government inefficiency (12), mining (20), land issues (23), tourism (31.5) and game animals (38).

A large majority of the respondents believe the state government should do more to regulate energy exploration (67%), enforce environmental regulations (68%) and manage natural resources (79%). A much smaller proportion of Montanans believe state government should do less to regulate energy exploration (26%), enforce environmental regulations (24%), and manage natural resources (14%). Nearly four-fifths of the respondents believe federal lands within Montana should be subject to state environmental and leasing laws with only 13% disagreeing. Two-thirds of Montanans believe environmental pollution is a significant problem in the state, while the other one-third believes it is not a significant problem. Over half of the respondents believe the state needs more laws to protect the environment; two-fifths believe more laws are not needed.

Respondents were asked if they believed that most industries could be trusted to follow good environmental practices without state regulation. Four-fifths said no while less than one-fifth said yes.

This survey also asked questions about land use. Almost all of the respondents indicated development can take place without degrading the environment. Nearly three-fifths believe protecting the environment is more important than economic development. Montanans split over whether economic benefits should determine land use; 50% agree and 46% disagree.

In indicating priorities for water use in Montana, agricultural use ranks highest with nearly three-fourths of the respondents ranking it high and nearly all respondents ranking it either high or moderate. Other highly ranked uses include residential use (53% high priority), fish and wildlife (53% high priority), industrial use (22% high priority), and recreation (22% high priority). The lowest priority ranking was water for mining, with only 14% rating mining as a high priority use.

In asking about access, one question asked if public access across private lands to public lands for recreational purposes should be required. Half of the respondents indicated yes and two-fifths indicated no.

PLANNING AREA ANALYSIS

This information is based on 70 discussions with over 85 planning area residents. The discussions were conducted by BLM employees in April, 1989. This information offers an indication of how planning area residents perceive public lands and the issues. Discussion participants represent a cross section of people from Valley, Phillips, Fergus and Petroleum Counties, with various occupations and time spent in the planning area.

The occupations of discussion participants were business (25 discussion participants), insurance and banking (2),

newspaper (2), military (1), homemakers (8), local government (6), professional services (6), other services (5), education (6), students (7), agriculture (15), outfitters (3), and elected officials (6). Some discussion participants identified themselves with more than one occupation (e.g. agriculture and outfitting) and 11 of the participants were BLM livestock grazing permittees.

About 40% of the discussion participants lived in the area all their life while about 18% had lived in the area less than 5 years. Another 13% had lived in the area 6 to 10 years, 16% 10 to 25 years and 15% 25 years or more, but not all their life. About 30% of the discussion participants were in the 36 to 45 age group, with 35% 35 or under and 35% 46 or older.

Lewistown and the Judith Resource Area

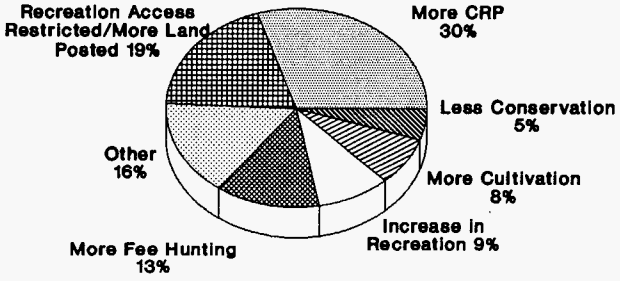
Judith RA discussion participants describe Lewistown as a stable, off-the-beaten-path, low key community with a large proportion of retired citizens. Recreation (hunting and fishing) is very important to many residents. People feel the area is a good place to live, and most indicate their personal lifestyle needs are met. These needs include access to outdoor recreation activities, easy access to the surrounding area, good environment, a small and friendly community, and good schools and activities for kids. Discussion participants varied in their observations of the changes that have occurred in Lewistown in the past 10 years. Some people indicated the area was pretty stable or had not changed much with comments such as: "retirees stabilize the community, stable except for agriculture which is hurting, lost a few businesses but others came in, and not much change socially or politically." Other people indicated the Lewistown economy has improved recently due to agriculture and mining activities and a few residents indicated Lewistown was going downhill.

Expectations of future community trends (next 10 to 20 years) varied from "a lot of potential for growth" to "no growth anticipated." The "no growth" scenario was suggested by the majority of the discussion participants with some people indicating Lewistown does not need to grow. Other people indicated there was potential for growth in Lewistown and cited the Midgetman Missile System, agriculture, relocation by retirees and tourism as offering possibilities for growth. A few people expect the community to slowly decline due to the poor transportation network and local business not being competitive.

Economics and related problems were cited by residents as the major problems facing Lewistown. Specific concerns include the poor economy and lack of jobs; the young leaving the area due to lack of opportunities; the aging population with a high requirement for special services; problems with funding public services such as schools, roads and water; possible loss of the air service; and keeping businesses here in the community. Problems cited by other communities in the area such as Winnett, Moore and Winifred include subdivisions, consolidation of schools and funding for services such as schools.

Changes in land use in the past decade perceived by discussion participants included more private land being posted and more cultivation. The majority of people indicated that more private land was being posted; some added that the closed land was leased for hunting (fee hunting). Other comments included "more rural subdivisions or play farms, less concern for conservation practices such as erosion and weed control, ORVs are causing erosion, mining has increased, Conservation Reserve Program (CRP) has changed some land use, and out-of-staters buy land and close it to the public" (see Figure 3.17).

FIGURE 3.17
Perception of Land Use Changes:1979-1989
Planning Area Discussion Participants



SOURCE: BLM, 1989 (n=77)

Glasgow and the Valley Resource Area

Valley County discussion participants describe Glasgow as a small, rural, agricultural community with a declining population and a history of boom and bust development. The boom and bust development refers to the building of Fort Peck in the 1930s and the development and subsequent closure of the Glasgow Air Force Base in the 1950s and 1960s. Residents felt that Glasgow and Valley County is a good place to live and most indicated that their personal lifestyle needs are being met. These personal lifestyle needs include good people, a small close-knit community, an uncrowded area with natural beauty, a good place to raise children, plentiful outdoor recreation opportunities and wide open spaces.

Discussion participants indicated the major change in Glasgow in the past decade was the continued outmigration of people due to the poor economy. In addition to this initial assessment, the following comments were made by some people: "many people in the 25 to 40 year old age group have left, accelerating the population aging trend; farms

and ranches are getting bigger, resulting in the loss of the farm population; Glasgow businesses are having a difficult time because of the population loss; and schools and other services are stretched to the limit because of the declining tax dollars."

Expectations of future community trends (next 10 to 20 years) varied from anticipating "slow growth" to "will hold own" to "will continue to decline." The latter two possibilities were cited by the majority of the people. Many people indicated Glasgow's future depends upon what happens with the Glasgow Air Force Base (i.e., the success of the St. Marie Retirement Village, or other possibilities) and/or agriculture.

Economic problems were cited by all the discussion participants as the major problem facing the community. Other related comments include: "a lack of jobs which causes the young people and sometimes whole families to move; low wages which make it difficult to support a family; declining tax revenues with an infrastructure designed for a larger community; and the loss in the variety of businesses because of the dwindling population and shopping elsewhere by those who remain." A few people mentioned the drought and that the community needs the agricultural base to survive.

Changes in land use that have occurred in the past decade include land placed in the CRP and access for recreation becoming more restricted. Most discussion participants identified land being placed in CRP as the major land use change and further commented that there is a weed problem connected with CRP. CRP has hurt implement dealers as well as other businesses because those who put their land in the program do not remain in the community. Comments regarding CRP generally described it in a negative light. Comments referring to changes in access were made by many people. These comments included: "landowners are dissatisfied with hunters, more landowners are restricting access for hunting to their private land, fee hunting is being discussed and landowners may turn to fee hunting in the future for economic reasons, and access to public land across private land is restricted" (see Figure 3.17).

Malta and the Phillips Resource Area

Phillips County discussion participants describe Malta as a small, friendly, rural, cooperative community with an agricultural base. Although Malta is a progressive community with a good business climate, young people find it difficult to stay here because of the lack of employment opportunities. Malta has an increasing number of elderly people because people retire here due to the medical facilities and housing. All of the discussion participants felt Malta and Phillips County is a good place to live and that their personal lifestyle needs are met. Qualities people like about Malta are the small schools where students get lots of attention, the progressive community, the size, the recreation such as hunting and fishing, the ruralness of the area, friendliness, easy-going lifestyle, good people, community orientation and safety. Drawbacks to Malta include its isolation, lack of commercial transportation, limited goods and services and economic problems such as low incomes.

The changes in Malta in the past 10 years, as described by discussion participants, were varied. The most common comments were: "lost the bentonite plant, mining development in Zortman started and helped the community, the population is aging, and people left, primarily the young." Comments related to community economics/ businesses were: "the economy has tightened/is more depressed, business has decreased, and debts are higher."

Expectations of future community trends (next 10 to 20 years) varied with the most common comment being "does not see a lot of change." Other comments included: "agriculture will stabilize, this will help the whole economy; mining will continue, this will pick up the slack; and tourism and hunting will increase." Several people offered conditional comments such as: "the stability of the community depends on what happens to agriculture and light industry; and the future of Malta is tied to mining, when the mines close people will leave and the tax base and schools will suffer."

General economic problems were the most common comment about major problems facing the community. Additional comments made by those who cited economic problems included: "economy fluctuates with agriculture; economy is not diversified, too dependent upon mining; and no jobs." Comments offered by other people were economic related: "the population is aging because young people are leaving, high taxes, tax base too small, and problems with funding for schools and other services."

The major theme that emerged in describing changes in land use that have occurred in the last decade was land being put in CRP. In regard to CRP, people also indicated: "CRP has paid off a lot of debts, financially, it is silly to farm; and CRP has brought money into Malta but eventually it will hurt businesses." Some people felt positive overall regarding CRP while others felt negative. Other land use changes identified include: "problems with access/land posted, increasing numbers of out-of-town hunters/sportsmen, a lot of range was broken up, and increased recreation use of public and private lands" (see Figure 3.17).

Planning Area Attitudes About BLM Land Management and Issues

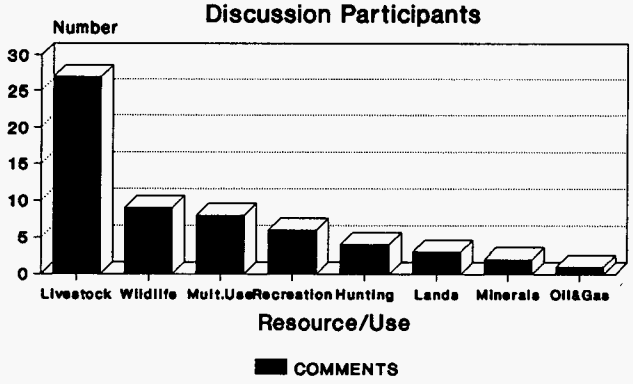
Most participants felt BLM decisions affect the area and many saw the effects in economic terms.

Just under half of the discussion participants had a problem identifying BLM land on the ground; this was more of a problem in the Phillips and Valley RAs than in the Judith RA. This occurred because BLM land is similar to adjoining lands, the broken land pattern makes it difficult to tell where you are and areas are not well marked. This inability to identify land on the ground contributes to access problems. Discussion participants suggested a variety of ways to enhance the ability of the public to identify land on the ground, including better maps and signing, advertise that BLM has maps and clearly define public roads.

Nearly all the discussion participants indicated there would be increases in demand for BLM land and resources in the future. Recreation was identified as the activity where demand would increase the most.

People see the following as the most important uses of BLM land: livestock grazing (27 discussion participants), wildlife (9), multiple use (8), recreation (6), hunting (4), the lands (3), mining/minerals (2) and oil and gas (1) (see Figure 3.18).

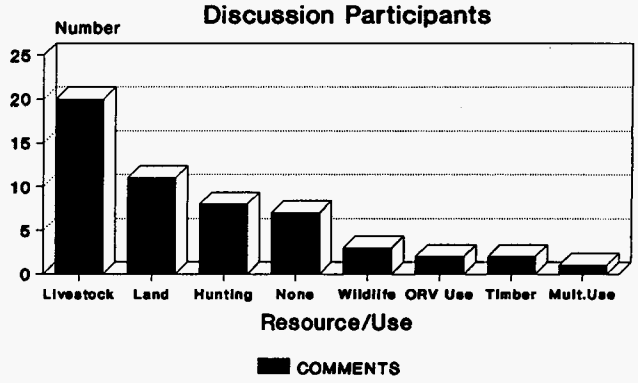
FIGURE 3.18
Important Uses/Resources on BLM Land
As Perceived by Planning Area
Discussion Participants



SOURCE: BLM, 1989 (N=54)

People see the following as the most threatened use on public lands: grazing because of outside pressure, there is a misconception that the land is overgrazed, or pressure from recreationists (20 discussion participants), the land itself from overgrazing and erosion (11), access for hunting (8), no threats (7), wildlife habitat (3), timber because of poor management (2), ORV use (2), and multiple use (1) (see Figure 3.19).

FIGURE 3.19
Threatened Uses/Resources on BLM Land
As Perceived by Planning Area
Discussion Participants



SOURCE: BLM INTERVIEWS, 1989; (N=54)

Discussion participants felt BLM should consider the following information during its planning effort: local concern about more rules and regulations and change coming from the outside; need to increase on-the-ground presence if recreation opportunities are enhanced; need to resolve access problems between landowners and recreationists; and need to take advantage of opportunities for improved public relations and education.

Land Acquisition and Disposal

Forty-four discussion participants discussed land acquisition and disposal. Nearly half indicated BLM land should be blocked up to make lands more manageable and policeable, and/or to block up scenic lands for recreation and wildlife habitat. About one-quarter of the people indicated recreation lands should be retained and/or acquired, and that acquisition and disposal should be used to acquire access. Some felt small tracts should be sold or disposed of and a few people said lands should be left in private ownership. Comments on the exchange process itself included: "actions should benefit the public, simplify things for permittees who wish to acquire tracts, drive a hard bargain and consider lessees when selling grazing lands."

Access to BLM Land

Fifty-seven discussion participants discussed access. The majority of those who identified themselves as hunters felt that there was an access problem, while only one-third of the non-hunters felt access was a problem. Permittees identified access as a problem, although from their point of view, it was the problems involved with allowing access across their private land. Access appears to primarily affect hunting access for people who are not long time residents of

the area. This seems particularly strong for the Valley and Judith RAs. In Phillips County fewer hunters who had been in the area less than 20 years thought access was a problem and a larger percentage of non-hunters and long time residents identified access as a problem.

Some of the hunters felt that landowners were blocking access to public land for personal gain through fee hunting. Many people had a concern that fee hunting would increase in the future. The effect of fee hunting on many of these hunters would include closing private land to hunting and the increasing pressure on public land. There is a fear that access to public land will be reduced by landowners who lease their private land for fee hunting. Landowner views of fee hunting did not emerge in great detail, although some people did indicate the economic attraction of fee hunting on their property.

Discussion participants also indicated that BLM should direct attention toward educating the public. This could help resolve access problems between landowners and recreationists. Access was one area where BLM could help solve local problems by acting as an intermediary between recreationists and landowners.

Another point which was brought up in the Judith RA was the importance of hunting and fishing to people who seek employment in this area.

Off-Road Vehicle Designations

Fifty-one discussion participants discussed ORV use. The majority of those who commented were hunters. There does not appear to be much actual ORV use (motorcycles, ATVs, etc.). Most off-road use is associated with hunting and involves driving ridges looking for game or retrieving big game. About half of the people felt ORV use was a problem, the other half felt things were all right. People saw the need for ORV limitations. These limitations could include closing areas or designating areas for a particular use.

Some people felt ORV use is not currently a problem, but could become one if future use increases. Problems identified with ORV use include erosion, too much use of ATVs and motorcycles in campgrounds, and extensive use causing some private landowners to close land. Problems during the hunting season include some hunters disturb others, and people drive everywhere and harass or scare wildlife.

Oil and Gas Leasing and Development

Thirty-eight discussion participants discussed this issue. Most of these people favored development with some indicating guidelines should be followed and environmental damage controlled. Some people indicated the economic implications to local communities were important and positive. A few people indicated regulations and inspections should be strictly enforced or made stricter while others indicated paperwork and rules associated with leasing are burdensome.

Hardrock Mining

Forty-three discussion participants discussed this issue. Not surprisingly, fewer comments were received from the Valley RA, where no mining is currently occurring, than from the Phillips and Judith RAs, where mining is currently occurring. The vast majority were positive toward mineral exploration and development giving such comments as: "development should be encouraged and development is economically important." A few people were opposed to mining because of environmental problems. Comments on the company currently operating at Zortman in the Little Rocky Mountains were positive.

Many people offered specific mining suggestions such as: "control to protect and reclaim land." Participants identified these concerns with mining: "use of mining claims for other purposes such as real estate, toxic waste and heavy metal run-off, visual effects and the environment in general."

Members of the Fort Belknap Indian Reservation are concerned about mining in the Little Rocky Mountains. Their concerns include potential impacts to water quality and quantity; reservation resident's health; Native American cultural, religious and social practices; wildlife including fisheries; and air quality. Potential escape of cyanide solution from mine sites is a particular concern.

Riparian and Wetland Management of Watersheds

Thirty-four discussion participants discussed this issue. The majority of comments were management suggestions. These included: "manage and enhance for watershed and wildlife, do not hurt agriculture, build reservoirs and holding areas, need more management to get the maximum use of the water, and need more wetlands." One point of view expressed repeatedly was that any change in grazing privileges (i.e. change in season of use or fencing riparian areas) is seen as only the beginning in the eventual removal of livestock from public lands, and that the impetus for this will come from outside the planning area.

Elk and Bighorn Sheep Habitat Management

Forty-nine discussion participants discussed this issue. The most frequently mentioned comment on the current situation

was that elk are causing problems; many of these residents were from Valley County. The majority of the people favored species reintroduction or expansion as a general concept or for a specific species such as elk, sheep, bald eagle or falcon. Comments negative to expansion and reintroduction were usually species specific, such as "no to bald eagles, elk or wolves." Other management suggestions included: "work closely with local communities, and do not get too upset if reintroduced species accidentally get trapped or killed." Several people expressed the point of view that it is not species reintroduction that is opposed, but all the rules and regulations that accompany reintroduction.

Prairie Dog and Black-Footed Ferret Management

Forty-six discussion participants discussed prairie dogs and black-footed ferrets. Over half of these people discussed control or management of prairie dog towns with suggestions ranging from total eradication to the use of ferrets and other predators to help control prairie dog populations. Prairie dog shooting, either as a control measure or for recreation, was discussed by over one-third of the people. Almost all of these people favored the idea. In the planning area, reintroduction of the black-footed ferret was favored by about one-quarter of the discussion participants and opposed by about the same proportion.

Of the ranchers with a BLM grazing permit, all favored control of prairie dogs. Many of these permittees had a prairie dog town on their private land or on BLM land adjacent to their private land.

Attitudes differed by resource area. People in Valley and Phillips RAs were generally opposed to reintroduction of the black-footed ferret, while the Judith RA had many more people in favor of reintroduction. Those who discussed prairie dogs in the Judith RA were a much smaller proportion of the whole than in the Phillips and Valley RAs. Those people residing in Phillips and Valley counties tend to be more strongly in favor of prairie dog control or eradication and recreational shooting.

Additional discussions were held in July through October, 1990, with ranchers who have private and/or permitted BLM grazing land included in the proposed black-footed ferret reintroduction area. The most frequently mentioned concerns were: "control of prairie dogs, loss of AUMs and the cost of the project." Many discussion participants were skeptical about the government and government projects and wanted to see guarantees or legal documents before agreeing to the reintroduction of the ferret. An associated concern was restrictions being placed on ranch operations if the project is implemented. Some ranchers indicated they were not so much concerned about the ferrets themselves, but about restrictions they feel would accompany ferret reintroduction. It was felt these restrictions could affect the value of private land near the reintroduction area. Concern about the effects to the ranching way of life from outside interference such as environmental groups was also evident.

Areas With Special Management Concerns

Thirty-six discussion participants discussed areas of critical environmental concern. Nearly half indicated ACEC designation, in general, was a good idea for: "sensitive areas, winter grazing for elk, to protect the land and to protect the land for future generations." Some approved of designation with the following reservations: "do not acquire new land, designate only for unusual lands, consider local input, and emphasize the homestead era rather than prehistoric sites." Azure Cave was the specific area receiving the most discussion. Most wanted access into the cave. Comments about the effects of special designations included: "these designations can have an adverse effect on traditional economics and sometimes when an area is designated for special use it becomes so crowded that no one can enjoy it."

SUMMARY

This planning area is rural, sparsely populated, with an agricultural based lifestyle. Residents have indicted a willingness to forego amenities found in many more urban environments, such as more available medical care, higher income, higher employment levels and better housing quality, to pursue what they consider a high quality of life. The area experiences a low crime rate, few social problems and plentiful and noncrowded outdoor recreation opportunities.

While regional and planning area residents feel this way of life is desirable, they observe with real concern the rate at which the population is outmigrating from the planning area and the lack of opportunity for jobs. These values and concerns lead to conflicts in resource issues. Generally, residents are in favor of economic growth through resource development or other industry because it would provide employment for them or their children and would promote overall economic well-being. On the other hand, they wish to continue to enjoy the outdoor recreational opportunities associated with sparse population and a largely pristine environment.